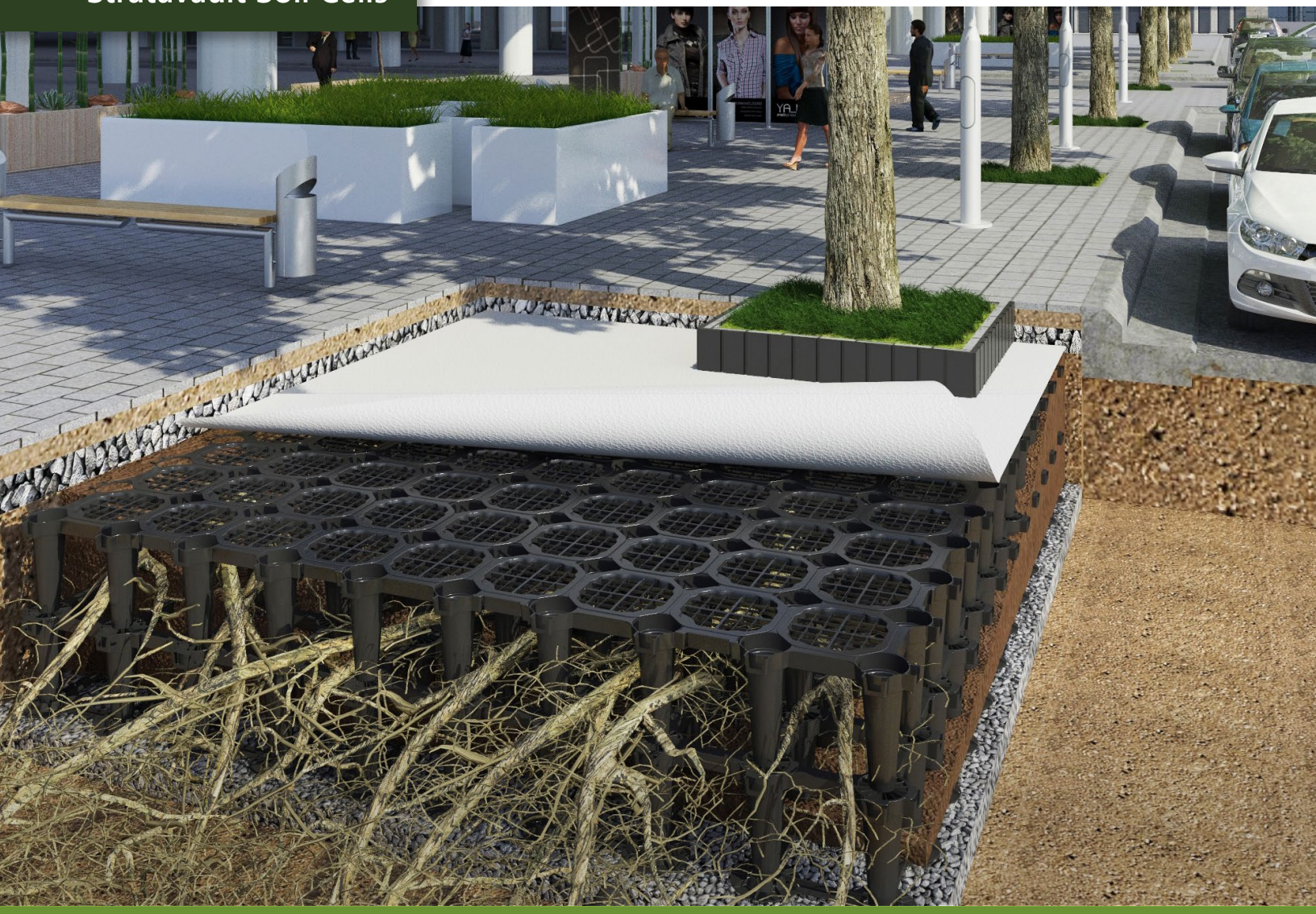
citygreen™
URBAN LANDSCAPE SOLUTIONS

# PROJECTS UPDATE

ISSUE 21 | Alberta, Canada

## Stratavault Soil Cells



### CASE STUDIES



### WHITE PAPER

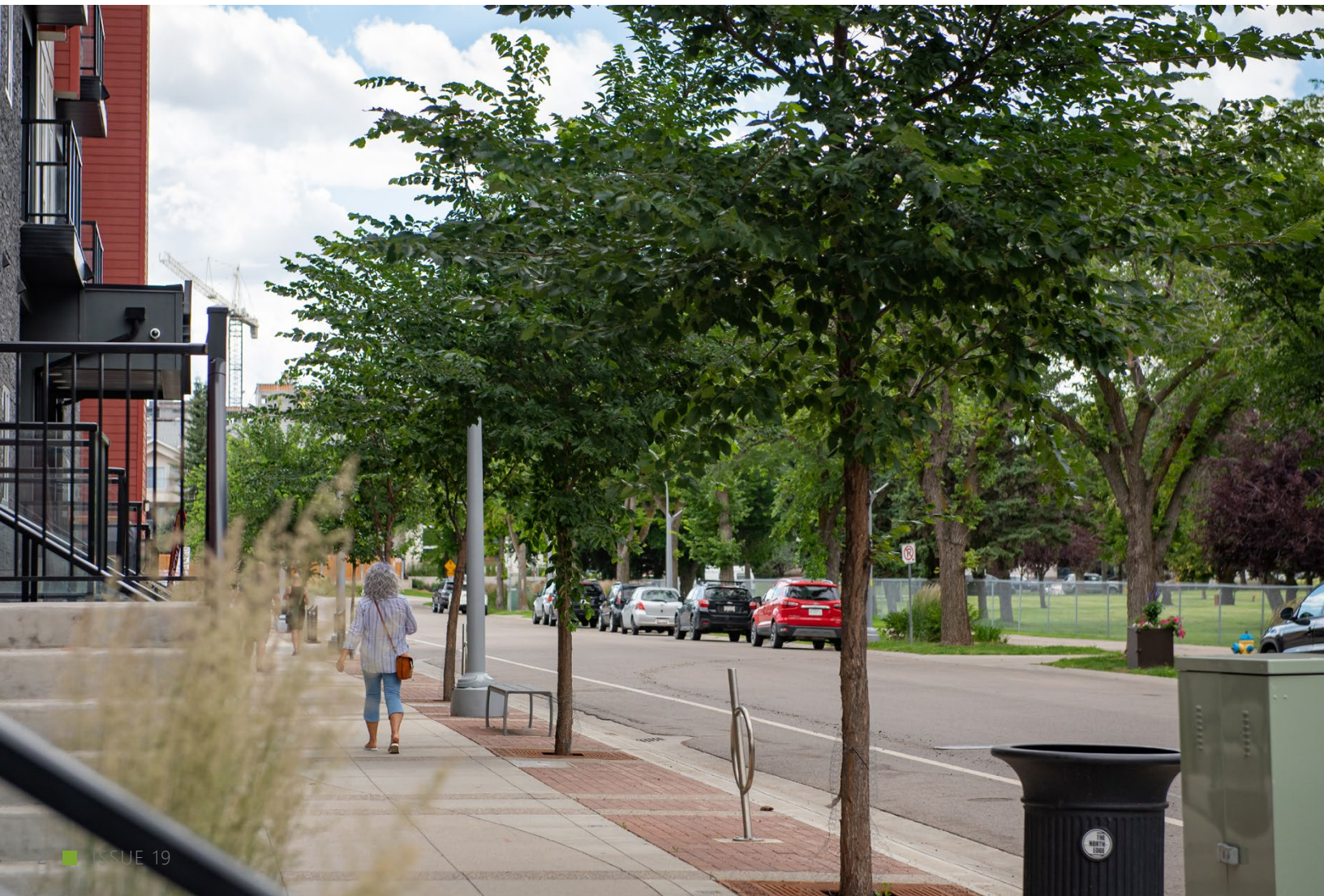
# The City of Edmonton revitalised its roads and established an urban forest with Citygreen's Stratavault™

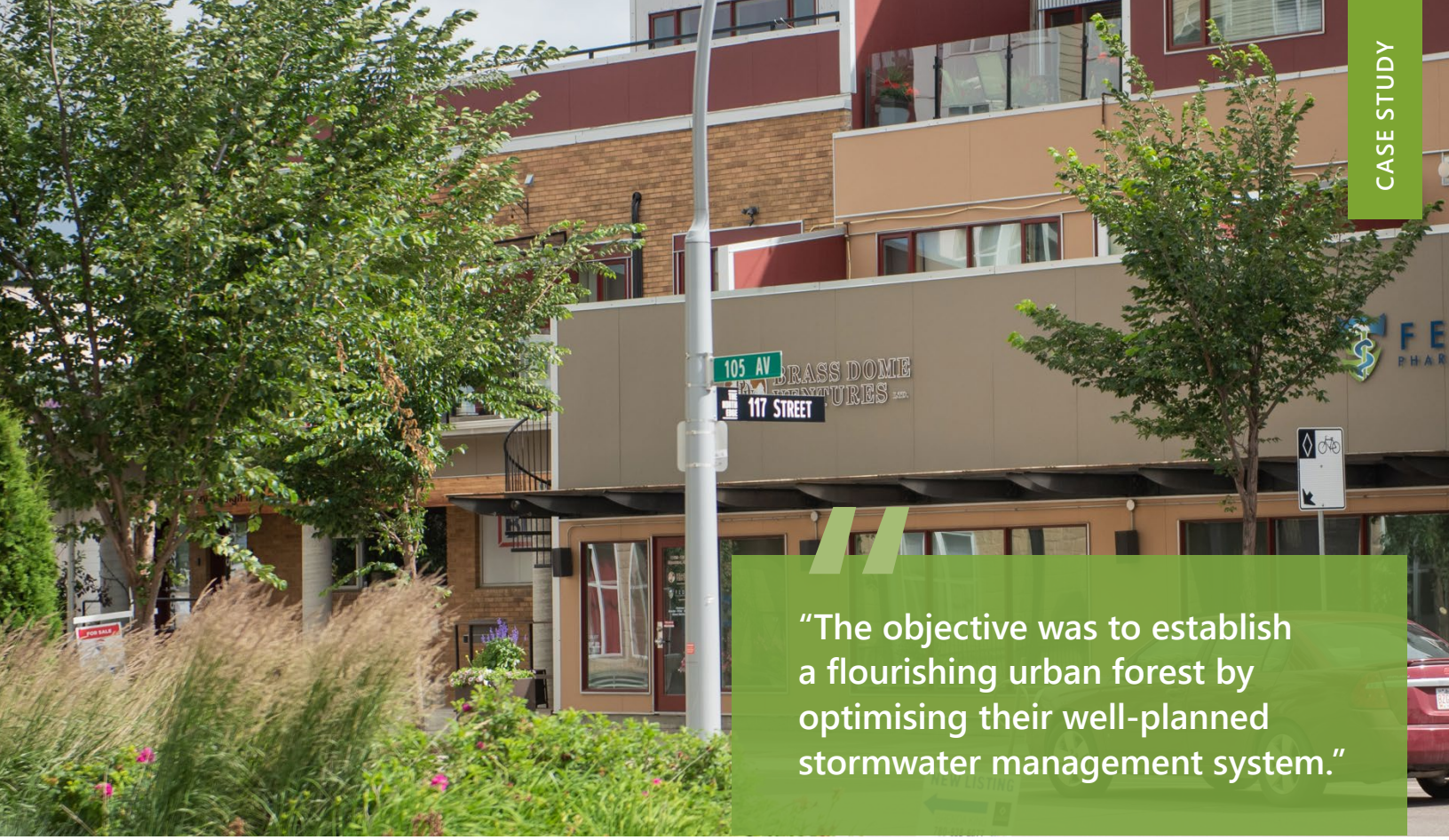
105th Avenue in Edmonton: Sidewalks and curbs were starting to fall into a state of disrepair.

