City of West Linn

Memorandum

Date: October 2, 2013

To: West Linn Planning Commission

From: Shauna Shroyer, Planning Administrative Assistant

Subject: CDC-13-01 – Written testimony and submittals regarding proposed "Cut the Red Tape" amendments to the West Linn Community Development Code (CDC).

Attached is written testimony and submittals regarding CDC-13-01, received by the October 2, 2013 2:00 p.m. deadline.

Karie Oakes
1125 Marylhurst DR
West Linn, OR 97068

West Linn Planning Commission
RE: CDC-13-01, Cut the Red Tape Amendments
October 2, 2013

Dear Chairman Babbitt and Commissioners:

Thank you for the extraordinary amount of work you a have done on this project. I appreciate your dedication and time in considering what is best for West Linn and especially your commitment to hear the citizens. I submit for your consideration my changes to the most recent draft of amendments.

- Citizen Goal 2- pg. 2

  Effectively support West Linn's neighborhood associations as the *primary tool to* promote citizen involvement in civic life. Foster land use planning and policies that give neighborhoods control over *the future of their neighborhood and the City.*

  Comment: The language needs to be strengthened, as underlined in italic, to support the ideas that self-governance begins with the citizen and that citizens are empowered by neighborhood associations- if NAs are involved in effective ways. The fact that the Council and staff did not see fit to involve neighborhood associations early on in this process, as required by municipal code, is evidence that stronger language is needed to describe the value of citizen involvement in neighborhood associations.

- Citizen Goal 10

  Comment: This goal should not be amended as proposed and the original language retained. Amendment of this goal significantly changes public policy and the record of these proceedings shows no evidence that citizens are aware of the change to end development paying for itself. The staff reports and the public outreach used to involve citizens so not specify it.

  The added language to this goal referring specifically to the Arch Bridge area should be revised to include other areas like Robinwood and Highway 43; and made Citizen Goal 11.

- Comprehensive Plan Goal 9 Economic Development- pg. 3

  West Linn has significant strengths as a location for employers. West Linn is conveniently located on the regional transportation network with two interchanges off of I-205, Highway 43, bridge connections to Oregon City and is within 30 minutes of the Portland International Airport. It is a 20 to 30 minute auto commute to the major employment centers of Portland, Vancouver, Beaverton, Gresham, Wilsonville and Hillsboro. This locational advantage can help provide options for residents employed outside West Linn and bring employment opportunities to the City.

Comment: This paragraph should not be added because it is contrary to other Comprehensive Plan Goals, the Vision West Linn document and the vision for West Linn citizens have expressed in these proceedings. As stated, this goal would make West Linn an employment center for businesses outside of West Linn to locate; and their employees from all over the region to commute to West Linn via freeway accesses. This is not desirable and not sustainable.

I know from experience that commuters are only interested in returning home after a long day's work and will not consider themselves a part of the West Linn Community or add to the economic prosperity of existing businesses.

The paragraph is also contrary to the existing paragraph following it that concludes, on the basis of evidences (Metro projections and a community survey for preparation of the Comp. Plan in 1998), that residents want to retain the quiet residential character of West Linn and planning should be directed to enhancement and retention of existing businesses.

There is no evidence in the record or the **only and antiquated** staff report dated July 26, to support adding this paragraph, even though some Commissioners and public testimonies repeatedly called for evidence to support this amendment package.

I call your attention to a study prepared for West Linn, *Available Industrial, Flex, Office, Retail Land*, by Clackamas County Business and Economic and dated March 6, 2013. It maps and reports on 25 properties vacant in WL and tracks and graphs the data beginning in 2008, showing the vacancy rate sharply jumping in the third quarter of 2012 and steadily climbing since. It forecasts a 22.5% vacancy rate in 2015.

Was this information made available to the Council before it adopted economic priorities on March 11 or in the update by the Planning Department in June? Was it available to the Planning Commission before the joint meeting with the Council on April 1 when this project began?

- **99.160 DECISION BY DIRECTOR**
  C. A decision made by the Director shall be final as provided by CDC 99.230 unless:
  2. **Not less than ~~two~~ A majority of the** members of the Commission or **two members of** the Council order a review within 14 days of the final decision pursuant to CDC 99.240.

  Comment: Calling for a majority of the members of the PC or CC to review a decision may cause a consensus of opinion that a review is necessary based on error(s) and thereby create an appearance of bias and cause a challenge of the PC or CC to hear the review.

- **99.270 CONTENTS OF NOTICE ON OF APPEAL OR ~~REVIEW~~ pg. 9**

  Amendments deleting the requirement for a de novo hearing on appeal and adding: 1)the requirement for an appeal application to list the grounds for appeal, 2) misapplied criteria or procedural irregularity, and

  "if petitioner is requesting that the Council re-open the record to allow submission of additional written testimony and evidence as part of the appeal, petitioner must show that:

The Planning Commission committed a procedural error, through no fault of the petitioner, that prejudiced the petitioner's substantial rights, and petitioner must demonstrate that reopening the record before the Council is the only means of correcting the error, or
A factual error occurred before the Planning Commission, through no fault of the petitioner, which is relevant to an approval criterion and material to the decision.

Comment: WHAT A BUNCH OF ATTORNEY GOBLEY GOOP!!! Not only will eliminating de novo hearings limit the hearing authority to information in order to make the best decision, these amendments will severely limit citizen and neighborhood association participation. For example, the Council in a de novo hearing found evidence that the fire department had not approved the plan for the Holiday Inn application and a fire trap was prevented from being built. The review would not have occurred had it not been for astute citizens who called to the Council's attention an unrelated concern that the application did not include a conditional use permit.

Citizens and neighborhood associations do not typically hire attorneys for a land use process at the city level and they are not professional planners. They are "Citizen Joe" who often has no knowledge or previous experience with the land use process and they are challenged to effectively participate in it. They learn the ropes as the process proceeds and eliminating de novo will put a nail in the coffin of citizen participation.

- 55.100(B)(2)(b) Relationship to the natural and physical environment- pg. 47

Comment: The tree code should not be weakened by changing the language from protecting at least 20% of Type I and II lands of the property to protecting only 20% of the area with containing significant trees or 20% of the significant trees, whichever has the greater ecological benefit.

In conclusion, the process of this project failed out of the gate and the scope of the originally proposed amendments was beyond that necessary to meet Council priorities for economic development. As a result, neighborhood associations and citizens were frantically spending their efforts to defend citizen participation and did not review the amendments actually related to economic development as closely as they would have.

I would like to point out that the draft copy of these amendments is dated September 27 and was made available to the public on the City web site on that date. There is no update to the staff report dated July 26 and no staff memo about what the most recent revisions are to the draft for this hearing. Also, written testimony was received up until October 2 at 2:00 pm.

The hearing tonight did not leave sufficient time for review of the information. I request a continuance to leave the record open for written testimony.

Shroyer, Shauna

From: Sonnen, John
Sent: Monday, September 30, 2013 8:23 AM
To: Shroyer, Shauna
Subject: FW: ONE OF THE SOURCES OF OUR CURRENT W L TREE CODE: INT'L SOC OF ARBORICULTURE. J. SIMPSON

Please get this to the PC

John Sonnen, Planning Director
Planning and Building, #1524

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Public Records Law Disclosure This e-mail is subject to the State Retention Schedule and may be made available to the public.

From: Julia Simpson [mailto:juliasimpson.pdx@gmail.com]
Sent: Saturday, September 28, 2013 12:12 PM
To: CWL Planning Commission
Subject: ONE OF THE SOURCES OF OUR CURRENT W L TREE CODE: INT'L SOC OF ARBORICULTURE. J. SIMPSON

ISA International Society of Arboriculture

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Tree Ordinance Guidelines

UNDERSTANDING THE VALUE OF TREES WITHIN OUR COMMUNITIES

More and more communities are beginning to recognize the tangible benefits that trees provide in the urban environment. Healthy trees reduce air and noise pollution, provide energy-saving shade and cooling, furnish habitat for wildlife, enhance aesthetics and property values, and are an important

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Utility Specialist Certification Study Guide
ISA Members:$49.95
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contributor to community image, pride, and quality of life. Furthermore, many communities have realized that in order to protect and enhance their valuable tree resources, it is useful to view and manage their trees as a cohesive unit, the community or urban forest.

Tree ordinances are among the tools used by communities striving to attain a healthy, vigorous, and well-managed community forest. By themselves, however, tree ordinances cannot assure that the trees in and around our communities will be improved or even maintained. Tree ordinances simply provide the authorization and standards for management activities. If these activities are not integrated into an overall management strategy, problems are likely to arise. Without an overall strategy, management will be haphazard, inefficient, and ineffective, and the community forest will suffer.

TYPES OF TREE ORDINANCES

Tree ordinances fit into one of three basic categories.

- Street tree ordinances primarily cover the planting and removal of trees within public rights-of-way. They often contain provisions governing maintenance or removal of private trees which pose a hazard to the traveling public. Also included in this category are ordinances with tree planting requirements, such as those requiring tree planting in parking lots.
- Tree protection ordinances are primarily directed at providing protection for native trees or trees with historical significance. They usually require that a permit be obtained before protected trees can be removed, encroached upon, or in some cases, pruned.
- View ordinances are designed to help resolve conflicts between property owners that result when trees block views or sunlight.

DOWNLOAD THE TREE ORDINANCE GUIDELINES

Download this resource, Guidelines for Developing and Evaluating Tree Ordinances, to learn more about the tools and resources available to your community. The guidelines are based on a study of city and county tree ordinances in California (Bernhardt and Swiecki, 1991). This study reviewed 159 enacted city tree ordinances and nine enacted county ordinances in addition to a small number of proposed ordinances. This sample represented about 50% of the city tree ordinances and 80% of the county tree ordinances in effect in California at that time.

Project Funding

Funding for this project was provided by the USDA Forest Service through the National Urban and Community Forestry Advisory Council and the International Society of Arboriculture.

Citation for This Project

Swiecki, T.J., and Bernhardt, E.A. 2001. Guidelines for Developing and Evaluating Tree Ordinances.

Shroyer, Shauna

From: Pelz, Zach
Sent: Thursday, September 26, 2013 9:02 AM
To: Shroyer, Shauna; Sonnen, John
Subject: FW: URGENT: Proposed changes to city codes.
Attachments: Arguments for Keeping the West Linn Tree Protections.pdf; Resolution Opposing Certain Changes to the CDC and Comp Plan.pdf; Resolution Opposing the timing of the Planning Commision meeting regarding the proposed Cutting the Red Tape changes.pdf; Resolution Opposing the timing of the Planning Commision meeting requesting information on economic goals.pdf

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From: Sonnen, John
Sent: Thursday, September 26, 2013 9:02:09 AM
To: Pelz, Zach; Kerr, Chris; Thornton, Megan
Cc: Shroyer, Shauna
Subject: FW: URGENT: Proposed changes to city codes.
Auto forwarded by a Rule

John Sonnen, Planning Director
Planning and Building, #1524

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From: Roberta Schwarz [mailto:roberta.schwarz@comcast.net]
Sent: Thursday, September 26, 2013 8:57 AM
To: CWL Planning Commission
Cc: Sonnen, John
Subject: FW: URGENT: Proposed changes to city codes.

Hello Planning Commissioners,

I wondered what the PC had discussed at the last Work Session meeting, which I could not attend, so I emailed the PC and asked about the status and got a response from John Sonnen. With all due respect, I was extremely disappointed to hear from John Sonnen that the PC was thinking along the lines of allowing one person, the city arborist, to make the final decisions on a case by case basis on which trees stay and which ones go rather than keeping our current tree code in place. And further, the fact that the drip line issue had not even been discussed, was very disheartening to me. After your reading the 18 points that I took hours to research and write and which several experts also did a lot of work on during their evenings and weekends, I was hoping that you would be able to support the community and firmly stand with what currently exists in our excellent tree code. Please take that strong stand. Please see below email I sent to my neighbors. Our town will never be the same if you allow the chipping away of our tree code and therefore our canopy. Also please do not allow any of the items covered by the SONA resolution (see attached) to pass your careful scrutiny. If you need further time, please take that time so that this most important

decision will be one you are proud of in the future. Please have this entire document added to the public record.

Thank you very much,
Roberta

Hello neighbors,

Did you move to West Linn because of the trees and open space? Do you want to maintain our tree canopy which is one of the best in the Portland Metropolitan area? After my oral and written testimony at the last Planning Commission meeting, I was recently asked by the Commissioners to give them a written argument about why the tree canopy of West Linn should be preserved. I have attached the work that I submitted after researching and writing this document with the help of several experts who are medical doctors, forestry experts, conservationists, and green space specialists. It is a quick read with 18 points spelled out. **Please read this document and mark your calendars for the next Planning Commission meeting on October 2nd at 7 pm. Please come.**

Also at risk are the citizen rights on land use that have been a part of West Linn governance for as long as I can remember. Please see the attached resolutions that were passed by the Savanna Oaks Neighborhood Association. Versions of these were also passed by several other neighborhood associations including Robinwood, Marylhurst, and Willamette. Has your N. A. passed one yet? If not, please ask your N.A. president to convene a meeting and discuss this issue and take a vote on it. You have that right as a member of the neighborhood association. If you don't know which N. A. you are in or who your president is, you can call the city and give them your address and they'll give you that information.

If you are not involved before the changes are made, the city that you fell in love with, and decided to make your home in, will dramatically change. Please forward this on to your friends and neighbors in West Linn.

Thank you very much,
Roberta

Zach Pelz, Associate Planner
Planning and Building, #1542

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Arguments for Keeping the West Linn Tree Protections Exactly As They Are and Not Further Diminishing our Tree Canopy

1. In the Portland Park and Recreation July 2012 report titled "Tree Canopy Monitoring" canopy cover is identified as an important measure of urban forest health. This document makes reference to "The Urban Forest Management Plan" of 2004 which recommends canopy cover for residential areas of 40%.

2. As pointed out in Appendix F from the Metro sponsored report which you were given as part of my testimony, West Linn, with 38.7%, has one of the best tree canopy covers in the Portland Metro area. Keeping this healthy canopy by retaining our tree protections has a beneficial effect on the citizens who live here in the following ways:

   a. By storing tons of carbon
   b. By removing ground level ozone
   c. By helping to purify our water
   d. By helping to control against flooding
   e. By helping to regulate the climate

3. Our excellent tree canopy is an economic benefit to the City of West Linn and the property owners as well. It makes the area a more desirable place to live and Dr. Mark Gilbert's written testimony, read by SONA President Ed Schwarz, drove this fact home very eloquently. Twelve new physicians hired by Kaiser who could have chosen to live anywhere in the Portland Metro area chose West Linn in large measure because of the tree canopy. Dr. Gilbert's written testimony underscored his not having to have air conditioning because the trees in his part of town lower the temperature about 15 degrees. As I stated in my testimony, keeping our trees won't cost the city money it will help West Linn retain its high property values.

4. An August 2013 article in "Governing the States and Localities" Portland's first ever Arbor Month was discussed in detail. In 2006 The US Forestry Service provided a free application which helps public officials to put a monetary value on trees. Portland used the fifth iteration of this app. and then printed up colorful price tags and hung them on some of their trees. One read, "This tree has given $20,000 worth of environmental and aesthetic benefits over its lifetime". Portland declared that for every dollar spent on a tree, an estimated $3.80 worth of benefits are returned. These numbers were determined by using this modeling program called i-Tree. This suite of open-source software allows cities to "strengthen their urban forest management and advocacy effort by quantifying the environmental services that trees provide". With over 10,000 downloads so far, cities from Baltimore to Milwaukie have been inspired not to diminish tree protections, but to strengthen them. Indeed i-Tree has been helping public officials to put a monetary value on the benefits of growing trees. Because of this, Pittsburg approved a master plan for maintaining and expanding its tree canopy over the next 20 years.

5. The article also discusses the fact that trees increase property values. The USDA Forest Service has found that mature trees add an average of about 10% to a property's value. It cites a new study that found that living near trees dramatically improves health. Businesses do better on tree lined streets. A 2004 study found that consumers overwhelmingly preferred business areas with canopy covered streets and suggests a link to the amount of time shoppers are willing to spend in stores.

6. There is a safety component in keeping our tree canopy intact as well. In researching this material for the Planning Commission, I was referred by several experts to the OSU handbook on tree protection. There are some very compelling reasons on why we should protect our tree canopy included in this document. Disturbing remnant forest stands in the area introduces the threat for "windthrow" or "blowdown" of Douglas-fir trees. As a

licensed arborist wrote me when I requested more information about this hazard "Trees on the edge are typically adapted to wind forces with long live crowns and wide tapering trunks. Trees on the interior are often not windfirm and have live foliage only in their tops and little taper to their trunks. When these interior trees are exposed with new development, we sometimes see windthrow. The results can be catastrophic if people or structures are in the fall zone of the trees."

7. The Oregon State University handbook also states that stands, groves and patches of native trees are **ecosystems** which are remnants of the larger forests that previously covered the area. Numerous benefits are found in these ecosystems. Wildlife can use these areas relatively unimpaired, soil remains undisturbed, trees structurally support one another (as outlined in #3 above), shady microclimates encourage natural plants, and the trees are attractive. These areas should be preserved. Look around you, this is a description of West Linn.

8. **"Protected Area - Dripline + 10 Feet"** is completely stricken out in the proposed changes to the tree code. If our tree protections are diminished, the same OSU document speaks to what happens if there are poor stand protection zones:

   a. Soil dries out and soil erosion occurs
   b. Sunlight and temperature increase
   c. Weeds and invasive species take over
   d. The stand is visually unattractive
   e. Ecological functions are severely interrupted
   f. Trees blow over easily due to lack of support
   g. Forest microclimate is disturbed

9. In the "SE 122nd Avenue Study" published in October of 2010, which Dr. Mark Gilbert (Oregon Medical Association Community Health Committee Chair) worked on, the growing interest in how the built environment influences community and individual health is addressed. Trees are described as a "character defining asset". One of the key recommendations

is to implement a better tree policy to preserve more trees. West Linn is in the excellent position of already having a good tree policy. It behooves the Planning Commission to keep it intact.

10. Dr. Gilbert's recent research for this document for the West Linn P.C. included a reference to an April 2008 abstract, "Environmental Health Perspectives". It states "The World Health Organization recently estimated that over 25% of the burden of human illness worldwide is attributable to modifiable environmental conditions." Deforestation is listed as a priority challenge to human health. This same abstract includes the following statement: "In the environmental sector, policy debates are commonly framed as conflicts between environmental preservation and the economic well-being of communities. This perspective ignores the interdependence of human health and the integrity of the natural environment, as well as the complex social, economic, and health effects of environmental management decisions." Public health considerations must influence planning in communities across the United States. That is the whole idea behind Environmental Impact Assessments (EIAs) and Health Impact Assessments (HIAs) like the study that Dr. Gilbert participated in on the "SE 122nd Ave Study".

11. Dr. Gilbert also refers to a June 10th 2013 abstract about another HIA: "Health Impact Assessment of Targeted Tree Planting in Ann Arbor Michigan and Identification of Neighborhoods Vulnerable to Climate Change". The results included the following: neighborhoods with lower tree canopy had inhabitants more likely to be exposed to air pollution and crime and less likely to participate in physical activity. They were also at risk for higher rates of heat related illness, asthma, COPD, diabetes, obesity, hypertension, and mental illness than those living in neighborhoods with a greater tree canopy.

12. Air pollutant exposure retards lung growth, exacerbates respiratory disease and increases cardio pulmonary mortality. An 18 year research study by the

US Forest Service has found a correlation between tree loss and human mortality.

13. Tree canopy benefits include protection from harmful UV rays.

14. Contact with nature facilitates cognitive and physical development and serves a restorative function throughout life.

15. In the article, "Benefits of Trees and the Urban Forest" an excellent case is made for maintaining our tree canopy, "Trees shelter wildlife and promote biodiversity. Environmental systems are complex and require the presence of a diverse range of bioforms. Trees provide a necessary habitat for a wide variety of wildlife that might otherwise have a difficult living in the cities. A single oak tree, a species commonly found in many American cities, can support up to 500 species of insects and invertebrate species".

16. The same article also includes the following cultural benefits:

    a. Trees define a sense of place and can underscore regional history, culture and identity
    b. Trees and urban forests encourage community interaction. People tend to gather more when green spaces are available.
    c. Trees help to reduce noise pollution by absorbing and blocking urban noise. This has been shown to reduce stress for people living and working among trees.
    d. Habitats created by urban forests provide educational opportunities for people.

17. The loss of habitat connectivity, forest structural diversity, and LWD (large woody debris) in urban areas harm many mammals as per the Goal 5 Tech report by Metro.

18. **As a couple of the experts I contacted with requests for recent data suggested: "Perhaps you might ask the flipside of the question of the Planning Commission – is there any data that proves removing canopy increases economic development? It would be rather curious if you're being asked to supply data for one side of the argument if there isn't any actual data for you to refute on the other side." An excellent point, don't you think?**

I would like to thank the following experts for their assistance in researching and writing this Argument:

Dr. Mark Gilbert, M.D. Past Chair, Oregon Medical Association Community Health Committee

Paul Ries, Urban and Forestry Program Manager, Oregon Department of Forestry

Dr. Edward C. Jensen, Ph.D. Professor, Forest Ecosystems and Society, College of Forestry, Oregon State University

Kristin Ramstad, Community Assistance Forester, Oregon Department of Forestry

Jim Labbe, Urban Conservationist, Audubon Society of Portland

Keith Nevison, former Green Space Specialist, Friends of Trees

Savanna Oaks Neighborhood Association

August 6, 2013

Resolution

At its regularly scheduled meeting on August 6, 2013 the assembled members of the Savanna Oaks Neighborhood Association passed the following resolution:

Be it resolved that the Savanna Oaks Neighborhood Association is in opposition to the following changes in the proposed amendments to chapters of the Community Development Code and various sections of the Comprehensive Plan:

1. Eliminating "de novo" hearings which allow Neighborhoods Associations and individuals the right to present new information in an appeal to the City Council,
2. No longer allowing Neighborhood Associations the right to appeal planning decisions at no cost,
3. Subdivision applications and design reviews would no longer be heard in public by the Planning Commission but would be decided by the Planning Director,
4. Eliminating the requirement that applicants proposing new developments smaller than 25 units meet with Neighborhood Associations,
5. Changing the requirements for applicants requesting a meeting with the neighborhood associations,
6. Loosening the tree protections that help keep the West Linn tree canopy coverage one of the best in the Portland Metro area,
7. CDC 99.160 – Increasing from two to a majority the number of Planning Commissioners required to call up for review a decision from the Planning Director, and
8. CDC 99.170 – Increasing from two to a majority the number of City Councilors required to call up for review a decision made by the Planning Commission.

For the above stated reasons SONA opposes the changes in the proposed amendments to chapters of the Community Development Code and various sections of the Comprehensive Plan.

Aye: 15
Nay: 0
Abstain: 0

Submitted by
Edward Schwarz, President
Savanna Oaks Neighborhood Association

Savanna Oaks Neighborhood Association

August 6, 2013

Resolution

At its regularly scheduled meeting on August 6, 2013 the assembled members of the Savanna Oaks Neighborhood Association passed the following resolution:

Be it resolved that the Savanna Oaks Neighborhood Association (SONA) is in opposition to the timeline for the Planning Commission meeting regarding the proposed "Cutting the Red Tape" amendment. We request a one month delay to allow sufficient time for community review of the proposal and preparation of a response.

Our reasons for this opposition include:

1. Municipal Code 2.085(s)(2) requires that the economic committee work in close partnership with the West Linn Chamber of Commerce, neighborhood associations and general public .
2. The timing of the "Cutting the Red Tape" does not allow sufficient time for these bodies to provide input and so does not meet this code requirement.

For the above stated reasons SONA opposes the timing of the August 7th 2013 Planning Commission Meeting at which the "Cutting the Red Tape" proposal is to be discussed.

Ayes: 15
Nay: 0
Abstain: 0

Submitted by
Edward Schwarz, President
Savanna Oaks Neighborhood Association

ISA

Avoiding Tree Damage During Construction

As cities and suburbs expand, wooded lands are being developed into commercial and residential sites. Homes are constructed in the midst of trees to take advantage of the aesthetic and environmental value of the wooded lots. Wooded properties can be worth as much as 20 percent more than those without trees, and people value the opportunity to live among trees.

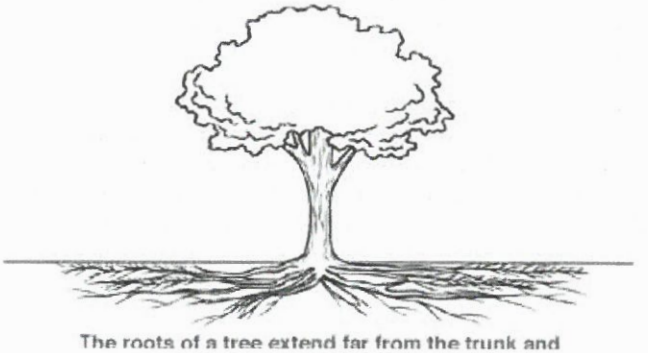
Unfortunately, the processes involved with construction can be deadly to nearby trees. Unless the damage is extreme, the trees may not die immediately but could decline over several years. With this delay in symptom development, you may not associate the loss of the tree with the construction.

It is possible to preserve trees on building sites if the right measures are taken. The most important step is to hire a professional arborist during the planning stage. An arborist can help you decide which trees can be saved and can work with the builder to protect the trees throughout each construction phase.

How Trees Are Damaged During Construction

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

Cutting of Roots. The digging and trenching that are necessary to construct a house and install underground utilities will likely sever a portion of the roots of many trees in the area. It is easy to appreciate the potential for damage if you understand where roots grow. The roots of a tree are found mostly in the upper 6 to 12 inches of the soil. In a mature tree, the roots extend far from the trunk. In fact, roots typically are 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 5 to 20 percent of the root system.



The roots of a tree extend far from the trunk and

News

What is an Arborist and How Can You Find One?
From *Planet Green* a Discovery Company MORE >>

Green Parking II: Putting Parking Lots to Work
Green parking lots are defined as those that are designed to do environmental work. Parking lots should be designed to reduce the use of energy, improve environmental quality and to ensure more healthy conditions for people. Further, parking lots should be planned and designed to reflect regional landscape types. Plant materials and other materials of construction must be used in ways that will support this objective. MORE >>

NADF Hardiness Zone Map
Find out the right tree to plant where you live MORE >>

Hot Topics
"Hot Topic" press releases fro the USDA newsroom ranging from current pest alerts for specific regions of the United States to new trends in disease prevention and tree and plant care. MORE >>

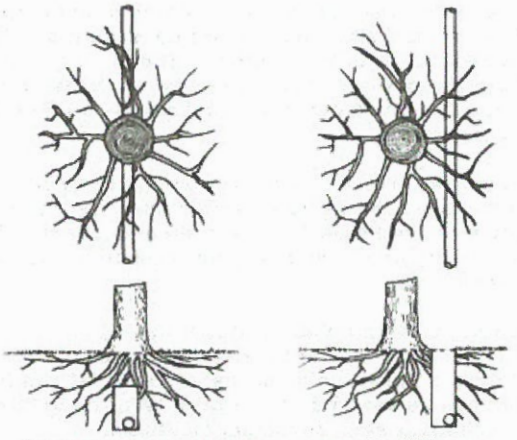
Don't Move Firewood!
Camping Season is fast approaching. Please remember to not transport firewood. Tree-killing insects and diseases can lurk in firewood. These insects and diseases can't move far on their own, but when people move firewood they can jump hundreds of miles. New infestations destroy our forests, property values, and cost huge sums of money to control. MORE >>

National Tree Benefits Calculator
Make a simple estimation of the benefits individual street-side trees provide. With inputs of location, species and tree size, users will get an understanding of the environmental and economic value trees provide on an annual basis. For more detailed information on urban and community forest assessments, visit the i-Tree website. MORE >>

are found mostly in the upper 6 to 12 inches of soil.

Another problem that may result from root loss caused by digging and trenching is that the potential for the trees to fall over is increased. The roots play a critical role in anchoring a tree. If the major support roots are cut on one side of a tree, the tree may fall or blow over.

Less damage is done to tree roots if utilities are tunneled under a tree rather than across the roots.



Less damage is done to tree roots if utilities are tunneled under a tree (left, top and bottom) rather than across roots (right, top and bottom).

Soil Compaction. An ideal soil for root growth and development is about 50 percent pore space. These pores—the spaces between soil particles—are filled with water and air. The heavy equipment used in construction com-pacts the soil and can dramatically reduce the amount of pore space. This compaction not only inhibits root growth and penetration but also decreases oxygen in the soil that is essential to the growth and function of the roots.

Smothering Roots by Adding Soil. Most people are surprised to learn that 90 percent of the fine roots that absorb water and minerals are in the upper 6 to 12 inches of soil. Roots require space, air, and water. Roots grow best where these requirements are met, which is usually near the soil surface. Piling soil over the root system or increasing the grade smothers the roots. It takes only a few inches of added soil to kill a sensitive mature tree.

Exposure to the Elements. Trees in a forest grow as a community, protecting each other from the elements. The trees grow tall, with long, straight trunks and high canopies. Removing neighboring trees or opening the shared canopies of trees during construction exposes the remaining trees to sunlight and wind. The higher levels of sunlight may cause sunscald on the trunks and branches. Also, the remaining trees are more prone to breaking from wind or ice loading.

Getting Advice

Hire a professional arborist in the early planning stage. Many of the trees on your property may be saved if the proper steps are taken. Allow the arborist to meet with you and your building contractor. Your arborist can assess the trees on your property, determine which are healthy and structurally sound, and suggest measures to preserve and protect them.

One of the first decisions is determining which trees are to be preserved and which should be removed. You must consider the species, size, maturity, location, and condition of each tree. The largest, most mature trees are not always the best choices to preserve. Younger, more vigorous trees usually can survive and adapt to the stresses of construction better. Try to maintain diversity of species and ages. Your arborist can advise you about which trees are more sensitive to compaction, grade changes, and root damage.

Planning

National Register of Big Trees
Big trees are symbols of all the good work trees do for the quality of the environment-and our quality of life. MORE >>

"Woodman, spare that tree! / Touch not a single bough! / In youth it sheltered me, / And I'll protect it now." - General George P. Morris

Resources

Avoiding Tree Damage During Construction Brochure

Available through the ISA Web store

Arborists Provide Advice on Avoiding Tree Damage During Home Construction
...When building or remodeling a house on property where there are trees, it is important to guard against tree damage during the construction. MORE >>

Your arborist and builder should work together in planning the construction. The builder may need to be educated regarding the value of the trees on your property and the importance of saving them. Few builders are aware of the way trees' roots grow and what must be done to protect them.

