ENERGY, ENVIRONMENT & NATURAL RESOURCES COMMISSION

TO: **ENERGY, ENVIRONMENT & NATURAL RESOURCES COMMISSION**

FROM: **BRUCE INMAN, DIRECTOR OF PUBLIC WORKS**

DATE: **SEPTEMBER 21, 2016**

SUBJECT: **APPEAL OF DIRECTOR'S DECISION TO REMOVE PARKWAY FICUS TREE AT 85 SOUTH BALDWIN AVENUE**

DISCUSSION

On June 14, Public Works staff responded to a complaint from a resident about a section of sidewalk located at 85 South Baldwin which the resident described as "becoming a safety issue" and noted that "wheelchairs are unable to get over the concrete." Staff followed up with an inspection of the subject area and noted that the public sidewalk was severely displaced vertically. It was also noted that the displaced sidewalk was not original to that location; it had already been replaced at least once and that asphalt ramping had been subsequently placed on the replacement sidewalk. Staff noted that the roadway curb and gutter has also been lifted.

At the June 13th meeting of the Energy, Environment and Natural Resources Commission, staff provided a written report noting that the City Arborist and staff had inspected the location. As noted in staffs report "Tim Crothers of West Coast Arborists indicated that the tree would have to be removed to make repairs to the sidewalk due to the size and quantity of roots that would have to be pruned." Having heard no discussion or objection to the recommended removal from the Commission, Director Inman ordered the tree posted for removal.

Following the posting of the tree for removal, staff has received multiple phone contacts and written appeals of the proposed tree removal. Copies of the written appeals and their respective attachments are attached to this report. The appeal by Mr. Golden has also been sent by the appellant to members of the City Council and to the local newspaper.

Staff agrees with the point made by multiple callers and appeal writers that the ficus trees along the west side of South Baldwin create a beautiful, impressive entry to the community. Indeed, Sierra Madre is proud of being a Tree City. It is always staff's first choice in situations like this to save the tree. This is seen in the arborist's comments that root pruning, our preferred treatment, is not appropriate in this case.

FOR EENRC AGENDA_____ ITEM_____

Mr. Golden's appeal requests a temporary halt to the tree removal and that 1) a second arborist's opinion be sought regarding root pruning after the sidewalk is removed; and, 2) the City should seek an easement from the adjoining property owner in order to route the sidewalk around the tree.

Staff has obtained a quote from Arborist Jan Scow for providing the requested second opinion. His price to inspect the tree and provide a written report would be $500. If so requested by the Commission staff will direct Mr. Scow to do the inspection and prepare her report. Funding will be taken from the City's tree maintenance budget.

The second option suggested by Mr. Golden and later by two other appellants is to create an easement so that the sidewalk can be re-routed around the tree. There is very little space in which to re-route the sidewalk; in fact, in order to relocate the sidewalk far enough from the ficus to avoid a re-occurrence of the sidewalk damage, it would be necessary to remove the two palm trees from the private property.

Creation of an easement to allow for a meandering sidewalk would involve the preparation of easement documents, preparing an appraisal of the property to determine the market value associated with the proposed easement, recording costs at the County Recorder's office, cost to remove the two palm trees that are in the way, and provision of payment to the property owner for the easement.

Obtain Preliminary Title Report	$400
Obtain Property Value Appraisal	$500
Prepare Easement Grant Deed	$200
Prepare Easement Legal description and exhibits	-------
Los Angeles County Recordation Cost	$75
Removal of two palm trees	$3,600
Property owner compensation*	$23,450
Total estimated cost	$28,225

*Based on appraisals recently received for easements requested by Edison on City – owned property. Actual costs may vary depending on site-specific appraisal.

The City's arborist has suggested the creation of a bow-out around the tree in lieu of obtaining an easement and removing the palms. This concept would result in the loss of as many as three on-street parking spaces and potentially form an unsafe mid-block narrowing of the southbound travel lane. The concept would have to be reviewed by the City's traffic engineer.

There are a number of materials other than concrete that could be used to replace the sidewalk. These materials, as described in the attached excerpt from the City's 2015 Sidewalk Master Plan each have their individual advantages and disadvantages. Some of the listed replacement materials have been suggested for use in some of the appeals that were received.

Staff has been made aware of a utility worker and other bystander who recently rushed to assist a handicapped gentleman who lost control of his motorized wheelchair at this location. This is in addition to the concern raised back in June.

The City is on notice of a public safety issue in a high traffic area adjacent to the Post Office, as well as a potential ADA-related complaint. The City recently had a citywide survey completed covering all city building and infrastructure facilities, including sidewalks. The subject location was included in that report. The issue of the displaced sidewalk needs to be corrected. Some things to keep in mind when reviewing this tree removal proposal and the associated appeals:

1.) The tree is already too large for the location in which it was planted. If left in place it is going to continue to grow, causing damage to all surrounding improvements, including any replacement sidewalk, even if the sidewalk is replaced in an alternate alignment or alternate material.
2.) The street improvements are beginning to be impacted. Continued tree growth will exacerbate that damage.
3.) There are underground utilities in this location, including significant Edison, telephone and cable television, substructure.
4.) The maximum running slope on a sidewalk is 5% (1:20) per ADA Standard 11B-403 (Walking surfaces). Also per 11B-403.3 (Slope) the running slope of sidewalks shall not exceed the general grade established for the adjacent street or highway. The general grade of South Baldwin is 4.8%. Any ramping to go over the existing roots would require that the existing grade of Baldwin be exceeded, thereby rendering the ramping non-compliant.
5.) There are ten more ficus trees located along the west side of South Baldwin. There are 5 locations on South Baldwin where similar large ficus trees have been removed and successfully replaced with oaks. There is clearly precedent for removal of the subject tree, and removal of the subject tree will continue the precedent of removing them one at a time and replacing them with oaks, (provided the property owner is willing to care for and water the replacement tree.)

Should the Commission elect to support the staff decision regarding removal of the parkway tree at 85 South Baldwin, the appellants will have until Monday, October 3 to submit a further appeal to the City Council, as described under Municipal Code §2.68.020.

PUBLIC NOTICE PROCESS

This item has been noticed through the regular agenda notification process. Copies of this report are available at the City Hall public counter.

COMMISSION ACTION NEEDED

Staff recommends that the Commission uphold staff's decision to remove the subject tree.

Submitted by:

Bruce Inman
Director of Public Works

Attachments: Daniel Golden Appeal
Jeff and Julie Appeal
Shirley Moore Appeal (w/attachments)
Milne Appeal
Moore Appeal
John Hopkins Appeal
Mary Hopkins Appeal
Tse Appeal
Moser Inquiry

29 August 2016

To: Bruce Inman, Director of Public Works, City of Sierra Madre

Cc: James Carlson, Management Analyst, City of Sierra Madre

From: Daniel Golden, resident 278 East Alegria, Sierra Madre

Subject: Appeal Letter regarding Ficus on parkway in front of 85 S. Baldwin

This is my official appeal to the City, requesting temporary halt to plans for removal of large ficus in front of 85 S. Baldwin, pending further research and examination of the tree and buckled sidewalk. I am asking to have the issue placed on the September 21 Agenda of the Energy, Environment and Natural Resource Commission meeting, and that I be given the chance to make Public Comment at that Commission meeting.

The Deep Background, which you both know:
The large ficus on city-owned parkway in front of 85 South Baldwin has been tagged for removal. The sidewalk next to this tree (and the adjoining trees) has been buckled for decades, and this may create some hazard for pedestrians and wheelchair-bound citizens. In fact, there was the concern expressed on ADA grounds by one citizen that initiated the city's plan for removal of the tree.

I think there may be other solutions that could preserve the tree and ensure public safety for all.

