City of Encinitas

3.22.17 Assessment of Ficus Tree At 510 Second Street (Front-1)

SUBMITTED TO:

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PREPARED BY:

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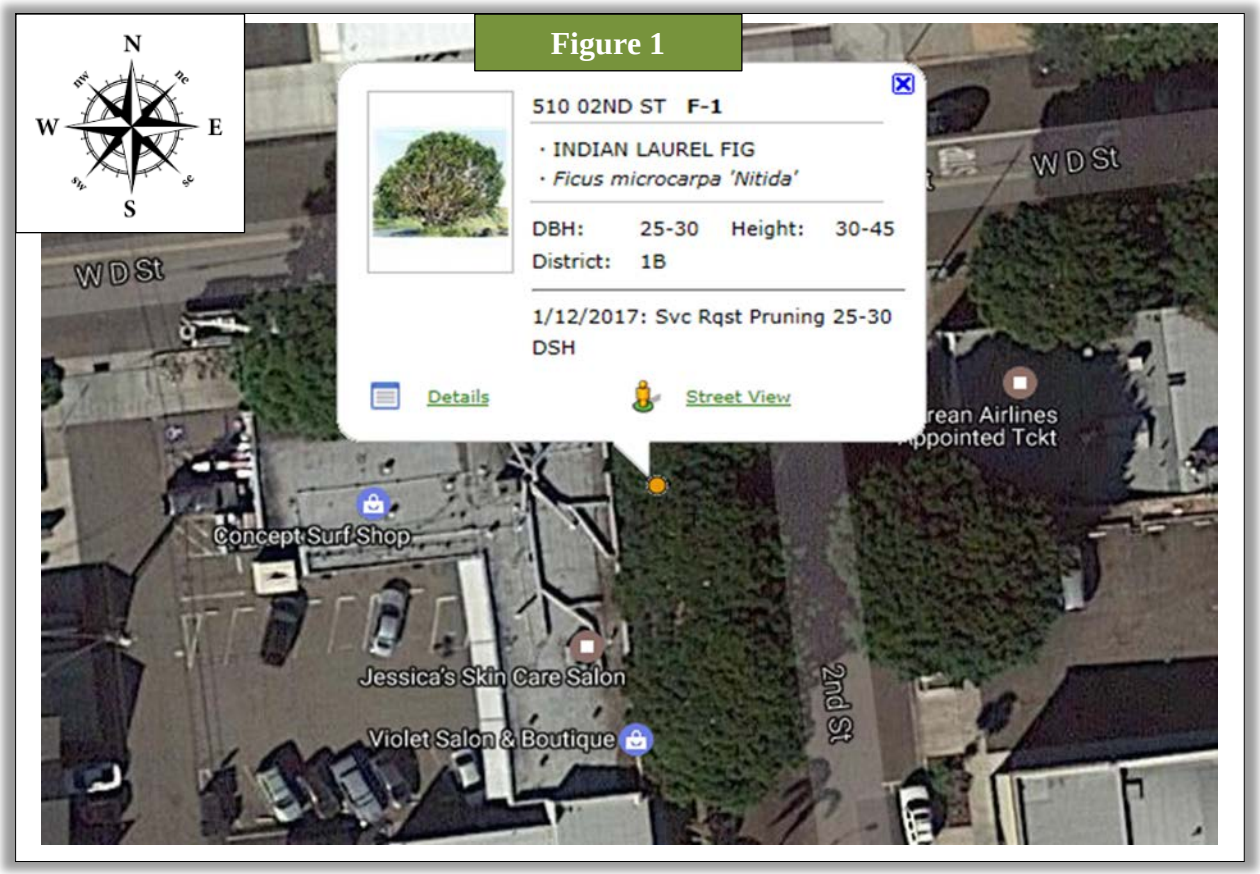
BACKGROUND AND ASSIGNMENT

In March of 2017, West Coast Arborists, Inc., (WCA) was contacted by John Ugrob (City of Encinitas) in regard to the assessment of an Indian Laurel Fig tree (*Ficus microcarpa 'nitida'*) located near 510 2nd St. In ArborAccess (WCA's tree inventory database), the tree is inventoried as 510 02ND ST F-1 and had a Facility I.D. # of 5040ETREE (see Figure 1 below).

