# Protected Tree Report:
# Tree Survey, Encroachment, Protection and Mitigation

# 425 Prospect Circle
# South Pasadena, CA 91030


Prepared For: X Beltran Architects
c/o Xavier Beltran
3012 Fanita St.
Los Angeles, CA 90026
Email: xavier@xbarchitects.com
Tel: (310) 439-5616

Prepared By: Michael Crane
Arbor Care, Inc.
1660 E. Mountain St.
Pasadena, CA 91104
Tel: (626) 737-4007
Email: info@arborcareinc.net


February 2024

# Table of Contents

## SUMMARY OF DATA

| | |
|---|---|
| Total number of Trees located on the property | 9 |
| Total number of Trees located in the setback area in front of the property (street trees) | 1 |
| Total number of Trees located off-site but with a portion of its canopy encroaching over the property | 0 |
| Total number of healthy Trees to be preserved | 8 |
| Total number of healthy Trees to be removed (one 14" and one 16" Non-Native) | 2 |
| Total number of proposed mitigation trees to be planted on site (6 x 24" box, for 14" and 16" DBH of Non-Native Tree) | 6 |

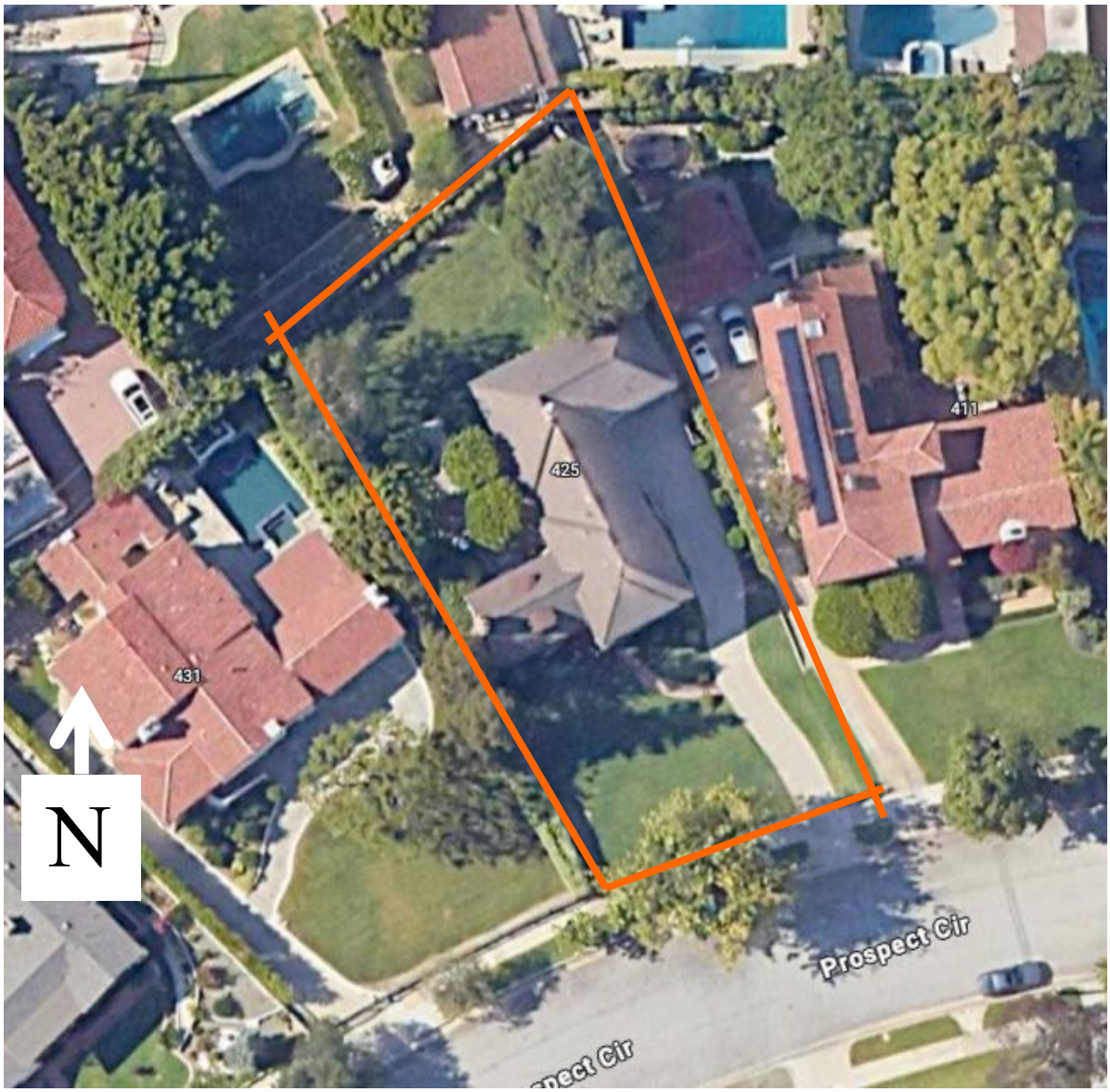
## BACKGROUND & PURPOSE

I was retained by the project's architect and manager, to be the consulting arborist for the planned expansion and renovations to the property located at 425 Prospect Cir.. There are trees located on the property and in the public right-of-way setback. The proposed construction may impact these trees and this report will serve to both notify the City of South Pasadena Planning Division of the extent of the potential impacts as well as to inform the builder of the proper protection measures. As part of my preparation for this report I made several site visits to the property in January 2024. I met with both the structural and landscape architects to discuss the plans as they relate to the trees, and I was provided with an architectural survey and site plan for my field analysis.

## PROJECT LOCATION & DESCRIPTION

The property consists of a two-story single-family residence that appears to be in very good condition. An addition will be built onto the rear portion of the house and a detached ADU at the northeast corner of the property. The landscape will be renovated and will include a new swimming pool and patio areas.

The landscape is maintained, and all trees appear to be in good health. Two non-native trees will be removed and mitigated on-site to accommodate the landscape design.




*This aerial view (courtesy of Google Maps) has been illustrated with orange lines to show the approximate boundary of the property.*

CITY OF SOUTH PASADENA TREE ORDINANCE
**Policy on Replacement Trees on Construction Sites:**

Non-native tree removal: One 24" box tree for each 6" in diameter, or portion thereof.

Native species removal: Two 24" box native trees for each 6" in diameter, or portion thereof.

