

UNIVERSITY OF WASHINGTON LIFE SCIENCES BUILDING PROJECT

Draft Supplemental Environmental Impact Statement



UNIVERSITY OF WASHINGTON

July 2015

DRAFT

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

for the

UNIVERSITY of WASHINGTON

Life Sciences Building Project

University of Washington

Capital Projects Office

The Draft Supplemental EIS (Draft SEIS) for the University of Washington *Life Sciences Building Project* has been prepared in compliance with the State Environmental Policy Act (SEPA) of 1971 (Chapter 43.21C, Revised Code of Washington); the SEPA Rules, effective April 4, 1984, as amended (Chapter 197-11, Washington Administrative Code); and rules adopted by the University of Washington implementing SEPA (478-324 WAC). Preparation of this Draft SEIS is the responsibility of the University's Capital Projects Office. The Capital Projects Office and the University's SEPA Advisory Committee have determined that this document has been prepared in a responsible manner using appropriate methodology and they have directed the areas of research and analysis that were undertaken in preparation of this Draft SEIS. This document is not an authorization for an action, nor does it constitute a decision or a recommendation for an action; in its final form, it will accompany the *Proposed Action* and will be considered in making the final decisions on the proposal.

Date of Draft SEIS Issuance July 2, 2015

**Date Comments are Due on the
Draft SEIS August 3, 2015**

FACT SHEET

PROJECT TITLE University of Washington Life Sciences Building Project

PROPONENT/APPLICANT University of Washington

LOCATION The site of the proposed *Life Sciences Building Project* is located on the University of Washington Seattle campus, in the south portion of the Central Campus area. The site is generally bounded by Stevens Way NE on the north, the Burke Gilman Trail on the south, Kincaid Hall on the west, and open space areas associated with Garfield Place NE on the east.

EIS ALTERNATIVES For the purposes of environmental review, two alternatives are analyzed in this Draft SEIS, including Alternative 1 – Proposed Action and Alternative 2 – No Action Alternative.

Alternative 1 – Proposed Action

Alternative 1 (Proposed Action) the proposed Life Sciences Building would be constructed on Development Site 21C and would include approximately 179,600 square feet of academic and research space and approximately 21,700 square feet of greenhouse space within seven levels (including two basement levels). The proposed building would be approximately 105 feet at its highest point (within the 105-foot maximum height limit for the site) and would include a greenhouse, headhouse (greenhouse equipment storage and temperature control), research laboratories and support space, classrooms, animal care facilities and support space, offices, and conference rooms.

Alternative 2 - No Action Alternative

Under the No Action Alternative, the *Life Sciences Building Project* would not be constructed and the existing uses on the site (Botany Greenhouse, Plant

Laboratory, and Plant Laboratory Annex buildings) would remain. The Life Sciences Program would continue to utilize their existing facilities (including Kincaid Hall, Hitchcock Hall, and Johnson Hall) and could experience capacity and facility deficiencies in the near future.

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PURPOSE OF THIS DRAFT SEIS

This Draft SEIS supplements the *2003 University of Washington Master Plan-Seattle Campus EIS (CMP-Seattle 2003)*. This Draft SEIS provides supplemental environmental analysis of environmental issues associated with the proposed *Life Sciences Building Project* that were not analyzed in the *CMP-Seattle 2003 EIS*.

This Draft SEIS is intended to address the potential for significant adverse environmental impacts that could occur as a result of the Proposed Action. The SEPA environmental review process is designed to be used along with other decision-making factors to provide a comprehensive review of the proposal (WAC 197-11-055). The purpose of SEPA is to ensure that environmental values are given

appropriate deliberation, along with other considerations.

FINAL ACTION

The decision by the Board of Regents, after consideration of environmental impacts and mitigation, to approve the project and authorize award of the General Contractor/Construction Manager (GC/CM) contract by the Capital Projects Office.

PERMITS AND APPROVALS

Preliminary investigation indicates that the following permits and/or approvals could be required or requested for the Proposed Actions. Additional permits/approvals may be identified during the review process associated with specific development projects.

University of Washington

- Project Approval, design approvals, authorization to prepare contract documents, and authorization to Call-for-Bids.

Agencies with Jurisdiction

- ***State of Washington***
 - Dept. of Labor and Industries
 - Dept. of Ecology, Construction Stormwater General Permit
- ***City of Seattle***
 - Master Use Permit
 - Grading Permit
 - Shoring Permit
 - Building Permits
 - Electrical Permits
 - Mechanical Permits
 - Occupancy Permits
 - Comprehensive Drainage Control Plain, Inspection and Maintenance Schedule
 - Construction Stormwater Control Plan Approvals
- ***Seattle-King County Department of Health***
 - Plumbing Permits

- **Puget Sound Clean Air Agency**
 - Demolition and Asbestos Notification

**DRAFT SEIS AUTHORS AND
PRINCIPAL CONTRIBUTORS**

The *Life Sciences Building Project* Draft SEIS has been prepared under the direction of the University's Capital Projects Office and analyses were provided by the following consulting firms:

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**PREVIOUS ENVIRONMENTAL
DOCUMENTS**

Per WAC 191-11-635, this Draft SEIS incorporates by reference the following environmental document:

- University of Washington Master Plan-
Seattle Campus EIS (2003)

**LOCATION OF BACKGROUND
INFORMATION**

Background material and supporting documents are located at the office of:

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Capital Projects Office**
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**DATE OF DRAFT SEIS
ISSUANCE**

July 2, 2015

**DATE DRAFT SEIS
COMMENTS ARE DUE**

August 3, 2015

**AVAILABILITY OF THE
DRAFT SEIS**

This Draft SEIS has been distributed to agencies, organizations and individuals noted on the Distribution List contained in **Appendix A** to this document. Copies of the Draft SEIS are also available for review at the University's Capital Projects Office (University Facilities Building), the University's Visitors Information Center, and at the following University and Seattle Public Libraries:

University of Washington

- Suzzallo Library
- Architecture and Urban Planning (Gould Hall)

Seattle Public Libraries

- Downtown Central Library (1000 Fourth Avenue)
- University District Branch (5009 Roosevelt Way NE)
- Montlake Branch (2300 24th Avenue E)

A limited number of copies of this Draft SEIS are available at the University's Facilities Building while the supply lasts. Additional copies may be purchased at the University's Facilities Building for the cost of reproduction.

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Summary

CHAPTER 1

SUMMARY

1.1 INTRODUCTION

This chapter provides a summary of the Draft Supplemental Environmental Impact Statement (Draft SEIS) for the University of Washington *Life Sciences Building Project*. **Chapter 1** briefly describes the Proposed Action (Alternative 1) and Alternative 2 (No Action Alternative), and contains a comprehensive overview of environmental impacts identified for the Proposed Action and alternatives. Please see **Chapter 2** of this Draft SEIS for a more detailed description of the Proposed Actions and alternatives and **Chapter 3** for a detailed description of the affected environment, environmental impacts, mitigation measures, and significant unavoidable adverse impacts.

The University of Washington's Life Sciences Program is one of the most popular undergraduate degree programs and contributes significantly to the University's ability to fulfill its primary mission of the preservation, advancement and dissemination of knowledge. The Life Sciences Program is housed in a number of buildings on campus, including Kincaid Hall, Johnson Hall, Hitchcock Hall, the Botany Greenhouse, the Physics Astronomy Auditorium Basement, and the Plant Laboratory. The proposed *Life Sciences Building Project* would provide additional academic space to meet the current and future needs of the Life Sciences Program, as well as provide new, modern research and instructional areas that would allow the department to recruit top-notch faculty and fulfill the undergraduate student demand.

For the purposes of environmental review, two alternatives (Alternative 1 – Proposed Action and Alternative 2 – No Action Alternative) are analyzed in this Draft SEIS.

Alternative 1 – Proposed Action

Location

Under Alternative 1, the proposed *Life Sciences Building Project* would be located in the south portion of the Central Campus area and on the site of the existing Botany Greenhouse, Plant Laboratory, and Plant Laboratory Annex buildings. The site is generally bounded by Stevens Way NE to the north, vegetated areas adjacent to Garfield Place NE to the east, the Burke Gilman Trail to the south, and Kincaid Hall to the west. The building would be directly adjacent to Kincaid Hall (and would include a tunnel connection between the buildings) and would be in direct proximity to Hitchcock Hall to allow collaboration with the existing Life Sciences Program spaces.

Design Concept

The design of the *Life Sciences Building Project* under Alternative 1 is intended to accommodate the specific requirements of the Life Sciences Program and the Department of Biology and allow flexibility for the existing and future needs of the program. The proposed design would create new, state of the art academic space, and provide new modern research and instructional areas that would allow the Life Sciences Program to continue to recruit top-notch faculty and fulfill the undergraduate student demand.

The design of the proposed building includes seven levels (including two basement levels) and approximately 179,600 square feet of academic and research uses, and approximately 21,700 square feet of greenhouse space. The proposed building would be approximately 105 feet at its highest point, which would be within the 105-foot maximum building height established for the site under the *Campus Master Plan-Seattle 2003 (CMP-Seattle 2003)*. The new building would include a greenhouse, headhouse (used for greenhouse equipment storage and temperature control), research laboratories and support space, classrooms, animal care facilities and support space, offices, and conference rooms.

Alternative 2 – No Action Alternative

Under Alternative 2 – No Action Alternative, the *Life Sciences Building Project* would not be constructed on the site and the existing uses (Botany Greenhouse, Plant Laboratory, and Plant Laboratory Annex buildings) would remain. The Life Sciences Program would continue to utilize its existing facilities (including Kincaid Hall, Hitchcock Hall, and Johnson Hall) and could experience capacity and facility deficiencies in the near future.

1.2 IMPACTS, MITIGATION MEASURES AND SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

The following highlights the impacts, mitigation measures, and significant unavoidable adverse impacts that would potentially result from the alternatives analyzed in this Draft SEIS. **Table 1-1** provides a summary of the potential impacts that would be anticipated under the Draft SEIS Alternatives. This summary is not intended to be a substitute for the complete discussion of each element that is contained in **Chapter 3**.

**Table 1-1
IMPACT SUMMARY MATRIX**

Alternative 1 Proposed Action	Alternative 2 No Action Alternative
3.1 – AESTHETICS/LIGHT AND GLARE	
<p><u>Visual Character:</u></p> <ul style="list-style-type: none"> • <i>Proposed Site Development</i> – Existing buildings, pavement, and some trees would be demolished or removed on the site. The new proposed building is intended to have a high degree of transparency, activate public spaces, and create a compatible design with surrounding campus uses. The proposed landscape design would be consistent with the University’s landscape design standards. • <i>Visual Impact</i> – The proposed development would substantially intensify the level of development on the site and would be prominently visible, but would be consistent in height and scale with other campus buildings in the area. The use of mature trees and the orientation of the greenhouse towards the Burke-Gilman Trail would increase the visual compatibility of the building. 	<ul style="list-style-type: none"> • Under the No Action Alternative, the new development of the Life Sciences Building would not occur, and the existing visual character of the site would remain.
<p><u>Light and Glare:</u></p> <ul style="list-style-type: none"> • <i>Light</i> – The proposed building would add new light sources to the site, but the proposed lighting system would be designed to minimize light impacts to offsite uses. Light emanating from the building is anticipated to be similar to that of recently constructed campus buildings in the vicinity. Additional light from greenhouse uses would be higher, but would occur at the same hours as other uses on site, and would be partially screened by landscaping. • <i>Glare</i> – Solar glare would be generated by new building sources, including building surfaces, pavement, and vehicles. Reflectivity of glass selected for the proposed greenhouse would be as low as possible while maintaining the proper operational requirements for greenhouse functions; as a result, glare from the new building is not anticipated to be significant. 	<ul style="list-style-type: none"> • Under the No Action Alternative, the new development of the Life Sciences Building would not occur, and the existing light and glare at the site would remain.

Alternative 1 Proposed Action	Alternative 2 No Action Alternative
3.2 – HISTORIC RESOURCES	
<p><u>Cultural Resources (Archaeology):</u></p> <ul style="list-style-type: none"> The likelihood of finding or observing precontact to ethnohistoric period cultural remains or historic period archaeological remains was identified as moderate to high at the site, and would be found in at or near the surface. However, no previously eligible cultural resources have been identified within or adjacent to the site (including Site 45KI957 which was determined to be not eligible for listing). With identified mitigation measures, it is not anticipated that construction would result in significant impacts to cultural resources. 	<ul style="list-style-type: none"> The proposed Life Sciences Building Project would not be constructed and no direct or indirect long-term or construction-related impacts would affect cultural resources on campus.
<p><u>Historic Resources (Buildings and Spaces):</u></p> <ul style="list-style-type: none"> <i>Site Buildings: Botany Greenhouse</i> – The Botany Greenhouse is significant for its associations with the history of the Botany Department on the campus and as a mid-century example of a Lord & Burnham greenhouse and early Paul Thiry design. However, the greenhouse has lost a majority of its integrity and would not be considered eligible for NRHP listing. Demolition would not result in significant impacts. <i>Site Buildings: Plant Laboratory</i> – The complex retains many of its original materials, with few alterations to the exterior of the building. The offices and greenhouses contain architectural qualities and is associated with the history of the University’s early Botany department. Both Annex buildings appear to retain their original materials but are not considered eligible for NRHP listing. The main building and greenhouse are considered eligible for listing. However, with proposed mitigation measures (proposed DAHP Level II mitigation report is consistent with DAHP guidelines that are often implemented prior to demolition of a building eligible for listing), demolition would not be considered a significant impact. <i>Site Vicinity Buildings and Spaces: Benson Hall</i> – Benson Hall is significant for its architectural character and association with the firm Bindon, Wright, and Partners, as well as for association with historic events on the campus. The Life Sciences Building may alter views from the building but would not impact its eligibility or integrity, and the proposed project would not have an impact on Benson Hall. 	<ul style="list-style-type: none"> The proposed Life Sciences Building Project would not be constructed and no direct or indirect long-term or construction-related impacts would affect historic resources on campus.

<p style="text-align: center;">Alternative 1 Proposed Action</p>	<p style="text-align: center;">Alternative 2 No Action Alternative</p>
<ul style="list-style-type: none"> • <i>Site Vicinity Buildings and Spaces: Medicinal (Pharmaceutical) Herb Garden</i> – The Herb Garden is recognized in the CMP Seattle – 2003 as a unique and significant landscape. It is significant for its association with pharmaceutical research on campus and broader historical trends, and is eligible for listing. However, the Herb Garden is separated from the site by Stevens Way NE and would not be anticipated to be impacted by the project. 	
<p style="text-align: center;">3.3 – CONSTRUCTION</p>	
<p><u>Construction Activities:</u></p> <ul style="list-style-type: none"> • Construction activities would include the removal of existing buildings, pavement, landscaping, and existing vegetation; excavation and grading; and construction of the building and greenhouse. The staging area would be approximately 12,000 square feet, and construction would occur in in two phases. Approximately 24,700 cubic yards of cut would be removed, and 4,660 cubic yards of fill imported. 	<ul style="list-style-type: none"> • The proposed Life Sciences Building Project would not be constructed and no construction-related impacts would occur.
<p><u>Air Quality:</u></p> <ul style="list-style-type: none"> • Construction activities on the site would generate air pollutants from fugitive dust, excavation/earthwork activities, and emissions from construction vehicles and equipment. Emissions would be temporary in nature and localized to the immediate vicinity of the construction site. Demolition of existing buildings could result in exposure to hazardous materials; if found, materials would be treated or removed in accordance with applicable regulations and standards. 	<ul style="list-style-type: none"> • The proposed Life Sciences Building Project would not be constructed and no construction-related impacts to air quality would occur.
<p><u>Greenhouse Gas Emissions:</u></p> <ul style="list-style-type: none"> • The proposed development would generate GHG emissions associated with construction activities and operation of the Life Sciences Building. Over the lifespan of the building, the project is expected to generate approximately 210,455 MTCO_{2e} emissions, equating to 3,367 MTCO_{2e} over the building lifespan of 62.5 years. 	<ul style="list-style-type: none"> • The proposed Life Sciences Building Project would not be constructed and no construction-related impacts to greenhouse gas emissions would occur.
<p><u>Noise:</u></p> <ul style="list-style-type: none"> • Localized noise levels would increase temporarily during construction and may affect users in the site vicinity, including academic uses and users on the Burke-Gilman Trail. These impacts would be temporary in nature, and measures would be taken to mitigate noise levels during construction. 	<ul style="list-style-type: none"> • The proposed Life Sciences Building Project would not be constructed and no construction-related noise impacts would occur.

Alternative 1 Proposed Action	Alternative 2 No Action Alternative
<p><u>Vibration:</u></p> <ul style="list-style-type: none"> The use of heavy equipment during construction would create vibration that could affect sensitive research equipment. However adjacent programs do not typically employ this kind of highly sensitive equipment, and vibration is not anticipated to result in significant impacts. Construction activities would utilize practices to minimize vibration levels to the extent feasible. 	<ul style="list-style-type: none"> The proposed Life Sciences Building Project would not be constructed and no construction-related vibration impacts would occur.
<p><u>Trees:</u></p> <ul style="list-style-type: none"> Of the 87 existing trees on the site, 43 would be considered exceptional under City of Seattle Director’s Rule 16-2008. Approximately 38 trees would be removed, including 8 trees meeting the exceptional designation. Tree replacement is intended to meet or exceed the City of Seattle’s tree replacement requirements and in accordance with the University’s Tree Management Plan to provide a replacement ratio of 1:1. Landscaping would be consistent with the university’s landscape design standards. 	<ul style="list-style-type: none"> The proposed Life Sciences Building Project would not be constructed and no construction-related impacts to trees would occur.
3.4 – TRANSPORTATION	
<p><u>Construction Traffic:</u></p> <ul style="list-style-type: none"> Construction access would be west of Kincaid Hall, and would follow the proposed construction access road along the south portion of the site; traffic would exit the site to the east on Garfield Lane NE. Existing adjacent buildings would maintain access from Stevens Way NE, but occasional construction use of these drives could cause temporary increased congestion. Removal of fill from the site would result in approximately 1,000 truck trips generated to and from the site, but would be distributed so that significant traffic impacts would not be anticipated. Pedestrian and bicycle routes through and adjacent to the site would be temporarily affected by construction, and sidewalks and the Burke Gilman Trail would be rerouted. Bike and vehicle parking on the site would also be temporarily displaced, but temporary replacement of bicycle parking would be provided. 	<ul style="list-style-type: none"> The proposed Life Sciences Building Project would not be constructed, existing transportation conditions would remain at the site, and no construction-related transportation impacts would occur.
<p><u>Operational Traffic:</u></p> <ul style="list-style-type: none"> After construction, vehicle access to the site would continue to be provided from the east side of the site, and a paved driveway would provide access to the loading dock and loading areas. No staff or visitor 	<ul style="list-style-type: none"> The proposed Life Sciences Building Project would not be constructed, existing transportation conditions would remain at the site, and no construction-related transportation impacts would occur.

<p style="text-align: center;">Alternative 1 Proposed Action</p>	<p style="text-align: center;">Alternative 2 No Action Alternative</p>
<p>parking would be provided.</p> <ul style="list-style-type: none"> • Pedestrian and bicycle access would be restored after construction, and new pathways would provide additional pedestrian connections between the building and Stevens Way NE. A new fully ADA accessible pathway between Kincaid Hall and the site would be constructed to link Stevens Way NE, the Burke Gilman Trail, and the Hitchcock Bridge. A plaza area and bicycle parking areas would also be provided on the site. 	

SUMMARY OF MITIGATION MEASURES AND SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

AESTHETICS

Mitigation Measures

The following measures would be implemented to mitigate potential impacts to aesthetics and light and glare from the development of the proposed *Life Sciences Building Project*. These mitigation measures would be applicable for Alternative 1.

- The proposed design is intended to be an integration of natural and tectonic materials to reflect the spirit of the Life Sciences Program and Department of Biology, while being compatible with the aesthetic character of the overall University of Washington campus.
- All disturbed campus landscapes would be restored to the quality of work and method of installation in agreement with long term campus plans for the area.
- The majority of the existing trees on the site would be retained to screen and soften views to the Life Sciences Building.
- New landscaping and trees would be provided on the site, particularly along Stevens Way, to enhance the aesthetic character of the site. The University would meet or exceed the City of Seattle tree replacement standards.
- Building and greenhouse design would consider using the least reflective glazing material, as well as shading devices (for the building), to minimize the potential glare impacts to surrounding uses.
- Exterior building lighting and pedestrian lighting would be directed downward and away from existing buildings and spaces to minimize the impacts to nearby uses.

Significant Unavoidable Adverse Impacts

The proposed *Life Sciences Building Project* would replace the existing Botany Greenhouse Building, Plant Laboratory Building, and the Plant Laboratory Annex buildings with a new five level (above grade) structure and replacement greenhouse facility. The proposed development would intensify the level of development in the area; however, the height of the building would be consistent with other buildings in the surrounding area. Significant visual impacts would not be anticipated. New development would introduce new sources of light and glare to the area, but with proposed mitigation, significant light and glare impacts would not be anticipated.

HISTORIC AND CULTURAL RESOURCES

Mitigation Measures

The following mitigation measures are proposed for the development of the *Life Sciences Building Project* on the University of Washington campus.

Plant Laboratory

- The University of Washington is exploring opportunities to display components of the Plant Laboratory Building in the entrance lobby of the Life Sciences Building. Components for display include existing case-work, historic herb collections and decorative doors that are original features of the Plant Laboratory building.
- If an adverse impact is unavoidable due to project needs and constraints, it is recommended that mitigation measures, including documenting the resources via a DAHP Level II mitigation report to be shared with the Suzzallo and Allen libraries, and/or creating interpretive and educational materials to be shared with the public via the University website, be considered (the DAHP Level II mitigation report is consistent with DAHP guidelines that are often implemented prior to demolition of buildings determined to be eligible for listing).

Accidental Discovery of Archaeological Resources

- In the event that archaeological deposits are inadvertently discovered during construction in any portion of the site, ground-disturbing activities should be halted immediately, and University of Washington should be notified. The University would then contact DAHP and the interested Tribes, as appropriate, and as described in the recommended inadvertent discovery plan.

