



# Root Directors

A compact, cost-effective solution for urban tree installation



# RootDirector

## Modular Root Management Device for Urban Trees



Trees planted in urban settings often require root systems to be directed below the level of hard pavements and road curbs, to prevent costly damage due to root heave. Once a road pavement surface or road curb is broken, water penetrates and encourages further shallow root growth, and the extent of pavement damage escalates rapidly. Often the most economical solution is to remove the tree, to the loss and detriment of the community and environment.

Planting trees with a properly designed root management system is a small cost to pay compared to the cost over time of infrastructure repair, not to mention litigation.

The new C series Root Director range carries forward the function of the original RD640 Root Director, including tapered sides, root training ribs, and seamless sides, with the additional benefit of an integrated circular lawn edge at the top surface for a neat finish to your project. Root Director C series is available in two sizes to suit the most popular rootball dimensions.

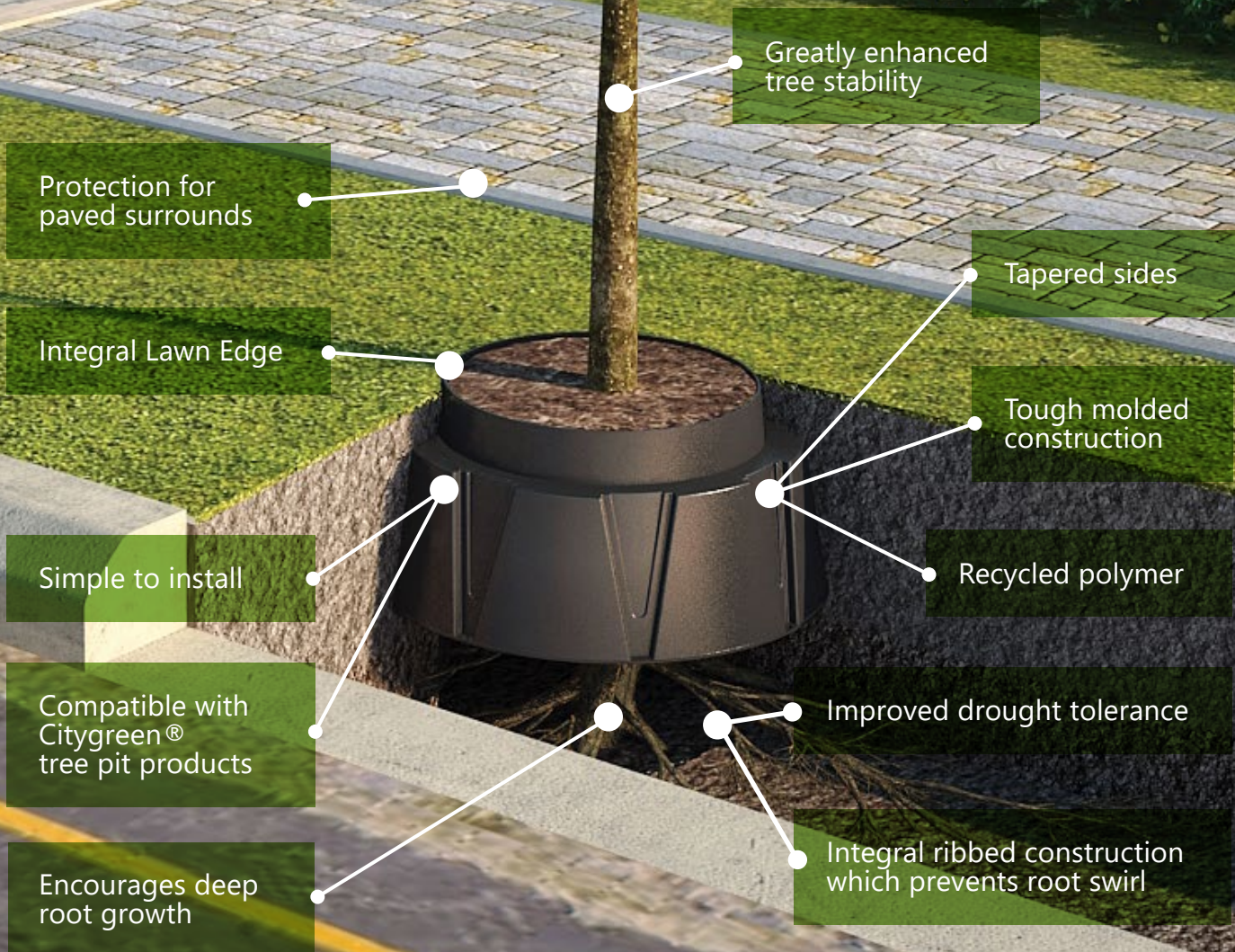
### **We even have the research to back it up.**

