Urban Tree Wells: Past, Present, Future

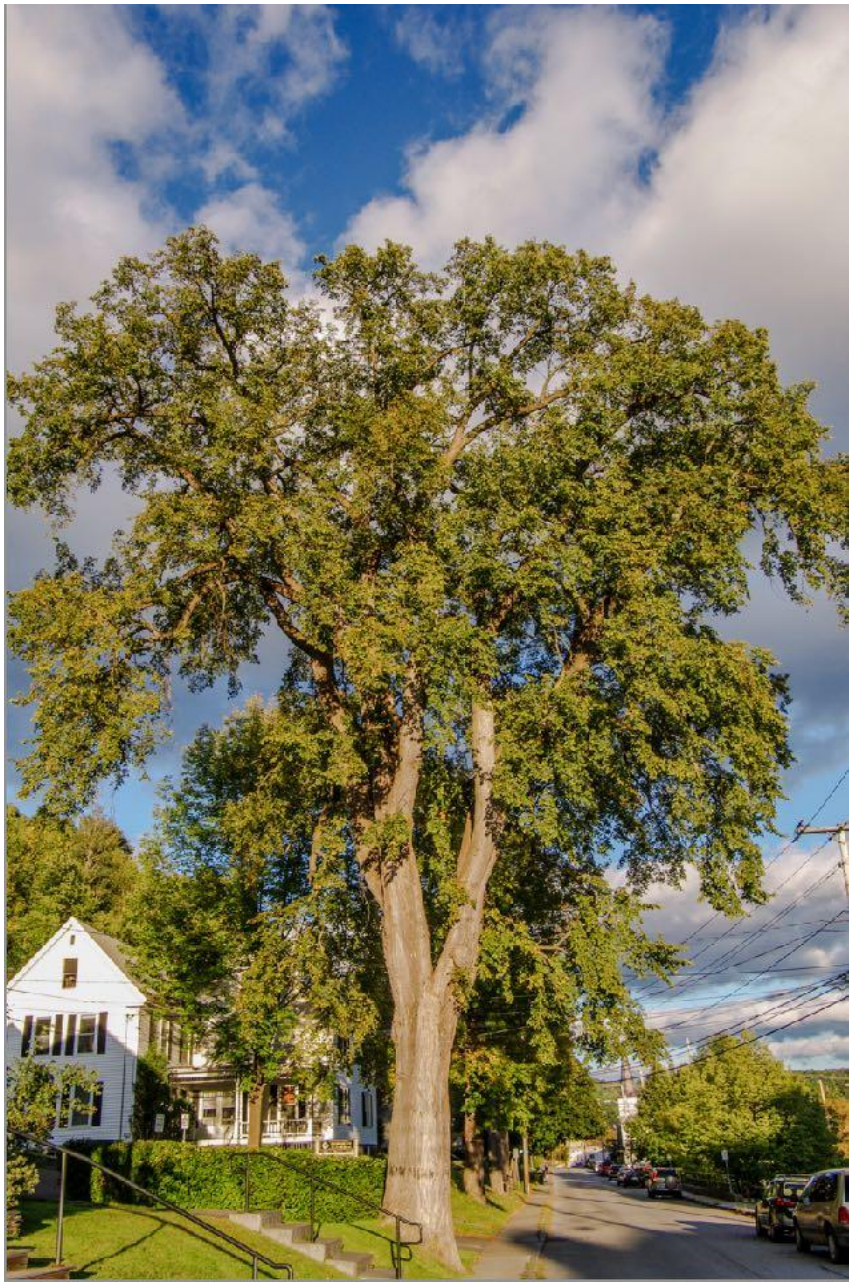
- Past 20 years of experimenting
  - John Snell, Montpelier Tree Board
- Present: 5 years with the Stockholm Method
  - Joseph Ferris, Montpelier City Arborist
- Future: Stockholm Method and Stormwater Credits
  - Alec Ellsworth, Montpelier Tree Warden

Renovating Existing Sidewalk Planting Wells

An experiment…

John Snell
Montpelier Tree Board

THE MONTPELIER TREE BOARD
Taking root in Montpelier



Why can’t all urban trees look like this?!

Life in the city can be tough

- Unknown soils
- High pH in sidewalks
- Inconsistent water
- Summer heat/winter cold
- Electric lights

Life in the city can be tough

- Snow piles
- Salt
- Dog poop & pee
- Cigarette butts & trash

Life in the city can be tough

- Holiday lights
- People
- Isolated individual trees
- Plus…

A 4’x4’x __’ planting well—
it ain’t much to grow roots in!

We reap what we sow!

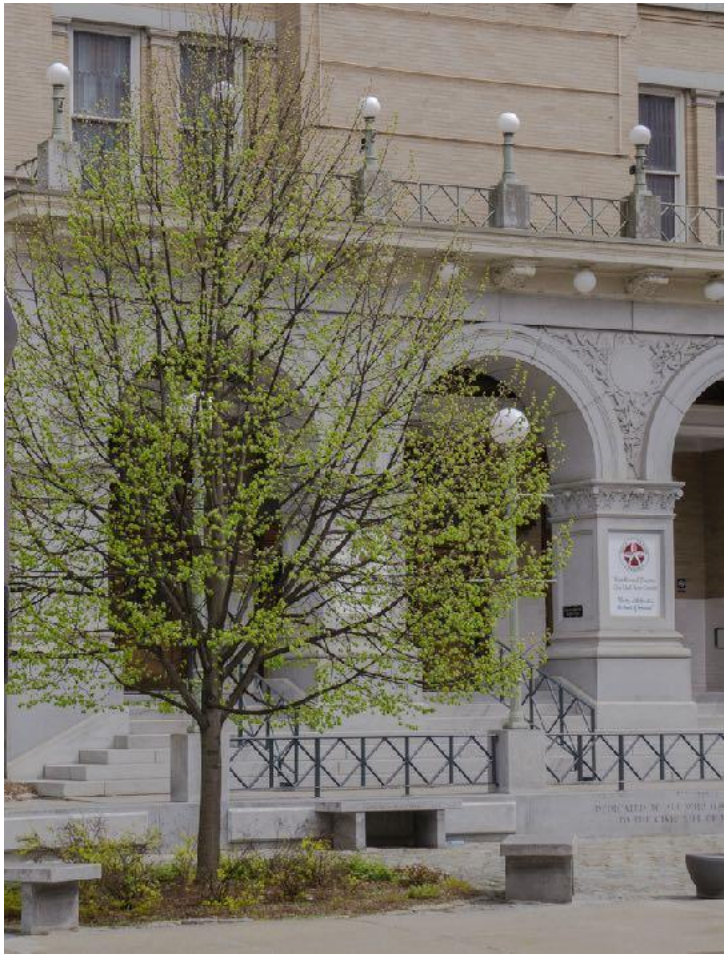
Some trees do just fine!
Can we replicate that?