Discovery of Human Remains

- Any human remains that are discovered during construction of the Project will be treated with dignity and respect.
 - If ground-disturbing activities encounter human skeletal remains during the course of construction, then all activity that may cause further disturbance to those remains must cease, and the area of the find must be secured and protected from further disturbance. In addition, the finding of human skeletal remains must be reported to the county coroner and local law enforcement in the most expeditious manner possible. The remains should not be touched, moved, or further disturbed.
 - The county coroner will assume jurisdiction over the human skeletal remains, and make a determination of whether those remains are forensic or non-

forensic. If the county coroner determines the remains are non-forensic, they will report that finding to the DAHP. DAHP will then take jurisdiction over those remains and report them to the appropriate cemeteries and affected tribes. The State Physical Anthropologist will make a determination of whether the remains are Indian or non-Indian, and report that finding to any appropriate cemeteries and the affected tribes. The DAHP will then handle all consultation with the affected parties as to the future preservation, excavation, and disposition of the remains.

Significant Unavoidable Adverse Impacts

With implementation of identified mitigation measures, significant unavoidable adverse impacts to cultural and historic resources would not be anticipated with development of the *Life Sciences Building Project*.

CONSTRUCTION IMPACTS

Mitigation Measures

The following measures would be implemented to mitigate potential construction impacts from the development of the proposed *Life Sciences Building Project*.

Air Quality

The following measure would be implemented to mitigate potential construction-related air quality impacts from the development of the *Life Sciences Building Project*.

- Site development would adhere to the Puget Sound Clean Air Agency (PSCAA) regulations regarding demolition activity and fugitive dust emissions, including: wetting of exposed soils, covering or wetting of transported earth materials, washing of truck tires and undercarriages prior to travel on public streets, and prompt cleanup of any materials tracked or spilled onto public streets.
- The University and project contractor would coordinate to temporarily duct and protect air intakes of adjacent buildings to minimize the potential for the intake of fugitive dust and exhaust fumes.
- A survey of potential hazardous materials within the existing buildings would be conducted prior to demolition on the site. In the event that hazardous materials are found onsite, the materials would be treated and/or removed in accordance with all applicable regulations and standards.

Greenhouse Gas Emissions

The following measure would be implemented to mitigate potential GHG emission impacts from the development of the *Life Sciences Building Project*.

- Continued implementation of the University’s Transportation Management Plan (TMP) would reduce vehicle trips to the campus (including the *Life Sciences Building Project*), thereby reducing GHG emissions. Implementation of a Construction Management Plan would also help to control transportation issues during construction and could reduce construction-related GHG emissions.

Noise

Because of the proximity of academic and other University uses near the site, the University agrees that the mitigation of construction-related noise impacts is important and they are committed to the measures listed below. The following measures would be implemented to mitigate potential construction-related noise impacts from the development of the *Life Sciences Building Project*.

- Placement of materials and backing up of trucks could be done without warning beepers (with a flagger walking behind the vehicle).
- Alternate white noise backup warning systems would be installed (as allowed by Washington State construction safety regulations, WAC 296-155-605).
- Low noise portable air compressors would be used where feasible.
- Nighttime activities would not exceed allowable noise levels.
- The use of noise impact-type equipment, such as pavement breakers, pile drivers, jackhammers, sand blasting tools, and other impulse noise sources would be limited to work activity between 8 AM and 5 PM on weekdays.
- Whenever appropriate, hydraulic impacts tools with electric models would be substituted to further reduce demolition and construction-related noise.
- Loud talking, music, or other miscellaneous noise-related activities would be limited.
- Construction noise would be reduced with properly sized and maintained mufflers, engine intake silencers, engine enclosures, and turning-off idling equipment.
- Truck haul routes would be jointly developed by the UW, SDOT and DPD and approved by SDOT.

Vibration

The following measures would be implemented to mitigate potential construction-related vibration impacts from the development of the *Life Sciences Building Project*.

- To the extent feasible, construction activities would utilize practices that would minimize vibration, such as the use of sawcutting for concrete removal in lieu of using impact tools.
- Orientation would be provided for all construction workers to inform them of the importance of minimizing impacts to adjacent buildings, including vibration.

- Advanced notification could be provided to surrounding buildings and uses to inform them of construction activities that would cause vibration (e.g., drilling of soldier piles). Early notification would allow surrounding uses to prepare in advance of potential vibration activities.

Trees

The following measure would be implemented to mitigate potential construction-related tree impacts from the development of the *Life Sciences Building Project*.

- The existing Deodar cedar trees along Stevens Way NE would be retained as part of the project and protected during construction. The building would be located to minimize impacts to major structural roots of the existing Deodar cedar trees and a temporary bridge would be provided over the Deodar cedar root area to minimize impacts from construction vehicles.
- Tree removal and replacement would be intended to meet or exceed the City of Seattle's tree replacement requirements and be in accordance with the University's Tree Management Plan.

Significant Unavoidable Adverse Impacts

Construction of the proposed *Life Sciences Building Project* would result in some construction-related air quality, GHG emissions, noise, vibration, and tree impacts that would be unavoidable with the proposed project. However, with the implementation of proposed mitigation measures, construction activities would not be anticipated to result in significant impacts to surrounding uses.

TRANSPORTATION

Mitigation Measures

The following mitigation measures would be implemented to minimize potential transportation-related impacts from the proposed *Life Sciences Building Project*.

- Construction activities would occur in compliance with applicable University of Washington and City of Seattle regulations and would include the preparation of a Construction Management Plan to control and minimize potential construction-related transportation issues.
- The proposed *Life Sciences Building Project* would enhance the existing pedestrian and bicycle connection between Stevens Way NE and the Hitchcock Bridge (to the west of the site and adjacent to Kincaid Hall). The proposed connection would be ADA accessible and include enhanced features including seating areas and an

adjacent plaza/gathering space between Kincaid Hall and the proposed *Life Sciences Building Project*.

- The proposed *Life Sciences Building Project* would provide new bicycle parking spaces near the plaza adjacent to the Burke Gilman Trail. The number of bicycle parking spaces would be consistent with University of Washington requirements.
- The proposed *Life Sciences Building Project* would fall under the provisions of the University of Washington's Transportation Management Plan (TMP), including elements such as parking pricing and the U-Pass Program to help reduce single-occupancy vehicle trips and encourage transit use, carpooling and other alternative modes of transportation.

Significant Unavoidable Adverse Impacts

With the implementation of the mitigation measures described above, significant unavoidable adverse transportation impacts would not be anticipated.

Description of Proposed Action and Alternatives

CHAPTER 2

INTRODUCTION AND DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

This chapter of the Draft Supplemental Environment Impact Statement (SEIS) provides a discussion of the planning activities conducted in support of the proposed University of Washington *Life Sciences Building Project*, information on the site and surrounding area, and a description of the proposed *Life Sciences Building Project*. A description of Alternative 2 (No Action Alternative) is also provided in this chapter. A detailed description of the affected environment, environmental impacts, mitigation measures and significant unavoidable adverse impacts is provided in **Chapter 3** of this Draft SEIS.

2.1 PROJECT SUMMARY

The primary mission of the University of Washington is the preservation, advancement and dissemination of knowledge and as one of the University's most popular undergraduate degree programs, the Life Sciences Programs contributes significantly to the University's ability to fulfill its primary mission. The Life Sciences Program (and associated Department of Biology) is one of the University of Washington's highest priorities and with 1,748 undergraduate students and 106 graduate students registered in the Spring of 2013, the Department of Biology serves a significant portion of Life Sciences students. The Department of Biology provides introductory courses to a large portion of Life Sciences undergraduate students, and provides the majority of the undergraduate degrees for students entering the Health Sciences

Currently, the Department of Biology is housed in a number of buildings on campus including Kincaid Hall (immediately west of the proposed project site), Johnson Hall (approximately 0.15-miles north of the project site), Hitchcock Hall (approximately 0.05-miles south of the project site), the Botany Greenhouse (within the proposed project site), and the Plant Laboratory (within the proposed project site). The proposed Life Sciences Building Project would provide additional academic space to meet the current and future needs of the Department, as well as new, modern research and instructional areas that would allow the Department to recruit top-notch faculty to fulfill the undergraduate student demand.

The proposed *Life Sciences Building Project* would be located on the western portion of the site and would include seven levels (including two basement levels). The proposed building would contain approximately 179,600 square feet of academic and research uses and approximately 21,700 square feet of green house space. The proposed building would provide space for greenhouse uses, laboratory and associated laboratory support space,

classrooms, offices, conference rooms, and animal care and associated animal care support spaces.

2.2 BACKGROUND

University of Washington Campus

The University of Washington was founded in 1861 as a public research and education institution and currently has campuses in Seattle, Tacoma, and Bothell. The University of Washington conducts master planning to guide future development on all campuses. In January 2003, the University of Washington adopted the Seattle Campus Master Plan (*CMP-Seattle 2003*), a conceptual plan for the Seattle Campus that establishes guidelines and policies for up to approximately three million square feet of building area for academic, housing, research, education and support uses. This plan was approved by the University of Washington Board of Regents, and the City of Seattle. All new development on the University of Washington Seattle Campus considers the guidelines and requirements that are identified in the *CMP-Seattle 2003*.

For planning purposes, the *CMP-Seattle 2003* divided the Seattle Campus in five different areas, including the Central, West, South, Southwest, and East Sector. Each area is characterized by varying structures and uses, and each area follows a list of objectives that represent ideas for future development. The proposed *Life Sciences Building Project* site is located in the Central Campus Sector which is generally bounded by NE 45th Street to the north, Montlake Boulevard to the east, NE Pacific Street to the south, and 15th Avenue NE to the west. The Central Campus contains the Original Core of the University of Washington campus, and the *CMP-Seattle 2003* identified conservation of this core as a primary goal.

The *CMP-Seattle 2003* indicates the amount of new development allowed in each sector during the 10-year planning period covered by the document. The *CMP-Seattle 2003* indicates that approximately 1,590,000 gross square feet (GSF) of new development would be allowed in the Central Campus. The *CMP-Seattle 2003* further indicates that up to an additional 20 percent of GSF of development is allowed in each sector without an amendment to the *CMP-Seattle 2003*; a total of 1,908,000 GSF of new development would be permitted in the Central Campus. There is adequate development square footage in the Central Campus to accommodate the proposed *Life Sciences Building Project*.

The *CMP-Seattle 2003* also contains guidelines for the development of the four campus sector areas, as well as guidelines for specific individual development sites on campus. The proposed *Life Sciences Building Project* site is located in the Central Campus on Development Site 21C, within the Surrounding Central Perimeter area outside of the Original Core. Specific objectives for the Surrounding Central Campus Perimeter sector include the following:

- Preserve and enhance important open spaces;

- Use new development to strengthen campus form by clearly defining open spaces and circulation routes;
- Improve connections to University-related uses north of 45th, west of 15th, south across Pacific, and east across Montlake Boulevard;
- Create well-designed connections between the University and the larger community; and,
- Create more inviting campus edges and entrances.

The *CMP-Seattle 2003* identifies approximately 70 potential development sites throughout the campus, and includes guidelines and policies for development on these sites. The proposed *Life Sciences Building Project* site is located on Development Site 21C, which is located on the southeastern edge of the Central Campus Sector within the Surrounding Central Perimeter areas. Development Site 21C is generally bounded by Stevens Way NE to the north, open space areas associated with Garfield Place to the east, the Burke-Gilman Trail to the south, and Kincaid Hall to the west. The project site currently contains the Botany Greenhouses, the Plant Laboratory, and the Plant Laboratory Annex buildings. The *CMP-Seattle 2003* identifies Development Site 21C as a potential site for academic uses, with approximately 336,000 square feet of potential above-grade building development and a maximum allowable building height of 105 feet (approximately eight stories). The potential for the demolition of up to approximately 22,112 square feet of building area is also identified for the site.

Specific *CMP-Seattle 2003* policies and guidelines that relate to Development Site 21C include the following:

- Develop Stevens Way frontage with service screened from street;
- South façade should be sensitive to Burke-Gilman Trail;
- Consider retaining or integrating greenhouses in new development;
- Service could be from NE Pacific Street; and,
- Possibility to develop above-grade connection over NE Pacific Street to increase connections and extend open space.

University of Washington Life Sciences Program

The Life Sciences Program (and associated Department of Biology) is one of the University of Washington's highest priorities. With 1,748 undergraduate students and 106 graduate students registered in the Spring of 2013, the Department of Biology serves a significant portion of Life Sciences students, and is the most popular undergraduate degree program at the University. The Department of Biology further provides introductory courses to a large portion of Life Sciences undergraduate students, and provides the majority of the

undergraduate degrees for students entering the Health Sciences.¹ In 2011, the University of Washington prepared a Precinct Plan for the College of Arts & Sciences that found that the major limitation on the Department of Biology's ability to graduate students with a Biology or related major and to grow as a department was its limitations on space.²

Currently, the Department of Biology is housed in a number of buildings on campus including Kincaid Hall (immediately west of the proposed project site), Johnson Hall (approximately 0.2-miles north of the project site), Hitchcock Hall (approximately 0.1-miles south of the project site), the Botany Greenhouse (within the proposed project site), Physics Astronomy Auditorium Basement (to the west of the site), and the Plant Laboratory (within the proposed project site). These buildings occupy approximately 240,400 GSF of building space and currently employ approximately 125 faculty members.

2.3 EXISTING SITE CONDITIONS

Existing Site

The approximately 3.1-acre proposed Life Sciences Building site is located in the Central Campus of the University of Washington and is generally bounded by Stevens Way NE to the north, open space areas associated with Garfield Place to the east, the Burke-Gilman Trail to the south, and Kincaid Hall to the west (see **Figure 2-1** of Chapter 2 for a map of the University of Washington campus).

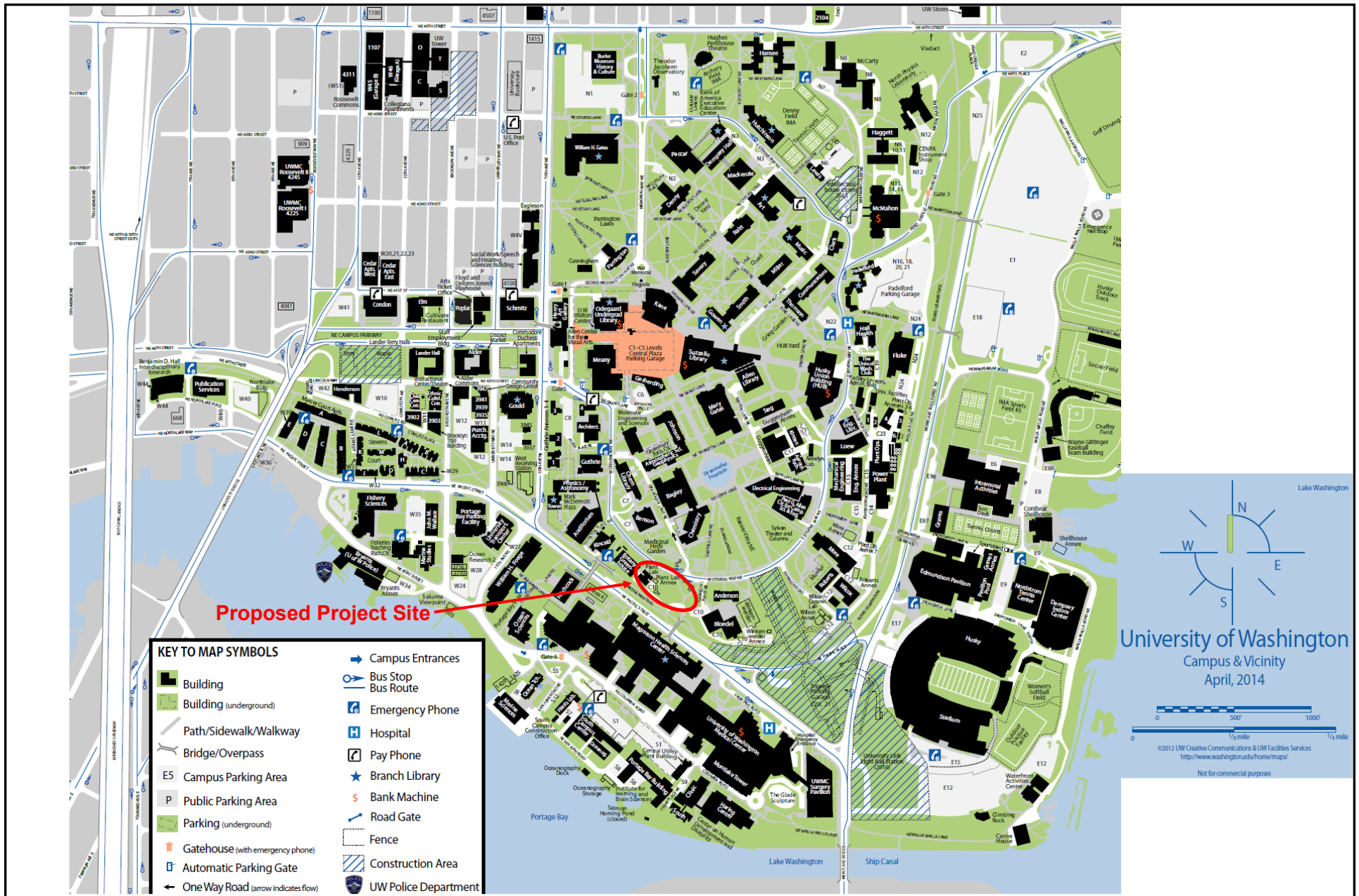
The site has a gradual slope to the south with a grade change of approximately 17 feet from the north end of the site (Elevation 93 feet near Stevens Way) to the south end (Elevation 76 feet along the northern edge of the Burke Gilman Trail).

The proposed site currently contains the one-story Botany Greenhouse, the one-story Plant Laboratory, and the one-story Plant Laboratory Annex buildings; a student farm area is also located adjacent to these buildings. Vehicular access to the site is provided by Garfield Place NE (to the east) via a gravel roadway; a gravel parking area (a portion of Lot C10) is located adjacent to the roadway. A bus stop is located in the northeast corner of the proposed site and includes a bus stop structure/shelter and associated artwork. Approximately 18 bicycle lockers are located in the northwest corner of the site (within the Kincaid Hall plaza) and approximately 62 bicycle parking stalls are located at the southwest corner of the site (adjacent to the Burke Gilman Trail near the Kincaid Hall loading area). See **Figure 2-2** of Chapter 2 for a map of the existing site survey.

¹ ZGF Architects, "University of Washington: Life Sciences Building," September 30, 2013 and Department of Biology, "Fact Sheet," December 2013, <http://www.biology.washington.edu/sites/washington.edu.dept/files/pdf/2013%20A%26S%20FactSheet-Biology.pdf>.

² ZGF Architects, "University of Washington: Life Sciences Building," September 30, 2013.

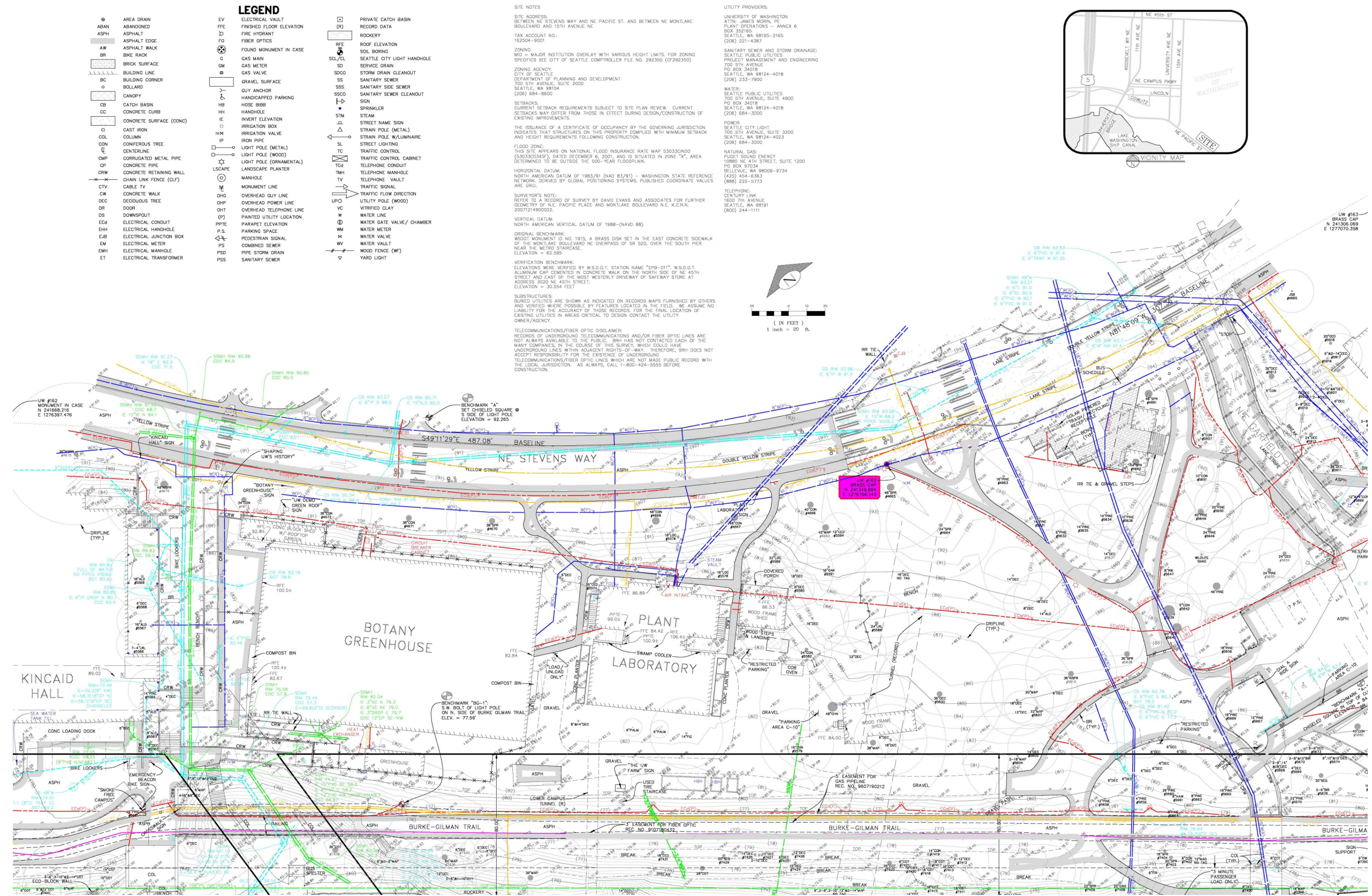
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Source: University of Washington, 2015.

