



# **DESIGNING FOR MANDATORY TREE PROTECTION DURING CONSTRUCTION**

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# DESIGNING FOR MANDATORY TREE PROTECTION DURING CONSTRUCTION

## 1. What is tree protection & why is it necessary?

Construction activities can cause irreparable damage to adjacent street trees and it is important that they be protected to insure the longevity of Santa Monica's Community Forest. This is why architects need to consider how a proposed project will impact existing street trees as well as trees on the site of the proposed project or the adjacent properties when designing a project.

Policy 2.5 of the City's Community Forest Management Plan mandates that measures be implemented for the protection of existing City trees during construction activities. During construction projects, Tree Protection Zones must be established around all City trees prior to the commencement of construction activities.

Construction impacts to existing trees can be minimized by including the tree as an element of the City's infrastructure that must be protected during construction. The photo at right shows an inadequate protection zone around a City street tree that resulted in irreversible damage to its trunk.



When designing plans for construction projects it is important to consider the impact a proposed project might have on the adjacent City street tree. Projects should be designed so they blend into and/or accentuate the existing conditions on the street right-of-way. Contractors should also have a clear understanding of how to access the site during construction, where to locate construction trailers, install utility meters, how building materials should be delivered or stored and eventually how to make repairs to sidewalks, curbs and gutters.

