

Tree Research Memo

La Crosse has been a Tree City USA Community for 31 Years!

Tree Inventory

Definition: detailed report prepared (often by arborist) that lists and describes all the trees and their locations. Involves individual tree assessment, ground based visual of tree's crown, trunk, and above-ground roots; as well as species, age, condition, defects, and recommended actions with priority rating (high, medium, low priority). <https://www.cai-illinois.org/tree-inventory-community-benefits-seeing-forest-trees/> Said to be an essential tool for good management.

Why is it needed?

- To determine the need for a community's forestry program.
- Prioritizes maintenance, reduce potential liability, and helps facilitate long-term budgeting.
- Educate residents about benefits of an urban, community forest and inform about best species suited to the community.
- Facilitate planning.
- Overall, provide basis for the development of a comprehensive community forest management plan.
- <http://www.ctforestry.uconn.edu/TreeInventory.html>

How Can We Fit Trees into Existing Roads?

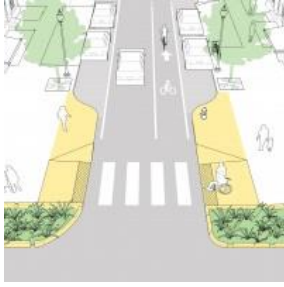
Curb Extensions, Bump Outs, Bulb Outs



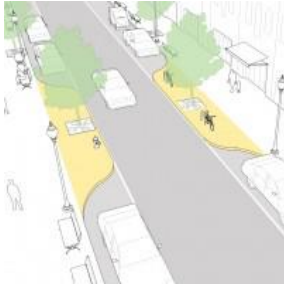
Curb extensions visually and physically narrow the roadway width. Have many possible benefits to implement them; shorter crossing for pedestrians, traffic calming, and bioretention which can include plantings, benches, and trees. They are only appropriate where there is on-street parking, should not extend more than 6 feet from curb. Considerations: should enable street sweeping, turning needs of large vehicles (busses, emergency vehicles), street utilities (pipes, wires), and runoff and drain situations. Estimated implementation cost ranges from \$2,000 to \$20,000, consider maintenance.

Types – all of which can allow trees!

Gateway: applied at mouth of intersection, to slow traffic and increase pedestrian safety.



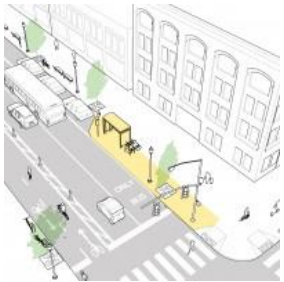
Pinchpoint: applied at midblock, to slow traffic and add public space.



Chicane: applied on residential or low volume downtown streets, to slow traffic and add public space.



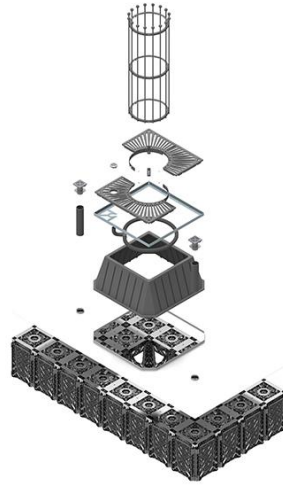
Bus Bulbs: align bus stop with parking lane without leaving the travel lane, decreasing time lost when merging in and out of traffic.



Other References:

- <https://nacto.org/publication/urban-street-stormwater-guide/stormwater-elements/green-infrastructure-configurations/stormwater-curb-extension/> (offers more recommendations and things to think about)
- http://pedbikesafe.org/PEDSAFE/countermeasures_detail.cfm?CM_NUM=5

Tree Pits, Structure Soils



ArborSystem

example, <https://greenblue.com/na/products/arborsystem/>

A tree pit is a larger volume around a planting hole that is designed to extend the volume of rootable soil available to the tree.

