Tree Assessment

A Street Revitalization Plan

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Summary

This report is the result of the examination of 36-trees along the northern section of the A Street Revitalization Plan. The 36-trees are scheduled for removal and/or replacement due to line-of-sight issues, infrastructure improvements, missing or dead trees, and trees performing poorly. The question has been raised, is it necessary to remove all 36-trees, may some, or all, of the trees be saved and nursed back into good health and condition. As a sampling of the tree conditions at this site, 9-trees were selected of the largest and the healthiest to represent the total 36. Most of the trees along A Street, north of Gregory Street, have stunted growth, and are in poor condition (the average DBH of the trees north of Gregory Street was 4.5-inches, the trees south of Gregory Street 7.5-inches). The selected 9-trees had soil removed from individual tree root flares, and the depth of soil over trunk flares measured (in healthy trees the root flare will be exposed at grade level).

This investigation found that the 9-trees selected as a sampling of those to be removed and/or replaced, had physical defects present within their root systems. That these trees are struggling due to poor soil conditions and incorrect planting depth. Once trees have developed rooting problems, attempting to mitigate these problems becomes extremely difficult.

The procedures required to remove root system defects and reset trees at proper planting depth would be cost prohibitive, and not guaranteed to resolve all outstanding defects. The most cost-effective approach to providing the neighborhood with an aesthetically pleasing streetscape and a safe, secure interaction with street trees, is to remove and replace the trees with rooting defects. All but one of the sample trees had physical root defects that would be difficult to mitigate or resolve.

Because mistakes made at planting have lasting influence, it is extremely important that the planting site be carefully prepare. All efforts should be made in selecting the right tree species to match the site, that the trees are vigorous, healthy nursery stock with well-developed root systems. Yet having healthy vigorous trees will not compensate for poor or improper planting.

In planting sites without overhead utility lines, and infrastructure conflicts, native species such as Live oak, Red maple, American and Winged elms could be installed as these trees are medium to large growing with a wide crown spread. In planting sites with overhead utility and infrastructure conflict, Red bud, Weeping Bottlebrush, Red Buckeye, Yellowleaf Hawthorn, or Crape myrtle may be utilized.

Introduction

On March 8, 2022, a request from the members of the Community Redevelopment Agency was made to inspect the 36-trees located along A Street that have been scheduled for removal. These trees are part of the A Street Revitalization Plan and are located from the southeast corner of Gregory Street, north to Cervantes Street. The following report is an independent assessment as to the condition of the 36-trees, which trees should be replaced, retained, or removed, as observed between March 8, and March 16, 2022.

Starting on March 8, 2022, I visually inspected the 36-trees scheduled for removal and/or replacement and then assigned each of the 36-trees an identification number. I then identified those trees that are scheduled to be removed due to improvements, 7-trees conflicted with proposed infrastructure placement (Tree#2, 11, 12, 13, 28, 35 & 36), 2-trees were dead or missing (Tree#19 & 26), 2-trees were a palm or cycas (Tree#7 & 24), 1-tree was an invasive species (Tree#21), 2-trees were volunteers which

grew independently (Tree#1 & 20), and the remaining 22-trees that are struggling. A visual health assessment of the 22-trees, labelled as poorly performing, was conducted for individual tree condition, health, vitality, and safety. I measured and recorded each of the 22-trees for their diameter and height.

9-trees of the 22-trees that are in question as to final disposition, were selected for a physical inspection. The physical inspection exposed the **root collar** within the soil medium, measured the planting depth, identified the presents of any **adventitious root** system development, checked for **circling root** growth, and noted if the root system had any kinked buttress or supporting roots. The presents of these **defects** within tree roots systems would elevate the risk of whole tree failure as the trees continue to grow larger, explain the poor growth rate, and low vitality endemic in the trees located north of Gregory Street to Cervantes Street.

Background

A Street, between Main Street, in the south, and Cervantes Street, in the north, has been selected for revitalization and infrastructure improvement. The revitalization plan that has been accepted requires the removal of 36-trees that will conflict with proposed infrastructure improvements and street revitalization. The question has arisen as to the disposition of 22-trees that the improvement plans have selected for removal and replacement, due to plant species, poor tree vitality and/or condition.

