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**D. EXTERNAL WORKS – SCHEDULE OF CHANGES – REVISION 4.1**

As a guide only, attention is drawn to changes that have been made in the following clauses since the last revision

Clause	Date
General revision	
D 2	August 2004

## **D. EXTERNAL WORKS**

### **D.1. LANDSCAPING (SOFT)**

#### **D.1.1. General**

Materials and workmanship shall be in accordance with the relevant standards of the Standards Association of Australia including AS4419 "Soils for Landscaping and Garden Use".

##### **D.1.1.1. Topsoil Depth for Gardens and Turf**

Unless otherwise specified a minimum depth of 300mm topsoil is required for garden beds and a minimum depth of 100mm topsoil for turfed or seeded areas.

Unless otherwise specified, the UNSW Grounds Curator prior to use must approve topsoil.

Topsoil shall be a friable sandy loam with a sand content of between 60% and 80% by volume and a humus content of between 5% and 10% by volume.

Topsoil pH shall be in the range of pH 6.0 to 7.0.

Topsoil shall be free from stones, weeds, sticks and rubbish.

Topsoil Depth for Planter Boxes and Beds within Paved Areas

A minimum depth of 1 metre unless otherwise specified.

#### **D.1.2. Garden Mulch**

Mulch shall be free from soil, weed growth, green material or other matter.

Unless otherwise specified, the UNSW Grounds Curator prior to use must approve garden mulch.

Mulch placed on garden beds must be a minimum of 75mm thick.

Black plastic is not to be used below mulch.

Mulch is to finish flush with adjoining retainer or surfaces.

Mulch shall be of the following types:

Shredded pine flake

Woodchip / leaf mulch mix with a minimum of 70% woodchip content

#### **D.1.3. Turf**

Turf shall be from the following list of turf species. The UNSW Grounds Curator must approve turf species prior to works commencing.

- Legends C1 couch
- Greenlees Park couch
- Soft leafed buffalo
- Kikuyu

#### **D.1.4. Dilapidation Reports**

Before the commencement of any landscape works, the landscape contractor shall provide UNSW with a Landscape Dilapidation Report detailing the following:

A list of all landscape elements on site. The list shall include, but not be restricted to include lawns, gardens, trees, irrigation components, seating, rubbish bins, light poles and fittings, paving and other landscape elements that are present.

Identify landscape elements condition.

A list of landscape elements that will be affected or removed as a result of the landscape works.

All landscape elements will remain the property of UNSW unless otherwise specified by the Grounds Curator or nominated representative.

The landscape contractor must 'make good' all landscape elements to the pre-works condition of the landscape element. The Grounds Curator or nominated representative shall oversee these rehabilitation works. Works must be completed to the satisfaction of the Grounds Curator or nominated representative.

### ***D.2. IRRIGATION***

#### **D.2.1. Irrigation**

##### **D.2.1.1. General**

All work is to comply with the NSW Code of Practice Plumbing and Drainage as applicable and Plumbing and Drainage Code AS 3500 part 1. The Irrigation Contractor must supply a UNSW approved irrigation plan prior to commencement of the project and satisfying UNSW Irrigation Technician and Grounds Curator. The Contract shall include supply, installation, testing and commissioning of all equipment necessary for the completion of the works described or inferred in the specification and shown on the drawings. Commissioning must be undertaken in the presence of UNSW Irrigation Technician and Grounds Curator. The installer shall supply As-Constructed drawings and a list of components. Layout shall be at 1:200 scale, with details of typical layouts and fittings. Upon Practical Completion, the site shall be cleaned to the Ground Curator's satisfaction.

#### **D.2.1.2. Basis of Design**

On the irrigation plan provide details on which the design was based. Such information shall include: Basis of flow rates and system pressures, design pressure head at sprinklers.

Refer also: [Section D](#) External Works

#### **D.2.1.3. Water Supply**

All irrigation shall be supplied from the site bore water non-potable system. In exceptional circumstances, connection to potable water may be permitted where approved in writing by Manager Engineering Services. Provide ball-type service valve at the connection and install water meter as directed by SUPERINTENDENT.