City of Stockholm, UK has demonstrated that healthy trees can be cultivated in this way. Benefits: stormwater management, concrete frame. A concrete frame crate system is more environmentally friendly, as it doesn't have potential for spreading microplastics into environment. "the materials used for structural soils are more sustainable than plastic crates because the rock, biochar and compost can all be made of recycled material." Quotes need to be requested for specific prices, but https://www.crwa.org/uploads/1/2/6/7/126781580/crwa_tree_pit.pdf says between \$1,500 to \$10,000

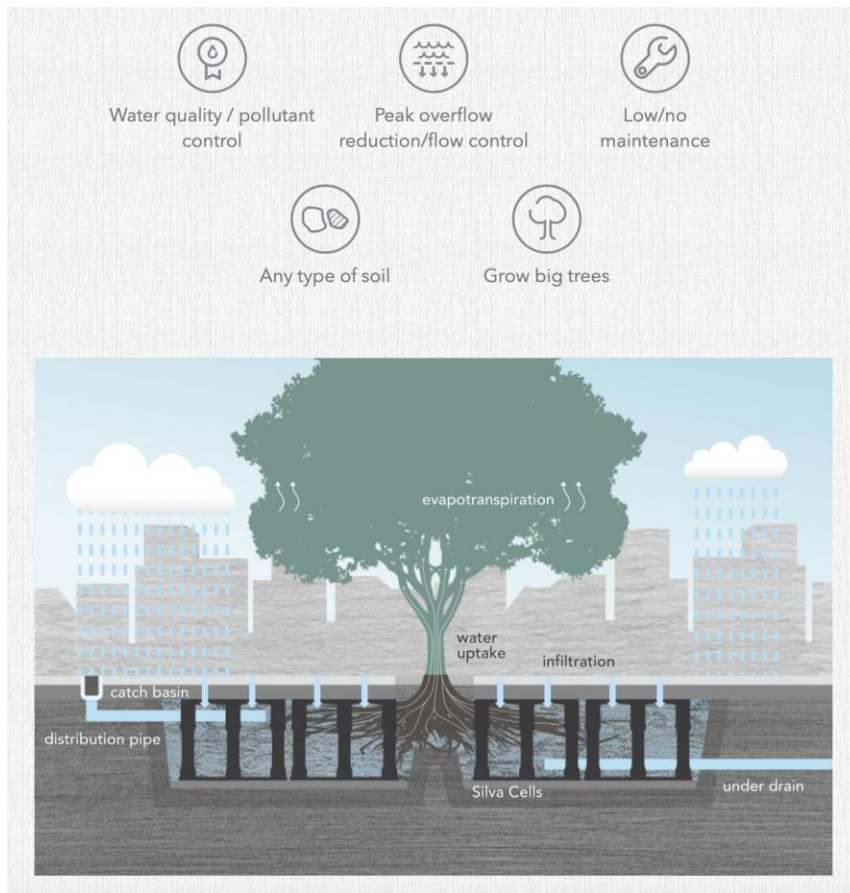
References:

- <https://stockholmtreepits.co.uk/assets/downloads/tree-pits-with-structural-soils-practice-note-v1-2.pdf>
- <https://stockholmtreepits.co.uk>

Side note: Could not find exact dimensions of pits, as they can be adjusted for types of trees planted. However, I believe there were the smallest sizes around 3ft x 3ft !

Another price reference: \$8,000 – \$10,000, to purchase one prefabricated system including filter material, plants and possibly some maintenance
\$1500 – \$6000 installation^{3, 4, 6} https://www.crwa.org/uploads/1/2/6/7/126781580/crwa_tree_pit.pdf

Silva Cells - example product



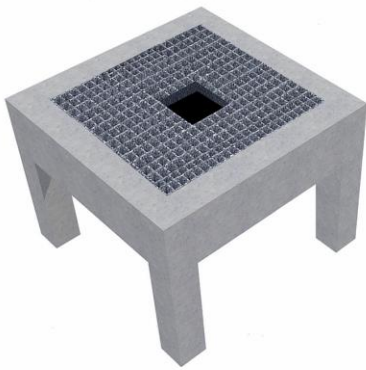
Specific brand. Similar build to the tree pits above. “Each 24-by-48-by-16-inch cell provides 10 cubic feet of soil volume, and they can be stacked to an appropriate height to fit any tree pit depth. The Silva Cell is made of a lightweight polypropylene blend, with a galvanized steel tube in the deck for additional strength. The open framework of the Silva Cell allows almost all of the space to be available for rooting. Since the Silva Cells are attached vertically but not horizontally, future excavations, as well as repairs, are easy to isolate.”