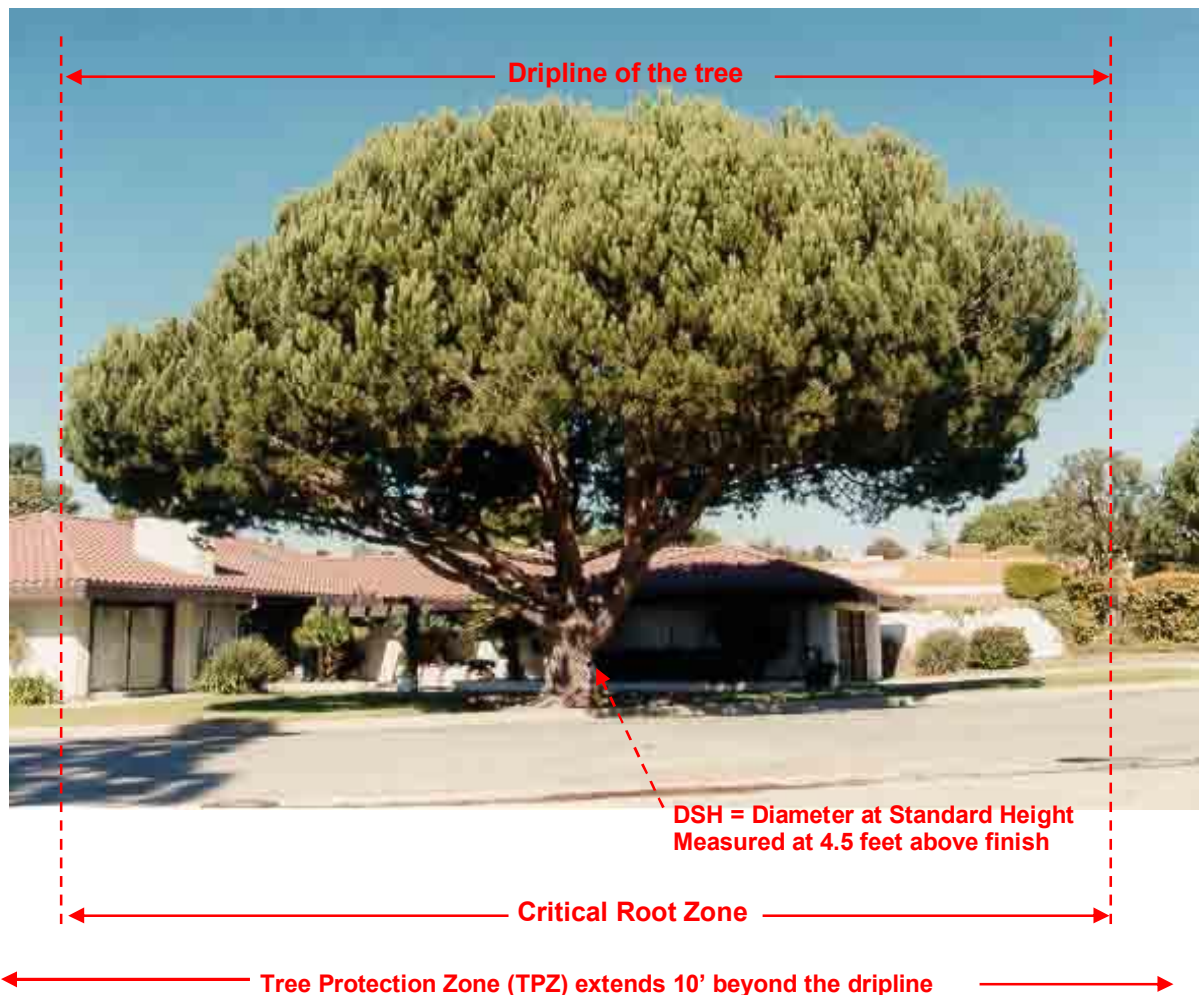


## 2. What is a Tree Protection Zone?

A Tree Protection Zone (TPZ) is the designated area that encompasses an entire tree plus an additional radial distance of ten feet (10') beyond the edge of the canopy. However, for practical purposes the City of Santa Monica