Sometimes small changes in the placement or design of your house can make a great difference in whether a critical tree will survive. An alternative plan may be more friendly to the root system. For example, bridging over the roots may substitute for a conventional walkway. Because trenching near a tree for utility installation can be damaging, tunneling under the root system may be a good option.

Erecting Barriers

Because our ability to repair construction damage to trees is limited, it is vital that trees be protected from injury. The single most important action you can take is to set up construction fences around all of the trees that are to remain. The fences should be placed as far out from the trunks of the trees as possible. As a general guideline, allow 1 foot of space from the trunk for each inch of trunk diameter. The intent is not merely to protect the aboveground portions of the trees but also the root systems. Remember that the root systems extend much farther than the drip lines of the trees.

Instruct construction personnel to keep the fenced area clear of building materials, waste, and excess soil. No digging, trenching, or other soil disturbance should be allowed in the fenced area.

Protective fences should be erected as far out from the trunks as possible in order to protect the root system.

Limiting Access

If at all possible, it is best to allow only one access route on and off the property. All contractors must be instructed where they are permitted to drive and park their vehicles. Often this same access drive can later serve as the route for utility wires, water lines, or the driveway.

Protective fences should be erected as far out from the trunks as possible in order to protect the root systems.

Specify storage areas for equipment, soil, and construction materials. Limit areas for burning (if permitted), cement wash-out pits, and construction work zones. These areas should be away from protected trees.

Specifications

Get it in writing. All of the measures intended to protect your trees must be written into the construction specifications. The written specifications should detail exactly what can and cannot be done to and around the trees. Each subcontractor must be made aware of the barriers, limitations, and specified work zones. It is a good idea to post signs as a reminder.

work zones. It is a good idea to post signs as a reminder.

Fines and penalties for violations should be built into the specifications. Not too surprisingly, subcontractors are much more likely to adhere to the tree preservation clauses if their profit is at stake. The severity of the fines should be proportional to the potential damage to the trees and should increase for multiple infractions.

Maintaining Good Communications

It is important to work together as a team. You may share clear objectives with your arborist and your builder, but one subcontractor can destroy your prudent efforts. Construction damage to trees is often irreversible.

Visit the site at least once a day if possible. Your vigilance will pay off as workers learn to take your wishes seriously. Take photos at every stage of construction. If any infraction of the specifications does occur, it will be important to prove liability.

Final Stages

It is not unusual to go to great lengths to preserve trees during construction, only to have them injured during landscaping. Installing irrigation systems and rototilling planting beds are two ways the root systems of trees can be damaged. Remember also that small increases in grade (as little as 2 to 6 inches) that place additional soil over the roots can be devastating to your trees. Careful planning and communicating with landscape designers and contractors is just as important as avoiding tree damage during construction.

Post-Construction Tree Maintenance

Your trees will require several years to adjust to the injury and environmental changes that occur during construction. Stressed trees are more prone to health problems such as disease and insect infestations. Talk to your arborist about continued maintenance for your trees. Continue to monitor your trees, and have them periodically evaluated for declining health or safety hazards.

Despite the best intentions and most stringent tree preservation measures, your trees still might be injured from the construction process. Your arborist can suggest remedial treatments to help reduce stress and improve the growing conditions around your trees. In addition, the International Society of Arboriculture offers a companion to this brochure titled Treatment of Trees Damaged by Construction.

E-mail inquiries: isa@isa-arbor.com

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UPDATED JULY 2005

Developed by the International Society of Arboriculture (ISA), a non-profit organization supporting tree care research around the world and is dedicated to the care and preservation of shade and ornamental trees. For further information, contact:
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JULIASIMPSON

From: JULIASIMPSON [julia.simpson@comcast.net]
Sent: Tuesday, January 16, 2007 6:22 PM
To: Ken Worcester (KWorcester@ci.west-linn.or.us); Mike Perkins (MPerkins@ci.west-linn.or.us)
Cc: CHRIS JORDAN (CJORDAN@CI.WEST-LINN.OR.US); John Atkins (jatkins@ci.west-linn.or.us); 'JACK SIMPSON'
Subject: TREE ORDINANCE FOLLOWUP

Hello Ken and Mike,

This is a belated follow-up to the tree ordinance adoption last fall.

1. Please send a thank you letter to Dave Dockter in Palo Alto and also the city manager and the city council. Along with the letter, send copies of the tree ordinance, the CDC section and the tree tech manual. Dave Dockter offered extensive help and research to us in developing the WL ordinance.

   Dave Dockter, Landscape Specialist, ASCA, ISA, APA
   City of Palo Alto, 250 Hamilton Ave.
   Palo alto, CA 94301
   1-650-329-2441
   Cell 1-650-444-5484
   http://www.cityof paloalto.org/trees/

2. You have set up a link on the website for the tree ordinance, but when I tried to download the pdf, my computer froze. Is there an easier way for people to get city tree info without having to download the entire ordinance? It should be easy and friendly!

3. I believe the city needs an ongoing tree preservation committee. The committee could work on such issues as heritage trees and significant trees. The committee could continue to work with the city on various ordinance issues that come up during the year. An article in the 11/28/06 Oregonian mentioned the Tree Preservation Committee of Gresham as a 7 member advisory panel appointed by the city council. The committee was requesting nominations for trees to be considered for significant tree status.

4. Consider creating a power point presentation to help in the education of the staff and the public on key points in the ordinance and how the ordinance can help them. Elements of this presentation could be on the website and also mailed out with water bills in printed form.

Thank you for your consideration of these matters!

Jack and Julia Simpson

UNIVERSITY OF MINNESOTA | EXTENSION

WW-06135 Revised 1999

Protecting Trees from Construction Damage:

A Homeowner's Guide

Gary R. Johnson

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This is a revision of the original publication authored by Nancy L. Miller, David M. Rathke,and Gary R. Johnson, and is dedicated to the memory of David M. Rathke.

Table of Contents

Are you planning to build or remodel a home? Are your city's streets, curbs, sidewalks, and buried utilities about to be widened, modernized, or replaced? Before you start, consider the impact of construction on plants.

Trees and shrubs contribute to property values by enhancing appearance, reducing noise, cutting energy costs, screening unsightly views, and attracting songbirds and other wildlife. Unfortunately, plants meant to be part of a home's permanent landscape often are needlessly damaged or killed during construction. Careful planning and coordination with a tree-care specialist and your builder can reduce damage and save you the trouble and expense of treating or removing injured plants.

This publication explains some things that landowners can do to minimize the impact of construction on trees. It describes landscape protection plans, special construction techniques, symptoms of damage, and treatment strategies. Although the information presented focuses on trees, it also can be applied to protecting shrubs.

Hiring a Tree Care Specialist

Each construction site has its own unique set of soil, tree species, and building process conditions. For this reason we recommend that you get advice from a professional urban forester or arborist *with experience in protecting trees from construction damage*. This person will be familiar with the growth characteristics and common problems faced by tree species in your area. He or she can help you evaluate plant health and the likely impacts of construction activities.

For your own protection:

- hire only professionals who are part of an established business listed in the phone book
- ask for references
- make sure the person you hire carries insurance for property damage, personal liability, and workers compensation.

Membership in the National Arborist Association, Minnesota Society of Arboriculture, or International Society of Arboriculture or certification from the International Society of Arboriculture are good indicators of reputable businesses.

Check with your local Extension office, or contact the local chapter of the International Society of Arboriculture (217-355-9411) for a directory of tree-care companies with certified arborists.

The Root of the Matter . . .

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Figure 1. *One common method used to define a tree's protected root zone (PRZ) is to consider it to be the part of the roots that lie directly below its branches within an area known as the* ***dripline****.*

Trees can be damaged or killed by a wide variety of construction activities. Some practices lead to obvious injuries such as broken branches or torn bark. Open wounds of this type deplete a plant's energy resources and provide entry points for insects, or for diseases such as oak wilt.

The worst damage, however, often remains hidden underground. Roots are one of the most vital parts of a tree. They are responsible for nutrient and water uptake, store energy, and anchor the plant. Because they are so important, it is critical that you protect roots that lie in the path of construction.

Trees are never the same shape below ground as they are above, so it is difficult to predict the length or location of their roots. Typically, however, approximately 90-95 percent of a tree's root system is in the top three feet of soil, and more than half is in the top one foot. The part of this root system in which construction damage should be avoided is called the Protected Root Zone (PRZ).

One common method used to identify the PRZ is to define it as the "dripline"--the area directly below the branches of the tree (Figure 1). However, many roots extend beyond the longest branches a distance equal to two or more times the height of the tree. For this reason you should protect as much of the area beyond the dripline as possible.

Unfortunately, on most sites space is limited and this rule must be bent. Just how close an activity can come without seriously threatening the survival of a tree depends on the species, the extent of damage, and the plant. s health.

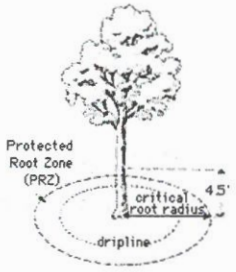

Figure 2. *Approximate a tree's* ***Protected Root Zone*** *by calculating the critical root radius (crr).*

First, measure the tree diameter in inches at breast height (DBH). Then multiply that number by 1.5 or 1.0. Express the result in feet.

Example:
dbh=8 inches
8 X 1.5 =12
crr=12 feet

Measure diameter (width)=dbh
dbhX 1.5=critical root radius for older, unhealthy, or sensitive species
***or** dbh X 1.0=critical root radius for younger, healthy, or tolerant species*

Some healthy trees can survive after losing 50 percent of their roots. However, other species are extremely sensitive to root cutting, even outside the dripline.

Table 1 shows the relative sensitivity of various tree species to root disturbance. If possible, disturb no more than 25 percent of the roots within the dripline for any tree, protect intermediate species to the dripline, and allow extra space beyond the dripline for sensitive species. For all trees, avoid needless or excessive damage. A qualified tree-care specialist can help you determine how much root interference a particular tree can tolerate.

When dealing with trees that have been growing in the forest or that naturally have a narrow growth habit, an approach called the "critical root radius" is more accurate than the dripline method for determining the PRZ. This is particularly true for columnar trees and for those where competition has reduced the canopy spread.

To calculate critical root radius, begin by measuring the diameter at breast height (dbh). This is done by measuring the tree's trunk diameter (thickness) at a point 4.5 feet above the ground. The measurement should be done in inches. For each inch of dbh, allow for 1.5 feet of critical root radius for sensitive trees, or 1.0 feet for tolerant trees. For example, if a tree's dbh is 10 inches, then its critical root radius is 15 feet (10 x 1.5 = 15). The PRZ is an area around the tree with a diameter of 30 feet (2 x radius), and is the area in which a critical amount of the tree's roots may be found. Whenever possible, isolate this area from construction disturbance (see Figure 2).

Table 1. Tree Characteristics

Species	Root Severance[6]	Soil Compaction & Flooding[6]	Soil pH Preference[8]	Mature Tree Height (feet)[8]	Mature Crown Spread (feet)[8]	Hazard Tree Rating*[7]	Damage-Causing Roots	Landsca Value**[1]
Northern white cedar	Tolerant	Tolerant	6.0-8.0	40-50	10-20	Low	.	High
Balsam fir	Tolerant	Tolerant	4.0-6.0	40-60	20-35	Medium	.	Mediun

White fir	Tolerant	Sensitive	4.0-6.5	50-75	10-20	Medium	.	High
Tamarack	Tolerant	Tolerant	4.0-7.5	50-75	15-25	Medium	.	High
White pine	Tolerant	Sensitive	4.5-6.5	80-100	50-80	Medium	.	High
Jack pine	Tolerant	Sensitive	4.5-6.5	30-80	20-30	High	.	Low
Red pine	Tolerant	Sensitive	4.5-6.0	50-80	20-40	(Medium)	.	Mediun
Scotch pine	(Tolerant)	(Sensitive)	4.0-6.5	60-100	30-50	Medium	.	Mediun
Eastern redcedar	Tolerant	Sensitive	4.7-7.8	40-50	10-20	Low	.	Low
Black spruce	Tolerant	Tolerant	3.5-7.0	30-70	15-30	(Medium)	.	Low
Colorado spruce	Intermediate	Tolerant	4.6-6.5	50-100	20-30	Medium	.	High
White spruce	Tolerant	Intermediate	4.5-7.5	40-80	20-30	Medium	.	Mediun
Black ash	Tolerant	Tolerant	4.1-6.5	40-70	30-60	(Medium)	.	Mediun
Green ash	Tolerant	Tolerant	6.0-7.5	30-60	30-50	Medium	.	Low
White ash	Tolerant	Intermediate	5.0-7.5	70-80	50+	(Medium)	.	Mediun
Bigtooth aspen	Tolerant	Sensitive	4.8-6.3	50-75	20-35	Medium	Yes	Low
Quaking aspen	Tolerant	Sensitive	4.8-6.5	40-60	20-35	Medium	Yes	Low
Blue beech	Sensitive	Sensitive	6.5-7.5	20-30	15-20	Low	.	High
Paper birch	Intermediate	Sensitive	5.0-8.0	50-70	30-50	Medium	.	Mediun
River birch	Tolerant	Tolerant	4.0-6.5	40-70	30-50	Low	.	High
Yellow birch	Intermediate	Sensitive	4.5-8.0	50-70	25-50	Medium	.	Mediun
Boxelder	Tolerant	Tolerant	6.5-7.5	40-60	35-50	High	Yes	Low
Ohio buckeye	Intermediate	Intermediate	6.1-6.5	30-50	30-40	Medium	Yes	Mediun
Butternut	Sensitive	Intermediate	6.6-8.0	40-60	50-60	(Medium)	.	Mediun
Catalpa	Intermediate	Tolerant	6.1-8.0	50-80	30-50	Medium	.	Mediun
Black cherry	Intermediate	Sensitive	6.0-7.5	50-70	40-50	Low	.	Low
Kentucky	Intermediate	Intermediate	6.5-7.5	50-80	40-50	Low	.	High

coffeetree								
Eastern cottonwood	Tolerant	Tolerant	5.5-8.0	80-100	80-100	High	Yes	Low
Red-osier dogwood	Tolerant	Intermediate	6.1-8.5	8-10	10-12	(Low)	.	Mediun
American elm	Tolerant	Intermediate	5.5-8.0	70-100	70-150	Medium	Yes	Low
Slippery elm	(Tolerant)	(Intermediate)	6.6-8.0	60-70	40-60	Medium	Yes	Low
Hackberry	Tolerant	Intermediate	6.6-8.0	30-130	50+	Low	.	High
Hawthorn	Intermediate	Intermediate	6.0-7.5	20-40	20-30	Low	.	High
Bitternut hickory	Intermediate	Intermediate	6.0-6.5	40-75	30+	(Medium)	.	Mediun
Honeylocust	Tolerant	Intermediate	6.0-8.0	50-75	50-75	Medium	Yes	Mediun
Ironwood	Sensitive	Sensitive	6.1-8.0	25-50	20-30	(Low)	.	High
Basswood	(Intermediate)	Sensitive	5.5-7.3	70-100	50-75	(High)	.	Mediun
Black locust	Tolerant	Sensitive	4.6-8.2	30-60	20-50	(Medium)	.	Low
Red maple	Tolerant	Tolerant	4.5-7.5	50-70	40-60	Medium	Yes	Hig
Silver maple	Tolerant	Tolerant	5.5-6.5	60-90	75-100	High	Yes	Low
Sugar maple	(Intermediate)	Sensitive	5.5-7.3	60-80	60-80	Medium	Yes	High
Mountain ash	Tolerant	Intermediate	4.0-7.0	15-25	15-25	Medium	.	High
Black oak	Sensitive	Sensitive	6.0-6.5	50-80	50-70	(Medium)	.	High
Bur oak	(Tolerant)	Intermediate	4.0-8.0	70-80	40-80	Low	.	High
Northern pin oak	Sensitive	Sensitive	5.5-7.5	50-75	30-50	(Medium)	.	Mediun
Red oak	Tolerant	Sensitive	4.5-7.0	60-80	40-50	(Medium)	.	High
Bicolor oak	(Intermediate)	Tolerant	6.0-6.5	60-70	40-50	Low	.	High
White oak	Sensitive	Sensitive	6.5-7.5	60-100	50-90	Low	.	High
Wild plum	Tolerant	Sensitive	6.5-6.6	20-25	15-25	Low	.	Mediun
Serviceberry	Intermediate	>Sensitive	6.1-8.5	6-35	6-15	>(Low)	.	>Hig
Black walnut	>Sensitive	Intermediate	6.6-8.0	70-100	60-100+	Medium	.	Mediun

Black willow	Tolerant	Tolerant	6.5-8.0	30-60	20-40	High	Yes	>Low

1: Hightshoe, 1988; 2: Minnesota Association of Soil and Water Conservation Districts Forestry Committee, 1986; 3: Matheny and Clark 1991; 4: Minnesota Society of Arboriculture, 1996.

Values in parentheses reflect the authors' or technical advisors' opinions.

***Hazard Tree Rating** refers to the relative potential for a tree to become hazardous. For a tree to be considered hazardous, a potential "target" (e.g., a house, a sidewalk, or other trees) must be present. A high hazard tree rating does not imply that the tree will always fail.

****Landscape Value** refers to the relative value of each species in Minnesota based on hardiness, form, color, growth habits, flowering a fruiting characteristics, structural strength, longevity, insect and disease resistance, maintenance requirements, and general desirability

Plan Ahead!

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Figure 3. *Careful planning may avoid the creation of hazardous tree situations such as damaged trees located too close to the house or dangerous overhanging limbs.*

You'll save time and money if you develop a landscape protection plan before construction begins. Careful planning will help you avoid the expense and heartache of later repairing or removing trees located too close to construction activities.

These steps will help you create a successful landscape protection plan:

1. **Mark construction zone boundaries.** Obtain a complete set of site development plans, including the proposed location of buildings, drive-ways, sidewalks, and utility lines. Ask the builder or architect to mark areas where heavy equipment will be used, where soil will be permanently added or removed and to what depth, and where fill and building materials will be temporarily stockpiled. Use a measuring tape, stakes, and string to temporarily mark the boundaries of construction activities on the site.

2. **Inventory trees on the site.** Record the location, size, and health of each tree. Wilted leaves, broken or dead limbs, trunk rot, and thin tops are all symptoms of stress. Trees that are overmature, display poor form, lean heavily over future buildings, or have severe insect or disease problems (Figure 3) should be marked for removal prior to construction. Also mark trees that need prun-ing to make room for future structures and construction equipment.

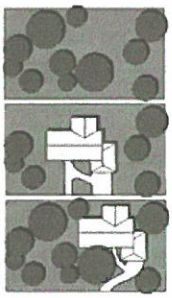

Figure 4. *You may be able to save some trees by siting the new construction away from the center of the lot.*

3. **Select the trees to be saved.** Examine the site carefully and note how each tree fits into the future landscape. Keep in mind that the builder may be able to shift the location of a building, utility line, or driveway. Although local ordinances differ, driveways and utility lines don't always have to be straight, and homes don't always have to be in the center of the lot (Figure 4). If considerable damage to the tree's root system within the PRZ is inevitable, you should seriously consider changing the original design, adding protection measures, or removing the tree before construction begins.
4. **Protect the trees you plan to save.** Develop a map with the builder or architect showing the location of trees to be protected and the safest route for access to the building zone. Then install bright orange polypropylene fencing and post "Off Limits" signs at the PRZ of the trees you plan to save (Figure 5). Your primary objective is to protect delicate root systems, so provide your trees with as much space as possible. Make sure all construction workers know that nothing inside this area is to be raked, cut, stored, or otherwise disturbed. A landscape protection contract signed by the builder and all contractors will help ensure compliance. Take several photographs of the site before construction begins to document the protection methods used and the condition of individual trees.
5. **Prepare the trees for construction disturbance.** You'll boost your trees' chance for survival if you make sure they're as healthy as possible before construction begins. Regularly water the trees if rainfall is not adequate. Fertilize them if soil tests or deficiency symptoms indicate they are nutrient stressed. (For soil test information, contact your county extension agent or call the University of Minnesota's Soil Testing Lab at 612-625-3101.) Prune branches that are dead, diseased, hazardous, or detrimental to the plant's natural form.
6. **Protect and preserve the soil for future tree planting.** Apply a layer of wood chips at least six inches thick over areas that will be used for traffic or materials storage during construction. If these areas become part of the new landscape, the wood chips will prevent the soil from becoming too compacted.

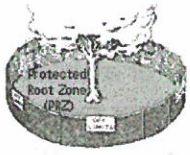

Figure 5. *Put up fences*

and signs around trees you want to save to alert construction workers to damage potential.

7. **Monitor the construction process.** Visit the site periodically and inspect the trees. Irrigate the PRZ of the trees regularly-- never let trees become water-stressed. Your presence alerts workers of your concern for the careful treatment of the trees. Should damage occur, begin repairs as soon as possible. Immediately inform the builder of any violations in the landscape protection contract and photograph the damage. Insist that protective fences remain in place until all construction workers have left the site.
8. **Make a final inspection of the site.** After construction has been completed, evaluate the condition of the remaining trees. Look for indications of damage or stress. It may take several years for severe problems to appear. Careful monitoring and preventive treatment (e.g., watering) may help minimize damage.
9. **Commit to long-term maintenance.** Trees will not recover from construction damage in one or two years. Mulch as much of the PRZ as you can tolerate and plant understory shrubs and perennials within the mulched areas. Irrigate the PRZ regularly for several years--never let the trees become water-stressed. Have an arborist inspect the trees every year or two for several years to determine if pruning, fertilization, and/or pest/disease control tactics are necessary.

Tree selection tips . . .

- Save the best and chip the rest. Use those wood chips to provide a blanket of protection over the root systems of trees that can be saved. It is expensive for the builder to work around trees, and it also is expensive to remove damaged trees after construction has been completed.
- Understand the characteristics of your trees or get the advice of someone who does. If you know about your trees you can help insure their survival and improve the future site appearance of the site.
- Select tree species that fit the spatial constraints of the site (Table 1), remembering that trees grow throughout their lives. Be sure to consider overhead powerlines.
- Young, small trees tend to survive disturbance better than old, large trees.
- Large trees almost never survive within five feet of a new building and should not be kept.
- Healthy young trees that fall in the construction zone may be saved by transplanting.
- Don't put all your eggs in one basket! Save a mixture of tree species to safeguard your landscape against contagious diseases or insects.
- Improve tree survival by saving groups of trees rather than individuals.

Minimize the Impact of Construction Activities

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In addition to protecting the PRZ, there are other ways in which you can reduce the impact of construction activities on your trees. Some of these are relatively simple; others can be extremely expensive. Carefully consider the importance of each tree to the future appearance of the site and consult a tree-care specialist before deciding whether protective measures are worth the cost.

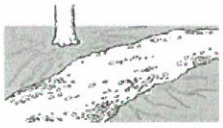

Figure 6. *A root system bridge will help protect trees in the path of construction vehicles.*

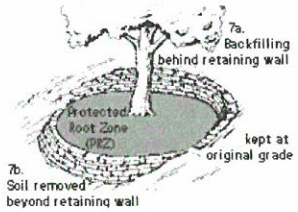

Figure 7. *If you change the grade within the root zone, use retaining walls to keep as much of the original grade as possible.* ***a)****backfilling;* ***b)*** *cutting.*

Site Clearing

When you remove a large number of trees, you expose the remaining plants to new conditions. Sudden increases in amounts of sunlight and wind will shock many of your trees. It is not uncommon to find scorched leaves, broken branches, and uprooted trees after a site is cleared. Although some of these problems are temporary, they may compromise tree health when coupled with additional construction damage.

You can avoid sun and wind stress by saving groups of trees rather than individuals. When possible, remove the unwanted plants in winter after the leaves have fallen. Dormant plants are less susceptible to damage, and frozen ground helps protect roots. Bulldozers should not be used to remove trees near plants to be preserved. Heavily wooded sites should be gradually thinned over two to three years to reduce removal shock on remaining plants. This is especially important in dense pine, spruce, or fir forests.

Soil Damage

Soil compaction is the single largest killer of urban trees. Tree roots need loose soil to grow, obtain oxygen, and absorb water and nutrients. Stockpiled building materials, heavy machinery, and excessive foot traffic all damage soil structure. Lacking good soil aeration, roots suffocate and tree health declines.

Prevent soil compaction by carefully selecting storage areas and traffic routes (the future driveway is a good choice for both) and installing protective fences and signs. If you can. t reroute traffic, install root system

bridges with steel plates suspended over railroad ties or spread several inches (six inches or more) of wood chips on the soil within the PRZ (Figure 6). Trees that are pruned or removed during the construction process should be chipped on site and the chips used for soil preservation tactics such as this. Heavy mixing trucks can be kept off tree roots by transporting concrete from the truck through conveyor pipes.

Improper handling or disposal of materials used during construction also can harm roots. For example, wood products treated with pentachlorophenol and creosote can be deadly to tree roots; CCA-treated timber (greenish color) is a better alternative. Ask the builder about the materials to be used on the site and read product labels. Chemical spill damage can be prevented by filling gas tanks, cleaning paintbrushes and tools, and repairing mechanical equipment well outside tree PRZs. Insist that all building debris and chemical wastes be hauled away for proper disposal, and not burned or buried on the site.

Finally, avoid changes in soil pH (acidity). Increases in pH are particularly dangerous to many species (Table 1). Alkaline clays or limestones should not be used for fill or paving, and concrete should be mixed on a thick plastic tarp or outside the site. Mixing trucks should never be rinsed out on the site.

Grade Changes

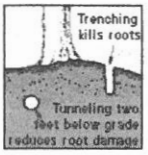

Figure 8. *Protect roots from damage when laying utility lines by tunneling rather than trenching.*

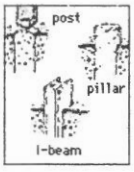

Figure 9. *You can minimize damage to trees near foundations by using posts, pillars, or I-beams rather than foundation walls.*

Moving large amounts of soil within the PRZ usually kills a tree. Except where absolutely necessary, avoid disruptions to the natural contour of the site or shift them well outside the PRZ.

Soil additions compact the soil around a tree and often raise the water table. You may be able to protect compaction-tolerant trees (Table 1) from additions of six inches or less of soil by using a porous fill within the PRZ. Porous fill can be made by mixing one part loam, one part coarse sand, and one part shredded bark.

Deeper fills require more expensive measures. A retaining wall beyond the PRZ may protect some trees (Figure 7a). These walls preserve much of the original root system and redirect excess water away from sensitive plants. Your tree-care specialist may suggest other, more elaborate measures for protecting trees that must be covered with soil close to the trunk. However, as a general rule, it is best to remove trees that would be buried by 24 inches or more of fill around the base.

Cutting the soil away from a tree removes vital feeder roots, eliminates nutrient-rich topsoil, and often lowers

the water table. Damage caused by shallow cuts (less than two inches) at least three feet away from the base of the tree may be minimal, but still can be a shock to a tree's vitality (health). If possible, avoid making the cut during hot, dry weather; water the tree (undisturbed portions) before, during, and after soil removal; and allow only hand digging inside the PRZ. A shallow layer of mulch (pine needles, wood chips, or coarsely chopped twigs and bark) and clean root cuts will help wound closure and regrowth. Deeper cuts within the root zone will require construction of a retaining wall no closer than the limit of the PRZ (Figure 7b).

Excavation

As much as 40 percent of a tree's root system could be cut during the installation of a nearby utility line. This reduces water and nutrient uptake, and may compromise the stability of the tree. If it is not possible to relocate the utility line outside the tree's PRZ, you can reduce root damage by as much as 25 percent by tunneling under the tree's root system (Figure 8). When digging a trench near a tree, begin tunneling when you encounter roots larger than one inch in diameter.

Trenching for building foundations also poses a danger to nearby trees. Although not often used in Minnesota, posts, pillars, or I-beams sometimes can be substituted for foundation walls and footers on homes (Figure 9). Drilling single holes as opposed to cutting deep trenches saves many critical roots.

For all digging operations, insist that exposed roots be cut cleanly to promote quick wound closure and regeneration. Vibratory plows, chain trenchers, and hand tools do a better job at this than bulldozers and backhoes. Minimize damage by avoiding excavation during hot, dry weather; keeping the plants well watered before and after digging; and covering exposed roots with soil, mulch, or damp burlap as soon as possible.

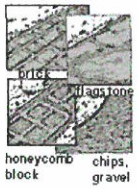

Figure 10. *Paving materials such as brick or flagstone over sand will produce less disruption than poured concrete to the roots of a nearby tree.*

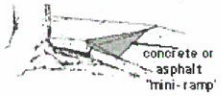

Figure 11. *A "mini-ramp" can be used to smooth the uneven surface caused by root damage to pavement.*

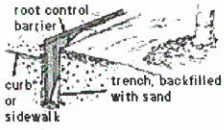

Figure 12. *A vertical underground barrier will help keep tree roots from damaging concrete as they grow.*

Pavement

Sidewalks and driveways located too close to a tree endanger its health and may threaten pavement stability. Factors such as frost heaving, poor drainage, and pavement flaws give roots an opportunity to expand, gain a foothold, and cause damage. Homeowners are faced with costly repair bills and potential liability for the hazardous situation that develops.

These problems can be avoided if you consider the spatial needs of a tree and its root system when designing the layout of new sidewalks and driveways. Just how much space is required depends on a tree's sensitivity to root cutting and its future size (Table 1). It's best to locate sidewalks and driveways outside the anticipated PRZ. At a minimum, walkways should be at least three feet from the trunk of a tree; driveways may cover up to half the distance from the tree's PRZ to its trunk, as long as no excavation occurs. No tree should be boxed into an area less than eight feet by eight feet by three feet deep, with larger trees receiving at least 300 cubic feet of root/soil volume.

You can minimize disruption by using alternatives to conventional paving materials. In some communities, brick or flagstone walkways on sand foundations can be substituted for concrete (Figure 10). These materials protect soil pH and allow water and oxygen penetration. Preserve natural contouring by spanning uneven areas with wooden walkways elevated on posts. Elevated decks are excellent alternatives to concrete porches. Where additional pavement strength is needed (e.g., driveways), concrete requires less excavation than asphalt. "Structural soils" may be used under pavement to allow for both adequate pavement base strength and tree root penetration. . Structural soils. are composed of 80% stone chips, 20% clay-loam soil, and a polymer binding agent. Ask your builder about raised pavement techniques near valuable trees.

