

Trees in Urban Environments



***Jimmy Socash, Landscape Architect,
JFS Design Inc, Miramar, Fl.
Henry Mayer, Miami-Dade County
Cooperative Extension Agency
2008***

The sorry status of our urban tree canopy...



J. Albert Diaz

33% - Nation-wide Average

10% - Miami-Dade County Average

3% - Hialeah

(American Forests Survey, 1996)

**30% TREE CANOPY GOAL for MIAMI-DADE STREET
TREE MASTER PLAN**

By 2020...12 years ! ! !

Shade Value for our sub-tropical urban landscape



Preserve existing trees...



"Meeting the Goals of the Miami-Dade County Street Tree Master Plan"

- Planning***
- Planting***
- Pruning***
- Education and Growth***
- Best Management Practices (BMP)***

ROOT ZONE GROWING AREA

"Design the soil space under and adjacent to the hardscape to sustain root growth – good trees well connected to the ground only develop if the roots have room to grow"



“The major impediment to establishing trees in paved urban areas is the lack of an adequate volume of soil for tree root growth.”

***Urban Horticulture Institute
December 2000***



Trees Growing in Confined Soil Spaces

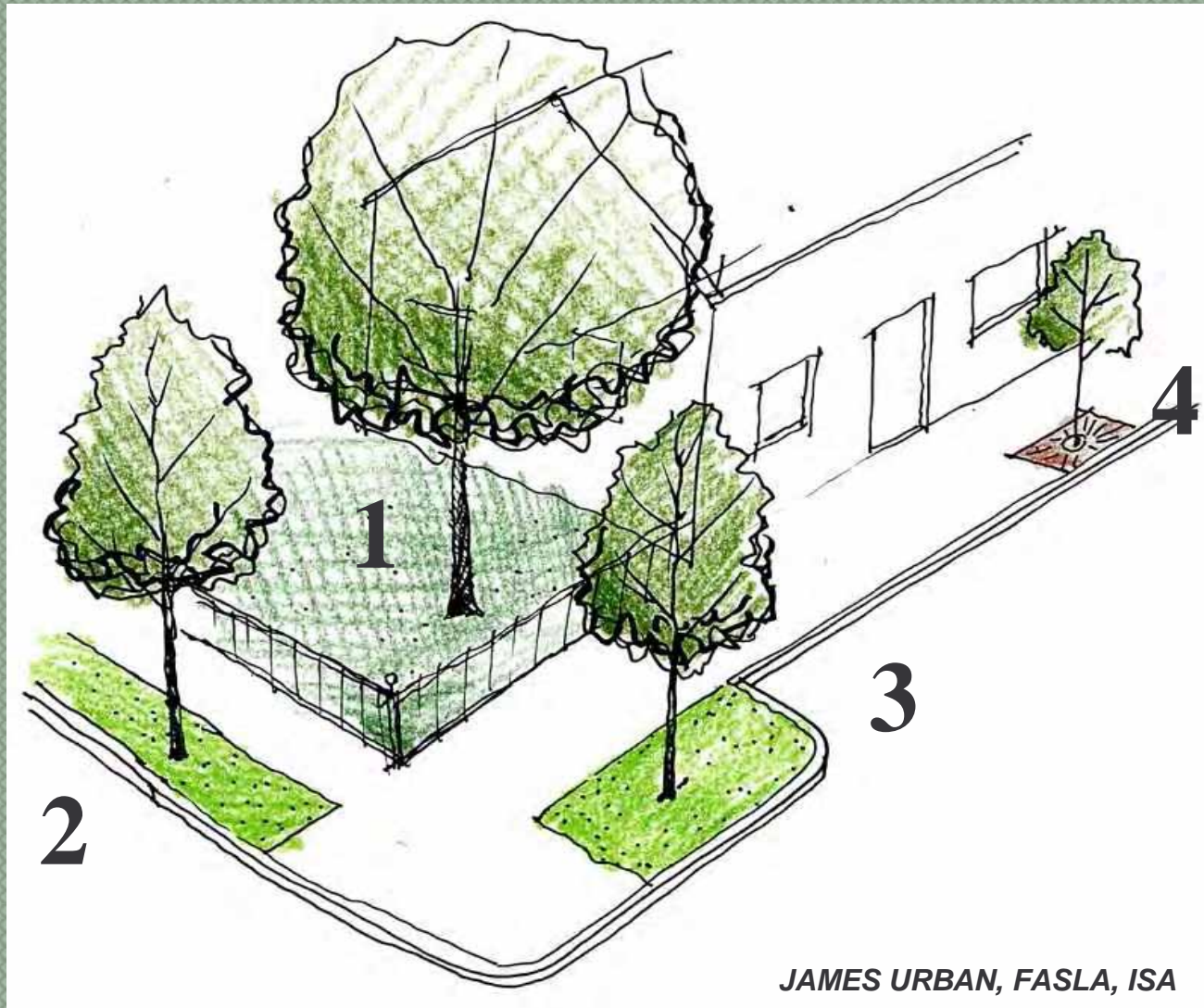
are Prone to Toppling...

...Rate of growth is greatly reduced...and... will be short-lived.

"Better to plant a 50 cent tree in a 5 dollar hole than a 5 dollar tree in a 50 cent hole"



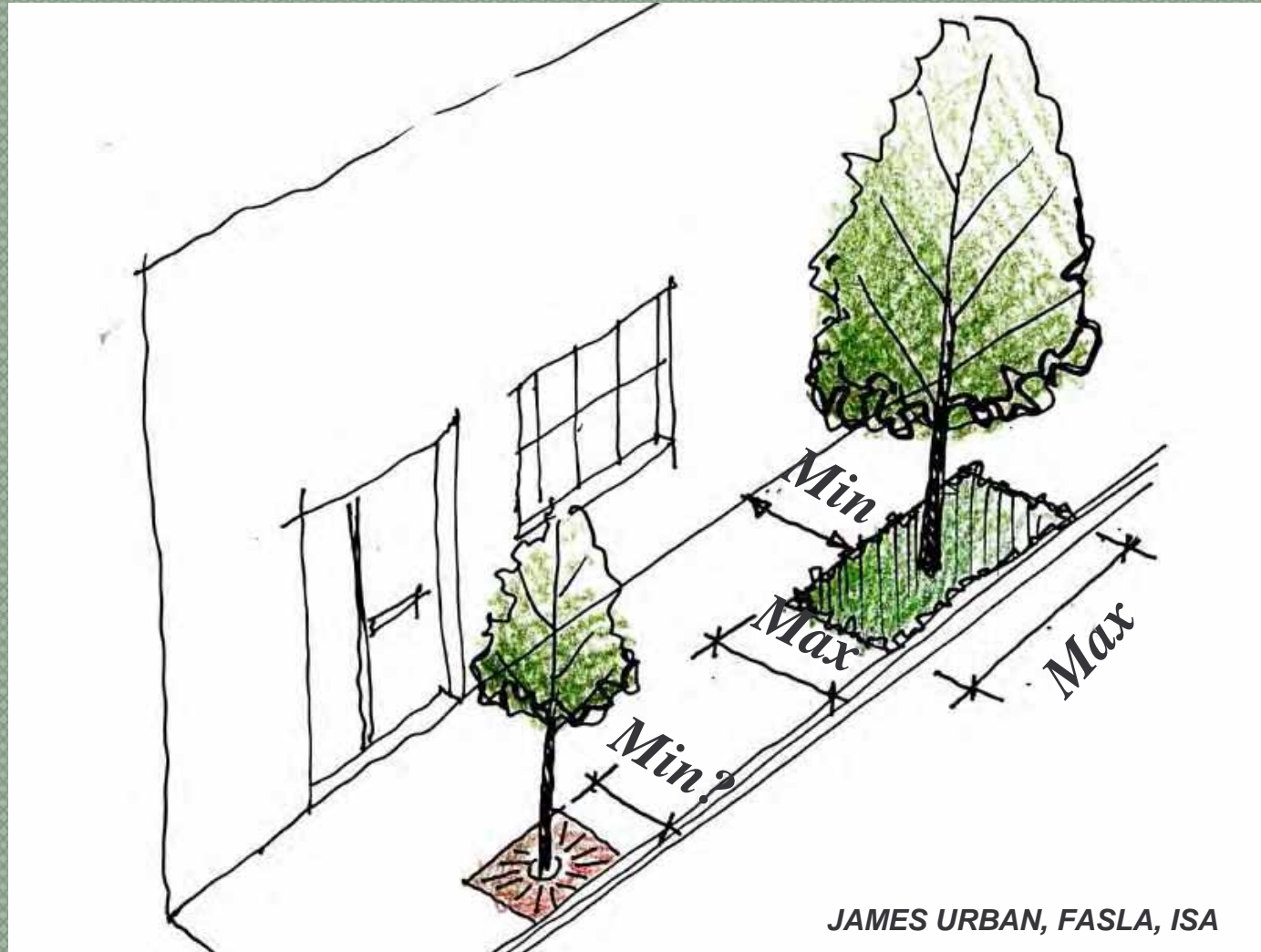
Plant the Easy Places First.



