



October 24, 2020

**Project:** Pre-construction assessment for garage renovation at 4602 East Mercer Way, Mercer Island, WA. Parcel number 7558700045.

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**Objectives:** Evaluate health and suitability for retention for 6 trees near the garage.

**Description:** The main layout of the 4602 property has been mostly undisturbed for more than thirty years. The original home was built in 1947 and then extensively renovated in 1990. All of the trees currently onsite have grown up in place since the existing home was built. The surrounding houses were all built in the same timeframes and few if any changes have taken place on those lots since their construction.

The property was purchased by the current owner in 2013 and they are proposing tearing down the garage and replacing it with one having a somewhat different footprint as shown in Figures 1 and 2. Superior NW Enterprise was contacted and asked to assess the trees in the disturbance area as to their health, stability, and overall suitability for retention.

The following itemized tree list begins at the SW corner of existing garage and their numerical designations are reflected in Figures 2 and 3. Diameters were measured at the standard height of 54” above grade (DSH) during the October 2020 site visit. Caliper measurements were made at 6” above grade. Heights were estimated. None were found to be exceptional.

- 1) Bigleaf Maple (*Acer macrophyllum*) dual stem 6.5” and 15” DSH separating from the base but not fully until the 48” level (Figure 4). The base of the tree is 7 feet on center from the southwest corner of the existing. It growing out of the side of a small embankment and its closest structural roots are 22” off of the stone retaining wall running along the south side of the driveway. The tree stands roughly 32” on center from the wall but is at least 20 inches above the top of the wall. The smaller stem bends slightly to the NE in a rather crooked manner reaching about 20’ where it kinks over more noticeably into the NE quadrant stretching as much as 20 feet over the top of the garage. The larger stem bifurcates again 7’ above the main separation point. It goes nearly vertical up to 22’ level where it branches off into a main scaffold and some sub scaffolds. The main goes nearly vertical to 65’ and the other stems reach out to the east crossing against each other. Fair health, weak structural condition.

- 2) Bigleaf Maple bifurcates at 44" mark, 12" and 16" DSH standing 5' on center southwest of the #1 tree and 40" above it on the bank. The smaller stem on this tree separates again and one of its scaffolds goes out east, crooks multiple times as it bends slightly to the south. The canopy on this section extends entirely into the SE quadrant. The larger stem bends slightly to the north, separates a couple more times and the majority of its canopy reaches out north. The mass of the tree is significantly off center of its base. This is most likely due to clearance pruning for the transformer on the utility pole 8' SSW of the base of the tree (Figure 5). The drop lines for both homes run through the lower canopy of this tree and the middle of the #1 maple's. Fair health, weak structure, and full of ivy.
- 3) Bigleaf Maple with four trunks from the base (likely is a stump sprout) measuring 17.5", 13", 10.5", and 19" DSH and all four have been pruned to the vertical to get them off of the subject garage and the neighbor's garage (Figure 6). The tree is growing in a narrow strip 8.5' wide between the south wall of the neighbor's garage and the subject garage's north wall (Figure 7). Its base is 5' S of and 5' vertically above the corner of the foundation for the neighbor's garage (Figure 8). It is 30" N of the existing garage foundation wall (Figure 9). It is close to 30" below the level of the floor of the garage.

The 17.5" trunk bifurcates at the 10' mark and one of its stems goes fully vertical. It has foliage between the 40' and 60' levels which extends to the west. The other half of the 17.5" leans south over the subject garage and its entire canopy extends to the south side. It has one scaffold at the 25' mark and all the rest above the 35' level. The 13" trunk broke off at the 10' level and only has a handful of epicormic sprouts in the ½" minus category present. The 10" trunk kinks to the north at the 10' level eventually reaches 35' where it bends increasingly to the horizontal finally reaching 45' tall and extending out at least 18' off center (Figure 10). The 19" trunk is close to vertical bifurcating somewhere around the 20' mark. There is quite a bit of ivy extending up this trunk to within 15' of its crown (Figure 11). One of its stems goes vertical reaching 65' and spreading almost uniformly 18-20' radially over the top of the others. The secondary stem leans out slightly to the NE, bends noticeably around the 40' level, and kinks over nearly horizontal to the north and northeast on a couple of scaffolds.

The tree has some structural roots heading north and down the slope but not a great deal and does not appear to have many lateral roots going east and west. Its base is actually slightly below what looks like the lower footing for the subject garage north wall (Figure 12). It could very well be that it has roots extending beneath this wall and is using it as a counterbalance. There was a cherry growing to the north side of the maple's base which has been stubbed off (Figure 13). Most likely it grew into the existing garage.

