

Trees and Construction



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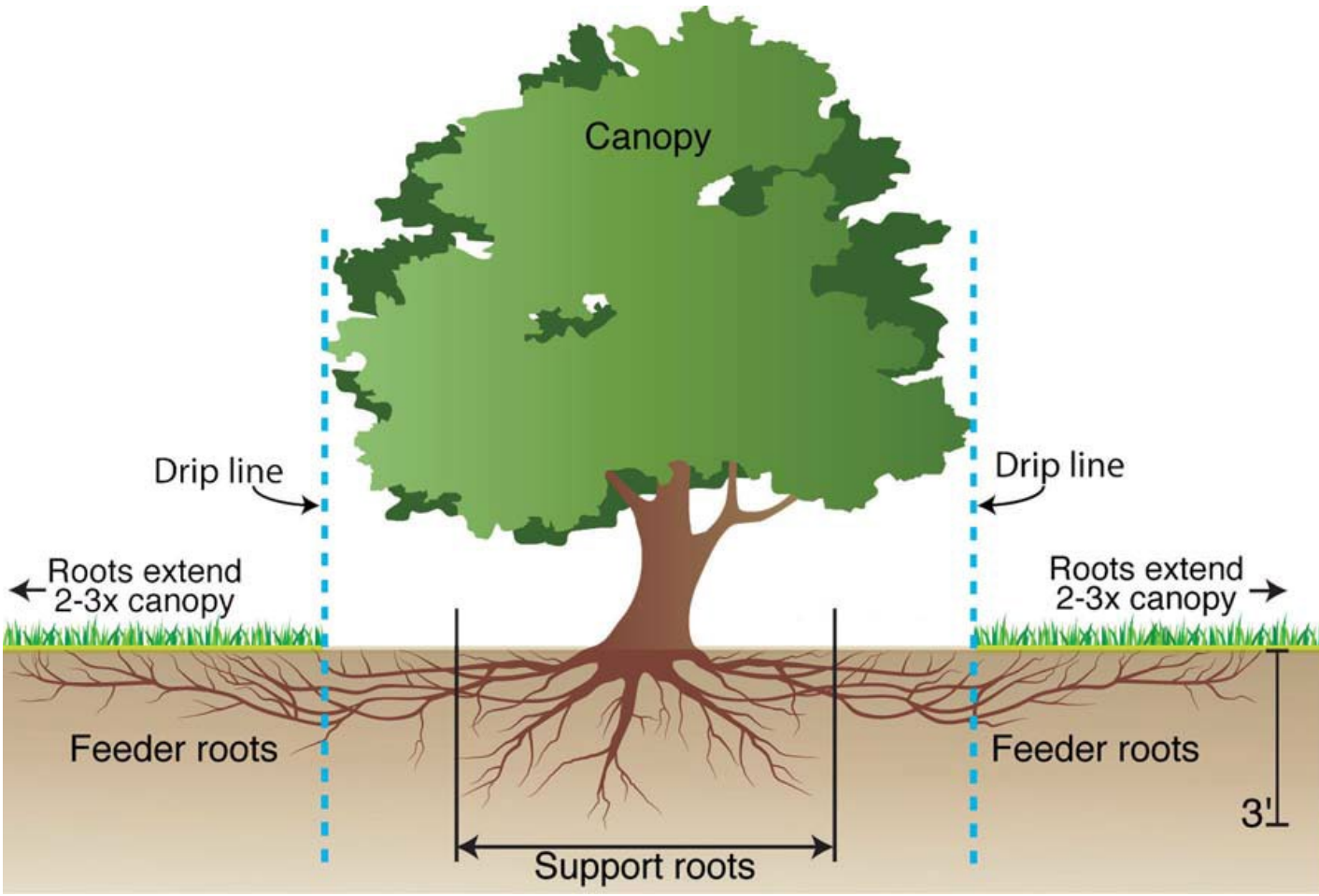
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Trees and Construction

