

# UBC Ponderosa Commons | Development Review Committee Application

## Appendices:

Tree Preservation Diagrams

Circulation Diagrams

Phasing Diagrams

Arborist's Report

HAPA COLLABORATIVE

November 10th, 2011

# Planting Diagrams

Planting: Existing Trees



- Lawns
- Shrub and Groundcover Planting
- Ornamental Grasses and Perennials

- Cherry Tree
- Maple Tree
- Coniferous Tree
- Birch
- Magnolia
- European Beech
- Dogwood

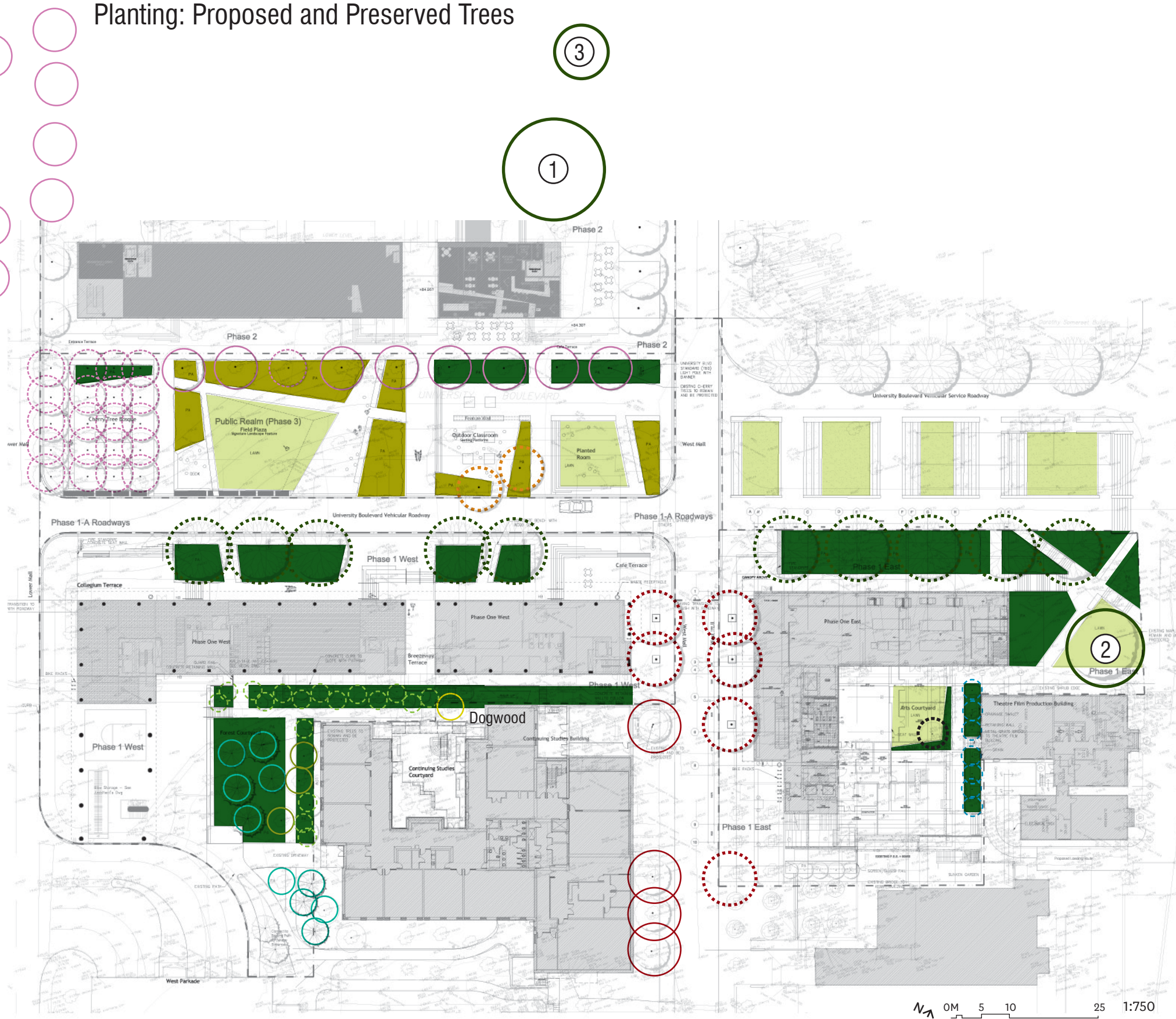
- 1 Ponderosa Pine
- 2 Cappadocian Maple
- 3 Digger Pine

- 39 Existing Trees to be Removed
  - 22 Existing Trees to be Preserved



# Planting Diagrams

## Planting: Proposed and Preserved Trees



- Lawns
- Shrub and Groundcover Planting
- Ornamental Grasses and Perennials

- Cherry Tree
- Maple Tree
- American Elm
- Coniferous Tree
- Apple
- Birch
- Columnar European Beech
- Golden Black Locust
- Vine Maple