- 4) Bigleaf Maple whose base is 7' E of the northeast corner of the existing garage foundation and 5'N of a support post for the northeast corner of its roof (Figure 14). The tree grows at a 45 degree angle to the north from its base (Figure 15) and at 8 feet out it sprouts into 5 stems that go nearly vertical (Figure 16). The ground drops off just about even with the north side of the base of the tree, probably as much as 16 feet (Figure 17). The knuckle where the tree goes to vertical is six feet south of the gutter line of the neighbor's house. At 54" out from its base the tree measured 29" in diameter. The stems are estimated at 7", 8", 10.5", 12", and 12" caliper.

The smaller two extend into the NE quadrant and bend increasingly over to the east. The smallest one's canopy is in a narrow column in the NE quadrant. The canopy on the 8" stem is in a narrow quadrant on the east side. Both reach out closes to 30 feet. The larger two go vertical to 65'tall. The north side one spreads to the north 25' and the south side one spreads 30' into the SW quadrant. The center stem leans slightly south as it rises and then increasingly bends to the horizontal as it turns into a set of scaffolds reaching at least 30' over the existing garage area. The branches and scaffolding within the tree are conflicting at many points. Fair health and weak structural formation.

5. Grand fir (*Abies procera*) 24" DSH standing 5.5' E of the east end of the existing garage. It reaches 65' tall bifurcating near the 40' mark into codominant tightly vertical stems. It exhibits average new growth and color.

There are a numerous other trees and shrubs scattered about the lot. None of these were assessed as none stand within or near the construction impact envelope.

**Methods:** Tree assessment is both an art and a science. To properly perform, an arborist must have an extensive background in biology, tree mechanics, and tree structure that is equal parts academic and field knowledge. It takes years of study to recognize and correctly diagnose the subtle signs trees exhibit before their failure, whether it be partial or total. The process begins with a visual inspection (visual tree assessment, VTA) which is followed up as necessary with soundings, core testing, and/or other detection means. Each tree is examined and evaluated according to several factors including species type, size, vigor, injuries present, root and grade disturbance, deadwood, location and extent of decay, stem taper, exposure, and targets that are at risk.

**Construction Analysis:** According to the provided plan sets each of these trees stand within the primary impact zone, that area defined as including the environs immediately within the boundaries of the proposed new construction and the regions within ten feet of those boundaries.

The proposed south side foundation/retaining wall will cut across the existing one no more than 6' west of #1 maple's base. On the north side the existing foundation will have to be removed and probably the area will be excavated to create space for the forms for the new one. And it is likely that the existing foundation on the east side will be demolished as the new garage east side is set 5' further to the west. Typically all trees within the primary zone are removed during the clearing and grading period of the project. In this case each tree will be analyzed individually.

As all the work will be in close proximity to the trees in question what first has to be established is whether their Structural Root Plates (SRP) will be disturbed. This radial area is a function related to the diameter of the tree in question but not quite in such a direct proportion as in the case of the 1':1" ratio of the Critical Root Zone. Figure 15 below illustrates the relationship.

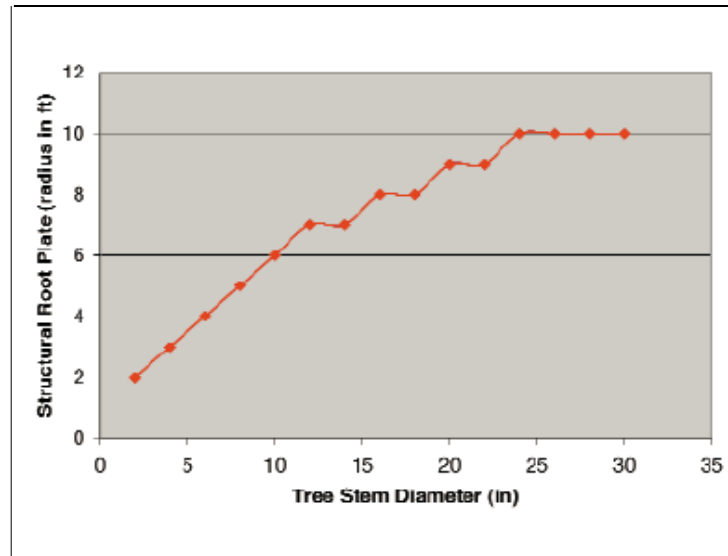


Figure 15. Size of the Structural Root Plate in relation to tree stem diameter. Note that the SRP levels off at 10' for any tree over 24" in diameter.

