

General specification for

NELSON MANDELA PRISON HOUSE, PAARL SOFT- AND HARD LANDSCAPING & CIVIL AND EXTERNAL WORKS

(Revision 0)

JUNE 2026

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PART 1: LANDSCAPING AND PLANTING PLANTS

1. GENERAL

These specifications address the installation of **NELSON MANDELA PRISON HOUSE TENDER**. The specifications must be read in conjunction with the General Specifications applicable to all contracts at the project. They must further be read in conjunction with the landscape drawings, as referred to in this document, produced by Insite Landscape Architects.

This specification deals with the work required for the Landscaping and maintenance of work to be done on different floors and around the new building, as well as the installation of an irrigation system

1.1. Scope of Specifications

All work, where applicable, must be carried out according to this specification.

The Contractor must take note of the contents of this specification as well as the type and extent of the work, as no claims will be considered as a result of misinterpretation. Vagueness and discrepancies should be discussed with the Landscape Architect prior to tendering without delay.

Where items of materials or the exact procedures may not be specified, the contractor will request that the Landscape Architect gives such detailed information as may be required so as to deliver a product of the highest quality.

1.2. Contractor's Equipment and Tools

The Tenderer's equipment shall be of a modern design and, where applicable, roadworthy and suitable for the service for which it is required. Where the Landscape Architect is of the opinion that the Contractor has ineffective or inadequate equipment on site which will hamper the work to be carried out, he shall have the right to instruct the Contractor to obtain and provide onsite such additional or approved equipment which in his opinion is required for the carrying out of the work, without the progress of the work being affected in any way.

The Contractor must remove all equipment, which is not in working order or needed on site.

1.3. Plotting of Works

The Contractor shall be responsible for the correct pegging out of the works as measured from reference pegs and sight levels as indicated by the Landscape Architect.

The Contractor must supply the necessary measuring equipment for use by the Landscape Architect, as well as sufficient assistants for the plotting, the surveying and the checking of heights, which may be required as the contracted work progresses.

Areas for preparation shall be set out and agreed before work commences. Borders, planting beds and tree positions shall be set out after preparation has been completed.

All planting areas, borders of planting areas, planting beds and tree positions shall be set out as indicated on the Drawings or as directed by Landscape Architect, for the approval of Landscape Architect.

Tolerances in setting out shall be plus or minus 100 mm in plan position and dimension.

Position shall be the horizontal position of centre line(s) and or centre point(s) in relation to the overall setting out as shown on the Drawings and dimension is the length and width that collectively determine the shape of an area or the position of a border.

1.4. Contractor's Labour

The Contractor shall make his own arrangements to recruit labour for the work as stipulated in the contract to be carried out. The registration and payment of any fees and insurance with regard to labour shall be the responsibility of the Contractor. Housing of all employees must meet the requirements of the Local Authorities.

1.5. Electricity and Water

1.5.1. Electricity

The Contractor must make his own arrangements for the use of electricity for construction purposes, and his tender must provide for expenses in this regard.

1.5.2. Water

No Water for construction purposes is available on site. The Contractor shall provide for and make his own arrangements for the supply of water to the works areas. All cost regarding connections, pipes and piping shall be borne by the Contractor.

1.6. Storage of Materials on Site

The Contractor must ensure that no material is delivered on site before its placing and storage have been approved.

1.7. Existing Works

The Contractor is responsible for obtaining any information regarding sewers, water mains, and stormwater drains, electric and telephone cable and any other public services and existing works, which may be affected by the Works.

The Contractor shall be responsible for any damage to such services and existing works in the execution of this contract and shall reimburse the Employer for any repairs required or compensation for damages awarded.

The Contractor shall be responsible for immediately notifying the Landscape Architect regarding any damage cause to services and existing works.

1.8. Maintenance and Safeguarding of New Works

During the various phases of the work, the Contractor shall safeguard his works from any damage, and maintain them at his own expense until they are handed over to the Client at the end of the retention period. Any defects or damage, which may occur during this period, must be rectified by the Contractor at his own expense, whether caused by construction machinery, normal traffic, rain, wind damage, faulty materials, or whatever reason. The Contractor shall rectify such damage immediately and at his own expense. If the Contractor neglects to undertake the required repairs, the Landscape Architect reserves the right to appoint any suitable person to effect said repairs at the expense of the Contractor. The Landscape Architect shall inform the Contractor as soon as possible if such action has been taken.

1.9. Program

The execution of the work set out in this contract shall be completed in phases in order to accommodate other construction work, and the provision of various works facilities should be sequenced according to a system. The Landscape Architect shall inform the Contractor of the particular succession of activities and the Contractor will not be able to accept such programming as grounds for claims for additional remuneration.

1.10. Underground services

All documentation and drawings / plans are to remain on site and are to be made readily available at all times.

The Contractor and his sub-contractors will obtain all “As built” drawings / plans to thoroughly familiarise themselves with any underground services, including electrical, domestic water, drainage (sewer), telecommunications, data and storm water drainage on site.

The Contractor will be responsible for damage and subsequent repairs to existing underground utilities, which are shown on the drawings or evidence of which is clearly visible on the site.

The Contractor will investigate the site prior to commencement of work and in case of discrepancies between existing site conditions and site conditions as shown on drawings, promptly notify the Landscape Architect in writing.

No work shall commence until such discrepancies have been investigated and corrected.

1.11. Re-instatement of damage to the site resulting from works

All roads, kerb stones, wire fencing, poles, structures, paving, etc. which have been affected in the course of the work carried out, shall be set right before the site is vacated, even though no provision has been made for this in the Bill of Quantities.

1.12. Site Meetings

Meetings on site shall be held at such suitable intervals as determined from time to time by the Landscape Architect or his representative and must be attended by the Contractor. The Contractor must carry out directives received at these meetings within the stipulated period. Failure by the Contractor to carry out these directives shall constitute breach of contract.

1.13. Overtime

No additional payments will be made for overtime worked. It is expected of the Contractor as part of his normal duties to complete the project timorously even if directed to work after normal hours.

1.14. Supervision

The Contractor must ensure the continuous presence of a capable overseer in his service who can receive and execute directives from the Landscape Architect.

1.15. Skilled Labour

Only bona fide skilled artisans, who are paid according to the standard rates, shall be used where skilled workmanship is required.

1.16. Co-operation with other Contractors

No claim for additional compensation, which arises from any cause resulting from the presence of another, Contractor on site will be considered.

1.17. Damage by flooding

The Contractor must at his own expense apply all the necessary measures to prevent his works from being damaged by floodwater and erosion. The Contractor must channel all stormwater which leaves his site so that it causes no damage to existing work or work in progress at a lower level, and does not flood or retard the progress of work being carried out by other contractors.

The Landscape Architect or his representative must approve any measures taken to cope with stormwater.

1.18. General neatness on site

The Contractor shall at all time during the duration of his contract keep the site neat and clean.

It shall be expected of the Contractor as a normal part of his duties, to clear and tidy the site totally over weekends, to such an extent that no disruption or discomfort is experienced and that the area may be considered safe.

1.19. Delays in the delivery of materials

The Contractor shall ensure that work carried out will not be delayed by the late delivery of materials to the site as a result of a shortage of materials or the fact that the Contractor neglected to place orders immediately.

1.20. Tests

Prior to the commencement of preparation for landscaping all other construction activities shall be completed to the extent that landscaping can take place without damage to plants etc. during other construction activities.

All finishing of areas as described in (1.3) Earthworks, and elsewhere in the specification shall be completed prior to commencement with landscaping.

On request of the Landscape Architect the Contractor shall arrange to take soil samples on site at places pointed out by the Landscape Architect for analysis as regards soil fertility and soil suitability. Detailed records of all samples drawn and results are to be kept by the Contractor.

The Landscape Architect will together with the Contractor decide on fertiliser and compost applications emanating from the tests done.

1.20.1. Testing Soil

Provide for chemical analysis of soil samples upon instruction from the Landscape Architect

1.20.2. Testing Density

Provide for density test of compacted areas upon instruction from the Landscape Architect

1.21. Removal of material from site

Any material, of whatever nature, which must be removed from the site as directed by the Landscape Architect and as stipulated in this contract, must first be placed in measurable heaps as instructed by the Contractor and to be measured in-situ by the Landscape Architect before it is

removed. No disbursements will be approved for material, which is removed without the proper controls.

Loading and removal to contractors own dumping site all unusable material, debris and stone, placed in measurable storage heaps, resulting from the initial soil preparation to the final finishing process (other than specified measured items)

1.22. Additional work

Should the Contractor be instructed by the Landscape Architect to carry out additional work, it will be done in terms of the Main Contract.

2. MATERIALS

2.1. General

The Contractor shall ensure that all material required for the contract will be delivered in good time and in good condition to the site. The Contractor will employ suitable security measures once delivery has been taken. All material which will be used for the contract may at any time be inspected and tested by the Landscape Architect. If material has become defective or unusable after delivery to site, the Contractor will replace it at his own cost

2.2. Fertiliser

All fertiliser blends/mixtures which are specified in the contract must conform to the specification contained in Act 36 of 1947. Fertiliser shall be as specified in sections 04, 05, 06 and 08, but would generally be the following:

Limestone ammonium-nitrate (28%N)
Super phosphate
2:3:2 (22)

All fertiliser specified for use in the contract, must be stored in plastic bags on site. Care must be taken that the bags are undamaged and not exposed to wind and inclement weather.

2.3. Compost

All compost shall consist of good decomposed organic material, free of damaging salts and other impurities, and with a pH not higher than 7,0. A sample must be submitted to the Landscape Architect for approval. Where compost is delivered on site in bulk the Contractor must take precautions in order to protect it from excessive dehydration, dispersal as a result of sun, wind or exposure to rain.

2.4. Topsoil

Acceptable topsoil shall be a sand loam to sand clay loam with a ratio of 15 to 20% clay, 10% silt and 65 to 75% sand. The organic material contents should be not less than 2% per volume.

Topsoil shall be free of harmful salts, weeds and debris of whatever kind. Topsoil will only be approved after a soil analysis test is carried out by an authorised institution

2.5. Topdressing

Topdressing for lawn areas shall consist of equal parts of topsoil and compost described in sections 02.03 and 02.04 respectively.

2.6. Mulch

Mulch shall consist of bark chips. The bark chips should vary in size between 7 and 10cm in diameter and should be free of seed or damaging salts and other impurities and with a pH not higher than 7.0. A sample must be submitted to the Landscape Architect for approval

2.7. Plant material

All plant materials shall be procured from recognised reputable dealer. The source of plants shall be approved by the Landscape Architect and plants shall be according to the species listed in the Bill of Quantities. No species shall be substituted without the approval of Landscape Architect. Contractor shall provide at time of tender details of the supplier for this Contract for the approval of Landscape Architect. All plants shall be tagged and approved by the Landscape Architect prior to delivery to Site.

