



The ROI of Healthy Urban Trees

Washington State ASLA Conference

We know mature trees contribute significantly to our health and well-being.

A ~~number of studies show that a tree of 30" in diameter...~~
numbers of large trees in urban areas.



Reduce

10x

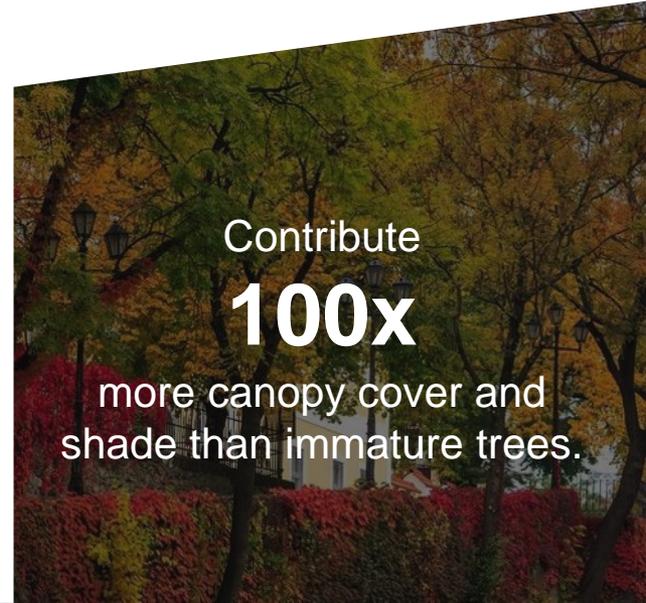
more pollution than
immature trees.



Store up to

90x

more carbon than
immature trees.



Contribute

100x

more canopy cover and
shade than immature trees.

Trees in cities seldom live long enough to reach maturity and provide meaningful benefits due to...