Curb and sidewalk damage resulting from interaction with tree roots continues to be a common problem in cities throughout the world. A statewide tree assessment in New Jersey estimated that 25% of street trees were involved with sidewalk damage (Cardiac 1996). Sidewalk repair costs were cited as the highest tree care related costs facing municipalities today (McPherson and Peper 1995). Many of these problems may be due to inadequately engineered sidewalks (Sydnor et al. 2000; Steve Sanford, pers. comm.). Until these design and construction problems are commonly managed, arborists will continue to use many techniques to manage the interaction of roots and concrete structures. Commercially available plastic root barriers frequently are a selected solution.

Continued on page 10 k



# Benefits



Root Directors are designed to divert roots down for protection of pavement, and out for stability and health of the tree.



# CASE STUDY

Citygreen Root Directors

## A Flourishing Success

Citygreen root directors are designed to protect pavements and hard landscaped areas. Root directors prevent root swirl and divert root growth downward and outward, thus avoiding the unsightly and hazardous root damage so commonly seen in urban areas.

A city council in Melbourne, Australia used root directors many years ago in a main road planting and the end results have been very satisfactory. The trees are healthy and growing well providing the street with shade and increasing the aesthetic appeal of the median strip.

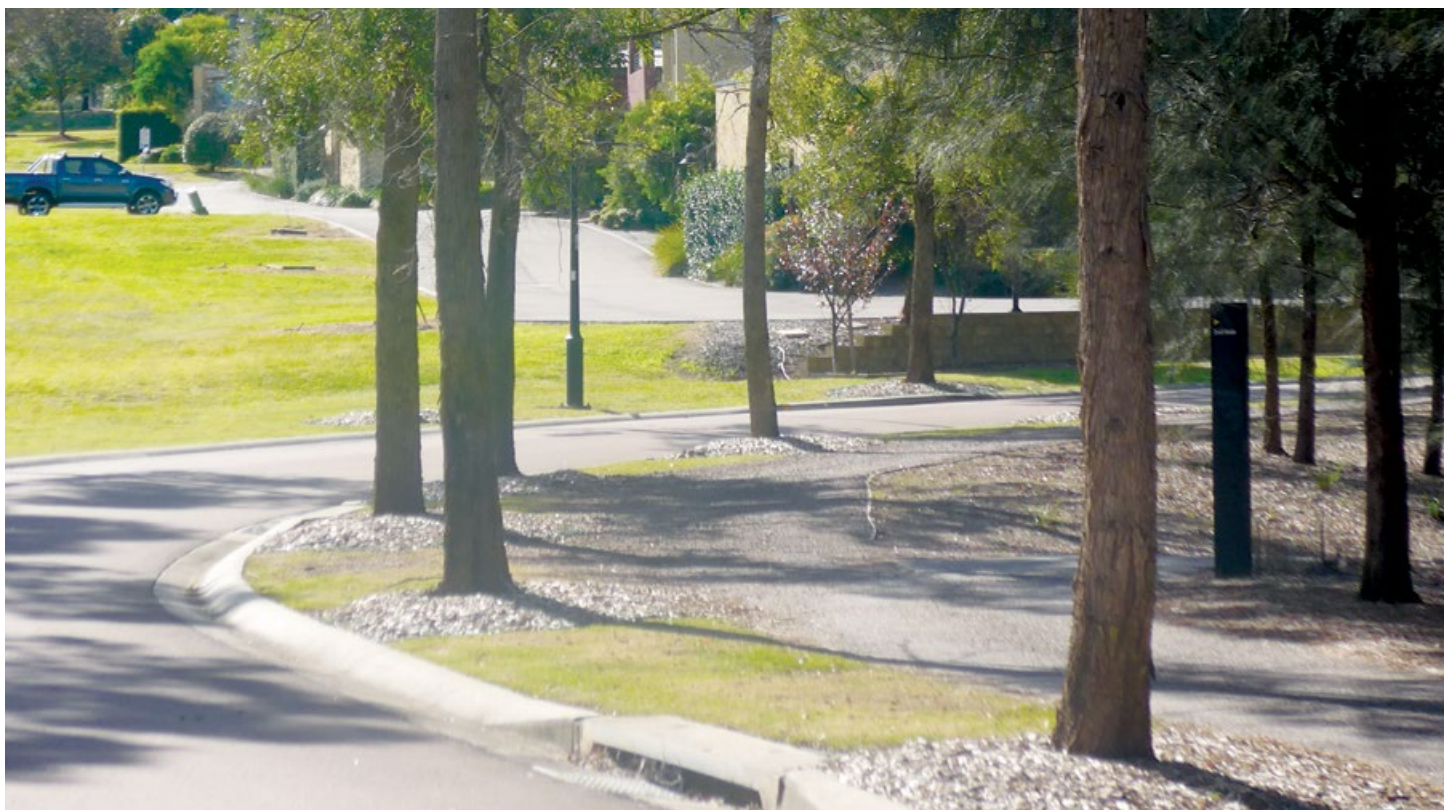




Sydney, Australia utilizing root directors – allowing the trees to grow larger and healthier without disturbing the surrounding pavement structure.

Citygreen has worked with many entities over the years supplying root directors to help facilitate tree growth and prevent hard scape damage. Root directors are designed to protect paved surface surrounds, encourage deep root growth, improve drought tolerance and enhance overall tree stability.

A Sydney Australia project encapsulates the benefit of root directors. Above is a photo of mature trees growing in Sydney, some with root directors and some without. Planted around the same time it is clearly evident the success of the root directors in providing healthy tree growth.



Healthy native species in residential estate planted in root directors. Zero damage to curb or sidewalk.









The new Citygreen root director C series carries the original benefits of the RD640 root director but now also includes an integrated circular lawn edge at the top surface for a neat finish to projects.

The Vintage Estate is a high class estate located in the Hunter Valley, NSW, Australia. Root directors were used in this estate and subsequently the trees have flourished.



# CASE STUDY

Citygreen Root Directors

## — 'Illalung' Historical Morpeth







Root Directors used within a hardscaped area on Morphet's main street

