UTAH FOREST FACTS

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UtahStateUniversity FORESTRY EXTENSION

Tree/Sidewalk Conflicts: One Way to Save Trees

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This factsheet describes a project undertaken by USU Forestry Extension and the City of Logan, Utah, to replace damaged sidewalks with flexible sidewalk panels made from 100% recycled plastic. These tiles allowed trees and most tree roots to remain intact. We explain the project methods, as well as the pros and cons of undertaking such a project. These materials and methods have the potential to change sidewalk and urban tree management practices.

Background

In Logan, Utah the cost of removing a tree that has buckled an adjacent sidewalk can range from $1,000 to $3,000. Cities like Logan with a mature urban tree canopy must balance the preservation of trees with the maintenance of safe, walkable sidewalks. To find a compromise, Logan City and USU Forestry Extension undertook a pilot project that tackled both of these concerns.

With a small grant from the Utah Division of Forestry, Fire and State Lands and additional financial support from Logan City, we purchased 2,000 square feet of Terrewalks® open-grid modular paving sidewalk tiles*. This product can replace damaged sections of sidewalks and may allow nearby trees to remain in place. In Logan (and most other municipalities in Utah), standard operating procedure in the event of a sidewalk/tree conflict is to remove the offending tree and the damaged sidewalk sections, install a

One sidewalk installation site in Logan located at 500 W Fairway Lane. Willow trees to the east were able to stay in place because the sidewalk tiles were used to replace the sidewalk that had been damaged by the tree roots.

*Neither USU Extension nor Logan City endorses Terrewalks®.

Before and after sidewalk located on the south side of 200 North between 400 and 500 West (444 W 200 N) in Logan. This sidewalk was excavated and sidewalk tiles were installed in fall 2015.

new sidewalk and plant a new tree. In some cases there may be political/ citizen pressure to retain existing trees, even though in the interest of safety, they should be removed. In those cases major roots may be cut so the sidewalk can be replaced, but tree stability is compromised and the tree becomes a hazard. The sidewalk panels used here may provide an alternative to this procedure that will result in fewer cut roots, which can save trees and may save money in the long run.

The Process

Selecting Sites

Logan City officials worked with Forestry Extension Specialist, Mike Kuhns, to select sites that would be good candidates for the trial phase of this material. We selected sites where trees planted in the parking strip (between the sidewalk and the curb) had grown roots that had damaged the sidewalk, usually creating a safety hazard. We chose sites where the parking strip was wide enough to contain a tree (at least 3 to 4 feet wide), though not always as wide as we would like (8 to 10 feet wide). We avoided using sites with very narrow parking strips that definitely should not have a tree in them, or where the tree species that was present was a very poor choice for the site (cottonwood for example).

Demolition and Site Preparation

Logan City crews removed damaged sidewalk slabs by reaching in with a backhoe from the street, taking care not to disrupt tree roots and tops, irrigation equipment, and nearby vegetation. Heavy equipment was kept off of the surrounding soil to avoid compaction. Concrete slabs were removed near the tree in either direction out to a point where the sidewalk was level and otherwise in good shape, usually a total of 10 to 15 feet. When possible the concrete was separated at an expansion joint, but in some cases a saw was needed to separate the damaged concrete from the remaining sidewalk. In most cases additional aggregate or base material (i.e., gravel) had to be added to fill in low areas and to bring the fill level up to the appropriate height. Terrewalks® panels are thinner than typical concrete side-

What about Maintenance?

Concrete panels often will crack when tree roots push against them from below or from the side. Terrewalks® flexible sidewalk tiles are made from rigid plastic that will bend with the movement and shifting of tree roots. The tile itself will bend a little and the installation will bend even more at the joints. The tiles are anchored at each end of an installation with a small area of concrete that ties the tiles into the existing sidewalk so they won't rise or sink even if the center of the installation settles. They are also secured in place with long stakes along the outer edges. If over time tree roots dislodge tiles and create a safety hazard, the panels can be lifted; offending tree root(s) identified, cut and removed; and the same tiles can be reinstalled.

Site selection, excavation, preparation and installation. This sidewalk is located about a block west of 1600 east at 1385 North in Logan.

walk slabs and will shift if the base is not compacted and level. From our observations, it is a good idea to place base material so that the panels end up a little high so they will be flush with the remaining sidewalk after they settle.

A tree expert (USU Forestry Extension Specialist Mike Kuhns) visited each site and assessed the condition of the tree roots that caused the sidewalk damage. Roots were cut if they extended up into where the panel was going to be placed, but this usually was not necessary. Roots that pressed tightly against the bottom of the concrete usually were not considered a problem and were left alone. This certainly is a compromise since it means that the sidewalk panels will deflect earlier than they would have if the entire tree and all its roots were removed and a full bed of base material was present. However, this entire process is a compromise that is done to save trees or at least to delay their removal. In only one situation did a very large root need to be cut. This root was cut cleanly on the end extending from the tree to aid in healing. The backhoe was never used to remove roots since pulling on woody roots until they break shatters the remaining root well away from where the root breaks.