Inadequate

Soil Volume

Insufficient

Irrigation
& Aeration

Lack

of Root
Management

Unmaintained

Staking & Above
Ground Guying

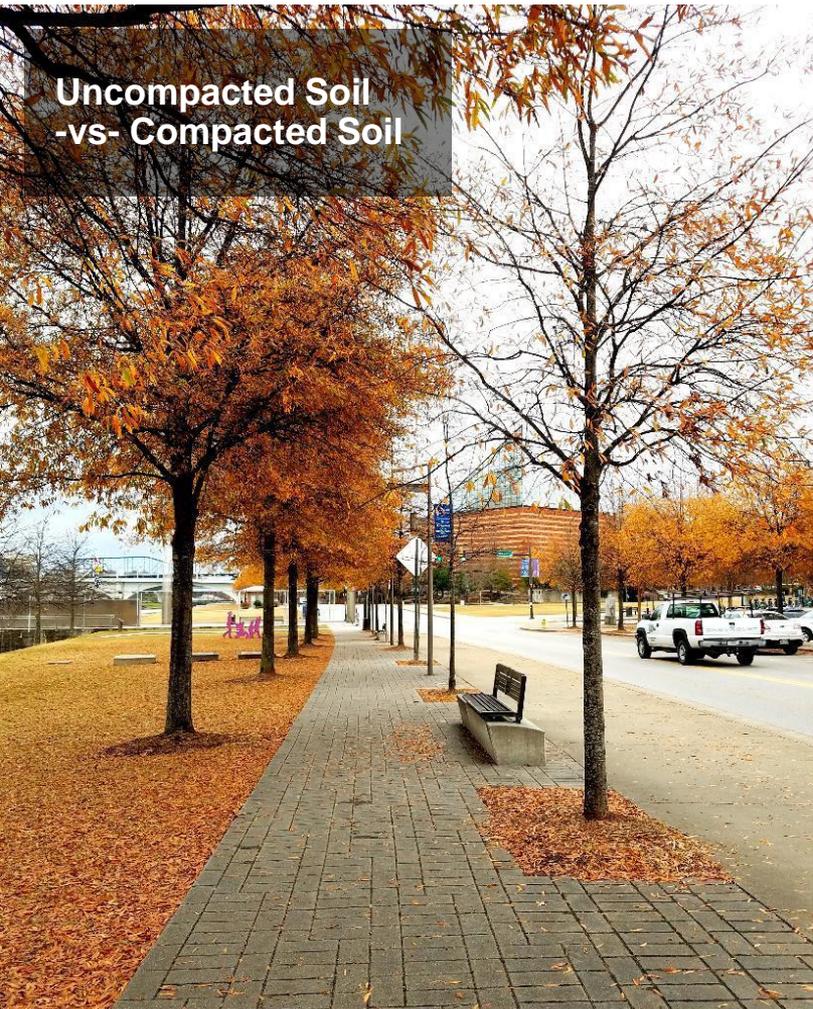
Gratuitous

Vandalism

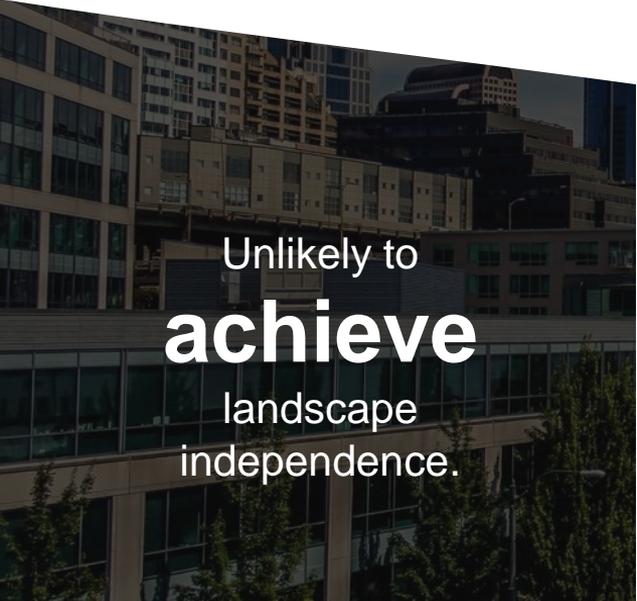


CONCEPT vs REALITY

**Uncompacted Soil
-vs- Compacted Soil**



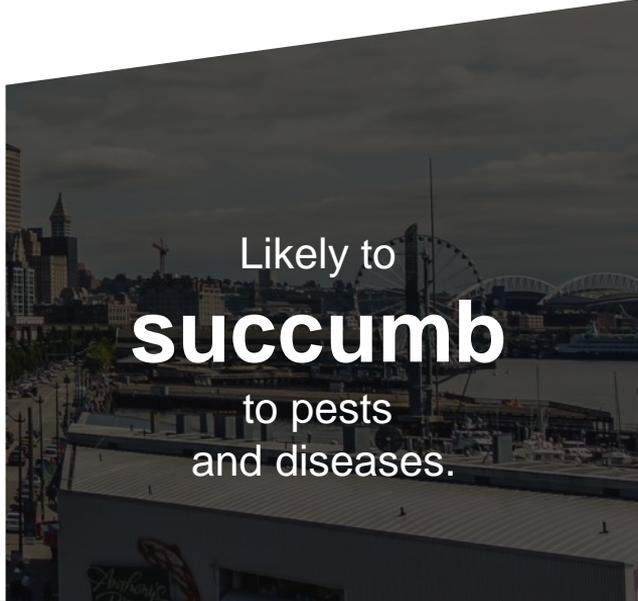
A TREE PLANTED IN A TRADITIONAL 4'x4' PIT IS...



Unlikely to
achieve
landscape
independence.

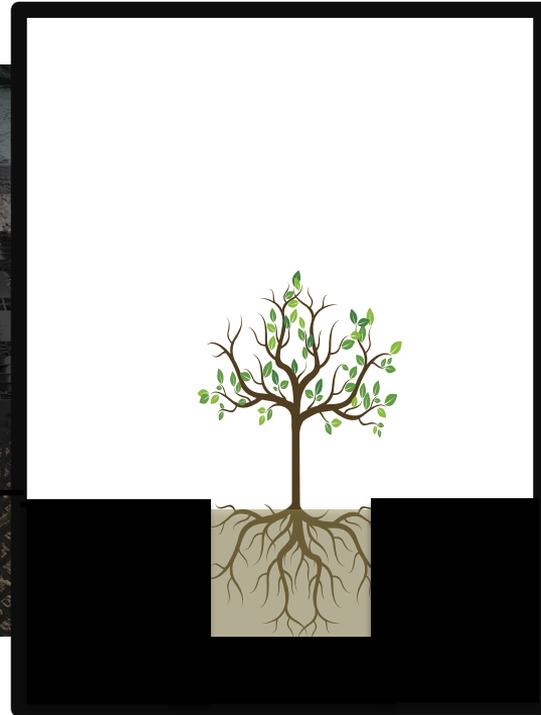


Unlikely to
grow
to its
full potential.



Likely to
succumb
to pests
and diseases.