The sidewalk is terribly buckled upwards at its seam joint, with no opportunity to 'ramp' the area within the pitch and angle requirements of ADA sidewalk ordinances, as has been done with asphalt paving on numerous other city sidewalks with less severe buckling.

I think the choice to remove is premature and warrants further research and action steps.

The Options as I see them:

Option 1. Secure a Second Opinion. Though the City's regular consulting Arborist is a certified and responsible professional, his analysis is necessarily incomplete, because a full sense of any possible root pruning to alleviate buckled sidewalk could only be made upon temporary removal of the damaged sections of sidewalk slabs.

A Second Opinion from a certified Arborist at that point seems in order. It took 24,000 days, more or less, for this tree to reach its mature splendor, but it would take less than 24 hours to remove it.

The only way to truly gauge the root structures would be to have the City lift the two sidewalk slabs in question. Given the two large trees that sit on private property at 85 S. Baldwin, we might, in fact, also

discover upon lifting the sidewalk slabs that the buckling has been caused or partially caused by the roots of those trees. But for complete diagnosis, access underneath the slabs is essential.

If root pruning is impossible without destabilizing the ficus or killing it outright, and the two Arborists were in agreement on this analysis, see Option 2:

Option 2. The City could try to seek an easement from the property owners to create a gentle loop in a new area of sidewalk that would curve away from the root area and leave a smooth, new path for walkers and those in wheelchairs. There is City precedent for such an action step that would protect the public safety, comply with ADA access criteria, and leave the ficus in place.

Even allowing for the time and expertise of the City Attorney and others in securing an easement, as well as costs of diagnostic removal of sidewalk slabs and getting a second opinion from a certified Arborist, the City would still save considerable costs, compared to the safe removal of this large tree.

I think it is worth delaying the tree removal until further discussion of other options can take place at the 21 September Commission meeting, where I hope to offer Public Comment.

Thank you,

Dan Golden
278 E Alegria Ave
Sierra Madre, CA
dangolden0@gmail.com
626 355 1919

Bruce Inman

From: notification@civiclive.com
Sent: Saturday, August 27, 2016 5:59 PM
To: Bruce Inman
Subject: trees

Dear Bruce Inman,

Dear Mr.Inman,
This is a tree city and also with all the pollution in the air we need ever tree we have.Every tree like the one at the post office is causing problems to the street.Are we to take everyone of these amazing trees out.They are the first trees you see when entering our town and they represent a magnificent site.Perhaps a better alternative is to do some root work and fix the sidewalks or post some signs near the sidewalks if they are a concern.The trees should come first not the other way around.Just how many people have fallen because of them.Also in the summertime when going to the post office and waiting in line, that tree gives many cars some wonderful shade which is just great.Please remember this is tree city and we need all we can get to help us breath better air and keep our city beautiful.
Thanks for Reading This,
Jeff & Julie

jeff and julie

[redacted]

August 29, 2016

Bruce Inman, Public Works Director
City of Sierra Madre
232 W. Sierra Madre Blvd.
Sierra Madre, CA 91024

RE: Ficus Tree Near Post Office on Baldwin Avenue - Removal Protest

Dear Mr. Inman:

I saw the notice posted on the mature Ficus tree just south of the post office on Baldwin Avenue this afternoon and wanted to add my voice to those who I hope have also protested the removal of this tree. I've included several links herein to websites which offer more environmentally conscious alternatives to complete removal of the tree. A meandering sidewalk, rubber sidewalk material or bridging/ramping over the area aethestically all appear to be viable solutions to the protruding tree root growth. These options are often combined, per the articles at these links, with air spading under the offending root to allow future root growth room to expand downward rather than upward. Apparently, root trimming is no longer considered one of the better options available.

We need to do whatever we can to protect the trees we still have in town; we've lost so many in the last few years – to bark beetle infestation, wind, and/or to new development. It would be a terrible shame to sacrifice this beautiful creature when there are options the city can and should exercise which will both resolve the liability issue and save the tree.

Please see the links below for further information. The last link is a sidewalk repair manual from the City of Portland, Oregon.

http://shadetreeexpert.com/sidewalks-and-tree-roots/

AUG30 16 2:23PM

https://www.bartlett.com/resources/Sidewalk-Repair-Near-Trees.pdf

http://pottstowntrees.org/pdf/2014-4-19-Trees-and-sidewalks.pdf

https://www.portlandoregon.gov/transportation/article/443054

Please do everything in your power to retain this tree. It takes so many years for a Ficus, or just about any other tree, to reach this stature, and once it has, it provides much-needed shade, cleaner air, and homes for the area wildlife. Such a treasured member of our community could not be replaced within our lifetime.

Thank you for your consideration!

Sincerely,

Shirley Moore
[redacted]
Sierra Madre, CA 91024

Options for Sidewalk Repair Around Existing Trees

Tree root-sidewalk conflicts are very common in developments. And the most commonly planted swale tree in many parts of Florida is the live oak (*Quercus virginiana*), which is a wonderful long-lived, sturdy tree, that simply requires more root and trunk space than the 6 foot swale designated by the designers. And as many homeowners and property managers have learned, the problem seems to escalate after the first 10 years as the trees begin to mature and their root systems expand and try to grow out of the much-too-small space allotted between the street curb and the sidewalk.

All too often large-growing trees like this live oak are planted in a narrow swale between the street and sidewalk creating infrastructure conflicts.

Obviously, it would be better to plant trees in larger spaces such as the front yard away from sidewalks and streets. But it is too late for many people who buy a home in a development that has already planted large-maturing trees in a narrow swale between the sidewalk and the street. This is a landscape design flaw, in my opinion, that is creating significant maintenance costs for homeowners and property managers.

Because removal of the trees by sidewalks is not practical, sometimes not allowed by local ordinance, and would remove an important environmental amenity from streetscape, I will primarily discuss options to accommodate roots on existing large trees, infrastructure-based strategies, not options for recently planted young trees by sidewalks that we refer to as root-zone based strategies. The goal is to adapt the infrastructure to accommodate the tree to reduce the sidewalk damage and increase the interval between sidewalk repairs.

Types of Damage:

Over the years I have observed swale trees (mostly live oaks in this part of Florida) lifting sidewalks usually at the seam or expansion joint. The lifting can occur anywhere between the slab next to the trunk to as far away from the tree as the third concrete slab which is about 15 feet from the trunk. Once the slab lifts over ½ inch, there is a serious liability issue — a trip and fall hazard.

Shaving the lifted slab to even out the uneven edges is useful but only temporarily. Here a shaved slab is lifting again.

In addition to the lifting pressure caused by roots, the tree root flare of trees will slowly expand outward and even upward putting sideways and upward pressure on the sidewalk. Often the root flare begins to become a problem with nearby infrastructure when trees reach a diameter of around 20 inches. The root flare of a 30 to 36 inch DBH live oak can extend almost the entire width of the 6-foot swale.

Cutting Roots

I have found that cutting roots is only a temporary solution. I have seen severed roots regrow under a sidewalk within three years after being cut. In San Francisco and other cities, the interval between root pruning and renewed sidewalk lifting is about five years. This relatively short repair interval can create an escalating and compounding effect of needed repairs as the trees continue to grow.

Root growth under the slab. Roots have been painted orange for

An additional problem with root pruning is the loss of tree stability. Trees have stability against wind throw because of the lateral roots. Tap roots are rare and quite small in most broadleaf trees and provide virtually no support. When the important lateral roots are pruned, tree stability can be reduced. Research at the Bartlett Tree Research Laboratories has demonstrated that cutting large lateral roots within the root plate, which is a distance from the trunk of three times the trunk diameter,

Testimonials

"Just a quick note to say the trees are flourishing. Well done! Thank you again. Will stay in touch as I plant more."