The City of Edmonton is home to an impressive amount of infrastructure that was built prior to the 1970s. As a result, its existing streets, sidewalks and curbs were starting to fall into a state of disrepair.

The city's next generation wanted to undertake restoration projects to enhance their overall condition and preserve their streetscapes. In fact, Edmonton had already undergone several revitalisation projects in the past few years to restore parts of this infrastructure but a lot of this work was focused around the pipes/civil infrastructure and as a result the trees had a lack of soil volume for their root systems and were failing.

105th Avenue was designed by ISL Engineering, this project was different to most that had come before it as it not only had the necessary soil volume for the trees but also a progressive stormwater management system which was a significant upgrade for the city.



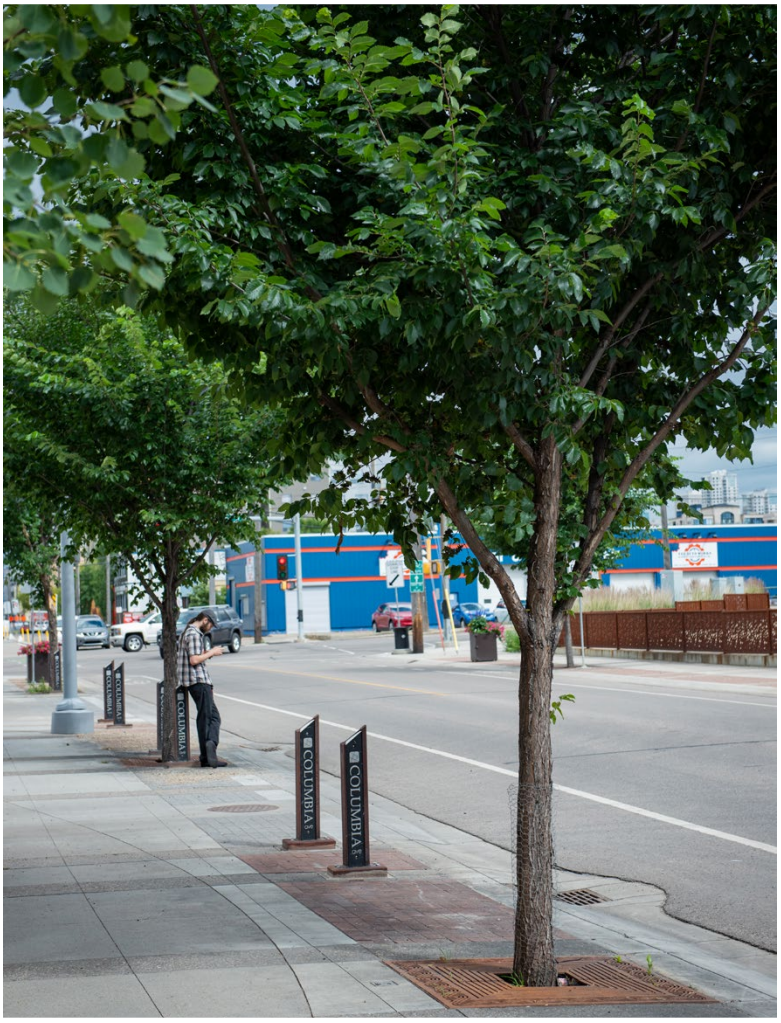


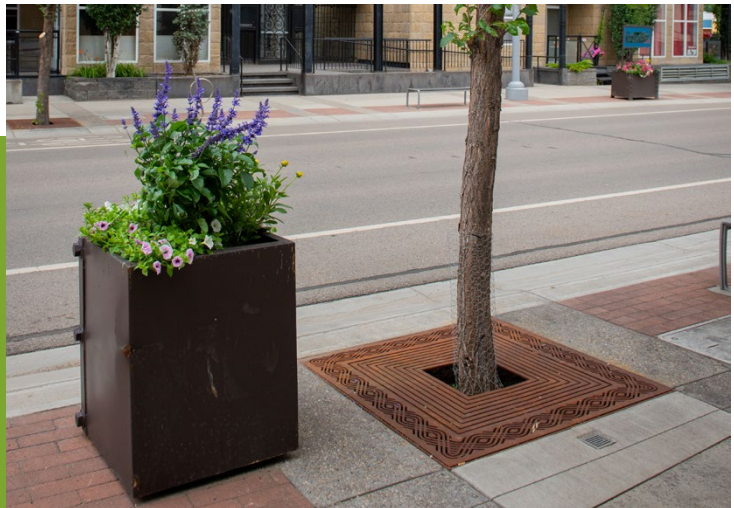

> "The objective was to establish a flourishing urban forest by optimising their well-planned stormwater management system."

## Project goals

By partnering with ISL Engineering, Carmack's (a large civil contractor), and Citygreen, (as an international leader in sustainable landscape systems), the project management team in Edmonton wanted to remodel the city's dull and aging streetscape into a modern and sustainable street that people would enjoy using.

To transform this city's grey space, the objective was to establish a flourishing urban forest by optimising their well-planned stormwater management system.



## Project solutions and methodology

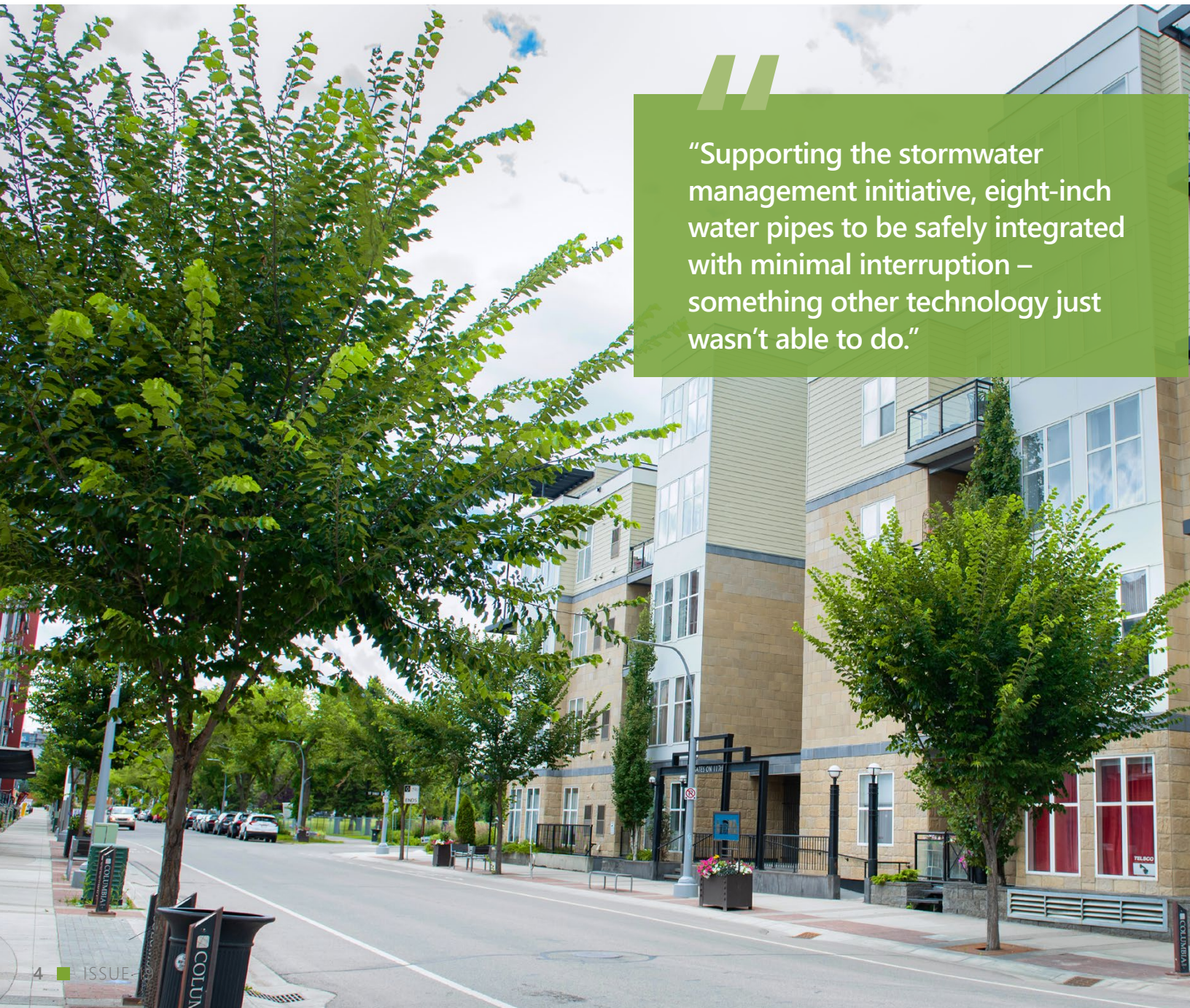
Citygreen's Stratavault™ soil cell system was identified as the most viable solution to meet the project's requirements.