There are several techniques for repairing pavement that has been damaged by protruding roots. For trees that are highly sensitive to root disturbance, consider creating a concrete or asphalt . mini-ramp. to smooth the uneven surface between two sidewalk sections (Figure 11). Local ordinances governing liability should be consulted prior to using this technique. Relocate walkways with broken concrete slabs a few feet farther from the tree. For trees that can tolerate root disturbance, a vertical underground barrier may redirect root expansion away from pavement (Figure 12).

All tree species are capable of causing root damage to sidewalks, foundations, or pipes. Species notorious for damage-causing roots are noted in Table 1.

Symptoms of Construction Damage

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Figure 13. *Suckering is one symptom of construction damage.*

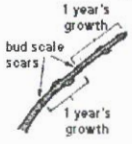

Figure 14. *Annual growth is the distance between bud scale scars on twigs. The twigs of healthy trees usually grow two to six inches longer each year.*

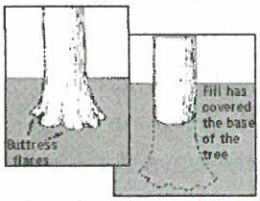

Figure 15. *To determine whether the grade has been changed around trees on a newly built site, check for the presence of* ***buttress flares*** *at the base of the trunk.*

Conspicuous symptoms of construction damage may take years to appear. Tree decline from soil compaction, for instance, may take three to seven years to appear as obvious symptoms of distress. Because of this delay, landowners often attribute tree losses to other causes. Carefully monitor affected plants and keep written records to help you recognize the less visible signs of tree stress. Remember, the most serious damage remains hidden in the root system.

Wilted or scorched leaves and drooping branches usually are the first signs of construction damage. In deciduous plants these symptoms may be followed by early fall coloring and premature leaf drop. Damaged conifers will drop excessive amounts of inner needles. In subsequent years you may notice yellowed or dwarfed leaves, sparse leaf cover, or dead branches.

Other indicators might include flowering out of season, excessive water sprout formation on the trunk (Figure 13), abnormal winter dieback, or abnormally large amounts of seed. Flower and seed production and water sprout formation are defense mechanisms for ensuring species survival and commonly indicate that the plant is experiencing extreme stress.

In addition to observing a tree's appearance, monitor its annual growth. A slightly damaged plant will grow more slowly and be less resistant to insects, diseases, and weather-related stress. Examine the annual shoot and branch growth (Figure 14). Healthy trees generally will grow at least two to six inches at the ends of the branches each year. Photographs and records of the tree prior to construction also can help identify growth problems.

If you purchased your home following construction, you can identify deep fills around large trees by looking for buttress flares at the base of the trunk (Figure 15). Most common shade trees in Minnesota have buttress flares, and their absence usually indicates that the tree's base has been covered. It may be helpful to examine the condition of trees on other sites where your builder has worked.

In many cases you would be wise to have a tree-care specialist look for early symptoms of tree stress. Dollars invested in consultations with professionals before damage becomes obvious may be repaid in considerable savings later on.

Treatment of Damaged Plants

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When a tree is injured by construction activities, energy and resources normally used for growth must be redirected toward the process of wound closure and regrowth. During this critical period plants are particularly vulnerable to additional stress, especially insects, diseases, and severe weather. You can minimize these problems by quickly treating the damage.

Water

Construction activities often alter the amounts of water received by trees. Thoroughly water plants before and immediately after they receive any kind of direct damage (e.g., severed roots). Continue periodic watering (at least four to five times per summer) throughout the next several growing seasons. Be careful not to overwater your trees. Soaking the soil to a depth of 8-10 inches throughout the PRZ is a good rule-of-thumb.

Two to four inches of mulch (wood chips or bark) spread over as much of the root system as practical will help the tree retain water and stimulate root regeneration. Living ground covers over the root system will have a similar effect, and may be more aesthetic. Apply these techniques to any deciduous tree exhibiting wilted leaves or any coniferous tree dropping excessive amounts of needles from the inner branches.

Drainage systems and grade changes may cause some trees to receive too much water. Species differ in the amount of water they can tolerate (Table 1). Intolerant plants will exhibit twig and branch death. don't wait for these symptoms to appear. If you suspect your plant is receiving too much water, contact a tree-care specialist for an evaluation of the problem. Treatment differs by tree species and by the amount of time the water remains on or close to the surface. For some species, a retaining wall or culvert may be needed to redirect the flow of water.

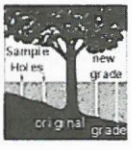

Figure 16. *Before you remove fill that has been added around trees, take vertical samples to determine how deep you need to go.*

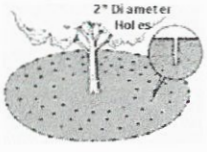

Figure 17. *A series of two-inch holes 12 to 18 inches deep will help alleviate root damage caused by compaction.*

Excavation of Back-Filled Trees

If you or your tree-care specialist has determined that excessive soil additions have been made around valuable trees, efforts should be made to restore the original grade, at least within the PRZ.

Approach this grade restoration carefully. Determine how much fill has been added by sampling depths at several different points within the PRZ (Figure 16). If the depth is great (more than 12 inches), you may remove most of the backfill with mechanical equipment. Once you are within 10 to 12 inches of the original grade, complete the fill excavation carefully with shovels and rakes. Make certain no soil is piled up against the tree trunk, and aerify the soil within the PRZ to complete the operation. If the tree is already exhibiting advanced symptoms of decline, however, restoration to original grade will probably be fruitless. In this case, remove the tree and plant a new one.

Aeration and vertical mulching

Soil compaction around a tree's roots may cause leaf wilt, early fall coloring, top dieback, and slow growth. Reduce the effects of compaction by carefully drilling a series of two-inch-diameter holes in the soil to a depth of 12 to 18 inches. Begin three feet from the tree trunk and continue drilling at one- to three-foot intervals in concentric rings around the tree out to the PRZ (Figure 17). Each hole may be refilled with sand, peat moss, or mulch. For severely compacted soils, this procedure--called vertical mulching--should be repeated every two to three years until the tree has fully recovered. A tree-care specialist may recommend other alternatives, including soil injections of air or pressurized water, to improve soil aeration.

Fertilizer

Injured trees may need additional nutrients to replace damaged root systems. Fertilizers containing phosphorus and nitrogen can help stressed plants recover since these nutrients promote root and plant growth. Avoid excessive nitrogen; increased stem and foliage growth can cause stress, especially during hot, dry weather or if the tree has been stressed due to construction activities. Because of this problem, many experts recommend waiting two years after damage has occurred before fertilizing the trees. Specific guidelines for selecting and applying fertilizer are described in *Tree Fertilization* (Minnesota Extension Service publication FO-2421).

Pruning and Wound Repair

Careful pruning and wound repair are important treatments for damaged trees. Prune broken or dead branches cleanly at the branch collar (Figure 18). To test whether a branch is dead, bend several twigs. Twigs on live branches tend to be pliable, while twigs on dead branches tend to break. Buds also can be used to evaluate branch condition. Live buds appear full and normal in color while dead ones appear shriveled or dry.

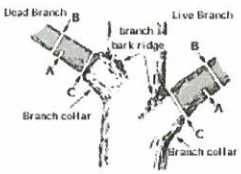

Figure 18. *Prune branches at the branch collar.*

Pruning is commonly recommended for large trees that have suffered root damage. However, opinions differ over the merits of this practice. Assuming that the tree has adequate water and is not in severe decline, some experts believe that retaining maximum leaf cover is important for root regeneration and only dead limbs should be removed. Others argue that pruning selected live limbs is necessary to compensate for lost

roots. Generally, it is best to follow the recommendation of your tree-care specialist experienced in construction damage to trees.

When properly done in moderation by a skilled professional, pruning may reduce wind resistance and limb failure and improve tree health and appearance. DO NOT let anyone cut off all of the top branches to the same height (" topping").

The treatment of trunk wounds depends on the extent of damage. If 50 percent or more of the bark has been removed around the entire trunk, the tree will not likely survive and should be removed. If only a patch of bark has been removed leaving a few splinters, use a sharp knife to cleanly cut off the loose bark to a place on the stem where it is firmly attached. DO NOT make the wound any larger than necessary.

You do not need to use pruning paint or dressing to cover exposed wounds or pruned limbs. Except for special cases involving disease control, these products do little more than improve appearance.

Oak Wilt

Oak wilt is a lethal fungal disease normally spread through root grafts between adjoining oak trees. The disease also may be spread overland by sap beetles of the Family Nitidulidae. In Minnesota, construction activities that injure roots, break branches, or otherwise open a wound on an oak between April 1 and July 1 provide the beetles easy access to transmit the fungus. (Some studies have found the occurrence of oak wilt to be four times more likely within 160 feet of a construction site.) Immediately (within minutes) cover all open wounds with any water-based paint or shellac during this period. If you suspect oak wilt, contact your city forester or private tree-care specialist. If you have oaks on your site, obtain a copy of *Oak Wilt in Minnesota* (Minnesota Extension Service publication MI-3174) for additional information on identifying the disease and protecting your trees.

Other Insect and Disease Problems

Insects are attracted by distinctive chemicals that are released by plants recovering from injuries. Examples of insect pests that can sense a tree under stress include the pine bark beetle, bronze birch borer, two-lined chestnut borer, sap beetle (transports oak wilt fungus), and some scale insects. These insects can kill a plant by their feeding or boring or by transmitting disease.

Likewise, some diseases multiply in plants experiencing stress. Verticillium wilt, ash yellows, and *Armillaria mellea* are examples of diseases that attack weakened trees.

Continually monitor the health of your trees, especially those near construction activities, for insect and disease problems. Proper treatment, including corrective pruning, watering, and pesticide or fungicide applications, can restore tree health. Contact your county extension educator or local forester for additional information on specific tree pests.

Tree Removal

Even the best protection plans cannot guarantee plant survival. Death may occur shortly after construction or years later. Look for trees with very few leaves and many dead branches. If the tree does not leaf out the following year it is dead. Large trees that lean or exhibit rot, deep trunk cracks, or extensive top dieback are potentially hazardous (Figure 19). They should be evaluated by a tree-care specialist or be removed. Dead trees are excellent for wildlife, but dangerous to people and buildings. Large trees should be carefully removed by professionals so as not to damage the remaining plants.

Tree loss can have a dramatic impact on site appearance. Prompt replacement will minimize your grief.

Remember, the tree you plant is your own.

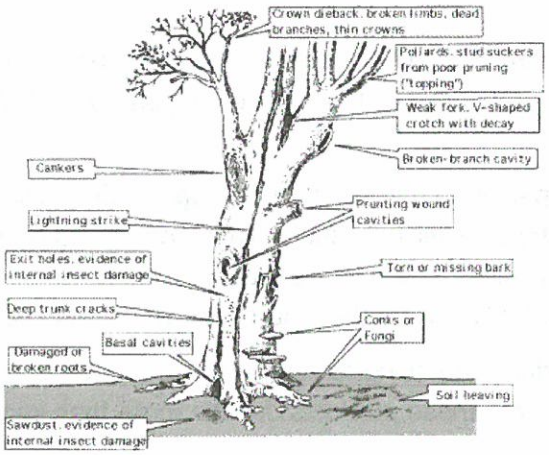

Figure 19. *Trees with extensive dieback, disease, or damage may pose a threat to property and people. A tree-care specialist should evaluate and if necessary remove such trees.*

Street Trees and Construction Damage

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Established street trees are subjected to damage from construction activities perhaps even more frequently than forest trees. The infrastructure of any community--streets, sidewalks, curbs, and buried utilities--is continually updated, repaired, or expanded and trees growing in boulevards (tree lawns) or close to these public services are vulnerable to construction activities.

The most common type of damage street trees suffer is root loss. This is particularly harmful because these trees already are growing in root-limited spaces, and are often less healthy than other landscape trees due to the environmental stresses of boulevards (small volumes of soil, often a poor quality of soil, accumulations of deicing salts, and characteristically drier conditions than other landscape sites).

Trees growing in boulevards or near streets typically have an unbalanced and very restricted root distribution. Therefore, any root removal or damage during construction is often a more significant loss compared to trees growing in more open areas. Root loss not only affects the health of these trees but a more serious effect may be on their condition or stability. A boulevard tree that experiences significant root loss will have a different center of gravity as a result. This shift in balance often results in less stable trees--especially the large, mature ones - and leaves them more vulnerable to toppling (wind throwing) during severe weather.

Minimizing construction damage to street trees

Minimize root loss.

Most healthy trees can tolerate one-sided root cutting and recover from the loss with long-term after-care. Trees that have roots cut on two sides usually suffer much more damage and are less stable (see Figure 20). It is questionable whether to save trees that suffer root loss on three or more sides.

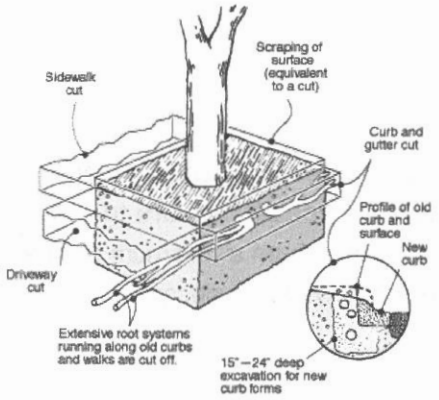

Figure 20. *Root cuts on more than one side seriously affect the health and stability of even healthy trees.*

Figure 21. *Consider planting a "blooming boulevard" as an alternative to turf cover.*

The number of cuts near street trees may be reduced by a variety of methods and compromises. If possible, avoid widening streets or sidewalks when they are replaced. If curbs are slated to be replaced, hand-form the curbs adjacent to tree roots, rather than excavating with machinery for mechanical forms. Excavation with machinery destroys major branch roots, even if the new curb remains in the same position as the old curb.

Consolidate utilities into common trenches whenever possible, and tunnel under tree root systems (see Figure 8). Often it is possible to run several utilities in a common trench, minimizing the number of trenches and root cuts.

Do not regrade the surface of the boulevard. Although it is not trenching, it still cuts and removes roots, usually the fine roots that absorb most of the water and nutrients for the tree. If the new grade creates a mowing/maintenance problem, consider the installation of retaining walls at the curb line, or remove the turfgrass from the boulevard and replace it with mulch and landscape plantings.

Avoid Damage to the Soil.

Do not allow equipment, vehicles, or materials to be stored on the boulevard. Establish a separate staging and parking area on a paved area away from the tree lawn. If this is not possible, cushion the boulevard with at least six inches of wood chips applied as a mulch.

Do not allow any foreign materials to be buried or deposited into the boulevard soil. Don't bury debris (such

as concrete) or wash out equipment or tools in the boulevard soil area.

Maintain the Health of the Trees During Construction.

As long as the soil drains water adequately, water, water, water the trees. root systems. Adequate water before, during, and after construction is the most critical requirement for boulevard trees if they are to tolerate construction damage. Place soaker hoses over their root systems and soak them a minimum of one time per week during construction and immediately after, allowing two to three hours per soaking.

Continue Therapy and Care for Several Years After Construction.

Never let the trees become water stressed. Plan on having an arborist remove dead wood in the canopy within two to three years after the construction. Seriously consider removing the turf from the trees' root systems and replacing it with mulch and low-growing shrubs and herbaceous perennials. "Blooming boulevards" are becoming more common in communities across the nation and are often allowed in city ordinances (Figure 21). If your community's ordinances don't allow "blooming boulevards," try to have them changed.

Reconsider Replanting Narrow Boulevards.

Not all boulevards should have trees growing in them. Trees are most at risk for future construction/reconstruction damage when they are planted in boulevards less than 8-10 feet wide. In places where boulevards are very narrow, consider creating "green easements" that allow public trees to be planted in private lawns adjacent to the public property. They will enjoy a larger rooting area and a longer life.

Conclusion

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It's not always easy to save trees during construction, but your efforts are worth the trouble. Healthy, well-placed trees can increase property values by 9 to 27 percent. Protecting tree health on a construction site is a matter of recognizing the potential impacts. Advance planning and simple steps to minimize damage often can prevent future problems. Many trees have a tremendous capacity to survive disturbance, but in an urban setting we continually test them. Take the time to protect and monitor the health of your investment. Your home and our communities will be healthier, more attractive places to live.

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ORDINANCE NO. 4362
ORDINANCE OF THE COUNCIL OF THE CITY OF PALO ALTO ADDING CHAPTER 8.10 TO TITLE 8 OF THE PALO ALTO MUNICIPAL CODE REGARDING TREE PRESERVATION AND MANAGEMENT REGULATIONS

The Council of the City of Palo Alto does ORDAIN as follows:

SECTION 1. The City Council finds as follows:

(a) The City of Palo Alto is endowed and forested by native oaks and other heritage trees, which give the City a unique visual character and enhance property values. The vestiges of the original abundant oak forest so well adapted to much of this region, are increasingly threatened after more than a century of development. Redwood trees have a special role in Palo Alto's history due to the original "El Palo Alto" Redwood serving as a regional landmark. The City Seal includes a Redwood tree as its central focus. Redwood trees are among the tallest trees in the City and are the State Tree of California. Moreover, Redwood trees are planted widely in Palo Alto so that virtually every neighborhood has been and can be impacted by the removal of large Redwoods. Preservation and maintenance of the remaining healthy native oaks, redwoods and other heritage trees will retain their great historic, aesthetic, and environmental value for the benefit of all residents. Preservation of these trees is important for the following reasons:

(1) To protect and conserve the aesthetic and scenic beauty of the City;

(2) To encourage and assure quality development;

(3) To protect the environment of the city;

(4) To aid in the reduction of air pollution by protecting the known capacity of trees to produce oxygen and ingest carbon dioxide;

(5) To help reduce potential damage from wind;

(6) To provide shade;

(7) To protect property values;

(8) To act as a noise barrier; and

(9) To assist in the absorption of rainwater into the ground, thereby protecting against potential damages from soil erosion and flooding, as well as reducing the cost of handling storm water by artificial means.

(b) In order to promote the health, safety, and general welfare of the residents of the City, while recognizing the interests of the property owners in developing, maintaining, and enjoying their property, it is necessary to enact regulations for protection of specified trees on private property within the City.

ORDINANCE 226

AN ORDINANCE AMENDING SECTIONS 15-05.020, 15-45.070, 15-45.080, 15-46.030, 15-46.040, AND ARTICLE 15-50 OF ZONING REGULATIONS OF THE CITY OF SARATOGA RELATING TO TREE REGULATIONS AND ADOPTING BY REFERENCE THE INTERNATIONAL SOCIETY OF ARBORICULTURE PRUNING STANDARDS (2001 EDITION) AND TREE VALUATION FORMULA CONTAINED IN THE GUIDE FOR PLANT APPRAISAL (APRIL 2000 EDITION)

THE CITY COUNCIL OF THE CITY OF SARATOGA DOES ORDAIN AS FOLLOWS:

Section 1. Findings.

The City Council finds and declares as follows:

A. The Planning Commission has conducted a public hearing to consider an amendment to the Zoning Regulations with respect to the City Code provisions relating to Tree Regulations and made a recommendation that the City Council amend the City's Tree Regulations.

B. The adoption of this ordinance is consistent with the provisions of the Saratoga General Plan Open Space Element which states on page 16, "The City should provide information and assistance to the public in the preservation and care of native trees whose existence can be threatened by environmental stress and development."

C. The adoption of this ordinance is consistent with the provisions of the Saratoga General Plan Conservation Element, which states in Policy CO.3.0, "Preserve the quality of the natural environment and the character of the City through appropriate regulation of site development."

D. The procedures required by Government Code Sections 50022.1 through 50022.8 for adoption of the ISA Standards by reference have been satisfied as follows:

(1) The title of the Tree Ordinance and the title of the ISA Standards to be adopted by reference have been read at a meeting of the City Council.

(2) The title of the ISA Standards to be adopted by reference are specified in the title of the ordinance.

(3) The Council subsequently scheduled a public meeting, notice of which was published in the local newspaper once a week for two successive weeks stating the time and place of the hearing; stating that copies of the ISA Standards being adopted are on file with the City Clerk and open to

public inspection; and describing the purpose and subject matter of the ordinance in a manner the City Council deemed sufficient, as required by the Government Code.

(4) A certified copy of the ISA Standards, which are adopted by reference, were on file in the Office of the City Clerk at least 15 days preceding the public hearing.

(5) The City Council held a public hearing on the Tree Ordinance and the ISA Standards adopted by reference in the Ordinance.

(6) At least one copy of the ISA Standards adopted by reference will be kept in the Office of the City Clerk for public inspection while the ordinance is in force.

(7) Upon adoption, copies of the adopted ISA Standards will be available for purchase by the public in the Office of the City Clerk, at a cost not to exceed the actual cost of them to the City.

Section 2. Adoption.

Section 15-05.020 of the Saratoga City Code is amended to read:

15-05.020 Purposes of Chapter.

The purposes of this Chapter shall be to promote and protect the public health, safety, peace, comfort, convenience, prosperity and general welfare, including the following more specific purposes:

(a) To control the physical development of the City in such a manner as to preserve it as essentially a residential community with a rural atmosphere.
(b) To achieve the arrangement of land uses depicted in the General Plan.
(c) To foster a harmonious, convenient, workable relationship among land uses.
(d) To promote the stability of existing land uses which conform with the General Plan, and to protect them from inharmonious influences and harmful intrusions.
(e) To ensure that public and private lands ultimately are used for the purposes, which are most appropriate and most beneficial from the standpoint of the City as a whole.
(f) To prevent population densities in excess of those prescribed in the General Plan, and to maintain a suitable balance between structures and open spaces on each site.
(g) To ensure adequate light, air and privacy for each dwelling unit.
(h) To minimize traffic congestion and to avoid the overloading of utilities by preventing the construction of buildings of excessive size in relation to the land around them.
(i) To facilitate the appropriate location of community facilities and institutions.
(j) To provide for adequate off-street parking and loading facilities.
(k) To provide for the orderly, attractive development of commercial facilities in those areas where permitted by the General Plan.

(l) To exclude new industrial development in order to preserve the essential residential character of the City.
(m) To preserve the natural beauty of the City.
(n) To ensure that uses and structures enhance their sites and harmonize with improvements in the surrounding area.
(o) To protect and enhance real property values within the City.
(p) To protect and preserve heritage, native, and other significant trees at all times, including, the real property development planning and implementation processes.

Section 15-45.070 is amended to read:

15-45.070 Application requirements.

(a) Application for design review approval shall be filed with the Community Development Director on such form, as he shall prescribe. The application shall include the following exhibits:
(1) Site plan showing (i) property lines, (ii) easements and their dimensions, (iii) underground utilities and their dimensions, (iv) structure setbacks, (v) building envelope, (vi) topography, (vii) species, trunk diameter at breast height (DBH as defined in Section 15-50.020(g)), canopy driplines, and locations of all heritage trees (as defined in Section 15-50.020(l), trees measuring at least ten (10) inches DBH, and all native trees measuring at least six (6) inches DBH on the property and within 150 feet of the property, (viii) areas of dense vegetation and (ix) riparian corridors.
(2) A statement of energy conserving features proposed for the project. Such features may include, but are not limited to, use of solar panels for domestic hot water or space heating, passive solar building design, insulation beyond that required under State law, insulated windows, or solar shading devices. Upon request, the applicant shall submit a solar shade study if determined necessary by the Community Development Director.
(3) Elevations of the proposed structures showing exterior materials, roof materials and window treatment.
(4) Cross sections for all projects located on a hillside lot, together with an aerial photograph of the site if requested by the Community Development Director.
(5) Engineered grading and drainage plans, including cross sections if the structure is to be constructed on a hillside lot.
(6) Floor plans that indicate total gross floor area, determined in accordance with Section 15-06.280 of this Chapter.
(7) Roof plans.
(8) Landscape and irrigation plans for the site, showing the location of existing trees proposed to be retained on the site, the location of any proposed replacement trees, the location and design of landscaped areas, types and quantities of landscape materials and irrigation systems, appropriate use of native plants and water conserving materials and irrigation systems and all other landscape features.
(9) Tree Preservation Plan, as required in Section 15-50.140.
(10) Preliminary title report showing all parties having any interest in the property and any easements, encumbrances and restrictions, which benefit or burden the property.
(11) Such additional exhibits or information as may be required by the Community Development Director. All exhibits shall be drawn to scale, dated and signed by the

person preparing the exhibit. Copies of all plans to be submitted shall consist of two sets drawn on sheets eighteen inches by twenty-eight inches in size and fifteen reduced sets on sheets eleven inches by seventeen inches in size.
(12) A geotechnical clearance as defined in Section 15-06.325 of this Code, if required by the City Engineer.
(a) The application shall be accompanied by the payment of a processing fee, in such amount as established from time to time by resolution of the City Council.

Section 15-45.080 is amended to read:

15-45.080 Design Review findings.

The Planning Commission shall not grant design review approval unless it is able to make the following findings:
(a) **Avoid unreasonable interference with views and privacy.** The height, elevations and placement on the site of the proposed main or accessory structure, when considered with reference to: (i) the nature and location of residential structures on adjacent lots and within the neighborhoods; and (ii) community view sheds will avoid unreasonable interference with views and privacy.
(b) **Preserve natural landscape.** The natural landscape will be preserved insofar as practicable by designing structures to follow the natural contours of the site and minimizing tree and soil removal; grade changes will be minimized and will be in keeping with the general appearance of neighboring developed areas and undeveloped areas.
(c) **Preserve native and heritage trees.** All heritage trees (as defined in Section 15-50.020 (l)) will be preserved. All native trees designated for protection pursuant to Section 15-50.050 will be preserved, or, given the constraints of the property, the number approved for removal will be reduced to an absolute minimum. Removal of any smaller oak trees deemed to be in good health by the City Arborist will be minimized using the criteria set forth in Section 15-50.080.
(d) **Minimize perception of excessive bulk.** The proposed main or accessory structure in relation to structures on adjacent lots, and to the surrounding region, will minimize the perception of excessive bulk and will be integrated into the natural environment.
(e) **Compatible bulk and height.** The proposed main or accessory structure will be compatible in terms of bulk and height with (i) existing residential structures on adjacent lots and those within the immediate neighborhood and within the same zoning district; and (ii) the natural environment; and shall not (i) unreasonably impair the light and air of adjacent properties nor (ii) unreasonably impair the ability of adjacent properties to utilize solar energy.
(f) **Current grading and erosion control methods.** The proposed site development or grading plan incorporates current grading and erosion control standards used by the City.
(g) **Design policies and techniques.** The proposed main or accessory structure will conform to each of the applicable design policies and techniques set forth in the Residential Design Handbook and as required by Section 15-45.055.

Section 15-46.030 is amended to read:

15-46.030 Application requirements.

(a) Application for design review approval shall be filed with the Community Development Director on such form, as he shall prescribe. The application shall include the following exhibits:

(1) A site plan showing property lines, easements, dimensions, topography, and the proposed layout of all structures and improvements including, where appropriate, driveways, pedestrian walks, parking and loading areas, landscaped areas, fences and walls, and the species, trunk diameter breast height (DBH as defined in Section 15-50.020(g)), canopy driplines, and locations of all heritage trees (as defined in Section 15-50.020(l)), trees measuring at least ten (10) inches DBH, and all native trees measuring at least six (6) inches DBH on the property and within 150 feet of the property. The site plan shall indicate the locations of entrances and exits and the direction of traffic flow into and out of parking and loading areas, the location and dimension of each parking and loading space, and areas for turning and maneuvering vehicles.

(2) Architectural drawings or sketches showing all elevations of the proposed structures as they will appear upon completion. All exterior surfacing materials and their colors shall be specified, and the size, location, material, colors and illumination of all signs shall be indicated.

(3) A landscape and irrigation plan for the site, showing the locations of existing trees proposed to be retained on the site, the location of any proposed replacement trees, types and quantities of landscape plants and materials and irrigation systems, appropriate use of native plants, and water conserving plants and materials and irrigation systems, and all other landscape features.

(4) Cross sections for all projects located on a hillside lot.

(5) Engineered grading and drainage plans, including cross sections if the structure is to be constructed on a hillside lot.

(6) Floor plans showing total gross floor area, determined in accordance with Section 15-06.280 of this Chapter.

(7) Roof plans.

(8) Such additional exhibits or information as may be required by the Community Development Director or the Planning Commission. All exhibits shall be drawn to scale, dated and signed by the person preparing the exhibit. Copies of all plans to be submitted shall consist of two sets drawn on sheets eighteen inches by twenty-eight inches in size and 15 sets on sheets eleven inches by seventeen inches in size.

(b) The application shall be accompanied by the payment of a processing fee, in such amount as established from time to time by resolution of the City Council, together with a deposit toward the expense of noticing the public hearing as determined by the Community Development Director.

Section 15-46.040 is amended to read:

15-46.040 Design criteria.

In reviewing applications for design review approval under this Article, the Planning Commission shall be guided by the following criteria:
(a) Where more than one building or structure will be constructed, the architectural features and landscaping thereof shall be harmonious. Such features include height, elevations, roofs, material, color and appurtenances.
(b) Where more than one sign will be erected or displayed on the site, the signs shall have a common or compatible design and locational positions and shall be harmonious in appearance.
(c) Landscaping shall integrate and accommodate existing trees and vegetation to be preserved; it shall make use of water-conserving plants, materials and irrigation systems to the maximum extent feasible; and, to the maximum extent feasible, it shall be clustered in natural appearing groups, as opposed to being placed in rows or regularly spaced.
(d) Colors of wall and roofing materials shall blend with the natural landscape and be nonreflective.
(e) Roofing materials shall be wood shingles, wood shakes, tile, or other materials such as composition as approved by the Planning Commission. No mechanical equipment shall be located upon a roof unless it is appropriately screened.
(f) The proposed development shall be compatible in terms of height, bulk and design with other structures in the immediate area.

Article 15-50 is amended to read:

Article 15-50 TREE REGULATIONS

15-50.010 Findings; purposes of Article.

The City Council finds that the City is primarily a residential community; that the economics of property values is inseparably connected with the rural attractiveness of the area, much of which is attributable to the wooded hillsides and the native and ornamental trees located throughout the City; that the preservation of such trees is necessary for the health, safety and welfare of the residents of the City in order to preserve scenic beauty, prevent erosion of topsoil, protect against flood hazards and the risk of landslides, counteract pollutants in the air, maintain the climatic balance and decrease wind velocities.

To compliment and strengthen zoning, subdivision and other land use standards and regulations, while at the same time recognizing the privileges of private property ownership, the City Council adopts this ordinance to establish basic standards and measures for the maintenance, removal, and replacement of trees. Thus, this ordinance is designed to provide a stable and sustainable urban forest to preserve and protect significant historic heritage values, and to enhance the unique aesthetic character and environment of this City.