Nestled on the Hunter River in New South Wales, historic Morpeth has a rich history and was instrumental to the development of the Hunter Valley. Historic Trust-classified, it remains a living museum with quaint streetscapes and beautifully-preserved buildings.

Also known by its Aboriginal name 'Illalung', Morpeth formed one third of a land grant made to Lieutenant Edward Charles Close by Governor Brisbane in 1821. With its desirable location on the Hunter River, Morpeth quickly evolved into a frontier town and busy river port channelling produce from the Hunter Valley to nearby Newcastle Harbour and surrounds.

Today, Morpeth continues to thrive with many visitors exploring the township each year. Maitland City Council is dedicated to preserving the town for generations to come and has recently planted some new street trees using Citygreen's Root Director system. The council has leveraged this system for more than 20 years, enabling countless trees to thrive in close proximity to underground infrastructure and roadways by directing root growth downwards. In the latest installation at Morpeth, we see the new round Root Directors used within a hardscaped area, providing a neatly-rounded edge between the trees and the surrounding pavement. So far, the trees are performing well and should stand the test of time – like historic Morpeth itself.



# Specifications

## Root Directors RDC 600 & 900



| Product Code | Dimension A (nom) | Dimension B (nom) | Dimension C (nom) |
|--------------|-------------------|-------------------|-------------------|
| RDC600       | 600mm             | 900mm             | 400mm             |
| RDC900       | 900mm             | 1200mm            | 400mm             |





# Excerpts from the Journal of Arboriculture

There has been concern that circling root barriers may reduce the stability of trees under extreme wind condition. It has been observed that trees growing near various subgrade structures are more susceptible to windthrow (Francis and Gillespie 1993). This study was developed to determine if commercially available ribbed barriers reduce or increase the stability of trees under severe lateral stress.

by E. Thomas Smiley, Albert Key & Craig Greco

## Materials and Methods

Thirty-six 1.5-in. (4-cm) caliper green ash (*Fraxinus pennsylvanica*) were dug with a 32-in. (81-cm) diameter tree spade set to cut an 18-in. (46-cm) diameter root ball and planted on November 11 and 12, 1996. Half of the trees were installed centered in 22-in. (55-cm) top diameter by 18-in. (46-cm) deep round preformed tree root barriers (Deep Root Partners, L.P., San Francisco, CA, Product #RP22-30-18) planted according to manufacturers recommendations (Figure 1). The other half were planted in backhoe-dug holes, twice the width of the root ball. No wire baskets or burlap were used. All trees were irrigated during drought periods and fertilized equally in the fall of 1997 and 1998.