**Native Tree Species List**

| Scientific name | Common name(s) |
|---|---|
| Sequoia sempervirens | Coast Redwood |
| Sequoia gigantea | Giant Redwood |
| Sequoia glyptostroboides | Dawn Redwood |
| Juglans californica | California Walnut |
| Lithocarpus densifiora | Tanbark Oak |
| Quercus lobata | Valley Oak |
| Quercus douglasii | Blue Oak |
| Quercus engelmannii | Engelmann Oak |
| Quercus chrysolepis | Canyon Live Oak |
| Quercus agrifolia | Coast Live Oak |
| Quercus wislizenii | Interior Live Oak |
| Quercus kelloggüi | California Black Oak |
| Quercus morehus | Oracle Oak |
| Quercus palmeri | Palmer Oak |
| Platanus racemosa | Western Sycamore |
| Heteromeles arbutifolia | Toyon |
| Sambucus caerulea | Blue Elderberry |
| Sambucus mexicana | Mexican Elderberry |

a permit is required for the removal of any significant tree or mature California species or oak tree on any property in the City of South Pasadena.

- A significant tree is 12-inches or larger in diameter.
- A mature tree is 4-inches or larger in diameter.

## TREE SURVEY

The table below lists all Trees located on or encroaching onto the property from off-site, including street trees located in the public right-of-way in front of the property. The tree number corresponds with all information in this report provided for the individual tree. An "os" next to the tree number indicates it is located off-site, with a portion of its canopy extending over the property. Each tree's botanical and common name is provided, as well as its trunk diameter (DBH) measured in inches at four feet above grade. Diameters of multi-trunked specimens are given with the diameters of all trunks or leaders measured at standard height. Approximate heights and average crown spreads are listed as well as a general health and condition rating, which is based on a combination of health and structure. The locations are accurately plotted on the architectural survey map located on the next page.

| Tree Number | Botanical Name | Common Name | Trunk Diameter (inches) | Height (feet) | Spread (feet) | Condition |
|---|---|---|---|---|---|---|
| 1 | Quercus agrifolia | Coast Live Oak | 30 | 40 | 40 | Good |
| 2 | Ficus microcarpa | Indian Laurel | 14 | 25 | 20 | Good |
| 3 | Ficus microcarpa | Indian Laurel | 16 | 25 | 20 | Good |
| 4 | Betula pendula | White Birch | 12, 10 | 30 | 20 | Good |
| 5 | Betula pendula | White Birch | 11, 10 | 30 | 20 | Good |
| 6 | Acer palmatum | Japanese Maple | 10 | 20 | 20 | Good |
| 7 | Acer palmatum | Japanese Maple | 12, 10 | 20 | 20 | Good |
| 8 | Sequoia sempervirens | Coast Redwood | 18 | 40 | 20 | Good |
| 9 | Sequoia sempervirens | Coast Redwood | 16 | 40 | 20 | Good |
| 10 | Ceratonia siliqua | Carob | 32 | 20 | 20 | Good |

# FIELD OBSERVATIONS & DESIGN ANALYSIS

**Refer to Site Plan located in this section, and Construction Impacts Matrix on pages 9 - 10 and Photos in Appendix A, page 13.**

Analysis regarding rootzone impacts are based on the type of impact, e.g, soil compaction, grading, and excavation; as well as the distance from the trunk that the impacts will occur. It is commonly accepted among professional arborists that a distance equal to three times a trunks diameter contains the structural roots responsible for keeping the tree upright. This critical rootzone area is defined as the root plate. Beyond the root plate the roots typically taper off into smaller, less significant sizes. These smaller roots are usually two inches in diameter or smaller and make up the rootmass responsible for water and nutrient uptake. Although roots of these sizes can be cut without significantly impacting health and stability it is advised that no more than 30 percent of the rootmass within the dripline is severed. The bulk of the rootmass is located within the top three feet of soil and root growth slows or halts when soil bulk density exceeds 1.60 g/cm$^3$ for most soils. More information regarding rootzone impacts is provided in the Excavation and Root Pruning section of the Construction Impact Guidelines, Appendix C.

**Tree #1 – 30" Coast Live Oak**: Located in the back yard area along the north property line. Encroachments will occur by the construction of an accessory dwelling unit (ADU) and an addition to the home. The excavation for the ADU foundations will occur as close as eight feet from the trunk and the addition will come as close as six feet. The excavation will be done to a depth of five feet and recompacted to construct the building pads; and the deep compaction will allow for little or no over excavation. Due to the encroachment occurring within the root plate area an exploratory trench was dug so that any significant roots located in the planned area of excavation can be accurately located, and a determination could be made on the true impacts to the tree and the feasibility of the design. The trench was dug in the footprint of the proposed foundations, at the closest point to the trunk out to a distance of 13 feet, which is a distance of five time the trunk's diameter. It was dug to a depth of 18-24 inches, which is within the typical soil profile of structural roots on Oaks. The directions were to hand dig the trench and preserve any encountered roots that were the diameter of the shovel handle (1 ½ inches) or larger. Smaller roots could be cut in order to facilitate the depth of the trench.

No significant roots were encountered. This is understandable because the majority of the tree's structural roots are located on the windward, north to northwest, side and the trench was dug on the south side.

A minor amount of pruning will be required to accommodate the rooflines. Two low branches on both the west and east sides of the crown will be removed. Each branch is approximately four inches in diameter. Some crown raising may also be required using small cuts.

A minor amount of landscape renovation will encroach but will require no grading.