Each plant shall be handled and packed in the approved manner for that species or variety, and all necessary precautions shall be taken to ensure that plants will arrive at the Site in proper condition for successful growth. Trucks used for transporting plants shall be equipped with covers to protect plants from windburn. Plants must have been in the container for a minimum period of twelve weeks prior to delivery to site. Containers shall be in a good condition and free from weeds. Soil in plant containers will continually be topped up with a suitable soil / compost mix where required in order to prevent the exposure of plant roots.

Plants shall be healthy, shapely and well rooted. No part of the plants shall be broken or snapped. Roots shall show no evidence of having been restricted or deformed at any time.

All plants delivered to the Site shall be in good condition and free from obvious diseases and pests and Contractor shall accept full responsibility to maintain the plants in good condition for the period of construction and the maintenance period up to the end of the defects liability period. The plants shall be fully maintained during this period, including watering, and any losses of plants due to lack of maintenance, including diseases developed during the contract period and the period of maintenance, shall be replaced at Contractor's expense.

Plants furnished by the Contractor as replacements shall also comply with the requirements of this section.

2.8. Seed

Only fresh certified seed shall be used and shall be seed of the species specified and with a guaranteed germination rate and complying with the relevant SABS standards. A valid certificate of germination must be submitted upon request to the Landscape Architect. Seed used must not contain any foreign seed or other material and must be purchased from a registered seed merchant.

2.9. Grass sods

Lawn sods shall be obtained from an approved source, be cut short but with a minimum leave length of 20 mm, and be weed and disease free. It can either be nursery-grown or veld sods. Both

types shall be harvested, delivered, planted and watered within 36 hours, unless otherwise specified by the Landscape Architect. The dimensions should be approximately 1000 mm long and 500 mm wide. Runners must be well matted, with a soil layer of at least 30mm soil thickness for nursery-grown and 50mm soil thickness for veld sods. Sods must be transported to the site in a rolled up form (alternatively on pallets) and must be laid down on the same day. Grass sods shall be pure as regards the species. The sods shall have a good, healthy green colour, without any dead spots.

2.10. Herbicides and pesticides

Herbicides and pesticides may only be used with the prior written approval of the Landscape Architect. The Contractor shall have available at all times Material Safety Data Sheets for all pesticides, herbicides and applications used and shall remove and dispose of empty containers, bags, etc. in an environmentally responsible way. Herbicides, pesticides, chemical products and applications used in this contract shall meet all requirements set by law and the Department of Water Affairs and is to comply with relevant SABS specifications.

2.11. Irrigation materials and equipment

All irrigation materials and equipment will be as specified elsewhere

2.12. Alien or Exotic Vegetation and Weeds.

Weeds are defined as any plant declared a weed in terms of the Conservation of Agricultural Resources Act, Act No 43 of 1983 as well as any plant generally considered to be a weed. No alien or exotic vegetation shall be introduced to the area of the Site.

All alien and invader species should be removed in the appropriate manner. Refer to the guidelines on how to remove invader species and best practice thereof (**ANNEXURE F**).

Refer to below methodology and control programme regarding to the removal of the Wattle species on site.

2.12.1. Wattle and invader plant control programme on vertical cut faces and embankments around dam:

2.12.1.1. Methodology:

- a. Mechanical Removal and control of trees by physical action which methods could include hand pulling, uprooting, felling, slashing, mowing, ringbarking or bark stripping.
- b. Removal of trees and cut branches through the process of fire.
- c. Chemical control by means of either cut-stump herbicide application, stem injection or foliar spraying whichever is most suitable for the particular site.

2.12.1.2. Control Programme:

- a. Initial control by Developer: Drastic reduction of existing population by mechanical removal.
- b. Follow-up control by developer and homeowners association: Control of seedlings, root suckers and coppice growth through mechanical and chemical means.
- c. Maintenance control by Homeowners association: Sustain low alien plant numbers with annual control

3. EARTHWORKS

3.1. Scope

The Contractor shall only commence with the earthworks with the approval of the Landscape Architect. The Contractor is to make a proper survey of the existing layout of the site before any earthworks are commenced. This is necessary to clarify any possible vagueness between the conditions on the site and the drawings indicating site works.

3.2. Clearing of area to be landscaped

This item is to include excavation and removal of all rubbish, soiled earth and waste from the whole area to be planted or where construction work will take place, as well as roughly levelling cleared areas. All loose rubble, concrete, dead trees, dead shrubs, etc., must be stockpiled and then removed from the site to the contractor's own dump site, after the quantities have been measured and approved by the Landscape Architect or his representative. Only trees and shrubs indicated by the Landscape Architect or his representative may be removed. Rubble is to be removed on a regular basis.

3.3. Conservation of Topsoil

The topsoil, including the existing grass cover (where applicable) should be shallowly ripped (only the depth of the topsoil) before removal. This is to ensure that organic plant material, and the natural seed base is included in the stripping process. Topsoil stockpiles shall not be stored for a period longer than 4 months.

Stockpiles along the trenches shall not be allowed to become contaminated with oil, diesel, petrol, garbage or any other material, which may inhibit the later growth of vegetation. The contractor shall apply soil conservation measures to the stockpiles to prevent erosion. This could include the use of erosion control fabric or grass seeding.

All grass and other vegetation should be left on the topsoil stockpiles so that they colonize the area after construction. Dust and erosion of topsoil from runoff must be minimised through appropriate watering and the avoidance of transporting and placing of topsoil in areas exposed to high wind or excessively rainy conditions.

3.4. Removal and transplanting of large trees

All existing trees that are marked and as selected by the Landscape Architect will be excavated, removed and replanted if necessary. Trees that are excavated should temporarily be replanted in 2000 to 3000 litre polypropylene bags, according to suitable sizes and stored at a suitable location where efficient maintenance will take place.

Seaweed hardener should be applied to each tree, three weeks prior to intended relocation date. Evapotranspiration retardant should also be applied to prevent moisture loss. For optimum success, replanting should be done when tree is in its dormant state (May to August).

- a. Add organic supplement, 2:3:2 fertilizer @ 4.3kg/m³.
- b. Attach micro sprayers to each tree.
- c. Ensure irrigation of two to three years.
- d. Use steel cables to anchor tree

Tree that are not excavated and replanted will be eradicated and timber used for functions as specified by the Landscape Architect or the client.

50% of the contractors fees shall be paid during the re planting of the applicable trees and 50% will be paid at the end of the stipulated maintenance period.

3.5. Cut and fill

All levels must be graded to the contours indicated by the Landscape Architect. Excess excavated material must be removed to a suitable dump site or stored in heaps of not more than 1 (one) meter high for later re-use.

Disturbed compacted levels must be re-compacted to the density specified by the Landscape Architect.

All cutting and filling must be done by mechanical plant to the levels and methods prescribed by the Landscape Architect. Final finishing levels must be done by hand.

- a. Soil type: Sandy to clay and pickable
- b. Soil filling in planting areas to be sufficiently compacted in 300mm layers so as to avoid subsidence
- d. Soils to be selected as to requirements
- e. Inclusive of handwork where required
- f. Inclusive of profiling to drainage points or general site drainage to tie in with existing levels
- h. Provisional: This item is only upon Instruction by the Landscape Architect

3.6. Excavation of landscape areas

The final level of all excavations may not be more than 25 mm higher or 50 mm lower than the levels indicated on the drawings or as stated elsewhere.

3.6.1. Excavations deeper than indicated levels

When it is necessary for the Contractor to excavate deeper than indicated on the drawings, he must notify the Landscape Architect in writing to do the necessary measuring on site before commencing with any further work in the excavations.

When the Contractor does not comply with this, no claims in connection with the deeper excavations will be entertained and he will be remunerated according to the excavation depths indicated on the drawings.

3.6.2. Excessive excavations

If the Contractor excavated any excavations too deep, he must fill and compact it to the correct depth and density at his own cost, in such a way that future sagging will not occur.

3.6.3. Safe of excavations

The Contractor will at all times be responsible for the safety of the excavations. Any loss or damage as a result of negligence to comply with the demands of safety will be carried and corrected by the contractor at his own expense to the satisfaction of the Landscape Architect.

3.6.4. Filling of landscape areas

3.6.4.1. General

The existing area must be renovated or scarified to a depth of 200 mm.

Filling, where necessary, must be done in 150 mm layers. Where the nature of the compilation of the layers differs, the layers must be inter-mixed.

All filling material placed by the Contractor must be spread and compacted as required by the Landscape Architect so as to avoid sagging during wet conditions. Where filling is done, all existing plants, if any, must be removed as described in 'Clearing of the area to be landscaped'.

If any concrete slabs or blocks have to be covered by filling material, the minimum thickness of such filling must be 1 (one) meter. If this is not possible, the concrete must be removed as described in 'Clearing of area to be landscaped'.

Where loose stones, shale, cinder or gravel form part of the filling, it must not be placed in layers, but mixed with the soil to provide maximum drainage and penetration for plant root systems.

The difference in the level of the finishing layer should not be more than 50 mm than the basic topographic lines, unless otherwise prescribed by the Landscape Architect.

3.6.4.2. Excess filling

If the Contractor places excessive filling, he will have to remove it at his own cost to the satisfaction of the Landscape Architect.

Source of filling material

If the filling material is not supplied by the Employer and the source not specified by the Landscape Architect, the Contractor must get the approval of the Landscape Architect by submitting samples.

It will be expected from the Contractor to get soil tests from an approved institution and he must allow for this in his prices.

3.7. Hard rock

All material like norite, quartzite, sandstone, slate and similar or other hard stones as well as stones more than 0.03 m³ in volume will be taken as hard rock.

If hard rock is found during excavations, the Contractor must inform the Landscape Architect of the same so that the extent of the hard rock can be established and the necessary measurements to be done for extra allowance. If measuring of hard rock is done in the absence of the Landscape Architect, no claim will be granted and it will be taken as normal pick able material.

3.8. Carting away

Excess material must be carted away to a suitable dumping site outside the borders of the site, unless it is specified by the Landscape Architect that excess material must be spoiled on site.

3.9. Maintenance of excavations

The Contractor must maintain all excavations deeper than 1.5 meter according to Government Regulations. Nevertheless, the Contractor must also maintain excavations less than 1.5 meters deep in the same way if it jeopardizes the safety of workmen and others. The Contractor must carry the risk of collapse of sides of excavations, whether he has taken the necessary precautions or not.

The scope of the precautions taken by the Contractor depends on his own judgment. He must accept full responsibility and must allow for everything in his prices.