The following report will review the suitability of keeping several trees scheduled for removal and replacement, the long-term outlook for health and public safety, and the recommendations for mitigation of defects if trees were kept in current location.

Assignment

Visually inspect trees scheduled for removal and/or replacement, assess health, condition, and vitality. Recommend which trees should be kept, and provide mitigation options to improve individual tree health, condition, and vitality if some, or all the trees were kept in place.

Limits of the Assignment

All tree in quested were visually inspected, 9-trees as a representative sampling were physically inspected by soil removal at root zone. The sample trees were not fully excavated. Soil compaction was not measured, nor was soil **pH** measured with samples sent to a laboratory, as these procedures were beyond the scope of this assignment

Purpose and Use of the Report

To help the City of Pensacola Community Redevelopment Agency decide the final disposition of the 36-trees scheduled for removal and/or replacement along A Street.

Observations

The 36-trees scheduled for removal and/or replacement in the A Street Revitalization Plan appear to be performing poorly, in comparison with the same species pallet found along the southern half of A-Street. The trees listed as in conflict with proposed infrastructure, palms, invasive species, non-street trees, or trees found to be dead, or missing were not physically inspected. Observations regarding the remaining 1-Crape Myrtle, 6-Magnolia and 15-Holly trees are as follows.

The pattern of individual tree performance of the 22-trees to be replaced, along with the remaining trees located in the northern portion of A Street would indicate a site wide problem. During visual inspection I did not find any exposed **trunk flares**, with supporting buttress roots at grade level, as would be expected from healthy, and correctly planted trees. No destructive living organisms were found causing health problems during the visual inspection. The location of poor performing trees being concentrated in the northern half of A Street, and the condition of these trees being noticeable over an extended period, the symptoms would indicate an **abiotic disorder**.

9-trees were selected as sampling of the total 22-poor performing trees located along the northern section of the A Street Revitalization Plan. Of the 9-trees selected, all but one, had structural issues with their root systems. The 9-trees selected for deeper investigation each had a combination of circling roots, kinked, or twisted supporting roots, an adventitious root system, and all had excessive soil over the original root ball.

Testing and Analysis

The 9-trees used as a sampling had soil removed from a section of the tree base, the trunk flare was identified, and the accumulated soil measured for depth. The roots were inspected to determine whether the roots were buttress/support roots, or if the roots exposed were adventitious and formed from **latent buds**. All analysis were visual, only hand tools to remove soil were used. Tree diameter was measured with a standard diameter tape, and height measured with the aid of a Hastings Nursery Stick.

Discussion

When trees of similar size and condition are planted correctly, tree health and vigor are relatively equal in outcomes. When a visual assessment is performed on a group of trees planted during the same project, of the same species, of relatively the same size, and when a section of those trees shows signs of deficiencies in health, vigor, and condition, there is usually a reason. The first step in diagnosing tree health problems is to determine whether the cause of poor plant performance is **abiotic** (nonliving) or **biotic** (living).

Biotic disorders include pathogens, nematodes, insects, mites, vertebrates, and parasitic plants. Abiotic disorders include physical or environmental problems, mechanical problems, and chemical problems. The symptoms of both sometimes mirror each other, so close examination of individual plants is required.

On the dates of March 8, 2022, through March 16, 2022, 9 of the 22-trees in question for disposition, had sections of soil removed from individual tree bases (Trees #2, 3, 4, 5, 6, 8, 9, 17, & #23), soil was removed with the aid of a small shovel and a hand trowel. The depth of the soil ran between 3-to 10-

inches over the trunk flares. Excessive soil over tree roots of newly planted trees is a common reason urban trees perform poorly.

Expanding, healthy tree roots require water, oxygen, nutrients, low soil penetration resistance, and appropriate microflora from the soil environment. The soil has great influence on root growth and distribution, and with expanded root growth, the health and over-all condition of trees. Urban soils often restrict depth of root penetration, due to compaction and composition.