Its open matrix design enabled tree roots to naturally grow and thrive in an oxygen-rich soil environment. Stratavault™ also allowed rainwater to be properly absorbed and redirected, which made sure the trees received the right amount of irrigation.

Supporting the stormwater management initiative, Citygreen's innovative solution also permitted the unhindered installation of water pipes and all necessary subterranean construction by offering the ideal structural integrity to overcome the weight of traffic above.

In fact, Citygreen's Stratavault™ made it possible for 200mm, eight-inch (8") water pipes to be safely integrated with minimal interruption – something other technology just wasn't able to do.

The City of Edmonton also took advantage of the low installation Stratavault™ offers. Stratavault™ is made up of 100% recycled plastic for sustainability purposes and requires no additional unique tools or specialised labour. This meant that there was no added budget required for the project.



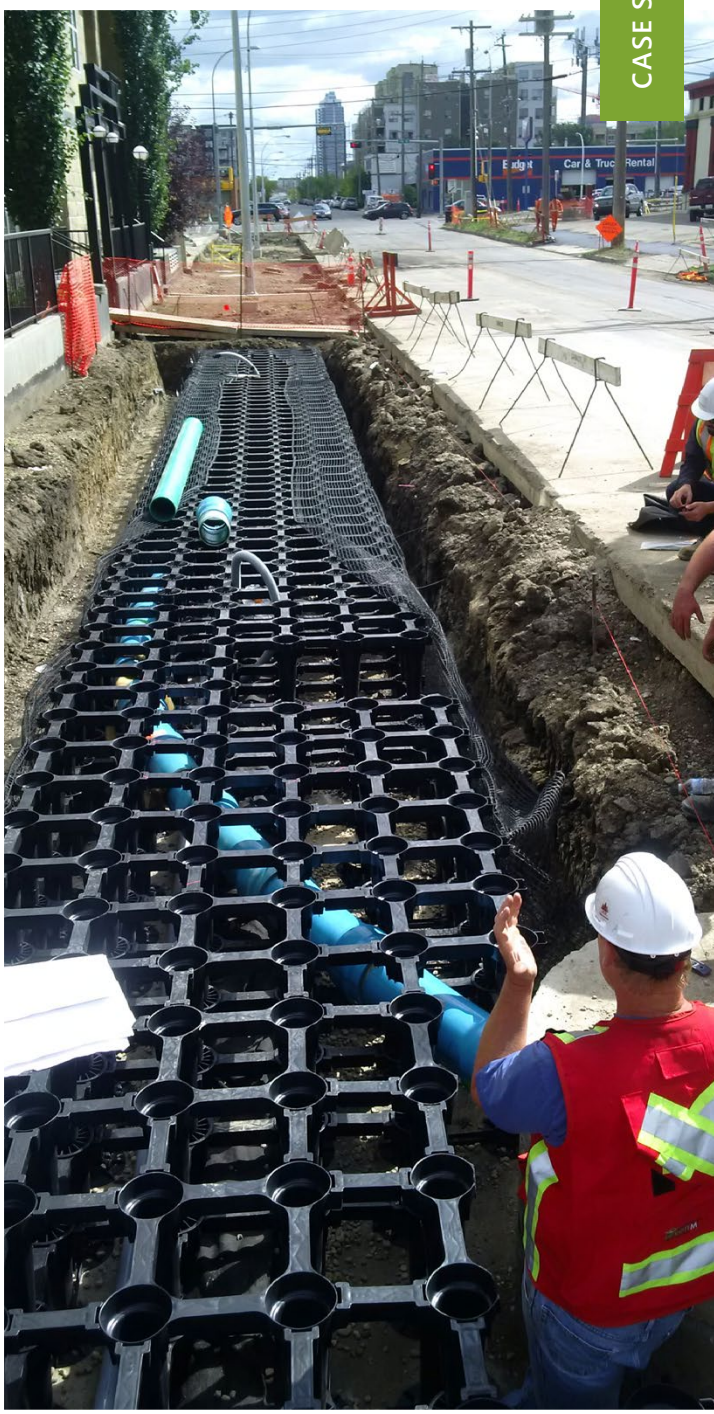
> **"Supporting the stormwater management initiative, eight-inch water pipes to be safely integrated with minimal interruption – something other technology just wasn't able to do."**

## Project outcomes

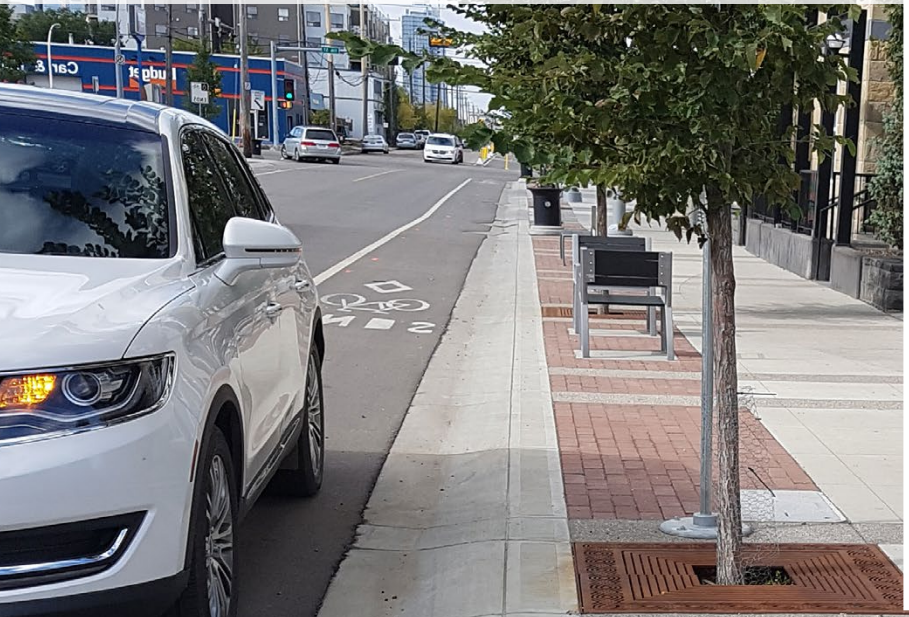
Due to Stratavault™'s seamless integration and cutting-edge technology, Edmonton's project management team hasn't encountered any issues with the installation of the tree pits since the project's inception in May 2015.

Just like its connected matrix design, Stratavault™ has been interconnecting streets and communities by providing healthier trees that enhance a city's beauty and reliable stormwater management systems that improve the community's quality of life.

This is all made possible by Citygreen's mission to deliver the best urban landscape solutions. Our goal is to transform the world into a greener place – one city at a time.



*Stormwater run-off enters the tree vault via the catch basin, for treatment and flow*

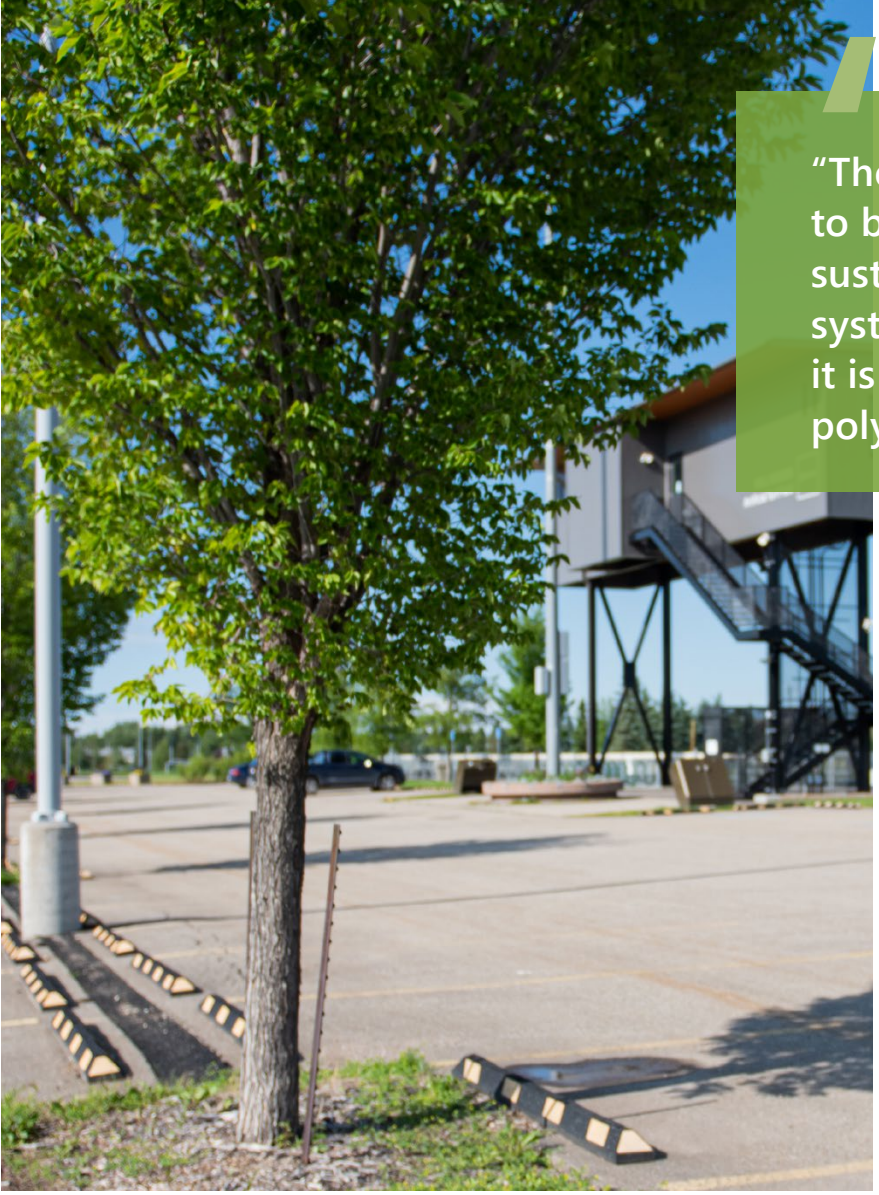


# Mill Woods trees create shade and irrigation benefits for the City of Edmonton with Citygreen's Stratacell™ system

The City of Edmonton wanted to enhance its purpose-designed community, Mill Woods, with tree pits to provide a filtered retention area for stormwater.

This community on the Southside of the city of Edmonton, AB were putting together a new park which promised to be a hub of activity for the community and had an array of amenities including several sports fields (natural and synthetic), a recreation centre and one parking lot with a difference. Stantec Engineering designed the park, and the scale was significant, and the use of innovative materials was welcomed by the residents and users of the facility.