- Norway Maples & Green Ash do well but are no longer on our planting list
- What is the main criteria for success of an urban tree?

Just a little (more) room to grow!

Five years later…

And it does not take much!

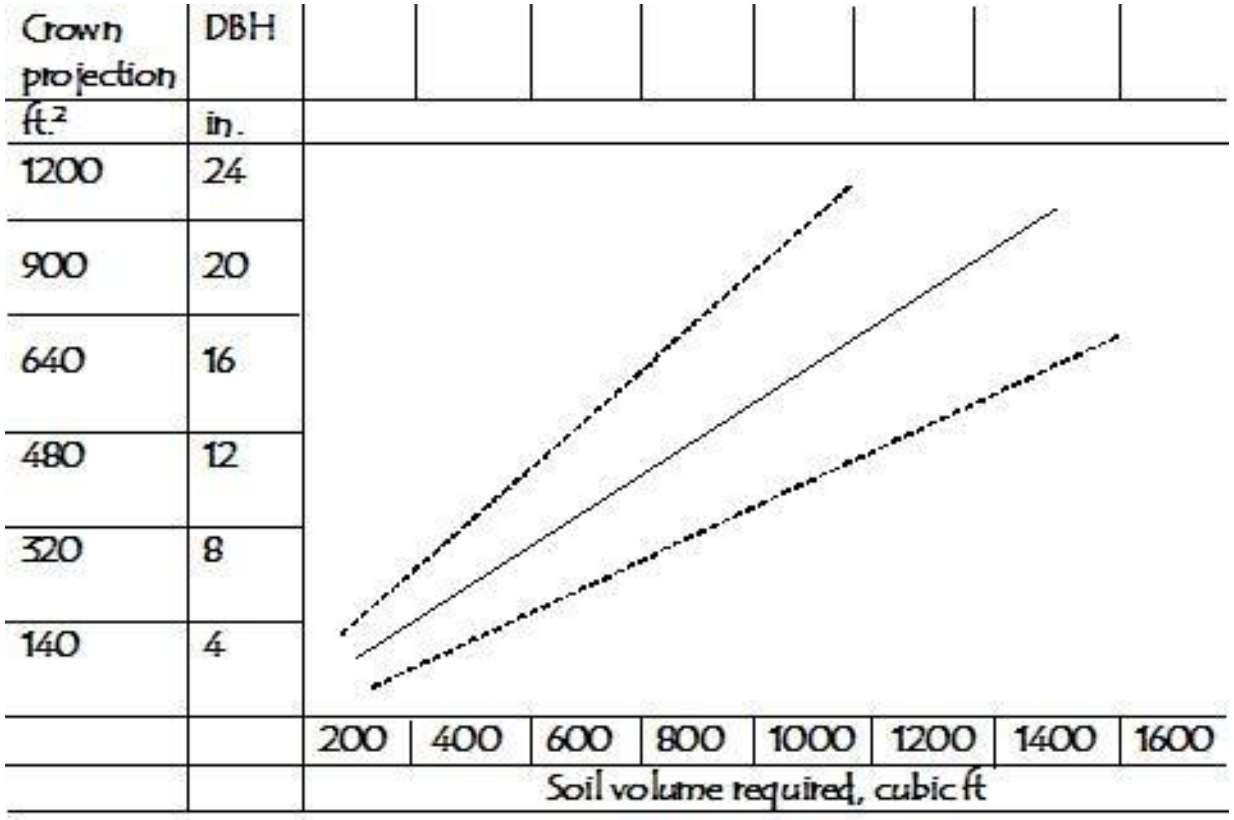


Greenspire Lindens, after 14 years

Red Oaks, After 18 years

Swamp White Oak, after 7 years

Root zone volume vs. tree size



4’x4’x2’ = 32 Cubic Feet (not even on this chart!)

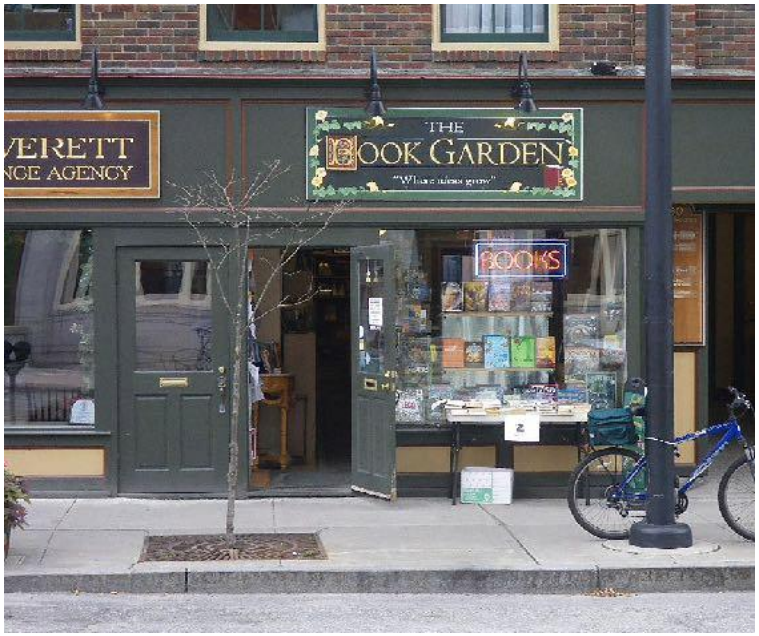
Experiments with CU Structural soil

- 15-year old Red Oak in parking lot with CU Structural Soil and pavers in a well that was 30’x4’x18”
- The tree has done very well and provides desirable shaded parking.

Experiments with CU Structural soil

- “Structural soil” placed under new sidewalk but on deep sand fill
- Patterned “pavers” rather than real ones (not permeable)
- SW facing site with brick wall
- Extensive watering is required
- For a variety of reasons, it has *not* been very successful.