- 1 Ponderosa Pine
- 2 Cappadocian Maple
- 3 Digger Pine

- 65 Proposed Trees
- 22 Existing Trees to be Preserved



# Circulation Diagrams

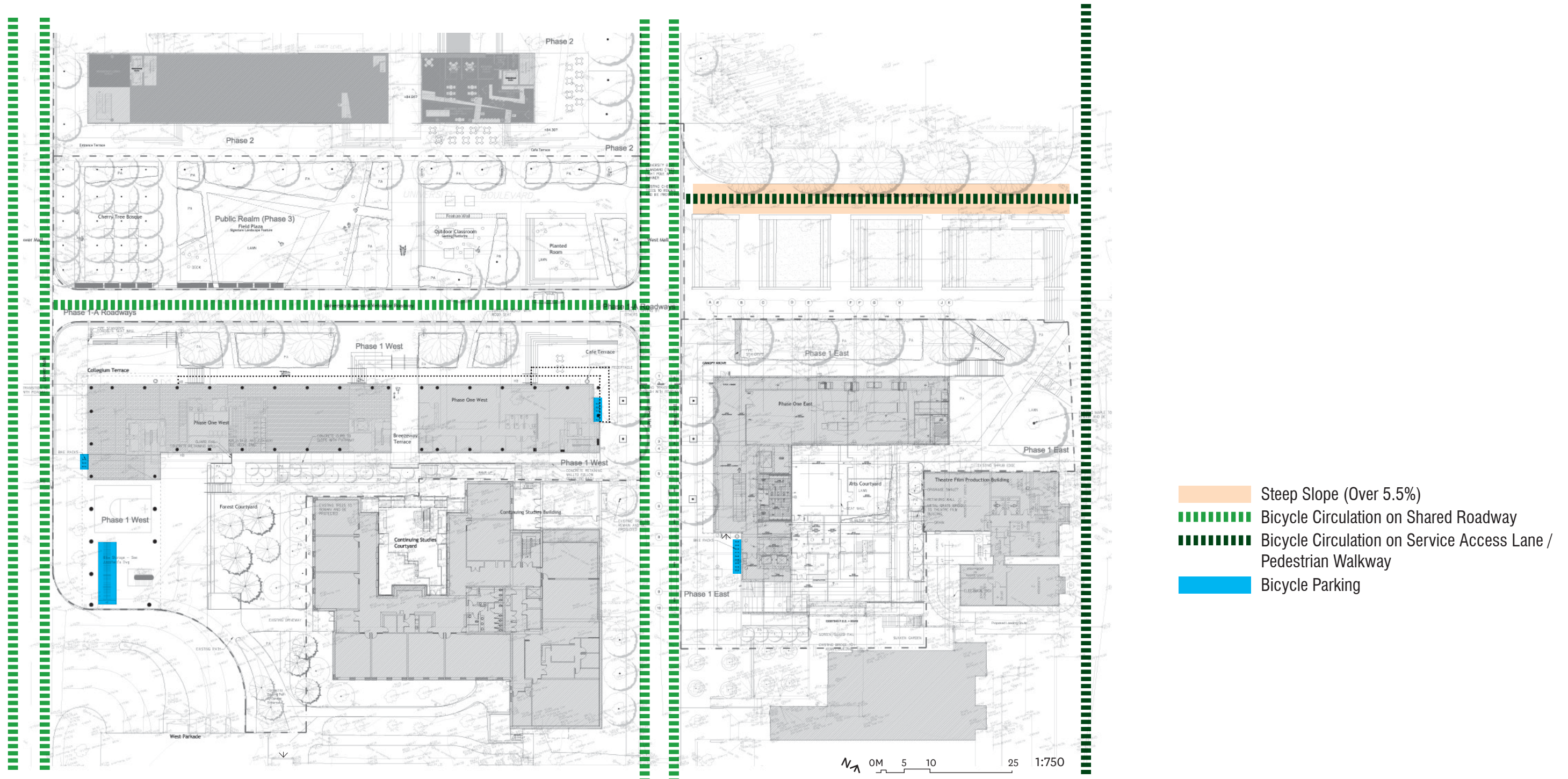
## Inclusive Circulation





# Circulation Diagrams

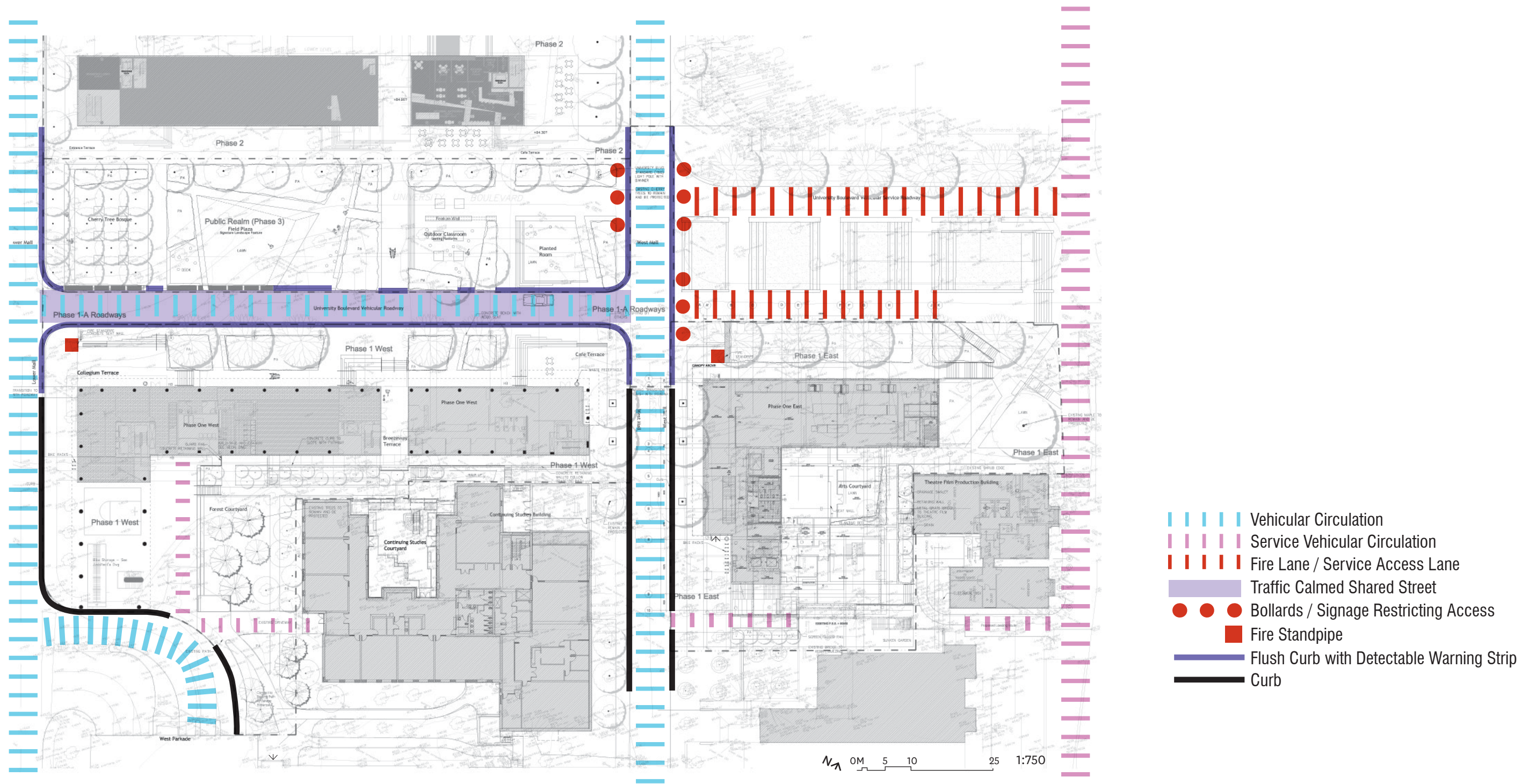
## Bicycle Circulation and Parking





# Circulation Diagrams




## Vehicular Circulation and Fire Access

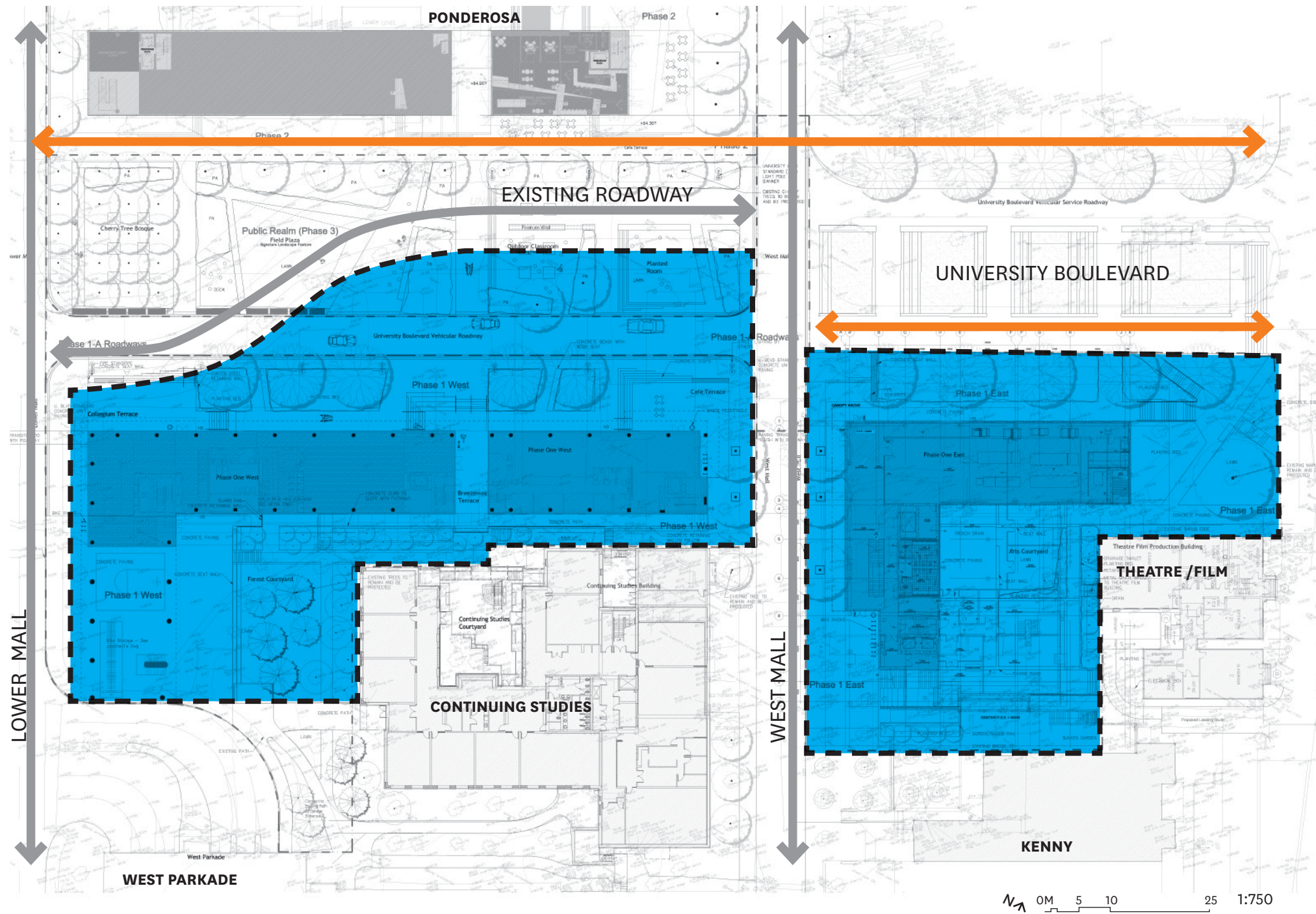




# Phasing Diagrams

## PHASE ONE - A




-  Construction Site
-  Pedestrian Route
-  Vehicular Route

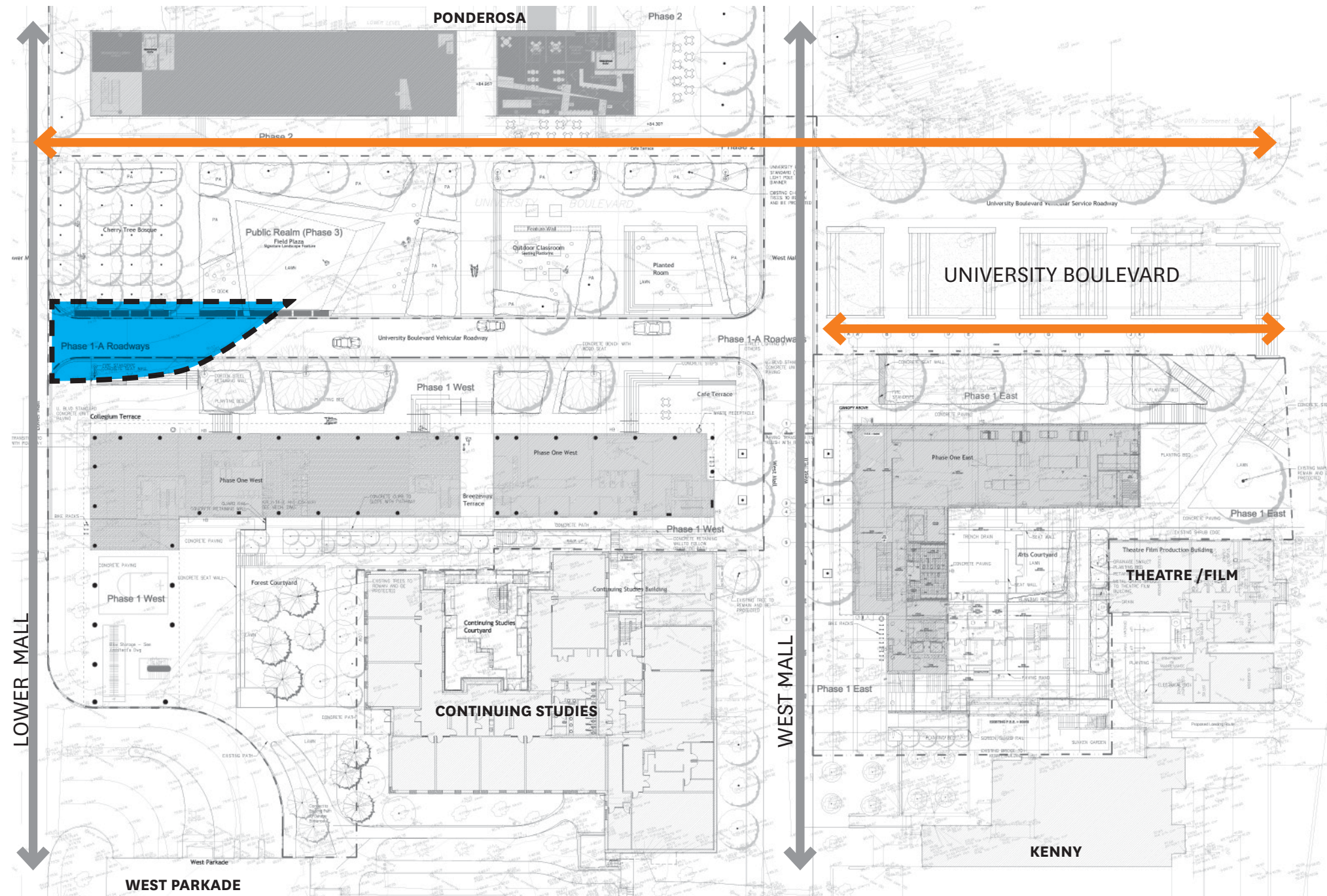




# Phasing Diagrams

## PHASE ONE - B

-  Construction Site
-  Pedestrian Route
-  Vehicular Route






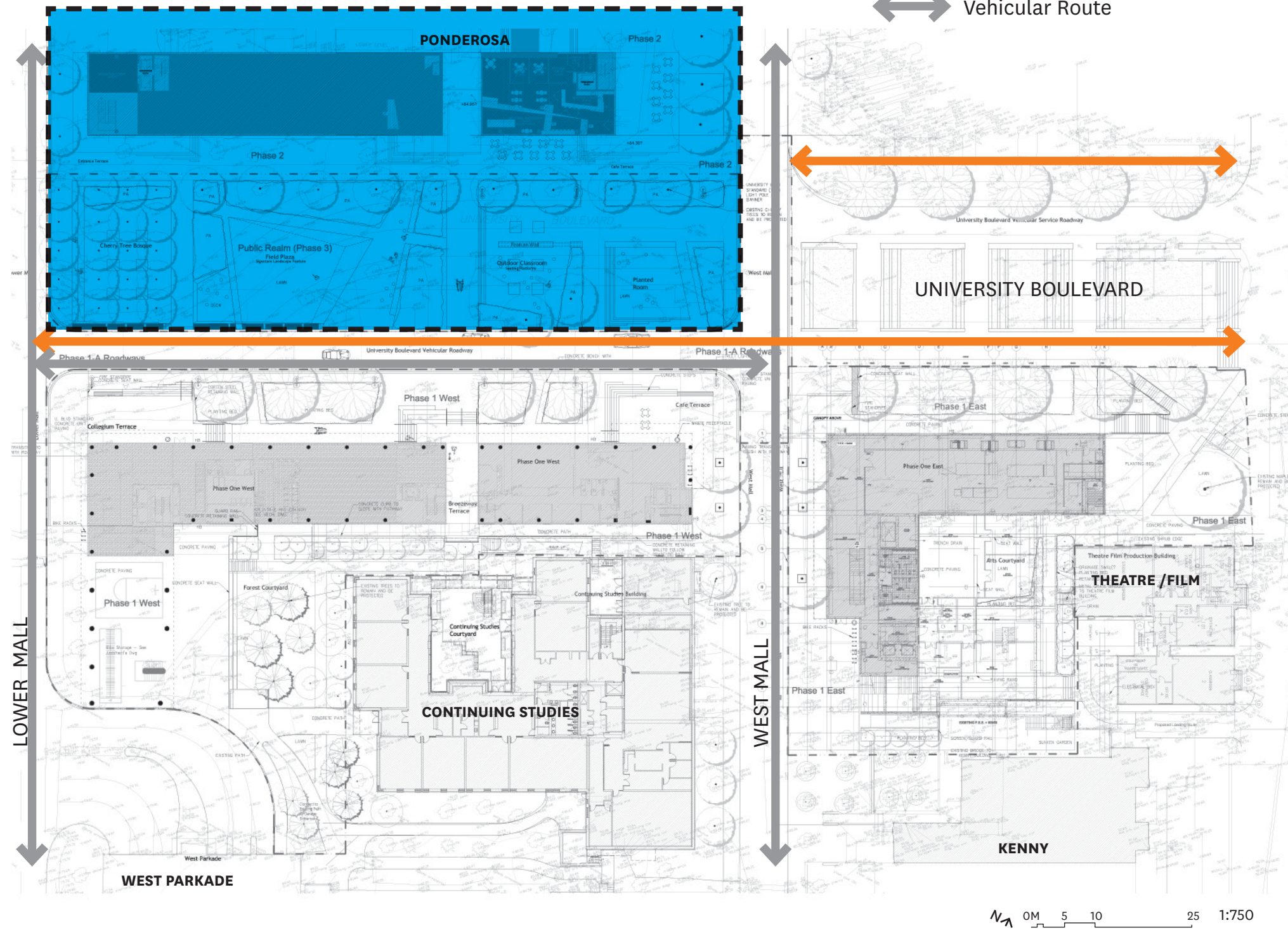
North Arrow | 0M 5 10 25 1:750



# Phasing Diagrams

PHASE TWO




-  Construction Site
-  Pedestrian Route
-  Vehicular Route

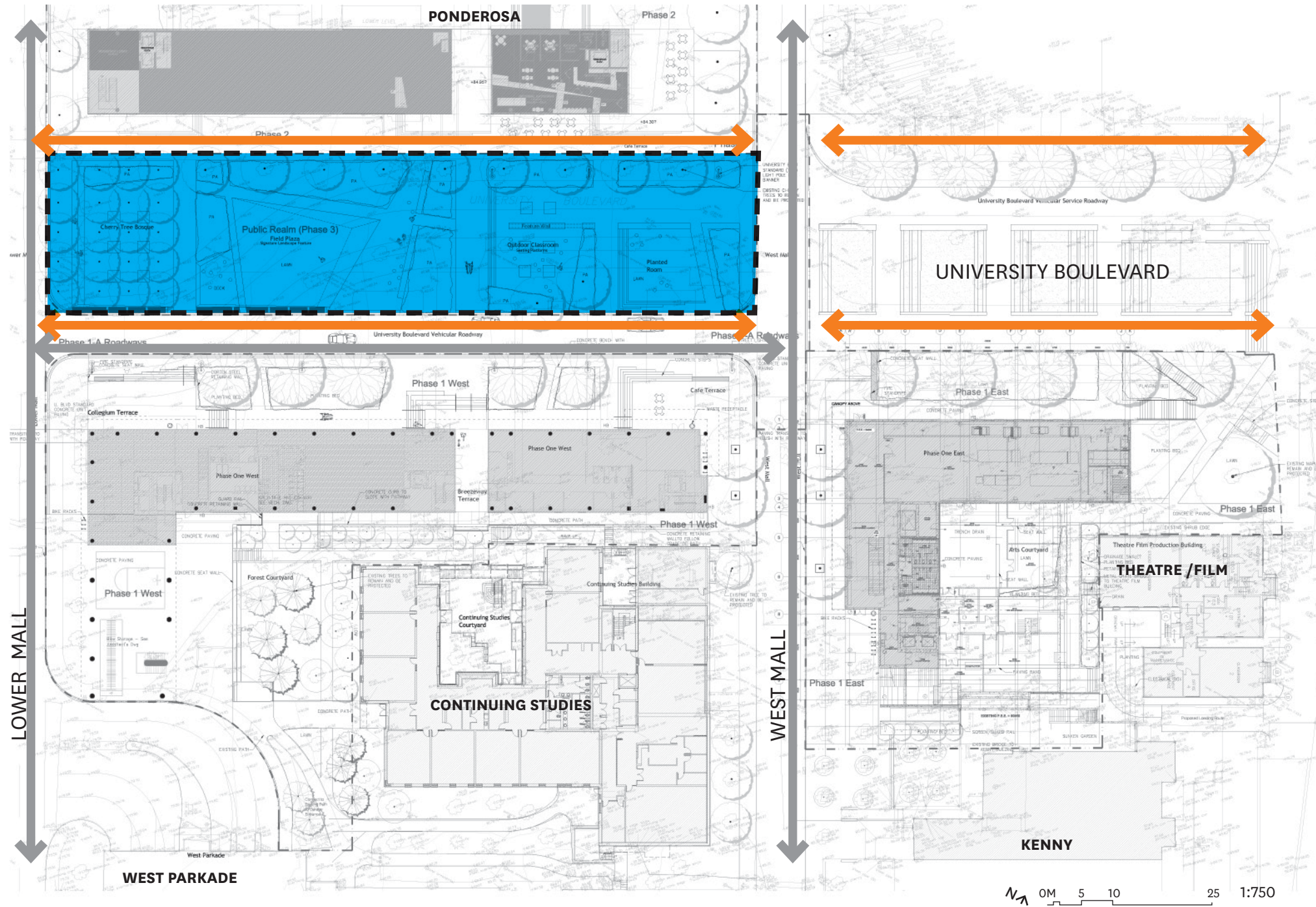




# Phasing Diagrams

## PHASE THREE: PUBLIC REALM




-  Construction Site
-  Pedestrian Route
-  Vehicular Route

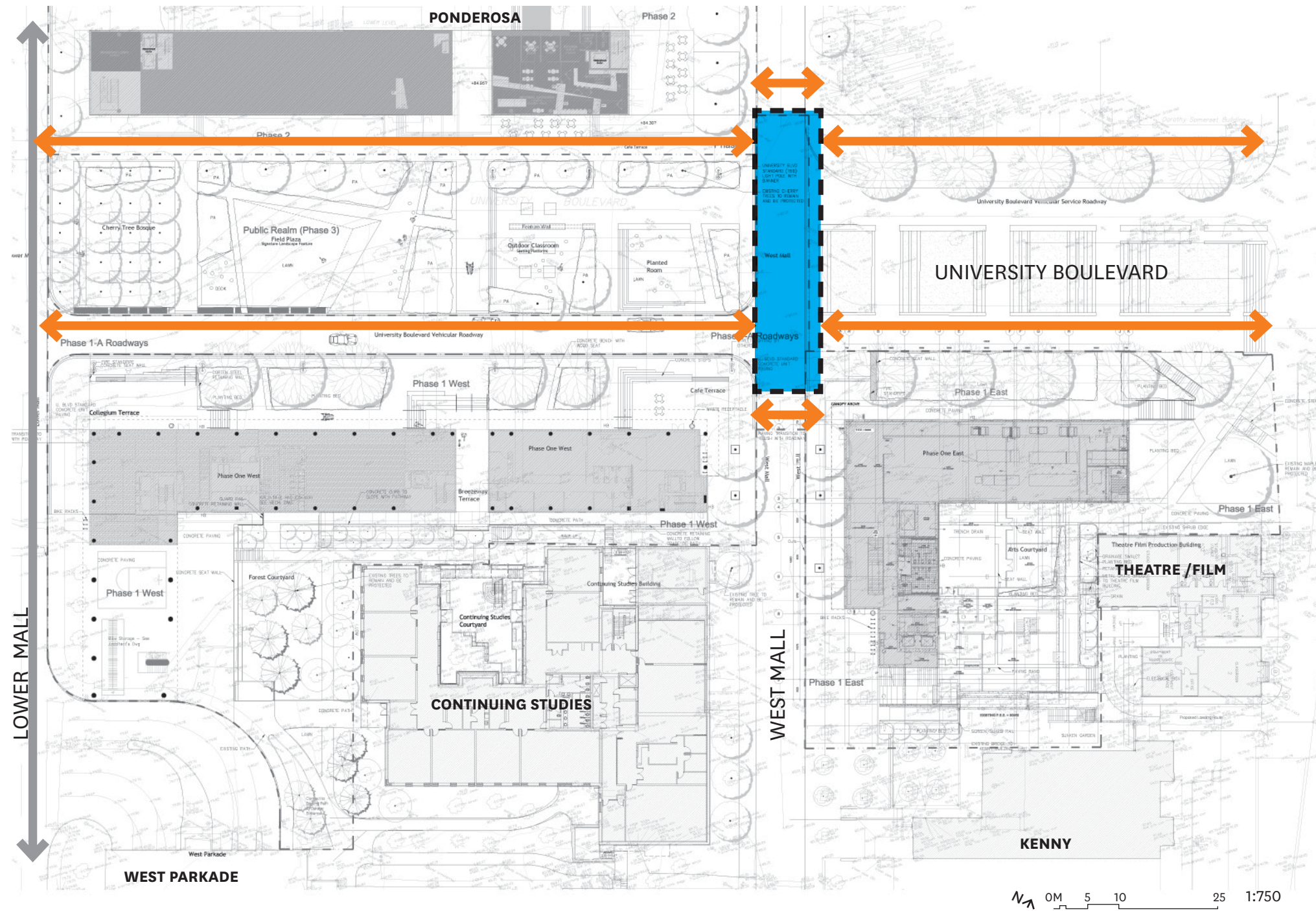




# Phasing Diagrams

## PHASE THREE - B: WEST MALL INTERSECTION

-  Construction Site
-  Pedestrian Route
-  Vehicular Route





**DRAFT -Arborist Report  
Student Housing  
Complex at Ponderosa Centre**



*Submitted to:*