Planting depth is an important factor in the life expectancy and health of trees. Planting too deeply is the most common mistake made during planting, and it is nearly impossible to correct when discovered months, or years later. Higher mortality, slower growth, low vigor, circling root systems, and tree stability issues often result from trees being planted too deeply. A tree with deep roots may appear to be growing normally without comparison to a tree with roots at the correct depth. Research has found that many tree species whose roots have been planted just 3-inches too deeply had reduced growth, increased likelihood of trunk collar rot, likelihood of basal canker disease, and an increased presents of circling/girdling roots.

The trees planted along A Street, and scheduled for removal and/or replacement, from the southeast corner of Gregory Street to Cervantes Street, visually appear to be struggling, when compared to the same species of trees planted along A Street, south of Gregory Street. The excavation of these trees reveled that the majority had been installed too deeply. The trees examined had circling roots, kinked roots, adventitious roots, and girdling roots (**See Appendix A - Photos Tree #2, 3, 4, 5, 6, 8, 9, 17, & #23)**. The average trunk diameter of the trees located south of Gregory Street was measured at 7.5-inch **DBH**. The trees located north of Gregory Street had an average trunk diameter of 4.5-inch DBH.

In cases where a tree has a significate historic or aesthetic value, tree roots maybe excavated, pruned to remove defects, and the tree re-planted. The process involves the use of either high-pressure air or water, which removes soil from around the tree roots, without causing damage to the root system. Any structural defects in the root system are exposed, the defects are then identified and corrected by pruning, when pruning has been completed, the soil is then replaced over the roots at the correct level. The process is time consuming and requires specialized equipment, therefore the procedure is normally performed only on trees of notable size or value.

Conclusions

The urban soil is typically heavily compacted, with high pH levels, and poorly drained. When planning new trees within the urban environment, it is important to prepare the planting holes carefully. The planting hole should be no deeper than the root ball, and the root ball must be supported by firm soil underneath to prevent settling. Research has shown that trees benefit from larger planting holes, a larger hole means a greater volume of loose cultivated soil for rapid initial root growth. Widening the planting hole is the only way to provide for a larger hole, as digging a deeper hole is not helpful. A planting hole that is two to three times the width of the root ball is optimum, as the loose soil provides less resistance to root growth plus more air spaces for oxygen.

Most of the trees included within this report had been planted incorrectly, with the resulting defects that would exclude these trees from being a long-term benefit to the community. The structural defects

that have been identified are not easily mitigated or corrected, and over time the trees will decline and fail to reach potential.

Recommendations

It is my professional recommendation that the trees currently selected for removal and/or replacement be removed and replaced. That the new tree installations be carefully planned to provide each new tree with large planting holes, 3 to 4-times the root balls in diameter. If feasible, the area between tree plantings should be tilled to provide the largest root space possible, as trees of the same species may graft roots and become mutually supporting, both in severe weather and in sharing resources. New trees should be examined to ensure that the root balls do not contain circling roots, and that each tree has an exposed trunk and root flare. That the exposed interphase between roots and trunk tissue remain exposed after planting and mulching.

There is a total of 180-trees, including the above 36-trees, located along A Street, from Main Street north to Cervantes Street. Any trees that have not already been inspected, with excessive mulch, buried root flares, or are leaning should be examined and have trunk flares excavated and exposed. Any trees that are found to have structural problems with kinked and twisted support roots should be regularly monitored for failure risk, and if failure risk becomes unacceptable, removed, and replaced.

In planting sites without overhead utility lines, and infrastructure conflicts, native species such as Live oak, Red maple, American and Winged elms could be installed as these trees are medium to large growing with a wide crown spread. In planting sites with overhead utility and infrastructure conflict, Red bud, Weeping Bottlebrush, Red Buckeye, Yellowleaf Hawthorn, or Crape myrtle may be utilized.

Glossary

Abiotic disorder: plant ailment caused by nonliving environmental, or man-made agents.

Adventitious roots: root like growth arising from roots or stems and having no connection to apical meristems.

Biotic disorder: disorder caused by a living organism.

Buttress roots: roots at the trunk base that help support the tree.

Circling roots: roots that grow in a circular pattern when a plant is confined in the same container longer than necessary. If not corrected, will prevent a tree from establishing well when planted and will create future problems, such as blow-over, girdling roots, and strangulation.