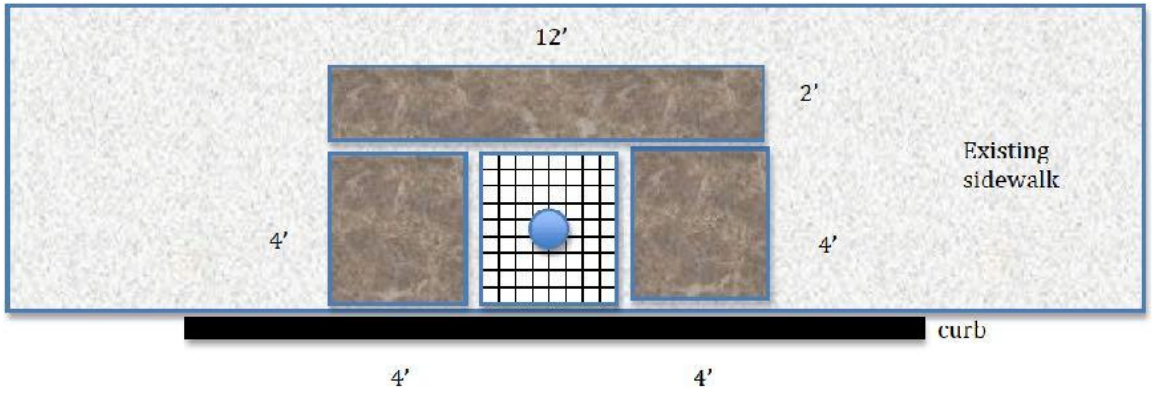
A project to renovate planting wells



- Montpelier was replacing a number of sections of deteriorated sidewalk downtown
- Many of these bordered existing trees planted in 4’x4’ wells
- Most of these trees—a variety of species—were *not* very vigorous.

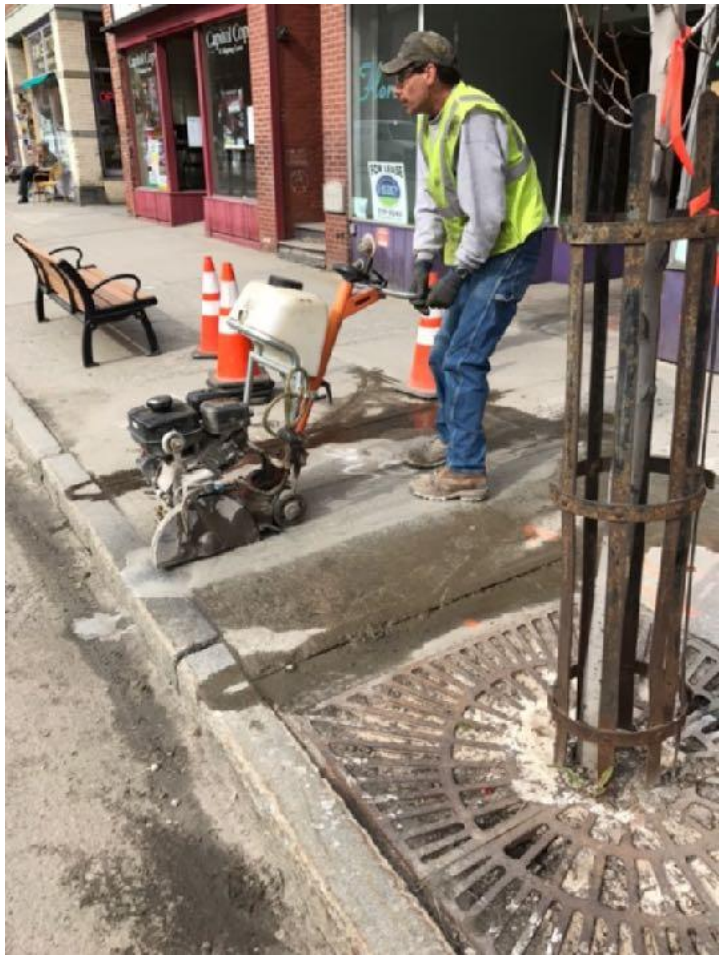
A project to renovate planting wells

- The Tree Board proposed an experiment—we had not much to lose!
- Department of Public Works agreed to excavate a larger area around *nine* tree wells and install CU Structural Soil prior to pouring new sidewalks.
- We opted to leave the trees in place!



Marking and cutting sidewalks

Marking and cutting sidewalks



Removing cut sidewalk slabs

Exposing the tree roots

Placing CU Structural Soil

Placing CU Structural Soil

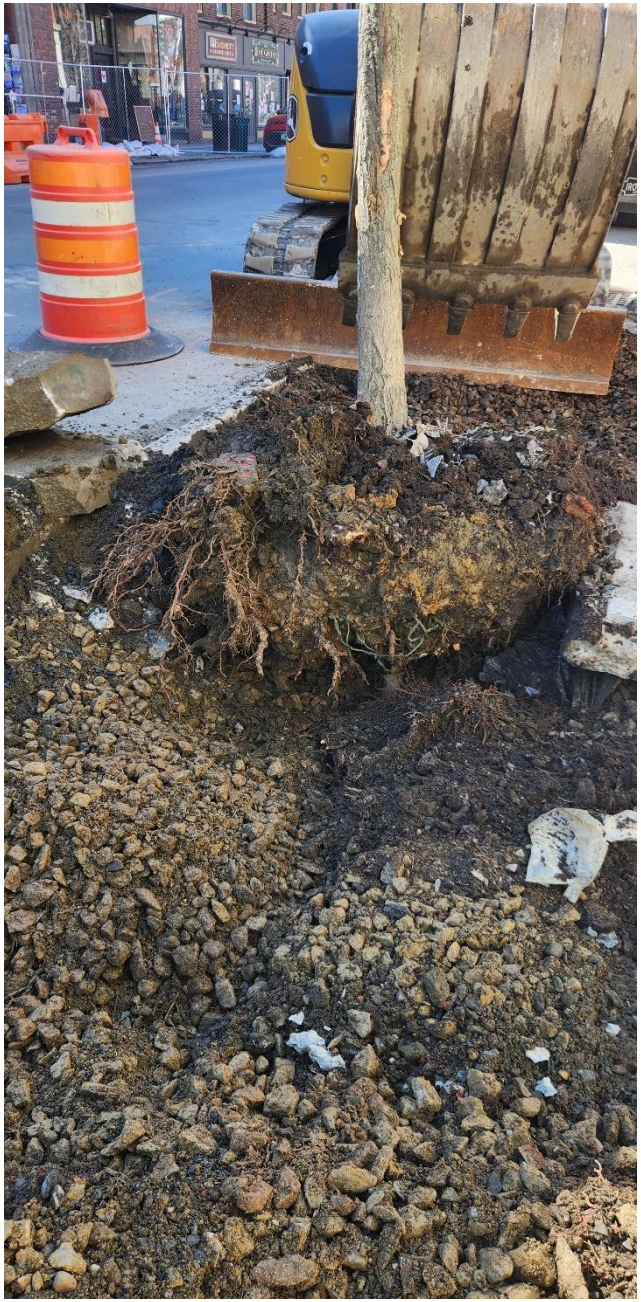
Depth of 16” was a compromise with the 24” recommended by Cornell

Results

- All trees but one were deemed worth leaving
- Same old problems:
  - Water issue is not solved by placing better sub-surface material.
  - Air exchange is still potentially an issue
- Same Results:
  - Small Trees
  - Not much root growth outside of 4x4 tree well.

