SITE IMAGE



GLOUCESTER STREET APARTMENTS 171-193 GLOUCESTER STREET, THE ROCKS

LANDSCAPE SPECIFICATION

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Prepared for: Stamford Properties

Project number: W 1289

Date: June 2010

Issue: G – Shade structure reference amended for Section 96 application

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1.0 GENERAL NOTES

1.1 Definitions

Terms used in this Landscape Specification shall have the meanings assigned to them in the referenced standards and as follows:

CONSULTANT	ORGANISATION	TELEPHONE	FACSIMILE			
Project Manager:	St Hilliers Contracting	9259 5200	9259 5201			
Architect:	Kann Finch Group	9299 4111	9290 1481			
Landscape Architect:	Site Image Pty Limited 28 Bowden Street Alexandria NSW 2015	9698 2899 Email: mail@siteimag	9698 2877 e.com.au			
Approved:	Shall mean as approved in writing by	the Project Manager				
Equal to:	Shall mean equivalent in performance, quality and price to that specified and shall be approved in writing by the Project Manager					

1.2 Cross References

This Specification shall be read in conjunction with the General Conditions of Contract included in the general building works specification.

Conform to associated landscape sections included in this specification, as follows:

- Site Preparation,
- Hardscape Elements,
- Softscape Elements,
- Irrigation, and
- Plant Establishment and Maintenance.

Refer to the following consultant's documents and specifications:

- Architect's documentation for building elements, structures and finishes,
- Civil and Structural Engineer's documentation for bulk earthworks, roads, walls, retaining walls, footings, expansion joints, etc,
- Hydraulic Engineer's documentation for drainage and water supply, and
- Electrical Engineer's documentation for external lighting and electrical connections for pumps.

1.3 Interpretation of Drawings

The Landscape Contractor shall check all relevant dimensions on site before proceeding with the work. Under no circumstances shall dimensions be scaled from the drawings. No claim for extras arising from failure to obtain measurements and other information on site will be allowed.

The origin of levels is generally to the Australian Height Datum (AHD) or as otherwise shown on the drawings.

1.4 Workmanship and Materials

The whole of the landscape works shall be carried out by a competent Landscape Contractor who is experienced in horticultural practice, landscape construction and planting techniques. The Landscape Contractor shall hold a current Building Contractors License and / or be a financial member of the Landscape Contractors Association.

All work shall be faithfully carried out in the most tradesperson-like manner in accordance with applicable trade and Australian Standards.

All materials shall be new and of the best quality and shall be approved before installation.

1.5 **Quality Assurance**

The Landscape Contractor is to implement and maintain a quality assurance system aligned with relevant Australian Standards. This system shall include as a minimum the following elements:

• The firm's general quality management system including quality manual, technical procedures, sample forms used in the quality management system and quality check lists is to be used.

In addition to the quality requirements outlined in the Contract documents, the Landscape Contractor shall have in place a system of record to identify:

- Supply source and types of materials required to complete the works,
- Method of installation,
- System certifications, and
- Certification of completeness.

1.6 Standards

Wherever reference is made to the Standards Association of Australia (SAA), Standard Specification (AS), Codes (ASC) or interim Codes (SAA Int.) the requirements of the additions and amendments to them current at the date of commencement shall apply to the relevant materials or operations and be deemed to be incorporated in this Specification.

The Landscape Contractor, if requested, shall furnish a certificate from the manufacturer that the materials or products delivered to the project meet the requirements of the relevant Standard. However, such certification shall not relieve the Landscape Contractor of the responsibility to comply with added requirements of this Specification. All materials and workmanship are to comply with the Building Code of Australia and the relevant Authority requirements.

1.7 **Project Conditions**

The Landscape Contractor and his sub-contractors shall visit the site and compare the contract documents with the area of the Works before tendering to ascertain for themselves the actual extent and nature of the work to be done and the nature of the ground. No claim will be accepted on account of the Landscape Contractor or his sub-contractors failure to do so. It is the responsibility of the Landscape Contractor to check the aspects of the required work and report any discrepancy to the Project Manager for a decision.

1.8 Access to Premises and Storage

The Landscape Contractor is required to make arrangements with the Project Manager (or representative), as necessary, for access or entry to premises (including material handling) to carry out installation of the works. Working hours shall comply with the local authority requirements.

Where possible, install materials directly in place. Store other materials in a secure location on site as directed by the Project Manager.

1.9 Reinstatement

Any injury or damage to property, both public and private, including buildings, services, roads, footways, paving, ground levels, retaining walls, fencing, passing and /or parked vehicles, existing vegetation including shrubs and trees and other property, shall be reinstated or made good by the Landscape Contractor to their own cost. Reinstatement is to match similar adjacent work and the whole left in a condition at least equal to that at the commencement of works.

1.10 Cleaning site

All areas affected by the landscape works are to be kept clean at all times, this includes collecting all empty plastic plant containers, labels and other rubbish daily during installation and disposing of them

appropriately. There shall be no burning or burying of rubbish on site. All empty containers and debris shall be removed from site prior to the works being approved for commencement of maintenance.

2.0 SITE PREPARATION

2.1 Scope

The works included in this section shall include the following:

- Environmental protection,
- Tree removal and protection, and
- Site clearing.

2.2 Quality

Give sufficient notice so that inspection may be made of the following:

- Trees identified and marked to be removed or retained, and
- Enclosures to trees to be retained.

Submit details of materials proposed, including the following:

• Provision of cleared vegetation for mulching.

Submit the methods and equipment proposed for the minor earthworks, including the following:

- Dewatering and groundwater control and disposal of surface water,
- Control of erosion, contamination and sedimentation of the site, surrounding areas and drainage systems, and
- Dust control.

2.3 Environmental Protection

Plan and carry out the work so as to avoid erosion, contamination, and sedimentation of the site, surrounding areas, and drainage systems.

Temporary erosion control measures to include:

- Staging operations, such as clearing and stripping,
- Progressively restoring disturbed areas,
- Providing temporary drains and catch drains,
- Diverting and dispersing concentrated flows to points where the water can pass through the site without damage,
- Dispersing concentrated runoff with spreader banks or other structures,
- Constructing and maintaining silt traps to prevent discharge of scoured material to downstream areas,
- Installing temporary grassing,
- Installing temporary fencing,
- Inspecting, cleaning and repairing if required temporary erosion and sediment control works after each rain, and
- Removing temporary erosion control measures when they are no longer required.

Maintain dewatering measures on site. Keep groundwork free of water. Provide and maintain slopes, crowns and drains on excavations and embankments to ensure free drainage. Place construction, including fill, masonry, concrete and services, on ground from which free water has been removed. Prevent water flow over freshly laid work.

2.4 Trees to be Retained and Protected

Trees to be retained are as shown on the landscape drawings, and are to be protected prior to and during construction activities on the site. Identify and mark trees and shrubs to be retained using a suitable non-injurious, easily visible and removable means of identification.

Protect from damage the trees and shrubs to be retained, including those beyond the site area, both above and below the ground. If a tree becomes damaged during the works or it is proposed to perform work on a tree, give written notice immediately and obtain instructions.

Trees to be retained shall be protected in accordance with the latest edition of AS 4970. Generally, this includes, but is not limited to, the installation of tree protection fencing at the perimeter of the Tree Protection Zone. The fencing shall, as a minimum, consist of 1.8 metre high temporary chain wire panels supported by steel stakes, fastened together and supported to prevent movement, with a lockable opening for access. The fencing shall be maintained in good condition during the construction works period.

Display a warning sign in a prominent position at each entrance to the site, at 10 metre intervals along the tree protection fencing, and where the tree protection fence changes direction. Each sign shall advise Tree Protection Zone, No Access, and contact details. The signs shall be a minimum size of 600mm x 500mm using lettering in accordance with AS 1319 and AS 4970.

