

May 26, 2023

Steve Kao & Hui Hong
C/O Dave Buck
Chesmore/Buck Architecture
27 100th Ave NE
Bellevue WA, 98004
425-679-0907
Email: dave@chesmorebuck.com

Re: Arborist Report – Hong/Kao Residence

DCG/Watershed Reference Number: 230306

Dear Dave:

We are pleased to present you with the findings of our tree inventory and assessment for the proposed project at 5425 W. Mercer Way (parcel #2948900015) in Mercer Island, WA. Lars Freeman-Wood, an ISA Certified Arborist® and Qualified Tree Risk Assessor with DCG/Watershed, visited the subject property on May 9, 2023, to inventory and assess trees within the project area.

The intent of this tree inventory was to screen for, identify, and assess any trees that may be impacted by the proposed project. Tree attributes including species, size, and condition, were assessed during the on-site inventory, and are summarized in the enclosed Tree Inventory Table. Tree locations are shown on the enclosed Tree Inventory Sketch.

This arborist report has been prepared for the following purposes:

- Describe the tree inventory and assessment methods;
- Summarize tree inventory and assessment results;
- Document relevant municipal code and outline any necessary tree replacement or replanting requirements;
- Discuss the effects of the proposed development on existing tree conditions; and
- Provide construction strategies for the protection of trees to be retained.

Introduction

Background

The project proposes additions to the current residence on site and the addition of a DADU to replace the current detached garage.

Study Area

The study area includes the subject property and adjacent trees with overhanging driplines which may be affected by the proposed project. The subject property totals approximately 42,797 square feet in size (according to King County Assessor) and is currently developed with a single-family residence, detached structures, associated hardscaping and ornamental landscaping. Single-family residential parcels border the subject property to the north, east, and south. Lake Washington borders the property to the west. The site is zoned single-family residential (R-15) and falls within 200 feet of the shoreline of Lake Washington. See Figure 1 for a map of the study area and site vicinity.



Figure 1. Vicinity map showing study area (parcel boundary highlighted in yellow). Imagery: [King County iMap](#).

Methods

All trees in the study area were identified and assessed in the field using a Basic Assessment according to International Society of Arboriculture (ISA) standards to collect species name (scientific and common), number of stems, diameter, height, average crown radius, overall condition rating, and general assessment notes. Attributes were recorded for additional off-site trees with critical root zones extending into the project site. All inventoried trees were assigned a unique identification number.

According to Mercer Island City Code (MICC) 19.16.010, a Regulated Tree is defined as *any tree with a diameter of ten inches or more, and any tree that meets the definition of an exceptional tree.* Additionally, MICC 19.16.010 states Exceptional Trees are defined as *a tree or group of trees that because of unique historical, ecological, or aesthetic value constitutes an important community resource. An exceptional tree is a tree that is rare or exceptional by virtue of its size, species, condition, cultural/historical importance, age, and/or contribution as part of a tree grove. Trees with a diameter of more than 36 inches, or with a diameter that is equal to or greater than the diameter listed in the Exceptional Tree Table (see MICC 19.16.010) are considered exceptional trees.*

Chesmore/Buck Architecture located some of the subject trees and provided survey data (Hong and Kao Residence February 2, 2023) to DCG/Watershed prior to the tree inventory. Survey data and proposed site plans, including proposed house, driveway, and accessory structure locations, were provided to DCG/Watershed in AutoCAD and PDF formats. Tree data and geospatial locations were collected in the field using an iPad with the ArcGIS Field Maps application, with several tree points adjusted visually based on the survey. GPS data is believed reliable for general planning and most regulatory purposes. However, accuracy is variable and should not be considered equivalent to a professional land survey. No warranty is expressed or implied.