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*Submitted by:*

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January 6, 2010



The following Diamond Head Consulting staff performed the site visit and prepared the report. All general and professional liability and individual accreditations have been provided below for reference.

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General Liability: The Dominion - Policy # CCP8442492, \$5,000,000 (Mar 2010 to Mar 2011)  
Errors & Omissions: Lloyds Underwriters – Policy # 1010191D, \$1,000,000 (June 2010 to June 2011)





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## Introduction

Diamond Head Consulting Ltd. (DHC) was asked to complete an assessment of the trees on and adjacent to the following proposed development:

Civic address: **Ponderosa Centre-UBC**  
Project No.:  
Client name: UBC Properties Trust.  
Date of site visit: December 17, 2010- 8:00 am  
Weather during visit: clear and mild

The objective of this report is to ensure the proposed development is in compliance with the University of British Columbia's development permit application process. The trees at the site were assessed, including: species, diameter at breast height (dbh) measured to the nearest 1 cm at 1.4 m above tree base, estimated height and general health and defects. Critical root zones were calculated for each of the trees with the potential for development impacts. Tree hazards were assessed according to International Society of Arboriculture and WCB standards. Suitability for tree retention was evaluated based on the health of the trees and their location in relation to the existing building envelopes and infrastructure. This report outlines the existing condition of the trees on and adjacent to the property, summarizes the proposed tree removals and retention trees as well as suggested guidelines for protecting the remaining trees during the construction process.

### *Limits of Assignment*

- Our investigation is based solely on our visual inspection of the trees on December 17, 2010. Our inspection was conducted from ground level. We did not conduct soil tests or root examination to assess the condition of the root system of the trees.
- This report does not provide any estimates to implement the proposed recommendations provided in this report.
- This report is valid for 6 months from the date of submission. Additional site visits and report revisions are required after this point to ensure accuracy of the report for the University's development permit application process.