## Results

Under dry soil conditions, the trees within the root barriers were pulled out of the ground at an average force of 2,341 lb (1,060 kg, Table 1). These trees failed after the roots in the 1-to-2-in. (2-to-5-cm) diameter range broke. The control trees broke with an average force of 1,961 lb (888 kg) when the lower stem/root collar broke. Average soil moisture was 14.5 % water (w/w). Under saturated soil conditions, the trees within the root barriers pulled out of the ground with an average force of 2,860 lb (1,296 kg, Table

1). These trees failed when the root system broke. The control trees failed with an average force of 2,063 lb (934 kg).

Visual observations indicated that root barrier grown trees appeared healthier. Average caliper, height and branch spread of root-barrier-grown trees, however, were not significantly greater than controls.

## Discussion

Young ash trees were very wind stable with or without surrounding root barriers. The wind speed equivalent force required to break or throw these trees was far in excess of 100 mph (160 kph). There were different failure patterns between barriers and control trees. Under dry conditions, the barrier treatments allowed the roots to move more, increasing the breaking force required. Because the root system did move, there were no trunk failures with the barrier. The control trees failed at the root collar or when the stem broke. Under saturated conditions, the pattern of failure was the same for all trees: The roots pulled out of the ground with breakage occurring in roots 0.25 to 0.5 in. (0.6 to 1.3 cm) in diameter. The force required to pull the trees out differed depending on treatment. Trees with root barriers were able to withstand higher forces than the control trees. It appeared that the reason for this increased resistance was deeper rooting of the barrier-

On July 20, 1999, three trees growing in the barrier and three control trees were attached to a 0.25-in. (6.3-mm) steel cable using a nylon sling attached 24 in. (61 cm) above soil level. The opposite end of the cable was attached to a Dillion 4,000 lb (1,800-kg) peak recording mechanical dynamometer (Weight-Tronix Inc., Fairmont, MN) then to a tractor. Trees were pulled until they either broke or were pulled out of the ground. Tree height, spread, caliper at 6 in. (15 cm) above soil level, and force required to pull it over were recorded. Mean breaking strength, diameter, height, and branch spread were statistically compared using a T-test.

| Treatment |         |                |         |         |
|-----------|---------|----------------|---------|---------|
| Soil Dry  |         | Soil Saturated |         |         |
| Tree      | Barrier | Control        | Barrier | Control |
| 1         | 2,000   | 1,735          | 3,030   | 1,290   |
| 2         | 2,800   | 2,150          | 3,550   | 1,725   |
| 3         | 2,225   | 2,000          | 2,000   | 3,175   |
| Average   | 2,341   | 1,961          | 2,860   | 2,063   |

Force in pounds required to pull over ash trees growing within surrounding root barriers or open grown, under two levels of soil moisture. Means are not significantly different when analyzed with a T-test.

surrounded trees. Roots grew beneath the barrier to a depth typically 12 to 16 in. (30 to 40 cm) deeper than the control trees. After growing under the barrier or through the slots near the bottom of the barrier, root growth varied. Most roots turned upward in to the soil outside of the gravel that surrounds the barrier, then became horizontal at a depth of 4 to 10 in. (10 to 25 cm). No girdling roots were observed; many roots inside the barrier were deflected downward by the ribs in the surface of the barrier. The root system configurations of trees surrounded by root barriers were very different from the control trees. After three growing seasons, this difference resulted in ash trees being more resistant to windthrow within root barriers than nontreated trees. The long-term effects of circling root barriers needs to be studied to determine if these trends continue.





Transform this ▲ into this ▼



# Engineered Solutions for Greener Cities

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[www.citygreen.com](http://www.citygreen.com)

Root Director® has worldwide patents registered and pending.

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