

Annexure 5 (Part of Section 6 – Works Requirement)

Technical Specifications for Various Works to be followed in the project duration including Works in Post Construction Period , by the Selected Bidder

1. QUALITY STANDARDS AND CONTROL

1.1. PRODUCTS AND EXECUTION

1.1.1. INCOMPLETE DOCUMENTATION

- Where and to an extent that products are not fully documented they should be:
 - of standard appropriate to the nature and character of that part of works where they will be used;
 - suitable for the purpose stated or reasonably to be inferred from the project documents;
- Omissions or errors in description or quantity shall not vitiate the Contract nor release the Contractor from any obligations or liabilities.

1.1.2. INSTALLER QUALIFICATIONS & SKILLS

- Operatives should be appropriately skilled and experienced for the type and quality of work.
- Operatives should be able to produce evidence of their qualifications when requested.

1.1.3. PRODUCTS

- Products should be new and unused, properly wrapped, boxed and shipped to site (and approved by the Client/Client's representative);
- Supply of the product should be from the same source or manufacturer;
- Whole quantity of the product should be of consistent kind, size, quality and overall appearance;
- Where critical, measure a sufficient quantity to determine compliance;
- Deterioration should be prevented during the lifecycle of the project, products should be ordered in suitable quantities to a programme and used in appropriate sequence.

1.1.4. EXECUTION

- Generally fix, lay, apply, install products securely, accurately, plumb, neatly and in specified alignment;
- Do not use different colour batches where they can be seen together;
- Check on-site dimensions;
- Finished work should be free of defects, not damaged, disfigured, dirty, and faulty or out of tolerance;
- Adjust joints open to views so they are even and regular.

1.1.5. PROTECTION

- The Contractor shall exercise extreme care in the execution of his work, will provide all necessary safeguards and exercise caution against injury or defacement of existing site. He will ensure that his works in no way shall adversely affect the work of others or adjoining properties;
- The Contractor/Landscape Contractor will prevent vehicles of any kind from passing over sidewalks, curbs, etc., unless adequate protection is provided. If

any damage to existing roads or kerbs occurred, they shall be rectified immediately by the contractor at his own cost to the original or better condition;

- The Contractor/Landscape Contractor is responsible for any damages resulting from hard landscape operations, and will repair all damages and return the area to its previous condition at his own expense.

1.1.6. COMPLIANCE

- Proprietary specifications should be followed;
- Evidence that the proprietary product specified has been supplied and used on site should be retained by Contractor;
- Should specified product being not available, notify the Client's Representative with both available substitution and reasonable explanation for approval of Client's Representative.

1.1.7. INSPECTIONS

- Notify Client's Representative in writing 2 days in advance when reasonable sections of the following stages are ready for inspection on the works quality. Obtain confirmation from Client's Representative before proceeding to next stage. Inspections should be done at the following stages:
 - Delivery of each shipment of materials to site,
 - After spreading and levelling site area,
 - After setting out of trees, planting beds and any additional features,
 - After completion of tree planting pits,
 - At the time of initial installation of trees,
 - Mock-up of paving/edging/other hardscape elements,
 - After completion of all hardscape elements installation,
 - At ready for Substantial Completion inspection,
 - At completion of every three-months of maintenance period.
- Inspection or any other action must not be taken as approval unless confirmed in writing. Written statement should include:
 - Date of the inspection,
 - Part of the work inspected,
 - Characteristics which are approved,
 - Extent and purpose of the approval,
 - Any associated conditions.

1.1.8. RELATED OR NEW WORK

- Provide all traders with necessary details of related types of work;
- Before commencing new type/section of work ensure previous work is:
 - Appropriately complete,
 - In accordance with project documents,
 - To suitable standard,
 - In suitable condition to receive new work,
- Ensure all necessary preparatory work has been carried out.

1.1.9. MANUFACTURERS RECOMMENDATIONS/INSTRUCTIONS

- Always comply with manufacturers printed recommendations and instructions current on the date of the invitation to tender;
 - If there are any changes to recommendations or instructions – submit details to Clients Representative prior to ordering for approval.
- 1.2. SAMPLES AND APPROVALS
- 1.2.1. GENERAL
- Products or installations should comply with all specification requirements and in respect of the stated or implied characteristics to match a sample expressly approved as a standard for the purpose.
- 1.2.2. APPROVAL OF PRODUCTS
- Submissions, samples, inspections and tests should be undertaken and arranged to suit the Works programme;
 - Do not confirm orders or use the product until approval of the sample has been obtained;
 - Approved sample should be retained in good, clean condition on site. Remove when no longer required.
- 1.2.3. APPROVAL OF EXECUTION
- Submissions, samples, inspections and tests should be undertaken and arranged to suit the Works programme;
 - Do not conceal, or proceed with affected work until compliance with requirements is confirmed.
- 1.2.4. SETTING OUT/ACCURACY
- If tolerances and dimensions likely to be critical to execution or difficult to achieve proposal or site inspection of the appearance should be arranged for as early as possible;
 - General tolerances (maximum) should comply with approved local standards.
- 1.3. WORK RELATED TO OR AROUND SERVICES
- 1.3.1. COMPLIANCE WITH REGULATIONS
- Work related to or around any existing or new services should comply with the Bylaws and Regulations of the relevant statutory authority;
 - Any relevant documentation required to start the work or at the completion to be submitted to relevant statutory authorities. This should be included in Detailed Programme of Work;
 - Site organisation staff must include one or more persons with appropriate knowledge and experience of mechanical and electrical engineering services to ensure compatibility between engineering and the Works generally;
 - Submit when requested CVs or other documentary evidence relating to the staff concerned;
 - If you have read this document please contact the Clients Representative.
- 1.4. SUPERVISION/INSPECTION/DEFECTIVE WORK
- 1.4.1. KICK-OFF MEETING
- Prior to commencing work, the Contractor/Landscape Contractor will meet the PMC and all other concerned parties on the site to review the work under this section. The Contractor/Landscape Contractor will request this meeting in writing one (1) week prior to the desired meeting time;

- The meeting will define the scope of work of the Contractor/Landscape Contractor, and also identify all key stakeholders involved in the overall site works;
- The sequence and schedule for Hardscape Works, key contacts and communication protocol shall be discussed;
- Contractor to highlight if any additional information is required by him prior to commencement of works.

1.4.2. SUPERVISION

- In addition to the constant management and supervision of the Works provided by the Contractor's person in charge, all significant types of work must be under the close control of competent site supervisors to ensure maintenance of satisfactory quality and progress. C.V's of proposed Works Superintendent and Site Supervisors with their documented experience to be submitted with Tender documents;
- Replacement of the person in charge on site should be notified to the Client/Client's representative minimum one week in advance and approval in writing received prior to replacement of said person.

1.4.3. OVERTIME WORKING

- Overtime work shall be planned in advance with due consultation of the Client's Representative. Prior to overtime being worked, submit details of times, types and locations of work to be done for approval. Minimum one week notice is required;
- If works have been executed during overtime for which notice has not been given, it may be required to be opened up for inspection and reinstated at the Contractor's expense.

1.4.4. DEFECTS IN EXISTING WORK

- When defects discovered, immediately give notice. Do not proceed with affected related work until response from the Clients Representative has been received;
- Documented remedial work. Do not execute work which may
 - hinder access to defective products or work;
 - be rendered abortive by remedial work.

1.4.5. ACCESS FOR INSPECTION

- Before removing scaffolding or other facilities for access, give notice of not less than 48 hours.

1.4.6. TESTS AND INSPECTIONS

- Agree and record dates and times of tests and inspections to enable all affected parties to be represented;
- Confirm each test or inspection minimum 2 days in advance. If sample or test is not ready, agree a new date and time;
- Always submit a copy of test certificates to Clients Representative upon receipt and retain copies on site.

1.4.7. RECTIFICATION OF DEFECTIVE PRODUCTS/ EXECUTIONS

- Immediately after any execution or product is known, or appears, to be not in accordance with the Contract, submit proposals for opening up, inspection,

testing, making good, adjustment of the Contract Sum, or removal and re-execution of works;

- Such proposals may be unacceptable and contrary instructions may be issued.

1.4.8. MEASURES TO ESTABLISH ACCEPTABILITY

- Wherever inspection or testing shows that the work, materials or goods are not in accordance with the contract and measures (e.g. testing, opening up, experimental making good) are taken to help in establishing whether or not the work is acceptable, such measures:
 - **Will** be at the expense of the Contractor;
 - **Will not** be considered as grounds for extension of time.

1.4.9. QUALITY CONTROL

- Establish and maintain procedures to ensure that the Works, including the work of subcontractors, comply with specified requirements;
- Maintain full records, keep copies on site for inspection, and submit copies on request;
- Records should include:
 - Identification of the element, item, batch or lot including location in the Project Works,
 - Nature and dates of inspections, tests and approvals,
 - Nature and extent of non-conforming work found,
 - Details of corrective action.

1.5. WORK AT OR AFTER COMPLETION

1.5.1. WORK BEFORE COMPLETION

- Make good (correct/repair) all damage consequent upon the Works;
- Remove all temporary markings, coverings and protective wrappings unless otherwise instructed,
- Clean work site, thoroughly inside and out, including all accessible ducts and voids. Remove all splashes deposits, efflorescence, rubbish and surplus materials,
- Cleaning materials and methods for proprietary products should follow recommendations by manufacturers of products being cleaned, and must not damage or disfigure other materials or construction,
- Substances hazardous to health information sheets to be obtain for all materials used for cleaning and ensure they are used only as recommended by their manufacturers,
- For minor faults - touch up in newly painted work, carefully matching colour and brushing out edges. Repaint badly marked areas back to suitable breaks or junctions,
- Any moving parts of new work should be adjusted, eased and lubricated as necessary to ensure easy and efficient operation.

1.5.2. SECURITY AT COMPLETION

- Leave the Works and storage areas secure with, where appropriate, all accesses closed and locked. Account for and adequately label all keys and hand over to Client.

1.5.3. MAKING GOOD DEFECTS

- For any remedial work arrange access with the Client's Representative,
- For rectification give reasonable notice for access to the various parts of the Works,
- For completion notify when remedial works have been completed.

1.6. LIST OF STANDARDS

Appointed contractor shall be aware and follow the below listed Indian Standards:

IS 73-2013	Paving Bitumen
IS 1121-2013	Methods of test for determination of strength properties of natural building stones: Part I Compressive strength
IS 1122-1974	Method of test for determination of true specific gravity of natural building stones
IS 1123-1975	Method of identification of natural building stones
IS 1124-1974	Method of test for determination of water absorption, apparent specific gravity and porosity of natural building stones
IS 1125-2013	Determination of weathering of Natural building stones - Method of Test
IS 1126-2013	Determination of durability of natural building stones - Method of test
IS 1128-1974	Limestone (Slab and Tiles)
IS 1129-1972	Recommendation of dressing of natural building stones
IS 1200 (Part 1)-1992	Methods of measurement of building and civil engineering works: Part 1 Earthwork
IS 1200 (Part 2)-1974	Method of measurement of building and civil engineering works: Part 2 concrete works
IS 1200 (Part 4)-1976	Method of measurement of building and civil engineering works: Part 4 stone masonry
IS 1200 (Part 8)-1993	Method of measurement of building and civil engineering works: Part 8 steel work and iron work
IS 1200 (Part 9)-1973	Method of measurement of building and civil engineering works: Part 9 roof covering (including cladding)
IS 1200 (Part 11)-2013	Method of Measurement of Building and Civil Engineering Works Part 11 Paving, Floor Finishes, Dado and Skirting
IS 1200 (Part 15)-1987	Method of measurement of building and civil engineering works: Part 15 painting, polishing, varnishing etc
ISO1595 (Part 1)-1992	Construction of Stone Masonry - Code of Practice - Part 1 : Rubble Stone Masonry

IS 1805-1973	Glossary of terms relating to stones, quarrying and dressing
IS 4101 (Part1)-1967	Code of practice for external facings and veneers: Part I Stone facing
IS 15658- 2006	Precast concrete blocks for paving
IRC 11 - 2015	Recommended Practice for the design and layout of cycle tracks

2. HEALTH AND SAFETY

2.1. GENERAL

The safe completion of the works is a primary aim of the contract. All works should be executed in compliance with all applicable statutory requirements. Below listed are general requirements and items, contractor should take care of and provide in respect to Health and Safety onsite.

Contractor should always liaise with Client's Health and Safety Representative during pre-construction, construction and post construction/maintenance stage of work.

Client's Health and Safety Representative responsibilities should include the following;

- advise and assist the Client, Contractor and Consultants involved in project with their Health and Safety duties,
- notify details of the project to respective Health and Safety authorities,
- co-ordinate health and safety aspects of construction work and co-operate with others involved with the project,
- facilitate good communication between the client, designers and contractors,
- liaise with the principal contractor regarding ongoing work,
- identify, collect and pass on pre-construction information,
- prepare/update the health and safety file on a weekly basis.

2.2. PRE-CONSTRUCTION HEALTH AND SAFETY INFORMATION

2.2.1. TENDER STAGE

- Health and Safety should be taken into consideration at tender stage. Any major Health and Safety items which may affect the tender should be included in the proposal.

2.2.2. POST TENDER

- Post tender and prior to commencing works on site Contractor to submit detailed Health and Safety Plan (Construction Stage Health and Safety Plan);
- Health and Safety Plan to be approved by the Client/Client's representative prior to handling the site to Contractor and start of any works.

2.2.3. HEALTH AND SAFETY PLAN

- Health and Safety Plan to be submitted by Contractor to the Client/Client's representative for written approval;
- Following items should be included as part of the plan
 - Method statements on how risks from hazards identified in pre-construction information and other hazards identified by the Contractor will be addressed,
 - Details of management structure and responsibilities, with clearly stated point of contact in case of emergency,
 - Arrangements for issuing health and safety directions,

- Selection procedures for ensuring competency of other contractors,
 - Procedures for informing other contractors and employees of health and safety hazards,
 - Procedures for communications between the project team, other contractors and site operatives,
 - Arrangements for coordination and cooperation between contractors,
 - Procedures for carrying out risk assessments and for managing and controlling the risks,
 - Emergency procedures including those for fire prevention and escape,
 - Arrangements for ensuring that all accidents, illness and dangerous occurrences are recorded,
 - Arrangements for welfare facilities,
 - Procedures for ensuring that all persons on site have all the required safety gear and have received relevant health and safety information and training,
 - Arrangements for ensuring that all visitors to site receive the required safety gear and training prior to entering the site,
 - Arrangements for consulting with and taking views of people on site,
 - Arrangements for preparing site rules and drawing them to the attention of the those affected and ensuring their compliance,
 - Monitoring procedures to ensure compliance with site rules, health and safety standards and statutory requirements.
- In addition, all statutory health and safety requirements should be included as part of the Health and Safety Plan.

2.3. CONSTRUCTION

2.3.1. SITE PREPARATION - GENERAL

- All health and safety measures and procedures as stated in Health and Safety Plan should be followed during site preparation,
- Construction site should be fenced off from general public. No unauthorised access should be possible,
- Any fencing and barriers should be clearly visible during the day and night time,
- If public pedestrian/vehicular roads are blocked due to construction works, alternative route should be provided and clearly labelled,
- Any excavated areas, particularly pits and deep excavation, should be fenced off and clearly identified.

2.3.2. GENERAL EXECUTION HAZARDS

- All common hazards during execution should be controlled by good management and common practice.

2.3.3. GENERAL PRODUCT HAZARDS

- When dealing with hazardous substances site personnel exposure levels must not exceed occupational exposure standards (upper limit on the acceptable concentration of a hazardous substance in workplace) and maximum exposure limits stated in the relevant local regulations.

2.3.4. SECURITY

- Safeguard the site, the Works, products, materials, and any existing buildings affected by the Works from damage and theft,
- Take all reasonable precautions to prevent unauthorized access to the site storage areas, site facilities, the Works and adjoining property,
- Liaise with Client's Health and Safety Representative.

2.3.5. STABILITY

- Maintain the stability and structural integrity of the Works and adjacent structures during the Contract,
- When design loads included, obtain details, support as necessary and prevent overloading.

2.3.6. OCCUPIED PREMISES

- Any existing buildings on or along the site will be occupied and/ or used during the Contract as follows need to be secured and provided an access if required,
- All works should be carried out without undue inconvenience and nuisance and without danger to occupants and users.

2.3.7. COMMUNICATION

- Clear communication procedures should be established and followed as per Health and Safety Plan on daily basis,
- Health and Safety information should be provided across the site by clearly marked access points, emergency exits, medical points etc.

2.3.8. EMPLOYEES HEALTH AND SAFETY

- All employees should be given health and safety training prior to start of any new works,
- All employees should be aware of Health and Safety Plan and items related to their work,
- All employees should be provided with health and safety compliant protective clothing and equipment,
- If required contractor shall provide site quarters for Employees. These should be equipped with water, electricity and sanitary facilities (toilets, showers etc.) to comply with statutory Health and Safety regulations.

2.3.9. SITE VISITS BY CLIENT REPRESENTATIVE

- Submit in advance, to the Client/Client's Representative details of safety provisions and procedures (including those relating to materials, which may be deleterious), which will require their compliance when visiting the site,
- Protective clothing and/ or equipment should be provided and maintained on site for the Client/Client's representative and other visitors to the site,
- Visitors to site must be trained in basic site safety procedures prior to entering the site.

2.3.10. TEMPORARY STRUCTURES

- If required the Contractor shall provide adequate offices, toilet and sheds for the protection of equipment and materials from theft and weather conditions,
- Any temporary structures should comply with local Health and Safety regulations.

2.3.11. PROTECT AGAINST THE FOLLOWING

- Noise control

- Comply with local regulations and minimise the noise level where possible.
- Pollution
 - Protect the site, the Works and the general environment including the atmosphere, land, streams and waterways against pollution. If pollution occurs inform immediately, including to the appropriate authorities and provide relevant information.
- Nuisance
 - Prevent nuisance from smoke, dust, rubbish, vermin and other causes. Prevent hazardous build-up on site, in excavations and to surrounding areas and roads,
 - No dumping of material in the surrounding areas is permitted.
- Asbestos containing materials
 - Report immediately any suspected materials discovered during execution of the Works. Agree methods for safe removal or encapsulation.
- Fire prevention
 - Prevent personal injury or death, and damage to the Works or other property from fire. Comply with local statutory fire regulations.
- Smoking on site
 - Smoking on site not permitted.
- Burning on site
 - Burning on site not permitted.
- Moisture
 - Prevent from wetness and dampness where this may cause damage to the works.
- Contaminated materials
 - Where instructed to remove material affected by contamination from the site, minimize the risk of infecting other parts of the site.
- Waste
 - Waste includes rubbish, debris, spoil, containers and surplus material. Keep site and works clean and tidy,
 - Remove waste frequently and dispose off site in a manner approved by Waste Regulation Authority and as per Waste Management Plan.

