SECTION 15: GROUNDS AND LANDSCAPING

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15.1 INTRODUCTION

The University of Melbourne is recognised for the quality of its landscape and external environment. The University's on-going objective is to ensure that all new landscape areas provide visually pleasing places for campus users to meet, study and relax.

Landscape designers are required to meet the minimum standards nominated and to ensure that the overall design integrates well with the existing landscape.

The standards focus on maintaining design cohesion by providing a consistent pallet of linking elements to connect disparate buildings and structures throughout the campus. It is important that designers ensure that the landscape design is fully integrated with the design of related new built infrastructure.

The design of landscape projects must consider, to the maximum extent possible, the following factors:

- Safety in design
- Water sensitive urban design
- Sustainability and biodiversity
- Solar screening and access
- Pedestrian and traffic flows
- Noise reduction and privacy
- Maintenance of desirable sightlines
- Definition of borders between facilities
- Visual stimulation and creation of interest
- Reduced maintenance costs and vandal proofing

15.2 SCOPE

This section covers the following grounds and landscape requirements:

- Design principles
- Asset protection
- Hard and soft landscaping elements
- Services and,
- Establishment and maintenance

The following design considerations and elements are detailed in elsewhere in the Design Standards:

- Road and pavement sub base
- Bollards
- Water supply
- Security Help Points
- External drinking fountains
- External lighting

15.3 STANDARDS AND REGULATORY REQUIREMENTS

Design and documentation is to fully comply not only with the Design Standards but also with all relevant Acts, Codes, Regulations and Australian Standards. Any relevant landscaping good practice guidelines should also be complied with. Any inconsistency between these documents is to be notified to the University's project manager.

15.4 REFERENCE MATERIAL

- Campus)
15.5 SITE APPRECIATION AND DESIGN PRINCIPLES

The University of Melbourne’s landscaping philosophy stems from a long history dating back to its establishment in 1853. At the Parkville campus, heritage landscapes such as the System Garden, South Lawn and the collection of mature trees are integral to the University’s external fabric. The mid twentieth century expansion of the University saw a series of distinguishable courts and connecting lanes emerge that command their own unique quality. This distinctive feature of the University of Melbourne is to be retained and continued as new landscape works are undertaken.

The result is a diverse natural environment that is realised from old traditions blended with modern approaches. A key feature at Parkville is that the campus landscape integrates aesthetically with buildings whilst aiding and facilitating the logical and safe movement of students and staff.

What the University requires from future landscape designs is the preservation of important landscape areas and attributes as well as a continuance of the blending of one area of landscaping to the next. With the exception of zones which the University may nominate as requiring a unique landscape treatment, the University requires the continuation of its overall landscape concept. On occasion, the University may be amenable to new concepts, particularly ones which acknowledge changing climate conditions. However, overall design cohesion and adherence to the detailed information contained in the Design Standards is required.

The University recognises the importance of sustainable practices and, in particular, biodiversity as detailed in the Biodiversity Management Plan.


Landscape consultants and designers are encouraged to pursue increased biodiversity whenever opportunities present themselves.

The University’s significant tree collection is a valuable feature of the Parkville campus and includes trees on the National Trust Tree Register and the City of Melbourne’s Exceptional Tree Register.

https://sustainablecampus.unimelb.edu.au/key-areas/campus-grounds/urban-forest-data.

https://www.nationaltrust.org.au/services/significant-tree-register/


Designs which impact either physically or visually on significant trees are to be avoided.

Design for external areas should provide a diversity of space types (ranging from reflective spaces to those which encourage interaction) and that allow for spaces to function as living laboratories in support of teaching, learning and research.
Melbourne University campuses generally combine Australian native plants with complimentary exotic species. This sympathetic blending of species should be continued.

Where appropriate, distinct planting themes or character may be developed for new landscapes. Such themes might draw upon plant communities of a specific geographic region; be based on foliage / flower colour; plant forms, physiologies or properties; botanic classification; indigenous; culinary etc. Any theme devised for a new garden or precinct area is to be thoroughly discussed and tested in the project design phase. The Urban Forest Data webpage has layers displaying the current distribution of tree species, habit and origin. These may help in identifying existing themes across the landscape and help new landscaping tie in with its existing surrounds.

Mass planting is encouraged and is appropriate for large open spaces. An appropriate balance is to be achieved between areas of garden planting and occupiable space such as lawns according to expected levels of usage. Landscape design plans should at the same time seek to maximise use of vegetation and green space, whether garden, trees or lawn, to maintain and extend where possible the concept of a campus in a garden or park setting.

Desire lines of expected pedestrian movement across landscape space should be identified and allowed for. Garden beds should not be positioned so as to obstruct desire lines or hamper ease of movement around the campus. Consideration must be given to protection of sensitive landscape areas by creation of designed barriers which may include hedges, densely planted garden beds, retaining walls, furniture, water features or similar.

Plant selection should be principally based on use of trees, shrubs, grasses and strappy-leaved plants, and groundcovers. Perennials should be restricted to use as accent plants only, and in limited number, to reinforce and expand on an adopted theme. Ephemeral flowering annuals, bulbs and the like are to be avoided.

All plants should be selected for best suitability to the given landscape situation. Full account must be given to the aspect, sunlight levels, soil conditions including drainage, wind, natural rainfall patterns and the established planting character of adjacent areas.

Preference should be given to plant selections that are hardy, drought-tolerant, non-weedy or invasive, long-lived, low maintenance, resistant to pests and disease, and as free as possible of potential hazards.

Species selection, especially for large specimen trees in prominent locations, should take account of vulnerability to forecast climate change and extreme weather conditions in coming decades. Tree selection in such instances should only be for those species deemed to be suitably adaptable, tolerant and hardy over the course of their expected useful amenity life. The University’s Urban Forest webpage contains tree temperature vulnerability assessment information which identifies the tree species which have been deemed vulnerable to future warming temperatures in Melbourne.

Tree choice should aim to increase overall canopy cover across the campus, so larger long-lived specimens should be selected by preference where the situation allows. Deciduous trees should be favoured where winter sunlight penetration is a clear advantage for year-round amenity of any space. If any canopy is removed during a
project, the same area should be planned for replacement by planting a new tree/s that once mature will reinstate or expand on the canopy cover area that has been removed.