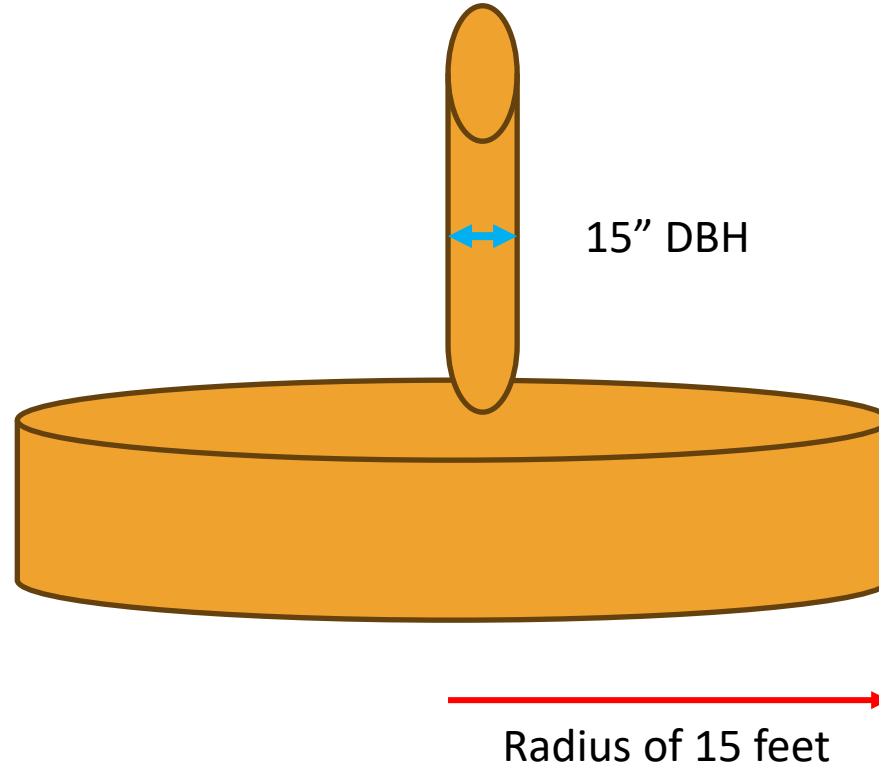
- Trees are valuable and have environmental, economic, and aesthetic benefits to a property
- Construction damage is one of the most common causes of tree death and decline in urban trees
- A professional arborist should be involved early in the planning process of development to advise on retention and protection measures, assist in designing a suitable layout, and to minimize construction damage

Drip-line?





CRZ – Critical Root Zone



98% of the root system is in the top 18" of the soil.
90% of those are in the top four inches!





Types of Construction Damage

- Greatest damage is often underground to roots and soil
- Physical wounding
- Environmental changes
 - Soil compaction
 - Excessive thinning of stand
 - Moisture stress
 - Soil fill
 - Soil cuts

Physical Wounds



- Removal of large areas of bark and cambium reduces tree vigor
- Large wounds seal or close very slowly and are open to insects and/or disease
- Improper pruning or branch breakage also lead to open wounds

Cutting Roots

- Trenching and digging can:
 - Remove vital feeder roots that pick up nutrients and water
 - Eliminate the nutrient rich topsoil
 - Damage major roots and opens them to pest entry
 - Reduce the ability of the tree to anchor itself
- Tunneling should be considered over trenching