2.3.12. PROTECT THE FOLLOWING

- Existing services
 - Notify all service authorities, statutory undertakers and/ or adjacent owners of proposed works not less than one week before commencing site operations,
 - Before starting work, check and mark positions of mains/ services. Where positions are not shown on drawings obtain relevant details from service authorities, statutory undertakers or other owners,
 - To identify services below ground prior to commencing works, use signboards, giving type and depth,
 - Damage to services; If damage to services as results from execution of the Works immediately give notice and notify appropriate service authority/

- statutory undertaker. Make arrangements for the work to be made good without delay to the satisfaction of service authority/ statutory undertaker or other owner as appropriate,
- Marker tapes or protective covers - replace, if disturbed during site operations, to service authority's/statutory undertakers recommendations.
 - Roads and footpaths
 - Maintain roads and footpaths within and adjacent to the site and keep clear of mud and debris,
 - If any damage occurs as a result of the Works, make good to the satisfaction of the Client, Local Authority or the Owner.
 - Existing topsoil and subsoil
 - Prevent over compaction of existing topsoil and subsoil in those areas which may be damaged by construction traffic, parking of vehicles, temporary site accommodation or storage of materials and which will require reinstatement prior to completion of the Works. Before starting work submit proposals for protective measures.
 - Retained trees/shrubs/grasses
 - Preserve and prevent damage, except those not required. Mature trees and shrubs if uprooted, destroyed, or damaged beyond reasonable chance of survival in their original shape, as a consequence of the Contractor's negligence, must be replaced with those of a similar type and age at the Contractor's expense and as per local government norms,
 - If excavation around existing trees may affect the stability of the plant, make sure trees are secured and protected from falling or causing any hazards.
 - Existing features
 - Prevent damage to existing buildings, fences, gates, walls, roads, paved areas and other site features, which are to remain in position during execution of the Works
 - Existing work
 - Prevent damage to existing work, structures or other property during the course of the work.
 - Adjoining property
 - Obtain permissions as necessary from owners if is required to erect scaffolding on or otherwise using adjoining property.
 - Materials for recycling/reuse
 - Sort and prevent damage to stated products or materials, clean off bedding and jointing materials and other contaminants,
 - Stack neatly and protect until required by the Employer or for use in the Works as instructed.

2.4. POST CONSTRUCTION AND MAINTENANCE

2.4.1. MAINTENANCE

- Contractor should follow Health and Safety Plan during the maintenance period.

2.4.2. HEALTH AND SAFETY FILE

- The Health and Safety File should be prepared or revised by Client's Health and Safety Representative, for the project. The file should contain information necessary for future construction, maintenance, refurbishment or demolition to be carried out safely, and should be retained by the client or any future owner of the property.
- All necessary information for Health and Safety File should be provided to Client's Health and safety Representative at the end of works and maintenance.

3. SITEMANAGEMENT

3.1. GENERAL Asbelow.

3.2. SITEMANAGEMENT

3.2.1. SITE MANAGEMENT PLAN

- Plan to be prepared by Contractor and approved by the Client/Client's representative prior to handover of the site.
- Plan should be followed during Construction.
- Plan should comply with all relevant statutory regulations as well as Health and safety requirements as per international standards..
- Plan should include and detail the following items;
 - Detailed information on site preparation measures to be taken up before commencement of works as well as during the works and maintenance period,
 - Clear site arrangement layout for temporary structures, storage, water, electricity supply, vehicular circulation and parking areas etc.,
 - Method statements on how site management will be carried out,
 - Details of management structure and responsibilities, with clearly stated points of contact,
 - Communication procedure within site team,
 - Procedures for informing other contractors and employees of site management issues,
 - Procedures for communications between the project team, other contractors and site operatives,
 - Procedures for keeping the records of site queries, obtained approvals, tests, any documentation that affects the site works etc.,
 - Storage of the materials and equipment on site,
 - Any additional information required by statutory regulations.

3.2.2. CONTRACTOR'S TEMPORARY STRUCTURES

- Any temporary structures should comply with Health and Safety requirements and relevant statutory regulations.
- Positioning of these facilities shall be on the approval of the Client's Representative and shall be done in co-operation with him.
- Cost of these facilities shall be for the account of the Contractor, unless agreed otherwise.
- The Contractor shall make provision for installation and removal, as agreed, of toilets, and the eventual clearing of the site to the satisfaction of the health

inspector. The Contractor shall ensure that the toilets are, indeed used by his staff.

- After the contract is fulfilled, the Contractor shall remove all structures and leave the site in a tidy condition to the satisfaction of the Client's Representative.

3.2.3. STORAGE FOR MATERIALS/EQUIPMENT ON SITE

- The Contractor should allow for a storage area for materials and equipment used onsite.
- The Contractor shall ensure that no material is delivered, dumped or off loaded on the site unless the Client's Representative has approved the area for it.
- Storage area should follow Health and Safety requirements as per "B. General Requirements, Section 4.0. Health and Safety" in respect to security, protection from weather conditions etc.

3.2.4. SITE BOARD AND INFORMATION BOARDS

- The erection of the site board on the site shall be at the commencement of the contract, and shall be removed when the contract is completed.
- The Contractor shall make provision for Health and Safety information boards across the site.

3.2.5. COMMUNICATION PROCEDURES

- Contractor should communicate with the Client through a single point of contact, as proposed in Site Management Plan.
- Clear communication procedures between the site team should be established and followed, as per Management Plan.
- All Employees should be provided with the training on communication on site, site team structure and responsibilities.
- All design queries shall be communicated and clarified with the Client/Client's Representative and records of the communication should be kept on site.
- Any major issues affecting the works and programme should be immediately communicated to the Client and mitigation procedures should be established.

3.2.6. EXISTING WORKS

- Special precautions shall be taken by the Contractor to avoid damage to existing buildings, structures, sewerage pipes, storm water drains, and pipes, storm water grids, and inlets, manholes, valve casings, water pipes and taps, fire hydrants, irrigation pipes and equipment, cables, completed landscaping works, telephone and light poles, vegetation and other services.
- Contractor to follow Health and Safety requirements as per international standards
- Where manholes, valve castings and other services have to be adjusted to fit in with the construction work or for any other reason, the Client's Representative shall be notified in good time, so that the necessary arrangements can be made. Manholes, valve casings, meter casings, fire hydrants etc., shall always be easy to reach and visible.

3.2.7. PROTECTION OF PROPERTY

- The Contractor shall take all necessary precautions against damage that might occur to any person, animal, building, structure, services, vegetation, vehicles

etc. Enough warning signs, railings, lighting etc. shall be placed around excavations, obstacles, and heaps. Foot bridges, shall be placed over trenches, where necessary for the convenience of the public. Construction activity is to be limited to pre-designated areas.

3.2.8. CLEANLINESS & MAINTENANCE OF PUBLIC ROADS

- The Contractor shall maintain the cleanliness of public roads and drains used by his vehicles throughout the Contract Period. He shall be responsible for cleaning up all deposits left by his vehicles on the road and sufficient workers shall be employed for this operation every day.
- Gravel pads are to be constructed at all main exits where the site meets a public road, to dislodge mud, dirt and/or debris from the tyres of trucks and other vehicles before leaving the site. Exit of vehicles should be limited to these exit points only. Size of the gravel pad should be a minimum of 30' x 50', consisting of a 75mm thk. layer of washed gravel, rock or crushed rock of minimum 25mm dia.

3.2.9. TRAFFIC

- Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
- Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Client's Representative and authorities having jurisdiction.
- Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction so that traffic movement around the site is not hampered.

3.2.10. ADJOINING PROPERTY

- Authority for performing site clearing indicated on property adjoining Project site will be obtained by Client's Representative before award of Contract.
- Do not proceed with work on adjoining property until directed by Client's Representative.

3.2.11. WATER LOGGING & CONSERVATION OF WATERWAYS

- The site shall be free from stagnation of water. The contractor shall provide and maintain slopes, crowns and drains on excavations and embankments to ensure satisfactory drainage. Freshly laid out work should be protected from water damage. Where directed by the Client's Representative the contractor shall carry out minor earthworks to top up low-lying area or excavate drain to prevent stagnation of water. Earth for the filling shall be cut from site as indicated on the drawings or from the Contractors own source as indicated and directed.
- The Contractor shall at all times have a capable supervisor of the work in his employment; said supervisor shall receive instruction from the Client's Representative and see that such instructions are executed.

3.2.12. CLEARING UP

- The Contractor/Landscape Contractor will keep all planting areas and other work areas clean, neat and orderly at all times during the period of the Contract and free from accumulation of waste materials or rubbish. No waste materials

or rubbish shall be allowed to remain at the areas of work at the end of each working day.

- Upon completion of the work, the Contractor shall remove all waste materials or rubbish from and around the work areas, together with all tools, equipment and materials, and shall leave said areas in a condition satisfactory to Client's Representative.
- Carefully remove items indicated to be salvaged and stored the site where indicated. Except for stripped Subsoil or other materials indicated to remain on Owner's property, cleared materials shall become the Contractor's property and shall be removed from the project site, on a periodic basis and on completion of site works.

A. PRODUCTS AND EXECUTION – HARDSCAPE WORKS

1. SITE PREPARATION

Prior to the start of any construction works on site contractor should make sure that the below listed items have been executed.

- **SITE SURVEY**

- 1..1. **GENERAL**

- Prior to commencing the works Contractor shall carry out own survey and inform the Client's Representative/PMCC of any discrepancies with the Design Intent Drawings. Subsequently, appropriate revision to be incorporated in the construction drawings by the Contractor and to be submitted for approval to the PMC/ Client representative.
 - Site survey shall be carried out by skilled and experienced team for the type of work.
 - If any unforeseen/unrecorded hazards or items have been discovered Contractor shall give notice to the PMC/Client's Representative. No works shall be carried out until the issue has been resolved.

- **SITE INVESTIGATION**

- 1..1. **GENERAL**

- Contractor shall be solely responsible for obtaining all the information on the nature of the site and sub-surface soil conditions for the purpose of preparing tender and the subsequent execution of the contract.
 - Site investigation shall provide data to allow Contractor to proceed with works.
 - Extent of the investigation shall be determined by the PMC/Client's Representative and the Contractor.
 - Site investigation shall include;
 - Establish records of mean water table,
 - Identify all previous known uses of the site,
 - Identify site features to be preserved,
 - Identify areas of limited access, incomplete work by others or any other issues which may hamper the execution of the works,
 - Locate and identify all known land and water contaminants,
 - Locate and identify soil types to a depth of 4.0m below existing ground level,
 - Recommendations for further investigations.

- 1..2. **PUBLIC AND SITE SAFETY**

- During any temporary works during the investigation, area investigated shall be secured and public access shall be limited.
 - Erect temporary fences, footpaths, warning lights etc. Before starting the investigation.
 - Area of any investigation shall be kept clean and protected from ground and surface waters.

1..3. FIELD TESTSGENERAL

- Each test shall be recorded and following data shall be provided;
 - Project name and reference,
 - Date and time of test,
 - Weather conditions,
 - Soil types and description,
 - Location and detail of the sample,
 - Site photograph,
 - If any feature should be encountered, provide description and depth of:
 - Changes in soil strata,
 - Drains,
 - Foundations/structures,
 - Hard strata,
 - Services.

1..4. FIELD TEST - SOIL

- Soil test shall be carried out in accordance with relevant local standards;
- Tests shall be carried out at every test pit;
- Method of testing to be proposed by contractor.
- Test shall provide the information on the following:
 - Permeability,
 - Geophysical conditions,
 - Any special features, as advised by Contractor.

1..5. SAMPLES

- When taking samples make sure the following;
 - Sample complies with relevant local standards,
 - Method should be proposed by Contractor. It should include information on depth, frequency and locations,
 - Samples should be collected and stored in a manner that prevents exposure to direct heat and sunlight, extreme temperatures,
 - Samples should not be contaminated,
 - Ensure samples are a typical representation of the zone from which they were taken,
 - Retain samples for 28 days post submission of the final report.

1..6. SITE TESTS – WATER

- Tests should identify ground water levels and pressures.
- Method to be proposed by Contractor.

1..7. LABORATORY TESTS

- Mechanical and Chemical properties shall be tested.
- Method of testing should be proposed by Contractor.

1..8. FINALREPORT

- Final site investigation report should include;
 - All known land and water contaminants,
 - Identify all previously known uses of the site,

- Locate and identify soil types to a depth of the 4.0m below existing ground level,
- Mean watertable,
- Recommendations for further investigation,
- Features to be included;
 - All above and below ground features,
 - All underground services,
 - Topography.
- **DEMOLITION**
 - 1..1. **GENERAL NOTES**
 - Contractor to survey and agree with the Client representative/PMC extent of demolition and methodology.
 - Extent of works should be within site boundary, otherwise notify and agree with Client representative/PMC.
 - Contractor to submit details of the demolition works prior to proceeding. The document should include;
 - Location and types of structures, site and surrounding area,
 - Extent,
 - Removal method,
 - Information on adjoining premises which may be affected,
 - Information on below and above ground services, including arrangements for disconnection/removal,
 - Health and safety procedures for protecting public and site workers;
 - Proposed programme of workplace,
 - Any special requirements.
 - Report to be submitted in 3 No A4 printed copies, as well as electronic copy.
 - 1..2. **SERVICES AFFECTED BY DEMOLITION:**
 - Works should be carried out in accordance with relevant local regulations.
 - Any services affected by works, shall be clearly marked and demolition/diversion should be agreed with PMC/Client representative prior to commencement.
 - Contractor shall arrange for disconnection (in coordination with Local Authorities) of services if needed.
 - Any drains that will not be in future use (redundant), shall be disconnected and removed. Connections shall be sealed.
 - Drains to be retained shall be protected and kept clean. This includes; manholes, inspection chambers, gullies, vent pipes, fittings.
 - Retained services should be protected from works.
 - 1..3. **HEALTH AND SAFETY**
 - Health and Safety procedures should be followed during all demolition works. This includes: public safety, site team safety, health hazards, dust control, gas and vapour risk etc.
 - 1..4. **TIMING**

- Do not proceed with demolition works until commencement of other works in the area is imminent.

1..5. MATERIALS ARISING

- All components and materials arising from the demolition works shall be utilised as per Waste Management Plan procedures.
- All components and materials arising from the demolition works shall be removed from site, if they cannot be reused/recycled.

• PRESERVATION OF EXISTING SITE FEATURES

All existing features identified as to be retained should be dealt with in accordance with the below listed procedures.

Existing features include hard landscape structures as well as trees and other feature soft landscape elements.

1..1. PRESERVATION OF HARD LANDSCAPE

- All hard landscape elements identified as to be retained shall be protected from all on going site works.
- No structural elements should be removed/relocated without written permission of Client representative.
- All protected elements should be kept clean and clear from works area.
- All protected elements should be clearly identified and labelled, site team should be aware of all the items to be protected.

1..2. PRESERVATION OF TREES – GENERAL NOTES

- No existing trees should be cut/pruned without written permission of Client representative/PMC.
- All works shall be carried out in coordination with experienced horticulturalist.
- All works to trees shall be in accordance with relevant local standards;

1..3. TREES TO BE REMOVED

- Any existing trees identified as “to be removed” or any dead trees;
 - Contractor shall cut and fell, as close to the ground as possible,
 - Trunks to be cut to convenient lengths,
 - Root stumps to be removed to a minimum depth of 800mm below ground level,
 - Any debris or material that comes from the above works shall be utilised in accordance with Waste Management Plan.
- All works shall follow Health and Safety procedures.

1..4. TREES TO BE RETAINED

- Trees identified as “to be retained”.
- All retained trees should be clearly identified and information signs should be displayed on site in prominent positions at each entrance.
- All retained trees shall be marked by visible, durable tags, lettered to tree number or symbol (if any) on the drawings.
- Trees should be fenced off the works area if possible, in all cases tree trunk and roots should be protected from site works.
- Protected area should be in a shape of a circle around each tree with radius of 3m or to the width of the canopy line, measured from tree trunk.
- Do not allow soil compaction to occur under the tree canopy.

- Do not store any materials or site equipment under or near the trees.
 - Do not allow for any vehicles to be parked near retained trees or to pass under the trees.
 - Prevent damage to tree bark, do not attach any items to trees.
 - Do not expose tree roots.
 - When works under the tree;
 - Do not add or remove topsoil within the drip line of trees, do not fill against tree trunks even temporarily,
 - Open excavation under tree canopy should be carried out for as short period of time as possible. If exposing roots unnecessary temporarily cover with polyethylene sheet to reduce evaporation,
 - Use only hand methods to locate, expose, and cleanly remove the soil around roots on the line of excavation. Root systems should be preserved intact,
 - When it is necessary to cut the roots bigger than 25mm diameter, make sure the cutting does not disturb remaining root system. Cut should be smooth with no ragged edges. Clean cut surface should be immediately treated with bituminous fungicidal sealant.
- **SITE CLEARANCE**
 - 1..1. **GENERAL**
 - The Contractor/Landscape Contractor will clear all planting areas of existing vegetation not specified to remain and all other debris and foreign materials considered a hindrance to the planting operation and considered part of the proposed works.
 - The Contractor/Landscape Contractor will maintain previously established grades and swales.
 - The Main Contractor will be responsible for cleaning the planting areas after completion of civil and other works in that area, and turning them over to the Contractor/Landscape Contractor in a manner suitable for planting and free from deleterious material. It is to the responsibility of the Contractor/Landscape Contractor to ensure that this is done. Failing this, site works to clean up will be the responsibility of the Contractor/Landscape Contractor.
 - The Contractor/Landscape Contractor will arrange to have all cleared materials moved to areas on/off site as directed by the Main Contractor.
 - 1..2. **TIMING**
 - Do not clear any area until commencement of other work in the area is imminent.
 - 1..3. **EXTENT**
 - Clear only the site areas to be occupied or affected by the Works and any other areas that the Contract specifically requires to be cleared.
 - If not included within the areas specified above, clear generally only to the extent necessary for the performance of the Works, if required.
 - Do not commence site-clearing operations until temporary erosion and sedimentation control measures are in place.

1..4. UTILITY LOCATIONS

- Coordinate with Client's Representative regarding potential utility obstructions and their location before site clearing operations.
- Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Client's Representative and then only after arranging to provide temporary utility services according to requirements indicated;
 - Notify Client's Representative not less than two days in advance of proposed utility interruptions,
 - Do not proceed with utility interruptions without Client's Representative's and Responsible Authorities written permission.

1..5. CLEARING OPERATIONS

- Remove everything on or above the site surface, including rubbish, vegetal matter, construction debris and other unwanted material and dispose off all serviceable material within the Project Site and all unserviceable/ unsuitable material outside the Project Site.

2. EARTHWORKS

• GENERAL ITEMS

2..1. GENERAL NOTES

- The section refers to excavation and filling of soil across the site as part of the works.
- Contractor should carry out own survey to identify levels and services, prior to start of works and identify any discrepancies in writing to the Clients Representative.
- If significant variations in site levels or ground water levels are identified in comparison to site investigation report or Drawings provided by the Client, Contractor shall notify PMC/Client Representative immediately.

2..2. RELEVANT CONTRACT DOCUMENTS

- The section to be read in conjunction with the BOQ & listed Drawings in the RFP
- Contractor to make sure relevant Drawings from other packages are in his possession (e.g. relevant structural details).

2..3. SETTING OUT

- Before start of excavation works Contractor shall carry out setting out.
- Contractor will be fully responsible for establishing and locating at site, all grid lines, base lines, levels and limits for project.
- Qualified surveyor should be engaged to prepare the above works.
- All setting out information established by Contractor on site should conform accurately with information in the Drawings.
- Client's Representative shall approve all setting out and locations prior to any excavation works. Written notice of inspection required to be issued to the Clients Representative a min 48 hrs prior to subsequent works commencing.
- Prior to start of further works, Contractor should do a Quality check and any errors/non-compliance with Drawings should be highlighted to the Client's Representative. If the setting out will be a cause of errors in further execution of works, Contractor should seek clarification from the Client's Representative. Any works done without approval from the Client's Representative which cause

obstruction to future works, shall be demolished and reconstructed at the expense of the Contractor.