requires that the parkway be delineated with chain link fencing and posted to alert contractors on the site and others that no equipment, materials, debris, supplies or fill soil shall be located within the TPZ.

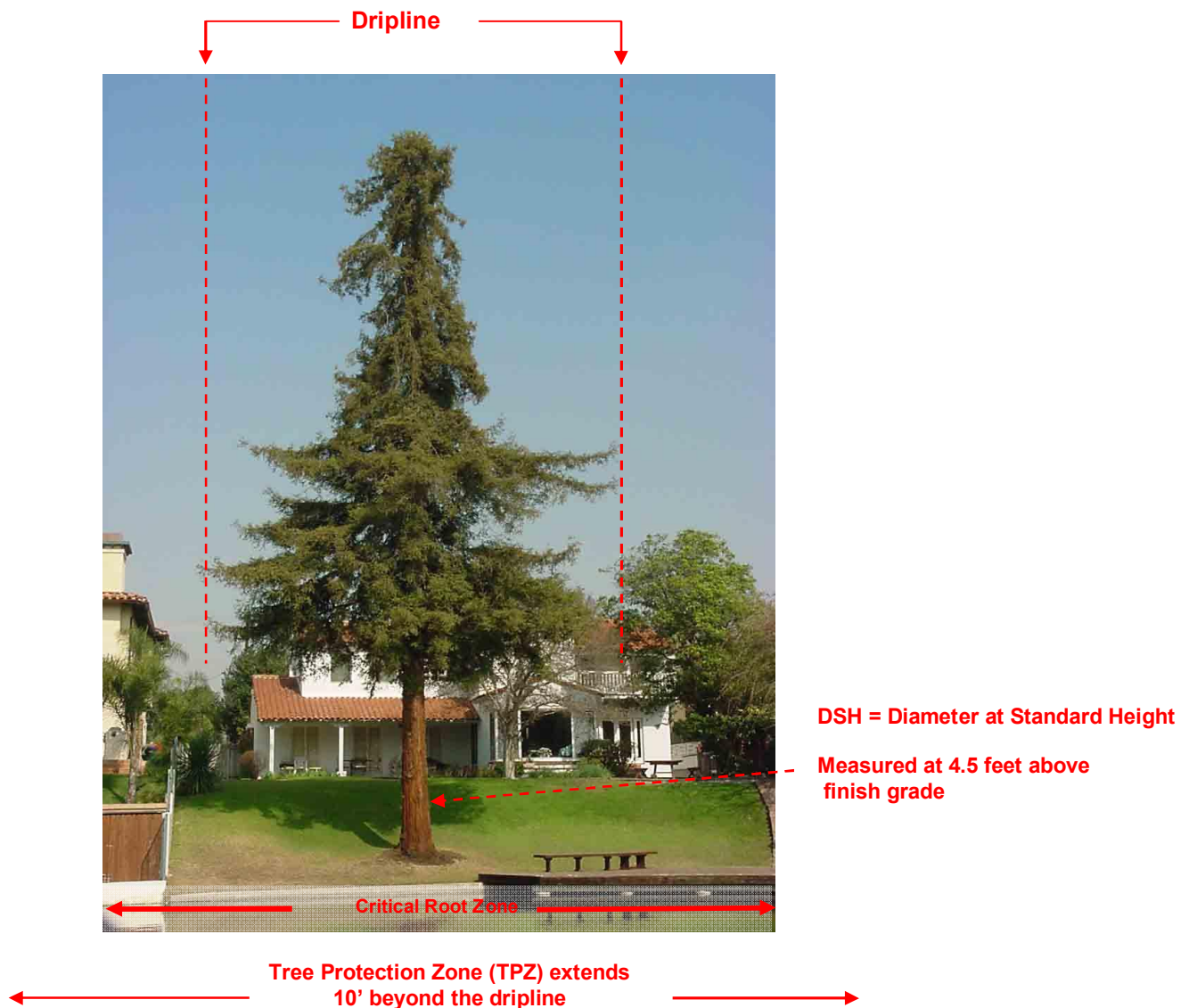
## 3. How is a Tree Protection Zone determined?