Roots Cut During Construction

Step 1



Step 2



Step 3



Photo credit: Andy Kittsley

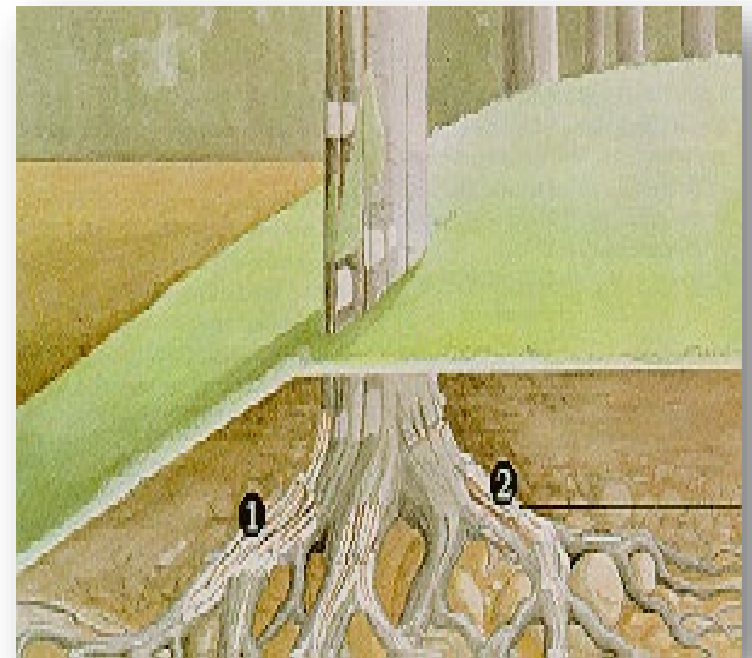
Soil Compaction

- Running heavy equipment over root zones
- Piling debris on top of tree roots
- Parking construction trailer under tree



Soil Fill

- Soil fill over tree root areas suffocates trees especially if fine textured and compacted
- A few inches of fill can kill roots
- Damage may not be seen for many years
- Even in the absence of grade changes, drainage can be affected



Moisture Stress

- Changes in the soil grade, cut outs or soil fills
- Soil compaction
- Changes in drainage and grading
- Trees can end up too wet or too dry and not be able to adapt