### *Purpose and Use of Report*

- Provide documentation pertaining to on and off site trees to supplement the proposed development permit application.





Figure 1. Aerial view of the site (from Google Earth).

## Observations

### *Site Overview*

The site consists of three areas with University Boulevard dissecting the areas, Ponderosa Centre to the north and the Botany Annex, Huts M-21 and M-22 to the south. There are numerous trees on the site, many of them significant due to their species and a combination of their size, and condition. Many of these trees are an extension or part of the Old Arboretum on the University Campus. The plantings in the Arboretum began with native trees in 1916 (some of which are located to the north of the Ponderosa Centre) and exotic trees after the Second World War. Many recent tree plantings are located along the southern edge on lower mall and extending up along the south side of University Boulevard. The project site is mostly composed of young dogwoods and mature specimens that are unique to the region. Areas of trees that contained similar species and characteristics due to their location and proximity to hardscapes were group together. These Conifers and other deciduous species within this area were tagged and recorded within the inventory and report. Tree attributes, critical root zones and recommendations for the trees are listed below in **Table 1**.

### *Tree Inventory*

The following is an inventory of assessed trees. Trees large enough to hold a tag were marked with a numbered tag and those too small were given a number that is referenced in the report and the attached map. Tree species, characteristics, comments, recommendations and required root protection zones have been suggested for trees with low to moderate risk and high risk trees with a low risk category (Table 1). Their locations are illustrated on the accompanying map.





### Tree Risk Assessment

Using the *Tree Risk Assessment in Urban Areas and the Urban/Rural Interface Release 1.4* manual, published by the International Society of Arboriculture, a Risk Rating out of 12 maximum points was given to the tree as shown in Table 2. The formula used was: **Probability of Failure + Size of Part + Target Area = Tree Risk Assessment (Rating)**.

In the Tree Risk Assessment, the tree was rated as follows:

**Probability of Failure = (1 low to 5 Extreme)** This is the likelihood of branch or whole tree failure. One is the lowest possible score; five is the highest likelihood of tree part failure.

**Size of Defective Part = (1 small to 3 large)** This section identifies the largest part, which could fail. A part greater than 50cm in given a rating of 3, a part between 10 and 50cm is given a rating of 2 and all parts less than 10cm are given a rating of 1.

**Target Area = (1 low to 4 high)**. The target that the tree could strike is designated a value from 1 to 4 based on the potential to cause personal injury or damage structures and infrastructure.

A value for each of the three categories is assessed and added together in the Risk Rating calculation shown in Table 2. A score of 3-5 indicates a low risk, 6-8 is a moderate risk, 9-11 is a high risk and 12 indicates an extreme risk; this level warrants immediate tree removal. A risk category assigning ranges to the three levels of risk is also provided. Please refer to the table in Appendix 1 for detailed information on interpretation and implications of risk ratings and categories.





*Photographs*



Photo 1. View of the magnolias in the planting bed off of lower mall.



Photo 2. Looking at the weeping spruce and cypress outside of the Botany annex. Note the large maple in the background. All three are significant trees.



Photo 3. View of the large *Acer Campestris* near the Botany and Film building

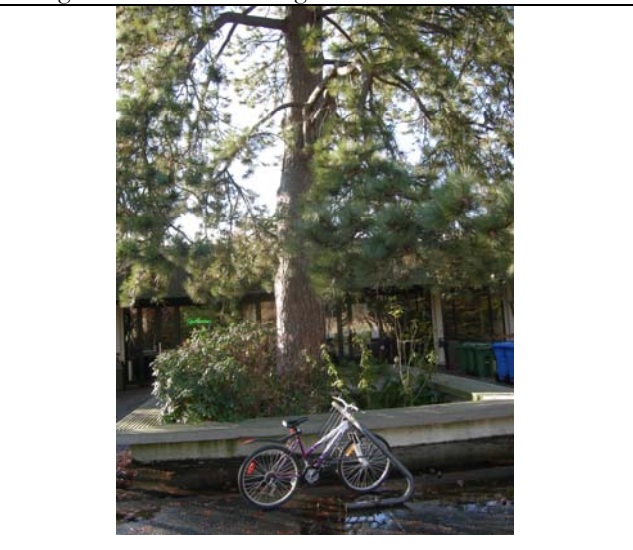


Photo 4. Photo of the large ponderosa pine outside of the ponderosa building.





**Table 1. Tree Inventory**

Tag #	Common Name	Botanical Name	DBH (cm)	Ht (m)	Live Crown Ratio (%)	Overall Condition	Tree Risk Category	Comment	Retain/Remove	Root Protection Zone (m)
01	Jacquemont Birch	Betula utilis var. jacquemontii	21	10	>50%	Excellent	Mod - 1	Tree is adjacent to the sidewalk in a grass area. No evidence of the Birch Bark Borer Beetle. Good maintenance.		1.4
02	Jacquemont Birch	Betula utilis var. jacquemontii	16	9	>50%	Excellent	Mod - 1	Tree is adjacent to the sidewalk in a grass area. No evidence of the Birch Bark borer. Good maintenance.		1.0
03	Jacquemont Birch	Betula utilis var. jacquemontii	13	9	>50%	Excellent	Mod - 1	Tree is adjacent to the sidewalk in a grass area. No evidence of the Birch bark borer. Good maintenance.		1.0
04	Dogwood	Cornus ssp.	11	4	>50%	Good	Mod - 1	Healthy tree adjacent to the sidewalk. Good maintenance.		1.0
05	Dogwood	Cornus ssp.	9	4	>50%	Good	Low - 3	Healthy tree adjacent to the sidewalk. Good maintenance.		1.0
06	Dogwood	Cornus ssp.	9	4	>50%	Good	Low - 3	Healthy tree in raised planter area, surrounded by healthy ground cover. There area a few suckers at the base of the tree otherwise good maintenance.		1.0
07	Hybrid Black Locust	Robinia pseudoacacia	13	5	>50%	Good	Mod - 1	Tree is in a small parking lot island, slight lean at the base, otherwise healthy. Good maintenance.		1.5
08	Mountain Hemlock	Tsuga mertensia	7	5	>50%	Good	Low - 3	Healthy tree in shrub bed, next to sidewalk and parking lot.		1.0
09	Cypress	Chamaecyparis nootkatensis	10	6	>50%	Good	Mod - 1	In grass area between road and sidewalk, young, healthy well mulched tree.		1.1
10	Cypress	Chamaecyparis nootkatensis	18	9	>50%	Good	Mod - 1	In grass area between road and sidewalk, young, healthy well mulched tree.		1.2
11	Cypress	Chamaecyparis nootkatensis	18	9	>50%	Good	Mod - 1	In grass area between road and sidewalk, young, healthy well mulched tree.		1.2
12	Ash	Fraxinus spp.	9	6	>50%	Good	Low - 3	In grass area next to sidewalk, near underground vent and surrounded by concrete that is 2-3m away. No leaves left to ID.		1.0
13	Japanese Maple	Acer palmatum	14,11	4	>50%	Good	Low - 3	Measured at base calliper is 14-11cms, by entrance to botany annex, mulched and well maintained.		1.3
14	Brewers weeping	Picea	7	4	>50%	Good	Low - 3	In bed well maintained, next to entrance to		1.0





Tag #	Common Name	Botanical Name	DBH (cm)	Ht (m)	Live Crown Ratio (%)	Overall Condition	Tree Risk Category	Comment	Retain/Remove	Root Protection Zone (m)
	spruce	breweriana						botany annex.		
15	Spruce	Picea spp.	4	2	>50%	Good	Low - 3	In bed area, well maintained, understory tree. Suspect a black spruce hybrid.		1.0
16	Photinia	Photinia serratifolia	Multiple stems	10	>50%	Good	Mod - 1	Very healthy large specimen, next to building and parking area. Treat as 50cm.		3.0
17	Paper Birch	Betula papyrifera	11		>50%	Good	Mod - 1	On edge of building.		.7
4642	Yoshino Cherry	Prunus yedoensis	63	8	>50%	Fair	Mod - 2	In bed on the edge of the road, healthy tree.		4.1
4643	Yoshino Cherry	Prunus yedoensis	54	8	>50%	Fair	Mod - 2	Tree has major decay in one of the scaffold branches over the road, prune if retaining.		3.5
4644	Yoshino Cherry	Prunus yedoensis	45	6	>50%	Fair	Mod - 2	Minor decay, in bed at edge of the road.		2.9
4645	Yoshino Cherry	Prunus yedoensis	38	6	>50%	Poor	Mod - 3	Tree has major decay at the base, not suitable for long term retention.		2.5
4646	Western Hemlock	Tsuga heterophylla	79	28	30-35%	Fair	Mod - 3	Tree is in decline, major previous pruning contributing to a strange overall form.		5.1
4771	Lawson Cypress	Chamaecyparis lawsoniana	68	25	>50%	Good	Mod - 1	Healthy tree in grassy area, no previous pruning. Good retention tree.		4.4
4773	Grand Fir	Abies grandis	32	11	>50%	Good	Mod - 1	Healthy tree, bordered by 2 sidewalks in a grass area. Well maintained.		2.1
4792	Vine leaved Maple	Acer cissifolium	68	11	>50%	Good	Mod - 1	Significant tree, Well maintained tree in a shrub bed. Has a botanical name plate and tag. Wide spreading over walkway and parking area.		4.4
4831	Osage orange	Maclura pomifera	35	12	>50%	Good	Mod - 1	On the edge of a local access road, large wound at base but otherwise healthy. Pavement in close proximity on east side.		2.5
4836	Red maple	Acer rubrum	36	20	>50%	Good	Mod - 1	Healthy tree between sidewalk and road. Part of a row of trees. One of the scaffold branches over the road has a decay column. Maple, bud cluster at ends of branches to assume red maple		2.3
4841	Cherry/Plum	Prunus cerasifera - hybrid	50	10	>50%	Good	Mod - 1	In lawn area healthy tree.		3.3