When designing a new project it is important to determine how the structure will be built and how contractors can access the site without harming any existing trees. This is done by calculating the critical root zone (CRZ). This measurement is oftentimes consistent with the ~~the~~ dripline of the tree which is the greatest extent of the tree's branches.



For some trees with narrow crowns, such as the tree shown in the photo below, this distance is not near enough to insure that the critical tree roots will be protected.

To accurately determine the critical root zone of a narrow crowned tree, measure its trunk diameter at 4.5 feet above the ground with a diameter tape. Then multiply that number by 1.5 and express the results in feet. For example; if the tree in the photo below has a trunk diameter of 24 inches then the critical root zone has a radial distance of 36 feet, or a total diameter of 72 feet across.



Once the CRZ has been determined the boundary of the TPZ can then be established to determine, underground utilities, drainage lines, location of driveway approaches and the ultimate size of the proposed structure.

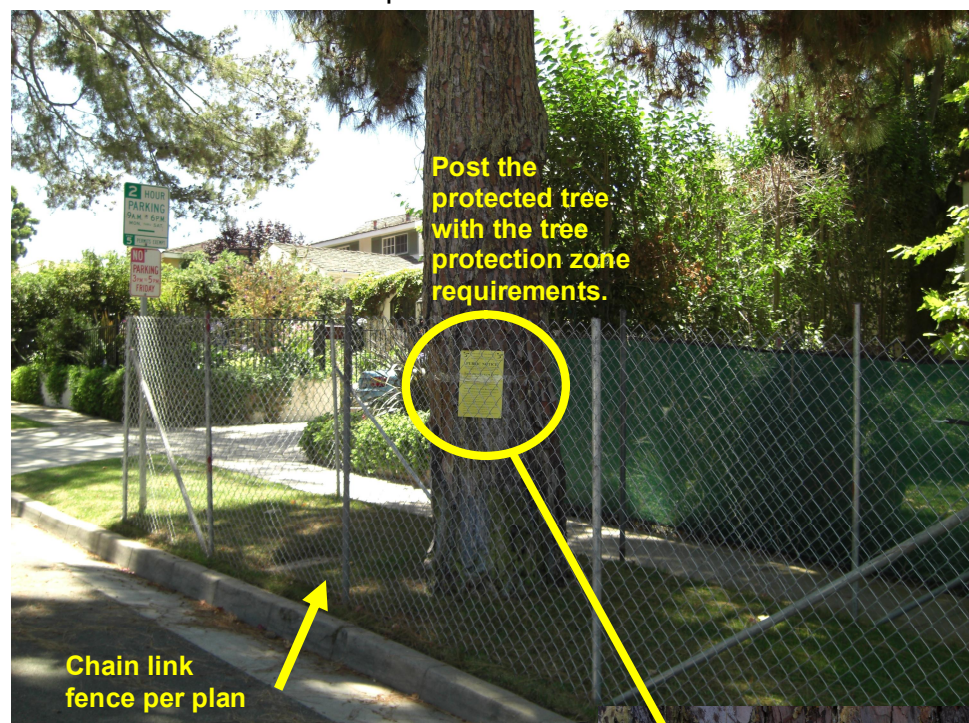


#### 4. What is the proper way to set up a Tree Protection Zone?

Construction equipment can injure the above ground portion of a tree by breaking branches, tearing the bark, and wounding the trunk. These injuries are permanent and, if extensive, can be fatal to the tree.

Parkways must be fenced off to protect street trees during construction. The location of the fence must be shown on the plans and the following notes regarding the TPZ fencing are typically added:

- Obtain TPZ requirements from Community Forester's office and post the tree as required by the City of Santa Monica.
- Fence the TPZ (*field example shown below*) with a six foot (6') chain link fence to prevent wounds to the tree and soil compaction within the root zone.



Proper tree protection fence





Occasionally there are circumstances that require access to the construction site be through the TPZ. In those cases where access is necessary through the TPZ, a steel plate may be utilized to bridge over the parkway for access. In other situations construction work may need to be conducted within the TPZ. In those situations steel plates can be placed over a mulch base to create a temporary work surface. These measures will prevent soil compaction within the critical root zones of trees.

In order to obtain authorization for this type of approach it must be detailed on the plans submitted to the City and authorized prior to any construction activities taking place.



**Steel plate**

When bridging over a parkway the steel plate should rest on the top of the curb and the top of the concrete sidewalk on the opposite side of the parkway.

## 5. Construction access and permanent driveways.

Once the Critical Root Zone has been established a better understanding can be gained of how the proposed design can fit into the project site. Equally as important is how to access the site, both during the construction phase as well as once the project is completed. It is always best to utilize an existing driveway for both construction access and as a permanent driveway as that has the least impact on existing street trees.

### a. Construction access:

Constant traffic associated with a construction project that continually crosses over the parkway can have a negative impact on the root zone. To avoid this it's important to utilize the existing driveway approach or the alley if possible.



Construction access on existing driveway

### b. New permanent driveways:

On projects when a new driveway is planned, it is important to remember the critical root zone of existing trees when deciding on where exactly to locate the driveway. Keep in mind that the trunk of an existing street tree as well as its root system will increase in size. In order to avoid future conflicts between a driveway approach and the surface roots of an existing street tree the edge of new driveways must be located at least ten feet (10') away from the outside edge of the trunk of the street tree.



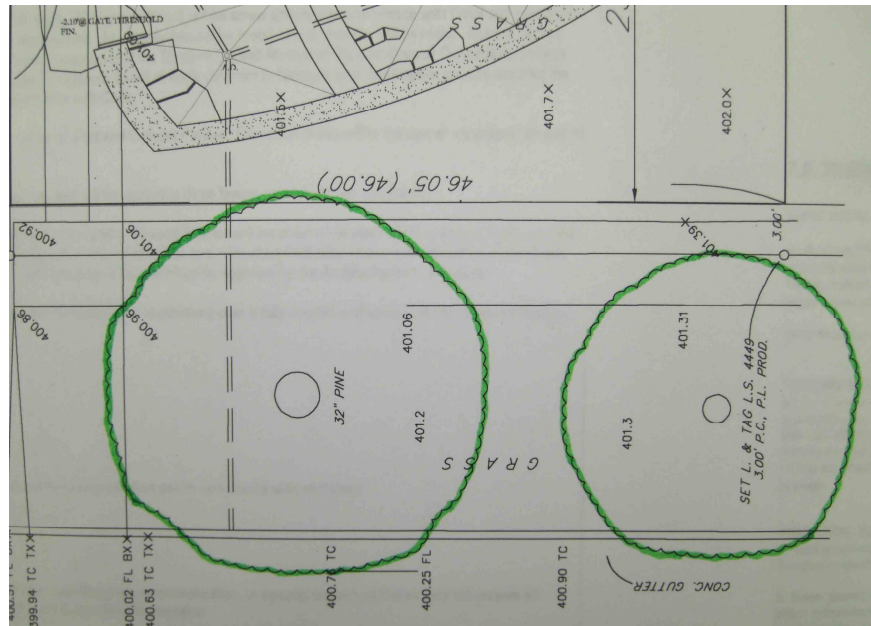
This new driveway is positioned 10' from the street tree