Tree species known to cause allergies or regularly shed limbs must be avoided.

Climbing plants intended to cover building walls must have durable and adequate support structures installed to provide for growth and maintain wall adhesion. Climbing plants should only be used where there is sufficient access for appropriate equipment for on-going pruning and maintenance.

Landscape and planting design must consider maintenance requirements into the future, aesthetic presentation and visual impact throughout all stages of growth to maturity, and any amenity issues or possible adverse implications for campus infrastructure.

The above provides only a short summary of the University’s required approach to landscape design. Landscape consultants and designers are required to initiate early discussion with the University’s Grounds Manager to ensure that a thorough understanding of the elements underpinning the University's landscape design philosophy is obtained.

15.6 LANDSCAPE PROTECTION

During the early design stages, the Consultant shall consult with the Grounds Manager and Biodiversity Co-ordinator or their nominees with regards to the impact of the proposed construction works on trees, shrubs and grounds within the construction site.

An assessment of each tree within the construction zone shall be carried out by the Grounds Section during the design process and any trees requiring protection will be nominated at this time.

Depending on the scale of the project, an external project arborist may need to be appointed by the Contractor to provide oversight and advice for tree protection throughout the project term. Such an appointment will be at the recommendation and approval of the Grounds Manager and all costs, including for recommended tree protection measures, will be included in the tendered/quoted project cost. Any reports generated by the project arborist will be made available to the Grounds Manager.

The University of Melbourne’s buildings and grounds contain a large number of objects of cultural importance such as sculptures, facades, mosaics, heritage items etc. These belong to the various cultural collections of the University and are to be protected during works.

Protection and care of objects of cultural significance during works will be based on advice sought by the University’s Project Manager from the University’s Potter Museum of Art, the custodian of the University’s cultural objects.

Individual objects of cultural significance are to be identified in tender documents and the specific nature of their protection and care during works is to be documented prior to site occupation. Site inspections may be made to ascertain compliance with protection of cultural materials.

The Contractor may be required to salvage valuable landscape items and materials for storage or reuse as part of early work for the project. The Grounds Manager or his/her nominee will give advice of any requirements.

Damage to grounds, gardens, plant material, tree roots, paving, irrigation systems and outdoor furniture must be avoided. If damage does occur work must cease immediately and the matter reported without delay to both the relevant University Project Officer and the Grounds Manager.
Any tree, group of trees or shrubs nominated in the tender documents as requiring protection must have suitable protection provided. This shall be in the form of a minimum 1.8m high fixed hoarding or chain-link fencing, complete with access gate to be erected, maintained and removed by the Contractor. The fence shall be placed at the outer edge of the TPZ or drip line of the tree(s) or shrubs, and shall serve as an exclusion zone for all construction activity. No building or construction material or liquid waste is to be stored or disposed of within the designated zone of protection, or other areas of garden. Tree Protection Zone signage shall be fixed to the fence, and shade cloth if stipulated.

Depending on the timeframe for the project (both duration and time of year) a layer of mulch or aggregate of between 50-100mm depth may be required around the tree within the protection zone, along with temporary irrigation.

Pruning of branches and / or roots and any removal of plants must only be carried out by the University’s Ground Section or their nominated contractor.

The Contractor is required to consult with the Grounds Section at least 2 working days prior to the commencement of any excavation and / or construction in garden areas and tree root zones.

In the likelihood that activities associated with intended site works or construction would damage or remove significant portions of plant root zones anywhere within the project site, the Project Arborist and Grounds Manager or his/her nominee shall be advised and an appropriate course of action identified prior to works proceeding.

If the supply of water to either the landscape or, specifically, to irrigation systems, including landscape areas beyond the project site itself is to be disrupted for longer than one week, arrangements will be made by the Principal Consultant to install and manage a suitable temporary water supply system until such time as the infrastructure is repaired or replaced.

The Grounds Manager or his/her nominee may require a bank guarantee to the value of the nominated tree(s) on construction sites. Such a guarantee shall be held by the University in trust against damage and injury to the nominated tree(s) for at least the period of the construction defects period, or any longer period as judged to be necessary by the Grounds Manager or his/her nominee. The value of the tree will be determined by the University using the City of Melbourne’s valuation methodology as a basis.

Note that any works which could adversely impact a registered significant tree (as listed on the City of Melbourne Register of Exceptional Trees) will require a planning permit.

Construction works and activities shall ensure appropriate hygiene practices are carried out to avoid transmission of soil borne disease which can threaten plant health. Contaminated material must be removed from site and all materials brought in must be clean. The Grounds Manager will give advice of any specific disease concerns for an area of the campus, and appropriate control measures are to be implemented by the Contractor.

Depending on the scale and location of the work, regular site inspections may be required by the Grounds Manager or his/her nominee. Any non-compliance will require work to cease until satisfactory rectification can be made.

The documentation for all projects is to include a requirement for the full reinstatement of the landscape to a standard at least equal to existing condition.

15.7 EARTHWORKS

Excavations and earthworks should be limited in order to avoid disturbance to adjacent landscape. Plant material, irrigation and other landscape objects are to be removed prior
by Grounds staff unless otherwise agreed by the Grounds Manager. Hard surface materials to be salvaged shall be removed without damage by the Contractor and put aside or into storage.

Checks for underground services shall be made by the Contractor. Services damaged by the work shall be repaired by the Contractor.

Topsoil shall be set aside separately from other spoil and kept clean of contaminants.

Advice shall be sought from the Grounds Manager should any tree roots be uncovered larger than 30mm. Such tree roots shall not be damaged or cut without inspection, advice and approval from the Grounds Manager or his/her nominee.

Care shall be taken when using excavators or other digging or earthmoving equipment in proximity to overhanging trees or other vegetation to avoid damage to branches or the canopy.

At times in certain sensitive landscape situations, hand digging will be required. The Grounds Manager will provide further information during preliminary discussion regarding the project works.

Subsoils must not be mixed with topsoil when backfilling trenches or used as a finishing layer.

Heavy clays and rocks shall be discarded and removed from site as waste unless otherwise agreed. No contaminants of any description are to be buried or remain on site.

Stockpiled topsoil is to be reused to a minimum depth of 100mm.