DBH : acronym for tree diameter at breast height. Measured at 4.5-feet above ground level, in the US.

Defect: injuries, growth patterns, decay, or other conditions that reduce the tree's structural strength.

Latent bud: bud held in dormancy for more than one year by hormones originating from the terminal bud. Term sometimes used to refer to dormant buds or adventitious buds.

pH: unit of measure that describes the alkalinity or acidity of a solution. Negative log of the hydrogen ion concentration. Measured on a scale from 0 to 14. Greater than 7 is alkaline, less than 7 is acid, and 7 is neutral (pure water).

Root collar: flared area at the tree trunk base where the roots and trunk come together.

Trunk flare: transition zone from trunk to roots where the trunk expands into buttress or structural roots. Root flare.

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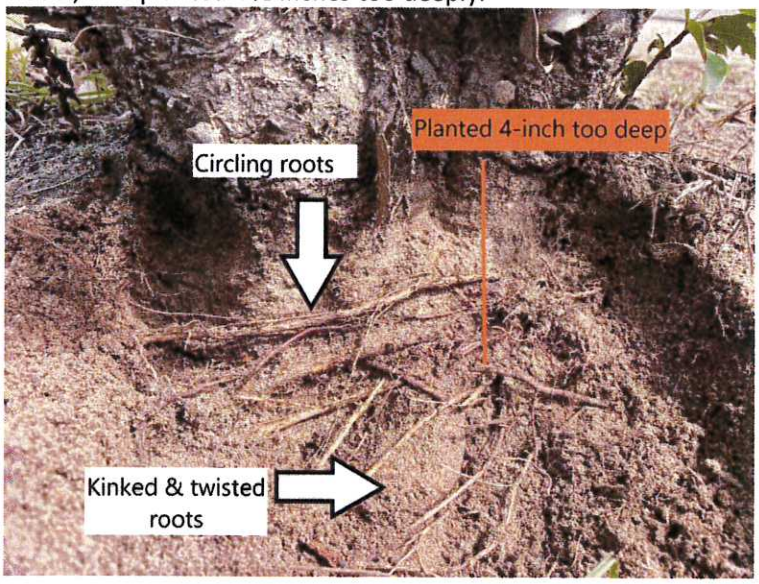
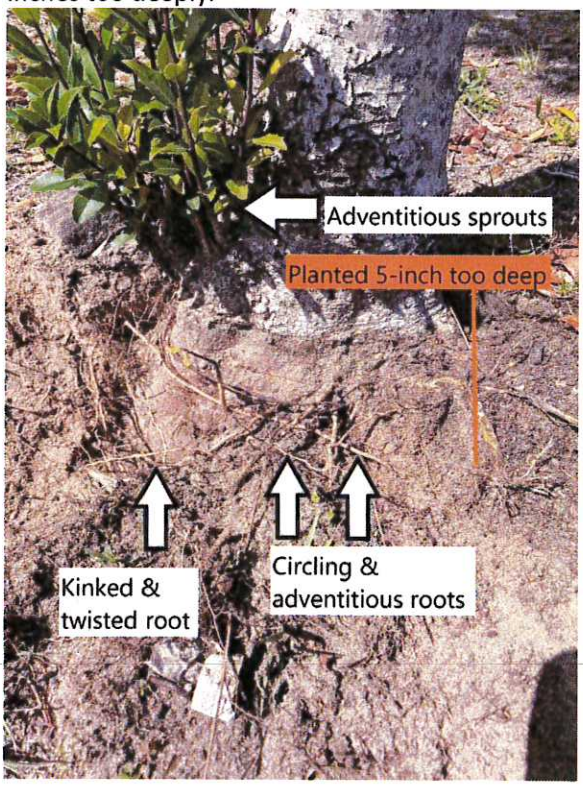
Appendix A Inspected Tree Rooting