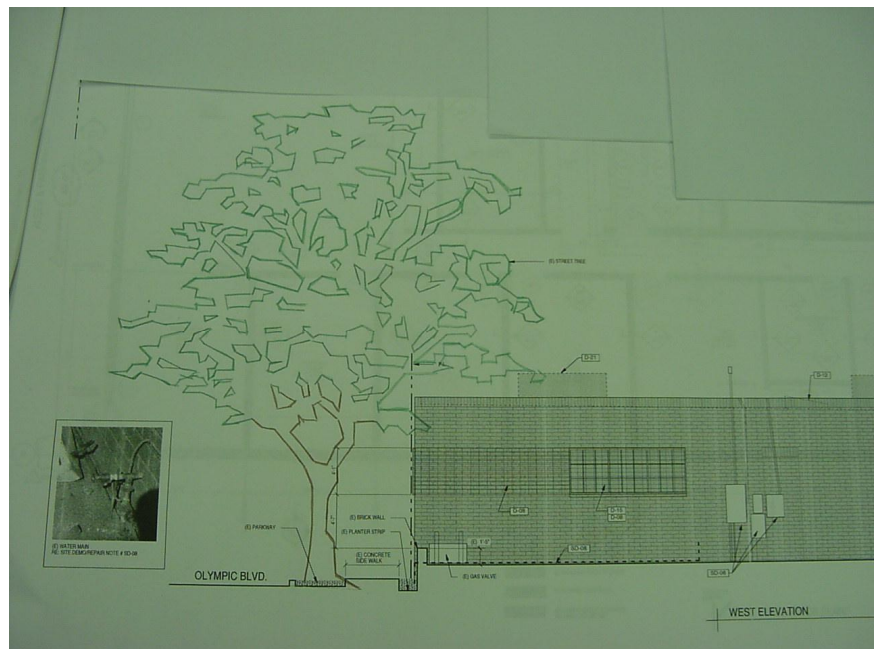
## 6. How should trees be shown on the plans?

Whether a project consists of constructing a new building, or renovating an old one, it is important to know what fixed features in the public right-of-way need to be worked around. Street trees are part of Santa Monica's infrastructure and probably one of its largest elements. The easiest way to understand the impact of having to work around a fixed object is to know its actual size.

- a. Plans must accurately show the actual sizes of the street tree canopies to scale on all pages that show the street right-of-way or any portion of the street right-of-way.