The parking lot is attracting a lot of attention, it was the first project in Edmonton to use "Strata cell" or "Soil cell" technology and now the results eight years after the installation are staggering.



> **"The City of Edmonton wanted to be an active advocate for sustainability, the Citygreen system was the ideal solution as it is made from 100% recycled polymers."**

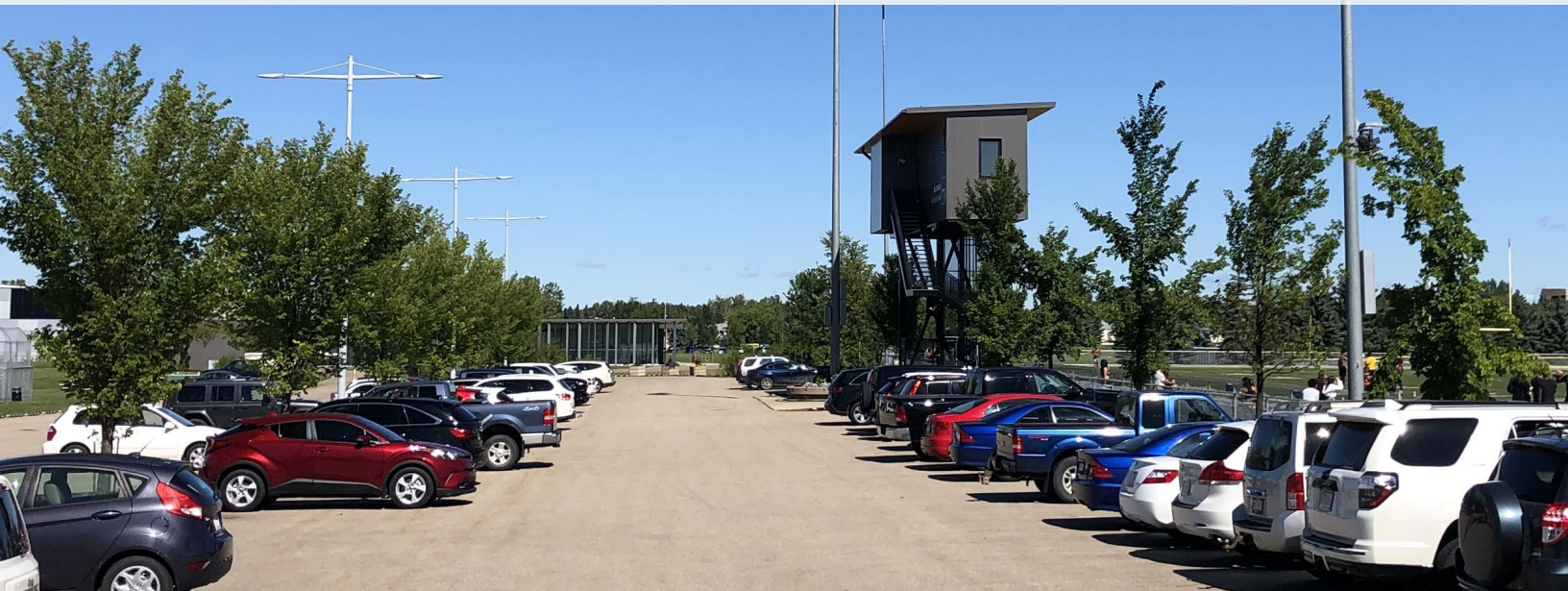
## Project goals

Aside from making sure the trees in the parking lot thrive, they intended to utilise tree pits to provide a filtered retention area for stormwater. The filtered stormwater would then be directed to the community's recreational lake to provide irrigation to the surrounding sports fields within the 40-hectare site.

They also intended to take advantage of the Citygreen system to ensure the six trees planted in the parking lot would have sufficient soil volume – ensuring that these trees would grow successfully to beautify the aesthetics and provide the necessary shade.

## Tree Comparison

The same trees have been planted at the same time for comparison, using two different methologies. Trees on the left have been planted in StratacellTM module, trees on the right have been planted in open grass verge. Photo taken in September 2020.



## Before vs After: Planted in Citygreen's Stratacell™ Modules

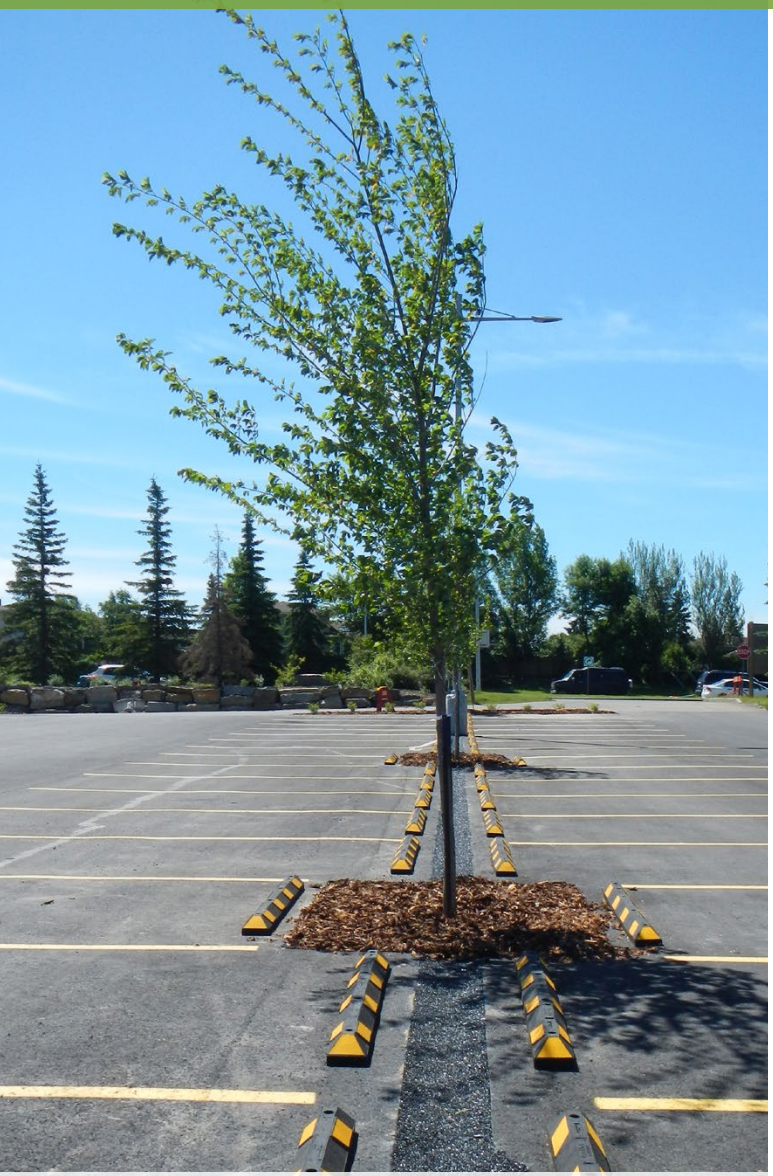


*Photo was taken after tree has been planted in 2012.*

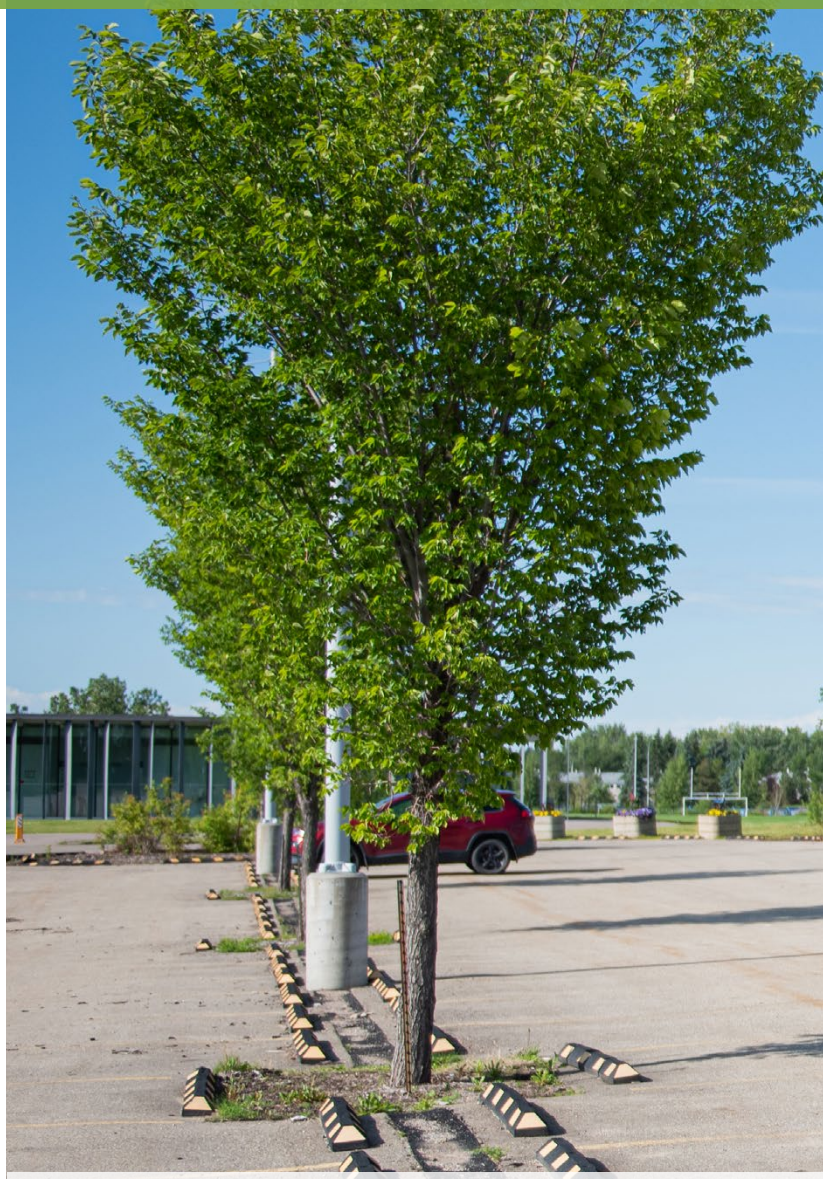


*Photo has been taken in September 2020*

## Project solutions and methodology

Bearing in mind the goals for the Mill Woods project, Citygreen identified the Stratacell™ system as the ideal solution.