Fresh soils, sands and aggregates brought to site for reinstatement must be clean and appropriate to their purpose. Additional topsoil shall be of consistent physical and chemical properties to existing, and complimentary to intended planting. Soil analysis evidencing appropriate physical and chemical properties may be required for larger quantities (greater than five cubic metres) of additional fresh topsoil. This shall be obtained by the Contractor from the supplier and submitted to the Grounds Manager for approval.

Geotextiles where used shall be new, comply with the relevant Australian Standard, be fit for purpose and installed correctly.

All reinstatement shall be adequately compacted to avoid slumping and finished grade changes over time. Heavy compaction of areas to be planted must be avoided.

Finished grades should not enable soils or mulches to erode or wash onto adjacent paths or hard surfaces, or contaminate drains, with following rain.

On completion, the site shall be cleared of all spoil and hard surfaces left clean. Any landscape fittings temporarily removed to allow the work to proceed will be reinstated by the Contractor.

Depending on the scale and location of the work regular site inspections may be required by the Grounds Manager or his/her nominee. Any non-compliance will require work to cease until satisfactory rectification can be made.
15.8 SOFT LANDSCAPING

Garden soils:

Imported garden topsoils, where required, must be free of perennial weeds and their roots, bulbs and rhizomes; building rubble and other contaminants which can adversely affect plant growth; and rocks and stones greater than 5mm or 5% by volume; of neutral pH (6.0 – 7.0); friable with a light to medium texture; free of silts and non-hydrophobic.

Imported garden soils are required to meet Australian Standard AS4419 Soils for Landscaping and Gardening Use.

NATA accredited laboratory soil tests for physical properties and nutrient levels may be required.

Imported soils shall be blended with existing soil by first ripping and cultivating site subsoil to a depth of 300mm then thoroughly mixing through the new soil.

Where necessary to avoid ponding of surface water in garden beds or grassed areas, subsoil drainage shall be installed using 100mm PVC AG Drain/UPVC slotted drain pipe.

Garden beds:

New garden beds shall be constructed by excavating to a minimum depth of 300mm. Existing topsoil shall be separated and kept aside. Subgrade in areas for planting shall be ripped to a minimum depth of 150mm and cultivated with gypsum. Subsoils shall then be graded and lightly and evenly compacted at 300mm below finished level. 200mm topsoil shall be added uncompacted. Retained and imported topsoils shall be blended before use. 75mm mulch shall be applied as a finish dressing.

Garden beds shall be edged to clearly define the extent of the garden bed, retain the mulch, and inhibit the encroachment of grasses and/or weeds from adjacent lawn areas. Refer Appendix 1.

Garden mulches:

All mulches must be free of weed material and seed, debris and other foreign matter or contaminants of any kind. No recycled building materials such as treated pine or chipboard are acceptable.

Organic mulches must be thoroughly aged, with a coarse texture comprising 80% of particles in the 20-35mm size range and 5-10mm in thickness, with no particles exceeding 50mm.

Organic mulches may be derived from weathered bark, chipped or shredded plantation pine or other tree prunings, or wastes from native plantation operations. Such mulches should comply with Australian Standard AS4454 Composts, Soil Conditioners and Mulches.

Inorganic mulches may be suitable for some applications, and comprise gravels, stone, recycled brick or coarse sands. River cobbles, stone or pebbles are acceptable in small feature landscapes only, but preference should be given to alternative materials with less environmental impact. Samples must be submitted to the Grounds Manager for approval prior to application.

Mulches shall be evenly spread at 75mm thickness over garden beds except for directly around the stems of all plants to avoid the possibility of rot. Valve boxes, drain covers or other landscape hardware or fixtures at surface level shall not be covered.

Any nitrogen drawdown, or likelihood of, resulting from the application of mulches must be counteracted by use of appropriate fertilisers

Planting:
A planting design plan shall be developed for each project, denoting the species to be used, the size and number of each species, and the set out and density within any garden bed, for approval by the Grounds Manager.

Any proposed species substitution or other changes to the design plan must be advised to the University Project Manager and the Grounds Manager for approval prior to installation.

Planting density must take full account of the mature size of all species used so that each specimen has adequate space for growth and establishment. New plants must not be crowded so as to inhibit proper growth and form, or spread so far that empty space in the garden will remain over time.

The minimum pot size for garden planting is 150mm. Introduced trees should be of advanced size. Only quality professional nursery stock is acceptable. Plants must be treated and handled carefully at all times to avoid damage to roots, stems and growing shoots.

New plants must be provided with adequate nutrition by application of appropriate fertilisers to ensure full establishment.

Plants must be set at the correct planting depth so the top of the rootball is even with the finished soil level. The planting hole, to be prepared by hand unless another methodology is approved, must be 75-100mm wider than the rootball. A suitable fertiliser shall be incorporated with topsoil for backfilling.

Plants must be thoroughly watered in by hand immediately on completion of the planting task.

Fertilisers:
Pelletised, low odour, slow release organic fertilisers with a balanced NPK ratio are preferred.
Low phosphorus fertilisers are to be used for native plantings.
Fertilisers intended for use with establishing new plantings, including lawns, are to be advised to the University Grounds Manager for approval during the project design phase or prior to use.

All fertilisers are only to be used at the manufacturer’s prescribed rate.

15.9 HARD LANDSCAPING

Refer to the Appendices at the end of this Section for data sheets on hard landscaping elements.

15.10 ROOFTOP WORKS

The University’s Grounds Manager must be consulted during the planning and design process for any green roof project.

The following points are to be adhered to when designing green roofs:
- Projects are only to be documented by consultants with design experience in similar installations.
- Only use waterproof membranes which are specifically designed for roof gardens.
- Use a water membrane which incorporates a certified root barrier treatment or, if a separate root barrier layer is being used, the separate membrane materials must be compatible with each other.
- When the membrane installation is complete, it must be tested by flooding and inspection.
- Only use plants which are proven to survive in roof top environments. Plants with aggressive root systems are not to be used.
- The growing medium is to comprise a minimum of 75 per cent inorganic materials.
- Any concrete roof is to contain a waterproofing additive.
- Particular attention is to be paid to ensure that water drains freely and does not pond.
- All the drainage and protection layers and irrigation components must relevant Australian standards.
- It is preferred that non-potable water sources for irrigation of roof gardens are explored.
- Any exposed components are to be UV stable
- Roof outlet drains are to be located, sized and protected to ensure that they never become covered or blocked

Consultants are encouraged to refer to the Growing Green Guide http://www.growinggreenguide.org/

A documented photographic record through the construction period of any roof top project must be maintained by the builder. The photographic record must clearly show the built form of the garden area including hobs, irrigation, drainage points as well as drainage and protection layers.

