Tree Solutions Inc
Consulting Arborists

Project No. TS - 8203

Arborist Report
DRAFT

To:	Absher Construction c/o Blaine Wolfe and Integrus Architects c/o Sara Wilder
Site:	1601 39th Ave SE Puyallup, WA 98374
Re:	Tree Inventory
Date:	January 28,2022
Project Arborists:	George White, ISA Certified Arborist #PN-8098A ISA Qualified Tree Risk Assessor
	Sean Dugan, Registered Consulting Arborist # 475 ISA Board Certified Master Arborist #PN-5459B ISA Qualified Tree Risk Assessor
Referenced Documents:	Survey Existing Conditions A100 (Integrus, 1/20/2022)
Attached:	Draft - Table of Trees

Summary

We inventoried and assessed 118 trees within the scoped project area. We were asked to inventory and assess trees measuring 15 inches or greater in diameter at standard height (DSH, 4.5 feet above grade). We tagged each tree with an aluminum tree tag, which is used as the tree identifier throughout the report and corresponding site survey. Trees 401 through 406 have been omitted from the Table of Trees and Survey due to a gap in the tagging sequence.

Development plans have not been provided to provide an opinion on tree protection specific to each tree. When created, Tree numbers should be included across the plan sets to allow for easy cross referencing.

Trees selected for retention should have their health and structure evaluated for potential consequences following the removal of the surrounding forest stand.

Tree 397 presents an elevated risk potential that will not improve. This tree should be reduced to a wildlife snag or removed. Trees 408 and 422 are being considered for retention within the site design. If chosen for retention, Tree 422 should have an advanced assessment to evaluate the internal structure and possible management needs.

Assignment and Scope of Work

This report documents the visit by George White and Sean Dugan of Tree Solutions Inc. on December 14th, 2021, to the above referenced site. We were asked to review provided documents, maps, and plans for preparation and completion of a tree inventory and assessment. We were asked to collect data for all trees equal to 15 inches or greater at 4.5 feet above grade (Diameter at Standard Height = DSH) and document tree identification number, species, DSH, health and structural condition. Each tree was identified in the field by attaching an aluminum tag with the tree identification number.

We were asked to produce an arborist report with our findings, discussion, and recommendations. Absher Construction and Integrus Architects, representing the owners of the property, requested these services to be used for planning and design purposes in preparation for proposed development.

Observations/Discussion

Site

The approximately 160,000 square foot site straddles two parcels (0419023012 and 0419034018) and is located in the center of the Pierce College campus in Puyallup, WA. An aerial photograph showing the boundaries of the inventoried area can be found in Appendix C – Figure 1. Site Map. The topography of the site is generally flat. There are no environmental critical area (ECAs) present within the scoped area. The site is currently undeveloped.

The understory vegetation on site was a mix of native plants such as sword ferns (*Polystichum munitum*), Salal (*Gaultheria shallon*), and huckleberry (*Vaccinium parvifolium*), and invasive species including Himalayan blackberry (*Rubus bifrons*), cut-leaf blackberry (*Rubus laciniatus*), ivy (*Hedera spp*), and English holly (*Ilex auqifolium*). The amount invasive species coverage fluctuated across the site with some areas with mainly native underbrush, and some areas that had been entirely overrun with invasive species, most notably, Himalayan blackberry (See photos 1-3). All invasive plant species should be managed prior to development.

We noted a few windthrown (failed) trees that displayed evidence of root rot fungi across the site. The presence of root rot fungi does not necessarily suggest that it is widespread throughout the tree population or imply that all the site trees are unstable. However, the presence of root rots should be considered when assessing tree health and condition of trees proposed for retention.

Trees

Information specific to each tree can be found in the attached Table of Trees. Trees on site were a mix of native deciduous and coniferous tree species typical of the lowland forests of western Washington. Species included Douglas-fir (*Pseudotsuga menzeisessi*), western redcedar (*Thuja plicata*), western hemlock (*Tsuga heterophylla*), bigleaf maple (*Acer macrophyllum*) and black cottonwood (*Populus trichocarpa*). Douglas-fir and western redcedar are the dominant species on site.

We observed that many of the large Douglas-firs had a low live-crown ratio (LCR). LCR is an approximation of the percent of the trunk that supports a live canopy. This low-LCR condition is typical for Douglas-firs growing in the middle of a forest strand, where they must compete with adjacent trees for sunlight.