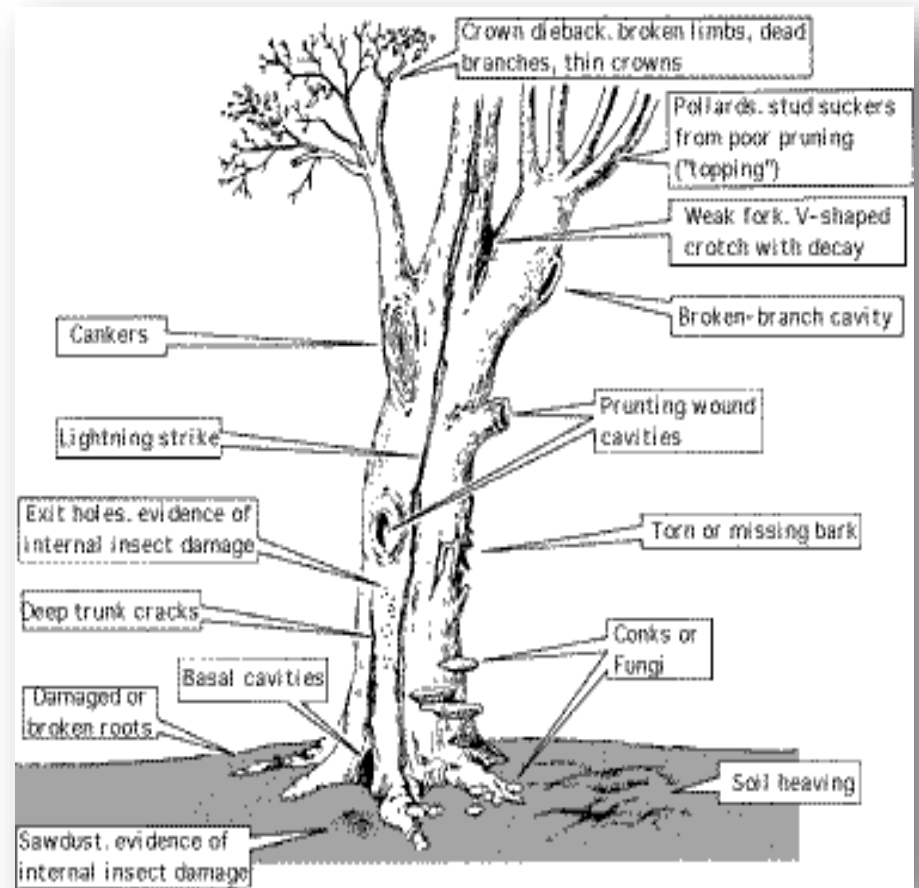
Exposure

- Thinning trees reduces protection from wind
- Produces weaker trees with thin trunks and small crowns
- Leaves trees vulnerable to wind throw or ice breakage



Planning and Protection

- Should be done in preliminary plan before construction begins
- Based on location, health, size, species
- Plan developed by a certified arborist



Is this tree worth saving?

Construction Practices

- Site clearing and demolition
- Rough grading to create grade contours
- Installation of utilities and water, storm, and sanitary sewer systems
- Grading for establishment of final pad, surface, and roads
- Construction of roads and buildings and installation of utilities
- Fine grading and installation of landscapes

Arborist's Role

- Enforce the tree protection zone (TPZ)
- Assist with changes in the field
- Monitor injury to trees and provide corrective action
- Communicate with the project superintendent
- Facilitate completion of the project

Preventing Damage

- Protect desirable trees – good species, large specimens, historic trees
- Protect the critical root zone* which runs from the base of the trunk at least to the drip line if not beyond
- *CRZ is usually defined by municipalities or counties



Preventing Damage

- Specifications—write down on the plan and put into construction specifications
 - Include the exact details, so that everyone understands the purpose
 - Post signs as reminders
 - Build in fines and penalties for violations



Avoiding Tree Damage During Construction

- Barriers, construction fences around trees to be protected; subcontractors and equipment operators must understand their purpose
- Signage identifying the tree protection zone (TPZ) should be installed
- Keep people, materials, waste and extra soil out of the protected areas
- Limit access and allow only one access route on and off the property

Critical Root Zone

- CRZ or the critical root zone is the area under the tree where roots must be protected to ensure their future survival; the area where no construction activities are allowed
- Different states and cities specify different minimum CRZs, so be sure you refer to local ordinances before initiating a tree protection plan
- Typical is one foot of radius for every inch of DBH can be as much as two feet per inch of DBH

Reducing Compaction

- Mulch 6 to 12 inches deep to disperse the weight of construction equipment
- Place large plywood or steel sheets over the mulch or use trackway or other protection systems
- Mulch must be removed carefully as soon as possible



Tree Protection Zone

Grade Changes

- Can be devastating to trees even if not severe
- Amount of root system that will remain after grading, tree age, species tolerance to root loss, degree to which the grade is lowered, soil conditions, and irrigation will affect tree survival
- Changes in hydrology and soil/water relations can also affect tree survivability
- Tree island can be constructed where grade must be lowered; include as much of the root system as possible
- Increases in grade may require aerations systems