INVESTING IN SOIL VOLUME



INCREASED SOIL VOLUME = INCREASED ROI

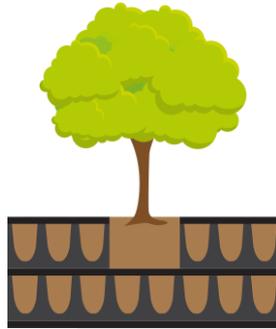


Small Trees

10ft

Mature Canopy Diameter

Target: 300-400 cu ft

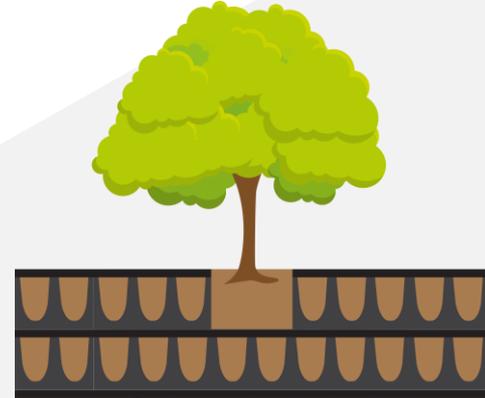


Medium Trees

16ft

Mature Canopy Diameter

Target: 600-800 cu ft



Large Trees

26ft

Mature Canopy Diameter

Target: 1000-1200 cu ft

Bookmark our FREE "Soil Volume Calculator"
greenblue.com/soil-calculator



A Tree Planted with RootSpace

Has access to adequate
uncompacted soil

1

2

Has access to
water and air
below ground

Is less likely
to **suffer stress**

3

4

Is less vulnerable to
pests and insects



THE FINDINGS

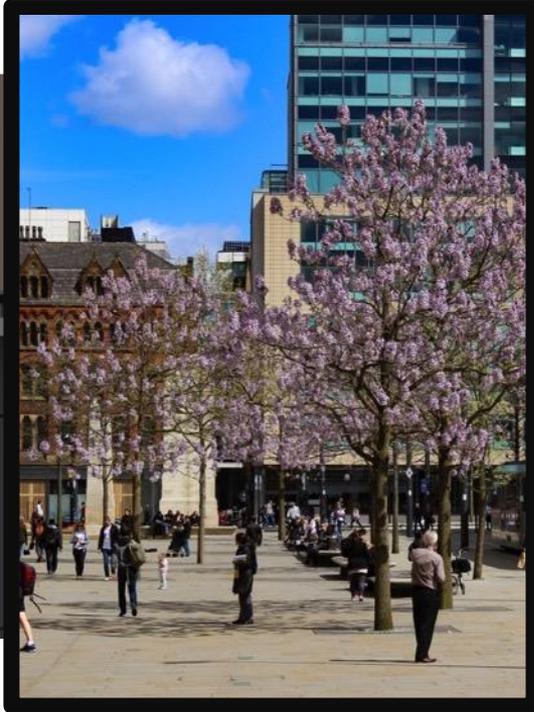
SOIL CELL BENEFITS

Trees in RootSpace provide more benefits than traditionally planted trees because their **size, health, longevity, and resilience** is significantly increased.



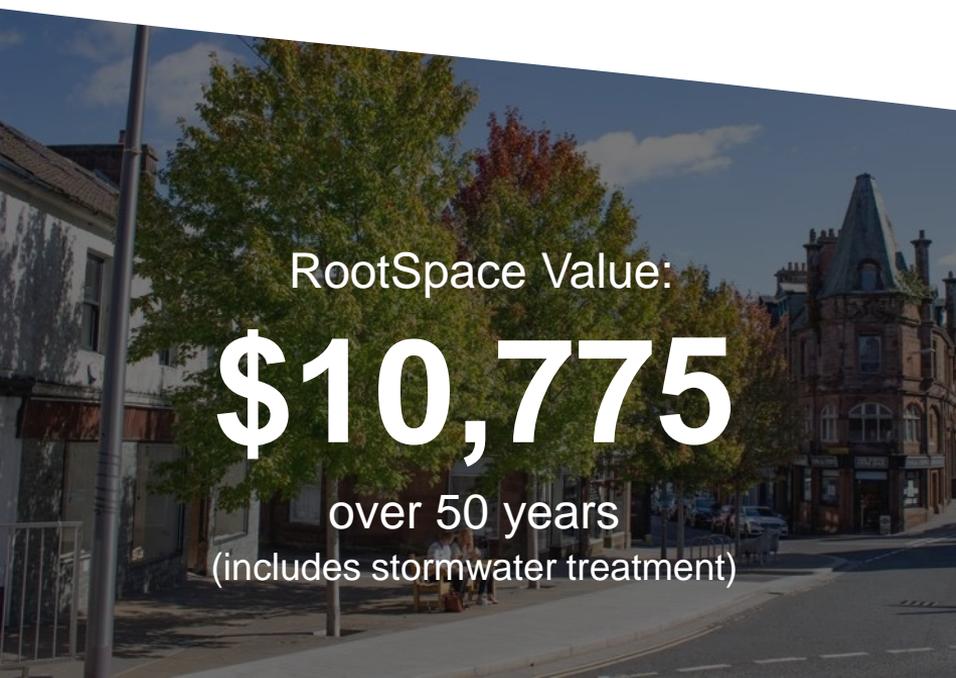
LONG-TERM CANOPY

The cumulative benefits provided by RootSpace Street Trees are **50x** more than those provided by Traditional Street Trees*