– Dianne - April 11, 2013

can destabilize a tree. For example a 20-inch diameter tree should not have roots cut closer than 60 inches from the tree (3 X 20 = 60). In a 6-foot wide swale with a growing tree, that does not allow space to root prune at the edge of the sidewalk. So root pruning should only be done as a last resort when all other methods have been judged as not feasible. And those ordering cutting of major lateral roots should be aware of the liability for tree failure that root cutting creates.

clarity. The roots growing under the sidewalk were cut and had grown back in only three years lifting the slab again.

Other Options:

There are several options to consider when repairing lifted sidewalks. These include options that sometimes can be combined with others. All of the techniques except for #1 Shaving and #2 Slapjacking are used when removing and replacing sidewalk slabs.

Three years prior to taking this photo, the lifted sidewalk slab had been replaced and the roots cut. In only three years the sidewalk had lifted again pushed up by new root growth. Cutting tree roots does not provide long term results and should be the last choice not the first.

Shaving lifted concrete: Once a slab is lifted by roots, it can be shaved down several times until the thickness of the sidewalk is too small to support the weight of pedestrians and golf carts using the sidewalk. This relatively inexpensive technique should be used at first to even out lifted sidewalks. Another version of shaving is the use of asphalt to level the sidewalk slabs where they have lifted. Asphalt on a concrete sidewalk is not a very esthetic alternative.

Slabjacking: This is a process where concrete is injected under high pressure beneath the low side of a lifted slab causing the slab to lift upward to match the lifted section of the adjacent slab. This process has been around for several years but I have yet to speak with anyone who has had the slapjacking done.

Once the roots have been exposed with an Air Spade, it is easier to determine the best location for the replacement sidewalk where the roots are smaller and less damaging to the sidewalk.

The new sidewalk is located outside the root plate where there is less damage to the tree and its root system and less chance of sidewalk lifting.

Meandering sidewalk: Move the repaired sidewalk out away from the tree by several feet preferably outside the root plate, which is the distance from the tree that is three times the tree diameter. See Meandering Sidewalk.

Excavating beneath an offending root can allow the root to expand downward rather than pushing up against the sidewalk.

Excavate beneath offending roots: Instead of cutting the offending roots that have lifted the sidewalk, leave the root intact and use an air excavation tool like an Air Spade or Air Knife to remove soil beneath the root. This void can be left open beneath the root or filled with clean pea gravel that will move out of the way as the root expands downward. Because the concrete sidewalk is being replaced above the root, the root should expand downward filling the void. This technique should be combined with reinforced sidewalks and possibly thicker sidewalks.

Bridge over roots: Sometimes the roots are too large to cut and have expanded above the natural grade. In these cases the root(s) must be bridged possibly creating a slight rise in the sidewalk where it passes over the root.

Bridging over tree roots can take many forms. This is an excellent example of a substantial bridge. But bridges do not have to be this large to protect roots. (Photo taken in Bluffton, SC)

Use reinforced concrete: Use rebar or wire mesh when repouring concrete sidewalk slabs. This will make the sidewalk stronger. It is important to connect the slabs together with rebar to avoid the lifting of a single slab. In that way the root will be pushing against two or three slabs rather than a single slab.

Use thicker concrete: Increasing the concrete thickness from 4 inches to 6 inches will make the sidewalk less likely to break or lift. This technique should be used with the reinforced concrete technique above for best results. There is currently research being done to determine the best concrete thickness to use. But no data is available at this time.

Place sidewalk over a geogrid and gravel base: Recent research into roots and sidewalks has demonstrated that a geogrid mesh base placed on top of roots will spread the force of the upward pressure of the roots over a wide area. Then if we cover the geogrid

with clean #57 stone for at least a depth of 3 to 4 inches, the concrete sidewalk can be poured on top of the stone. The stone should be covered with a geotextile fabric to help keep the sand and soil from filtering into the stones, which provide a partially flexible buffer to diffuse the force of lifting roots on the concrete sidewalk slabs above. This arrangement may cause the sidewalk to be higher than the original sidewalk.

Place clean gravel beneath sidewalk: Recent research has demonstrated that simply placing clean gravel beneath a sidewalk slab will cause roots to grow below the gravel not directly below the concrete slab. The large air spaces in the gravel cause any roots to grow below both the concrete sidewalk and the gravel layer. Consequently, the sidewalk is less likely to get pushed upward by the roots.

Installing geogrid mat over roots and then clean gravel provides a strong buffer against the lifting force of roots

Rubber Sidewalks and Pavers: Rubber sidewalks, other flexible materials and brick pavers allow for reduced repair costs to lift out a root-damaged sidewalk section and replace it. However, often the repair involves cutting the offending root that is lifting the sidewalk. These materials, do not solve the problem of what to do with an existing large root that is increasing in diameter. Other methods may be needed to accommodate the large roots rather than cutting them.

Options that may not have merit:

Pervious pavement: This type of pavement will allow moisture to percolate through the concrete directly to the soil and roots below. But pervious concrete is not as strong as regular concrete so a thicker layer of pervious concrete may be needed. And allowing moisture to percolate through the concrete may increase root growth beneath the concrete. Pervious concrete is a good product to use in a parking lot or area where root growth is to be encouraged and stimulated. Stimulating root growth under a sidewalk is not helping the situation, in my opinion.

Root Barriers: Root barriers are sometimes useful on well-drained soils on new plantings if the root barriers are properly installed and at least 2 or 3 feet deep. The top of the root barrier must be slightly above grade or roots will grow over the top of the barrier and this root barrier protruding edge can be unsightly. Proper installation is very important. **Root barriers are usually not appropriate where trees are already established. For more on root barriers and recent root barrier research** click here.

Tree Growth Regulator (TGR) Applications: Generally arborists use TGR chemicals to slow top growth of trees. Electrical utilities have been using TGR's for over 30 years to control top growth of trees near power lines and extend the pruning cycle. Subsequently some arborists have been selling the relatively expensive TGR's as a way to reduce pruning and slow tree growth in developments where tree root-sidewalk conflicts are beginning to be a problem. Ironically, the benefits of the most widely used TGR, paclobutrazol, is to divert energy from top growth into root growth. So TGR's may make the tree root-sidewalk conflict worse by increasing root growth even though top growth is being reduced. Until there is research indicating the TGR's are in reducing sidewalk damage or increasing the sidewalk repair interval, I do not recommend TGR's as a viable solution.

Heavy crown pruning to slow tree growth: The extra expense of heavy crown pruning to keep a large-growing tree short and stunted is not really practical. Large maturing trees will quickly grow to their genetically predisposed size once the excessive and expensive pruning stops. There are many other reasons, which I will not go into here, why heavy pruning will not work and is bad for the health of the trees.

Good Resources for Dealing with Sidewalk-Tree Root Problems

1 Dr. L.R. Costello and Dr. K.S. Jones, ***Reducing Infrastructure Damage by Tree Roots: A compendium of Strategies***, Western Chapter of the International Society of Arboriculture, Cohasseet, Ca., 2003.

2 John Roberts, Nick Jackson and Mark Smith, ***Tree Roots in the Built Environment***, Centre for Ecology & Hydrology, Natural Environment Research Council, London, 2006.

3 Dr. Ed Gilman's website http://hort.ufl.edu/woody/urbansidewalk.shtml (as of June 29, 2011)

4 Dr. Ed Gilman, ***Trees for Urban and Suburban Landscape***, Delmar Publisher, New York, 1996.

5 Smiley, Thomas, Bruce Fraedrich, Neil Hendrickson, Ph.D.'s, ***Tree Risk Management***, Bartlett Tree Research Laboratories), Charlotte, NC, 2002.