The #1 maple would be expected to have a 7' SRP based on its calculated 16" diameter. As it is already constrained by the retaining wall on its north side it is more likely than not to have compensated by extending east and west parallel to it. The excavation for the proposed south side foundation could come as near as 6' to the base of the tree and will likely cut through structural elements.

The #2 tree has a 20" calculated diameter and would be expected to have an 8' radial SRP. The cut for the south side foundation appears to be right at the 8' mark so this tree should not have its SRP impacted to a great degree.

The #3 tree has a greater than 24" diameter and should have a 10' radial Structural Root Plate. It obviously doesn't based on the proximity of the garages (unless it does grow under the subject one). Any structural roots it does have are rather tightly constrained and have to be pressing into the existing foundation walls. The demolition of the existing garage alone will damage this tree's SRP let alone if further excavation is necessary for the forms.

The stairs on the north side of the proposed garage cut right through the base of the #4 tree.

The #5 tree would be expected to have the full 10' SRP. As the existing east foundation is 5.5' away its demolition has the potential to cause some injury to the fir's structural set. Extreme care will have to be taken when extracting this section and it should be done under arborist oversight.

**Recommendations:** The #1, #3, and #4 maples should be removed during the clearing and grading period for the project. Each of these trees has structural and locational issues preventing them from becoming viable full grown trees currently. Each will also experience significant impacts to their Root Plates which will create catastrophic failure concerns.

The #2 maple stands just far enough away from potential impact that it can be retained but the ivy has to be severed at its base. A swath at least 36" tall should be completely cleared of the vine on the trunk of the tree to ensure it does not continue to grow. This tree may require some degree of remedial pruning to address weight loads on over extended branches, crossing elements, and clearance for the power drops.

The Noble fir should come out with a net gain in rooting space based on the plan set. The demolition of the foundation will just have to be monitored to ensure that its roots are protected. It should be protected by laying down layers of mulch to cushion any impact to its roots and to prevent soil compaction. Somewhere in the neighborhood of 8-12" of mulch laid down out to 3' past the existing driplines should be adequate.

Typically 6' chain link fencing is installed to designate no impact zones and is placed at the distance proscribed by the City of Mercer Island for non-incursion which is one linear foot per linear inch of tree diameter. In this case the only place it even makes sense to set fencing is at the west side of the fir and it can only be set at the east side of the existing garage.

Any work which has to occur within the protection fencing will require arborist oversight. Roots which are discovered in these areas should be severed cleanly rather than torn out by machinery. The exact depth of fill required and its placement will have to be determined by the arborist in real time as the project proceeds.

**Waiver of Liability** Because the science of tree risk assessment is constantly broadening its understanding, it cannot be said to be an exact science. Every tree is different and performing tree risk assessment is a continual learning process. Many variables beyond the control, or immediate knowledge, of the arborist involved may adversely affect a tree and cause its premature failure. Internal cracks and faults, undetectable root rot, unexposed construction damage, interior decay, and even nutrient deficiencies can be debilitating factors. Changes in circumstance and condition can also lead to a tree's rapid deterioration and resulting instability. All trees have a risk of failure. As they increase in stature and mass their risk of breakdown also increases, eventual failure is inevitable.

While every effort has been taken to provide the most thorough and accurate snapshot of the trees' health, it is just that, a snapshot, a frozen moment in time. These findings do not guarantee future safety nor are they predictions of imminent events. It is the responsibility of the property owner to adequately care for the tree(s) in question by utilizing the proper professionals and to schedule future assessments in a timely fashion.

