

### BMP T101: Tree Protection Requirements

#### Purpose

The section identifies management practices to employ at construction sites to guarantee successful tree and vegetation protection before, during, and through a lifetime of site use and maintenance. The City of Bellevue regulates and manages tree retention during development through the Land Use Code and the Clearing and Grading Code. Trees and vegetation are preserved for several reasons:

- To sustain both the function and value of vegetation assets
- To enhance public safety by carefully maintaining the health of onsite vegetation and to reduce liability
- To contain costs associated with site restoration
- To reduce or avoid soil compaction and degradation
- To avoid physical injury to existing trees
- To avoid root injury to trees and other vegetation
- To protect soils and hydraulic integrity of the entire site
- To protect existing irrigation, utilities and underground drainage
- To prevent sediment-laden and/or polluted runoff from entering drainage systems and water bodies (streams, wetlands, lakes).

#### Definitions

**Critical Root Zone (CRZ)** - The circular area around the base of a tree calculated as the distance to the furthest extent to the tree's dripline.

**Development Project** - Any construction activity including demolition, grading, drainage improvements, new construction of main house or accessory structures, added square footage to existing main house or accessory structures, site preparation and landscaping.

**Diameter at Breast Height (DBH)** - The diameter of the tree trunk at four and one-half feet (or 54 inches) above natural grade level. The diameter may be calculated by using the following formula:  $DBH = \text{circumference at 4.5-feet} \times 3.14$ . To determine the DBH of multi-trunk trees or measuring trees on slopes, consult the current Guide for Plant Appraisal, published by the Council of Tree and Landscape Appraisers.

**Drip line** - The circular area around the base of a tree measured by the furthest lateral extent of the foliage.

**Project Arborist** - A qualified professional who is qualified to evaluate trees such as a Certified Arborist, a Registered Consulting Arborist, a Licensed Landscape Architect or a Certified Forester. The project arborist is responsible for decisions related to vegetation on site before, during and after construction.

**Project Manager** - The person assigned to the construction project by the department or the contractor who is responsible for managing the overall project. Project management duties include schedule, budget, and related logistics, including construction site management.

**Tree Protection Site Plan (Base Map)** - A set of drawings that show existing site conditions and proposed landscape improvements, including trees to be removed, relocated or to be retained. Site plans shall include the following minimum information that may affect trees:

A. Surveyed location, species, size, drip line area of significant (including trees located on neighboring property that overhang the project site) and Street Trees within 30-feet of the project site.

B. Paving, concrete, trenching or grade change located within the **Tree Protection Zone (TPZ)**.

C. Existing and proposed utility pathways.

D. Surface and subsurface drainage and aeration systems to be used.

E. Walls, tree wells, retaining walls and grade change barriers, both temporary and permanent.

F. Landscaping, irrigation and lighting within TPZ of trees.

G. All of the final approved site plan sheets shall reference tree protection instructions.

**Significant Tree** - A healthy evergreen or deciduous tree, eight inches in diameter or greater at four feet above existing grade. (Land Use Code 20.50.046)

**Street Tree** - means any tree growing within the street right-of-way, outside of private property.

**Tree Appraisal** - means a method of determining the monetary value of a tree as it relates to the real estate value of the property, neighborhood, or community.

**Tree Protection Plan (TPP)** - A plan prepared by a certified arborist that outlines measures to protect and preserve trees.

**Tree Protection Zone (TPZ)** - The circular area around a tree calculated as one foot of radius for every inch of DBH, or at least 6 feet, whichever is greater that is required to be protected with a fenced enclosure.

**Tree Protection Fencing** - A temporary enclosure erected around a tree to be protected at the boundary of the tree protection zone. Tree protection fencing should consist of six 6 foot high chain link fence, mounted on two inch diameter metal posts, driven into the ground to a depth of at least 2-feet at no more than 10-foot spacing.

**Warning Sign** - A warning sign shall be prominently displayed on each fence. The sign shall be a minimum of 8.5 x 11-inches and clearly state: "WARNING – Tree Protection Zone - This fence shall not be removed and any injury to this or these trees is subject to penalty according to BCC 14.06.100."

#### Conditions of Use

Trees and vegetation can be impacted during construction in many ways and often times the damage is not seen for several months or even years after the construction is completed. Proper tree protection can benefit not only the tree by reducing stress during construction but also the developer and property owner by reducing long term costs associated with future maintenance. The cost of

removing a tree killed by construction after development is usually greater than the cost of protecting the tree during construction.