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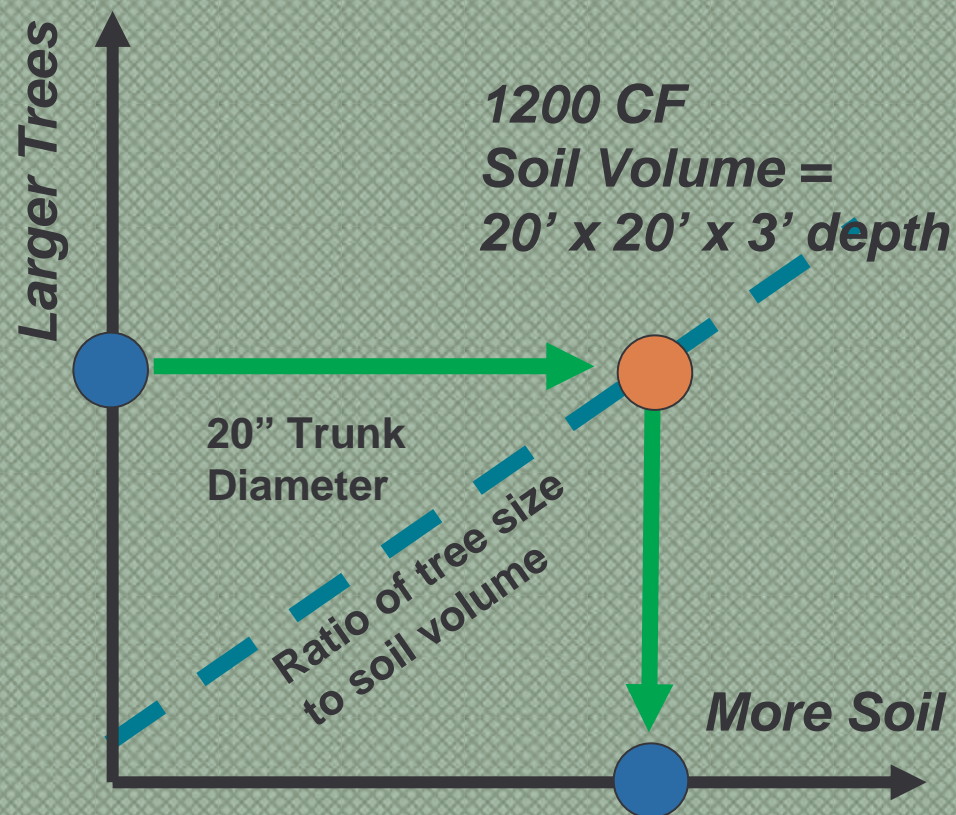
***Develop design options that plant trees
in large soil resources.***

Make Bigger Planting Spaces.



Balance the size of paved and soil areas.

How Much Soil ?



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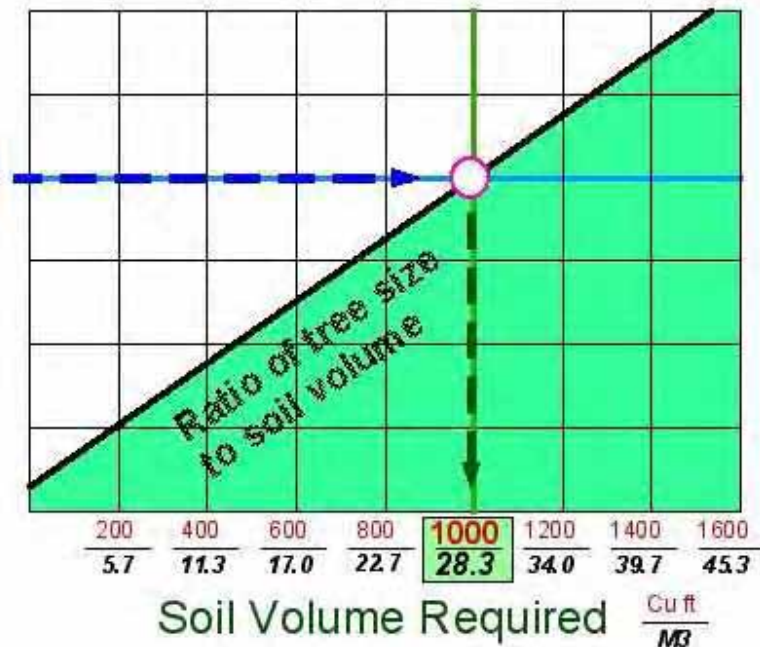
**20" Trunk Diameter Tree will require
20' x 20' x 3' deep soil volume (min.).**

Ultimate tree size

Crown Spread DBH - Trunk Diameter

Sq Ft	Inch
<i>M2</i>	<i>mm</i>
1200	24
111.5	610
900	20
83.6	508
640	16
59.5	406
480	12
44.6	305
320	8
29.7	203
140	4
13.0	102

Example: A 16 inch/406 mm diameter tree requires 1000 cf/28.3 M3 of soil.

