

Appendix B
Arborist Report

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ARBORIST REPORT

740 West San Carlos Street Mixed Use

San Jose, California

Prepared for:

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Cover photo: The southeast perimeter of the site with the individual and groups of **Tree-of-Heaven trees labeled as #2, 4 and 5 with avocado #3** in between. All photos in this report were taken by D. Ellis on March 25, 2015.



TREE MAP





SUMMARY

THE PROJECT

An existing industrial area will be demolished. Mixed use high rise residential and commercial buildings will then be constructed on the property.

THE TREES

There are very few planted trees on the project site. Most of the existing trees are *volunteers* (they were not planted) *Ailanthus altissima* (Tree-of-Heaven). This is a common weedy (but tough-as-nails) tree species. These Tree-of-Heavens grow primarily near the fence close to the property line at the railroad tracks along the southern perimeter of the site. Due to the numerous weedy **sucker**¹ or **stump sprout** trunks of most of the Tree-of-Heavens, it is difficult to determine how many individual "trees" actually exist on the site. Due to this problem, some of the Tree-of-Heavens have been evaluated as groups that have been assigned a single tree tag number. If the individual trunks that were counted in these "groups" are added to the number of trees on the site that are distinct individual trees, there are approximately 93 tree trunks on the site, including 14 distinct individual trees.

There are several planted landscape trees (**#11-16**) bordering 740 West San Carlos Street near the existing commercial building. Four of these trees, **#12-16, Raywood ash**, may be City Street Trees. None of the trees on or adjacent to the project site are native to the immediate area or to California in general. Most of the trees on this site are in poor condition and have poor preservation suitability relative to the proposed development.

The Tree Map on page 1 shows the approximate locations of the trees described in this report. Table 1, the Summary Tree Table on page 3 provides a brief description of each tree, while Table 2 the Complete Tree Table includes a more detailed description of the trees as well as recommended minimum root protection distances, should any of the trees be retained. Photos of the trees are included on pages 12 through 14.

¹ Terms **highlighted** at their first occurrence in this report are explained in the Glossary on page 18.



THE TREES & THE PROJECT

It is my understanding that the most or all of the existing trees will need to be removed because the proposed new buildings and parking will fill the majority of the site. Due to this fact, and also to a lack of construction plans including existing tree trunks and canopies, I did not provide an "Expected Impact of Construction" or an "Action" (Save, Remove or Debatable) for each tree. **The west neighbor's large Monterey pine** (see [Tree Map](#) and the photo of this tree on page 15) must be taken into consideration and protected during the development. There should be no excavation or other soil disturbance closer than 9 feet from the trunk of this pine, and the tree's canopy must also remain undamaged. The edge of the dripline of this tree is just about at the borderline between the two sites.

TABLE 1 SUMMARY TREE TABLE

Tree #	Common Name	Trunk Diam. @2ft.	Preservation Suitability
1	Tree-of-Heaven	19 x 3-8"	Poor
2	Tree-of-Heaven	3,3,2"	Poor
3	avocado (edible)	5,4"	Poor
4	Tree-of-Heaven	18,9"	Poor
5	Tree-of-Heaven	39 x 2-11"	Poor
6	almond (edible)	7"	Poor
7	Tree-of-Heaven	7 x 2-12"	Poor
8	Tree-of-Heaven	12,14,19"	Poor
9	Tree-of-Heaven	12"	Poor
10	Tree-of-Heaven	18"	Poor

Tree #	Common Name	Trunk Diam. @2ft.	Preservation Suitability
11	Chinese pistache	3,4,4, 5"	Fair/Poor
12	Raywood ash	16"	Fair
13	Raywood ash	15"	Fair/Poor
14	Raywood ash	5"	Fair/Poor
15	Raywood ash	17"	Fair
16	Italian cypress	5"	Fair/Good
17	Tree-of-Heaven	16,9,5"	Poor
18	Tree-of-Heaven	5 x 5-13"	Poor
19	Tree-of-Heaven	9 x 2-12"	Poor



INTRODUCTION

PLANS REVIEWED FOR THIS PROJECT

- Conceptual Floor 1: Ground Floor Plan. Sheet 9.0, SGPA Architecture & Planning, February 23, 2015.
- Conceptual Floor 2: Second Level Parking Floor Plan. Same as above, Sheet 9.1.