15-50.020 Definitions.

For the purposes of this Article, the following words and phrases shall have the meanings respectively ascribed to them by this Section, unless the context or the provision clearly requires otherwise:

(a) "Agricultural tree" means a fruit or nut tree grown for the production of fruit or nuts.
(b) "Approving body" means the body having authority to approve or deny an application and includes the Planning Commission and the Community Development Director.
(c) "Arborist Report" means a report prepared by a certified arborist and accepted by the Community Development Director containing specific information on the location, condition, structure, potential impacts of development, and recommended actions and mitigation measures regarding one or more trees on an individual lot or project site.
(d) "Bond or security deposit" means a financial instrument which guarantees a future condition and may include an irrevocable letter of credit or cash.
(e) **"Canopy"** or tree canopy means all portions of the tree with foliage. As context requires, the term also describes the area inside the drip line.
(f) **"Crown"** means the portion of the tree above the trunk including the limbs and foliage.
(g) "DBH" means diameter at breast height. It is the diameter of a single stem trunk tree measured at four and one-half (4 ½) feet above the ground while standing on the high side of the tree. The diameter may be calculated using the following formula:

Diameter = Circumference / 3.142

To measure trees with multi-stem trunks, the tree diameter equals the full diameter of the largest trunk plus 50% of the diameter of all other trunks on the tree; each trunk is measured at four and one-half (4 ½) feet above the ground while standing on the high side of the tree.
(h) "Damage" means any action undertaken which causes short term or long term injury, death, or disfigurement to a tree. This includes, but is not limited to: cutting of roots or limbs, poisoning, over-watering, relocation, or transplanting a tree, or trenching, grading, compaction, excavating, paving or installing impervious surface within the root zone of a protected tree.
(i) "Destroy" means to cause the premature decline of tree health or life as evaluated and determined by the City Arborist.
(j) "Dripline" means the outermost edge of the tree's canopy. When depicted on a map or plan, the dripline is the irregular shaped circle that follows the contour of the tree's branches as seen from overhead.
(k) "Encroachment" means any intrusion or human activity occurring within the root zone of a tree, including, but not limited to structural pruning in excess of International Society of Arboriculture Commission (ISA) Pruning Standards (2001 Edition), grading, excavating, trenching, parking of vehicles, permanent or temporary storage of materials or equipment, or the construction of structures or other improvements within the root zone of a tree
(l) "Heritage tree" means any tree of historic significance as a tree having historic value related to the heritage of the City and designated by action of the City Council upon recommendation of the Heritage Preservation Commission.
(m) "ISA Standards" means the 2001 Edition of the pruning standards and the Tree Valuation Formula contained in the April 2000 Guide for Plant Appraisal published by the International Society of Arboriculture.

(n) **"Native tree"** means Coast Live Oak (Quercus agrifolia), Valley Oak (Quercus lobata), Tan Oak (Lithocarpus densiflorus), Black Oak (Quercus kellogi), Blue Oak (Quercus douglasi), Scrub Oak (Quercus dumosa), Big Leaf Maple (Acer macrophylhum), California Buckeye (Aesculus californica), Douglas fir (Pseudotsuga menziesii) and Coast Redwood (Sequoia sempervirens).
(o) "Oak" means any native oak tree of the Genus Quercus, regardless of size. This definition shall not include oak trees planted, grown and held for sale by licensed nurseries or the first removal or transplanting of such trees pursuant to and as part of the operation of a licensed nursery business.
(p) "Project site" means the site of the proposed tree removal, pruning, or encroachment affecting a protected tree.
(q) "Protected tree" has the meaning set forth in section 15-50.050.
(r) "Pruning" means any and all work performed on or adversely affecting the roots, branches or limbs of a protected tree.
(s) "Remove" and "Removal" mean the physical removal or destruction of a tree or causing the death of a tree through damaging, pruning, encroaching or other direct or indirect action on the canopy or root zone.
(t) "Root zone" means a specifically defined area commencing at the trunk and moving outward to form an irregularly shaped circle that follows the contour of the tree canopy and extending beyond the dripline of the tree by five (5) feet or such greater distance determined by the City Arborist.
(u) "Routine maintenance" means actions needed for the continued good health of a tree including, but not limited to, removal of deadwood, insect control spraying and watering.
(v) "Street tree" means any tree within the Public Street or right-of-way.
(w) "Shrub" means a bushy, woody plant, usually with several permanent stems, and usually not over fifteen feet high at maturity. The Community Development Director, after consultation with the City Arborist may determine whether any specific woody plant shall be considered a tree or a shrub.
(x) "Structural Pruning" means pruning to maintain the size of lateral branches to less than three-fourths the diameter of the parent branch or trunk.
(y) "Tree" means a woody perennial plant characterized by having a main stem or trunk, or a multi-stemmed trunk system with a more or less definitely formed crown, and is usually over ten feet high at maturity. This definition shall not include trees planted, grown and held for sale by licensed nurseries or the first removal or transplanting of such trees pursuant to and as part of the operation of a licensed nursery business.
(z) "Tree fund" means a City-held monetary account accounted for separately from other City funds. The express functions of the Tree fund are: (1) To receive and hold any fines, penalty assessments civil penalties, bonds or other remedial funds or sources of funds for violations of Article15-50 of this code; (2) To receive and hold monetary valuations and payments for replacement trees pursuant to Section 15-50.170, as prescribed by the Community Development Director, or as a condition of development approval; and (3) To pay for new or replacement trees, their planting and maintenance, as determined by the Community Development Director, on public properties, streets, easements and dedicated open spaces.
(aa) "Tree Preservation Plan" means a detailed plan containing all protective measures to be implemented before, during, and, after any encroachment or other activity affecting

one or more protected trees including provision for future maintenance, to preserve and protect all trees to be retained on any project site.

15-50.030 Application of Article.

This Article shall apply to every owner of real property within the City, and to every person responsible for removing, damaging, pruning or encroaching upon a tree regardless of whether such person is engaged in a business for such purpose.

15-50.040 Street trees.

(a) **Policies and standards.** The Community Development Director shall implement policies and standards for street tree planting and maintenance as established from time to time by resolution of the Planning Commission or City Council.
(b) **Planting required condition of approval.** The planting of street trees may be required as a condition of any approval granted under this Chapter.
(c) **Responsibility for maintenance.** The City shall provide maintenance for street trees located within a commercial district and on arterial roads, unless such maintenance responsibility has been assumed by a property owner or other person under a landscape maintenance agreement with the City. In all other areas of the City, the City shall not conduct but shall control the planting, maintenance and removal of street trees and shrubs which might affect the public right-of-way; the owner or occupant of such property shall be responsible for the maintenance of street trees on the property and in the public right-of-way abutting the property.

15-50.050 Removal of certain trees without permit.

Except as otherwise provided in Section 15-50.060, it is unlawful for any person to remove, damage, prune, or encroach upon, or cause to be removed, damaged, pruned, or encroached upon any protected tree, located on any private or public property in the City without first having obtained a tree removal, pruning or encroachment permit issued pursuant to this Article and authorizing the proposed action. A protected tree shall consist of any of the following:
(a) Any native tree having a DBH of six (6) inches or greater
(b) Any other tree having a DBH of ten (10) inches or greater.
(c) Any street tree, as defined in Section 15-50.020(v), regardless of size.
(d) Any heritage tree, as defined in Subsection 15-50.020(l) regardless of size.
(e) Any tree required to be planted or retained as a condition of any approval granted under this Chapter or Chapter 14 of this Code.
(f) Any tree required to be planted as a replacement, as provided in Subsection 15-50.170 of this Article.

15-50.060 Exceptions.

The permit requirement set forth in Section 15-50.050 shall not apply to any of the following:

(a) **Emergencies.** If the condition of a tree presents an immediate hazard to life or property, it may be removed without a permit on order of the City Manager, the Public Works Director, the Community Development Director, their designated representatives, or a Peace Officer, or the fire department having jurisdiction.

(b) **Public utilities.** Public utilities subject to the jurisdiction of the State Public Utilities Commission may without a permit take such action as may be necessary to comply with the safety regulations of the Commission and as may be necessary to maintain a safe operation of their facilities.

(c) **Project approval.** Where removal of a protected tree or encroachment upon one or more protected trees has been specifically authorized as part of any project approval granted under this Chapter or Chapter 14 or 16 of this Code, no permit pursuant to this Article shall be required for such activity, provided the Community Development Director determines in writing that the criteria specified in sections 15-50.080 and 15-50.120 and 15-50.140 have been met. Any protected tree authorized for removal, pruning or encroachment pursuant to such project approval shall not be removed, pruned or encroached upon, until the issuance of a building or grading permit for the improvements, which are subject of the approval.

15-50.070 Application for permit.

(a) Application. Application for a tree removal pruning or encroachment permit shall be made to the Community Development Director on such form as he or she may prescribe. The application shall contain the number and location of each tree to be removed, pruned or encroached upon, the type and approximate size of the tree, the reason for removal, pruning or encroachment and such additional information as the Director may require. The application shall be signed by the owner of the property upon which the tree is located and if the applicant is not the owner of said property shall include a statement that the owner consents to the activity described on the permit application.

(b) Notice. Prior to acting on an application for a tree removal permit affecting one or more protected trees, notice shall be given to property owners within 150 feet at the time of application, at least ten (10) days before a decision on the permit is made.

(c) Pruning Permit: A permit is required for structural pruning in excess of ISA Standards (the 2001 Edition of which is hereby adopted by reference) during any given growth period or year of any protected tree. Pruning shall not exceed 25% of the canopy. No permit is required for structural pruning, which complies with ISA Pruning Standards, or for the pruning of productive agricultural trees.

(d) Notwithstanding the foregoing, either written permission or a permit is required for the pruning of a protected tree the trunk of which is at least partially located on a neighboring property.

15-50.080 Determination on permit.

(a) **Criteria.** Each application for a tree removal pruning or encroachment permit shall be reviewed and determined on the basis of the following criteria:
(1) The condition of the tree with respect to disease, imminent danger of falling, proximity to existing or proposed structures and interference with utility services.
(2) The necessity to remove the tree because of physical damage or threatened damage to improvements or impervious surfaces on the property.
(3) The topography of the land and the effect of the tree removal upon erosion, soil retention and the diversion or increased flow of surface waters, particularly on steep slopes.
(4) The number, species, size and location of existing trees in the area and the effect the removal would have upon shade, privacy impact, scenic beauty, property values, erosion control, and the general welfare of residents in the area.
(5) The age and number of healthy trees the property is able to support according to good forestry practices.
(6) Whether or not there are any alternatives that would allow for retaining or not encroaching on the protected tree.
(7) Whether the approval of the request would be contrary to or in conflict with the general purpose and intent of this Article.
(8) Any other information relevant to the public health, safety, or general welfare and the purposes of this ordinance as set forth in section 15-50.010.
(9) The necessity to remove the tree for economic or other enjoyment of the property when there is no other feasible alternative to the removal.
(b) **Additional recommendations.** The Community Development Director may refer the application to another department, commission or person for a report and recommendation. The Director may also require the applicant to furnish a written report from an ISA Certified Arborist acceptable to the Director, such report to be obtained at the sole expense of the applicant. At the discretion of the Community Development Director, City Arborist review may be required before any tree removal, pruning or encroachment permit is issued or before approval of a project involving the removal of, pruning of or encroachment upon one or more protected trees is granted. City Arborist review shall also be at the sole expense of the applicant.
(c) **Decision by Director.** The Community Development Director shall render his or her decision within thirty days (30) after the filing of the application for a permit. The Director may grant or deny the application or grant the same with conditions, including, but not limited to, (1) the condition that one or more replacement trees be planted of a species and size and at locations as designated by the Director, (2) relocation of existing tree desired to be removed, and/or (3) payment of a fee or the posting of a bond or security deposit in favor of the City to the Tree Fund. Any such tree replacement, relocation, fee payment, or bonding or security deposit shall be at the sole expense of the applicant.
(d) **Security deposits and maintenance bonds.** In the case of an application for, or a project involving encroachment on one or more protected trees, the applicant shall post a security deposit with the City in an amount equal to 100 % of the ISA valuation of the trees involved. The City may also require posting of a maintenance bond or security deposit of at least five years designed to ensure long term maintenance of the affected or

replacement trees. Security deposits or maintenance bonds required for protected trees or replacement trees in public or private development may, in the reasonable discretion of the Community Development Director, be refunded upon a determination that the project is in compliance with the City Arborist's requirements and/or Tree Preservation Plan. In the case of violations of this Article or where replacement, restitution, or other remedy required pursuant to Section 15-50.170 cannot be made on the project site, then such payments shall be made from the deposit or bond being held before any refund is made.

15-50.090 Development or improvement projects.

(a) Subdivision approval. When any application is made pursuant to Chapter 14 and that proposal would involve removal of, pruning of, or encroachment upon a protected tree, the City shall take into consideration the provisions of this Article in granting or denying the application.

(b) Project approval. Removal of, pruning of, or encroachment upon any protected trees pursuant to project approval granted under this Chapter or Chapters 14 or 16 of this Code shall meet the requirements of Section 15-50.140 and be evaluated according to the criteria in section 15-50.080.

(c) Modifications to approved projects. In the event of any change or modification to an approved site development plan which results in removal of or an increase in pruning of or encroachment upon any protected tree, the provisions of this Article shall apply.

15-50.100 Appeals.

(a) Except otherwise provided in subsection (b) of this Section, any person objecting to a decision by the Community Development Director made pursuant to any of the provisions of this Article, may appeal such decision in accordance with the procedure set forth in Article 15-90 of this Chapter. Any permit issued pursuant to this Article shall take effect immediately upon the expiration of the appeal period specified in Article 15-90 of this Chapter unless the permit is appealed. If the permit is appealed or a permit denial is appealed and the Planning Commission upholds the permit or reverses the denial, the permit shall take effect immediately upon the decision of the Planning Commission unless appealed to the City Council in accordance with the procedure set forth in Article 15-90 of this Chapter.

(b) Where an application for a tree removal permit has been granted and the Community Development Director determines that the tree in question presents a clear and immediate threat of causing injury to persons or property, the Community Development Director may issue the tree removal permit prior to expiration of the appeal period specified in Article 15-90 of this Chapter.

15-50.110 No liability upon City.

Nothing in this Article shall be deemed to impose any liability upon the City or upon any of its officers or employees, nor to relieve the owner or occupant of any private property from the duty to keep in safe condition any trees and shrubs upon his property or upon a public right-of-way over his property.

15-50.120 Setback of new construction from existing trees.

Unless otherwise permitted by the approving authority, no structure, excavation or impervious surface areas of any kind shall be constructed or installed within the root zone of any protected tree without mitigating special design, such as post and beam footings that bridge the roots. No parking, storing of vehicles, equipment or other materials shall be permitted within the dripline of any protected tree without special design considerations approved by the Community Development Director and the City Arborist.

15-50.130 Arborist Report

An Arborist Report shall be required for any application for discretionary development approval that would require the removal of one or more trees protected by this Chapter and for any other projects where the Community Development Director determines it is necessary. The Community Development Director may require any Arborist Report (or portion thereof) to be reviewed by the City Arborist. The Arborist Report and any review of it by the City Arborist required by the Community Development Director shall be at the sole expense of the applicant.

15-50.140 Tree Preservation Plan.

(a) A Tree Preservation Plan shall be required for any project approved pursuant to Chapters 14, 15 and 16 of the Code on any site on which an Arborist Report is prepared.
(b) The Tree Preservation Plan shall consist of a separate detailed plan drawn to a sufficient scale (but no larger that 20 feet to the inch, with any details to be shown at least 10 feet to the inch) to clearly indicate all protection and mitigation measures to be taken as required by the Community Development Director and/or the Arborist Report for the project.
(c) When a project has been submitted for approval pursuant to Chapters 14, 15, or 16, there shall be no permits issued for grading or site improvements until a Tree Preservation Plan for the project has been approved by the Community Development Director and the required protection measures are determined to be in place through City inspection. Protection measures required shall remain in place for the duration of the construction activity at the project site, or as otherwise required by the City and shall not be removed until authorized by the Community Development Director.
(d) The Tree Preservation Plan and any permits for tree removal shall be maintained at the project site at all times during construction activities and until all work has been completed, inspected and approved by the City.
(e) At least three scheduled inspections shall be made by the City to ensure compliance with the Tree Preservation Plan. The inspections shall, at a minimum include the

following: (1) Initial inspection prior to any construction or grading, (2) After completion of rough grading and/or trenching, and (3) Completion of all work including planting and irrigation system installation. Other inspections may be conducted as required by the Community Development Director.

15-50.150 Tree Fund

(a) Purpose and source of funds. A tree preservation fund shall be established for the City for the purposes specified in Section 15-50.020(z). The Tree Fund shall be funded by those fines, penalties, and other remedial payments which may be assessed by courts or administratively imposed, including, but not limited to, those provided for in Chapter 3 of this Code for violations of this Article. In addition, payments required for replacement trees pursuant to Section 15-50.170, as prescribed by the Community Development Director, or as a condition of development approval, or from payments made from a security deposit or bond, shall be held in the Tree Fund and used to purchase new and replacement trees. The Community Development Director and the City Arborist shall determine the selection, planting and location of any such trees.
(b) Tree valuation. Lawfully removed trees to be replaced as a condition of development approval shall be valued and their removal compensated for as follows: Trees replaced on or off site according to good forestry practices, shall provide, in the opinion of the Community Development Director, equivalent value in terms of aesthetic and environmental quality, size, height, location, appearance, and other significant beneficial characteristics of the removed tree/s. The City Arborist shall calculate the value of the removed tree/s in accordance with the ISA Tree Valuation Formula contained in the April 2000 ISA Guide for Plant Appraisal, which is hereby adopted by reference.

15-50.160 Enforcement

(a) General. The City shall vigorously enforce the provisions of this Article. Inspectors shall, in the course of their regular duties, monitor construction activities. Any observed violations shall be immediately reported to the Community Development Director for follow-up action.
(b) Stop work orders. Whenever any activities are in violation of the provisions of this Article, applicable tree permit/s, Tree Preservation Plans, or conditions of project approval, a Building Inspector, Public Works Director, Community Service Officer, or Community Development Director shall issue a written notice to stop work on the project for which a violation has occurred. The notice shall state the nature of the violation or danger and with the exception of ordered remediation, no work shall be allowed to proceed until the violation has been rectified and any remaining activity approved by the City.
(c) Cumulative remedies. All remedies in this Section shall be cumulative and are not exclusive.

15-50.170 Violations; penalties and remedies.

The violation of any provision contained in this Article is hereby declared to be unlawful and shall constitute public nuisance and an infraction. As either a public nuisance or an infraction, the violation shall be subject to the penalties or remedies as described in Chapter 3 of this Code and any other remedies authorized by the City Code, including, but not limited to the following:

(a) Requiring that the violator obtain a tree removal, pruning or encroachment permit for the previously conducted unlawful activity, including one or more of the following conditions as appropriate:

(1) the violator shall replace each unlawfully removed tree with one or more new trees which can be accommodated on the site of the violation according to good forestry practices and, in the opinion of the Community Development Director, will provide equivalent value in terms of cost (as determined pursuant to the City Arborist's calculation of the value of the removed tree/s in accordance with the ISA Tree Valuation Formula adopted by reference), aesthetic and environmental quality, size, height, location, appearance and other characteristics of the unlawfully removed tree; or

(2) where replacement trees cannot be accommodated on site according to good forestry practices, or cannot provide equivalent aesthetic or environmental quality of removed tree/s on site, the violator shall either plant replacement trees off site or make a cash payment to the City Tree Fund (based on the City Arborist's calculation of the value of the removed tree/s in accordance with the ISA Tree Valuation Formula adopted by reference), or any combination thereof, in accordance with the following:

(A) To the extent that a cash payment is required for any portion or all of the value of the removed tree, such payment shall be doubled to reflect the estimated installation costs that would be incurred if replacement trees are planted; and

(B) To the extent that the planting of offsite replacement trees is required, the retail cost of such trees, as shown by documentary evidence satisfactory to the Community Development Director, shall be offset against the value of the removed tree, but no credit shall be given for transportation, installation, maintenance and other costs incidental to the planting and care of the replacement trees; or

(3) Where the unlawful activity did not result in tree removal, but did result in tree damage, the violator shall enhance the condition of the remaining trees or portions of trees according to good forestry practices which in the opinion of the Community Development Director, will provide equivalent value in terms of damage to the tree(s), aesthetic and environmental quality, size, height, location, appearance and other characteristics of the unlawfully damaged tree; provide equivalent enhancement of the condition of trees off site or make a cash payment to the City Tree Fund (based on the City Arborist's calculation of the equivalent value of the unlawful damage to the tree).

(b) Any person who is required to plant replacement trees pursuant to this Section shall permanently maintain such trees in a good and healthy condition, for a minimum of five (5) years to ensure permanent establishment of any such tree/s, as determined by the

City Arborist. Such person shall post a maintenance bond or security deposit in a form prescribed by the Community Development Director and execute a maintenance agreement with the City, which shall be recorded in the office of the County Recorder.
(c) As part of a civil action brought by the City, a court may assess against any person who commits, allows, or maintains a violation of any provision of this Chapter a civil penalty. Where the violation has resulted in removal of a protected tree, the civil penalty shall be in an amount not to exceed $5,000 per tree unlawfully removed unless the replacement value of a tree unlawfully removed is greater than $5,000 in which case the civil penalty for removal of that tree shall equal the replacement value (excluding installation) of the tree.

(d) Payment (to the extent authorized by law and determined appropriate by the Community Development Director) of any criminal, civil, administrative, or other penalty or restitution order into the Tree Fund.
(e) The violation of any provision contained in this Article during the conduct by any person of a tree removal, structural pruning, landscaping, construction or other business in the City shall constitute grounds for revocation of any business license issued to such person.
(f) All remedies provided in this Section shall be cumulative and are not exclusive.

15-50.180 Tree Companies Operating in the City

Any business, which performs structural pruning or tree removal on protected trees in the City, must be in possession of a Saratoga business license, and must have an ISA Certified Arborist on staff, in a supervisory position for the accomplishment of such work.

15.50-190 Possession of an Approved Tree Removal Permit

Any person engaged in any conduct requiring a permit pursuant to this Article shall have in his or her possession a copy of the approved permit. Upon request of a Peace Officer, City of Saratoga Code Enforcement Officer or other City Official, the person engaging in the referenced conduct shall produce the approved permit. If the person cannot produce the approved permit, all activity shall be suspended until a permit can be produced or obtained from the Community Development Department.

Section 3. Severance Clause.

The City Council declares that each section, sub-section, paragraph, sub-paragraph, sentence, clause and phrase of this ordinance is severable and independent of every other section, sub-section, sentence, clause and phrase of this ordinance. If any section, sub-section, paragraph, sub-paragraph, sentence, clause and phrase are held invalid, the City Council declares that it would have adopted the remaining provisions of this ordinance irrespective of the portion held invalid, and further declares its express intent that the remaining portions of this ordinance should remain in effect after the invalid portion has been eliminated.

Section 4. Publication.

This ordinance or a comprehensive summary thereof shall be published in a newspaper of general circulation of the City of Saratoga within fifteen days after its adoption.

The foregoing ordinance was introduced and read at the regular meeting of the City Council of the City of Saratoga held on the 17th day of September, 2003, and was adopted by the following vote following a second reading on the 17th day of December, 2003:

AYES:	**Councilmembers Stan Bogosian, Norman Kline, Nick Streit, Vice Mayor Kathleen King, Mayor Ann Waltonsmith**
NOES:	**None**
ABSENT:	**None**
ABSTAIN:	**None**

ATTEST:

/s/ CATHLEEN BOYER, CITY CLERK

adopt to WL

Appendix J

PALO ALTO STANDARD TREE PROTECTION INSTRUCTIONS

Subject to site specific changes as required

Prior to Issuance of a Demolition or Building Permit, this sheet shall appear on grading, demolition and/or improvement plans

1. Tree Protection Statement. A written statement shall be provided to the Building Inspections Division verifying that protective fencing for the trees is in place before demolition, grading or building permit will be issued, unless otherwise approved by the City Arborist.

2. Fencing - Protected Trees, Street Trees, or Designated Trees. Fenced enclosures shall be erected around trees to be protected to achieve three primary functions, 1) to keep the foliage canopy and branching structure clear from contact by equipment, materials and activities; 2) to preserve roots and soil conditions in an intact and non-compacted state and 3) to identify the Tree Protection Zone (TPZ) in which no soil disturbance is permitted and activities are restricted, unless otherwise approved.

A Size, type and area to be fenced. All trees to be preserved shall be protected with five or six (5' - 6') foot high chain link fences. Fences are to be mounted on two-inch diameter galvanized iron posts, driven into the ground to a depth of at least 2-feet at no more than 10-foot spacing.

Type I Tree Protection. The fences shall enclose the entire area under the canopy dripline or TPZ of the tree(s) to be saved throughout the life of the project. Parking areas: if fencing must be located on paving or concrete that will not be demolished, the posts may be supported by an appropriate grade level concrete base.

Type II Tree Protection. For trees situated within a narrow planting strip, only the planting strip shall be enclosed with the required chain link protective fencing in order to keep the sidewalk and street open for public use.

Type III Tree Protection. Trees situated in a small tree well or sidewalk planter pit, shall be wrapped with 2-inches of orange plastic fencing from the ground to the first branch and overlaid with 2-inch thick wooden slats bound securely (slats shall not be allowed to dig into the bark). During installation of the plastic fencing, caution shall be used to avoid damaging any branches. Major scaffold limbs may also require plastic fencing as directed by the City Arborist

A Duration. Tree fencing shall be erected before demolition, grading or construction begins and remain in place until final inspection of the project, except for work specifically allowed in the TPZ. Work in the TPZ requires approval by the project arborist or City Arborist (in the case of work around Street Trees).

A 'Warning' sign. A warning sign shall be prominently displayed 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 - This fence shall not be removed and is subject to a fine according to PAMC Section 8.10.110."

During Construction

3. All neighbors' trees that overhang the project site shall be protected from impact of any kind.

4. The applicant shall be responsible for the repair or replacement of any publicly owned trees that are damaged during the course of construction, pursuant to Section 8.04.070 of the Palo Alto Municipal Code.

5. The following tree preservation measures apply to all trees to be retained:

a. No storage of material, topsoil, vehicles or equipment shall be permitted within the tree enclosure area.

b. The ground under and around the tree canopy area shall not be altered.

c. Trees to be retained shall be irrigated, aerated and maintained as necessary to ensure survival.

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Modify

Appendix M

PROCEDURE FOR REMOVING A PROTECTED TREE

The Planning Division procedures for reviewing an application to remove a Protected Tree requires the following steps to be completed and the information submitted to the Planning Division for review, response and action.

Protected Trees are defined as: Coast Live Oak, ~~Valley Oak 11.5~~-inches in diameter or greater and Coast Redwood 18-inches in diameter, when measured at 54-inches above natural grade. Further definition details, maintenance requirements and criteria used to evaluate removal are outlined in the Palo Alto Municipal Code Section 8.10.

Publicly owned trees growing in the right-of-way (i.e. street trees) are also protected and removal is prohibited unless approved. The applicant must (1) contact the Public Works Department at (650) 496-5953 and, (2) receive prior written approval.

Designated Trees on non-residential or commercial property requires the approval of the Planning Department.

STEP 1 - APPLICATION FORM

Planning Division standard Application Form is available from the counter staff at the Development Center, 285 Hamilton Avenue, Palo Alto, CA 94301. Block #1 of the form must have the Protected Tree Removal box checked, and the application fee of $145.00 filled in (per FY-98 Fee Schedule: $125 and $20 Record Management). It is also advisable that a copy of the Tree Preservation Ordinance No. 4362 be provided to the applicant at this time.

STEP 2 - APPLICANT CHECKLIST

Applicant is required to submit the following items to the Planning Division counter staff: 9 Completed City of Palo Alto Tree Removal Application (Box 2- zone, parcel # or historic category is not required) 9 Payment of $145.00 fee, in the form of a personal check.

Arborist Letter Report including the following for each tree:

1. A written narrative from an ISA Certified Arborists report

2. Arborist Name, Certification # and company letterhead

3. Species (common and scientific name)

4. Size (diameter, height and crown spread)

5. Condition (foliage, vigor, structural integrity, etc.)
6. Prognosis (dangerous, imminent hazard, property damage?) The attached Hazard Evaluation

Other Sources of Information

ANSI Z133.1. 1988. Safety Standards. American National Standard for Tree Care Operators. Washington, D.C.: American National Standards Institute.

—— A300. Standard Practices for Tree, Shrub and Other Woody Plant Maintenance. Washington, D.C.: American National Standards Institute. (in press).

Brown, G.E. 1972. The Pruning of Trees, Shrubs and Conifers. London: Faber and Faber.

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National Arborist Association. 1988. Pruning Standards for Shade Trees. Amherst, NH: National Arborist Association.

Pirone, P.P. and others. 1988. Tree Maintenance, 6th ed. New York: Oxford University Press.

Shigo, A.L. 1989. Tree Pruning: A Worldwide Photo Guide. Durham, NH: Shigo and Trees, Associates.

Form may be used to rate a dangerous condition

7. Life expectancy

8. Location diagram (and photograph, if desired)

STEP 3 - CITY REVIEW

Counter Staff Responsibility Planning Division counter staff will

(1) date-stamp the application and report;

(2) enter the application in the Tree Removal Log located at the Technicians desk, and assign the next consecutive file number (e.g. 01-PTR-13) and enter same onto application;

(3) document the fee payment, giving the applicant a copy of receipt;

(4) route the material to the Planning Arborist. Review Period Upon receipt of all required submittal items the case will be reviewed by the Planning Arborist, and written response shall be mailed or faxed to the applicant within 10 working days of the date-stamp. Staff may require a site visit, contact with the applicant, arborist or additional information if needed. If the tree prognosis is deemed urgent or is a life/safety emergency, the Planning Arborist or City Staff shall have the discretion to approve or modify this process as needed, with documentation to follow after the hazard has been brought to a safe level.

Action The City's written response within 10 days to the applicant will include either approval (may be with conditions for tree replacement), denial (with reasons cited and/or mitigating recommendations) or request for additional information. No work on the subject tree is permitted until written City approval is granted. A copy of the approval letter must be on site when the tree is being removed.