Tag #	Common Name	Botanical Name	DBH (cm)	Ht (m)	Live Crown Ratio (%)	Overall Condition	Tree Risk Category	Comment	Retain/Remove	Root Protection Zone (m)
4841	Yoshino Cherry	Prunus yedoensis	57	8	>50%	Fair	Mod - 2	Some decay and fungal bodies on stem. Tree appears ok though.		3.7
4842	Cherry/Plum	Prunus cerasifera - hybrid	53	10	>50%	Good	Mod - 1	Next to walkway and lifting it. Minor previous pruning and decay at base.		3.4
4843	Juniper hybrid	Juniperus spp.	28,26	12	>50%	Good	Mod - 1	Healthy tree in bed next to building, minor previous pruning.		3.0
4844	Nootka Cypress	Chamaecyparis nootkatensis	~100	25	>50%	Good	Mod - 1	7 stems from the base use 100cms for tree protection area. Open form, in bed beside service road, hangs over road.		6.5
4845	Western Red Cedar	Thuja plicata	95	29	>50%	Good	Mod - 1	Open form, in bed beside service road, hangs over road.		6.2
4847	Douglas-fir	Pseudotsuga menziesii	107	32	>50%	Good	Mod - 1	Tree has a large open grown canopy with limbs over the small building at the base. Tree is slightly stressed likely due to the amount of concrete at the base of the tree.		7.0
4848	Japanese Maple	Acer palmatum	~80	8	>50%	Good	Mod - 1	Multiple stems treat as 80cms for root protection zone. Tree has minor decay at base but appears ok. Next to building in shrub bed.		5.0
4849	Persian Ironwood	Parrotia persica	23,15,21	7	>50%	Good	Mod - 1	Tree is suppressed by adjacent larger pine tree, good form and well maintained in shrub bed.		3.8
4850	Digger Pine	Pinus sabiniana	81	23	>50%	Good	Mod - 1	Healthy tree in shrub bed. Scaffold branches into multiple stems, natural form for this species. Very large cones, nice specimen - may be only specimen in Vancouver (Tree of Vancouver reference).		5.3
4852	Japanese Maple	Acer palmatum	~50	6	>50%	Good	Mod - 1	4 main stems use 50cms for tree protection area. Very healthy old specimen.		3.5
4853	Japanese Maple	Acer palmatum	19,12	6	>50%	Fair	Mod - 1	Minor decay at base otherwise healthy.		2.0
4854	Ponderosa Pine	Pinus ponderosa	108	32	>50%	Excellent	Mod - 2	Significant tree - may be one of the largest when referencing big trees of BC list. Large previous pruning wounds showing good signs of codit. Between two raised walkways and building, ideal dry growing conditions for this species. Very large specimen.		7.0
4855	Japanese Maple	Acer palmatum	~50	6	>50%	Good	Mod - 1	Multiple stems use 50cms for tree protection area. Very healthy old specimen.		3.5
4856	Japanese Maple	Acer palmatum	~50	6	>50%	Good	Mod - 1	Multiple stems use 50cms for tree protection		3.5





Tag #	Common Name	Botanical Name	DBH (cm)	Ht (m)	Live Crown Ratio (%)	Overall Condition	Tree Risk Category	Comment	Retain/Remove	Root Protection Zone (m)
								area. Very healthy old specimen.		
4857	Japanese Maple	Acer palmatum	~50	7	>50%	Good	Mod - 1	Multiple stems use 50cms for tree protection area. Healthy tree under building edge.		3.5
4858	Japanese Maple	Acer palmatum	~60	6	>50%	Good	Mod - 1	Multiple stems use 60cms for tree protection area. Minor decay and minor previous pruning, otherwise healthy.		4.0
4859	European White Birch	Betula pendula	40,41,35	20	>50%	Fair	Mod - 1	Tree is next to sidewalk in shrub bed, tree shows symptoms of the majority of birch trees in the region, dying from the top down and slowly in decline. This tree has less dieback and has not had the tops cut out. This is the best tree in the row of trees.		5.0
4860	European White Birch	Betula pendula	41,38,23	18	>50%	Fair to Poor	Mod - 2	Tree is next to sidewalk in shrub bed, tree shows symptoms of the majority of birch trees in the region, dying from the top down and slowly in decline. This tree has less dieback and has not had the tops cut out.		5.0
4862	Yoshino Cherry	Prunus yedoensis	49	8	>50%	Good	Mod - 1	Large mature tree between sidewalk and road, tree is lifting sidewalk. Well maintained and healthy with minor decay and moderate previous pruning.		3.2
4863	Yoshino Cherry	Prunus yedoensis	34	6	>50%	Good	Mod - 1	Large, slightly younger than group of trees, between sidewalk and road, tree is lifting sidewalk. Well maintained and healthy with small cavity at the base.		2.2
4865	Yoshino Cherry	Prunus yedoensis	43	10	>50%	Good	Mod - 2	Large mature tree between sidewalk and road, tree is lifting sidewalk. Well maintained with large decay and large fresh previous pruning.		2.8
4866	Yoshino Cherry	Prunus yedoensis	72	10	>50%	Good	Mod - 1	Large mature tree between sidewalk and road, tree is lifting sidewalk. Well maintained and healthy with minor decay and minor previous pruning.		4.7
4867	Yoshino Cherry	Prunus yedoensis	40	8	>50%	Good	Mod - 1	Large mature tree between sidewalk and road, tree is lifting sidewalk. Well maintained and healthy with moderate decay and minor previous pruning.		2.6
4868	Yoshino Cherry	Prunus yedoensis	43	8	>50%	Good	Mod - 1	Large mature tree between sidewalk and road, tree is lifting sidewalk. Well maintained and		2.8



Tag #	Common Name	Botanical Name	DBH (cm)	Ht (m)	Live Crown Ratio (%)	Overall Condition	Tree Risk Category	Comment	Retain/Remove	Root Protection Zone (m)
								healthy with moderate decay and large previous pruning wounds.		
4869	Yoshino Cherry	Prunus yedoensis	37	6	>50%	Good	Mod - 1	Large mature tree between sidewalk and road, tree is lifting sidewalk. Well maintained and healthy with minor decay and moderate previous pruning.		2.4
4871	European White Birch	Betula pendula	42,45	11	>50%	Fair to Poor	Mod - 2	Tree is next to sidewalk in shrub bed, tree shows symptoms of the majority of birch trees in the region, dying from the top down and slowly in decline. Has had major previous pruning to remove the dead tops.		4.7
4872	European White Birch	Betula pendula	33,26	12	>50%	Fair to Poor	Mod - 2	Tree is next to sidewalk in shrub bed, tree shows symptoms of the majority of birch trees in the region, dying from the top down and slowly in decline. Has had major previous pruning to remove the dead tops.		4.0
4873	European White Birch	Betula pendula	40,35,34	12	>50%	Fair to Poor	Mod - 2	Tree is next to sidewalk in shrub bed, tree shows symptoms of the majority of birch trees in the region, dying from the top down and slowly in decline. Has had major previous pruning to remove the dead tops.		6.0
4874	European White Birch	Betula pendula	32,31,30,27	12	>50%	Fair to Poor	Mod - 2	Tree is next to sidewalk and loading bay retaining wall, in shrub bed, tree shows symptoms of the majority of birch trees in the region, dying from the top down and slowly in decline. Has had major previous pruning to remove the dead tops.		6.0
4875	Japanese Pagoda	Sophora japonica		9	>50%	Good	Mod - 1	Tree has 4 stems each 20-30cms. In hedge at edge of building with some branches growing against building.		5.4
4876	Norway maple	Acer platanoides	62	12	>50%	Good	Mod - 1	Significant tree at entrance to building, on edge of walkway, minor dead wood in the canopy.		4.0
4877	Maple	Acer	~30	6	>50%	Good	Mod - 1	Species to be determined by project arborist. Tree is in bed adjacent to building.		2.1
7836	Lawson Cypress	Chamaecyparis lawsoniana	79	20	>50%	Good	Mod - 1	Significant tree. Previously tagged, next to sidewalk, well maintained, tree has 3 or 4 codoms at 8m, natural form, racoon living in tree.		5.1