Installation

Once the damaged sidewalk was removed and any problem roots were assessed and/or cut, a layer of aggregate / base fill was put down and carefully compacted. Then a permeable textile fabric was laid which helped to stabilize the base. Once the site was prepared, the sidewalk panels were locked into each other with integral lugs and spiked along the edges. Concrete was poured at each end of the installation to stabilize the panels and tie them into the existing sidewalk. Spacing shims (¼ inch thick) were placed temporarily between panels as they were laid to ensure that there was adequate room for expansion. A detailed explanation of each step is outlined in the installation manual.

SYSTEM (TERREWALKS®) PROS

- Large trees remain intact.
- Tiles are constructed from 100% recycled plastic, thus encouraging plastic recycling by providing a market for hard to recycle material.
- Tile adjustments can be made if tree roots disturb the system; tiles can be lifted and re-laid following root cutting.
- Terrewalks® tiles have a 20 year warranty.

SYSTEM (TERREWALKS®) CONS

- Increased initial cost for Terrewalks® vs. traditional concrete.
- Terrewalks'® light weight and flexibility *may* lead to a

Another sidewalk installation site in Logan located at 1300 North 200 East. The close proximity of the Cache Valley Mall and Logan Pointe Apartments made this sidewalk a high priority for Logan City officials after the adjacent tree had buckled the old sidewalk in multiple places.

need for frequent maintenance, since it can be pushed up as tree roots grow. Concrete's weight and stiffness make it better at resisting buckling; however Terrewalks® allow for frequent, fairly easy maintenance while reusing the same materials.

- Long-term success of this system is unknown and conclusions about its effectiveness can't be made at this time.

This pilot project can serve as a template for other municipalities interested in preserving their urban tree canopy while repairing damaged sidewalks. The long-term outcome won't be known for years, but we hope this can serve as an example for city foresters, arborists, and public works professionals interested in an alternative way to manage tree and sidewalk conflicts.

Why Trees?

Trees provide a multitude of aesthetic, economic, social, and environmental and health benefits for citizens.

Economic Value

Consumer spending at businesses landscaped with mature trees is on average 9-12% greater than if trees were absent. Commercial offices surrounded by mature trees have 7% higher rental rates than those not surrounded by trees. Additionally, property values can be 2-15% higher when mature trees are a part of the landscape. A 2015 study found that adding 10 trees per city block in Toronto improved citizens' perceptions of their personal health. This change in perception is equivalent to an income increase of $10,200 a year or being 7 years younger.

Environmental Values

Air quality

An average healthy urban tree absorbs about 330 pounds of carbon dioxide annually. Trees improve air quality by removing pollutants from the atmosphere. In 2010, 17.4 million tons of air pollution was removed by trees and forests in the U.S. (excluding Alaska and Hawaii). This pollution removal had an estimated human health effect valued at $6.8 billion, including the avoidance of 850 incidences of human mortality and the prevention of 670,000 acute respiratory symptom events. Along Utah's Wasatch Front, where improving air quality is a top concern for many citizens, maintaining and retaining mature street trees can be extremely important.

Water Quality

Tree roots filter pollutants out of water that infiltrate the soil while simultaneously reducing erosion and runoff, and potentially buffering property from flooding during high precipitation events. It is estimated that an urban forest can reduce annual runoff amounts by 2-7%. This translates into real savings for municipalities because as runoff is reduced, there is less demand on water filtration and drainage systems. In addition trees can increase water infiltration and groundwater supplies.

Shade

Urban heat islands occur in densely populated cities because there is a lack of vegetation and shade and an overabundance of hard surfaces, i.e., concrete/ asphalt. For a city with 1 million residents (i.e., San Jose, California), the urban heat island effect can increase temperatures from 1.8° to 5.4°F. As temperatures increase, electricity use for air conditioning increases. Strategically planted trees can shade pavement and extend asphalt pavement's life, and shade buildings, reducing the need for air conditioning.

Social

Numerous studies have found positive correlations between trees and perceptions of physiological and psychological health, ability to cope with stress, speedy recoveries from surgeries, an increased sense of community cohesion and feelings of safety, a decrease in crime, a decrease in noise pollution and an increase in confidence that a community will be able to recover and adapt when challenges such as extreme climate events arise (flooding, extreme weather patterns).

All of these benefits can positively influence urban communities, but trees must remain in place if these potential impacts are to be realized.

Resources

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