STEP 4 - CONDITIONS

Frequently, a file will remain open if the approval is conditioned upon required replanting with one or more trees of a predetermined size. To bring closure to the file, it is the applicants responsibility to insure that conditions are implemented, and to schedule a follow-up inspection with the Planning Arborist at (650) 329-2441.

JACK SIMPSON

From: Dockter, Dave [Dave.Dockter@CityofPaloAlto.org]
Sent: 02 March 2006 11:43
To: jacksimpson@comcast.net; mperkins@ci.west-linn.or.us
Subject: Palo Alto Tree Program Document #1
Attachments: Tree Disclosure Statement_final04.pdf; Tree Protection, TTM_Section_2-00.pdf; WARNING - Tree Protection Zone Sign.pdf; Tree Protection Detail #503_final04.pdf; Tree Protection--it's Part of the Plan!_Sheet T-1.pdf; Spare Parts.pdf

It was a pleasure speaking with you this morning. Here are some documents and resources that may be of use to you. You have our permission to use the Manual in whole or in part, changing the pertinent areas of course.

If the Palo Alto material is useful to West Linn, it would be appropriate for the city to send a note of thanks to our city manager, Frank Benest, and City Council. Technology transfer and sharing successes is critical to making the diminishing dollar resources stretch farther and to preserve the patriarch trees that define the character of our communities.

We have added more forms and resources to our website that you should browse and download what you need. http://www.cityofpaloalto.org/planning-community/tree_forms.htm

I will send three separate emails.

Cheers!

Dave Dockter

Landscape Specialist, ASCA, ISA, APA

City of Palo Alto, 250 Hamilton Avenue

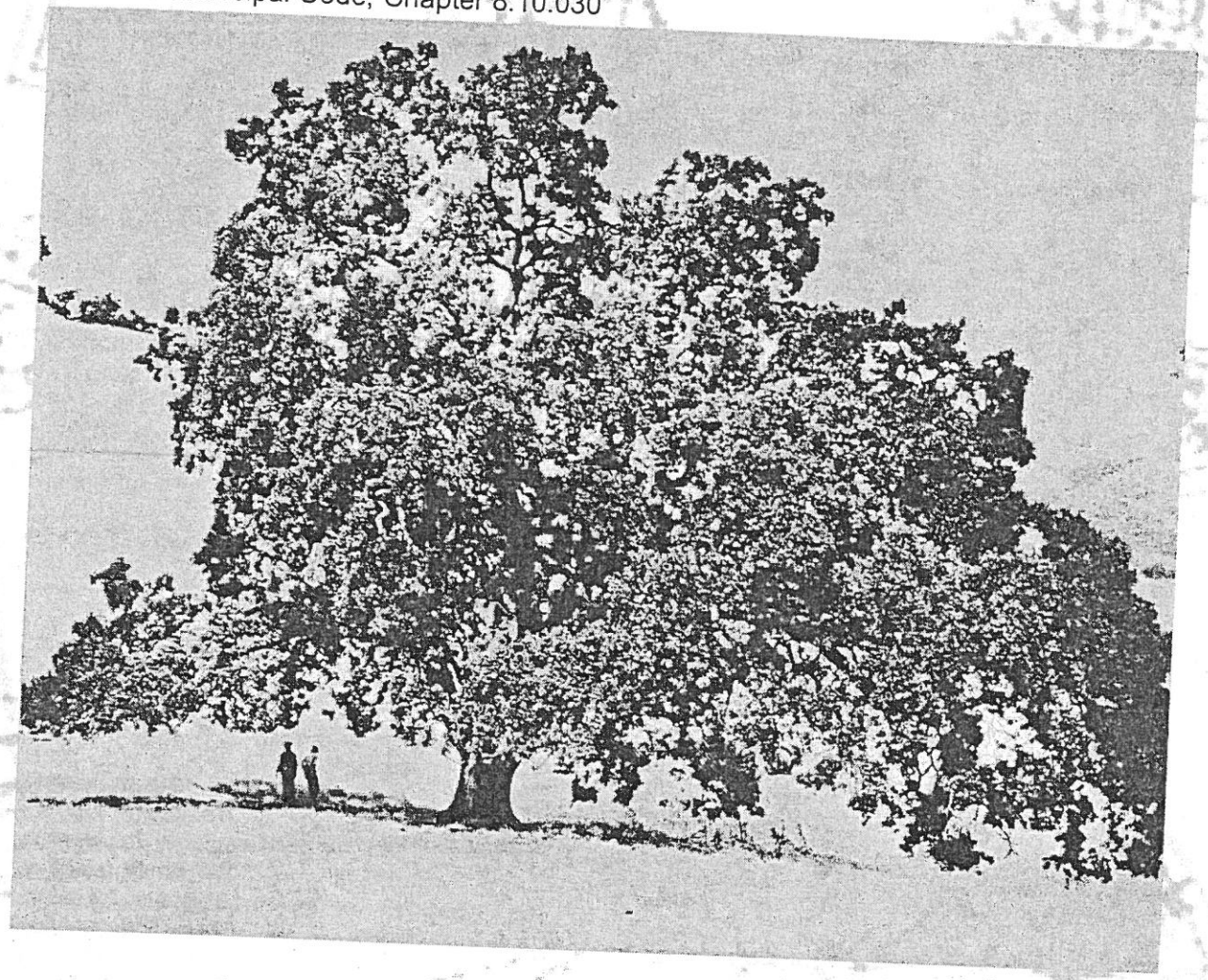
Palo Alto, CA 94301 USA

650-329-2441 ~ http://www.cityofpaloalto.org/trees/

Tree Technical Manual

CITY OF PALO ALTO

Standards & Specifications
Palo Alto Municipal Code, Chapter 8.10.030



Photograph by Alvin Dockter

June, 2001 First Edition
Department of Planning and Community Environment

Published by
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Department of Planning and Community Environment
250 Hamilton Avenue
Palo Alto, CA 94301
Phone 650-329-2441
Fax 650-329-2154

First Edition June, 2001

World Wide Web Version
This document is available on the
City of Palo Alto's website:
http://www.city.palo-alto.ca.us/trees

Cover Photo
In 1997, Palo Altans celebrated their love for trees by enacting a tree preservation ordinance. This cover photo shows citizens enjoying the shade of a grand Valley Oak protected by ordinance and native to our region. Embracing the preservation of these trees demonstrates our investment in the future.
Photo by Alvin Dockter

printed on recycled paper
containing 30% post consumer chlorine-free fiber

CITY OF PALO ALTO

TREE TECHNICAL MANUAL

STANDARDS AND SPECIFICATIONS

Palo Alto Municipal Code, Chapter 8.10.030

Prepared for the City Manager
by Dave Dockter, Managing Arborist

Table of Contents

APPENDICES

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This section acknowledges those persons
involved in the preparation of the *Tree Technical Manual.*

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Marni Barnes, Landscape Architect
Bruce Hagen, Urban Forester, State of California
RDC interactive, Inc.
Canopy: Trees for Palo Alto
and
The International Society of Arboriculture--
for authorization to reprint guidelines from *Tree Pruning Guidelines* and the *Tree Hazard Evaluation Form, 2nd Edition* from the *Photographic Guide to the Evaluation of Hazard Trees in Urban Areas.*

References

This section references sources of information for further review or which was consulted in the preparation of the *Tree Technical Manual*.

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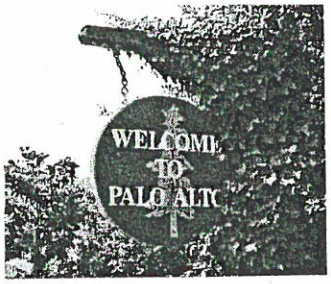
END OF SECTION



"In Palo Alto, it's the trees!"

notes:

Intent & Purpose

The City of Palo Alto is endowed with a large population of trees, including magnificent individual trees, groupings of trees, native oaks, redwoods and heritage trees which give the City a unique visual character. Trees are a source of shade, air conditioning and other environmental benefits, and yield both a high quality of life and economic benefits to the community, including enhanced property values. The City is dedicated to the planting and protection of one of its greatest natural resources. Palo Alto is recognized by the State of California and National Arbor Day Foundation as a Tree City-USA.

Sustaining trees in Palo Alto's developed environment presents a challenge, requiring careful planning and vigilant maintenance. The vestiges of the City's original abundant oak and redwood environs, so well adapted to much of this region, are increasingly vulnerable after more than a century of development. Meeting this challenge, the Tree Preservation and Management Regulations were codified in 1997, adding Chapter 8.10 to Title 8 - Trees and Vegetation of the Palo Alto Municipal Code. The ordinance complements the City's Tree Management Program for street and parkland trees.

Tree Preservation and Management Regulations are the City's primary regulatory tool to provide for orderly protection of specified trees, to promote the health, safety, welfare, and quality of life for the residents of the City, to protect property values and to avoid significant negative impacts on adjacent properties. By assuring preservation and protection through regulations and standards of care, these resources will remain significant contributions to the landscape, streets and parks — and continue to help define the unique character of Palo Alto.

The *Tree Technical Manual* is a separately published document issued by the City Manager, through the Departments of Planning and Community Environment and Public Works to establish specific technical regulations, standards and specifications necessary to implement the Ordinance, and to achieve the City's tree preservation goals. These goals are intended to provide consistent care and serve as benchmark indicators to measure achievement in the following areas:

- Insure and promote preservation of the existing tree canopy cover within the City limits
- Provide standards of maintenance required for protected and city-owned trees
- Provide a standardized content for tree reports required by the City
- Establish criteria for determining when a tree is unsafe and a possible threat to the public health, safety and welfare
- Provide standards for the replacement of trees that are permitted to be removed
- Increase the survivability of trees during and after construction events by providing protection standards and best management practices

notes:

Introduction – Use of the Manual

I. PALO ALTO'S REGULATED TREES

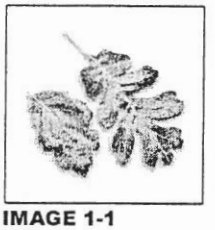
A. Palo Alto Municipal Code

Title 8 protects specific trees on public or private property from removal or disfigurement. The *Tree Technical Manual* establishes procedures and standards for the purpose of encouraging the preservation of trees. Trees that fall within the following three categories are considered *"Regulated Trees"*, and must be maintained in accordance with the standards and regulations contained in the *Manual*. A permit from the Planning or Public Works Department is required prior to removal of a *Regulated Tree*. Trees that are not in any of these categories may be maintained or removed without City review or approval.

▸ Protected Trees

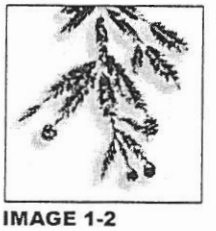
PAMC 8.10

All Coast Live Oak, *Quercus agrifolia*, Valley Oak, *Quercus lobata* trees that are 11.5-inches or greater in diameter (36-inches in circumference measured at 54-inches above natural grade) and Coast Redwood, *Sequoia sempervirens* trees that are 18-inches or greater in diameter (57-inches in circumference measured at 54-inches above natural grade) and Heritage Trees, individual trees of any size or species designated as such by City Council. Property owners may nominate a tree that has distinctive characteristics such as being of great age or size, unique form or other historical significance. A list of designated heritage trees is kept at the Planning Division offices.



Oak Tree Identification
The Valley Oak leaf on the right has deeply-lobed margins. The Coast Live Oak leaf on the left is oval-shaped with stiff prickly points.

IMAGE 1-1



Redwood Tree Identification
The redwood tree leaf has needles on opposite sides of the stem with stiff prickly points. Small cones may also be present.

IMAGE 1-2

▸ Street Trees

PAMC 8.04.020

All trees growing within the street right-of-way (publicly-owned), outside of private property. In some cases, property lines lie several feet behind the sidewalks (*see Image 2.20-3*). A permit from the Public Works Department is required prior to any work on or within the dripline of any *'street tree'*.

notes:

- **Designated Trees**
  All trees, when associated with a development project, that are specifically designated by the City to be saved and protected on a public or private property which is subject to a *discretionary development* review; such as a variance, home improvement exception, architectural review, site and design, subdivision, etc. Approval from the Planning Division is required to remove a designated tree.

B. Protected Categories
Throughout the *Manual*, the designation of *Regulated Trees* shall refer to all those trees or groups of trees included in the above three categories.

II. REQUIRED PRACTICES

- The Required Practices are to be implemented by the property owner, project applicant, contractor or designee - and are the minimum standards by which the care of a *Regulated Tree* is to be administered.

- The Required Practices category identified throughout the *Manual* are reasonable measures that are consistent with best management practices in the tree care industry and are intended to promote healthy, structurally sound trees.

- In all such cases, the ~~Director of Planning~~ & Community Environment, Public Works or *City Arborist* shall, if justified by field conditions such as conflict with utilities or a public nuisance, have the discretion to modify or add to any condition, practice or standard mentioned within the *Manual*.

III. RECOMMENDED PRACTICES

- The Recommended Practices identified throughout the *Manual* are not mandatory, but provide additional proactive measures for the care of trees, such as fertilizing, reducing a tree hazard, protection from specific *disturbances* or procedures for planting trees on problem sites.

- Note: A *recommended practice* may be required if it is so specified within the 'conditions of approval' for a development project or mitigation for injury or disturbance.

- In all cases, the Director of Planning & Community Environment, Public Works or *City Arborist* shall, if justified by changing field conditions such as conflict with utilities, have discretion to modify, redesignate or add to any condition, practice or standard mentioned within the *Manual*.

IV. DEFINITIONS

Certain terms that are unique to the arboricultural or construction industry are defined to provide a uniform understanding of the terms and concepts used and mentioned in this document. Words that are defined are noted in *italics* throughout the document

and are found in the Definitions, Section 1.00 of both the *Manual*, and in the *Tree Preservation and Management Regulations*, Chapter 8.10.020 of the Palo Alto Municipal Code (*see Appendix A*).

notes:

V. APPENDICES

The appendices at the end of this *Manual* provide supplemental information referenced within the *Manual* and sources of technical information for specific or unusual situations.

VI. ASSUMPTIONS AND LIMITING CONDITIONS

- No responsibility is assumed by the City of Palo Alto for matters legal in character regarding this *Manual*. Any legal description that may be provided is assumed to be correct.
- Care has been taken to obtain reasonable information from reliable sources for this *Manual*.
- Visual aids within this *Manual*, such as sketches, diagrams, graphs, photos, are not necessarily to scale and should not be construed as engineered data for construction.
- This *Manual* has been crafted to conform with current standards of care, best management practices, evaluation and appraisal procedures, diagnostic and reporting techniques and sound arboricultural practices as recommended by the sources listed in the References section.

END OF SECTION

notes:

SECTION 1.00 DEFINITIONS

For the purposes of this *Manual* and interpretation of regulations, the following definitions shall apply:

1. Appraisal (*see Tree Appraisal, Section 1.34*).
2. Building Area means the area of a parcel that (1) upon which, under applicable zoning regulations, a structure may be built without a variance, design enhancement exception, or home improvement exception or; (2) is necessary for the construction of primary access to structures located on the parcel, where there exists no feasible means of access which would avoid protected trees. On single-family residential parcels, the portion of the parcel deemed to be the building area access shall not exceed ten (10) feet in width. PAMC 8.10.020
3. Building Footprint means the two-dimensional configuration of a building's perimeter boundaries measured on a horizontal plane at grade level. PAMC 8.10.020
4. Certified Arborist is an individual who has demonstrated knowledge and competency through obtainment of the current International Society of Arboriculture arborist certification, or who is a member of the American Society of Consulting Arborists. A *certified arborist* can be found in the yellow pages of the local telephone book, by contacting Canopy: Trees for Palo Alto at (650) 964-6110 (www.canopy.org) or the Western Chapter of the ISA at (916) 641-2990 (www.wcisa.org).
5. City Arborist means the person designated as such by the Director of Planning and Community Environment or the Director of Public Works.
6. Compaction means compression of the soil structure or texture by any means that creates an upper layer that is impermeable ('cap'). *Compaction* is injurious to roots and the health of a tree (*see Soil Compaction Damage, Section 2.20*).
7. Dangerous see Hazardous.
8. Dead Tree means a tree that is dead or that has been damaged beyond repair or is in an advanced state of decline (where an insufficient amount of live tissue, green leaves, limbs or branches, exists to sustain life) and has been determined to be such by a *certified arborist*. If the tree has been determined to be dead, *removal* is permitted under Section 8.10.050 of the Palo Alto Municipal Code.
9. Designated Tree means all trees that are specifically designated by the City to be saved and protected on a public or private property which is subject to discretionary development approval (*see Discretionary Development Approval, Section 1.11*), such as a variance, home improvement exception, architectural review, site and design, subdivision, etc. Designated trees are to be indicated on approved building permit or landscape plans. PAMC 16.48.120

notes:

10. Diameter at Breast Height (DBH) or Diameter at Standard Height means the diameter of the perimeter tree trunk at four and one-half feet (or 54 inches) above natural grade level. See '*Protected trees*' for diameters of different species. The diameter may be calculated by using the following formula: DBH= circumference at 4.5-feet x 3.142 (D=C x Þ). 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.

11. Director means the Director of Planning and Community Environment or the Director's designee, unless otherwise specified in the *Manual*.

12. Discretionary Development Approval means a planned community zone, subdivision, use permit, variance, home improvement exception, design enhancement exception, or Architectural Review Board approval.

13. Disturbance refers to all of the various activities from construction or development that may damage trees.

14. Dripline Area means the area within X distance from the trunk of a tree, measured from the perimeter of the trunk of the tree at 54-inches above natural grade, where X equals a distance ten times the diameter of the trunk at 54-inches above natural grade.

15. Excessive Pruning means: removing in excess, one-fourth (25 percent) or greater, of the functioning leaf, stem or root area. Pruning in excess of 25 percent is injurious to the tree and is a prohibited act. *Excessive pruning* typically results in the tree appearing as a 'bonsai', 'lion's-tailed', 'lolly-popped' or overly thinned (*see 'Standards for Pruning Protected Trees', Section 5.15*).

    - Unbalanced Crown. *Excessive pruning* also includes removal of the leaf or stem area predominantly on one side, topping, or excessive tree canopy or crown raising. Exceptions are when clearance from overhead utilities or public improvements is required or to abate a *hazardous* condition or a *public nuisance*.
    - Roots. *Excessive pruning* may include the cutting of any root two (2) inches or greater in diameter and/or severing in excess of 25 percent of the roots.

16. Hazardous Tree refers to a tree that possesses a structural defect which poses an iminent risk if the tree or part of the tree that would fall on someone or something of value (target)(*see Determining if a tree is Hazardous, Section 4.00*).

    - Structural defect means any structural weakness or deformity of a tree or its parts. A tree with a structural defect can be verified to be *hazardous* by a *certified arborist* and confirmed as such by the City Arborist. For the purpose of tree removal information required by the City, the tree report shall include a completed *ISA-TREE HAZARD EVALUATION FORM*, or an approved equivalent. The *City Arborist* retains discretionary right to approve or amend a *hazardous* rating, in writing, and recommend any action that may reduce the condition to a less-than significant level of hazard. If the tree has been determined to be *hazardous*, *removal* of the tree is permitted under Section 8.10.050 of the Municipal Code.

- A *'target'* may mean people, vehicles, structures or property, such as other trees or landscape improvements. A tree may not be a hazard if a *'target'* is absent within the falling distance of the tree or it's parts (e.g., a substandard tree in a non-populated area away from pedestrian pathways may not be considered a hazard).

notes:

17. Injury means a wound resulting from any activity, including but not limited to *'excessive pruning'*, cutting, *trenching*, excavating, altering the grade, paving or *compaction* within the *tree protection zone* of a tree. *Injury* shall include bruising, scarring, tearing or breaking of roots, bark, trunk, branches or foliage, herbicide or poisoning, or any other action foreseeably leading to the death or permanent damage to tree health.

18. Monthly Inspection Report means a written report prepared by the property owner, *project arborist*, architect, developer, landscape architect, builder, applicant or other designated individual to document that a monthly tree inspection or any other required measure has been accomplished. The *project arborist* shall perform a site inspection to monitor the tree condition on a minimum interval of four weeks. The Planning Division Arborist shall be in receipt of the progress report during the first week of each calendar month until project completion at fax # (650) 329-2154.

19. Project Arborist means a *certified arborist* (*see Certified Arborist, Section 1.4*) retained by a property owner or development applicant for the purpose of overseeing on-site activity involving the welfare of the trees to be retained. The *project arborist* shall be responsible for all reports, *appraisals*, tree preservation plans, or inspections as required.

20. Protected Tree means:

    - All Coast Live Oak, *Quercus agrifolia*, Valley Oak, *Quercus lobata* that are 11.5-inches or greater in diameter (36-inches in circumference measured at 54-inches above natural grade) and Coast Redwood, *Sequoia sempervirens* trees that are 18-inches or greater in diameter (57-inches in circumference measured at 54-inches above natural grade) and Heritage trees, individual trees of any size or species designated by City Council having distinctive characteristics such as great age, large, unique form or possess historical significance (*see Introduction - Use of The Manual, Regulated Trees*).

21. Protective Tree Fencing means a temporary enclosure erected around a tree to be protected at the boundary of the *tree protection zone*. The fence serves three primary functions: 1) to keep the foliage crown, branch structure and trunk clear from direct contact and damage by equipment, materials or *disturbances*; 2) to preserve roots and soil in an intact and non-compacted state; and 3) to identify the tree protection zone (*see Section 2.15 E*) in which no soil *disturbance* is permitted and activities are restricted. (*For size, type, area and duration of the fencing, see Protective Tree Fencing, Section 2.15.D*).

22. Public Nuisance means either an individual tree or shrub on any private property or in any street, or a type or species apt to destroy, impair or otherwise interfere with any street improvements, sidewalks, curbs, *street trees*, gutters, sewers, or other public improvements, including above and below ground utilities.

PAMC 8.04.050 (b)

notes:

23. Recommended Practice means an action, treatment, technique or procedure that may be implemented for superior care or preservation of trees. Recommended practices may be required under specific conditions of approval for *discretionary development* projects or *injury* mitigation.

24. Regulated Tree means any *Protected Tree*, *Street Tree* or *Designated Tree*.

PAMC 8.10.020

25. Removal means any of the following:

    - Complete tree *removal* such as cutting to the ground or extraction of the tree.
    - Taking any action foreseeably leading to the death of a tree or permanent damage to its health or structural integrity, including but not limited to *excessive pruning*, cutting, girdling, poisoning, over watering, unauthorized relocation or transportation of a tree, or *trenching*, excavation, altering the grade, or paving within the *dripline* of the tree.

26. Required Practice means a mandatory action, treatment, technique or standard of care required to be implemented by the property owner, developer, contractor or designee for the preservation of trees

27. Root Buffer means a temporary layer of material to protect the soil texture and roots. The buffer shall consist of a base course of tree chips spread over the root area to a minimum of 6-inch depth, capped by a base course of 3/4-inch quarry gravel to stabilize 3/4-inch plywood on top. (*see Buffers, Section 2.15.5 B*).

28. Site Plan means a set of drawings (e.g. preliminary drawings, *site plan,* grading, demolition, building, utilities, landscape, irrigation, tree survey, etc.) 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 impact trees:

    - Surveyed tree location, species, size, *dripline area* (including trees located on neighboring property that overhang the project site) and *street trees* within 30-feet of the project site.
    - Paving, concrete, *trenching* or grade change located within the *tree protection zone*.
    - Existing and proposed utility pathways.
    - Surface and subsurface drainage and aeration systems to be used.
    - Walls, tree wells, retaining walls and grade change barriers, both temporary and permanent.
    - Landscaping, irrigation and lighting within dripline of trees, including all lines, valves, etc.
    - Location of other landscaping and significant features.
    - All of the final approved *site plan* sheets shall reference tree protection instructions (*see also Site Plan, Section 6.35*).

notes:

29. Soil Compaction means the compression of soil particles that may result from the movement of heavy machinery and trucks, storage of construction materials, structures, paving, etc. within the *tree protection zone*. Soil *compaction* can result in atrophy of roots and potential death of the tree, with symptoms often taking 3 to 10-years to manifest (*see Compaction, Section 2.20; and Aeration, Section 5.50 A*).

30. Soil Fracturing means the loosening of hard or compacted soil around a tree by means of a pneumatic soil probe (Gro-gun) that delivers sudden bursts of air to crack, loosen or expand the soil to improve the root growing environment.

31. Street Tree means any publicly owned tree, shrub or plant growing within the street right-of-way, outside of private property. In some cases, property lines lie several feet behind the sidewalks. A permit from the Public Works Department is required prior to any work on or around these trees. Check with the Public Works Department to verify prior to any work near a street tree (*see Introduction - Use of The Manual, Regulated Trees*).

PAMC 8.04.020

32. Target is a term used to include people, vehicles, structures or something subject to damage by a tree.

    - Note: A tree may not be a hazard if a *"target"* is absent within the falling distance of a tree or its parts (e.g., a defective tree in a non-populated area away from pathways may not be considered a hazard (*see Hazardous Tree, Section 1.15*).

33. Topping means the practice of cutting back large-diameter branches or truncating the main stem.

34. 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. When required, a *certified arborist* determines the appraisal by adjusting a tree's basic value by its condition, location and species using the most recent edition of the *Guide for Plant Appraisal*, published by the Council of Tree and Landscape Appraisers (*see Tree Reports, Section 6.00*).

35. Tree Protection and Preservation Plan means a plan prepared by a *certified arborist* that outlines measures to protect and preserve trees on a project (*see Tree Protection and Preservation Plan, Section 2.10 and Reports, Section 6.30*). This plan shall include requirements for preconstruction; treatments during demolition and/or construction; establish a *tree protection zone* for each tree; tree monitoring and inspection schedule; and provide for continued maintenance of those trees after construction according to the requirements in this *Manual*.

36. Tree Protection Zone or (TPZ) means, unless otherwise specified by a *project arborist* or *City Arborist*, the area of temporary fenced tree enclosure (*see Protective Tree Fencing, Section 2.15.D, and Section 2.15.E*). Within the TPZ, roots that are critical for tree survival are typically found in the upper three foot soil horizon, and may extend beyond the *dripline area*. Protecting the roots in the TPZ is necessary to ensure the tree's survival. The TPZ is a restricted activity zone where no soil *disturbance* is permitted, unless otherwise approved. TPZ must be identified for each tree and shown on all applicable improvement plans for a development project. Restricted and approved activities within the TPZ are outlined in Section 2.15.E.

notes:

- Determining the TPZ. Unless otherwise specified, the approved minimum TPZ shall be formulated in the following way: the TPZ radius shall be 10 times the DBH of the trunk (*see Dripline area, Section 1.13*). For example: a 2-foot DBH = a 20-foot radius from the perimeter of the trunk—or a 40-foot TPZ. The *City Arborist* retains discretionary right to extend or modify the TPZ at any time.

37. Tree Report means a report submitted to the City for review that is prepared by a *certified arborist* retained by the property owner or agent.

    - Tree Survey Report. In the case of a *discretionary development approval*, a tree survey report is required to provide information about all trees on the site including: inventory of all trees, location, species, size, condition, maintenance needs, potential impacts of disturbance, recommended mitigation measures, tree appraisal value, etc. (*see Tree Reports; Tree Protection and Preservation Plan and Tree Appraisal, Section 6.00*).
    - Letter Report. A 'letter report' shall provide a brief description of the tree information to determine whether or not a tree is dead, hazardous or constitutes a public nuisance as defined in Palo Alto Municipal Code, Chapter 8.04.050 (2) (*see Tree Reports; Tree Protection and Preservation Plan and Tree Appraisal, Section 6.00*).

PAMC 8.10.030

38. Tree Technical Manual is this document.

39. Trenching means any excavation to provide irrigation, install foundations, utility lines, services, pipe, drainage or other property improvements below grade. *Trenching* within the TPZ is injurious to roots and tree health and is prohibited, unless approved. If *trenching* is approved within the TPZ, it must be in accordance with instructions and table outlined in this *Manual* (*see Trenching, Section 2.20.C, and Existing Paving and Hardscape Conflicts with Tree Roots, Section 2.40*).

40. Verification of Tree Protection means the *project arborist* shall verify, in writing, that all pre-construction conditions have been met (tree fencing, erosion control, pruning, etc.) and are in place. An initial inspection of protective fencing and written verification must be submitted to the *City Arborist* prior to demolition, grading or building permit issuance (*see Inspections, Section 2.30*).

41. Vertical Mulching means augering, hydraulic or air excavation of vertical holes within a tree's root zone to loosen and aerate the soil, typically to mitigate compacted soil. Holes are typically penetrated 4- to 6-feet on center, 2- to 3-feet deep, 2- to 6-inches in diameter and backfilled with either perlite, vermiculite, peat moss or a mixture thereof.

END OF SECTION

notes:

SECTION 2.00 - PROTECTION OF TREES DURING CONSTRUCTION

INTRODUCTION

The objective of this section is to reduce the negative impacts of construction on trees to a less than significant level. Trees vary in their ability to adapt to altered growing conditions. Mature trees have established stable biological systems in the preexisting physical environment. Disruption of this environment by construction activities interrupts the tree's physiological processes causing depletion of energy reserves and a decline in vigor, often resulting in the tree's death. Typically, this reaction may develop from one to twelve years or more after disruption. The tree protection regulations are intended to guide a construction project to insure that appropriate practices will be implemented in the field to eliminate undesirable consequences that may result from uninformed or careless acts, and preserve both trees and property values.

Typical negative impacts that may occur during construction include:

- mechanical *injury* to roots, trunk or branches
- *compaction* of soil, which degrades the functioning roots and inhibits the development of new ones and restricts drainage, which desiccates roots and enables water mold fungi to develop
- changes in existing grade which can cut or suffocate roots
- alteration of the water table - either raising or lowering
- microclimate change, exposing sheltered trees to sun or wind
- sterile soil conditions, associated with stripping off topsoil.

Construction projects within the *tree protection zone* (TPZ) of *Regulated Trees* are required to implement the protective practices described in Section 2.00.

2.10 TREE PROTECTION AND PRESERVATION PLAN

Required Practices

Prior to commencement of a development project, a property owner shall have prepared a *Tree Protection and Preservation Plan* if any activity is within the dripline of a *Protected* or *Designated Tree*, (*see Tree Reports, Section 6.30 and Section 1.35*). The Tree Protection Plan will be prepared by a *certified arborist* to assess impacts to trees; recommend mitigation to reduce impacts to a less than significant level and identify construction guidelines to be followed through all phases of a construction project. Projects protecting only *street trees* with fencing (*see Protective Tree Fencing, Section 2.15.D*) are exempt from preparing a Tree Protection and Preservation Plan.

notes:

Required Practices

2.15 PRE-CONSTRUCTION REQUIREMENTS

The following six steps shall be incorporated within the Tree Protection and Preservation Plan prior to building permit issuance.