Figure 1



The City of Encinitas was concerned with the structure, health, and stability of the subject tree. Mr. Ugrob requested that WCA perform a health and risk assessment and present management recommendations in order to help determine a course of action regarding the subject tree. The assessments performed as part of this report are valid for a period of one year from the date of inspection unless there are any abnormal, site impacting changes or events. The contents of this report are intended to be used by Mr. Ugrob and the City of Encinitas.

OBSERVATIONS

I inspected the subject tree on March 21, 2017. On site, I performed a **Level 2**: **Basic Assessment**[1]**.** I assessed the health and structural integrity of the tree using the **Best Management Practices (BMPs)** for tree risk assessment. I visually inspected the **crown** and **stem** of the tree, looking for structural defects such as **included bark**, **cavities**, **fungal fruiting bodies**, and/or **decay**. My inspection of defects in the crown was limited to a ground-level visual inspection. On site, I observed the following:

Tree Observations

- The tree was growing in a 7 foot wide tree well on the west side of 2nd St. and in front of the 510 business address (see Figure 1, as well as Photo #1 in Appendix A).

- Judging by the color and density of the foliage, the tree appeared to be in fair health for the species and time of year. The tree had a moderate **live crown ratio** of approximately 40% which is common for street trees necessitating crown raising for vehicle clearance (see Photo #1 in Appendix A).

- The tree had a DSH[2] measurement of 29 inches and a height of about 40 feet (measured with a TruPulse laser).

- There were some powerlines on the north side of the tree which appeared to be outside of the **target zone** (see Photo #1 in Appendix A).

- The tree had multiple **codominant stems** and branches which are indicative of poor structure yet common to this species (see Photo #2 in Appendix A).

- There was evidence of an old stem failure on the west side of the tree which was likely caused by either a vehicle impact, or weakly attached overextended growth (see Photo #2 in Appendix A).

- Some of the branches had evidence of some included bark and poorly developed branch unions (see Photo #3 in Appendix A).

[1] Terms appearing in boldface type are defined in the Glossary at the end of this report.
[2] Diameter at Standard Height (DSH) is the trunk diameter measured 4.5 feet above grade level.

- There was evidence of some older root pruning that occurred near tree's base, likely to perform hardscape repairs. The percentage of overall root mass that was observed to be injured did not appear great enough to compromise structural stability (see Photo #4 in Appendix A).

- There was evidence of hardscape repairs such as slab replacements and sidewalk grinding to mitigate trip hazards around the tree (see Photo #5 in Appendix A).

Site Observations

- Vehicles appeared to use this area of 2nd Street frequently throughout the day. Based on my experiences of living near the area, I would estimate parked vehicles being within the target zone approximately 8-14 hours per day.

RISK ASSESSMENT METHODOLOGY

According to the *Tree Risk Assessment Manual*, published by the International Society of Arboriculture (ISA), it is impossible to maintain trees free of risk. There is no way to guarantee that a tree will not fail. Tree benefits increase as the age and size of trees increase; however, some level of risk must be accepted to experience the benefits provided. The goal in assessing and managing trees is to strike a balance between the risk that a tree poses and the benefits that individuals and communities derive from trees.

Data collected from the Level 2 Basic Assessment is used to derive a level of risk based on the matrices found in the *ISA Tree Risk Assessment Manual* (see **Figure 2** below). The level of risk determined (low, moderate, high, or extreme) is to be used by risk managers to help in tree management decisions. When assessing risk, the value of targets is taken into consideration in order to categorize the consequences of failure (negligible, minor, significant, or severe). The people who use and frequent the target zone are generally the most important target with buildings, structures, and cars being secondary in importance. Factors such as occupancy rate and protection factors are used to help determine the target that constitutes the highest overall Risk Rating.

Figure 2

Matrix 1

This matrix is used to estimate the liklihood of a tree impacting a specified target.

Likelihood of Failure	Likelihood of Impacting a Target			
	Very Low	*Low*	*Medium*	*High*
Imminent	Unlikely	Somewhat Likely	Likely	Very Likely
Probable	Unlikely	Unlikely	Somewhat Likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat Likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2

This matrix is used to determine the level of risk as the combination of liklihood of a tree failing and impacting a target, and the severity of the consequences.