Remove fencing and signs on completion of all construction works only.

2.5 Work near Trees

Keep the area of the Tree Protection Zone free from construction activities that may cause damage to the tree, including:

- Modification of soil levels,
- Excavation and trenching,
- Cultivation of the soil,
- Mechanical removal of vegetation,
- Soil disturbance,
- Movement of natural rock,
- Storage of materials, plant, or equipment,
- Erection of site sheds,
- Affixing signage or hoarding to the trees,
- Preparation of building materials,
- Disposal of waste materials and chemicals,
- Movement of pedestrian or vehicular traffic, and
- Temporary or permanent location of services, or the works required for their installation.

If encroachment is required into the tree protection zone, give notice and obtain instructions.

2.6 Existing Services

Before commencing any earthworks, locate and mark existing underground services in the areas which will be affected by the earthworks operations including clearing, excavation and trenching.

Do not excavate by machine within 1000mm of existing underground services.

2.7 Site Clearing

Clear only the following works:

- Areas to be occupied by works such as roads, buildings, structures, walls, paving, excavation, regrading and landscaping,
- Other areas designated to be cleared, and
- Extent of area necessary for the performance of the works.

Remove everything on or above the site surface, including rubbish, scrap, grass, vegetable and organic debris, scrub, trees (except trees to be retained), stumps, boulders and rubble. Grub out stumps and roots over 75mm diameter to a minimum depth of 500mm below sub-grade under buildings, embankments or paving, or 300mm below finished surface in unpaved areas. Remove grass to a depth just sufficient to include the root zone. Remove old works, including slabs, foundations, pavings, drains and manholes found on the surface.

2.8 Weed Eradication

Eradicate weeds using environmentally acceptable methods, such as non-residual glyphosate herbicide in any of its registered formulae, at the recommended maximum rate.

Regularly remove, by hand, rubbish and weed growth throughout grassed, planted and mulched areas. Remove weed growth from an area 750mm diameter around the base of the trees in grassed areas. Continue eradication throughout the course of the works and during the planting establishment period.

2.9 Spoil

Remove surplus excavated material and surplus site clearance material form the site.

Put cleared vegetation through a chipper. Reduce to pieces not larger than 75 x 50 x 15 mm and stockpile for re-use as mulch.

Do not bury boulders, concrete fragments and the like on site.

3.0 HARDSCAPE ELEMENTS

3.1 Scope

The works included in this section shall include the supply of labour and materials to install and/or construct:

- Retaining walls,
- Insitu concrete steps,
- Stone paving,
- Precast concrete paving,
- Insitu concrete paving,
- Asphalt paving,
- Brass paving,
- Bluestone setts paving,
- Porous paving,
- Gravel paving,
- Timber deck,
- Balustrades,
- Handrails,
- Tactile indicators,
- Furniture, and
- Edging.

3.2 Quality

Give sufficient notice so that inspection may be made of the following:

- Completed sub-grade, sub-base and base course preparation,
- Set-out of walls,
- Completed trial set-out for all paving types,
- Completed trial set-out for timber deck,
- Completed pavements, and
- Set-out of edging.

Submit samples of the following finishes, showing the full range of texture and colour of the material:

- Stone paver,
- Precast concrete paver,
- Brass paver,
- Gravel paving,
- Timber deck material,
- Tactile indicators, and
- Edge.

Prepare 1000 x 1000mm sample panels of the following designated finishes, including samples of junctions and trim details:

- Rendered wall,
- Stone paving,
- Precast concrete paving,
- Insitu concrete paving,
- Asphalt paving,
- Timber deck,
- Steel edge.

Provide at least 2 panels of the following, fixed in position and including fixings and finishes:

- Handrail, and
- Balustrade.

3.3 External Walls Set-out and Preparation

Set-out the wall line and mark the position of external walls.

Except trees and shrubs to be retained, clear vegetation within 1 metre of the wall alignment. Grub out stumps and roots of removed trees and shrubs and trim the grass to ground level, but do not remove topsoil.

3.4 Retaining Walls

Installation shall be in accordance with structural engineer's documentation.

Fix the units securely and accurately in their final positions. Provide components and materials, including fasteners, braces, shims, jointing straps, sealant, flashings, grout and mortar.

Protect the units against staining, discolouration and damage.

Supply and install the following wall types:

- Wall Type: Concrete Block Wall with Rendered Finish
 - Location: as shown on landscape drawings,
 - o Block Type: 190 concrete block,
 - Supplier: equal to Boral Masonry Units, plain face concrete blocks 200 series (ref 20.42),
 - o Colour: plain grey,
 - Finish: plain face,
 - Size: 390 x 190 x 190 mm,
 - Footings: concrete slab to engineer's details,
 - Reinforcing: to engineer's details,
 - o Joints: nominal 10mm mortar joints, colour to match blockwork,
 - Facing Finish: 10mm oxide cement render,
 - Colour: equal to 'abilox' creamstone, with 8.3% dose rate, as supplied by Ability Building Chemicals Co.,
 - Exposed corners: stainless steel angle to all exposed corners (top and sides).
 - Wall Type: Existing Concrete Wall, capped to increase height, with Rendered Finish
 - Location: as shown on landscape drawings,
 - Capping Type: reinforced concrete, to engineer's specification,
 - Reinforcing: dowelled to existing wall, to engineer's specification,
 - Facing Finish: 10mm oxide cement render,
 - Colour: equal to 'abilox' creamstone, with 8.3% dose rate, as supplied by Ability Building Chemicals Co.,
 - Exposed corners: stainless steel angle to all exposed corners (top and sides).

3.5 Rendering to Retaining Walls

Before rendering make good any defects in the substrate. Hack off excessive projections, and fill voids and hollows with a mix not stronger than the substrate nor weaker than the first coat. Move deleterious and loose material and leave the surface clean and dust free. Install stainless steel corner beads to all exposed corners/edges to ensure a straight arris and to protect against impact. Apply a dash coat or proprietary bonding agent, allow the dash coat to harden in damp conditions and protect it from drying out before applying the next coat.

Apply one coat to a thickness of 8-12mm. Finish plane surfaces within a tolerance of 6mm in 3 metres, determined by a 3m straight edge placed anywhere in any direction. Finish corners, angles, edges, and curved surfaces within equivalent tolerances. If joining up is unavoidable in a large area of work, make joints invisible in the finished work. Provide an even textured finish by wood floating the final coat.

Provide movement joints in the finish which coincide with movement joints in the substrate. Ensure that the substrate joint is filled with the specified jointing material, and is not bridged during rendering.

Provide warranties for the whole rendering works, including all components, trim and finishes for a minimum period of ten (10) years from the date of practical completion. The warranty shall cover delamination from the substrate, grinning, crazing, peeling efflorescence, effect of salt and humidity and any other deterioration in the physical or visual state of the ready product.

3.6 Waterproofing to Retaining and Planter Walls

Apply waterproof membrane to back of reinforced concrete block walls of retaining and planter walls, and concrete slabs in accordance with engineer's details and manufacturer's recommendations.

The waterproofing shall be fully warranted for a period of 20 years. Installation of the waterproofing shall be fully guaranteed for a minimum of 15 years.