Citygreen consultant, Kirsty McIntyre, cited that the high load-bearing qualities of Stratacell™ would be able to support the trees planted around the parking lot successfully. It would also increase their soil volume while allowing for stormwater retention.

**For the water harvesting aspects of the project, this involved the following:**

1. Utilising a permeable surface, the water runoff is draining into the parking lot's centre.
2. The Stratacell™ system, equipped with washed rock, will filter and store through the water through the matrix
3. Water run-off is directed to a perforated pipe linked to the storm sewer. This channels the water into the SWM pond located on the southeast side of the park.
4. The perforated pipe transfers more water underneath the trees and into the storm line.

## Project outcomes

To track the effectiveness of the Citygreen system, some trees in the grassed area to the West of the parking lot were planted without using the new technology. Surely if the trees in the Stratacell could grow to be close to the size of the ones planted in the lawned area, the project would be a success.

In as little as eight years, the City of Edmonton is now witnessing excellent and physically noticeable results from Citygreen's solution.

Mill Woods trees planted with Citygreen system have a fuller canopy and uniformity of branches, compared to the general soft landscaped trees. With the right drainage and oxygenation system, the trees have grown to be much larger and capable of providing sufficient shade to the parking lot.

Furthermore, the recreational lake is getting maintained due to the filtered stormwater that the Stratacell™ system facilitates.

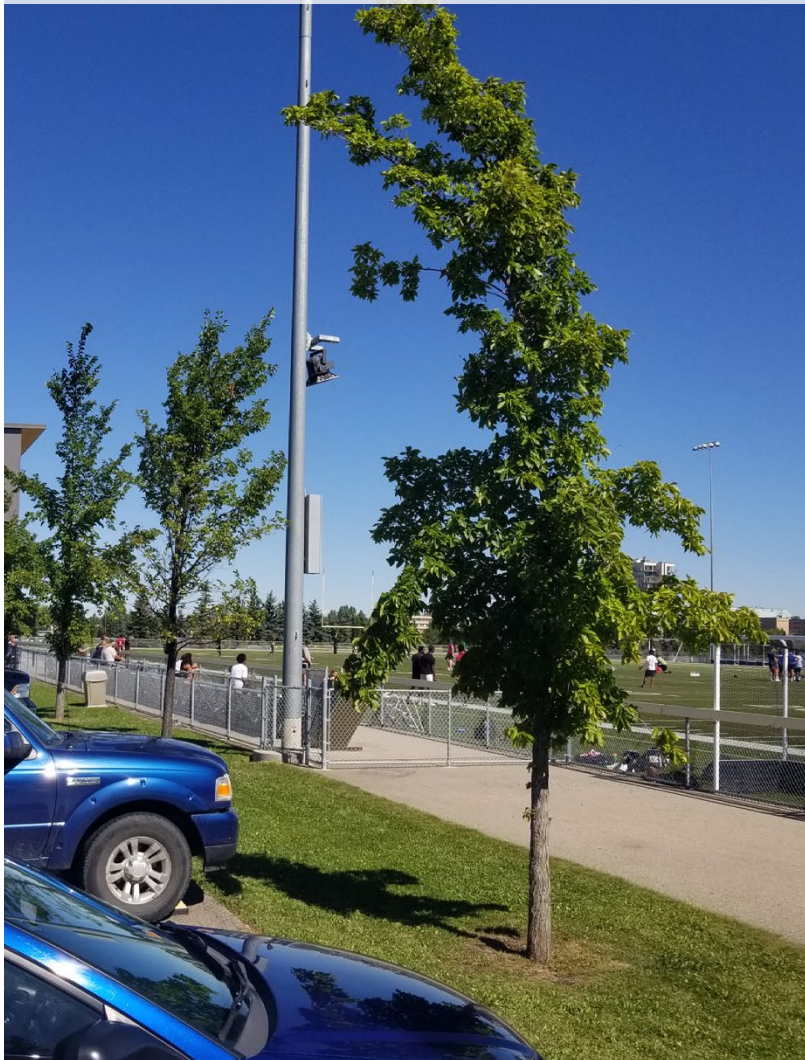
This case study demonstrates how Citygreen provides effective, long-term solutions that help you fulfil your sustainability and urban growth goals while making your city greener, healthier and better than before.

See the results for yourself - these trees speak for themselves.

## Before vs After: Planted without soil cells in open grass verge

*Photo was taken after tree has been planted in 2012.*

*Photo has been taken in September 2020*

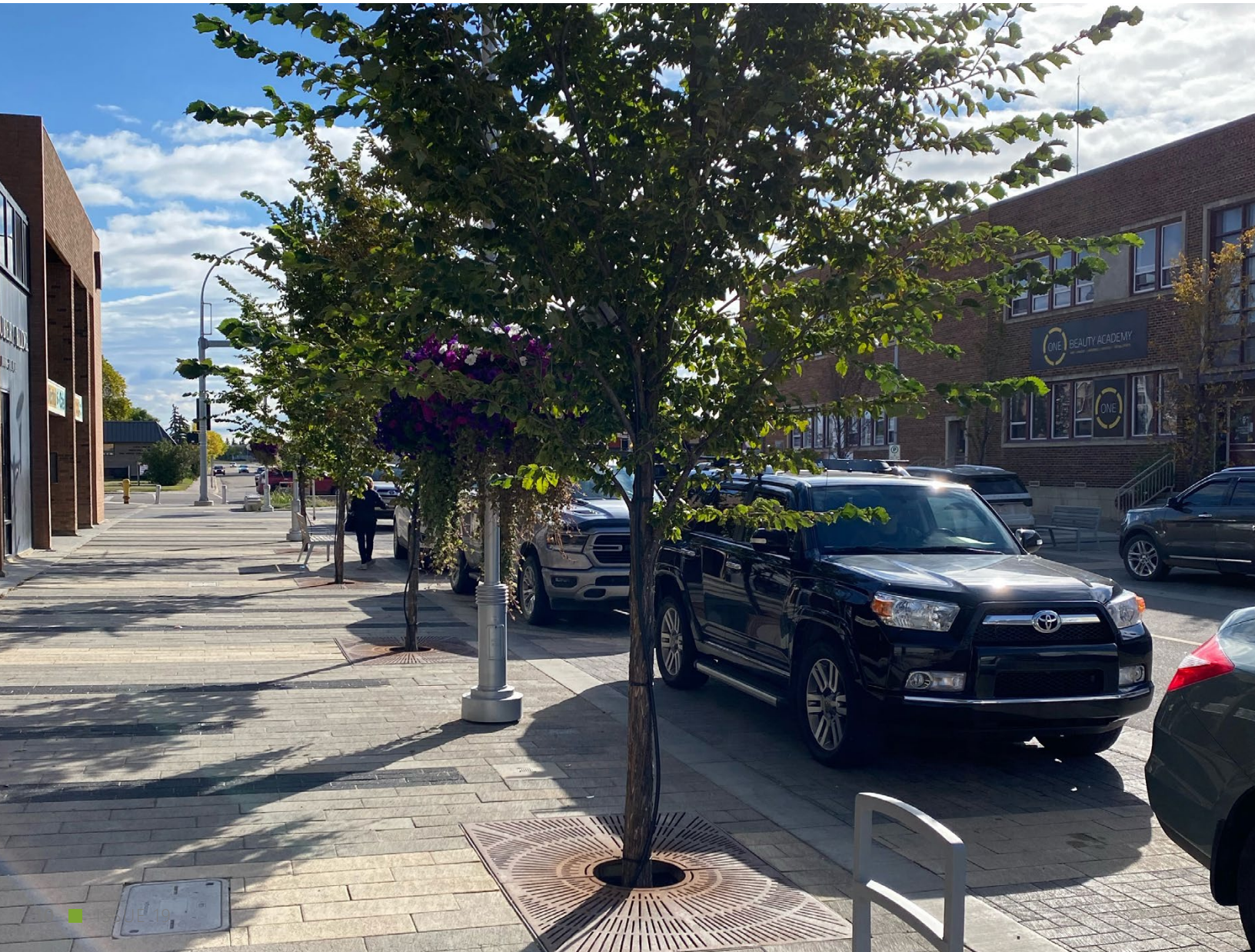


# Citygreen's Stratavault™ solves the spatial restrictions for Grande Prairie redevelopment

The City of Grande Prairie is encouraging healthier urban tree growth despite the spatial challenges present within the city.

The City of Grande Prairie is located in North-western Alberta, Canada. It has a population of 69,000 residents from over 80 different cultural and ethnic groups, creating a city with a vibrant and collectively diverse culture.

To beautify the area and create a healthy environment for its citizens, the local City Council launched several rehabilitation projects between 2016 to 2018.



## Project goals

Growing trees in urban environments has always been a challenge – healthy soil is scarce, there are aeration and irrigation concerns and trees struggle to thrive without damaging sidewalks and infrastructure.

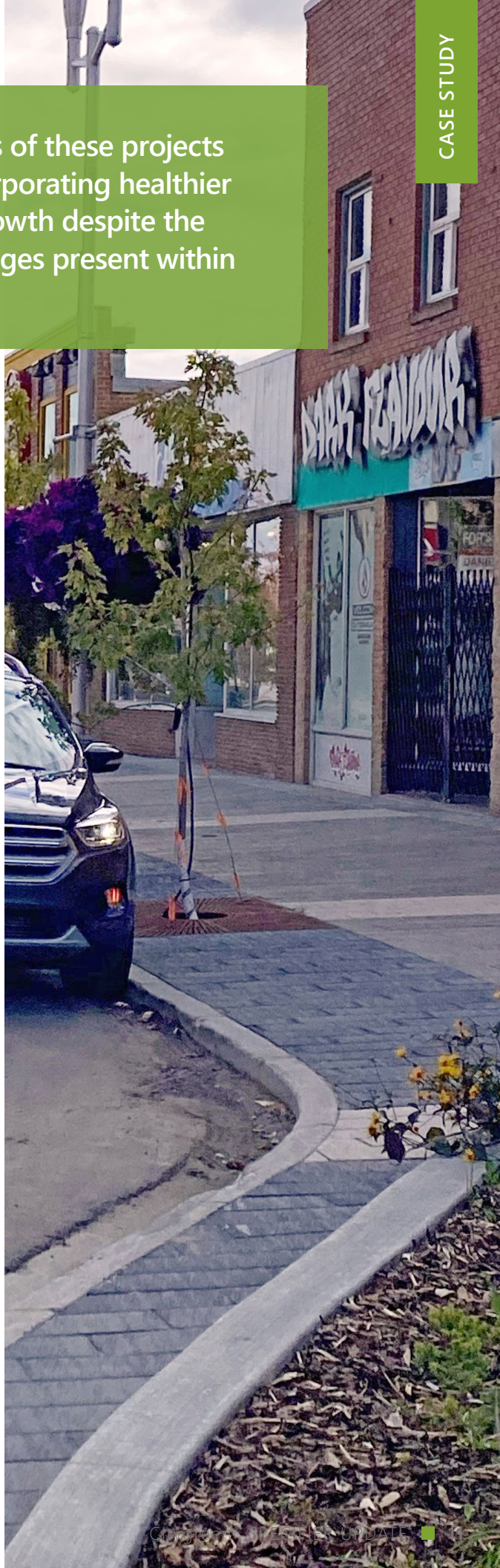
> **The objectives of these projects included incorporating healthier urban tree growth despite the spatial challenges present within the city.**

The City of Grande Prairie knew that they needed to branch out of their usual planting methods and look for a more innovative solution that offered a better approach to support tree growth without causing risk to other structures.