**15.11 WATER SUPPLY AND IRRIGATION**

- All work is to be compliant with all applicable Plumbing Regulations and a Compliance Certificate is to be issued to the University on completion.
- The Consultant / Contractor must determine the location of any underground services in the area of the works. Repair costs to services damaged by the Contractor, shall be the responsibility of the Contractor.
- All materials and quality of work shall be to the best of their respective kind, conform to manufacturer’s recommendations for installation and shall meet the following Australian Standards:
  - **AS 1477** Unplasticised PVC (uPVC) pipes & fittings for pressure applications
  - **AS 3879** Solvent cements and priming fluids for use with unplasticized PVC (uPVC) pipes and fittings
  - **AS 1462** Methods for testing uPVC pipe & fittings
  - **AS 4130** Polyethylene Metric – PE80B – pipe for pressure applications
  - **AS 1432** Copper tubes for water, gas and sanitation
  - **AS 2032** Code of Practice for installation of PVC pipe systems
  - **AS 2698.1** Polyethylene micro irrigation pipe
  - **AS 2053** Non-metallic conduits and fittings
  - **AS 3000** Electrical installations
  - **AS 3500.1** National Plumbing and Drainage Code: Part 1 Water Supply
- All pipework and associated fittings are to be new Class 12 uPVC, unless otherwise stated.
- Trenching for pipework will be to a depth to allow for 300mm minimum cover over installed pipe unless agreement with the nominated University project manager is reached for alternative installation. Trenches are to be backfilled with soil, free of rock or other debris, to surface level. Trenches are not to be left open overnight.

- Conduits under paving for wiring & pipework are to be 100mm sewer grade PVC, unless otherwise stated. Any lifting of paving for conduit placement will require reinstatement according to the University Design Standard for paving (refer Appendix 1).

- Solenoid control wires are to be coded, poly coated valve wiring of 0.5mm diameter between controller and all solenoid valves where wire runs are less than 100m. Allow for 500mm loop at each valve connection to provide for valve removal for servicing. All wire runs should be continuous with no joints. All wiring joints in the field must be made using ‘king’ type 3M DBY or heat shrink connectors.

- Two spare control wires to be left at the furthest solenoid in any direction from the controller, and at the master solenoid valve to allow for possible future extension of the irrigation system, or repair.

- An external lockable power switch is to be fitted in line to the controller.

- An appropriate backflow prevention device in line after the water meter or master gate valve is required unless backflow prevention is otherwise already provided on the supply line.

- Rain and/or ET sensor, or dedicated weather station to be fitted to all new systems. Soil moisture sensor(s) may be required for major systems. Any such need will be advised by the Grounds Manager during project design and consultation.

- Large multi-station systems shall have a flow control valve fitted on the downstream side of the meter or backflow device. Fitting of a flow control valve substitutes for a master gate valve. The flow control valve is to be wired back to, and compatible with, the system controller.

- Irrigation systems utilising reclaimed water must use appropriately identifiable components (lilac colour).

- On completion of installation the system is to be tested, in the presence of a representative from the University’s Grounds Manager.

- The Contractor will provide to the University as built drawings of the installed system and any operational manuals and keys for the controller box.

- A 12 months defects liability period for the system will apply from the commissioning date or date of practical completion, whichever is the later, during which time the Contractor will be responsible for maintenance of the system.

The following components and arrangements are approved for use in irrigation systems:

**Micro/drip Systems**

- Toro Drip Eze or Enviro-Drip 13mm pressure compensating
- Emitters at 30cm spacing
- When laid in grid pattern, line spacing 300mm apart in garden beds; 500mm apart under trees, unless otherwise specified.

**Garden (and short-throw turf) Sprays**

- ¾” threaded PVC no-flex risers for standpipe use
• Rainbird 1800 spray bodies (pop up height to suit application) or equivalent
• Filter screens to be fitted to each spray
• Hunter MP Rotator spray heads appropriate to each application

Turf Sprays

• Hunter PGP rotors (nozzles selected according to application)

Irrigation Controllers (appropriate to given system application)

• Basic automatic controller: Hunter Pro C (modular)
• Smart automatic controller: Hunter I-Core or Hunter ACC
• Battery-operated programmable controller: Hunter Node

Sensors (Rain, ET, Flow)

• Rain sensor (basic): Hunter Rain-Clik (wired or wireless)
• Weather sensor: Hunter Solar Sync (wired or wireless)
• Flow sensor (compatible with ACC and I-Core controllers): Hunter Flow-Sync

Valves

• Gate valves to function as isolation valves, prior to the solenoid valve, are to be fitted on the discharge side of the water meter or mains supply point, and to irrigation lateral lines. Gate valves must be tested, brass construction, with a rated working pressure of 800 kPa, and 25mm BSP threaded female connection.
• Solenoid valves are to be 25mm Irritrol (Richdel) 205 series with flow control, or equivalent
• A Richdel master solenoid valve in line after the backflow prevention device (where fitted) or isolating gate valve, is to be installed.
• All control valves are to be placed below ground and housed in suitably sized commercial grade valve boxes. Valve boxes are to be set flush at finish level in lawn areas and 50mm above finished grade in garden beds.

Irrigation system performance

• Spray irrigated areas are required to meet industry best practice for effectiveness of application and uniformity. The industry standard for sprinklers is Field Distribution Uniformity (DU) 75%
• Drip systems are required to achieve high uniformity of emitter discharge. Emission Uniformity (EU) 85% is required.
• Applied water is not to result in runoff or wasteful application.
• The selection of components is required to achieve effective and reliable operation and sound functioning of the irrigation system.
• All equipment selected and installed is to meet local regulatory requirements and Australian Standards.

• All spray fittings to be installed to throw water away from building walls

15.12 DRAINAGE

Refer to Appendix 2 at the end of this Section for data sheets on drainage elements.
15.13 LIGHTING

Refer to Section 7, Electrical Services for external lighting requirements.