3.7 Paving and Steps Materials and Components

Materials and components are to incorporate the following:

- Sub-grade:
 - Sand, gravel or quarry rubble as fill,
 - Minimum dry density ratio: 98% to AS 1289.5.2.1,
 - Thickness tolerance: 5mm, and
 - Level tolerance: 25mm.
- Base-course:
 - Well-graded crushed rock or gravel, free from deleterious material,
 - Maximum particle size 26.5mm,
 - o Uniformly graded,
 - Maximum clay content 6% by mass,
 - Minimum dry density ratio: 98% to AS 1289.5.2.1,
 - o Thickness tolerance: 5mm, and
 - Level tolerance: generally -0, +25mm, but at existing structures -0, +10mm.
- Bedding sand:
 - Coarse, well-graded, washed sand, free from deleterious material including organic matter and soluble salts or other contaminants liable to cause efflorescence or reduce slip resistance, and
 - Grading: maximum particle size 4.75mm and not more than 30% passing 0.3mm sieve.
- Bedding cement:
 - Type GP to AS 3972.
- Insitu concrete:
 - Standard: to AS 1379 and AS 3600,
 - References: to be read in conjunction with engineer's specification,
 - Thickness: to engineer's detail, but generally, 100mm for light traffic, and 150mm for medium traffic,
 - Reinforcement: to engineer's details, but generally F62 mesh with 30mm minimum cover for pedestrian only areas, and F82 mesh placed centrally for vehicular areas,
 - o Aggregate: 70% basalt, 30% cowra quartz graded to 10mm in size,
 - Joints: to engineer's details, but generally expansion joints at maximum 6m spacing and at junctions with fixed structures including buildings and other paving finishes, and control joints at maximum 2m spacing,
 - o Margins: 50mm wide steel tooled margins,
 - Exposed aggregate finish: steel trowelled to a smooth surface, after final set use clean water and brushes to remove the surface film of mortar until the aggregate is uniformly exposed without undercutting of the matrix,
 - Oxide finish: oxides are to be applied where specified to the concrete mix at the mixing plant at the dose rate by weight and in accordance with manufacturer's instructions, the oxide is to be mixed thoroughly and uniformly to prevent discolouration and patching, finish the concrete with wood float and broom,
 - Broom finish: wood float and broom, using a moistened nylon broom 500mm wide, across the pavement to give an even textured slip-resistant surface,
 - Wood float finish: wood float across the pavement to give an even textured slip-resistant surface, and
 - $\circ~$ Finished surface: uniform in appearance and free from depressions in which water can lie, with a texture depth of 2 2.5mm.
- Asphalt / bitumen:
 - Standard: to AS 2734,
 - Mixes: 15mm thick AC3 DG with 2.5% carborundum (wearing course), and 30mm thick AC10 DG (intermediate course),

- o Bitumen binder class: 170, except 320 for areas with high ambient temperature,
- Compaction: while above 140° C,
- Site density(minimum): 95% of the 50 blow Marshall density of the laboratory compacted mix, and
- Level tolerance: <u>+</u> 10mm.
- Precast concrete pavers:
 - Standard: to AS/NZS 4455,
 - Dimensional category: DPA1 and DPB1,
 - Minimum thickness: 40mm,
 - o Minimum abrasion index: 1.2,
 - o Resistance to salt attack category: exposure,
 - Minimum unconfined compressive strength: 12 MPa,
 - o Breaking load: 2 kN,
 - Maximum deviation of the finished surface under a 3 metre straight edge laid in any direction: 10mm, and
 - o Maximum deviation across junctions between adjacent pavement surfaces: 2mm
- Jointing sand:
 - o Clean, fine sand or screened bedding sand, and
 - Passing a 1.18mm sieve.

3.8 Paving and Steps Preparation and Installation

Remove topsoil containing grass roots. Fill and compact as necessary. Ensure strength and stiffness is similar throughout, including soft spots and service trenches. If necessary, loosen the sub-grade to a depth of 200mm and adjust the moisture content before compaction. Spray sub-grade with a soil steriliser.

Spread the base-coarse material to correct loose thickness of 75mm by approved mechanical means. Do not transport new material over uncompacted material unless prior approval is given. Compact the base-coarse material by approved mechanical means. Bring the base-coarse materials to the optimum moisture content prior to and during placement. Do not add water during compaction except for light sprinkling if necessary to replace evaporation loss. Bring the compacted base-coarse to the required levels within a tolerance from the level indicated on plans. Any required contours of the pavement will be achieved by shaping the base-coarse. During compaction all soft or yielding, and other unsuitable material shall be removed and replaced with approved material. Grade the base course to provide 1-2% cross fall to all paved surfaces to drain toward garden beds and away from buildings.

Install a dividing strip the full width of junctions between different pavement finishes, with the top edge flush with the finished pavements.

Leave pavements and steps clean on completion.

3.9 Insitu Concrete Paving

Supply and install insitu concrete paving as follows:

- Paving Type: Insitu Concrete Paving with Exposed Aggregate Finish
 - o Location: to Cumberland Street, as shown on landscape drawings,
 - Type: insitu concrete with washed exposed aggregate finish,
 - Finish: exposed aggregate,
 - Size: depth varies to engineer's details,
 - Reinforcing: to engineer's details,
 - o Base Course: 100mm depth FCR to engineer's details, and
 - o Joints: expansion and control joints as specified and to engineer's details.

3.10 Insitu Concrete Steps

Supply and install insitu concrete steps as follows:

- Step Type: Insitu Concrete Steps
 - o Location: to Cumberland Street, as shown on landscape drawings,
 - o Type: off-form insitu concrete, design as per engineers details,
 - References: to be read in conjunction with engineer's specification,

- Treads: broom finish with tooled edges including 5mm radius, with two (2) of 12 x 10mm 0 carborundum strips to edge of treads in accordance with AS 1428.1, and
- Risers: off-form finish class B 0

3.11 Precast Concrete Pavers

Supply and install precast concrete pavers as follows:

- Paver Type: Precast Pavers on Slab
 - o Location: to level 8 roof terrace, as shown on landscape drawings,
 - Paver Type: precast concrete paver,
 - o Supplier: equal to Stonevue (phone: 1300 763 976), Ecovue range paver,
 - Colour: Foreshore,
 - Finish: Shot blast, 0
 - Size: 400 x 400 x 50 mm, 0
 - Pattern: square stacked or stepping stones, as shown on the drawings, 0
 - Bedding: 25mm (min) mortar bed, 0
 - Base Course: structural slab to engineer's details, and 0
 - Joints: nominal 3-5mm mortar joints. 0

3.12 Stone Pavers

Install the mortar bedding layer (using a mix of 1:3 cement:sand) at least 12mm thick. Do not disturb the bedding course before the paving units are laid.

Lay pavers in pattern as specified below. Tamp the pavers using a rubber mallet only.

Expansion joints are to occur every eight courses, where paving meets other hard elements such as different pavements, pit lids, and drains. Sealant joint with backing rod is to be installed. Backing rod and matching colour sealant to stone paves shall be installed, ensure sealant is neatly applied not spilling over adjacent pavers.

After completion of all public domain works, clean all granite pavers and supply and install 'Techni -Seal Protective Sealant' or similar, as per manufacturers' instructions to all new stone paved areas.

Supply and install stone pavers as follows:

- Paver Type: Stone Pavers
 - o Location: to Cumberland Street, as shown on landscape drawings.
 - Paver Type: bluestone paver.
 - Finish: Flame exfoliated.
 - Size: 400 x 400 x 60 mm,
 - o Pattern: square stacked, as shown on the drawings,
 - Bedding: 30mm mortar bed, 0
 - Base Course: concrete slab to engineer's details, and 0
 - Joints: butt jointed. 0
 - Paver Type: Stone Banding Pavers
 - o Location: to Cumberland Street (above underground tunnel), as shown on landscape drawings.
 - Paver Type: bluestone paver, 0
 - Finish: Flame exfoliated, 0
 - Size: 300 x 600 x 60 (on grade) or 40 (on slab) mm, 0
 - Pattern: stacked, as shown on the drawings, 0
 - Bedding: 30mm mortar bed, 0
 - Base Course: concrete slab to engineer's details, and 0
 - Joints: butt jointed. 0

3.13 **Bluestone Setts Pavers and Porous Paving**

Supply and install bluestone setts pavers and porous paving in accordance with landscape details and City of Sydney specification, and generally as follows:

- Paver Type: Bluestone Setts and Porous Paving to Tree Surrounds
 - Location: to new and existing street trees, as shown on landscape drawings,
 - Setts Type: bluestone setts, 100 x 100 x 40 mm, and
 - o Porous type: basalt gravel and blue metal screenings.