When a disturbance, such as a clear cut, exposes low-LCR trees to novel wind forces it can increase the likelihood of failure. We refer to these freshly exposed trees as edge trees. (See photo 4.) We find that

the likelihood of failure for an edge tree is elevated for approximately 10 years following the initial disturbance, until the tree is able to compensate for the altered environmental conditions. This should be considered for any trees retained following proposed development activities.

Many of the western redcedars onsite exhibited signs of stress including thinning foliage, and limited dieback in the upper canopy. These symptoms are consistent with drought stress, which is increasingly typical of the species as we experience hotter, drier summers. This condition makes it difficult for western redcedars to cope with the additional stresses affiliated with development and construction. Western red cedar is very sensitive to construction impacts and proper protection is imperative to ensure long-term viability.

Tree 397
Tree 397 is a Douglas-fir tree adjacent to the pedestrian path (see Appendix C – Figure 1). This tree has a thin canopy compared to other Douglas-fir trees in the area and has excessive pitch flow near the base (See photos 5 and 6). These are both typical symptoms for root decay caused by *Armillaria* fungi. The tree currently presents a moderate risk potential to the surrounding targets. The risk will increase over time and will be a high risk when the site is developed. It is our opinion that this tree is need of management. We recommend that this tree should be prioritized for reduction to a wildlife snag or removal.

Discussion—Construction Impacts

This report is preliminary as we have not reviewed design or construction plans for this area.

Tree 408 and 422
Trees 408 and 422 are two mature western redcedars that are designated for retention. Western red cedars are typically very sensitive to construction impacts, especially in their mature stage. We recommend that a tree protection zone (TPZ) equal to one foot of protected area radiating from the tree for each diameter inch should be established for both trees. No excavation, materials storage, or machine access should be permitted within the TPZ without coordination with the project arborist. Additional protection measures can be found in Appendix G – Tree Protection Specification.

Tree 422 has two codominant trunks. One of the trunks has previously failed at approximately 30 feet above grade. The remaining trunk is in good health and structure. It is our opinion that if this tree is being considered for retention a more thorough evaluation of the tree's internal structural integrity should be completed. This may include the use of advanced testing tools such as micro-resistance drilling and/or sonic tomography to assess the possible presence and decay within the base of the tree.

Recommendations

- Include surveyed trees and tree identifiers on the site survey, and on all pertinent plans.
- Site planning around trees designated for retention should adhere to the tree protection practices outlined in Appendix G.
- Have the project arborist evaluate proposed design for potential impacts on trees selected for retention
- Consider removal or creation of a wildlife snag for tree 397.

- Tree 422 should have an advanced assessment if proposed for retention.
- All pruning should be conducted by an ISA certified arborist and following ANSI A300 specifications.[1]
- Invasive species should be managed prior to development.

Respectfully submitted,

George White and Sean Dugan,
Consulting Arborists

[1] Accredited Standards Committee A300 (ASC 300). ANSI A300 (Part 1) Tree, Shrub, and Other Woody Plant Management – Standard Practices (Pruning). Londonderry: Tree Care Industry Association, 2017.

Appendix A **Glossary**

ANSI A300: American National Standards Institute (ANSI) standards for tree care

critical root zone: the area containing the roots necessary for the tree's health and stability in which no grading or construction activity should occur. Typically measured as 1 foot of root area extending radially from the base of the tree for each inch of trunk DSH. (adapted from Harris 2004)

DBH or DSH: diameter at breast or standard height; the diameter of the trunk measured 54 inches (4.5 feet) above grade (Council of Tree and Landscape Appraisers 2019)

drip line: a boundary on the soil surface delineated by the branch spread of a single plant or group of plants (ANSI A300)

hazard: situation or condition that is likely to lead to a loss, personal injury, property damage, or disruption of activities; a likely source of harm. In relation to trees, a hazard is the tree part(s) identified as a likely source of harm (ISA 2013)

high (risk rating): defined by its placement in the risk matrix (*see Matrix 2 on page 2 of the Tree Risk Assessment form*) consequences are *significant* and likelihood is *very likely* or *likely*, or consequences are *severe,* and likelihood is *likely* (ISA 2017)

ISA: International Society of Arboriculture

Regulated Tree: A tree required by municipal code to be identified in an arborist report.

