SERIES 5000: ANCILLARY ROADWORKS

SECTION 5800: LANDSCAPING AND PLANTING PLANTS

CONTENTS

5801 SCOPE AND DEFINITION

(a) Scope

This section covers the landscaping of designated areas, the planting of plants for functional and aesthetic purposes on cut and fill slopes, landscaped areas and such other areas where it may be required,

(b) Definition

WEEDS

Any proclaimed weeds or alien invader plants (as listed in bulletin 413 issued by the Department of Agriculture, Directorate of Agricultural Information), as well as any tree, shrub, herb, water plant or any other plant which, in the opinion of the engineer, may pose any problems in specified areas (such as the road reserve, haul roads, borrow pits, camp sites, stockpile sites, etc) at certain times, and is therefore regarded as being undesirable.

5802 MATERIALS

(a) Fertiliser/soil-improvement material

The type of fertiliser/soil-improvement material to be used shall, be one or more of the following types and any other type of fertiliser/soil-improvement material specified in the project specifications or prescribed by the engineer.

(i) Soil-improvement materials such as dolomitic lime, basic slag, gypsum, superphosphate and agricultural lime.

(ii) Fertilisers such as limestone ammonium nitrate, 2:3:2 (22) and 3:2:1 (25).

(b) Grass cuttings

Grass cuttings shall be fresh cuttings of an approved type of grass with sufficient root material to ensure good growth.

(c) Grass seeds

Only fresh certified seed shall be used and the types of seeds in the seed mixture shall be as specified in the project specifications.

Mixing the various types of grass seeds for obtaining the prescribed grass-seed mixture shall be done on the site in the presence of the engineer. At any time during the planting process the engineer has the right to take sample_ in order to test the quality of materials and workmanship Storing and identifying the grass seeds and the grass-seed mixtures on the site shall be the responsibility of the contractor.

(d) Trees and shrubs

Plants shall be of the variety and size shown on the drawings or in the project specifications and/or the schedule of quantities.

The contractor shall supply the required number of plants as shown on the drawings or in the project specifications and/or the schedule of quantities. Plants must be healthy. shapely, well rooted and disease-free. Plants shall not show any evidence of having been restricted or deformed at any time. Plants shall be grown specifically to be able to cope with the adverse conditions as experienced in the road reserve. The plants must be hardened off and be exposed to direct sunlight for at least six months prior to planting in the road reserve. A minimum amount 01 water/fertiliser should be administered in order to acclimatize the plants for their future environment all to the satisfaction of the engineer.

Each tree shall be supplied in a plastic plant container of at least 8,0 L / capacity, and shall have a height of at least 1 500 mm.

Each shrub shall be supplied in a plastic plant container of at least 4,5 L / capacity and shall have a height of at least 500 mm.

Each plant shall be handled and packed in the approved manner for that species or variety, and all the necessary precautions shall be taken to ensure that the plants will arrive at the site of the works in an undamaged and healthy condition for successful growth. Trucks used for transporting plants shall be equipped with covers to protect the plants from windburn. Containers shall be in an undamaged condition.

The contractor shall ensure that the plants are in a good condition and free from pests and diseases and he shall accept full responsibility for maintaining the plants in a good condition throughout the contract and the maintenance periods. The plants shall be fully maintained and watered during this period and any losses of plants on account of the lack of care, also where they are diseased, during the contract and maintenance periods, shall be replaced at the contractor's own cost.

(e) Grass sods

Grass sods shall be either nursery-grown or veld sods as described below. Both types shall be harvested, delivered, planted and watered within 36 hours unless otherwise authorised by the engineer. The grass sods shall be free from noxious weeds and diseases. Sods delivered to the site shall be moist and shall have at least 30 mm soil thickness for nursery-grown sods and 50 mm soil thickness

for veldsods at the points of planting or placement. Sods shall also measure a minimum of 400 mm in width and 500 mm in length and shall retain the minimum dimensions until they are placed.

(i) Nursery-grown sods

These sods shall be of the variety of grass specified in the project specifications, unless the use of an alternative has been approved by the engineer. The grass shall have been grown specifically for sod purposes, mown regularly and cared for to provide an approved uniformity to the satisfaction of the engineer. It shall be harvested by special machines manufactured for this purpose to ensure an even depth of cut with sufficient root material and soil.

(ii) Veld sods

These sods may be obtained from areas approved by the engineer within or near the site where a suitable type and density of grass and type of soil are found. These areas shall also be mown regularly and cared for to provide suitable sods to the satisfaction of the engineer.

(f) Anti-erosion compounds

Anti-erosion compounds shall consist of an organic or inorganic material to bind soil particles together and shall be a proven product able to suppress dust and form an encrustation. The application rate shall conform to the manufacturer's recommendations. The materials used shall be of such a quality that grass seeds may germinate and penetrate the crust.