Common types of tree injuries that occur during construction may include:

- Mechanical injury to roots, trunk or branches
- Compaction of soil by storing of materials or equipment, which degrades the functioning of roots, inhibits the development of new roots and restricts drainage.
- Changes in existing grade which can cut or suffocate roots
- Alteration of the water table - either raising or lowering
- Changes in drainage patterns that promotes erosion or excessive accumulation of runoff
- Sterile soil conditions associated with stripping off topsoil
- Damage to roots from dumping of liquids or rinsing of construction equipment

Not all damage occurs to trees and vegetation during the actual construction of buildings or structures. Trees are often damage during the landscaping phase after the heavy equipment and workers have left. Installing irrigation, applying topsoil and turf installation also causes damage to trees. All construction-related impacts can produce long-term maintenance problems that can be avoided by following the BMPs set forth in the remainder of this chapter.

#### Planning & Permitting Phase

- Inventory and evaluate all existing trees on the site and trees immediately adjacent with driplines or expected root zones extending onto the project site. The inventory and evaluation shall include, but not be limited to the following information:

Tree species

Tree size in DBH and canopy spread

Tree condition or observed defects

Tree numbers that are included in an inventory table

A calculation of the total diameter inches of significant trees on the site along with an indication of the interior or perimeter location of the tree, if applicable to the proposed development type and tree retention.

Tree map showing the location of the existing significant trees on the site with numbers corresponding to the tree inventory table.

- **Submit a Tree Protection Plan (TPP)** prepared by a Project Arborist that includes the following information:

Location of and description all significant trees that will remain on the project site per LUC 20.20.900

Illustration of the Tree Protection Zone (TPZ) for each tree is a radius of 1.5 feet for every inch of DBH or a minimum of 6 feet, whichever is greater.

The TPZ will regularly exceed the Critical Root Zone (CRZ), which is the outer edge of the tree's canopy, or drip line. The reduction of TPZ closer to the CRZ must be accompanied by mitigating measures and be approved in writing by the City of Bellevue. The TPZ may not be smaller than the CRZ.

Description of expected tree protection techniques that will be used on the project as per the Land Use Code and the Clearing and Grading Code  
All tree removal and pruning needed to make room for future structures and construction equipment should also be drawn on the base map

A timetable for project meetings with the Project Team including a pre-construction meeting and the schedule for the Project Arborist monitoring.

Calculation of appraisal amounts to be collected by the City as an assurance device in the form of a deposit equal to the tree appraisal value of all protected trees as determined under the methods described in the Guide for Establishing Value of Trees and Other Plants, published by the International Society of Arboriculture.

#### Pre-Construction Site Preparation Phase

- Stage equipment away from trees and vegetation to be retained so that existing plants and their roots are protected.
- Fence off with chain link or construction fencing all entry and exit routes. When planning routes, avoid utility access corridors.
- Protect irrigation and drainage systems shall from damage unless plans call for renovation of such systems.
- Stake and/or flag clearing limits and tree protection to be verified and approved by the City's clearing and grading inspector at the required preconstruction meeting.
- Project Arborist will supervise and verify the following tree protection measures are in place and comply with the approved TPP:

A 6" layer of coarse mulch or woodchips is to be placed beneath the Tree Protection Zone (TPZ) of the protected trees. Mulch is to be kept 12" from the trunk.

Trees that have been identified in the site inventory as posing a health or safety risk may be removed or pruned by no more than one-third, subject to approval of the required permit by the City of Bellevue. Pruning of existing limbs and roots shall occur under the direction of the Project Arborist.

Tree Protection Fencing of 6' chain link fencing shall be installed around the TPZ of protected tree(s). The fencing can be moved within the TPZ if authorized by the Clearing and Grading Inspector and the Project Arborist but not closer than 2' from the trunk of any tree. Fence posts shall be 1.5" in diameter and are to be driven 2' into the ground. The distance between posts shall not be more than 10'.

Tree protection fencing shall have a warning signs prominently installed on each fence at 20-foot intervals. The sign shall be a minimum 8.5-

inches x 11-inches and clearly state: "WARNING - Tree Protection Zone"

Movable barriers of chain link fencing secured to cement blocks may be substituted for "fixed" fencing if the Project Arborist and City Staff agree that the fencing will have to be moved to accommodate certain phases of construction. The builder may not move the fence without authorization from the Project Arborist and City Staff.

Should temporary access into the TPZ be approved, an additional 3" layer of gravel and 3/4" plywood shall be placed over the CRZ.

## Construction Phase

During the Construction phase, ensure the TPP is being followed and report any conflicts or deviations to the City of Bellevue Clearing and Grading Inspector. Monitor construction activities that require encroachment within the TPZ, such as grading or trenching.