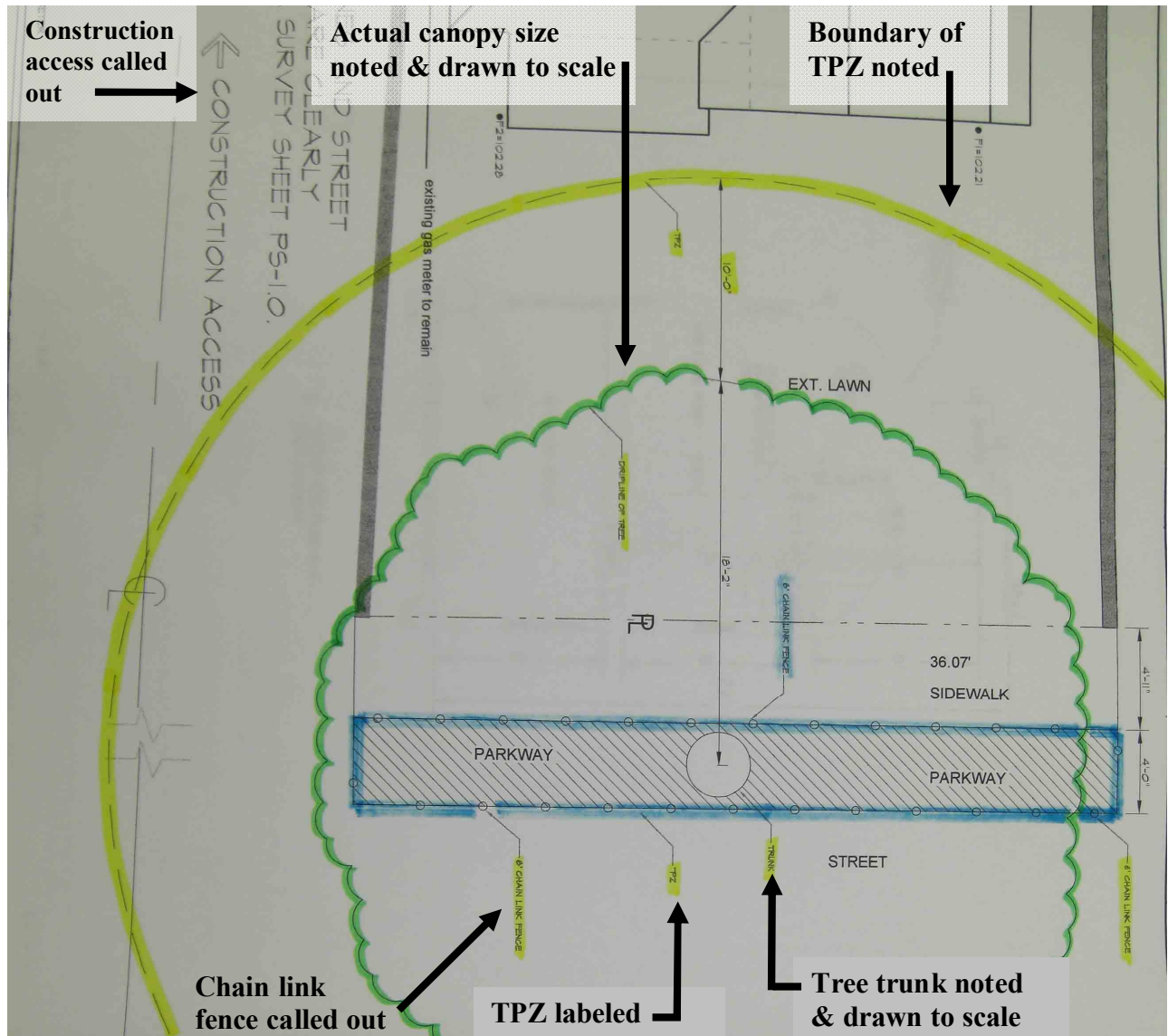
- b. Elevation sheets should also show a silhouette of the actual size of all existing street trees as in this example:





## 7. How should a Tree Protection Zone be shown on the plans?

The plans must show a Tree Protection Zone (TPZ) around existing street tree(s). The TPZ needs to encompass the canopy plus an additional radial distance of ten feet (10') beyond the dripline. An example is shown below:



The TPZ should be clearly shown on all pages that show the street right-of-way or any portion of the street right-of-way. This includes but is not limited to the site plan, demolition plan, grading & drainage, utility site plan, shoring plan, elevation sheets and landscape plan.