(g) Topsoil

Topsoil shall preferably consist of selected fertile loamy soil, obtained from areas with a good soil coverage of natural vegetation, preferably grasses. It shall be free from deleterious matter such as large roots, stones, refuse, stiff or heavy clays and the seeds of noxious weeds, which will adversely affect its suitability for grass being planted. Topsoil stripped from areas infested with weeds shall be stockpiled separately.

Topsoil shall be obtained from wherever suitable material occurs either in the road reserve from areas where cuts and fills are to be constructed or from borrow areas to be cleared as described in subclause 1702(c). The engineer shall communicate his requirements to the contractor regarding the quantity of topsoil which is necessary and the areas from which it shall be selected and removed by the contractor. Unless otherwise specified, topsoil shall be taken from not deeper than 400 mm from the surface. If the contractor fails to conserve the topsoil as instructed, he shall obtain suitable substitute material from other sources at no extra cost to the employer.

Where so specified, the contractor shall procure and furnish topsoil from his own sources outside the site, after such sources have been approved by the engineer.

Topsoil shall be stockpiled in separate loose heaps as tipped from the trucks and shall not be stockpiled in heaps exceeding 2,0 m in height, unless otherwise specified by the engineer. Care shall be taken to prevent the compaction of the topsoil in any way, especially by trucks being driven over such material.

(h) Manure

Manure shall, unless another type has been approved by the engineer, be old, sweated, pure kraal manure free from soil, noxious weed seeds or other undesirable material. It shall not contain any particles that will not pass through a 50 mm screen and shall be approved by the engineer before being delivered to the site.

(i) Compost

Compost shall be well decayed, friable and free from noxious weed seeds or any other undesirable materials. It shall not contain any particles that will not pass through a 50 mm screen and shall be approved by the engineer prior to delivery on the site.

5803 LANDSCAPING THE AREAS

(a) Shaping

Areas within the road reserve but outside the road prism which require shaping by means of bulk earthworks such as contoured areas at interchanges and intersections and rest areas which require earthworks shall be excavated, filled and compacted when required. and shaped to the correct contours to within a tolerance of plus or minus 1.50 mm. Such work shall be regarded as being earthworks and measurement and payment therefore shall be made under section 3300, except that quantities may be measured by means of a grid system of levels taken at 10 m intervals before and after shaping or else it may be determined by leveled cross-sections.

(b) Trimming

Trimming shall consist of trimming the existing or previously shaped ground to an even surface-with the final levels generally following the original surface, and it is a requirement that the drainage remains effective. Trimming shall normally be done by grader or in more confined or steep areas by bulldozer. Where machine operations are not practicable, because of confined spaces or steep slopes, trimming shall be done with hand tools. When trimming is done on slopes, the ridges shall be made parallel to the contour. Such ridges shall be approximately 100 mm wide, and the centers between the ridges approximately 400 mm. Trimming shall be done where instructed by the engineer to areas inside the road reserve but outside the road prism, i.e. normally outside the tops of cuts or the toes of fills, but trimming of rock outcrops and koppies will not be required.

Trimmed surfaces shall be left slightly rough to facilitate a better binding with topsoil or the natural establishing of vegetation.

When subsequent grassing is required or when it is ordered by the engineer, areas previously shaped shall be trimmed as described above to within a tolerance of plus or minus 100 mm with all undulations following a smooth curve. The above tolerance shall apply only to areas where the final contours are given on the drawings.

During trimming, all stones in excess of 50 mm in size and all excess material shall be removed. Areas which require

grassing shall be trimmed in such a way that, after cultivation and the application of topsoil, the finished surface of the area shall be at least 30 mm below the top of adjacent kerbing, channeling or pavement in the event of sodding with nursery grown sods, and at least 50 mm below in the event of veld sods being placed.

(c) Plant rates

The engineer shall be entitled to pay for shaping and trimming as described above on the basis of hourly plant rates. The motor grader and bulldozer to be provided shall each have a flywheel power of not less than 93 kW. All machines shall be in a good condition. Any labour or other plant required shall be paid for as a variation as specified in clause 40 of the general conditions of contract.

5804 PREPARING THE AREAS FOR PLANTS

(a) Soil ripping

Where soil is too hard to be scarified with a light tractor, the soil shall be ripped up to a depth of 300 mm before it is loosened by a scarifier to a depth of 150 mm.

(b) Areas which do not require topsoil

Where _the areas to be grassed consist of organically suitable material, the topsoil shall be loosened by scarifying to a minimum depth of 150 mm. All loose stones exceeding 50 mm in size on areas to be mowed by machine and falling within the road reserve and all stones exceeding 150 mm in size in other areas shall be removed.

Fertilizing may still be required as specified in subclause 5804(d).

(c) Areas which require topsoil

Where areas to be grassed consist of organically unsuitable material, the surface shall be scarified to a minimum depth of 150 mm before topsoil is placed to ensure a proper bond between the topsoil and the subsoil. If required, the area shall be scarified as described in subparagraphs (a) or (b) above.