3.14 Asphalt Paving

Refer to City of Sydney's standard specification for footpaths.

Ensure base course surface is firm, free of surface water, oils, greases, retarders, loose material and dust. Tack coat base course immediately before placing asphalt, using bitumen emulsion spray.

Bitumen surface finish shall be dense, smooth, and free of roller marks and loose material.

Supply and install asphalt paving as follows:

- Paving Type: Asphalt Paving
 - o Location: to public domain footpaths, as shown on landscape drawings,
 - Type: asphalt paving,
 - o Colour: black,
 - o Size: 15mm thick AC10 DG with 2.5% carborundum on 30mm AC10 DG,
 - Joints: as shown on landscape plans and details, and in accordance with City of Sydney's requirements, but generally, expansion joints at nominal 12m (min) spacings, with 10mm wide x 25-30mm deep sawcut, filled with approved bituminous filler, and saw cut joints at nominal 6m (max) spacings, with 3mm wide x 25-30mm deep sawcut, and
 - Base Course: Concrete slab to engineer's details.

3.15 Brass Paving

Supply and install brass paving as follows:

- Paving Type: Brass Banding
 - Location: to Cumberland Street (along alignment of old kerb), as shown on landscape drawings,
 - Manufacturer / Type: Brass band,
 - o Size: 12 mm wide,
 - Fixing: epoxy fix, to manufacturer's requirements, and
 - Base Course: concrete slab to engineer's details.
- Paver Type: Brass Plaques
 - o Location: to Cumberland Street, in four (4) locations to be advised by SHFA,
 - o Manufacturer / Type: Brass plaques, to be supplied by SHFA, and
 - Installation: to SHFA requirements.

3.16 Timber Decking

Unless shown otherwise on the drawings, sawn timber shall be hardwood durability class I or II grade F17 in accordance with AS 1720 and AS 2082.

Cuts, recesses, laps and end grains shall be coated liberally with CN Emulsion by Koppers in accordance with the directions for use.

Sawn timber shall be straight, with ends cut square. It shall be free from impairing grub holes, live insects, termite galleries, decay, knots other than sound intergrown knots, knot holes, splits, transverse or right shakes, impairing gum pockets, sapwood, wane or want, excessive gum veins which are exposed on the face of the piece and will permit lifting of the adjacent surface, and any other defects liable to impair the utility of the piece. Unless otherwise specified, timber shall be free from heart and sapwood.

Limited defects will be permitted as follows:

- Borer holes not exceeding 1.5mm in diameter, or other holes measuring 1.5 to 6mm in diameter, not to exceed one per 0.06 square metres,
- Grub holes situated not more than 450mm from the ends of the piece,
- Tight gum vein up to 3mm width, provided that they do not permit a shelling of the corners,

- Gum pockets, provided that they occur on the lower two thirds of the edges, or on the lower side, and that there are not more than open in any 1.8 lineal metres,
- Sound intergrown knots, except on the face side, and
- Cross grain, provided it does not exceed 1 in 15.

Size and shape of timbers shall conform to the following requirements:

- Material shall be uniformly sawn to the dimensions specified with the +or- 5mm tolerance for width and thickness,
- Spring shall conform with AS 2082, sub-clause 1.9.2,
- Bow shall conform with AS 2082, sub-clause 1.9.2, and
- Twist shall conform with AS 2082, sub-clause 1.9.3.

Supply and install timber decking as follows:

- Timber Decking Type: Timber Deck on slab
 - Location: to level 8 roof terrace, as shown on landscape drawings,
 - Type: kiln dried dressed hardwood one selected from the following species; Grey Gum, White Mahogany, Grey Box, Turpentine or Blackbutt,
 - Decking Size: 70 x 19mm,
 - Edging Size: 150 x 100mm,
 - Pattern: as shown on the landscape plans,
 - Joists: 75 x 50mm, to engineer's details,
 - Footings: isolation pads, to engineer's details,
 - o Joints: nominal 5mm, and
 - Fixings: fixed with two (2) of hot dipped galvanised recessed countersunk screws to each joist, finished flush with surface.

An Inspection Certificate certifying compliance of the timber with the specification shall be submitted to the project manager prior to incorporation of the timber in the work. This inspection and approval of timber, however, will not relieve the contractor of their responsibility to deliver it in sound condition nor of any other obligation imposed by the contract. Should the project manager find that any portion of the timber has become damaged or rendered unfit during delivery it will be rejected and replaced by the contractor at their expense.

3.17 Gravel Finish

Supply and install gravel finish to the edge of the level 8 terrace, as shown on landscape plans and details, using the following:

• River gravel: equal to Nepean river gravel graded 30-40mm, as supplied by Australian Native Landscapes (phone: 9450 1444).

3.18 Tactile Paving Indicators

Tactile paving indicators shall be provided in accordance with the latest edition of AS 1428.

Supply and install tactile paving indicators as follows:

- Tactile Type: Tactile Indicator Studs
 - o Location: to bottom and top of steps, as shown on landscape drawings,
 - Type: tactile indicator studs,
 - Supplier: equal to Pathfinder Metal Tactile Indicators on a 25mm star shaft, as supplied by Pathfinder Systems Australia (phone 02 9541 2708)
 - o Colour: Stainless steel, and
 - Installation: in accordance with manufacturer's recommendations, using an approved accredited installer.

3.19 Balustrades and Handrails

Supply and install metal work that is sound and free from defects liable to affect its strength, appearance, durability or proper functioning under the intended conditions of use.

Materials and components are to incorporate the following:

- Handrails to comply with the latest edition of AS 1428, and
- Weld quality to be free from imperfections such as cracks and pits, and to be ground and polished to give required surface finish.

Shop drawings are to be provided for checking by the project manager and landscape architect, and are to be prepared by the fabrication company following measurement on site of the area, which will help determine exact lengths, angles of intermediate post rail connections, bending requirements and locations for top rail. Details provided are indicative only. Prepare shop drawings detailing:

- Compliance with performance criteria,
- Fabricated components and assemblies including allowance for expansion and contraction of handrails and balustrades,
- Any proposed materials and methods of construction differing form those specified, and
- Proposed fixing methods for balustrades and handrails, including fixing to base and the entire method of production and installation.

Supply and install balustrade as follows:

- Balustrade Type: Freestanding Balustrade
 - Location: to concrete retaining walls, as shown on landscape drawings,
 - Type: mild steel, to match existing balustrade/handrail in Essex Street,
 - Posts: 25mm x 25mm,
 - Top handrail: 50mm x 12mm (with curved top face),
 - o Intermediate and bottom rails: 38mm x 13mm (with curved outside face),
 - Fixing to Ground: subsurface plates under finishes, and
 - Shop Drawings: to be prepared for checking and approval.

Supply and install handrails as follows:

- Handrail Type: Freestanding Handrail to Steps
 - Location: to steps, as shown on landscape drawings,
 - o Type: mild steel,
 - o Posts: 25mm x 25mm,
 - Top handrail: 50mm x 12mm (with curved top face),
 - Intermediate rail: 38mm x 13mm (with curved outside face),
 - Fixing to Ground: subsurface plates under finishes, and
 - Shop Drawings: to be prepared for checking and approval.