Pricing: “Costs will vary based on characteristics of the site, the quantity of frames and decks required for the project, the tree size and stormwater treatment goals, and the design objectives. Remember that each frame is 48" (1200 mm) long x 24" (600 mm) wide x 16" (400 mm) high and holds about 10 ft³ (.28 m³) of soil. According to bid tabulations from projects across North America, the Silva Cell system generally costs \$14 - \$18 per cubic foot installed (that estimate includes everything except the base course, the final paving and the tree itself).” <https://www.greenmax.eu/en/silvacell-budget-pricing/?page=silvacell-budget-pricing/&lang=en>

DeepRoot installs Silva Cells. They provide an estimating worksheet here: <https://www.deeproot.com/products/silva-cell/price.html>

They also have root barriers as a product to guide and redirect tree roots down and away from hardscapes. <https://www.deeproot.com/products/root-barrier.html>

Storm Tree – example product #2



This is another specific brand of a tree pit or “tree well” in this case. “Our tree pit systems can be designed and installed with the tree at surface grade, or with the tree recessed several inches below grade, as a “tree well”, with the ability to intercept and collect additional surface water, providing supplemental irrigation. Another advantage of recessing a tree slightly below a sidewalk surface, prevention of the potential for the lifting or upheaval of the sidewalk, since root development and spread takes place at a lower depth. Features: systems can be installed with underdrain pipes to prevent potential water logging, systems can be integrated with trench and other surface drains and systems can be connected to underground storage chambers for high flow volume control, storage, or harvesting.”

Pricing: starts at \$3,400 and include a 4 foot by 4 foot precast concrete frame, ADA compliant fiberglass tree grate, support hardware, and sufficient soil profile to support the healthy and vigorous growth of your selected tree.

<https://www.storm-tree.com/tree-pits>

Other possibilities:

Taken from:

<https://www.seattle.gov/Documents/Departments/UrbanForestryCommission/2014/2014docs/SDOTTreesSidewalksOperationsPlan120814.pdf>

Easements

EASEMENT



An easement may allow construction of a sidewalk on private property in order to provide more space for existing or new trees. The width of easements is site specific.

BEST USED IF

- Adequate planting space is not available in the right-of-way.

DON'T USE IF

- Topography requires new structures, such as walls, in the right-of-way.

PROACTIVE / RESPONSIVE

- Proactive - Can provide a larger planting area for new trees, particularly if larger species are desired.
- Responsive - May provide larger root zone for existing trees, to prevent future damage after any repairs and potentially prolong life of the tree.

NOTE

- This requires coordination between the property owner and SDOT.

ESTIMATED COST

- Market value or dedication from property owner

REFERENCES

- Seattle Right-of-Way Improvements Manual



EXPECTED USEFUL LIFE



COST

\$-\$\$\$



Tool addressed in
Seattle ROWIM

SUSPENDED PAVEMENT SYSTEMS



Suspended pavement systems may be used in new tree plantings where there is not an adequate volume of soil available for tree root growth. These systems provide structural support for pavement while allowing the use of planting soil as fill, which provides space for roots to grow, promoting healthy trees and preventing pavement damage by roots near the surface.

BEST USED IF

- Adequate soil volume for the size of intended tree species is not available within the tree pit and adjacent planting strip.
- An area below pavement between the planting strip and back of sidewalk is desired for root growth while avoiding pavement damage.

DON'T USE IF

- Cannot work within grading requirements for site-specific conditions.

PROACTIVE / RESPONSIVE

- Proactive - Should be used for new tree plantings, particularly in urban conditions with limited planting area within the streetscape.

ESTIMATED COST

- \$15 - \$25 / cubic foot (depending on depth)

REFERENCES

- Seattle Right-of-Way Improvements Manual

EXPECTED USEFUL LIFE

M	Y	D	C
DECADES			

COST

\$\$\$-\$\$\$\$



Tool addressed in
Seattle ROWIM

ROOT PATHS

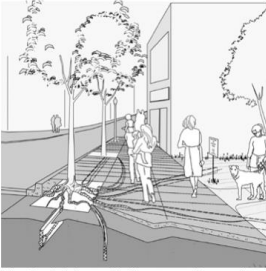


Photo Credit: Arlington, VA, Department of Community Planning, Housing and Development

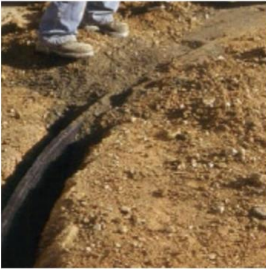


Photo Credit: Casey Trees, Tree Space Design Report

Root paths are narrow trenches, roughly 4" wide by 1' deep, installed in compacted subgrade before the gravel base for pavement is added. A commercially available strip drain material could be added to the trench to support drainage, and the remaining space backfilled with planting soil. Root paths extend radially from tree pit locations, and may connect to adjacent tree pits, and/or other nearby planting areas (lawns, etc.).