Visual Tree Assessment (VTA): method of evaluating structural defects and stability in trees by noting the pattern of growth. Developed by Claus Mattheck (Harris, *et al* 2004)

wildlife snag: any standing dead, partially dead, or defective tree at least 10 feet tall that provides present or future habitat critical for the maintenance or enhancement of wildlife (*adapted from* Dunster 1996)

Appendix B **References**

Accredited Standards Committee A300 (ASC 300). ANSI A300 (Part 1) Tree, Shrub, and Other Woody Plant Management – Standard Practices (Pruning). Londonderry: Tree Care Industry Association, 2017.

Council of Tree and Landscape Appraisers, Guide for Plant Appraisal, 10th Edition, Second Printing. Atlanta, GA: The International Society of Arboriculture (ISA), 2019.

Dunster, Julian & Katherine. Dictionary of Natural Resource Management. Vancouver: UBC Press, 1996

Harris, Richard W., James R. Clark, and Nelda P Matheny. Arboriculture: Integrated Management of Landscape Trees, Shrubs, and Vines, 4th Ed. New Jersey: Prentice Hall, 2004.

Mattheck, Claus and Helge Breloer, The Body Language of Trees.: A Handbook for Failure Analysis. London: HMSO, 1994.

Smiley, E Thomas, Nelda Matheny, and Sharon Lilly. Best Management Practices: Tree Risk Assessment Second Edition. Champaign, IL: International Society of Arboriculture, 2017