PURPOSE & USE OF REPORT

The purpose of the report is to identify and describe the existing trees on or adjacent to the project site that are within or close to proposed construction - - their size, condition and suitability for preservation. All trees on the project site were evaluated. The audience for this report is the property owner, developer, project architects and contractors, and City of San Jose authorities concerned with tree preservation and tree removal. The goal of this report is to preserve existing trees on site that are in acceptable condition, are good species for the area and will fit in well with the proposed new use of the site.

METHODOLOGY

I performed a brief evaluation of the subject trees on March 24, 2015. Tree characteristics such as form, weight distribution, foliage color and density, wounds and indicators of decay were noted. Surrounding site conditions were also observed. Evaluation procedures were taken from:

- *Guide for Plant Appraisal*, 9th edition, 2000, authored by the Council of Tree and Landscape Appraisers (CTLA) and published by the International Society of Arboriculture (ISA).
- *Species Classification and Group Assignment* published by the Western Chapter of the International Society of Arboriculture (WCISA), 1992.

The above references serve as industry professional standards for tree and landscape evaluations.



Each of the trees was tagged in the field with metal number tags that correspond with the tree numbers referenced in this report and on the [Tree Map](#)². I measured the trunk diameter of each tree with a diameter tape at 2 feet above the ground, which is the required trunk diameter measurement height of the City of San Jose. Trunk diameter was extrapolated to *DBH* (diameter at breast height, 4.5 feet above the ground) because DBH is also used calculate tree protection distances and other tree-related factors. The DBH figure is not included in the Tree Tables, but I have used it to estimate construction impacts to trees. Trunk diameter was rounded to the nearest inch. I estimated the tree's height and canopy spread. Tree *Condition* (structure and vigor) was evaluated and I also recorded additional notes for trees when significant. Tree species and condition considered in combination with the proposed post-development use of the site yields the *Tree Preservation Suitability* rating. The more significant trees (or groups of trees) were photographed with a digital camera. Some of these photos are included in this report, but all photos are available from me by email if requested.

OBSERVATIONS

SITE CONDITIONS

The project site is currently used for commercial industrial business and storage. Most of the site is covered with asphalt pavement or buildings. Site topography is mainly level. Sun exposure for the trees varies from full to partly shaded, depending upon proximity to existing buildings and to other trees. There does not seem to be any irrigation operating on site to water any of the trees or the small landscape area in front of the 740 building on West San Carlos Street. Landscape and tree maintenance is of a very low level.

² There are two trees (or groups of trunks) that were not tagged because their trunks were inaccessible to debris or other factors; these are Tree-of-Heaven trees #2 and #9.



APPENDIX

TABLE 2 COMPLETE TREE TABLE

This Table is continued through page 7. Data fields in the Table are explained on pages 8 to 10.

Tree #	Species & Common Name	Trunk Diam. @3ft.	Size	CONDITION		Preservation Suitability	Notes	TREE ROOT PROTECTION DISTANCES		
				Vigor	Structure			3xDBH	5xDBH	OTZ
1	<i>Ailanthus altissima</i> , Tree-of-Heaven	19x3-8	40*30	80	40	Poor	Five clumps of trunks; all appear to be stump sprouts.	3	4	5
2	Tree-of-Heaven	3,3,2	15*7	60	40	Poor	Stump sprout tree. Not tagged because trunks are inaccessible behind pile of building materials.	3	4	5
3	<i>Persea americana</i> , avocado (edible)	5,4	15*10	80	60	Poor		3	4	6
4	Tree-of-Heaven	18,9	35*25	80	50	Poor	Stump sprout tree.	6	9	17
5	Tree-of-Heaven	39x2-11	22-35 * 6-25	50-80	20-60	Poor	The most common trunk diameter is around 6 inches in this long row of sucker and stump sprout trunks.	3	4	5
6	<i>Prunus amygdalus</i> , Almond (edible)	7	22*18	80	50	Poor	Volunteer.	3	4	6
7	Tree-of-Heaven	7*2-12	12-30 * 4-25	50-80	20-50	Poor		3	5	6
8	Tree-of-Heaven	12,14,19	45*35	85	50	Poor	Causing massive asphalt damage around root collar .	8	13	16
9	Tree-of-Heaven	12	42*25	80	50	Poor	Not tagged because inaccessible between structures. Trunk diameter is estimate.	3	5	6
10	Tree-of-Heaven	18	40*30	85	60	Poor	Roots of tree causing massive asphalt damage. Trunk pressing against the adjacent cyclone fence.	4	7	13
11	Chinese pistache	3,4,4, 5	22*22	90	40	Fair/Poor	Stump sprout from previous tree that was cut down.	3	4	5