Tag #	Common Name	Botanical Name	DBH (cm)	Ht (m)	Live Crown Ratio (%)	Overall Condition	Tree Risk Category	Comment	Retain/Remove	Root Protection Zone (m)
7837	Japanese Snowbell	<i>Styrax japonicus</i>	20,16	13	>50%	Good	Mod - 1	Healthy old tree in shrub bed, growing over building, minor decay and moderate previous pruning.		2.5
7838	American Holly	<i>Ilex opaca</i>	28,28,25	13	>50%	Good	Mod - 1	Tree has multiple stems at 5m, healthy.		4.0
7839	Cappadocian Maple	<i>Acer cappadocicum</i>	68	19	>50%	Good	Mod - 1	Significant tree, botanical name plate and tag, in grassy area, well maintained healthy tree, minor previous pruning.		4.4
7987	Yoshino Cherry	<i>Prunus yedoensis</i>	40	10	>50%	Good	Mod - 1	Large mature tree between sidewalk and road, tree is lifting sidewalk. Well maintained and healthy with minor decay and two large previous pruning wounds.		2.6
8139	Sitka Spruce	<i>Picea sitchensis</i>	77	28	>50%	Good	Mod - 1	In small planting area, slightly stressed due to lack of soil.		5.0
8983	Arbutus	<i>Arbutus menziesii</i>	12	4	>50%	Excellent	Mod - 1	Multiple stems with the main stem being 12cms and the rest less than that. Well maintained tree in shrub bed, very healthy specimen. Arbutus trees are very difficult to move and do not respond well to transplanting.		2.0
8984	Dogwood	<i>Cornus ssp.</i>	13	3	>50%	Good	Mod - 1	Minor decay column at base from previous pruning. In shrub bed.		1.0
8985	Dogwood	<i>Cornus ssp.</i>	10	2	>50%	Good	Low - 3	Small tree with weeping form, in shrub bed. Well maintained mature small tree.		1.0
Group A	Magnolia		7-10	4	>50%	Good	Low - 3	Recent plantings. Healthy young trees in grassy areas and flowerbeds, good maintenance.		1.5
Group B	Magnolia		5-10	4-5	>50%	Good	Low - 3	In grassy area between road and sidewalk, good rooting space and generally healthy. Some minor vehicle damage on a few of the trees.		1.5
Group C	Cherry		4-8	3	>50%	Good	Low - 3	In grassy areas or shrub beds, trees still have tree stakes and are a relatively new planting. Some type of ornamental flowering cherry.		1.5
Group D	Magnolia	<i>Magnolia grandiflora</i>	4	2.5	>50%	Good	Low - 3	Healthy tree in shrub bed beside building.		1.5
Group E	Trees in concrete planters				>50%	Good	Low - 3	Concrete raised planters with Japanese Maples, Mugho Pines and several types of Junipers. To		1.5



Tag #	Common Name	Botanical Name	DBH (cm)	Ht (m)	Live Crown Ratio (%)	Overall Condition	Tree Risk Category	Comment	Retain/Remove	Root Protection Zone (m)
								protect trees do not disturb planters. For moving treat the maples as 30cm calliper trees.		
Group F	European Beech	Fagus sylvatica var. dawyck	5-7	4	>50%	Good	Low - 3	Trees are between road and sidewalk. Can be moved easily.		1.5





## Summary

The site inventory identified 69 individual trees and 5 groupings of trees at the proposed project site. The location of protected trees, their root protection zones as well as those trees to be removed have been illustrated on the accompanying map.

### *Tree Retention and removal by Species*

**Table 3. Tree species on site, summary.**

Tree Species	Total # of Trees	Total Retained	Total Removed
Cherry			
Dogwood			
Douglas-fir			
Grand Fir			
Hazelnut			
Holly			
Horse Chestnut			
Laburnum			
Maple			
Monkey Puzzle			
Pine			
Poplar			
Red alder			
Scotch Pine			
Walnut			
Western Red Cedar			
Willow			
<b>Total</b>			

**Table 4 Tree species summary.**

Species	On-site	Off-site	City	Total
Cherry				
Dogwood				
Douglas-fir				
Grand Fir				
Hazelnut				
Holly				
Horse Chestnut				
Laburnum				
Maple				
Monkey Puzzle				
Pine				
Poplar				
Red alder				
Scotch Pine				
Walnut				
Western Red Cedar				
Willow				
<b>Total</b>				

**Table 5. Tree species summary.**

	On-site	Offsite	City	Total



Total number of trees to be protected			2	
Total number of trees to be removed				
Totals				
Total number of trees to be replaced @ 1:1				
Total number of trees to be replaced @ 2:1				
Totals				







## Construction Guidelines

The following are recommendations for risk mitigation and proper tree protection during the construction phase of the project.

### *Tree Retention Zones*

The City of Vancouver's Tree Protection Distance Table was used to determine the optimal root protection zone (RPZ). The RPZ is the area around the tree in which no grading or construction activity may occur and is required for the tree to retain good health and vigor.

The following are tree preservation guidelines and standards for the RPZs:

- No soil disturbance or stripping;
- The natural grade shall be maintained within the protection zone;
- No storage, dumping of materials, parking, underground utilities or fires;
- Any plan affecting trees should be reviewed by a consultant including demolition, erosion control, improvement, utility, drainage, grading, landscape, and irrigation;
- Special foundations, footings and paving designs are required if within the tree protection zone;
- Utilities should be routed around the RPZ;
- Excavation within the tree protection zone should be supervised by a consulting arborist;
- Surface drainage should not be altered so as to direct water into or out of the RPZ; and
- Site drainage improvements should be designed to maintain the natural water table levels within the RPZ.

Respecting these guidelines will prevent changes to the soil and rooting conditions, wounding of the trees and contamination due to spills and waste. Any plans for work or activities within the RPZ that are contrary to these guidelines should be discussed with the project arborist so that mitigation measures can be implemented.

### Tree Protection Fences

Prior to any construction activity on site, tree protection fences must be constructed at the specified distance from the tree trunks. The protection barrier or temporary fencing must be at least 1.2 m in height and constructed of 2 by 4 lumber with orange plastic mesh screening. This must be constructed prior to tree removal, excavation or construction and remain intact throughout the entire period of construction. Further standards for fencing construction can be found at:

### Regulation of Soil Moisture and Drainage

The excavation and construction activities adjacent to the RPZs can influence the moisture availability to the subject trees. This is due to a reduction in the total rooting mass, changes in drainage conditions and changes in exposure including reflected heat from adjacent hard surfaces. To mitigate these concerns the following guidelines should be followed:

- Soil moisture conditions within the tree protection zones should be monitored during hot and dry weather. When soil moisture conditions are dry, supplemental irrigation should be provided. Irrigation should wet the soil to the depth of the root system (approximately 30 cm deep).
- Any planned changes to the surface grades within the RPZ, including the placement of mulch, should be designed so that the water will flow away from the tree trunks.





- Excavation adjacent to trees can alter the soils hydrological processes by draining the water faster than it had naturally. It is recommended that when excavating within 6 meters of any tree, the site be irrigated more frequently to account for this.

### Tree Pruning

All heavy machinery (excavators, cranes, dump trucks, etc.) working within five meters of tree crowns should be made aware of their proximity to the tree. If there is to be a sustained period of machinery working within five meters of the tree crowns, a line with colored flags should be suspended at the height of the crowns along the length of the protected tree area. If there are concerns regarding the clearance required for machinery and workers within the tree protection zone, or just outside of it, the project arborist should be consulted so that a pruning prescription can be developed or a zone surrounding the crowns can be established. Any wounds incurred to the subject trees during construction should be reported to the project arborist immediately.

### Fertilization

Fertilization is generally recommended only if the trees are growing slowly and showing signs of nutrient deficiency. Currently the subject trees are healthy and do not require supplemental nutrients. It is not advised that fertilization be applied for at least one year following construction.