15.14 LANDSCAPE FURNITURE

Refer to Appendix 3 at the end of this Section for data sheets on landscape furniture.

15.15 DEFECTS LIABILITY PERIOD

During the defects liability period the Contractor will be responsible for the full establishment and maintenance of installed landscape plantings, paving, fittings and features, and the operation and proper functioning of associated irrigation.

On completion of the defects liability period:

- Any planting failures, equipment breakdowns or other repairs associated with installations delivered as part of the project works is to be made good by the Contractor.
- Trees and garden plantings shall be healthy and well presented.
- The density and composition of the planting shall comply with the specification.
- Garden beds shall be free of weeds and have an appropriate covering and depth of mulch or other specified surface dressing.
- All landscape surfaces, fixtures, fittings, furniture and equipment shall be in proper order as per the specification.
- An inspection carried out by the Grounds Manager or his/her nominee and approval given.

General cleaning of external areas within the project precinct during the Defects Liability Period will be the responsibility of the University.

15.16 DESIGN CHANGE AUTHORISATION

All requests for changes to the requirements of the Design Standards must be made on the Modification Request Form. No design work is to proceed on the basis of the proposed modification until the modification request has been approved in writing.

15.17 AS-BUILTS, WARRANTIES AND MANUALS

In addition to the normal items required to be provided to a building owner at project completion, all requirements noted in this section of the Design Standards are to be provided to the University’s Project Manager. Draft documentation is required four weeks prior to practical completion and final documentation no later than four weeks after practical completion.

15.18 APPENDICES

- Appendix 1 - Hard Landscaping
- Appendix 2 – Drainage
- Appendix 3 – Furniture

Note that the information in the above appendices generally applies to all campuses however some adjustments may be appropriate for the non-Parkville campuses. Any such changes are to be approved via the Modification Request Form noted in Section 15.16 above.
APPENDIX 1 – Hard Landscaping

This Appendix comprises the following data sheets:

• Brick Paving - Pedestrian Footpaths
• Brick Paving – Vehicle Roads
• Bluestone Pavers - Pedestrian Footpaths
• Bluestone Pavers – Vehicle Roads
• Tactile Indicators
• Handrails
• Fences
• Edges – Paved Brick
• Edges – Steel Strip
• Edges – Bluestone
Paving Element – Brick Paving for Pedestrian Footpaths

Description

University Grey brick paving is one of the two standard materials used for pedestrian paving treatment at the University of Melbourne. The pavers used are Austral University Grey and their dimensions are approx. 230 x 110x 76mm. The arrangement of pavers for pedestrian access only areas is detailed below.

Technical Details

Pedestrian Pathways

**Base Course**
Thickness of pedestrian footpath base course depth is 150mm with a rating of 20mm class 2 wet mix crushed rock compacted to Aust. Standards OR a minimum depth of 100mm concrete slab with a minimum rating of 32mpa with SL82 steel and with a 80mm depth of 20mm class 2 wet mix crushed rock compacted to Aust. Standards

**Bedding Course (Wet Mortar)**
The bedding material is washed coarse sand from Aggregate Sand Seymour 921055 mixed six parts with one part Portland cement. The wet consistency should be firm and hold together when squeezed in the hand.
Bedding should not exceed 50mm depth and not less than 25mm depth. The mortar must not dry out whilst laying is in progress.

**Brick Paving**
Bricks are laid normally in stretcher bond pattern. Bricks must be laid to levels and lines as per drawing supplied but should always have a minimum fall of 1:80 to allow for adequate drainage.
Large colour or size variation between deliveries from the brick supplier are not acceptable. Colour blending, to avoid patches of light and dark colours can be resolved by working off three paver pellets at the same time, is the responsibility of the layer. Using a rubber mallet the bricks should be hand-tapped down into the mortar, with a gap of approximately 3mm between courses and verticals. No mechanical vibrators are to be used. The final surface profile shall be without hollows that would allow water to pond.

**Joint Filling**
After each section of the area is completed fine white dry washed sand must be brushed into the spaces between the bricks and some sand allowed to remain on the surface. The latter must be swept off when the works are completed and joints completely filled.
Paving Element – Brick Paving for Vehicle Roads

Description
University Grey brick paving is one of the two standard materials used for road access treatment at the University of Melbourne. The pavers used are Austral Brick – University Grey and their dimensions are approx. 230 x 110 x 76mm. The arrangement of pavers for roads or shared (pedestrian and vehicular) access are detailed below.

Technical Details
Vehicle Roads

Base Course
Thickness of road base course is 300 mm thick of 20mm crushed rock compacted to Aust. Standards or no less than 150mm concrete slab minimum 25 mpa with SL62 steel with a sub base of 80mm of 20mm crushed rock compacted to Aust. Standards.

Bedding Course (Wet Mortar)
The bedding material is washed coarse sand from Aggregate Sand Seymour 921055 mixed six parts with one part Portland cement. The wet consistency should be firm and hold together when squeezed in the hand. Bedding should not exceed 50mm depth and not less than 25mm depth. The mortar must not dry out whilst laying is in progress.

Brick Paving
Bricks are laid normally in stretcher bond pattern. Bricks must be laid to levels and lines as per drawing supplied but should always have a minimum fall of 1:80 to allow for adequate drainage. Large colour or size variation between deliveries from the brick supplier are not acceptable. Colour blending, to avoid patches of light and dark colours can be resolved by working off three paver pellets at the same time, is the responsibility of the layer. Using a rubber mallet the bricks should be hand-tapped down into the mortar, with a gap of approximately 3mm between courses and verticals. No mechanical vibrators are to be used. The final surface profile shall be without hollows that would allow water to pond.

Joint Filling
After each section of the area is completed fine white dry washed sand must be brushed into the spaces between the bricks and some sand allowed to remain on the surface. The latter must be swept off when the works are completed and joints completely filled.
Paving Element – In-situ Bricks Paving Roads & Footpaths

Technical Details

Dual String Line Every 5 Pavers

Horizontal string line

Concrete

Minimum Gaps of 3mm Filled With Fine White Dry White Sand

Footpaths 100mm Thick & Roads 150mm Thick

80mm thick with a rating of 20mm class 2 wet mix crushed rock compacted to Aust. Standards

OR

Crushed Rock

Minimum Gaps of 3mm Filled With Fine White Dry White Sand

Footpaths 150mm thick & Roads 300mm thick with a rating of 20mm class 2 wet mix crushed rock compacted to Aust. Standards

Bedding Course (Wet Mortar)
Paving Element – Bluestone Pavers

Bluestone Pavers For Roads

Description
Bluestone pavers are one of the two standard materials used for vehicle access treatment at the University of Melbourne. The bluestone paver dimensions are of various lengths and widths with a minimum depth of 80mm. The type of bluestone used is diamond sawn with an approved sandblasted finish. The arrangement of pavers for roads and for shared (pedestrian and vehicular) access are detailed below.