Topsoil shall be placed on the prepared surfaces and trimmed to the uniform thickness required. The topsoil shall be scarified by means of hand raking or light rotavators and all stones removed as specified for areas not requiring topsoil in subparagraph (b) above,

Areas inaccessible for topsoil being placed mechanically after the construction works have been completed shall be covered with topsoil and protected against erosion as construction works progress.

(d) Fertilizing

For all areas to be painted the contractor shall have the top 150 mm of the prepared surface analysed to determine the quantity and type of fertilizer which may be required for establishing proper growth conditions for the grass. The locations of soil samples taken shall be indicated on plans by the contractor. The engineer shall be furnished with the soil-analysis and subsequent fertilizer recommendations. Only after approval by the engineer of the nature and quantity of the fertilizer, may the application proceed.

Soil-improvement materials (such as lime, superphosphate, etc) shall be evenly applied over all surfaces where grass is to be planted, and shall then be thoroughly mixed with the soil to a depth of 150 mm either mechanically or manually. Where hydroseeding is to be performed, the fertilizer may be mixed with the anti-erosion compound and water used in the hydroseeding.

(e) Verdyol Complex or similar

In certain limited and unique cases, where topsoil is not available or can not be retained on a steep slope, Verdyol Complex or similar may be used at an approved application rate, at the discretion of the engineer.

(f) General

After an area has been prepared for grassing, the grassing shall be completed before crustification takes place. Where a crust has been formed before grassing is done, the contractor shall, at his own cost, loosen the crust by scarifying to a depth of 150 mm.

5805 GRASSING

The method of establishing grass shall depend on the circumstances relating to each case, and the engineer shall decide which method is to be used.

(a) Planting grass cuttings

The areas to be grassed by means of grass cuttings shall, unless already moist, be thoroughly watered before the cuttings are planted to ensure that the soil will be uniformly moist to a depth of at least 150 mm when the planting is done. This method shall only be used on flat areas, such as medians.

An approved variety of grass cuttings shall be evenly planted by hand or mechanically at a rate of at least 600 kg of cuttings per hectare and shall be covered with 30 mm of approved soil. Fresh cuttings only shall be used but not any grass cuttings that have been allowed to dry out. Immediately after having been planted, the grass cuttings shall be given a copious watering, and, when sufficiently dry, shall be rolled with a light agricultural roller.

(b) Sodding

Areas to be grassed by sodding shall be given a layer of topsoil of at least 50 mm in thickness unless, where suitable soil is present, the engineer orders the topsoil to be omitted. The areas to be sodded shall be thoroughly watered beforehand so that it will be moist to a depth of at least 150 mm during sodding. The surface shall be roughened slightly to ensure a good penetration of roots into the soil. Sods shall be protected against drying out and kept moist from the time of harvesting until they are finally placed. The handling of the sods shall not result in

the sods losing their prescribed soil thickness.

The first row of sods shall, where possible, be laid in a straight line and if on a slope, laying the sods shall start at the bottom of the slope. The sods shall be butted tightly against each other, and care shall be taken not to stretch or overlap the sods. Where a good fit cannot be obtained, any Intervening spaces shall be filled with topsoil. The next row shall be similarly placed tightly against the bottom row with _staggered joints, and so on until the entire area has been covered with sods. Sods shall be laid in such a way that unnecessary trampling over areas previously laid is prevented. To this end, a diagonal method of laying sods is preferred, moving up the slope and behind previously laid sods. On steep slopes the sods shall be held in position by a sufficient number of wooden stakes approximately 300 mm long by 20 mm In thickness and these stakes shall be knocked In to a depth of 100 mm Into the subsoil.

Sods laid adjacent to concrete side drains shall be laid in such a manner that the sodding will be 20 mm higher than the concrete. The top surface of sods laid adjacent to the road pavement shall be 50 mm lower than the road surface. When stripsodding is required, the sods shall be laid in such a manner that the sods are proud of the surrounding ground level. During stripsodding the areas in between shall be hydro seeded as specified in subclause 5805(c). Stripsodding shall at all times be staked as specified above.

As sodding is completed each section shall be lightly rolled or firmly pressed to ensure a proper bond with the underlying material, and thoroughly watered afterwards.

(c) Hydroseeding

Where it is specified that hydroseeding is to be carried out on topsoil, the thickness of the topsoil layer shall be as specified in the project specifications or as directed by the engineer.

The types and mixtures of seeds to be used shall be as specified in the project specifications or, if not so specified therein, shall be agreed on by the engineer and the contractor before any seed he may wish to use is ordered by the contractor. The contractor shall be solely responsible for establishing an acceptable grass cover, and any approval by the engineer of seed or seed mixtures intended for use by the contractor shall not relieve him of this responsibility:

Mulch shall be added to the hydroseeding mix at an approved rate.

Hydroseeding shall then be carried out with an approved hydroseeding machine at a rate of application of not less than 38 kg of seed mixture per hectare, unless otherwise specified in the project specifications.