Conor Coney, the City of Grande Prairie's Project Sponsor for these assignments, said, "Our Engineering Consultant and Landscape Architects (ISL Engineering) outlined that the only way that trees would successfully establish and grow in an urban downtown environment with spatial constraints would be to install them in a soil cell structure, whereby tree roots would have sufficient area to spread and grow and be able to have a secure supply of air and water."

Taking this into account, the city's urban tree planting project aimed to:

- Utilise durable soil cell system in planting trees
- Maintain a large space for tree root growth and service integration
- Minimise transportation costs
- Achieve an affordable installation cost for the soil cell structure

## Project solutions and methodology

The project contractors of Grande Prairie selected Citygreen's Stratavault™ system as the most viable solution to their project for several reasons.

For one, Stratavault™ utilised soil cells to provide trees with the necessary soil volume and irrigation lines needed for healthy growth.

Jeff Schurek, Manager of Landscape Architecture at ISL Engineering, also explained why they thought Stratavault™ was the better option compared to other alternatives.

> ***"Soil cells have significantly lowered costs than soil trenches bridged by structural slabs. They also contain growing medium, which is superior to structural soils".***

Most importantly, the features of Stratavault™ were well-aligned with the objectives of the project, including:

1. **The project aimed to use only the most durable soil cell system:** While it is made up of 100% recycled plastic, Stratavault™ is the world's strongest soil cell without relying on any steel bars, glass reinforcement or virgin resins. It also passes several crush tests and quality testing.
2. **The project was intended to reduce transport and installation expenses:** Stratavault™ has been engineered to achieve major reductions in installation costs. It is also designed to minimise volume and shipping expenses.
3. **The project's main goal was to enable the healthy growth of trees:** Stratavault™ facilitated an effective "architecture of the soil" that is conducive to root growth, while also providing support to surrounding pavements. Through this, trees can flourish beautifully without damaging infrastructure.

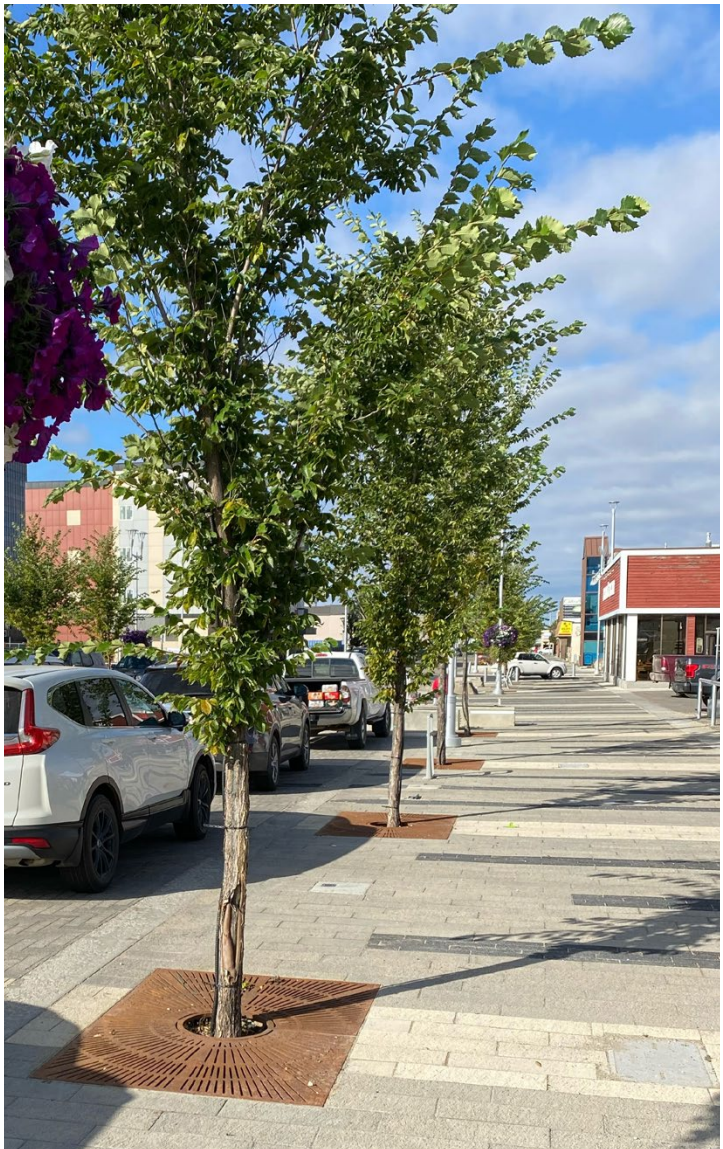
## Project outcomes

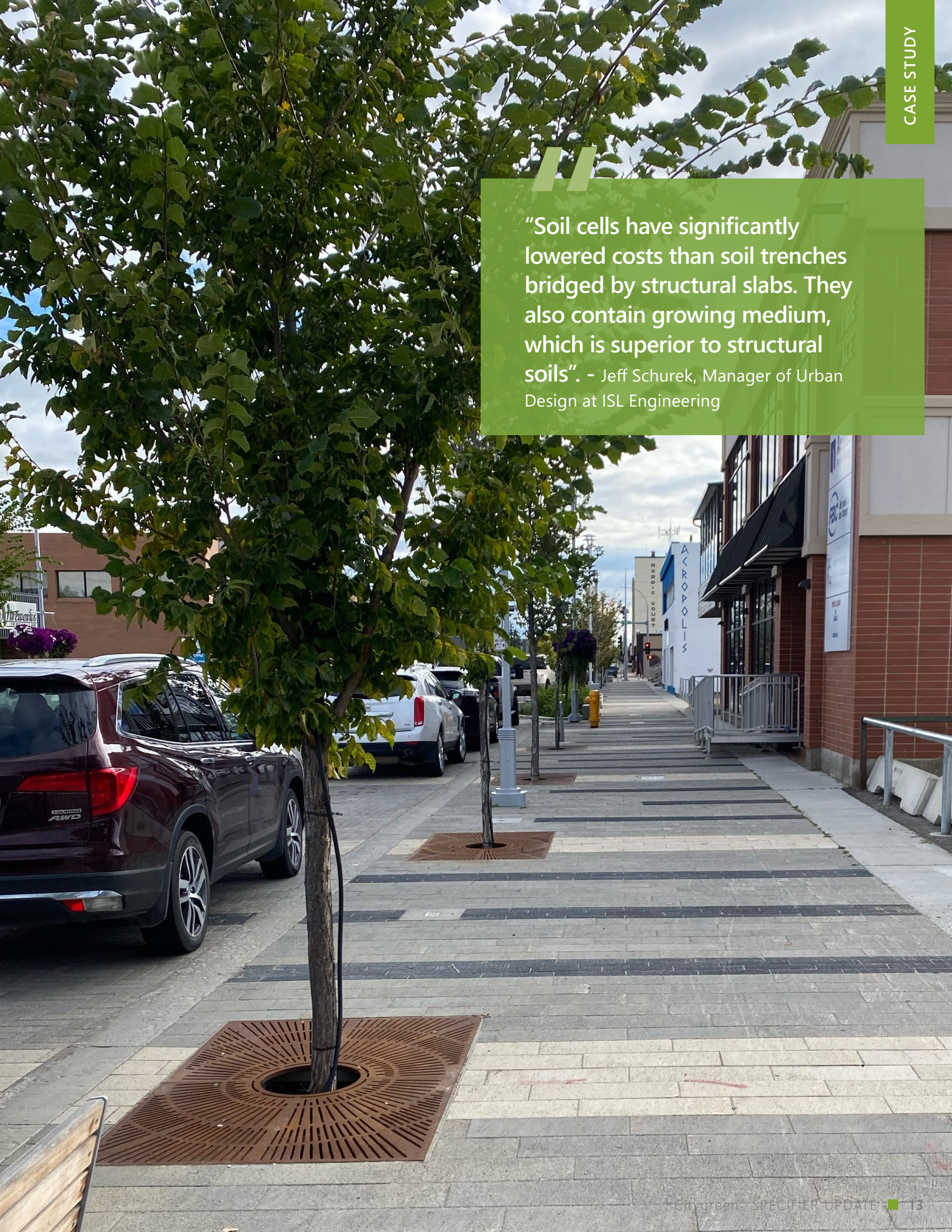
Citygreen's Stratavault™ has enhanced the overall appearance of Grand Prairie by making it possible for Elm, Ash, Maple and Liden trees to thrive and survive in the city.

Residents are now able to enjoy their greener outdoor surroundings, appreciate nature and participate in activities under the cool breeze and shade of healthy trees.

Due to this initial success, the Stratavault™ system was also implemented in Phase 2 and 3 of the Grande Prairie's rehabilitation project - with phase 4 to be installed in 2021.

At Citygreen, it is our mission to continuously sustain urban ecosystems. Through our innovative solutions, the City of Grande Prairie won't be the only city we help transform into healthier, greener spaces.