#### **D.2.1.4. Pipework**

When supplied from Borewater system, three different pipe types are required depending on function, as follows:

Supply from Borewater main to Control Valve: For pipework up to 80mm, use black Polyethylene Class PN12 or greater with lilac stripe or Lilac Class 16 PVC Where pipework de-pressurises upon closing of the master valve, Class 12 PVC may be used.

Where potable water is supplied, PVC Class 16 or Type B copper shall be used.

Backflow prevention devices are required as follows:

Where supply is from bore water and fertilizer injection is installed, a testable RMC Watts Double Check Valve Assembly shall be installed.

Where supply is from potable water supply, a testable RMC Watts Reduced Pressure Zone Device Assembly shall be installed

#### **D.2.1.5. Trenching and Backfilling**

Prior to any excavation, check for underground services with UNSW Facilities survey draftspersons and obtain an existing services drawing for that area. Carry out soil and water management to Randwick Council requirements to prevent stormwater pollution and loss of soil. Where excavation is to be located under existing hard pavement, excavation and restoration shall be carried out by UNSW Senior Works Supervisor on 9385 7855. Backfill to his instructions.

Excavate to maintain main lines at 450mm cover and laterals at 300mm cover. Bed pipework on 50mm sand with sand side support and overlay to a depth of 100mm above pipe. Backfill to 95% minimum density by tamping or mechanical compaction in layers 150mm thick using selected excavated material. Overfill trenches to allow for settlement and top up and level trenches after 3 months.

#### **D.2.1.6. Controller**

Control large to medium irrigation systems by 'Cloudmaster CM-20' automatic controller as supplied by JEC (Jeffrey Electronic Control). Provide access to telephone line for future computerised central control connection. Provide Toro 'Greenkeeper Series' for small works. Locate local controller in associated building plant room where practicable. Mount all controllers in lockable galvanised box, supplied and installed by UNSW Grounds.

#### **D.2.1.7. Rain Sensor**

Install a Toro rain sensor to each system, supplied by UNSW. Locate sensor so that it is not sheltered from wind-blown rainfall from any direction.

#### **D.2.1.8. Solenoid Valves**

25mm to be Toro '250 Series' with union both sides of valve.

40mm – 50mm to be Toro 'P220 Series' plastic valves installed with a union either side of the valve.

80mm solenoid valves to be RAINBIRD 'BPES Series' (brass base with plastic bonnet) installed with a flange either side of valve. A 'slip-fix repair coupling' to be installed on the downstream side of the valve flange or union for all solenoid valves.

#### **D.2.1.9. Isolation valves**

Provide isolation ball valves on each branch at tee and upstream of each solenoid valve. Valves to be Philmac (Black base with blue handle)

#### **D.2.1.10. Valve Boxes**

Valve boxes to be buried with lid approx. 10-20mm below turf level (for lawn areas) and 10-20mm above soil level (for garden areas). Use large boxes to house isolating ball and solenoid valve installations. Where necessary, use two boxes for ease of access.

#### **D.2.1.11. Sprinklers**

Sprinklers shall be of the Toro types spaced on a head to head basis wherever possible and of the models as follows:

1. Small lawns & gardens up to 4m radius: Toro Model 570 series sprinklers
2. Medium lawn & gardens up to 9m radius: Toro Model 300 series stream sprinklers

3. Large lawn & gardens up to 15m radius: Toro Model S700 commercial series sprinklers
4. Playing fields over 15m radius for cricket, soccer & rugby: Toro Model 640 series sprinklers
5. Synthetic hockey fields: Toro Model 690 series sprinklers

#### **D.2.1.12. Wiring**

Underground wiring to be multi-core multi-strand type, taped to the underside of the irrigation pipe where possible. Aboveground wiring to be installed inside electrical conduit. Contractor to size control wiring to minimise voltage drop hence ensuring that solenoid valves operate satisfactorily.