Grade Changes

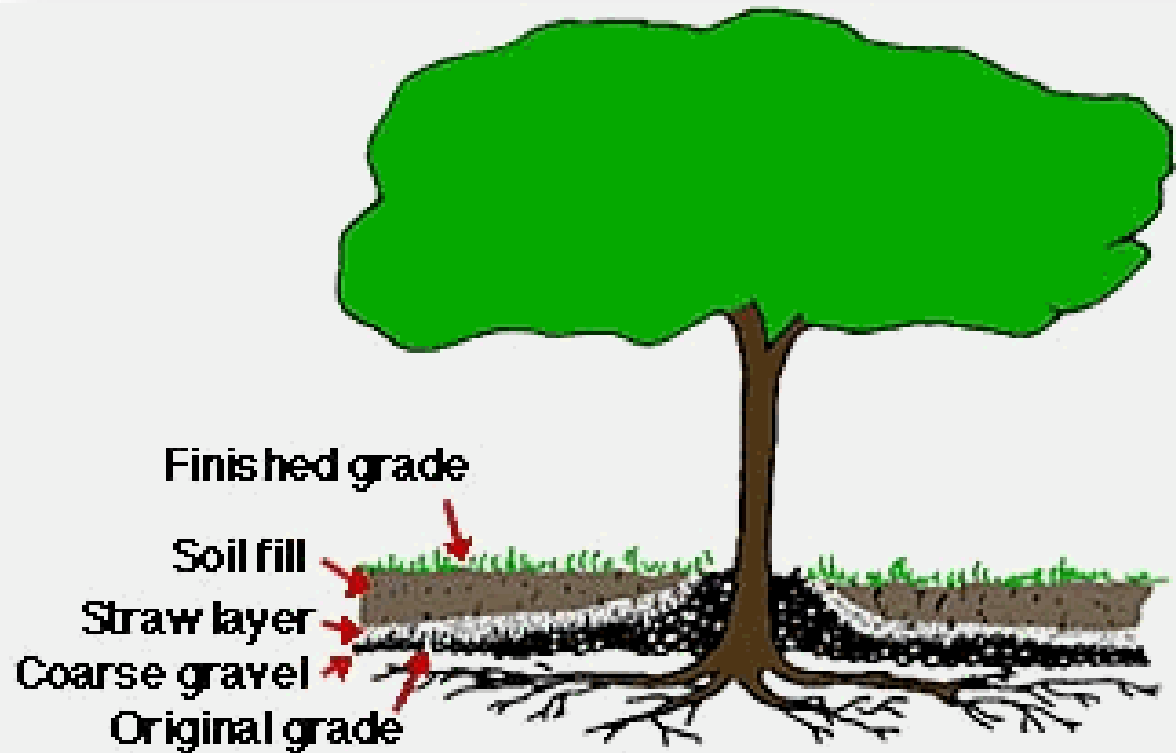
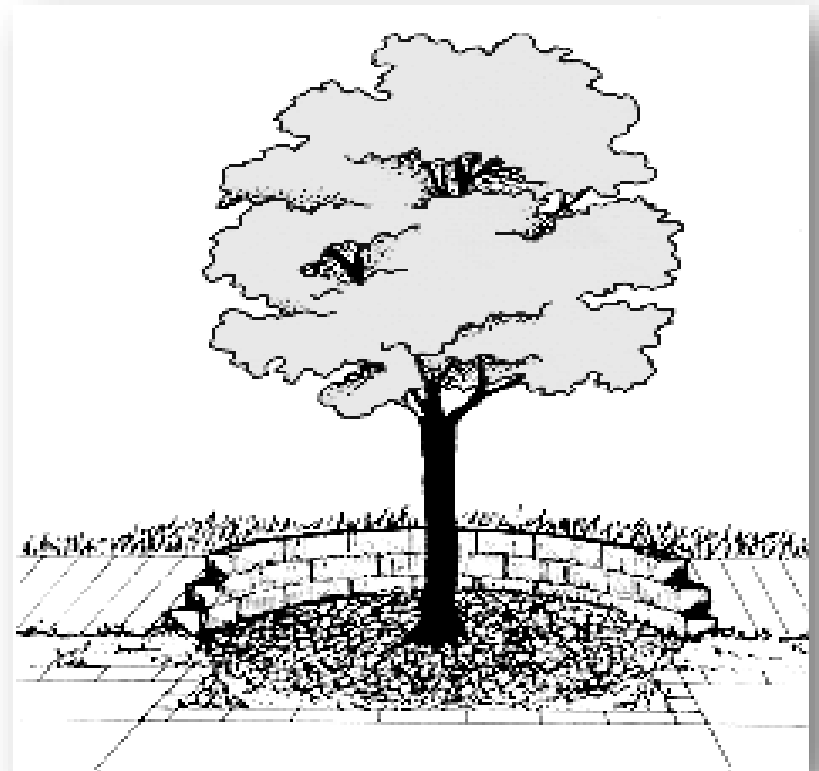


Fig 3. Coarse gravel placed over the original grade will provide aeration for tree roots beneath shallow soil fill.