3.20 Furniture

•

Supply and install items in accordance with the manufacturer's recommendations, as follows:

- Furniture Type: Table
 - o Location: to open space areas, as shown on landscape drawings,
 - o Quantity: 3,
 - Manufacturer / Type: equal to Urban Art Projects (phone: 07 3630 6300) Parkland Table (product code PRK03),
 - Finish: weathered mild steel legs with galvanised mild steel frame and recycled hardwood slats, and
 - Fixing: subsurface fixed to manufacturer's specifications.
- Furniture Type: Seat
 - o Location: to open space areas, as shown on landscape drawings,
 - o Quantity: 9,
 - Manufacturer / Type: equal to Urban Art Projects (phone: 07 3630 6300) Parkland Seat (product code PRK01),
 - Finish: weathered mild steel legs with galvanised mild steel frame and recycled hardwood slats, and
 - Fixing: subsurface fixed to manufacturer's specifications.
- Furniture Type: Bench
 - Location: to open space areas, as shown on landscape drawings,
 - o Quantity: 11,

- Manufacturer / Type: equal to Urban Art Projects (phone: 07 3630 6300) Parkland Bench (product code PRK02),
- Finish: weathered mild steel legs with galvanised mild steel frame and recycled hardwood slats, and
- Fixing: subsurface fixed to manufacturer's specifications.
- Furniture Type: Bollard (fixed)
 - Location: to open space areas, as shown on landscape drawings,
 - o Quantity: 4,
 - Manufacturer / Type: equal to Urban Art Projects (phone: 07 3630 6300) Parkland Bollard (product code PRK04),
 - o Finish: weathered mild steel with cast aluminium capping, and
 - Fixing: subsurface fixed to manufacturer's specifications.
- Furniture Type: Bollard (removable)
 - o Location: to open space areas, as shown on landscape drawings,
 - o Quantity: 2,
 - Manufacturer / Type: equal to Urban Art Projects (phone: 07 3630 6300) Parkland Bollard (product code n/a, special product to be coordinated with manufacturer),
 - \circ $\;$ Finish: weathered mild steel with cast aluminium capping, and
 - Fixing: to manufacturer's specifications.
- Furniture Type: Relocated Rocks Sign
 - Location: to open space areas, as shown on landscape drawings,
 - o Quantity: 1, and
 - o Installation: in accordance with Sydney Harbour Foreshore Authority specifications.
- Furniture Type: Shade Structure
 - Location: to open space areas, as shown on landscape drawings (note: exact location to be coordinated with structural engineer requirements),
 - o Quantity: 8, and
 - Type: refer to Kann Finch drawings SK499(02) and SK500(02), and Meinhardt engineering requirements.
- Furniture Type: Prefabricated Pot
 - o Location: to level 8 roof terrace, as shown on landscape drawings,
 - Quantity: 21 (x 1500 trough) and 5 (x 1000 trough),
 - Manufacturer / Type: equal to Quatro Design (phone: 07 5525 0775) Trough Planters, 500 series,
 - Size: (21 of) 1500mm x 500mm x 500mm (product code Z5M155050) and (5 of) 1000mm x 500mm x 500mm (product code Z5M105050), and
 - Colour: Charcoal.

3.21 Pergola

Supply and install pergola to level 8 roof terrace, in accordance with architectural drawings.

3.22 Outdoor Kitchen

Supply and install outdoor kitchen to level 8 roof terrace, including bench, sinks, taps, and barbeque, in accordance with architectural details.

3.23 Painting

Supply and install anti-graffiti paint to all walls, fences, timber decking, balustrades, handrails, and furniture in accordance with manufacturer's recommendations, as follows:

• Anti-graffiti paint: equal to Dulux 'Orica Coatings Duraplast AG (antigraffiti)'.

3.24 Edging

Edging shall be used as a separation between gardens (including tree planting) and lawns.

Supply and install edging as follows:

- Edging Type: Mild Steel Metal
 - Location: to edge of turf, as shown on landscape drawings,

- o Installation: set edging flush with grass and 150mm higher than adjoining paved surfaces,
- Installation: fix edging bracing to suspended concrete slab with mortar bed, or fix edging bracing using pegs which shall be securely fixed to the steel edging at the required location to provide a neat fit,
- Type: mild steel,
- Size: 200 x 8mm nominal in longest practicable lengths,
- Pegs: 10 x 10 x 500mm long, and
- Fixings: fillet welded, particularly to all corner joints.

4.0 SOFTSCAPE ELEMENTS

4.1 Scope

The works included in this section shall include the supply of labour and materials to install and/or construct:

- Soil preparation,
- Soil works,
- Planting preparation,
- Planting installation,
- Mulching, and
- Turfing.

4.2 Quality

Give sufficient notice so that inspection may be made of the following:

- Softwork areas set-out,
- Sub-grades cultivated or prepared before placing topsoil,
- Topsoil spread before planting or turfing,
- Plant holes excavated and prepared for planting,
- Plant material set-out before planting,
- Planting, staking and tying completed, and
- Turfing completed.

Place orders for all plants with approved nurseries and provide evidence of order within fourteen (14) days of being awarded the contract. All plant material shall be obtained from approved suppliers. A warranty shall be provided by the supplier declaring that plants and their containers are true to the specified species and free from diseases, pests, weeds and the like.

Submit representative samples of each of the following materials, packed to prevent contamination and labelled to indicate source and content:

- Soil mix types, including chemical composition,
- Mulch, and
- Plant sample for each plant species or variety.

4.3 Soil Testing

Sampling: As recommended in AS 4419 Appendix A.

Undertake at least two (2) soil tests, in locations as advised by Project Manager, and provide results and recommendations for the improvement of plant growth and to adjust the soil to achieve appropriate planting medium (including pit levels) for successful plant growth.

Provide a complete chemical composition test equal to that provided by Sydney Environment and Soil Laboratory, telephone (02) 9980 6554.

4.4 Subsoil

Excavate all garden beds to bring the subsoil to at least 300mm below finished design levels. Shape the subsoil to fall to subsoil drains where applicable. Do not excavate within the drip line of trees to be retained.

Cultivate the subsoil to a further depth of 100mm. Remove stones exceeding 25mm, clods of earth exceeding 50mm, and weeds, rubbish or other deleterious material brought to the surface during cultivation. Do not disturb services or tree roots, if necessary cultivate these areas by hand. During cultivation, thoroughly mix in materials required to be incorporated into the subsoil, as recommended in the soil testing results and to manufacturer's recommendations. Trim the surface to design levels after cultivation.

4.5 Drainage Provision to On Slab Planting Areas

Supply and install drainage provision to all on slab planting areas and planter boxes.

The Landscape Contractor shall check the waterproofing is installed in accordance with the "Waterproofing to Retaining and Planter Walls" section (refer "Hardscape Elements" above) and with engineer's details and manufacturer's recommendations, and notify of any breaks or inadequacies prior to installation.

Supply and install a polypropylene cellular drainage cell equal to 'Atlantis' drainage cell complete with a continuous geotextile filter fabric liner to all planting areas on slab, in accordance with manufacturer's instructions and details. Drainage cell and filter fabric shall extend across the base of planters on slab and up planter side walls to the underside of the mulch layer.

Geotextile filter fabric is to be installed over all drainage cell material. Allow to tape the fabric over the top of the planter walls to ensure soil mix does not escape into drainage outlets/holes.

Install a minimum 50mm double washed coarse river sand over all geotextile lining prior to installation of soil mix.

4.6 Topsoil

Import topsoil for the garden areas, unless the topsoil can be provided from material recovered from the site, as recommended in the soil testing results.