### **D.3. HARD LANDSCAPING**

#### **D.3.1. Pits Lids and Grates**

Where grates are to be located in pedestrian areas, a 'heel guard' type grate shall be used. Where grates are to be used in trafficable areas, the gap between bars must be narrow enough to prevent bicycle wheels and wheelchairs from becoming lodged. Longitudinal bars are to be avoided.

Where pit lids are to be used in areas of terrazzo or in-situ concrete paving, the pit lid shall be in-filled with the same paving material

Submit samples for approval prior to installation

Refer also: [Section E.1](#)

#### **D.3.2. Paving**

Four main paving types are to be used – clay brick, concrete brick, concrete unit (terrazzo) and in-situ concrete. All paving must comply with slip resistance testing in accordance with AS 4582.

Where possible, previous paving should be used, particularly in pedestrian and lightly trafficked areas. This will:

Prevent water collecting in puddles in wet weather.

Reduces storm water run-off and nuisance flooding in small storms.

Recharge the aquifer.

Reduce irrigation loads in areas adjacent to paving

Brick Paving:

Shall comply with AS 1225 and Clay Brick and Paving Institute Note One: Specifying and Laying Clay Pavers.



The standard paving brick to be used throughout campus shall be Bowral Pavers from Bowral Bricks Pty Ltd. Pavers shall be 230 x 115 x 65mm thick. Colour is to be predominantly Chestnut. Trim colours to be Maple or Regency Grey. Paving bricks are to be laid on course river sand unless otherwise specified. Paving bricks must be laid level and flush with no more than + or –3mm between bricks. Brick paving shall not be used where the site is in constant shade.

#### **D.3.2.1. Concrete Unit Paving:**

The only concrete unit paver approved for use is that supplied by Pebblecrete Pty Ltd. All concrete unit paving is to have a honed finish and the aggregate is to be clearly visible. A variety of colours and aggregates have been approved for use. All “Pebblecrete” pavers are to be laid on a concrete subgrade to the manufacturer’s specification. Pavers are to be 40mm thick in pedestrian only areas and 60mm thick on trafficable area.

#### **D.3.2.2. In-Situ Concrete Paving:**

Concrete paving shall have either a wood float finish or exposed aggregate finish. Consideration shall be given to using an exposed aggregate finish where paving is to be in constant shade and subject to a build up of moss. In this instance, brick paving shall not be used. Concrete paving shall be reinforced to engineer’s detail. Paving is to be 100mm thick in pedestrian only areas and a minimum of 150mm thick in trafficable area.

#### **D.3.2.3. Steps and Ramps**

All steps and ramps are to comply with AS 1428 Part 2.  
Face brickwork SHALL NOT be used for stairs and steps  
Open treads SHALL NOT be used for stairs and steps  
Where stairs/steps are sufficiently wide, a central handrail shall be used rather than a handrail on one or both sides.  
All tread nosings must be in a contrasting colour.  
Handrails must comply with AS 1428 part 2 and in particular, must project a minimum of 300mm beyond the top riser and one tread width plus 300mm beyond the bottom riser.  
All steps and ramps must have a kerb edge on both sides  
Treads shall be not less than 350mm with a fall to the outside to avoid ponding  
Risers shall be between 120 and 160mm  
Single steps are to be avoided. Where a single step is unavoidable, a kerb ramp must also be provided. A flight of 3 risers should be a minimum. With long flights of stairs, provide a landing every 10 risers  
Steps must have even treads and risers

See also: [Section B](#)

### **D.3.3. Non Slip Finishes**

All retaining walls, planter boxes and edge details that are prone to inappropriate use by skate boarders shall include some means of protecting the edge or minimising damage. A stainless steel or galvanised steel edge is preferred. Submit samples for approval prior to installation.

### **D.3.4. Anti Skateboard Inclusions**

All retaining walls, planter boxes and edge details that are prone to inappropriate use by skate boarders shall include some means of protecting the edge or minimising damage. A stainless steel or galvanised steel edge is preferred. Submit samples for approval prior to installation.