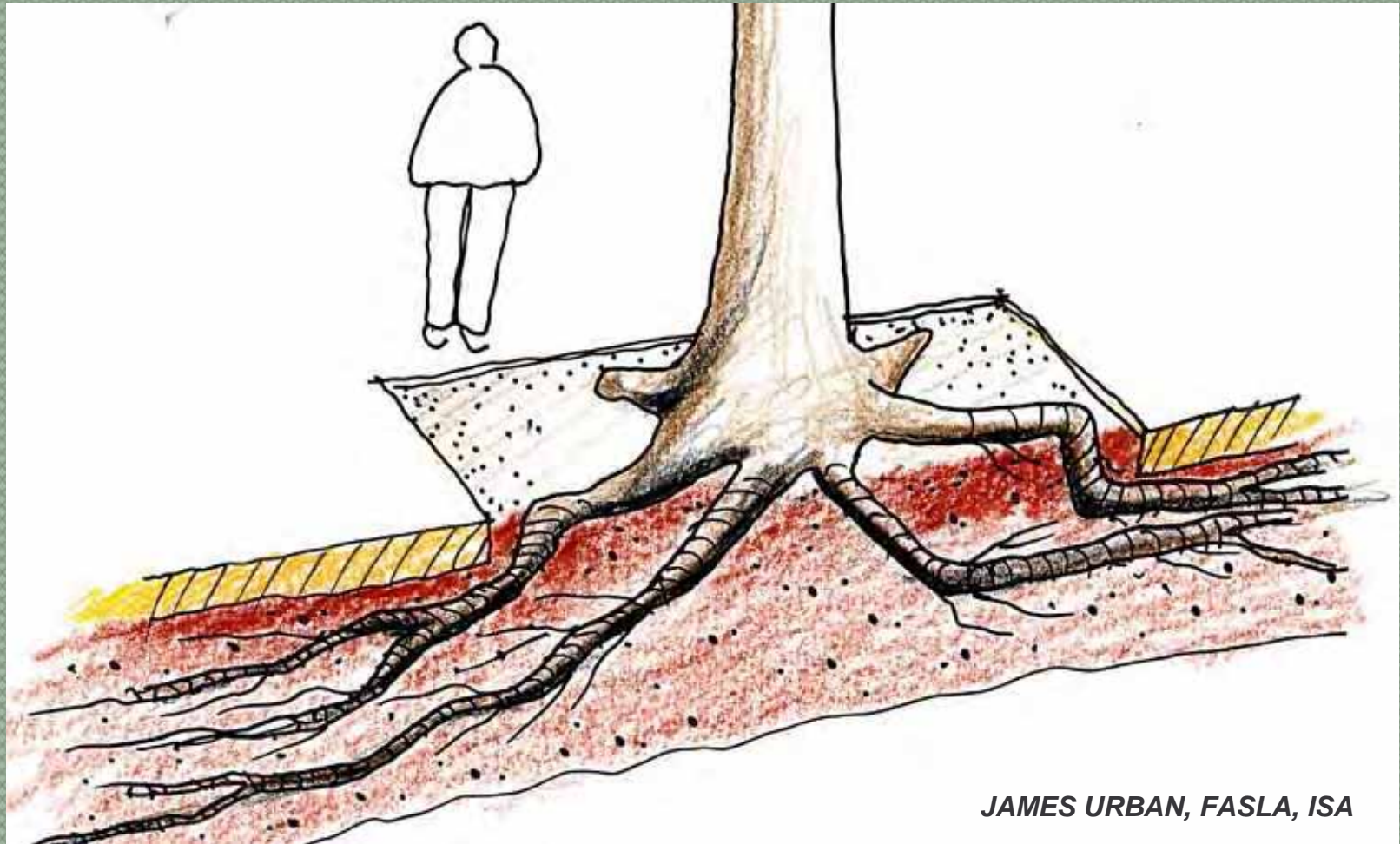


Tree/soil volume requirements

Figure 1.3.1c

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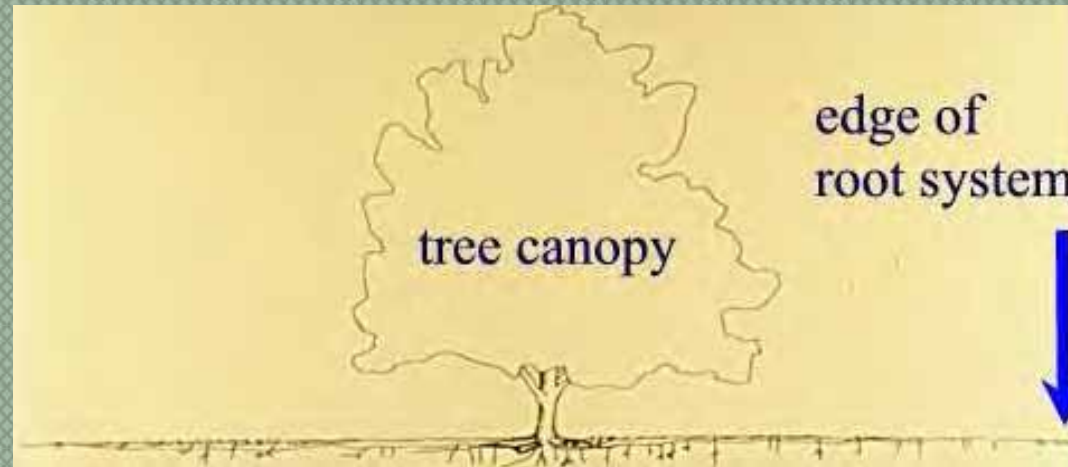
Make Space for Roots.



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Design spaces for roots under the pavement and utilize different approaches to root space design as conditions change

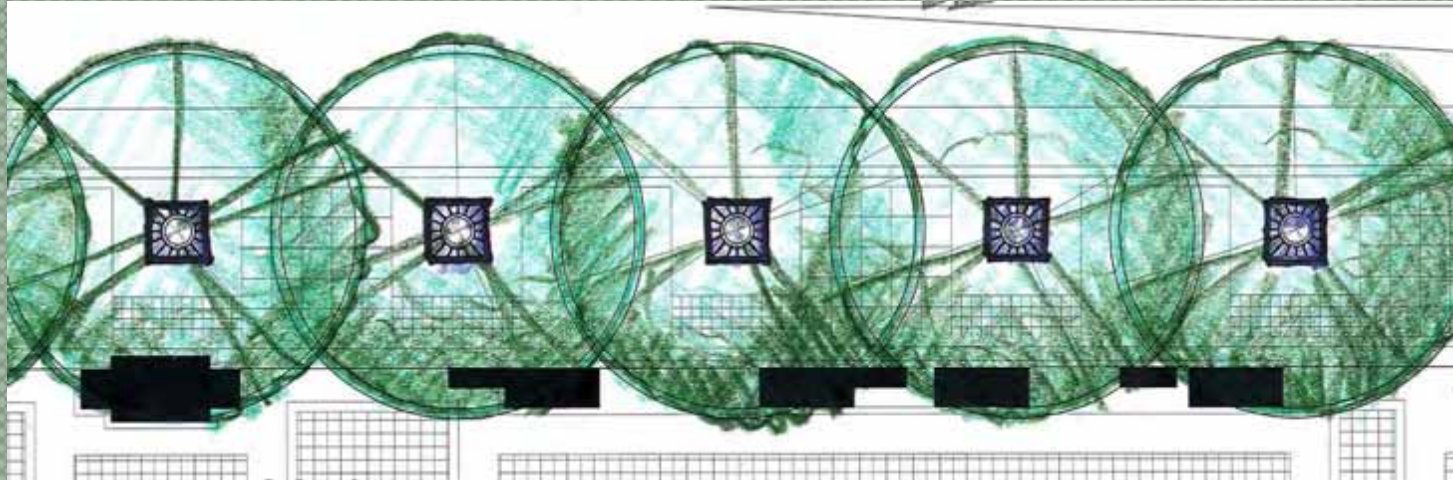
Roots grow well beyond canopy edge



Dr. Ed Gilman, U of Florida

- ***Trees that normally grow a very expansive root system can become stressed and grow poorly in urban landscapes where soil space is limited***
- ***The result can be poor tree health, damaged sidewalks and curbs, and other problems***

"Downtown Kendall Urban Center District"



"Street Trees: ...minimum caliper of six (6) inches and a minimum clear trunk of eight (8) feet at the time of planting."

TYPICAL MINIMUM SIZE OF 18' OVERALL HEIGHT

***SITE PLAN PROVIDES STREET TREES BUT...
IN 3' X 3' SQUARES...(27 C.F. OF SOIL VOLUME)!***

WILL THESE TREES GROW?

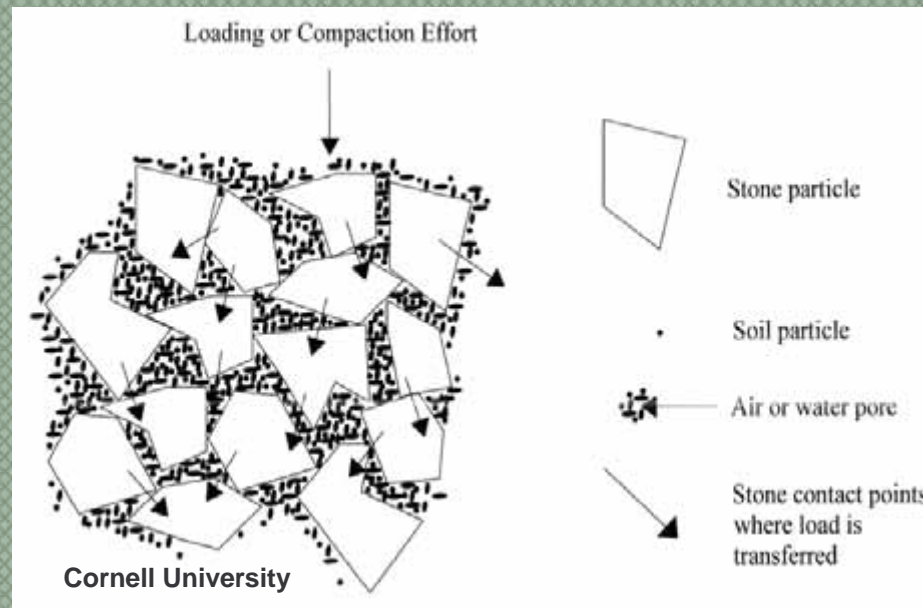
HOW LONG WILL THEY LAST?