A. Site Plan

On all improvement plans for the project, plot accurate trunk locations and the *'dripline areas'* of all trees or groups of trees to be preserved within the development area. (*see Site Plan, Section 1.00*). In addition, for *Protected* and *Street Trees* (oaks, redwoods, heritage or *street trees*) the plans shall accurately show the trunk diameter, dripline and clearly indicate the *tree protection zone* to be enclosed with the specified tree fencing as a bold dashed line.

B. Verification of tree protection

The *project arborist* or contractor shall verify, in writing, that all preconstruction conditions have been met (tree fencing, erosion control, pruning, etc.) and is in place. Written verification must be submitted to and approved by the Planning Department prior to demolition, grading or building permit issuance (*see Inspections, Section 2.30*).

C. Pre-construction meeting

The demolition, grading and underground contractors, construction superintendent and other pertinent personnel are required to meet with the *Project Arborist* at the site prior to beginning work to review procedures, tree protection measures and to establish haul routes, staging areas, contacts, watering, etc.

D. Protective Tree Fencing for Protected Trees, Street Trees or Designated Trees

Fenced enclosures shall be erected around trees to be protected to achieve three primary goals, (1) to keep the foliage crowns and branching structure clear from contact by equipment, materials and activities; (2) to preserve roots and soil conditions in an intact and non-compacted state and; (3) to identify the *tree protection zone* (TPZ) in which no soil *disturbance* is permitted and activities are restricted, unless otherwise approved (*see Tree Protection Zone, Section 1.00 and 2.15.E*).

- Size and type of fence
  All trees to be preserved shall be protected with five or six (5' - 6') foot high chain link fences. Fences are to be mounted on two inch diameter galvanized iron posts, driven into the ground to a depth of at least 2-feet at no more than 10-foot spacing (*see Public Works Department Detail #505, Appendix K*). This detail shall appear on grading, demolition and improvement plans.
- Area to be fenced.

notes:

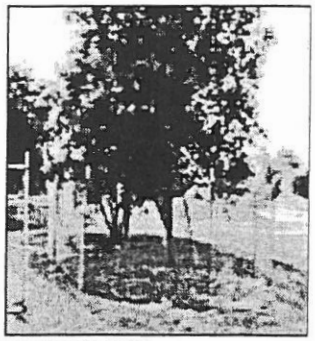


IMAGE 2.15-1
Tree Protection Fence at the Dripline

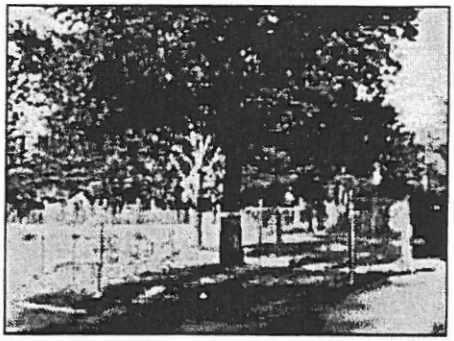


IMAGE 2.15-2
Tree Protection Fence at the Dripline

• Type I Tree Protection
The fences shall enclose the entire area under the **canopy dripline or TPZ** of the tree(s) to be saved throughout the life of the project, or until final improvement work within the area is required, typically near the end of the project (*see Images 2.15-1 and 2.15-2*). Parking Areas: If the fencing must be located on paving or sidewalk that will not be demolished, the posts may be supported by an appropriate grade level concrete base.

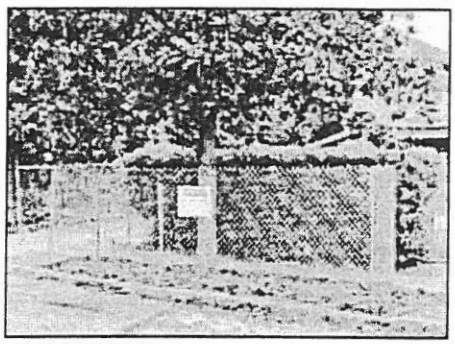


IMAGE 2.15-3
Tree Protection within a Planter Strip

• Type II Tree Protection
For trees situated within a **narrow planting strip**, only the planting strip shall be enclosed with the required chain link protective fencing in order to keep the sidewalk and street open for public use.(*see Image 2.15-3*)

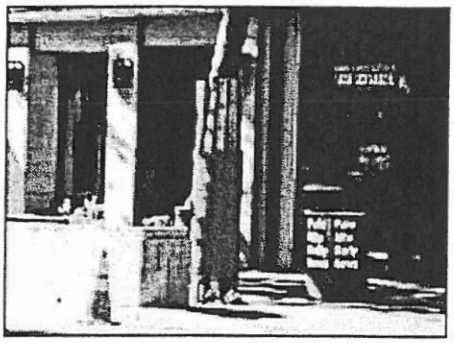


IMAGE 2.15-4
Trunk Wrap Protection

• Type III Tree Protection
Trees situated in a small tree well or **sidewalk planter pit**, shall be wrapped with 2-inches of orange plastic fencing as padding from the ground to the first branch with 2-inch thick wooden slats bound securely on the outside. During installation of the wood slats, caution shall be used to avoid damaging any bark or branches. Major scaffold limbs may also require plastic fencing as directed by the *City Arborist*. (*see Image 2.15-4*)

notes:

- Duration
  Tree fencing shall be erected before demolition, grading or construction begins and remain in place until final inspection of the project permit, except for work specifically required in the approved plans in which case the *project arborist* or *City Arborist* (in the case of *streettrees*) must be consulted.

- '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 is subject to a penalty according to PAMC Section 8.10.110.9. (*see Image 2.15-5*).

IMAGE 2.15-5
'Warning' Sign

Required Practices

E. Tree Protection Zone or (TPZ)

Each tree to be retained shall have a designated TPZ identifying the area sufficiently large enough to protect the tree and roots from *disturbance*. The recommended TPZ area can be determined by the formula outlined (*see Definitions, Tree Protection Zone, Section 1.36*). The TPZ shall be shown on all site plans (*see Definitions, Site Plan, Section 1.28*) for the project. Improvements or activities such as paving, utility and irrigation *trenching* and other ancillary activities shall occur outside the TPZ, unless authorized by the *City Arborist*, or by project approval. Unless otherwise specified, the protective fencing shall serve as the TPZ.

1. Activities prohibited within the TPZ include:

   - Storage or parking vehicles, building materials, refuse, excavated spoils or dumping of poisonous materials on or around trees and roots. Poisonous materials include, but are not limited to, paint, petroleum products, concrete or stucco mix, dirty water or any other material which may be deleterious to tree health.
   - The use of tree trunks as a winch support, anchorage, as a temporary power pole, sign posts or other similar function.
   - Cutting of tree roots by utility *trenching*, foundation digging, placement of curbs and trenches and other miscellaneous excavation without prior approval of the *City Arborist.*
   - Soil *disturbance* or grade change (*see Grade Changes and Trenching, Section 2.20*).
   - Drainage changes.

2. Activities permitted or required within the TPZ include:

   - Mulching. During construction, wood chips may be spread within the TPZ to a 4-to 6-inch depth, leaving the trunk clear of mulch to help inadvertent *compaction* and moisture loss from occurring. The mulch may be removed if improvements or other landscaping is required. Mulch material shall be 2-inch unpainted, untreated wood chip mulch or approved equal.
   - *Root Buffer*. When areas under the tree canopy cannot be fenced, a temporary buffer is required and shall cover the root zone and remain in place at the specified thickness until final grading stage (*see Definitions, Section 1.27, and Heavy Equipment,Section 2.20 C*).
   - Irrigation, aeration, fertilizing or other beneficial practices that have been specifically approved for use within the TPZ.

3. Erosion Control. If a tree is adjacent to or in the immediate proximity to a grade slope of 8% (23 degrees) or more, then approved erosion control or silt barriers shall be installed outside the TPZ to prevent siltation and/or erosion within the TPZ.

notes:

F. Tree Pruning, Surgery and Removal

Required Practices

Prior to construction, various trees may require that branches be pruned clear from structures, activities, building encroachment or may need to be strengthened by means of mechanical support or surgery. The most compelling reason to prune is to develop a strong, safe framework and tree structure. Such pruning, surgery or the *removal* of trees shall adhere to the following standards:

1. Pruning limitations:

   - Minimum Pruning: If the *project arborist* recommends that trees be pruned, and the type of pruning is left unspecified, the standard pruning shall consist of 'crown cleaning' as defined by ISA Pruning Guidelines (*see Pruning, Section 5.15, and Appendix E*). Trees shall be pruned to reduce hazards and develop a strong, safe framework.
   - Maximum Pruning: Maximum pruning should only occur in the rarest situation approved by the *City Arborist*. No more than one-fourth (25 percent) of the functioning leaf and stem area may be removed within one calender year of any *protected* or *designated tree*, or *removal* of foliage so as to cause the unbalancing of the tree. It must be recognized that trees are individual in form and structure, and that pruning needs may not always fit strict rules. The *project arborist* shall assume all responsibility for special pruning practices that vary from the standards outlined in this *manual* (*see Excessive Pruning, Section 1.15*).
   - Tree Workers. Pruning shall not be attempted by construction or contractor personnel, but shall be performed by a qualified tree care specialist or certified tree worker, according to specifications contained within this *Manual* (*see Pruning Mature Trees, Section 5.20*).

notes:

2. Surgery. Prior to construction, if it is necessary to promote health and prolong useful life or the structural characteristics, then trees shall be provided the appropriate treatments (e.g. cavity screening, bark tracing, wound treatment, cables, rods or pole supports) as specified by the *project arborist* (*see ANSI A-300, Appendix G*).

3. Tree *Removal* Procedure. When *Regulated Trees* are removed and adjacent trees that are to be preserved (as shown on the approved *site plans*) must be protected, then the following tree *removal* practices apply:

   - Tree Removal
     Removal of trees that extend into the branches or roots of *Regulated Trees* shall not be attempted by demolition or construction personnel, grading or other heavy equipment. A *certified arborist* or tree worker shall remove the tree carefully in a manner that causes no damage above or below ground to trees that remain.

   - Stump Removal
     Before performing stump extraction, the developer shall first consider whether or not roots may be entangled with trees that are to remain. If so, these stumps shall have their roots severed before extracting the stump. *Removal* shall include the grinding of stump and roots to a minimum depth of 24-inches but expose soil beneath stump to provide drainage. In sidewalk or small planter areas to be replanted with a new tree, the entire stump shall be removed and the planting pit dug to a depth of 30-inches. If dug below 30-inches, compact the backfill to prevent settling. Large surface roots three feet from the outside circumference shall be removed, including the spoils and backfilled with City approved topsoil to grade, and the area tamped to settle the soil.

Required Practices

2.20 ACTIVITIES DURING CONSTRUCTION & DEMOLITION NEAR TREES

Soil *disturbance* or other injurious and detrimental activity within the *Tree Protection Zone* (TPZ) is prohibited unless approved by the City based on a *tree report*. If an injurious event inadvertently occurs, or soil *disturbance* has been specifically conditioned for project approval, then the following mitigation is required:

A. Soil Compaction

If *compaction* of the soil occurs, it shall be mitigated as outlined in Soil Compaction Damage, Section 2.20, E and/or Soil Improvement, Section 5.50.

B. Grading Limitations within the Tree Protection Zone

- Grade changes outside of the TPZ shall not significantly alter drainage to the tree.
- Grade changes within the TPZ are not permitted.
- Grade changes under specifically approved circumstances shall not allow more than 6-inches of fill soil added or allow more than 4-inches of existing soil to be removed from natural grade unless mitigated.

- Grade fills over 6-inches or impervious overlay shall incorporate an approved permanent aeration system, permeable material or other approved mitigation.
- Grade cuts exceeding 4-inches shall incorporate retaining walls or an appropriate transition equivalent.

notes:

Required Practices

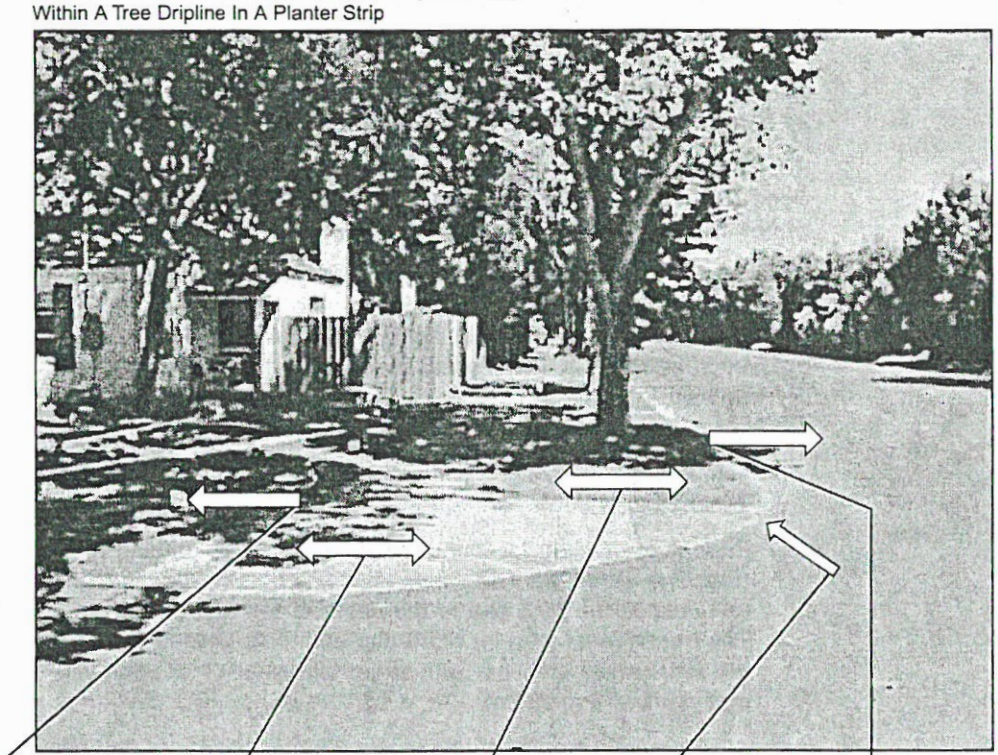
C. Trenching, Excavation and Equipment Use

Trenching, excavation or boring activity within the TPZ is restricted to the following activities, conditions and requirements if approved by the *City Arborist. (See Restriction Zones for Excavation, Trenching or Boring Near Regulated Trees, Image 2.20-1 through 2.20-3)*. Mitigating measures shall include prior notification to and direct supervision by the *project arborist*.

1. Notification. Contractor shall notify the *project arborist* a minimum of 24 hours in advance of the activity in the TPZ.
2. Root Severance. Roots that are encountered shall be cut to sound wood and repaired (*see Root Injury, Section 2.25 A-1*). Roots 2-inches and greater must remain injury free.
3. Excavation. Any approved excavation, demolition or extraction of material shall be performed with equipment sitting outside the TPZ. Methods permitted are by hand digging, hydraulic or pneumatic air excavation technology. Avoid excavation within the TPZ during hot, dry weather.
   - If excavation or *trenching* for drainage, utilities, irrigation lines, etc., it is the duty of the contractor to tunnel under any roots 2-inches in diameter and greater.
   - Prior to excavation for foundation/footings/walls, grading or *trenching* within the TPZ, roots shall first be severed cleanly 1-foot outside the TPZ and to the depth of the future excavation. The trench must then be hand dug and roots pruned with a saw, sawzall, narrow trencher with sharp blades or other approved root pruning equipment.
4. Heavy Equipment. Use of backhoes, steel tread tractors or any heavy vehicles within the TPZ is prohibited unless approved by the *City Arborist*. If allowed, a protective *root buffer* (*see Root Buffer and Damage to Trees, Section 2.25.A-1*) is required. The protective buffer shall consist of a base course of tree chips spread over the root area to a minimum of 6-inch depth, layered by 3/4-inch quarry gravel to stabilize 3/4-inch plywood on top. This buffer within the TPZ shall be maintained throughout the entire construction process.
   - Structural design. If injurious activity or interference with roots greater than 2-inches will occur within the TPZ, plans shall specify a design of special foundation, footing, walls, concrete slab or pavement designs subject to *City Arborist* approval. Discontinuous foundations such as concrete pier and structural grade beam must maintain natural grade (not to exceed a 4-inch cut), to minimize root loss and allow the tree to use the existing soil.

notes:

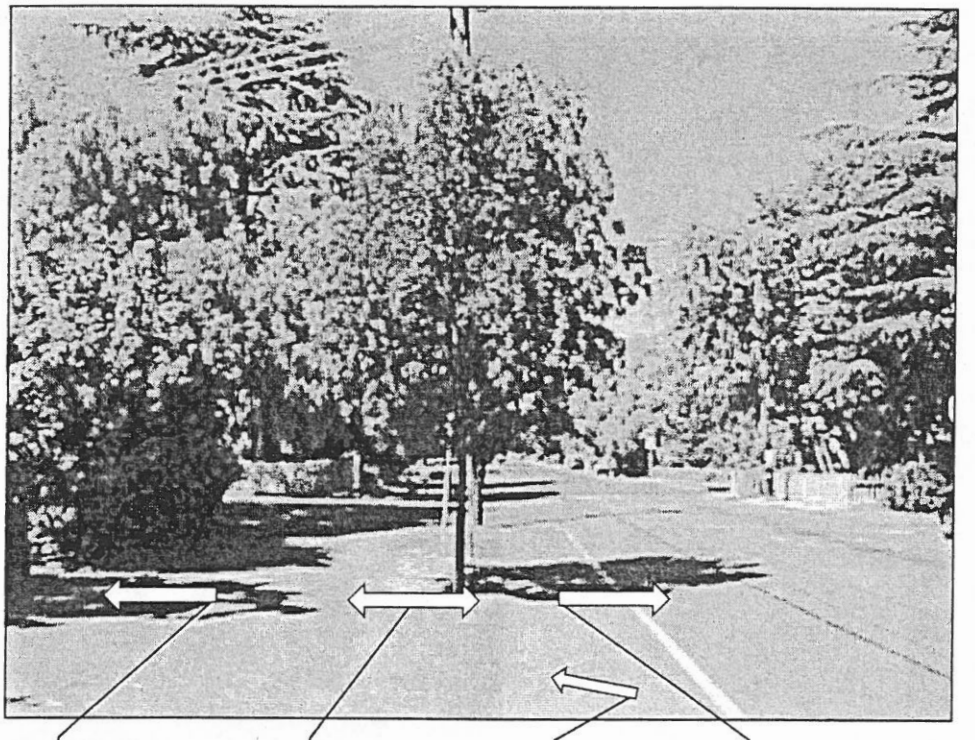
IMAGE 2.20-1
Restriction Zones For Excavation, Trenching Or Boring
Within A Tree Dripline In A Planter Strip



Zone 1 Private Property	**Zone 2** Sidewalk	**Zone 3** Planter Strip	**Zone 4** Curb & Gutter	**Zone 5** Roadway
Severing roots greater than 1" needs approval by property owner arborist.	Severing roots greater than 2" needs approval by Public Works Arborist.	No mechanical digging. Severing roots greater than 2" needs approval by Public Works Arborist.	Severing roots greater than 2" needs approval by Public Works Arborist.	No Restrictions

notes:

IMAGE 2.20-2
Restriction Zones For Excavation, Trenching Or Boring within A Tree Dripline And No Curb Or Sidewalk



Zone 1
Private Property

Severing roots greater than 1" needs approval by property owner arborist.

Zone 3
Tree Protection Zone to Pavement Edge

No mechanical digging. Severing roots greater than 2" needs approval by Public Works Arborist.

Zone 4
Pavement Edge

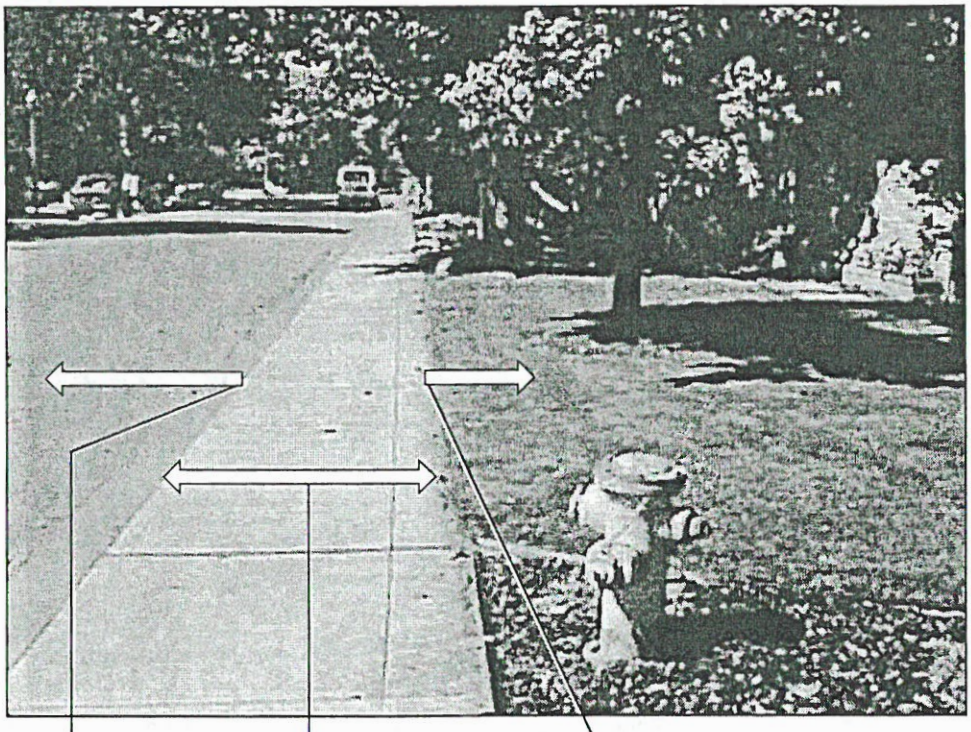
Severing roots greater than 2" needs approval by Public Works Arborist.

Zone 5
Roadway

No Restrictions

notes:

IMAGE 2.20-3
Restriction Zones for Excavation, Trenching or Boring within a Tree Dripline behind Sidewalk and Rolled Curb



Zone 5
Roadway
No Restrictions

Zone 2
Sidewalk
Severing roots greater than 2" needs approval by Public Works Arborist.

Zone 1
City Owned Tree
City owned tree is usually within 5' back of sidewalk. Severing roots greater than 1" needs approval by Public Works Arborist.

- Basement excavations shall be designed outside the TPZ of all *protected* and *designated trees* (*see Excavation, Section 2.20-3*) and shall not be harmful to other mature or neighboring property trees.

notes:

Required Practices

D. Tunneling & Directional Drilling

If *trenching* or pipe installation has been approved within the TPZ, then the trench shall be either cut by hand, air-spade, hydraulic vac-on excavation or, by mechanically boring the tunnel under the roots with a horizontal directional drill and hydraulic or pneumatic air excavation technology. In all cases, install the utility pipe immediately, backfill with soil and soak within the same day. Installation of private utility improvements shall be tunnel bored beneath the tree and roots per *Trenching Tunneling & Distance Matrix* in Table 2-1.

TABLE 2-1
Trenching & Tunneling Distance

TRENCHING DISTANCE

When the Tree Diameter At 4.5 Ft Is:	Trenching will be Replaced with Boring at this Minimum Distance (10x tree dia.) from the Face of the Tree in any Direction:
6-9" Measured At 6" à	6-9'
10-14" Measured At 54" à	10-14'
15-19" Measured At 54" à	15-19'
Over 19" Measured At 54" à	20' +

DEPTH OF TUNNELING

Tree Diameter	Depth of Tunneling
9" Or Less Measured At 6" à	2.5'
10-14" Measured At 54" à	3.0'
15-19" Measured At 54" à	3.5'
More Than 19" Measured At 54" Depth of Tunnel à	4.0'

Bore Pits Shall Be Located At A Minimum Distance As Specified By The Trenching Distance Table Above.

1. Public Utilities
   Underground public utility improvements or repairs shall be performed in accordance with the *Utility Standards for Excavation, Trenching or Boring, Section 02200.309*; and per *Restriction Zones Near Regulated Trees* (*see Images 2.20-1 through 2.20-3*).

2. Street Trees
   Exclusions for *street trees* in the publicly owned right-of-way (ROW).

   - *Street Trees* that are in conflict with utility infrastructure where the conflict cannot be resolved may be removed if approved by Public Works Operations (e.g., a tree planted directly on top of a damaged sewer lateral.)

notes:

- Emergency utility repairs shall be exempt from the above restriction zones within the TPZ. The *City Arborist* shall be contacted after any such repairs that may result in significant tree damage or *removal*.

Required Practices

E. Injury Mitigation

A mitigation program is required if the approved development will cause drought stress, dust accumulation or soil *compaction* to trees that are to be saved. To help reduce impact *injury*, one or more of the following mitigation measures shall be implemented and supervised by the project arborist as follows:

1. Irrigation Program. Irrigate to wet the soil within the TPZ to a depth of 24-inches to 30-inches. Or, apply sub-surface irrigation at regular specified intervals by injecting on approximate 3-foot centers, 10-gallons of water per inch trunk diameter within the TPZ. Duration shall be until project completion or monthly until seasonal rainfall totals at least 8-inches of rain, unless specified otherwise by the *project arborist*.
2. Dust Control Program. During periods of extended drought, wind or grading, spray wash trunk, limbs and foliage to remove accumulated construction dust.
3. Soil Compaction Damage. *Compaction* of the soil is the largest killer of trees on construction sites due to suffocation of roots and ensuing decline of tree health. If a *compaction* event to the upper 12-inch soil horizon within the tree protection zone has or will occur by any means, then one or more of the of the following mitigation measures shall be implemented (*see Compaction and Grade Change, Section 2.20 A&B and Soil Improvement, Section 5.50*).
   - Type I Mitigation. If an approved paving, hardscape or other compromising material encroaches within the TPZ, an aeration system shall be designed by the *project arborist* and used within this area (subject to approval by the *City Arborist*).
   - Type II Mitigation. If inadvertent *compaction* of the soil has occurred within the TPZ, the soil shall be loosened by one or more of the following methods to promote favorable root conditions: *vertical mulching, soil fracturing*, core-venting, radial trenching or other method approved by the *City Arborist* (*see Soil Improvement, Section 5.50*).
   - Type III Mitigation. For City-owned improvements in the right-of-way, areas within the TPZ that will be improved (e.g., asphalt, concrete or pavement) soil shall be compacted to 95% proctor density. Unimproved areas (e.g., grass, open landscape strip, etc.) soil in the TPZ shall not exceed 85% by water jet *compaction*.

Required Practices

2.25 DAMAGE TO TREES

A. Reporting

Any damage or injury to trees shall be reported within 6-hours to the *project arborist* and job superintendent or *City Arborist* so that mitigation can take place. All mechanical or chemical *injury* to branches, trunk or to

roots over 2-inches in diameter shall be reported in the *monthly inspection report*. In the event of *injury*, the following mitigation and damage control measures shall apply:

notes:

1. Root injury: If trenches are cut and tree roots 2-inches or larger are encountered they must be cleanly cut back to a sound wood lateral root. The end of the root shall be covered with either a plastic bag and secured with tape or rubber band, or be coated with latex paint. All exposed root areas within the TPZ shall be backfilled or covered within one hour. Exposed roots may be kept from drying out by temporarily covering the roots and draping layered burlap or carpeting over the upper 3-feet of trench walls. The materials must be kept wet until backfilled to reduce evaporation from the trench walls.
2. Bark or trunk wounding: Current bark tracing and treatment methods shall be performed by a qualified tree care specialist within two days.
3. Scaffold branch or leaf canopy *injury*: Remove broken or torn branches back to an appropriate branch capable of resuming terminal growth within five days. If leaves are heat scorched from equipment exhaust pipes, consult the *project arborist* within 6 hours.

B. Penalty for damage to street trees

In the event that *street trees* or their roots have been damaged, the contractor or property owner shall be subject to the penalty rate of $100.00 per inch of damage (City of Palo Alto, Current FY Fee Schedule - subject to change). Measurement of the damage shall be the width of the wound measured across the grain at the widest point. Penalty fee shall be paid to the City and deposited to the general fund as required.

Required Practices
PAMC 8.04.070

notes:
Required Practices

2.30 INSPECTION SCHEDULE

The *project arborist* or Landscape Architect retained by the applicant shall conduct the following required inspections of construction sites containing *protected* and *designated trees*. Inspections shall verify that the type of tree protection and/or plantings are consistent with the standards outlined within this *Manual* and Conditions of Approval for discretionary projects. For each required inspection or meeting, a written summary of the changing tree related conditions, actions taken, and condition of trees shall be provided to the City of Palo Alto. *Monthly Inspection Reports* shall be faxed to the Planning Arborist at (650) 329-2154.

TABLE 2-2
Inspection Schedule

INSPECTION SCHEDULE

A. Inspection of Protective Tree Fencing. The *City Arborist* shall be in receipt of a written statement from the applicant or *project arborist* verifying that he has conducted a field inspection of the trees and that the protective tree fencing is in place prior to issuance of a demolition, grading, or building permit, unless otherwise approved *(see Verification of Tree Protection, Section 1.39)*.

B. Pre-Construction Meeting. Prior to commencement of construction, the applicant or contractor shall conduct a pre-construction meeting to discuss tree protection with the job site superintendent, grading equipment operators, *project arborist, City Arborist,* and, if a city maintained irrigation system exists, the Parks Manager (Contact 650-496-6962).

C. Inspection of Rough Grading. The project arborist shall perform an inspection during the course of rough grading adjacent to the TPZ to ensure trees will not be injured by compaction, cut or fill, drainage and trenching, and if required, inspect aeration systems, tree wells, drains and special paving. The contractor shall provide the *project arborist* at least 48 hours advance notice of such activity.

D. Monthly Inspections. The *project arborist* shall perform monthly inspections to monitor changing conditions and tree health. The *City Arborist* shall be in receipt of an inspection summary during the first week of each calendar month or, immediately if there are any changes to the approved plans or protection measures *(see Monthly Inspection Report, Section 1.17)*.

E. Special activity within the Tree Protection Zone. Work in this area (TPZ) requires the direct onsite supervision of the project arborist *(see Trenching, Excavation and Equipment, Section 2.20 C)*.