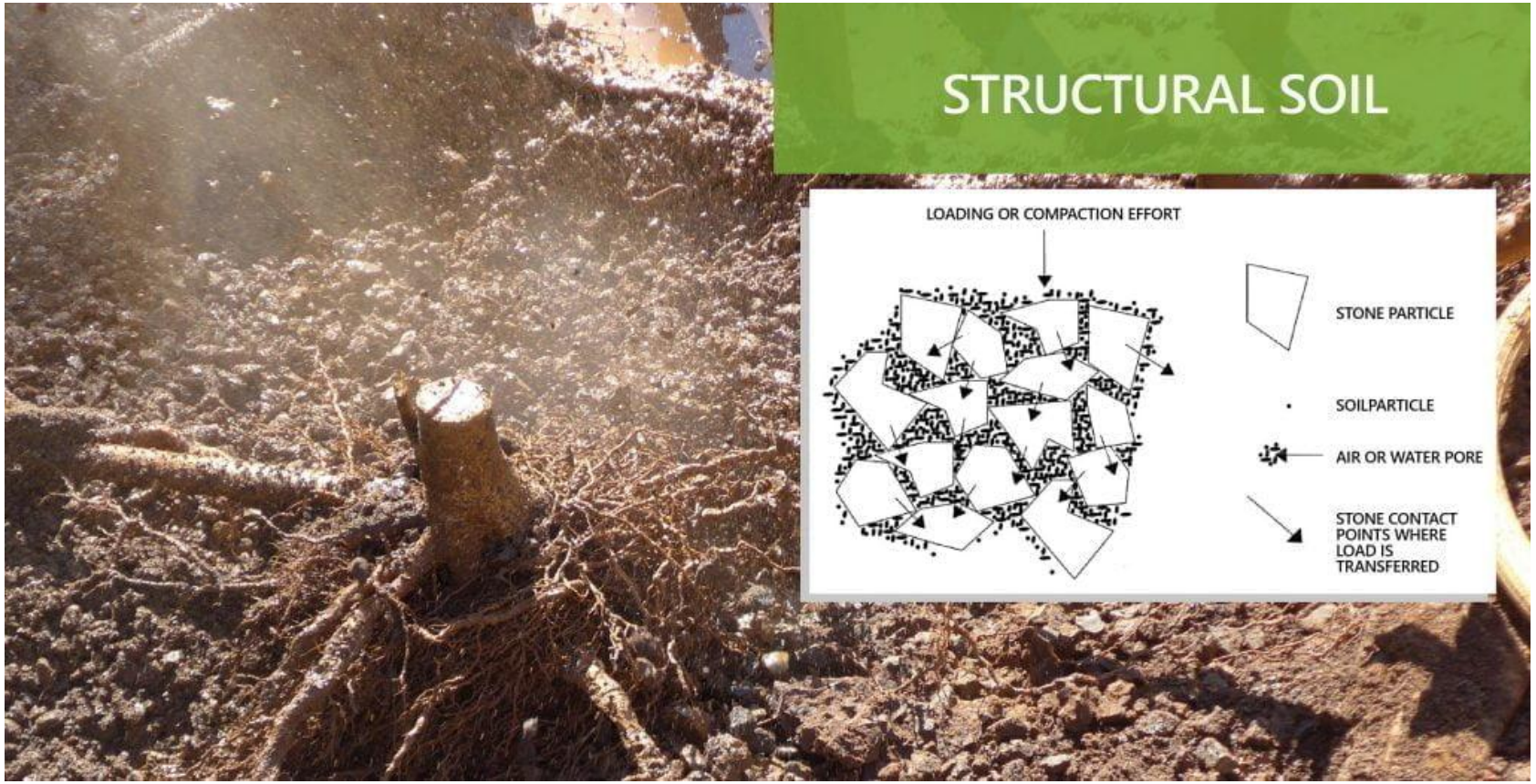
Another example

- Ginko on State Street. Planted 2003 in “structural soil.” Removed in Spring 2025
- Virtually no root growth outside the 4x4 grate except along curb line (water).



Next Generation, Ideas Considered

- More CU soil
  - Expensive, mixed results, no stormwater benefit.
- Silva Cells
  - Stormwater benefits, proven success, solves a lot of the problems we face in urban environments.
  - Expensive, specialized install, can’t dig them up or go around non-standard spaces.
- Stockholm Method
  - Has potential to address multiple issues with growing big trees, with stormwater benefits.