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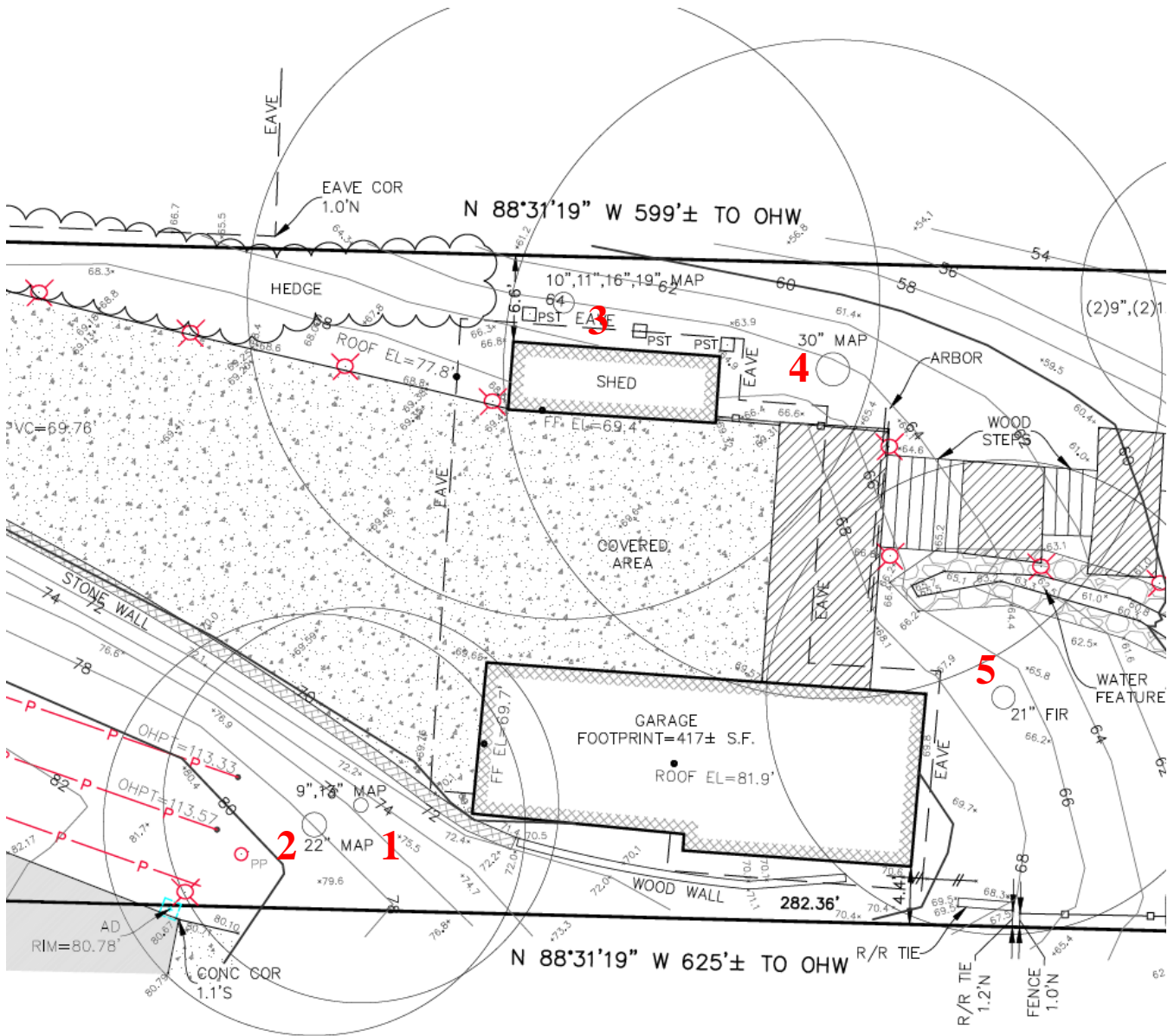


Figure 1. Excerpt from the survey plans showing footprint of existing garage. The subject trees are notated in red.

