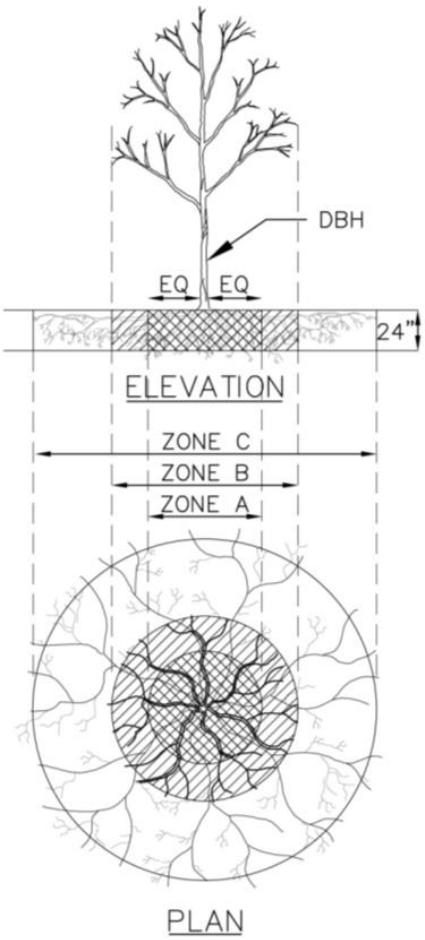
Chapter 7: Tree Protection During Construction

Urban trees need to be protected from damage to maximize their health, safety, benefits and functionality. Mature, young and newly transplanted trees need protection from construction activities. Tree protection involves activities designed to preserve and protect tree health by avoiding damage to tree parts such as roots, trunk and crown.

This Chapter describes mandatory actions for construction activities around existing trees that are to be retained to comply with TMC 13.06.502 landscaping requirements or for Stormwater Flow Control credits per the City of Tacoma Stormwater Management Manual. For more information on tree protection during construction, the following resources are suggested:

- Tree Protection on Construction and Development Sites- A Best Management Practices Guidebook for the Pacific Northwest
- American National Standards Institute (ANSI) A300 (Part 5) -Construction Management Standard
- International Society of Arboriculture Best Management Practices (BMP)- Managing Trees During Construction

7.1 Tree Protection Areas



(Zone A) Critical Root Zone (CRZ)

"Critical root zone" means the area around and under a tree. The radius of the Critical Root Zone measures 1 foot per 1 inch of diameter at breast height (DBH) from the trunk outwards and twenty-four inches in depth. For example, for a 10 inch DBH tree, the Critical Root Zone is located at least 10 feet out from the trunk and 24 inches deep.

Tree Diameter	CRZ radius	CRZ Diameter (including tree trunk)
2 inches	2 feet	4 feet + tree trunk
6 inches	6 feet	12 feet + tree trunk
20 inches	20 feet	40 feet + tree trunk
50 inches	50 feet	100 feet + tree trunk

(Zone B) Drip Line

"Drip line" is the area on the ground below the tree with a boundary designated by the edge of the tree's crown. Refer to glossary for definition of tree crown. For young trees, Zone A and B may be one and the same.

(Zone C) Feeder Root Zone

"Feeder Root Zone" is the area under and around a tree. The radius of the Feeder Root Zone measures 2 feet per one inch of DBH from the trunk outwards and 24 inches in depth. For example, for a 10 inch DBH tree, the Feeder Root Zone is located at least 20 feet out from the trunk and 24 inches deep.

Tree Protection Zone (TPZ)
"Tree Protection Zone" is an Arborist defined area surrounding the trunk intended to protect the roots and soil to ensure future tree health and stability. A TPZ consists, at a minimum, of Zone A or B, whichever is greater, or may be another area (typically larger) as defined by the Arborist. Fencing may not be required in portions of the Tree Protection Zone that are covered by pavement, that will remain undisturbed during the construction activities, but other restrictions and protection measures are required as discussed in this Chapter.

7.2 Tree Protection Plans
Any person conducting construction activities such as: excavation, filling, tunneling, trenching, compacting, demolition, utility work or other land disturbing activity in the Critical Root Zone or Drip Line of any tree, must submit a Tree Protection Plan to be approved by the City prior to commencement of work if the trees are to be retained to comply with TMC 13.06.502 or for Stormwater Flow Control credits per the City of Tacoma Stormwater Management Manual. The tree protection site plan shall be incorporated into the demolition and temporary erosion and sediment control plans.

Tree Protection Plans shall include each of the following elements:

1) An Arborist Report (refer to Appendix 4), detailing the tree's(s') health, condition and recommendation for or against retention; and
2) A site plan that is drawn to scale and shows:
    - all trees to be preserved on the site including their species, diameter at breast height (DBH) and Tree Protection Zone (including required fencing location);
    - location of existing and/or proposed utilities;
    - proposed grade changes and cross-sections; and,
    - location of proposed new trees.