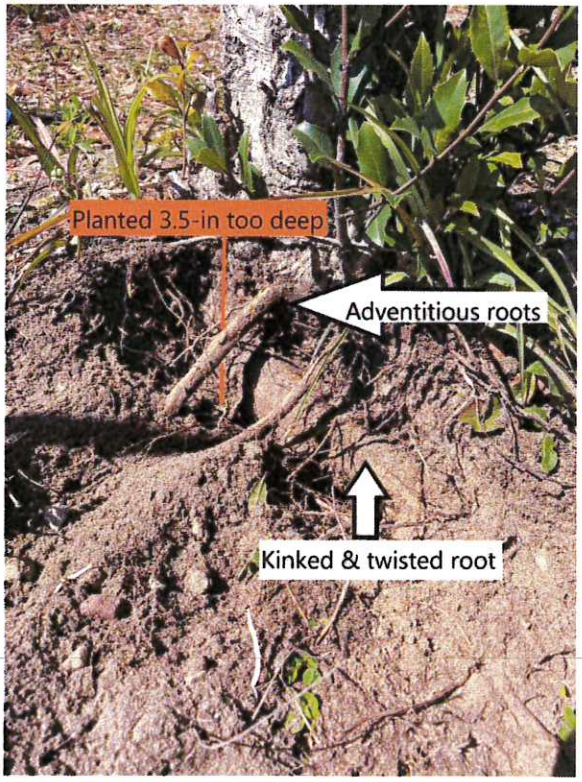
Tree #2: 5-in DBH, 20-ft height. Circling roots, kinked & twisted buttress Roots, tree planted 4 ½ inches too deeply.



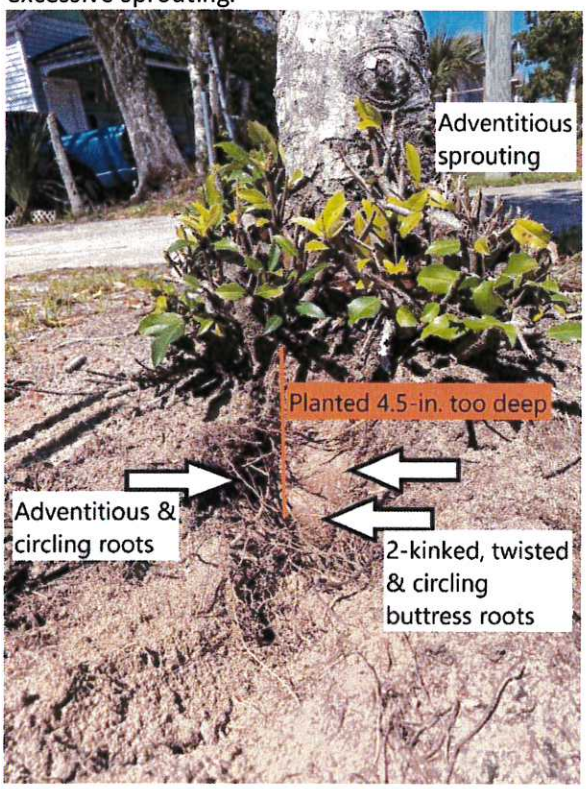
Tree #3: 4.5-in. DBH, 21-ft height. Circling roots, kinked & twisted buttress Roots, tree planted 6-inches too deeply.



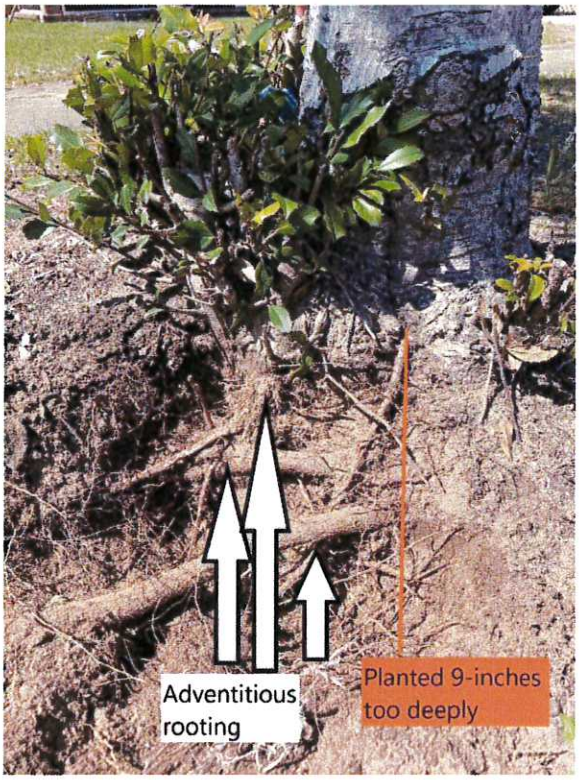
Tree #4: 5.5-in. DBH, 17-ft height, Planted 3.5-inches too deep, adventitious rooting, kinked & twisted buttress root.