*Treeconomics Ltd

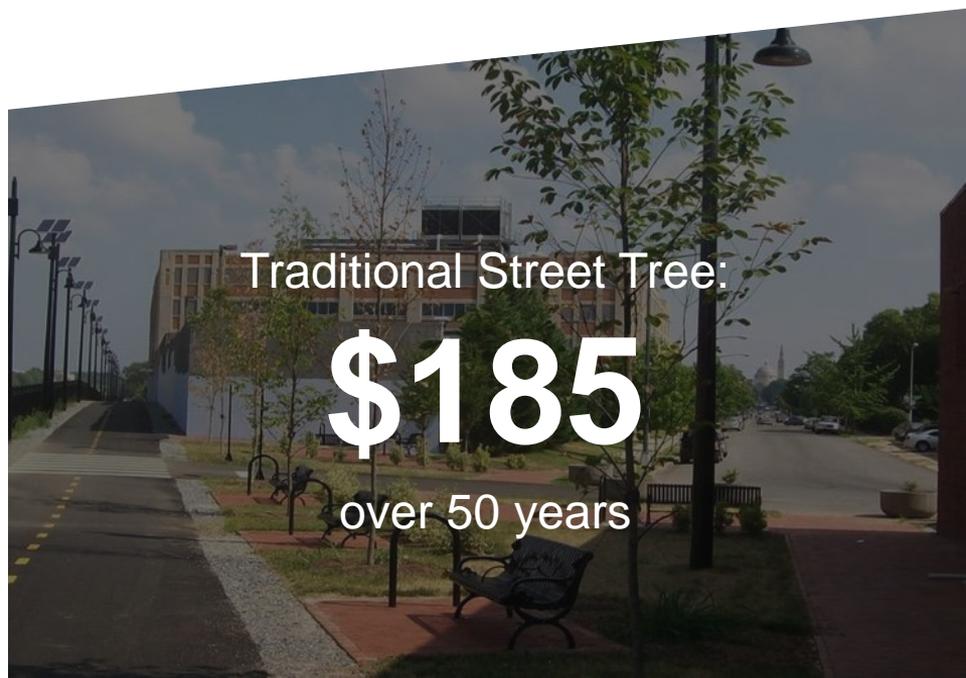
INCREASING VALUE

A street scene featuring mature trees with green and autumn-colored foliage. In the background, there are historic brick buildings, including one with a prominent corner tower. The sky is blue with light clouds.

RootSpace Value:

\$10,775

over 50 years
(includes stormwater treatment)

A street scene featuring young trees planted in a modern urban setting. There are benches, a street lamp, and modern buildings in the background. The sky is overcast.

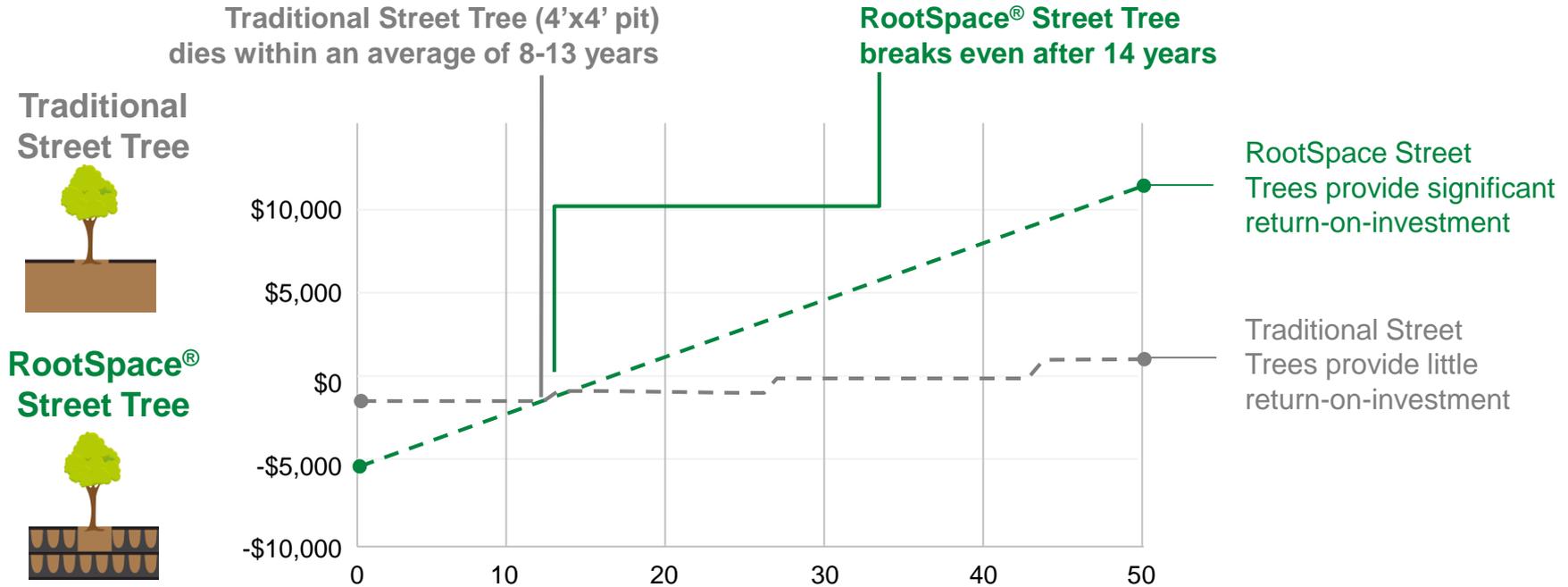
Traditional Street Tree:

\$185

over 50 years

COST EFFECTIVENESS

Despite lower upfront costs, traditional trees planted without adequate soil volume are not cost effective and do not provide a return-on-investment





2008 → 2018 → 2028

East Main St. & Cross St. – Welland, ON

2008

10 trees planted in
150 ft³ of uncompacted soil
per tree at a cost of \$1350
per tree

2018

\$130 of benefits
per year
per tree*

2028

Projected **\$190** of benefits
per year
per tree*

**Benefits calculated by i-Tree Design Tool and exclude additional hard-to-quantify benefits such as health improvement, urban heat island effect reduction, traffic calming, pavement life extension, etc – as well as the benefits of the pavement support system (such as stormwater attenuation and quality improvement, etc)*

INCREASING RETURN

After **50 years**, the benefits
of trees in RootSpace
rise exponentially.





CUMULATIVE BENEFIT

A 100-year-old tree has
4 times the benefits of
a 50-year-old tree.

**NOT ALL
TREE PITS
ARE
CREATED
EQUAL**



Soil Cells vs. Structural Soil

Main Street
Cambridge, ON

2011

Planting

5

Linden
Trees

1

end of the block planted
using soil cells, the other
side planted in structural soil

7

Years Later



Soil Cells vs. Structural Soil

Blackfriars Road
London, UK

2014

Planting

4

Platanus
Hispanica
Trees

1

end of the block planted
using soil cells, the other
side planted in structural soil

3

Years Later



Soil Cells



VS



INSTALLATION



Structural Soil

Bartlett Tree Labs – Charlotte, NC

Soil Cells



3+ YRS ROOT COMPARISON

VS



1 YEAR GROWTH COMPARISON



Structural Soil





RETAINING EXISTING TREES

When considering development sites, GreenBlue Urban always recommend the retention of healthy trees where possible.

Retaining large, existing trees are 5X more cost effective than replacing them.

COST PROFILE

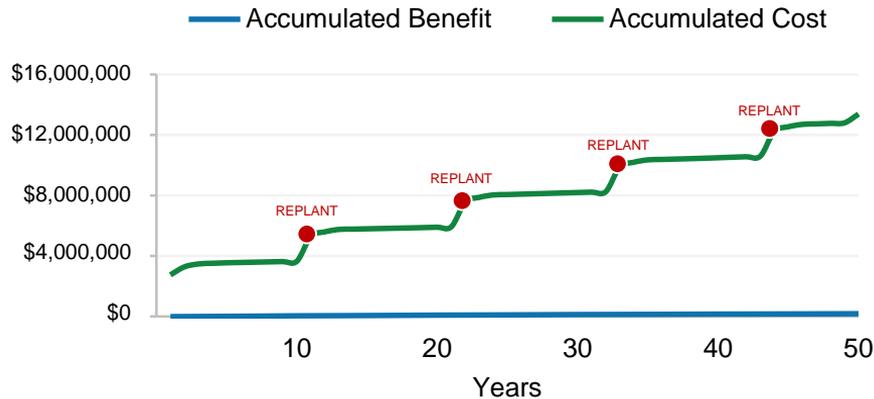
FOR URBAN TREES

Item	Traditional Street Tree - 50yrs	Notes	RootSpace Street Tree - 50yrs	Notes
Installation Costs	(-\$11,666)	Tree replaced 4 times over the study period	(-\$6,680)	GBU planting spec
Total Accumulated Benefits after 50yr period	\$188	Air pollution filtration, carbon sequestered and stormwater attenuated from the tree canopy	\$10,971	Air pollution filtration, carbon sequestered and stormwater attenuated from both the tree canopy and RootSpace system
Total Maintenance	(-\$2,252)	15% Failure Insurance (Yrs1-3), Inspection, leaf clearing and formative pruning	(-\$547)	Inspection, leaf clearing, formative pruning
Removal Costs	(-\$2,351)	End of life felling (4 times) and stump grinding	\$0.00	Still growing at 50 years
Net Life Cycle Cost	(-\$16,079)		\$3,745	

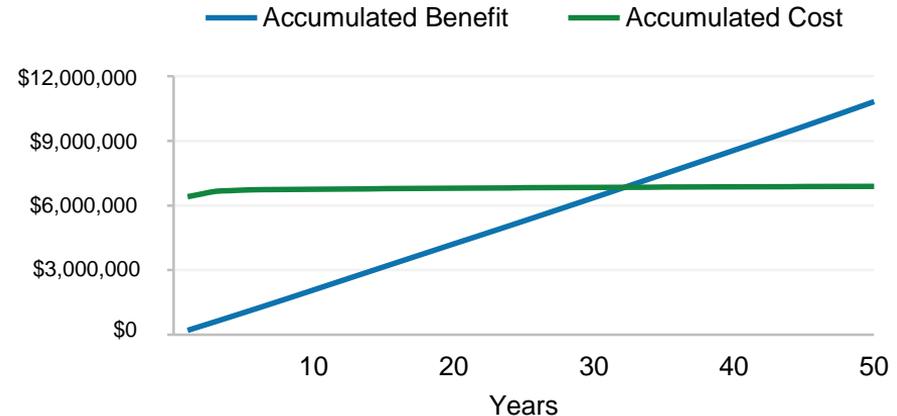
BREAK-EVEN POINT

A traditional street tree will never break-even due to lack of tree maturity and the ongoing need of periodic replacement and / or damaged infrastructure repairs.