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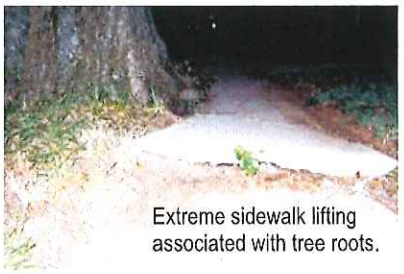
Sidewalk Repair Near Trees

E. Thomas Smiley, Ph.D.

Tree roots grow underneath sidewalk pavement when there is oxygen, water and space for them to grow. Roots are very small when they start growing under pavement but then increase in diameter as the tree grows resulting in lifting or cracking of the pavement. When pavement lifting is excessive, a pedestrian tripping hazard is created. It then becomes a challenge to preserve the tree while continuing to allow pedestrian use of the sidewalk.



Extreme sidewalk lifting associated with tree roots.

The best opportunity of dealing with sidewalk lifting problems is at the time of tree planting or concrete installation. Tree species can be selected to fit the available space.

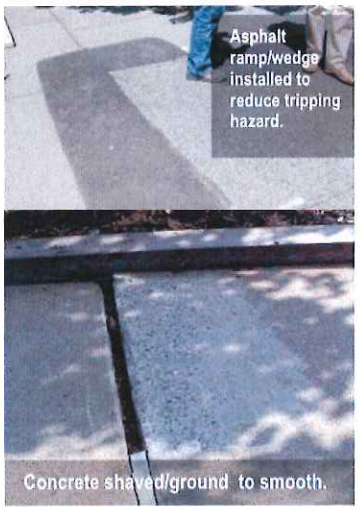
Bartlett Lab research plot showing different root growth patterns with no base layer (upper) and where foam board was installed (lower).

If space is limited, small maturing trees or species known not to damage pavement should be planted. Alternatively, modifications can be made under or next to the pavement to reduce root growth. Modifications that will extend the useful life of sidewalk pavement include installation of root barriers alongside the pavement or installing a root excluding base beneath the concrete. Root barriers must be at least 18 inches (45 cm) deep and the top must be above the soil and mulch surface to be effective. Base layers that successfully exclude roots include washed coarse gravel (1-1.5 inches, 2.5-3.7 cm diameter, with no fines) and foam insulation boards. A gravel base at least 4 inches (10 cm) thick is recommended, thicker is probably better. Gravel is only effective in well drained soils. Foam boards are commonly available from ½ to 2 inches (1.25 to 5 cm) thick. Two 2 inch (5 cm) thick boards can be glued together to provide a 4 inch (10 cm) base for the greatest protection from root growth damage.

When roots do lift sidewalks, there are a number of actions that can be taken to ameliorate the problem. These solutions have varying costs and impacts on tree health, longevity and stability. They may be used alone or in combination and include:

1) Shaving the top of the concrete or installing a ramp to even the surface and reduce the tripping hazard. Shaving or grinding the concrete is done with a specialized cutting machine. The goal is to lower the raised concrete edge to the level of the lower slab. Concrete can be ground to about ½ of its original thickness. The other commonly used alternative is to install a ramp or wedge of asphalt or concrete to smoothly bring the lower level up to the lifted edge.
2) Increasing the distance from the tree to the edge of the sidewalk. This can be done by either narrowing the sidewalk or rerouting it around the tree. The Americans with Disabilities Act (ADA) limits sidewalk width to no less than 39 inches (1m). By increasing the distance from the sidewalk to the trunk, the roots that are most likely to cause damage will no longer be underneath the pavement.

Sidewalk rerouted to increase the distance from the trunk and avoid root



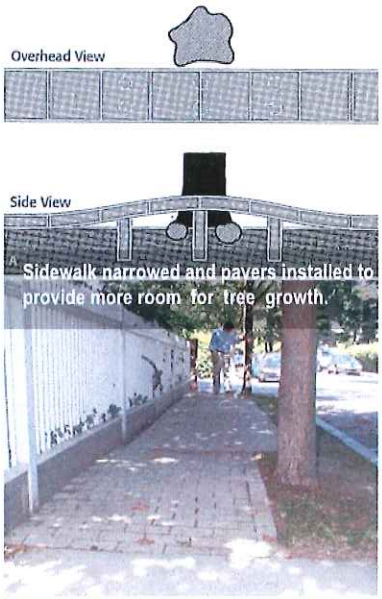
Asphalt ramp/wedge installed to reduce tripping hazard.

Concrete shaved/ground to smooth.

Sidewalks can often be curved around a tree with the permission of the adjacent landowner. These techniques can avoid damage to large roots that are primarily responsible for tree stability.

3) Bridging the pavement over the roots. Bridges are simply sidewalks that are raised root growth beneath. They may be supported near the tree by concrete piers or they may be supported by the base layer. The steps to install bridges are: remove the existing concrete, base and soil from above the existing roots; drill holes and install concrete form tubes (e.g. Sonotubes®, Quick-Tube®) if needed for additional support; level the base with the top of the roots using coarse sand or pea gravel; apply a layer of foam board with holes cut for piers (if installed); frame for concrete, pour reinforced concrete and finish. The maximum ADA allowed slope for this type of construction is 1:20.

Sidewalk bridging plan from Costello and Jones.



4) Replacing concrete with interlocking paver blocks or rubber pavers. This alternative will not slow pavement lifting, but will allow for a smoother transition and the removal of blocks that have lifted too high. Pavers are installed by removing the concrete and base materials above the roots and removing the soil between the roots if needed using a supersonic air excavation tool, installing a new sub-base of coarse sand or pea gravel, leveling and compacting the sub-base slightly above the existing roots, install a geotextile fabric (e.g. Typar 3341) on top of the base, then installing and compacting a coarse sand base layer, and finally installing the pavers. Paver joints should *not* be mortared.

5) Root shaving then installing new concrete. If the pavement must be reinstalled flat and in the same location from which it was removed, the height of the offending roots will need to be lowered. For mature trees, it is best not to cut roots greater than 2 inches (5 cm) in diameter. However, it is usually roots that are larger than this that create sidewalk lifting problems. It is better to remove the top surface of a root rather than the entire root. This is done by shaving the root using a chainsaw or debarking tool. Large roots should not be cut more than 1/3 of their diameter. Cut roots do tend to callus quickly, so a layer of rigid foam or pipe insulation foam should be installed between the shaved root surface and the new concrete. The loss of tree stability from root shaving and the rate of decay in shaved roots are not known. The tree should be inspected annually for health and stability if shaving is done closer than three times the trunk diameter (DBH) from the base of the tree.


Root top shaved to lower the surface.

6) Root removal and sidewalk replacement. The removal of roots at the edge of the sidewalk followed by concrete replacement will provide a longer term solution to sidewalk lifting but will have the greatest effect on tree health and stability. A thorough tree structural analysis should be conducted before roots are removed. It is recommended that buttress roots not be cut closer to the trunk than a distance equal to three times the trunk diameter (DBH). If they need to be severed closer than 1.5 times trunk diameter, tree removal should be considered since it is very likely that tree stability will be affected at this distance, depending on tree species and condition. When reinstalling the pavement next to a root cut tree, allow space for callus and trunk diameter growth. Installation of a root barrier or root excluding base (foam board or washed gravel) should also be considered under the new pavement to avoid reoccurrence of the problem.

Trees provide many benefits in urban areas; however they do occasionally conflict with sidewalks, especially when trees are not designed into the urban infrastructure. It is best to plan for these conflicts and install trees that are compatible with sidewalks or implement measures at the time of planting to reduce conflicts. If this cannot be done, there are many techniques that can be used to retain trees and reduce damage to the pavement. The method that is least damaging to the tree while allowing for a safe sidewalk should be used. *Always have a qualified arborist present for any root cutting.*

For more details see:

Larry Costello and Katherine Jones. 2003. *Reducing infrastructure damage by tree roots: a compendium of strategies*. ISA Press Champaign IL. 119pp.