Appendix C **Site Map**

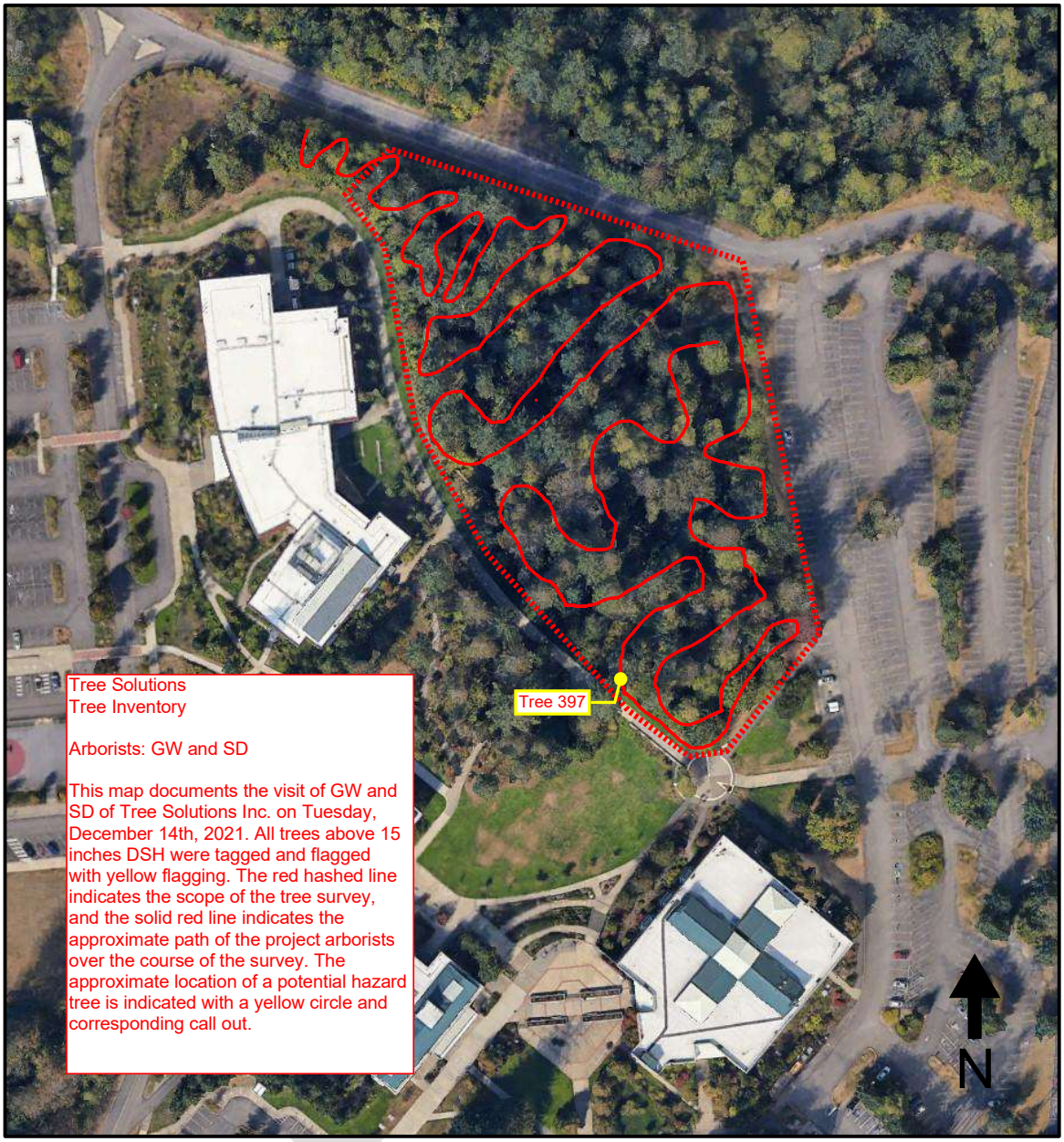

Figure 1. Site Map Aerial photograph of the subject site.

Appendix D **Photographs**

Photo 1. Native understory vegetation including Salal and sword ferns.

Photo 2. A portion of the site understory that has been overrun with Himalayan blackberry.

Photo 3. A well-established English holly. (Indicated with red circle.) Holly is an invasive species and can spread rapidly if not contained.

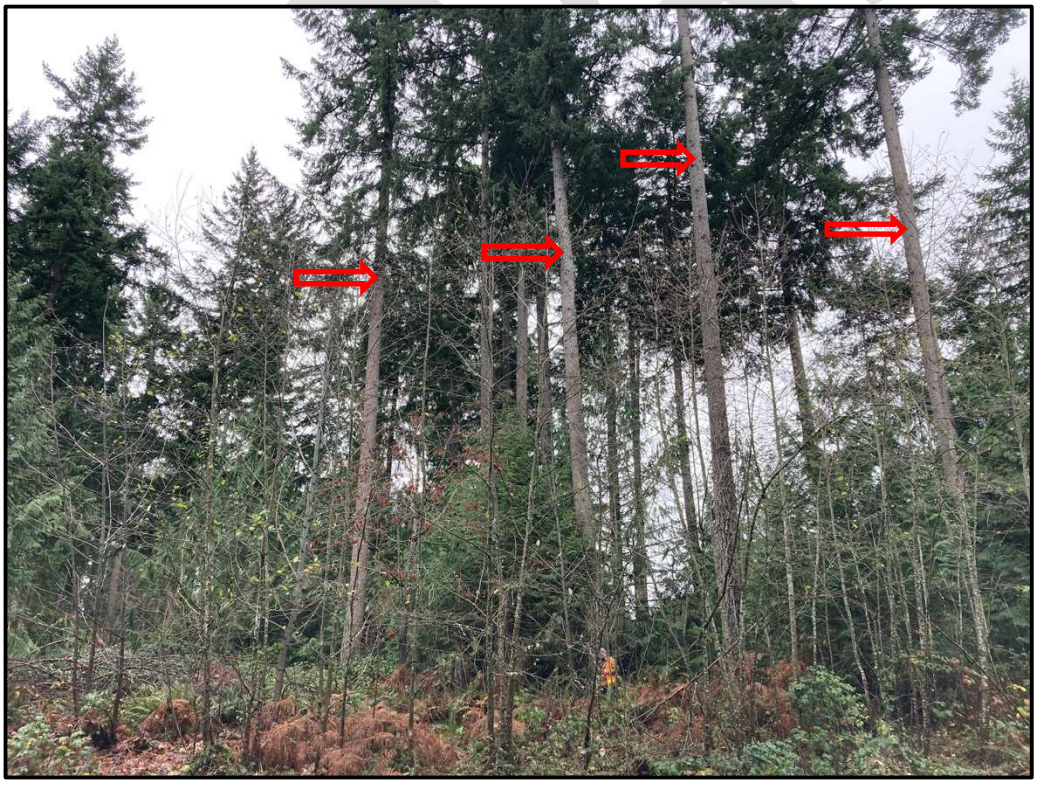

Photo 4. Edge trees with a low live crown ratio (indicated with red arrows). Note the presence of young red alders (*Alnus rubra*) trees in the foreground. These trees readily colonize recently disturbed areas.