Tree #	Species & Common Name	Trunk Diam. @3ft.	Size	CONDITION		Preservation Suitability	Notes	TREE ROOT PROTECTION DISTANCES		
				Vigor	Structure			3xDBH	5xDBH	OTZ
12	<i>Fraxinus angustifolia</i> 'Raywood', Raywood ash	16	40*40	60	50	Fair	Condition somewhat uncertain because tree is leafless now during its deciduous period. I can see some definitely dead branches, though.	4	6	15
13	Raywood ash	15	40*40	70	40	Fair/Poor	Same as previous regarding condition. This tree and the adjacent Raywood ash may be City Street Trees.	4	6	14
14	Raywood ash	5	5,5,5,6,11	90	20	Fair/Poor	A stump sprout tree. Same as previous regarding condition.	3	4	5
15	Raywood ash	17	45*35	90	40	Fair	Same as previous regarding condition.	4	7	16
16	<i>Cupressus macrocarpa</i> 'Stricta', Italian cypress	5	35*4	80	80	Fair/Good		3	4	5
17	Tree-of-Heaven	16,9,5	45*32	80	50	Poor	Two clumps of trunks. Some of the trunks are growing through and are embedded in the adjacent cyclone fence.	6	9	11
18	Tree-of-Heaven	5x5-13	40*35	80	50	Poor	Size is provided for the entire grove .	3	5	6
19	Tree-of-Heaven	9x2-12	10-25*6-15	40-60	20-50	Poor		3	5	6



EXPLANATION OF TREE TABLE DATA COLUMNS:

- 1) **Tree Number** (the field tag number of the existing tree). Each existing tree or group of trunks in the field (except trees #2 and #9 due to access problems) was tagged with a 1.25 inch round aluminum number tag that corresponds to its tree number referenced in the arborist report, Tree Map, Tree Protection Specifications and any other project plans where existing trees must be shown and referenced.
- 2) **Tree Name and Type:**
Species: The *Genus* and *species* of each tree. This is the unique scientific name of the plant, for example *Quercus agrifolia* where *Quercus* is the Genus and *agrifolia* is the species. The scientific names of plants can be changed from time to time, but those used in this report are from the most current edition of the *Sunset Western Garden Book* (2012) Sunset Publishing Corporation. The scientific name is presented at its first occurrence in the Tree Table, along with the regional common name. After that only the common name is used.
- 3) **Trunk diameter (at 2 feet above the ground).** This is the trunk diameter measurement height required by the City of San Jose, in lieu of *DBH*³. For multi-trunk trees, trunk diameter is measured for the largest trunk and estimated for all smaller trunks.

Examples: an "18" in the Diameter column means that the tree has a diameter of 18 inches at 2 feet above the ground. "18, 7, 5" means that this is a multi-trunk tree with trunk diameters of 18, 7 and 5 inches at 2 feet above the ground.

- 4) **Size:** tree size is listed as height x width in feet, estimated and approximate and intended for comparison purposes.
- 5) **Condition Ratings:** Trees are rated for their *condition* on a scale of *zero to 100* with zero being a dead tree and 100 being a perfect tree (which is rare – like a supermodel in human terms). A 60 is “average” (not great but not terrible either). There are two components to tree condition – **vigor** and **structure**, and each component is rated separately. Averaging the two components is not useful because a very low rating for either one could be a valid reason to remove a tree from a site -- even if the other component has a high rating. Numerically speaking for each separate component:

100 is equivalent to *Excellent* (an 'A' academic grade), **80** is *Good* (B), **60** is *Fair* (C), **40** is *Poor* (D), **20** is *Unacceptable* (F) and **0** is *Dead*.