When the use of anti-erosion compounds is required and such compound is to be applied simultaneously with the hydroseeding, it shall be mixed with the hydroseeding mixture before application. Should Verdyol Complex or approved equivalent be used, the quantities of the fertilizers shall be adjusted accordingly, subject to the engineer's approval.

(d) Topsoiling only

Where, in the opinion of the engineer, the planting of grass or hydroseeding can be dispensed with on account of favorable climatic and other conditions; the contractor may attempt to establish grass by topsoiling only. Topsoil shall be selected for the presence of natural grass and seeds and shall be removed and placed whenever possible at a time that would favour the establishing of grass. These areas shall be treated with an. anti-erosion compound, if so instructed by the engineer. Fertilizing shall be done as specified in subclause 5804(d).

After the topsoil has been placed, it shall be lightly rolled and well watered, and afterwards watered and mown whenever instructed by the engineer.

The contractor will not be held responsible for establishing an acceptable grass cover as defined in subclause 5806(b) when this procedure is followed, but will be responsible for the consequences of any omission to water or mow or weed the grass as instructed by the engineer.

No payment for grassing shall be made other than for placing topsoil, providing and applying fertilizers and for watering, mowing and weeding the grass, which will be paid for at the tendered rates. For any replanting of grass on bare patches, repairs caused by erosion, and similar work, the contractor will be paid for as a variation in terms of clause 40 of the general conditions of contract.

(e) Grassing with an approved grass planter

Grassing shall be done with an approved grass planter which plants the seeds in rows spaced not more than 250 mm apart. The planter shall plant the seeds approximately 6 mm deep and shall lightly compact the soil. The prescribed fertiliser may be distributed simultaneously with the grass planting.

(f) Sowing by hand

If approved by the engineer, sowing may be done by hand on areas inaccessible to machines. The seed shall be spread uniformly over the surfaces and then lightly raked into the soil.

(g) **Whenever specified in the project specifications, other methods of grassing may be employed.**

(h) **The grassing of borrow pits, temporary deviations, camp sites, access roads and stockpile sites**

Prior to any grassing that may be required on such areas, the finishing-off of borrow pits as described under clause 3105, obliterating the temporary deviations and access roads as described in clauses 1516 and 5903 respectively, and the clearing of camp sites as described in section 1300, shall have been carried out as specified in the relevant sections.

Note:

With regard to subclauses 5805(e) and (f), the areas to be grassed shall be prepared as described in clause 5804 and the areas shall be thoroughly watered after completion of the operation. Also, if deemed necessary, an anti-erosion

compound shall be applied.

5806 PLANTING AND MAINTAINING THE PLANTS

(a) Watering, weeding, mowing and replanting

All sodded and grassed areas shall be adequately watered at regular and frequent-intervals to ensure the proper germination of seeds and growth of grass until the grass has established an acceptable cover and thereafter until the beginning of the maintenance period of the grass- The quantity of water and the frequency of watering shall be subject to the engineer's approval. With hydroseeding the commencement of watering may be postponed until a favorable time of the year, but watering shall in any case commence and continue as soon as the seeds have germinated and growth has started.

The contractor shall further mow the grass on all areas where grass has been established whenever so instructed by the engineer, until the end of the maintenance period. All grass cuttings shall be collected and disposed of if so directed by the engineer. All weeds shall be eradicated and disposed of by approved means and provision for payment for such operations shall be made under item 58.04. Weeds shall be eradicated before they have a chance to flower. My bare patches where the grass has not taken or where it has been damaged or has dried out shall be recultivated, planted, sodded or hydroseeded at the contractor's own expense.

All grassed areas shall have an acceptable cover as defined below at both the beginning and the end of the maintenance period.

(b) Acceptable cover

An acceptable grass cover shall mean that not less than 75% of the area grassed or hydroseeded shall be covered with grass and that no bare patches exceeding 0,25 m2 in any area of 1 m x 1 m shall occur. In the case of sodding, acceptable cover shall mean that the entire area shall be covered with live grass at the end of any period not less than three months after sodding.

(0) Maintenance period

The maintenance period in respect of grass shall commence when an acceptable grass cover as defined in (b) above has been established and shall be one year. This means that the maintenance period in respect of grass can commence earlier or later than the maintenance period for other parts of the contract.

If the maintenance period in respect of grass expires before the end of the maintenance period for the other roadworks, the contractor shall further mow the grass on such areas as instructed by the engineer up to the end of the maintenance period for the other roadworks. For mowing that is executed after the maintenance period in respect of grass has expired, the contractor will be paid under item 58.07.

5807 TREES AND SHRUBS

(a) Positions of trees and shrubs

The localities where trees and shrubs are to be planted are as follows:

(i) Trees and shrubs shall be planted at locations shown on the drawings.

(ii) Plants in the median shall be planted in a. line 1,5 m from the centre line of the median or as directed by the engineer.

(iii) When the carriageways are at different levels, the plants in the median shall be planted 3 m from the edge of the pavement on the high side of the median or as directed by the engineer.