Figure 2-1
Campus Map

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Source: Perkins+Will, 2015.



Figure 2-2
Existing Site Survey

Vegetation primarily consisting of mature trees and shrubs covers the remainder of the proposed site. The trees are primarily located along the northern, eastern, and southern borders of the proposed site; trees along the northern portion of the site, adjacent to Stevens Way NE appear to have been recently topped. A total of 87 trees are located on the site that meet the City of Seattle’s definition of significant trees. Of these trees, 43 trees meet the City of Seattle’s designation of Exceptional Trees³ with 36 of these trees considered Exceptional due to being part of a Grove. The Grove is located within the eastern portion of the site.

Surrounding Area

The proposed *Life Sciences Building Project* site is located in the Central Campus area of the University of Washington campus, which is characterized by the historic core of the University and its surrounding perimeter with a variety of uses including academic, student housing, and University support uses. Within the Original Core there are a number of significant buildings and open spaces including the Liberal Arts Quadrangle, Denny Yard, Memorial Way, Rainier Vista, Hub Yard, Parrington Lawn, and Central Plaza (see **Figure 2-3** for an aerial map of the proposed site and surrounding area).

The area to the north of the proposed site, across Stevens Way NE, is comprised of the approximately 2.5-acre Medicinal Herb Garden which is utilized and maintained by the Department of Biology, and the four-story Benson Hall which is home to the University’s Department of Chemical Engineering and Department of Environmental Health and Safety. Further to the north are a number of other academic buildings (i.e., Bagley Hall and the Chemistry Building) and the Drumheller Fountain.

To the east of the site are vegetated/landscaped areas, Garfield Place NE, and associated pedestrian/bicycle pathways. Further to the east are additional vegetated/landscaped areas and existing buildings associated with the School of Environmental and Forest Sciences, including the three-story Bloedel Hall, the three-story Anderson Hall, and the two-story Winkenwerder Forest Sciences Laboratory. Open space and pedestrian walkways associated with Rainier Vista are located further to the east.

The area to the immediate south of the proposed *Life Sciences Building Project* site is primarily comprised of the Burke Gilman Trail and NE Pacific Street. Further to the south are the Magnuson Health Sciences Center and the South Campus area. The South Campus area is generally characterized by the Magnuson Health Sciences Center, the University of Washington Medical Center and uses along Portage Bay.

³ City of Seattle Department of Planning and Development – Director’s Rule 16-2008.

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Source: Google Earth and EA Engineering, 2015.



Figure 2-3
Aerial Photo

To the west of the site are the six-story Kincaid Hall, the four-story Physics/Astronomy Auditorium, the seven-story Physics/Astronomy Tower, and the four-story Physics/Astronomy Building. Further to the west are 15th Avenue NE and the West Campus area. The West Campus is generally comprised of a variety of University uses, including several new student housing facilities, academic uses and administrative/support uses; commercial uses are also located within the West Campus.

2.4 PROJECT GOALS AND OBJECTIVES

The University of Washington identified the following project goals as part of the proposed University of Washington *Life Sciences Building Project*.

- Consolidate proposed Life Sciences academic and greenhouse uses on the same site.
- Locate the new facility in proximity to the Animal Research and Care facility to achieve research efficiencies.
- Locate the new facility in direct proximity to existing life sciences, biology and environmental sciences uses, including Kincaid Hall.
- Locate the new facility to minimize disruption of plant collections and research, and provide direct proximity to the Medicinal Herb Garden which is utilized and maintained by the Department of Biology.
- Develop a state of the art, functional science building to provide enhanced education and research facilities for the Life Sciences Program and aid in the recruitment and retention of staff/faculty for the Life Sciences Program and Department of Biology.
- Provide open and collaborative laboratories for students and faculty.
- Create a connection with the Life Sciences community and provide enhanced connectivity to the surrounding campus area.
- Create a memorable building and landscape that is enduring leading into the future.
- Create an open and welcoming public space as part of the proposed development.
- Develop a building that will meet the LEED Silver requirements.

2.5 ALTERNATIVES

For the purposes of environmental review, two alternatives are analyzed in this Draft SEIS, including Alternative 1 – Proposed Action and Alternative 2 – No Action Alternative. The Proposed Action would include the development of the Life Sciences Building on the site of the existing Botany Greenhouse, adjacent to Kincaid Hall. Under Alternative 2, the proposed Life Sciences Building would not be constructed and the Life Sciences Program would continue to utilize their existing facilities.

Because of specific program and locational objectives of the *Life Sciences Building Project*, other sites identified in the *CMP-Seattle 2003* for potential development are not considered in this SEIS because these sites would not meet the project goals/objectives at a lower environmental cost (WAC 197-11-4400(5)). For example, *CMP-Seattle 2003* Site 24C (Chem. Library) would not meet the goals of consolidating academic and greenhouse uses on the same site or locating the building in direct proximity to Kincaid Hall. Impacts associated with construction, aesthetics, and transportation are anticipated to be similar to those under the proposal.

Alternative 1 – Proposed Action

Overview

The Life Sciences Program is one of the University's most popular undergraduate degree programs and contributes significantly to the University's ability to fulfill its primary mission. Currently, the Department of Biology is housed in a number of buildings on campus including Kincaid Hall and Hitchcock Hall. The proposed *Life Sciences Building Project* would provide additional academic space to meet the current and future needs of the Department, as well as new, modern research and instructional areas that would allow the Department to recruit top-notch faculty to fulfill the undergraduate student demand.

The proposed *Life Sciences Building Project* would be located on the western portion of the site and would include seven levels (including two basement levels). The proposed building would contain approximately 179,600 square feet of academic and research uses and approximately 21,700 square feet of green house space. The proposed building would provide space for greenhouse uses, laboratory and associated laboratory support space, classrooms, offices, conference rooms, and animal care and associated animal care support spaces.

Location

Under Alternative 1, the proposed *Life Sciences Building Project* would be located in the south portion of the Central Campus area and on the site of the existing Botany Greenhouse and Plant Laboratory. The site is generally bounded by Stevens Way NE to the north, open space areas associated with Garfield Place to the east, the Burke-Gilman Trail to the south, and Kincaid Hall to the west. The building would be directly adjacent to Kincaid Hall (and would include a tunnel connection between the buildings) and in direct proximity to Hitchcock Hall to allow continued collaboration with existing Life Sciences Program space (see **Figures 2-1** and **2-3** for maps of the site location and vicinity).

Design Concept

The proposed *Life Sciences Building Project* is designed to accommodate the specific requirements of the Life Sciences Program and Department of Biology and allow flexibility for the existing and future needs of the program. The proposed design of the building would

create new, state-of-the-art academic space to meet the current and future needs of the Life Sciences Program, as well as new, modern research and instructional areas that would allow the Program to recruit top-notch faculty to fulfill the undergraduate student demand (see **Figure 2-4** for a site plan of the proposed project). The design of the proposed building includes seven levels (including two basement levels) and approximately 179,600 square feet of academic and research uses and approximately 21,700 square feet of green house space⁴. The building would be located on the western portion of the site and would be proximate to Kincaid Hall and Hitchcock Hall which would allow for collaboration and connections with existing Life Sciences Program uses within those buildings.

The proposed Life Sciences Building would include approximately 179,600 square feet of academic and research uses and approximately 21,700 square feet of green house space within seven levels (including two basement levels). The proposed building height would be approximately 105 feet at its highest point, which would be within the 105-foot height limit established for the site under the *CMP-Seattle 2003*. The new building would include a greenhouse, headhouse (used for greenhouse equipment storage and temperature control), research laboratories and support space, classrooms, animal care facilities and support space, offices, and conference rooms. The building would support approximately 40 new principal researchers and their associated staff; classroom and teaching labs would also provide new capacity for approximately 820 FTE students as the program expands its student population in the future. **Table 2-1** provides a summary of the proposed building area by floor.

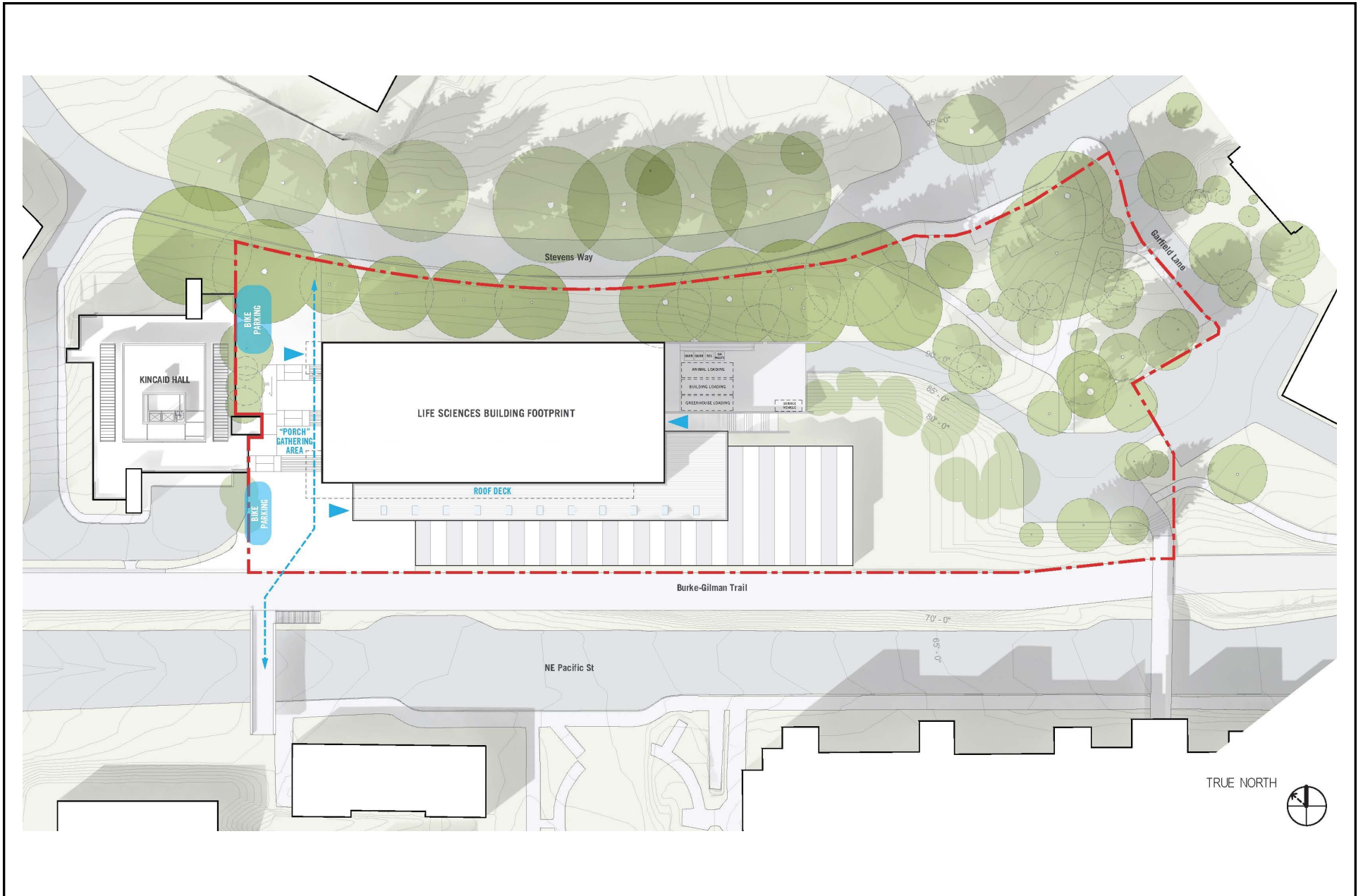
**TABLE 2-1
PROPOSED LIFE SCIENCES BUILDING SUMMARY**

Proposed Life Sciences Building	Baseline Gross Square Feet (GSF)
Basement 2 Level	21,370
Greenhouse	13,395
Headhouse	8,308
Basement 1 Level	23,485
First Level	21,273
Second Level	23,624
Third Level	23,534
Forth Level	23,805
Fifth Level	23,596
Mechanical Penthouse	18,910
Total Building Area	201,300

Source: Perkins+Will, 2015.

⁴ The basement levels of the building would contain approximately 44,855 square feet and pursuant the *CMP-Seattle 2003*, these below-grade areas would not count against the allowed development total for the Central Campus.

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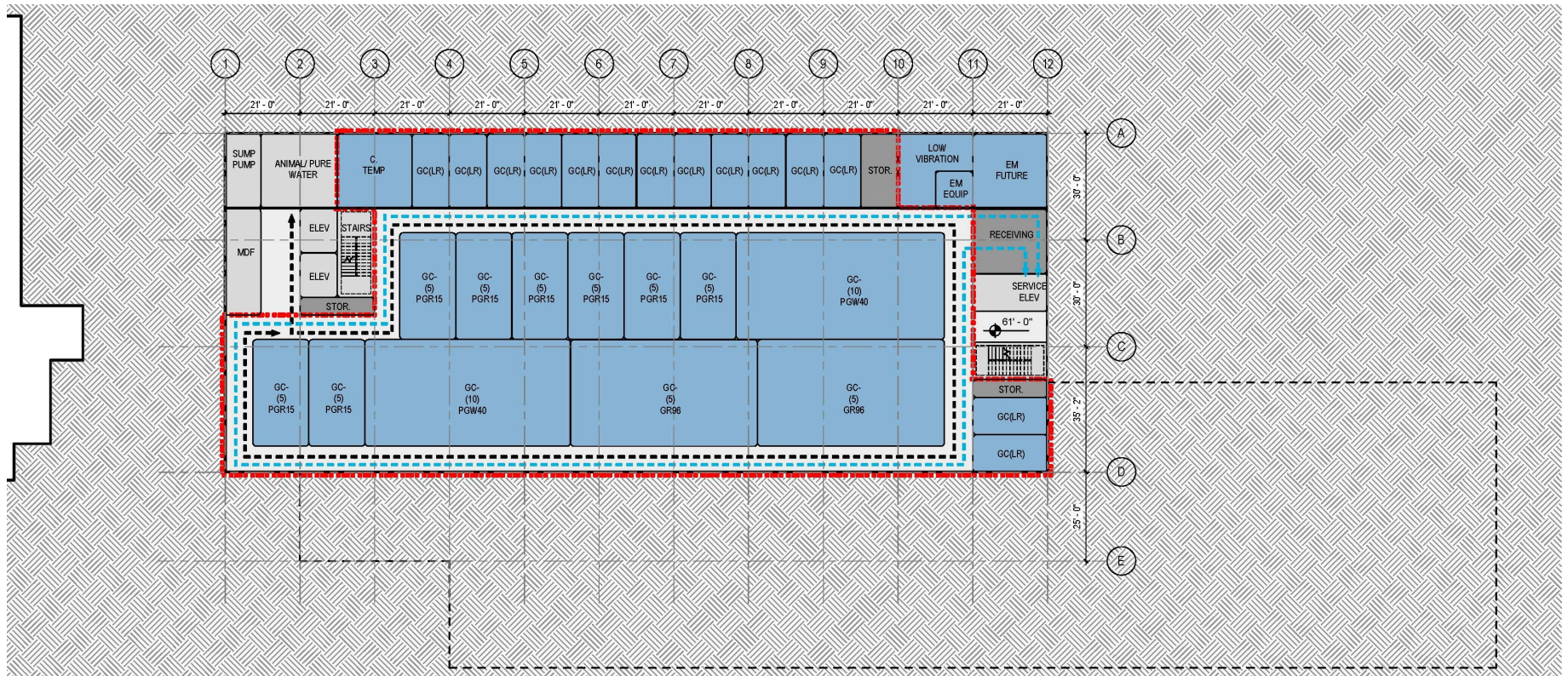
The Basement 2 level of the proposed Life Sciences Building would primarily be comprised of laboratory support space rooms for the building (see **Figure 2-5** for a floor plan of the Basement 2 level). This level would include a large collection of reach-in and walk-in growth chambers to support the Department of Biology's growing needs. Service elevators and a receiving area are located on the east end of this level. Stairway access would be located on the east and west sides and elevators would be located on the west side of the Basement 2 level as well.

The Basement 1 level would provide the largest floor plate of the building and would be visible to the south of the site (along the Burke Gilman Trail) due to the sloping nature of the site grades. This building level would primarily include animal care uses and animal care support uses, as well as lab support space and building mechanical rooms. The Basement 1 level would also align with the greenhouse and headhouse along the southern portion of the building. The greenhouse would include four research areas and four teaching/collection areas while the adjacent headhouse would include storage space for greenhouse equipment, work stations, an office, and a demonstration/students room. Stairway access would be located on the east and west sides and elevators would be located on the west side. A tunnel to the adjacent Kincaid Hall basement area would also be provided on the west side of the Basement 1 level (see **Figure 2-6** for a floor plan of the Basement 1 level).

Level 1 of the Life Sciences Building would serve as the primary entry point for students, faculty and visitors entering the building and would be designed to create an open and accessible area for students and staff; the primary entry would be located on the west side of the building. Four large classrooms with supporting offices and prep rooms would be provided on the north side of Level 1. Multiple conference rooms of varying sizes would be located on the south side, as well as a seminar room, break rooms, offices and storage areas. A café, associated kitchen space and lounge would be located on the west side of the building (near the primary entrance) to serve students and staff, along with visitors from adjacent buildings (i.e., Kincaid Hall, etc.). The loading dock and receiving area would be provided on the east side of Level 1 and would include separate loading space areas for animal care uses, greenhouse uses and other building uses. An outdoor deck would also be provided at the southern portion of the building and would provide views to the south over the greenhouse and headhouse (see **Figure 2-7** for the floor plan of Level 1).

Levels 2 through 5 of the Life Sciences Building would contain similar floor plates and uses, primarily including laboratory use and associated support space. Laboratory and support space would be centrally located on each level, as well as along the northern portion of the levels. Offices would be located along the south side of each of these levels to allow for daylight to enter the rooms and adjacent laboratory areas. Conference rooms and a break room would also be located along the west side of the building (see **Figure 2-8** for the floor plan for Levels 2 through 5).

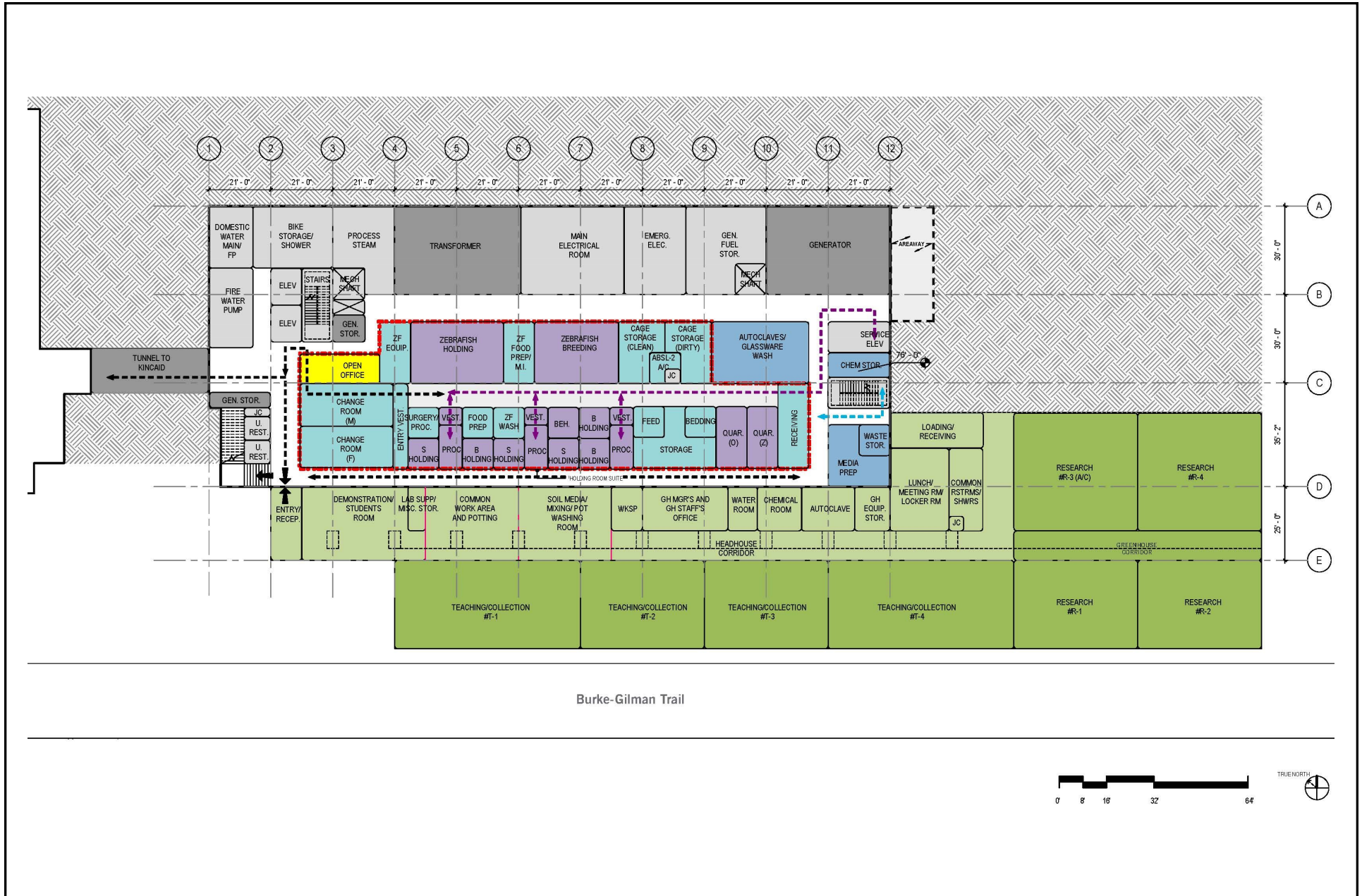
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Source: Perkins+Will, 2015.