For an approved Sample Tree Protection Plan refer to Appendix 4.

7.3 Alternative Tree Protection Plans
If the requirements for a Tree Protection Plan contained in this Chapter cannot be met, an alternative Tree Protection Plan may be submitted by an Arborist. The alternative must show alternative means for achieving tree protection and include a statement by the Arborist that the plan provides the same level of protection as the requirements in this chapter. The City will make the final decision on whether an alternative plan is acceptable based on the likelihood of the construction impacts affecting the tree's health and stability.

7.4 Tree Protection Fencing
Any person engaging in work that requires a Tree Protection Plan, or any person causing such work to be performed, must ensure that trees shall be sufficiently guarded and protected by those responsible for such work.

Requirements for tree protection fencing for trees to be preserved during construction are as follows:

1) **Trees not located directly adjacent to retained pavement (refer to Standard Detail LS-09):**
   - Erect readily visible 6 foot high chain link fencing at the edge of the Tree Protection Zone, and at the boundary of any open space tracts or conservation easements that abut the construction site except where, due to space restrictions, a specific distance is specified and approved by the Arborist/City.
   - The fencing shall be secured by 6 foot metal posts with movable footings located above ground.

2) **Trees located directly adjacent to retained pavement (refer to Standard Details LS-10 and LS-11):**
   - Erect readily visible chain link or reusable temporary tree and landscape protection fencing (such as high visibility fencing, plywood or similar fencing material) at the edge of the tree well/planting strip or at a minimum width of 4 feet on all sides, whichever is greater.
   - All fencing height shall be between 4 feet to 6 feet high. Chain link fencing shall be secured by metal posts with movable footings located above ground. Metal posts shall not be more than 10 feet apart.

3) **All trees regardless of location:**
   1) Fencing shall be flush with the initial undisturbed grade.
   2) Tree Protection Signs (Appendices 5 &/or 6) shall be attached to the fencing. Maintain the fencing in place until the City authorizes removal or a final certificate of occupancy is issued, whichever occurs first. DO NOT affix signs to trees.
   3) Ensure that any clearing, grubbing or landscaping done in the TPZ, subsequent to the removal of the fencing, shall be accomplished with light machinery (ex. sod cutter) or hand labor.
   4) No construction activity shall occur within the TPZ without prior written approval from the City. If construction activities are desired to be conducted within the TPZ, the City shall be given at least 24 hour notice prior to the anticipated commencement of construction activities. Prohibited work needing approval includes but is not limited to:
      - dumping of construction waste;
      - storage of materials;
      - storage of vehicles or equipment;
      - trenching;
      - changing soil grade;
      - compacting soil with vehicle or equipment traffic;
      - installing pavement of any kind;
      - attaching anything to trees using nails, crews and/or spikes; or,
      - causing injury by fire or excessive heat.

Penalties pursuant TMC 13.06.502 and 13.05.100 are applicable for non-compliance with this Chapter.

For Tree Protection Zone fencing standard plans, refer to Standard Plans LS-09, LS-10 and LS-11. For standard Tree Protection Zone Signs, refer to Appendices 5 and 6.

7.5 Working In the Tree Protection Zone – Protective Measures

While certain construction activities are limited or prohibited within the TPZ, it is recognized that some activities cannot be avoided. If any construction activities are to be conducted within the TPZ, the following protective measures shall be conducted.

7.5.1 Surface Protection Measures

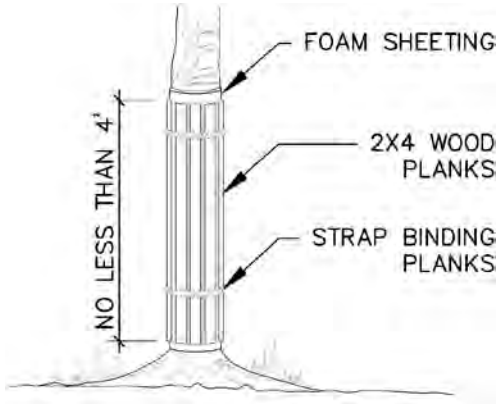
If traffic and construction activities cannot be kept out of the Tree Protection Zone for the entire duration of construction, actions shall be taken to disperse the vehicular load and/or surface compaction to protect the roots and minimize root damage.

Surface Protection Measures include:

1) applying 6 to 12 inches of wood chip mulch to the area;
2) laying ¾-inch plywood over 4 x 4 wood beams over a 4+inch thick layer of wood chip mulch;
3) applying 4 to 6 inches of gravel over a taut, staked geotextile fabric;
4) placing steel plates on top of a 4+inch thick layer of wood chip mulch; or,
5) placing commercial or logging road mats on top of a 4+inch thick layer of wood chip mulch.