In the quantities the total vertical area of excavated surfaces is given and it will be subject to adjustment in as far as the areas of the vertical faces might change, whether or not temporary strutting or other precautions are made use of.

3.10. Water in excavations

No water should be allowed to accumulate in any part of the excavations. Excavations must be kept as dry as possible at all times to the satisfaction of the Landscape Architect.

3.11. Topsoil and Placing Topsoil

The Contractor is to Import topsoil for all his/her topsoil requirements for the execution of this contract, unless otherwise specified by the Landscape Architect.

Topsoil shall be placed and spread over prepared areas and then trimmed to the uniform thickness, as required by the Landscape Architect. Furthermore, on spreading and compacting the topsoil, the topsoil thickness shall nowhere be less than specified.

Topsoil shall be placed on the prepared surfaces and be trimmed to a uniform thickness of 200mm by means of hand raking and mechanical blading. Where machine operations are not practicable, because of confined space or steep slopes, final shaping shall be done using hand tools. In all cases the layer of topsoil may be thicker than specified, but not thinner.

Stones less than 25 mm in size contained in the topsoil may be left on the surface. However, all stones larger than 25 mm shall be removed to spoil.

3.11.1. Areas not Requiring Topsoil

Where the areas to be landscaped consist of suitable material as determined by the Landscape Architect, it shall be scarified, cultivated or loosened to a minimum depth of 200mm. In all instances the area shall be scarified such that the entire surface is loosened.

Stones less than 25 mm in size loosened, or brought to the surface by scarifying may be left on the surface. However, all stones larger than 25 mm as well as concrete, rubble and litter shall be removed to spoil. On completion the surface shall be left smoothly contoured.

3.11.2. Areas Requiring Topsoil

Where areas to be landscaped consist of unsuitable material as determined by the Landscape Architect, the surface shall be scarified to a minimum depth of 200 mm. In all instances the area shall be scarified such that the entire surface is loosened.

Stones less than 25 mm in size loosened, or brought to the surface by scarifying may be left on the surface. However, all stones larger than 25 mm as well as concrete, rubble and litter shall be removed to spoil. Scarified surfaces shall be left slightly rough to facilitate binding with topsoil to be placed on these areas.

3.11.3. Load, cart & spread topsoil from stockpiles on site

- a. Source: from stockpiles created by road and paving prep
- b. Thickness: 150mm and as required
- c. For groundcover areas: Best quality topsoil
- d. For hydro seeding areas: other topsoil
- e. Inclusive of all handwork and all levelling where required
- f. Only to be used where in-situ material is not sufficient
- g. Areas to be provided with topsoil to be approved by Landscape Architect for profile prior to spreading
- h. Inclusive of all spreading, shaping and levelling to desired profiles and to tie in with existing levels
- i. Final profiling to ensure proper drainage and prevent erosion
- j. Quality to be confirmed by Landscape Architect

3.12. Subsidence

The Contractor shall address any subsidence of soil levels that may occur relating to the works as set out in this contract. The cost of reinstating soil levels shall be borne by the Contractor.

3.13. Payment

Payment for earthworks shall be made according to the quantities indicated in the Bill of Materials and the actual works completed by the Contractor.

4. SOIL IMPROVEMENTS

4.1. General

Prior to planting the soil in all areas prepared for landscaping shall be improved.

All fertilizer shall be stored in plastic bags. Fertilizer mixtures used shall comply with the specification in Act 36 of 1947. Application of fertilizer for soil improvement will be specified by the Landscape Architect on review of soil analysis and amendment recommendations submitted with the awarded tender or added strictly according to the manufacturer's specification.

The fertiliser shall be evenly applied over all surfaces where landscaping work will be done and shall then be thoroughly mixed with the topsoil to a depth of 200 mm either mechanically or manually. Fertiliser shall be applied over the area with a calibrated fertiliser applicator machine. During the process of rotation, substances, which need to be added in large quantities, will be thoroughly mixed throughout the growing horizon to a depth of 200 mm and not just placed on the surface. These substances include lime, phosphates, manure, compost, slow release fertilizers, colloids, etc. No fertilizer should be added more than two weeks prior to planting.

All fertilizers and soil improvement remedies must be applied during dry weather conditions.

Fertilizers must be worked in within 24 hours after application to prevent loss through wind and weather.

4.2. Soluble fertilizers (Time of application)

Soluble fertilizers must be applied after irrigation and be washed into the soil with a further light wetting.

Soluble fertilisers such as nitrogen fertilisers and potash, as well as fertiliser compounds, shall not be applied more than eight days before planting.

Soluble fertilizers may only be applied to growing plants if leaf surfaces are dry.

Fertilizers must be rinsed off the leaves immediately after application.

The application rate for fertiliser shall be as follows, unless otherwise specified in the Schedule of Quantities

- Limestone ammonium-nitrate (28%N) - 25 g/m²
 - a. Area: Groundcover areas
 - b. Application rate: Groundcover Areas: 25gm/m²
 - c. Irrigate well after every application
 - d. Spread two weeks after planting, thereafter upon instruction from Landscape Architect
 - e. Purchase and apply only upon instruction from Landscape Architect (depending on soil analysis)
- Super phosphate - 100 g/m²
 - Over surface:
 - a. Area: Groundcover areas
 - b. Application rate: 150gm/m²

- c. Spread prior to fine trimming
- d. Work in to a depth of 200mm
- e. Purchase and apply only upon instruction from Landscape Architect (depending on soil analysis)

- Plant holes for trees:

- a. Area: In plant holes
- b. Application rate
 - 100 l trees and larger: 300gm/hole
 - 50 l trees: 250gm/hole
 - 20 l trees: 200gm/hole
- c. Spread in plant hole
- d. Purchase and apply only upon instruction from Landscape Architect (depending on soil analysis)

- 2:3:2 (22) - 150 g/m²

- Over surface:

- a. Area: Groundcover areas
- b. Application rate: Groundcover Areas: 50gm/m²
- c. Spread prior to fine trimming
- d. Work in to a depth of 200mm
- e. Purchase and apply only upon instruction from Landscape Architect (depending on soil analysis)

- In plant holes:

- a. Area: In plant holes
- b. Application rate
 - 100 l trees and larger: 120gm/hole
 - 50 l trees: 100gm/hole
 - 20 l trees: 80gm/hole
- c. Spread in plant hole
- d. Purchase and apply only upon instruction from Landscape Architect (depending on soil analysis)

4.3. Planting Tablets for Trees

Supply, deliver and apply as per suppliers specification planting tablets:

- a. Type: 21gm: 2 year release;
- b. Application rate:
 - 8 tablets per tree out of 100 litre container and larger
 - 6 tablets per tree out of 50 litre container
 - 4 tablets per tree out of 20 litre container
- c. Working in provided elsewhere
- d. Purchase and apply only upon instruction from Landscape Architect (depending on soil analysis)

4.4. Compost

The Landscape Architect will only accept compost if the samples submitted comply with the following requirements:

Supply and deliver compost for plant holes to trees, shrubs and groundcovers. Contractor to spread and work-in compost for tree holes. Compost to be mushroom compost of the highest quality, aged and consistent throughout. Compost must be well-decomposed organic material, free of weed, seeds, detrimental salts, soil, sand, glass, debris, animal by-products and pathogens, and other toxic impurities.

The compost must be made up of pure plant organics and manufactured to within a pH that shall not exceed 6.0 to 7.0. The resultant porous nature of the pro-pH range of duct must yield a high water retention capacity, ensuring vigorous early and sustained growth to the maturity of all plant material. Compost must not be stored in bulk on Site and must be ensured safe covered storage and be protected away from wind, excessive rain, dissipation and sun.

Compost shall be applied in quantities as specified, unless otherwise specified in the Schedule of Quantities.

- a. Application rate:
 - Trees out of open ground larger: 0.34m³ per tree hole
 - Trees and shrubs out of 100 litre containers: 0.17m³ per tree hole
 - Trees to be planted in tree grids: 0.83m³ per tree hole
 - Trees and shrubs out of 50 litre containers and larger: 0.17m³ per tree hole
 - Trees and shrubs out of 20 litre containers: 0.17m³
 - Groundcover areas: 30mm over entire planting area
- b. Sample of compost must comply with specification and be approved by the Landscape Architect prior to delivery to site.

4.5. Payment

Payment for the purchase of and spreading of fertilizers shall be made according to the quantities indicated in the Bill of Quantities and the amounts actually applied as instructed by the Landscape Architect.

Payment for the working in of fertilizers shall be covered under seedbed preparation.

5. SEEDBED PREPARATION FOR PLANTING

5.1. Scarifying

After shaping and trimming, all soil, which is going to be cultivated, must, unless otherwise specified by the Landscape Architect, shall be prepared as follows:

Rip or pick soil in areas to be planted with lawn, trees & groundcovers.

- a. Includes grubbing and removing of existing plant material prior to ripping
- b. Be ripped to a depth of 250mm by crisscrossing the area
- c. Rip in two directions, crisscrossing the area at 200mm intervals using an approved implement
- d. Soil on inclines steeper than 1:5 must only be broken loose at 1000 mm intervals, on the contour and to a depth of 200 mm.

- e. Contractor to ensure that no services or structures are damaged
- f. Rip before spreading of topsoil

5.2. Compacted material

All imported and compacted material in tree openings on parking islands to be handpicked and removed to in situ material depth.

5.3. Filling

After soil earmarked for cultivation is ripped and fertilized according to quantities as specified in the Bill of Quantities, tillable soil can be tilled once to a depth of 200 mm by means of a rotator.

5.4. Shaping and Hand trimming

All areas to be landscaped, or areas as directed by Landscape Architect shall be shaped in such a manner that the final profile shall appear as a natural extension of the adjacent undisturbed ground profiles or as indicated on the Drawings or as directed by Landscape Architect. Where machine operations are practicable, shaping shall be done by grader. There may be limited cut and fill during the shaping operation and all surplus material shall be removed to spoil.

Trimming shall consist of bringing the existing or previously shaped ground to a smoothly flowing surface with the final levels generally following the original surface. Trimming shall normally be done using hand tools.

Shaping and Trimming of any areas shall be done in such a way that, after scarifying and application of topsoil, if required, the finished surface of the area shall be approximately 25 mm below the top of adjacent kerbing, channelling or pavement. In all instances the areas shall be shaped such that drainage of storm water to the existing storm water facilities is possible.

- a. Cultivate fertilizers and compost as supplied elsewhere to a depth of 200mm
- b. Provision must be made for proper and effective storm water drainage
- c. Stones larger than 50 mm in diameter and all foreign material must be placed in measurable heaps to be removed from site
- d. Final surface must be shaped to desired profiles and tie in with existing levels

Areas, which are not tillable by mechanical implements, will, unless otherwise determined by the Landscape Architect, be dug over to a depth of 200 mm using garden forks. The soil must have optimal moisture content for cultivation.