- 6) Relative to the scope of work for this report, tree *Condition* has been rated but not explained in detail and recommendations for the management of tree condition have not been included. The tree owner may contact Deborah Ellis for additional information on tree condition and specific recommendations for the general care of individual trees relative to their condition.

³ *DBH* is tree trunk diameter in inches “at breast height”, measured at 4.5 feet above ground level. This is the forestry and arboricultural standard measurement height that is also used in many tree-related calculations.



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- 7) The *Condition* of the tree is considered relative to the tree species and future intended use of the site to provide an opinion on the tree’s Preservation Suitability Rating (i.e. “Is this tree worth keeping on this site, in this location) as explained in Table 3 below. This is based upon the scenario that the tree is given enough above and below-ground space to survive and live a long life on the site. Ratings such as “Fair/Good” and “Fair/Poor” are intermediate in nature. The Preservation Suitability rating is not always the same as the Condition Rating because (for example) some trees with poor condition or structure can be significantly improved with just a small amount of work – and it would be worthwhile to keep the tree if this were done.

Table 3 Preservation Suitability Rating Explanation

Excellent	Such trees are rare but they have unusually good health and structure and provide multiple functional and aesthetic benefits to the environment and the users of the site. These are great trees with a minimum rating of “Good” for both vigor and structure. Equivalent to academic grade ‘A’.
Good	These trees may have some minor to moderate structural or condition flaws that can be improved with treatment. They are not perfect but they are in relatively good condition and provide at least one significant functional or aesthetic benefit to the environment and the users of the site. These are better than average trees equivalent to academic grade ‘B’.
Fair	These trees have moderate or greater health and/or structural defects that it may or may not be possible to improve with treatment. These are “average” trees – not great but not so terrible that they absolutely should be removed. The majority of trees on most sites tend to fall into this category. These trees will require more intensive management and monitoring, and may also have shorter life spans than trees in the “Good” category. Retention of trees with moderate suitability for preservation depends upon the degree of proposed site changes. Equivalent to academic grade ‘C’.
Poor	These trees have significant structural defects or poor health that cannot be reasonably improved with treatment. These trees can be expected to decline regardless of management. The tree species themselves may have characteristics that are undesirable in landscape settings or may be unsuitable for high use areas. I do not recommend retention of trees with low suitability for preservation in areas where people or property will be present. Equivalent to academic grade ‘D’.
None	These trees are dead and/or are not suitable for retention in their location due to risk or other issues. In certain settings however, (such as wilderness areas, dead trees are beneficial as food and shelter for certain animals and plants including decomposers. Equivalent to academic grade ‘F’.



- 8) **Notes:** This may include any other information that would be helpful to the client and their architects and contractors within the scope of work for this report, such as a more detailed explanation of tree condition or expected construction impact.
- 9) **Tree Protection Distances** (See page 11).
- a) **Root Protection:**
- i) **3 and 5xDBH:** Both the 3 and 5xDBH distances are listed for each tree. For multi-trunk trees 100% of the DBH of the largest trunk is added to 50% of the DBH for all other trunks in order to compute the operational DBH to use for these the Tree Protection Distance calculations. For practical purposes, the minimum 3xDBH distance is 3 feet and the minimum 5xDBH distance is 4 feet. If disturbance cannot be kept at least 3 feet from the trunk of a tree, the tree should normally be removed.
- ii) **OTPZ (Optimum Tree Protection Zone):** This is calculated as per the text, *Trees & Development*, Matheny et al., International Society of Arboriculture, 1998. This method takes into account tree age and the particular tree species tolerance of root disturbance. Because it may not be possible to maintain the OPTZ distance recommended for trees on many projects due to crowded site conditions, the Arborist may omit this requirement and list only the 3 and 5xDBH distances.
- b) **Canopy Protection:** Additional space beyond root zone protection distances may be necessary for canopy protection.