Figure 2-5
Basement 2 Floor Plan

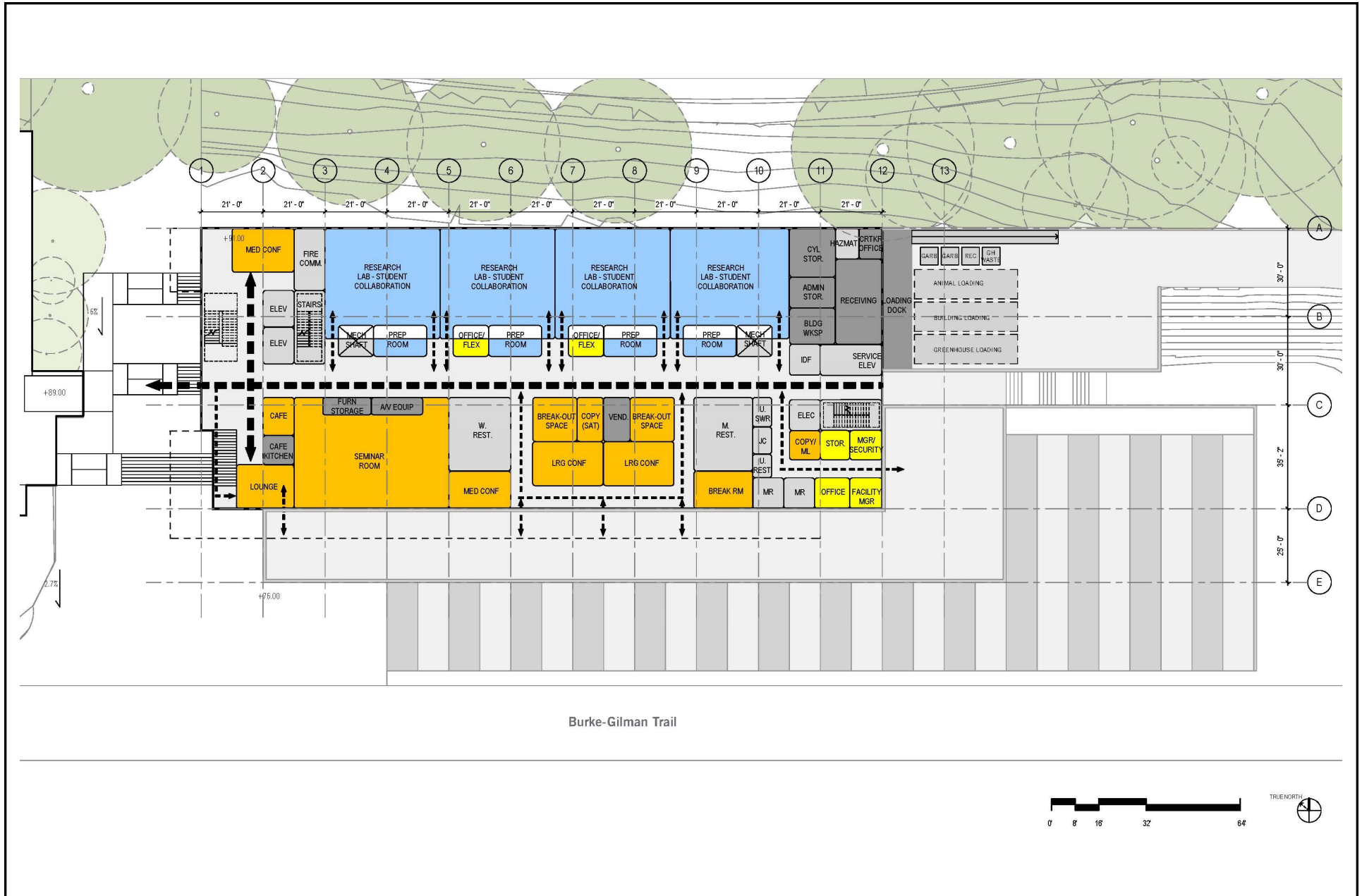
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Source: Perkins+Will, 2015.

Figure 2-6
Basement 1 Floor Plan

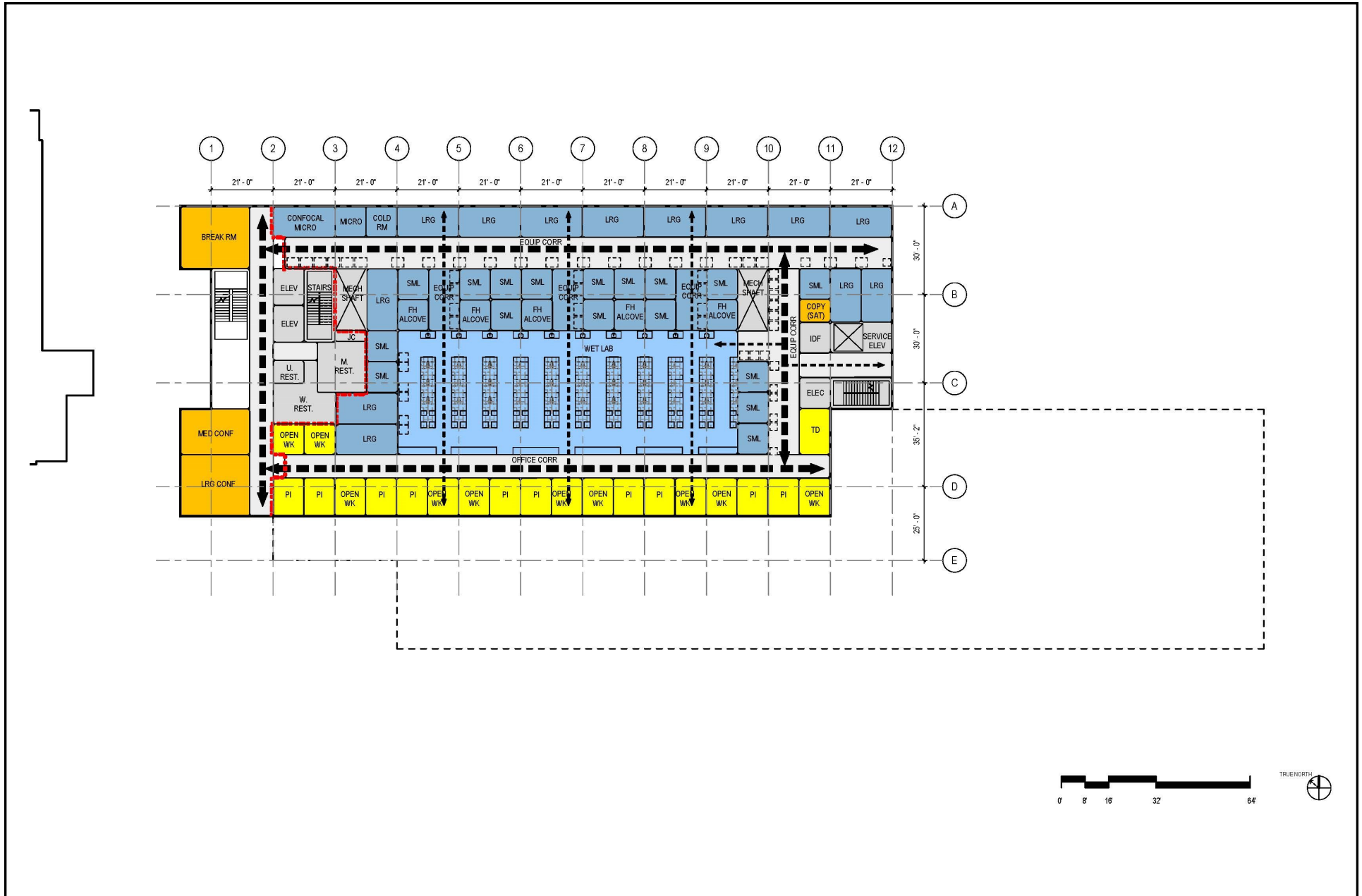
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Source: Perkins+Will, 2015.

Figure 2-7
Level 1 Floor Plan

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Source: Perkins+Will, 2015.

Figure 2-8
Level 2—5 Floor Plan

Exterior Building Design

The proposed Life Sciences Building is situated in a transition zone between natural landscape and urban built environment on the campus and as a result, the design is intended to be an integration of warm, natural and tectonic materials to capture the spirit of the Life Sciences Program and Department of Biology.

A substantial degree of transparency would be provided in the building to activate the public spaces and make the educational areas more engaging and accessible. A performative exterior façade would be incorporated into the design to optimize energy and daylighting control, as well as to create a compatible design with the surrounding campus areas and distinguish the building as a connector of the Central Campus and South Campus areas. The proposed greenhouse and headhouse would be located on the southern portion of the site to allow for maximum solar exposure and would serve to activate the area and provide a visual connection with the adjacent Burke Gilman Trail (see **Figure 2-9** building renderings and **Figures 2-10** and **2-11** for building elevations of the proposed project).

Sustainable Design Features

The design of the proposed Life Sciences Building is intended to meet or exceed the University of Washington's requirement of LEED Silver. The building systems would benefit from their close proximity to the greenhouse and surrounding buildings to allow for the sharing of resources and redundancy. By designing redundancy into the building systems, in an emergency Kincaid Hall could utilize it as a backup system and avoid duplicating redundant systems. There would also be an opportunity for load sharing to reduce energy consumption within the building since there are different times of use and mechanical loads for the greenhouses, labs, offices and public spaces. In addition, by providing a high performance building envelope, the energy loads within the building could be minimized and the mechanical system potentially reduced.

Operable windows would be provided in offices and public spaces to provide natural ventilation cooling; however, these features would not be provided in laboratory spaces due to their more stringent climate control requirements. Additional sustainable building design features could include chilled beams, heat recovery, green rooftop features, water collection and re-use for toilet flushing and irrigation, an educational building dashboard with real-time metrics on building performance, and toxic-free building materials to provide a healthier working environment.

Design strategies for the Life Sciences Building site would also include opportunities for sustainable site design features, including permeable pavers for traffic areas to reduce stormwater runoff, landscaping with native plants to reduce irrigation requirements, and the retention of existing trees to provide a natural buffer and allow for the use of operable windows in the building.

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Southeast Aerial View



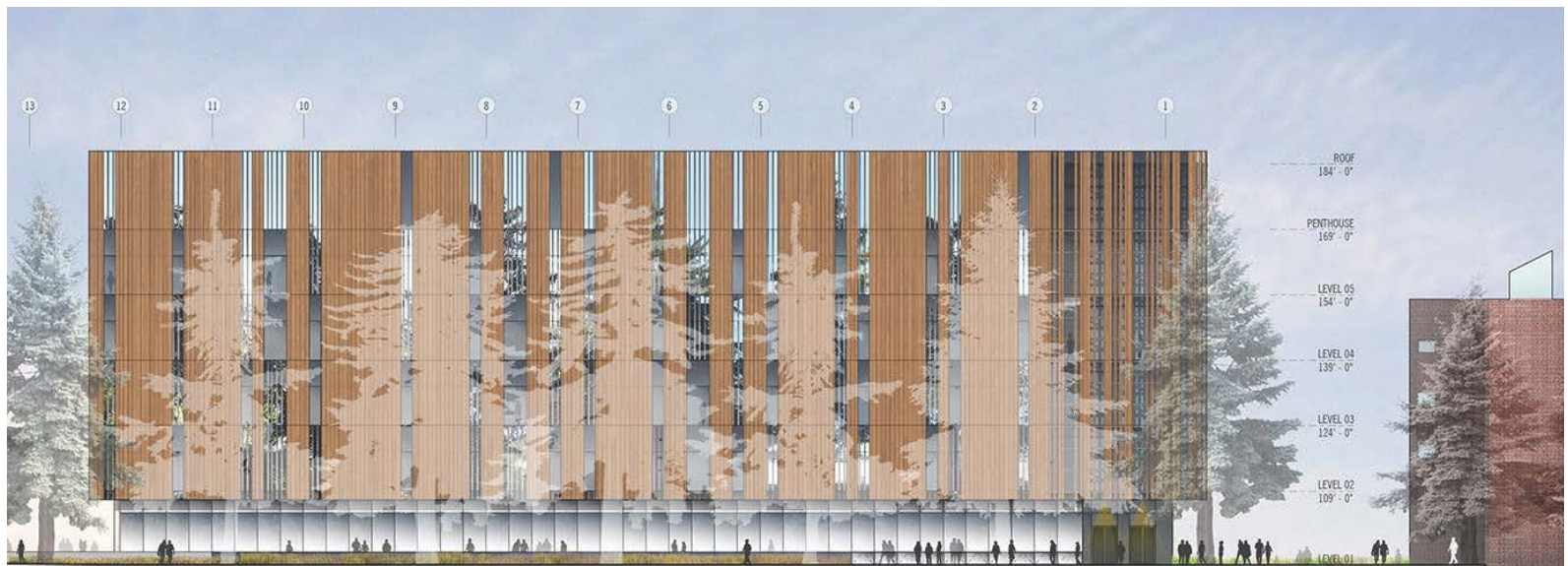
Southwest Entry View

Source: Perkins+Will, 2015.

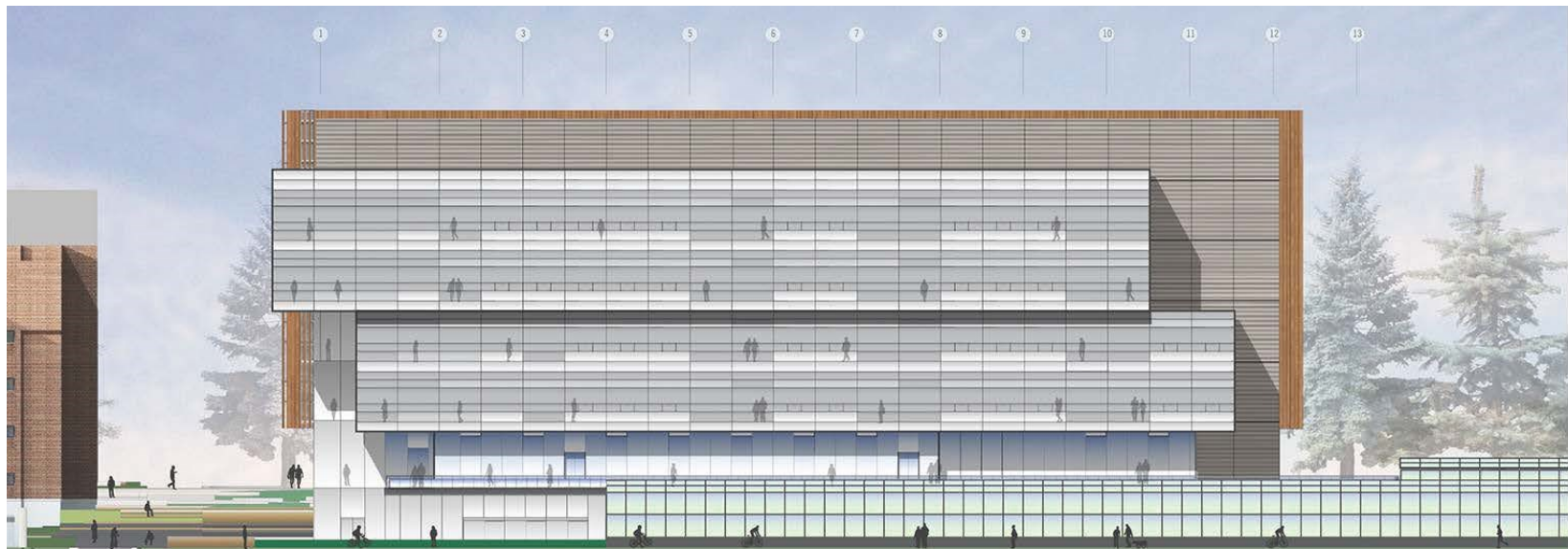


Figure 2-9
Building Renderings

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North Elevation



South Elevation

Source: Perkins+Will, 2015.

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East Elevation



West Elevation

Source: Perkins+Will, 2015.

Figure 2-11
East and West Building Elevations

Circulation and Parking

Vehicular access would be provided from the eastern portion of the site via a driveway connection to Garfield Place NE and Stevens Way NE; the access driveway would serve the loading dock areas on the east side of the proposed building. Fire and emergency access would be provided along Stevens Way NE to the north of the site. In the case of an emergency, the south lane of traffic on Stevens Way NE (eastbound) would be temporarily blocked to allow emergency access.

Similar to the parking procedures for many other University buildings on campus, staff and student parking would not be provided on the site. Staff and students that drive to campus would be anticipated to park their personal vehicles in surrounding University parking lots. Bicycle parking racks would also be provided at the western portion of the site (between the proposed Life Sciences Building and Kincaid Hall). The number of bicycle parking spaces would be consistent with University of Washington requirements (approximately 50 to 100 bicycle parking spaces). In addition, the University also operates its U-Pass program, which provides students and employees with a variety of low-cost transportation options to encourage alternative modes of transportation, including buses, commuter rail, vanpooling and discount carpool parking; U-Pass is a universal program for all eligible students and available for purchase by employees.

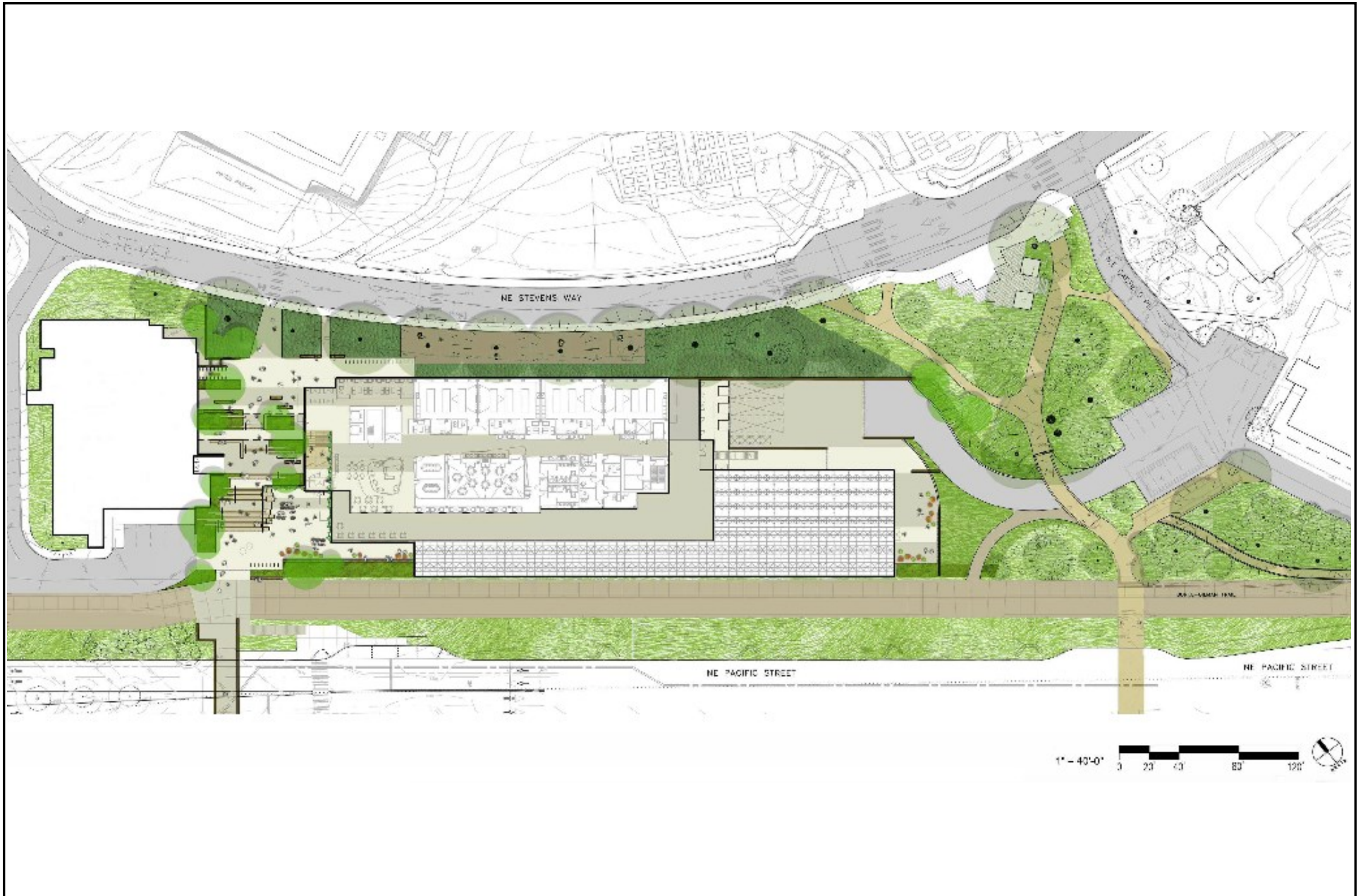
The pedestrian sidewalk along the south side of Stevens Way NE adjacent to the project site (between Kincaid Hall and the bus shelter at the northwest corner of the site) would be replaced at the same width and material as part of the project development. Informal pathways from the Stevens Way NE sidewalk area would also be provided to create additional pedestrian areas adjacent to the site and proposed building. The existing pedestrian pathway to the west of the site which connects Stevens Way NE and the Hitchcock Bridge would also be replaced as part of the project and would include an expanded pathway and plaza area between Kincaid Hall and the *Life Sciences Building Project* to provide a gathering space and event space area with seating for visitors and pedestrians/bicyclists.

No modifications to the Burke Gilman Trail are proposed as part of the *Life Sciences Building Project*. Potential future improvements to the Burke Gilman Trail would be provided as part of a separate project and are describe further in **Section 2.6 – Separate Actions/Projects** of this chapter.

Landscaping

The landscape design for the proposed University of Washington *Life Sciences Building Project* would be consistent with the University's landscape design standards and is intended to protect the existing trees on the site to the extent feasible and enhance the Pacific Northwest woodland character of this area of the Central Campus (see **Figure 2-12** for an illustration of the proposed landscape plan).

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Source: Perkins+Will, 2015.

