

PART L50
PERMEABLE PAVING

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1. GENERAL

- .1 This Part specifies the requirements for site assessment, site preparation, tree root care, soil amendment and backfill, load support and permeable paving surfaces for the installation of permeable paving over tree root systems.
- .2 Documents referenced in this Part are listed below:
 - (a) ISO 9001 Quality Management System

2. PERMEABLE PAVING REQUIREMENTS

- .1 The Contractor shall conform to the following permeable paving requirements:
 - (a) **Installation of Permeable Paving for Future Tree Planting:** The site shall be prepared for future tree planting by installing permeable paving.
 - (b) **Installation of Permeable Paving around Existing Trees:** Permeable paving shall be installed around existing trees. A qualified arboriculturist shall assess the trees that are to be retained and shall formulate a critical root zone for each individual tree before any site work occurs. The critical root zone shall be clearly marked on the plans of the project.
 - (c) **Replacement of Existing Pavement with Permeable Paving for Future Tree Planting:** The site shall be prepared for future tree planting by removing the existing pavement and replacing it with permeable paving.
 - (d) **Replacement of Existing Pavement with Permeable Paving around Existing Trees:** Existing pavement around trees shall be removed and replaced with permeable paving. A qualified arboriculturist shall assess the trees that are to be retained and shall formulate a critical root zone before any site work occurs. The critical root zone shall be clearly marked on the plans of the project.

3. SITE PREPARATION**General**

- .1 Site preparation shall be carried out in accordance with this Specification.
- .2 If the site preparation method(s) have not been nominated by the Principal, the Tenderer shall examine the site conditions and recommend the preferred method(s) of site preparation in the tender submission.
- .3 All unsuitable material including plants and debris shall be removed and disposed of by the Contractor at a location agreed with the Principal.

Establishment of Tree Protection Zone

- .4 The Contractor shall define a Tree Protection Zone (TPZ) around the tree equivalent to the area of the current canopy. The TPZ shall include both the below and aboveground parts of the tree. A temporary protective fence shall be erected around the TPZ to prevent damage to the tree from other onsite machinery. The area shall be clearly signed TREE PROTECTION ZONE – NO ENTRY. The temporary protective fencing shall be constructed using 2.1 m high chain mesh panels.

Excavation Responsibilities

- .5 The Contractor shall confirm to the following excavation responsibilities:
 - (a) **Excavation Method Specified by Principal:** The method of excavation for the project shall be as specified by the Principal.

- (b) **Excavation Method Recommended by Contractor:** The Contractor shall arrange for a qualified arboriculturist experienced in excavation to undertake a site assessment and recommend preferred methods of excavation for the project.

Excavation Method

- .6 All work shall be carried out or supervised by a qualified arboriculturist experienced in excavation within a critical tree root zone or trained in non-destructive excavation techniques.
- .7 The volume of soil to be removed shall be determined in consultation with the Principal, and will be dependent on the site conditions, root characteristics of existing trees and future tree planting requirements.
- .8 Works may occur during all seasons. Moist hessian shall be used to shade exposed tree roots from the sun. The moisture level of the hessian shall be checked frequently to prevent tree roots drying. When exposure exceeds more than 48 hours, tree roots shall be packed in moist sawdust.
- .9 The Contractor shall use the following excavation methods:
- (a) **Air Excavation within Tree Root Zone:** Tree roots shall be exposed using a high-pressure air excavation tool (Air-Spade, Air Knife or similar approved). A qualified operator shall carry out the work.
- During excavation, protective guards shall be used around the excavation site to contain fast moving debris. Water shall be used when the soil is dry to reduce dust caused by the air excavation.
- (b) **Hand Spade Excavation within Tree Root Zone:** Tree roots shall be exposed with a hand spade, taking care not to damage the roots. Digging shall start at the base of the tree following the roots out from the trunk.

4. TREE ROOT CARE

- .1 Prior to pruning any tree roots, a qualified arboriculturist shall assess the tree health, growth habit, structure and stability and determine the percentage of roots to be removed within the Tree Protection Zone.
- .2 If tree roots require pruning or are damaged, the arboriculturist shall determine the significance of the root to tree health and shall treat it accordingly (i.e. pruning back to an appropriate point, redirecting or removing the root). The arboriculturist shall expose tree roots by hand and shall cut the identified roots with a hand saw back to a lateral root.

5. LOAD SUPPORT

General

- .1 The locations for load support installations shall be shown on the Drawings.

Load Support Methods

- .2 The Contractor shall use the following load support methods:
- (a) **Structural Soil:** The estimated mature tree sizes and each individual site will determine the volume of structural soils to be used. Structural soil volume per tree shall be approximately 6 cubic metres per 9 square metres of estimated mature tree canopy projection.