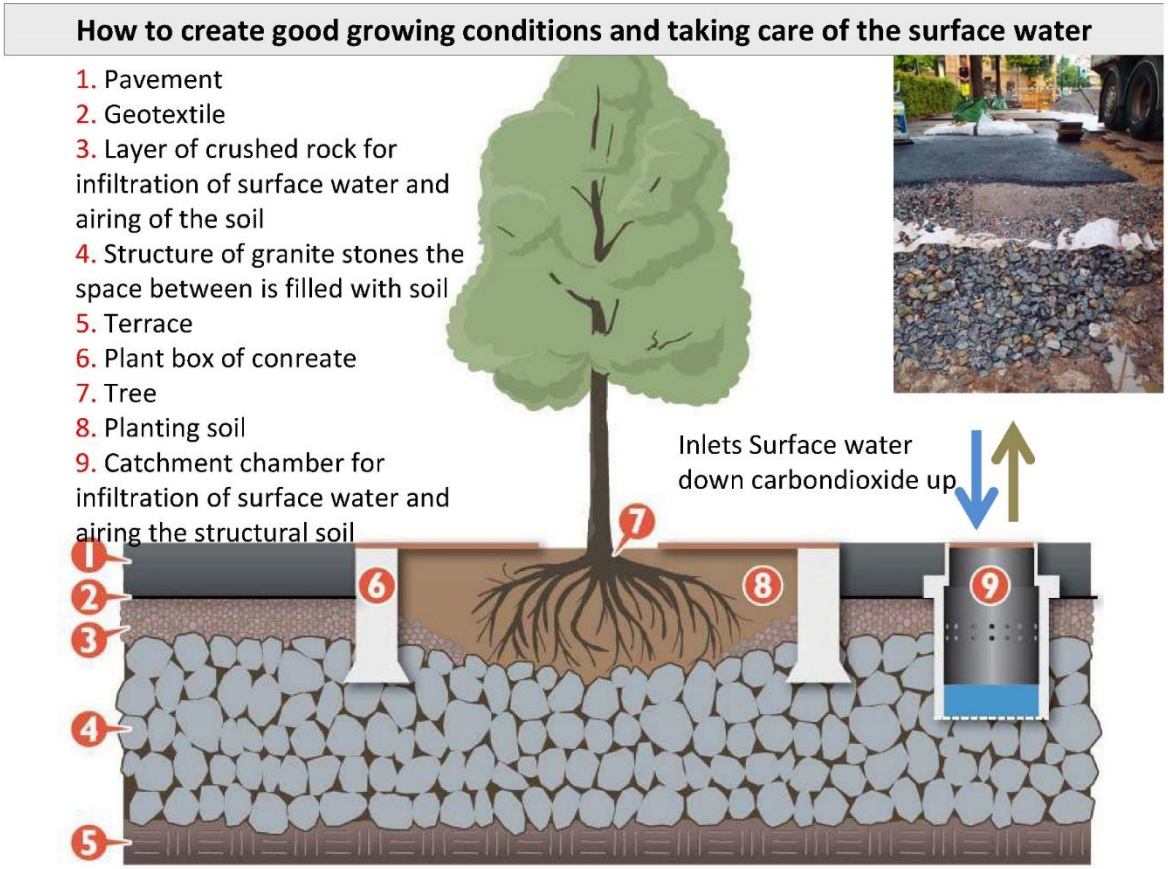


Structural Soil Pros/Cons

- Similar in some ways to the Stockholm Method, with some important differences.
- Propriety product ---trucked in from far away.
- More expensive than Stockholm Method (~$10/cu ft vs. $5/cu ft)
- Mixed results locally in Montpelier
- No stormwater benefit.

Silva Cells Pros/Cons

- Proven method, great for trees.
- Can incorporate stormwater benefits.
- Expensive installation ($14-$18/cu. ft vs $5/cu ft)
- Not great where there are a lot of obstacles to work around (i.e. downtown Montpelier)
- Not great if you have to dig it up again (i.e. anywhere in Montpelier).