WHERE IS THE 1200 C.F. OF SOIL VOLUME?



- 1. INCREASE ROOT ZONE AREA...
Use "CU Structural Soils" or
"Deeproot Silva Cell" Applications***
- 2. USE PERMEABLE PAVEMENTS...***

"CU-Structural Soils"...



Comprised of two main components:

1. Rigid Stone "lattice"

Lattice are load-bearing stones for stability and interconnected voids that allows root penetration, air and water movement.

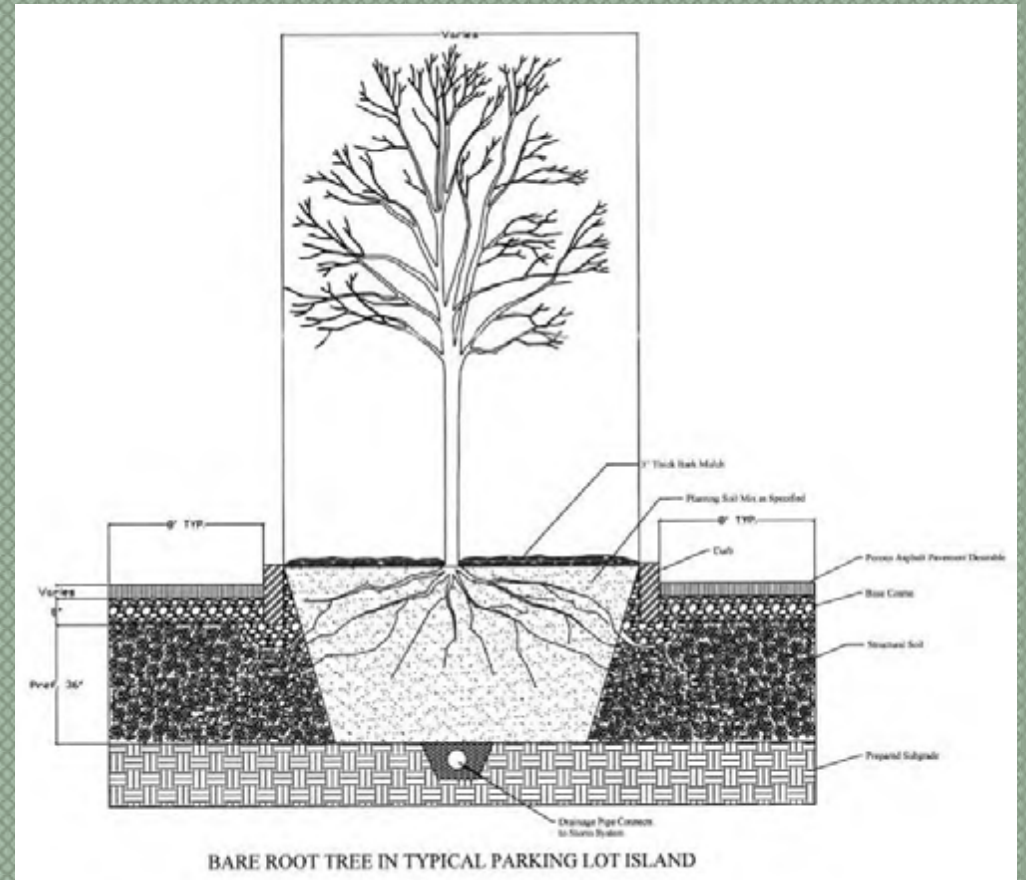
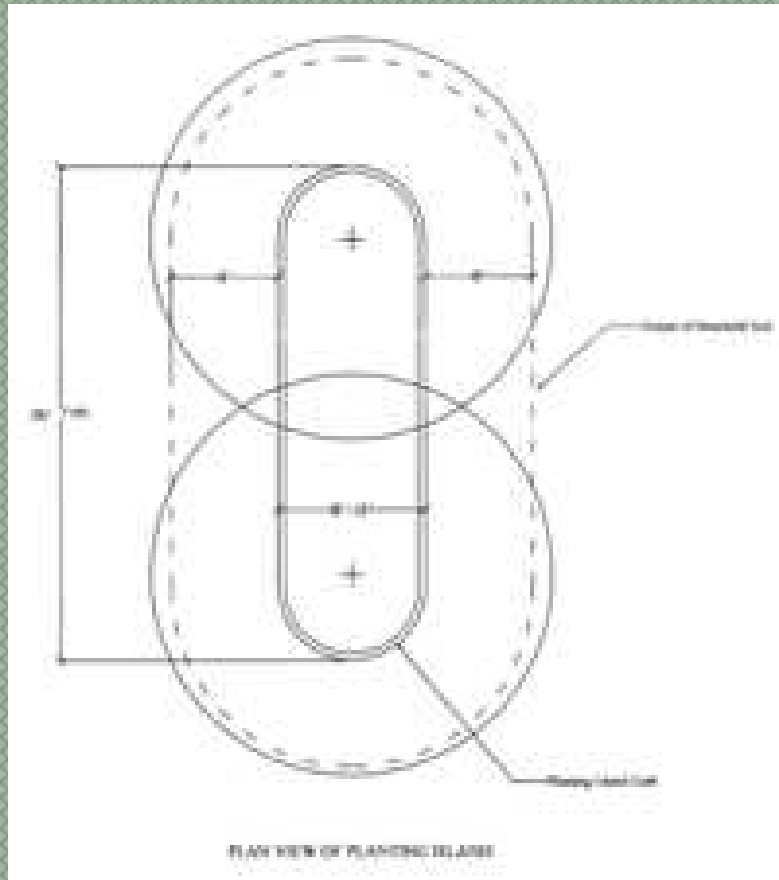
2. Quantity soil (heavy clay loam or loam)

Clay holds most of the water and nutrients.

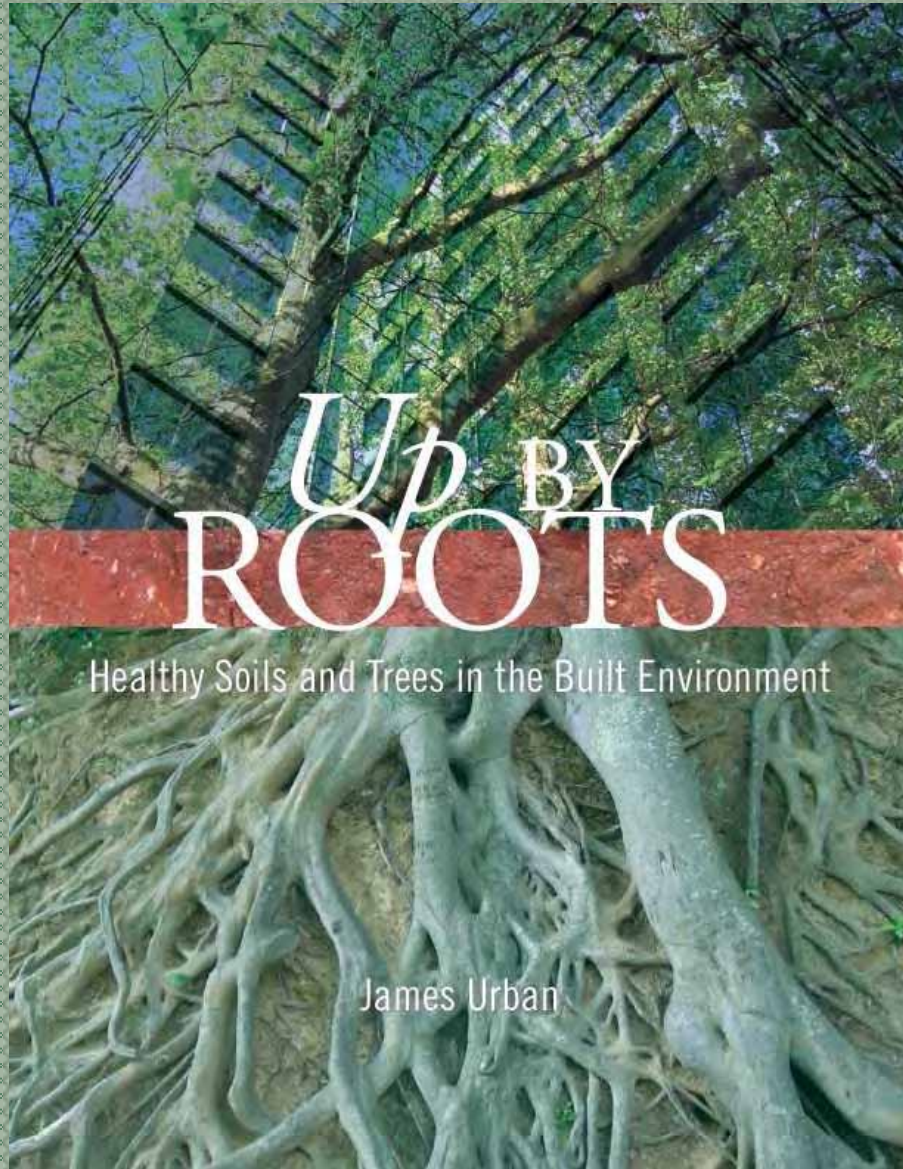
with...