Diameter

The diameter-at-breast-height (DBH) of all regulated trees in the study area was measured at 4.5 feet above the average surface of the ground. Methodology for measuring and calculating the diameter of trees with multiple trunks, major leans, or on steep slopes followed those outlined in the *Guide for Plant Appraisal, 10th Edition*, written by the Council of Tree and Landscape Appraisers (CTLA) and published by ISA (CTLA 2020). To measure trees with multiple trunks, the total diameter of multi-stemmed trees was calculated by taking the square root of the sum of each diameter squared; this allows for comparison to other single-stemmed trees and for more accurate permitting and tree retention calculations.

Estimated Height

The height of trees was visually estimated.

Canopy Radius

Canopy radius, also known as dripline, was measured horizontally from the center of the trunk to the outermost branch tips. For trees with uneven crowns, the average of two perpendicular radii was recorded.

Condition

A basic visual assessment was used to evaluate the health and condition of trees within the study area in accordance with ISA and CTLA standards. The condition determination was based on current conditions and considered the health, structural integrity, and form of the tree, in addition to characteristics of each species. Each tree was given an overall condition rating from Excellent to Very Poor as summarized below in Table 1.

Table 1. Tree Condition Ratings (adapted from CTLA 2020).

Rating Category	Condition Components	
	Health	Structure
Excellent	High vigor and nearly perfect health with little or no twig dieback, discoloration, or defoliation.	Nearly ideal and free of defects.
Good	Vigor is normal for species. No significant damage due to diseases or pests. Any twig dieback, defoliation, or discoloration is minor.	Well-developed structure. Defects are minor and can be corrected.
Fair	Reduced vigor. Damage due to insects or diseases may be significant and associated with defoliation but is not likely to be fatal. Twig dieback, defoliation, discoloration, and/or dead branches may compromise up to 50% of the crown.	A single defect of a significant nature or multiple moderate defects. Defects are not practical to correct or would require multiple treatments over several years.
Poor	Unhealthy and declining in appearance. Poor vigor. Low foliage density and poor foliage color are present. Potentially fatal pest infestation. Extensive twig and/or branch dieback.	A single serious defect or multiple significant defects. Recent change in tree orientation. Observed structural problems cannot be corrected. Failure may occur at any time.
Very Poor	Poor vigor. Appears dying and in the last stages of life. Little live foliage.	Single or multiple severe defects. Failure is probable or imminent.
Dead	No live branches or buds remain above the base of the trunk. Tree is in a stage of decay.	Failure is probable or imminent.

Results

Tree Inventory and Assessment Findings

A total of 31 trees were assessed within the study area. Of those trees, 16 trees were located on-site and met the criteria for a regulated tree. An additional four off-site trees were also inventoried and assessed. On-site trees (including non-regulated) are as follows: 11 Japanese maples (*Acer palmatum*), nine Hinoki falsecypress (*Chamaecyparis obtusa*), five Douglas-fir (*Pseudotsuga menziesii*), one black locust (*Robinia pseudoacacia*), and one silver fir (*Abies alba*).

Off-site trees in the study area included two Douglas firs (*Pseudotsuga menziesii*), one giant sequoia (*Sequoiadendron giganteum*), and one cherry (*Prunus spp.*).

A detailed table of all trees inventoried can be found in the enclosed Tree Inventory Table.

Diameter

Regulated on-site trees range in DBH from 10.2 inches to 43.3 inches. The average diameter is 16.7 inches.

Exceptional Trees. One on-site tree met the criteria for an Exceptional Tree (Tree #6, a 43.3-inch Douglas-fir). One off-site tree met the criteria for an Exceptional Tree (Tree #8, a 78-inch giant sequoia).

Height

The estimated height of on-site significant trees ranges from 25 feet to 110 feet. The average height is 49 feet.

Canopy radius

The average canopy radius of all on-site significant trees ranges from eight feet to 22 feet, with an average radius of 12 feet.