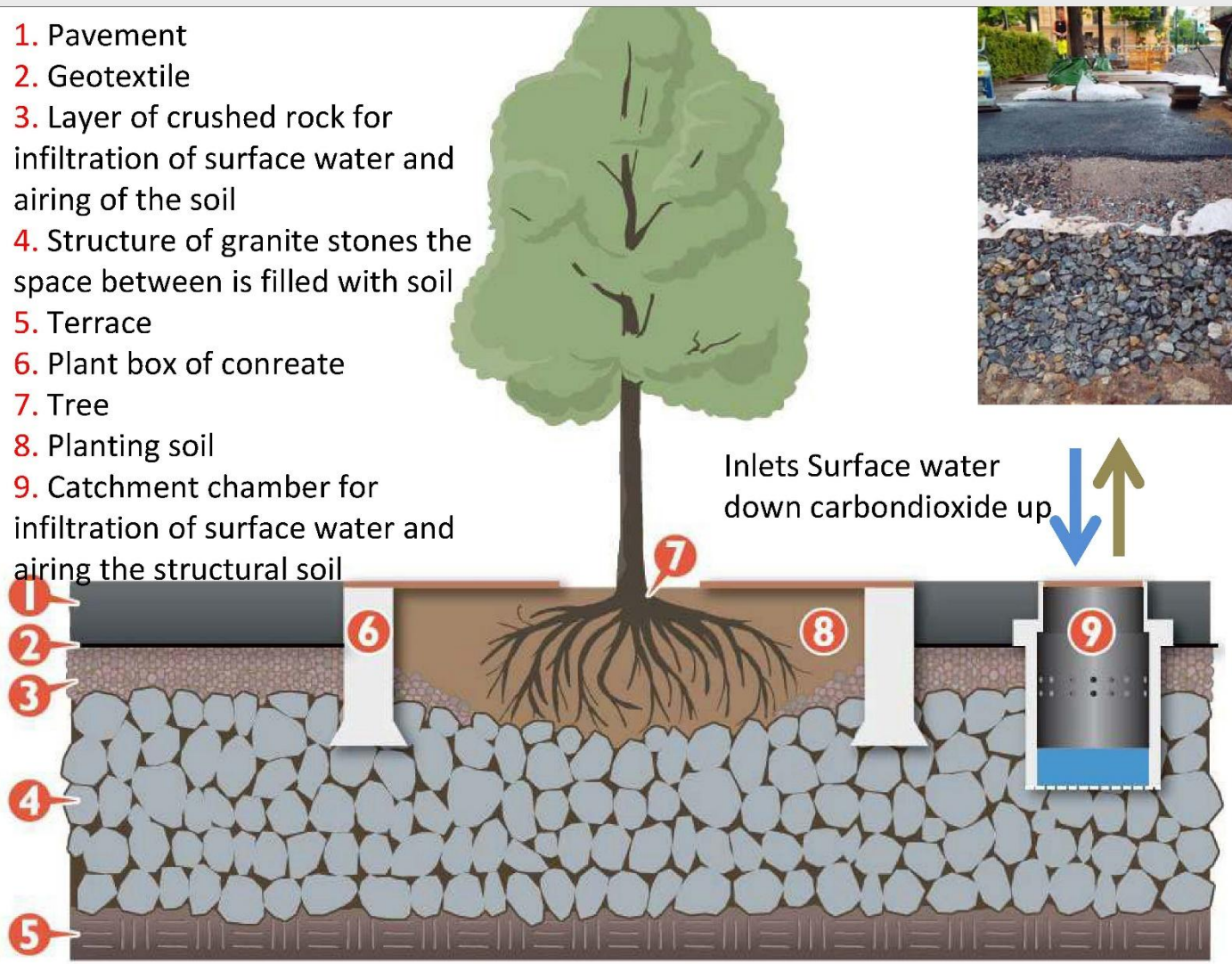


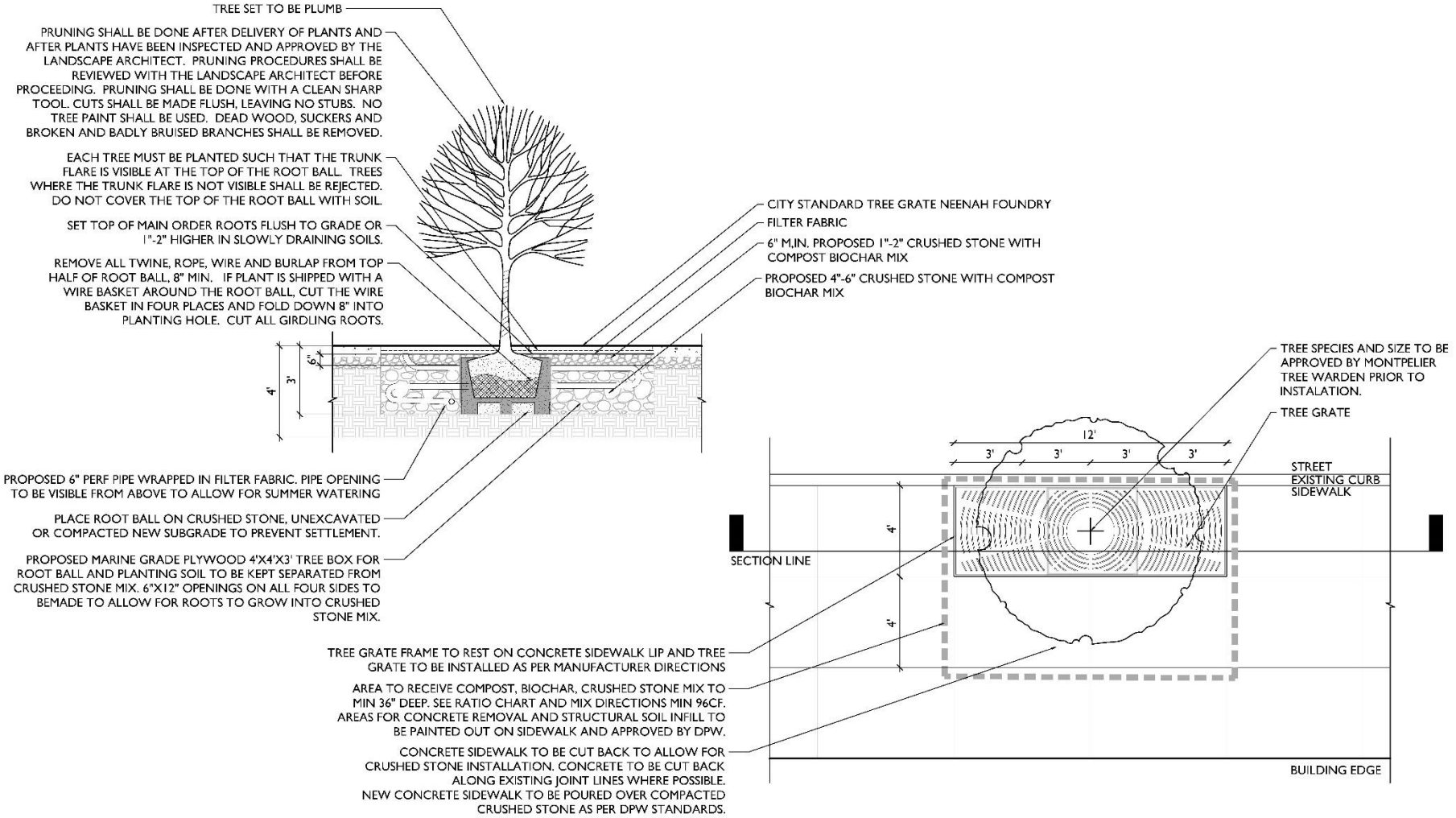
Stockholm Method Pros/Cons

- Relatively Cost effective (~$5/cu. ft)
- Uses all local materials.
- Installation using methods that are mostly familiar to contractors/municipal crews in VT.
- Can (potentially) incorporate stormwater benefits.
- Easy to make it work in almost any shape of space. Can be dug up and replaced.

How to create good growing conditions and taking care of the surface water

1. Pavement
2. Geotextile
3. Layer of crushed rock for infiltration of surface water and airing of the soil
4. Structure of granite stones the space between is filled with soil
5. Terrace
6. Plant box of conreate
7. Tree
8. Planting soil
9. Catchment chamber for infiltration of surface water and airing the structural soil





4 0 4 8

SCALE OF FEET

Montpelier City

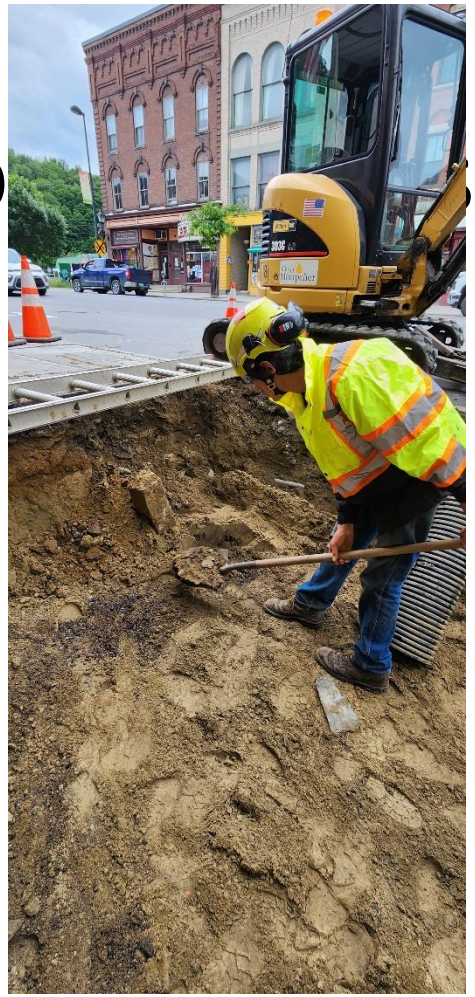
STREET TREE PLANTING DETAIL

JOB NO.	000
SCALE	1/4"=1'-0"
DATE	040721

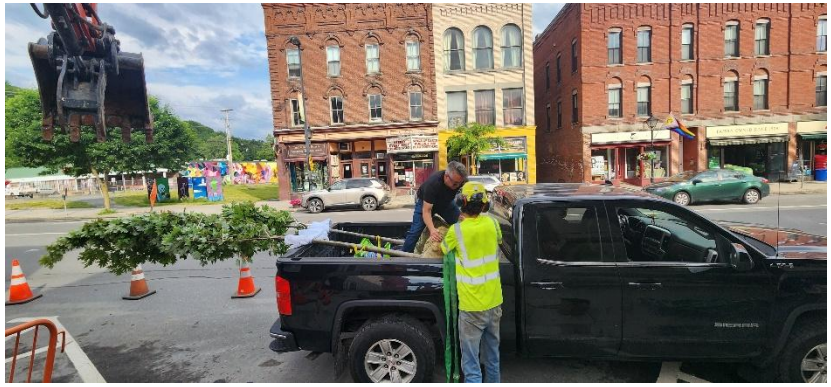
2024 Installation

oto sta


4' clearance along bldg during const
11x5 pit
11x5 additional root space
22x5 total length