Gelscape Hydrogel combines with the mix and works as a non-toxic, non-phytotoxic tackifier.

"CU-Structural Soils" with permeable pavements...



"DeepRoot Silva Cell"...



Urban Trees + Soils

Consulting to Site Designers

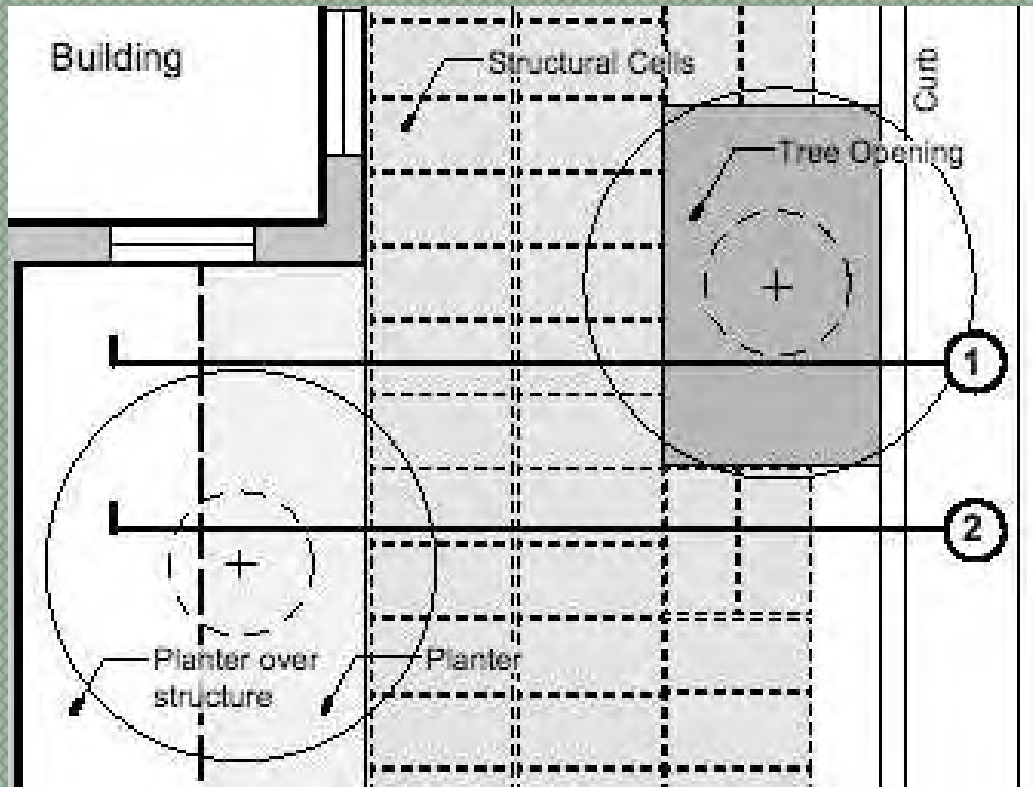
Urban Trees

**PLANTING SPECIFICATIONS
ROOT SYSTEM DESIGN
TREE PRESERVATION
TREE SELECTION**

Urban Soils

**DESIGN AND SPECIFICATIONS
SITE ASSESSMENT
SOIL TESTING
DRAINAGE**

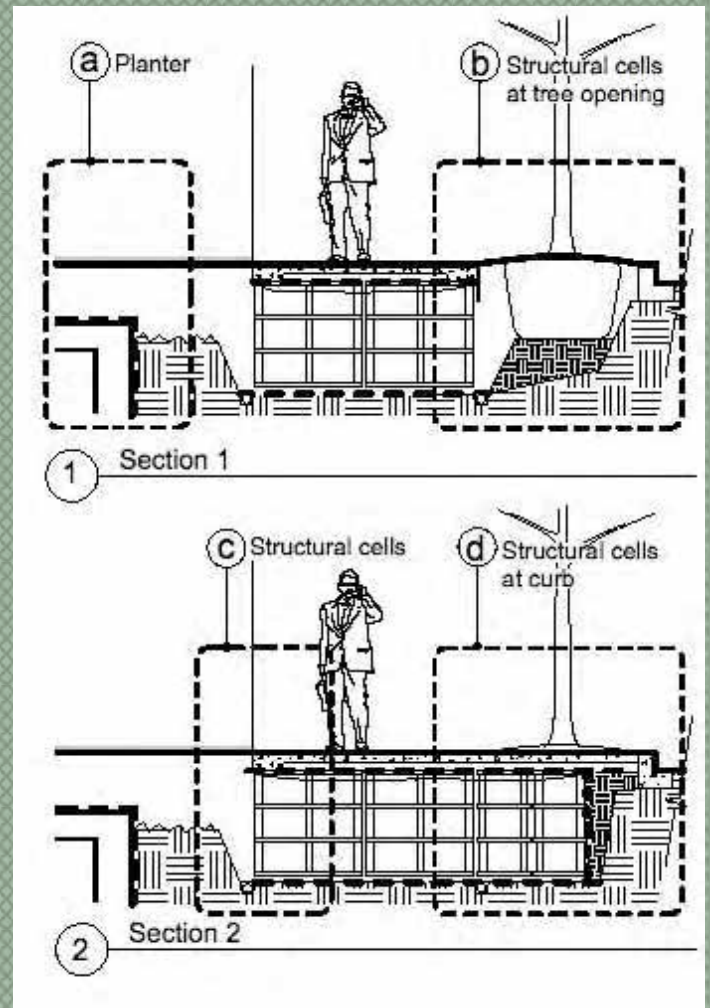
"Deeproot Silva Cells"...



Load-bearing structural cells...

With frame and deck...

Backfilled with planting soil...



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"Deeproot Silva Cells"...



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“Deeproot Silva Cells”...



www.deeproot.com

1 (800) 458-7668

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Set grades 3" (75mm) or greater above walk to accommodate future settlement

Paving

Till 3"-4" (75-100mm) organic compost into top 6" (150mm) of planting soil

Wall

Mulch

Compact planting soil in 8" (200mm) to 12" (300mm) lifts

Slope toward drain line @ 1% min.