Likelihood of Failure and Impact	Consequences			
	Negligible	*Minor*	*Significant*	*Severe*
Very Likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat Likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

The risk matrices in Appendix C can guide you through the process used in determining the subject tree's overall risk.

Likelihood of Failure[3]

The subject tree was assessed to have a **possible** *likelihood of failure* within the next year. The most likely and relevant failure would be to one of the roughly 4-6 inch diameter and 10-15 foot long braches on the west side because of their overextended growth and evidence of poorly developed branch unions. This failure would be most likely to occur during abnormal or extreme weather conditions.

Likelihood of Impacting Target

The main targets included the people, buildings, and stationary or moving vehicles. Vehicles were assessed to have the highest risk of being impacted by a failure due to their frequent exposure to the **target zone** and lack of protection factors. The *likelihood of impacting a target* (vehicle) was **high** due to these factors.

Consequences

Because of the relatively small size and fall distance of the concerning branches, the consequences of failure would likely be **minor** to an average vehicle in this area. The branch part to initially impact a vehicle would likely be foliage towards the end of the branch which would likely lessen the force of impact.

Based on the categorization of the above risk factors, this tree is currently presenting an overall **low risk** (see Appendix C).

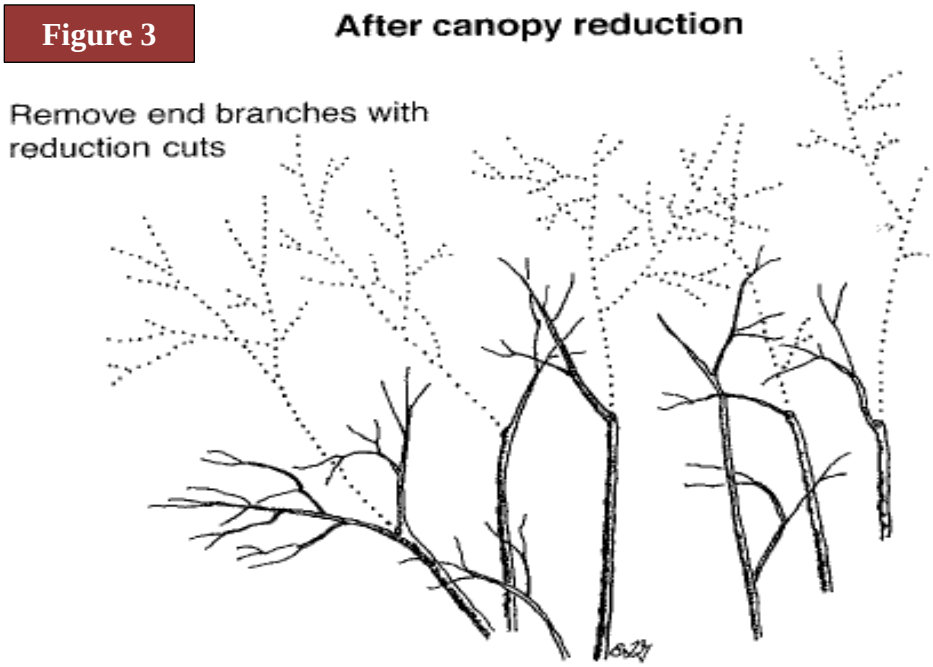
[3] Italicized terms are those terms used in the risk rating matrices (see Appendix B).

DISCUSSION AND RECOMMENDATION

After analyzing site observations and running them individually through the tree risk assessment matrices (Figure 2), it was concluded that the subject tree is currently presenting an overall low risk and mitigation is not necessary at this time. If the City of Encinitas would like to further decrease the overall associated risks then I recommend reducing or removing the branches pointed out in Appendix A, Photo #3 as well as maintaining the tree near its current height and retaining interior foliage. This should be achieved using pruning techniques which are further explained in Figure 3 below as well as Appendix B .

If conflicts between roots and infrastructure arise in the future, I recommend consulting with an ISA Certified Arborist to aid in finding the most efficient long term solution with minimal impacts to the tree. It is with the health and safety of the community in mind for which I present these recommendations.