Technical Details
Vehicle Road Ways

Sub Base Course
Thickness of the sub base for roadways is at a minimum depth of 80mm with a rating of 20mm class 2 wet mix crushed rock compacted to Aust. Standards

Base Course
Thickness of the base concrete slab for roadways is at a minimum depth of 200mm with a minimum rating of 32 mpa with SL82 steel.

Bedding Course (Wet Mortar)
The bedding material is washed coarse sand from Aggregate Sand Seymour 921055 mixed six parts with one part Portland cement. The wet consistency should be firm and hold together when squeezed in the hand. Bedding should not exceed 50mm depth and not be less than 25mm depth. The mortar must not dry out whilst laying is in progress.

Bluestone Paving
Pavers shall be 80mm thick (nominal) diamond sawn bluestone with an approved sandblasted finish. no more than 20% “cats paws” (blotches) and/or vented streaks on the face of the pavers is permissible.

Grouts/Joints
Grouts/Joints between pavers shall be a maximum 2.5mm wide. Grout joints with an approved non shrink cementitious grout (Lanko 702 Durabed or equivalent which is equal and approved). Mix and apply in accordance with manufacturer’s recommendations. Ensure that no residue grout remains on paver surface.
Paving Element – Bluestone

In-situ Bluestone Pavers For Pedestrian Footpaths

Description
Bluestone pavers are one of two standard materials used for pedestrian footpaths at the University of Melbourne. The bluestone paving dimensions are of various lengths, widths with a minimum thickness of 40mm. The type of bluestone used is a diamond sawn with an approved sandblasted finish. The arrangement of pavers for pedestrian footpaths is detailed below.

Technical Details
Pedestrian Footpaths

Sub Base Course
Thickness of the sub base for footpaths is at a minimum depth of 80mm with a rating of 20mm class 2 wet mix crushed rock compacted to Aust. Standards.

Base Course
Thickness of the concrete slab base for footpaths is at a minimum depth of 100mm with a minimum rating of 32 mpa with SL82 steel.

Bedding Course (Wet Mortar)
The bedding material is washed coarse sand from Aggregate Sand Seymour 921055 mixed six parts with one part Portland cement. The wet consistency should be firm and hold together when squeezed in the hand. Bedding should not exceed 50mm depth and not be less than 25mm depth. The mortar must not dry out whilst laying is in progress.

Bluestone Paving
Pavers shall be 40mm thick (nominal) diamond sawn bluestone with an approved sandblasted finish.
No more than 20% “cats paws” (blotches) and/or vented streaks on the face of the pavers is permissible.

Grouts/Joints
Grouts/Joints between pavers shall be a maximum 2.5mm wide. Grout joints with an approved non shrink cementitious grout (Durabed or equivalent which is equal and approved). Mix and apply in accordance with manufacturer’s recommendations. Ensure that no residue grout remains on paver surface.

Max 2.5mm Grout Joint

Min. Width 40mm Bluestone Paver
Min. 25 to 50mm Depth Bedding Course
Min. depth 100mm Concrete Slab
Min. depth 80mm - 20mm class 2 wet mix crushed rock compacted
**Tactile Indicators**

Bluestone tactile Pavers For Pedestrian Footpaths

**Description**
Bluestone tiles with granite tactile indicators are a standard material used in the University. They are used to assist visually impaired pedestrians in hazardous areas and for directional access treatment. The tactile tile comes in multiple dimensions sizes 300sq, 400sq and 600sq and is 40mm thick. The tactile tile must be installed compliant with DDA Standards.

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**Technical Detail:**
Pedestrian Footpaths

**Sub Base Course**
Thickness of the sub base for footpaths is at a minimum depth of 80mm with a rating of 20mm class 2 wet mix crushed rock compacted to Aust. Standards.

**Base Course**
Thickness of the concrete slab base for footpaths is at a minimum depth of 100mm with a minimum rating of 32 mpa with SL82 steel.

**Bedding Course (Wet Mortar)**
The bedding material is washed coarse sand from Aggregate Sand Seymour 921055 mixed six parts with one part Portland cement. The wet consistency should be firm and hold together when squeezed in the hand. Bedding should not exceed 50mm depth and not be less than 25mm depth. The mortar must not dry out whilst laying is in progress.

**Bluestone Paving**
Pavers shall be 40mm thick (nominal) diamond sawn bluestone with an approved sandblasted finish.
No more than 20% “cats paws” (blotches) and/or vented streaks on the face of the pavers is permissible.

**Grouts/Joints**
Grouts/Joints between pavers shall be a maximum 2.5mm wide. Grout joints with an approved non shrink cementitious grout (Durabed or equivalent which is equal and approved). Mix and apply in accordance with manufacturer’s recommendations. Ensure that no residue grout remains on paver surface.
Handrails

The University preferred external type of handrail is stainless steel or galvanized steel and must be compliant with DDA Standards.

All external handrails must have skateboard deterrent components and a button on either end of the handrail to assist the visually impaired as per drawing below. The end of the handrail must be finished with a curved end or end post as per drawing and photo.

Technical Details

All handrail components, dimensions and installations must be compliant with DDA standards.
**Fences**

**Description:**
University border fencing.

**A**

**B**

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**Technical Details**

The University has two preferred fences.