(iv) Where the road curves, the plants in the median shall be planted on the inside of the median centre line.

(v) Where the carriageways are at different levels as well as on a curve, the plants in the median shall b_ planted on the high side, provided they do not impede on sight distance, or as directed by the engineer.

(vi) At freeway crossings over roads or rivers, shrubs shall be planted in the positions shown on the drawings.

(vii) At the headwalls of culverts or similar structures, trees and/or shrubs shall be planted to indicate the positions of these structures. The locations for planting the plants shall be as shown on the drawings or as directed by the engineer.

(viii) Care shall be taken not to obscure traffic signs by plants.

(ix) Trees shall not be planted closer than 10 m from the yellow line on the outside shoulder, or as directed by the engineer.

(b) Preparing plant holes

Unless otherwise directed by the engineer, holes shall be spaced and prepared as follows:

(i) All holes shall be square in plan.

(ii) Holes for shrubs shall be at least 500 mm square by 600 mm deep at intervals of at least 1,5 m centre to centre. Alternatively a 500 mm wide trench 600 mm deep may be dug, subject to the engineer's approval.

(iii) Holes for trees shall be at least 700 mm square by 800 mm deep.

(iv) The holes for plants shall be refilled with selected and approved topsoil thoroughly mixed beforehand with manure or compost (one 5 *l* bucket full for every shrub hole and one 10 *l* bucket full for every tree hole) and, depending on soil-analysis, the required quantity and type of fertilizer. The fill material shall contain an approved water retaining admixture.

(v) The holes shall be thoroughly watered before plants are planted. Where the soil is poorly drained, 150 mm of

crushed stone shall be placed at the bottom of the hole before it is filled with soil.

(c) Planting

Before trees and shrubs are removed from their containers for planting purposes, they shall be watered to the point of saturation.

Directly after having been planted, each plant shall be well watered with a view to settling the soil. After the soil has settled, additional topsoil mixture shall be added where necessary to bring the replaced soil in the hole to within 150 mm of the ground surface, so as to ensure that sufficient water can be retained in the hole around the plant. All trees shall be tied by means of treated sisal rope to two creosote-treated timber stakes planted firmly in the ground on both sides of the tree directly opposite each other. The distance between the stakes shall be 1, 0 m. The stakes shall have a minimum diameter of 50 mm and shall be at least 300 mm longer than the planted tree, but its length shall not exceed 1,5 m above ground level.

After planting, the ground surface around the shrubs shall be covered with straw or grass or any other type of mulch to minimize evaporation and/or weed competition.

The ground surface around each tree shall be covered with a plastic membrane with a surface area of 1,0 m2 and a thickness of 150 micron. Thereafter rocks or stones measuring 150 mm to 250 mm in diameter shall be placed in a riprap fashion following the contours of the plant hole.

The contractor shall water the trees and shrubs until they are established. He will be paid for watering under item 58.06.

(d) Maintenance

During the period of maintenance, which shall be twelve months after acceptance of established trees and shrubs, the contractor shall be responsible for watering the trees and shrubs when necessary and keeping the plants free from weeds and pests. The plants shall be watered in accordance with an agreement concluded between the engineer and the contractor prior to the beginning of the maintenance period. The watering of plants will be paid for under item 58.06.

Every tree or shrub, which is not healthy or shows unsatisfactory growth, shall be replaced by the contractor at his own expense, within one month of having been notified by the engineer, in writing. Such notification as set out in the latter sentence, may be given quarterly during the maintenance period.

5808 GENERAL

(a) Time for planting

Grass, trees and shrubs- shall be planted as far as is practicable during periods of the year most likely to produce best growing results. The contractor shall make every effort to programme his operations in such a manner that grass, trees and shrubs shall, as far as is possible, be planted during this period.

(b) Traffic on grassed areas

The contractor shall not plant any grass until all operations which may require road-building equipment to be taken over grassed areas have been completed. No road-building equipment, trucks or water carts shall be allowed onto areas which have been grassed and only equipment required for the preparations of areas, 'application of fertiliser and spreading of topsoil will be allowed to operate on areas to be grassed. All damaged areas shall be reinstated by the contractor at his own expense.

(c) Erosion prevention

During construction the contractor shall protect all areas susceptible to erosion by installing all the necessary temporary and permanent drainage works as soon as possible and by taking such other measures as may be necessary to prevent the surface water from being concentrated in streams and from scouring the slopes: banks or other areas.

Any runnels or erosion channels developing during the construction period or during the maintenance period shall be backfilled and compacted, and the areas restored to a proper condition. The contractor shall not allow erosion to develop on a large scale before effecting repairs and all erosion damage shall be repaired as soon as possible and in any case not later than three months before the termination of the maintenance period. All topsoil or other material accumulated in side drains shall be removed at the same time. Topsoil washed away shall be replaced.