7.5.2 Trunk Protection Measures

If traffic and construction activities cannot be kept out of the TPZ for the entire duration of construction, actions shall be taken to protect the trunk from incurring damage.



Trunk Protection Measures:
Install 2-inch thick wood planks around the trunk of the tree with ¼" or greater closed-cell foam pads between the trunk and planks. The height of the wood planks shall be 4 feet minimum, or match the height of the vehicle clearance, whichever is greater. Use straps or wire to bind the planks in place. DO NOT drive fasteners into the tree. If the protective planks are to be in place for longer than 6 months, loosen and adjust the planks every 3 months to allow for growth.

7.5.3 Supplemental Irrigation

If construction activities are conducted within the TPZ during the months of May through September supplemental irrigation, which could include hand watering or another regular source of water, shall be provided. Trees shall be irrigated to provide at least 1 inch of water applied once a week directly to the root system using a slow delivery method to allow for adequate infiltration. The delivery method shall be identified on the work plan.

All trees elected to be retained through construction shall be monitored for signs of drought stress. Signs of drought stress include:

- Leaf curling or rolling
- Leaf drop
- Early fall color
- Dieback on leaders (esp. in conifers).

If signs of drought stress persist or worsen after providing regular irrigation, promptly notify the City's Planning and Development Services at (253) 591-5030.

7.5.4 Canopy/Clearance Pruning

If canopy/clearance pruning is required to provide adequate clearance for construction equipment, the crown raising method of pruning shall be applied to achieve clearance. Typical vehicular clearance is 14 feet over vehicular trafficked areas.

Where excessive pruning would be necessary for construction clearance, temporary tie-up of lower limbs may be considered appropriate so long as the limbs are not structurally damaged.

7.6 Working In the Tree Protection Zone – Trenching / Excavation

7.6.1 General

Boring /Tunneling/Jacking is permitted in all Zones providing that:

1) All soil disturbance is at a minimum depth of 2 feet below grade;
2) The receiving / insertion point is not located within Zones A and B; and,
3) The diameter of the tunnel is not to exceed 6 inches.

7.6.2 Zone A (Critical Root Zone)

1) No disturbance allowed without site-specific inspection and approval of methods to minimize root damage, except in the case of tunneling / boring / jacking.
2) Severing roots larger than 2 inches in diameter requires City approval.
3) Tunneling/boring/jacking is required to install lines 3 feet below grade or deeper.

7.6.3 Zone B (Drip Line)

1) Operation of heavy equipment and/or stockpiling of materials are subject to City approval, and requires specific surface protection measures, refer to Section 7.5.1.
2) Trenching may be allowed if adhering to the following:
    - excavation by hand or with a hand-driven trencher may be required;
    - trench width must be limited;
    - no disturbance in Zone A is allowed; and,
    - 2/3 or more of Zone B must be maintained in an undisturbed condition.
3) Tunneling may be required for trenches deeper than 3 feet.

7.6.4 Zone C (Feeder Root Zone)

1) Operation of heavy equipment and/or stockpiling of materials is subject to City approval, and may require specific surface protection measures, refer to Section 7.5.1.
2) Trenching is allowed with strict adherence to the following:
    - excavation by hand or with a hand-driven trencher may be required;
    - trench width must be limited;
    - no disturbance in Zone A is allowed; and,
    - 2/3 or more of Zone C must be maintained in an undisturbed condition.

For tree protection during construction standard plans, refer to Standard Plans LS-08, LS-09, LS-10 and LS-11.

7.7 Critical Root Zone – Prohibited Construction Activities

The following activities are prohibited within the Critical Root Zone:

- Dumping or storing materials such as building supplies, soil, waste items, vehicles or equipment;
- Parking vehicles;
- Excavating for utility or building construction;
- Constructing new paved surfaces; and
- Significant changes to the grade or drainage patterns to the tree(s).

Any landscaping done in the CRZ subsequent to the removal of the fencing shall be accomplished by hand operated equipment or, when not feasible to be done by hand, shall be conducted with the smallest mechanized equipment necessary.

7.8 Post-Construction Tree Monitoring

All trees retained through construction shall be monitored and maintained including mulching, irrigation and pruning where necessary, for the next 3 years following construction. Trees shall be inspected annually to look for changes in condition and signs of pests or disease. If symptoms persist or worsen, promptly notify the City's Planning and Development Services at (253) 591-5030.

Ongoing protection activities following construction include:

- maintaining a mulched, grass-free area around the trunk to avoid damage by mowers or string trimmers;
- keeping building and other maintenance activities away from the limbs and trunks of trees during repair projects;
- avoiding soil contamination from oil, gasoline, paint, paint thinner, or other chemicals; and,
- not attaching wires, cables, conduit, mailboxes or other objects to the trees.