F. Landscape Architect Inspection. For *discretionary development projects*, prior to temporary or final occupancy the applicant or contractor shall call for the Landscape Architect to perform an on site inspection of all plant stock, quality of the materials and planting *(see Quality, Section 5.20.1 A)* and that the irrigation is functioning consistent with the approved construction plans. The City shall be in receipt of written verification of Landscape Architect approval prior to scheduling the final inspection, unless otherwise approved.

2.40 PAVEMENT AND HARDSCAPE CONFLICTS WITH TREE ROOTS

Conflicts may occur when tree roots grow adjacent to paving, foundations, sidewalks or curbs (hardscape). Improper or careless extraction of the these elements can cause severe *injury* to the roots and instability or even death of the trees. The following alternatives must first be considered before root pruning within the TPZ of a *Regulated Tree*.

notes:

A. Removal and Replacement of Pavement or Sidewalk:

Required Practices

- Removal of existing pavement over tree roots shall include the following precautions: Break hardscape into manageable pieces with a jackhammer or pick and hand load the pieces onto a loader. The loader must remain on undisturbed pavement or off exposed roots. Do not remove base rock that has been exploited by established absorbing roots. Apply untreated wood chips over the exposed area within one hour, then wet the chips and base rock and keep moist until overlay surface is applied.
- Replacement of pavement or sidewalk: An alternative to the severance of roots greater than 2- inches in diameter should be considered before cutting roots. If an alternative is not feasible remove the sidewalk, grind roots only as approved by the Public Works Arborist and replace sidewalk using #3 dowels at the expansion joint if within 10-feet of a street tree. Use a wire mesh reinforcement within if within 10-feet of the trunk of a *protected* or *street tree*.

Note: Any work in the right-of-way requires a street work permit from Public Works Department.

B. Alternative methods to prevent root cutting:

Recommended Practices

The following remedies should be considered before cutting tree roots that may result in tree instability or decline:

- Grinding a raised sidewalk edge.
- Ramping the walking surface over the roots or lifted slab with pliable paving.
- Routing the sidewalk around the tree roots.
- Install flexible paving or rubberized sections.
- On private property, new sidewalk or driveway design should consider alternatives to conventional pavement and sidewalk materials. Substitute permeable materials for typical asphalt or concrete overlay, sub-base or footings to consider are: permeable paving materials (such as ECO-Stone or RIMA pavers), interlocking pavers, flexible paving, wooden walkways, porches elevated on posts and brick or flagstone walkways on sand foundations.

C. Avoiding Conflict

Recommended Practices

Conflicts and associated costs can be avoided or reduced by the following planting practices:

- Plant deep rooted trees that are proven to be non-invasive.
- Over soil that shrinks and swells, install a sidewalk with higher strength that has wire mesh and/or expansion slip joint dowel reinforcement.
- Follow soil loosening planting techniques to promote deep rooting.

notes:

- Install root barrier only along the hardscape area of the tree (but allow roots to use open lawn or planter strip areas).
- Dedicate at least 10-linear feet of planting space for the growth of each tree.

Recommended Practices

D. Alternative Base Course Materials

When designing hardscape areas near trees, the project architect or engineer should consider the use of recommended base course material such as an engineered structural soil mix. The Palo Alto approved structural soil mix will allow a long term cost effective tree and infrastructure compatibility that is particularly suited for the following types development projects: repair or replacement of sidewalk greater than 40-feet in length; subdivisions with new street tree plantings; planting areas that are designed over structures or parking garages; confined parking lot medians and islands or other specialized conditions as warranted. (*see City of Palo Alto Public Works Improvement Specifications Standards and; www.amereq.com/cuintro*).

END OF SECTION

notes:

SECTION 3.00 - REMOVAL, REPLACEMENT AND PLANTING OF TREES

INTRODUCTION
A *Regulated Tree* may not be removed without City review and approval, except in certain emergencies. The purpose of City review is to verify that the removal is allowed under City law, and to prevent unnecessary tree removal. In some cases, a removed tree must be replaced by the property owner or, in the case of street trees, developer. This section describes the type and size of tree required, and the planting techniques to be used. It also describes how to determine the replacement value of a tree that cannot be replaced in its original location, and the circumstances in which the City may require a security deposit to assure the survival of trees during development projects.

3.05 TREE REMOVAL

A. Allowable Removal

A written permit is required to remove a *Regulated Tree*, except in emergency situations outlined in Hazardous Trees, Section 4.00. *Removal* of *Regulated Trees* is allowed if:

- A *Protected Tree* is determined to be dead, hazardous (*see Hazardous trees, Section 4.0*), a detriment to or crowding an adjacent *protected tree*, or a *Public Nuisance* (*see Section 1.00*).
- A *protected tree* trunk is touching or the basal flare is under the building footprint of an existing building (for example, uplifting foundation, contact or damage to eves, gutter, etc.).
- On projects other than a single family residence, a *Protected Tree* if it reduces the otherwise-permissible *Buildable Area* by more than 25%.
- Other specific circumstances exist, as described in Section 8.10.050, Appendix A.
- In the case of *street trees*, Public Works Operations issues a written approval.
- In the case of a *Designated Tree* shown on previously approved site or landscape plans, the Director approves the removal in writing.

B. Permit Application

Required Practices

Tree Removal Applications are available at the City of Palo Alto, Development Center, 285 Hamilton Avenue, Palo Alto, CA 94301, 650-617-3118. The following is a checklist of items necessary for City review for tree removal. Additional information may be required by the reviewing staff. Response will generally be mailed to the applicant within 10 days. The removal permit must be on site during the *removal*.

notes:

Tree Removal Checklist

- ❑ Completed City of Palo Alto Protected Tree Removal Application (available at the City of Palo Alto, Development Center, 285 Hamilton Avenue, Palo Alto, CA 94301. (650) 617-3118).
- ❑ Payment of $145.00 review process fee ($125 Schedule Fee and $20 Records Management)
- ❑ Arborist letter report from a *certified arborist* on company letterhead (*see Tips for Selecting an Arborist, Section 5.95, and Tree Reports, Section 6.10*) — to include the following information for each tree:
- ❑ A written narrative describing the tree species (common and scientific); location (in relation to street, structures and property line); size (DBH, height & crown spread); condition (foliage, vigor, structural integrity, etc.); life expectancy and prognosis (is the tree *hazardous*, severe decline, property damage, etc.?)

C. Hazard Trees

To remove a *protected* or *designated* tree that has been verified as *hazardous*, as defined within Chapter 8.10 of the Palo Alto Municipal Code and *Tree Technical Manual*, written approval from the *City Arborist* is required and must be available on site when the tree is being removed, unless emergency conditions exit (*see Emergency Removal Conditions, Section 4.00*).

Required Practices

3.10 WHEN TREE REPLACEMENT IS REQUIRED

Replacement Trees. Certain conditions determine whether or not a *protected* or *designated tree* must be replaced. In summary, they are:

PAMC 8.10.050

A. Protected Trees

If the City authorizes removal of a protected tree because it is dead, dangerous, or a nuisance, no tree replacement is required. In all other cases, the tree must be replaced.

B. Designated Trees

When authorizing removal of a *Designated Tree*, the Director or the Director's designee shall require tree replacement if it is necessary or desirable to implement the intent of the original site design. The number and nature of the replacement trees shall be determined by the Director or designee, taking into consideration the value of the tree removed and the site design.

PAMC 8.04.070

C. Street Trees

If the City authorizes removal of a street tree in connection with a development project, it shall specify the replacement requirements in the permit authorizing removal.

3.15 ALTERNATIVES WHEN TREES CANNOT BE REPLACED ON SITE

In some circumstances, crowding or other physical constraints make it impossible or undesirable to replace a tree of equal value in the same place. In that case, the value of the tree shall be computed under the Tree Value Replacement Standard in Section 3.25. Once the value has been determined, that sum of money shall be used in the following order of preference, as approved by the Director: (1) to provide additional trees elsewhere on the site; (2) to add or replace street trees or other public landscaping in the vicinity, or (3) to add trees or other landscaping to other City property.

notes:

3.20 TREE CANOPY REPLACEMENT STANDARD FOR ONSITE TREE REPLACEMENT

Required Practices

When a *Protected* or *Designated Tree* is to be replaced on site, the following standards apply.

A. Species

The replacement trees shall be the same species unless the Director determines that another species would be more suitable for the location. Factors to be considered include the long term health of the tree in the location and its compatibility with the adjacent uses as well as design considerations.

B. Location

The location of the replacement tree on site shall be approved by the Director. If it is not possible or desirable to replace the tree on site, Section 3.15 shall apply.

notes:

C. Size and Number

Often it is not possible to replace a large, older tree with a single equivalent tree. In such cases, the following tree canopy replacement ratio shall be used:

TABLE 3-1
Tree Canopy - Replacement Standard

COLUMN 1	COLUMN 2	COLUMN 3
Canopy of the Removed Tree (Avg. dist. across the canopy*)	Replacement Trees	Alternative Tree
4'-9'	Two 24" Box Size (minimum)	One 36" Box Size
10'-27'	Three 24" Box Size	Two 36" Box Size
28'-40'	Four 24" Box Size	Two 48" Box Size
40'-56'	Six 24" Box Size	Two 48" Box & Two 36" Box Size
56'-60'	Two 24" Box & Two 36" Box + Two 48" Box Size	**
60'+	**	**

*Add half of the difference between the two to the narrowest measurement for the average canopy.
** Replace the tree with a combination of both Tree Canopy and Tree Value Standards.

Note: Basis of this table is determined by the growth of one 24" box size tree, growing at a rate equivalent to 9 feet of canopy over the course of ten years.

How to use Table 3-1, Tree Canopy Replacement Table.

- Column 1. Determine the leaf canopy of the removed tree by measuring the distance across the canopy at the widest point and narrowest point. Add half of the difference between the two to the narrowest measurement for the average canopy. The leaf canopy diameter of the tree (this information is typically supplied within the arborist report) is used to determine number and size of replacement trees in Column 2.
- Column 2. Determine the number of replacement trees. The planting of new trees should equal the leaf canopy of the removed tree within a period of ten years. The minimum replacement for removal of any *Protected or Designated Tree* shall be two 24-inch box trees.
- Column 3. Alternative size of trees may be desired. The property owner shall have the option to plant an alternative size tree to accommodate site specific landscape needs or constraints, such as space, design or soil volume limitations.

> Example of Tree Canopy Replacement Ratio:
>
> The removal of a tree with a 39' crown spread will require four 24-inch box trees to satisfy the criteria of this Section. Methodology- e.g. the average canopy of a new tree is 4' wide + the expected canopy growth of 6" per year x 10 years = a 9' net canopy of one replacement tree. Thus, four 9' trees = 36' of new canopy, and is a close approximate to the original 39' canopy tree.

3.25 TREE VALUE REPLACEMENT STANDARD

notes:

When the value of a tree needs to be determined for establishing the amount of security required, or for any other purpose, the value shall be determined by using the most recent edition of the *Guide for Plant Appraisal* published by the Council of Tree and Landscape Appraisers (*see Section 6.45.)*

3.26 SECURITY DEPOSITS

As a condition of a development approval, the Director may require that the developer post security of between 25% and 100% of the value of the trees to be preserved, as determined under Section 3.25. The security may be a cash deposit, letter of credit, or surety bond and shall be filed with the Finance Department. It shall be in a form satisfactory to the City Attorney. The security shall be posted before issuance of any grading or building permits. The guarantee period shall be specified; in general, it shall be at least two years after expected completion of construction. If the trees fail to survive, the developer shall replace them; if the developer fails to do so, the City may use the security to provide off site trees and/or landscaping as described in Section 3.15.

3.30 TREE AND SHRUB PLANTING SPECIFICATIONS

Required Practices

Planting specifications apply for trees and shrubs that are: 1) planted as a replacement for a *Regulated Tree*, 2) to be planted as a *street tree* within the City right-of-way or other public land; or 3) planted as part of a landscape plan subject to non-residential development approval (*see Discretionary Development Approval, Section 1.11*). Using the following specifications will result in consistent city-wide plantings, and superior tree growth and vitality. To achieve this, the landscape architect shall incorporate these items into their specifications.

3.35 PLANTING STOCK AND MATERIALS

A. Quality

Required Practices

It is the contractor's responsibility to supply stock that meets ANSI 760.1-1996 and City of Palo Alto *Tree Technical Manual Standards*.

- All plants and trees installed within the City of Palo Alto shall conform with American Association of Standards, ANSI Z60.1, *Specifications for Acceptance of Nursery Trees at the Time of Delivery*, in all ways.
- Plants shall be sound, healthy, vigorous, and free of plant disease and insect pests and their eggs.
- Container stock shall be grown for at least 8-months in containers in which delivered and shall not be root bound or have girdling roots.
- Trees shall not have been topped or headed.
- Landscape Architect shall inspect and verify, in writing, that all plant material to be installed on the site meets the above standards and is acceptable.
    - The written verification shall be forwarded to the City Planning Department files within one week of acceptance (*see Inspections, Section 2.30 F)*.
    - Inspection shall occur after delivery of stock to the project site.

notes:

- Plants and trees with broken tops, branches or injured trunks shall be rejected.

Required Practices

B. Miscellaneous Materials

The following materials shall be used unless otherwise specified:

- Tree stakes. Support stakes shall be treated 2-inch diameter Lodgepole Pine, two stakes per tree or approved equivalent. No cross brace shall be used. After installation, stakes shall be trimmed so that the branches clear the top of the stake.
- Tree Ties. 'V.I.T' Tree Supports (recommended) or equivalent, twist brace, fabric-reinforced rubber (3/8-inch minimum), or equivalent approved by the City of Palo Alto shall be used and installed in a figure eight fashion to support the tree to the stakes.
- Mulch. Screened untreated wood chips 1/2- to 1-inch in size, spread to a 2-inch depth out to the edge of the root ball. The mulch should be kept at least two inches away from the trunk and shall be applied to each tree (*see Mulching, Section 3.45-G*).
- Root Control Barriers. Use along all public sidewalks, and indicate on approved plans and drawings. 18-inch Linear Barrier LB18-2 root control barrier shall be used. Unless specified otherwise, a 10-foot length shall be placed on center with the tree and on the sidewalk side only. Root barrier boxes are not approved.
- Mower guards. For trees in turf areas requiring regular mowing, the tree stem shall be protected with TreeGuard or equivalent.
- Tree Grates. Where sidewalk width is less than 8-feet and new trees will be installed in a tree well, metal tree grates shall be used and approved by Public Works. Minimum size grates shall be 4' x 4' unless specified otherwise. All tree grates shall be mounted in frames, frames inset into a concrete foundation within the sidewalk or surface material and shall be flush with the surrounding surface.

3.40 PLANTING SITE PREPARATION

Required Practices

A. Soil Preparation and Conditioning

- All debris, wood chips, pavement, concrete and rocks over 2-inches in diameter shall be removed from the planting pit to a minimum of 24-inch depth, unless specified otherwise (*see also Soil Improvement, Section 5.50*).

Required Practices

B. Planter Pit

- Trees in a confined planter pit or sidewalk area: The planting hole shall be excavated to a minimum of 30-inches deep x the width of the exposed area. Scarify the sides of the pit (*see Placing the Tree, Section 3.45 D*). Soil beneath the rootball shall be compacted to prevent settling.

- Trees in all other areas: Excavate the hole's width a minimum of three times the diameter of the container, and deep enough to allow the root ball of the container to rest on firm soil. Scarify the sides and the bottom of the pit.
- The height of the container root ball should be 1-2-inches higher than grade level (*see Placing the Tree, 3.50*), except when structural urban tree soil mix is used (*see Alternative Base Course Materials, Section 2.40 D*), in which case the tree may be planted at level grade.

notes:

C. Drainage

1. Poor drainage. For *discretionary development projects*, a percolation test is required to ensure there is adequate drainage for planting new trees. A minimum of one test per site shall be reviewed with the *project arborist* or Landscape Architect prior to plant installation. One or more of the following mitigations are required for locations with poor drainage.

Required Practices

2. Mitigation for locations with poor drainage:

Required Practices

   - Install french drain. The trench shall radiate away from the tree and be a minimum of 18-inches in depth filled with drain rock. The grade shall fall away from the tree trunk.
   - Install drain tiles or perforated pipe directing water away from the tree.
   - Install a drain chimney at the bottom of the planting pit, a minimum of 4-inches in diameter and filled with medium sand or fine gravel to ensure percolation of all water from the filled planter pit. Auger bore drain holes to penetrate hard pan or cileechee clay a minimum of 12-inches into undisturbed pervious soil. Angle the boring as close to vertical as possible.

3. Planting Percolation Test. A minimum of one test per development site is required. Additional tests may be needed as required by Landscape Architect or *City Arborist*. Fill planting hole with water, provide drainage that is greater than 2-inches per hour. If percolation is less, one or more of the following mitigation measures must be implemented for tree planting *(see Soil Improvement, Section 5.50)*.

Required Practices

D. Aeration tubes for trees

Required Practices

- *Street trees* planted in the City right-of-way, sidewalk planter pits, planting strip, medians or *designated trees* when specifically required in development plans, shall use 4-inch diameter perforated aeration piping (rigid or flexible), circling the bottom of the planter connected to a 'T' fitting to two riser tubes with grated caps and wrapped with filter fabric, per Public Works Planting Detail #503 for tree wells or #504 for planter strip planting (*see Appendix H*). This detail shall be shown on the approved landscape plans.
- All other trees (*see Aeration TubeTable, 3-2*) shall be planted with 4-inch diameter perforated aeration tubes with grated plastic caps placed at the edge of the root ball to the bottom of the pit per Table 3-2, Aeration Tubes. Irrigation heads shall not be installed inside the aeration pipes.

notes:

- Any of the above holes, pipes, grates or fixtures shall include the installation of Filter Fabric wrap over the side openings and secured as recommended by manufacturer when connected to an approved aeration system.

TABLE 3-2
Aeration Tubes

AERATION TUBE TABLE	
TREE SIZE	NUMBER OF TUBES
15 gallon trees	one tube
24' box trees	two tubes
36' box trees	two tubes
48' box trees or larger	four tubes or as needed

3.45 PLANTING THE TREE

Required Practices

A. Perform percolation test

If the soil is dry, add a few inches of water in the hole. Let it drain before planting the tree (*see Percolation Test, Section 3.40 C*).

B. Depth

To check the proper depth of the rootball, place the tree in the hole and lay a pole or shovel across the original grade - the top of the root ball should be 1 to 2-inches higher (*see notes on depth, Section 3.40 B*).

C. Container and Roots

Remove tree from the container and trim the root ball in the following way:

- Thick circling roots: straighten and/or cut cleanly
- Thin roots: make three to four vertical cuts 1/2-inch deep around root ball, spread the bottom out if necessary

D. Placing the Tree

Locate the tree in the hole, and rotate the tree to direct the main branches away from the street side, if possible.

E. Filling the Hole

Place the aeration tubes, fill the hole halfway up with original soil (amended soil only when approved), and gently tamp out air pockets with a pole or shovel handle. Add about 1-inch of water, and let drain. Fill the rest of the hole to grade, water the fill soil, and let drain.

F. Staking

Place the stakes at the edge of the root ball (drive them 2-feet into undisturbed ground), and avoid contact with the branches. If in a windy area, set the stakes in a plane at right angles to the wind. Remove the nursery stake. Loosely place two ties in a figure eight around the trunk, as low as needed to hold the tree upright and nail to the stake. Stakes shall be trimmed so that the branches clear the top of the stake. Do not install a cross-brace.

G. Berm, Mulch and Water

In non-turf areas, form a soil berm 3 to 4-inches high at the outermost edge of the root ball. Place 1 to 2-inches of mulch or bark over root ball and berm, keeping the mulch away from the trunk a minimum of 2-inches. Fill the berm with water to capacity (*see Watering 5.45, Section A*).

notes:

3.50 PLANTING IN DIFFICULT SOIL CONDITIONS

Recommended Practices

A. Turf Areas

In turf areas that receive regular watering, the watering berm may be eliminated. The turf shall be maintained a minimum of one foot from the new tree stem, and mulch placed on top of the rootball. The mulch shall not be touching the tree stem. In turf areas, install tree guard (*see Mower Guards, Section 3.35 B*).

B. Alternate Specifications

Occasionally, tree planting must occur in poor or difficult soil where standard planting techniques will result in poor-to-average performance or mortality (such as unique or unusual regional geology, slope, soil volume, restrictive physical or chemical properties, poor drainage, etc.). In this case, the responsible party must investigate alternative solutions to enable long term tree growth. Alternative planting specifications or plans that vary from the native or typical soil conditions shall be submitted to the *City Arborist* for approval prior to installation.

- Alternative or specified soils, such as engineered, amended or structural urban tree soil mix, including written specifications and physical samples, shall be submitted for approval from the *City Arborist* and/or Landscape Architect (*see Alternative Base Course Materials, Section 2.40 D*).

END OF SECTION

notes:

SECTION 4.00 HAZARDOUS TREES

INTRODUCTION
Property owners are responsible for the trees on their own property. The City does not require advance permission for removal of *Protected* or *Designated Trees* in emergencies. However, it does require documentation of the problem after the fact. This is to avoid the unlawful removal of sound trees on the grounds that they are hazardous. If there is no immediate danger, and the structural deficiency can be corrected, it should be. If the City determines that there was no reasonable basis for believing there was an emergency, the property owner may face penalties for violating City law.

The health and safety of a tree are two distinct and separate functional characteristics. A vigorous and healthy tree may not necessarily be of sound wood or structure. To remove a dangerous *protected* or *designated tree*, it must first be evaluated and the tree determined to be *"hazardous"* as defined in this section. This must be verified in writing by the *City Arborist* before the tree can be *removed*. (*see also Removal, Replacement and Planting Trees, Section 3.00, and ISA Hazard Evaluation Form, Section 4.20 B*).

A. Tree Hazard Responsibility

On private property, it is the responsibility of the property owner to mitigate or abate a known hazardous condition of a *protected* or *designated tree* that may be of questionable structure or deemed as hazardous. Most tree hazards can be prevented with regular checkups by a tree care professional and timely maintenance action by the property owner. Street trees on city property that may be a public safety hazard should be reported to the City of Palo Alto, Public Works — Operations at (650) 496-5953.

B. Recognizing Tree Hazards

Required Practices

Determining whether or not a tree's defects constitutes a condition that presents an imminent hazard to an area requires a high degree of knowledge and experience. Hazard tree assessment of a *protected* or *designated tree* should only be evaluated by an arborist who is familiar with tree physiology and can interpret the external signs of weaknesses, who can perform internal checks if necessary and recommend mitigation (*see Hazard Reduction and Prevention, Section 4.40, and Hazard Evaluation Form, Section 4.20 B*).

4.10 EMERGENCY REMOVAL CONDITIONS

A. Abatement

When a tree has partially failed or it is apparent it is about to fail and persons or property are threatened the tree may be removed without City review or approval. The City does not require an arborist report before the removal in this instance.

notes:

B. Authorization

Such cases must be substantiated after the fact by the property owner and tree professional with photographs, abatement information, insurance claim or other relevant information and completion of a Protected Tree Removal Application. The information is to be submitted to the City Planning Division Arborist within five days of emergency *removal*. All other authorizations are subject to the standard procedure outlined in *Removal of Protected Trees, Section 3.05.*

Required Practices

4.20 CRITERIA USED BY THE CITY TO DETERMINE IF A TREE IS HAZARDOUS

A. Definition of Hazardous

Palo Alto Municipal Code Chapter 8.10.020 defines *'Hazardous'* as: an imminent hazard or threat to the safety of persons or property. If a tree possesses a structural defect that may cause the tree or part of the tree to fall on someone or something of value (i.e. *'target'*), and the condition is determined to be imminent, the tree is considered *hazardous*.

B. Evaluation Form

The City uses the national standard, an ISA - HAZARD EVALUATION FORM (*see Appendix C*) as a basis to determine the hazard rating of a tree (*see Hazard Rating, Section 4.25*). This form, or an approved equivalent, must be completed by a *certified arborist*. The *City Arborist* retains discretionary right to approve, request in writing a second opinion of a rating, in writing, or recommend action that may reduce the condition to a less-than significant level of hazard.

C. Authorization

If the *hazardous* condition or *target* cannot be mitigated or reduced to a less than significant level (*see Hazard Reduction and Prevention, Section 4.40*) then the tree shall be authorized by the City and removed by the property owner to abate the condition.

Required Practices

4.25 DETERMINING A TREE'S HAZARD RATING

For the purpose of removal, if a tree is declared a hazard it must be rated for the level of hazard to persons or property by using the Hazard Rating Formula, or other professional methodology acceptable to the City of Palo Alto (*see Hazard rating formula Table 4-1 and Appendix C*):

TABLE 4-1
Hazard Rating Formula

ISA - HAZARD RATING FORMULA International Society of Arboriculture			
Failure Potential	**+ Target**	**+ Additional Factors/Size of Part**	**= Hazard Rating**
	+	+	=
1 = low 4 = severe	1 = low 4 = severe	1 = low 4 = severe	3 = low 12 = severe

Note: The above factors are combined to quantify a hazard rating. For example, a minimum rating of 3 is the safest (a low predicable hazard), and the maximum rating of 12 is an imminent hazard (a high predictable hazard). Further details regarding this formula can be found in the ISA- HAZARD EVALUATION FORM (see Appendix C) and the ISA publication " Evaluation of Hazard Trees in Urban Areas, most current edition.

notes:

A. Failure Potential Rating

Failures do not occur at random, but are the result of a combination of defects and aggravating conditions. The scope of the professional evaluation will include structural defects in the tree (including branches, trunk and roots; and if necessary, shall employ the use of the most current methods of internal decay inspection available); soil/slope and/or creek bank stability; individual species susceptibility to failure; pruning; history; decay weaknesses and any other compromising or pertinent factors considered by the consultant.

B. Target Rating

Evaluation of potential targets shall include people, structures or property use and occupancy that are imminently threatened. Property use shall consider what structures or activities are under or around the tree (e.g. building, parking, pedestrian, recreational, utility lines, hardscape, etc.). Occupancy shall consider frequency of the use (occasional, intermittent, frequent or constant), and whether the *target* will be present when failure occurs.

- Consideration shall be given as to whether the *target* can be reasonably removed or isolated to reduce the hazard rating to a less than significant level. A target means people or property (public or private).
- A tree may be a potential hazard if it is: (a) a tree with the potential to fail; (b) in an environment that increases the likelihood of failure and; (c) a tree that would strike a *target*.

C. Additional Factors

Evaluation of other factors that contribute to aggravating conditions shall be considered, such as: size of the affected defect (i.e. a small branch vs. the entire tree uprooting); significant potential of fire, utility line contact or catastrophic effects, etc.

Recommended Practices

4.30 TREE EVALUATION CHECKLIST

This part is intended to further help the property owner understand tree defects and how they may be interpreted by an arborist. Many tree defects are not readily apparent because decay or structural damage may be internal. Also, poor tree health may not reflect poor tree structure. *Hazardous* trees must be carefully evaluated. The following checklist of criteria that is typically used by professionals may indicate potential or current tree hazards. The checklist is not meant to be a comprehensive guide, however, it is an outline of indicators that may alert a property owner to potential hazards and suggest action to avert a tree failure and liability. If you answer 'yes' to one or more of the checklist items, you should contact an arborist to discuss how to reduce the potential hazard.

A. Hazard Evaluation Questionnaire

- Target: If the tree or branch falls will it hit cars, houses, structures, power lines or people? If so, immediate action may be necessary.
- Dead Branches: Are there dead tops or branches? Is the tree dead?
- Cracks: Are there deep, open cracks in the trunk or branches? These are major starting points for trunk and branch failure.

notes:

- Crotch Cracks: Are there deep, open cracks below joining trunks or stems?
- Tree Architecture: Has the tree grown beyond its species specific shape into a hazardous form? Is the tree leaning?
- History: Has the tree recently lost large branches?
- Edge Tree: Were neighboring trees recently removed, leaving tall trees exposed at the edge that may be subject to unexpected wind dynamics and blow-over?
- Living Branches: Do live branches bend abruptly upward or downward where tips of large branches were cut off? These may pull out of trunks that are weakened by rot or cracks. Beware of large branches on rotten or cracked trunks.
- *Topping:* Are large branches growing rapidly from topping cuts? These sprouts have weak attachments and may weaken further as they grow. Is there decay below topping cuts?
- Storm *injury*: Are there broken branches, split trunks, or injured roots? Are branches close to power lines?
- Root Rot: Are there fungus fruit bodies (mushrooms) on roots or near the trunk? Were roots injured by construction?
- Rots and Cankers: Are there hollows or cankers (dead spots) in the trunk or major branches, some with fungus fruit bodies?
- Construction *injury*: Have roots, trunk, or branches been injured?
- Is there a new lawn or garden over injured roots? The added fertilizer may stimulate the growth of fungi that will rot the supporting roots while the top gets heavier. A moderate storm could cause the tree to fall.
- Guying of trees. Staking and guying of small to medium size trees may benefit from the additional support. Discretion must be exercised that the guying does not hide weaknesses, such as toppling over, that result from poor quality nursery stock or girdling roots.

4.40 HAZARD REDUCTION AND PREVENTION

Recommended Practices

Review the following list to reduce hazardous conditions.

- Plant trees that are not problematic and that fit the site
  The International Society of Arboriculture (ISA) has developed a list to assist you to avoid planting a tree that may become a problem (*see Inherent Failure Patterns for Selected Species, Appendix D*).
- A healthy, vigorous tree that receives regular care is less likely to become *hazardous* than one that is ignored. Prevention is the best solution to the tree hazard problem.
- The risk of a hazard tree may be reduced by removing dead and broken branches, reducing branch end weights, by mechanically supporting weak branches from below, or by cabling and bracing.

In some cases, *targets* may be removed such as by moving picnic tables or other items beneath a precarious tree, fencing to prevent access to such trees, or rerouting pedestrian or vehicular traffic.