5.5. Final seedbed preparation

After the soil has been tilled and shaped to the desired soil profile and stipulated in the quantity list, final formation will be achieved by means of a light-duty tractor and scraper and, wherever possible, garden rakes will be used for finishing.

Where establishment of seed according to diagrams and quantity list is prescribed, seed must be sown before the final manual labour is deployed.

5.6. Rolling of cultivated areas

After the soil is finally shaped, and in areas where seed is sown or grass roots are to be planted, the total cultivated area must, wherever possible, be rolled along the contour using an approved roller.

5.7. Seedbed preparation for the establishment of veldgrass

5.7.1. Scarifying and fertilization

In areas as indicated on the relevant drawings, where the tolerance of levelness of the cultivated area must be such that the grass can be cut with mechanical mowers, the soil preparation will consist of the loosening of the ground according to item 3.4.1 whereupon the ground will be ploughed with an approved instrument. The working in of fertilizers is included in this item.

5.7.2. Levelling of Veldgrass areas

Where the ground level does not satisfy the specified tolerance, the area to be sown must be scraped level by crisscrossing the terrain twice using a soil plane.

5.7.3. Harrowing of veldgrass areas

After the ground has been ploughed, planed, fertilized and seed has been sown, the ploughed areas must be harrowed in a crisscross pattern using a spike-tooth harrow.

5.7.4. Rolling of veldgrass areas

Areas, which have been sown, must be rolled once with an approved roller.

5.7.5. Hand trimming

In areas where the use of mechanical equipment is not possible, the seedbed will be prepared according to item 3.4.4.

5.8. Stones and rubble

Stones larger than 50 mm diameter and rubble, which are exposed during the finishing processes, must be placed in measurable heaps so that the Landscape Architect can measure the volume. Storage heaps must be kept neat.

Removal of stones and rubble to the dumping site, except as stipulated in the Specification, may only be done upon instruction from the Landscape Architect.

5.9. Payment

Payment for seedbed preparation

Payment will be made according to the unit price per m², according to area prepared, fertilized and planted or sown for all areas, including final shaping to a tolerance of 25 mm when measured with a 4-meter straight edge.

Planting will be excluded from the payment for seedbed preparation.

Payment for seedbed preparation for establishment of veldgrass

Payment will be per m² area prepared and sown, including harrowing and rolling after completion of sowing.

6. PLANTING SPECIFICATIONS

6.1. General

All plants shall comply with the plant schedule and no alternatives will be accepted without the written approval of the Landscape Architect.

Extremes in temperature and moisture must be considered before the commencement of planting.

Planting shall be done after preparation and soil improvement has been completed and the irrigation system if any has been installed. Planting shall comprise planting and maintaining of ground cover; planting and maintaining of shrubs; planting, staking and maintaining trees, and seeding areas.

Planting activities shall only be carried out during the months of September to March. No planting shall be done at other times unless agreed with owner, and such planting shall be entirely at Contractor's risk.

6.2. Plant material

- a) All plant material must be nursery grown and be in a healthy vigorous growing condition free of disease and / or pests.
- b) Purchase all plants at registered SANA nurseries, transport to site and hold in site nursery until instructed to plant by the landscape architect.
- c) Plants should preferably be sourced locally, however the contractor must provide for sourcing of plant species countrywide. The contractor must make provision to purchase plants from any supplier in the Republic of South Africa and transport them to site.
- d) All plants must be transported to the site in trucks with closed canopies. Plants in transit may not be exposed to wind or any other harmful elements. Plants must be acclimatised to conditions on site prior to arrival on site.
- e) The contractor must before tendering, ascertain that plant species are available as specified and submit proof to this effect
- f) All plants are to be viewed and approved by the Landscape Architect prior to purchasing and delivery to site. Samples are to be delivered to the landscape architect.
- g) The Contractor must, if so requested by the Landscape Architect, give preference to particular sources of plant material.

Stock furnished shall be at least the minimum size indicated. Larger stock is acceptable providing that the larger plants will not be cut back to size indicated unless approved by the Landscape Architect. If the minimum requirements regarding the size and appearance of plants are not met, the Contractor shall only be remunerated according to the size of the plants on site.

All plants and other products and materials to be supplied by the Contractor shall be subject to inspection and approval of quality, size and colour by the Landscape Architect prior to their installation. Such inspection shall be made at the site or nursery if proximity allows at dates and times which shall be agreed to. Right is reserved to reject plants considered as unsatisfactory. Rejected plants shall be removed from site. Plants planted in rows shall be matched in form.

Planters shall be free of weeds and an approved soil/compost mix shall be continually added to the soil to prevent the exposure of plant roots.

Plant names indicated in legends conform to the local nursery nomenclature, or will give the synonymous name where these differ.

Substitutions will not be permitted. If proof is submitted that specific plants or sizes are unobtainable, proposals will be considered for nearest equivalent size or variety with equitable adjustment of contract price.

The height of the trees, measured from the crown of the roots to the top of the top branch, shall not be less than the minimum size designated in the plant list. The measurements for height shall be taken from the ground level to the average height of the top of the plant and not the longest branch.

Shrubs and small plants must meet the requirements for spread and height indicated in the plant list.

No pruning wounds shall be present with a diameter of more than 25 mm. All wounds shall show vigorous bark on all edges. Plants shall not be pruned immediately prior to delivery.

6.3. Planting procedure

- Planting

- a. Refer to Plant plan supplied
- b. Supply all equipment and labour for planting of trees, shrubs and groundcovers.
- c. Backfill with soil, compost and fertilizer to specification and tramp down firmly.
- d. Remove all surplus soil
- e. Provide all necessary stays for trees and secure tree firmly.
- f. Form pond around trees and shrubs and water well after planting.
- g. Plant when microclimatic conditions on site are best for planting

- Positions of Ground Cover, Shrubs and Trees

The positions in which shrubs and bulbs are to be planted shall be as shown on the Drawings and as directed by the Landscape Architect. Where Ground Cover and shrubs are planted in mass the number of plants indicated on the Drawings or as directed Landscape Architect shall be distributed evenly over the area.

The Contractor will set out the positions of the groundcovers according to the triangle system in such a way that plants, after being planted, will form neat rows in four directions to facilitate weed and plant control.

- Planting of Ground Cover, Shrubs and Trees

- Supply, deliver and plant TREES:

- a. Contractor is to ensure the safety of services, underground or otherwise, prior to excavating.
- b. Dig square holes 1.5X root ball size diameter in all directions. Holes to be inspected by landscape architect prior to planting.

- c. Place trees plumb in the centre of the planting pit with a minimum of 150mm of compacted planting soil mixture mixed in under the root ball. Face the plant to give the best appearance in relationship to adjacent structures and to stand vertical. Cut away any ropes or tags which might girdle the trees and remove container prior to backfill procedure.
- d. Backfill with soil, compost and fertilizer to specification and tramp down firmly (Compost and Fertiliser measured elsewhere). Ensure no air pockets remain around the roots.
- e. If the removed soil is not suitable, imported topsoil (as measured elsewhere) or suitable soil from stockpiles to be used.
- f. Remove all surplus material and apply approved ant remedy
- g. Water thoroughly when hole is half full of tamped soil mixture, and again when the operation is complete. Form pond around stem.
- h. Clean tree stem up as required, treat all wounds to Landscape Architects instruction
- i. Provide all necessary stakes as described below for trees and secure tree firmly.
- j. Rate to be all inclusive
- k. Particulars per tree size described below, unless otherwise specified in the Schedule of Quantities:
 - Trees out of 100 l size Containers: 3000 mm stem height after planting with stem diameter of 70 mm measured 300 mm above soil level and with a crown diameter of 1500mm. Tree to be naturally shaped and full bodied.
 - Trees out of 50 l size Containers: 2200 mm stem height after planting with stem diameter of 40 mm measured 300 mm above soil level and with a crown diameter of 1000mm. Tree to be naturally shaped and full bodied.
 - Trees out of 20 l size Containers: 1500 mm stem height after planting with stem diameter 20mm measured 200 mm above soil level and with a crown diameter of 700mm. Tree to be naturally shaped and full bodied.
- o Supply, deliver and plant SHRUBS AND GROUNDCOVERS:
 - a. Contractor is to ensure the safety of services, underground or otherwise, prior to excavating.
 - b. Dig square hole 400X root ball size diameter in all directions. Holes to be inspected by landscape architect prior to planting.
 - c. Place plant plumb in the centre of the planting pit with a minimum of 50mm of compacted planting soil mixture mixed in under the root ball. Face the plant to stand vertical. Cut away any ropes or tags which might girdle the plant and remove container prior to backfill procedure.
 - d. Backfill with soil, compost and fertilizer to specification and tramp down firmly (Compost and Fertiliser measured elsewhere). Ensure no air pockets remain around the roots.
 - g. Remove all surplus material
 - h. Form pond around stem and water thoroughly
 - k. Rate to be all inclusive
 - l. Particulars per groundcover size described below, unless otherwise specified in the Schedule of Quantities:
 - Shrubs out of 10l containers: 700 to 800mm height and/or runner length after planting depending on species.
 - Groundcovers out of 2l containers: 150 to 300mm height and/or runner length after planting depending on species.

6.3.1. Plant holes

All trees out of crate sized containers or transplanted trees or palms, must be planted in a hole at least 2 times larger than the root ball. Place excavated material on a heap next to the plant hole.

All trees out of 100 kg, 50 kg, and 20 kg containers must be carefully removed from their containers and planted in at least 0.55 m³ of good growing medium (750 x 750 x 750 mm hole, unless otherwise specified in the Schedule of Quantities). In the event that the root ball is larger than 0.55 m³ a hole must be dug at least twice the size of the root ball. All holes shall be square in plan and thoroughly watered before planting.

Two 75 mm diameter black PVC agricultural pipes (feeder pipe and drainage pipe) have to be installed at each of the trees planted in tree rings.

All shrubs and groundcovers out of 4 kg containers must be planted in plant holes 400 x 400 x 400 mm deep, unless otherwise specified in the Schedule of Quantities, after removing the container. The plant medium must be broken loose slightly before planting.

Groundcovers out of 2 kg containers must be planted in plant holes 250 x 250 x 250 mm deep, unless otherwise specified in the Schedule of Quantities, after removing the container. The plant medium must be broken loose slightly before planting.

Rooted plugs must be planted in 50 x 50 x 50 mm deep, unless otherwise specified in the Schedule of Quantities, holes after carefully removing the plants from their containers.