- The Contractor shall follow the datum set out by the Main Civil Works Contractor. Contractor shall be responsible for providing, maintaining and safeguarding the position and levels of all survey pillars/pegs and benchmarks existing on site or added.
- Contractor shall maintain sufficient number of pillars/pegs for checking/monitoring of the works for the entire duration of the project.

- **PRESERVATION OF EXISTING TOPSOIL**

- 2..1. **STRIPPING TOPSOIL**

- For the extent/depth of the topsoil refer to site investigation report
- Before beginning general excavation or filling, Contractor shall strip topsoil from areas where there will be regrading, paving/roads and other areas shown on drawings.
- Topsoil shall be removed to an average depth of 300mm, if the depth of topsoil is difficult to determine Contractor shall give notice to PMC/Client's Representative.
- Stripped topsoil to be reused immediately after stripping or removed from site.
- Contractor to make sure the following treatment has been applied to removed topsoil;
 - Topsoil not to be mixed with subsoil, stone, hardcore deleterious material, rubbish or material from demolition, other soil or materials containing aggressive weeds or non-soil forming materials, oil, fuel cement or other substances harmful to plant growth.

- **EXCAVATION**

- 2..1. **GENERAL NOTES**

- All excavation works shall be in accordance with relevant local standards.
- Any features like; pavement wearing surface, concrete paths, kerbs, channels or alike, should be cut by saw to give clean break line along the edge of excavation.
- If excavating next to existing features (metro pillars, ramps, services, trees etc.) Contractor to ensure all health and safety procedures are strictly followed to avoid disturbance of foundations, tree roots etc.
- All excavation shall be carried out by mechanical equipment, unless specified otherwise by Client representative. Contractor can suggest alternative methodology for Client's Representative approval. However any consequent loss or damage will be still under Contractor's liability.

- 2..2. **EXTENT**

- Excavate over the site to give correct levels and profiles as the basis for construction, paving, filling and other relevant works. Make allowance for compaction and settlement.
- Excavate for footings, pits and alike, to the required size and depths. Confirm the bedding capacity is as specified.

- 2..3. **ACCURACY AND PERMISSABLE DEVIATION**

- All excavation works shall be taken up to such widths, lengths, depths and profiles as are shown on the drawings or such other lines and grades as specified by Client's Representative.
- All excavation shall be done to minimum dimensions as required for safety, quality and efficiency.
- Any deviation from formation levels beneath mass concrete foundations, ground bearing slabs, embankments and cuttings, external walls etc. shall be consulted with Engineer and approval given in writing prior to works commencing.
- General permissible deviation from linear dimension to be >25mm.

2..4. SIDES OF THE EXCAVATION

- Site slopes shall be as steep as will withstand safely for actual site conditions encountered, the Contractor shall obtain instruction from the civil engineer on the extent of the slope to be cut or excavated.
- Every precaution shall be taken to prevent slips, including temporary shoring, protection of the exposed slope.
- Should slips occur, the slipped material shall be removed and stacked at the slope dressed to modified stable slope.
- Removal of slipped earth will not be paid for by the Client.
- As a general guideline all proposed slopes shall be;
 - For vertical heights less than 1m, 1m vertical to 1.5 horizontal,
 - For vertical heights between 1m and 3m; 1m vertical to 2 horizontal,
 - For vertical heights exceeding 3m, benching of 3m wide and suitable cut off drain along the benching and cascading drains to be provided.

2..5. EXCAVATION TO EXISTING FOUNDATIONS AND STRUCTURES

- Prior to commencing excavation excavate trial pits adjacent to existing foundations to determine extent and formation level.
- Agree with engineer formation level in the new excavation for the safety of the structure.
- Backfill material to excavation to be determined by engineer.
- Provide support to adjacent structures if necessary and written approval by appropriately qualified Engineer provided in writing to Client's Representative, prior to works commencing, sufficient to prevent damage arising from works.
- Supports should be lateral (shoring) and vertical (piling or underpinning).
- If permanent support required give notice to PMC/Client's Representative.

2..6. ADJACENT EXCAVATION

- Where excavation encroaches below a line drawn at 45 degree (angle of repose) from the nearest formation level of another higher excavation, the lower excavation, all work within it and backfilling thereto must be completed before higher excavation is made.
- Provide support to adjacent structures if necessary and written approval by appropriately qualified Engineer provided in writing to Client's Representative, prior to works commencing

2..7. EXISTING WATERCOURSES

- Divert water courses which are to be filled, remove vegetable growths and soft deposit.

2..8. EXCAVATING IN MADE UP GROUND

- Excavate down to a natural formation of undisturbed subsoil. Notify PMC/Client's Representative if discrepancy identified greater or lesser than given depth.

2..9. DEWATERING/DRAINAGE

- All excavations should be kept free of water.
- Grading to the excavation should be such as to exclude rain/surface water draining into excavated areas.
- Any water in the excavated areas should be pumped out by Contractor, this should be continued until area is clear of water and up till foundation work is completed and backfilled.
- Do not disturb excavated faces or stability of adjacent ground or structures during pumping. Pumped water should be discharged without flooding adjacent property outside the site. Sumps made for dewatering shall be clear of excavations and fill on completion.

2..10. DISPOSAL MATERIALS

- Surplus subsoil to be stockpile in temporary storage heaps. Protection from wind and disturbance shall be provided in the form of covers or vegetation.
- Surplus subsoil should be spread and level on site as per Contractor's proposal.
- Contractor not to raise soil levels within root spread of the existing trees that are to be retained.
- Remaining material to be removed from site, as per Waste Management Plan.

2..11. INSPECTIONS

- Contractor to give 5 days notice for inspections of formations for foundations and filling formations, service trenches, roads and pavings.
- Seal the approved formation with blinding concrete within 4 hours of inspection.

• FILLING

2..1. FILL MATERIAL GENERAL

- Submit full details of proposed fill materials, including;
 - Type and source of imported fill,
 - Proposals for processing and reuse of material excavated on site,
 - Test reports as required.
- Submit the above at least 5 working days before commencing back filling works.

2..2. FILL MATERIAL PROPERTIES AND TYPES

- Any fill material used for filling should be free of hazardous, aggressive or unstable content. Within the top 1000mm of any area to receive topsoil, do not use fill materials which would, either in themselves or in combination with other materials or ground water, give rise to a health hazard, damage to building structures or instability in the filling.
- Sulphur content: Do not use filling with sulphur content exceeding 0.5% within 0.5 m of cement bound elements (for example concrete structures or masonry),

unless such elements are protected by impermeable membranes or by other suitable means.

- Where directed, re-use material recovered from excavations on the site. Dry out recovered material as necessary prior to use.
- Fill types recommendations;
 - General fill: Well-graded material, maximum particle size 75 mm, plasticity index $\leq 55\%$.
 - Select fill: Granular material complying with the following properties;
 - Particle size: 75 mm maximum,
 - Proportion passing 0.075 mm sieve: 25% maximum,
 - Plasticity index: $\geq 2\%$, $\leq 15\%$,
 - Soaked CBR: Not less than 15.
 - Road embankment fill: Well graded material with maximum plasticity index 35% and maximum particle size determined by location and layer thickness, but not exceeding two-thirds of the un-compacted layer thickness.
 - Fill sub grade: Use class 3 materials or select fill.

2..3. TESTING OF SUITABILITY OF FILL MATERIALS BEFORE START OF FILLING

- If required PMC/Client's Representative may request for a laboratory test of the proposed fill material.
- Samples should be submitted to accredited laboratory by Contractor.
- Report to be submitted by Contractor to Structural engineer.

2..4. PREPARATION FOR FILLING

- General: Remove loose material, debris, rubbish, standing water and organic matter.
- Benching;
 - If filling is to be placed against a ground surface that has slopes more than 1:4, bench into the natural surface for at least 1 m at every 1 m change of level to form a key for the filling.
- Underground slabs, pavements and other load bearing elements;
 - For under filling that will support slabs, pavements and other load-bearing elements, compact the stripped surface as for filling. If necessary, loosen the material to a depth of 200 mm and adjust the moisture content.
- Under earth mounds;
 - Cultivate the ground by ripping to a depth of 200 mm before mound formation.
- Rock;
 - Remove any loose or unstable blocks of rock to a depth suitable for construction works to commence.

2..5. PLACING FILL

- Place and compact fill material in layers;
 - Place so that only one type of material occurs in each layer,
 - Each layer to be min 150mm, max 300mm thick.
- Site grading shall be carried out as indicated in the drawings and as directed by the Client's Representative.

- Adjacent structures, membranes and buried services;
 - Do not overload, destabilise or damage,
 - Submit proposals for temporary support necessary to ensure stability during filling. Remove support progressively as backfilling proceeds,
 - Allow 14 days (minimum) before backfilling against in situ concrete structures.
- Compaction
 - Compact fill as soon as possible after placing.
 - After compaction surface of each layer must be well closed, showing no movement under compaction plant, and without cracks, holes, ridges, loose material and the like.
 - Defective areas: Remove and re-compact to full thickness of layer using new material.
 - To ensure that the fill has been compacted as specified, the Contractor at his cost shall carry out field and laboratory tests. Field compaction test shall be carried out at different stages of filling and also after the fill to the entire height have been completed. This shall hold good for embankments as well.
 - The fill shall be carried out such dimensions and levels as indicated on the drawings after the stipulated compaction. The fill will be considered as incomplete if the desired compaction has not been obtained.
- The Contractor shall protect the earth fill from being washed away by rain or damaged in any other way. Should any slip occur, the contractor shall remove the affected material and make good the slip.
- The Contractor shall make good the slip at his cost.

2..6. REUSE OF MATERIAL FOR FILL

- If so specified, the rock as obtained from excavation may be used for filling and levelling to indicated grades without further breaking. In such an event, filling shall be done in layers not exceeding 500 mm.
 - After rock filling to the approximate level, voids in rocks shall be filled with finer materials such as earth, broken stone etc., and the area flooded so that the finer materials fill up the voids. Care shall be taken to ensure that the finer fill material does not get washed out. Over the layer so filled, a 100 mm thick mixed layer of broken material and earth shall be laid and consolidation carried out by a 12 tonne roller. No less than twelve passes of the roller shall be accepted before subsequent similar operations are taken up.

2..7. TOLERANCE OF CUT & FILL

- Unless otherwise specified, no portion of the earth cutting shall vary from the specified or proposed level by an amount exceeding <150mm. The tolerance of the fill level or those on slope shall not be more than <75mm from the proposed level. The same tolerance shall be applicable to the limits and lines of cut and fill. All levels are those applicable at the end of the Defects Liability Period. The Contractor should therefore make the necessary allowance for shrinkages, consolidation, settlement and any other losses and to include all expenses for this in his quoted rates.

- Notwithstanding the above, all cut or fill area shall be such that there is no stagnation of water. Should there be any local depressions, the Contractor shall be required to re-grade or fill up the depressions as necessary. The Contractor shall be responsible for making good all settlements or erosion in the filling and cut area whenever the defects occur or as directed by the Client's Representative up to the end of the maintenance period.

2..8. INSPECTION

- On completion of the earthwork, The Contractor shall arrange for inspection between his surveyor and the Client's Representative to determine the as-built earthwork.
- The Contractor shall be required to rectify any defects that may be determined and to resurvey as necessary till the Work can be certified satisfactorily.
- The Contractor shall provide all necessary labour, tools, equipment and pegs for the joint surveys, re-surveys and include the expenses in his quoted supply.
- Further joint survey should also be organized at the end of the Defects Liability Period to check all the levels within the contract area and defects, if any, are to be certified.

• ANTITERMITE TREATMENT

2..1. GENERAL

- This section covers the general requirements for Anti-Termite Treatment measures, chemical treatment of soils for the protection of features & buildings attack of subterranean termites, Chemicals to be used with their minimum rates of application and procedure to be followed for treatment of Foundation.

2..2. CHEMICALS

- The chemical used for soil treatment shall be any one of the following;

Chemical	Relevant Indian Standard	Concentration by weight_%
Chlorpyriphos emulsifiable concentrate	IS: 8944-1978	1.0
Heptachlor emulsifiable concentrate	IS: 6439-1972	0.5
Chlordane emulsifiable concentrate	IS:2682-1966	1.0

2..3. APPLICATION

- The method of application and the stages it will be applied shall be submitted for approval and this shall conform to relevant IS codes.
- All works related to application of the Chemicals shall strictly follow Health and Safety procedures. Workers shall be properly protected during application and shall wear the necessary clothes, masks, goggles and other gear to avoid direct contact and inhalation of chemicals ;

- No work shall be carried out under unsuitable weather conditions, these include:
 - Rain or when the soil is wet due to rain or sub-soil water;
 - Strong winds;
 - Heat waves;
- Chemicals shall be brought to the site of work in sealed original containers. The materials shall be brought in at a time, in adequate quantity to suffice for the work. The material shall be kept in cool and locked stores. The empties shall not be removed from the work site till the relevant item of work has been completed and permission granted by the Client/ Client's Representative.
- Chemicals available in concentrated forms with concentration indicated on the sealed containers shall only be used. Chemicals shall be diluted with water in the desired quantity before use, using graduated containers to achieve the desired percentage of concentration.
- Hand operated pressure pump with graduated containers shall be used to ensure uniform spraying and to facilitate proper penetration of the chemical. Continuous check shall be kept to ensure that the specified quantity of chemicals is used for the required area during the operation.
- Soil treatment shall start when the foundation trenches and pits are ready to receive mass concrete in foundations. Laying of mass concrete will start when the chemical emulsion has been absorbed by the soil and the surface is quite dry. The above mentioned also applies in the case of treatment to the filled earth surface within the plinth before laying the sub grade for the floor. The treated soil barriers shall not be disturbed after they are formed. If by chance, treated soil barriers are disturbed, immediate steps shall be taken to restore the continuity and completeness of the barrier system.

3. KERBS ANDEDGES

• GENERALITEMS

3..1. SCOPE

- This section of the Specification covers the general requirements for kerbs and edges and allied works including all materials, labour, curing, scaffolding, tools etc.

3..2. RELEVANTCONTRACTDOCUMENTS

- The section to be read in conjunction with the BOQ & listed Drawings in the RFP
- Contractor to make sure relevant Drawings are in his possession (e.g. relevant structural details).

3..3. QUALITYASSURANCE

- All items and works related to the section shall be compliant with relevant local standards;
- Installer Qualifications: Registered Contractor.
- All paving materials to be obtained from single source as per approved Supplier's list – submitted by Contractor and approved by Client's Representative;
- Source Limitations for Other Materials: Obtain each type of cementitious material, mortar, and other material from single source or producer for each

aggregate and sufficient quantity ordered to allow for damage and colour variation.

- Pre-construction Compatibility and Adhesion Testing: Submit the latex-additive manufacturer, for testing indicated below, samples of paving materials that will contact or affect mortar and grout that contain latex additives.
- Use manufacturer's standard test methods to determine whether mortar and grout materials will obtain optimum adhesion with, and will be non-staining to, installed paving stones and other materials constituting stone paver installation.
- Pre-installation Inspection: Conduct inspection at Project site with Client's Representative as per approved Works Programme
- Mockups:
 - Construct Mockups to set quality standards for materials and execution as coordinated and request written approval by Client's Representative prior to continuing works.
 - Kerb mock ups to be incorporated into paving mock-ups.

3..4. DELIVERY, STORAGE, AND HANDLING

- Paving units to be delivered on site in packaging that should not allow for cracks, chippings or discolorations of the material.
- Store materials on elevated platforms, under cover, and in a dry location. Do not use materials that have become damp.
- Store all accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.
- All materials shall be stored in a secured location and in accordance with Health and Safety Plan requirements as per international standards.

• PRODUCTS

3..1. CONCRETE KERBS

- Concrete type and quality to Engineer's specification and to comply with local standards and regulations;
- Contractor to submit samples of all the concrete kerbs in specified sizes, finishes and with any special features (if applicable) for approval prior to commencement of works;
- All concrete kerbs should be free from vents, cracks, fissures, discolouration or other defects deleterious to strength, durability or appearance;
- Kerb sizes, colour, finish, pattern, jointing, remarks and any other aesthetic characteristics to follow submitted Landscape Drawings. Allow for oversized units;
- Fixing of the kerb and any structural related details to Engineer's specification.
- Contractor to reject any kerb units that do not comply with the above requirements. Client's Representative to reserve right to reject the inaccurate products.

• EXECUTION

3..1. LAYING CONCRETE KERBS

- All works shall be executed in accordance with relevant local standards;
- Contractor to follow Health and Safety procedures set in Health and Safety Plan requirements as per international standards.

- Do not install in adverse weather conditions. Adequately protect foundations, bedding and haunching against extreme temperatures and rapid drying by wind and sun.
- Cutting to be neat and accurate, without spalling. Form neat junctions. Minimum cut as specified on Drawings. If minimum cut not possible use oversized unit;
- Use special corner and radii units at bends, corners and junctions, refer to Drawings for details.
- Units to be positioned true and levelled along top and front faces, in a mortar bed on accurately cast foundations;
- Ends of units buttered with bedding mortar as laying proceeds. Joints completely filled, tightly butted and surplus mortar removed immediately
- After bedding has set, secure units with a continuous haunching of concrete;
- Deviation in finish kerb levels should be no more than 5mm, horizontal and vertical alignment should not exceed 3mm in 3m.

4. PAVING

GENERAL ITEMS

4..1. SCOPE

- This section of the Specification covers the general requirements for concrete paving, natural stone paving, bituminous surfaces, tactile paving and allied works including all materials, labour, curing, scaffolding, tools etc.

4..2. RELEVANT CONTRACT DOCUMENTS

- The section to be read in conjunction with the BOQ & list of drawings provided in the Annexures 1 to 4.
- Contractor to make sure relevant Drawings are in his possession (e.g. relevant structural details).

4..3. QUALITY ASSURANCE

- All items and works related to the section shall be compliant with relevant local standards;
- Installer Qualifications: Registered Contractor;
- All paving materials to be obtained from single source, as per approved Supplier's list – submitted by Contractor and approved by Client's Representative;
- Source Limitations for Other Materials: Obtain each type of cementitious material, mortar, and other material from single source or producer for each aggregate;
- Pre-construction Compatibility and Adhesion Testing: Submit to latex-additive manufacturer, for testing indicated below, samples of paving materials that will contact or affect mortar and grout that contain latex additives.
- Use manufacturer's standard test methods to determine whether mortar and grout materials will obtain optimum adhesion with, and will be non-staining to, installed paving stones and other materials constituting stone paver installation.
- Pre-installation Inspection: Conduct inspection at Project site with Client's Representative as per approved Works Programme
- Mockups;

- Construct Mockups to set quality standards for materials and execution as coordinated and approved by Client's Representative.
- Construct Mockups for each type of paving, each Mockup shall be to scale, and surface areas as dimensioned as stipulated in the Drawings'. Notes for each Mockup to be provided.
- Contractor to submit the drawing showing layout, location and dimensions for 'on-site' Mockup area, for Client's Representative's approval prior to construction of Mockup.
- Mockup should include kerbs, recessed manhole covers, paving transitions, interface with lighting and any additional feature as required;
- Approval of mock-ups should include quality of finish, materials, mortars & P.C.C. and workmanship;
- Approval of mockups is also for other material and construction qualities that the Client's Representative specifically approves in writing. Approval of mockups does not constitute approval of deviations from the Contract Documents unless Client's Representative specifically approves such deviations in writing.
- If any major item has been rejected, mockup panel shall be removed or corrected and presented again for approval.
- If minor items have been rejected, notes shall be taken and followed during the construction programme in respect to mentioned items.