BEST USED IF

- Underlying (native) soil supports some rooting even when it is somewhat compacted.

DON'T USE IF

- Positive drainage out of / away from root path cannot be achieved.

PROACTIVE/RESPONSIVE

- Proactive - Root paths should be installed for new plantings during construction, at the time of subgrade preparation (before paving).

NOTE

- Root paths may be most applicable in urban areas where tree roots need to be directed around utilities and planting space is limited.

ESTIMATED COST

- \$600-\$800 per tree [Costello & Jones 2003]

EXPECTED USEFUL LIFE



COST

\$-\$\$



Tool NOT addressed in Seattle standards

REFERENCES

- Casey Trees. 2008. Tree Space Design: Growing the Tree Out of The Box. <http://caseytrees.org/resources/publications/treespacedesign/>
- Costello, L. R. and K. S. Jones. 2003. Reducing Infrastructure Damage By Tree Roots: A Compendium of Strategies. Western Chapter of the International Society of Arboriculture.

P. 60

Other sidewalk changes:

Referenced from <https://www.portlandoregon.gov/parks/article/577453>

Curving Sidewalks—the sidewalk curves away from the tree.



Nonstandard-sized slabs or enhanced tree pits—sections of concrete are cut to accommodate a tree



Urban Forestry Plans/Ideas

The Seattle Department of Transportation – Trees and Sidewalks Operations Plan

TREE PIT SIZING



Tree pits are typically used as an alternative to planting strips in business districts where additional sidewalk width is important to accommodate pedestrian volumes. In Seattle, when permitted as an alternative to planting strips, tree pits shall be constructed per Standard Plan 424, dimensioned to meet or exceed the minimum size required. The minimum square footage for a tree pit is 24 square feet of open area (typically 4' x 6' or 5' x 5'). Any proposed variations shall be subject to site-specific review to ensure that (1) conditions justify the variation; (2) the design meets public safety standards; and (3) the design provides adequate conditions, including soil volume, to support trees.

BEST USED IF

- A continuous planting strip is not a good option for the site (e.g., in a busy/pedestrian setting, or adjacent to curbside parking with frequent turnover).

DON'T USE IF

- Continuous planter strips are more appropriate for the site.

PROACTIVE / RESPONSIVE

- Proactive - Tree pits for new plantings should allow adequate room for trunk and root growth for the species of tree being planted.
- Responsive - In some cases tree pits may be enlarged to alleviate constrained root or trunk space and provide better growing conditions for an existing tree.

EXPECTED USEFUL LIFE

M	Y	D	C
DECADES			

COST

\$



Tool addressed in
COS Standard Plans

ESTIMATED COST

- Proactive - No added cost if included in design
- Responsive - \$15 / square yard

REFERENCES

- City of Seattle Standard Plan 424
- City of New York Parks & Recreation. February 2014. Tree Planting Standards. <http://www.nycgovparks.org/pagefiles/53/Tree-Planting-Standards.pdf>

CURB BULBS



A curb bulb is a radial extension of a sidewalk at an intersection used to shorten the crossing distance for pedestrians. Curb bulbs may be landscaped and provide additional root growth area for trees, and can improve pedestrian crossings. Designs that include trees and landscaping must ensure proper sight lines are maintained.

BEST USED IF

- Additional planting space would likely reduce further sidewalk damage by tree roots.
- Existing planting strip does not have enough space for desired tree species.
- Parking restrictions already exist at location (e.g., within 30' of a crosswalk).

DON'T USE IF

- Relocating the curb will not work due to drainage or other infrastructure conditions.
- Curb bulb will not work due to traffic conditions.
- Other street uses may be planned for the existing roadway width (such as bicycle facilities, etc).

PROACTIVE / RESPONSIVE

- Proactive - Curb bulbs may be used to create a larger planting area for a new tree.
- Responsive - Curb bulbs may be used to give an existing tree more space to grow.

NOTE

- Certain conditions must be in place, including curbs, drainage, and proper location of utilities.
- Curb bulbs are generally a costly solution, but may be particularly appropriate where they serve other purposes (such as traffic calming/pedestrian improvements).