6.3.2. Refilling of plant holes

Set plant material in the planting pit to proper grade and alignment. Set plants upright, plumb and faced to give the best appearance.

Refill the plant hole sufficiently so that the top of the plant container, when placed in the hole, is on same plane as ground level.

Backfilling of soil, compost and fertilizers must be done according to the soil improvement specifications. Remove all excess material.

6.3.3. Transplanting of plants from containers

Remove the plant from the container without loosening the soil. Loosen the bottom 40 mm of roots thoroughly and place plant in the prepared hole. Replace the soil so that the plant is 10 mm deeper than what it had been in the container. All roots must be thoroughly covered. The soil must be shaped so that a pond is formed around the plant. Tramp the plant roots down to embed them firmly, irrigate to fill pond and hole to capacity.

6.3.4. Plant positions

The Contractor will set out the positions of the groundcovers according to the triangle system in such a way that plants, after being planted, will form neat rows in four directions to facilitate weed and plant control. Plant positions will be marked out on the surface of the ground.

6.3.5. Transplanting of plants from open ground

Each tree to be transplanted will be approved by the Landscape Architect before any preparation work is embarked on.

Every effort will be made to prepare the trees to be transplanted during the most suitable period, winter.

Plants for planting on the site are transplanted from open ground must be laid in soil immediately after arriving at the appropriate position (according to the plant plan) and be kept moist until they can be planted. Care must be taken that roots are well spread and not broken or bent when the plants are planted. Root tips must be pruned at an angle.

The crown of the tree will be reduced by about 30% before the transplant. All wounds will be sealed with approved tree sealer.

As wide a crown that will still make transportation feasible will be retained.

All leaves will be removed and the entire tree sprayed with a nutrition formula.

The tree will be trenched so as to retain as large a root ball as possible, within the limits of transportation.

All root wounds will be sealed.

The root ball will be tied / bur lapped for safe transport.

Extreme care will be taken to not damage bark during the lifting and transportation of the trees.

The tree will be kept moist during the transportation by regular spraying.

The tree will be protected from wind damage during the transport.

Should any traffic control measures be required for the safe transport of the trees, this is to be arranged and executed by the Contractor.

6.3.6. Watering of plants

All plants must be planted in moist soil and be well irrigated not later than one hour after planting.

6.3.7. Treatment after planting

6.3.7.1. General

Soil around plants must be tramped down well.

Plant roots must be spread and damaged roots must be pruned. Roots must be folded in or snapped.

Remaining stone and soil from plant holes must be removed from the site as part of the planting cost.

Apply an approved remedy against ants, pests and termites to each plant as and when required. Quantities should be according to manufacturer's directions.

6.3.7.2. Staking and guying of trees

All trees and large shrubs (Crates, 100 kg, 50 kg, 20 kg) shall be tied in an upright position and must be fastened to wooden tree stakes positioned at opposing sides of the plant, with a cross brace to stabilize the stakes. This will avoid any danger of being snapped or damaged by the wind. Tree stake placed on the side to brace tree against the predominant wind direction.

Additionally, trees located in hard landscaping area must also be protected with Tree Guard or any other bio-barrier approved by the Landscape Architect.

The wooden stake shall be "tanalith" treated, have a minimum diameter of 50mm Ø and shall be 300 mm longer than the planted tree with a maximum length of 3 m above ground surface. Approved tree ties will be used to attach the tree to the cross brace (50mm Ø x 700mm) between

the stakes and one tree tie per meter will be used. These stakes shall be driven into the soil at least 500 mm deep not closer than 300 mm from the trunk of the tree. After being driven into the soil the stakes shall be extending 1 800 mm above ground level, unless this height is not extending 300mm above the planted tree or shrub, taller stakes should be used.

In the case of large trees out of open ground, tree guys shall be spaced equally about the tree. Each guy shall be set at an angle of about 45 degrees at approximately 2/5 of the tree height and anchored to the ground stakes, which have been driven into the ground at an angle away from the tree and notched to accommodate the guy wires.

Point of attachment to the tree trunk shall be protected with rubber hose chafing guards. Guys shall be slightly tightened by twisting the strands together or by means of turnbuckle. Under no circumstances shall a tree be plumbed with extreme tautness of guy wires. Plumbing shall be accomplished by adjusting the ball.

6.3.7.3. Subsidence

Subsidence, where these appear in plant holes, must be rectified on a continuous basis.

6.3.7.4. Mulching

After trees and shrubs and groundcovers have been planted, tramped down securely, irrigated and supported, a 50mm thick layer of approved mulch shall be placed around the stem and, thoroughly watered.

Supply, deliver and spread mulch in groundcover planting areas, consisting of bark and organic chips of between 30 and 50mm in size. Mulch to be approved prior to delivery by Landscape Architect

6.3.7.5. Hydro-seeding

Seeding shall be carried out using an approved seeding machine.

The seed mix shall be applied directly to the areas to be seeded after the area has been well watered. Seed shall be mixed in a 1:1 ratio with clean dry building sand and applied in two consecutive applications to ensure even distribution over the area to be seeded.

The seed mixture shall be the following species in the stated proportions applied to the various areas as indicated on the Drawings or as instructed by the Landscape Architect:

Cynodon dactylon	100%
Application Rate:	40kg/ha

Directly after seeding the area shall be lightly raked to cover the seed sufficiently with soil.

All work described hereunder relates to all activities involved in the process of hydro seeding, except supply and spreading of topsoil if and where required as described under item 2 and except maintenance.

The following items are to be quantified once all the hard works have been completed and the exact area can be measured and once the results from the soil analysis become available.

- Soil Analysis

The Contractor shall take representative samples of the top 75 mm topsoil for soil analysis by a recognised laboratory in order to determine the soil pH, the Lime, Superphosphate and N P K fertiliser requirements of the material. The CEC (Cation Exchange Capacity) and the organic carbon content of the soil is also to be determined. The areas to be grassed are to be fertilised as required by the soil analysis. Agricultural lime and or Superphosphate fertiliser, if required, is to spread and worked in to the soil prior to soil preparation or grassing. The fertiliser quantities and other supplements are to be recalculated after evaluation of the soil analysis.

- Soil Preparation

The top soiled areas are to be scarified mechanically or manually by forming horizontal drills 100-150 mm apart running parallel to the contour.

- Depth of drills: 30mm
- Contractor to ensure that no services are damaged
- Rip before spreading of topsoil
- Topsoil supply and spreading measured elsewhere
- extent of work is to be determined on site after completion of construction activities

- Supply Seed Mixture

Supply grass seeding mix. The unit of measurement for providing grass seed shall be the kilogram of seed of the specified seed mixture supplied on instruction by the Landscape architect. The tendered rate shall include full compensation for procuring, furnishing, mixing and storing the seed.

- The seed is to be applied at a density of 40 kg/ha
- The mix is as follows:

Cynodon dactylon	100%
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- Application (Hydro seeding) measured elsewhere

- Supply processed Mulch

The mulch shall consist of either straw or Veld grass that has been processed by an agricultural hammer mill where the fibre length does not exceed 25 mm. Only straw or Veld grass that is not contaminated with weeds will be used. The mulch will be placed in closed bags and delivered to site where it will be inspected prior to use.

- The mulch application will be 250 kg/ha.
- Application (hydro seeding) measured elsewhere

- Supply Agricultural Lime

- Application will be 1000 kg/ha.
- Application (hydro seeding) measured elsewhere
- The fertiliser requirements will be determined by the soil analysis

- Supply Superphosphate

- Application will be 500 kg/ha.
- Application (hydro seeding) measured elsewhere
- The fertiliser requirements will be determined by the soil analysis

- Supply limestone Ammonium Nitrate

- Application will be 250 kg/ha.

- b. Application (8 to 12 weeks after germination as part of the maintenance program) measured elsewhere
- c. The fertiliser requirements will be determined by the soil analysis

- Supply Urea

- a. Application will be 150 kg/ha.
- b. Application (8 to 12 weeks after germination as part of the maintenance program) measured elsewhere
- c. The fertiliser requirements will be determined by the soil analysis

- Supply 2:3:2 (22) +Zn

- a. Application will be 350 kg/ha.
- b. Application (hydro seeding) measured elsewhere
- c. The fertiliser requirements will be determined by the soil analysis

- Supply Organic Supplement

Supply organic supplement or similar approved processed chicken/cattle manure will be applied 1000 kg/ha or at the recommended application rates as determined by the soil analysis (Organic carbon content).

- a. Application will be 1000 kg/ha.
- b. Application (hydro seeding) measured elsewhere
- c. The fertiliser requirements will be determined by the soil analysis

- Supply Soil Binder / Anti Erosion Compound

The soil binder or anti erosion compound will be provided at a rate of 5 kg/ha or as specified by the suppliers. The soil binder/anti erosion compound will be applied simultaneously with the hydro seeding mixture and only on instruction by the Landscape Architect.

- a. Application will be 5kg/ha.
- b. Application (hydro seeding) measured elsewhere
- c. The fertiliser requirements will be determined by the soil analysis

- Initial Erosion Control

The modest 'rills/gullies' that forms is not problematic as the creeping grasses will cover these up over the period. However the bigger gullies that forms which require topsoil or filling material will have to be re-seeded after the surrounding areas have established. The water run-off should then be diverted away from the damaged areas to the surrounding established areas.

- Initial Weeding

In some cases during the establishment period the removal of annual weeds & invader species will be required. This can be done by manual hand labour or with mechanically means using brush cutter to cut down the infested vegetation

- Watering, Weeding and Re-seeding

Dry Land or Irrigated:

Generally hydraulic seeding is a dry rehabilitation method, which does not necessitate any form of irrigation. The use of scarifying drill, a soil binder and mulch will retain the application slurry in situ, binding the surface layer. A microclimate will form as the climate & soil moisture conditions for germination improve and vegetation establishment occur.

On irrigated sections, water the seeded areas early in the mornings and late in the afternoons for maximum water retention. The seed will germinate within 3-21 days depending on seed selection, with proper soil moisture. After the areas have germinated water three times (every second day) a week for approximately 4 weeks and subsequently once or twice every two weeks until established.

If only a drag line irrigation system is available and the total area cannot be watered within 24 hour cycle, the following can be implemented:

Divide the area in manageable sections for effective and ease of watering operations

Water the selected areas early in the mornings and late afternoon for maximum water retention

Retain moisture by concentrating on the selected section at a time, until pioneer and / or turf grass seed has germinated

Progress to the adjacent areas and rotate back to the germinated sections as needed, wilting of grass leaves will occur

The seed will germinate within 3-21 days depending on seed selection, with proper soil moisture

Alternate the drag line frequently to prevent any water run-off

After the areas have germinated water three times (every second day) a week for approximately 4 weeks and subsequently once or twice every two weeks until established.