James Urban. 2008. *Up by roots*. ISA Press Champaign IL. 479pp.

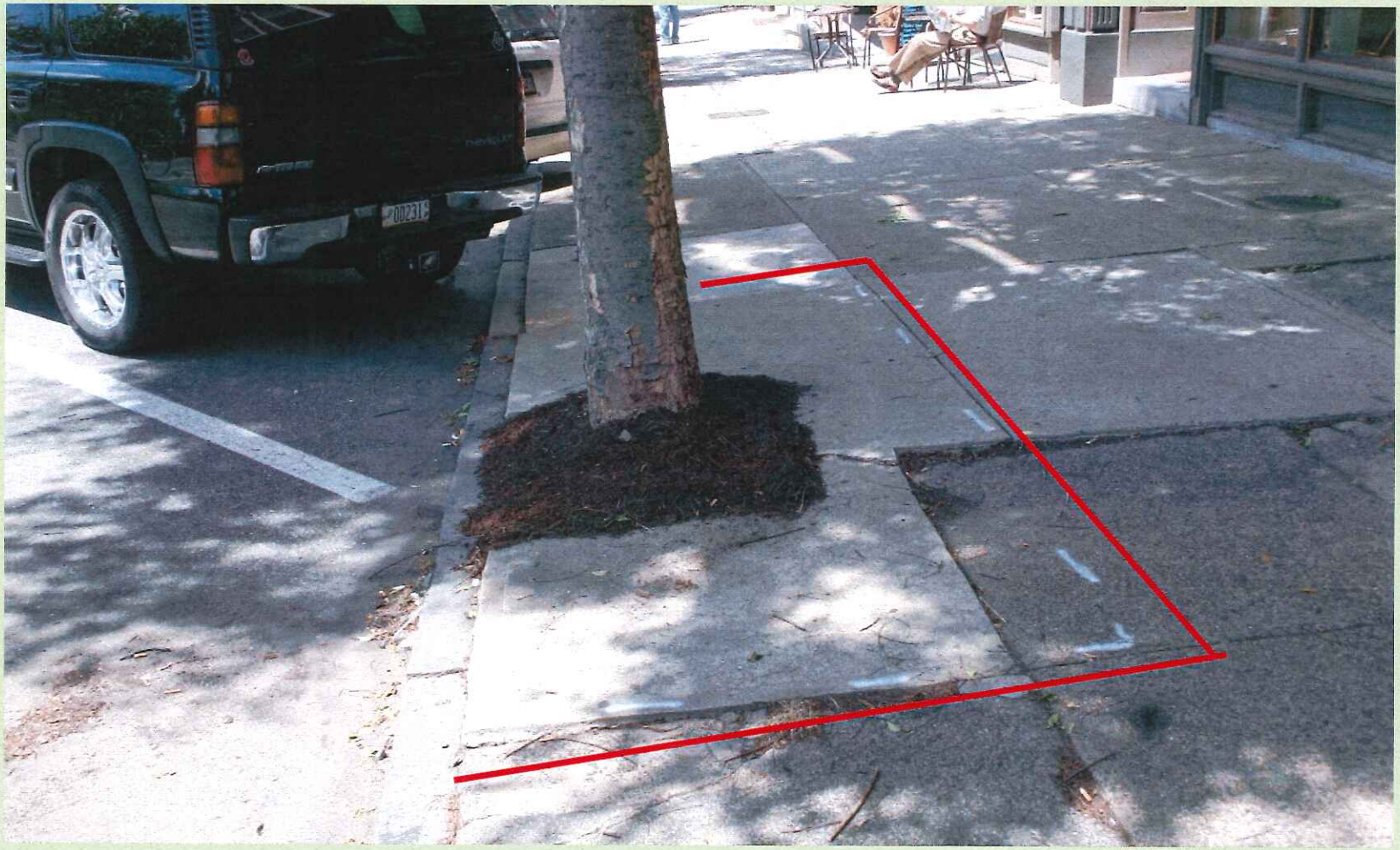
Sources:

ADA http://www.ada.gov/pubs/ada.htm, Up by Roots http://secure.isa-arbor.com/webstore/Up-By-Roots-P353C24.aspx

Reducing infrastructure damage by tree roots http://secure.isa-arbor.com/webstore/Reducing-Infrastructure-Damage-by-Tree-Roots-P229.aspx Geotextile http://www.typargeotextiles.com/paved.html Sonotubes http://www.sonotube.com/

Pavers http://www.paversearch.com/ Rubber sidewalks www.rubbersidewalks.com/ Research http://auf.isa-arbor.com/newresults.asp Concrete shaving or grinding http://www.saberleveling.com/grinding/trip_hazzards.ws

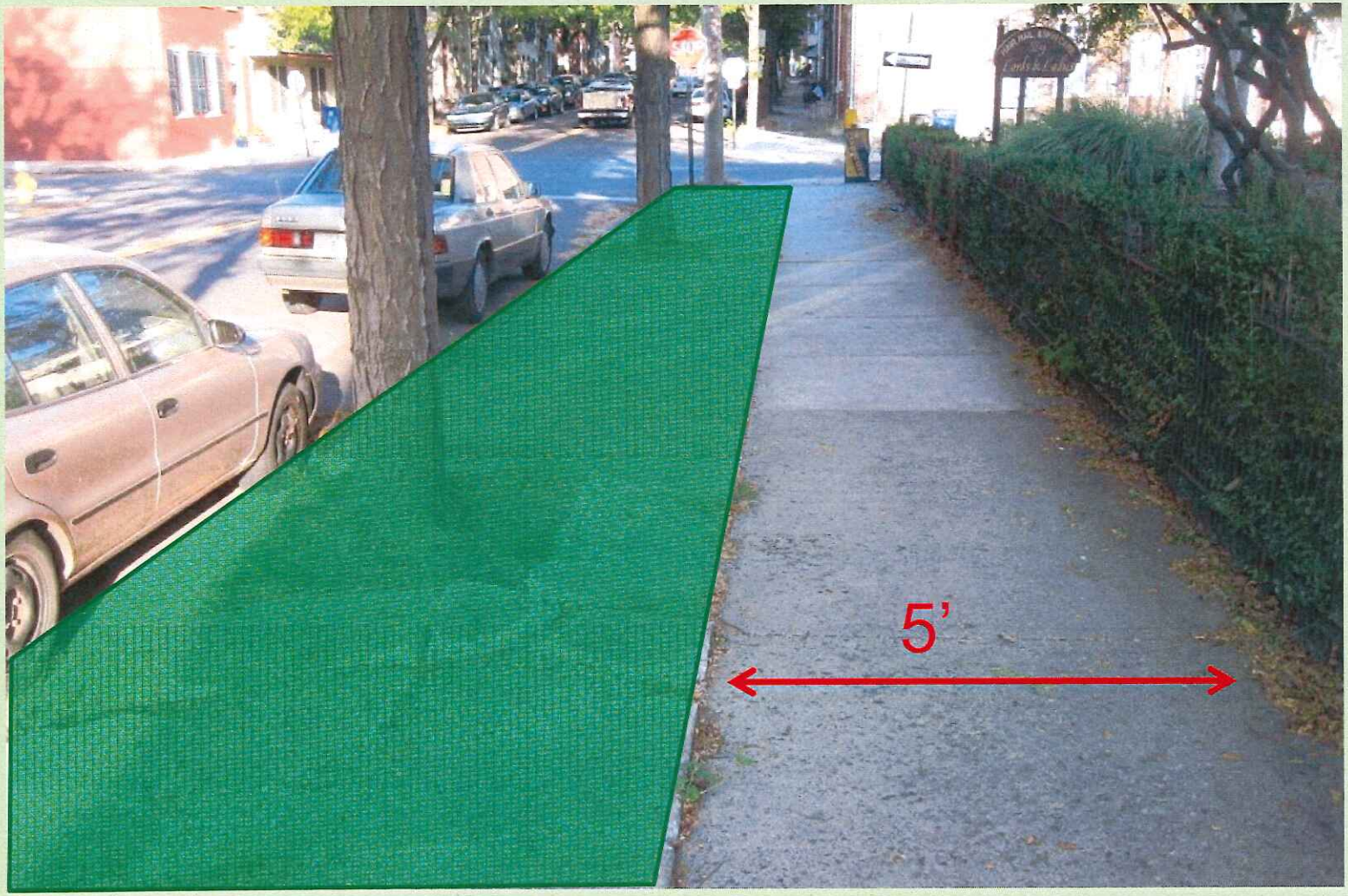
The first step to repairing a sidewalk damaged by a tree is to enlarge the tree pit.