Improved topsoil is to comply with the soil testing results, and as a minimum the following relevant test criteria:

. 0	AS sieve aperture	Soil Textures		
	·	Fine	Medium	Course
	2.36	100	100	100
	1.18	90-100	95-100	95-100
	0.60	75-100	75-100	70-90
	0.30	57-90	55-85	30-46
	0.15	45-70	38-55	10-22
	0.075	35-55	25-35	5-10
	0.002		2-15	2-8
Improv	ved topsoil properties			
. 0	Property	Туре		Amount
	Nutrient levels	Phosphorous	(P) (mg/L)	0.7-4
		Potassium (K) (mg/L)	35-250
		Sulphur (S) (r	ng/L)	>40
		Calcium (Ca)	(mg/L)	50-350
		Nitrogen (N) (mg/L)	<u><</u> 100
		Nitrogen draw	/down (NDI 150)	>0
	Additives	Gypsum (kg/r	n²)	0.25
		Compost		to AS 4454
	Other properties	Organic matte	er (% by mass)	20 maximum
		Wettability		>5mm/min
		Soil reaction ((pH)	6-7
		Electrical con	ductivity (dS/m)	<1.2 w/v testing method
		Soluble salts	(% by mass)	0.1
		2-100cm/hr		

• Improved topsoil particle size (% passing by mass)

Spread the topsoil on the prepared subsoil and grade evenly, compact lightly and uniformly in 150mm layers. Avoid differential subsidence and excess compaction and produce a finished topsoil surface which has the following characteristics:

- Finished to design levels, allowing for mulch or turf, which is to finish flush with adjoining hard surfaces such as paths and edge,
- Smooth and free from stones or lumps of soil,
- Graded to drain freely, without ponding, to catchment points,

- Graded evenly to adjoining surfaces, and
- Ready for planting.

Supply and install the following imported topsoil mixes:

- Soil Mix Type A
 - 60% soil mix (60% coarse sand and 40% black soil),
 - o 10% mushroom compost,
 - o 10% pine bark fines,
 - o 10% composted sawdust, and
 - o 10% composted manures.
- Soil Mix Type B
 - o 80% washed river sand, and
 - o 20% black soil.
- Soil Mix Type C
 - Equal to Lightweight Planter Box Mix as supplied by ANL.

Spread topsoil to the following typical depths:

- Planting on ground
 - o Improved Site Soil or Soil Mix Type A: top 225mm of soil profile, and
 - Soil Mix Type B: below top 225mm of soil profile to 100mm below base of rootball.
- Planting on slab
 - Soil Mix Type C: to depth of planter as detailed.
 - Trees on ground
 - Soil Mix Type A: top 225mm of soil profile, and
 - Soil Mix Type B: below top 225mm of soil profile to 100mm below base of rootball base for trees <75L and 300mm below rootball base for trees <75L.
- Planting in planter boxes
 - Soil Mix Type C: to depth of planter as detailed.
- Turf areas
 - Soil Mix Type B: 150mm.

4.7 Compost

Provide, in accordance with AS 4454, well rotted vegetative material or animal manure, free from harmful chemicals, grass and weed growth.

4.8 Fertiliser

Provide proprietary fertilisers, delivered to the site in sealed bags marked to show manufacturer or vendor, weight, fertiliser type, N:P:K ratio, recommended uses and application rates.

The following application is to be used as a minimum, and may vary in accordance with results and recommendations established from soil tests:

- Trees apply two (2) pellets /300mm top grown (maximum 8/tree) of Kokei pellets or equivalent.
- Mass planted areas apply 500g/m2 of Nutricote Blue slow release fertiliser (with N:P:K ratio of 16:4.4:8.3) or equivalent.
- Turf areas apply to manufacturer's recommendations granulated pelletised chicken manure (with N:P:K ratio of 9:4:6) prior to laying or seeding and biannually, as well as Nitram 6 weeks after laying.

4.9 Plants

Supply plants in accordance with the landscape drawings and schedules, which have the following characteristics:

- Large healthy root systems, with no evidence of root curl, restriction or damage,
- Vigorous, well established, free from disease and pests, of good form consistent with the species or variety,

- Hardened off, not soft or forced, and suitable for planting in the natural climatic conditions prevailing at the site, and in particular shade conditions,
- Grown in their final containers for not less than twelve weeks,
- Trees, unless required to be multi-stemmed, shall have a single leading shoot, and
- Containers shall be free from weeds and of appropriate size in relation to their container.

All plant specimens are to be true to name and variety listed in the plant schedules on the landscape drawings. Make no substitutions of species type or container size unless approved by the Landscape Architect and Project Manager.

Plants shall not exhibit signs of having been stressed at any stage during their development and delivery due to inadequate watering, excessive shade/sunlight, physical damage or have restricted growth due to nursery conditions.

4.10 Plant Delivery and Labelling

Plants are to be delivered to site in a covered vehicle to prevent wind damage. Plants are to be placed in the vehicle in a manner that prevents them from moving and sustaining any damage. Plants damaged on delivery shall be rejected and replaced at the Landscape Contractor's cost. Deliver plant material to the site on a day to day basis, and plant immediately after delivery.

Label at least one plant of each species or variety in a batch with a durable, legible tag. Maintain the tags for the plant establishment period.

4.11 Installation of Plants

Do not plant in unsuitable weather conditions such as extreme heat, cold, wind or rain. In other than sandy soils, suspend excavation when the soil is wet, or during frost periods.

Do not vary the plant locations from those shown on the drawings unless otherwise directed. If it appears necessary to vary the locations and spacings to avoid service lines, or to cover the area uniformly, or for other reasons, apply for directions. Allow for sufficient notice for approval by the Landscape Architect and Project Manager of the location of mature and feature trees and plants.

For tree plantings, excavate a hole to twice the diameter of the root ball and at least 200mm deeper than the root ball. Break up the base of the hole to a further depth of 100mm, and loosen compacted sides of the hole to prevent confinement of root growth.

Following excavation of the planting hole place and spread 15gms of wetting agent equal to 'terra-sorb', premixed with one (1) litre of water, at the bottom of each planting hole, at the following rates:

- Semi-advanced plants (<75L): 2 tablets, or
- Advanced (<u>>75L</u>): 3 tablets.

Thoroughly water the plants before planting, immediately after planting, and as required to maintain growth rates free of stress. No plant material shall show signs of water stress at any time.

When placing, remove the plant from the container with minimum disturbance to the root ball. Ensure that the root ball is moist and place it in its final position, in the centre of the hole and plumb, and with the top soil level of the plant root ball level with the finished surface of the surrounding soil. All plants are to be positioned in the centre of the hole.

In planting beds and individual plantings, apply fertiliser pellets, as recommended in the soil testing results and in accordance with the manufacturer's recommendations around the plants at the time of planting. Provide proprietary fertilisers, delivered to the site in sealed containers displaying manufacturer or vendor's name, weight, fertiliser type, N:P:K ratio, recommended uses and application rates.

Backfill the planting holes with topsoil mixture. Lightly tamp and water to eliminate air pockets. Ensure the topsoil is not placed over the top of the rootball, so that the plant stem remains the same height above the ground as it was in the container.

4.12 Root Barriers

Supply and install root control barriers to all new and existing tree plantings, where their proximity poses a threat to the stability of road kerbs, road paving and footpaths and other hard landscape elements such as walls, fences, steps, and garden edging.

Root barriers shall be equal to Root Wall, as supplied by Treemax, and installed alongside the landscape element to be protected in accordance with manufacturer's recommendations.

4.13 Mulching

Garden mulch shall conform to AS4454 and be free of deleterious and extraneous matter such as soil, weeds, sticks, wood slivers, stones and vegetative reproductive parts of undesirable plants.

Mulch shall be approved recycled mulch recovered from site clearing, if available, otherwise pine bark equal to "Horticultural Graded Pine Bark 15mm" as supplied by Australian Native Landscapes.

Before placing mulch ensure that soil depths are correct and that the soil surface is even and ready to receive mulch as a consistent layer.

Place mulch in all garden beds to a depth of 75mm, when all specified plants are installed, clear of all plant stems, and rake to an even surface flush with the surrounding finished levels and evenly graded between design surface levels. The specified depth shall be achieved after the mulch has settled.