Figure 2-12
Landscape Plan

The proposed design would follow the character of the woodland landscape where buildings and circulation spaces respond to the natural sloped conditions in this area of campus, and circulation pathways, terraces and exterior spaces would be woven into the landscape design. The proposed landscaping would surround the building and create terraces at entry points and gathering areas on the site. New landscaping would include hardscape areas, planted areas, and site furnishings, including seating, benches and site lighting.

The proposed site contains 87 existing trees, of which 43 would be considered Exceptional per City of Seattle Director's Rule 16-2008. Approximately 38 existing trees would be removed as part of the proposed *Life Sciences Building Project*, including approximately eight Exceptional trees. Proposed tree removal and replacement would be intended to meet or exceed the City of Seattle's tree replacement requirements and would be in accordance with the University of Washington's Tree Management Plan. Tree replacement on the site would be designed to meet or exceed the typical University of Washington requirement to provide tree replacement at a 1:1 ratio.

Utilities

Stormwater

The proposed *Life Sciences Building Project* would route stormwater to a University-owned 21-inch stormwater main that is located under the west side of the site; this main continues south under NE Pacific Street and discharges into Portage Bay.

Water quality treatment would be required as part of the proposed development for new and replacement pollution generating impervious surface (PGIS) areas greater than 5,000 square feet, including roadways and uncovered loading dock areas. StormFilters would be provided which would treat stormwater from PGIS areas prior to discharge to the stormwater main and would be in accordance with City of Seattle requirements.

Per City of Seattle requirements, an analysis of the possibility of Green Stormwater Infrastructure (GSI) would be performed as part of the project and would include the use of green rooftop features, porous pavements or other features that reduce the amount and rate of peak flows of stormwater from the site.

Water

Domestic and fire service protection water service would be provided from the existing University-owned water mains to the north or east of the site. The proposed *Life Sciences Building Project* would require a four-inch domestic service water line and a six-inch fire protection service lines. Water meters and backflow prevention devices would be installed within the building per University of Washington standards.

Sewer

New six-inch side sewer connections would be provided for the proposed *Life Sciences Building Project* and would be connected to the existing University-owned sewer main located to the west of the site, near Kincaid Hall.

Electrical, Telecommunications and Other Utilities

Electrical power, telecommunications and other campus utility services would be provided from the existing mains within the campus utility tunnel below the eastern portion of the project site. Steam would be available from the campus steam plant via the existing steam tunnel to the east of the project site or from an existing buried conduit that crosses under the central portion of the site. Natural gas service for the Life Sciences Building would be available from an existing University-owned main along the south side of Stevens Way NE.

Construction Activities and Schedule

Existing uses on the proposed University of Washington *Life Sciences Building Project* site would be demolished as part of the construction activities, including the existing greenhouse, plant lab building and plant lab annex building. Existing pavement on the site would also be demolished and transported from the site to a permitted regional recycling facility. During the construction process, the existing bus shelter at the northeast corner of the site (adjacent to Stevens Way NE) would remain in its current location and condition.

An approximately 12,000-square foot construction staging area would be located on the eastern portion of the site and would allow for the protection of existing trees that are to be retained as part of the project. The construction of the Life Sciences Building is anticipated to occur in two phases in order to preserve the existing plant collections and minimize impacts to ongoing research in the existing greenhouse. During Phase 1, the smaller greenhouse would be demolished and the southern portion of the proposed new greenhouse would be constructed. As part of this phase, construction trucks would access the site from the west of Kincaid Hall and exit via Garfield Lane. During Phase 2, the existing plant collections would be moved to the new greenhouse and the existing remaining structures would be demolished to allow for the construction of the remainder of the Life Sciences Building. Construction traffic would continue to access the site from the west of Kincaid Hall and would exit through Garfield Lane.

Construction of the proposed project would require approximately 24,700 cubic yards of cut/excavated materials and approximately 4,660 cubic yards of imported fill material. Due to site soil conditions, it is anticipated that none of the cut/excavated material would be used as project fill material.

It is anticipated that construction activities would begin in June 2016 and that the proposed building would be operational by June 2018.

Alternative 2 – No Action Alternative

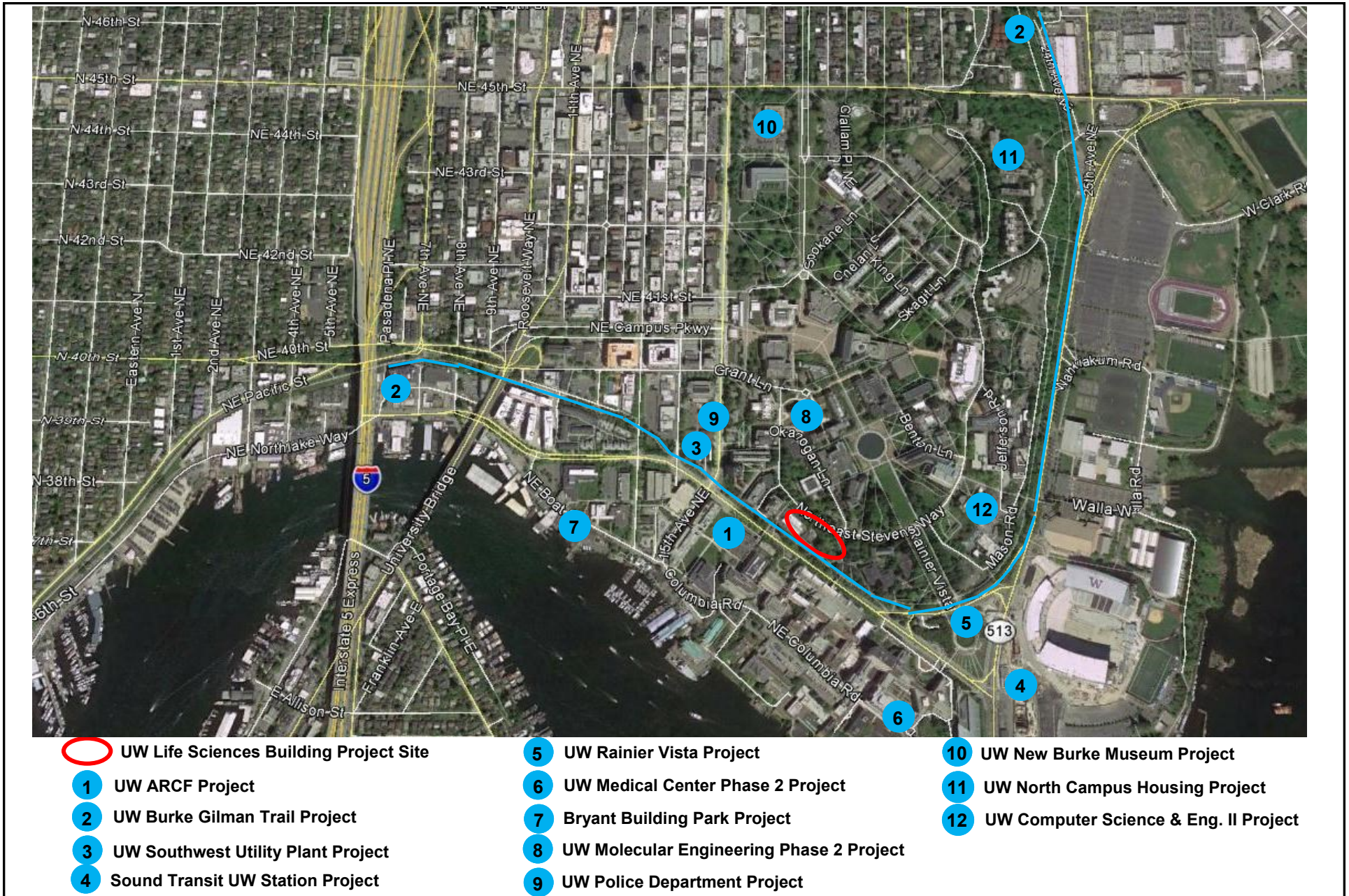
Under Alternative 2 – No Action Alternative, the proposed Life Sciences Building would not be constructed and the existing uses on the site (Botany Greenhouse, Plant Laboratory and Plant Laboratory Annex buildings) would remain. The Life Sciences Program would continue to utilize their existing facilities, (including Kincaid Hall, Hitchcock Hall, and Johnson Hall) and could experience capacity and facility deficiencies in the near future.

2.6 SEPARATE ACTIONS/PROJECTS

In addition to the University of Washington *Life Sciences Building Project*, there are several separate actions/projects in the site vicinity that are currently under construction or are anticipated to be under construction during the development timeframe for the proposed project. These projects include the University of Washington New Burke Museum Project, University of Washington Police Department Project, University of Washington Animal Research and Care Facility (ARCF) Project, University of Washington Burke Gilman Trail Project, the University of Washington Southwest Campus Central Utility Plant Project, the Sound Transit University of Washington Station Project, the University of Washington Rainier Vista/Montlake Triangle Project, the University of Washington Medical Center Phase 2 Project, and the Bryant Building Park Project (see **Figure 2-13** for a map of the separate action/project locations).

- The **University of Washington New Burke Museum Project** will be located on the site of the existing Burke Museum and will include the construction of a new, approximately 105,387-square foot museum building. Construction will occur on the western edge of the site to allow the existing museum to remain open until the new building is completed. Once the new building is complete the existing museum will be demolished to accommodate the remaining site development (i.e., Burke Yard, parking, landscaping, and open space and pedestrian pathways).
- The **University of Washington Police Department Building Project** would be located south of Gould Hall and would consist of a three-story, approximately 29,241-square foot of building. The proposed building would provide space for approximately 93 staff members and would include offices, a dispatch/communications center, records storage, identification lab, evidence storage, community multi-purpose rooms and fleet parking. Construction is currently underway and anticipated to be complete in September 2016.

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Source: Google Earth and EA Engineering, 2015.

Figure 2-13
Separate Actions/Projects Map

- The **University of Washington Animal Research and Care Facility (ARCF) Project** will be located between the William H. Foege Building and Hitchcock Hall and will consist of a two-level, below-grade building with approximately 95,700 square feet of building space for research and animal housing at the University. The project will include an above-grade exhaust tower, an above-grade entry pavilion, and new landscaping and pedestrian pathways to enhance the site landscape and maintain the Portage Bay Vista. Construction for this project is currently underway and anticipated to be completed in December 2016.
- The **University of Washington Burke Gilman Trail Project** includes improvements to the 1.7-mile University-owned portion of the trail from Pasadena Place NE to NE 47th Street. The improvements are designed to improve safety and accommodate existing/future traffic flows and include trail widening and consolidated intersections/connections with the trail. The initial phase of the project will occur from 15th Avenue NE to Rainier Vista. Four additional phases will occur in the future, including Pasadena Place NE to University Bridge, University Bridge to Brooklyn Avenue NE, Brooklyn Avenue NE to 15th Avenue NE, and Rainier Vista to NE 47th Street. The initial phase is anticipated to be completed in May 2015; construction of future phases will occur once funding is available.
- The **University of Washington West Campus Utility Plant Project** will be located to the south of the proposed Police Department Building (near the intersection of University Way NE and NE Pacific Street) and will provide process chilled water and emergency power to portions of the South and West campus. The building will be approximately 20,000 square feet and will include one below-grade level and one above-grade level. The construction period for this project is anticipated to be from November 2015 to January 2017.
- The **Sound Transit University of Washington Station Project** is located adjacent to Husky Stadium and is part of the University Link Light Rail Extension which connects the University of Washington with Capitol Hill and Downtown. The University of Washington Station consists of a single above ground entrance to connect with the light rail tunnel and will serve approximately 25,000 riders by 2030. Construction of this project is currently underway and is anticipated to be completed by early 2016
- The **University of Washington Rainier Vista/Montlake Triangle Project** will modify the pedestrian connection between the Sound Transit University of Washington Station and the University of Washington campus. The modified connection includes a pedestrian/bicycle bridge over Montlake Boulevard that will connect the University Station with the Montlake Triangle, establishment of a Rainier Vista land bridge spanning a lowered NE Pacific Place, and a modified Burke Gilman Trail. The construction of this project has begun and is anticipated to be completed by September 2016.

- The **University of Washington Medical Center Phase 2 Project** is located at the southern portion of the Medical Center and will include the buildout of three bed floors and the operating rooms suite within the new Montlake Tower (Phase 1) and will renovate approximately 125,000 square feet within the existing Cascade and Pacific Towers. Construction of this project is currently underway and is anticipated to be completed by June 2017.
- The **Bryant Building Park Project** will include the development of a new park at the current Bryant Building location (adjacent to Portage Bay) to serve as a park replacement for existing park property that was converted to non-park use as part of the WSDOT SR-520 Bridge Project. Construction of this project will occur subsequent to the completion of the proposed Police Department Building Project; however, the specific timeline is unknown at this time.
- The **University of Washington Molecular Engineering Building Phase 2 Project** site is located to the north of the existing Molecular Engineering Building (east of Stevens Way and south of Grant Lane). The proposed Phase 2 building was analyzed as part of the *University of Washington Molecular Engineering Facility Supplemental EIS (2009)* and will include a six-story, approximately 78,000-square foot building with research, laboratory and faculty/staff office uses. Construction for this project is currently underway and anticipated to be completed in September 2016.
- The **University of Washington North Campus Housing Project** site is located in the northeast corner of the Central Campus and will occur over two phases. Phase A consists of replacing McCarty Hall with two new buildings and the demolition of Haggett Hall. Phase B entails the construction three buildings, one on the Haggett Hall site and two on the site of the existing tennis courts. The proposed redevelopment will result in approximately 3,200 student beds, an increase of 350 beds over existing conditions. Construction is anticipated to begin in the summer of 2016.
- The **University of Washington Computer Science and Engineering II Project** site will include approximately 130,000 gross square feet of above and below grade space to support the Computer Science and Engineering Program. Three alternatives will be analyzed for the project, including the preferred site (existing More Hall Annex site), alternative site (existing Physical Plant offices site) and the No Action Alternative (potential reuse of the existing More Hall Annex building). It is anticipated that construction will begin in September 2016 and would be completed in September 2018.

Temporary construction activity associated with any of these separate actions/projects will occur in compliance with applicable University of Washington, City of Seattle, and other relevant regulations. Significant cumulative construction-related impacts are not anticipated because each project has its own separate construction schedule and haul

routes that are specific for each project site. Additionally, each project will prepare a Construction Management Plan (CMP) to control and mitigate potential transportation issues during the construction process.

2.7 BENEFITS AND DISADVANTAGES OF DEFERRING IMPLEMENTATION OF THE PROPOSAL

The benefits of deferring approval of the Proposed Action and implementation of development of the *Life Sciences Building Project* include the deferral of:

- Temporary displacement of existing uses and displacement of existing vegetation on the site.
- Temporary construction-related impacts associated with vibration, noise, air pollution and traffic.

The disadvantages of deferring the approval of the Proposed Action and development of the Life Sciences Building include the deferral of:

- The opportunity to develop a new Life Sciences Building to meet the current and future needs of the Life Sciences Program.
- The opportunity to locate the proposed building in proximity to existing Life Sciences Uses (Kincaid Hall and Hitchcock Hall) to allow continued collaboration and efficiencies for the program.

**Affected Environment,
Impacts, Mitigation
Measures, and Significant
Unavoidable Adverse Impacts**

CHAPTER 3

AFFECTED ENVIRONMENT, SIGNIFICANT IMPACTS, MITIGATION MEASURES AND SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

This chapter describes the affected environment, impacts of the alternatives, mitigation measures and any significant unavoidable adverse impacts on the environment that are anticipated from construction and operation of the *Life Sciences Building Project* under the Draft SEIS alternatives.

3.1 AESTHETICS/LIGHT AND GLARE

This section of the Draft SEIS describes the existing aesthetics and light/glare characteristics of the Life Sciences Building site and the site vicinity, and evaluates how development of the Proposed Action would affect these characteristics.

3.1.1 Affected Environment

Visual Character

Site

The Life Sciences Building site is located in the Central Campus of the University of Washington and is generally bounded by Stevens Way NE to the north, open space areas associated with Garfield Place to the east, the Burke-Gilman Trail to the south, and Kincaid Hall to the west (see **Figure 2-1** of Chapter 2 for map of the University of Washington campus).

The site currently contains the one-story Botany Greenhouse (steel frame on a concrete foundation with aluminum bars around safety glass), the one-story Plant Laboratory (glass greenhouse structure with concrete and brick office), and the one-story Plant Laboratory Annex buildings (wood structures on concrete piles); a student farm area is also located adjacent to these buildings. Vegetation primarily consisting of mature trees and shrubs covers the remainder of the site. The trees are primarily located along the northern, eastern, and southern edges of the site.



Plant Laboratory

The overall visual character of the Life Sciences Building site is characterized by the primarily translucent Botany Greenhouse and Plant Laboratory buildings within a vegetated context. Current views to the buildings on the site are primarily afforded from the south, southwest and southeast; views to the existing buildings are most prominently afforded from the Burke-Gilman Trail to the immediate south of the site. From the north along Stevens Way NE, views to the site reflects a primarily vegetated character, with mature trees dominating the view, with views to the tops of the Botany Greenhouse and Plant laboratory visible in the background beyond the trees; the Botany Greenhouse is prominently visible from Stevens Way NE at the northwest corner of the site.



North Project Site Area

Surrounding Area

The *Life Sciences Building Project* site is located in the Central Campus area of the University of Washington campus, which is characterized by the historic core of the University and its surrounding perimeter with a variety of uses including academic, student housing, and University support uses. Within the Original Core there are a number of significant buildings and open spaces including the Liberal Arts Quadrangle, Denny Yard, Memorial Way, Rainier Vista, Hub Yard, Parrington Lawn, and Central Plaza (see **Figure 2-3** of Chapter 2 for an aerial map of the proposed site and surrounding area).

The visual character of the area to the immediate north of the site, across Stevens Way NE, is primarily defined by the approximately 2.5-acre Medicinal Herb Garden and the four-story Benson Hall: the visual character of the Medicinal Herb Garden reflects ground level planter areas surrounded by a gravel walkway grid; and, the visual character of Benson Hall reflects a contemporary four-story brick building above a concrete base. Further to the north are a number of other academic buildings (i.e., Bagley Hall and the Chemistry Building) and the Drumheller Fountain.



Medicinal Herb Garden

The visual character of the area to the east of the site is defined by vegetated/landscaped areas, Garfield Place NE, and associated pedestrian/bicycle pathways. Further to the east are additional vegetated/landscaped areas and existing buildings associated with the School of Environmental and Forest Sciences, including the three-story Bloedel Hall, the three-story Anderson Hall, and the two-story Winkenwerder Forest Sciences Laboratory. Open space and pedestrian walkways associated with Rainier Vista are located further to the east.

To the immediate south of the site, the visual character is primarily defined by the Burke Gilman Trail and NE Pacific Street, which reflect paved pedestrian and vehicular routes with perimeter vegetation. Further to the south are the Magnuson Health Sciences Center and the South Campus area. The South Campus area is generally characterized by the

Magnuson Health Sciences Center, the University of Washington Medical Center and uses along Portage Bay.



Kincaid Hall

The visual character of the area to the immediate west of the site is defined by the six-story Kincaid Hall, the four-story Physics/Astronomy Auditorium, the seven-story Physics/Astronomy Tower, and the four-story Physics/Astronomy Building. The visual character of this area reflects a developed urban campus. Further to the west are 15th Avenue NE and the West Campus area. The West Campus is generally comprised of a variety of University uses, including several new student housing facilities, academic uses and administrative/support uses; commercial uses are also located within the West Campus.

Light and Glare

Site

Current sources of light on the Life Sciences Building site are generally indicative of a horticultural research/teaching setting, with the overall level of lighting being less than at intensively developed areas of campus. The sources of light on the site primarily include exterior and interior lighting associated with the Botany Greenhouse and Plant laboratory buildings, with a lesser level of exterior lighting associated with the Annex buildings. Existing lighting for the Botany Greenhouse utilizes long day photoperiods and typically run until 8 to 10 PM. Lighting associated with vehicles using the four parking spaces in Lot C10 adjacent to the Plant Laboratory Building is also periodically produced on the site.

Sources of glare currently on the site include the primarily glass surfaces of the Botany Greenhouse and Plant Laboratory buildings. Other sources of glare on the site include vehicles using the small parking area (portion of Lot C10) located adjacent to the Plant Laboratory Building, and vehicles traveling the site access road parallel to the Burke-Gilman Trail.

Surrounding Area

Lighting conditions surrounding the Life Sciences Building site are typical of an urban academic campus environment. Lighting conditions to the north consist of street lighting and vehicle headlights associated with W. Stevens Way NE. Further to the north, across W. Stevens Way NE, are interior and exterior building lighting associated with Benson Hall, and associated walkway lighting. Lighting to the west of the site primarily consists of interior and exterior building lighting from Kincaid Hall; lighting is also provided along associated walkways. To the south, the primary sources of light include pole lighting along the Burke-Gilman Trail, and street lighting and vehicle headlights associated with NE Pacific Street. Interior and exterior building lighting associated with the Magnuson Health Sciences Center

are prominent further to the south, across NE Pacific Street. Sources of light to the east are limited to parking lot lighting (Lot C10) and interior and exterior building lighting associated with Bloedel and Anderson halls.

Sources of glare in the vicinity of the Life Sciences Building site include roadways, parking areas, vehicles and building surfaces.

3.1.2 Environmental Impacts

Alternative 1 – Proposed Action

Visual Character

Site

Proposed Site Development - Existing uses on the *Life Sciences Building Project* site would be demolished as part of the construction activities, including the existing Botany Greenhouse Building, Plant Laboratory Building, and the Plant Laboratory Annex buildings. Existing pavement on the site would also be demolished and transported from the site. Approximately 38 of the existing 87 trees would be removed to accommodate building construction.

The design of the proposed building includes seven levels (including two basement levels) and approximately 179,600 square feet of academic and research uses and approximately 21,700 square feet of green house space. The design is intended to be an integration of warm, natural and tectonic materials to capture the spirit of the Life Sciences Program and Department of Biology.

A substantial degree of transparency would be provided in the building which is intended to activate the public spaces and make the educational areas more engaging and accessible. The exterior building design is intended to create a compatible design with the surrounding campus areas and distinguish the building as a connector of the Central Campus and South Campus areas. The proposed greenhouse would be located on the southern portion of the site to allow for maximum solar exposure and is intended to activate the area and provide a visual connection with the adjacent Burke Gilman Trail (see **Figure 2-9** of Chapter 2 for building renderings and **Figure 2-10** and **2-11** for building elevations of the proposed Life Sciences Building).