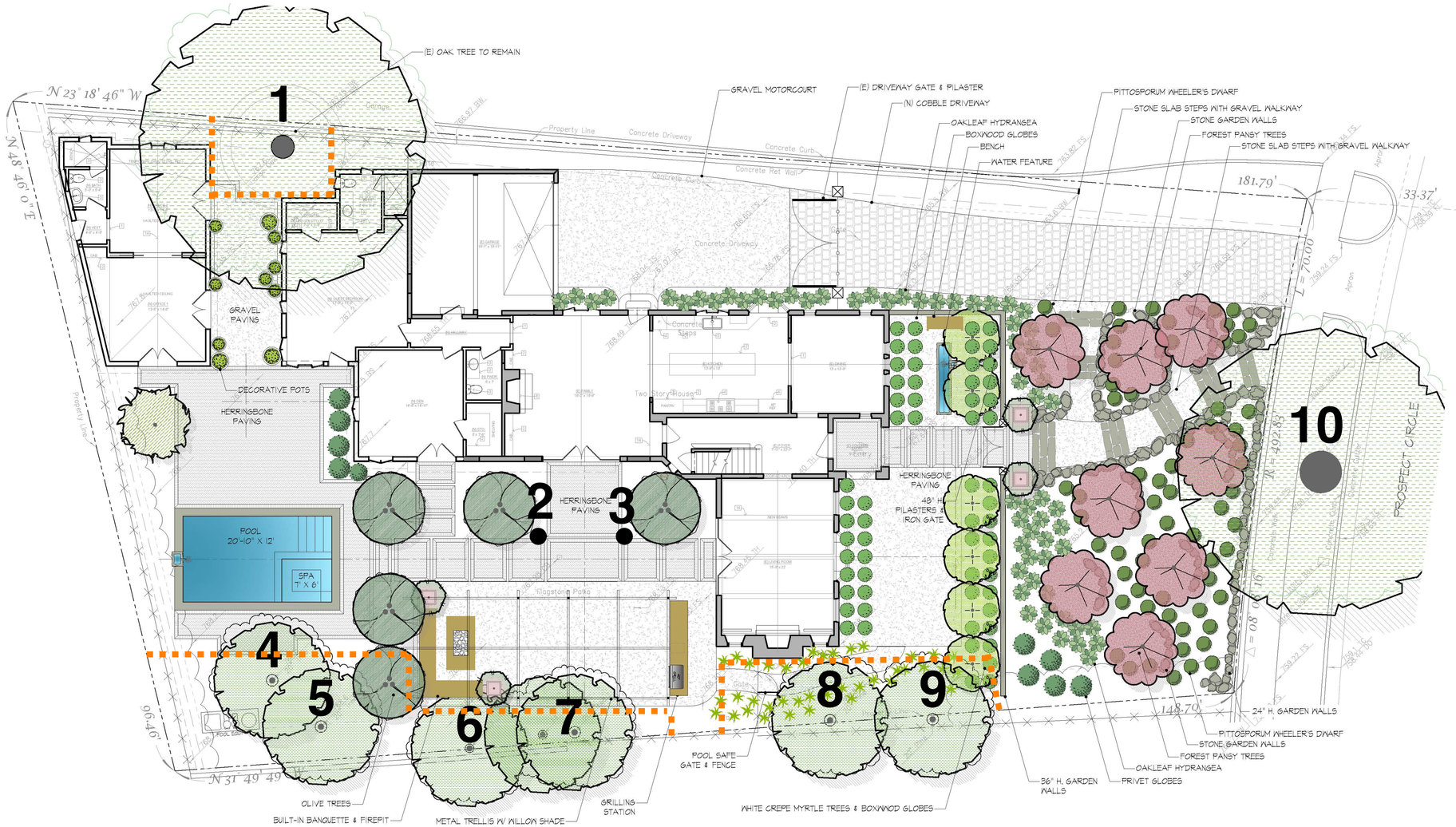
**Trees #2 – 14" Indian Laurel; and #3 – 16" Indian Laurel:** These two trees are in small tree wells within a stone-paved courtyard area. The courtyard will be renovated and expanded to include an outdoor dining area, outdoor kitchen, and a seating area with a firepit. Both trees are planned for removal and replacement, and the mitigation trees will be six 24" box or larger size Crape Myrtle (Lagerstromia indica), planted in the new courtyard that will be built in the front yard. Additionally, five mature, field grown Olives will also be planted in the patio area.

**Trees #4 – 22" White Birch; and #5 – 21" White Birch:** These trees are in the southwest corner of the back yard. The new pool and pool deck will encroach Tree #4. The excavation for the pool will come as close as six feet from the root crown, which is a distance slightly more than tree times the trunk's diameter. The modest amount of shallow grading for the pool deck will come as close as three feet. No pruning of the live crown will be required.

**Trees #6 – 10" Japanese Maple; and #7 – 22" Japanese Maple:** These trees are located in the back yard along the south property line. The new outdoor dining and sitting area will encroach. The new flagstone patio will be built as close as six feet from Tree #6 and three feet from Tree #7. Most of the light grading required for the new surface will occur in the footprint of the existing brick patio. No pruning of the live crowns is required to complete the project.

**Trees #8 – 18" Coast Redwood; and #16 – 22" Coast Redwood:** These trees are in the front yard along the south property line. A new semi-enclosed courtyard will be built onto the front of the house, which will be paved in flagstone. A moderate amount of fill will be required to create a level grade for the patio, and this will come as close as 10 feet from the trunk of each tree. A flagstone walkway will also be built on the north side of the trees between them and the patio, and this will be built on grade. No pruning of the live crowns is required to complete the project.

**Tree #10 – 32" Carob:** Located in parkway strip within the right-of-way setback in front of the property. Typical landscape renovations will be done in the front yard, which will encroach. The existing sidewalk and driveway apron will remain. No pruning of the live crowns is required to complete the project.




# ARBORIST'S NOTE

**All trees with trunk diameters measuring four inches or greater have been accurately plotted. The numbers correspond to the tree survey and the analysis of construction encroachments and impacts found in this report. The dashed orange lines indicate where fences or soil and root protection material should be installed.**

SCOTT SHRADER
exterior design

9040 Elevado Street
West Hollywood, CA 90069
310-488-2200

KEY NOTES

811 Know what's **below.** Call before you dig.

LICENSED LANDSCAPE ARCHITECT CHERYL FIELDS STATE OF CALIFORNIA — NOT FOR CONSTRUCTION

| PROGRESS | |
|---|---|
| DESIGN REVIEW | 01-23-2024 |
| DESIGN REVIEW | 01-30-2024 |
| DESIGN REVIEW | 02-08-2024 |

DRAWING DATE 02-08-2024

PROJECT

PRIVATE RESIDENCE

425 PROSPECT CIRCLE
SOUTH PASADENA, CA 91030
APN NO: 5317-034-010

DRAWING

SITE PLAN

SCALE 1/8" = 1'-0"

NORTH

L1.0

This section includes all Protected Trees that are either located or encroaching on the property. It provides data collected from the analysis of the Site Plan. The trees have been surveyed and numbers correspond to the Site Plan included in this report. Tree numbers with an "os" indicate that the specimen is located off-site and a portion of the canopy extends over the subject property.