POLICE

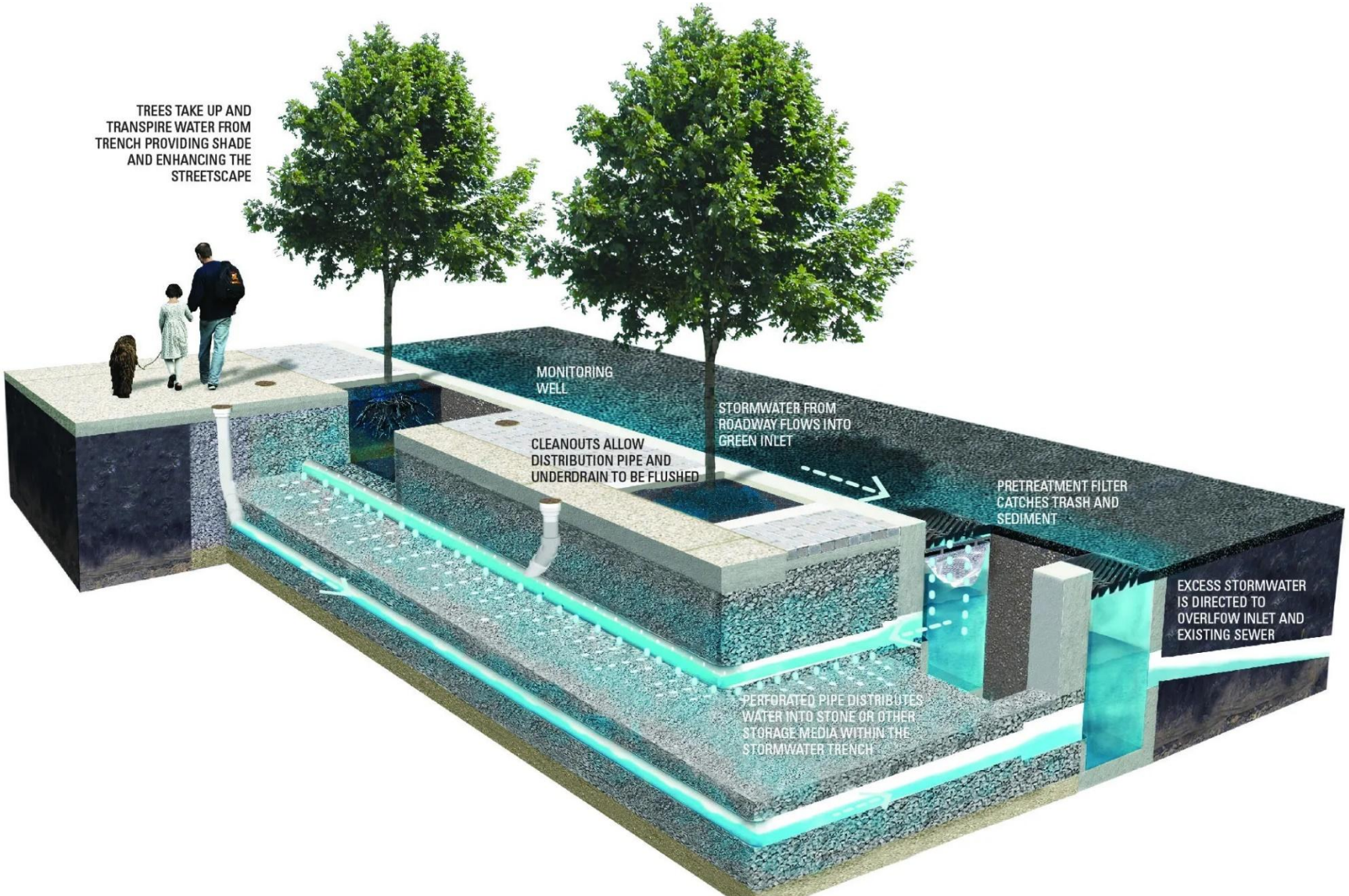


Budget/Cost

Name	Round 2 Actuals	Round 1 Actuals
Biochar	$1,380.00	$3,330.00
Compost	$786.00	$2,056.19
Concrete Labor & Material	$4,274.00	$8,329.00
Grates & Guards	$10,135.80	$21,600.74
Stone	$519.65	$1,127.44
Other - Plywood, Fabric, Root Dip, Fertilizer, Pipe, etc.	$1,372.69	$2,254.97
Trees	$725.99	$2,902.00
TOTAL	**$19,194.13**	**$41,600.34**
Per Tree	**$9,597.07**	**$10,400.09**
Per Tree, without fixed costs	**$2,392.17**	**$2,917.65**
Per Cu. Ft., without fixed costs	**$5.15**	

Preliminary Results

~~Stockholm Gen2~~ Montpelier Method



Barriers to Implementation

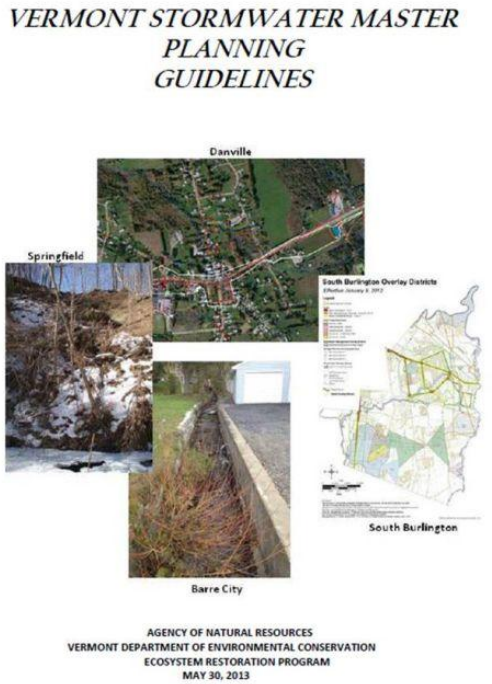
- Connecting to streetscape is hard in an ad-hoc way.
- Stormwater manual does not provide credits for tree wells. No incentives.

Solution

- Partner with DPW on large infrastructure project.
- Grant funding from VTUCF
- Partnership with UVM to study Phosphorous removal, TSS, and Water Quality Volume.