Drain board against wall

Subgrade soil

Slope side of excavation away from walk @ 1/2:1 slope

Drain Line
Planting Soil

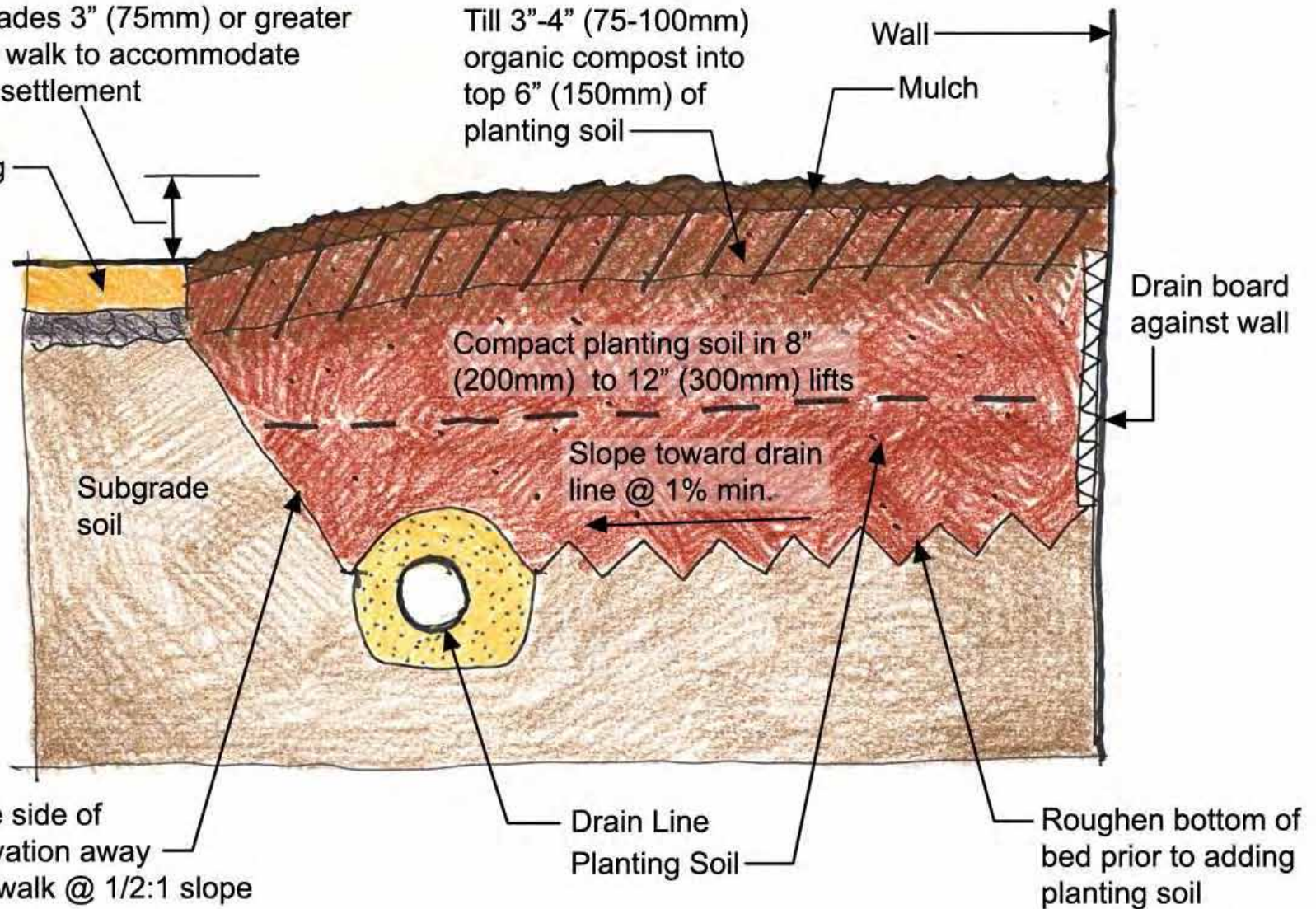
Roughen bottom of bed prior to adding planting soil

Compaction Levels in Planting Soil

Sandy loams	1.4 - 1.55 gr/cm
Sandy clay loams	1.1 - 1.3 gr/cm

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PLANTING SOIL INSTALLATION



"Deeproot Silva Cells"...

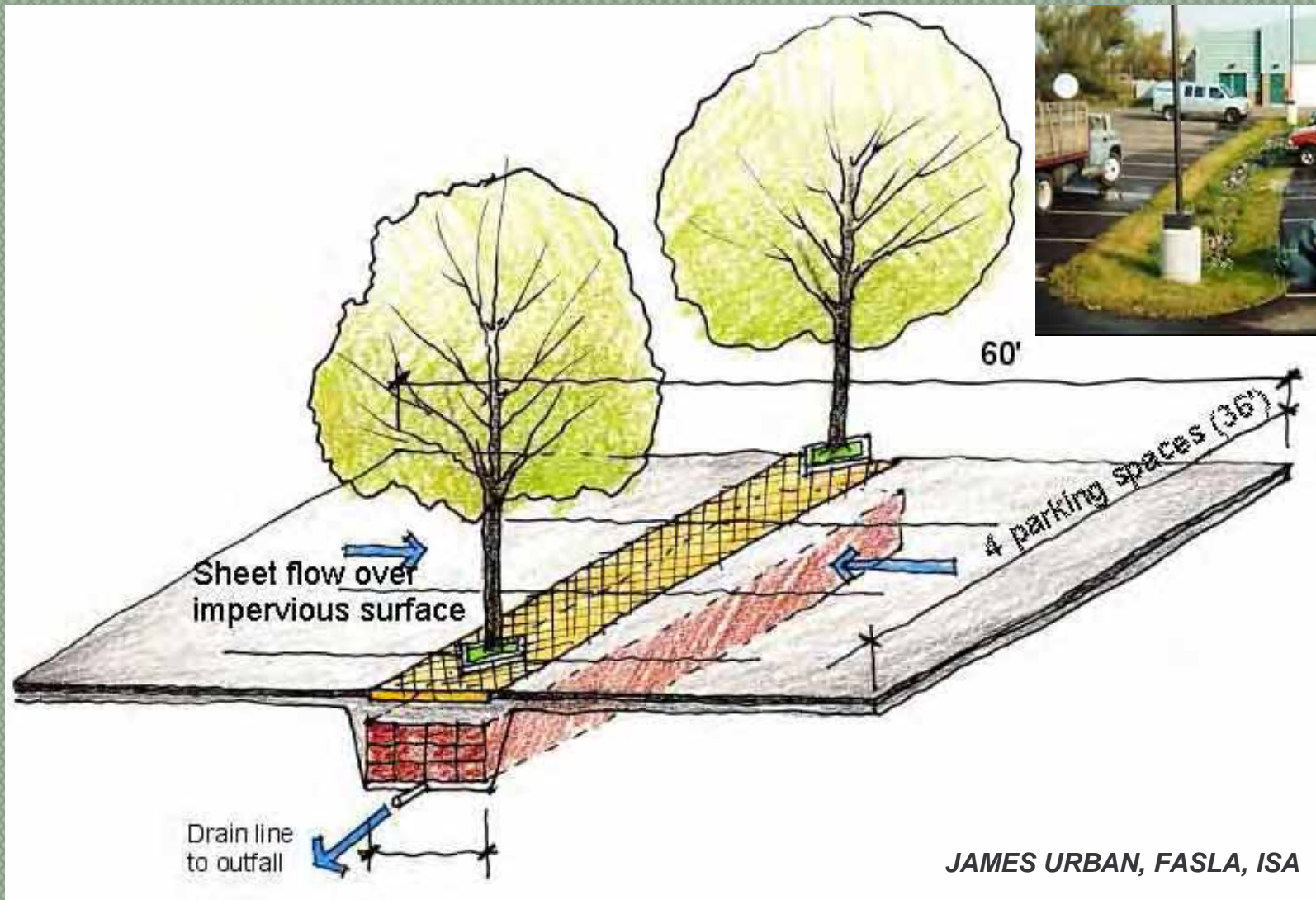
- 1. Increased Soil volumes enable large trees to flourish...***
- 2. Healthy trees...increase real estate values...***
- 3. Underground bioretention areas manage stormwater on-site...***
- 4. Large tree canopies reduce urban heat-island effect and improve air quality...***
- 5. Expanded soil-volumes reduce rainfall runoff...***

“Deeproot Silva Cells”...



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Structural Cell Applications



Trees and Rainwater Harvesting

Permeable Pavements...



When integrated with "CU-Structural Soils" or "Deeproot Silva Cells" ...