Condition

Of the 16 significant on-site trees, the majority (12) were found to be in *Good* condition with normal vigor, well-developed structure and no significant damage, defects or disease. Two trees were in *Fair* condition, showing signs of reduced vigor, twig dieback, defoliation, or with significant damage or defects. Two trees were in *Poor* condition with poor vigor, extensive twig and branch dieback, or had some significant defects.

Discussion

Effects of Proposed Development

The proposed demolition of the garage and addition of the DADU on site will be within the Critical Root Zone (CRZ) of off-site Tree #8 and therefore the tree protection zone for off-site Tree #8 will need to be modified from the typical dripline recommendation. Tree protection fencing should be set at the edge of the adjacent garage proposed for demolition. Due to the location of the existing garage's foundation currently within the CRZ of off-site Tree #8, along with the orientation of the proposed DADU having less of a footprint within the CRZ of off-site Tree #8, it is unlikely that the addition of the DADU will encounter significant roots within the new building footprint. The proposed DADU having less of a footprint within the CRZ of off-site Tree #8 will mean more permeable surface for roots to have access to oxygen and soil space within the CRZ of the tree. Since off-site Tree #8 was found to be in *Good* condition with normal vigor and health, along with the tree protection recommendations listed below, the tree should remain healthy and viable.

Tree Removal Recommendations

Tree #9 and Tree #11 should be removed due to their being in *Poor* condition with significant canopy dieback. See Figures 2 and 3 for photos of the trees.

Tree Unit Calculations

If Tree #9 and Tree #11 are removed, they will need to be replaced with four new trees, according to MICC 19.10.070.A. Replacement trees shall be primarily those species native to the Pacific Northwest, according to MICC 19.10.070.B.2. Replacement coniferous trees shall be at least 6 feet tall, and replacement deciduous tree shall be at least one and one-half inches in caliper, according to MICC 19.10.070.B.3.

Tree Protection Recommendations

All retained trees, including those on-site and on adjacent properties, will require protection measures during construction. Trees can be damaged quickly and irreversibly by construction activities, especially by heavy machinery and exposure to chemicals. The following best management practices follow the industry standards for tree protection (ANSI A300 Part 5, 2019), and should be adhered to whenever work is being performed.

Tree Protection Zones and Fencing

The critical root zone (CRZ) is the area that contains tree roots critical to the health and stability of the tree. It can be approximated by an area with a radius of one foot for every diameter inch

of the trunk. However, topography and site conditions may greatly affect where critical roots are growing.

The tree protection zone (TPZ) is the area within the critical root zone in which certain activities are prohibited or restricted to prevent or minimize potential injury to designated trees, especially during construction or development. The TPZ should encompass as much of the CRZ as possible. However, the TPZ may be adjusted in size or shape to accommodate the existing infrastructure, planned construction, and specific site conditions, as well as the tree canopy conformation and visible root orientation, species response to construction impacts, size, condition, and maturity. All construction activities, including staging and driving machinery, should be located outside of the TPZ. Verification of site conditions and long-term health of the tree by an ISA certified arborist may be required for intrusions into the TPZ.

The TPZ and other tree protection measures for preserved trees should be shown on the site development plans, including grading and drainage plans and temporary erosion and sediment control (TESC) plans.

Tree Protection Fencing Requirements

- Fencing should be placed at the outer edges of the tree protection zone.
- Fencing should be four to six feet high, and constructed of chain link, wire-mesh, or high-visibility plastic fencing.
- Fencing should include visible warning signs, such as “Tree Protection Area – Keep Out”, spaced no further than 15 feet apart.
- Fencing and signage should be installed prior to the start of construction and remain in place for the duration of the project.

Minimize Grade Changes

Most tree roots grow in the top six to 18 inches of soil and are highly susceptible to damage from grade changes. If the grade is lowered, roots critical to health and stability will be removed. If the grade is raised, roots can suffocate from lack of oxygen.

If an increase in grade within the TPZ is recommended and approved, these best management practices should be followed:

- Do not place fill or other organic matter against the trunk.
- If the fill to be applied is no more than two to four inches, it should be a coarser texture than the existing soil.