<table>
<thead>
<tr>
<th>Component</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top Rail (Tube)</td>
<td>50x25x3mm</td>
</tr>
<tr>
<td>Posts (Tube)</td>
<td>40x40x3mm</td>
</tr>
<tr>
<td>Pickets / Baluster (Round)</td>
<td>12mm Ø</td>
</tr>
<tr>
<td>Bottom Rail</td>
<td>40x12x3mm</td>
</tr>
<tr>
<td>Top Rail D Section Posts</td>
<td>50x6mm</td>
</tr>
<tr>
<td>Posts (Tube)</td>
<td>75x75x3mm</td>
</tr>
<tr>
<td>Pickets / Baluster Bottom</td>
<td>40x5mm</td>
</tr>
<tr>
<td>Rail</td>
<td>75x50x3mm</td>
</tr>
</tbody>
</table>

Fence (A & B) components either galvanized steel or hot dip galvanized.

Fence (A & B) Pickets / Balusters maximum spacing is 115 mm.

Fence posts must have a minimum depth of 300 mm into a concrete footing.

Maximum span between post 1300 mm.

Concrete footings 300x300x450 depending on soil condition.

University preferred colour and paint type is: Dulux ‘PG1A7 TICKING’ - Super Enamel High Gloss
Edges

Paved Brick Garden Edges

Product Description

Garden edges are used in instances where garden beds are adjacent to University Grey brick pedestrian paving. Pavers adjacent to mulch are to be laid in a repetitive, offset fashion with a concrete haunch on the end of the paver to prevent movement. This arrangement also applies with bluestone paving.

Installation

Garden edges are to be installed in all instances where university grey paving or bluestone paving and garden beds are adjacent.
Edges
Steel Garden Edges

Product Description
Mild steel or stainless steel edges are used for separating paved or asphalted paths from garden beds and lawn. These edges are to be used where separation for tight or curved areas is required.

Installation
When a hard course of bricks cannot be laid e.g. around trees, then steel edges are to be installed flush with paving finished level.

The minimum dimension of mulch area for trees is governed by the drip line of the tree foliage.
**Edges**

Paved Bluestone Garden Edges

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**Product Description**

Garden edges are used in instances where garden beds are adjacent to University Grey brick pedestrian paving. Pavers adjacent to mulch areas are laid in a repetitive, offset fashion with a concrete haunch on the end of the paver to prevent movement. This also applies with bluestone paving.

**Installation**

Garden edges are to be installed in all instances where University Grey paving or bluestone paving and garden beds are adjacent.

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Bluestone Edging

Concrete haunch bedding material is washed coarse sand from Aggregate Sand Seymour 921055 mixed six parts with one part Portland cement.
APPENDIX 2– Drainage

This Appendix comprises the following data sheets:

• Bluestone Kerb and Channel
• Brick Channel Drains
• Side Entry Pits
• Stainless Steel Grates
• Galvanised Grates
• Pits and Lids
Kerbs

Bluestone Pitcher Kerb and Channel

Product Description

Sawn bluestone kerbs are one of the two standard kerbing materials used at the University.

Technical Details

Sawn bluestone kerbstones are 300 x 300mm with a 25mm bullnose. Their length is typically 1000mm and a minimum of 800mm. Adjacent channel (gutter stone) is typically 250mm wide by 100mm thick, with a typical length of 900mm.

The bedding sub base for the bluestone kerbing is a bed of 80mm thick 20mm class 2 wet mix crushed rock compacted to Aust Standards and a 100mm slump concrete bedding.

The butt joints in the kerb and channel must be staggered and the butt joints in the kerb sections need to be tight (no mortar).

A typical 10mm joint between the curb and channel is mortared. Refer to drawings below.
University Grey Brick Channel Drains

Description

University Grey paver spoon channels provide natural drainage in paved areas. It is the preferred detail within the University of Melbourne.

Technical Details

**Base Course**
Refer to paving details for either footpath or roads.

**Bedding Course (Wet Mortar)**
Refer to paving details for either footpath or roads.

**Brick Paving**
Bricks must be laid to achieve a 10 to 15mm hollow at the deepest point in the channel to allow for adequate drainage.
Using a rubber mallet the bricks should be hand-tapped down into the mortar, with a gap of approximately 3mm between courses and verticals.
No mechanical vibrators are to be used. The final surface profile shall be without hollows that would allow water to pond.

**Joint Filling**
After each section of the channel is completed apply wet mortar into the joint spaces between the bricks within the channel until completely filled.
Road Drainage Pit Side Entry

Product Description

Sawn bluestone overflow kerbs with a Class D bike proof steel grate is one of the two standard arrangements used in the University. Depending on surrounding surfaces, a concrete side entry pit may be used.

Technical Details

The sawn bluestone overflow kerb is 300 square with a 25mm bullnose. Length is typically 1300 mm to suit a standard grate.

Adjacent channel (gutter stone) is typically 250mm wide by 100mm thick, with a typical length of 900mm.

The bedding sub base for the bluestone kerbing is a bed of 80mm thick 20mm class 2 wet mix crushed rock compacted to Aust. Standards and a 100mm slump concrete bedding.

The butt joints in the kerb and channel must be staggered and the butt joints in the kerb sections need to be tight (no mortar).

A typical 10mm joint between the curb and channel is mortared.

The pit depth, pipe entry and drain details are to be designed according to site conditions.

The grate should be Class D rating (heavy duty) with a bike proof grate design.

Refer to drawings below
**Stormwater and Strip Drain Grates / Pits**

**Stainless steel**

Stainless steel heelguard grate pit covers are one of two preferred types of pit cover used in University grounds. The pit covers must have minimum strength rating of class D for all roads, pathways and other areas. The minimum requirement for precast concrete pits is class D and for in-situ pits the concrete must be 40 mpa with reinforcement steel.

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**Technical Details**

**Grates**
Stainless steel grates should be class D rating (heavy duty) with 5mm maximum gaps between slats for every heel proof grate design. Stainless steel grates must have dimples on face surface as per drawing below.

**Pits**
Refer to Pits and Lids details sheet.

![Stainless Steel Heel Proof Grate](image)

*Note:* Pits & Grates must be rated class D
Stormwater and Strip Drain Grates / Pits

Galvanized Steel

Galvanized steel heelguard grate pit covers are one of two preferred types of pit cover in the University grounds. The pit covers must have minimum strength rating of class D for all roads, pathways and other areas. The minimum requirement for precast concrete pits is class D and for the in-situ pits the concrete must be 40 mpa with reinforcement steel.

Technical Details

Grates
Galvanized steel grates shall be Class D rating (heavy duty) with 5mm maximum gaps between slats for heel proof grate design.