# CONSTRUCTION IMPACTS MATRIX

| | TREE SPECIES | SIZE & CONDITION | | ROOTZONE IMPACTS | | | | | | | | REQUIRED PRUNING OF LIVE CROWN | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TREE NUMBER | | TRUNK DIAMETER (DBH) | CONDITION | Sides of tree where excavation (six inches or deeper) will occur | Sides where excavation impacts are buffered by existing infrastructure | **Excavation will remain a distance of at least 10 X DBH from trunk** | **Excavation will remain a distance of at least 5 X DBH from trunk** | **Excavation will remain a distance of at least 3 X DBH from the trunk** | **Removal or Relocation** | Additional light grading less than 6" deep to occur within dripline | Estimated % of total root mass to be removed or severed | **No Pruning Required** | **Pruning not to exceed 10%** | **Pruning not to exceed 30%** | Number of cuts larger than 3" in diameter required | Diameter of cuts for branch removals |
| 1 | Quercus agrifolia | 30 | Good | S | - | | | | | Yes | <30 | | | | 2 | 4, 4 |
| 2 | Ficus microcarpa | 14 | Good | - | - | | | | | - | - | - | - | - | - | - |
| 3 | Ficus microcarpa | 16 | Good | - | - | | | | | - | - | - | - | - | - | - |
| 4 | Betula pendula | 22 | Good | - | - | | | | | Yes | <30 | | | | 0 | N/A |
| 5 | Betula pendula | 21 | Good | - | - | | | | | Yes | <20 | | | | 0 | N/A |
| 6 | Acer palmatum | 10 | Good | - | - | | | | | Yes | <10 | | | | 0 | N/A |
| 7 | Acer palmatum | 22 | Good | - | - | | | | | Yes | <20 | | | | 0 | N/A |

# CONSTRUCTION IMPACTS MATRIX (continued)

| | TREE SPECIES | SIZE & CONDITION | | ROOTZONE IMPACTS | | | | | | | | REQUIRED PRUNING OF LIVE CROWN | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TREE NUMBER | | TRUNK DIAMETER (DBH) | CONDITION | Sides of tree where excavation (six inches or deeper) will occur | Sides where excavation impacts are buffered by existing infrastructure | **Excavation will remain a distance of at least 10 X DBH from trunk** | **Excavation will remain a distance of at least 5 X DBH from trunk** | **Excavation will remain a distance of at least 3 X DBH from the trunk** | **Removal or Relocation** | Additional light grading less than 6" deep to occur within dripline | Estimated % of total root mass to be removed or severed | **No Pruning Required** | **Pruning not to exceed 10%** | **Pruning not to exceed 30%** | Number of cuts larger than 3" in diameter required | Diameter of cuts for branch removals |
| 8 | Sequoia sempervirens | 18 | Good | - | - | | | | | Yes | <10 | | | | 0 | N/A |
| 9 | Sequoia sempervirens | 16 | Good | - | - | | | | | Yes | <10 | | | | 0 | N/A |
| 10 | Ceratonia siliqua | 32 | Good | - | - | | | | | Yes | <10 | | | | 0 | N/A |

## FINDINGS

- Excavation to construct the building pads for the foundations of both the addition and ADU will have very little impact on Tree #1. The exploratory trenches dug at the edges of the planned foundations within five times the trunk's diameter encountered no significant roots.

- Two four-inch diameter cuts will be required on Tree #1 to remove two branches in the lowest portion of the crown for roofline clearance.

- Trees #2 and #3 will be removed to accommodate the new design of the patio areas in the back yard. Both are non-native trees that each require three 24" box trees as mitigation. The six mitigation trees will be planted in the front yard area.

- Tree #4 will be encroached by the pool construction. The deep excavation will occur at a tolerable distance from the trunk.

- All other trees (Trees #5 – 10) will be encroached slightly and impacts will be amount to minimal amounts of fine feeder root disruptions.

- No pruning of the live crowns of any tree will be required aside from the two branch removals on Tree #1.

## RECOMMENDATIONS

As with many construction projects, soil compaction is the most preventable impact that will need to be monitored in order to provide reliable protection and long-term preservation of the trees. To prevent unnecessary soil compaction a protective fence must be installed around the Protected Trees before any construction activity occurs. The recommended fence placements are drawn in dashed lines on the Site Plan of this report. A fence will not be practical around Tree #1 due to the need for space to build and finish the addition and ADU. For this protection zone soil and root protection material shall be installed along with trunk protection to prevent mechanical damage. The main haul route for the entire project is the existing driveway and north side of the property.

- Prior to demolition the contractor and consulting arborist shall meet on site to make sure fences and protective materials are properly placed and installed and to review the goals for the tree protection plan. **The location of the protective fences is drawn with a dashed line on the Site Plan included in this report.**

- Tree Protection Zone fences shall be at least four feet tall and constructed of chain link fencing secured on metal posts.

- A specification for Trunk Protection is provided in Appendix C.

- Examples of Soil and Root Protection materials are provided in Appendix D.

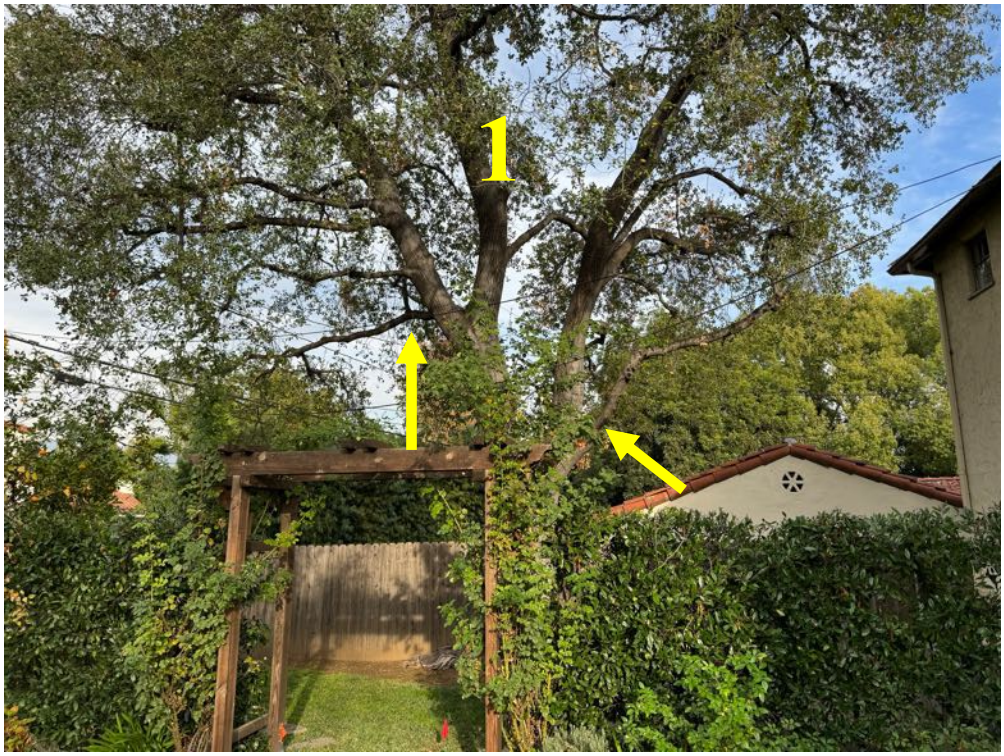
- Maintain the fences and protection materials throughout the completion of the project. No staging of materials or equipment or washing-out is to occur within the Tree Protection Zones.
- Refer to the Construction Impact Guidelines in Appendix B for important general preservation measures concerning the different elements of this project.