### Diseases and Pests

Currently there are no signs of diseases or pests affecting these trees. The trees should be monitored after completion of the development for any signs of pests or diseases.

### Paving Within and Adjacent to Tree Protection Zones

The development plans propose the construction of sunken paved areas and retaining walls close to the proposed tree protection zones. Construction of these features raises concerns regarding proper aeration, drainage, irrigation and opportunities for adequate root growth. The following design and construction guidelines should be followed to minimize the long-term impacts to these trees:

- Any excavation activities near the TPZ (tree protection zone) should be monitored by a Certified Arborist. Excavation should remove and disturb as little of the rooting zone as possible and all roots greater than 2 cm in diameter should be hand pruned.
- The natural grade of the rooting zone should be maintained. Any retaining walls should be designed at heights that will maintain the existing grade to within 20 cm of its current level. If the grade is altered, it should be raised not reduced in height.
- The long-term health of the tree is directly dependent on the volume of available, below ground growing space. If the RPZ must be compromised, the planned distance of structures from the trunks of the subject trees should not be closer than 2 meters on more than two sides of the tree.
- Compaction of sub grade materials can cause the trees to develop shallow rooting systems. This can contribute to long-term damage to pavement surfaces as the roots grow. Minimizing the compaction of sub grade materials using structural soils and increasing the strength of the pavement reduces the reliance on sub grade for strength.
- If it is not possible to minimize the compaction of sub grade materials, subsurface barriers should be considered to help direct roots downward into the soil and prevent them from growing directly under the paved surfaces.



### Plantings Within the TPZs

If there are plans to landscape the ground within the TPZ, measures should be taken to minimize impacts. It is not recommended that the existing grass layer be stripped, as this will damage the surface roots. The grass layer should be covered with mulch at the start of the project, which will gradually kill the grass while moderating soil moisture and temperatures. Topsoil should be mixed with the mulch prior to planting of shrubs; however the depth of this new topsoil layer should not exceed 20 cm. Planting should take place within the newly placed topsoil mixture and should not disturb the original rooting zone of the trees. Two meters around the base of each tree should be left unplanted and covered in mulch.

### *Monitoring During Construction*

Ongoing monitoring should be provided for the duration of the project. Site visits should be more frequent during activities that are higher risk, including the first stages of construction when excavation occurs adjacent to the trees. Site visits will ensure contractors are respecting the recommended tree protection measures and will allow the arborist to identify any new concerns that may arise.

During each site visit the following measures will be assessed and reported on:

- The integrity of the Tree Protection Zone and fencing;
- Changes to TPZ limits including: overall maintenance, parking on roots, and storing or dumping of materials within TPZ. If failure to maintain and respect TPZ is observed, suggestions will be made to ensure tree protection measures are upheld;
- Review and confirmation of recommended tree maintenance including root pruning, irrigation, mulching and branch pruning;
- Health and condition of each tree;
- Damage to trees that may have resulted from construction activities will be noted, as will the health of branches, trunks and roots of protected trees. Recommendations for remediation will follow;
- Changes to soil moisture levels and drainage patterns; and
- Factors that may be detrimentally impact the trees.

All findings and recommendations will be documented in a summary report. All concerns will be highlighted along with recommended mitigation measures.





## Final Remarks

This report summarizes the planned management of trees on the site. If there are any questions or concerns as to the contents of this report, please contact us at any time.

Sincerely,

Supervisor:

Trevor Cox, MCIP  
ISA Certified Arborist (PN1920A)  
Certified Tree Risk Assessor (43)  
BC Parks Wildlife and Danger Tree Assessor

Project Staff:

Andrew Connell B.Sc.  
ISA Certified Arborist (PN6991A)  
ISA Certified Tree Risk Assessor (797)  
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Insurance: Proof of Professional Liability Insurance attached



## Limitations

The assessments of the trees discussed in this correspondence have been made using acceptable arboricultural techniques. These include a visual tree assessment of the trees discussed for structural defects, scars, external indications of decay such as fungal fruiting bodies, evidence of insect attack, discolored foliage, the condition of any visible root structures, the degree and direction of lean (if any), the general condition of the tree(s), the surrounding site and the proximity of property and people. Except where specifically noted in this correspondence, none of the trees examined were dissected, cored, probed, or climbed, and detailed root crown examinations were not undertaken.

Notwithstanding the recommendations and conclusions made in this correspondence, it must be realized that trees are living organisms, and their health and vigor constantly changes over time. They are not immune to changes in site conditions, or seasonal variations in the weather.

While reasonable efforts have been made to ensure that the trees recommended for retention are healthy, no guarantees are offered, or implied, that the trees recommended for retention are healthy, no guarantees are offered or implied, that these trees, or all parts of them, will remain standing. It is both professionally and practically impossible to predict with absolute certainty the behavior of any single tree - or group of trees-, or all their component parts, in all given circumstances. Inevitably, a standing tree will always pose some risk. Most trees have the potential for failure in the event of adverse weather conditions, and this risk can only be eliminated if the tree is removed.

Although every effort has been made to ensure that this assessment is reasonably accurate, the trees should be re-assessed periodically. In accordance with standard practice, the assessment presented in this correspondence is valid at the time it was undertaken.

Approval and implementation of any recommendations made within this correspondence is the responsibility of the owner of the trees, and in no way implies any inspection or supervisory role on the part of Diamond Head Consulting Ltd. unless we have specifically been requested to examine said implementation activities, and have been able to do so. In the event that inspection or supervision of all or part of the implementation plan is requested, said request shall be in writing and the details agreed to in writing by both parties. Any on site inspection or supervisory work undertaken by Diamond Head Consulting Ltd. shall be restricted to the items requested, and shall be recorded in written form and submitted to the client as a matter of record.

Sketches, diagrams and photographs contained in this report, being intended as visual aids, should not be construed as engineering reports or legal surveys. If a tree prescribed for removal is not situated wholly on the owners' property, then permission from the additional owner(s) must be obtained before treatment is undertaken.





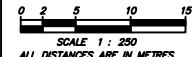
## Appendix 1.

### *The Overall Risk Rating and Action Thresholds*

<i>Risk Rating</i>	<i>Risk Category</i>	<i>Interpretation and Implications</i>
3	Low 1	Insignificant - no concern at all.
4	Low 2	Insignificant - very minor issues.
5	Low 3	Insignificant - minor issues not of concern for many years yet.
6	Moderate 1	Some issues but nothing that is likely to cause any problems for another 10 years or more.
7	Moderate 2	Well defined issues - retain and monitor. Not expected to be a problem for at least another 5 - 10 years.
8	Moderate 3	Well defined issues - retain and monitor. Not expected to be a problem for at least another 1 - 5 years.
9	High 1	The assessed issues have now become very clear. The tree can still reasonably be retained as it is not likely to fall apart right away, but it must now be monitored annually. At this stage it may be reasonable for the risk manager/owner to hold public education sessions to inform people of the issues and prepare them for the reality that part or the entire tree has to be removed.
10	High 2	The assessed issues have now become very clear. The probability of failure is now getting serious, or the target rating and/or site context have changed such that mitigation measures should now be on a schedule with a clearly defined timeline for action. There may still be time to inform the public of the work being planned, but there is not enough time to protracted discussion about whether or not there are alternative options available.
11	High 3	The tree, or a part of it has reached a stage where it could fail at any time. <b>Action to mitigate the risk is required within weeks rather than months.</b> By this stage there is not time to hold public meetings to discuss the issue. Risk reduction is a clearly defined issue and although the owner may wish to inform the public of the planned work, he/she should get on with it to avoid clearly foreseeable liabilities.
12	Extreme	This tree, or a part of it, is in the process of failing. <b>Immediate action is required.</b> All other, less significant tree work should be suspended, and roads or work areas should be closed off, until the risk issues have been mitigated. This might be as simple as removing the critical part, drastically reducing overall tree height, or taking the tree down and cordoning off the area until final clean up, or complete removal can be accomplished. The immediate action required is to ensure that the clearly identified risk of harm is eliminated. For areas hit by severe storms, where many extreme risk trees can occur, drastic pruning and/or partial tree removals, followed by barriers to contain traffic, would be an acceptable first stage of risk reduction. There is no time to inform people or worry about public concerns. Clearly defined safety issues preclude further discussion.

The Table shown above outlines the interpretation and implications of the risk ratings and associated risk categories. This table is provided to inform the reader about these risk categories so that they can better understand any risk abatement recommendations made in the risk assessment report.

**PONDEROSA SITE**



All elevations and distances shown are in metres.  
Elevations are derived from UBC Monument W-W, located  
on East Mall in front of the CEMC Building (between  
Agronomy Road and University Boulevard)  
Geodetic Elevation = 93.631  
Contour Interval = 0.25m