TREE PROTECTION DISTANCES

3 TO 5 X DBH

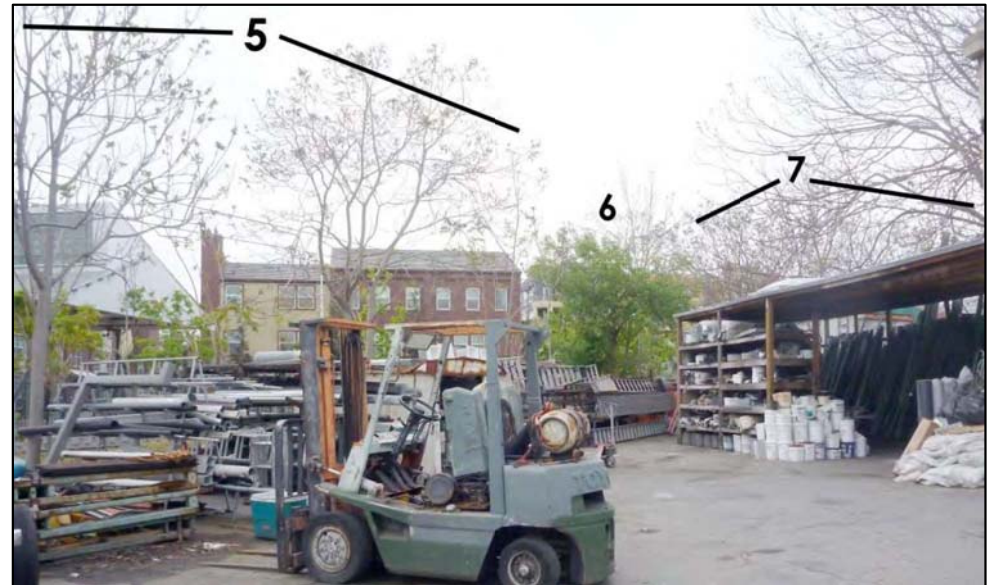
No one can estimate and predict with absolute certainty how far a soil disturbance such as an excavation must be from the edge of the trunk of an individual tree to affect tree stability or health at a low, moderate or severe degree -- there are simply too many variable involved that we cannot see or anticipate. 3xDBH however, is a reasonable "rule of thumb" minimum distance (in feet) any excavation should be from the edge of the trunk *on one side of the trunk*. This is supported by several separate research studies including (Smiley, Fraedrich, & Hendrickson 2002, Bartlett Tree Research Laboratories. *DBH* is trunk "diameter at breast height" (4.5 feet above the ground). This distance is often used during the design and planning phases of a construction project in order to estimate root damage to a tree due to the proposed construction. It tends to correlate reasonably well with the *zone of rapid taper*, which is the area in which the large *buttress roots* (main support roots close to the trunk) rapidly decrease in diameter with increasing distance from the trunk. For example, using the 3X DBH guideline an excavation should be no closer than 4.5 feet from the trunk of an 18-inch DBH tree. Such distances are guidelines only, and should be increased for trees with heavy canopies, significant leans, decay, structural problems, etc. It is also important to understand that in actual field conditions we often find that much less root damage occurs than was anticipated by the guidelines. 3xDBH may be more of an aid in preserving tree stability and not necessarily long-term tree health. 5X DBH or greater is the "preferred" minimum distance which should be strived for, and this distance or greater should probably be used when there are multiple trenches on more than one side of the trunk. The roots beyond the zone of rapid taper form an extensive network of long, rope-like roots one to two inches in diameter. These woody perennial roots are referred to as *transport roots* because they function primarily to transport water and minerals. Maintaining a 5xDBH tree protection zone or greater around a tree will preserve more of these transport roots, which will have less of an impact on tree health than if the excavation were closer to the trunk.

OTPZ (OPTIMUM TREE PROTECTION ZONE)

OTPZ is the distance in feet from the trunk of the tree, all around the tree, that construction or other disturbance should not encroach within. If this zone is respected, then chances of the tree surviving construction disturbance are very good. This method takes into account tree age, DBH and the particular species tolerance to root disturbance. Although there are no scientifically based methods to determine the minimum distance for construction (for example, root severance) from trees to assure their survival and stability, there are some guidelines that are often used in the arboricultural industry. The most current guideline comes from the text, Trees & Development, Matheny et al., International Society of Arboriculture, 1998. The tree protection zone calculation method in this text was used to obtain the OTPZ's provided in this report. Due to the crowded, constrained nature of many building sites it is often not be possible to maintain the OPTZ distance recommended for many of the trees -- therefore I have also listed alternate distances of 3 and 5X DBH (see *paragraph above*).