## MITIGATION

- Two Non-Native Tree will be removed (Trees #2 and #3), which have trunk diameters measuring 14 and 16 inches respectively. According to the city's tree ordinance the typical mitigation of Native Trees is one 24" boxed nursery grown trees for every six inches of removed tree caliper, or portion thereof.
- Six mitigation trees will be planted on site. They will be a minimum size of 24" boxed, nursery-grown specimens.
- The City of South Pasadena shall determine the actual mitigation requirements as condition to a tree removal permit for this project.
- Mitigation trees may be planted at any time, but preferably in the fall season for best success in establishment.

# APPENDIX A – Photos


ABOVE: Looking north at Tree #1. An addition to the home will be built on the right (east) side and an ADU on the left (west). BELOW: These two four-inch branches will be removed to accommodate the new rooflines.




ABOVE and BELOW: The exploratory trench for the ADU. No significant roots were encountered.


ABOVE and BELOW: The exploratory trench for the addition. No significant roots were encountered.


ABOVE: Trees #2 and #3 are planned for removal to accommodate the new patio design. BELOW: A swimming pool will be built near Trees #4 and #5.


ABOVE: The pool and pool deck will be built where in the existing lawn area.
BELOW: Trees #6 and #7 will be incorporated into the new design of the back yard patio.


ABOVE: A semi-enclosed courtyard will be built onto the front of the house near Trees #8 and #9, BELOW: The existing driveway will remain in place. It will serve as the haul route, and is well clear of the street tree (Tree #10).

# APPENDIX B - Protected Tree Construction Impact Guidelines

**Size and Distribution of Tree Roots** – Taken from Arboriculture, Integrated Management of Landscape Trees Shrubs and Vines. Harris, R.W., Clark, J.W., Matheny N.P. Prentice Hall 2004.

Roots of most plants, including large trees, grow primarily in the top meter (3 ft) of soil (see figure below). Most plants concentrate the majority of their small absorbing roots in the upper 150 mm (6 in.) of soil if the surface is protected by a mulch or forest litter. In the absence of a protective mulch, exposed bare soil can become so hot near the surface that roots do not grow in the upper 200 to 250 mm (8 to 10 in.). Under forest and many landscape situations, however, soil near the surface is most favorable for root growth. In addition, roots tend to grow at about the same soil depth regardless of the slope of the soil surface.

Although root growth is greatly influenced by soil conditions, individual roots seem to have an inherent guidance mechanism. Large roots with vigorous tips usually grow horizontally. Similar roots lateral to the large roots grow at many angles to the vertical, and some grow up into the surface soil. However, few roots in a root system actually grow down.

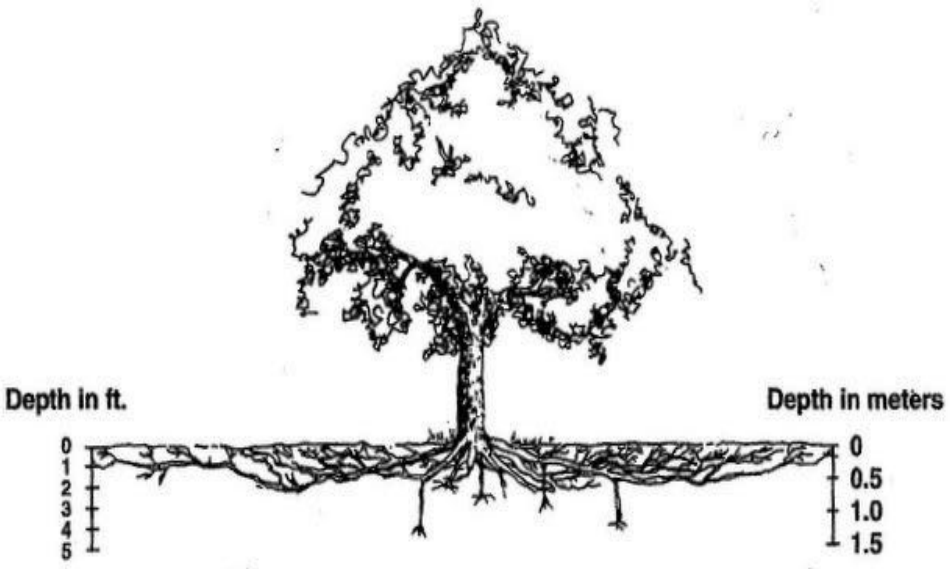



**FIGURE** In mature trees, the taproot is either lost or reduced in size. The vast majority of the root system is composed of horizontally oriented lateral roots.

## The importance of soil

Soil supports and anchors tree roots and provides water, minerals and oxygen. Furthermore, soil is a habitat for soil microorganisms that enhance root function. A soil's ability to sustain tree growth is largely determined by its texture, structure (bulk density), organic matter, water and mineral content, salinity, aeration, and soil-microbe abundance and diversity.

## Soil physical properties

Soil texture – the relative proportion of sand, silt and clay, is important because it affects water – and nutrient-holding capacity, drainage and aeration (gaseous diffusion). Soil structure is the arrangement of individual soil particles into clumps (aggregates). The net result is the formulation of larger voids between the aggregates which serve as channels for gaseous diffusion, movement of water and root penetration. Unfortunately, soil aggregates are readily destroyed by activities that compact the soil (increase bulk density). When this occurs, gaseous exchange, permeability, drainage and root growth are restricted.

The influence of the organic matter content of soil properties is quiet significant. Its decomposition by soil organisms releases substances that bind soil particles into larger granules, which improves both soil aeration, and drainage. In essence, the breakdown of organic matter improves water – and nutrient-holding capacity and reduces bulk density. Furthermore, it is the primary source of nitrogen and a major source of nitrogen and a major source of phosphorus and sulfur. Without organic matter soil organisms could not survive and most biochemical processes in the soil would cease.