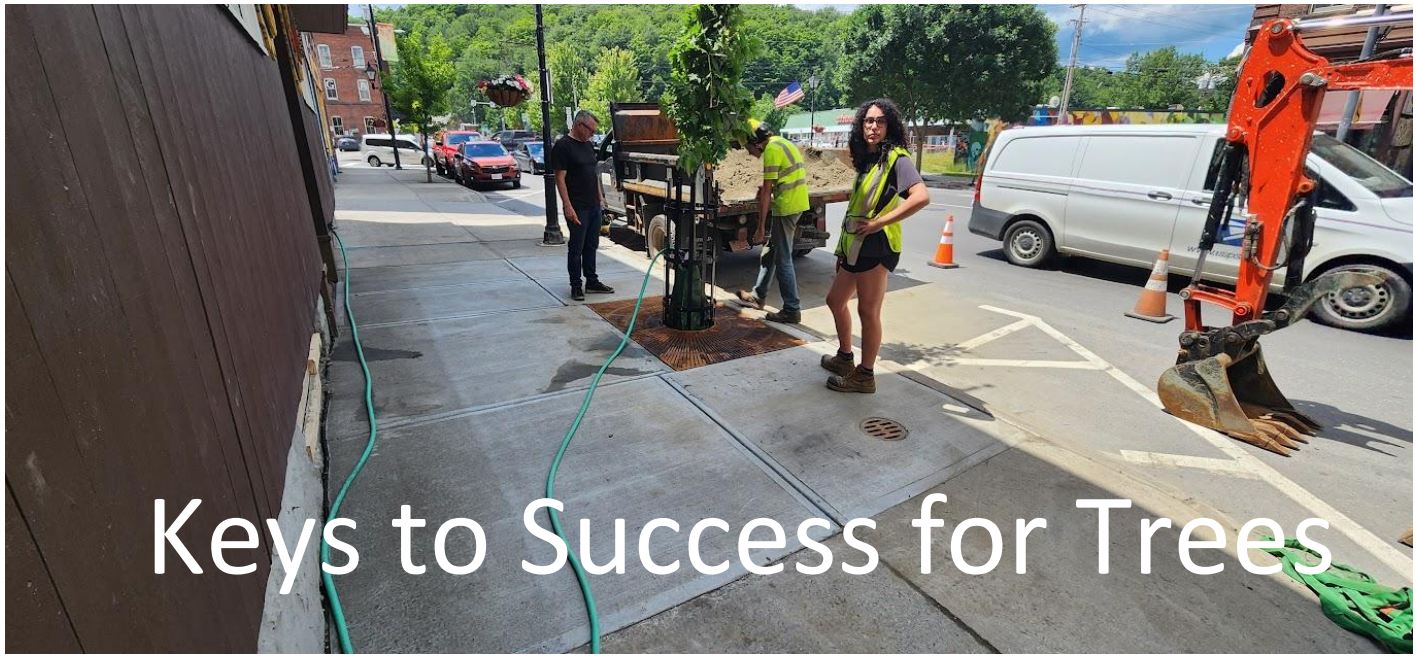
3-year Goal

Establish tree wells as an "Accepted Stormwater Treatment Practice" in the VT Stormwater Manual.



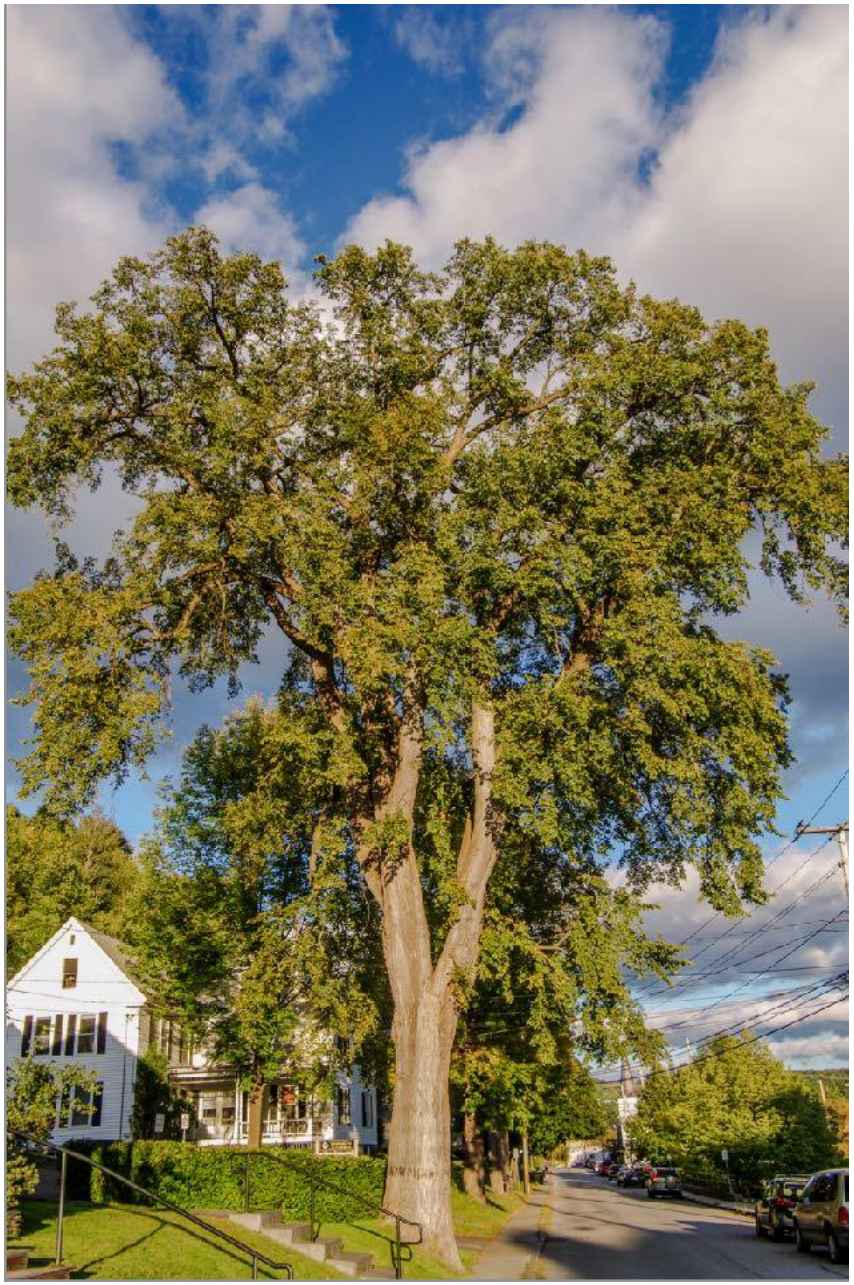
Keys to Success For Municipalities

- **Planning Documents**: make trees a priority
  - Local City Plan, Master Plan
  - Downtown Master Plans, Stormwater Master Plan, etc.
  - Regional Planning Commission
- **Partnerships**: DPW, planning commission, Tree Board, Tree Warden.
- **Funding**: Grants, Capital Budget, Donations



Keys to Success for Trees

- **Start with the basics**
  - Right tree, right place
  - Protect the trees
  - Plant them right
- **Provide what they need:**
  - Adequate sub-surface space and conditions
  - Access to water beyond the planting pit
  - A little bit of maintenance



Questions