TREE PHOTOS



Left photo: **Tree-of-Heaven #1** (5 clumps of 19 trunks, 3 to 8 inches in diameter) at the very northeast corner of the site.

Right: **Tree-of-Heaven #5 and #7** (groups of trunks, as with tree #1) and **almond #6** along the south perimeter of the site.

Note: **Tree-of-Heaven #2 and #4 and avocado #3** are on the cover of this report.



Left photo: **Tree-of-Heaven trees #8 and 9**, squeezed between a storage shed and the building behind.

Center: close-up of lower trunk of **Tree-of-Heaven #8**.

Right: **Tree-of-Heaven #10** near one of the commercial buildings, close to West San Carlos Avenue.



Left photo: **Tree-of-Heaven #10, Chinese pistache #11, Raywood ash #12 and 13 and Italian cypress #16** near the building at 740 West San Carlos Avenue. The ash trees may be City Street Trees

Right: **Raywood ash #13-15** along West San Carlos Avenue. These ash trees may be City Street Trees.





Upper Left: **Tree-of-Heaven #17 and 18** at the southwest corner of the site.

Upper Right: **Tree-of-Heaven #17, 18 and the large group of trunks #19** at the southwest corner of the site.

Lower Left: close-up of some of the trunks labeled as **Tree-of-Heaven #19**.

Lower Right: **west neighbor's large Monterey pine** along the west perimeter of the site, near the northwest corner and West San Carlos Avenue.



ASSUMPTIONS & LIMITATIONS

1. **Tree locations** were not provided to us on an existing topographic survey map. In lieu of a topographic map we have provided approximate tree trunk locations on an aerial map with a handheld GPS device. If any trees may remain on the project site those trees should be surveyed and accurate trunk locations and tree driplines included on all site-based plans.
2. **The Condition Ratings for deciduous trees that are out of leaf (because they have shed their leaves for winter dormancy) are estimated.** More accurate condition ratings for these trees can be obtained after they have fully leafed out (usually mid-May through September). Deciduous trees on this site that were nearly or completely leafless are: Tree-of-Heaven, Chinese pistache and Raywood ash.
3. **A Basic Evaluation of the subject trees described in this report was performed on March 24, 2015 for the purpose of this report.** A basic evaluation is a visual evaluation of the tree from the ground, without climbing into the tree or performing detailed tests such as extensive digging, boring or removing samples. This is an initial screening of the tree after which the evaluator may recommend that additional, more detailed examination(s) be performed if deemed necessary.
4. **Trees on neighboring properties were not evaluated.** They were only viewed cursorily from the project site. I did not enter the neighboring property to inspect these trees up close.
5. **Many trees had their root collars and or lower trunks covered** with soil, vegetation or debris and were obstructed from view when I conducted my tree evaluation. The obstructions should be removed and I should re-examine these previously covered areas.
6. **Any information and descriptions provided to me for the purpose of my investigation in this case and the preparation of this report are assumed to be correct.** Any titles and ownerships to any property are assumed to be good and marketable. I assume no responsibility for legal matters in character nor do I render any opinion as to the quality of any title.
7. **The information contained in this report covers only those items that were examined** and reflects the condition of those items at the time of inspection.
8. **Loss or removal of any part of this report** invalidates the entire report.
9. **Possession of this report, or any copy thereof, does not imply right of publication** for use for any purpose by any person other than to whom this report is addressed without my written consent beforehand.
10. **This report and the values represented herein represent my opinion.** My fee is in no way contingent upon the reporting of a specified value or upon any finding or recommendation reported.
11. **This report has been prepared in conformity with generally acceptable appraisal/diagnostic/reporting methods and procedures** and is consistent with practices recommended by the International Society of Arboriculture and the American Society of Consulting Arborists.
12. **My evaluation of the trees that are the subject of this report is limited to visual examination of accessible items without dissection, excavation, probing or coring.** There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the plants or property in question may not arise in the future.