Many sidewalks are far wider than they need to be. Enlarging a tree pit not only gives tree roots more room to grow, increasing the amount of pervious surface allows more rainwater to percolate into the ground.

Here, damaged sidewalks are repaired simply by enlarging the tree pit.

The enlarged pit can then be filled with gravel, mulch, grass, or other ground cover.



Many older towns have far more impervious surface than necessary. Excess concrete can be removed to create planting strips and still leave plenty of room for pedestrians.

This planting strip accommodates 60-year-old plane trees.

This tree pit has been enlarged, but there is still a raised portion of the sidewalk to be repaired. Rather than replace sound concrete, it is often more cost effective to remove the tripping hazard.

In fact, about two-third of sidewalk damage consists of concrete panels that can be remediated without replacing them.

Concrete panels are typically 4 inches thick. If a panel is lifted, up to 2 inches can be removed with a special saw to provide a smooth walking surface without compromising the integrity of the concrete. Beveling uneven concrete panels is about a quarter of the cost of replacing them.

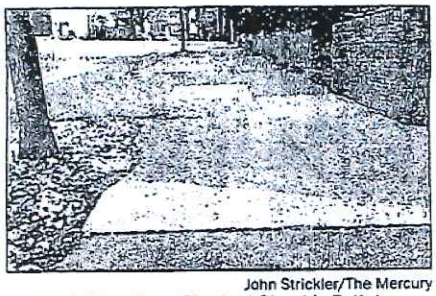
The bevel provides a suitable surface for wheelchairs and is ADA complaint.

The special beveling work is performed in Pennsylvania by a company called Always Safe Sidewalks. The same service is offered nationwide by affiliates of Precision Concrete Cutting Inc.

Several hundred sidewalks have been remediated in Pottstown using special saws.

In recent years, this method has been used throughout Pennsylvania.

POTTSTOWN



John Strickler/The Mercury

A carved sidewalk on Chestnut Street in Pottstown.

Sidewalk repairs may be on the cutting edge

By Evan Brandt
ebrandt@pottsmerc.com

POTTSTOWN – A plan to address buckled sidewalks in town that borough council recently agreed to examine is quite literally on the cutting edge.

The common rub in Pottstown is that many sidewalks are buckled by tree roots.

And that's true.

But more than half the buckled sidewalks in town got that way for reasons that have nothing to do with trees, according to a recent study.

In either case, the fix is usually the same, pull up the concrete, address the underlying problem, and put down more concrete. But that gets expensive.

Tom Sweitzer, co-founder of Always Safe Sidewalks, recently told borough council that there are nearly 3,000 trip hazards amid the borough's dilapidated sidewalks that are "not beyond repair."

Fixing them all the conventional way would cost about $890,000.

But there is another method, one that would only cost about $210,000, and that is to use a special saw to trim the concrete down to the point that the trip hazard is eliminated.

Sweitzer said he began his precision concrete cutting company in 2007 and has done work in Lancaster, York, State College, and the University of Pennsylvania, Drexel and Penn State and that his crews can address "50 hazards per day."

"Essentially, Pottstown has too much sidewalk and overall, they're in very poor condition," he said, estimating that "50 percent is beyond any type of repair."

He added that "trees definitely play a role, but they are not, by far, the only reason" for sidewalk problems.

Please see SIDEWALKS on A4

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Pottstown sidewalk repairs may be on the cutting edge

SIDEWALKS, from A1

The cuts are usually no more than two inches, but smooth out bumps enough to not only eliminate tripping hazards, but also to meet federal Americans with Disabilities Act regulations, Sweitzer said.

The procedure also causes no structural damage to the sidewalk, an assertion supported by Doug Yerger, Pottstown's public works director.

The cost to property owners, who are legally liable for the conditions of the sidewalk in front of their property, can be as low as $50, $70 for wider sidewalks, Sweitzer said.

"It seems like a very viable, cost-effective solution," Council Vice President Jeff Chomnuk told Sweitzer following his presentation.

"It looks like a good idea to me," seconded Councilman Jody Rhoads. "I don't think there's a problem with it."

The idea Rhoads endorsed was brought to Pottstown by former shade tree commission chairman Thomas Hylton.

Hylton said he discovered the sidewalks where work had been done completely by accident while walking in places like Franklin and Marshall College, University of Pennsylvania, Drexel University, and the Morrisville School District.

He received permission from Borough Manager Jason Bobst to try the process on some "demonstration projects" in down on sidewalks damaged by tree roots, using $7,500 from Trees Inc., the non-profit organization which does some tree maintenance in Pottstown.

"It's less expense and it's a lot easier than replacing the sidewalk," he told council in introducing Sweitzer.

"I just wanted people to be aware of this alternative," he said.

Council President Stephen Toroney appointed Councilman Mark Gibson, along with Rhoads and Chomnuk to form a committee to "identify what areas in the borough would be addressed" in a further demonstration project, Bobst wrote in an e-mail to The Mercury.

Toroney "appointed these three Councilors since the majority of the areas identified in Tom's study are in the first, third and fourth Wards. Council seems very supportive of the concept and hopes it can address our sidewalk concerns where applicable," Bobst wrote.

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However, some sidewalks are so damaged they need to be replaced. Asphalt makes a much better replacement material than concrete.

After the concrete is removed, it is occasionally necessary to grind down surface roots.

However, unlike concrete, it is often possible to ramp over tree roots with asphalt rather than remove them.

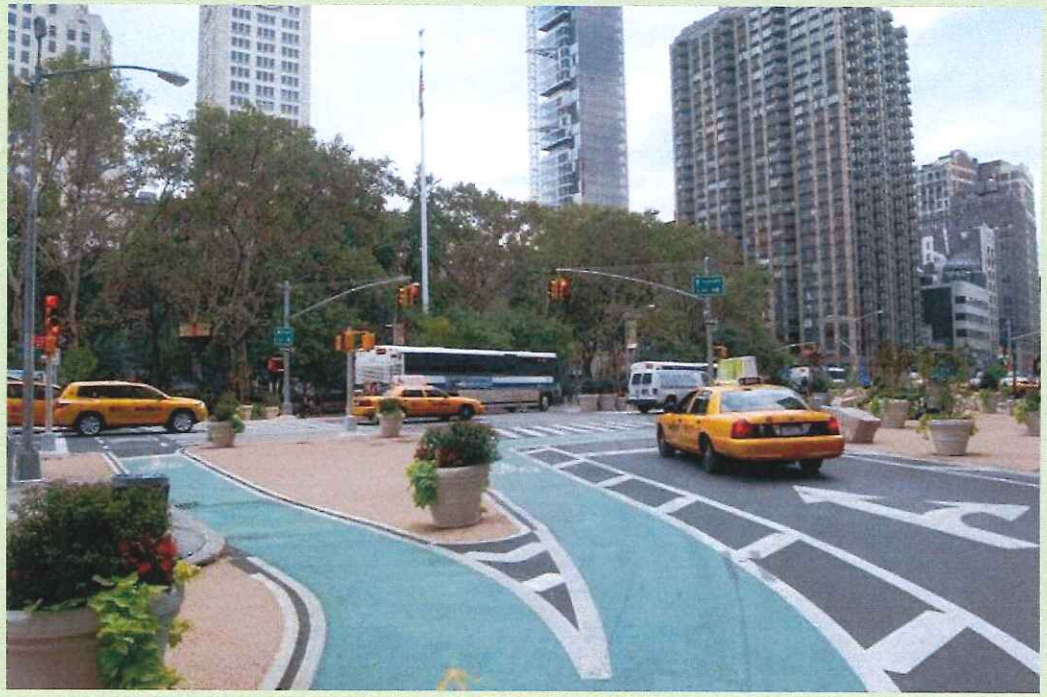
Unlike concrete, asphalt does not need time to cure.