(d) Proprietary brand materials used for erosion prevention

Certain proprietary brands of materials which may be necessary for erosion prevention to enable natural grass to become established shall, if required, be specified in the project specifications. The method according to which the material is to be applied, the surface preparation required, the type of material to be provided and the method of payment shall be as specified in the project specifications.

(e) Responsibility for establishing an acceptable cover

Notwithstanding the fact that the engineer will determine the method of grassing and that the type of seed or grass used and the rate of application of the seed may be specified or agreed on by the engineer, and that the frequency of mowing will be as ordered by him, the contractor shall be solely responsible for establishing an acceptable grass cover and for the cost of replanting grass or re-hydroseeding where no acceptable cover has been established. Where however, in the opinion of the contractor, it is doubtful from the outset if it will be possible to establish an acceptable cover he may inform the engineer of his reasons therefore, and the engineer may, if he agrees, either adopt another method of grassing or agree to accept whatever cover can be obtained, provided that all reasonable efforts shall be made to establish a good grass cover by the proposed method. Any such agreement shall be valid only if given in writing by the engineer beforehand.

In the case of grassing by topsoiling only the contractor will, not be held directly responsible for establishing an

acceptable grass cover but will be held responsible for the consequences of supplying workmanship which does not conform to the specifications, or for lack of proper care.

(f) Re-fertilizing

Should it become necessary, the engineer may instruct the contractor to undertake a re-fertilizing programme on grassed areas during the twelve month maintenance period.

Payment for re-fertilization will be made under subitem 58.03(e).

5809 MEASUREMENT AND PAYMENT

Item	**Unit**
58.01 Trimming:	
(a) Machine trimming…….	square meter (m2)
(b) Hand trimming…….....	square meter (m2)

Note:

All bulk earth-moving operations as described under shaping in subclause 5803(a) shall be measured and paid for under section, *3300.*

The unit of measurement for trimming shall be the square meter of area trimmed on the instruction of the engineer, including areas trimmed after having been shaped. No trimming within the road prism shall be measured for payment.

The tendered rates shall include full compensation for trimming the areas to the specified finishing requirements, including the moving of a small quantity of material which would be inherent in this process and the removal of surplus material and stones. Payment shall distinguish between machine trimming which can reasonably be done by bulldozer or motor grader, and hand trimming which cannot be done by machine on account of confined space, steep slopes or difficult shapes.

Item	**Unit**
58.02 Using machines for trimming or shaping (alternative to subitem 58.01 (a)):	
(a) Bulldozer…….	hour (h)
(b) Motor grader……..	hour (h)

The' unit of measurement shall be the hour actually worked by each machine in trimming or shaping areas. Standing time will not be measured.

The tendered rates shall include full compensation for furnishing and using the machines, including the cost of fuel, operators, maintenance, transporting the machine to and from the point where' it is to be used, and for all other incidentals necessary for carrying out the work.

Item	**Unit**
58.03 Preparing the areas for grassing:	
(a) Ripping……..	hectare (ha)
(b) Scarifying for loosening Topsoil…… .	hectare (ha)
(c) Topsoiling within the road reserve, where the following materials are used:	
(i) Topsoil obtained from within the road reserve or borrow areas (free-haul *1,0* km)……..	cubic meter (m3)
(Ii) Topsoil obtained from other sources by the contractor (including all haul)……	cubic meter (m3)
(d) Topsoiling of borrow pits by using topsoil obtained from borrow areas or from the road reserve (free-haul 1,0 km)……..	cubic meter (m3)
(e) Providing and applying chemical fertilizers and/or soil-improvement material:	
(i) Lime……..	ton (t)
(Ii) Superphosphate……..	ton (t)
(Iii) Limestone ammonium nitrate……..	ton (t)
(iv) 2:3:2(22)……	ton (t)
(v) 3:2: 1 (25)…….	ton (t)
(vi) Other fertilisers and/ or soil-improvement materials if required (type stated)……..	ton (t)
(f) Stockpiling topsoil (free-haul 1,0 km)……	cubic meter (m3)

(a) Ripping

The unit of measurement for ripping shall be the hectare of soil ripped. Only areas ripped on the written instructions of the engineer shall be measured for payment.

The tendered rate shall include full compensation for ripping, complete as specified in clause 5804.

Loosening the soil by scarifying will be paid for under subitem 58.03(b).

(b) Loosening the topsoil by scarifying

The unit of measurement for loosening the topsoil by scarifying shall be the hectare of soil loosened and prepared in accordance with the specifications. Only areas loosened by scarifying on the written instructions of the engineer shall be measured for payment.

The tendered rate shall include full compensation for loosening the topsoil by scarifying, removing stones, and leveling and trimming the surface.

(c) and (d) Placing the topsoil

The unit of measurement shall be the cubic meter of topsoil applied at the specified thickness or as directed by the engineer, measured in situ after the topsoil has been placed. The quantity shall be calculated from the net area of the topsoiled surface multiplied by the average thickness of the topsoil but before the grass sods are placed. Any topsoil placed in excess of the average thickness specified or prescribed will not be measured for payment.