If a decrease in grade within the TPZ is recommended and approved, these best management practices should be followed:

- No more than six inches of soil should be removed from the existing grade.
- Consider retaining walls or terraces to avoid excessive soil loss. Support for retaining walls should not impact major structural roots. Soil excavation by hand or hydro-vac prior to mechanical auguring is recommended to avoid root impacts.
- Spread two to four inches of mulch over the exposed area to buffer the root's environment change.
- Apply supplemental water during dry months between June and September by soaking the ground within the dripline once a week to encourage new root growth.

Root pruning

Where excavation or construction is proposed within the dripline, critical root zone, or tree protection zone, roots must be protected or properly pruned to ensure tree health and stability. Prior to excavation within a tree's root zone (either within or outside of the TPZ), exposing roots using high-pressure air (pneumatic) or water (hydraulic) excavation is recommended. Any roots over one inch that are exposed after excavation should be clean cut by hand and the project arborist should be consulted before root pruning.

Canopy pruning

All construction activities should stay out of the canopy zone. However, if the canopy of a tree will conflict with construction, the canopy could be raised to avoid aerial conflicts after consulting with the project arborist or designee. Any pruning of trees should be done by / overseen by a certified professional through the International Society of Arboriculture (ISA) or Tree Care Industry Association (TCIA). No other pruning should be necessary and could negatively impact the health of the trees.

Maintenance

The impacts of construction are stressful to trees, which may not show the signs of stress for up to five to ten years after being impacted. Applying additional woodchip mulch and providing supplemental irrigation may be necessary to reduce tree stress during construction.

Trenching, Excavation, and Tunneling

Trenching and excavation within the critical root and tree protection zones should be avoided to reduce root loss and to help preserve the structural integrity of the tree. Alternative routes outside the CRZ should be considered for underground infrastructure. If no alternative path is possible, consider using air excavation to create a trench or tunneling at least 18 inches below the soil to reduce the loss of roots.

The following best practices for trenching are as follows:

- Keep equipment and excavated material farthest away from the tree and out of the TPZ.
- Backfill should be replaced the same day it was excavated to reduce root desiccation.
- Cover exposed roots with wet burlap immediately; burlap should be kept moist.
- Chemicals, debris, trash, or other materials should not be mixed with backfill.
- Backfilled soil should match and not exceed the compaction of the surrounding soil.
- Water the tree's root zone to keep impacted roots moist.

Limitations of This Study

The findings of this report are based on the best available science and are limited to the scope, budget, and site conditions at the time of the assessment. Although the information in this report is based on sound methodology, internal physical flaws (such as cracking or root rot) or other conditions that are not visible cannot be detected with this limited basic visual screening. Trees are inherently unpredictable. Even vigorous and healthy trees can fail due to high winds, heavy snow, ice storms, rain, age, or other causes.

This report is based on the current observable conditions and may not represent future conditions of the trees. Changes in site conditions, including clearing and grading, will alter the condition of remaining trees in a way that is not predictable.

The conclusions contained within this report have been made for permitting purposes only and are not intended for tree risk assessment purposes.

Please call if you have any questions or if we can provide you with any additional information.

Sincerely,



Lars Freeman-Wood
ISA Certified Arborist® WE-8769AU
Tree Risk Assessment Qualified (TRAQ)
ISA Certified Utility Specialist®

Figures



Figure 2. Tree #9, silver fir in *Poor* condition with significant canopy dieback.



Figure 3. Tree #11, Hinoki cypress in *Poor* condition with significant canopy dieback.