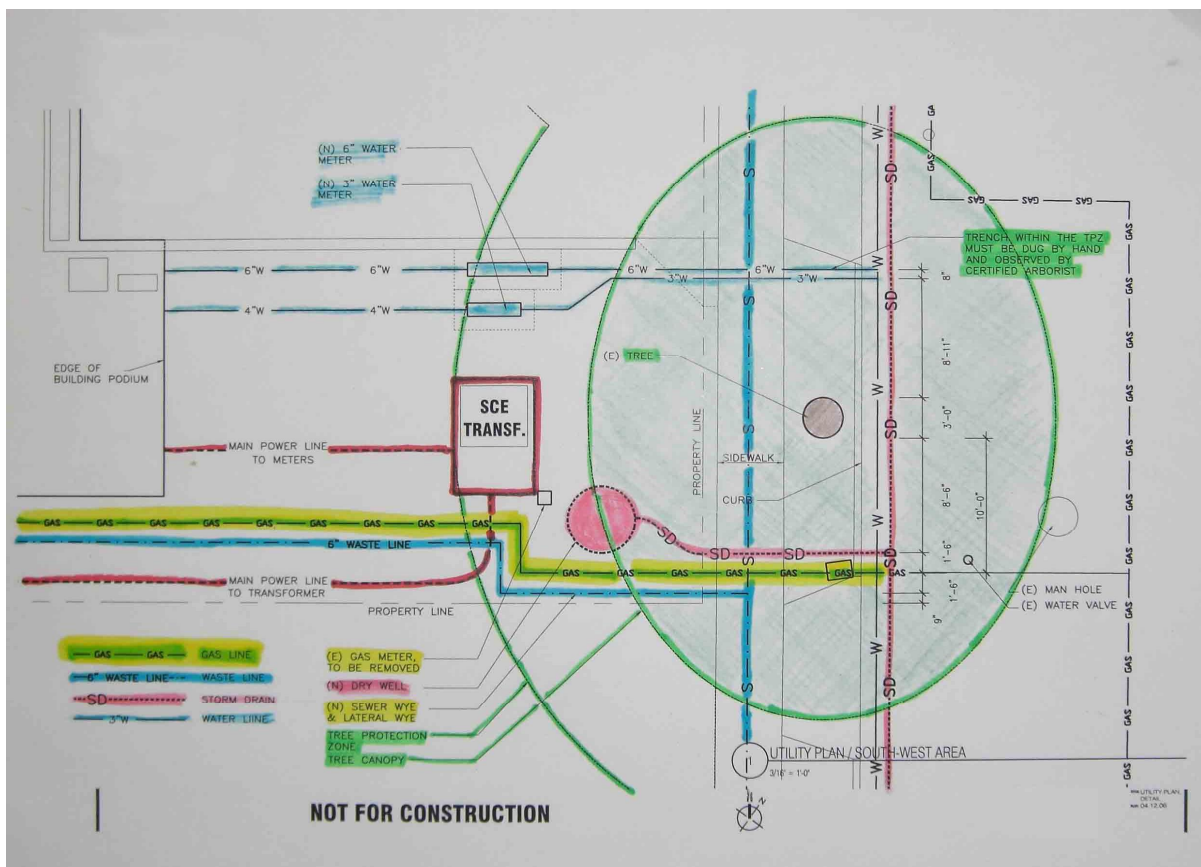
The TPZ should be labeled with the following notes;

- a. Coordinate all off-site improvements within the TPZ with the Community Forester's office.
- b. No construction materials or activities allowed in this area.
- c. Pruning of City trees to provide clearance for construction activities shall only be done by City of Santa Monica Community Forest Operations.

## 8. What about excavation & utility installation within TPZ's?

The excavation that is necessary to install underground utilities will likely have a negative impact on sections of the of street tree's roots adjacent to a project. During the design phase of a project the staff at Community Forest Operations can help you understand where roots may be growing.

The roots of street trees are found mostly in the upper 6 to 12 inches of the soil yet the roots of a mature tree can extend far beyond the edge of the canopy. In fact, many times roots can be found growing a distance of one to three times the height of the tree. The amount of damage a tree can suffer from root loss depends, in part, on how close to the tree the cut is made. Severing one major root can cause the loss of a significant portion of the root system, affecting its health or its stability. This is why it is important to show the locations of proposed utilities and their proximity to existing street trees.