Avoid the following conditions:

1. Allowing run off or spillage of damaging materials into the approved TPZ.
2. Storing construction materials or portable toilets, stockpiling of soil, or parking or driving vehicles within the TPZ.
3. Cutting, breaking, skinning, or bruising roots, branches, or trunks without first obtaining authorization from the Project Arborist.
4. Discharging exhaust into foliage.
5. Securing cable, chain, or rope to trees or shrubs.
6. Trenching, digging, tunneling or otherwise excavating within the CRZ or TPZ of the tree(s) without first obtaining authorization from the Project Arborist.

Periodically inspect during construction - at four-week intervals - to assess and monitor the effectiveness of the TPP and provide recommendations for any additional care or treatment. More frequent may be required based on the TPP.

The following activities should be observed and inspected by the project arborist during the construction phase to ensure compliance with the approved TPP:

1. Only excavation by hand or compressed air shall be allowed within the TPZ of trees. Machine trenching shall not be allowed.
2. In order to avoid injury to tree roots, when a trenching machine is being used outside of the TPZ of trees, and roots are encountered smaller than 2", the wall of the trench adjacent to the trees shall be hand trimmed, making clear, clean cuts through the roots. All damaged, torn and cut roots shall be given a clean cut to remove ragged edges, which promote decay. Trenches shall be filled within 24 hours, but where this is not possible, the side of the trench adjacent to the trees shall be kept shaded with four layers of dampened, untreated burlap, wetted as frequently as necessary to keep the burlap wet. Roots 2" or larger, when encountered, shall be reported immediately to the Project Arborist, who will decide whether the Contractor may cut the root as mentioned above or shall excavate by hand or with compressed air under the root. All exposed roots are to be protected with dampened burlap.
3. Route pipes outside of the TPZ of a protected tree to avoid conflict with roots. Where it is not possible to reroute pipes or trenches, bore or tunnel beneath

the TPZ of the tree. The boring shall take place not less than 3' below the surface of the soil in order to avoid encountering "feeder" roots. All boring equipment must be staged outside of the TPZ.

4. All grade changes adjacent to the TPZ of a significant tree shall be supervised by the Project Arborist. Cuts or Fills of soil that are adjacent to the TPZ will have a retaining wall system designed in consultation with the Project Arborist and approved in writing by City Staff.

5. Any damage due to construction activities shall be reported to the Project Arborist and City Staff within six hours so that remedial action can be taken.

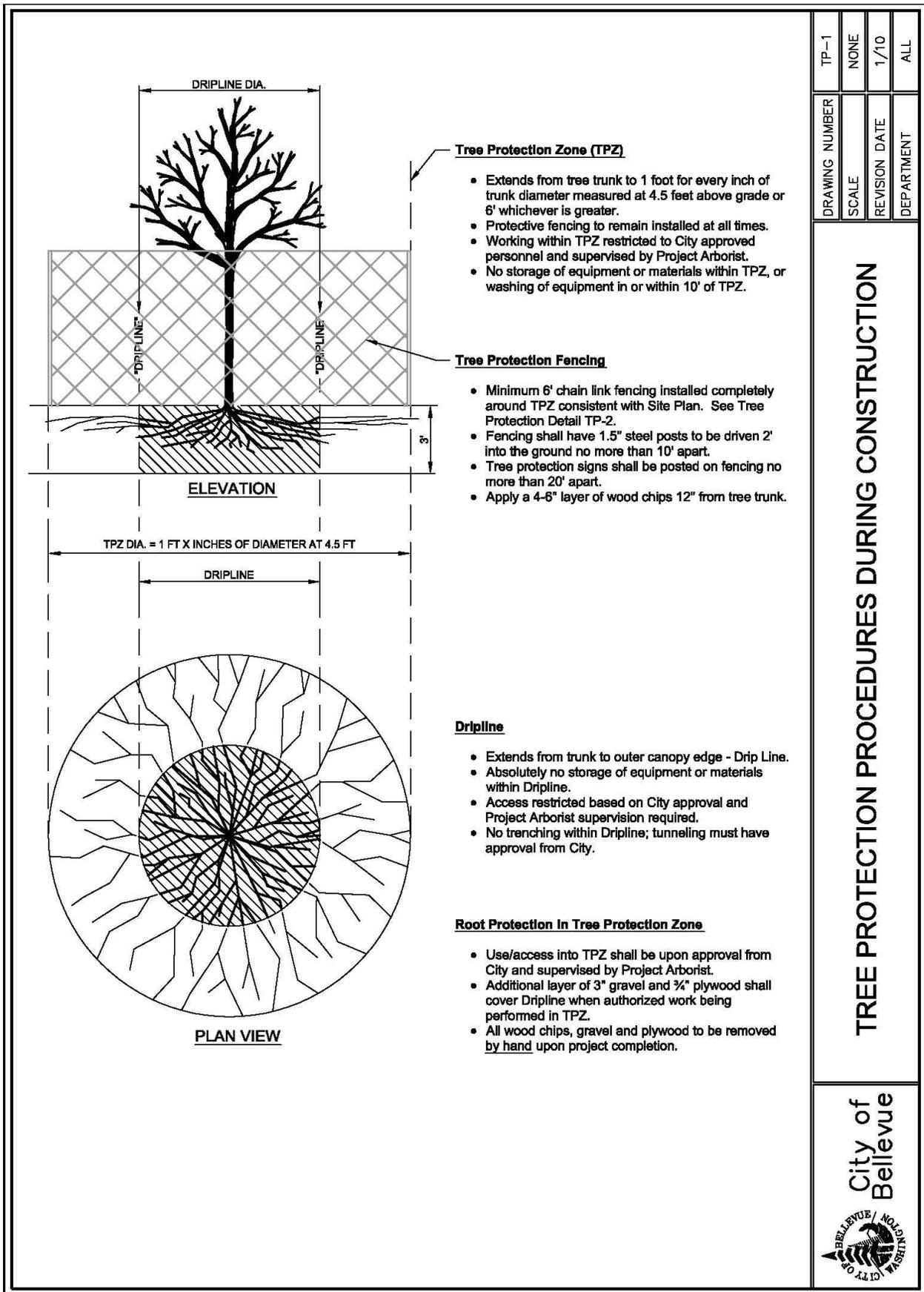
6. The Project Arborist shall be responsible for the preservation of the designated trees. Should the builder fail to follow the tree protection specifications, it shall be the responsibility of the Project Arborist to report the matter to City Staff as an issue of non-compliance.