Break-even points for a Traditional Street Tree (USD)



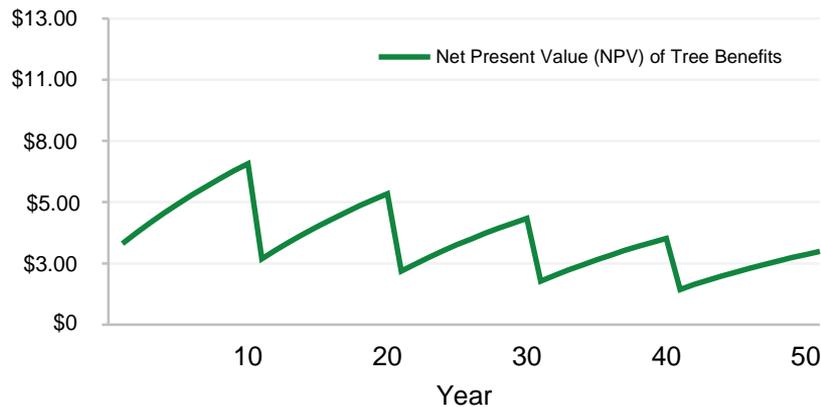
Break-even points for a RootSpace Street Tree (USD)



ANNUAL BENEFITS OF TRADITIONAL STREET TREES

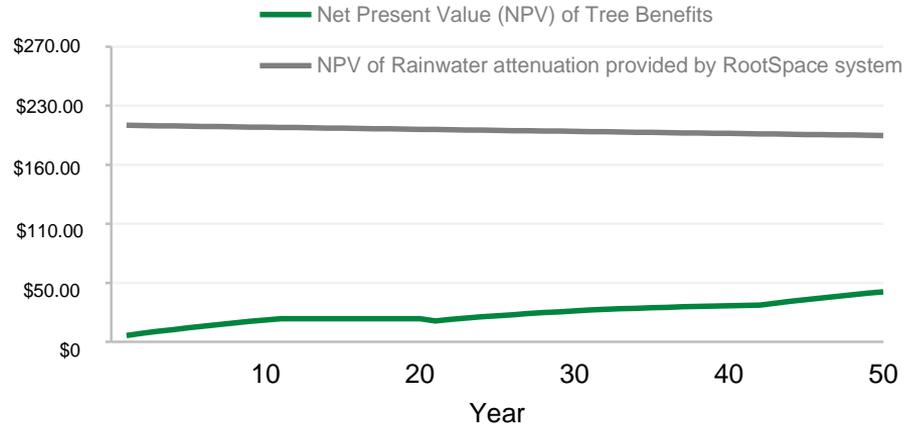
With the need to be replaced every 8-13 years, traditional street trees provide little benefit.

**Traditional Street Tree
Annual Benefits over 50 years (USD)
(replaced every 10 years)**



INCREASED BENEFITS USING ROOTSPACE

RootSpace Street Tree Annual Benefits over 50 years (USD)



FULL LIFECYCLE BENEFITS & COSTS

If given adequate rooting volume, street trees will live well beyond 50 years. However development cycles are generally only 30 to 60 years.

Meaning that at the time street trees start providing maximum benefit, the built infrastructure around them may be in need of redevelopment.

200 year benefits (USD)



PUTTING A VALUE ON URBAN FORESTS

Toronto, Ontario

A 2018 study estimated Toronto's urban forest to be worth \$7 billion in economic and environmental benefits

How did Toronto achieve this?

The value of trees is understood and protected from **the highest level of local government**

1

2

Mandatory minimum uncompacted soil volume of **1000 ft³ per tree** for any tree planted in city right-of-way

Urban tree planting guidelines help specifiers create **cost-effective tree planting details**

3

4

The **stormwater management capabilities of trees with uncompacted soil volumes** are utilized through the city-wide use of LID practices

PUTTING A VALUE ON URBAN FORESTS

Lancaster, Pennsylvania

The City of Lancaster has quantified green infrastructure as providing \$2.8 million in benefits annually. This easily exceeds the costs of investment.

How did Lancaster achieve this?

- 1 Reducing \$120 million in grey infrastructure capital costs
- 2 Reducing \$661,000 in wastewater pumping and treatment costs
- 3 Reducing stormwater volumes & improving stormwater quality
- 4 Reducing air pollution & improving public health
- 5 Increasing property values
- 6 Reducing energy costs
- 7 Reducing heat island affect
- 8 Enhancing aesthetics



A 10% increase in trees can postpone health problems by 5 years



Students with a view of trees recover pay attention longer



A 10% increase in tree canopy has been associated with a 12% decrease in crime



Particulate levels on tree-lined streets are up to 60% lower than those without trees



Trees provide food, protection, and shelter for many birds and mammals



Trees can increase property prices anywhere from 5% to 18%



There is up to 24% reduction in particulate matter near a mature tree



For every 5% of tree cover, stormwater runoff is reduced by 2%

**TOTAL
VALUE**

CASE STUDIES

Measuring
ROI





Improving Health

BBC Television Center - GBU project planted in 2015

Leonard Circus

London, UK

This project in London, UK has been calculated to provide an annual **£1.76 million (£2.25 million)** of health benefits.