Payment shall distinguish between topsoil obtained from designated areas within the road reserve or borrow areas and topsoil obtained by the contractor from outside sources when sufficient topsoil is not available from the designated areas mentioned above. Payment shall further distinguish between topsoil applied to slopes, at interchanges and at other areas within the road reserve and topsoil applied at borrow areas.

The tendered rates shall include full compensation for excavating and loading the topsoil, any royalties or compensation that may be payable in the case of topsoil under subsubitem 58.03(c)(ii). transport (except overhaul), off-loading, placing and spreading it to the required thickness, leveling it off to a smooth surface, for removing any stones as specified and for roughening the surface to be topsoiled.

The free-haul distance of topsoil obtained from the road reserve or borrow areas shall be 1,0 km. The tendered rate for topsoil under subsubitem 58.03(c)(ii) shall also include full compensation for transporting the topsoil to the point of eventual use.

(e) Providing and applying fertiliser and/or soil-improvement material

The unit of measurement for fertiliser shall be the ton of each type of fertiliser and/or soil-improvement material ordered and applied.

The tendered rates shall include full compensation for furnishing the fertiliser and/or soil-improvement material, transporting it to the point of use, spreading and mixing it into the scarified soil or topsoil, irrespective of the method of application.

(f) Stockpiling the topsoil

The unit of measurement shall be the cubic meter of topsoil stockpiled on the written instructions of the engineer where this operation is unavoidable despite proper advance planning. Only material actually loaded, transported to and stockpiled on sites designated for stockpiling will be measured, but not any material merely pushed or bladed into heaps next to the area from which it is taken, unless it was done with the prior approval of the engineer, anti the material was stockpiled in an approved area.

The tendered rate shall include full compensation for loading the topsoil, placing it in stockpile and for any payments to private owners for the use of stockpile areas.

Item		**Unit**
58.04	**Grassing:**	
(a)	The planting of grass cuttings (type of grass indicated) ……..hectare (ha)	
(b)	Sodding by using the following types of sods:	
(i)	Nursery sods (type of grass specified)…… square meter (m2)	
(Ii)	Veld sods…….. square meter (m2)	
(c)	Hydroseeding:	
(i)	Providing an approved seed mixture for hydro seeding…….. kilogram (kg)	
(ii)	Providing an approved mulch……...kilogram (kg)	
(iii)	Hydroseeding…… hectare (ha)	
(d)	Planting grass seed with an approved grass-plan ting machine……... hectare (ha)	
(e)	Hand sowing…….square meter (m2)	
(f)	Other methods (specify)	

(a) Planting grass cuttings

The unit of measurement for planting grass cuttings shall be the hectare of established grass with an acceptable grass cover.

The tendered rate shall include full compensation for furnishing and planting the cuttings, watering, weeding, and replanting if necessary, and all other incidentals which may be necessary for establishing an acceptable cover and maintaining the grass, except mowing.

(b)

Sodding

The unit of measurement for sodding shall be the square meter covered with sods which have an acceptable cover.

The tendered rates shall include full compensation for procuring, excavating, loading, transporting, off-loading, placing and watering the sods, for replanting dead areas, for watering and weeding the grass, for supplying and placing timber stakes and for all other incidentals, except for mowing, which may be necessary for establishing an acceptable cover, and maintaining the grass. Payment shall distinguish between nursery-grown sods and veld sods obtained from within the road reserve or borrow areas. In the case of veld sods the tendered price shall include leveling-off and trimming areas from which the sods are taken.

(c) Hydroseeding

(i) The unit of measurement for providing seed shall be the kilogram of seed of the specified seed mixture.

The tendered rate shall include full compensation for procuring, furnishing, mixing and storing the seeds.

(ii) The unit of measurement for providing an approved mulch shall be the kilogram of mulch.

The tendered rate shall include full compensation for procuring and furnishing the mulch and applying it as specified, or as directed by the engineer.

(iii) The unit of measurement for hydroseeding shall be the hectare of grass established by hydroseeding, which has an acceptable cover.

The tendered rate shall include full compensation for furnishing mulch and mixing it with seed and water and with any anti-erosion compound if required, applying the mixture, watering, weeding, re-hydroseeding bare patches, and for any other work, except mowing, which may be necessary for establishing an acceptable cover and maintaining the grass.

(d) The unit of measurement for planting any grass seeds by using an approved planter shall be the hectare of grass with an acceptable cover, where the seed has been planed with an approved planter.

The tendered rate shall include full compensation for all labour, material, equipment, weeding, and all incidentals which may be necessary for planting the grass seeds and establishing an acceptable grass cover. The tendered rate shall also include full compensation for watering the planted areas until an acceptable grass cover has been established. Payment for the grass seed will be separate under subsubitem 58.04(c)(i).

(e) Hand-sowing

The unit of measurement for handsowing the grass seeds shall be the square metre of grass with an acceptable covering on surfaces instructed by the engineer to be hand-sown.