Analysis of the structural soil shall be carried out so that appropriate amendments may be applied. Analysis may include pH, EC, organic matter, major and trace elements and exchangeable cations. Tests shall be conducted by a laboratory accredited under ISO 9001 and results shall be submitted to the Principal. A fertilising program shall be recommended by the Contractor and submitted to the Principal for approval.

Unless shown otherwise on the Drawings, the proposed subgrade shall be excavated and compacted to a minimum depth of 600 mm prior to any base material or pavement being added on top of it.

The Contractor shall confirm that the subgrade is at the proper level and compacted as required. Subgrade elevations shall slope parallel to the finished grade and/or toward the subsurface drain lines as shown on the Drawings.

The excavation shall be cleared of all construction debris, trash, rubble and any foreign material. In the event that fuels, oils, concrete washout silts or other material harmful to plants have been spilled into the subgrade material, the soil shall be excavated sufficiently to remove the harmful material. Any over excavation shall be filled with approved fill and compacted to the required subgrade compaction.

The Contractor shall not proceed with the installation of the structural soil material until all walls, kerb footings and utility work in the area have been installed. For site elements dependent on structural soil

for foundation support, installation shall be postponed until immediately after the installation of structural soil.

The Contractor shall install any subsurface drain lines required and ensure they are operational prior to installation of structural soil material.

Structural soil shall be placed directly over the exposed tree root system in increments of 150 mm deep and compacted to not less than 95% of the dry density determined using AS 1289, test method 5.2.1 (modified compaction). A layer of Bidim A14 or Bontec SG28/28 geotextile shall be placed over structural soil, with a minimum of 600 mm overlap on all fabric seams. A 25 mm deep bedding sand layer shall be installed above the geotextile and prepared for the permeable paving surface to be installed above.

Structural soil shall be placed to the finished levels.

- (b) **Ecocell:** Ecocell 100 mm Standard Cell shall be placed over tree root systems to create a non-compacting footpath only. Ecocell 150 mm Standard Cell shall be used for areas receiving vehicular traffic.

All debris, vegetation cover and unacceptable in-situ soils shall be removed. The Contractor shall excavate specified anchor and toe trench if working on sloping surfaces.

Where the finished soil level is uneven, gullies shall be filled with coarse sand or gravel to achieve the desired level.

A Bidim non-woven geotextile for drainage and separation from subbase shall be installed with a minimum of 600 mm overlap on all fabric seams as required. If excessive groundwater is expected an appropriate drainage system shall be incorporated.

The Ecocell panels shall be installed in accordance with the manufacturer's recommendations.

At one side of the Ecocell perimeter, straight, 10 mm diameter steel pins shall be driven into the ground at the spacing specified.

Pins shall be driven in until they are flush with the top of the Ecocell. Ecoclips shall be driven over the end of the pin and clipped over the Ecocell panel.

The cells of the Ecocell panels shall be completely filled with no fines gravel with a consistent granule size of 13-15 mm.

If paving is to be placed, another geotextile layer shall be installed over the compacted Ecocell infill.

6. PERMEABLE PAVING

.1 The Contractor shall use the following permeable paving types:

- (a) **Porous Concrete:** Porous concrete shall be delivered and installed in accordance with the manufacturer's instructions. The concrete shall include a typical void ratio of 20–25% and provide a minimum percolation rate of 150 litres/hour/m². Concrete composition shall be portland or blended cement with 10 mm aggregate, a water/cement ratio of 0.3–0.4, and an aggregate to cement ratio of 4 to 4.5. A small amount of sand (10–20% of total aggregate) shall be added to improve strength characteristics. After installation, the concrete shall be covered with plastic sheets to facilitate curing. The depth of the concrete shall be 100 mm.

Porous concrete shall not be used as a road surface.

- (b) **Aggregate Bonded with Terrabond:** Terrabond shall be installed in accordance with the manufacturer's instructions by a qualified Terrabond Contractor. Installation of Terrabond shall be limited to the area immediately around the tree trunk, making allowance for future trunk girth.

- (c) **Boral Hydrapave:** Hydrapave shall be installed in accordance with the manufacturer's instructions.

All debris, vegetation cover and unacceptable in-situ soils shall be removed. Excavation shall be carried out to the required levels. Where the finished soil level is uneven, gullies shall be filled with coarse sand or gravel to achieve the desired level.

Hydrapave shall be installed in accordance with the manufacturer's recommendations.

- (d) **Standard Paving:** A qualified contractor shall install standard paving. When paving over Ecocell, a non-woven geotextile layer shall be placed before a levelling sand layer.

7. HOLD POINTS

.1 There are no Hold Points referenced in this Part.