Figure 3



- Shown above is an example of reduction pruning techniques to achieve a canopy reduction. The diagram is from the International Society of Arboriculture "*Best Management Practices for Tree Pruning"* 2008 publication.
- If there are not suitable laterals meeting the 1/3rd size correlation, pruning other reduction cuts may only be considered under the direction of an ISA Certified Arborist. Some of these reduction pruning cuts will be done to a shoot, branch, or stem that extends nearly as far as the removed parent branch; if this is the case then additional subordination pruning cuts back to a bud or young growth may be acceptable in order to maintain a point of **apical dominance** and to achieve the reduction goal.

APPENDIX A – PHOTOS

Photo #1

- The tree was growing in a 7 foot wide tree well on the west side of 2nd St. and in front of the 510 business address.

- Judging by the color and density of the foliage, the tree appeared to be in fair health for the species and time of year. There was a moderate **live crown ratio** of approximately 40% which is common for street trees necessitating raised crowns for vehicle clearance.

APPENDIX A – PHOTOS

Photo #2

- The tree had multiple **codominant stems** and branches (red arrows) which are indicative of poor structure yet common to this species.
- There was evidence of an old stem failure on the west side of the tree (green arrow) which was likely caused by either a vehicle impact or weakly attached overextended growth.

APPENDIX A – PHOTOS

Photo #3

Some of the branches (examples indicated by red arrows) had evidence of some included bark and poorly developed branch unions. There was a fair amount of responsive growth including grafting to other branches (green arrow) located around most of these poorly structured branch unions.

APPENDIX A – PHOTOS

Photo #4

There was evidence of some older root pruning that occurred near tree's base (red arrow), likely to perform hardscape repairs. The percentage of overall root mass that was observed to be injured did not appear great enough to compromise structural stability.

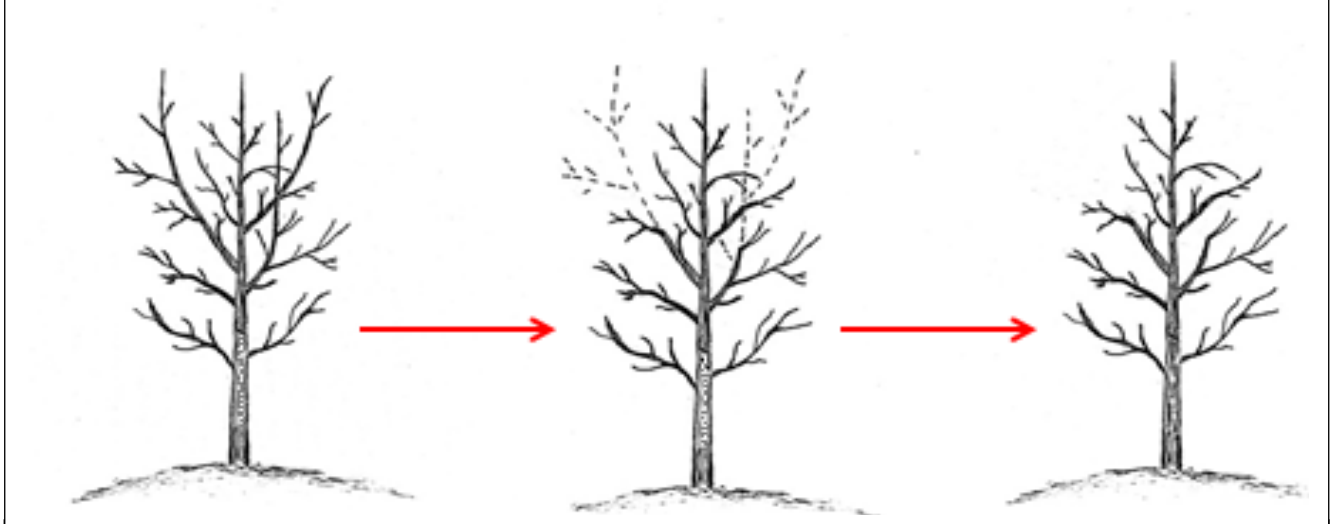
APPENDIX A – PHOTOS

Photo #5

There was evidence of hardscape repairs such as slab replacements and sidewalk grinding (red arrow) to mitigate trip hazards around the tree.