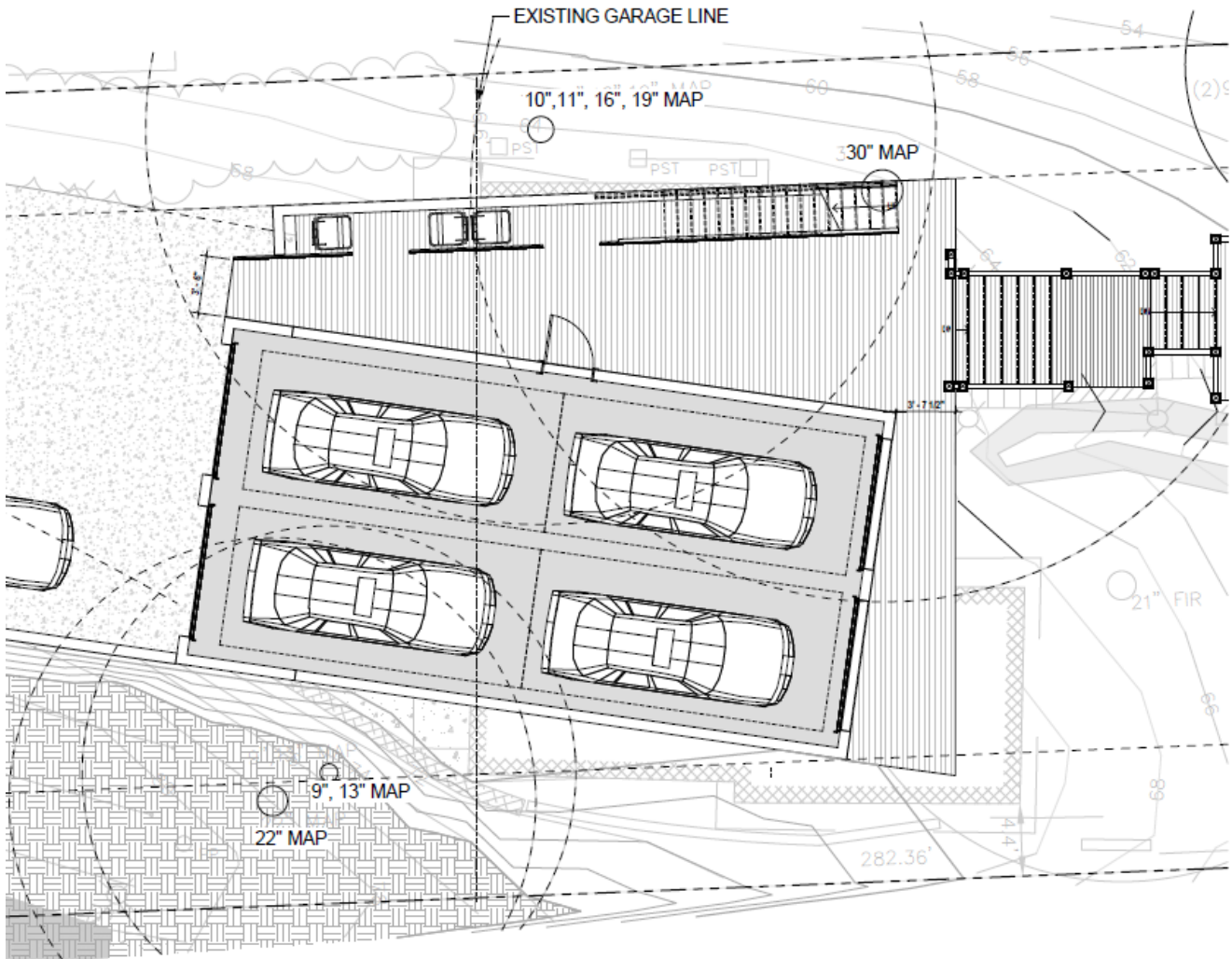


Figure 2. Excerpt from proposed plans showing layout of new garage. Note foundation/retaining wall intersecting the existing one on the south side.





Figure 3. Aerial view of the subject property showing the approximate location of the trees listed in the description section (white numerals).





Figure 4. Base of #1 maple showing the separation point and proximity to the SW corner of the existing garage.



Figure 5. The utility pole standing next to the #2 maple.





Figure 6. Looking up at the canopy formation of the #3 maple. Note the lack of lower branches which creates instability in these small diameter stems.



Figure 7. Showing where the #3 maple stands between the subject garage on the right and the neighbor's garage whose roof is just visible on the left.





Figure 8. Looking past the base of the #3 tree at the corner of the neighbor's garage.



Figure 9. Showing the proximity of the subject garage to the base of the #3 tree.





Figure 10. Showing the formation of the canopy at the top of the 10” stem on the #3 maple.



Figure 11. Showing the ivy inundating the 19” stem on the #3 tree.





Figure 12. Looking at the base of the north side foundation/retaining wall of the existing garage. There is evidence that the #3 tree has roots growing under this section.



Figure 13. The cherry stub at the base of the #3 tree.





Figure 14. Looking at the base of the #4 maple and its proximity to the NE corner of the existing garage.



Figure 15. Looking east at the base of the #4 maple.





Figure 16. Looking NE at the point where the stems rise off of the #4 maple. It is highly likely that the mainstem was severed at this point many years ago and the existing stems were formed in epicormic response.



Figure 17. Looking down past the base of the #4 maple. The narrow path shown at the left side of the image is a 36" wide walkway for the north side neighbor's house.