The example above clearly shows the utilities and how they are being proposed to be installed. Since they are within the boundary of the TPZ and could have an adverse impact on the CRZ, design alternatives should be presented to the City and a workable solution arrived at during the design phase and well before construction gets underway.



### **9. What if there is a conflict between utility trenches and tree roots?**

In cases where proposed utility lines are in conflict with existing tree roots trenchless methods are recommended. This is a much more advantageous method because excavation is not necessary between access points and construction activity is concentrated at the access sites, rather than along the entire length of the proposed trench.

Trenchless methods offer several potential advantages in addition to root preservation. They can reduce noise, dust, construction vibration, and other environmental impacts. These methods also have minimal impact on the public near a construction site, traffic is not interrupted, and other utilities are minimally affected. Trenchless technologies are also generally safer both for the construction workers and the general public.

### **10. How should off site repairs and improvements be made?**

When conducting off-site work such as sidewalk or driveway repairs it is important to consider the impact of that work on the critical root zone and individual roots.

When removing hardscape materials the use of mechanical equipment is acceptable. However, to avoid damaging the surface roots and allow for proper root pruning to take place, remove the broken up material manually as shown in the photo below.



All excavation within the TPZ shall be done either manually or through the use of an air spade. This will help to preserve the root structure and allow a more precise determination to be made on root pruning requirements. More importantly it will avoid unnecessary damage to roots which should be preserved. This in turn helps to prolong a tree's life and insure its stability after construction has been completed.

## STANDARD TREE PROTECTION ZONE GUIDELINES

1. Trees within the public right-of-way may not be removed for any reason and are to be protected from injury or damage during construction. This tree is a significant tree in the City of Santa Monica. Pruning shall only be done by Community Forest Operations staff to provide clearance for construction activities. Questions regarding street trees may be directed to the Community Forester at (310) 458 - 8974.
2. The typical TPZ should encompass the canopy plus an additional radial width of ten feet (10'). However, since these conditions are unique, the application should be evaluated with the final limits of the TPZ being established by the Community Forester.
3. Mulch the entire area of the TPZ in an effort to improve the growing environment for the roots. During construction phase maintain a four to six inch layer of chip mulch over the soil surface to reduce soil compaction, improve aeration, enhance moisture retention and reduce temperature extremes. Mulch generally consists of shredded leaves or bark, pine straw, peat moss, wood chips or composted greenwaste.
4. Fence the TPZ with a six foot (6') high chain link fence to prevent wounds to the tree and soil compaction within the root zone. Post the fence with a sign stating:  
*TREE PROTECTION ZONE – KEEP OUT*
5. Should it be necessary to trench within the TPZ all trenches shall be hand dug. No roots larger than two inches (2") shall be cut unless no other alternative is feasible. All smaller roots that require cutting shall be cut with pruning saws. Cuts shall be made flush with the side of the trench. If at any time twenty-five percent (25%) of the area within the TPZ is being separated from the tree by a trench, then the line shall be either relocated or installed by boring.
6. Removal of hardscape and/or excavation within the TPZ shall be done manually.
7. The minimum distance between an open trench and any tree shall be between six inches (6") to one foot (1') for every inch of trunk diameter measured at four and a half feet (4 ½') above existing grade, depending on the species of tree. Minimum clearance shall be ten feet (10') from the trunk of the tree.
8. In the event root pruning is required to accommodate grade changes or the installation of hardscape features the root pruning procedures shall be directed by Community Forest Operations staff.
9. At no time shall any equipment, materials, supplies or fill soil be allowed in the TPZ unless necessary.
10. Prune and fertilize the trees after the completion of all exterior work on the building and at the beginning of the landscape phase.
11. Prior to the commencement of your project contact the City's Planning Arborist at (310) 458-8974 to determine the precise requirements of the TPZ.