Once it is spread out and tamped down, it can be used immediately.

Enlarging the tree pit should always be part of repairing a sidewalk.

Although many communities leave their asphalt sidewalks untouched, an epoxy coating is available to color asphalt.

New York City, for example, uses beige and lime green coatings for its bike lanes and sitting areas that have been reclaimed from travel lanes, such as Broadway in Manhattan, right.



Strategically placed planters, weighing 600 to 1,000 pounds, help protect people on an esplanade from wayward traffic.

Front-Row Seats on Broadway, if You Dare

Warming to an Esplanade, With a Wary Eye on Traffic

By WILLIAM NEUMAN

As if New York wasn't stimulating enough already, the city has provided a new kind of thrill right in the heart of Midtown: an esplanade carved into Broadway where people can sit and relax as cars and trucks whiz by.

And while the esplanade seems to have become an instant hit with office workers and tourists — the metal benches, tables and chairs (some under red umbrellas) were rarely empty on Monday morning, even though they have been out for only a few days — many eyed the traffic warily.

"I think it's dangerous," said Vicki Lee, who nonetheless sat with two friends eating lunch at a cafe table on the esplanade just south of 34th Street.

Ms. Lee, a clothing designer at a Midtown fashion company, was careful to sit so that she could keep an eye on the traffic heading downtown.

Her concern, she said, centered on the gray plastic planters arrayed every few feet along the edge of the esplanade as a buffer for the passing traffic. The planters were filled with soil, flowers and other plants and were too heavy for one person alone to budge. Yet they did not make Ms. Lee feel safe.

"You hear so many accidents of the cars going out of control and all they have here is plastic pots," she said, lisp she dug into her salad and added, "We're going to roll the dice and eat lunch here today."

Not far away, Eric Sachnin and Grace Ong sat on two metal chairs pulled up to the edge of the esplanade closest to the traffic. They ate sandwiches and gazed at the passing cars.

"It's a death trap," Mr. Sachnin, a network administrator for a garment company, said with a laugh. "It'll be up for a month and then somebody'll get hit and they'll take it down."

"I like it, though," said Ms. Ong, an administrative assistant, who observed that a pedestrian would be no safer on the sidewalk than on the esplanade if a car lost control. Besides, she said, the esplanade was a good spot for people watching. "That's why you live in New York," she said, "to watch everything go by."

Continued on Page B4

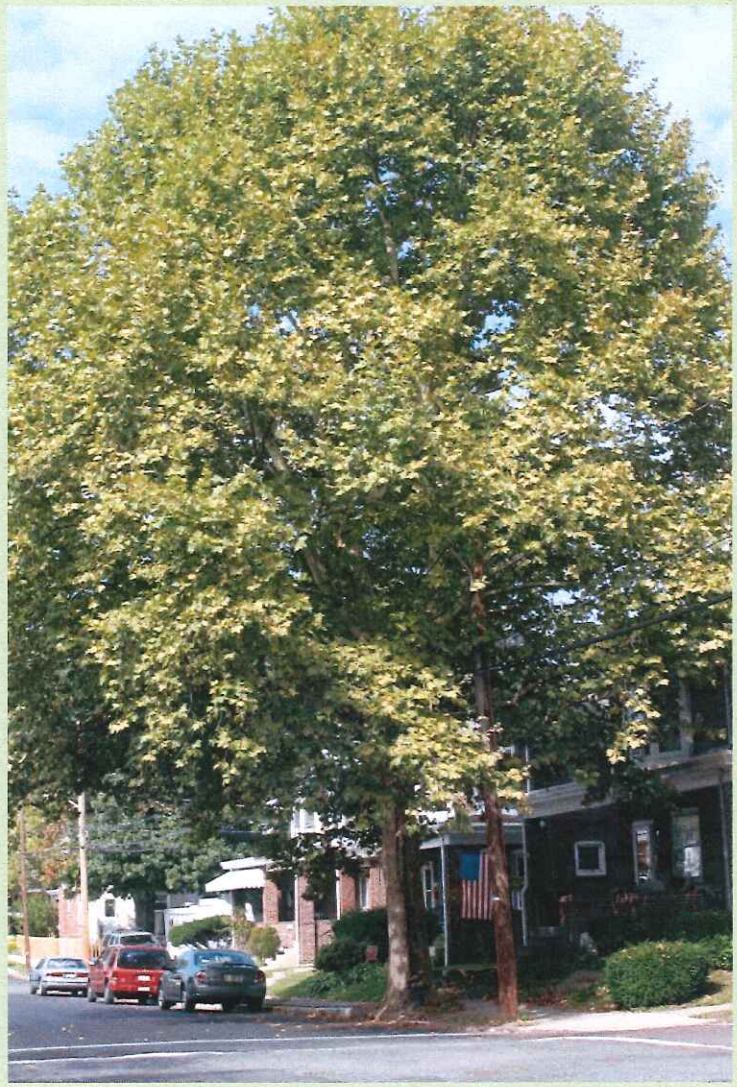
Trees Inc. covers its asphalt sidewalks with the same epoxy coating used in New York City.

The gray color used is similar to newly poured concrete, below.

Asphalt makes it possible to repair even badly lifted sidewalks. Although the sidewalk above is ramped, the slope still conforms to ADA standards.

Using the computer program developed by the U.S. Forest Service, it is possible to calculate the benefits of individual street trees.

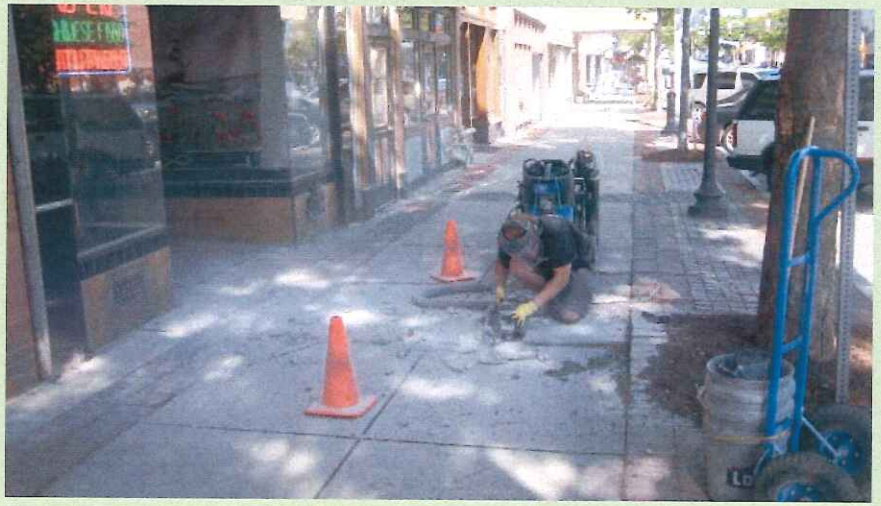
That way, a cost/benefit analysis can be performed for a single tree or small groups of trees.