## **D.4. TRAFFIC MANAGEMENT**

### **D.4.1. General**

A speed limit of 10kph applies to all roads on campus.

Three types of hard surface zone exist on campus.

Vehicular Entry Roads. Vehicular street entries.

Shared Zones. Shared by pedestrians and vehicles.

Pedestrian only areas. For example the Mall.

All roads on campus other than the gate entry zones and roads to multi-deck carparking are 'shared zones' for both pedestrian and vehicle use. The demarcation between vehicular road and shared zone will be a raised flat top speed hump with clear signage.

All shared zones are to be sign posted in accordance with RTA standards and requirements

Kerb and gutters are to be avoided in shared zones. Paving material shall be either brick or exposed aggregate paving. Pedestrian crossings are only to be used outside shared zones.

Where 'shared zones' adjoin pedestrian only areas, paving selection is to clearly distinguish between the two zones for both safety and maintenance. The construction of pedestrian areas is to a lighter duty level than roads and shared zones.

Chicanes shall be used as a means of slowing vehicles in preference to speed humps

### **D.4.2. Speed Humps**

Speed humps shall only to be used on bitumen paved roads where other means of slowing vehicles is not available. Speed humps shall be constructed of concrete and

shall be 3 metres wide with a height of 150mm. All speed humps shall be sign posted and marked in accordance with the relevant Australian Standard.

#### **D.4.3. Pedestrian Crossings**

#### **D.4.4. Road Signage & Line Marking**

Where possible, signage relating to parking and traffic control will be painted on to the pavement in preference to pole mounted signage. Refer :[Section C](#)

### **D.5. OUTDOOR FURNITURE**

#### **D.5.1. Barriers & Bollards.**

##### **D.5.1.1. Supplier:**

Street Furniture Australia  
92 Buckland Street  
ALEXANDRIA NSW 2015  
Ph: 93101488  
Fax: 93181343  
PO Box 525  
ALEXANDRIA NSW 1435

Product Name:  
B2 Bollard  
Colour: Dulux Wizard 50283

Removable Bollard  
Supplier: Polite Enterprises  
Unit 3  
192A Kingsgrove Road  
KINGSGROVE NSW 2208  
Ph: 95545577

Product Name: UNSW Custom Bollard  
Colour: Dulux Wizard 50283

#### **D.5.2. Edging**

#### **D.5.3. Fixtures & Furniture**

##### **D.5.3.1. Bike Racks**

Supplier:

Cora Bike Rack Pty Ltd  
79/69 Allen Street  
LEICHHARDT NSW 2040  
Ph: 1800 249878  
Fax: 1800 249879

**D.5.3.2. Product Code:**

Small: 2704  
Medium: 4506  
Large: 7510  
Finish: Galvanised

**D.5.4. Bench Seats**

**D.5.4.1. Supplier:**

Street Furniture Australia  
92 Buckland Street  
ALEXANDRIA NSW 2015  
Ph: 93101488  
Fax: 93181343  
PO Box 525  
ALEXANDRIA NSW 1435

**D.5.4.2. Product Name:**

CM Plaza 1 Contoured Seat  
Colour: Frame: Dulux Navy 50282  
Battens: Natural Jarrah oiled timber finish

**D.5.5. Litter Bins**

**D.5.5.1. Supplier: Polite Enterprises**

Unit 3  
192A Kingsgrove Road  
KINGSGROVE NSW 2208  
Ph: 95545577

**D.5.5.2. Product:**

120 litre Wheel Bin Surround

Colour: Perforated metal surround:  
Dulux Navy 50282 or Dulux Wizard 50283  
Top: Polished Stainless Steel

### **D.5.6. Bollards**

#### **D.5.6.1. Ash Cylinders**

Supplier:  
Street Furniture Australia  
92 Buckland Street  
ALEXANDRIA NSW 2015  
Ph: 93101488  
Fax: 93181343  
PO Box 525  
ALEXANDRIA NSW 1435

Product: Ash Cylinder – wall or post mounted  
Colour: Dulux Navy 50282 or brushed aluminium