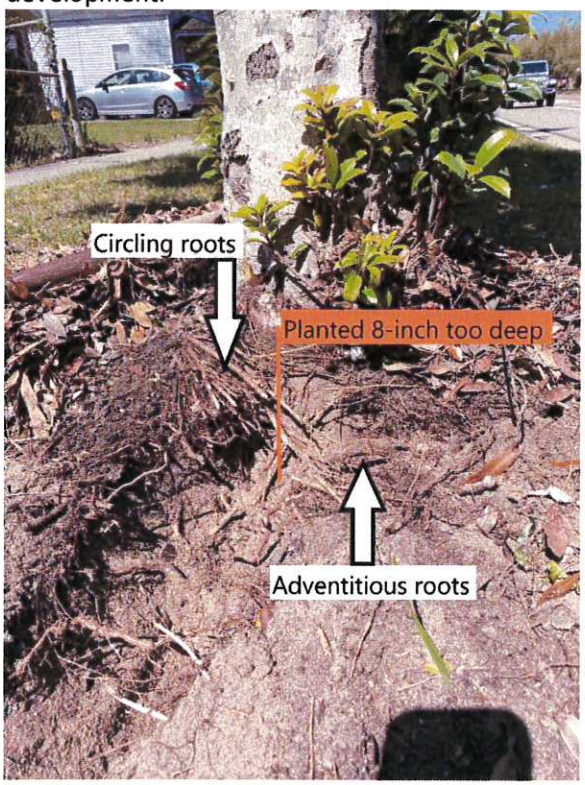
Tree #5: 3.5-in. DBH, 16 ½ ft height, planted 4 ½ inches too deeply, Kinked & twisted Buttress roots, adventitious & circling roots, excessive sprouting.



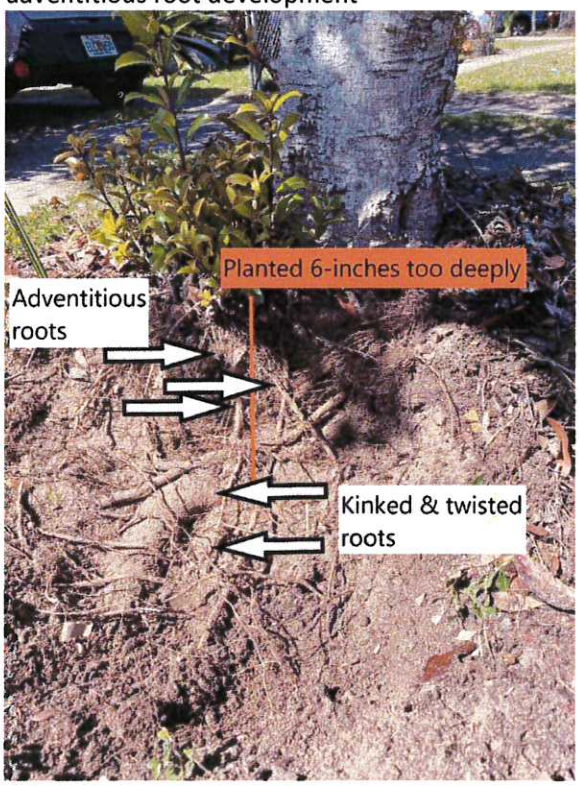
Tree #6: 6-in. DBH, 20 ft height, planted 9-inches too deeply, Multiple adventitious roots developing, epicormic sprout development along trunk at soil level.