Photo5. Excessive pitch flow near the base of tree 397 (Indicated with red circle). This is a tell-tail symptom of root decay caused by an *Armillaria* fungi.

Photo 3. The canopy of tree 397 (Indicated by red arrow). Note how thin the foliage is compared with other health Douglas firs in the area. This stress symptom is likely affiliated with root decay caused by *Armillaria sp.*

Appendix E **Assumptions & Limiting Conditions**

1 Consultant assumes that the site and its use do not violate, and is in compliance with, all applicable codes, ordinances, statutes, or regulations.

2 The consultant may provide a report or recommendation based on published municipal regulations. The consultant assumes that the municipal regulations published on the date of the report are current municipal regulations and assumes no obligation related to unpublished city regulation information.

3 Any report by the consultant and any values expressed therein represent the opinion of the consultant, and the consultant's fee is in no way contingent upon the reporting of a specific value, a stipulated result, the occurrence of a subsequent event, or upon any finding to be reported.

4 All photographs included in this report were taken by Tree Solutions, Inc. during the documented site visit, unless otherwise noted. Sketches, drawings, and photographs (included in, and attached to, this report) are intended as visual aids and are not necessarily to scale. They should not be construed as engineering drawings, architectural reports, or surveys. The reproduction of any information generated by architects, engineers or other consultants and any sketches, drawings or photographs is for the express purpose of coordination and ease of reference only. Inclusion of such information on any drawings or other documents does not constitute a representation by the consultant as to the sufficiency or accuracy of the information.

5 Unless otherwise agreed, (1) information contained in any report by consultant covers only the items 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, probing, climbing, or coring.

6 These findings are based on the observations and opinions of the authoring arborist, and do not provide guarantees regarding the future performance, health, vigor, structural stability, or safety of the plants described and assessed.

7 Measurements are subject to typical margins of error, considering the oval or asymmetrical cross-section of most trunks and canopies.

8 Tree Solutions did not review any reports or perform any tests related to the soil located on the subject property unless outlined in the scope of services. Tree Solutions staff are not and do not claim to be soils experts. An independent inventory and evaluation of the site's soil should be obtained by a qualified professional if an additional understanding of the site's characteristics is needed to make an informed decision.

9 Our assessments are made in conformity with acceptable evaluation/diagnostic reporting techniques and procedures, as recommended by the International Society of Arboriculture.

Appendix F **Methods**

Measuring

We measured the diameter of each tree at 54 inches above grade, diameter at standard height (DSH). If a tree had multiple stems, I measured each stem individually at standard height and determined a single-stem equivalent diameter by using the method outlined in the Guide for Plant Appraisal, 10th Edition Second Printing published by the Council of Tree and Landscape Appraisers. A tree is regulated based on this single-stem equivalent diameter value. Because this value is calculated in the office following field work, some trees in our data set may have diameters smaller than 15 inches. These trees are included in the tree table for informational purposes only and not factored into tree totals discussed in this report.

Tagging

We tagged each tree with a circular aluminum tag at eye level. we assigned each tree a numerical identifier on our tree table, corresponding to this tree tag. We attached yellow flagging to our aluminum tags to increase visibility to the land surveyors.

In a few cases, access restrictions inhibited our ability to measure the diameter of a surveyed tree. In these cases, the DSH was estimated to the best of our abilities. Estimated measurements are noted in the attached Table of Trees.

Evaluating

We evaluated tree health and structure utilizing visual tree assessment (VTA) methods. The basis behind VTA is the identification of symptoms, which the tree produces in reaction to a weak spot or area of mechanical stress. A tree reacts to mechanical and physiological stresses by growing more vigorously to re-enforce weak areas, while depriving less stressed parts. An understanding of the uniform stress allows the arborist to make informed judgments about the condition of a tree.

Rating

When rating tree health, I took into consideration crown indicators such as foliar density, size, color, stem, and shoot extensions. When rating tree structure, I evaluated the tree for form and structural defects, including past damage and decay. Tree Solutions has adapted our ratings based on the Purdue University Extension formula values for health condition (*Purdue University Extension bulletin FNR-473-W - Tree Appraisal*). These values are a general representation used to assist arborists in assigning ratings.