The landscape design for the proposed *Life Sciences Building Project* would be consistent with the University's landscape design standards and is intended to protect the existing trees on the site to the extent feasible and enhance the Pacific Northwest woodland character of this area of the Central Campus (see **Figure 2-12** of Chapter 2 for an illustration of the proposed landscape plan). The proposed design would follow the character of the woodland landscape where buildings and circulation spaces respond to the natural sloped

conditions in this area of campus, and circulation pathways, terraces and exterior spaces would be woven into the landscape design. The proposed landscaping would surround the building and create terraces at entry points and gathering areas on the site.

Visual Impact - As illustrated in **Figures 2-9, 2-10** and **2-11** of Chapter 2, proposed development of the five-story Life Sciences Building would substantially intensify the level of development on the site, and building development would be prominently visible, especially from the Burke-Gilman Trail to the south, and Stevens Way NE to the north.

However, the height and scale of the proposed building would be consistent with the majority of the campus buildings in the area, including the six-story Kincaid Hall to the immediate west. The proposed orientation of the lower-height and transparent greenhouse toward the Burke- Gilman Trail would increase the visual compatibility with the Trail to the south. The retention of the existing mature trees on the north edge of the site would also help to soften the visual appearance of the building along W. Stevens Way NE.

Light and Glare

Light

The proposed *Life Sciences Building Project* would add new light sources to the site in the form of interior and exterior building lighting, outdoor lighting for pedestrian visibility/walkways and loading functions, and vehicular traffic.

The *Life Sciences Building Project* would primarily create light from stationary sources such as exterior building fixtures, indirect light from interior building fixtures, and pedestrian scale lighting along walkways. The proposed lighting system would be designed to minimize impacts to offsite uses and enhance pedestrian circulation and safety on the site. Light fixtures would be shielded downwards to reduce light spillage and light impacts to adjacent uses. The lighting design would also comply with the City of Seattle Energy Code requirements, which include measures to minimize light pollution for the site; LEED credit SS8 also requires measures to minimize light pollution and light trespassing from the site.

It is anticipated that light emanating from the Life Sciences Building would be generally similar to that of recently constructed campus building in the vicinity including Molecular Engineering and William H. Foege Halls, buildings that include a high level of transparency; the level of light from the Life Sciences Building would also be generally consistent with that from other adjacent buildings including Kincaid Hall. Depending on the hours of nighttime lighting, operation of the greenhouse facility could generate more light than a typical campus building and areas immediately adjacent to the greenhouse could experience some form of light spillage (primarily the area to the immediate south of the site). However, given the existing greenhouse uses on the site and that greenhouse lighting hours would be similar to the existing uses (typically until 8 to 10 PM), the level of greenhouse light would not be anticipated to be substantially greater than current conditions. Additionally, proposed landscaping would partially screen some light from the greenhouse, and some

level of increased lighting along the Burke-Gilman Trail could be considered a positive to some trail users.

The minor amount of additional vehicle traffic associated with the Life Sciences Project would not be anticipated to result in a significant increase in vehicular light.

Glare

Solar glare would be generated by the proposed *Life Sciences Building Project* from new sources such as building surfaces (particularly windows and other reflective surfaces), paved areas, and vehicles. Building materials and lighting would be chosen to help minimize glare impacts; specific building materials are anticipated to include an integration of warm, natural, tectonic materials to capture the spirit of the Life Sciences Program and substantial transparency would be provided in the building. In particular, the glass curtain wall on the south site of the building could produce some glare in the afternoon and early evening at certain times of the year. The reflectivity of the glass selected for the proposed greenhouse would be as low as possible while also maintaining the proper operational requirements for the greenhouse functions. As a result, it is anticipated that this amount of glare would not be significant and would not obstruct the vision of users of the Burke-Gilman Trail or NE Pacific Street. The minor amount of vehicle traffic associated with the Life Sciences Building would not be anticipated to result in a significant increase in vehicle glare. New landscaping and retained trees on the site would also help to minimize glare associated with building surfaces, paved areas, and vehicles travelling to and from the site.

Alternative 2 – No Action

Under the No Action Alternative, development of the Life Sciences Building would not occur at this time. The existing aesthetic and light/glare conditions currently found on the site would remain.

3.1.3 Mitigation Measures

The following mitigation measures are proposed for development of the *Life Sciences Building Project*.

- The proposed design is intended to be an integration of natural and tectonic materials to reflect the spirit of the Life Sciences Program and Department of Biology, while being compatible with the aesthetic character of the overall University of Washington campus.
- All disturbed campus landscapes would be restored to the quality of work and method of installation in agreement with long term campus plans for the area.

- The majority of the existing trees on the site would be retained to screen and soften views to the Life Sciences Building.
- New landscaping and trees would be provided on the site, particularly along Stevens Way, to enhance the aesthetic character of the site. The University would meet or exceed the City of Seattle tree replacement standards.
- Building and greenhouse design would consider using the least reflective glazing material, as well as shading devices (for the building), to minimize the potential glare impacts to surrounding uses.
- Exterior building lighting and pedestrian lighting would be directed downward and away from existing buildings and spaces to minimize the impacts to nearby uses.

3.1.4 Significant Unavoidable Adverse Impacts

The proposed *Life Sciences Building Project* would replace the existing Botany Greenhouse Building, Plant Laboratory Building, and the Plant Laboratory Annex buildings with a new five level (above grade) structure and replacement greenhouse facility. The proposed development would intensify the level of development in the area; however, the height of the building would be consistent with other buildings in the surrounding area. Significant visual impacts would not be anticipated. New development would introduce new sources of light and glare to the area, but with proposed mitigation, significant light and glare impacts would not be anticipated.

3.2 HISTORIC AND CULTURAL RESOURCES

This section of the Draft SEIS identifies historic and cultural resources and analyzes the potential for impacts associated with development of the proposed *Life Sciences Building Project* on the University of Washington's Seattle Campus. A cultural resources inventory and Historic Resources Addendum (HRA) were prepared by Historical Research Associates, Inc., and are summarized within this section. The full report is included in **Appendix B** of this Draft SEIS.

3.2.1 Affected Environment

Regulatory Context

This cultural resources and architectural resources inventory is intended to identify resources that need to be considered during SEPA review, including whether the construction of the facility would impact any historic properties (listed or eligible for listing in federal, state, or local historic registers¹) on or immediately adjacent to the site.

In addition to the mandated State Environmental Policy Act (SEPA) process, the University of Washington outlines its own process for considering the potential effects of new project planning on campus buildings and features in the University of Washington Master Plan – Seattle Campus (*CMP-Seattle 2003*). The *CMP-Seattle 2003* calls for the production of a Historic Resources Addendum (HRA) for any project that makes exterior alterations to a building over 50 years old. The HRA provides context and analysis to insure that important elements of the campus, its historical character and value, environmental considerations, and landscape context are preserved, enhanced, and valued.

General Background

The approximately 3.1-acre *Life Sciences Building Project* site is generally bounded by Stevens Way NE to the north, the Burke-Gilman Trail to the south, Kincaid Hall to the west, and open space areas associated with Garfield Place to the east (refer to **Figure 2-3** of Chapter 2).

The following provides information on the architectural and cultural resources context of the University of Washington campus area.

Cultural Resources

Archaeological and historical evidence indicates that Native Americans moved into the area at the close of the last ice age, occupying Western Washington for at least the last 11,000 years. More evidence is available for occupation after about 5,000 years ago and especially

¹ Refer to Appendix B for discussion on the criteria for eligibility for listing on the various historic registers.

for the last 2,500 years when populations apparently increased and large, permanent villages were inhabited. The human history of the area is a response to the availability of natural resources along the rivers, streams, marshes, sloughs, prairies, and nearby coastal areas.

Prehistory

The earliest archaeological evidence of human presence in Washington State comes from Clovis fluted projectile points and stone tools dating to about 11,000 before present (BP). These tools are believed to be associated with highly mobile Paleoindian groups adapted to hunting large fauna such as mammoth and mastodon, with some reliance on plants and other animals. Clovis materials are rare in Washington, known from nine isolated finds. Other evidence for this adaptation includes the Manis Mastodon site near the town of Sequim where extinct bison and mastodon remains dating from 12,000 BP and 10,000 BP were found in possible association with cultural remains.

The Early period in Western Washington spans from approximately 8,000-5,000 BP. Artifacts are referred to as “Olcott” after the site type in Snohomish County and referred to in other areas of the country as “Old Cordilleran” or “Early Lithic”. The distinctive Olcott stone tool assemblage consists of large, leaf-shaped and stemmed points, and cobble and flake tools, often made of heavily weathered volcanic rock like dacite or basalt. Sites with Olcott assemblages, which generally lack organics and features, are usually found inland on raised terraces where human occupation likely became established as landforms stabilized during the middle Holocene.

The Middle period in Puget Sound prehistory, from approximately 5,000-2,500 BP, is characterized by increasing populations with more complex socio-economic organization and evidence for greater reliance on marine and riverine resources. Marine resource use may extend back further in time; however, earlier shoreline sites would have been inundated by rising sea levels which reached near-modern elevations by about 5,000 BP. Middle period sites yield more stone and bone tools in addition to chipped stone tools. The developing importance of woodworking is evident in the presence of tools such as adzes, wedges, and mauls. A diversification of economic pursuits in this period is indicated by sites in a variety of environmental settings and common finds of the remains of sea mammals, fish, and shellfish.

The Late period of the last 2,500 years in the Pacific Northwest is marked by sites and assemblages that indicate development of craft specialization and a significant concentration of wealth, both traits being representative of the “classic” Northwest Coast cultural complex. Of note are abundant shells, and increase in art objects and status markers, and a large variety of tools including ground slate knives and points, celts, and bone harpoons and points. The seasonal use of resources and locations continued, and permanent and semi-permanent winter villages were established. Archaeological sites of

the Late period provide evidence of subsistence and settlement patterns including hunting, fishing, woodworking, and plant processing.

Native Americans

The site area was formerly occupied by the Duwamish, a Lushootseed speaking group who inhabited all of present-day Seattle and Renton, and who occupied villages along the shorelines of Lake Union, Lake Sammamish, Lake Washington, Elliott Bay, Shilshole Bay, and the Duwamish, Black, and Cedar Rivers. The Duwamish maintained close ties with neighboring groups, including the Snoqualmie, Suquamish, Puyallup, and people living on the Upper Green and White Rivers. Known as the *xa'tcoabc* (lake people), the Lake Washington people were considered by some to be intermediate between the Duwamish and Snoqualmie.

Recorded place names indicate native presence in the project vicinity, as well as, through the environs of greater Seattle. East of the project area, longhouses of the group living at *SWAH-tsu-gweel* on the shore of Union Bay near the present day University of Washington campus marked the eastern end of an important portage route that led to salt water. An "Indian trail" marked on the 1856 land survey map is shown from the northwest side of Union Bay and entering Portage Bay on the east side just south of the project area. Another trail farther south connects the lower end of Union Bay with the southern end of Portage Bay and continues across the terrain to reach the east side of Lake Union, crossing land again in the vicinity of today's Gaswork's Park.

There are references in the literature to Native American names for features in the site vicinity. *Baqwob* referred to a prairie or open space north of Portage Bay. *Waq³e'q³ab* from the word for frog, was a small creek that entered Lake Union just east of today's Interstate 5 Bridge. A small promontory, Sqwitsqs, jutted into Lake Union where the University Boat Club once stood. *SSlu?wi't* referred to a creek passage from the north shore of Union Bay through the marsh lying between Webster Point and the buildings of the University. It may have been the location of a fish trap. In Union Bay on today's Foster Island, the Duwamish had a burial ground, *Stitici*, where the dead were placed in boxes placed up in the branches of trees. Other places were noted in the vicinity of Webster Point, Sand Point, and Laurel Point.

The annual cycle of activities was based on the availability of resources in different seasons and varied environments. In spring and summer, traveling along trails or by dugout canoe, small groups set up temporary camps to fish, hunt, harvest shellfish, and gather berries, roots, bulbs, and other plant resources. Salmon and shellfish, especially clams, formed the most important part of their diet. Other resources included freshwater fish caught in the lakes and streams throughout the area; deer, bear, and small mammals hunted in the valleys, uplands, and lake shores, waterfowl found on the numerous waterways; and, marine resources including sea mammals, clams, crabs, shrimp, oysters, mussels, and other invertebrates found along the coast.

The Duwamish spent the winter months in cedar plank houses built along shorelines and riverbanks living on the salmon, clams, berries, roots and other foods they had preserved by smoking or drying and tending to social relationships through visiting, trading, and engaging in festivities and ceremonies. The Duwamish were linked by marital ties as well as by shared use of some resource areas with the Suquamish to the west, Snohomish to the north, Snoqualmie to the east, and with groups on the White and Green Rivers to the south now collectively referred to as the Muckleshoot.

The Duwamish maintained friendly relations with Seattle pioneers, providing them with labor, salmon, shellfish, baskets, and other resources, and continuing to live among them in spite of treaty-era tensions and diminishing means of pursuing a traditional lifestyle. The last Duwamish natives known to live in the project vicinity were Cheshiahud (also known as Lake John), a canoe maker and lake guide who lived with his family at the foot of today's Shelby Street on Portage Bay until about 1900. Formerly the leader of a village on Lake Union, he and his family lived on a small piece of land with a cabin and potato patch. He is believed to have moved to the Suquamish Reservation following the death of his wife Madeline. A trail recently opened around Lake Union was named the Cheshiahud Lake Union Loop Trail in honor of the association of Duwamish natives with the area.

Today many people of Duwamish descent live among the Muckleshoot, Snoqualmie, Suquamish, and Tulalip Tribes, as a result of the 1854-1855 treaties that led to the creation of area reservations and to shifts in settlement and inter-group relationships. Others continue to seek independent Duwamish tribal status.

Historic Context

The University of Washington was established by the State Legislature in 1861, as the first public university in the state. It was sited on a ten-acre parcel of land in what is now downtown Seattle. In 1895, the campus was moved to its present site, and Denny Hall, originally known as the Administration Building, was completed that year. The Observatory was also constructed nearby. A drill hall, gymnasium, dressing rooms, and two dormitories followed within the next four years. Meanwhile, the University Regents sought some type of campus plan to guide the location of future buildings. In 1898, engineering professor A.H. Fuller developed a plan known as the Oval Plan, which included only the northern portion of the university site. Remaining buildings from the 1890s include the two early dormitories, later named Lewis and Clark Halls, in addition to Denny Hall and the Observatory. All four of these buildings are located in the north campus area.

In 1903, the Board of Regents hired the Olmsted Brothers renowned landscape architects, to prepare a design for a general campus plan. However, this 1904 Olmsted Plan was never realized, and the present campus plan descends from the Olmsted's Beaux-Arts design for the Alaska Yukon Pacific Exposition (AYP) of 1906. The AYP grounds reverted back to the University in 1909, providing the central axis of Rainier Vista and an emphasis on

landscaping. Cunningham Hall dates from the AYP and is one of only two buildings remaining from the Exposition. The six other permanent buildings retained after the fair closed were the Auditorium (which became the original Meany Hall), the Machinery Building, the Washington Building, the Arctic Brotherhood Building, the Forestry Building, and the Fine Arts Building.

Henry Suzallo was the University of Washington's fifteenth president with a tenure lasting eleven years (1915-1926), and he worked closely with architect Carl Gould in the physical planning of the campus and its buildings. The Regents Plan of 1915, adopted during Suzallo's first year as president, became the University's guiding planning document. It reaffirmed the Olmsted's AYP grounds while adapting a symmetry and formality in the design for the upper campus. The Regents Plan proposed grouping Liberal Arts programs on the upper campus, administrative and library facilities at its core on the Central Quadrangle, and the Science programs along Rainier Vista and the southern portion of Stevens Way. The plan placed Suzallo Library clearly beside the intersecting axis from Liberal Arts Quadrangle and Rainier Vista, and the main axis of the Science Quadrangle. Major athletic facilities were later located along the eastern edge of the campus near Lake Washington. This plan served as the basis for subsequent construction, and set the Collegiate Gothic character for architectural design.

Planning for the Magnuson medical complex began directly after World War II on the site of the former golf course and training facilities. University enrollment swelled at the end of the war, and in 1949, the University opened the Health Sciences Building, the first of its sprawling medical complex. In 1959, the University Hospital was opened. The complex was renamed the Magnuson Health Sciences Center in 1978, when it was approximately a third of its current size.

Other buildings on the campus that were constructed after World War II were designed in a variety of Modern styles that emphasized new materials and expressive structural qualities. In the 1950s, a University Architectural Commission was established and a University architect appointed. Collegiate Gothic was replaced by modern architecture as the preferred style for new buildings. The 1962 General Development Plan was prepared by the University architect, with input from consultants including alumnus Paul Thiry.

While development in the southern campus was still sparse, the NPRR, owners of the segment of line within the campus, continued heavy use of the line until 1963. The NPRR merged with two other railroad companies, Burlington and The Great Northern, in 1970, and the new company, the Burlington Northern Railroad, abandoned the line that would become the Burke-Gilman Trail in 1971. The first section of the line to be paved and turned into the Burke-Gilman Trail connected Gas Works Park (west of the site) within Tracy Owen Park in Kenmore (north of the site).

The south campus began to grow more quickly during the last half of the twentieth century. Between 1960 and 2003, 100 construction projects took place on campus, and many of them were constructed in the open spaces between buildings south of Frosh Pond.

Within or adjacent to the site, Benson Hall was constructed in 1966, Bloedel Hall was completed in 1970, the Kincaid Building in 1971, the Hitchcock Building in 1981, and the Chemistry Building in 1995.

Along with new buildings came new utilities upgrades. Waterlines, natural gas lines, and a number of other utilities including fiber optic and electrical lines were installed in the vicinity of the site during the late twentieth century.

Historic Resources (Buildings and Spaces)

The following provides detail on architectural resources on the site and in the site vicinity.

Site

Botany Greenhouse (1947)

Constructed in 1947, the Botany Greenhouse was fabricated by the preeminent greenhouse design firm Lord & Burnham. Original plans show that it was designed by noted local architect Paul Thiry as two greenhouses connected by a central corridor.



Botany Greenhouse

The Botany Greenhouse, designed to be streamlined and modern, holds the University's plant collection, including specimens that can be traced back to the original teaching collection, developed along with the University's early Botany Department in another part of the campus in 1900. The greenhouse includes three different habitats: cool tropical, warm tropical, and xeric (desert).

The Botany Greenhouse is oriented northwest to southeast. The landscape is on an incline and buildings north and west of the greenhouse look down on it from their upper floors. The greenhouse is bordered by W Stevens Way NE on the north and the Burke-Gilman Trail on the south. Farther south is NE Pacific Street. A gravel parking area, plantings, and the campus Plant Lab are located directly southeast of the greenhouse. Northwest of the greenhouse are sloping concrete walkways and retaining walls with climbing vines. These separate the greenhouse from pedestrian paths and Kincaid Hall to the northwest.

The Botany Greenhouse is constructed of a steel frame on a concrete foundation with aluminum sash bars around safety-glass panels. The greenhouse is rectangular in plan, made up of two front-gabled greenhouses tied together by a central corridor. All structures have steeply pitched roofs with vents at the ridgeline. Original plans from Campus Facilities show that the building was restored and mechanical systems were upgraded throughout the 1970s, 1980s, and 1990s. A major renovation took place in 1996–97; the greenhouse was reglazed and its wooden sash bars were replaced with aluminum, and its lapped glass panels were replaced with safety glass. The footprint and frame and the benches, doors, and other interior materials are original, but the skin of the building is new.

The interior of the Botany Greenhouse includes poured-concrete floors, and framed glass walls with wood doors between each greenhouse and the central corridor. The central corridor is devoted to planning, study, and systems management. Metal cabinets, counters, and shelves line both sides of the corridor. Florescent lights hang from the ceiling, which also includes louvered vents. Plants populate all portions of the greenhouse and parts of the central corridor. A large metal vat in the northwest corner of the corridor holds aquatic plants.

Plant Laboratory (1939)

Constructed in 1939, the Plant Laboratory complex of buildings was based on designs first drawn in 1927 and then revised in 1937 by campus planners Bebb and Gould. The main building of the Plant Laboratory, which includes brick offices and a greenhouse, appears to be based entirely on the Bebb and Gould drawings.

The Plant Laboratory is oriented northeast to southwest within the area of direct effects. Like the Botany Greenhouse, the laboratory is bordered by W Stevens Way NE to the north and the Burke-Gilman Trail to the south. The lab is only minimally visible from these routes. Pathways, plantings, and the Botany Greenhouse sit northwest of the Plant Laboratory. The laboratory is bordered on the east by open space devoted to farming and other landscaping, along with two small annexes. Annex #1 sits northeast of the building; Annex #2 sits southeast of the building. The Plant Laboratory is surrounded by mature foliage, plantings, and trees. A portion of its greenhouse is visible from the Burke-Gilman Trail.



Plant Laboratory

The Plant Laboratory complex consists of buildings in a variety of materials and styles. The main office building is constructed of concrete faced in brick and sits atop a concrete foundation. The building is constructed as a central block with two, recessed, flanking wings. The primary façade faces northeast, but is nearly obscured by mature foliage. The primary façade's central block includes a wood entry door with nine lights topped by a transom and flanked by two double-hung, wood windows with four divided lights per sash. Windows on flanking wings are divided into eight lights.

Secondary elevations also include double-hung, wood windows of eight divided lights. Windows include projecting concrete sills and are topped by ornamental details including concrete bars punctuated by concrete diamonds. These sit atop and below courses of header brick in a wall of rugfaced brick in running bond. The building's roofline is further ornamented with a rounded concrete cornice and metal coping. This minimally ornamented building is an example of a simplified Art Deco style.

The main brick building is attached by a brick corridor to a greenhouse on its southwest elevation. The greenhouse includes two side-gabled greenhouses linked by a central, front-gabled corridor. The central corridor is taller than the greenhouses and the attached brick building and its roofline is extended over the brick building, appearing as a shingled hipped roof on top of the brick building's flat roof.