***"Vegetation is watered,
reducing the need for irrigation ...***

Ground water is recharged

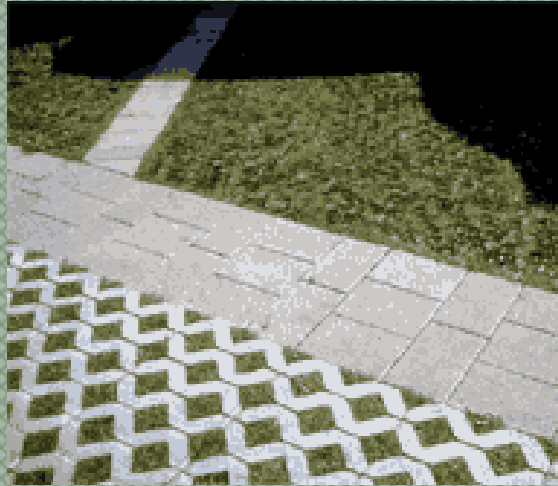
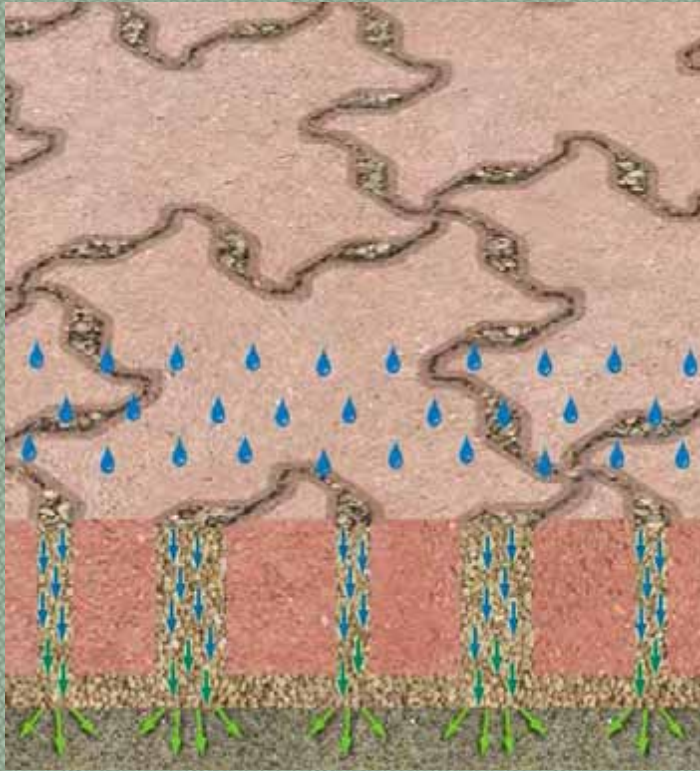
Water resources are preserved

Stormwater runoff is reduced

Stormwater runoff quality is improved."

www.CoolCommunities.org

Permeable Pavements...

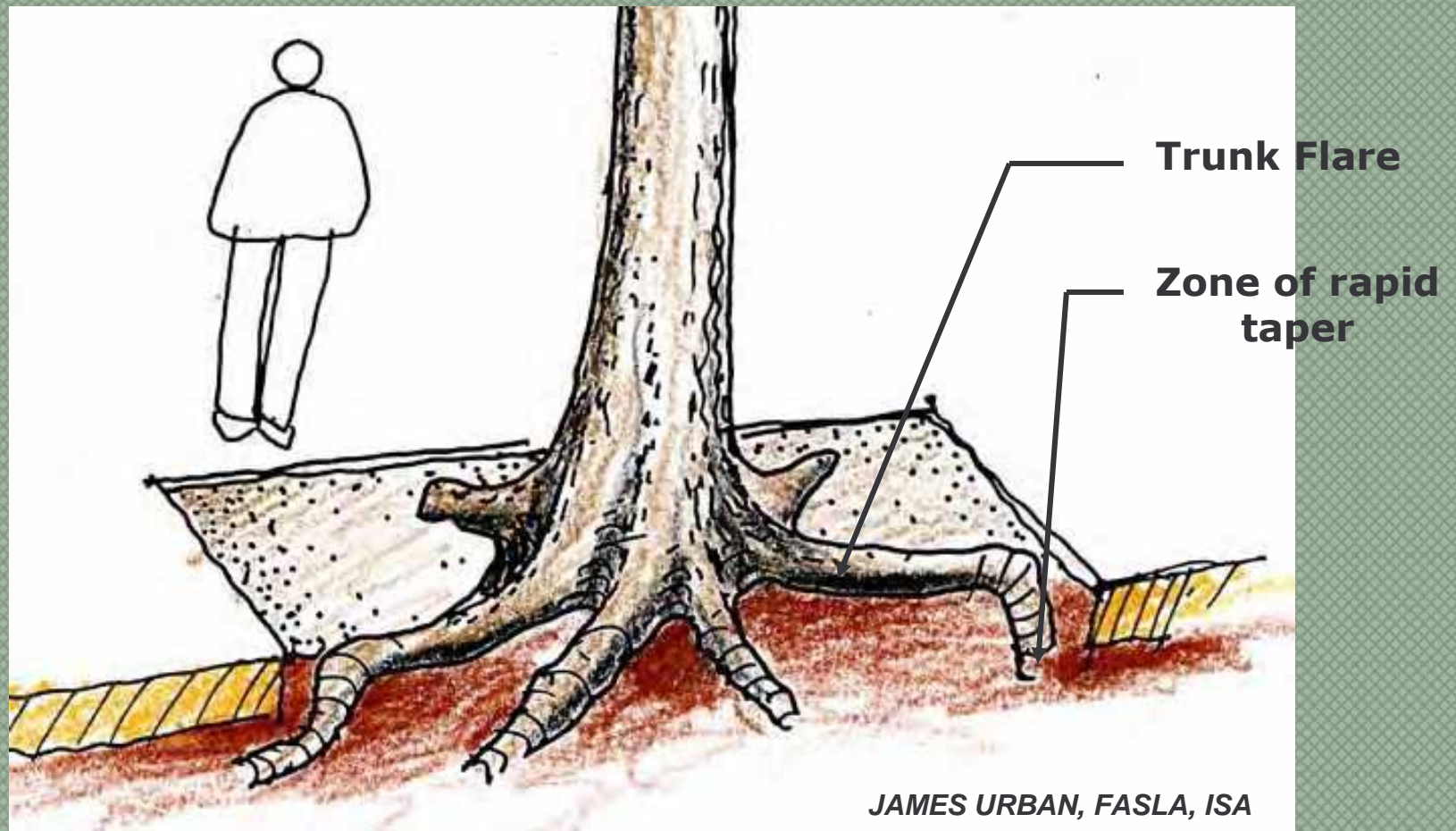


**U.S. GREEN BUILDING COUNCIL (USGBC)
LEED (Leadership in Energy and Environmental Design) CERTIFIABLE**

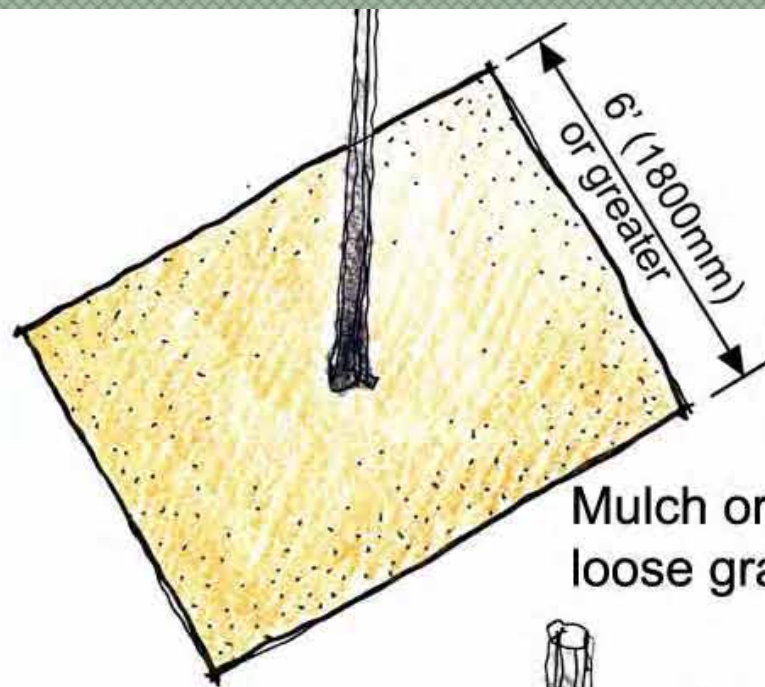
"Pervious pavements can be made of concrete, asphalt, open-celled stones, and gravel, that are mixed in a manner that creates an open cell structure allowing water and air to pass through. For example, porous concrete can pass 3-5 gallons of water per minute, which is far greater than most conceivable rain events and highly effective in controlling storm water drainage. "