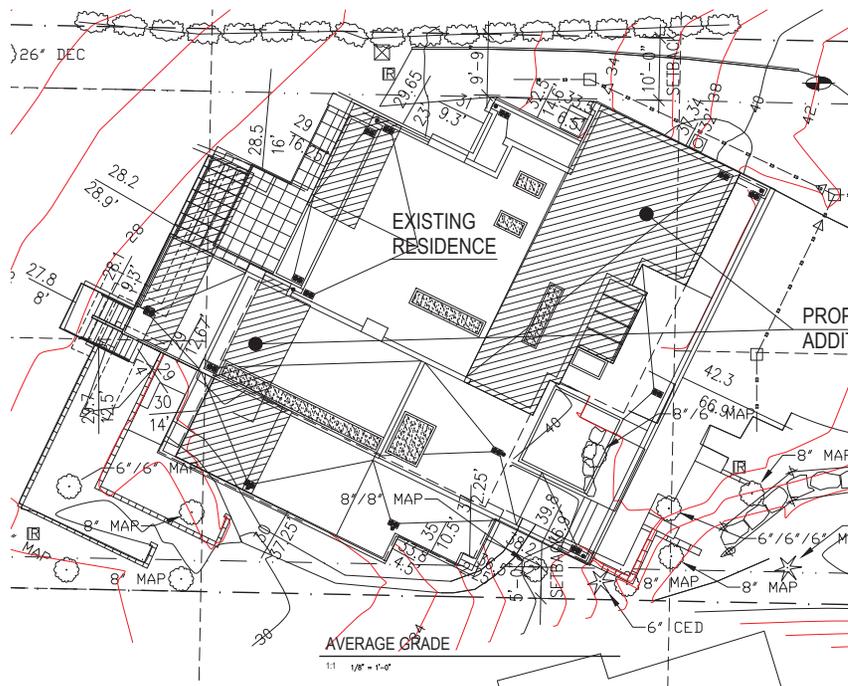
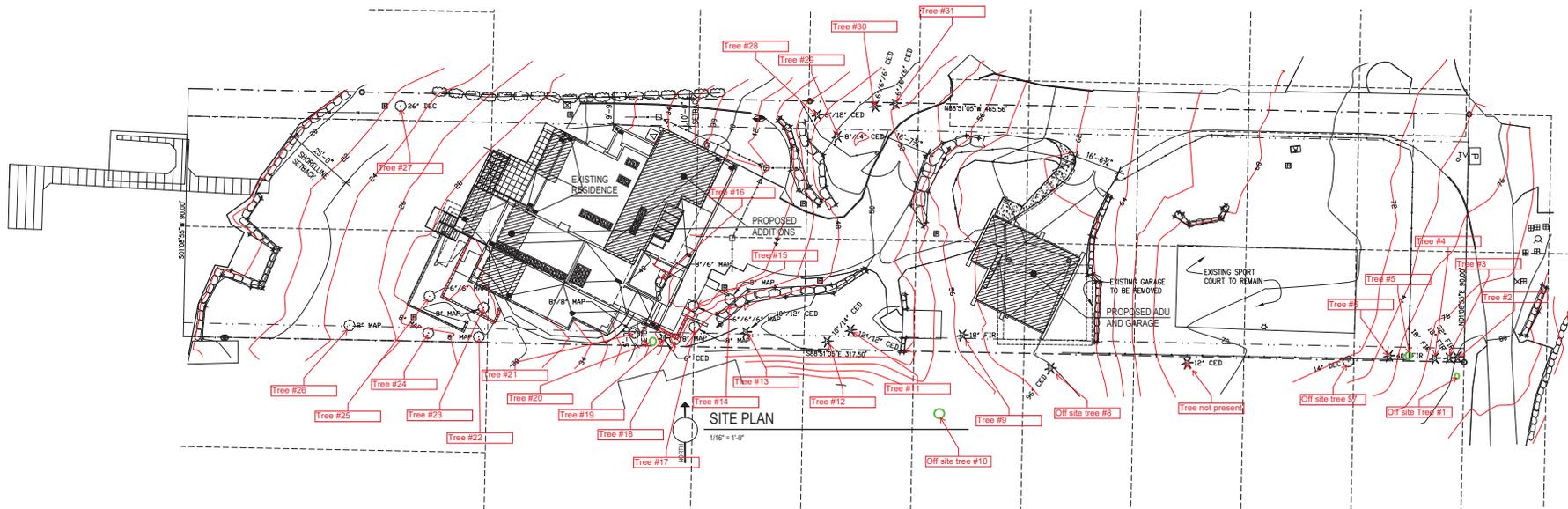
Figure 4. Tree #8, off-site giant sequoia near current garage.