The attached greenhouse's steel structure includes glass panels atop concrete stem walls. Portions of the roof are constructed of panels in steel frames that open to vent the building. Unlike the Botany Greenhouse, the Plant Lab retains much of its original glazing and original steel structure, as well as wooden elements including windows on the gabled ends. The ventilation system was upgraded in the late twentieth century.

The brick building was originally used as offices for the director of the garden and horticultural staff. The building also included lab space for student research. The brick portion of the building was designed to hold a lab and fertilizer room on the north and rooms for seeds, herbs, roots, and grinding on the south. The basement includes work rooms with concrete and vinyl-tiled floors. The laboratory's greenhouses include concrete floors and benches and beds for holding various plants.

Also part of the Plant Laboratory are two annexes. Annex #1 is a wood building on concrete piers dating from 1963. It has a shallow side-gabled roof with a deep overhanging eave above the entry. The entry faces a wooden porch to the northeast. The building is clad in board-and-batten siding and includes sliding aluminum windows.



Plant Laboratory Annex

The final set of buildings includes connected sheds on concrete piers. The sheds, known collectively as Annex 2, are clad in horizontal wood boards and include original, doublehung, wood windows with divided lights. The primary building is topped by a shed roof with a slight eave and a hood with knee braces over a central entry door. The shed likely dates from the early years of the Plant Laboratory, though it appears to have been expanded in more recent years. The CMP-Seattle 2003 lists the date of construction as 1985. However, the building's materials and style suggest a construction date in the 1930s or 1940s. While the original building was likely constructed within the historic period, it is suggested that additions may date from the 1980s. These are generally obscured by vines and other mature foliage growing against exterior walls.

Site Vicinity

Benson Hall (1966)



Benson Hall

Benson Hall, originally known as the Chemical Engineering Building, was designed by Bindon, Wright, and Partners and was constructed in 1966. The building was named after Henry K. Benson, former chair of Chemistry and Chemical Engineering, and was constructed soon after the University formed its Nuclear Engineering Department. On the dedication of Benson Hall, the Puget Sound Chemist ran an article stating that “the building contains a small-scale paper mill and a refinery-sized glass distillation column for use by undergraduate students.

Benson Hall also houses a pulse neutron accelerator and accompanying console facilities for the nuclear engineering department. The building will be home to about 120 undergraduate students in chemical engineering, nuclear engineering and forestry majors.” The Nuclear Engineering Department was disbanded in the early 1990s

The building includes a 35 ton sliding door and reverse pressure rooms. These features were incorporated to prevent the accidental escape of radioactive material in the pulse neutron generation lab or particles from escaping when the door was opened. Also a special sump was installed to prevent harmful chemicals from entering Seattle’s sewer system.

Benson Hall sits on an incline in the southern portion of the university campus, north of the site. It is bordered by W Stevens Way NE on the southwest and by Okanogan Lane on the northeast. The building faces southeast, with a view of the Pharmaceutical Herb Garden. The site, located southwest of W Stevens Way NE, is primarily visible from the upper floors of Benson Hall.

Plans and drawings held by the Campus Engineering Facilities Services show that building alterations have generally taken place within labs and classrooms. Mechanical upgrades occurred throughout the 1970s and 1980s. However, no alterations, beyond minimal repairs, have taken place on the building’s exterior or within its first floor lobby (UW Facilities 2014).

Medicinal (Pharmaceutical) Herb Garden (1911)



Medicinal Herb Garden

The Medicinal Herb Garden, constructed as the Botany Department’s “Drug Garden,” in 1911, and now managed by the Biology Department, contains the University’s collection of medicinal herbs from around the world. The garden is approximately 2.5 acres and includes planting beds separated by gravel paths. The garden has been altered over the years and does not retain its original footprint. In 1993, the herb garden was improved by the addition of an art installation that includes a

storage shed for supplies and an integrated bus station on its southeast corner. The installation was designed by Suzanne Hellmuth and Jock Reynolds.

No plans or drawings of the original or current garden remain in the Campus Facilities Collection.

The Herb Garden is located north of W Stevens Way NE and is visible from the roadway. The garden sits south of Benson Hall, Bagley Hall, and the Chemistry Building. Both the Chemistry Building and Benson Hall are oriented toward the garden. Pathways lead from building entries to walkways through the garden. Garden beds are located on either side of Okanogan Lane but are screened from Rainier Vista by mature foliage. The Herb Garden is located across W Stevens Way NE from the project area. It is minimally visible from the project area.

Gridded pathways, generally covered in gravel, lead between rectangular planting beds with wooden borders that hold the garden’s international collection of medicinal herbs. Small signs on metal posts identify herb varieties.

Other Architectural Resources in the Vicinity

Four previously recorded buildings, structures, and objects (BSOs) were identified in the site vicinity. Of these, only Bagley Hall has been found eligible for listing in the NRHP by Department of Archaeology and Historic Preservation (DAHP). The University of Washington segments of the Burke-Gilman Trail and the Medical Center and Magnuson Health Sciences Center were found ineligible for listing by DAHP in 2013. Only Bagley Hall appears on the Washington State Register of Historic Places (WHR). **Table 3.2-1** provides a description of the previous historic eligibility findings for these resources.

**Table 3.2- 1
PREVIOUSLY IDENTIFIED POTENTIAL HISTORIC FEATURES**

Historic / Common Name	Description	Eligibility Status
Bagley Hall	Legacy data, no description available.	Eligible (NRHP and WHR)
Burke-Gilman Trail (University District Segments)	Paved Bicycle and pedestrian pathway constructed atop a former railroad grade, with a single-span concrete-arch viaduct near Rainer Vista area.	Not Eligible
Medical Center/BB Tower and Magnuson Health Science Center	Sixteen-story medical facility built and expanded over fifty years beginning in approximately 1947.	Not Eligible.
Northern Pacific Railroad Bridge	Former railroad bridge dating from 1914, now used as a pedestrian bridge and part of the Burke-Gilman Trail.	Recommended Not Eligible.

Source: HRA, Inc. 2015

Cultural Resources (Archaeology)

Three cultural resources features have been documented within 0.5 mile of the site. **Table 3.2-2** lists the pervious cultural resources findings in the area, and the eligibility status. As indicated in the table, site 45KI952 is an amber glass bottle circa 1920s–1930s. The bottle was found in fill during construction excavation, approximately four feet below ground surface. In the same general location as 45KI952, the remnants of an abandoned wood-stave pipeline and associated metal pipeline were identified as Site 45KI955. The pipeline is assumed to be associated with the sewage system constructed in Seattle during the early 1900s.

Table 3.2-2
PREVIOUSLY IDENTIFIED POTENTIAL CULTURAL RESOURCE FEATURES

Site Number and Name	Site Type/Description	Distance from Site	Eligibility for NRHP
45KI952	Historic Bottle Isolate, circa 1920s to early 1930s	~½ mile southeast	Not Evaluated
45KI955	Historic Public Works	~½ mile southeast	Not Evaluated
45KI957 <i>UW Greenhouse Site</i>	Multi component- Prehistoric Lithic Material and Historic Debris	Within	Not Evaluated

Source: HRA, Inc. 2015

Site 45KI957 (UW Greenhouse Site) is a prehistoric lithic scatter located on an eroded slope above the Burke-Gilman Trail, in the vicinity of the Botany Greenhouse. Materials observed were two lithic quartzite flakes and a chert projectile point (arrowhead) mixed with historic-period debris (iron fragments, hardware, gardening tags, and ceramic sherds) in redeposited sediment on the surface. The soil was likely redeposited during construction of the former railroad line that the Burke-Gilman Trail currently resides on and again disturbed during use of the greenhouse. Thus, it is likely that the cultural material recorded as 45KI957 represent materials that were imported with fill.

In addition to identifying the previously documented findings, a surface and subsurface survey was performed within and immediately adjacent to the site in order to identify archaeological materials and to assess the potential of the site to contain archaeological materials.

In general, sediments observed were fill/disturbed sand/silt overlaying intact glacial sediment. Fill included poorly sorted gravels, sand and silt not observed in glacial sediment and occasional modern debris. Deep fill/disturbed sediment reinforce observations made during surface survey suggesting heavy ground surface modification (see **Appendix B** for more details concerning the inventory methodology and results).

Washington State Department of Archaeology and Historic Preservation - Predictive Model

The Washington State Department of Archaeology and Historic Preservation (DAHP) predictive model for archaeological sites is based on statewide information, using largescale factors. Information on geology, soils, site types, landforms, and from GLO maps was used to establish or predict probabilities for archaeological resources throughout the state. The DAHP model uses five categories of prediction: Low Risk, Moderately Low Risk, Moderate Risk, High Risk, and Very High Risk. The DAHP predictive model map indicated that the site is located in a Very High Risk area. However, given the previous modifications in the vicinity with the construction of railroad lines, roadways, and the university, and the land alterations associated with the AYP, the actual anticipated probability for intact archaeological resources is Moderate to High, typical of most other areas on the campus.

3.1.2 Environmental Impacts

Alternative 1 – Proposed Action

Under the Proposed Action, existing uses on the site would be demolished as part of the construction activities, including the existing Botany Greenhouse Building, Plant Laboratory Building, and the Plant Laboratory Annex buildings. Existing pavement on the site would also be demolished and transported from the site.

The design of the proposed building includes seven levels (including two basement levels) and approximately 179,600 square feet of academic and research uses and approximately 21,700 square feet of green house space. The design is intended to be an integration of warm, natural and tectonic materials to capture the spirit of the Life Sciences Program and Department of Biology.

Cultural Resources (Archaeology)

Based on archival research, as well as the environmental and the cultural settings of the site and vicinity, there is a moderate to high probability for observing precontact to ethnohistoric period cultural remains during excavation activities associated with construction. Settings similar to that of the site would have been the focus of hunting and gathering activities and would have been ideal locations for long term occupation as well. Expected artifacts and features would relate to these activities. Although the site vicinity has been the subject of significant development over the past 120 years, anticipated materials could include fragments of fire-modified rock (FMR), either singly or in intact clusters (sometimes with charcoal and/or oxidized soils), indicating the presence of cooking or processing hearths; assemblages of lithic and/or bone tools and tool fragments; and isolated lithic or bone tools or tool fragments.

The likelihood of finding historic-period archaeological remains is moderate to high, given the use of the site vicinity as an important transportation corridor early in the history of the development of Seattle. Historic features and artifacts encountered would likely be associated with the SLS&E railroad and NPRR. Some artifacts associated with the AYPE may be encountered as well. Artifacts and features may include railroad spikes, brick, nails, glass and metal refuse, building foundations, and objects related to operation of the railway (e.g., portions of signals).

Because the area surrounding and including the site is mapped geologically as glacial sediment and till, any intact archaeological deposits should be found at or near the surface. Glacial sediment has no potential to contain deeply buried cultural materials. By extension, archaeological materials should only be found in soils that are derived from that glacial material.

As indicated earlier, no previously eligible cultural resources have been identified within or adjacent to the site

It is concluded that Site 45KI957 (prehistoric lithic material and historic debris in the vicinity of the Greenhouse) is not eligible for listing on state or national registers because materials were observed in fill or highly disturbed native sediments, and the surrounding landscape does not contain intact sediments. In addition, the site does not represent a site in primary context, is lacking in data potential, and has a lack of integrity. Refer to **Appendix B** for additional detail.

In conclusion, with identified mitigation measures, it is not anticipated that proposed construction would result in significant impacts to cultural resources.

Historic Resources (Buildings and Spaces)

Four architectural resources over 45 years old were identified within the site and site vicinity that had not yet been recorded in the state's database and potentially in need of assessment as part of the Life Sciences Building project. These resources include two on the site (Botany Greenhouse and Plant Laboratory) and two immediately off the site (Benson Hall and the Herb Garden)

Of the four historic-era resources assessed in this SEIS, it is concluded that three are eligible for listing. Benson Hall is eligible for its architectural qualities and its association with campus research and education. The Plant Laboratory is eligible for its architectural qualities and its associations with campus research and education, and the Pharmaceutical Herb Garden is eligible based on its associations with important events in local, state, and national history. Discussions of each resource's eligibility recommendations are found below. Refer to **Appendix B** for additional detail.

Site Buildings

Botany Greenhouse - The Botany Greenhouse was prefabricated by noted firm Lord & Burnham and designed by a well-respected local architect. Lord & Burnham began constructing greenhouses and the boilers that kept them temperature controlled in the nineteenth century. They became well known for designing large, sometimes Gothic, conservatories including the Conservatory of Flowers in San Francisco, which was constructed in 1878 and listed in the NRHP in 1971. Lord & Burnham also designed the Conservatory at the U.S. Botanic Gardens in Washington, D.C., built in 1933.

Paul Thiry was trained at the University of Washington and focused on residential properties until the early 1930s when an influential trip abroad introduced Thiry to European Modernism, which he promoted once he returned to the United States. During World War II, Thiry designed the West Kiln Building on the campus (1942), and went on to design the Museum of History and Industry (1950); the North East Branch Library in Seattle, which won the 1955 Seattle AIA Honor Award; and the Washington State Library in Olympia (1959).

The Botany Greenhouse retains its original footprint and continues to be used for its original purpose, to house the university's collection of plants.

Lord & Burnham produced a number of greenhouses, solariums, and conservatories between the 1840s and 1980s, when the firm's designs were purchased by Under Glass, which continues to provide greenhouses based on Lord & Burnham plans today.

According to Under Glass, "early greenhouses were made of cypress wood and iron or steel. Experimentation with aluminum as a material for greenhouse construction was started as early as 1932 when the U.S. Botanical Gardens in Washington, D.C. were built. However, it was not until 1955 that greenhouses with exterior members of aluminum had reached a point where they were competitive with wood construction" (Under Glass 2014). The Botany Greenhouse was constructed before aluminum was considered competitive and originally included wood sash bars, which have since been removed.

The Botany Greenhouse is significant for its associations with the history of the Botany Department on the campus, and as a midcentury example of a Lord & Burnham greenhouse fabrication of an early Paul Thiry design. The building is also significant for its associations with the University's botanical research and education in the mid-twentieth century. However, the greenhouse has lost a great deal of integrity. As noted by the greenhouse manager, the building has been entirely reglazed, lapped glass panels have been replaced with safety glass, and wooden sash bars have been replaced with metal.

The building retains integrity of site and setting, feeling, and association. However, it has lost integrity of design, materials, and workmanship. Furthermore, though it was designed by a wellknown architect, it is not among that architect's principal works and does not represent the building style that Thiry came to be known for. The building is not known to

be associated with the lives of specific people significant to our past or with a specific aspect of our cultural, political, or economic history. The building does not appear likely to yield information important in prehistory or history.

Although the building is significant for its associations, it is concluded that the Botany Greenhouse is not eligible for listing due to a lack of integrity, and that demolition of the Botany Greenhouse without mitigation would not result in significant impacts.

Plant Laboratory - The Plant Laboratory was designed by Bebb and Gould, and constructed in 1939 as a combination of offices for horticultural staff and greenhouses for the cultivation of a teaching collection.

Bebb and Gould not only provided the plans for the 1915 redesign of the University campus but were also responsible for the design of many of its buildings, including the Suzzallo Library (1927) and Anderson Hall (1925). The firm also designed the Seattle Times building (1916) and what is now the Seattle Asian Art Museum (1933).

The Plant Laboratory was known at the time of its construction as the “drug lab,” and was likely associated with the 1911 pharmaceutical “drug garden,” now the “pharmaceutical herb garden,” located to the north of the site. Though plans for the Plant Lab were revised in the 1930s, the existing building retains the original plan, materials, and ornamental details outlined in the Bebb and Gould drawings.

Unlike the Botany Greenhouse, this complex retains many of its original materials. The office building is a fine example of a restrained Art Deco style and retains its character-defining features, including its plan, divided windows, and ornamental cornice details, as well as its attachment to the existing greenhouse. The greenhouse also retains original materials and design, including its steel structure, original glazing, and original wooden windows. Facilities records note that alterations to the buildings have included mechanical upgrades, new finishes and features for the offices and labs, but few alterations to the exterior of the building beyond regular repairs.

The main office building and the attached greenhouse possess excellent integrity of location, design, setting, materials, workmanship, feeling, and association. HRA finds that the offices and greenhouse are significant for their architectural qualities and as an example of a building designed by one of the primary architects of the current UW campus. The complex is also significant for its associations with botanical education and research at the university.

Both Annex buildings appear to retain their original materials, although Annex #2 has been altered and enlarged as recently as 1984. However, neither annex building is significant enough to be recommended individually eligible for listing in the NRHP for its architectural qualities.

It is concluded that the main building of the Plant Laboratory, along with its attached greenhouse, is eligible for listing. The building is also significant for its association with the history of the University's early Botany Department and is also eligible under Criterion A. The building is not known to be associated with the lives of specific people significant to our past or with a specific aspect of our cultural, political, or economic history. The building does not appear likely to yield information important in prehistory or history.

Without mitigation, demolition of the Plant Laboratory would be considered an adverse impact. However, with proposed measures to document the building, including documenting the resources via a DAHP Level II mitigation report (the DAHP Level II mitigation report is consistent with DAHP guidelines that are often implemented prior to demolition of buildings determined to be eligible for listing) to be shared with the Suzzallo and Allen libraries, and/or creating interpretive and educational materials to be shared with the public via the University website demolition would not be considered a significant impact. In addition, the University of Washington is exploring opportunities to display components of the Plant Laboratory Building in the entrance lobby of the Life Sciences Building. Components for display include existing case-work, historic herb collections and decorative doors that are original features of the Plant Laboratory building. See Section 3.2.3, **Mitigation Measures**, for detail.

Site Vicinity Buildings and Spaces

Benson Hall - Benson Hall was designed by Bindon, Wright, and Partners, an influential firm that also designed the Seattle City Light Building in 1957, the downtown branch of the Seattle Public Library in 1960, an addition to the Suzzallo Library on campus in 1963, and the library at Pacific Lutheran University in 1966. Bindon and Wright were recognized for their designs by the Seattle chapter of the American Institute of Architects, who granted them awards for the Bethlehem Pacific Coast Steel Corporation Office Building, constructed in 1960, and the Parke-Davis Company Seattle Sales Office Building, constructed in 1965. The firm was also honored for partnering with Skidmore, Owings, & Merrill to design the Norton Building in Seattle. The building was completed in 1959 and is recognized as Seattle's first modern office tower.

Benson Hall reflects characteristics found in the Norton Building, including the separation between the base and the projecting upper floors. Both buildings are nearly devoid of surface ornament as is common in the International Style.

Benson Hall appears on firm partner John LeBaron Wright's biography for the American Institute of Architects as one of the firm's principal works. Although the firm was prolific, other principal works, including the downtown Seattle branch of the public library, have been demolished, making Benson Hall one of a diminishing number of resources by this firm that retain excellent integrity.

Benson Hall is significant for its architectural character and for its association with the firm Bindon, Wright, and Partners. It is also significant for its associations with historic events

that had a significant effect upon the campus, namely the growth of chemical engineering, nuclear engineering, and forestry research and education at the University of Washington in the late twentieth century.

Benson Hall is within sight of the site, but is separated from the site by W Stevens Way NE. Benson Hall is not associated with the Biology Department and has no association with the buildings proposed for demolition. Furthermore, the building is recommended eligible because of its Modern architectural characteristics and its associations with the history of the Engineering Department. The Life Sciences Building Project may alter views from the building but will not impact its eligibility or its integrity of location, setting, design, materials, workmanship, feeling, or association. Development of the proposed *Life Sciences Building Project* would not be considered to have an impact on Benson Hall.

Medicinal (Pharmaceutical) Herb Garden - The Herb Garden is one of the earliest remaining elements of the university's early Botany program, and is recognized in the CMP Seattle – 2003 as a unique and significant landscape.

The Herb Garden was created in 1911 on 1.5 acres managed by the School of Pharmacy, which grew herbs for the treatment of everything from colds to heart disease. The garden's heyday was around World War I, when the garden grew to eight acres and produced medicinal herbs for shipment overseas. By the end of World War II, pharmaceuticals had embraced synthetic medicines over plant extracts. The garden fell into disrepair and shrank to the 2.5 acres it inhabits today, though even this footprint has been slightly altered by the construction of newer buildings on its boundaries).

The Herb Garden is significant for its association with more than 100 years of pharmaceutical research on the campus, and for its association with broad trends in our history, including the production of medicinal herbs for use by armed forces during World War I. The Herb Garden is not known to be associated with the lives of specific people significant to our past or with a specific aspect of our cultural, political, or economic history. The landscape feature does not appear likely to yield information important about prehistory or history.

The current Herb Garden is only a remnant of the World War I-era garden. Although its integrity of location has been altered over time, the garden retains integrity of design, workmanship, feeling, and association and has been at or near its current size for more than fifty years.

It is concluded that the Herb Garden is eligible for listing due to its associations with important trends in local, state, and national history.

The Herb Garden is located across W Stevens Way NE from the site but would not be anticipated to be adversely impacted by the Life Sciences Project. The garden would not lose integrity of design, materials, workmanship, feeling, or association. The garden's eligibility is linked to its association with the early Botany program at the University and

with that program's importance to the campus war effort, but not specifically for its association with the buildings slated for demolition. Therefore, it is concluded that the herb garden would not be adversely impacted by the removal of existing buildings and the construction of new buildings serving a similar purpose.

Alternative 2 - No Action

The proposed *Life Sciences Building Project* would not be constructed and no direct or indirect long-term or construction-related impacts would affect historic or cultural resources on campus.

3.2.3 Mitigation Measures

The following mitigation measures are proposed for the development of the *Life Sciences Building Project* on the University of Washington campus.

Plant Laboratory

- The University of Washington is exploring opportunities to display components of the Plant Laboratory Building in the entrance lobby of the Life Sciences Building. Components for display include existing case-work, historic herb collections and decorative doors that are original features of the Plant Laboratory building.
- If an adverse impact is unavoidable due to project needs and constraints, it is recommended that mitigation measures, including documenting the resources via a DAHP Level II mitigation report to be shared with the Suzzallo and Allen libraries, and/or creating interpretive and educational materials to be shared with the public via the University website, be considered (the DAHP Level II mitigation report is consistent with DAHP guidelines that are often implemented prior to demolition of buildings determined to be eligible for listing).