Soil aeration, the movement and the availability of oxygen, is determined by both soil texture and structure. In general, compacted and finer soils, due to a higher proportion of small pore spaces (micropores), tend to drain slowly and hold less air than coarser, sandy, or well-structured find soils. Water retained in the small pores displaces oxygen and inhibits gaseous diffusion.

The availability of soil water is largely determined by the size of the pore spaces between the soil particles and the larger aggregates in which water is held. Most of the water in the larger pore spaces drains readily due to gravitational forces. A relatively thin film of water, which is readily available to plant roots, remains following drainage. Much of water held within the smaller pore spaces resists uptake by plant roots because it is held tightly on the soil surfaces.

Plant roots require an adequate supply of oxygen for development. Injury or dysfunction results when oxygen availability drops below a critical level. Root respiration is the first process to be restricted, followed by disruptions in growth, metabolism, nutrient and water uptake, and photosynthesis. Furthermore, the accumulation of high levels of carbon dioxide, produced by the roots during respiration can also impair root function. Reduced soil aeration resulting from soil compaction, flooding, excess irrigation, or

impervious pavement favors the development of crown rot (Phytophthora root disease). It also inhibits mycorrhizal fungi that enhance water and nutrient uptake and resist root pathogens.

The forest floor under a canopy in most undeveloped forests and woodland settings is typically covered by a layer of fallen leaves and other woody debris. It is usually cool, shady, well-aerated, and relatively moist – conditions that favor normal root growth. When the natural leaf litter is removed and when a tree's lower canopy is pruned up to provide clearance, the absorbing roots in the upper few inches of the soil experience higher soil temperatures and increased desiccation due to direct exposure to sunlight.

**Minimizing the Effects of Construction and Development on Tree Root Systems**

Activities that injure roots or adversely affect the root zone should be avoided or kept as far from the trunk as possible. Design changes or alternative building practices that avoid or minimize construction-related impacts should be considered and proposed when applicable.

**Soil Compaction**

Soils are intentionally compacted under structures, sidewalks, reads, parking areas, and load-bearing fill to prevent subsidence, and to prevent soil movement on slopes. Although unintentional, soil within the root zone of trees is often compacted by unrestricted foot traffic, parking of vehicles, operation of heavy equipment, and during installation of fill. Compaction destroys the soil's natural porosity by eliminating much of the air space contained within it. It leaves the soil hard and impenetrable and largely unfavorable for root growth. The soil's natural porosity, which allows for water movement and storage, gaseous exchange, and root penetration, is greatly reduced. Consequently, root growth and tree health suffer. Soil compaction is best managed by preventing it.

Bulk density is used to describe a soil's porosity, or the amount of space between soil particles and aggregates. High bulk densities indicate a low percentage of total pore space.

**Pavement**

Paving over the root systems of trees is another serious problem because it reduces the gaseous diffusion and soil moisture. Most paving materials are relatively impervious to water penetration and typically divert water away from a tree's root zone. Cracks and expansion joints do, though, allow for some water infiltration into the soil below. Of greater concern, is the loss of roots from excavation to achieve the required grade, and the necessary compaction to prevent subsidence. Once the soil surface is compacted, a base material is then added and compacted as well. With that done, the surface can then be paved. Thus, pavement within the root zones of trees can damage roots and create unfavorable soil conditions. One alternative to minimize pavement impacts is to consider placing the pavement on the natural grade over a layer of minimally compacted base material. To reduce sub-grade compaction, consider using reinforced concrete or asphalt over a goetextile blanket to help stabilize the soil. On-grade patios or paving that covers

more than one-third of the tree protection zone (TPZ) should be constructed using permeable materials that allow aeration and water penetration. Soil under permeable surfaces should not be compacted to more than 80 percent.

**Excavation and root pruning**

Excavation within the root zones of trees should be avoided as much as possible. The extent of root pruning (selective) or cutting (non-selective) should be based on the species growth characteristics and adaptive traits, environmental conditions, age, health, crown size, density, live crown ration and structural condition of the tree. The timing of the root pruning or cutting is another important consideration. Moderate to severe root loss during droughts or particularly hot periods can cause serious water-deficit injury or death.

When root pruning/ cutting is unavoidable, roots should be pruned or cut as far from the trunk as possible. Cutting roots on more than one side of a tree should also be avoided. Root cutting extending more than half-way around a tree should generally be no closer than about 10 times the trunk diameter. Recommended distances range from as little as 6 times trunk diameter (DBH) for young trees to 12 times trunk diameter for mature trees. The size of the TPZ should, however, be increased for over mature and declining trees and species that are sensitive to root loss.

The minimum distance from the trunk that roots can be cut on one side of the tree without destabilizing it, is a distance equal to about three times the diameter (DBH) of the trunk. Roots severed within that distance provide little or no structural support. Root pruning or cutting distances from the trunk should be greater for trees that lean and/ or those growing on shallow or wet soil.

In cases where the proposed grading will adversely affect trees designated for retention, special attention should be given to proper root pruning and post-construction care for injured trees. Where structural footings are required for foundations, retaining walls, etc., and roots larger than 2 inches in diameter will be impacted, consider design changes or alternative building methods.

When excavation within 5 times trunk diameter is unavoidable, roots greater than 1 ½ inches in diameter should be located prior to excavation and then pruned to avoid unnecessary damage. Hand-digging or use of a hydraulic or pneumatic soil excavation tool is the least disruptive way to locate roots for pruning. Although mechanical root pruners make clean cuts, they are non-selective. A backhoe bucket, dozer blade or trencher will typically pull, rip or shatter the larger root, causing additional damage toward the tree. Once the roots that interfere with the structure being built, e.g., foundations, footings, retaining wall, curbs, etc., are exposed, they should then be cut perpendicular to their long axis using a hand-saw, ‘carbide-tipped chainsaw’ or sharp ax, depending on size. Roots that are pruned in this manner typically regenerate new roots from near the cut. Roots exposed by excavation should be protected from exposure to sun and desiccation. Exposed roots that can not be covered with soil by the end of the day should be covered with moistened burlap or similar material.

Roots can generally be cut in a non-selective manner when excavating near of beyond the dripline. Ripped, splintered or fractured portions of roots however, should be re-cut. The damaged portion should be removed using sharp tools. The cut should be flat across the root with the adjacent bark intact. Wound dressings should not be applied to pruned or damaged roots except when recommended for disease, insect or sprout control.