The seeded areas shall be kept free of weeds for the period up to establishing acceptable cover and for the period of maintenance. Weeds shall be controlled by means of pulling, cutting or any other approved means.

Any bare patches where the vegetation has not taken, or where it has been damaged or has dried up, shall be re-cultivated and seeded without any additional payment.

- Apply hydro seeding mixture

The prepared and scarified slopes are to be hydraulically seeded (hydro seeded) using equipment that has been specifically designed to agitate a homogenous mixture of grass seed, mulch, NPK fertiliser, soil binder/anti erosion compound, organic supplement and water and that it can disperse the mixture over a distance of 50 metres from the nozzle of the hydro seeding pumping mechanism.

- a. The unit of measurement for hydro seeding shall be the actual area covered with grass and having an acceptable grass cover.
- b. The tendered rates shall include full compensation for supplying and applying the specified mixture, weeding of noxious weeds, reseeding all or any bare patches that may occur and for any other work except mowing, which may be necessary for establishing an acceptable grass cover.
- c. 75% of the tendered rate shall become payable on completion of the work and the remainder when an acceptable cover has been attained.
- d. An acceptable grass cover shall mean that not less than 75% of the area grassed or hydro seeded shall be covered with grass with no bare patches exceeding 500mm x 500 mm in area shall occur.
- e. Inclusive of all watering that may be required to achieve successful establishment, an acceptable grass cover and growth until practical completion.

- Acceptable Grass Cover

An acceptable grass cover shall mean that not less than 75 % of the area seeded shall be covered with vegetation of the seeded species, and that there shall be no bare patches of more than 500 x 500 mm in maximum dimension.

- Responsibility for Establishing an Acceptable Cover and Growth

The establishment period depends on the climate, soil moisture and soil conditions. Provided that the watering and / or rainfall are adequate, growth should have occurred within 3 – 21 days and there should be suitable grass cover within a 2 to 6 period that will prevent soil erosion and is aesthetical pleasing.

Notwithstanding the fact that Landscape Architect determines the method of planting, the Contractor shall be solely responsible for establishing an acceptable cover and growth and for the cost of re-planting or re-seeding where acceptable cover or growth is not obtained. Where, however, in the opinion of the Contractor, it is doubtful from the outset whether it will be possible to establish an acceptable cover or growth, he may inform the landscape Architect of his reasons for this and the Landscape Architect may, if he agrees, either adopt another method of planting or agree to accept whatever cover or growth can be obtained, provided that all reasonable efforts are made to establish a good cover or growth using the method specified. Any such agreement shall only be valid if given in writing by the Landscape Architect.

- Cleaning of areas

During landscape gardening areas shall be kept as neat and clean as possible and all soil, mud, plant material, fertiliser and litter spilled onto surrounding areas shall be swept and cleaned at the end of each working day.

Where landscape gardening is done at entrances to buildings or adjacent to walkways spillage of soil, mud, plant material or fertiliser shall be cleaned immediately, or alternative temporary walkways shall be provided.

- Plant succession

The following paragraph clarifies the basic plant succession description during establishment / succession period:

“A Standard veld reclamation seed mixture consists of 30% pioneer species and 70% sub-climax and climax species. Through time the succession of plant communities will progress until climax species has established. Some plant soften habitat-specific represent two or even three succession stages. The pioneer species are hardened, annual plants that grow rapidly to protect the bare soil against wind & water erosion. As growth conditions improve the sub-climax, perennial plants grow stronger to drive out the annual pioneer grasses. The sub-climax plants are largely perennials with a life span of two to five years. Climax perennial plants replace sub-climax plants that are adaptable to optimal growth conditions as long as the conditions prevail.”

- Mowing of vegetation

If pioneer grasses, generally *Eragrostis teff* reach an approximately 200 to 300 mm in height it can be mowed down to 150mm if necessary. The mowing of pioneer grasses can be done throughout the year but not during the autumn months as the pioneer grass cover create a cooler surface for better seeding development in the spring.

In the summer rainfall the grasses generally flowers within the period of November to May. We recommend that grass cutting only commence late in autumn when the veld becomes a fire hazard or untidy.

The more the soil is exposed from the mowing operation, the change of proper succession decline. The exposed soil forms a crust reducing the conditions to establish seedlings as the water retention is poor.

Should the disturbed / denuded area that is reinstated not be of high ecological status, the establish vegetation (sub & climax stages) be mowed as and when required.

6.4. Planting of cuttings, sprigs, rooted plugs, etc.

6.4.1. General

Plants must be planted in neat rows at intervals as determined by the Landscape Architect, in rills or individual plant holes, which in both cases must be deep enough to contain the total root system of a particular plant. All roots must be carefully and adequately covered. All leaves must, where applicable, be above ground and soil free.

6.4.2. Irrigation

After plants have been planted the area must be irrigated and kept moist until completion of the works.

6.5. Planting of lawn.

Types: Cynodon dactylon

Backfill lawn area with soil mix.

Lay lawn sods tightly against each other, without loosening or breaking the root structure.

Fill gaps between sods with soil mix.

Roll with a horticultural roller.

Water well.

6.6. Payment for planting

Payment will be made according to plant type, plant size, per plant or per area planted or the Landscape Architect may determine as.

7. IRRIGATION

The Contractor in consultation with a specialist irrigation supplier shall supply, construct, commission and guarantee an irrigation system as per the irrigation design supplied by the landscape architect. The irrigation system should accommodate for all trees, shrubs and ground covers planted, as well as any lawn areas. Any trees within dump rock areas should be provided with bubblers as per the irrigation design, unless otherwise specified. Should no irrigation be indicated in some areas, this should be communicated to the landscape architect to decide on the way forward. A water cart should be supplied for all trees that will be planted in areas without landscaping and irrigation.

Irrigation system shall conform to the following requirements, unless otherwise specified within the Schedule of Quantities:

- Municipal water will be used to irrigate.
- The system shall take off from the water mains as indicated on the drawings. The main contractor should indicate the water mains before construction and implementation starts.
- The system shall provide water to the landscaped areas as indicated by the Landscape Architect.
- Each section of the system shall be capable of delivering 25 mm of water over the area covered by that section in an eight hour period.
- All areas shall be watered equally.
- Water pipes shall be HDPE or LDPE depending on the position in the system.
- Drip irrigation to be installed as per the irrigation plan
- The system shall be automatic in that there shall be no movable parts. All sprinklers must be fixed in position and the system must be able to be controlled from one or two valves at each location. Computerised automation shall be priced as indicated.
- Mist sprayers shall be provided for all shrubs and ground cover areas. The sprayers shall be erected on standpipes between approximately 300 mm and 500 mm above finished topsoil level, depending on the nature of the plants to be irrigated.
- Allowance shall be made for the prevailing wind conditions.
- QC valves at a maximum of 30 m spacing shall be provided on the veld grass area on the median.
- 0.25 gpm pressure compensating bubblers approximately 50 mm above ground level shall be provided at all trees.
- Bubbler shall be installed in a 75mm x 200mm PVC pipe and filled with crusher stone as to prevent any blocking of the bubbler.
- If computerized all electrical work is to comply with local municipal codes.
- Trenches shall be 650 mm deep and 250 mm wide for all pipes over 63 mm Ø, and 450 mm deep and 250 mm wide for all pipes below and including 63 mm Ø pipe.
- Coarse sand bedding will be used up to 50 mm above all pipes.
- Backfill and compaction of trenches through hard surfaced areas to be to specification for other civil works. Through planted areas it is to be to the same degree of compaction of the surrounding planting area, such that no subsidence occurs after backfilling.
- The system shall be guaranteed for at least one year.
- An as built drawing shall be provided after the completion of the installation to the Landscape Architect.
- The entire installation will be maintained from installation to the date completion, by the Contractor.

7.1. Water connection point:

- A water connection point to be made available close to the irrigation mainline.
- The contractor is responsible for the supply, delivery and installation of water points
- Allow for numerous water points along the route, as indicated on the irrigation plan.
- Minimum water pressure and flow required are 110L/P/M @ 5 BAR which must be confirmed on site by irrigation contractor before any work commences.
- A municipality approved water meter and shutoff valve in a suitable valve box shall be provided at each take-off point

7.2. Sleeve requirements:

- All sleeves to be 110mm in diameter. The pipe is to be slotted with a corrugated outer wall and a smooth inner wall. The pipe must have a pipe stiffness of at least 450kpa. The sleeving pipe must conform to SABS and ISO standards.
- All sleeves to be installed approximately 500mm below ground level and clearly marked. In the case of the sleeves being buried deeper than 500mm the project manager needs to be notified of the depth details. All sleeves, if installed by the main contractor should be clearly marked and a draw wire made available. The main contractor should also indicate on site to the landscape contractor where all the sleeves are installed if any
- All sleeves should extend a minimum of 500mm behind the kerb into the landscape area.
- All sleeves connecting tree rings (including electrical, etc.) must be placed to the side of the tree ring and not in the middle. All other service sleeves must be placed to the side as well.
- Refer to the irrigation layout for more information

7.3. Electrical:

- The irrigation controller must be installed where indicated on the drawing.
- Battery operated controllers to be used, unless otherwise specified on the irrigation layout and on the Schedule of Quantities
- All wire quantities are determined by the controller position and should site conditions require it to change. The landscape architect and irrigation specialist should be notified first, as this will affect the Schedule of Quantities.
- The controllers electrical connection should be 220V and 15Amp power supply.

○ Please note:

The irrigation bill of quantities can change considerably if the irrigation sleeves, water requirements and controller are not able to be installed as specified. Any variations from initial design must be pointed out to the irrigation consultant in order to amend design or bill accordingly.

All work is to be installed to L.I.A specifications and this may be checked in the form of random on site visits.

8. SITE ESTABLISHMENT

8.1. General

Site Establishment will include the supply of all management expertise, labour, maintenance equipment, tools, materials and fuel as may be deemed necessary for the mowing of lawns, pruning of trees and shrubs, replacement of dead plants, weed control, removal of litter and rubble, inspections, patching up with grass roots, applying of fertilizers and digging in of compost, irrigation, maintenance and adjustment of the irrigation system, maintenance of paved and dump rock areas, taking of soil and water samples and conducting tests to determine fertilisation and other requirements, and in general everything that is deemed necessary to keep all plants healthy and maintain the site neat and acceptable to the highest standards to the satisfaction of the Landscape Architect until final delivery to the employer.

Normal retention work, i.e. any defects in construction of any kind, will be repaired or replaced to the satisfaction of the Landscape Architect before final delivery of the site.