Health

Excellent - Perfect specimen with excellent form and vigor, well-balanced crown. Normal to exceeding shoot length on new growth. Leaf size and color normal. Trunk is sound and solid. Root zone undisturbed. No apparent pest problems. Long safe useful life expectancy for the species.

Good - Imperfect canopy density in few parts of the tree, up to 10% of the canopy. Normal to less than ¾ typical growth rate of shoots and minor deficiency in typical leaf development. Few pest issues or damage, and if they exist, they are controllable, or tree is reacting appropriately. Normal branch and stem development with healthy growth. Safe useful life expectancy typical for the species.

Fair - Crown decline and dieback up to 30% of the canopy. Leaf color is somewhat chlorotic/necrotic with smaller leaves and “off” coloration. Shoot extensions indicate some stunting and stressed growing conditions. Stress cone crop clearly visible. Obvious signs of pest

problems contributing to lesser condition, control might be possible. Some decay areas found in main stem and branches. Below average safe useful life expectancy

Poor - Lacking full crown, more than 50% decline and dieback, especially affecting larger branches. Stunting of shoots is obvious with little evidence of growth on smaller stems. Leaf size and color reveals overall stress in the plant. Insect or disease infestation may be severe and uncontrollable. Extensive decay or hollows in branches and trunk. Short safe useful life expectancy.

Structure

Excellent - Root plate undisturbed and clear of any obstructions. Trunk flare has normal development. No visible trunk defects or cavities. Branch spacing/structure and attachments are free of any defects.

Good - Root plate appears normal, with only minor damage. Possible signs of root dysfunction around trunk flare. Minor trunk defects from previous injury, with good closure and less than 25% of bark section missing. Good branch habit; minor dieback with some signs of previous pruning. Codominant stem formation may be present, requiring minor corrections.

Fair - Root plate reveals previous damage or disturbance. Dysfunctional roots may be visible around the main stem. Evidence of trunk damage or cavities, with decay or defects present and less than 30% of bark sections missing on trunk. Co-dominant stems are present. Branching habit and attachments indicate poor pruning or damage, which requires moderate corrections.

Poor - Root plate disturbance and defects indicate major damage, with girdling roots around the trunk flare. Trunk reveals more than 50% of bark section missing. Branch structure has poor attachments, with several structurally important branches dead or broken. Canopy reveals signs of damage or previous topping or lion-tailing, with major corrective action required.

Appendix G **Tree Protection Specifications**

The following is a list of protection measures that must be employed before, during and after construction to ensure the long-term viability of retained trees.

1. **Project Arborist:** The project arborists shall at minimum have an International Society of Arboriculture (ISA) Certification and ISA Tree Risk Assessment Qualification.
2. **Tree Protection Area (TPA):** TPA is the area within the dripline of all retained trees. The TPA may be reduced based on the recommendation of the project arborist.
3. **Tree Protection Fencing:** Tree protection fencing shall consist of 6-foot-tall chain-link fencing installed at the edge of the TPA as approved by the project arborist. Fence posts shall be anchored into the ground or bolted to existing hardscape surfaces.
    a. Where trees are being retained as a group the fencing shall encompass the entire area including all landscape beds or lawn areas associated with the group.
    b. Per arborist approval, TPA fencing may be placed at the edge of existing hardscape within the TPA to allow for staging and traffic.
    c. Where work is planned within the TPA, install fencing at edge of TPA and move to limits of disturbance at the time that the work within the TPA is planned to occur. This ensures that work within the TPA is completed to specification.
    d. Where trees are protected at the edge of the project boundary, construction limits fencing shall be incorporated as the boundary of tree protection fencing.
4. **Access Beyond Tree Protection Fencing:** In areas where work such as installation of utilities is required within the TPA, a locking gate will be installed in the fencing to facilitate access. The project manager or project arborist shall be present when tree protection areas are accessed.
5. **Tree Protection Signage:** Tree protection signage shall be affixed to fencing every 20 feet. Signage shall be fluorescent, at least 2’ x 2’ in size.
6. **Filter / Silt Fencing:** Filter / silt fencing within, or at the edge of the TPA of retained trees shall be installed in a manner that does not sever roots. Install so that filter / silt fencing sits on the ground and is weighed in place by sandbags or gravel. Do not trench to insert filter / silt fencing into the ground.
7. **Monitoring:** The project arborist shall monitor all ground disturbance at the edge of or within the TPA.
8. **Soil Protection:** Retain existing paved surfaces within or at the edge of the TPA for as long as possible. No parking, foot traffic, materials storage, or dumping (including excavated soils) are allowed within the TPA. Heavy machinery shall remain outside of the TPA. Access to the tree protection area will be granted under the supervision of the project arborist. If project arborist allows, heavy machinery can enter the area if soils are protected from the load. Acceptable methods of soil protection include placing 3/4-inch plywood over 4 to 6 inches of wood chip mulch or use of AlturnaMats® (or equivalent product approved by the project arborist). Compaction of soils within the TPA must not occur.
9. **Soil Remediation:** Soil compacted within the TPA of retained trees shall be remediated using pneumatic air excavation according to a specification produced by the project arborist.
10. **Canopy Protection**: Where fencing is installed at the limits of disturbance within the TPA, canopy management (pruning or tying back) shall be conducted to ensure that vehicular traffic does not damage canopy parts. Exhaust from machinery shall be located 5 feet outside the dripline of retained trees. No exhaust shall come in contact with foliage for prolonged periods of time.
11. **Duff/Mulch:** Apply 6 inches of arborist wood chip mulch or hog fuel over bare soil within the TPA to prevent compaction and evaporation. TPA shall be free of invasive weeds to facilitate mulch