Improving Health

Source: TFI Better Streets Delivered 2



Reducing Stormwater Runoff

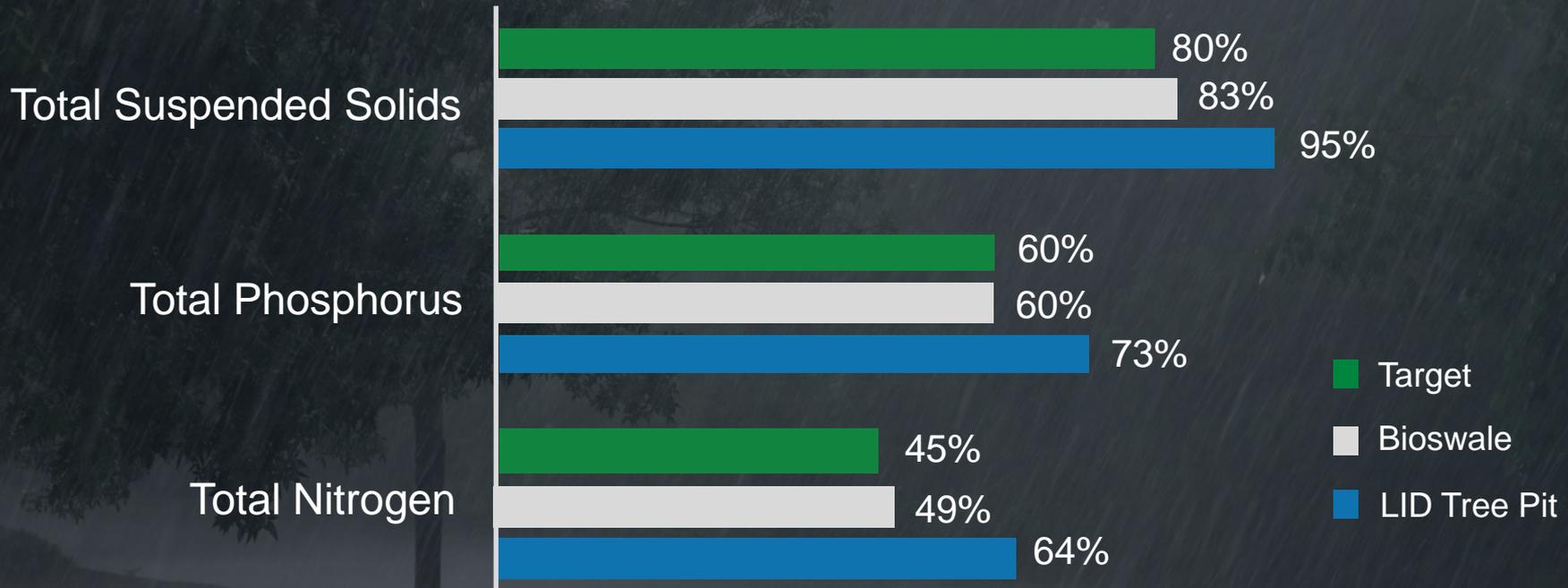
Jack Layton Ferry Terminal

Toronto, ON

19 trees in **15,000 ft³** (425 m³) of RootSpace, providing
25,000 gallons (95,000 liters) of stormwater attenuation

Reducing Stormwater Runoff

IMPROVING STORMWATER RUNOFF



A photograph of a modern university courtyard. In the foreground, there is a paved area with a metal grate. To the left, a small water feature with several jets is visible. In the center, there is an outdoor seating area with several tables and chairs. The background features a building with large glass windows and a sculpture. The text "Pace University" is overlaid in the center, and "New York City, NY" is overlaid below it. A dark banner with the text "Improving Stormwater Quality" is in the bottom left corner.

Pace University

New York City, NY

Improving Stormwater Quality



Increasing Property Values & Retail Sales

Darley Street Shopping Area - GBU project planted in 2007

2015

2018

East New Street

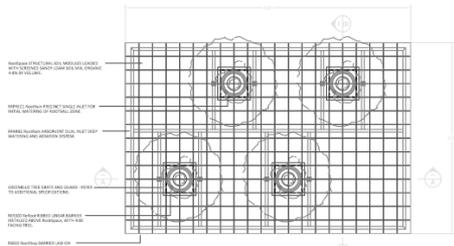
Lititz, PA

A Philadelphia-based study demonstrated that properties close to new tree planting increased in price by about 10% (Wachter and Gillen).