ESTIMATED COST

- \$50 / linear foot (excludes drainage and ramps)

REFERENCES

- Seattle Right-of-Way Improvements Manual

EXPECTED USEFUL LIFE



CENTURY

COST

\$\$\$ - \$\$\$\$



Tool addressed in
Seattle ROWIM

P. 28

<https://www.seattle.gov/Documents/Departments/UrbanForestryCommission/2014/2014docs/SDOTTreesSidewalksOperationsPlan120814.pdf>

Urban Forest Management Plan Toolkit <https://ufmptoolkit.net>

PLANNING STEPS

Pre-planning

WORK PLAN

The work plan information that you gather will be included in the "Introduction" part of the UFMP. See sample [Table of Contents of UFMP](#)

Why do you need to develop a plan?

Who are the people whose support you will need?

Where will the geographical limits be?

What areas/trees will be addressed?

When will the plan be developed, and how long will the plan cover?

How is the plan going to be developed? (e.g. personnel - funding)

Plan Development

URBAN FOREST MANAGEMENT PLAN

Vision

What do you want?

Inventory and Assess

What do you have?

Collect data to understand the current state of the urban forest and its management.

Strategic Plan

How do you get what you want?

Analyze data and identify issues and trends over time.

Prioritize needs and opportunities.

Goals, objectives, actions based on your vision and analysis.

Implementation (Action) Plan

Who will take action and when?

Monitoring Plan

How will you know when you're achieving your goals?

Compile the documents for public review, revise as needed, and obtain approval.

See sample [Table of Contents of UFMP](#).

Post-planning

ADAPTIVE MANAGEMENT

Monitor, evaluate progress, and revise as needed. *Are you getting what you want?*

Grants

Wisconsin DNR <https://dnr.wisconsin.gov/topic/urbanforests/grants>

Urban Forestry Startup Grants: deadline has passed, but maybe future ones? Grants range from \$1,000 to \$5,000 and require a 50–50 match (total project cost range is \$2,000 to \$10,000)

Is this the one the Parks Department already applied for?

Regular Grants: are competitive cost-share grants of up to \$25,000. Grants are to support new, innovative projects that will develop sustainable urban and community forestry programs, not to subsidize routine forestry activities.

Parking Lot Beautification

The City of Milwaukee partners with the Milwaukee Metropolitan Sewerage District (MMSD) to combat the issues that come with 45% of Milwaukee having hard surfaces such as parking lots, streets, roofs.

Issues include poor water quality, sewer backups, flooding. All local, non-residential, private property owners are welcome to apply for funding, including 501(c)3 nonprofit organizations, universities and other educational institutions, daycares, funeral homes, and properties owned by religious groups. The Commercial Green Infrastructure Grant from the City of Milwaukee can provide up to \$25,000.

<https://city.milwaukee.gov/GreenLots>

Funding

“MMSD is a regional unit of government. The city of Milwaukee is one of 28 municipalities we serve. When we fund stand-alone (smaller) tree projects with our funding across our region (generally but not always via our Green Infrastructure Partnership Program, or GIPP), that funding in the past has come from user charges. When we fund larger projects that include other green infrastructure strategies plus trees, that funding is from our capital budget that's funded by property taxes. We also from time to time have taken advantage of federal grants for *specific* projects, but that money is not made available to commercial interests...but rather to areas we decide to target.” -Karen Sands, Director of Planning, Research & Sustainability, Milwaukee Metropolitan Sewerage District, ksands@mmsd.com, 414-225-2123

<https://city.milwaukee.gov/eco/WCC/GI>

Other Thoughts:

Minimum planting strip size requirements in 11 U.S. cities

City	Minimum Planting Strip Size in Feet
Portland, OR	3
Vancouver, WA	3*
Salem, OR	5.5*
Eugene, OR	4
Corvallis, OR	4*
Spokane, WA	5*
Seattle, WA	5
Boise, ID	5*
Missoula, MT	3
New York, NY	4
San Francisco, CA	3

* Information provided by their City Forester. ⁱ

<https://www.portlandoregon.gov/parks/article/577453> p. 2

New York Standards: <https://www.nycgovparks.org/permits/trees/standards.pdf>

Benefits of Trees

<https://www.arboday.org/programs/treecityusa/benefits.cfm>

<https://canopy.org/tree-info/benefits-of-trees/>