4..4. DELIVERY, STORAGE, AND HANDLING

- Paving units to be delivered on site in packaging that should not allow for cracks, chippings or discolorations of the material.
- Store materials on elevated platforms, under cover, and in a dry location. Do not use materials that have become damp.
- Store all accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.
- All materials shall be stored in a secured location and in accordance with Health and Safety Plan (as per "B. General Requirements, Section 4.0. Health and Safety")

€ PRODUCTS

4..1. CONCRETE PAVERS

- Concrete type and quality to Engineer's specification and to comply with local standards and regulations;
- Contractor to submit samples of all the concrete paver types in specified sizes, finishes and with any special features (if applicable) for approval prior to commencement of works. These to include tactile paving and pathway markers with metal inlay;
- All concrete pavers should be free from vents, cracks, fissures, discolouration or other defects deleterious to strength, durability or appearance;
- Paver sizes, colour, finish, pattern, jointing, remarks and any other aesthetic characteristics to follow submitted Landscape Drawings. Allow for oversized units;

- Fixing of the pavers and any structural related details to Engineer's specification.
- Contractor to reject any pavers that do not comply with the above requirements. Client's Representative to reserve right to reject the inaccurate products.

4..2. NATURAL STONEPAVING

- Stone type and quality to Engineer's specification and to comply with local standards and regulations.
- Contractor to submit samples of all the stone paving unit types in specified sizes, finishes and with any special features (if applicable) for approval prior to commencement of works. These shall include painted pathway markers.
- All stone paving should be free from vents, cracks, fissures, discolouration or other defects deleterious to strength, durability or appearance.
- Paving unit sizes, colour, finish, pattern, jointing, remarks and any other aesthetic characteristics to follow submitted Landscape Drawings. Allow for oversized units.
- Fixing of the paving and any structural related details to Engineer's specification.
- Contractor to reject any pavers that do not comply with the above requirements. Client's Representative to reserve right to reject the inaccurate products.

4..3. BITUMINOUS PAVING

- Bituminous material and quality to Engineer's specification and to comply with local standards and regulations.
- Contractor to submit samples of all the bituminous surfaces in specified finishes and with any special features (if applicable) for approval prior to commencement of works.
- All bituminous surfaces should be free from vents, cracks, fissures, discolouration or other defects deleterious to strength, durability or appearance.
- Bituminous paving sizes, colour, finish, pattern, remarks and any other aesthetic characteristics to follow submitted Landscape Drawings.
- Fixing of the bituminous paving and any structural related details to Engineer's specification.
- Contractor to reject any products that do not comply with the above requirements. Client's Representative to reserve right to reject the inaccurate products.

4..4. THERMOPLASTIC PAINT MARKINGS

- Thermoplastic paint type and quality to Engineer's specification and to comply with local standards and regulations.
- Contractor to submit samples of all thermoplastic paint markings in specified sizes, finish and special features (if applicable) for approval prior to commencement of works.

- All thermoplastic paint surfaces should be smooth and continuous, free from vents, cracks, fissures, discolouration or other defects deleterious to strength, durability or appearance.
- Thermoplastic paint markings sizes, colour, finish, pattern, remarks and any other aesthetic characteristics to follow submitted Landscape Drawings.
- Fixing of the bituminous paving to Manufacturer's specification.
- Contractor to reject any products that do not comply with the above requirements. Client's Representative to reserve right to reject the inaccurate products.

€ EXECUTION

4..1. LAYING CONCRETEPAVERS

- All works shall be executed in accordance with relevant local standards;
- Contractor to follow Health and Safety procedures set in Health and Safety Plan (as per "B. General Requirements, Section 4.0. Health and Safety") at any time during the works;
- Do not install in adverse weather conditions. Adequately protect foundations, bedding and haunching against extreme temperatures and rapid drying by wind and sun, heavy rainfall.
- Sub base and bedding to be laid to Engineer's specification;
- Bedding to be firm and properly compacted. Rocking or subsidence should not occur or develop.
- Saturated sand bedding to be removed and replaced, otherwise allow to dry and assess the stability before proceeding with works.
- Use geotextile sheet around obstructions to prevent washing away of bedding. Lay immediately below sand bedding course for 1.0m perimeter around obstruction. Joint by overlap, lap to be 300mm. When approaching the edge turn the sheet up to form an upstand against the features, height no less than thickness of sand bedding.
- All masonry cutting to be machine made and neat and accurate, without spalling to form neat junctions with edging and adjoining finishes. Minimum cut as specified on Drawings.
- Levels and lines of finished surface should be smooth and even with falls as per plan to prevent ponding.
- When laying on the slope, lay paving units from the bottom of slope, upwards;
- Paving should appear even and regular with even joint widths and free of mortar and sand stains.
- Deviation in finish paving levels should be no more than $\pm 5\text{mm}$. Allowed deviation in height of finished paving above features (gullies/drainage channels/kerbs) to be no more than $\pm 3\text{mm}$.
- Sudden irregularities are not permitted. Variation in levels between adjacent block/pavers sets to be no more than $\pm 2\text{mm}$.
- Paving should be clean and free from mortar droppings, oil and other materials likely to cause staining after completion.
- After laying of paving, brush in clean granular sand into all the joints and use vibrating plate compaction machine to level the entire paved area.

- Water down the paved area after compaction and repeat the process until all the joint voids are filled with sand and properly compacted.
- Do not overload previously laid paving with stacks of materials. Avoid damage to unit corners, surfaces etc.
- After laying do not allow for any pedestrian traffic for 24h, vehicular traffic for 28days.

4..2. LAYING NATURAL STONE PAVING

- All works shall be executed in accordance with relevant local standards;
- Contractor to follow Health and Safety procedures set in Health and Safety Plan (as per "B. General Requirements, Section 4.0. Health and Safety") at any time during the works.
- Do not install in adverse weather conditions. Adequately protect foundations, bedding and haunching against extreme temperatures and rapid drying by wind and sun, heavy rainfall.
- Sub base and bedding to be laid to Engineer's specification.
- Bedding to be firm and properly compacted before proceeding with paving. Rocking or subsidence should not occur or develop.
- Saturated mortar bedding to be removed and replaced, otherwise allow to dry and assess the stability before proceeding with works.
- Use geotextile sheet around obstructions to prevent washing away of bedding. Lay immediately below sand bedding course for 1.0m perimeter around obstruction. Joint by overlap, lap to be 300mm. When approaching the edge turn the sheet up to form an upstand against the features, height no less than thickness of sand bedding.
- Cutting to be neat and accurate, without spalling to form neat junctions with edging and adjoining finishes. Minimum cut as specified on Drawings. If minimum cut not possible use oversized unit;
- Levels and lines of finished surface should be smooth and even with falls to prevent ponding.
- When laying on the slope, lay paving units from the bottom of slope, upwards.
- Paving should appear even and regular with even joint widths and free of mortar and sand stains.
- Deviation in finish paving levels should be no more than $\pm 5\text{mm}$. Allowed deviation in height of finished paving above features (gullies/drainage channels/kerbs) to be no more than $\pm 3\text{mm}$.
- Sudden irregularities are not permitted. Variation in levels between adjacent block/pavers sets to be no more than $\pm 2\text{mm}$.
- Paving should be clean and free from mortar droppings, oil and other materials likely to cause staining.
- Do not overload previously laid paving with stacks of materials. Avoid damage to unit corners, surfaces etc.
- After laying do not allow for any pedestrian traffic for 24h, vehicular traffic for 28days.

4..3. LAYING BITUMINOUS PAVING

- All works shall be executed in accordance with relevant local standards;

- Contractor to follow Health and Safety procedures set in Health and Safety Plan (as per “B. General Requirements, Section 4.0. Health and Safety”) at any time during the works;
- Do not install in adverse weather conditions. Adequately protect against extreme temperatures and rapid drying by wind and sun, heavy rainfall;
- Sub base and bedding to be laid to Engineer’s specification;
- Bituminous surface to be laid in layers as per Engineer’s specification;
- Levels and lines of finished surface should be smooth and even with falls to prevent ponding;
- Paving should appear even and regular and free of stains;
- Deviation in finish paving levels should be no more than 5mm. Allowed deviation in height of finished paving above features (gullies/drainage channels/kerbs) to be no more than 3mm;
- Sudden irregularities are not permitted.

4..4. LAYING THERMOPLASTIC PAINT MARKINGS

- All works shall be executed in accordance with relevant local standards;
- Contractor to follow Health and Safety procedures set in Health and Safety Plan (as per “B. General Requirements, Section 4.0. Health and Safety”) at any time during the works;
- Do not install in adverse weather conditions. Adequately protect against extreme temperatures and rapid drying by wind and sun, heavy rainfall;
- Installation to manufacturer’s specification;
- Markings should appear even and regular and free of stains;
- Sudden irregularities are not permitted.

5. MASONRY WORKS AND WALL CLADDING

• GENERAL ITEMS

5..1. SCOPE

- This section of the Specification covers the general requirements for masonry works, GRC/FRP wall panels, natural stone cladding and allied works including all materials, labour, curing, scaffolding, tools etc.

5..2. RELEVANT CONTRACT DOCUMENTS

The section to be read in conjunction with the BOQ & list of drawings provided in the Annexure 1 to 4

- Contractor to make sure relevant Drawings are in his possession (e.g. relevant structural details).

5..3. QUALITY ASSURANCE

- All items and works related to the section shall be compliant with relevant local standards;
- Installer Qualifications: Registered Contractor;
- All cladding materials to be obtained from single source, as per approved Supplier’s list – submitted by Contractor and approved by Client’s Representative.

- All Masonry materials to be obtained from single source, as per approved Supplier's list – submitted by Contractor and approved by Client's Representative and in conformance with applicable Indian Standards IS.
- Source Limitations for Other Materials: Obtain each type of cementitious material, mortar, grouts and other material from single source or producer for each aggregate.
- Pre-construction Compatibility and Adhesion Testing: Submit the latex-additive, for testing indicated below with samples of paving materials that will contact or affect mortar and grout that contain latex additives to approved laboratory.
- Use manufacturer's standard test methods to determine whether mortar and grout materials will obtain optimum adhesion with, and will be non-staining to, installed cladding and other materials constituting cladding installation.
- Pre-installation Inspection: Conduct inspection at Project site with Client's Representative as per approved Works Programme
- Mockups:
 - Construct Mockups to set quality standards for materials and execution as coordinated and approved by Client's Representative.
 - Construct Mockups for each type of cladding, each Mockup shall be to actual scale, and surface areas as dimensioned as stipulated in the Drawings'. Notes for each Mockup to be provided.
 - Contractor to submit the drawing showing layout, location and dimensions for 'on-site' Mockup area, for Client's Representative's approval prior to construction of Mockup.
 - Mockup should include cladding, coping, cladding transitions, interface with lighting and any additional feature as required;
 - Approval of mock-ups should include quality of finish, materials, mortars & P.C.C. and workmanship;
 - Approval of mockups is also for other material and construction qualities that the Client's Representative specifically approves in writing. Approval of mockups does not constitute approval of deviations from the Contract Documents unless Client's Representative specifically approves such deviations in writing.
 - If any major item has been rejected, mockup panel shall be removed or corrected and presented again for approval.
 - If minor items have been rejected, notes shall be taken and followed during the construction programme in respect to mentioned items.

5..4. DELIVERY, STORAGE, AND HANDLING

- Cladding units to be delivered on site in packaging that should not allow for cracks, chippings or discolorations of the material.
- Store materials on elevated platforms, under cover, and in a dry location. Do not use materials that have become damp.
- Store all accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

- All materials shall be stored in a secured location and in accordance with Health and Safety Plan (as per “B. General Requirements, Section 4.0. Health and Safety”).

6. SITE FURNITURE AND FEATURES

• GENERAL ITEMS

6..1. SCOPE

- This section of the Specification covers the general requirements for all site furniture and features like benches, bins, signage, digital information panel and allied works including all materials, labour, curing, scaffolding, tools etc.

6..2. RELEVANT CONTRACT DOCUMENTS

- The section to be read in conjunction with the BOQ & below listed Drawings:

The section to be read in conjunction with the BOQ & list of drawings provided in the Annexure 1 to 4:

- Contractor to make sure relevant Drawings are in his possession (e.g. relevant structural details).

6..3. QUALITY ASSURANCE

- All items and works related to the section shall be compliant with relevant local standards;
- Installer Qualifications: Registered Contractor;

- All materials to be obtained from single source, as per approved Supplier's list – submitted by Contractor and approved by Client's Representative;
- Source Limitations for Other Materials: Obtain each type of cementitious material, mortar, grouts and other material from single source or producer for each aggregate;
- Use manufacturer's standard test methods to determine whether mortar, grout, paint or glue materials will obtain optimum adhesion with, and will be non-staining to relevant site furniture and features and other materials constituting their installation;
- Pre-installation Inspection: Conduct inspection at Project site with Client's Representative as per approved Works Programme;
- Mockups;
 - Construct Mockups to set quality standards for materials and execution as coordinated and approved by Client's Representative,
 - Construct Mockups for each type of site furniture, each Mockup shall be to scale, and surface areas as dimensioned as stipulated in the Drawings'. Notes for each Mockup to be provided,
 - Contractor to submit the drawing showing layout, location and dimensions for 'on-site' Mockup area, for Client's Representative's approval prior to construction of Mockup,
 - Mockup should include cladding bin, bench, signage and any additional features as required,
 - Approval of mock-ups should include quality of finish, materials, metal fixings, mortars & P.C.C. and workmanship,
 - Approval of mockups is also for other material and construction qualities that the Client's Representative specifically approves in writing. Approval of mockups does not constitute approval of deviations from the Contract Documents unless Client's Representative specifically approves such deviations in writing.
 - If any major item has been rejected, mockup panel shall be removed or corrected and presented again for approval.
 - If minor items have been rejected, notes shall be taken and followed during the construction programme in respect to mentioned items.

6..4. DELIVERY, STORAGE, AND HANDLING

- All elements to be delivered on site in packaging that should not allow for cracks, chippings or discolorations of the material.
- Store materials on elevated platforms, under cover, and in a dry location. Do not use materials that have become damp.
- Store all accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.
- All materials shall be stored in a secured location and in accordance with Health and Safety Plan (as per "B. General Requirements, Section 4.0. Health and Safety").

• PRODUCTS

6..1. FEATURE BENCH

- Material quality and details to Engineer's/ Manufacturers specification and to comply with local standards and regulations;
- Contractor to submit Shop Drawings for PMC/Client Representative's approval. Shop drawing's to include material detail specifications, fixing details and any other relevant information.
- Contractor to submit samples of all material types in specified colours, finishes and with any special features (if applicable) for approval prior to commencement of works.
- All feature benches should be free from chipping, vents, cracks, fissures, discolouration or other defects deleterious to strength, durability or appearance.
- Feature bench sizes, colour, finish, pattern, jointing, and any other aesthetic characteristics to match submitted Landscape Drawings and Approved Shop Drawings.
- All special features related to bench design should be executed to the highest quality. Any cracks, discolouration, edge defects must be corrected may lead to rejection of the whole unit.
- Fixing of the feature bench on site and any structural related details to Contractor's specification. This should be included in Shop Drawing's for PMC/Client's Representative approval.
- Contractor to reject any feature bench unit that do not comply with the above requirements. Client's Representative reserves the right to reject the inaccurate products.

6..2. FEATURE BIN

- Material quality and details to Engineer's specification and to comply with local standards and regulations;
- Contractor to submit Shop Drawings for PMC/Client Representative's approval. Shop drawing's to include material detail specifications, fixing details and any other relevant information.
- Contractor to submit samples of all the material types in specified colours, finishes and with any special features (if applicable) for approval prior to commencement of works.
- All feature bins should be free from vents, cracks, fissures, discolouration or other defects deleterious to strength, durability or appearance.
- Feature bench sizes, colour, finish, pattern, jointing, remarks and any other aesthetic characteristics to follow submitted Landscape Drawings and Approved Shop Drawings.
- All special features related to bin design should be executed to the highest quality. Any cracks, discolouration, edge defects must be corrected and may lead to replacement of the whole unit.
- Fixing of the feature bin on site and any structural related details to Contractor's specification. This should be included in Shop Drawing's for PMC/Client's Representative approval.

- Contractor to reject any feature bin unit that does not comply with the above requirements. The Client's Representative reserves the right to reject the products that do not fulfil requirements.

6..3. INSTALLATION

6..1. INSTALLATION OF FEATURE BENCH

- Fixing of the feature bench to Manufacturers /Contractor's specification whichever is higher.

- All works shall be executed in accordance with relevant local standards.
- Contractor to follow Health and Safety procedures set in Health and Safety Plan (as per “B. General Requirements, Section 4.0. Health and Safety”) at any time during the works.
- Do not install in adverse weather conditions. Adequately protect against extreme temperatures and strong winds, sun, heavy rainfall;
- During installation avoid damage to already executed works (paving, edging, wall cladding etc.). Any faults should be corrected to same quality and appearance.
- Feature Bench to be installed plumb and level and to best practise standards. All adhesives or residue from installation process to be removed prior to staining the surface. Any timbers/ concrete or steel works that are irreparably stained are to be removed and replaced prior to handover.
- After installation leave the area clean and tidy, do not leave any tools or materials on site. Any waste should be utilised in accordance with Waste Management Plan.

6..2. INSTALLATION OF FEATURE BIN

- Fixing of the feature bin to Manufacturers /Contractor’s specification whichever is higher.
- All works shall be executed in accordance with relevant local standards.
- Contractor to follow Health and Safety procedures set in Health and Safety Plan (as per “B. General Requirements, Section 4.0. Health and Safety”) at any time during the works.
- Do not install in adverse weather conditions. Adequately protect against extreme temperatures and strong winds, sun, heavy rainfall.
- During installation avoid damage to already executed works (paving, edging, wall cladding etc.). Any faults should be corrected to same quality and appearance.
- Feature Bin to be installed plumb and level and to best practise standards. All adhesives or residue from installation process to be removed prior to staining the surface. Any timbers/ concrete or steel works that are irreparably stained are to be removed and replaced prior to handover.
- After installation leave the area clean and tidy, do not leave any tools or materials on site. Any waste should be utilised in accordance with Waste Management Plan.

B. PRODUCTS AND EXECUTION – SOFTSCAPE WORKS**1. SITE PREPARATION**

Prior to the start of any construction works on site, the Contractor should make sure that the below listed items have been executed.

1.1. SITESURVEY**1.1.1. GENERAL**

- Contractor shall be solely responsible for obtaining all the information on the nature of the site and soil conditions for the purpose of preparing tender and the subsequent execution of the contract.
- Extent of the investigation shall be determined by the Client's Representative and the Contractor.
- Site investigation shall include:
 - Identify site features to be preserved;
 - Identify areas of limited access, incomplete work by others or any other issues which may hamper the execution of the softscape works;
 - Locate and identify all known land and water contaminants;
 - Recommendations for further investigations

1.1.2. PUBLIC AND SITE SAFETY

- During any investigation works on site, the area investigated shall be secured and public access shall be limited;
- Erect temporary fences, footpaths, warning lights etc. Before starting the investigation.
- Area of any investigation shall be kept clean and protected from ground and surface waters.