The Employer will have full use of the site during the maintenance period.

Allow for the complete maintenance and establishment of all planted areas, inclusive of:

- a. Maintenance will be for a period of **SIX (6) MONTHS**, beginning directly after the Landscape Architect's acceptance of the practical completion of the contract. Maintenance activities are applicable to necessary maintenance work during the construction period as well.
- b. Replacing of plants that have died with the same species according to specifications, pruning of plants, regular mowing of lawn, weed control, application of fertilisers, hand watering of all trees, loosening of soil and as directed by the landscape architect.
- c. Maintenance and repair where necessary of all hard landscaping, features and irrigation system. Rate to be all inclusive

8.2. Site Establishment prior to practical completion

The contractor must establish all planting.

All planted areas shall be established in a weed-free condition by hand. No chemical weed killers shall be used without prior approval of the Landscape Architect. The beds shall be kept in a tidy condition. The Contractor shall allow for checking the stakes and pruning as required. Any pruning shall only be carried out with the prior agreement of the Landscape Architect.

All planted and seeded areas shall be adequately watered and frequent and regular intervals in order to ensure proper germination and growth until an acceptable cover has been established and thereafter until the commencement of the Site Establishment period (see 'Watering'). The amount and frequency of watering shall be subject to the Landscape Architect's approval. Where seeding is carried out, the commencement of watering may be postponed until a favourable time of the year but watering shall in any case commence and continue as soon as the seeds have germinated and growth begins.

The Contractor shall ensure that during this period the irrigation system is working adequately and shall immediately report any malfunction to the Landscape Architect. Should the system malfunction, the Contractor shall during this period of malfunctioning allow for hand watering or making use of a water cart of all landscaped areas such that each area receives water every two days during initial establishment, or as instructed.

8.3. Site Establishment following practical completion

After planting has been completed to the satisfaction of the Landscape Architect or his representative, the Landscape Architect will issue a certificate of practical completion. By issuing of this certificate the general site establishment period on planting will commence during which period the Contractor will maintain all landscape areas. The site establishment period will be for a **THREE (3) month period** starting from practical completion.

The site establishment period on grassed areas will commence as soon as an acceptable coverage was obtained.

The site will be handed over to the Employer upon fulfilment of the all maintenance requirements, after a final inspection of the work has been done and the work and/or defective work has been found to have been completed to satisfaction.

At the end of the site establishment period, following the final inspection, the Landscape Architect will issue the final certificate. By issuing the certificate of practical completion, one half of the retention money will be released and the balance on issuing the final certificate.

8.4. Site Establishment activities

8.4.1. Maintenance equipment and machinery

Only specialised equipment and machinery in good condition and appropriate to the required tasks shall be used.

8.4.2. Inspections and assessing of maintenance requirements

A competent person shall once a week undertake a site inspection once a week by and submit a written report as to the status of weeds, invader plants, insects, pests, ants, termites, pollution and in general any other aspects which may have an effect on the successful establishment of all plant growth.

Special attention must be given to the control of all pests etc. and the eradication thereof. The supply and application of the required herbicides/pesticides and chemicals is deemed to be part of the routine maintenance.

8.4.3. Stones, rubble and litter

All stones, rubble and site litter must be collected and removed from the site as part of the routine maintenance. Under no circumstances may site litter, rubble etc. be placed in the Employer's litter bins.

8.4.4. Irrigation

The Contractor is to take care that all landscaped areas are continuously kept moist to the equivalent of 25mm per week so that plants do not wither. In addition to normal irrigation, all trees are to be individually watered once every two weeks by filling the pond around the tree.

8.4.5. After watering the soil shall be moist to a depth of at least 300 mm.

The Contractor has to make provision to do hand watering from water supply points or from a water cart where no irrigation system exists.

8.4.6. Mowing of lawns and grass

All lawn areas have to be mowed and manicured at least once a week in the summer season and at least once every two weeks in the winter season as part of the routine maintenance. Seasons are to be as will be determined on site by the Landscape Architect.

All lawns are to be mowed with acceptable modern petrol, diesel, or electrically self-driven cylindrical type lawn mowers, adequately equipped with a clipping catcher. Mower blades have to be sharpened regularly. All grass clippings have to be removed from site, unless otherwise directed. Grass clippings may not be used as mulch on plant beds.

Under no circumstances may slasher type mowers which are tractor drawn be used to mow the lawns.

All stones and foreign objects have to be picked up and removed from the site prior to each cutting. Lawns may only be cut when the leaves are dry, except in cases where continuous rain necessitates the cutting of moist lawns. Lawnmowers are to be set so as to cut the leaves and not the root mat.

Lawns may only be cut during normal and acceptable working hours unless prior approval is given by the Employer to cut lawns outside of normal working hours. Mowing of all lawns is part of the routine maintenance.

Veld grass areas will normally not be mowed regularly. However, the Contractor shall cut the grass in these areas and remove the clippings once during the maintenance period.

8.4.7. Use of 'Weed eaters'

Should "weed eaters" be used to trim grass around tree stems, care is to be taken not to damage the stem bark in any way.

8.4.8. Weeding

Unless otherwise determined by the Landscape Architect, all weeds on lawns which are not removed by the normal cutting process, have to be removed by hand and taken off the site. Weeds of any kind and invader plants occurring in beds and other areas such as between dump rock have to be hoed or pulled out with their roots regularly on a weekly basis and have to be removed from the site. Weeds occurring in roadways, kerbs or on paving have also to be pulled out and removed from site.

Aquatic weeds must be removed by hand and under no circumstances are herbicides to be used.

Herbicides may only be used with the written consent of the Landscape Architect and have to be applied under the supervision of skilled and trained personnel. The Contractor has to take the necessary precautions to prevent organic material brought to the site from spreading foreign grass types or weeds on the site. Pre-emergent as approved may be used by the Contractor to control weeds

All herbicides and pesticides shall be applied by specialists in the applicable field or adequately trained supervisors. The onus shall be on the Contractor to ensure that no desirable vegetation is damaged or dies as result of the application of herbicides or pesticides or any other product used by the Contractor, the incorrect use of equipment, incorrect equipment or negligence on the part of the Contractor or his staff. The Contractor shall take all reasonable steps to ensure that weed and pest control is done in optimal weather conditions to ensure maximum effectiveness.

If in the opinion of the Landscape Architect any vegetation is damaged or dies as result of any actions whatsoever by the Contractor such vegetation shall be replaced to the satisfaction of the Employer. Such vegetation, lawns etc. will be replaced with the same species or in consultation with the Employer with any other species that may be decided upon. The cost of such replacement shall be for the account of the Contractor. Prior to replacing vegetation, lawn etc. and on instruction from the Employer the Contractor shall ensure that all residue of the herbicide etc. is removed from the soil, paving or any other surface or area applicable.

The Contractor shall make his own deductions and conclusions as to the nature of the weeds or pests where work is to be executed and shall accept full responsibility therefore. He shall ensure that all complimentary information necessary for the execution of the service is obtained and checked in due time and will not invoke a lack of information as justification for delayed and/or defective work.

All weeding and use of any herbicides form part of the routine maintenance.

8.4.9. Aeration

The Contractor must make provision as part of his normal maintenance routine for the aeration of all plant beds on a bi-weekly basis by means of light forking. Care must be taken not to damage or disturb any plant roots as well as any irrigation pipes and fittings. Plant beds are to be kept well defined by forming a neat row. However, no forking of plant beds must be done in beds where plants root by means of runners.

8.4.10. Re-sowing of veld grass

Any open patches larger than 0.25 square meters in area have to be rectified by either sowing applicable seed or planting additional sprigs of specific species. Such areas have to be loosened and fertilized thoroughly before planting or sowing, in accordance with the specifications regarding the application of fertilizer applicable to the specified area. Costs incurred in this regard will be for the account of the contractor.

Any open patches which may develop as a result of instructions given by the Landscape Architect to do variations, will be planted or sown by the Contractor according to the specifications. Payment for such replanting will be in accordance with the unit price specified in this contract, unless such repairs have been necessitated by bad material employed or a lack of skill on the Contractor's part.

8.4.11. Cutting of borders / edges

All borders of lawn areas bordering on pavements, pedestrian walks, structures, paving, kerb stones, poles, mow edges and fences, planted areas etc. have to be cut neatly with shears or border cutters on a regular basis and cuttings removed from the site.

Lawn roots growing into these areas are also to be contained and where necessary removed. All clippings and roots are to be collected and removed from the site. Similarly all groundcovers/shrubs overhanging kerbs are to be selectively pruned.

8.4.12. Veld grass areas

Veld grass areas will normally not be cut, but the contractor will be expected to cut these areas and remove the cuttings if the Landscape Architect should so order.

8.4.13. Pruning of trees and shrubs

All trees and shrubs are to be regularly pruned by specialists as part of the routine maintenance and branches and leaves removed from site.

Trees and shrubs are to be pruned according to species and to the desired shape. All prune wounds are to be suitably sealed off. All damaged branches and stems are to be treated and tied up as is common horticultural practice.

Plants are to be, where necessary, pruned so as not to impair visibility of motorists as well as create security risk areas.

The Contractor will be permitted as part of his routine maintenance to chip all pruned tree and shrub branches which may then be used for mulch in the plant beds

8.4.14. Tree stakes

All trees are to be kept staked, firm and tied according to specification. Broken or unserviceable stakes are to be systematically replaced with the same type of stake as part of the routine maintenance

8.4.15. Wash-a-ways / sagging

The Contractor will as part of his routine maintenance regularly repair all normal washaways and sagging of any nature in the landscaped areas. Groundcovers which are available on site may be harvested and planted in areas to combat washaways as part of the routine maintenance. Abnormal damage is to be referred to the Employer for a decision and instruction.

8.4.16. Watering

All plants shall be adequately watered at frequent and regular intervals to ensure proper growth until the plants have established an acceptable growth. The amount and frequency of watering shall be agreed with Landscape Architect.

8.4.17. Acceptable growth

An acceptable growth shall mean that all the plants shall be alive and healthy at the end of any period not less than three months after planting.

8.4.18. Drainage

The contractor will as part of his routine maintenance ensure that all stormwater and irrigation water drains away so as to avoid swamping. All stormwater catchpits are to be kept clean and free of plant matter, litter etc.

The cleaning of stormwater pipes and systems does not form part of the routine maintenance and should be maintained by the employer. Water which cannot drain away as is normal must be referred to the Employer for a decision and instruction.

8.4.19. Services

All manholes are to at all times be kept totally exposed for easy identification and access

Maintenance, inspection and servicing of the irrigation and water features

The complete irrigation and water feature system inclusive of pumps and control units is to be inspected and serviced on a monthly basis by a competent person and a written report submitted as to the condition of the system.

