Trees and Soil
or
Why landscapers are key for the urban forest
Landscape designer are key to urban trees! “green” landscapers will be busy.
What we will talk about today:

- Roots: where?
- Soil characteristics: basics
- Water and soil: basics
- Nutrients

Common Abiotic tree defects related to soil:

- Compaction
- Grade issues
- Root flares
The Critical Root Zone - Development Impact Zones

Critical Root Zone - preserve 50%

1/4 CRZ - no impact

1/2 CRZ - no cut/fill > 4"

20 inch tree

5 feet

10 feet

20 feet

CRZ ?!
Root location !!!
Root Depth?
Root Plate VS Root ball
¼ crz root mapping: size and depth of roots.
Soil properties:

- **Texture**: particle sizes. Clay-silt-sand-Gravel
- **Structure**: bonding of particles. Clay peds are strong. Sandy peds are weak.
- **Density**: degree to which particles are packed together. Bulk density is the measure of compaction of a soil.
- **Water movement**: speed at which water moves in response to capillarity and gravity.
- **Nutrient holding** capacity: clay holds better than sand.
- **Temperature**: 75F is ideal. Nitrification slows above 85 and roots are damaged at 95 and above.
- **Organic activity**: **rhyzosphere**, the last frontier.
Water: how much?

- 1 sqft requires 1.2 gal to saturate 12” depth and is 1” of rainfall.

- A 20” tree → 1440 sqft CRZ → 1728 gal. → 2160 cuft soil

With a 3/4” hose, at 9gal/min, that is 3h 10 min!

Spray irrigation soaks about 2-3 inches depth and encourages shallow tree roots. Trees become dependent on the turf schedule.
Newsflash

• Water does not stand still, it is impacted by gravity
• Trees do not depend on rain falling on their root zone only, they also obtain large amounts of water from run off
• Alterations in grade and channeling modifies drainage and average annual available water on site
• Conclusion:

Retain some of the storm water by all means necessary, including soil quality and quantity:

Erosion Control
The need for thinking outside the pipe!
Water wise design: 100% of 2” rainfall controlled on site.
Earth and rock works for waterwise design
Check dams and cedar mulch trail
Herb and bulb Garden check dam
Dry stack edging as mini check-dam
Last note on water:

- Remember CRZ and soil volume
- Mulch can shed water....
- Mulch needs to be “fluffy” not watershedding
Organic Matter !!!
Compaction:
the process of killing soil and loosing water.
The building process
Compaction by vibrating roller
Not supposed to be able to hold soil like that.
Instant Soil Rejuvenation in Root Zones
Radial Trenching
Soil:  Dig it!

This is how you look after airspading.
And having removed the ppe’s of course.
Grade issues
Graded below the root profile at start of project: tree declined rapidly.
2 years after Construction
Buried root flare
Mass of small roots over root flare
The holy Root Crown
Fibrous and small diameter roots over root flare. How much can I remove?
Raised beds....choking roots and water shedding
Canopy density contrast. See next slide for diagnosis.
Choking root

Tree well
GANODERMA basal rot: Infection from drought stress or root damage in a 3 ft radius around the base
Phytophthora “Plant Killer”: cambium rot disease

Slow kill. Infection favored by long term moisture on the root flare or by general loss of vigor
Flux on a Cedar Elm.
Limit turf, and soil will follow