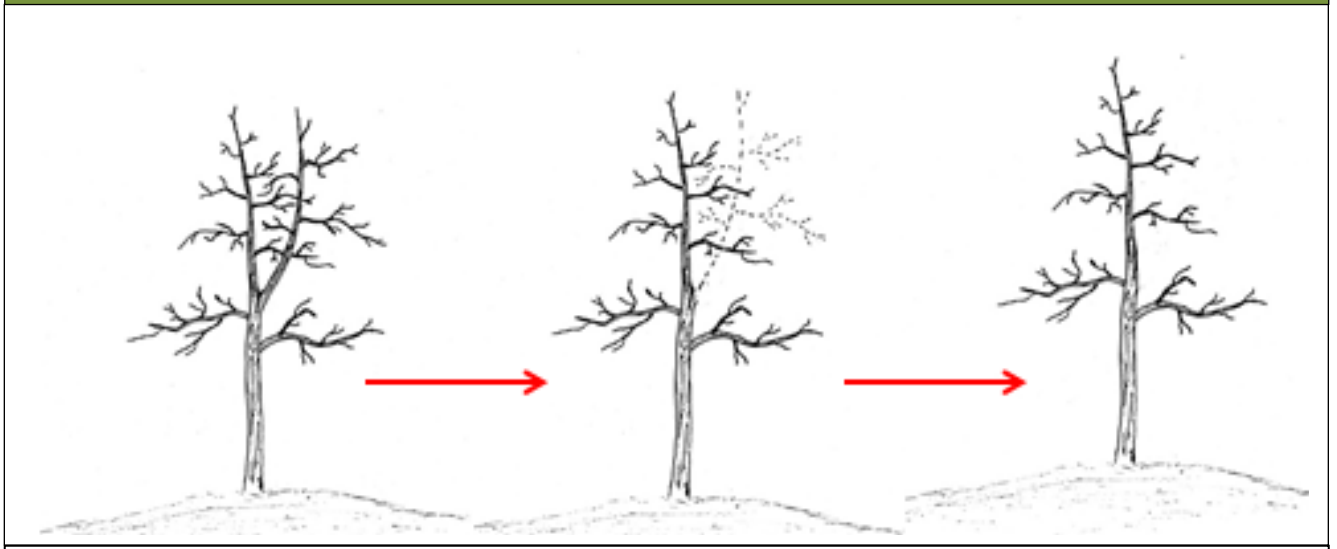
APPENDIX B – RECOMMENDED PRUNING TECHNIQUES

Reduction Pruning Techniques



Reduction pruning: A pruning cut that reduces the length of a branch or stem back to a live lateral branch large enough to assume apical dominance, typically at least 1/3rd the diameter of the cut stem.

Removal Pruning Cut Techniques



Removal Pruning Cut: A pruning cut that takes off a branch back to the trunk or parent stem to just beyond the branch collar.

APPENDIX C - RISK MATRICES

The red arrows are used to guide you through the process of determining the overall risk associated with the subject tree.

Matrix 1 Branch Failure

This matrix is used to estimate the likelihood of the specified tree failure and impact to a parked vehicle. The pink box exemplifies a somewhat likely failure and impact scenario in the next year if no mitigation is implemented.

Likelihood of Failure	Likelihood of Impacting Target			
	Very Low	Low	Medium	High
Imminent	Unlikely	Somewhat Likely	Likely	Very Likely
Probable	Unlikely	Unlikely	Somewhat Likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat Likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2 Branch Failure

This matrix is used to determine the overall level of risk associated with the subject tree by using the likelihood of failure and impact in combination with severity of the consequences. The pink box exemplifies an overall low risk for the tree under discussion at its current state.

Likelihood of Failure and Impact	Consequences			
	Negligible	Minor	Significant	Severe
Very likley	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

ASSUMPTIONS AND LIMITING CONDITIONS

1. Care has been taken to obtain all information from reliable sources. All data has been verified insofar as possible; however, the Consultant can neither guarantee nor be responsible for the accuracy of information provided by others. Standard of Care has been met with regards to this project within reasonable and normal conditions.

2. The Consultant will not be required to give testimony or to attend court by reason of this report unless subsequent contractual agreements are made, including payment of an additional fee for such services as described in the fee schedule and contract of engagement.

3. Loss or alteration of any part of this report invalidates the entire report.

4. Possession of this report or a copy thereof does not imply right of publication or use for any purpose by any other than the person to whom it is addressed, without the prior written consent of the Consultant.