Routine replacement of small parts; repairs to leaks, cables, valves, nozzles and pipes; adjustments to the system, etc. as well as damage and losses due to the Contractor's negligence will be considered to be part of the routine maintenance. Broken, damaged or malfunctioning irrigation components covered under the product guarantee will be replaced by the Contractor.

Broken components, caused by exterior factors only will be replaced by the Contractor, with additional remuneration.

8.4.20. Fertilisers and nutrients

All fertilisers and nutrients will be applied using calibrated and suitable equipment to the manufacturer's specification at the rates as recommended and as and when instructed to do so by the Employer. Areas which are fertilised are to be well irrigated after each application so as to ensure that there is no fertiliser left on the leaves of any plants.

8.4.21. Top dressing

On request the Contractor to apply a top dressing consisting of topsoil/compost. The material used for the top dressing will consist of equal parts of well-rotted organic matter and topsoil as specified. Topsoil and all other components should be supplied by the Contractor. Before applying the top dressing the grass has to be cut and all cuttings removed.

The top dressing will be applied in layers with a maximum thickness of 10 mm, but preferably not less than 5 mm. It will be neatly finished by working it into the grass mat employing a drag-mat and touching up with rakes and straight edges.

8.4.22. Replacement of dead plants and replanting

All plants which have died during the maintenance period have to be systematically replaced by the Contractor at his expense during the maintenance period as and when directed to do so by the Landscape Architect.

Plants have to be replaced with the same species in accordance with the specifications or in consultation with the Landscape Architect with any other species which may be decided upon.

Any bare patches where the vegetation has not taken, or where it has been damaged or has dried up, shall be re-cultivated and re-planted without any additional payment

8.5. Guarantee

Plants shall be guaranteed by the Contractor and shall be alive and in a satisfactory growing condition at the end of the guarantee period.

Plants, which die or become unhealthy from any cause or appear to be in a badly impaired condition, shall be removed promptly and replaced as directed by the Landscape Architect and any plants that settle below or rise above the described finished grades shall be reset at proper grades. All replacements shall be plants of the same kind and quality as the plant to be replaced and they shall be furnished, planted, guyed and maintained as specified herein.

The guaranteed period shall be for 90 (ninety) days, commencing simultaneously with the retention period following practical completion.

At the conclusion of the 'Guarantee Period' a final inspection of all work included in this contract will be made by the Landscape Architect.

8.6. Acceptance of the site

The site or part of it will be handed over to the employer upon fulfilment of the establishment requirements, a final inspection of the work has been done and the work and / or defective work have been found to have been completed to satisfaction.

An inspection to determine the acceptance of plant bed areas will be made by the Landscape Architect.

9. MEASUREMENT AND PAYMENT

9.1. General

Unit : Number (No)

Measurement for testing will be the actual number of test results supplied to the Landscape Architect.

The rate tendered shall include full compensation for taking samples, transporting samples to the laboratory, receiving and interpreting the results, making copies available to the Landscape Architect and for any other work which may be necessary to obtain the results.

9.2. Removal of unsuitable materials

Unit : cubic metre (m³)

Measurement will be the volume of material removed from site to the Contractor's dump site.

The rate tendered shall include full compensation for gathering, stockpiling and loading from stockpile, transport, off-loading at the dump site, as specified.

9.3. Shaping and Trimming

Unit : square metre (m²)

Measurement for shaping, trimming will be for the area of ground shaped, trimmed and scarified as indicated on the Drawings or as instructed in writing by Landscape Architect.

The rate tendered shall include full compensation for shaping and trimming, minor cut to fill and for removing surplus material to spoil.

9.4. Cut and Fill

Unit : cubic metre (m³)

This item will only apply where significant amount of material need to be moved as part of the shaping. Measurement for cut and fill will be the volume measured in situ to be cut and filled as part of the shaping exercise.

The rate tendered shall include full compensation cutting, loading, transportation, filling and compaction of material to achieve the desired shaping of the area. Removal of any surplus material will be measured under item 104.02.

9.5. Scarifying

Unit : square metre (m²)

Measurement for scarifying will be for the area of ground scarified as indicated on the Drawings or as instructed in writing by Landscape Architect.

The rate tendered shall include full compensation scarifying, removing stones, smoothing off the surface, minor cut to fill and for removing surplus material to spoil.

9.6. Placing Topsoil

Unit : cubic metre (m³)

Measurement will be the volume of topsoil applied at the specified thickness over the area directed by the Landscape Architect. The quantity will be calculated from the net area of the surface topsoil multiplied by the specified thickness of the topsoil. Any topsoil placed in excess of the specified thickness will not be measured.

The rate tendered for topsoil obtained from Site stockpiles shall include full compensation for selecting, screening if required, loading the topsoil from stockpile, transport, off-loading, placing and spreading to the required thickness, levelling it off to a smooth surface and removing any stones as specified.

9.7. Furnishing and applying fertilisers

Unit : kilogram (kg)

Measurement of fertiliser will be by mass of each type of fertiliser applied.

The rate tendered shall include full compensation for furnishing the fertiliser, transporting it to the point of use and for spreading and mixing it into the soil or topsoil in accordance with the manufacturer's instructions or as agreed by the Landscape Architect.

9.8. Planting Tablets

Unit : Number (No)

Measurement of planting tablets will be the number of each type used with planting.

The rate tendered shall include full compensation for procuring the tablets and placing it in the plant holes with planting.

9.9. Compost

Unit : cubic metre (m³)

Measurement for compost will be the volume of compost applied at the specified rates.

The rate tendered shall include full compensation for furnishing the compost, transporting it to the point of use and for spreading and mixing it into the scarified soil or topsoil in accordance with the specification.

9.10. Furnishing plant material

Unit : Number (No)

Measurement of plant material will be the number of each type and size of plant supplied to and planted on Site.

The rate tendered shall include full compensation for procuring the plants, transporting plants from commercial nurseries to the Site and maintaining the plants in a healthy condition on Site until it is planted.

9.11. Planting Ground Cover, shrubs and trees

Unit : Number (No)

Measurement for planting of ground cover, shrubs and trees will be the actual number planted to specification in agreed positions.

The rate tendered shall include full compensation for transporting plants from the site nursery to the point of planting and planting it in accordance with the specification, disposal of the plant bags and pots off-site, staking the plants, for initial watering and watering during the maintenance period, weeding, re-planting were necessary, and for any other work which may be necessary to achieve acceptable growth.

Payments due will be certified as follows:

- 50% of the rate tendered when planting has been carried out
- 50% of the rate tendered when an acceptable growth been achieved.

9.12. Mulching Unit : cubic metre (m³)

Measurement for mulching will be the volume of mulch applied as specified.

The rate tendered shall include full compensation for furnishing the mulch, transporting it to the point of use and for spreading it in accordance with the specification.

9.13. Planting of lawn sods Unit : square metre (m²)

Measurement for seeding will be the net area planted.

The rate tendered shall include full compensation for furnishing plant material planting and staking the sods as specified.

Payments due will be certified as follows:

- 50% of the rate tendered when planting has been carried out
- 50% of the rate tendered when an acceptable growth been achieved.

9.14. Seeding Unit : square metre (m²)

Measurement for seeding will be the net area seeded and having acceptable cover.

The rate tendered shall include full compensation for furnishing building sand and mixing it with seed, for seeding and raking over, rolling, for watering to establish acceptable cover, weeding, mowing, re-seeding bare patches, and for any other work which may be necessary to establish acceptable cover and to maintain the vegetation.

Payments due will be certified as follows:

- 50% of the rate tendered when seeding has been carried out
- 50% of the rate tendered when an acceptable cover has been established.

9.15. Irrigation System Unit : Sum

A lump sum payment shall be made for the design, supply, installation, testing, commissioning, guarantee and supply of drawings & manuals. The payment shall be certified as follows:

- 20% of the sum once detail design has been submitted and accepted by Owner.
- 80% of the sum when the system has been installed and commissioned satisfactorily after planting has been completed.

9.16. Maintenance Unit : month

Measurement for maintenance will be a month of maintenance.

The rate tendered shall include full compensation for all maintenance activities as specified.

9.17. Additional landscaping requirements Unit : Provisional Sum

A Provisional Sum has been allowed against which payment for other gardening requirements or work instructed by the Landscape Architect will be reimbursed.

9.18. Conservation of Topsoil

Unit : cubic metre (m³)

Measurement shall be cubic metre of topsoil stockpiled.

10. HARD LANDSCAPING AND PAVING

10.1. General

These specifications address the installation of **PAVING**. The specifications must be read in conjunction with the **Standard Specifications for Civil Engineering Construction, SANS 1200 MJ: Segmented Paving (SEE ANNEXURE)** Measurement for testing will be the actual number of test results supplied to the Landscape Architect.

The rate tendered shall include full compensation for taking samples, transporting samples to the laboratory, receiving and interpreting the results, making copies available to the Landscape Architect and for any other work which may be necessary to obtain the results.

The specifications must be read in conjunction with the drawings produced by the engineer and Insite Landscape Architects.

PART 2: SCHEDULE OF QUANTITIES**1 . PREAMBLE**

For the purpose of this schedule of quantities, the following will have the meanings assigned to them:

Unit	The unit of measurement for each item of work as defined in the Schedule of Quantities.
Quantity	The number of units of work for each item.
Rate	The payment per unit of work at which the Contractor tenders to do the work.
Total (R.c.)	The product of the quantity and the rate tendered for an item, given as Rands and Cents.
Sum	A price tendered for an item of which the extent is described in the Schedule of Quantities, the specifications or elsewhere, but the quantity of work is not measured in any units.

The quantities set out in the Schedule of Quantities are approximate only and only the quantities of work finally accepted and certified for payment and not the quantities given in the Schedule of Quantities will be used for determining payments to the Contractor. The validity of the Contract will in no way be affected by differences between the quantities in the Schedule of Quantities and the quantities finally certified for payment. Work will be valued at the rates or lump sum prices quoted upon.

Rates and lump sum prices will be inclusive of overheads, profits, incidentals, tax, etc. and will include full compensation for the items of work specified. Full compensation for completing and maintaining during the maintenance period, all the work shown on the drawings and specified in the specifications and for all the risks, obligations and responsibilities specified in the general special conditions of Contract and Specifications, will be considered as provided for collectively in the items of payment given in the Schedule of Quantities, except insofar as the quantities given in the Schedule of Quantities are only approximate.

The units of measurement described in the Schedule of Quantities are metric units. Abbreviations used in the Schedule of Quantities are as follows:

mm	millimeter
m	meter
No.	number
m ²	square meter
m ³	cubic meter
/	liter (container size)