## Post-Construction

The Post-Construction Phase begins when the equipment leaves and the new tenants move in. Important follow-up monitoring of the protected trees will help ensure their survival and identify signs of early stress.

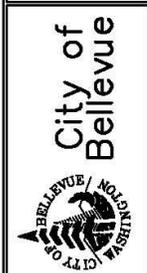
The applicant shall arrange with the Project Arborist for the long-term care and monitoring of preserved trees by complying with the following conditions:

1. Complete post-construction tree maintenance, including pruning, mulching, fertilization, irrigation, and soil aeration where necessary.
2. Remove, by hand, all soil and root protection material such as wood chips, gravel and plywood.
3. Provide for remediation of compacted soil by methods such as aeration or vertical mulching.
4. Apply at least 1 inch of water per week by deep watering in the absence of adequate rainfall.
5. Fertilize trees with slow released phosphorus, potassium, calcium, magnesium, and other macro- and micro-nutrients as indicated by a soil test, but wait at least one year to apply any nitrogen.
6. Fertilize lightly with slow release nitrogen after 1 year, and then make annual light nitrogen applications for the next 3 to 5 years.
7. Inspect trees annually for at least 3 and up to 5 years after construction to look for changes in condition and signs of insects or disease, and to determine maintenance needs.
8. Remove trees that are badly damaged or are in irreversible decline as determined by the Project Arborist and City Staff.
9. Continue to protect not only the large, established trees on the site but also those newly planted in the landscape as per LUC 20.20.520.K.
10. Provide annual inspection reports to the City.