5. This report and any values expressed herein represent the opinion of the Consultant, and the Consultant's fee is in no way contingent upon the reporting of a stipulated result, a specified value, the occurrence of a subsequent event, nor upon any finding to be reported.

6. Unless expressed otherwise: 1) information contained in this report covers only those items that were examined and reflects the condition of those items at the time of inspection; and 2) the inspection is limited to visual examination of accessible items without dissection, excavation, or coring, unless otherwise stated. There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the tree(s) or property in question may not arise in the future.

7. Arborists are tree specialists who use their education, knowledge, training, and experience to examine trees, recommend measures to enhance the beauty and health of trees, and attempt to reduce the risk of living near trees. It is highly recommended that you follow the arborist recommendations; however, you may choose to accept or disregard the recommendations and/or seek additional advice.

8. Arborists cannot detect every condition that could possibly lead to the structural failure of a tree. Trees are living organisms that fail in ways we do not fully understand. Conditions are often hidden within trees and below ground. Arborists cannot guarantee that a tree will be healthy or safe under all circumstances, or for a specific period of time.

9. Any recommendation and/or performed treatments (including, but not limited to, pruning or removal) of trees may involve considerations beyond the scope of the arborist's services, such as property boundaries, property ownership, site lines, disputes between neighbors, and any other related issues. Arborists cannot take such considerations into account unless complete and accurate information is disclosed to the arborist. An arborist can then be expected to consider and reasonably rely on the completeness and accuracy of the information provided.

10. The author has no personal interest or bias with respect to the subject matter of this report or the parties involved. He/she has inspected the subject tree(s) and to the best of their knowledge and belief, all statements and information presented in the report are true and correct.

11. Unless otherwise stated, trees were examined using the risk assessment criteria detailed by the International Society of Arboriculture's publications *Best Management Practices – Tree Risk Assessment* and the *Tree Risk Assessment Manual*.

BIBLIOGRAPHY

Harris, Richard W., James R. Clark, and Nelda P. Matheny. *Arboriculture: Integrated Management of Landscape Tree, Shrubs, and Vines.* New Jersey: Prentice Hall, 2004. Print (ISA) *International Society of Arboriculture*. Web. 15 March 2014.

Smiley, Thomas E., Nelda Matheny, and Sharon Lilly. *Best Management Practices: Tree Risk Assessment.* Illinois: International Society of Arboriculture, 2011. Print.

Kelby Fite, E. Thomas Smiley. *Best Management Practices: Managing Trees During Construction.* Illinois: International Society of Arboriculture, 2008. Print.

Edward F. Gilman, Brian Kempf, Nelda Matheny, Jim Clark. *Structural Pruning, A Guide For The Green Industry:* Urban Tree Foundation, 2013.

GLOSSARY

Best Management Practices (BMPs) – The International Society of Arboriculture has developed a series of Best Management Practices (BMPs) for the purpose of interpreting tree care standards and providing guidelines of practice for arborists, tree workers, and the people who employ their services.

Bending Moment - The algebraic sum of all the moments to one side of a cross-section ofa beam or other structural support.

Buttress Root- Large structural roots most common to trees native to rainforest soils where nutrients are not as abundant or accessible in the deeper soil layers.

Canopy – The part of the crown composed of leaves and small twigs (Harris, Clark, and Matheny 526).

Cavity – An open wound, characterized by the presence of decay and resulting in a hollow (Harris, Clark, and Matheny 527).

Codominant – Equal in size and relative importance, usually associated with either the trunks/stems or scaffold limbs/branches in the crown (Harris, Clark, and Matheny 527).

Compartmentalization – Natural defense process in trees by which chemical and physical boundaries are created that act to limit the spread of disease and decay organisms.

Crown – The leaves and branches of a tree measured from the lowest branch on the trunk to the top of the tree (Harris, Clark, and Matheny 527).

Decay – Process of degradation of woody tissues by fungi and bacteria through the decomposition of cellulose and lignin (Harris, Clark, and Matheny 527).

Elevated Root Bridging- Root bridging and ramps can be used to create a spatial separation between infrastructure elements (typically sidewalks) and the root zone. This is an important yet costly remedial design option when root pruning is not possible. An added benefit of this technique is the facilitation of root evaluation when fitted with removable steel plates. Coarse aggregate material and drains can be implemented to reduce water and debris accumulation within the gap if necessary.