1.1.3. FIELD TESTS GENERAL

- Each test shall be recorded and following data shall be provided:
 - Project name and reference;
 - Date and time of test;
 - Weather conditions;
 - Soil types and description;
 - Location and detail of the sample;
 - Site photograph
- Also see '*B. General Requirements, Section 3. Quality Standards and Control*' for Soil Test requirements.

1.1.4. LABORATORY TESTS

- Mechanical and Chemical properties shall be tested.
- Method of testing should be proposed by Contractor.

1.2. PRESERVATION OF EXISTING SITE FEATURES**1.2.1. GENERAL**

- All existing features identified as to be retained should be dealt with in accordance with the below listed procedures.
- Existing features include hard landscape structures as well as trees and other feature soft landscape elements.

1.2.2. PRESERVATION OF HARD LANDSCAPE

- All hard landscape elements identified as to be retained shall be protected from all on going site works.
- No structural elements should be removed/ relocated without written permission of Client representative.
- All protected elements should be kept clean and clear.
- All protected elements should be clearly identified and labelled, site team should be aware of all the items to be protected.

1.2.3. PRESERVATION OF TREES – GENERAL NOTES

- No existing trees should be cut/pruned without written permission of Client representative/PM;
- All works shall be carried out in coordination with experienced horticulturalist;
- All works to trees shall be in accordance with relevant local standards;

1.2.4. TREES TO BE REMOVED

- Any existing trees identified as “to be removed” or any dead trees;
 - Contractor shall cut and fell, as close to the ground as possible,
 - Trunks to be cut to convenient lengths,
 - Root stumps shall be removed to a minimum depth of 800mm below ground level,
 - Any debris or material that comes from the above works shall be utilised in accordance with Waste Management Plan.
- All works shall follow Health and Safety procedures.

1.2.5. TREES TO BE RETAINED

- Trees identified as “to be retained”.
- All retained trees should be clearly identified and information signs should be displayed on site in prominent positions at each entrance.
- All retained trees shall be marked by visible, durable tags, lettered to tree number or symbol (if any) on the drawings.
- Trees should be fenced off the works area if possible, in all cases tree trunk and roots should be protected from site works.
- Protected area should be in a shape of a circle around each tree with radius of half the tree's height, measured from tree trunk.
- Do not allow for soil compaction under the tree.
- Do not store any materials or site equipment under or near the trees.
- Do not allow for any vehicles to be parked near retained trees or to pass under the trees.
- Prevent damage to tree's bark, do not attach any items to trees.
- Do not expose tree roots.
- When works under the tree;
 - Do not fill against tree trunks even temporarily,
 - Open excavation under tree canopy should be carried for as short period as possible. If exposing roots is necessary, temporarily line with polyethylene sheet to reduce evaporation,

- Use only hand methods to locate, expose, and cleanly remove the soil around roots on the line of excavation. Root systems should be preserved intact.
- When it is necessary to cut the roots bigger than 25mm diameter, make sure the cutting does not disturb remaining root system. Cut should be smooth with no ragged edges. Cut surface should be immediately treated with bituminous fungicidal sealant.

1.3. SITECLEARANCE

1.3.1. GENERAL

- The Softscape Contractor will clear all planting areas of existing vegetation not specified to remain and all other debris and foreign materials considered a hindrance to the planting operation and/or unsightly in appearance.
- The Softscape Contractor will maintain previously established grades and swales.
- The Main Contractor will be responsible for cleaning the planting areas after completion of civil and other works in that area, and turning them over to the Softscape Contractor suitable for planting. It is to the responsibility of the Softscape Contractor to ensure that this is done. Failing this, clean-up will be the responsibility of the Softscape Contractor.
- The Softscape Contractor will arrange to have all cleared materials moved to areas on site as directed by the Main Contractor.

1.3.2. TIMING

- Do not clear any area until commencement of other work in the area is imminent.

1.3.3. EXTENT

- Clear only the site areas to be occupied or affected by the Works and any other areas that the Contract specifically requires to be cleared.
- If not included within the areas specified above, clear generally only to the extent necessary for the performance of the Works, if required.
- Do not commence site-clearing operations until temporary erosion and sedimentation control measures are in place.

1.3.4. UTILITY LOCATIONS

- Coordinate with Client's Representative regarding potential utility obstructions and their location before site clearing operations.
- Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Client's Representative and then only after arranging to provide temporary utility services according to requirements indicated.
 - Notify Client's Representative not less than two days in advance of proposed utility interruptions.
 - Do not proceed with utility interruptions without Client's Representative's written permission.

1.3.5. CLEARING OPERATIONS

- Remove everything on or above the site surface, including rubbish, vegetal matter, construction debris and other unwanted material and dispose off all

serviceable material within the Project Site and all unserviceable/ unsuitable material outside the Project Site.

2. EARTHWORK & GRADING

2.1. GENERAL

2.1.1. GENERALNOTES

- The section refers to excavation, grading and filling of soil across the site as part of the works.
- Contractor should carry out own survey to identify levels and services, prior to start of works.
- If significant variations in site levels or ground water levels in compare to site investigation report or Drawings, Contractor shall notify Client Representative.

2.1.2. RELEVANT CONTRACT DOCUMENTS

The section to be read in conjunction with the BOQ & list of drawings provided in the RFP:

- Contractor to make sure relevant Drawings from other packages are in his possession (e.g. relevant structural details).

2.1.3. SETTING OUT

- Before start of excavation works Contractor shall carry out setting out works;
- Contractor will be fully responsible for establishing and locating at site all grid lines, base lines, levels and limits for project;
- Qualified surveyor should be engaged to prepare the above works;
- All setting out information established by Contractor on site should conform accurately with information in the Drawings. Position of individual plants and outlines of all planting areas shall be staked and set out according to the Drawings.
- The Landscape Architect will approve all planting areas and locations prior to any excavation of planting pits, trenches or beds;
- In the event that site conditions necessitate relocation of planting areas or locations, due to subsurface utilities, pipes, structures, impervious materials or inadequate drainage, the Landscape Architect will designate new locations;
- Prior to start of further works, Contractor should do a Quality check and any errors/non-compliance with Drawings should be highlighted to the Client's Representative. If the setting out will be a cause of errors in further execution of works, Contractor should seek clarification from the Client's Representative. Any works done which cause obstruction to future works, without approval from the Client's Representative, shall be demolished and reconstructed at the expense of the Contractor;
- The Contractor shall follow the datum set out by the Main Civil Works Contractor. He shall be responsible for providing, maintaining and safeguarding the position and levels of all survey pillars/pegs and benchmarks existing on site or added;
- Contractor shall maintain sufficient number of pillars/pegs for checking/monitoring of the works for the entire duration of the project.

2.2. EXCAVATION

2.2.1. GENERAL

- All excavation works shall be in accordance with relevant local standards;
- The work shall include the hauling and satisfactory disposal of surplus excavated or deleterious material;
- Notify Client's Representative if unexpected rock, hardpan or obstructions detrimental to trees or shrubs are encountered in excavations.
- Hardpan Layer: Drill 150-mm diameter holes, 600 mm apart, into free-draining strata or to a depth of 10 feet (3 m), whichever is less, and backfill with free-draining material.
- If excavating next to existing features (metro pillars, ramps, services, trees etc.) Contractor to ensure all health and safety procedures are strictly followed to avoid disturbance of foundations, tree roots etc.;
- Protect, structures, utilities, sidewalks, pavements and other facilities and lawns and existing plants from damage caused by settlement, lateral movement, washout and other hazards created by Excavation Works;
- Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways;
- All excavation shall be carried out by mechanical equipment, unless specified otherwise by Client's representative. Contractor can suggest alternative methodology for Client's Representative approval. However any consequent loss or damage will be still under Contractor's liability;
- Remove any rubbish or debris from the planting surfaces. Grades, which have been established, shall be maintained in a true and even condition;
- Maintenance shall include any necessary repairs to previous graded areas;
- Remove obstructions, debris, rubbish, rocks greater than 100mm in diameter, trees, shrubs, grass, and other vegetation to permit installation of soil layers during the Fillingworks;
- Side slopes shall be as steep as will withstand safely for actual site conditions encountered for planting beds;
- The following actions need to be followed during this process;
 - Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 - Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction. Ensure adequate protection is provided to any exposed roots.
 - Grind stumps and remove roots, obstructions, and debris extending to a depth of 450 mm below exposed sub-grade.
 - Chip removed tree branches and stockpile or dispose in areas approved by Client's Representative.
 - The type of soil to be excavated for pits will cover all soil types such as soft soil, hard moorum and soft rock as is incident on site.

2.2.2. EXTENT

- Position of individual plants and outlines of all planting areas shall be staked and set out according to the Contract Drawings.

- Excavate over the site to give correct levels and profiles as the basis for grading and filling works. Make allowance for compaction and settlement.
- Excavate for trees, palms, shrubs, ground covers and turf areas to the required size and depths.

2.2.3. ACCURACY AND PERMISSIBLE DEVIATION

- All excavation works shall be taken up to such widths, lengths, depths and profiles as are shown on the drawings or otherwise indicated in this Specification. In case of discrepancy between the Drawings and Specifications, Drawings shall be followed;
- Any deviation from rough grading levels shall be consulted with the Client's Representative;
- Excavate over the site to give correct levels and profiles as the basis for grading and filling works.
- General permissible deviation from linear dimension to be <25mm.

2.2.4. DRAINAGE

- All excavations should be kept free of water.
- Grading to the excavation should be such as to exclude rain/surface water draining into excavated areas.
- The Softscape Contractor must test all planters/planting pits for its drainage capability by filling the planters/planting pits with water. Conditions permitted the retention of water in the planters/planter pits for an excessive period of time must be brought to the attention of the Main Contractor, Client's Representative, Architect and Landscape Architect immediately. The notice must include the proposal and its cost of rectifying the drainage problem. The Softscape Contractor must ensure that the drainage problem is rectified before proceeding with planting works.
- If the Softscape Contractor fails to inform the Main Contractor, Client's Representative, Architect and Landscape Architect, he will be responsible for the rectification of the drainage problems and replace all damaged plant materials at his own cost.

2.2.5. EXCAVATED MATERIALS

- Soil excavated from planting holes shall be removed and may be re-used in back filling, if instructed by the Client's Representative, by proving it acceptable through amendments to form specified General Planting Soil Mix as provided in this Specification.

2.3. PRESERVATION OF EXISTING TOPSOIL

2.3.1. STRIPPING TOPSOIL

- Before beginning general excavation or filling, Contractor shall strip topsoil from areas where there will be working;
- Topsoil shall be removed to an average depth of 300mm, if the depth of topsoil is difficult to determine Contractor shall give notice to Client's Representative;
- Stripped topsoil may be reused immediately after stripping or stockpiled in the on-site top soil dump as directed by the Client's Representative for later use;

- Location of stockpile: To be agreed - topsoil shall be stored in an area of the site where it should not interfere with other site operations so that it can be left undisturbed during the construction process.
- Site Clearance: The area that is to be used for storing the topsoil shall be cleared of vegetation and any waste arising from the development e.g. building rubble and fill materials.
- Protection:
 - Topsoil not to be mixed with subsoil, stone, granular aggregate, rubbish or material from demolition, other soil or materials containing aggressive weeds or non-soil forming materials, oil, fuel cement or other substances harmful to plantgrowth.
 - Do not place any other material on top of storage heaps.
 - Do not allow construction plant to pass over storage heaps.
 - Prevent compaction and contamination, by fencing and covering as appropriate.
- Height:
 - If the topsoil is reasonably dry and friable, the topsoil shall be heaped to a maximum height of 4m. Compaction of the surface to be done.
 - If the topsoil is moist and plastic, the topsoil shall then be heaped up further to a maximum height of 2m. No further compaction required.
- Stock-piled top soil should be planted with rough grasses etc. to limit erosion of soil.

2.3.2. DISPOSAL MATERIALS

- Surplus subsoil to be stockpiled in temporary storage heaps or spread and level on site as per Contractor's proposal. Protection from wind and disturbance shall be provided.
- Never rise soil levels within root spread and above the root flare of existing trees that are to be retained.
- Remaining material to be removed from site, as per Site Waste Management Plan, refer '*B. General Requirements, Section 2.2 Post Tender Submittals*'.

2.3.3. INSPECTIONS

- Contractor to give 2 days notice for inspections of excavated areas and tree/palm pits.

2.3.4. SIZES & DEPTH

- Pits and Trenches: Excavate square or circular pits for trees and palms, and circular pits for large shrubs, with side slopes vertical. Where impractical to do so due to non-cohesive nature of the soil, they shall be so excavated as to provide not less than the specified plan size at the bottom of the excavation. Trim base leaving central area slightly raised to support root ball and assist in drainage. Break base to 100mm depth. Scarify sides of plant pit smeared or smoothed during excavation.
- Fill excavations with water and allow percolating away before positioning trees and shrubs.
- Pest control treatment to be done as required in pits before planting, with approval of Client's Representative.

- The minimum size of tree & shrub pits and planting beds shall be as follows:
 - Trees/ Palms: 1.2m x 1.2m x 1.0m or as specified in the Drawings.
 - Large Shrubs: 0.6m x 0.6m x 0.6m
 - Shrub beds: 0.6m depth x area as per Drawings
 - Ground cover beds: 0.3m depth x area as per Drawings
 - Turf areas: 0.3m depth x area as per Drawings

2.4. GRADING & FILLING

2.4.1. GENERAL

- The work shall consist of grading, contouring, smoothing or otherwise shaping areas beyond the planting beds and lawns at the locations shown on the drawings, including earth mounds.
- Roadway shoulders and soil areas left exposed after planting shall be graded as required to leave a generally smooth appearance conforming to the general shape and cross section indicated on the drawings. The final surfaces shall be raked. All objectionable material, trash, brush, weeds and stones larger than <50 mm in diameter shall be removed from the site and disposed of in an approved manner.
- Make up any deficiency of existing sub-grade level on site with approved backfill to achieve required sub-grade levels.
- Landscape levels will be tied to existing conditions such as existing trees, palms, landscape features, utility lines, pavement and kerbs, etc. Finished grades will bear proper relationship to such control. The Contractor will adjust all works as necessary to meet the conditions and fulfill the intention of the Drawings.
- For areas below earth mounds, cultivate the ground by ripping to a depth of 200mm before mound formation.
- All grades shall provide for natural run off of water without low spots or pockets, flow lines shall be accurately set and shall not be less than 2% gradient, unless otherwise noted. Grades will be smooth and even on a uniform plane without abrupt changes or pockets and slope it away from all buildings.
- The Contractor will verify the surface drainage of all planting areas and notify the Client's Representative of any discrepancies, obstructions, or other conditions considered detrimental to proper execution of the work and plant growth. The Contractor will adjust finished grading with screened soil as necessary.

2.4.2. RIPPING

- Light and non-cohesive sub-grade: When ground conditions are reasonably dry, rip sub-grade thoroughly to a minimum depth of 300 mm.
- Stiff clay and cohesive sub-grade: When ground conditions are reasonably dry, rip sub-grade thoroughly to a minimum depth of 450 mm.
- Remove stones larger than 25mm in any dimension and sticks, roots, rubbish, weeds and other extraneous matter harmful to plants growth and legally dispose of them outside the Project Site.
- Roughly grade to form free flowing contour without humps and water retaining hollows. Operate along with contour when on slope area to avoid significant alteration of formed sub grade level.

- Ripping on slope:
 - Sub-grade at slope between 15 and 27 degree (2:1) shall be ripped parallel to the contour lines of existing sub grade.
 - Sloped sub-grade exceeding 27 degree (2:1) shall not be ripped.

2.4.3. MIXING

- Mixing: Thoroughly blend top soil/ imported sub-standard planting soil applied with the recommended soil amendments and fertilizers to form General Planting Soil Mix. Mixing to be done at approved site area as approved by Client's Representative, before spreading on surface of specific planting area.
 - Delay mixing fertilizer with planting soil if planting will not proceed within a few days.

2.4.4. FILLING

- Planting pits and beds shall be filled carefully to fill all voids and to avoid breaking or bruising roots. Pack backfill firm to prevent settlement. When pit or bed is nearly filled, water thoroughly and allow water to soak away. If settling of the fill occurs after watering, add more fill to bring to level.
- Sloped surfaces steeper than 1 vertical to 4 horizontal should be ploughed, scarified, or broken up sloped so fill material will bond with existing material.
- Spread specified Planting Soil Mix corresponding to planting types and as indicated in the Drawings to meet finish grades after natural settlement. Place and compact fill material in layers as follows:
 - Under planted areas, place specified soil material;
 - Over Drainage Cells place specified soil material;
 - In raised planter areas place specified soil material.
- Do not spread if planting soil or sub-grade is muddy, or excessively wet.
 - Spread approximately one-half the thickness of planting soil mix over loosened sub-grade. Compact the layer reasonably. Spread remainder of planting soil mix.
 - Do not mix or spread specified Planting Soil Mix until sample from each blended batch has analysed, reported and is submitted and approved by Client's Representative.
 - Cover and temporarily store prepared plant mix on site area designated by Client's Representative during the period of soil testing; Take measure to prevent degradation, fermentation, puddling and pest of the soil during the period.

2.4.5. FINISHED GRADING

- Grade planting beds to a smooth, uniform surface plane with loose, uniformly fine texture. Water the plant bed thoroughly and allow settlement of planting soil mix. Finishing level and finished contouring profile as indicated on the drawings.
- Unless otherwise specified, finishing grade for planting areas shall be:

Planting bed	50mm below hard finish level
Lawn area	25mm below hard finish level when compacted
Raised planters	100mm below adjoining hard finish level

Adjoining soil areas Merge

- Before planting, restore planting beds if eroded or otherwise disturbed after finished grading.

2.4.6. TOLERANCE

- The tolerance of the fill level or those on slope shall not be more than 75mm from the proposed level. The same tolerance shall be applicable to the limits and lines of cut and fill. All levels are those applicable at the end of the Defects Liability Period. The Contractor should therefore make the necessary allowance for consolidation, settlement and any other losses and to include all expenses for this in his quoted rates.

2.4.7. DRAINAGE COURSE

- Install Drainage Course for raised planters or planting areas over slab with following procedure:
 - Check and ensure drain hole are adequate, in-place and functioning properly.
 - Place Drainage Mat layer, as specified in the Drawings, including upturns.
 - Lay and fix single layer of Geo-textile on top of Drainage Mat.

2.4.8. PREPARATION FOR TURF

- Check and ensure drainage of lawn area is in place and working properly; report to Client's Representative if any irregularity is spotted.
- Fill the planting bed with the Soil Mix to the required depths as per drawings and meet Final Grade as indicated on drawing.
- Level the soil in gradient as indicated and tread or roll to firm up soil to prevent any settling of soil mass but without compaction; never firm up soil when it is wet.
- Rip through the Top soil to remove impurity, materials harmful to plant growth, stones over 25mm in diameter and to form a fine tilth. If carpet or seeding is not installed on the same day, rake the area again just before sod is laid.
- Protect the prepared plant bed from soil erosion or soil compaction if carpet is not installed on the same day of preparation works.