- If there are no other options to abate the hazard, the tree may need to be removed entirely (*see Removing a Hazardous Tree, Section 4.10*). Steps outlined in the Tree Removal Procedure (*see Section 3.05*) should be submitted as soon as possible for review by the City.

notes:

The following checklist will help property owners avoid future problems:

- ❑ Inspect your trees carefully at least once each season every year. Annually, have a *Certified Arborist* inspect your trees and provide you with a written report.
- ❑ Avoid planting brittle species where falling limbs could injure people or property (*see Inherent Failure Patterns for Selected Species,Appendix D*).
- ❑ Prune trees when they are young (*see Pruning Young Trees, Section 5.30*) and regularly thereafter.
- ❑ Use correct pruning methods, always making the pruning cut outside the branch collar. This will allow only the minimum of decay infection.
- ❑ Do not allow *topping* (*see Definition, Section 1.32*).
- ❑ Always plant the right tree in the right place. Select trees based upon their mature height and shape, and make sure the species selected matches the soil and other site characteristics. For example, avoid planting tall-growing trees such as redwoods near power lines or too close to your house (*see Inherent Failure Patterns for Selected Species, Appendix D*).
- ❑ Water thoroughly (generally, until saturation is reached) during dry periods, slowly applying at least 2-inches of water per week (*see Watering, Section 5.45*).
- ❑ Erect barriers around or slightly beyond the root protection zone of trees during construction. Insist that these root protection zones be honored by construction workers.
- ❑ Consider cabling or bracing weak forks of branches in larger trees of high value.
- ❑ Do not plant trees with a narrowly-forked stem v-crotch, imbedded bark or girdling root ball.
- ❑ Where a valuable specimen tree may be suspected of developing into a *hazardous* tree, use landscaping to keep people at a safe distance. This may require techniques such as rerouting walks, moving patio furniture, or planting shrubs and hedges to function as barriers to keep foot traffic at a safe distance (*see Determining if a Tree is Hazardous, Section 4.20*).

END OF SECTION

notes:

SECTION 5.00 TREE MAINTENANCE GUIDELINES

INTRODUCTION
This chapter establishes the minimum standard of care and maintenance of Palo Alto's *Regulated Trees*. These standards apply to all persons who own or are engaged in the business of repairing, maintaining, or preserving these trees. The following standards of care are set forth for pruning (including utility, fire and traffic encroachment), planting, watering, soil and nutrient requirements, insect, disease and fruit control. Guidelines for selecting an arborist are also given. These standards and guidelines are based on sound arboricultural principles and are applicable to trees, shrubs and woody plants.

SECTION 5.05 CARE OF REGULATED TREES

Required Practices

All owners of *Regulated Trees* are to follow the required maintenance standards set forth in this *Manual*. If special pruning or situations require a variance from these Standards, it is the responsibility of the project arborist and property owner to clarify why the changes are needed and review them with the City Arborist.

SECTION 5.10 PROHIBITED ACTS

Required Practices

Improper maintenance may constitute a prohibited act as defined by the Palo Alto Municipal Code, Chapter 8.10.050 and a violation which may be subject to penalty. The following permitted and prohibited maintenance practices for *protected* and *designated trees* apply.

A. Excessive Pruning
Except for clearance pruning of utility lines, traffic or abating a *Public Nuisance, excessive pruning* (*see Excessive Pruning, Section 1.15*) shall be considered a prohibited act.

B. Topping
Topping shall be considered a prohibited act (*see Topping, Section 1.33*). Seek alternatives to topping (*see Crown Reduction, Section 5.20-A*).

C. Other prohibited actions
Taking any action foreseeably leading to the death of a tree or permanent damage to its health, including but not limited to excessive pruning, cutting, girdling, poisoning, over watering, unauthorized relocation or transportation of a tree, or trenching, excavating, altering the grade, or paving within the dripline area of a tree (*see Palo Alto Municipal Code Chapter 8.10.020, Appendix A*).

5.15 STANDARDS FOR PRUNING REGULATED TREES

Required Practices

The most compelling reason to prune trees is to develop a strong, safe framework. All work to be performed on *Regulated Trees* shall be in accordance with the following standards.

notes:

Required Practices

A. Specifications

All specifications for working on *protected* and *designated trees* shall be written and shall be administered by a qualified arborist, and shall be designed to promote the preservation of tree structure and health.

B. Industry Standards

All work on *Regulated Trees* shall be in accordance with the most current edition of the following industry standards: (*see Performance Standards. Standard Practices for Tree Care Operations - ANSI A300-1995 Appendix G; Safety Standards, ANSI Z133.1-1994, Appendix F; and Tree Pruning Guidelines, Appendix E*).

Required Practices

5.20 PRUNING MATURE TREES

There are six types of pruning that may be required for use on mature *Regulated Trees (see ISA Tree Pruning Guidelines, Appendix E)*. Prior to entering the tree, the tree worker is required to be familiar with these types of pruning as stated in the Performance Standards, ANSI, A300-1995. 'Species-specific' pruning promotes the natural shape of the tree (i.e. excurrent, decurrent, vase-shaped, fast growing, etc.).

A. Types of Pruning

- Crown Cleaning
- Crown Thinning
- Crown Raising
- Crown Restoration
- Crown Reduction
- Utility Pruning

B. Tree Injury

Climbing and pruning practices shall not injure the tree except for the pruning cuts.

C. Timing of Pruning

Recommended Practices

To reduce the probability of insect infestation, disease or infection, the following seasonal restrictions apply, except when public safety is a concern (*see Tree Pruning, Surgery and Removal, Section 2.15-F*):

- Pine (*Pinus spp.*) or Elm (*Ulmus spp.*): Do not prune May-October
- All species: Do not prune during the flush of spring shoot growth
- Trees with thin bark: Do not prune in summer when sun scald injury may be a factor
- Deciduous trees (leafless in winter): Best pruned November-February
- Hazardous trees of any species may be pruned any time of the year for abatement reasons

5.25 PRUNING DISTRESSED TREES

notes:
Recommended Practices

Distressed trees require as much leaf area as possible to overcome stressed conditions. To avoid additional injury, the following measures shall be followed for these trees.

A. Injury or Disturbance

If a tree has been damaged by injury or disturbance, delay pruning until deadwood becomes evident (typically 1-3 years after injury). Crown cleaning is then recommended.

B. Neglect

Trees that have received little or no care or maintenance may need moderate crown thinning, reduction of end weights or entire crown restoration.

5.30 PRUNING YOUNG TREES

Recommended Practices

The average life expectancy for trees growing in harsh urban conditions is 7-10 years. By pruning trees early, it will improve life expectancy and is a proven, cost-effective measure. Added benefits are also reflected in safer trees with fewer branch failures. For trees that serve as a replacement for a *protected* or *designated trees*, they shall be pruned in the following way:

- Young trees should be pruned during the second year after planting to improve their structure, and only minor crown cleaning every 3-7 years thereafter. Refer to *ISA Tree Pruning Guidelines* (*see Appendix E*).
- Do not top the main leader except to position the lowest main branch. Other main branches should be spaced at least 18-inches apart to alleviate a tight grouping branches.
- Select permanent branching and allow temporary low branching on the lowest part of the trunk to remain.

5.40 FERTILIZING STANDARDS

This section outlines performance standards for fertilizing and apply only if fertilizing is specified. Fertilizing mature trees is generally not necessary. Fertilizing may be specified for trees that will be impacted by upcoming disturbance, grade changes or a modified environment. Benefits gained from the increase stored resources may aid the tree to overcome the stress caused by disturbance.

A. Specifications

Fertilizing, if specified, shall be performed to the following standards:

Recommended Practices

- Method of application: The method shall be subsurface injection, on approximate 3-foot centers (within the root ball on young trees; 2-feet out on older trees) and out to the approximate dripline perimeter. Specific situations may justify other variations such as vertical mulch, soil-fracture or surface-broadcast methods.
- Material and Rates: Unless specified otherwise, fertilizer formula shall be a slow-release, complete fertilizer with chelate trace elements (e.g. 22-14-14 or 20-20-20) and mixed at label rates not to exceed 4-pounds nitrogen per 100-gallons of water. Extraordinary cases may require soil and tissue sampling to correct target deficiencies.

notes:

- Amount: Unless specified otherwise, volume shall be determined by mixing 10-gallons of water per inch of trunk diameter when measured at 54-inches above natural grade.
- Timing: Timing should not be detrimental to tree health. Best results are derived from applications made during the prior growing season. Apply fertilizer between May through September for best results.

5.45 WATERING SCHEDULE

Required Practices

Newly installed trees planted, including drought tolerant species, are dependent upon supplemental irrigation until established, typically for two years. Periods of extreme heat, wind or drought may require more or less water than recommended in these specifications. The method and amount that is applied may vary depending upon soil composition, heat, wind, planted in turf or ground cover, periods of abnormal rainfall or in poorly drained soils (*see Drainage, Section 3.40-C*). The watering of *protected* or *designated trees* or their replacements shall follow these standards:

A. New trees

During the establishment period (1-2 years) trees should be watered thoroughly to their root depth as frequently as needed. A watering schedule is to be submitted at the preconstruction meeting. The schedule is to include watering frequency and quantity. The minimum standards shall be as follows:

- 1-3 months in the ground: 4 times per month or as necessary
- 4-6 months in the ground: 2 times per month or as necessary
- 7-12 months in the ground: 1 time per month or as necessary

B. Mature trees

- Most species: 1 time per month during irrigation season (usually March through September)
- Coast Live Oak, Valley Oak and Blue Oak: deep water in May and September — do not water during other months. For oaks already in the vicinity of irrigated conditions,automatic sprinklers or regular watering shall not be allowed to spray on or within three feet of the trunk. The water shall not be allowed to pool or drain towards the trunk.

C. Watering Methods

The following options shall fulfill the watering requirements. One or more of the following may be utilized dependent upon unique circumstances subject to the *City Arborist* determination. The options are as follows:

PAMC 12.32.040

1. Automated Watering Systems. All new *street trees* planted within the right-of-way and *designated trees* shall be provided with one of the following automatic watering systems. All tree irrigation is to be consistent with current *Landscape Water Efficiency Standards for the City of Palo Alto.* Other city maintained systems shall be per Parks Department specifications.

- Bubbler heads (Preferred). One or two bubbler heads mounted on flexible tubing are to be placed adjacent to or on top of the root ball. The placement of bubbler within an aeration tube is not allowed.
- Drip Loop system. A continuous loop of drip tubing circling around the trunk at a point two-thirds out from the trunk to the edge of the root ball (for new trees 36-inch box size and greater, a second loop of drip tubing is required at a point just beyond the root ball on native soil).
- Hand watering systems. Recommended for trees that are part of a development project that must be watered to insure tree survival during the course of construction until automatic irrigation is installed.
- Flood watering. Newly installed trees must be 'flood or basin-watered' on top of the root ball to allow the water to infiltrate through the root zone.
- Subsurface injections using a hydraulic spray pump (practical for use in hard, compacted soils or steep hillsides).
- Soaker hose. Slow, deep watering using a garden type soaker hose.
- Wetting agent. A root ball that has been allowed to dry out beyond the wilting point shall require the addition of a wetting agent to the water (such as Aqua-grow or equivalent).

notes:

D. Amount

Unless otherwise specified, the volume of water applied at each irrigation should be in the range of 10-gallons per inch of trunk diameter when measured at 54-inches above natural grade. The final decision of whether to water or not should be based on accurate soil probe samples that are taken from the root ball.

5.50 SOIL IMPROVEMENT

Required Practices

During development, compaction of the soil is the largest single factor responsible for the decline of oaks and older trees. Ninety percent of the damage to the upper eighteen inches of soil occurs during the first pass of heavy equipment - and cannot be reversed. Every effort to avoid compaction of soil porosity within the tree protection zone shall be taken at all times (*see Soil Compaction, Section 1.29*). When required by the conditions of *Discretionary Development Approval* for a project or as mitigation for injury or a prohibited action, the following performance standards for improvement of compacted or damaged soil shall be implemented:

A. Aeration

Required Practices

Soil that is damaged or compacted within the dripline of *protected* or *designated trees* shall be loosened or aerated to promote root growth and enhance tree vitality. One of the following aeration methods shall be specified an in effort to correct compacted soil conditions:

- *Vertical Mulching:* auger holes 2 to 4-inch diameter, 2 to 3-feet deep, on 4-foot centers and backfilled with porous material such as perlite, vermiculite or volcanic rock (*see Definitions, Section 1.41*)

notes:

- Radial Trenching: with an air excavator, excavate a soil trench 3 to 6-inches wide and a minimum of 12-inches deep from (approximately) 3-feet from the trunk out to the dripline area. The trenches shall radiate out from one foot apart at the closest point.
- *Soil-fracturing* with a pneumatic air-driven device (*see Definitions, Section 1.30*)
- Subsurface injections under moderate hydraulic pressure using a three foot probe and applied on 3-foot centers under the dripline

Required Practices

B. Drainage

Adequate drainage must be provided to the surrounding soil for the planting of new trees. If the trees are to be planted in impermeable or infertile soil, and water infiltration rates are less than 2-inches an hour, then one of the following drainage systems or other approved measures must be implemented (*see Drainage, Section 3.40-C)*.

- French drain, a minimum of three feet in depth
- Drain tiles or lines beneath the trees
- Auger six drain holes at the bottom perimeter of the planting pit, a minimum of 4-inches in diameter, 24-inches deep and filled with medium sand or fine gravel

5.60 INSECT AND DISEASE CONTROL

Generally, insect populations do not threaten tree health to the point of mortality. More often, when their populations become too great they create a nuisance. For example, scale on tulips or aphids feeding on purple leaf plums produce sticky honeydew that may be a nuisance if dripping on cars or at a storefront entry. Occasionally, however, pests such as Oak or Tussock Moth larvae can defoliate and severely damage a tree. If action is warranted, Integrated Pest Management (I.P.M.) suggests that the pest source be identified and targeted with a specific and timely treatment. If insects or disease can lead to the death of a *protected* or *designated tree*, then it is the responsibility of the property owner to evaluate the condition according to the following guidelines and treat the problem in a timely fashion to prevent further deterioration of the tree

Recommended Practices

A. Insects

For treatment, consult a pest control operator that is licensed by the California Department of Pesticide Regulation. Accurate timing is critical for success.

- Nontoxic materials should be used whenever possible to control leaf-chewing insects

Required Practices

B. Disease and Decay - above ground

Disease such as heart-rot decay that erodes the health or weakens the structure of a *protected* or *designated tree* may compromise the safety of people or property (*see Hazardous Tree Determination, Section 4.0*). It is the property owner's responsibility to correct a known hazardous condition in a timely fashion.

- Consult with a *certified arborist* for remedy possibilities, for example, pruning out infected branches, thinning, or the spray application of a chemical treatment.

notes:

Required Practices

C. Disease - below ground

Soilborne diseases, such as Oak Root Fungus (*Armillaria mellea*) or Root Rot (*Phytophthora sp.*), are present in Palo Alto soils. Often, a poor landscape design surrounding old trees encourages harmful, and often lethal diseases. The following conditions that favor a disease environment must be avoided.

- Conditions to avoid: Compacting of the soil within the tree's dripline, adding fill dirt, rototilling, trenching, removing soil from the tree root area, and excessive or regular watering on or near the tree trunk area and planting incompatible water-loving plants within the tree's dripline. Combined with poorly-drained soil, these factors often activate normally dormant fungi to become opportunistic and infect the tree to cause the decline and eventual death of the tree. This decline can be slow and may not be evident for many years.
- Landscape Design
  When planning landscaping around a *protected* or *designated tree*, an evaluation of the tree and soil must be performed to determine if there is a disease present. If the tree is diseased and landscaping will contribute to decline, permanent damage or render it hazardous, it is the obligation of the property owner to take reasonable measures to reduce or eliminate the conditions that may cause the decline of the protected or designated tree.
- To identify cultural conditions that may lead to diseases such as Oak Root Fungus, Verticillium, Phytophthora or other soilborne fungi, review the *Sunset Western Garden Book* or consult with a *Certified Arborist* (*see Certified Arborist, Section 1.4*).
- Use plants under oaks that have low to moderate water needs. Refer to a list of these plants (*see Plant List for Use Under Oaks, Appendix L*), *Sunset Western Garden Guide* or call Canopy: Trees For Palo Alto at (650) 964-6110.
- Plants selected for use under an oak should not need water more than once a month. Use a drip system to irrigate around an oak so that runoff does not flood the area.

D. Foliar disease

Leaf spot or galls may be chronic or reoccur with specific seasons. Though many of these diseases destroy leaf tissue and become unsightly, they may not significantly reduce the trees health and therefore need not be treated.

5.80 FRUIT CONTROL

Recommended Practices

While all trees produce flowers or fruit of some kind, some trees can be considered a nuisance if the use area is not compatible with the litter generated by the tree. For example, the dropping fruit of the European Olive (*Olea europaea*), American Sweet Gum (*Liquidamber styraciflua*), or acorn drip of a Holly Oak (*Quercus ilex*) may be a safety hazard if it is in the proximity of a handicap ramp or other high pedestrian area and will thus justify control measures. Control can only be successful if materials are applied carefully at optimum timing. For treatment to control the situation, consult a pest control operator that is licensed by the California Department of Pesticide Regulation.

notes:

5.90 FIRE PROTECTION: KEEPING THE OPEN SPACE, PARKS & COMMUNITY SAFE

Recommended Practices

The following measures are recommended but not required. If followed, they may help avoid a catastrophic and irreplaceable fire loss to persons, houses, hillsides and mature trees that are centuries old.

Checklist:

- ❑ Keep dry grass mowed below 6-inches.
- ❑ A 30-foot defensible space should be obtained.
- ❑ No vegetation growing or combustible storage under decking.
- ❑ No tree canopy within 10-feet of chimney spark arrester.
- ❑ Break up solid areas of continuous plant growth which create a 'fire-ladder'.
- ❑ Ask nursery professionals about fire-resistant shrubs to use in landscaping.
- ❑ Keep tree well watered, regularly pruned and in healthy condition.
- ❑ Prevent build-up of leaves and old branches.
- ❑ No firewood storage within 10-feet of structures.
- ❑ Make sure your driveway, road and bridges allow access for fire equipment (13-foot vehicle clearance needed).
- ❑ Homes adjacent to slopes over 30% will need additional clearing of vegetation from the structure 100-200 feet to protect against radiant and convective heat currents and flame reach.

5.95 TIPS FOR SELECTING AN ARBORIST

Recommended Practices

A. Who should you look for?

Hiring a tree care provider deserves careful consideration and caution. A mistake can be expensive and long-lasting, while the right choice can assure health, beauty and longer life for your trees and landscape. The following suggestions will help you select an arborist:

- Check the phone directory, usually under trees or tree care service. Listings in the directory should indicate some degree of permanence. Look for professional membership affiliations. Membership does not guarantee quality, but a lack of it may cast doubt on the company's commitment to professionalism.
- Beware of door-knockers. Most reputable companies have all the work they can handle without going door-to-door.
- Request that the sales person be an arborist or tree worker that has been certified through a program of the International Society of Arboriculture (ISA). This program is the standard of performance for appropriate training, experience and knowledge about tree care. Additionally, it is best to use an arborist who is familiar with the trees and ordinances of the City of Palo Alto.

- Require a certificate of insurance, including liability for personal injury and property damage (such as your house and your neighbor's), and workers compensation. Phone their insurance company to make certain each policy is current. Under some circumstances, the property owner may be held financially responsible if an uninsured worker is hurt on your property, or if damage is done to a neighbor's property!
- Ask for local references and other jobs the company or individual has done in Palo Alto. Experience, education and good reputation are signs of a good arborist.
- Have more than one arborist look at your job and give you a written estimate that clearly states their scope of work. Don't expect a company to lower its bid to match another's bid. Be willing to pay for the estimate if necessary. Two or more opinions and estimates are worth the extra effort.
- A good arborist will offer a wide range of services including removal, pruning, fertilizing, cabling, pest control, etc.
- A good arborist will not recommend topping (Section 1.32) except in rare circumstances (such as; crown restoration after severe physical or wind damage, or for a formal setting in a restricted space).
- A knowledgeable arborist will not use climbing spikes if the tree is to remain in the landscape. These should be used only for tree removal.
- Beware of an arborist who is eager to remove a living tree. Removal clearly should be a last resort.

notes:

B. The Contract for Services

To be assured of having your work performed to the standards you expect, a contract should include all the necessary assurances. Most companies will provide their own contract and should include the following basics:

Recommended Practices

- Dates that work will begin and end.
- List exactly what will be done (*see Types of Pruning, Section 5.20*). If your tree is to be sprayed, get a written statement detailing the insect or disease to be treated, the chemical to be used and what precautions you need to take (cover patio furniture, keep pets inside, etc.). If fertilizer, how many pounds of fertilizer per inch of trunk diameter will be applied and by what method.
- Cleanup procedures should be listed and whether firewood will need to be cut (and into what lengths) should both be mentioned.
- Clarify if a tree removal includes grinding the stump and surface roots and if so, how deep?
- Will they remove grindings and backfill the hole?
- The total dollar amount you will be charged.
- Work is usually priced in one of two ways: (a) as a single price for the job, or (b) on an hourly basis plus materials. When using the latter, be sure to include the wording, "...but not to exceed...".

notes:

C. Using Arborists for Preventative Care

- A proactive tree and plant health care program can assure that minor, early pruning will prevent major, corrective pruning later on. An annual inspection will likely help you develop the landscape relatively hazard-free and display attractive curb appeal.
- Consulting arborists also offer advice and appraisals, diagnosis of problems and recommend treatment. They also can serve as a 'second opinion', if needed.

END OF SECTION

notes:

SECTION 6.00 TREE REPORTS

INTRODUCTION
An arborist report is needed for development projects and tree removal permits. The report must be prepared by a certified arborist for the applicant and submitted to the City for the purpose of providing accurate information and opinion regarding the condition, welfare, maintenance, preservation or value of a *protected or designated* tree.

Required Practices

A. When a written report is required

Generally, there are two circumstances in which tree reports are required: 1) when a tree removal permit is sought, and 2) to complete and verify a site plan, assess tree impacts and establish tree protection for property development when within the dripline of a *protected* or *designated tree*. Types of report formats are: *Letter Report, Tree Survey, Tree Protection and Preservation Plan* and *Tree Appraisal.*

B. Who may prepare the report

The tree report is to be prepared by a certified arborist retained by the applicant or property owner. This person shall possess a current ISA certification (*see Certified Arborist, Section 1.00*); be a member of the American Society of Consulting Arborists; or a member of good standing in another nationally recognized tree research, care, and preservation organization.

6.05 REPORT FOR INDIVIDUAL TREE REMOVAL PERMIT

Required Practices

A. Tree Removal Permit

The procedure (*see Tree Removal Checklist, Appendix M and Removal of Regulated Trees, Section 3.05*) involves three steps which must be completed and approved to *remove a protected tree*. The information contained within the application will be reviewed by the City Arborist for written response within aproxiamately 10 working days.

B. Submittals

For this purpose, the following information is to be submitted to the City for review:

- A completed application for the protected tree removal (delivered to the City of Palo Alto, Development Center, 285 Hamilton Avenue, Palo Alto, CA 94301)
- A filing fee ($145) for review and records management. (FY Fee Schedule Application fee - $125, records management $20)
- An arborist report prepared by a certified arborist

C. Written authorization

To *remove* a publicly-owned tree (*street tree*), the property owner shall first have obtained written permission from Public Works Operations or City Arborist. For a *protected tree* on private property, the permit from the Planning Division must be on site when the tree is being removed. For a *designated tree* in property development, the approved plans serve as the approval and no separate written permit is needed.

notes:

Required Practices

6.10 TYPE OF REPORT: LETTER FORMAT

A. Letter Report

A brief format is acceptable for (1) and (2) below, and can generally be used for assessing one or two trees. The report is to be on letterhead stationery of the individual preparing the report, including their ISA Certification number.

1. Removal
   If for a tree *removal* (i.e., an application request for a single tree removal only, not in connection with a property development), the report shall provide information and determination whether the tree is dead, hazardous or constitutes a nuisance under PAMC Section 8.04.050 (2).

2. Development
   If for development on a single family residential lot (not a subdivision), the report shall also clearly indicate whether or not any *protected* or *designated tree* is so close to the 'building area or building footprint' that it will be killed or permanently injured by disturbance. The report must make specific recommendations to protect and preserve the tree during the course of construction that are consistent with the specifications within this *Manual (see Tree Protection & Presentation Report, Section 6.30)*.

Required Practices

6.15 LETTER REPORT - SUBMITTALS

A. Standard information

All letter reports shall contain the following information: Arborist name and certification number; purpose of the report and for whom; site address; date of the inspection(s); a to-scale diagram of the tree(s) location, accurate size of the trunk diameter (measurement taken at 54-inches above natural grade); perimeter of leaf canopy; proximity to structures; condition of the tree health (and/or decay presence), condition of the tree structure, imminent danger of failing (ISA Hazard Rating, *see appendix C*); interface with utility services; conclusion and recommendation(s), photographs (encouraged) and Tree Protection Instructions (if needed).

B. Specific situations

Other conditions may require the following additional information on an as-needed basis if requested by the reviewing City staff: tree protection plans; appraised value (*see Tree Appraisal, Section 6.40 below*); and any other supporting information, photographs, diagrams, etc. that may be necessary.

Required Practices

6.20 TYPE OF REPORT: TREE SURVEY FORMAT

A more extensive 'Tree Survey Report' is required for all development projects except those identified in Section 6.10 above. The report shall inventory all trees that are greater than 4-inches in diameter (measured at 12-inches above natural grade) on site, including trees to be removed, relocated and retained on the property (including trees on neighboring properties that overhang the project site) and all *street trees* in the right-of-way within 30-feet of the project site (*see Tree Disclosure Statement, Appendix I*). In addition to information required in a letter report, the Tree Survey Report, shall include an inventory of the trees, site plan, appraised value (*see Appraisals, Section 6.40 below*) of the trees and any other information pertinent to the project.

6.25 SURVEY REPORT - SUBMITTALS

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Required Practices

A. Items to include

All Tree Survey Reports shall contain the following information: Arborist name and certification number; cover letter; title page; table of contents (if necessary); purpose of the report and for whom; site address; date of the inspection(s); site plan (showing each tree location by number that correlates with the tree inventory on plans; tree inventory data (include tree species, size, health, structure, etc. for all trees on the project site, including those to be removed (tables may be used); condition of the trees (include information with respect to health, structure, decay, imminent danger of falling, existing property lines, structures and utility services) conclusion, recommendation(s) and rated for suitability for preservation. The report shall include a separate list of all *protected trees* with location numbers. If necessary, other supporting information, photographs, diagrams, etc. may be required or provided.

B. Appraised Value

The monetary value that each tree contributes to the real estate value of the property shall be determined and listed separately within the Tree Survey Report. The formula used should be noted (*see Tree Appraisal, Section 6.40 below*).

6.30 TREE PROTECTION AND PRESERVATION REPORT

Required Practices

All *protected* or *designated trees* to be retained on a development site shall be shown on approved sets of civil, building and landscape plans and shall be protected during the construction process. *A Tree Protection and Preservation Plan* submitted for review by the Planning Division is required when trees to be saved may be *injured* by *disturbance*. The tree preservation plan shall assume compliance with standards in Section 2.00 of this *Manual* (*see Protection of Trees During Construction, Section 2.00*). In addition, the following submittal information must be included in the report:

A. Scope & Construction Phasing

The *tree protection and preservation plan* shall identify, but not be limited to, written recommendations for the health and long-term welfare of trees that are to be followed during the following distinct phases and conditions: pre-construction; during construction, post construction, demolition activities; methods of avoiding injury, damage treatment and inspections. Schedules shall be included.

B. Tree Protection Zone

The *tree protection and preservation plan* shall establish a tree protection zone (TPZ) for each tree to be fenced and clearly outline site-specific measures for protection of the trees during construction and describe a plan for continued maintenance of those trees after construction. After project approval, any changes to the protection measures must be approved in writing, by the *City Arborist*. The tree protection plan shall include the following *site plan* elements:

notes:

6.35 SITE PLAN

Required Practices

A. Disclosure of all trees on and near the site

The property owner or designee shall provide accurate information to the project arborist to develop the tree protection measures and to enable accurate recommendations to insure their survival. This *site plan* shall accurately show the surveyed location, species, size of trunk and leaf canopy; show the dripline of any neighboring trees that may overhang the site and *street trees* that are within 30-feet on each side of the project (*see Tree Disclosure Statement, Appendix I*). Failure to show a tree on the plans and later determined to be affected by construction may require the work to stop until mitigation can be agreed upon by the property owner and the City.

B. Plans submitted to the City

In addition to the above information, final improvement plans shall include and show the following information: show the *tree protection zone* of any tree to be retained and denote a 5-foot chain link type fencing around the protected zone of each tree or group of trees (to be clearly identified as such on all plans as a bold-dashed line); permeable paving located within the dripline area; approved utility pathways; grade changes; surface and subsurface drainage and aeration systems to be used; walls, tree wells, retaining walls and grade change barriers, both temporary and permanent; landscaping and irrigation within dripline of trees.

C. Plans must show tree protection

Protective tree fencing identified within the arborist report, both written and diagrammatic, shall be clearly shown as a bold, dashed line on the approved site plans submitted for demolition, grading, construction, building permit or any other aspects that are relevant to the project.

6.40 TREE APPRAISAL

Required Practices

Landscape value may contribute from seven to 20-percent of the real estate property value. An individual tree has an inherent value to the real estate that can be determined by an appraisal prepared by a certified arborist. An appraisal is a process for determining a monetary opinion of the value of a tree as it relates to either the property, a group of trees and/or the immediate community. A qualified *certified arborist* is required to determine this value, and must exercise good and fair judgement by adjusting the basic value by the tree's condition and location. There are two methods to determine tree value; (1) the Replacement Method, based upon the size and availability of the replacement tree or, (2) the Trunk Formula Method, if the tree cannot be replaced (e.g. not sufficient room on site or it is too large to replace). In all cases, the type of formula used must be identified.

6.45 APPRAISAL METHODS

Required Practices

The certified arborist must prepare the appraisal by using the most current edition of (1) the *'Guide for Plant Appraisal'*, published by the Council of Tree and Landscape Appraisers, and (2) the most recent *'Form for Northern California'* established by the International Society of Arboriculture.

A. The Replacement Cost Method

Applies to smaller trees with a trunk size up to 4-inches in diameter or, 48-inch box size trees (replaceable.) For this method, the appraised value shall be determined by combining: price quote + transportation + planting + other costs and applying the condition and location value to the tree. The sum of these is the appraised replacement cost.

B. The Trunk Formula Method

Applies to trees that are too large for practical replacement (transplanting) and shall be appraised by: determining the basic tree value and adjusting this value by a condition and location ratings. The appraised value shall be determined by using the most recent edition of the *'Guide for Plant Appraisal'*, published by the Council of Tree and Landscape Appraisers. The Trunk Formula or Replacement Method Forms for Northern California established by the International Society of Arboriculture must be used to compute the appraised value. All trees with a stem larger than 4-inches in diameter when measured at 12-inches above natural grade shall be calculated in this manner. (*See Determining the tree value, Section 3.25*).

notes:

END OF SECTION