References

American National Standard (ANSI) A300 (Part 5). 2019. Tree, Shrub, and Other Woody Plant Management Standard Practices (Management of Trees and Shrubs During Site Planning, Site Development, and Construction). Londonderry, NH: Tree Care Industry Association.

Council of Tree & Landscape Appraisers (CTLA). 2020. Guide for Plant Appraisal: 10th Edition, Revised. Atlanta, GA: International Society of Arboriculture.

TAG #	TREE NAME	# STEMS	COMB DBH (IN)	HEIGHT (FT)	RADIUS (FT)	CONDITION	REGULATED	NOTES
1	Pseudotsuga menziesii (Douglas-fir)	1	16.9	50	14	Good	Yes	Off site
2	Pseudotsuga menziesii (Douglas-fir)	1	28.0	100	18	Good	Yes	
3	Pseudotsuga menziesii (Douglas-fir)	1	17.0	100	18	Good	Yes	
4	Pseudotsuga menziesii (Douglas-fir)	1	19.0	100	18	Good	Yes	
5	Pseudotsuga menziesii (Douglas-fir)	1	10.2	50	12	Good	Yes	
6	Pseudotsuga menziesii (Douglas-fir)	1	43.3	110	22	Good	Yes	
7	Prunus sp. (Cherry species)	2	12.7	30	14	Good	Yes	Off site
8	Sequoiadendron giganteum (Giant sequoia)	1	78.0	80	20	Good	Yes	Off site
9	Abies alba (Silver fir)	1	15.8	45	10	Poor	Yes	Significant canopy dieback
10	Pseudotsuga menziesii (Douglas-fir)	1	28.0	90	18	Good	Yes	Off site
11	Chamaecyparis obtusa (Hinoki falsecypress)	2	15.2	30	10	Poor	Yes	Significant canopy dieback
12	Chamaecyparis obtusa (Hinoki falsecypress)	2	14.4	30	10	Fair	Yes	Some canopy dieback
13	Chamaecyparis obtusa (Hinoki falsecypress)	2	13.0	30	10	Fair	Yes	Some canopy dieback
14	Acer palmatum (Japanese maple)	1	7.0	25	6	Fair	No	Some canopy dieback
15	Acer palmatum (Japanese maple)	3	10.3	25	8	Good	Yes	
16	Acer palmatum (Japanese maple)	2	10.5	25	8	Good	Yes	
17	Acer palmatum (Japanese maple)	1	7.1	25	8	Good	No	
18	Acer palmatum (Japanese maple)	2	7.2	25	8	Good	No	
19	Chamaecyparis obtusa (Hinoki falsecypress)	1	6.9	25	6	Good	No	
20	Chamaecyparis obtusa (Hinoki falsecypress)	3	7.1	25	6	Good	No	
21	Acer palmatum (Japanese maple)	2	10.9	25	10	Good	Yes	
22	Acer palmatum (Japanese maple)	1	7.4	25	8	Good	No	
23	Acer palmatum (Japanese maple)	2	8.1	25	8	Good	No	
24	Acer palmatum (Japanese maple)	3	9.9	25	10	Good	No	
25	Acer palmatum (Japanese maple)	3	10.2	25	10	Good	Yes	
26	Acer palmatum (Japanese maple)	1	7.6	25	10	Good	No	
27	Robinia pseudoacacia (Black locust)	1	22.2	35	14	Good	Yes	Second stem removed
28	Chamaecyparis obtusa (Hinoki falsecypress)	3	12.7	25	10	Good	Yes	
29	Chamaecyparis obtusa (Hinoki falsecypress)	2	15.2	25	10	Good	Yes	
30	Chamaecyparis obtusa (Hinoki falsecypress)	3	9.1	25	10	Good	No	
31	Chamaecyparis obtusa (Hinoki falsecypress)	3	9.8	30	10	Good	No	