2.5. TREATMENT OF PITS/BEDS

2.5.1. PRE-PLANTING WEED CONTROL

- The Softscape Contractor will remove all visible weeds before any soil placement.
- Herbicides and weedicides are not allowed.

2.5.2. ANTI-TERMITE TREATMENT

- Any of the following chemicals (conforming to relevant Indian Standards) in water emulsion shall be applied by pressure pumps, uniformly over the area treated:

Chemical	Relevant Indian Standard	Concentration by weight_%
Chlorpyriphos 20 EC	IS: 8944-1978	1.0

Lindane 20 EC	IS: 632-1978	1.0
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- The method of application and the stages it will be applied shall be submitted for approval and this shall conform to relevant IS codes.
- All works related to application of the Chemicals shall strictly follow Health and Safety procedures;
- No work shall be carried out under unsuitable weather conditions, these include:
 - Rain or when the soil is wet due to rain or sub-soil water;
 - Strong winds;
 - Heat waves.
- Chemicals shall be brought to the site of work in sealed original containers. The materials shall be brought in at a time, in adequate quantity to suffice for the work. The material shall be kept in cool and locked stores. The empties shall not be removed from the work site till the relevant item of work has been completed and permission granted by the Client's Representative.
- Chemicals available in concentrated forms with concentration indicated on the sealed containers shall only be used. Chemicals shall be diluted with water in the desired quantity before use, using graduated containers to achieve the desired percentage of concentration.
- Hand operated pressure pump with graduated containers shall be used to ensure uniform spraying and to facilitate proper penetration of the chemical. Continuous check shall be kept to ensure that the specified quantity of chemicals is used for the required area during the operation.
- The treated soil barriers shall not be disturbed after they are formed. If by chance, treated soil barriers are disturbed, immediate steps shall be taken to restore the continuity and completeness of the barrier system.

3. SOILS

3.1. SOILMATERIALS

3.1.1. LOCAL SOIL MATERIAL

- Availability: Top soil to be used for planting mixes is to be transported from the on-site top soil dump. The location of the top-soil dump will be provided by the Client's Representative.
- Composition: Topsoil obtained shall generally be reasonably loose and friable in form containing not more than 10-15% of moisture content. Client's Representative will reject topsoil delivered in a wet and soggy condition. Where required, the Topsoil may be used as sub soil as well.
- Uses: Top soil from on-site dump is to be improved by addition of soil nutrients to comply to form the Soil Mix.
- Testing: Imported Planting Soil shall be tested for N.P.K. value, organic matter content, Cation Exchange Capacity ratio, organic carbon, pH value, physical content of sand, silt and clay and water content. Soil testing shall be arranged by the Contractor and carried out by an approved reputable firm or institute at

Contractor's cost, and the Report shall be submitted to the Client's Representative for approval.

3.1.2. IMPORTEDSUB-SOIL

- The imported sub-soil shall be evenly textured local soil as per specifications, that meets the following as minimum requirements:
 - ☑ pH range of 6.0 to 7.5
 - ☑ Free of grass or weed growth of any kind, sticky clays, or stones 100 mm or larger in any dimension and extraneous materials harmful to plant growth
 - ☑ Total percentage of stones should be less than 30% in volume
 - Salinity range of 2.0 – 4.0 ECe (dS/m)

3.1.3. IMPORTED PLANTING SOIL

- Availability: Planting Soil is prepared off-site for on-site use. The Contractor has to ensure that the prepared soil is mixed as per the requirements for planting mixes specified in this Specification.
- Composition: Imported Planting Soil shall be evenly textured, fertile, dark brown or black coloured medium loam free from weeds, deleterious matter and stones larger than 25mm in any dimension and shall not be excessively sandy, gritty or water logged.
- Uses: Imported Planting Soil may need to be amended per the specification here-in to produce specialty Planting soil Mixes for Palms, seasonals and lawn areas, upon approval of the Client's Representative.
- Testing: Imported Planting Soil shall be tested for N.P.K. value, organic matter content, Cation Exchange Capacity ratio, organic carbon, pH value, physical content of sand, silt and clay and water content. Soil testing shall be arranged by the Contractor and carried out by an approved reputable firm or institute at Contractor's cost, and the Report shall be submitted to the Client's Representative for approval. The soil analysis report shall be submitted to the Client's Representative at least 6 weeks in advance of the programme date for the start of filling operations. Upon approval by the Project Manager the Contractor would be able to prepare the soil stock mix. .
- Imported Planting Soil for General Planting Soil purposes shall comply with the following minimums:

pH value	: 5.5 – 7.5
% Organic Matter	: not less than 7.5%
% Organic Carbon	: 2.0 – 3.0
% Total Nitrogen	: 0.09 – 0.15
Carbon / Nitrogen ratio	: 25:1 – 45:1
Available P ₂ O ₅	: 7mg/100 – 10mg/100g
Exchangeable K ₂ O	: 15mg/100g – 30mg/100g
Cation Exchange Capacity	: 16 – 20 m.e. %

3.1.4. Soil Texture

Sandy loam preferable; soil amelioration to take place only after review of soil reports and approval of Client's Representative.

- Source: The Contractor should submit details of the source of Imported Planting Soil to the Client's Representative. No change in the source of Imported

planting Soil shall be allowed at a later date without the prior approval of the Client's Representative based on such tests and samples as specified here-in.

3.2. SOILAMENDMENTS

3.2.1. INORGANIC SOILAMENDMENTS

- Charcoal: Horticultural charcoal, size not more than 10mm.
- River Sand: Clean, washed, natural or manufactured quartz sand, free of toxic materials, brick and other building materials and wastes, plant matter, roots of perennial weeds and any other foreign matter or material or substance that would render the sand unsuitable for use.

3.2.2. FERTILIZER

- N-P-K 15:15:15 chemical fertilizer as per approval and as recommended by soil analysis. Will be uniformed in composition, free flowing and suitable for application with approved equipment. It will be delivered to the site in unopened containers, each fully labelled and conforming to the applicable fertilizer laws. It will bear the name or mark of the manufacturer.

3.2.3. ORGANIC COMPOST

- Farm yard manure (FYM): Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 13mm sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings.

3.3. PLANTING SOILMIXES

3.3.1. GENERAL REQUIREMENTS

- Planting soil mix shall be fertile, friable soil. It shall be free draining, non-toxic and capable of sustaining healthy plant growth.
- Planting soil mix shall be reasonably free from calcium carbonate, subsoil, refuse, roots, heavy clay, clods, noxious weed seeds, phytotoxic materials, coarse sand, rocks, sticks, brush, litter and other deleterious substances. It shall have a pH not lower than six or greater than eight.
- The Softscape Contractor shall submit a sample to be approved by the Client's Representative/ Landscape Architect prior to commencement of work. This approved sample shall be used as reference for the whole project.
- Topsoil and all planting media shall be free from any termite infestation, whether sub-terranean termites or dry wood termites. In the event termite infestation is found due to any softscape material (which shall be decided by the Landscape Architect, whose decision shall be final and conclusive), the Softscape Contractor shall carry out all necessary replacements and remedial works and make good all defects, damages or other faults (including but not limited to damage to any adjoining surfaces and /or finishes or any other works and properties caused directly or indirectly by the termite infestation).
- Any other organic matter and additives to balance the pH value of the soil mix will not be more than 15% of the total soil mix.

3.3.2. SOIL MIX A

- For use of tree pits, low shrubs and planting areas, comprise the following components in proportions by volume, which shall be mechanically cultivated to the correct proportions, prior to installation or backfilling:

☑ Good quality, loamy topsoil	50%
☑ Coco peat	20%
☑ River sand (no salty materials)	20%
☑ Organic compost	10%
– NPK 15-15-15 Chemical Fertilizer	5 kg/10m ³
(as per approval by Client's Representative/ Landscape Architect)	

3.3.3. SOIL MIX B

- For use in raised planters/planting areas over slab, comprises the following components in proportions by volume, which shall be mechanically cultivated to the correct proportions, prior to installation or backfilling:

– Good quality, loamy topsoil	50%
– Coco peat	10%
– River sand (no salty materials)	10%
– Organic compost	10%
– Lightweight aggregate	20%
– NPK 15-15-15 Chemical Fertilizer	5 kg/10m ³
(as per approval by Client's Representative/ Landscape Architect)	

3.3.4. SOIL MIX C

- For use as potting compost in containerized planters the following components in proportions by volume, which shall be mechanically cultivated to the correct proportions, prior to installation or backfilling:

– Good quality, loamy topsoil	40%
– River sand (no salty materials)	30%
– Charcoal	20%
– Organic compost	20%
– Water-retention crystals – according to manufacturer's specifications	

3.4. EXECUTION

3.4.1. GENERAL

- The work shall consist of furnishing, hauling and placing general planting soil mix in accordance with the details shown on the drawings and the requirements of these Specifications.
- Planting soil mix shall be spread uniformly on the designated areas to the required depths. When necessary, the area shall be cultivated to a sufficient depth to break up any materials which may have been compacted as a result of the spreading operations.
- The finished surface shall be free of all rocks and stones larger than one inch 25 mm in diameter.
- The Softscape Contractor will mix the soil mix composition thoroughly before placing it into the planting pit.

- Clean all subsoil areas to be filled free of rubbish and foreign materials and remove all stones exceeding >25mm in diameter and builders' debris from site. Any areas contaminated by petrol, oil or other toxic builders' chemical substances shall be immediately, fully and completely removed from site before filling commences.
- Excavated silty-clay site materials must not be used in backfilling. Dispose all excavated materials at the location as indicated by the Client's Representative.
- The soil mix must be free from heavy clay or coarse sand, stones, lumps, other vegetation, roots, sticks and other foreign material larger than <25 mm in diameter.
- The soil mix will be of the same composition and structure throughout and will not be delivered, handled or placed in a muddy condition.

4. PLANTING

The softscape work is intended to achieve an instant, visually lush effect. All plant materials are to be of an instant, well-grown quality that is free from any infestation &/or defects. The installation is to be executed to the best of professional horticultural standards thereby achieving the required visual effect – well-established, lush-looking with full, bushy plant specimens & materials.

4.1. GENERAL

4.1.1. RELEVANT CONTRACT DOCUMENTS

The section to be read in conjunction with the BOQ & list of drawings provided in the RFP:

- Contractor to make sure relevant Drawings from other packages are in his possession (e.g. relevant structural details).

4.1.2. SITE CONDITIONS

- Weather Limitations:
 - Proceed with plant bed establishment, planting and related works only when existing and forecasted weather conditions permit the works to be performed. Notify Client's Representative of any works delay and/or any deviation from Works Program approved due to weather limitations.
 - Planting operations shall be conducted under favourable weather conditions during the next season or seasons which are normal for such work as determined by accepted practice in the locality of the project. At the Softscape Contractor's option and full responsibility, planting operations may be conducted under unseasonable conditions without additional compensation.
- Coordination with Lawns: Plant trees and shrubs after finish grades are established and before planting lawns unless otherwise acceptable to Client's Representative. When planting trees and shrubs after lawns, protect lawn areas and promptly repair damage caused by planting operations.
- All planting shall be done during the time specified by the Architect.

- Planting shall not be done in soil that is excessively moist or otherwise in a condition not satisfactory for planting in accordance with accepted horticultural practice.
- Plants in containers shall be planted and watered the same day the plant is potted.
- Plants shall be removed from containers in such a manner that the root ball is not broken. Plants with broken root balls or with root balls that fall apart while being planted may be rejected.

4.1.3. PRE-PLANTING MEETING

- Contractor shall coordinate a Meeting with the Client's Representative prior to the installation of any of the works here-in.

4.1.4. DELIVERY, STORAGE AND HANDLING

- Dig and immediately deliver plants prepared at the off-site or on-site nursery after site preparation for planting to be completed.
- Handle plants in protective manner and keeping natural form,
 - ☑ Protect bark, branches, and root systems from sunscald, drying, sweating, whipping, and other handling and tying damage,
 - ☑ Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape,
 - ☑ Provide protective covering and any other measures to plants during delivery to avoid damages,
 - ☑ Do not drop plants during delivery and handling,
 - ☑ Handle planting stock by root ball, especially as lifting,
 - ☑ Tie up fronds of palm trees reasonably to protect fronds and meristem from mechanical damage,
 - ☑ Maintain and prevent loss of plant label during delivery,
- All equipment and transport vehicles required, including cranes required to transport semi-mature trees and large palms, are to be informed to the Client's Representative along with the delivery schedule to ensure adequate access as required.
- Deliver plants to construction site and/or On-site Nursery as designated by Client's Representative:
 - Provide Procurement Schedule as set out in '*B. General Requirements & Submittals, Section 2.2. Post Tender Submittals*'.
 - ☑ Schedule item delivery date in accordance with the approved overall project schedule.
 - Ensure the provision of watering system is in place and adequate to plants temporarily stored in On-site Nursery and verify with Client's Representative.
 - Notify Client's Representative in writing prior to delivery for on-site material inspection and material confirmation arrangement and of list of material to be delivered.
 - Before on-site material inspection and subsequent approval by Client's Representative, the plants and materials shall not be used.

- Replace all plants and materials rejected by Client’s Representative.
- Document all plant material damaged, dead or degraded during shipment and notifies Client’s Representative.
- ☑ Receive, unload and maintain plants as delivered to site prior to installation.
- ☑ Plants of the same species used in any defined area should be of similar specifications and form.
- If planting is delayed more than six hours after delivery, temporarily store plants and/or turf at On-Site Nursery as specified;
 - ☑ Store and maintain nursery plants grown in shade conditions in equivalent shade conditions.
 - ☑ Plants stored on-site shall be spaced to allow clearance for light and air and shall not be spaced together such that branches might die or wilt.
 - ☑ Plants shall be stored on free draining soil surface without deleterious materials.
 - ☑ Set balled stock on ground and cover ball with soil, jute bag, sawdust, or other acceptable material to keep moist.
 - ☑ Water root systems and crown of plants stored on-site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition.
 - ☑ Do not remove container-grown stock from containers before time of planting.
 - ☑ Trees and palms which are not immediately planted in their respective positions at On-site Nurseries shall be stood upright on level ground, protected and maintained in good condition by the Contractor at location approved.
- Client’s Representative shall reject any plants dead, dried out, wilted or degraded due to improper or prolonged storage.

4.1.5. TURF

- Harvesting to be done using turf cutter;
- Deliver turf in time for planting within 24 hours of harvesting to avoid stacking. Do not stack to a height of more than 1m;
- Take all necessary precautions to avoid breakage, drying out and deterioration of turf including covering the stored turf at all times;
- Store turf in shade area and water turf to keep moist as necessary. Do not use turf that shows any signs of deterioration;
- Lay on site sample area of 5m² of turf for Landscape Architects approval.
- Delivery of Fertilizer and Bulk Materials:
 - Fertilizers shall be delivered to site in original unopened containers bearing manufacturer’s guaranteed chemical analysis, name, and trademark.
 - ☑ Bulk materials including organic soil amendment, inorganic soil amendment, mulch, etc. shall be delivered to site in proper containers with certificate that includes manufacturers, quantity, chemical analysis, and trademark.
 - Keep all sacks, bags, containers and the like On-site for inspection by Client’s Representative.

- ☑ Stored material, particularly chemicals and fertilizers, are to be covered and enclosed in a defined area, or contained in any other way as required, to prevent mixing with nearby soil or water and causing soil and ground water pollution.
- Storage of soil materials
 - ☑ Stockpile all soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - ☑ Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.
- Transportation:
 - ☑ In preparing plants for moving, all precautions customary in good trade practice shall be taken. Workmanship that fails to meet the highest standards will not be accepted. All plants shall be dug to retain as many fibrous roots as possible. All plants shall be dug immediately before moving unless otherwise specified.
 - ☑ Prior to transportation, all plants shall be dug, handled, prepared and packed for shipment with care and skill, in accordance with recognized standard practice for each species. The root systems of all plants shall not be permitted to dry out at any time.
 - ☑ Plants shall be protected at all times against the sun and the wind while in transit.
 - During transportation in closed vehicles, plants shall receive adequate ventilation to prevent “sweating”. Plants delivered in a wilted, burned or wind damaged condition will be rejected.
- Delivery:
 - ☑ All plant balls shall be firm and intact. Plants whose stems are loose at the root collar may be rejected
 - ☑ Plants delivered, inspected and found acceptable for planting shall normally be planted within 24 hours after delivery to the project site. Plants which cannot be planted within 24 hours after delivery shall be stored at onsite nursery.
 - ☑ Plants with broken, loose or tampered root balls will be rejected.
 - ☑ All temporarily stored plants shall be protected from extreme weather conditions and roots shall be kept moist.

4.2. PRODUCTS

4.2.1. GENERAL

- General: Furnish nursery-grown trees and shrubs with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
- Provide trees and shrubs of sizes and ball or container sizes as indicated. Trees and shrubs of a larger size may be used if acceptable to Client’s Representative, with a proportionate increase in size of roots or balls.

- Root flare shall be visible before planting.
- Label one tree and one shrub of each variety in every delivery batches with a securely attached waterproof label indicating their species, size, serial number, nursery source and noted planting location.
- Plant List: A complete list of plants, including a schedule of qualities, sizes and other requirements is shown on the Drawings and shall be included in the Bill of Quantities.
- Nomenclature: Botanical plant names shall be as per the International Code of Botanical Nomenclature. Common names of plants will conform to names generally accepted in the local nursery trade and as interpreted by the Landscape Architect. In all cases of dispute, the decision of the Landscape Architect will be final.
- Quantities
 - ☑ The Landscape Sub-Contractor will provide sufficient quantities of plant materials needed to complete the work as shown in the Drawings for the lump sum price items.
 - ☑ Quantities indicated in the Drawings for unit price items are approximate only and are provided for the convenience of the Landscape Sub-Contractor. The Bill of Quantities will have precedence over the Drawings.
 - ☑ In the event that discrepancies occur between the quantities of plants in the Bill of Quantities and those shown on the drawing, the Bill of Quantity shall take precedence. In any event, it will be the Landscape Sub-Contractors responsibility to make sure that correct quantities provided on site.
- Watering: The Main Contractor will provide water for the period during the installation of the landscape works. The Landscape Sub-Contractor will be responsible for providing hoses, water trucks and necessary equipment to ensure that there is adequate water for the plants and thoroughly water each.

4.2.2. TREES AND PALMS

- Trees: Provide all trees with single sturdy straight trunk (or as indicated on drawing), branching spread equal or greater than indicated in the Plant Schedule (or as indicated on Drawings), well-balanced crown with sufficient branches and spread dimension as indicated on drawing, intact leader, with height, calliper and form as required.
- Palm Trees: Provide Palm Trees with form according to natural development of species and type or special form requirements as indicated in the Plant Schedule or on the Drawings, with relationship of calliper and height according to health growth stock of species and type, with upright habit (unless otherwise specified) and balanced crown form, with trunk height or total height, spread, number of fronds as specified in the Plant Schedule, with trunk free of lesions, sign of deterioration and damaged or deformed leave scale and with a health and sound meristem.
- All Trees & Palm Trees shall fulfil requirement of as listed in the Plant Schedule or as indicated in the Drawings.
- All plants shall be typical of their species or variety. All plants shall have normal, with developed branches and vigorous root systems. Trees and palms will be

straight and have uniformed shape without damage. They shall be sound, healthy, vigorous, and free from defects, plant disease, insect eggs, borers, and all other forms of infections. Trees with abrasions on the bark, sunscalds, disfiguring knots or damaged limbs over 25mm diameter which have not been pruned, will be rejected.