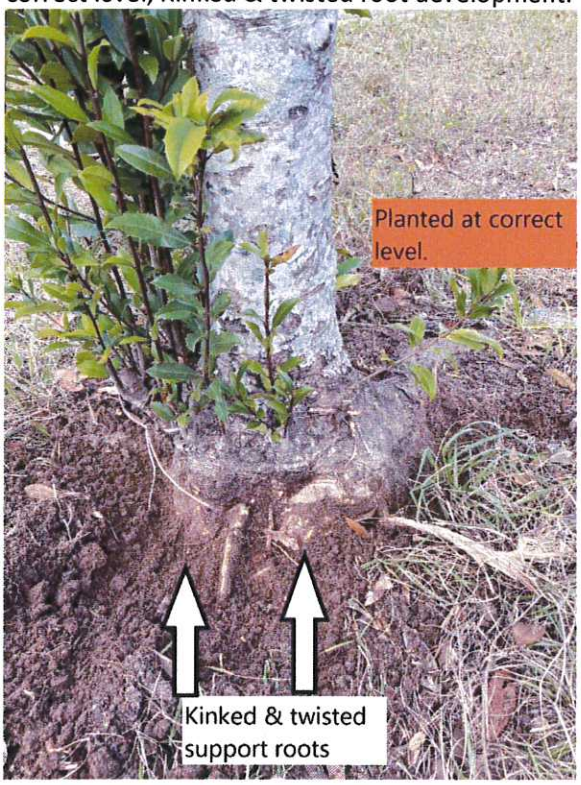
Tree#8: 5.5-in. DBH, 22-ft height, planted 8-inches too deeply, Circling roots, adventitious root development.



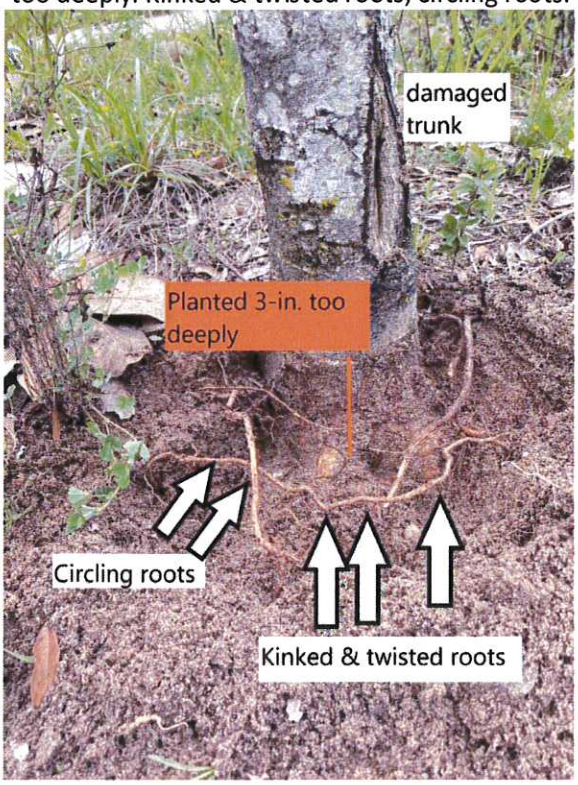
Tree #9: 6.5-in. DBH, 20-ft height, planted 6-inches too deeply, Kinked & Twisted support roots, adventitious root development



Tree #17: 3.5-in. DBH, 19-ft height, planted at correct level, Kinked & twisted root development.



Tree #23: 5.5-in. DBH, 18.5-ft height, planted 3-in too deeply. Kinked & twisted roots, circling roots.



Appendix B: Certificate of Performance

I, Kristopher J Stultz certify that:

1. I have personally inspected the trees and the property referred to in this report and have stated my findings accurately. The extent of the evaluation is stated in the attached report and the Limits of the Assignment.
2. I have no current or prospective interest in the trees or the property that are the subject of this report and have no personal interest or bias with respect to the parties involved.
3. The analysis, opinions and conclusions stated herein are my own and are based on current scientific procedures and facts.
4. My analysis, opinions, and conclusions were developed, and this report has been prepared according to commonly accepted arboricultural practices.
5. No one provided significant professional assistance to me, except as indicated within the report.

I further certify that I am a member in good standing of the American Society of Consulting Arborist, and the International Society of Arboriculture. I have been involved in the field of Arboriculture in a full-time capacity for a period of more than 35-years.