Pits
Refer to Pits and Lids details sheet.
**Pits and Lids**

Concrete infilled access pit covers are the preferred type of pit cover in the University grounds. The pit covers must have minimum strength rating of class D for all roads and pathways. The concrete infilled access cover is to be used for all under ground services pits. The preferred minimum requirement for precast concrete pits is class D and for in-situ pits the concrete must be 40 mpa with reinforcement steel.

**Precast pits Class D**

The pre cast pit to be installed to manufacturer guidelines.

80mm thick with a rating of 20mm class 2 wet mix crushed rock compacted to Aust. Standards
APPENDIX 3 – Furniture

This Appendix comprises the following data sheets:
• University Timber and Concrete Bench/Seat
• York Timber Seats
• Metro Town and Park Seats
• External Bin Enclosures
• Bike Hoops
• Service Meter Enclosures
Seating

Timber Bench / Seat on concrete legs

Description
Timber and concrete Bench/Seat units are one of the standard types of seating used throughout the University. The seat is made of Spotted Gum with galvanised mild steel brackets bolted onto concrete columns. Note - This type of seating comes with or without back rests.

Technical Detail:
Base frame is hot dip galvanised steel 100x10mm.
Timber battens are kiln dried Spotted Gum hardwood sized 132x40mm.
The concrete columns are 300mm diameter
4x M10 Dynabolt at 100mm are used to fix the seat to the concrete columns.

Installation:
Seats must be made level and 455 mm above natural surface level.
Sub-surface mounts are preferable.
Wooden seat to be bolted down to concrete column.
Concrete columns installed by contractors on site.

Finish
Timber Slats – 3 coats of Sikkens Cetol HLSe
Seating
York – Seat with back

Product Description:
The ‘York’ Seat with back is used throughout the University in heritage areas.
The York seat is made of teak hardwood.

Installation:
When the seat is installed in outdoor paving, concrete or asphalt areas the seat must be secured with the manufacturer’s anti-theft kit on a $600 \times 300\,\text{mm} \times 450\,\text{mm}$ deep concrete footings as per drawings below. It is preferred that the seats are not sited on grass areas.

Supplier:
Lister Teak Garden Furniture

Concrete Footing
Seating

Metro - Town & Park BSE Seat

Product Description:
The timber and steel ‘Metro’ seat comes with or without a back rest is a marine grade aluminium unit with stainless steel fixing and its design allows up to 4 metres of continuous FSC 100% hardwood. This seat is one of three types of Metro seat used in the University.

Technical Detail:
The Metro seats to be bolted down by 4 x 10M Dynabolts x200mm.

Installation:
There are many different types of Metro seats but they are all installed the same way as per drawings. Metro seating SSD/SS - If installed in paving areas and in asphalt areas must be bolted down on 300 X 700 X 450mm deep concrete footing as per drawings below.

Supplier:
Stoddart Town & Park.
External Bin Enclosures

Litter & Recycling Receptacle Bins

Description
Metro bins are a standard stainless steel bin enclosure used throughout the university. They are installed as sets of two bins. One being red for litter and the other being yellow for recycling. The bins must have University approved signage affixed.
There are two standards for installing the bins:
1. Concrete areas
2. Paved areas

Technical Detail:
The Metro stainless steel bins are designed to encase a 110 litre wheelie bin.

Installation:
The bins are only to be installed on hard surfaces ie. concrete surface or bluestone pavers. For both options, bins are to be secured with 4 x 12M Dynabolts x 150mm.
When installing bins on bluestone pavers, the pavers must be installed as per drawing below.
Signs to be installed on both sides of stand-alone bins ie. on the door and on the back of the bin. For one sided access bins, signage is only fixed to the door.

Supplier:
Furphy Foundry (Metro Litter Receptacle GOV119)
**Bike Hoops**

Individual Hoops Bluestone Edge

**Description:**
The individual bike hoops are 40NB 48.26x2.77 grade 304 finished stainless steel pipe with a 304 grade stainless steel base plate (65x200x20mm) fillet welded to the hoop.
Base plates to have 20mm bolt holes.

**Technical Detail:**
The stainless steel bike hoops are to be bolted down with 4 x 12M Dynabolyts x100mm.

**Installation:**
1. Bike hoops in brick paved areas must be bolted down on a concrete slab 100mm thick with a minimum rating of 32 mpa with SL82 steel. Note concrete base is the same size as the whole bike parking paved area
2. Bike hoops installed in asphalt areas are to be bolted down on 300mm square by 450mm deep concrete pads. As per Drawing below.

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1. Concrete Slab 100mm with a minimum rating of 32 mpa with SL82 steel for paved areas.
2. Concrete pads 300mm square x 450mm deep for asphalt areas.
Service Meter Enclosures

Service meter enclosures are the required for all services meters and fire equipment.

Doors must open outwards and be lockable by a padlock. Type of padlock is determined by the services enclosed e.g. gas, water and fire services.

The cage must be secured down on a 75mm concrete slab.

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Technical Details

Gates & enclosure framing is 50x50x3mm steel angle. Internal 9mm perforated galvanized steel sheeting 2mm thick. Gates & enclosure middle internal bracing railing is 25x25x3mm square tubing. Padlock plates – 50x75x3mm flat bar with 15mm ø diameter hole for padlock. Mounting by 10mm dyna bolts galvanized. Ball pin lift off welded gate hinges galvanized. Centre post for double gate units is 50x50x3mm. **ALL** components must be either DuraGal or hot dip galvanized steel.

University preferred colour and paint type is: Dulux 'PG1A7 TICKING' - Super Enamel High Gloss.

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50x50x3mm angle

**SIDE**

Internal bracing railing 25x25x3mm square tubing,

50x50x3mm angle

Internal bracing railing 25x25x3mm square tubing,

Internal 9mm perforated galvanized steel sheeting 2mm thick.

50x50x3mm angle

50x50x3mm square tubing centre post for double gates.
Sled Bike Hoops

4 x Galvanized bike hoops attached to galvanized steel sleds.

Description:
Galvanized bike sleds can accommodate 8 parked bikes per unit.

Technical Detail:
The bike sled hoops are to be bolted down by 4 x 16M Dynabolts x100mm or screw bolts 16Mx100mm.

Installation:
Bike sled hoops can be surface mounted on paved, concrete and asphalt areas.