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- 13. **I take no responsibility for any defects in any tree's structure.** No tree described in this report has been climbed and examined from above the ground, and as such, structural defects that could only have been discovered have not been reported, unless otherwise stated. Structural defects may also be hidden within a tree, in any portion of a tree. Likewise, **root collar excavations and evaluations** have not been performed unless otherwise stated.
- 14. **The measures noted within this report are designed to assist in the protection and preservation of the trees mentioned herein,** should some or all of those trees remain, and to help in their short and long term health and longevity. This is not however; a guarantee that any of these trees may not suddenly or eventually decline, fail, or die, for whatever reason. Because a significant portion of a tree's roots are usually far beyond its dripline, even trees that are well protected during construction often decline, fail or die. Because there may be hidden defects within the root system, trunk or branches of trees, it is possible that trees with no obvious defects can be subject to failure without warning. The current state of arboricultural science does not guarantee the accurate detection and prediction of tree defects and the risks associated with trees. There will always be some level of risk associated with trees, particularly large trees. It is impossible to guarantee the safety of any tree. Trees are unpredictable.

I certify that the information contained in this report is correct to the best of my knowledge, and that this report was prepared in good faith. Thank you for the opportunity to provide service again. Please call me if you have questions or if I can be of further assistance.

Sincerely,

Deborah Ellis, MS.
 Consulting Arborist & Horticulturist
 Certified Professional Horticulturist #30022
 ASCA Registered Consulting Arborist #305
 I.S.A. Board Certified Master Arborist WE-457B
 I.S.A. Tree Risk Assessment Qualified





GLOSSARY

1. **Deciduous:** a plant that sheds all its leaves at a specific time of the year, usually during the winter when the weather is cold. As opposed to “evergreen” which are plants that retain their leaves in living condition all year long, never dropping all their leaves at once.
2. **Grove:** is a group of trees that located close together that shelter each other from wind and the elements, having “knit” canopies. If of the same species, there is usually root grafting between trees, which lends support from the ground, as well as water and mineral sharing. Removal of one or some grove members could cause remaining members to be unstable due to a reduction of previous shelter. Grove trees often have asymmetrical canopies when viewed as individuals.
3. **Root collar & root collar excavation and examination:** The *root collar* (junction between trunk and roots) is critical to whole-tree health and stability. A root collar excavation carefully uncovers this area (with hand digging tools, water or pressurized air). The area is then examined to assess its health and structural stability. Buttress roots may be traced outward from the trunk several feet. Decay assessment of the large roots close to the trunk (buttress roots) involves additional testing such as drilling to extract interior wood with a regular drill, or the use of a resistance-recording drill to check for changes in wood density within the root; as would be caused by decay or cavities. It is important to note that root decay often begins on the underside of roots, which is not detectable in a root collar excavation unless the entire circumference of the root is excavated and visible. Drill tests may detect such hidden decay. Note that it is not possible to uncover and evaluate the entire portion of the root system that is responsible for whole-tree stability. Decayed roots that are inaccessible (e.g. underneath the trunk) can be degraded to the extent that the whole tree may fail even though uncovered and examined roots in accessible locations appear to be sound.
4. **Stump sprout trees** are the result of a tree trunk being cut down to a short stump close to the ground. If the tree survives, it sends out many small shoots (suckers) from around the cut stump. Some of these suckers may survive and grow to become significant trunks. These trunks are spaced very close together and usually have included bark between them, which reduces the strength of their union. Such trunks are prone to failure. Stump sprout trees can be very structurally unsound, particularly as they become large and old. There is often a great deal of decay associated with the mother stump, which can also reduce mechanical stability.
5. **Suckers** are secondary upright shoots arising from the roots or root collar (junction between roots and trunk) of a tree, or below the graft union. On a grafted tree the suckers (originating from the *stock* which includes the roots), are often not the same plant species as the *scion* (the grafted, desirable aboveground part). Suckers can be a nuisance in landscape situations. In nature however, suckers can serve to keep a tree alive after fire or mechanical damage that kills or removes the aboveground part of the tree.