Failure – Breakage of stem, branch, roots, or loss of mechanical support in the root system (Smiley, Matheny, and Lilly 48).

Fungal Fruiting Bodies – Any complex fungal structure that contains or bears spores.

Frass- Solid fecal matter produced by certain insects.

Included Bark – Pattern of development at branch junctions where bark is turned inward rather than pushed out (Harris, Clark, and Matheny 529).

Level 2: **Basic Assessment -** A Level 2 or basic assessment is a detailed visual inspection of a tree and its surrounding site, and a synthesis of the information collected. It requires that a tree risk assessor walk completely around a tree looking at the site, buttress roots, trunk, and branches. A basic assessment may include the use of simple tools to gain additional information about the tree or defects. This is the standard assessment that is performed by arborists in response to a client's request for tree risk assessment (Smiley, Matheny, and Lilly 15).

Level 3: Advanced Assessment – Advanced assessments (generally more time intensive) that are performed in conjunction with or after a Level 2 assessment to provide detailed information about specific tree parts, defects, targets, or site conditions. Specialized equipment, data collection and analysis, and/or expertise are usually required for advanced assessments. Procedures and methodologies should be selected and applied as appropriate, with consideration for what is reasonable to specific conditions and situations. All technologies involve some uncertainty and have their limitations; any evaluation of an individual tree will not be an accurate measure, but a qualified estimation. Information collected from advanced assessments can aid in making a final tree removal or retention recommendation.

Live Crown Ratio – The ratio of the height of the live crown to the height of the entire tree.

Minor Consequence – A consequences that involves low to moderate property damage, small disruptions to traffic or communication utility, or a very minor injury, examples include:

- A small branch striking a house roof from a high height.
- A medium sized branch striking a deck from a moderate height.
- A large part striking a structure and causing moderate monetary damage.
- Short term disruption of power at a service drop to a house.
- Temporary disruption of traffic on a neighborhood street.

Negligible Consequence – A consequence that involves low-value property damage or disruption that can be replaced or repaired; they do not involve personal injury, examples include:

- A small branch striking a fence.
- A medium-sized branch striking a shrub bed.
- A large branch striking a structure and causing low monetary damage.
- Disruption of power to landscape lighting.

Reduction Pruning – Pruning cut that reduces the length of a branch back to live lateral branch large enough to assume apical dominance. Typically at least one-third the diameter of the cut parent branch.

Response Growth - New wood produced in response to loads to compensate for higher strain in marginal fibers; includes reaction wood (compression and tension) and woundwood (Smiley, Matheny, and Lilly 50).

Removal Pruning Cut: A pruning cut that takes off a branch back to the trunk or parent stem to just beyond the branch collar.

Risk – The combination of the likelihood of an event and the severity of the potential consequences. In the context of trees, risk is the likelihood of a conflict or tree failure occurring and affecting a target, and the severity of the associated consequence—personal injury, property damage, or disruption of activities (Smiley, Matheny, and Lilly 50).

Severe Consequence – A consequence that could involve serious personal injury or death, disruption of important activities, damage to high-value property, examples include:

- Injury that may result in hospitalization or permanent damage.
- A medium- sized part striking an occupied vehicle.
- A large part striking an occupied house.
- Serious disruption of high-voltage distribution and transmission powerline.
- Disruption of arterial traffic or motorways.

Significant Consequence – A consequence that involves property damage of moderate – high value, considerable disruption, or personal injury, examples include:

- A medium sized part striking an unoccupied vehicle from a moderate to high height.
- A large part striking a structure and resulting in high monetary damage.
- Disruption of distribution primary or secondary voltage power lines, including individual services and street- lighting circuits.
- Disruption to traffic on a secondary street.

Stem – The main trunk of a tree or other plant (Harris, Clark, and Matheny 533).

Structural Pruning – Pruning that influences the orientation, spacing, growth rate, strength of attachment or ultimate size of branches and stems, resulting in a strong tree.

Target – People, property, or activities that could be injured, damaged, or disrupted by a tree (Smiley, Matheny, and Lilly 50).

Target zone – The area where a tree or branch is likely to land if it were to fail (Smiley, Matheny, and Lilly 50).

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