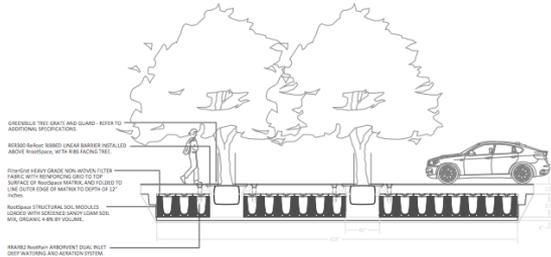
Increasing Property Values & Retail Sales

COMPONENT LIST	
PRODUCT	QTY
RootSpace STRUCTURAL SOIL CELL/AIR DECK	623/294
FG3000 FilterGrid Bt-AXIAL FILTER LAYER	102y9T
RRPRECI RootRain PRECINCT SINGLE INLET	4
RRARR RootRain AROUND INLET DUAL INLET	3
RRK300 RootRain LINEAR RIBBED R/BARRIER	33'
RS1200 RootStop BARRIER	140'

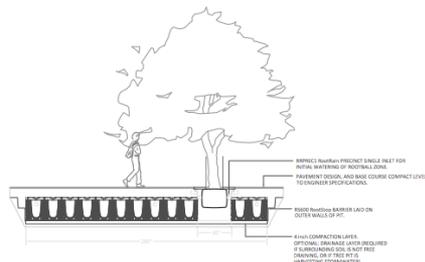
SOIL VOLUME GUIDE: APPROX 3232R³ OF SOIL (15%), DEPENDING ON SOIL TYPE AND EXCAVATION VARIATIONS



LINEAR TREEPIT - PLAN



LINEAR TREEPIT - SECTION AA



LINEAR TREEPIT - SECTION BB

- INSTALLATION/EXCAVATION TIPS
1. ADD 5% TO OUTER PLAN DIMENSIONS WHEN EXCAVATING PIT.
 2. ALWAYS CHECK PIT DIMENSIONS AT BASE OF PIT. ENSURING SIDES ARE CLEAN AND SQUARE.
 3. LEVEL AND SCREED DRAINAGE LAYER PRIOR TO PLACEMENT OF CELLS.

NOTE - ENSURE THE PIT BASE IS SCREEDED, LEVELLED AND COMPACTION PROPERLY BEFORE PLACING CELLS ON BASE, TO ALLOW FOR EASE OF INSTALLATION OF OVERALL MATRIX.

NOTE - ADEQUATE DRAINAGE FROM BASE OF TREEPIT TO BE PROVIDED IF DESIGN INCORPORATES WSUD PRINCIPLES, OR IF SITE CONDITIONS REQUIRE.



Designed: ES	Checked:
Date: 05/07/2023	Approved:
Scale: AS SHOWN	

No.	Revision	Date	Title

LINEAR TREEPIT
RSM PLAZA
DETAIL PLANS

Drawing No. Rev. A

Increasing Property Values



Increasing Student Attentiveness

University of Oxford - GBU project planted in 2012

A photograph of Church Street Public School in Toronto, ON. The building is a two-story brick structure with several windows, some of which have decorative elements. In the foreground, there is a green artificial turf field with a white goalpost. A young tree is planted in a mulched area, protected by a wire mesh cage. The sky is clear and blue.

Church Street Public School

Toronto, ON

Increasing Student Attentiveness

EXTENDING PAVEMENT LIFE

Trees extend pavement life by reducing deterioration by 11% for every 20% of shade cover.

Scenario	Slurry Seals	Total Cost	Savings	Savings (/m ³)	Savings (/ft ²)
Unshaded	6	\$4,971			
Crape Myrtle Tree	5	\$4,142	\$829	\$2.04 /m ³	\$0.19 /ft ²
Hackberry Tree	2.5	\$2,071	\$2,900	\$7.13 /m ³	\$0.66 /ft ²

Navy Pier

Chicago, IL

Reducing Urban Heat Island Effect





Reducing Urban Heat Island Effect

Chicago Riverwalk - GBU project planted in 2015



Improving Air Quality

Fenchurch Street - GBU project planted in 2015



St. Peter's Square

Manchester, UK

Improving Air Quality

Multiple Additional Benefits

There are many benefits of healthy urban trees that are often overlooked, because they are seen as too difficult to evaluate.

Improving
Health

Calming
Traffic

Encouraging
Exercise

Reducing
Urban Wind
Tunnel Effect

Protecting
Biodiversity

Reducing
Carbon

Providing
Shade

Noise
Abatement

A street scene with a large tree in the foreground and shops on the right. The tree is lush green and partially obscures the view of the street. The street is lined with various shops, including a Cex store and a Queen Nails store. People are walking on the sidewalk, and cars are parked along the street. The sky is clear and blue.

“

**Unlike most infrastructure,
mature street trees actually
increase in value
over time!**

”

**Investing in
urban trees means
investing in the
well-being of an
urban society.**





THANK YOU

Street Tree Cost Benefit Analysis

GET YOUR FREE DOWNLOAD TODAY!

bit.ly/roi-trees