www.CoolCommunities.org

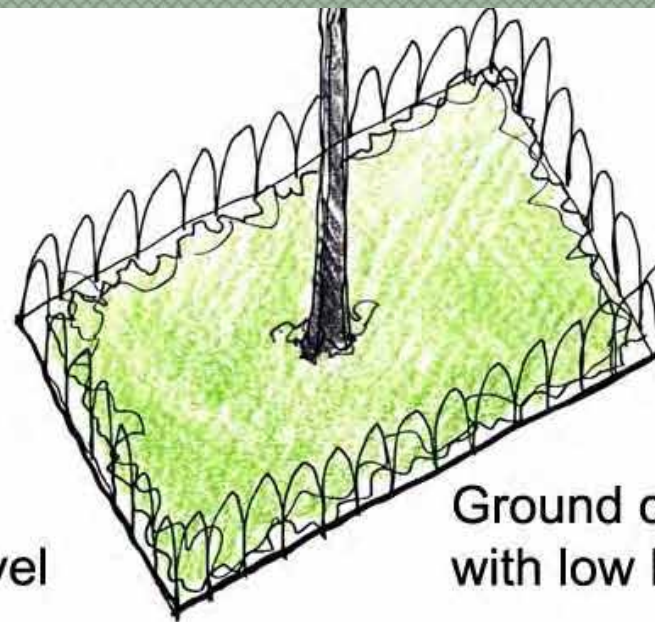
Respect the Base of the Tree.



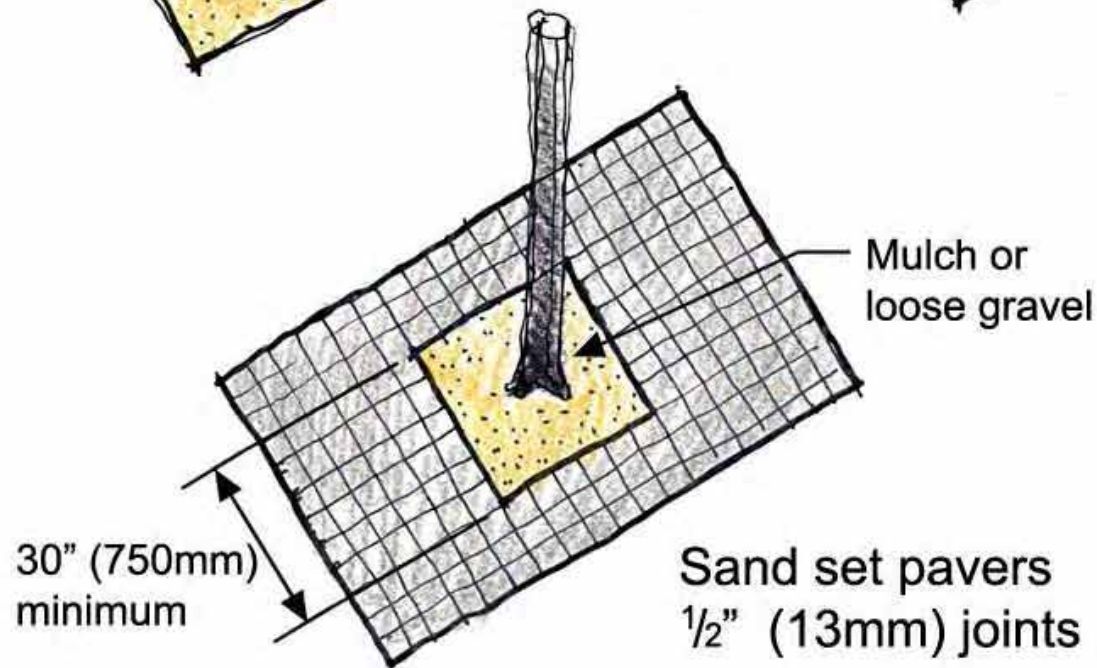
Do not pave in the area of the tree's future trunk flare.



Mulch or
loose gravel



Ground cover
with low barriers



Mulch or
loose gravel

Sand set pavers
1/2" (13mm) joints

Tree Friendly Trunk Flare Transition Areas

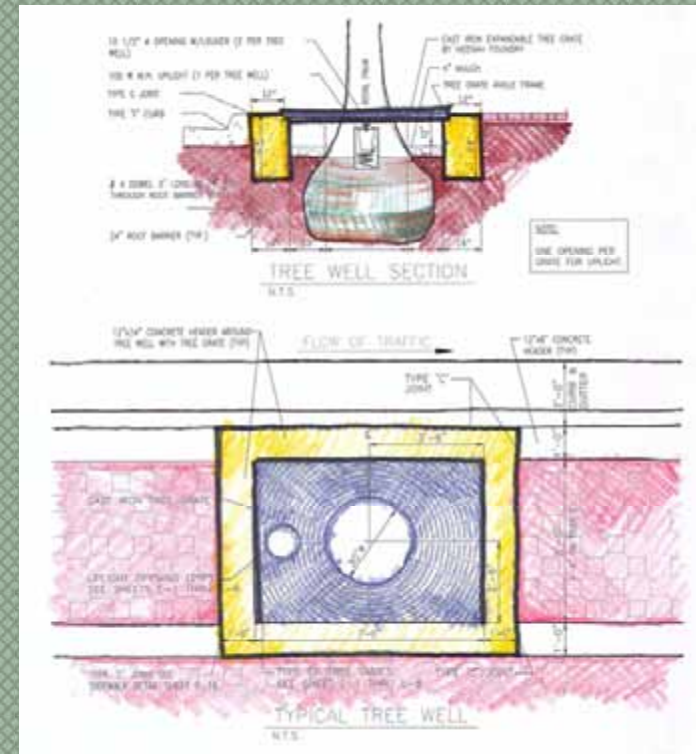
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Tree Grates...



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Tree Grates...

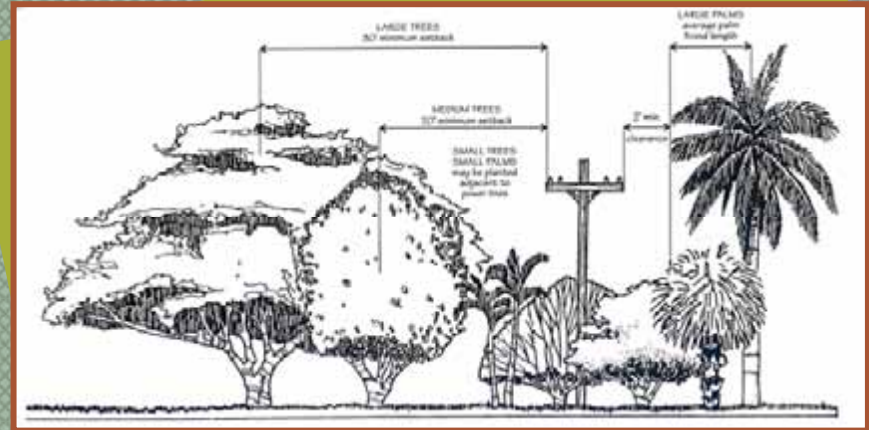


Tree grates. Many cities install decorative metal grates around newly planted trees. As the trunk grows, it may end up fighting the encircling obstacle. Though some tree grates are designed so that the innermost section can be removed as the trunk expands, rarely do municipalities remove them promptly enough. The grate girdles the trunk, stopping the flow of water and chemicals between the top and bottom of the tree. If the tree doesn't die first, it may lift the grate and create a hazard for pedestrians.

**"New Urban News"
February 2005**



THE LANDSCAPE MANUAL



Landscape code changes are oftentimes tedious and lengthy...

Departmental Policy Decisions can bypass this...