- All plants shall be nursery grown unless otherwise stated and shall have been growing under the same climatic conditions as the location of this project after the award of Sub-Contract. Refer to the drawings for specific forms and branching of plant material.
- The minimum acceptable size of all trees after pruning, with branches in normal positions, will conform to the measurement specified in the Bill of Quantities unless stated otherwise.
- Calliper measurement will be taken at a point on the trunk 1.0 meter above the ground.
- Plants that meet the specified measurement, but do not possess a normal configuration or balance of height and spread will be rejected. All trees supplied will be branched as specified in the Bill of Quantities. Natural form of the trees must be kept after pollarding. De-topped trees will be rejected. All trees supplied must have terminal shoots.
- Plant materials larger in size than specified may be used, but are subjected to the approval of the Landscape Architect. The use of larger plant material will make no change in the contract price. Height will not be substituted for balanced form.
- All plant materials will have a root ball of sufficient size to support the plant's recovery from transplanting. Any plant materials delivered with small or inadequate root balls will be rejected. In all cases, the decision of the Landscape Architect will be final.
- All trees and palms will be transplanted from growing site and planted at project site by mechanical crane whenever possible.
- All specimen trees must have a minimum crown spread of not less than half the size of the overall height.
- All instant trees must have minimum four main branching from the trunk with a minimum crown spread of not less than half the size of overall height.
- In case discrepancy between specification given in the Plant Schedule and indication on the Drawings, Drawings shall take precedent.

4.2.3. SHRUBS

- Shrubs: Provide shrubs grown from transplanted seedling or rooted cutting, pruned to encourage bushiness, with minimum of 3 numbers of canes/stems, with spread dimension at least two-third of height, and with well-developed root system.
- Shrub sizes indicated are sizes after pruning.

4.2.4. GROUND COVER PLANTS

- Provide ground covers of species, height, spread as indicated in the Plant Schedule or on the Drawings, established and well rooted in pots or similar containers of reasonable size.

4.2.5. SEASONALS

- Provide seasonals of species, height, spread as indicated in the Plant Schedule or on the Drawings, established and well rooted in pots or similar containers of reasonable size.

4.2.6. CLIMBERS

- Provide climbers of species as indicated on drawing and complying with requirements as follows:
 - ☑ Two-year plants with heavy, well-branched tops, with not less than 3 runners (shoots) 450 mm or more in length (or as indicated on drawing), and with a vigorous well-developed root system.
 - ☑ Provide field-grown climbers. Climbers grown in pots or other containers of adequate size and acclimated to outside conditions will also be acceptable.

4.2.7. BAMBOO

- Provide healthy, field-grown plants from a commercial nursery, of species, variety and size as indicated on drawing complying with requirements as below:
 - ☑ Height as per Plant Schedule (or Drawings)
 - ☑ Vigorous rhizome system.
 - ☑ Minimum 8 numbers of culms (or as indicated in the Plant Schedule) supplied with branches and leaves.
 - ☑ Provide field-grown bamboo in pot, container, or fabric bag of adequate size.

4.2.8. TURF GRASS CARPET

- Provide viable carpet of uniform density, colour, and texture, strongly rooted, free of disease, pest and weeds, and capable of vigorous growth and development when planted.
 - ☑ Turf grass Species: Turf species as indicated in the Plant Schedule;
 - ☑ Carpet Dimension: 500mm (Length) x 300mm (Width) x 25mm (Thickness)
 - ☑ Tolerance: 10% difference.

4.2.9. FERTILIZER

- Material handling: Chemical fertilizers shall be stored in waterproof sealed bags under shelter away from water and direct sunlight.
- Commercial Fertilizer (Post-planting fertilizer, only if recommended by soils Report): Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - ☑ Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.
- Slow-Release Fertilizer (Pre-planting Fertilizer): Granular or tablet fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - ☑ Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

4.2.10. GUYING FOR LARGE/SPECIMEN TREES & PALMS

- Guy Cables: 5-strand, 4.8 mm diameter, galvanized-steel cable, with zinc-coated turnbuckles, a minimum of 75 mm long, with two 10-mm galvanized eyebolts per Detail.
- Deadman Anchor: Pressure-Preservative (alternate material to be suggested) with thickness by length as indicated, pointed at one end per Detail.
- Hose Chafing Guards: Reinforced rubber hose at least 12 mm in diameter, black, cut to lengths required to protect tree trunks from damage per Detail.

4.2.11. STAKING FOR TREES & PALMS

- Wooden/Bamboo Stakes: Wooden/Bamboo with at least 50mm diameter flat cut at both end with length as per detail.
- Trunk Padding: Rubber sheath cut to lengths to protect tree trunks from damage as per Detail.
- Rubber Ties per Detail.
- Bamboo Stake Foot Plate: For Tree installation with-in Tree Grates.

4.2.12. SUB-SURFACE DRAINAGE

- Drainage mat: The sub-soil drainage modules shall be Versicell cellular drainage modules supplied by Elmich or approved equivalent. It should be a permeable modular structural drainage product manufactured from recycled plastic for filter system, an alternate of drainage gravel, equivalent and or approved material that can perform as aggregate; allow free drain within raised planter, specified planter box or for planting areas over slabs. Refer to Bill of Quantities for specification.
- Geo-textile: Woven or non-woven needle punched, hydrophobic geo-textile membrane laid over drainage mat for raised planters and planting areas over slab. 160-180gsm or as specified in the Bill of Quantities, fiberglass mat or equivalent approved. Mat laid at site with appropriate overlaps of 200 mm.

4.3. EXECUTION

4.3.1. PLANTING - PREPARATION

- Examine areas to receive soil, plants and lawns for compliance with requirements and conditions affecting installation and performance.
- Locate and clearly flag utilities, trees or vegetation to remain or to be relocated
- Proceed with installation only after unsatisfactory conditions have been corrected
- Lay out individual tree and shrub locations and areas for multiple plantings as set out in the Drawings. Stake locations, outline areas, adjust locations when requested, and obtain Client's Representative's acceptance of layout before planting. Make minor adjustments as required.

4.3.2. TREE, PALM AND LARGE SHRUBS

- **Trees & Shrubs:** Set Trees and Shrubs plumb and in centre of pit or trench with root ball resting on a soil bench as per Drawings.
- **Palms:** Set Palms plumb and in centre of pit or trench with top of root ball 25mm below adjacent finish grades.

- Before planting, verify that root collar is not visible at top of root ball covered by 25mm of soil.
 - ☐ Remove covering from tops of root balls and partially from sides, but do not remove from under root balls or carefully remove root ball from container/fabric bag. Do not use planting stock if root ball is cracked or broken before or during planting operation.
 - ☐ Place appropriate Planting Soil Mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of planting soil mix. Soil material shall be carefully firmed around the roots or the ball of the plant so as to eliminate air pockets. Soil shall be compacted around the roots or ball of the plants after planting operations to stabilise the rootball and ensure the tree is upright and vertical.
 - ☐ Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water, as per detail drawing.
 - ☐ Remove any wrapping and tying materials on trees/shrubs.
 - ☐ Remove any wrapping and tying materials from palms; if planting is not during planting season, keep fronds tied until establishment at location.
 - ☐ Immediately after planting, all plants shall be thoroughly irrigated until the soil fill around and below the roots or the root ball of each plant is saturated.
- Tree and Palm Planting on Slope: Planting should be carried out as soon as excavation or loosening of the prepared plant bed and immediately is fully supported as specified. Formed saucer indentation around tree or planting basin should be made with fall to drain as indicated on drawing.

4.3.3. SHRUB, GROUND COVER, SEASONALS, CLIMBER, BAMBOO

- Plant **Ground Cover, Seasonals, Climber** and **Bamboo** as following as general requirement:
 - ☐ Set out and space as indicated on drawing.
 - ☐ Dig holes large enough to allow spreading of roots and backfill with planting soil type as indicated in the Drawings.
 - ☐ Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
 - ☐ Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
 - ☐ Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

4.3.4. TURFING

- Harvest turf (carpet grass) with turf cutter. Lay turf within 24 hours of harvesting. Do not lay turf if dormant or if ground is muddy.
- Lay turf pieces to form a solid mass with tightly fitted joints. Butt ends and sides of each piece; do not stretch or overlap. Stagger turf strips or pads to offset joints in adjacent courses. Avoid damage to sub-grade or turf during

installation. Tamp and roll lightly to ensure contact with sub-grade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of turf if and when shrinkage occurs; remove excess to avoid smothering turf and adjacent grass.

- Laying on slopes:
 - ☑ Lay turf pieces across angle of slopes exceeding 1:3.
 - ☑ Anchor turf pieces on slopes exceeding 1:6 with wood pegs or steel staples spaced as recommended by the grass carpet manufacturer, not less than 2 anchors per carpet strip to prevent slippage.
- Saturate turf with fine water spray within half hour of planting. During first week after planting, water as necessary to maintain moist soil and moisten 100-150mm deep of soil below turf layer as watered every time.
- The top dressing media for all turf will consist of the following:
 - ☑ 100% good quality, loamy topsoil
 - 5kg/m³ of NPK 15-15-15-fertilizer

4.3.5. GUYING & STAKING

- **Guying for Large Palms and Semi-Mature Trees:** Unless otherwise indicated, securely attach no fewer than 3 guys to stakes 500 mm long, driven to grade.
 - ☑ For trees more than 150 mm in calliper, anchor guys to pressure-preservative-treated Deadman, 100 mm in diameter and 500 mm long buried at least 450 mm below grade. Provide turnbuckle for each guy wire and tighten securely.
 - ☑ Secure trees with guy wire looped as detailed with-in reinforced rubber hose at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.
 - ☑ Paint turnbuckles with luminescent white paint.
- **Stakes for Standard Trees & Palms:** Unless otherwise indicated, provide bracing system with stakes around perimeter of trunk as form of tripod to secure until established.
 - ☑ Place 2 X 2 stakes on either side of the tree trunk. Supporting point should be at one third of the trunk height. Firmly press end of all four bamboo stakes against finished grade and into the ground for stability but without disturbing root ball area. Care should be taken that the stakes remain firm and stable throughout the staking period.
 - ☑ Cushion contact area between stake and trunk with 5mm thick, 150 x 150 rubber tire trunk protection sheath.
 - Secure Bamboo stakes together where they join at contact area at trunk with rubber ties in an '8' profile, as detailed in the drawings and mock-up approved by the Landscape Architect/ Client's Representative.
 - ☑ For Tree Grate installations, secure stakes to Stake Foot Plate as per detail.
- **Staking for Climbers:** For staking against walls, pergolas and other as indicated.
 - ☑ Provide 25mm diameter by 2000 ht. Bamboo poles driven 300mm depth to soil.
 - ☑ Attached and twist runner of climbers around bamboo pole.

- ▣ Tie climbers to building wall or vertical members of pergola or railing as available.
 - **Bamboo on slope:** For bamboo planted on slope area or over 2 meter in height; provide support by tying and staking with bamboo poles of minimum 50mm diameter.
- 4.3.6. SUB-SOIL DRAINAGE IN RAISED PLANTERS OR OVER SLAB AREAS
- The sub-soil drainage system shall be provided and endorsed by an engineer or specialist with a reputable track record in quality assurance.
 - Proprietary materials supplied shall be identified clearly with the product's name and product information.
 - All installed subsoil drainage panels shall be joined with no gaps between them. The ends shall be properly sealed with geotextile to ensure soil particles cannot enter the subsoil drainage panels.
 - Prior to installation, the Contractor shall submit Method Statements and/or Shop Drawings endorsed by the manufacturer for the installation of the sub-soil drainage system. The latter shall be on at least A3 size paper and in a CAD-recognizable format.
 - The subsoil drainage panels installed vertically shall be temporarily supported in position either manually or by props until backfilling takes place.
 - Suitable planting soil mix shall be used for backfill and laid in lightly compacted layers to an elevation of 100 mm below top of planter, allowing natural settlement.
 - Care should be taken not to damage the subsoil drainage panels or the geotextile covering during backfill.
 - Clay material shall not be used as backfill. The disposed clay soil shall be replaced with sand backfill. Sharp stones that may puncture the geotextile shall be removed from the backfill material before backfilling.
 - The contractor shall organize a full inspection of the subsoil drainage panels prior to completing the drainage system and backfilling unless otherwise directed.
 - The installed subsoil drainage panels shall be protected during all stages of construction traffic, be maintained and be free of accumulation of silt, debris or other foreign material until the time of final Inspection.
- 4.3.7. TREE AND SHRUB PRUNING
- Remove only dead, dying, or broken branches. .
 - Prune, thin and shape trees and shrubs as directed by Client's Representative.
 - Prune, thin and shape trees and shrubs according to standard horticultural practice. Prune trees to retain required height and spread. Unless otherwise indicated by Client's Representative, do not cut tree leaders; remove only injured or dead branches from flowering trees. Prune shrubs to retain natural character or achieve desired form as specified in the drawing.
 - Clean all wounds with an approved fungicidal.
- 4.3.8. TRANSPLANTING
- Transplant trees and shrubs designated for relocation to locations shown on the Drawings.

- Prune, dig, ball and burlap, and move designated trees for relocation to the designated plant storage area for storage of materials until final planting areas are prepared, if required.
 - ☑ Maintain plants in storage areas by bracing plants in vertical position and setting balls in enclosed berms of topsoil or bark. Water as required for maintaining adequate root moisture.
 - ☑ Re-burlap plant balls if required before final transplanting operations.
 - ☑ Move to final locations shown on the drawings and plant in accordance with specified tree planting requirements.

4.3.9. DISPOSAL

- Disposal: Remove surplus soil material, unsuitable Subsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property only upon the direction and approval of Client's Representative.
- Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to an approved recycling facility or dumpsite.

4.3.10. COMPLETION INSPECTION

- When all the works are to be completed and ready for inspection for issuance of Completion Certificate, the Contractor should notify the Client's Representative at least 7 days in advance to confirm completion and any outstanding works items.

C. Scope Under Post Construction Period**1. MAINTENANCE****1.1. GENERAL**

Maintain and establish plantings by carrying out the Maintenance Works as described here.

1.1.1. SCOPE

- Planting Maintenance will continue for **twelve (12) months** upon receiving the **Handover Certificate** from the Landscape architect under the Main contract.
- Care of the plant materials during installation is not considered part of the maintenance period.
- The Contractor shall be responsible for the care and protection of trees, shrubs and plants planted. He will maintain all installation areas in optimum growing condition and appearance at all times. Such care and protection shall include, but not be limited to, the watering of stock, removal of trash and debris, controlling weeds, repairing, adjusting or replacing stakes and guying, furnishing and applying sprays and dust to combat diseases and insects and taking such precautions as necessary to prevent damage from sunburn or other hazards.
- The Landscape Sub-Contractor shall remove and replace, at his expense, all dead plants and all plants that show signs of failure to grow or which area so injured or damaged as to render them unsuitable for the purpose intended, as determined by the Architect.

1.1.2. SUBMITTALS

- Operations & Maintenance Manual: This should be submitted upon commencement of the maintenance period and shall include schedule and instructions for all activities to be undertaken for operations and maintenance of established works.
- As-built drawings:
 - The Contractor shall prepare As-built drawings and certify on these drawings that the drawings reflect the actual works installed.
 - The As-Built Drawings shall be submitted to the Project Architect at Practical Completion for checking before submission.
 - Three sets of these drawings (hardcopy and softcopy) shall be submitted to the client post approval and record.
 - The Contractor shall ensure that this submission of As-Built drawings will not delay subsequent inspections and tests by the relevant authorities; otherwise he shall be fully responsible for any consequence due to his delay.

1.1.3. MAINTENANCE SCHEDULE AND MONTHLY STATUS REPORT:

- Provide Maintenance Schedule and Monthly Status Report, including, but not limited to, the following:
 - Name of maintenance Foreman or person filing report.
 - Period covered by report and other key dates.
 - Names of crew persons working on job. Client's Representative to be notified of changes in personnel within 2 weeks.
 - Work performed and completed to date and projected work for the next month.

- Synopsis of weather conditions for the month noting extremes in wind, rain, temperature, etc.
- Application of agricultural chemicals and fertilizers used on site including type, rates, purpose for applications, and results of application.
- List of maintenance equipment used on site.
- Condition of plant materials, specifically noting physical abnormalities related to temperature, moisture, insects, diseases, poor drainage, death and replacement, etc.
- Include reports or recommendations by outside or consulting agencies.
- Report vandalism.
- Irrigation schedule, changes and current status.
- The Contractor will assume the responsibility of maintenance including watering, fertilizing, spraying, weeding, forking, repairing and straightening stakes, etc. upon completion of planting until the end of the Maintenance period.
- Contractor shall visit and walk around the site with the Client's Representative to observe and document existing site condition and to clarify scope of maintenance in addition to routine maintenance works.

1.1.4. RECORDS

- Ensure that approved supervisor reports to the Client's Representative before and after carrying out each day's Maintenance Works and makes a signed record each day:
 - Stating works carried out.
 - Indicating the percentage completed for each day's operation.
 - Obtaining countersignatures from the Construction Manager's site staff and keeping records available for inspection.

1.1.5. VANDALISM

- Provide proof on dead or damages of plants due to vandalism in writing with photographic record to Client's Representative within 3 days after occurrence.

1.1.6. PRE-MAINTENANCE INSPECTION

- At the completion of all contract operations and prior to the beginning of the formal maintenance period, the Pre-Maintenance Inspection will be held. At the completion of the formal maintenance period, the Final Inspection will be held.
- The Contractor will request these inspections of the Landscape Architect in writing five (5) working days prior to the completion of work in order that a mutually agreeable time for inspection may be arranged.
- The Architect, Landscape Architect, Contractor and Client/Client's Representatives, will be present at the inspection.
- At the time of inspection, the Contractor will have all the areas under the sub-contract neatly cultivated, raked and kept free of weeds, dead leaves and debris. All stakes, guys and plant basins will be in good order. Lawn will be cut neatly and all clippings removed.

- If all or certain portion of the works are not acceptable under the terms and intent of the Drawings and Specification, the formal maintenance period for the unacceptable works and any related item will be extended at no cost to the Client. All rectification works must be accepted by the Landscape Architect.
- The Landscape Architects decision as to what constitutes compliance with requirements and suitability shall be final and binding, the true intent and meaning of the contract being that the whole of the contract works shall be completed to the satisfaction of the Landscape Architect. No rejected item shall be considered as a reason for failure to meet the completion date.
- If, after the Pre-Maintenance Inspection, the Landscape Architect is of the opinion that not all works are acceptable, a Landscape Defects List must be drawn up and defects completed within seven (7) days, unless otherwise stated, and the Landscape Architect will set the final inspection date to verify the rectification works.
- On inspection, if it is the opinion of the Landscape Architect that the rectification works carried out are not acceptable, the Client's Representative will issue a direction to the Contractor to make good the defects, which need to be completed in seven (7) days, unless otherwise stated. If the Contractor fails to do so, the Client may employ other Contractors to give effect to the direction. The extra cost (if any) of doing so shall be deducted from any monies otherwise due or recover the same from the Contractor.