DRAWING NUMBER	TP-1
SCALE	NONE
REVISION DATE	1/10
DEPARTMENT	ALL

**TREE PROTECTION PROCEDURES DURING CONSTRUCTION**



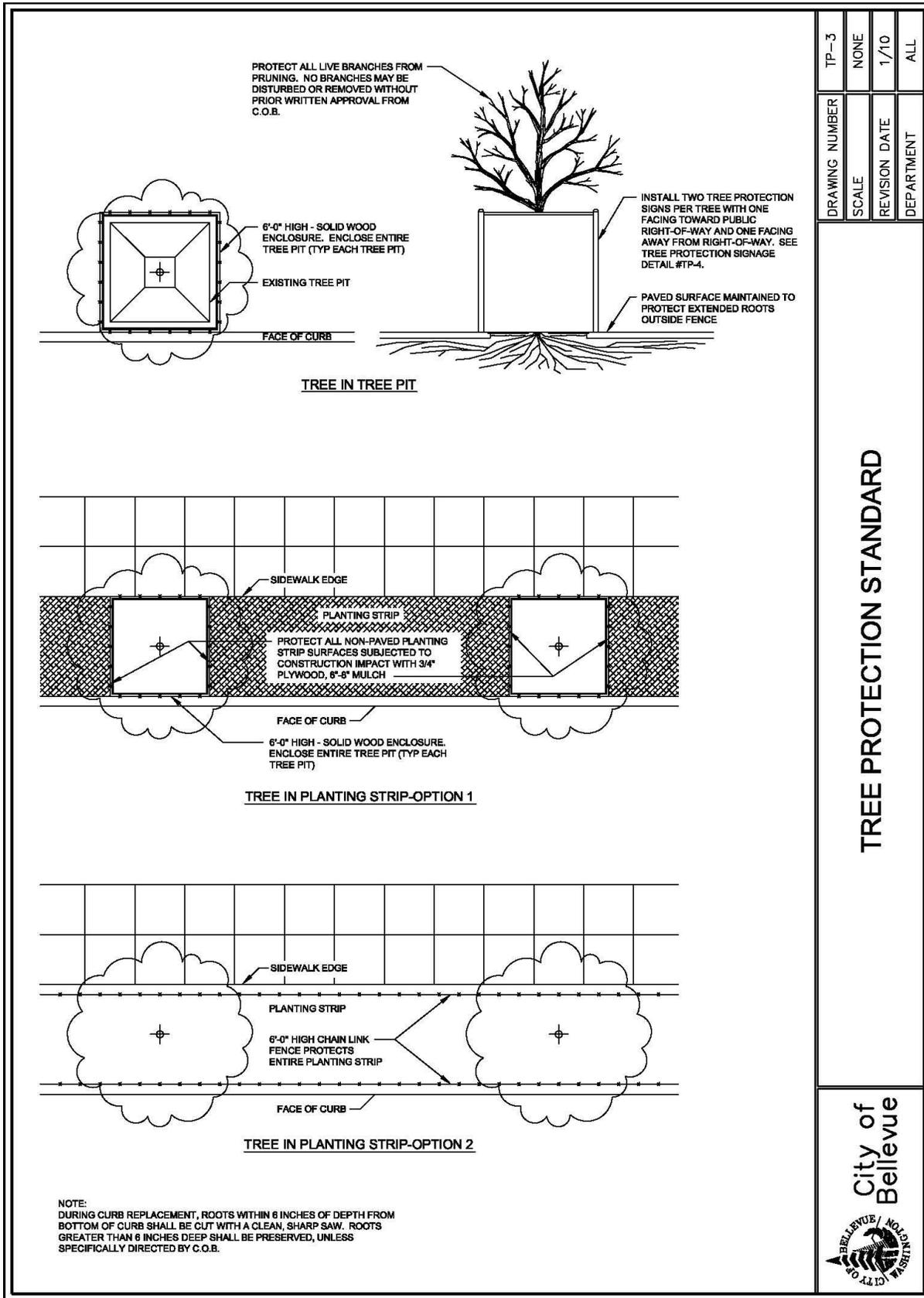
- Tree Protection Zone (TPZ)**
- Extends from tree trunk to 1 foot for every inch of trunk diameter measured at 4.5 feet above grade or 6' whichever is greater.
  - Protective fencing to remain installed at all times.
  - Working within TPZ restricted to City approved personnel and supervised by Project Arborist.
  - No storage of equipment or materials within TPZ, or washing of equipment in or within 10' of TPZ.

- Tree Protection Fencing**
- Minimum 6' chain link fencing installed completely around TPZ consistent with Site Plan. See Tree Protection Detail TP-2.
  - Fencing shall have 1.5" steel posts to be driven 2' into the ground no more than 10' apart.
  - Tree protection signs shall be posted on fencing no more than 20' apart.
  - Apply a 4-6" layer of wood chips 12" from tree trunk.

- Dripline**
- Extends from trunk to outer canopy edge - Drip Line.
  - Absolutely no storage of equipment or materials within Dripline.
  - Access restricted based on City approval and Project Arborist supervision required.
  - No trenching within Dripline; tunneling must have approval from City.

- Root Protection in Tree Protection Zone**
- Use/access into TPZ shall be upon approval from City and supervised by Project Arborist.
  - Additional layer of 3" gravel and 3/4" plywood shall cover Dripline when authorized work being performed in TPZ.
  - All wood chips, gravel and plywood to be removed by hand upon project completion.





TP-3	DRAWING NUMBER	SCALE	REVISION DATE	DEPARTMENT
NONE		1/10		ALL

**TREE PROTECTION STANDARD**