4.14 Stakes and Ties

Stakes shall be durable hardwood, straight, free from knots or twists, pointed at one end, in the following quantities and sizes for each of the various plant pot sizes:

- Plants (>25L): One (1) of 38 x 38 x 1200mm,
- Semi-advanced plants (≥75L): Two (2) of 50 x 50 x 1800mm, or
- Advanced (≥100L): Three (3) of 50 x 50 x 2400mm.

Drive stakes into the ground a minimum one third of their length, making sure they are plumb, equal in height and avoids damage to the plants root system.

Provide ties fixed securely to the stakes, one tie at half the height of the main stem, others as necessary to stabilise the plant, allowing a small degree of movement but not affording any damage to the stem. Ties shall be 50 mm hessian webbing installed around the stake and stem in a figure of eight pattern and stapled to the stake.

4.15 Turf

Turf shall be Soft Leaf Buffalo or approved equal, delivered to site as 25mm minimum thick cut rolls.

Obtain turf from a specialist grower of cultivated turf. Provide turf of even thickness, free from weeds and other foreign matter. Deliver turf to the site within 24 hours of being cut, and lay it within 24 hours of delivery. Prevent it from drying out between cutting and laying.

Lay the turf in the following manner:

- In stretcher pattern with the joints staggered and close butted,
- Parallel with the long sides of level areas, and with contours on slopes, and
- To finish flush, after tamping, with adjacent finished surfaces of ground, paving edges, and timber edges.

Lightly tamp to an even surface immediately after laying. Do not use a roller.

Water immediately after placement and as necessary to keep the topsoil moist to a depth of 100 mm. Protect newly turfed areas against pedestrian and vehicular traffic until grass is established. Keep the turf in a healthy condition.

Fertilise within two weeks after laying with approved lawn fertiliser and to manufacturer's recommendations. Apply additional fertiliser as required to maintain healthy grass cover.

Top dress the turf when it is established to a maximum depth of 10mm with coarse washed river sand to remove any depressions or irregular areas. Rub the dressing well into the joints and correct any unevenness in the turf surfaces.

Mow the turf to maintain a grass height of between 30-50mm.

5.0 IRRIGATION

5.1 Scope

The works included in this section shall include all the necessary components to:

- Design, supply, install, balance and commission multiple permanent irrigation systems,
- Prepare and submit irrigation design documents and plans for relevant authority and project approval that fully describe the system to be installed,
- Conform to Water Board and other relevant authorities' approvals, rules and regulations, and
- Supply and install all necessary pipes, fittings and pumps for providing a separate automatic system for irrigating all garden areas and lawns (not individual street trees) in the public domain areas, and
- Supply and install all necessary pipes, fittings and pumps for providing a separate automatic system for irrigating all individual new street trees in the public domain areas, and
- Supply and install all necessary pipes, fittings and pumps for providing separate automatic systems for irrigating all communal garden areas to the Reynell Building (level 8).

The final irrigation design and installed system shall take into account:

- The requirements to comply with water use restrictions dictated by authorities,
- Water saving and conservation components,
- Using a drip system rather than the use of sprinklers,
- Using the on-site irrigation storage tanks for irrigation reticulation (to Level 8), and using the existing potable water supply throughout the site (to new streetscape tree, gardens and lawns to Cumberland Street),
- Controlling water flow to deliver only the necessary volume to sustain plant vigour, and
- Reducing water delivery rates, volumes and frequencies as plants mature and find their own water sources in the soil and lower strata.

Areas to be irrigated: new street tree plantings, mass garden beds and lawns to Cumberland Street, and planters to level 8.

5.2 Quality

Give sufficient notice so that inspection may be made of the following:

- Work ready for specified testing,
- Underground or enclosed work ready to be covered up or concealed, and
- Final testing of the completed system.

Prepare and submit detailed shop drawings and a full performance programme for the required irrigation systems, including, but not limited to, irrigation pipes and fittings layout and irrigation controllers and valves locations. A transparency of all shop drawings is to be submitted to the Project Manager and Landscape Architect for review and approval prior to the supply and installation of the works.

Prepare and furnish to the Project Manager before the date of practical completion, 'work as executed' drawings of the irrigation, to the same scale and on the same sized standard sheets as the contract drawings, showing the locations of all pipes and fittings, including depths of underground pipework, position of control valves, and the like. Provide written instructions for the operation and maintenance of the automatic irrigation system.

5.3 System

The irrigation system shall be an automatic fixed drip system, with an irrigation controller self operated via a soil moisture sensor. The system shall be compatible to the type of plant material and rates of water required. Where appropriate adjustable and fully serviceable. The layout of the entire irrigation is to ensure that each individual plant receives the required amount of water to maintain healthy and vigorous growth.

The irrigation system shall be such that, component theft, vandalism, over-spray and wetting of paths shall be reduced to a minimum or completely eliminated by the use of a drip system.

5.4 Materials and Items

The system shall incorporate the following components:

- Valve boxes: All water supply points and timers shall be housed in lockable waterproof irrigation style valve boxes for easy access and location. The valve box should be manufactured from fibreglass or high density thermo plastic material. The valve lid is to incorporate a locking mechanism.
- Automatic control valves: 24V solenoid actuated hydraulic valves with flow control and a maximum
 operating pressure rating 1MPa. Provide stainless steel bonnet holding down bolts and internal
 metal parts of stainless steel, able to be serviced without removal from the line. Provide a gate valve
 of the same size immediately upstream of each automatic control valve. House both valves in a high
 impact plastic valve box with high impact plastic cover at finished ground level.
- Quick coupling valves: Provide DN 20 double lugged bronze quick coupling valves with neoprene seats mounted on DN 20 copper risers offset at least 150mm from the supply pipe. Provide valve boxes and covers set flush with the finished surface.
- Pressure regulating valves: Provide pressure regulating valves at offtake points, which are adjustable between 100-700 kPa. Provide an 800µm filter sized to suit the flow immediately upstream from the pressure regulating valve, and provide gate valves upstream from the filter and downstream from the pressure regulating valve. Mount the assembly in an accessible position in the valve box, access pit or adjacent building, and provide backflow prevention.
- Soil moisture sensors: Provide fixed ceramic moisture sensors. Connect to the irrigation controller via moisture control units.
- Control wires: Connect the automatic control valves and soil moisture sensors to the controller with double insulated underground cables laid alongside piping where possible. Lay intertwined for the full length without joints except at valves, sensors and branches of common wires. Provide waterproof connectors. Provide expansion loops at changes of direction and at joints.
- Irrigation controllers: Provide manual cycle and individual station operation, manual on/off operation of irrigation without loss of programme, 240V input and 24V output capable of operating 2 control valves simultaneously, 24 hour battery programme backup and power surge protection. Mount cabinet in a waterproof lockable cabinet. Provide a 240V electrical connection supply, with an isolating switch at the controller.

5.5 Installation

Work shall be done by or under the direct supervision of appropriately licensed personnel.

The final installation of the system shall include the following features:

- All components shall be installed in a manner that is concealed below ground or below mulch,
- All tubing below mulch shall be pinned into place with galvanised steel spikes to prevent the tubing bending up through the mulch layer,
- All valve boxes shall be supported in the ground on brickwork,
- Valve box lids shall be set level with garden mulch levels and in concealed locations,
- All control fittings such as valves and the like shall be fully accessible within concealed valve boxes in the landscaping,
- All mainline and lateral pipework shall be concealed from view,
- No tube junctions shall be placed in conduits or under slabs where access is not possible,
- Use Class B copper piping on underside of slabs,
- All joints shall be fitted tightly, sealed and made leak proof, with no internal projections, burrs or obstructions,
- Each separate system shall be controlled by one control panel located in a secure area,
- Back flow and master valve assemblies shall be sized as follows:
 - Flow rate 10-17 lpm use 25mm backflow and master valve assembly,
 - \circ $\;$ Flow rate 71-150 lpm use 40mm backflow and master value assembly, or
 - Flow rate 151-240 lpm use 50mm backflow and master valve assembly.
- Space dripline tubing at maximum 450mm centres and maximum 200mm from garden edges, and
- Pipework shall be in accordance with AS 1477 and AS 2032.