1.1.7. FINAL INSPECTION

- Inspection of the planting to determine its final acceptance will be made at the end of the Maintenance period by the Landscape Architect. If after the Final Inspection, the Landscape Architect is of the opinion that all works have been performed satisfactory, and in accordance with the maintenance schedule as stated in the Bill of Quantities, the Client's Representative will issue the Contractor a Handover Certificate.
- Submit a written request to Client's Representative for inspection at least 10 working days prior to end of the Maintenance Period.
- Prior to final approval of works, do the following:
 - Re-turf or replant areas where necessary to obtain full and even coverage.
 - Remove all debris resulting from works of this Section.
 - Fill all depression and eroded channels with sufficient planting soil mix to adjust grade to ensure proper drainage, compact lightly, and replant filled areas in accordance with drawing indicated.
- Soft works (landscape installation) shall not be considered complete if the Contractor fails to complete any one of the items below:
 - Each plant shall be alive, vigorous and thriving, showing signs of growth and no signs of stress disease or other weakness. Plants not meeting these conditions shall be replaced.
 - Items listed as defective are completed and approved by Client's Representative.
 - Final grades approved in accordance with drawing indicated.
 - Site free of weeds.

- All plant materials including trees, palms, shrubs, groundcovers, lawns installed in accordance with drawing indicated or as per site instructions of Client's Representative.
- All materials fertilized and soil amendment completed and in place.
- If, after the Final Maintenance Inspection, the Landscape Architect is of opinion that not all works are acceptable, a Landscape Defect List will be issued to the Contractor. Rectification works on the Landscape Defect List must be completed within seven (7) days, unless otherwise stated, and the Landscape Architect will set the final inspection date to verify the works.
- On inspection, if it is the opinion of the Landscape Architect that the rectification works carried out are not acceptable, the Client's Representative will issue a direction to the Contractor to make good the defects, which need to be completed in seven (7) days, unless otherwise stated. If the Contractor fails to do so the Client may employ other Contractors to give effect to the direction. The extra cost (if any) of doing so shall be deducted from any monies otherwise due or recover the same from the Contractor.
- Perform corrective work and materials replacement in accordance with drawing and specification indicated at no additional cost.
- After corrective work is completed, the Contractor shall again request a review for final inspection as outline above.
- Continue maintenance for the project until such time as corrective measures have been completed and accepted.
- The Landscape Architect has the right to shorten the maintenance period by issuing a landscape Handover Certificate to the Contractor upon which the Client has the right to terminate the maintenance service by the Contractor and the remaining period shall cease.
- Locations of plants that are replaced during the Maintenance Period shall be recorded by the Contractor and submitted to Client's Representative as a set of record drawings. These plants shall remain under warranty for one complete growing season after their installation to ensure their survival; this period shall be a minimum of 4 months and a maximum of 12 months after installation, depending on the timing of replacement. At the end of said growing season, Client's Representative and the Contractor will inspect the plants for health and vigour.

1.2. CARE AND PROTECTION OF PLANTS

1.2.1. TOOLS AND EQUIPMENT:

- Do not use tools and equipment at the site which has not been thoroughly cleaned of mud, sap, residue etc., after previous use elsewhere.
- Sterilize pruning tools previously used on diseased plant materials at other sites prior to their use at the site. When pruning diseased plant materials at the site, sterilize equipment after each cut to prevent the spread of disease.

1.2.2. DAILY INSPECTIONS:

- Daily inspection should be part of the maintenance routine. In addition, a comprehensive inspection should be conducted on a monthly basis to analyse plant materials for signs of stress, damage and potential form the following:

- Infestation: Moles, rats or other gnawing rodents, snails, slugs, insects, etc.
- Disease: Withering of leaves, die-back, blackened or galled branches, wilt, fungus growths, cancer, bleeding bark, root rot, stunted growth, discoloured or blotchy foliage.
- Loss of vigour: In normal healthy plants, this is seen as a failure to thrive, a dropping of unopened flowers, leaves that are small for the species, or thin or leggy growth. These symptoms may have many causes: heat stress, desiccation, wind damage, improper irrigation, incorrect installation, damage from construction or maintenance vehicles, or altered growing condition. Treat each instance individually when determining cause of decline and treatment.
- Fertilizer or soil chemical imbalance: Fertilizer 'burn' at leaf margins, unusually light green or yellowish-green leaf colour (chlorosis), yellow/brown salt 'burn' at leaf margin, or other symptoms. Make sure that spraying an application of fertilizers and soil chemical is done discriminately and in accordance with manufacturers' recommendations and confined to the areas affected.

1.2.3. CLEARING UP

- Remove dead and/ or over hanging branches of existing trees, palm, shrubs and groundcovers.
- Remove any garbage and unsightly foreign materials.
- Remove dead vines and plant materials.

1.2.4. WEEDING

- Keep planting areas free of weeds and undesirable grasses through daily weeding if required. Remove the entire root system of all weeds.
- Dispose off all weeds in appropriate trash container and remove from site.

1.2.5. PRUNING

- Pruning Procedures: Carry out pruning using sharp tools to give a clean cut, free from ragged edges and:
 - Prune all trees as directed by the Landscape Architect to establish desired form, habit and appearance.
 - Ensure cuts are immediately above buds or branches and slope away from an outward facing bud.
 - Prune back branches, to the main stem to encourage bushy growth and improve flowering.
 - Remove dead, damaged or crossing branches and dead flower heads.
 - Retain the individual habit and shape of the plant, unless otherwise directed or the intention of the design is to form a clipped hedge.
 - Prune flowering shrubs by removing the shoots bearing the dead flower heads and/or the new growth dependant on species.
- Do not clip shrubs into balled or boxed forms unless specifically called for in the design. Only shrubs designated as "hedges" are to be sheared. Periodically pinch back 'wild' growth on shrubs to maintain uniform habit.

- Immediately dispose of pruning and trimming debris from trees and shrubs off site at an approved dumpsite.
- Edge groundcover adjacent to walks to keep in boundary. When appropriate, trim top growth in spring by mow in order to renew growth, improve density and attractiveness, and to achieve an overall even appearance. Do not mow until plants have been firmly established and have formed a dense mat. The Client's Representative will determine mowing height. Dispose of groundcover clippings off site.

1.2.6. THINNING

- Where instructed by Client's Representative reduced the number of plants due to overcrowding as follow:
 - Dig up plants, transport and replant in locations as directed or remove from site as approved by Client's Representative.
 - Backfill the excavated void with Planting Soil Mix.

1.2.7. AERATION

- Shrub areas, including bamboos, climbers, and perennial: immediately after fertilizing, cultivate the soil by hand using fork to a depth of 100mm.
- Ground cover areas: immediately after fertilizing lightly break up the soil by hand using a fork to a depth of 75mm.
- Grass areas: immediately before fertilizing aerate the soil by inserting a fork to a depth of 100mm at 200mm centres.

1.2.8. WATERING

- The contractor shall be supplied with non-toxic water for irrigation at pre-defined locations by the client. The Contractor shall provide at all times a supply of non-toxic water to the planting area from the provided water source. The Contractor shall make due allowance in this rates for importing non-toxic water during periods of restrictions or pipe work failure if a piped supply has been laid on.
- Water all planted areas so as to maintain a moist soil (not saturated) through the depth of the soil profile adequate to ensure satisfactory establishment and as minimum:
 - Adjust watering as per rainfall and weather conditions.
 - Water desert origin plants at a much lower frequency to keep their growing medium reasonably dry to suit their species-specific habit; avoid over watering which might cause rotting of root and trunk
 - Carry out watering either early mornings or late afternoon or both.
 - Regulate watering as necessary to avoid erosion and gulling.

1.2.9. CONTROL OF PEST AND DISEASE

- Fertilize as needed in accordance with the manufacturer's recommendations and five days prior to the Final Inspection.
- Regularly inspect any sign pest invasion, fungal growth or disease outbreak, report and take immediate counter-action to prevent further spread and reduce damages to plants.
- Immediately effect remedial measures by spraying with solution of pesticide or germicide approved in strict accordance with the manufacturer's instruction

- Remove by corrective pruning plant material infested by pest or disease immediately after being identified.
- Transport diseased or infested plant materials or plant material cuttings completely off the site immediately after their removal. Do not permit pruned materials from diseased planting to be stockpiled anywhere on site at any time.
- Inspect new plant materials for signs of insect infestation or disease upon delivery to the site. If possible, quarantine new materials in the nurseries for 3 weeks prior to installation.
- Immediately wash off sprayer drippings and materials accidentally spilled on plants.
- Exercise caution, proper supervision and take necessary measures to avoid scorching of plants.

1.2.10. LAWN MAINTENANCE

- Maintain all lawn areas by watering, fertilizing, weeding, mowing, aeration, replanting, and other operations. Roll, re-grade, and replant bare or eroded areas and re-mulch to produce a uniformly smooth lawn. Provide materials and installation the same as those used in the original installation.
- Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawn uniformly moist to a depth of 100mm.
- Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
- Water lawn with fine spray as required unless rainfall precipitation is adequate.
- Mow the lawn as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowing. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowing to maintain the following grass height:
 - Mow the grass to a height of 25 mm whenever the average height exceeds 50mm
 - Grass will be cut according to the contours of the ground.
 - All clippings must be removed on the same day.
- Lawn installations shall meet the following criteria as determined by Client's Representative:
 - Satisfactory Lawn: At the end of maintenance period, a healthy, well-rooted, even-coloured, viable lawn has been established, free of weeds, open joints, bare areas, and surface irregularities.
 - Use specified materials to re-establish lawns that do not comply with requirements and continue maintenance until lawns are satisfactory.

1.2.11. TREESTABILIZATION MATERIALS

- Re-stake, straighten, tighten, repair, reset guys and stakes to proper grades or upright position for any plants that are not in their proper growing position.

- Remove all tree stabilization materials toward the end of maintenance period upon approval of the Client's Representative.

1.2.12. DEFECTIVE PLANTS & MATERIALS

- The expense of replacement of defective materials during the maintenance period will be borne by the Landscape Contractor and shall be included for in his price for this section of the work. The Landscape Architect shall be at liberty to reject any installation, materials and workmanship not complying with the requirements of the sub-contract specification or which are in any way unsuitable and to order their removal and replacement, without increase to the contract sum.
- All plants shall be guaranteed to remain alive and healthy for the Maintenance period.
- Plant materials with pest infestations and/or in diseased conditions during the maintenance period shall have additional warranty period of twelve (12) months from the end of the Maintenance Period. The Landscape Architect shall determine the non-conformance of the plant materials and notify the Contractor.
- Upon receipt of written notice from the Landscape Architect of rejection of any plant materials during the warranty period due to death, diseased or unacceptable/ defective growth pattern, the plant materials will be promptly replaced with the same species as originally planned. The replacement made will be of similar size as if normal growth had occurred since the original planting. Replacement will be subjected to all requirements as stated in this Specification and Bill of Quantities. All replacement works shall be completed within seven (7) working days from the date of the end-Maintenance Inspection.
- When plants are replaced, the Contractor will advise the Landscape Architect, in writing, of the necessary establishment maintenance which must be performed. If this information is not provided, the Contractor will be liable for the total cost of replacement should the replaced plant die.

1.3. SCHEDULE OF MAINTENANCE

1.3.1. GENERAL

- For Maintenance during and after issuance of Completion Certificate, carry out the maintenance works as per schedule in accordance with Works Programme as required. (Anticipated labour numbers; timing for maintenance schedule to be coordinated with Client's Representative)
- In the event of the scheduled operation requiring amendment due to the site and weather conditions prevailing during the Maintenance Period, seek approval, at least four weeks before the operation on site, with full justification to exceed the numbers specified.
- In the event of emergency, the Contractor must carry out the landscape maintenance works immediately according to the Owner's instruction.
- Maintenance schedule is below, to be verified with the Client's representative:

Maintenance Work	Timing
Watering	As often as necessary to ensure that planting medium does not dry out
Weeding	Fortnightly
Fertilizing: - Tree - Shrubs/ground cover - Turf	Once every 3 months Monthly Once every 3 months
Soil aeration	Monthly
Firming up	Immediately after strong winds and/or every 4 months
Tying climbers to supports and climber wires	Check monthly ties as necessary
Pruning and shaping trees	As and when required
Trimming shrubs/ground covers	Monthly, or as and when required
Guying & staking	As and when required
Grass cutting	Fourteen (14) days interval or as specified
Control of pests	Check fortnightly, treat immediately as per manufacturer's instructions
Control of diseases	Check monthly, treat immediately as per manufacturer's instructions
Top dressing for turf/shrubs	Monthly, and until the soil is level
Removal of dead leaves in landscape areas	Daily
Storm damage: assessment & repair	After each incident

1.4. LIABILITY

1.4.1. GENERAL

- Contractor agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period and to bear all costs therein.
- Failures include, but are not limited to the following:
 - Death and unsatisfactory growth.
 - Structural failures including plantings falling or blowing over.
 - Pest, fungal and disease infestation.
 - Damage by Vandalism.
 - Faulty operation of tree stabilization.
- Warranty Periods from Date of Substantial Completion:
 - All plants: One year.

- Include the following remedial actions as a minimum:
 - Remove dead plants immediately. Replace immediately unless required to plant in the succeeding planting season.
 - Replace plants that are more than 25 percent dead or in an unhealthy condition at the end of warranty period.
- Provide extended warranty for replaced plant materials; warranty period equal to original warranty period.
- The Contractor is responsible for the use of all material, labour, equipment and any injury to plant material caused by such material, labour and equipment will be repaired or replaced by the Contractor at his/ her own expense.
- The Contractor will not be held liable for loss of materials after the issue of 'Handover Certificate' due to vandalism and/ or act of Nature.
- The liability under the warranty period will include the repair of damages to the owner's, Main Contractor's and/or other Contractor's property caused by the failure of the work performed under this Section. All provision of this Section applies to work performed to satisfy the requirement of this warranty.

1. TERMINOLOGY

In the Specification and other Documents forming part of the Contract, the following expressions and words shall, unless the context otherwise requires, have the meaning hereby respectively assigned to them:

"Approved" or "approval"	means approved by or approval of the Client's Representative
"Submitted" or "submit"	means submitted to or submit to the Client's Representative in writing
"Accepted" or "acceptance"	means accepted by or acceptance of the Client's Representative
"As shown on Drawings"	means all works required to conform with the intent shown on the tender and/or contract drawings
"As required"	means as required in the Specification and other Documents forming part of the Contract
"As directed"	means as directed by the Client's Representative

2. DEFINITIONS

In the Specification and other Documents forming part of the Contract, the following terms or words shall, unless the context otherwise requires, have the meaning hereby respectively assigned to them:

Authorized Additional Excavation	Excavation below Sub-grade elevations or beyond indicated lines and dimensions as directed by Client's Representative. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Soil Placement & Finish Grading Works.
Backfill	Approved soil material used to fill an excavation above the required sub-grade.

Bad Ground	Ground unsuitable for the purposes of the Works, including filling liable to subsidence; ground full of vegetative matter; ground containing cavities, faults or fissures; ground contaminated by harmful substances including oil, cement and chemicals; ground containing acid sulphate soil; or ground which is or becomes soft, wet and unstable; and the like.
Earth	Earth shall consist of all materials except rock be it soil, gravel, soft rock, shale or any other material that can be removed, without the use of explosives, or mechanical plant.
Excavation	Removal of material encountered above sub-grade elevations and to lines and dimensions indicated.
Finish Grade	Finished elevation of hard landscape surfaces to required levels as defined in the Drawings.
Rock	Rock shall be boulders more than 0.5cu.m. in size and rock in solid banks or layers or beds of conglomerate or other materials appearing as solid as rock.
Structures	Buildings, footings, foundations, retaining walls, slabs, tanks, kerbs, mechanical and electrical accessories, or other man-made stationary features constructed above or below the ground surface.
Sub-grade	Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill, before placing General Planting Soil Mix.
Unauthorized Excavation	Excavation beyond indicated lines and dimensions without direction by Client's Representative. Unauthorized excavation, as well as remedial work directed by Client shall be without additional compensation.
Utilities	On-site underground services, pipes, conduits, ducts, and cables, as well as underground services

within buildings.

Sub-soil	All soil beneath the topsoil layer of the soil profile, typified by the lack of organic matter and soil organisms. Based on site conditions, Softscape Contractor will be responsible for delivery and placement of approved Soil Mix to make-up specified final finish level.
Imported Soil	Approved soil imported from off-site for use to prepare Soil Mix
Local Soil Material	Locally available top soil stored on-site.
Soil Mix	Artificially constituted Planting Soil Mix from available local soil (from on-site top soil dump) or imported soil, soil conditioners, approved fertilisers, soil amendments and/or sand. Approved composition shall be referred to in 'C. Products & Execution, Section 3.6. Planting soil mixes'.
Imported Soil Mix	Soil Mix prepared off-site for on-site use, which is evenly textured, fertile, sandy loam free from weeds, deleterious matter and stones larger than 25mm in any dimension and shall not be excessively sandy, gritty or water logged.
Ripping	Controlled mechanical de-compaction of the upper layers of the existing soil (Sub-grade) after Site Clearing and Grubbing to improve the natural percolation of water.
Soil Amendment	Stabilized organic materials added to local soil (from on-site top soil dump) or imported soil to improve soil structure.
Soil Placement Works	The supply and placement of Soil Mix over the existing sub-grade for all areas indicated in the Planting Plans, to the Finish Grade elevations as defined in the Drawings.
Sub-standard Planting Soil	Where the imported Planting Soil does not meet the criteria requirements set out in 'C. Products &

	Execution, Section 3.6. Planting soil mixes', it may be modified by the addition of soil amendment materials as specified, in quantities to be approved by the Client's Representative to form General Planting Soil Mix.
Topsoil	All soil above the subsoil layer of the soil profile, excavated and stockpiled in the on-site top soil dump as defined by Client's Representative.
Balled and Burlapped Stock	Plants dug with firm, natural balls of earth in which they are grown for not less than two growing seasons, and prepared not less than six months in the growing season; wrapped around in burlap and tied, rigidly supported, and drum laced with straw or Coco fibre.
Balled and Potted Stock	Plants dug with firm, natural balls of earth in which they are grown and placed for not less than two growing season, unbroken, in a container.
Clear Trunk Height	Linear measurement starting from root collar to the lowest branch of trees; also called 'branching height'.
Caliper	The diameter of the trunk taken 1 meter up from the root crown.
Container-Grown Stock	Healthy, vigorous, well-rooted plants grown in a container with well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during transport. Size of contained should be suitable for type and size of plant required.
Exterior Plants	Plants of their nature or acclimatized growing in outdoor environment and include Tree, Palms, Shrubs, Ground Cover, Annuals, Biennials, Perennials, Climbers and Bamboos.
Interior Plants	Plants acclimatized to growing in shaded or indoor environments which include Specimen, secondary

and filler plants.

Fertilizer		A chemical compound containing nitrogen (N), phosphorous (P), potassium (K) and/or other specified macro and micro nutrients in adequate quantities to promote plant growth.
Fabric Stock	Bag-Grown	Healthy, vigorous, well-rooted plants established and grown in-ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume for type and size of plant.
Nurseries		Sites of natural ground, which serves as nursing place of tree stock and temporarily storage area for planting materials and bulk materials.
Multi-stem		Where three or more main trunks/stems arise from the ground from a single root crown or at a point right above the root crown.
Root ball		The firmly bound fibrous root with soil that is removed intact with the plant.
Root Crown		The position on the plant stem where the plant naturally forms from the ground when growing in the nursery.
Root Pruning		The cutting away of part of the root system to stimulate fibrous root growth with-in a compact root ball.