application. Keep mulch 1 foot away from the base of trees and 6 inches from retained understory vegetation. Retain and protect as much of the existing duff and understory vegetation as possible.

12. **Excavation:** Excavation done within the TPA shall use alternative methods such as pneumatic air excavation or hand digging. If heavy machinery is used, use flat front buckets with the project arborist spotting for roots. When roots are encountered, stop excavation, and cleanly sever roots. The project arborist shall monitor all excavation done within the TPA.
13. **Fill:** Limit fill to 1 foot of uncompacted well-draining soil, within the TPA of retained trees. In areas where additional fill is required, consult with the project arborist. Fill must be kept at least 1 foot from the trunks of trees.
14. **Root Pruning:** Limit root pruning to the extent possible. All roots shall be pruned with a sharp saw making clean cuts. Do not fracture or break roots with excavation equipment.
15. **Root Moisture:** Root cuts and exposed roots shall be immediately covered with soil, mulch, or clear polyethylene sheeting and kept moist. Water to maintain moist condition until the area is back filled. Do not allow exposed roots to dry out before replacing permanent back fill.
16. **Hardscape Removal:** Retain hardscape surfaces for as long as practical. Remove hardscape in a manner that does not require machinery to traverse newly exposed soil within the TPA. Where equipment must traverse the newly exposed soil, apply soil protection as described in section 8. Replace fencing at edge of TPA if soil exposed by hardscape removal will remain for any period of time.
17. **Tree Removal:** All trees to be removed that are located within the TPA of retained trees shall not be ripped, pulled, or pushed over. The tree should be cut to the base and the stump either left or ground out. A flat front bucket can also be used to sever roots around all sides of the stump, or the roots can be exposed using hydro or air excavation and then cut before removing the stump.
18. **Irrigation:** Retained trees with soil disturbance within the TPA will require supplemental water from June through September. Acceptable methods of irrigation include drip, sprinkler, or watering truck. Trees shall be watered three times per month during this time.
19. **Pruning:** Pruning required for construction and safety clearance shall be done with a pruning specification provided by the project arborist in accordance with American National Standards Institute ANSI-A300 2017 Standard Practices for Pruning. Pruning shall be conducted or monitored by an arborist with an ISA Certification.
20. **Plan Updates:** All plan updates or field modification that result in impacts within the TPA or change the retained status of trees shall be reviewed by the senior project manager and project arborist prior to conducting the work.
21. **Materials:** Contractor shall have the following materials on-site and available for use during work in the TPA:
    - **Sharp and clean bypass hand pruners**
    - **Sharp and clean bypass loppers**
    - **Sharp hand-held root saw**
    - **Reciprocating saw with new blades**
    - **Shovels**
    - **Trowels**
    - **Clear polyethylene sheeting**
    - **Burlap**
    - **Water**