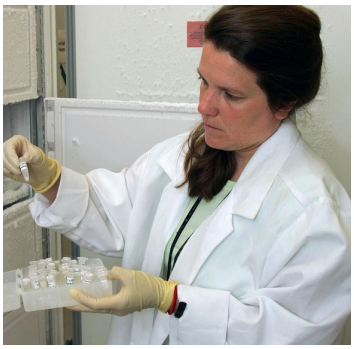


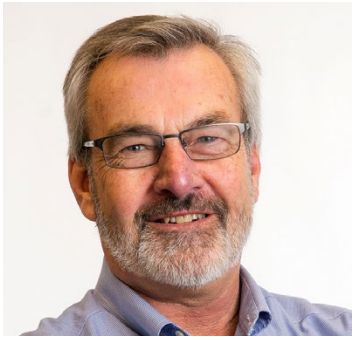

> **"Soil cells have significantly lowered costs than soil trenches bridged by structural slabs. They also contain growing medium, which is superior to structural soils". -** Jeff Schurek, Manager of Urban Design at ISL Engineering

# Conservation of our Urban Forest Health and Sustainability via Tree Genetic Diversity

by Cynthia Morton and Phil Gruszka

An urban environment rich with trees is highly valued for its aesthetic qualities as well as its environmental benefits, such as reducing summer cooling costs, carbon sequestration, intercepting airborne pollutants, reducing storm water runoff and promote habitats for native wildlife. In the United States, urban forests are estimated to contain about 3.8 billion trees, with an estimated structural asset value of $2.4 trillion (Nowak et al. 2002). Billions of federal, local and private dollars are being spent annually on management, labor, and the trees themselves as part of tree revitalization projects, and millions more are being spent by individual homeowners to improve their environment and property values. An important criterion for selecting trees to be planted is diversity: biodiversity and genetic diversity. Researchers of urban forestry refer to urban biodiversity as the 10-20-30 rule (Galvin 1999; Santamour 1990).





This rule states that not more than 10% of the urban forest should be of the same species, no more than 20% should be of the same genus, and no more than 30% should be of the same family. Genetic diversity refers to the diversity or genetic variability within a species. Each individual species possesses genes which are the source of its own unique features. Similary, human beings are all the same species but we all look different from each other. A lack of genetic diversity in individual species of trees reduces the genes available; as a result, unique features of the species are no longer present, even its resistance to diseases and thereforeindividuals looks alike. Genetic diversity is epically important for trees because of their long live spans and the unpredictability of future pests, pathogens, climate, and environmental quality. By selecting tree composition for the maximum biodiversity and genetic diversity, the trees will have a greater chance of surviving for longer periods. Unfortunately, the last few decades have seen a movement in the opposite direction: cultivation in order to achieve uniformity. Recently, some biodiversity measures have been implemented; however, despite this multi-billion dollar urban tree economy , little work has been done to understand urban tree genetic diversity as an issue of vulnerability, or to examine the long-term impacts of urban tree genetic diversity on the sustainability of the urban environment.

Work conducted by Cynthia Morton, PhD and Phil Gruszka, in 2008, compared the level of genetic variation in London Plane trees already existing in the Pittsburgh area with trees of the same species currently available from three commercial nurseries. The genetic diversity was far greater in the older urban tree samples compared to that of the nursery samples,

indicating that the nursery industry has been selectively cloning to produce new trees. While cloning trees is in itself a benign practice, doing so on a mass scale without a proper understanding of the implications of drastically reducing the genetic diversity of urban forests is ill-advised and potentially creating an area for natural disaster.

Morton and Gruszka's initial research led to enquiries for information about other commonly-grown nursery tree species and cultivars. The paper entitled "Popularity of tree species and cultivars in the United States" (Nowak 1992 and updated in 2006) lists the top ten species sold by nurseries in the United States and in which major geographic region they are sold. Almost all (eight of the top 10) of these nursery stock trees are grown throughout the United States and not just in one or two regions.

In early 2010, Dr. Morton conducted a telephone survey throughout the U.S. and discovered that most regional nurseries buy from wholesale growers located in Washington and Oregon. After this telephone survey was completed, Dr. Morton contacted the wholesale nurseries in Washington and Oregon and asked how 5 of the top 10 species of trees were grown. Their response indicated that almost all were cloned. We can conclude, then, that selective cloning to produce new trees is currently a common practice for most nurseries across the United States.

The Morton and Gruszka study found that the genetic diversity was greater in the older urban tree samples compared to that of the nursery samples. The existing older urban trees are approximately 100 years old and were originally planted from seeds or seedlings, representing decades of natural testing for resistance. Clearly, existing older urban trees are a great resource for increasing nursery diversity.

Some local groups, such as Tree Pittsburgh have begun growing trees from seed, but a much larger effort will be required to change the availability of such trees on a scale needed to supply the entire country.

Lohr (2013) conduct a survey on plant diversity distributed to wholesale nurseries in Washington State which showed that most respondents were aware of the issues, but lacked an in-depth understanding of them. The respondents reported that lack of consumer demand was an issue. Those with more education exhibited a deeper understanding of the risks from low diversity among landscape plants. In summary, Lohr found that more education is needed for people in the green industries on why biodiversity and genetic diversity among landscape plants are vital.

Morton has sought funding from several federal agencies for a project that would share cuttings and seeds from tested genetically diverse hardwoods with nurseries for the development of new and hardier cultivars. Several large nursery have even written letters of support for this research, but so far no funding has emerged.

A greater understanding of urban tree genetic diversity will allow policy makers, city planning and environmental agencies, and the nursery industry to make informed decisions and recommendations to improve practices for maintaining a robust tree landscape for the future.

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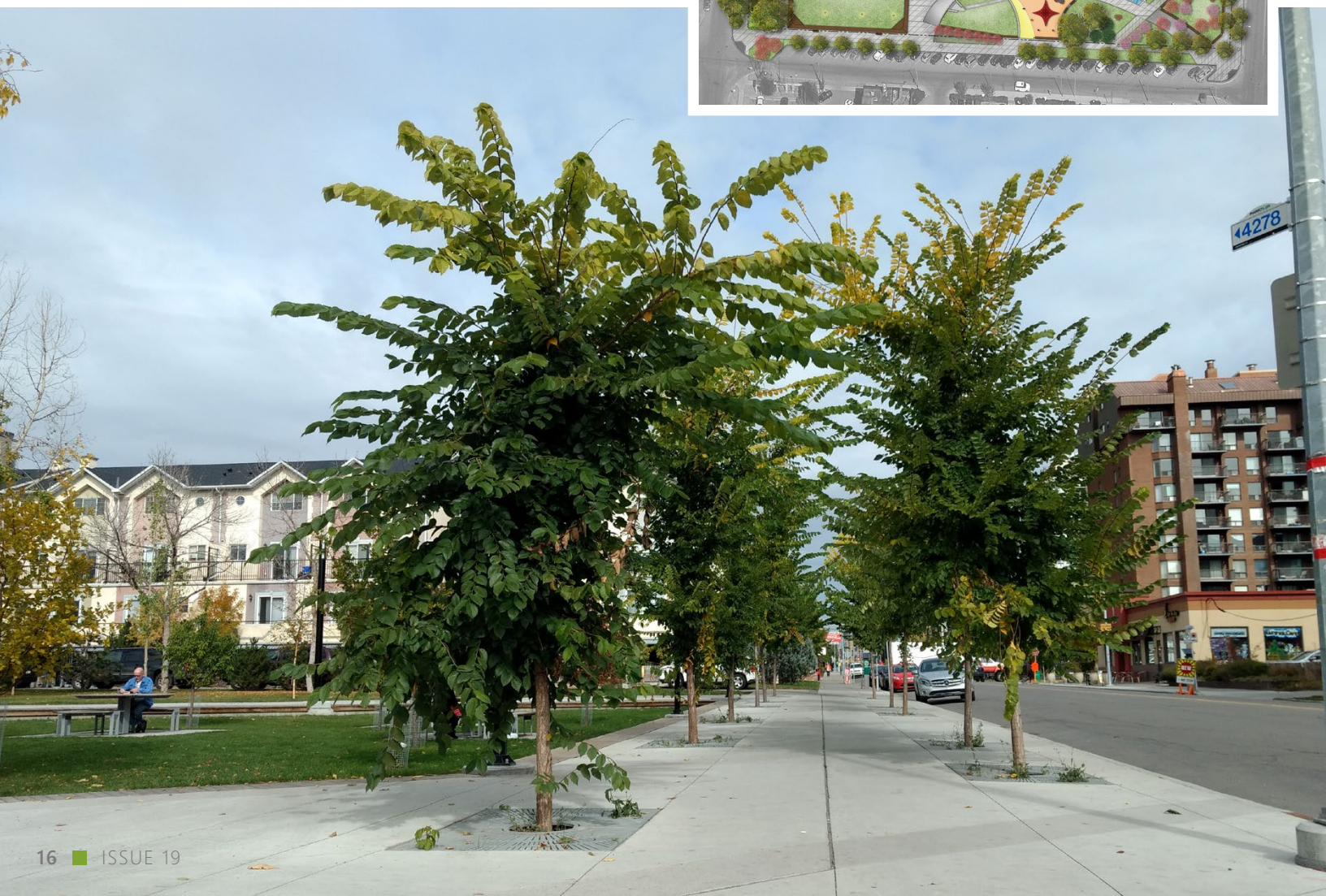
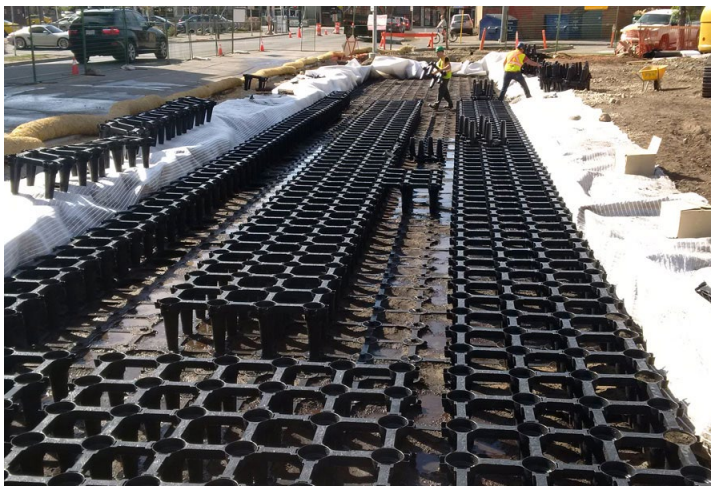
# Trees planted in Citygreen's Stratavault™ growing strong at Thompson Park in Calgary

When the bowling club moved to a new facility, the City recognised an opportunity to green the area and create one large park.