Sidewalk remediation
Cost/benefit analysis
For Downtown Pottstown
Using i-Tree benefits calculator

The Pottstown Downtown Improvement District Authority was created in 1987 to provide special services in the downtown area, supported by a special fee assessed on 134 properties. The following year, the borough and Trees Inc. planted 115 trees in the downtown district along with installing new sidewalks, benches, and street lights.

Sidewalk remediation
Cost/benefit analysis
For Downtown Pottstown
Using i-Tree benefits calculator



Twenty-five years later, the panels of some sidewalks had been lifted by tree roots. Using a specialized saw, contractors for Trees Inc. beveled the edges of the lifted panels to remove the trip hazards. The sidewalks are now code and ADA compliant.
Total cost = $1,554.

The cost of remediating the sidewalks, **$1,554,** was less than 15% of the annual benefits provided by the 115 trees, $**13,336.**

Sidewalk remediation
Cost/benefit analysis

200 block Walnut Street

15 honey locusts
Total annual benefits: $3,561

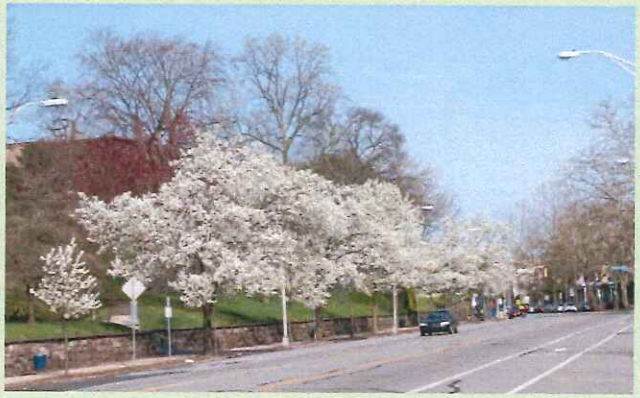
Cost to remediate sidewalks: $11,214

Years to amortize cost: 3.3

Callery pear trees along Hill School
High Street
Sidewalk remediation
Cost/benefit analysis

In 1985 and 1996, Trees Inc. planted 48 callery pear trees along High Street adjacent to the Hill School.

As the trees grew, by 2012, a number of concrete sidewalk panels had been lifted by tree roots.



Using a specialized saw, contractors for Trees Inc. beveled the edges of the lifted panels to remove the trip hazards. The sidewalks are now code and ADA compliant. Total cost = $2,043

Using the i-Tree calculator developed by the US Forest Service, Trees Inc. calculated the annual benefits of the trees ranged from $44 to $308 annually, for a combined total annual benefit of $5,651.

The cost of remediating the sidewalks, **$2,043,** was less than half the annual benefits provided by the 48 pear trees, **$5,651.**

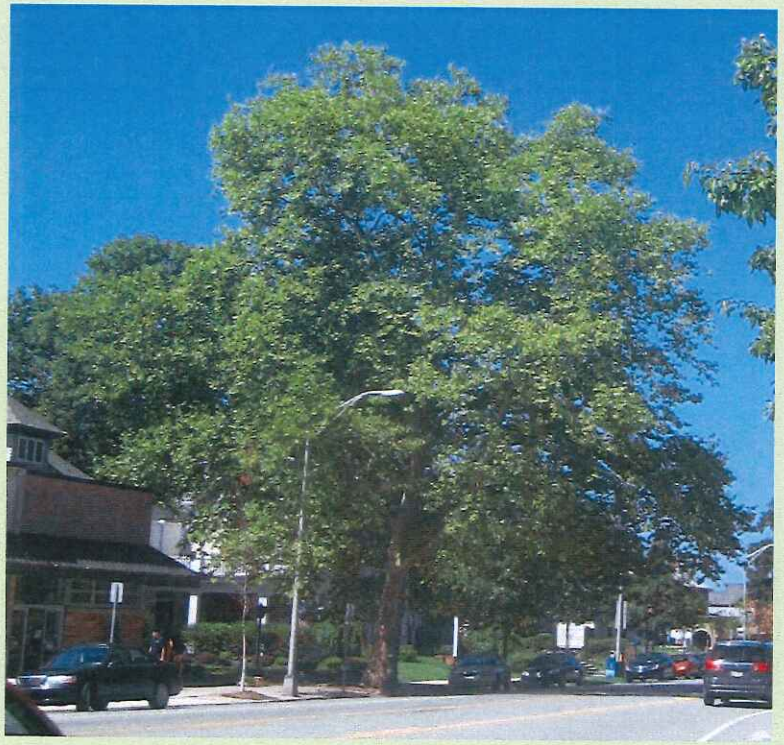
Northern red oak tree
1153 High Street

Sidewalk remediation
Cost/benefit analysis

Annual benefits: $232
Cost to remediate sidewalk: $911
Years to amortize cost of remediating sidewalk: 3.9 years

London plane tree
762 High Street

Sidewalk remediation
Cost/benefit analysis



Annual benefits: $296
Cost to remediate sidewalk: $690
Years to amortize cost of remediating sidewalk:
2.4 years

Callery pear trees along North Charlotte Street at Grace Lutheran Church

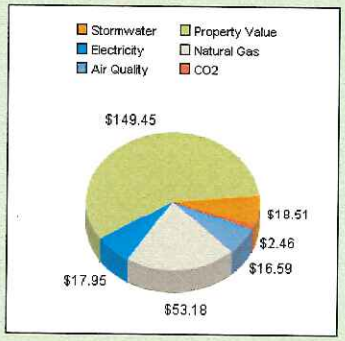
Sidewalk remediation
Cost/benefit analysis

In 1985, Trees Inc. planted 13 callery pear trees along North Charlotte Street adjacent to Grace Lutheran Church.

As the trees grew, by 2012, a number of concrete sidewalk panels had been lifted by tree roots.

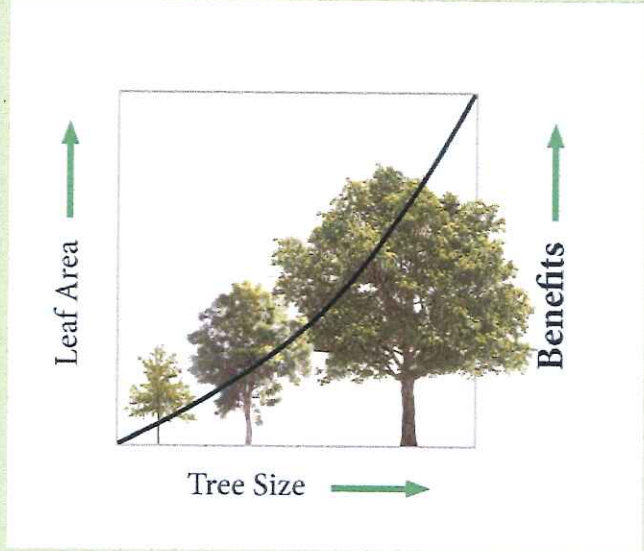
Using the i-Tree calculator developed by the US Forest Service, Trees Inc. calculated the annual benefits (energy savings, air quality, stormwater reduction, property value) of the trees ranged from $135 to $308 annually, for a combined total annual benefit of $2,878.

The cost of remediating the sidewalks, **$1,248,**
was less than half the annual benefits provided by the pear trees, **$2,878.**



It is commonly believed that street trees should not lift concrete sidewalks.

But the larger the tree, the more environmental and economic benefits it provides. Brick and asphalt sidewalks can co-exist with large trees much better than concrete.



But if sidewalks occasionally need to be repaired, the cost is more than repaid by the benefits provided by large trees.