length	elevation	axb
32	37.34	1194.88
6.5	33.5	217.75
14.6	32.5	474.5
9.3	31	288.3
23	29.65	681.95
16.25	29	471.25
16	28.5	456
28.9	28.2	814.98
9.3	28.1	251.33
8	27.8	222.4
12.5	29.7	371.25
4	29	116
14	30	420
37.25	32	1192
4.5	33.8	152.1
10.5	35	367.5
2.25	36.5	82.125
2.25	37	83.25
7.2	38.2	275.04
16.9	39.8	672.62
66.9	42.3	2829.87
342.1		11645.1

34.04 average grade

PROJECT NOTES
PROPOSED ADDITION TO EXISTING RESIDENCE AND NEW ADU/GARAGE

OWNERS
STEVE KAO & HUI HONG
21222 CHINDOK ROAD
WOODWAY, WA 98020

ZONING
R-15

PROPERTY TAX ACCT#
PROPERTY TAX ACCOUNT NUMBER: 294890-0015

LEGAL DESCRIPTION
GROVELAND PARK ADD VAC 3-4 & 5 10 FT OF 2 & SH LDS ADU & VAC ST ADU IN BLK 22 & VAC N 40 FT OF 16 THRU 22 & VAC S 50 FT OF 9 THRU 15 & VAC ST ADU IN BLK 2

LOT COVERAGE
TOTAL LOT AREA: 41,900 S.F.
LOT COVERAGE:
HOUSE W/ ADDITIONS 5,803 S.F.
ADU 1,059 S.F.
STRUCTURAL TOTAL 6,863 S.F.
SPORT COURT 1,947 S.F.
DRIVING SURFACES 4,458 S.F.
TOTAL 13,274 S.F.

40% ALLOWABLE LOT COVERAGE OR 16,760 S.F.

GROSS FLOOR AREA

BASEMENT	0 S.F.
MAIN FLOOR	4,511 S.F.
UPPER FLOOR	2,228 S.F.
ADU	1,025 S.F.
TOTAL	8,664 S.F.
ALLOWABLE GROSS FLOOR AREA	12,000 S.F.

SHEET INDEX

- 1.0 SITE PLAN
- 2.0 LOWER FLOOR DEMOLITION PLAN
- 3.1 MAIN FLOOR DEMOLITION PLAN
- 2.2 UPPER FLOOR DEMOLITION PLAN
- 3.0 FOUNDATION PLAN
- 3.0 LOWER FLOOR PLAN
- 3.01 MAIN FLOOR FRAMING PLAN
- 3.1 MAIN FLOOR PLAN
- 3.11 UPPER FLOOR/ LOWER ROOF FRAMING PLAN
- 3.2 UPPER FLOOR PLAN
- 3.01 ROOF FRAMING PLAN
- 4.0 SCHEDULES
- 5.0 EXTERIOR ELEVATIONS
- 5.1 EXTERIOR ELEVATIONS
- 6.0 BUILDING SECTIONS
- 6.1 BUILDING SECTIONS

Annotated by Lars Freeman-Wood
DCG/Watershed
5/22/2023

PRELIMINARY NOT FOR CONSTRUCTION

HONG AND KAO RESIDENCE
5425 W. MERCER WAY
MERCER ISLAND, WA 98040

SITE PLAN
Sheet No. 0.0
Project No. 2222
Date: 2/27/23