Flush piping system through with clear water at a velocity sufficient to remove foreign matter, and until only clean water is discharged at outlets. Leave the system free of foreign matter on completion.

5.6 Commissioning

The entire system shall be tuned and tested to deliver an adequate amount of water to all plants and turf. Test the system in the presence of the Landscape Architect and/or irrigation designer to facilitate the issue of a Certificate of Practical Completion.

Maintain the system for the duration of the establishment maintenance period as detailed elsewhere in the specification.

6.0 PLANT ESTABLISHMENT

6.1 Generally

The Landscape Contractor shall rectify defects during installation and that become apparent in the works under normal use for the duration of the contract Defects Liability Period.

The Landscape Contractor shall maintain the contract areas by the implementation of industry accepted horticultural practices for 52 weeks. The landscape maintenance works shall include, but not be limited to, the following:

- Replacing failed plants,
- Pruning,
- Insect and pest control,
- Fertilising,
- Maintaining mulch,
- Mowing,
- Watering,
- Rubbish removal, and
- Cleaning of the surrounding areas.

6.2 Logbook

Keep a Maintenance Logbook recording when and what maintenance work has been done and what materials, including chemical materials, have been used. The records shall show when and where identified chemicals were used and why. Submit the initial logbook for inspection prior to Practical Completion and again at the end of the Defects Liability Period as a prerequisite for granting Practical and Final Completion Certificates.

Record all major events and activities in the logbook.

Make the logbook available for inspection on request.

6.3 Plants

Trees, shrubs and groundcovers shall at all times show signs of healthy vigorous growth. Spent flower heads or stalks shall be removed immediately following flowering.

Replace failed plants. A "failed" plant may not mean complete death of soft tissue but failure due to poor growth, appearance, or unacceptable time for plant to re-establish new growth following damage or vandalism. Replacement plants shall be in a similar size and quality and identical species or variety to the plant that has failed. Replacement of plants shall be at the cost of the Landscape Contractor unless advised otherwise. Failure of the plant shall be at the sole discretion of the Landscape Architect.

6.4 Pruning

Whatever pruning work is requested by the Landscape Architect shall be performed, including any pruning of damaged growth or miscellaneous pruning considered as beneficial to the condition of the plants. All pruning works shall be undertaken in a manner equal to acceptable horticultural practice.

6.5 Spraying

Avoid spraying if ever possible.

Immediately report to the Project Manager any evidence of intensive weed infestation, insect attack or disease amongst plant material. Submit all proposals to apply chemicals and obtain approval before starting this work.

When approved, spray with herbicide, insecticide, fungicide as appropriate in accordance with the manufacturers' recommendations. Record in the logbook all relevant details of spraying activities including:

- Product brand / manufacturer's name,
- Chemical / product name,
- Chemical contents,
- Application quantity and rate,
- Date of application and location,
- Results of application, and
- Use approval authority.

6.6 Fertilising

Fertilise gardens with a proprietary slow release fertiliser applied in accordance with the manufacturer's directions and recommendations. Record in the logbook all relevant details of fertilising including:

- Product brand / manufacturer's name,
- Fertiliser / product name,
- Application quantity and rate, and
- Date of application and location.

6.7 Stakes and Ties

Adjust and replace as required to ensure plants remain correctly staked. Remove those not required at the end of the planting establishment period (Defects Liability Period).

6.8 Mulched Surfaces

Maintain the surface in a clean, tidy and weed free condition and reinstate the mulch as necessary to ensure correct depth as before specified.

6.9 Mowing and Top Dressing

Mow the turf to maintain a grass height of between 30-50mm. Do not remove more than one third of the grass height at any one time. Remove grass clippings from the site after each mowing.

Top dress to a maximum of 10mm as necessary to fill depressions and hollows in the surface.

6.10 Irrigation and Watering

Maintain the irrigation system to sure that each individual plant receives the required amount of water to maintain healthy and vigorous growth, adjust and rectify as required.

Provide additional watering, if necessary.

6.11 Erosion Control Measures

Where necessary, maintain the erosion control devices in a tidy and weed free condition and reinstate as necessary to ensure control measures are effective where deemed necessary.

6.12 Weeding And Rubbish Removal

During the plant establishment period remove by hand, rubbish and weed growth that may occur or re-occur throughout all planted, mulched and paved areas.

6.13 Urgent Works

Not withstanding anything to the contrary in the Contract, the Project Manager may instruct the Landscape Contractor to perform urgent maintenance works that place the completed contract works at risk. If the Landscape Contractor fails to carry out the work within seven (7) days of such notice, the Project Manager (or representative) reserves the right without further notice to employ others to carry out such urgent and specified work and charge it to the Landscape Contractor. Such work shall include but not limited to the inspection and clearing of drains in the pavement and gardens.

6.14 Completion

A final inspection shall be made by the Project Manager, Landscape Contractor and Landscape Architect before the completion of the Plant Establishment Maintenance Period (Defects Liability Period). Any items requiring rectification shall be repaired before completion of the relevant works and finally approved prior to certification.

6.15 Maintenance Schedule

Table	ACTIVITY	FREQUENCY				ACTION		
		D	W	2W	3W	М	3or6M	Daily, Weekly, Monthly
1	Logbook	+		+		+		Complete a logbook entry every
								day at site and at least every two
								weeks. All actions listed below
								require a logbook entry. Upon
								request, make the logbook
								available for inspection. Submit
								logbook to the Contract
								Administrator on a monthly basis
								Please note that more frequent
								short, occasional inspection
								should result in less maintenance
								work when problems are
								observed earlier than they might
								otherwise have been seen.
2	Plant replacement			+		+		Inspect and replace failed plants
								within 2 weeks of observation of
								failure. Match species, size
								(original) and location of new with
3	Mulch			-		-		linspect and replace mulch
5	WUGH			-		т		deficiencies within 2 weeks of
								observation. Prior to placing new
								mulch aerate the soil by fork
								turning to a depth of at least
								100mm, roughly level the soil and
								then place mulch. Do not disturb
								major plant roots while aerating
4				<u> </u>				SOII.
4	Erosion control			+				Inspect every two weeks and
								immediately Maintain erosion
								control device as necessary.
5	Stakes and ties			+				Inspect every two weeks, adjust
								and/or replace as necessary but
								remove as plants mature and are
								able to support themselves.
6	Weed and rubbish			+				Inspect and remove immediately
	removal							upon observation. Leave no
								waste on site. Dispose of waste
								disposal site
7	Pruning			+				Inspect every 2 weeks and prune
	r rannig							as necessary to remove dead
								wood, improve plant shape and
								promote healthy vigorous new
								growth.
8	Spraying			+				Inspect every 2 weeks and action
								as necessary. Do not spray if
								other non-chemical methods will
								sausiy the need to remove
								only when absolutely necessary
9	Urgent works		+					Complete within 1 week (7 days)
Ĭ			.					of notification. Inspect and clear
								drains.

10	Planting and fertilising		+		3m+	Inspect every 2 weeks and remove spent flowers and dead stalks as they become apparent. Fertilise gardens every 3 months or other frequency in accordance with fertiliser manufacturer's directions.
11	Watering	+	+			Water when and where necessary every day at site and at least every 2 weeks generally. Do not allow soil and plants to dehydrate. Allow for prolonged rain, windy and dry periods. Water in the early morning or late afternoon to avoid excessive evaporation during the heat of the day.
12	Mowing, top- dressing and edging		+	+	6m+	Summer fortnightly. Winter monthly. Top-dress 6 monthly.