The best approach to avoid water-deficit injury following root loss during the growing season is to provide ample irrigation. Irrigation should be considered prior to, during, and after root pruning. Watering schedules should also consider local soil conditions, climate, topography, time of year, species adaptability, extent of root pruning and tree health. If possible, irrigate the tree 7 to 10 days prior to excavation so that there is an adequate reservoir of soil water. Water can be delivered to large construction sites via water-tank trucks and applied directly to affected trees or stored nearby in plastic tanks. On relatively flat terrain, a 6 to 8 inch soil berm at the tree's dripline should be constructed to act as a watering basin. On steep terrain, soaker hoses should be used. They can be placed across the slope or spirally around the trunk, from about six feet away to the dripline. In addition, a two to four inch layer of wood chip mulch should be applied to as much of the root zone as possible to retard soil water loss.

Pruning foliage to compensate for root loss is not supported by scientific research and likely to result in slower recovery. Fertilization to stimulate root growth is generally unwarranted and may be counterproductive.

**Trenching within the Tree Protection Zone**

Trenching for underground utilities should be routed around the TPZ. When this is unavoidable, trenching within the TPZ should be done by 'hand' or using a pneumatic or hydraulic soil excavation tool, carefully working around larger roots. Roots larger than 1 ½ inches in diameter should not be cut. Dig below these roots to route utilities or install drains. A combination of tools can also produce satisfactory results, for example, a skillful backhoe operator under the arborist's supervision can dig down several inches at a time and detect larger roots by 'feel' (resistance). At that point, as assistant can expose the root and dig around it. In this manner, the backhoe can then continue extending the trench though the TPZ. Tunneling (boring) through the TPZ is the preferable alternative. For most large trees, tunneling depth should be at least 36 inches. Tunneling should begin at the edge of the TPZ, but no closer than a distance equal to one foot of clearance for each inch of tree DBH. Tunnels should also be offset to either side of the trunk. For trenching that extends only part way into TPZ, consider trenching radially to the tree trunk, as this is less harmful than tangential trenching. All trenches made within the TPZ should be backfilled as quickly as possible to prevent root and soil desiccation.

**Managing Root Injured Trees**

Root-pruned trees should be monitored for symptoms of water-deficit injury for a specified period following root pruning. Irrigation should be considered prior to, during, and after root pruning. Irrigation schedules should consider local soil conditions, climate, topography, time of year, species tolerance, extent of root pruning and tree health.

**Grade Change: Fill Soil**

Fill soil placed within the root zones of trees can have an adverse effect, particularly if the soil is compacted to support a structure or pavement. Soil compaction reduces aeration and water infiltration. Fill soil, die to textural changes, can also prevent water from penetrating the original soil layer below where the roots are. Furthermore, soil placed against the root crown and lower trunk can lead to root disease problems, especially if the soil near the trunk remains moist during the summer from irrigation. Alternatives to placing fills over roots zones shall be considered and proposed as appropriate.

# APPENDIX C – Trunk Protection Specifications

Taken from ANSI A300 Best Management Practices – Managing Trees During Construction

## Trunk Protection

When trees are so close to construction activities that the trunk or buttress roots may be mechanically damaged, those parts should be protected. This can be done by installing 2-inch thick (5 cm) wood planks, such as 2x4s or 2x6s (50 x100 mm or 50 x150 mm), around the trunk, preferably on a closed-cell foam pad (Figure 4). Straps or wire are used to bind the planks in place. No fasteners should be driven into the tree. Trunk protection should be adjusted to allow growth if it is in place during periods of trunk diameter growth.