Thomson Family Park is a thriving urban park situated in West Connaught in Calgary, Canada. The space was first recognised as a park in 1929, when the site was developed for use as a lawn bowling green. It became home to the heritage listed Calgary Lawn Bowling Club before being redeveloped in 2016. Today, it is a publicly accessible park that provides visual appeal, economic benefits and an abundance of green space to the local community.

Citygreen played a pivotal role in the park's transformation, working with Ground Cubed landscape architects, to create a functional, beautiful space that continues to delight the community three years after installation.





## Project goals

Before the redevelopment, the Thomson Family Park site was lacking green space, meeting only 30% of the City of Calgary's open space targets. When the bowling club moved to a new facility, the City recognised an opportunity to green the area and create one large park.

As well as reflecting the community's desire for a new public space, the project aimed to:

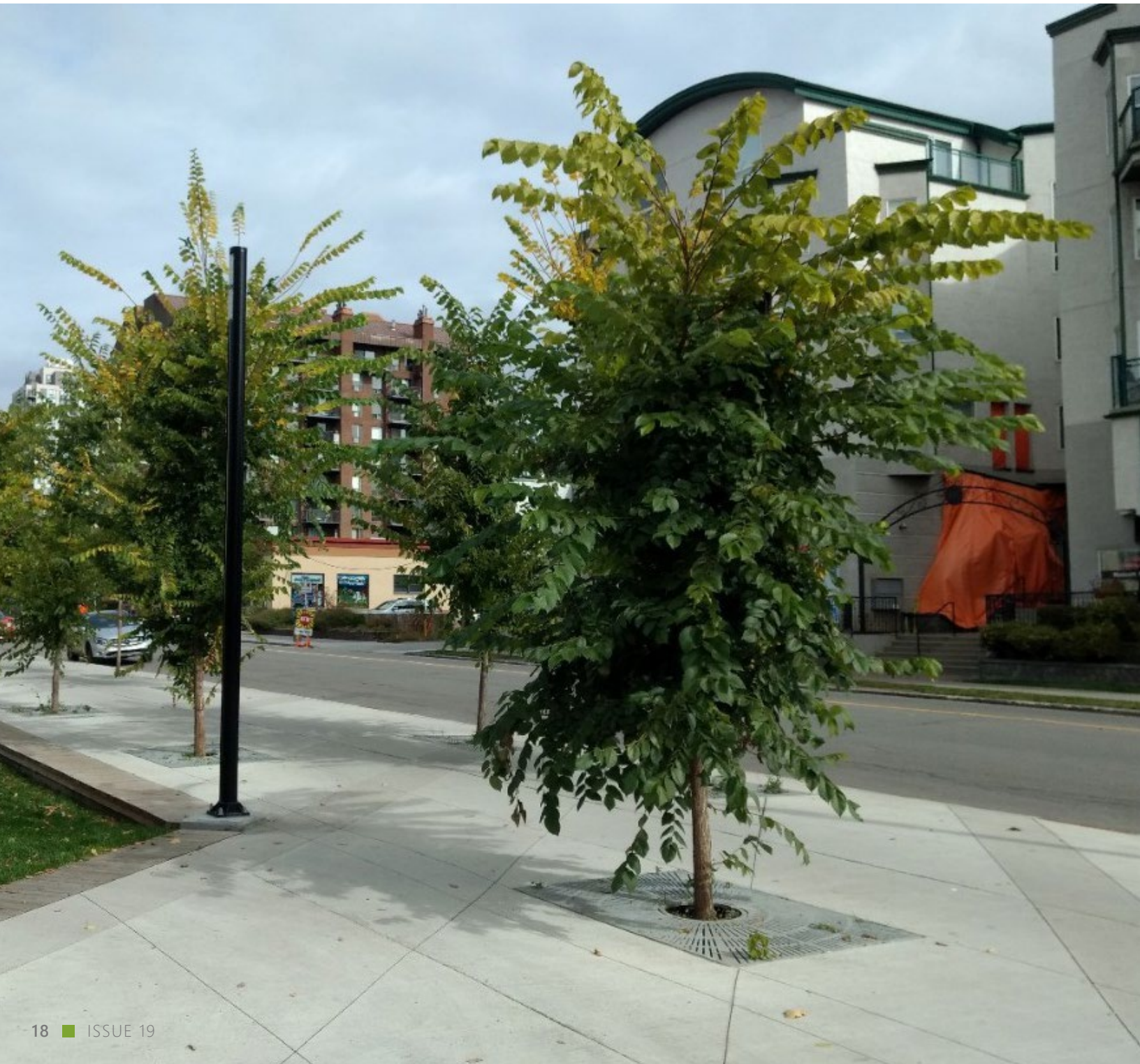
- Maximise use of the site, while honouring the park's history
- Increase shade and air filtration with healthy tree canopies
- Implement stormwater distribution and retention systems
- Combine LID infrastructure using 100% recycled sustainable solutions
- Reduce the load on the City's municipal sewer system
- Add value to the site and surrounding area

## Project solutions and methodology

Citygreen's Stratavault system was chosen for its ability to maximise soil volume for healthy trees to grow. With its incredible strength and lateral load distribution, Stratavault was also able to support the weight of the sidewalk in this high traffic area – a critical requirement for this project.

Stratavault soil cells were installed by Alpha Better Landscaping along the park's sidewalk on 11th Street. The photograph below shows the compacted subgrade, with the sub-drain running centrally through the tree-pit. The clean-out for this drain rises through the cells at the end.

Once the Stratavault cells were installed and back-filled with soil, stormwater distribution pipes were positioned at two parallel locations through the upper level of the cell matrix. The large apertures in Stratavault cells made this process easy, with no need to remove any part of the structure.



# LOCALLY DISTRIBUTED BY NORWOOD WATERWORKS

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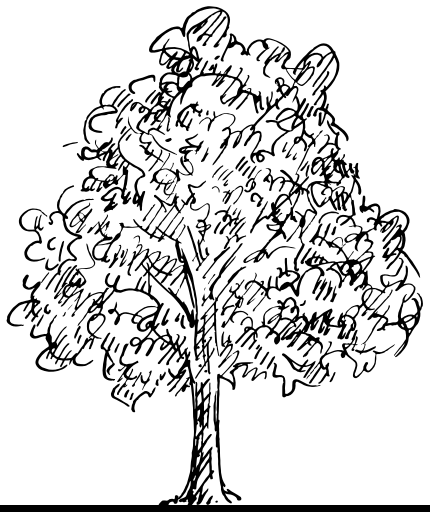

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# Engineered Systems for Large Healthy Trees and Effective Stormwater Treatment

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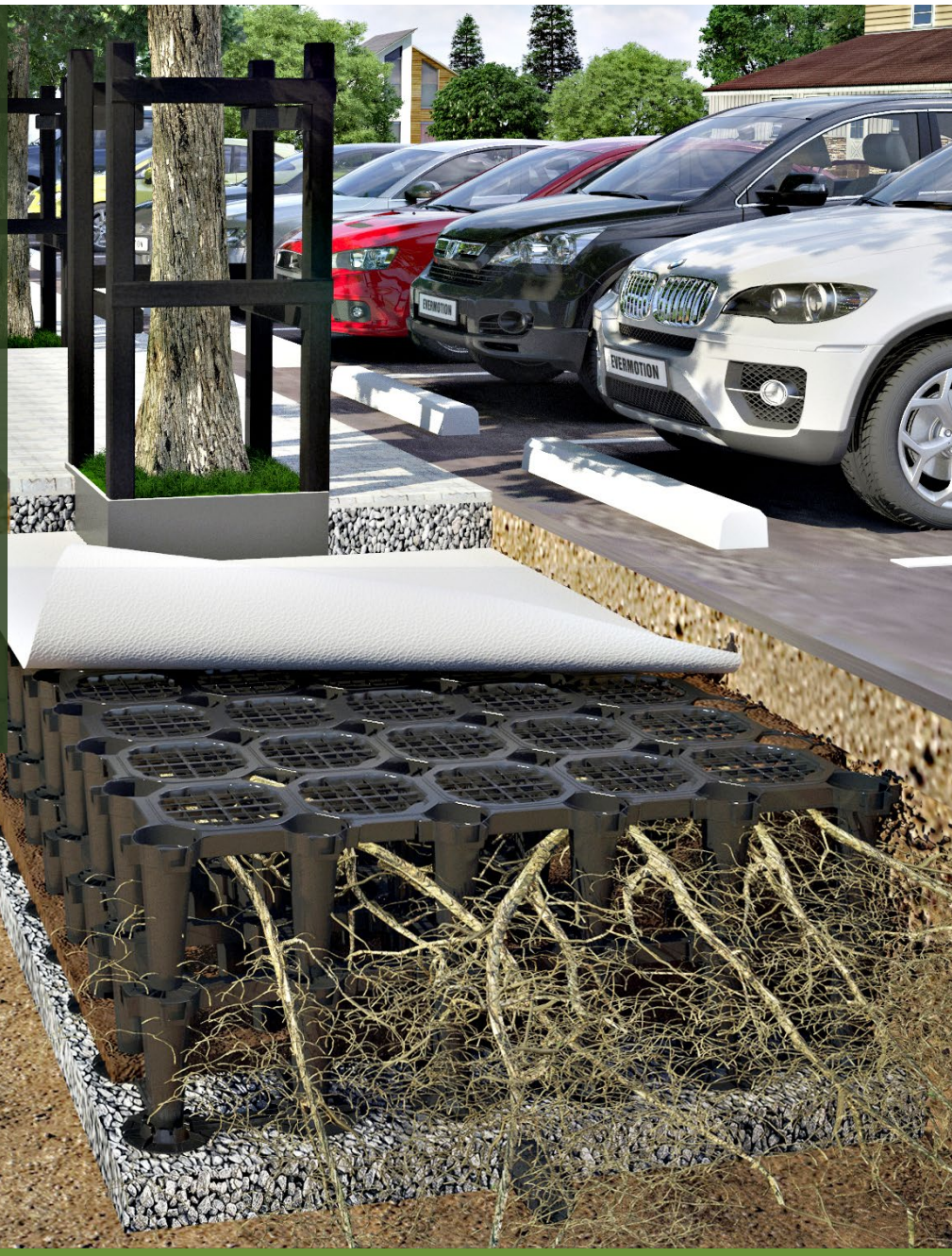


WATER HARVESTING TECHNOLOGY

MADE FROM 100% RECYCLED MATERIAL

citygreen
URBAN LANDSCAPE SOLUTIONS


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