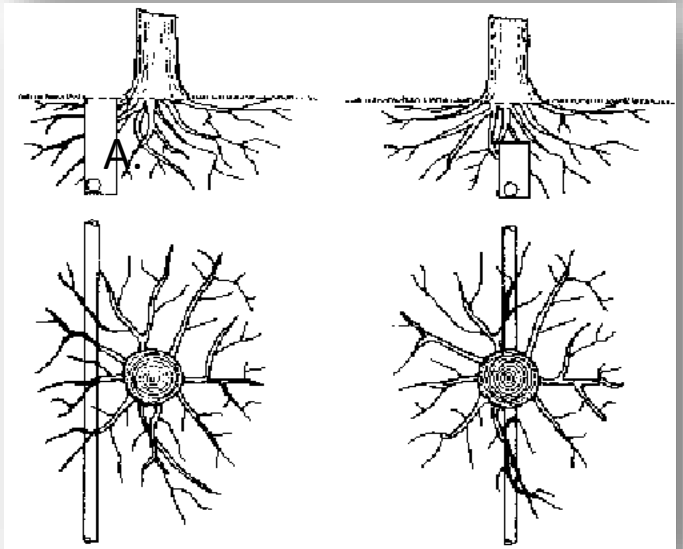
Tree Wells

- Tree wells can be effective if you have enough space to get them in
- Locate at the drip-line or beyond to protect the critical root zone (CRZ)



Excavation for Utility Lines

- Often the last thing installed
- Often not considered in poor tree protection plans
- Can be added with minimal tree damage using tunneling or boring



Soil Contamination

- Prevent soil contamination that can damage or kill trees
- Clean up fuel or hydraulic leaks
- Do not allow on-site paint dumping
- Plan for cement or mortar wash out areas



Symptoms of Construction Damage

- Trees with fewer and smaller leaves
- Trunk sprouts
- Visible wounds or decay fungi on trunks and branches
- Yellowing or browning leaves
- Dead trees
- Damage can occur quickly or over a number of years (5-7 years).



Other Protection Methods

- If roots have to be cut they should be cut clean and not torn
- Tunneling should be done under more valuable, older specimens
- Unwanted trees are removed carefully so nearby trees are not damaged
- Mulch and plywood can be placed over root areas to reduce soil compaction even in some traffic areas
- Tree trunks can be wrapped with fabric or other materials



Tree Care after Construction

- Treat wounds by bark tracing
- Aerate or use other soil alteration methods to re-introduce oxygen and reduce compaction
- Water deeply – to encourage new root development and reduce tree stress
- Inspect frequently – look for visible signs of insect or disease attack
- Mulch – them well but correctly
- Fertilize – not for stressed trees; fertilize in a year or two after they have recovered from construction stress based on soil analysis

Mitigating Compaction

- Vertical mulching; make holes with a drill or air tool; fill with compost or other organic materials
- Radial trenching; trench in a radial pattern throughout the root zone and backfill with native soil and compost
- Use an air excavator to reduce compaction, remove excess fill soil, and improve soil conditions

ANSI A-300

Parts 1-10

- Part 1 - Pruning
- Part 2 – Soil Management
- Part 3 – Supplemental Support Systems
- Part 4 – Lightning Protection Systems
- Part 5 – Management
- Part 6 – Planting and Transplanting
- Part 7 - Integrated Vegetation Management
- Part 8 - Root Management Standard
- Part 9 – Tree Risk Assessment
- Part 10 - IPM



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