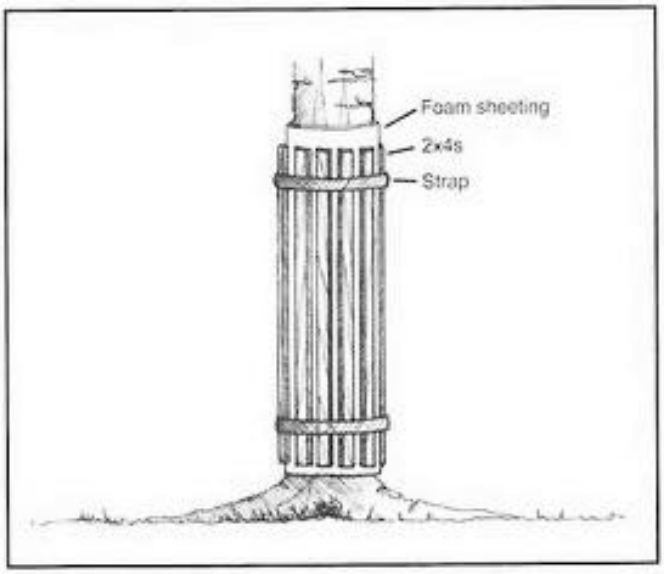


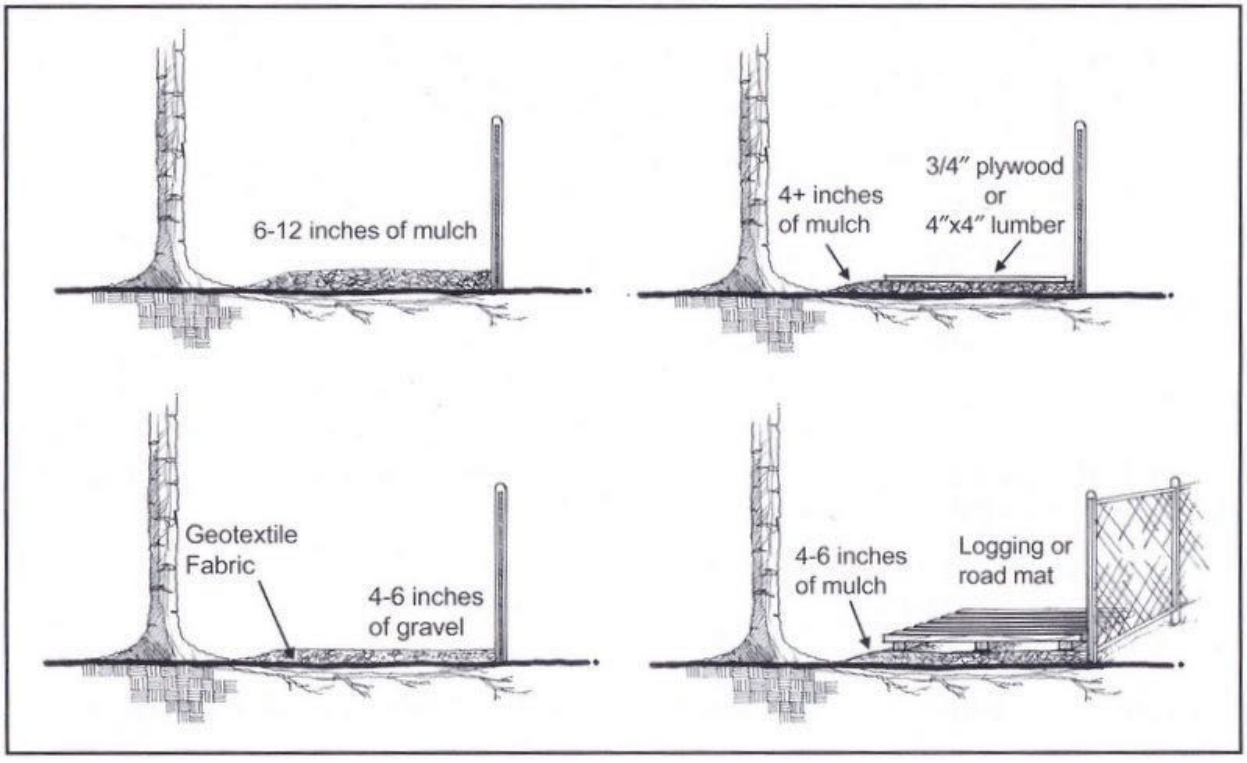

**Figure 4. Trunk protection structure.**

## APPENDIX D - Soil and Root Protection Within the Tree Protection Zone

If traffic cannot be kept outside of the Tree Protection Zone for the entire duration of construction, actions can be taken to disperse the vehicular load and protect the roots, minimizing soil compaction and mechanical root damage. These include:

1) Applying 6 to 12 inches of wood chip mulch to the area.
2) Laying ¾-inch thick plywood or 4x4 inch wood beams over a 4+ inch thick layer of wood chip mulch.
3) Applying 4 to 6 inches of gravel over a taut, staked geotextile fabric.
4) Placing commercial logging or road mats on top of a mulch layer.

Stone, geotextile, and mulch exceeding 4 inches thick will need to be removed from the TPZ once the threat of soil or root damage has passed.



# AUTHOR'S CREDENTIALS

The American Society of Consulting Arborists

*in recognition of fulfillment of the requirements for Registered Consulting Arborist status*

*confers upon*

Michael Crane, RCA #440

*Registered Membership*
*January 18, 2006*

*President*

*Executive Director*

ASCA
AMERICAN SOCIETY OF CONSULTING ARBORISTS

INTERNATIONAL SOCIETY OF ARBORICULTURE
BOARD CERTIFIED MASTER ARBORIST™

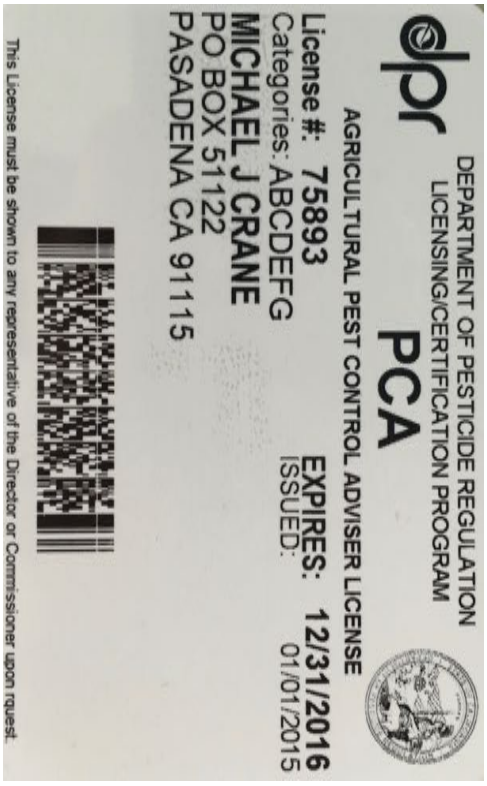
Michael J. Crane

Having successfully completed the requirements set by the Arborist Certification Board of the International Society of Arboriculture, the above named is hereby recognized as an ISA Board Certified Master Arborist®

Jim Skiera, Executive Director
International Society of Arboriculture

Skip Kincaid, Certification Board Chair
International Society of Arboriculture

WE-6643B — Certificate Number
Nov 09, 2005 — Certified Since
Dec 31, 2018 — Expiration Date



DEPARTMENT OF PESTICIDE REGULATION
LICENSING/CERTIFICATION PROGRAM

dpr

PCA

AGRICULTURAL PEST CONTROL ADVISER LICENSE

License #: 75893
Categories: ABCDEFG
MICHAEL J CRANE
PO BOX 51122
PASADENA CA 91115

EXPIRES: 12/31/2016
ISSUED: 01/01/2015

This License must be shown to any representative of the Director or Commissioner upon request.

ISA CERTIFIED ARBORIST QUALIFICATIONS

International Society of Arboriculture
Tree Risk Assessment Qualification

Michael J. Crane

Having successfully completed the requirements established by the Certification Board of the International Society of Arboriculture, the above named is hereby recognized as ISA Tree Risk Assessment Qualified.

Skip Kincaid, Certification Board Chair
International Society of Arboriculture

Jim Skiera, Executive Director
International Society of Arboriculture

February 1, 2013
Issue Date

December 11, 2020
Term of Validity End Date

# CERTIFICATION OF PERFORMANCE

I, Michael Crane, certify that:

- I have personally inspected the tree(s) and the property referred to in this report and have stated my findings accurately.
- I have no current or prospective interest in the vegetation or the property that is the subject of this report and have no personal interest or bias with respect to the parties involved.
- The analysis, opinions, and conclusions stated herein are my own and are based on current scientific procedures and facts.
- My analysis, opinions, and conclusions were developed and this report has been prepared according to commonly accepted arboricultural practices.
- No one provided significant professional assistance to me, except as indicated within the report.
- My compensation is not contingent upon the reporting of a predetermined conclusion that favors the cause of the client or any other party not upon the results of the assessment, the attainment of stipulated results, or the occurrence of any subsequent events.

I further certify that I am a member in good standing of the American Society of Consulting Arborists and the International Society of Arboriculture. I have been involved in the field of Horticulture in a full-time capacity for a period of more than 15 years.

Signed: _____

Registered Consulting Arborist #440; American Society of Consulting Arborist
Board Certified Master Arborist #WE 6643B; International Society of Arboriculture
Licensed California Agricultural Pest Control Adviser #AA08269

Date: February 7, 2024