The tendered rate shall include full compensation for all labour, materials, equipment, weeding, and all incidentals which may be necessary for planting the grass seeds and establishing an acceptable grass covering. The tendered rate shall also include full compensation for watering the planted areas until an acceptable grass covering has been established. Payment for the grass seeds shall be separate under subsubitem 58.04(c)(i).

(f) Other methods

Whenever other methods of grassing are specified in the project specifications, measurement and payment shall be as specified.

General

Half the payments under item 58.04 will become due when the grassing or hydroseeding has been done, and the remainder will become due when satisfactory cover has been established.

58

Item **Unit**

58.05 Watering the grass when established by topsoiling only…….. kilo litre (kl)

The unit of measurement for watering areas which have been topsoiled on the instruction of the engineer but which have not been hydroseeded or planted with 'grass, shall be the kilolitre of water applied on the instructions of the engineer and calculated from the number of tank loads applied, multiplied by the capacity of the tank used in each case.

The tendered rate shall include full compensation for procuring, transporting and applying the water as specified.

Item **Unit**

58.06 Watering the already planted grass, trees and shrubs during periods of drought experienced during the growing season……...kilolitre (kl)

The unit of measurement for watering the grass, trees and shrubs shall be the kilo litre of water used.

The tendered rate shall include full compensation for obtaining, transporting and applying the water.

The. contractor shall keep a careful record of the quantity of water used by him for watering the grass, trees and shrubs planted and shall submit such information to the engineer on a daily basis. When there are times during the normal growing season, as specified in the project specifications, when the monthly rainfall figure is less than 75% of the monthly average, the contractor will' be compensated under this item for the same percentage of the quantity of water used for watering as that for the monthly rainfall that fell short of the average rainfall.

Note:

The rainfall figures and minimum and maximum temperatures for the contract area are set out in the project specifications.

Item **Unit**

58.07 Mowing the grass…….. hectare (ha)

The unit of measurement shall be the hectare measured each time when the grass has been cut on the instructions of the engineer.

The tendered rate shall include full compensation for all plant, equipment and labour, required for every cutting of the grass and disposing of the grass cuttings, i.e. payment will be made every time the grass has been cut on the instructions of the engineer.

Item **Unit**

58.08 Anti-erosion compound (specify)……kilogram (kg)

The unit of measurement shall be -the kilogram net mass of anti-erosion compound used with the approval of the engineer.

The tendered rate for each kilogram of anti-erosion compound applied with the hydroseeding or by itself shall include full compensation for furnishing the material and mixing and applying it during hydroseeding or by itself.

Item **Unit**

58.09 Trees and shrubs:

(a) Providing the trees and shrubs (types indicated)……...number (No)

The unit of measurement shall be the number of each variety of tree or shrub furnished and established.

The tendered rate shall include full compensation for furnishing the plants at the point of final use, including substitutes for plants which may become diseased or die.

(b) Planting and establishing:

(i) Trees……number (No)

(ii) Shrubs……..number (No)

The unit of measurement shall be the number of each type planted and established.

The tendered rates shall include full compensation for excavating the holes to the specified dimensions, furnishing topsoil, wooden stakes, manure and compost and mixing them together with any fertilizer and water retaining admixture required for planting and refilling each hole with the topsoil mixture and other soil, for watering the plants until the end of the maintenance period, for .weeding and keeping the plants free from pests and

. diseases during the maintenance period, furnishing and planting substitutes for plants that have died and for maintaining the plants as specified until the end of the maintenance period, including any other incidentals which may be necessary for properly executing the work.

The tendered rate for planting and establishing trees shall also include full compensation for furnishing and placing the membrane and riprap stone pitching at every plant hole, complete as specified.

Any chemical fertiliser and/or soil-improvement material required will be measured and paid for under subitem 58.03{e).

General:

Seventy-five percent of the payments under item 58.09 will become due when the planting has been done, and the remainder will become due when satisfactory growth has been obtained.

Item **Unit**

58.10 Extra work for landscaping…….. provisional sum

The provisional sum allowed shall be expended at the discretion of the engineer to cover the cost of work in addition to the scheduled items which may be required in respect of shaping and trimming areas where plant is used at hourly rates, e.g. the cost of loading and transporting surplus material, establishing grass by topsoiling only, repairing erosion damage after topsoil has been applied, or any other items of work required for which no pay items have been provided.

Payment shall be made as specified in clause 48 of the general conditions of contract.

Item **Unit**

58 58.11 Weeding all grass-seeded areas and the grass when established by topsoiling only…….. hectare (ha)

The unit of measurement for weeding all- -grass-seeded areas and areas that have been topsoiled on the instruction of the engineer (but have not been hydroseeded or-planted with grass), shall be the hectare.

The tendered rate shall include full compensation for weeding the prescribed areas in accordance with the specifications.

Note:

Measurement and payment for overhaul shall be as specified in item 16.02, but no overhaul shall apply to topsoil paid for under subsubitem 58.03(c)(ii).