Accidental Discovery of Archaeological Resources

- In the event that archaeological deposits are inadvertently discovered during construction in any portion of the site, ground-disturbing activities should be halted immediately, and University of Washington should be notified. The University would then contact DAHP and the interested Tribes, as appropriate, and as described in the recommended inadvertent discovery plan.

Discovery of Human Remains

- Any human remains that are discovered during construction of the Project will be treated with dignity and respect.

- If ground-disturbing activities encounter human skeletal remains during the course of construction, then all activity that may cause further disturbance to those remains must cease, and the area of the find must be secured and protected from further disturbance. In addition, the finding of human skeletal remains must be reported to the county coroner and local law enforcement in the most expeditious manner possible. The remains should not be touched, moved, or further disturbed.
- The county coroner will assume jurisdiction over the human skeletal remains, and make a determination of whether those remains are forensic or non-forensic. If the county coroner determines the remains are non-forensic, they will report that finding to the DAHP. DAHP will then take jurisdiction over those remains and report them to the appropriate cemeteries and affected tribes. The State Physical Anthropologist will make a determination of whether the remains are Indian or non-Indian, and report that finding to any appropriate cemeteries and the affected tribes. The DAHP will then handle all consultation with the affected parties as to the future preservation, excavation, and disposition of the remains.

3.2.4 Significant Unavoidable Adverse Impacts

With implementation of identified mitigation measures, significant unavoidable adverse impacts to cultural and historic resources would not be anticipated with development of the *Life Sciences Building Project*.

3.3 CONSTRUCTION IMPACTS

This section of the Draft SEIS describes and evaluates the potential impacts associated with the construction of the *Life Sciences Building Project* under Alternative 1 (Proposed Action) and Alternative 2 (No Action). Construction-related impacts associated with air quality, greenhouse gases, noise, vibration, and trees are analyzed in this section. A discussion on transportation conditions (vehicle circulation, Pedestrian circulation and parking) during construction and operations is included in Section 3.4, **Transportation**.

3.3.1 Affected Environment

Site

The approximately 3.1-acre Life Sciences Building site is located in the Central Campus of the University of Washington and is generally bounded by Stevens Way NE to the north, open space areas associated with Garfield Place to the east, the Burke-Gilman Trail to the south, and Kincaid Hall to the west (see **Figure 2-1** of Chapter 2 for map of the University of Washington campus).

The site has a gradual slope to the south with a grade change of approximately 17 feet from the north end of the site (Elevation 93 feet near Stevens Way) to the south end (Elevation 76 feet along the northern edge of the Burke Gilman Trail).

The site currently contains the one-story Botany Greenhouse, the one-story Plant Laboratory, and the one-story Plant Laboratory Annex buildings; a student farm area is also located adjacent to these buildings. Vehicular access to the site is provided by Garfield Place NE (to the east) via a gravel roadway; a gravel parking area (a portion of Lot C10) is located adjacent to the roadway. A bus stop is located in the northeast corner of the site and includes a bus stop structure/shelter and associated artwork. Approximately 18 bicycle lockers are located in the northwest corner of the site (within the Kincaid Hall plaza) and approximately 62 bicycle parking stalls are located at the southwest corner of the site (adjacent to the Burke Gilman Trail near the Kincaid Hall loading area). See **Figure 2-2** of Chapter 2 for a map of the existing site survey.

Vegetation primarily consisting of mature trees and shrubs covers the remainder of the proposed site. The trees are primarily located along the northern, eastern, and southern borders of the proposed site; trees along the northern portion of the site, adjacent to Stevens Way NE appear to have been recently topped. A total of 87 trees are located on the site that meet the City of Seattle's definition of significant trees. Of these trees, 43 trees meet the City of Seattle's designation of Exceptional Trees¹ with 36 of these trees

¹ City of Seattle Department of Planning and Development – Director's Rule 16-2008.

considered Exceptional due to being part of a Grove. The Grove is located within the eastern portion of the site.

Surrounding Area

The proposed *Life Sciences Building Project* site is located in the Central Campus area of the University of Washington campus, which is characterized by the historic core of the University and its surrounding perimeter with a variety of uses including academic, student housing, and University support uses. Within the Original Core there are a number of significant buildings and open spaces including the Liberal Arts Quadrangle, Denny Yard, Memorial Way, Rainier Vista, Hub Yard, Parrington Lawn, and Central Plaza (see **Figure 2-3** for an aerial map of the proposed site and surrounding area).

The area to the north of the site, across Stevens Way NE, is comprised of the approximately 2.5-acre Medicinal Herb Garden which is utilized and maintained by the Department of Biology, and Benson Hall which is home to the University's Department of Chemical Engineering and Department of Environmental Health and Safety. Further to the north are a number of other academic buildings (i.e., Bagley Hall and the Chemistry Building) and the Drumheller Fountain.

To the east of the site are vegetated/landscaped areas, Garfield Place NE, and associated pedestrian/bicycle pathways. Further to the east are additional vegetated/landscaped areas and existing buildings associated with the School of Environmental and Forest Sciences, including Bloedel Hall, Anderson Hall, and the Winkenwerder Forest Sciences Laboratory. Open space and pedestrian walkways associated with Rainier Vista are located further to the east.

The area to the immediate south of the site is primarily comprised of the Burke-Gilman Trail and NE Pacific Street. Further to the south are the Magnuson Health Sciences Center and the South Campus area. The South Campus area is generally characterized by the Magnuson Health Sciences Center, the University of Washington Medical Center and uses along Portage Bay.

To the west of the site are Kincaid Hall, the Physics/Astronomy Auditorium, the Physics/Astronomy Tower, and the Physics/Astronomy Building. Further to the west are 15th Avenue NE and the West Campus area. The West Campus is generally comprised of a variety of University uses, including several new student housing facilities, academic uses and administrative/support uses; commercial uses are also located within the West Campus.

3.3.2 Environmental Impacts

Alternative 1 – Proposed Action

Development of the *Life Sciences Building Project* would consist of demolition of the existing Botany Greenhouse, Plant Laboratory, and Plant Laboratory Annex buildings, and replacement with an approximately 180,000 square foot academic/research building and approximately 22,000 square feet of greenhouse space (see **Figure 2-4** of Chapter 2 for the proposed site plan).

Construction Activities

Construction activities associated with the *Life Sciences Building Project* would occur primarily in the central and western portions of the site and would include: the removal of existing buildings (Botany Greenhouse, Plant Laboratory, and Plant Laboratory Annex buildings), pavement/gravel, landscaping (existing plant materials in the greenhouse structures would be protected and retained) and natural vegetation; excavation and grading; and, construction of the Life Science Building and greenhouse totaling approximately 202,000 square feet. It is anticipated that construction activities would begin in June 2016 with building occupancy in by June 2018.

An approximately 12,000-square foot construction staging area would be located on the eastern portion of the site and would allow for the protection of existing trees that are to be retained as part of the project. The construction of the Life Sciences Building is anticipated to occur in two phases in order to preserve the existing plant collections and minimize impacts to ongoing research in the existing greenhouse. During Phase 1, the smaller greenhouse (Plant Laboratory) would be demolished and the southern portion of the proposed new greenhouse would be constructed. As part of this phase, construction trucks would access the site from the west of Kincaid Hall and exit via Garfield Lane. During Phase 2, the existing plant collections would be moved to the new greenhouse and the existing remaining structures would be demolished to allow for the construction of the remainder of the Life Sciences Building.

Construction traffic would access the site from the west of Kincaid Hall and would exit through Garfield Lane, similar to the current site access. Construction vehicle traffic routes would also be coordinated between the general contractor/construction manager (GCCM) and the University of Washington and would be intended to minimize disturbance to the extent feasible, while also protecting pedestrian and vehicle safety in the area.

Demolition activities would include the demolition and removal of the Botany Greenhouse, Plant Laboratory, and Plant Laboratory Annex buildings from the site. Demolition of the buildings would be conducted in accordance with applicable local and state regulations.

In addition to building demolition, the limited amount of existing pavement on the site associated with driveways, walkways and other paved areas would be demolished and transported from site to a permitted regional recycling facility. Approximately 38 trees would be removed from the site to accommodate proposed construction.

Some site grading (cut, fill and site regarding) would be required to accommodate construction of buildings and associated facilities. Construction of the project under Alternative 1 would require approximately 24,700 cubic yards of cut/excavated materials and approximately 4,660 cubic yards of imported fill material. Due to site soil conditions, it is anticipated that none of the cut/excavated material would be used as project fill material.

Air Quality

Under the Proposed Action, construction activities on the site would generate air pollutants as a result of fugitive dust from demolition, earthwork/excavation activities, emissions associated with construction vehicles and equipment, as well as dust/emissions from other construction-related activities. Uses in nearby buildings such as Kincaid Hall, Benson Hall and Bloedel Hall could be sensitive to fugitive dust due to their proximity to the project site; pedestrians and bicyclists in the site vicinity (including users of the Burke-Gilman Trail) could also be sensitive to fugitive dust from construction at the site. It is anticipated that the air intakes of adjacent buildings would be temporarily ducted and protected to minimize the intake of fugitive dust and exhaust fumes during construction activities.

The primary types of pollutants expected during construction would be particulates and hydrocarbons. Gasoline or diesel-powered machinery used for demolition, excavation and construction would emit carbon monoxide and hydrocarbons. Such emissions, however, would be temporary in nature and localized to the immediate vicinity of the construction activity.

Trucks transporting excavated earth and/or construction materials would emit carbon monoxide and hydrocarbons along truck routes used by construction vehicles. No construction activity or off-site construction-related truck traffic would be expected to cause violations of applicable ambient air quality standards.

Demolition of existing buildings could potentially result in exposure to hazardous materials that may be located in the existing buildings. A survey of potential hazardous materials within the existing buildings would be conducted prior to demolition on the site. In the event that hazardous materials are found onsite, the materials would be treated and/or removed in accordance with all applicable regulations and standards.

Greenhouse Gas Emissions

Earth's Natural Climate and Human Influence on Climate

The global climate is continuously changing, as evidenced by repeated episodes of warming and cooling documented in the geologic record. The rate of change has typically been incremental, with warming or cooling trends occurring over the course of thousands of years. The past 10,000 years have been marked by a period of incremental warming, as glaciers have steadily retreated across the globe. Scientists have observed, however, an unprecedented increase in the rate of warming in the past 150 years. This recent warming has coincided with the global Industrial Revolution, which resulted in widespread deforestation to accommodate development and agriculture and an increase in the use of fossil fuels which has released substantial amounts of greenhouse gases into the atmosphere.

Greenhouse gases (GHG) such as carbon dioxide, methane and nitrous oxide trap heat in the atmosphere and are emitted by both natural processes and human activities. The accumulation of GHG in the atmosphere affects the earth's temperature. While research has shown that earth's climate has natural warming and cooling cycles, evidence indicates that human activity has elevated the concentration of GHG in the atmosphere beyond the level of naturally occurring concentrations resulting in more heat being held within the atmosphere. The Intergovernmental Panel on Climate Change (IPCC), an international group of scientists from 130 governments has concluded that it is "very likely" (a probability listed at more than 90 percent) that human activities and fossil fuels explain most of the warming over the past 50 years.²

The IPCC predicts that under current human GHG emission trends, the following results could be realized within the next 100 years:³

- global temperature increases between 1.1 – 6.4 degrees Celsius;
- potential sea level rise between 18 to 59 centimeters or 7 to 22 inches;
- reduction in snow cover and sea ice;
- potential for more intense and frequent heat waves, tropical cycles and heavy precipitation; and
- impacts to biodiversity, drinking water and food supplies.

The Climate Impacts Group (CIG), a Washington-state based interdisciplinary research group which collaborates with federal, state, local, tribal, and private agencies, organizations, and businesses, studies impacts of natural climate variability and global climate change on the

² IPCC, Fourth Assessment Report, February 2, 2007.

³ IPCC, Summary for Policymakers, April 30, 2007.

Pacific Northwest. CIG research and modeling indicates the following possible impacts of human-based climate change in the Pacific Northwest:⁴

- changes in water resources such as decreased snowpack; earlier snowmelt; decreased water for irrigation, fish and summertime hydropower production; increased conflict over water; and increased urban demand for water.
- changes in salmon migration and reproduction.
- changes in forest growth and species diversity and increases in forest fires; and
- changes along the coast such as increased coastal erosion and beach loss due to rising sea levels; increased landslides due to increased winter rainfall, permanent inundation in some areas; and increased coastal flooding due to sea level rise and increased winter streamflow.

Regulatory Context for Global Climate Change

United States Environmental Protection Agency – The United States Environmental Protection Agency (USEPA) is charged with enforcing the Clean Air Act and has established air quality standards for common pollutants. In addition, the USEPA has been directed to develop regulations to address the GHG emissions of cars and trucks. At the time of this writing, however, EPA regulations for GHGs have not yet been developed.

Western Regional Climate Action Initiative – On February 26, 2007, the Governors of Arizona, California, New Mexico, Oregon and Washington signed the Western Climate Initiative (WCI) to develop regional strategies to address climate change. WCI is identifying, evaluating and implementing collective and cooperative ways to reduce greenhouse gases in the region. Subsequent to this original agreement, the Governors of Utah and Montana as well as the Premiers of British Columbia and Manitoba joined the Initiative. The WCI objectives include setting an overall regional reduction goal for GHG emissions, developing a design to achieve the goal and participating in [The Climate Registry](#), a multi-state registry to enable tracking, management, and crediting for entities that reduce their GHG emissions. No regulatory guidance has been provided from WCI to date, however.

On June 8, 2007, Washington Gov. Christine Gregoire and British Columbia Premier Gordon Campbell signed a [Memorandum of Understanding](#) to launch a collaborative effort to cap and significantly reduce greenhouse gas emission and to collaborate on the innovation and implementation of clean technologies. No regulatory guidance has been provided from this initiative to date.

State of Washington – In February of 2007, Governor Christine Gregoire signed [Executive Order No. 07-02](#) establishing goals for reductions in climate pollution, increases in jobs, and reductions in expenditures on imported fuel. This statewide effort is intended to address climate change, grow the clean energy economy and move Washington toward energy

⁴ Climate Impacts Group, [Climate Impacts in Brief](http://www.cses.washington.edu/cig/pnwc/ci.shtml), accessed February 7, 2008, <http://www.cses.washington.edu/cig/pnwc/ci.shtml>.

independence. This executive order directed the Washington departments of Ecology and Community, Trade and Economic Development to lead the "[Washington Climate Challenge](#)," a process intended to engage business, community and environmental leaders over the next year. Washington Climate Challenge was directed to consider the full range of policies and strategies that could be adopted to achieve the goals established by the Governor.

In 2007, the Washington legislature passed SB 6001, which among other things, adopted the Governor's Climate Change Challenge goals into statute and created a performance standard for electrical utilities that serve Washington. Utilities may capture and store (sequester) carbon associated with the production of electricity to meet the performance standard. By June 2008, Ecology is to have rules on implementing the standard and how sequestration plans will be approved. No regulatory guidance has been provided from Ecology to date.

In 2008, the Washington Legislature passed E2SHB 2815, the Greenhouse Gas Emissions Bill. While SB 6001 set targets to reduce emissions, the E2SHB 2815 made those firm requirements and directed the state to submit a comprehensive GHG reduction plan to the Legislature by December 1, 2008. As part of the plan, Ecology was mandated to develop a system for reporting and monitoring GHG emissions within the state and a design for a regional multi-sector, market-based system to reduce statewide GHG emissions.

Ecology also issued a memorandum in 2008⁵ which stated that climate change and GHG emissions should be included in all State Environmental Policy Act (SEPA) analyses and committed to providing further clarification and analysis tools.

In 2009, Executive Order 09-05 was signed ordering Washington state actions to reduce climate-changing GHG emissions, to increase transportation and fuel-conservation options for Washington residents, and protect the state's water supplies and coastal areas. The Executive Order directs state agencies to: develop a regional emissions reduction program; develop emission reduction strategies and industry emissions benchmarks to make sure 2020 reduction targets are met; work on low-carbon fuel standards or alternative requirements to reduce carbon emissions from the transportation sector; address rising sea levels and the risks to water supplies; and, increase transit options, such as buses, light rail, and ride-share programs, and, give Washington residents more choices for reducing the effect of transportation emissions.

On June 1, 2010, Ecology issued draft guidelines entitled, *Guidance on Climate Change and SEPA*. These draft guidelines included: guidance regarding the types of GHG emissions that should be calculated; a discussion of how to determine if emissions surpass a threshold of "significance"; and, a description of different types of mitigation measures. Guidance was also provided regarding the requirement to discuss the ability of a proposal to adapt to

⁵ Manning, Jay. RE: Climate Change - SEPA Environmental Review of Proposals, April 30, 2008.

climate changes as a result of global warming. In 2011, Ecology narrowed the focus of the draft guidelines and in its place developed internal guidance for Ecology staff to use when Ecology is the lead agency or an agency with jurisdiction in *Guidance for Ecology Including Greenhouse Gas Emissions in SEPA Reviews* and *SEPA GHG Calculation Tool*. Ecology began using this guidance document in June 2011 and planned to update the document based on feedback from users.

City of Seattle – On December 3, 2007, the Seattle City Council adopted Ordinance 122574 that requires City departments that perform environmental review under the State Environmental Policy Act (SEPA) to evaluate GHG emissions when reviewing permit applications for development. King County began this evaluation in October 2007, becoming the nation’s first local government to officially add GHG emissions to the environmental review of construction projects. Seattle was one of the first cities in the country to require such a review.

The Seattle City Council adopted Comprehensive Plan goals and policies in 2007 related to achieving reductions in GHG emissions. To carry out these goals and policies, assessment of greenhouse gas emissions from proposed development is required. Under this assessment, developers for projects that trigger environmental review are required to identify the climate change impact of their proposals as shown by calculating the GHG emissions. At this point, the legislation does not require changes in the development proposals as a result of the review. Instead, the requirement is a first step toward limiting the potential negative effects of construction projects on the environment by disclosing emissions.

University of Washington – The University of Washington is a signatory on the American College and University Presidents Climate Commitment. The University is also one of the founding partners of the Seattle Climate Partnerships and has prepared an initial quantitative estimate of the University’s GHG emissions profile. In October 2007, the University of Washington also released the “2005 Inventory of Greenhouse Gas Emissions Ascribable to the University of Washington” which provided a quantitative estimate of the total GHG emissions produced on the University of Washington Campus.

Existing Greenhouse Gas Emissions – In order to provide a context for GHG emissions associated with the *Life Sciences Building Project*, it is useful to consider the estimated overall emissions. A 2007 study⁶ provided the statistics shown in **Table 3.3-1** for GHG for Central Puget Sound, Washington and the United States.

⁶ City of Seattle, *Seattle’s Community Carbon Footprint*, October 29, 2007.

**Table 3.3-1
COMPARISON OF GREENHOUSE GAS EMISSIONS**

	2005 Population	Estimate of Annual Greenhouse Gas Emissions (tons/year)
United States	296,410,404	7,100,000,000
Washington State	6,256,400	88,000,000
Seattle	573,911	6,600,000

Source: Seattle’s Community Carbon Footprint, City of Seattle, October 29, 2007.

Impacts of the Proposed Action

Climate change is a global problem, and it is not possible to discern the impact that greenhouse gas emissions from a single development project will have on global climate change.

Neither the federal Environmental Protection Agency, State of Washington nor City of Seattle currently have regulations in place to provide guidance on analysis of the impacts of climate change and associated greenhouse gas emissions. For the purposes of discussion of the climate change impacts of the Proposed Action for this EIS, the *SEPA Greenhouse Gas Emissions Worksheet* formulated by King County (see **Appendix C** for the completed worksheet) was used to grossly estimate the emissions footprint of the Proposed Action for the lifecycle of the development⁷; specifically:

- The extraction, processing, transportation, construction and disposal of materials and landscape disturbance (embodied emissions);
- Energy demands created by the development after it is completed (energy emissions); and
- Transportation demands created by the development after it is completed (transportation emissions).

It is anticipated that the proposed development under the Proposed Action would generate GHG emissions associated with construction activities (including demolition), production/extraction of construction materials, energy consumption from construction and operation, and vehicle emissions from associated delivery vehicle trips. Over the lifespan of the building, the proposed *Life Sciences Building Project* would generate approximately 210,455 MTCO_{2e} emissions, which would equate to approximately 3,367 MTCO_{2e} annually over an assumed building lifespan of 62.5 years (see **Appendix C** for further details).

⁷ The King County worksheet was utilized rather than the Washington State Department of Ecology form because the King County Worksheet calculation characteristics most closely reflect those of the Proposed Action

Noise

During construction, localized sound levels would temporarily increase in the vicinity of the site and streets used by construction vehicles accessing the construction site. The increase in sound levels would depend upon the type of equipment being used, the duration of such use, and the proximity of the equipment to the property line. Sound levels within 50 feet of construction equipment often exceed the levels typically recommended for institutional land uses and, in general, decrease at a rate of about 6 dBA for each doubling of distance from the noise source. Average noise levels associated with various types of construction equipment are listed in **Table 3.3-2**. For a relative comparison, **Table 3.3-3** provides a list of typical sound levels for a variety of activities.

**Table 3.3-2
TYPICAL NOISE LEVELS FROM CONSTRUCTION EQUIPMENT⁸**

Equipment	Average Noise Level (dBA measured 50 ft. from the equipment)
Dump Truck (15-20 cu.yd. capacity)	91
Scraper	88
Backhoe	85
Concrete Mixer	85
Concrete Pump	82
Air Compressor	81
Bulldozer (D-8)	80
Generator	78
Pump	76

**Table 3.3-3
TYPICAL SOUND LEVELS**

Noise Source	dB(A)
Aircraft Carrier Flight Deck Operations	140
Threshold of Pain	130-140
Fireworks	130
Jet Takeoff (200 ft. distance)	120
Jack Hammer	120
Auto Horn (3 ft. distance)	120
Chain Saw/Noisy Snowmobile	110
Jet Takeoff (2,000 ft. distance)	105
Noisy Motorcycle (50 ft. distance)	100
Heavy Truck (50 ft. distance)	90
Busy Urban Street	80
Normal Automobile, Commercial Area	70
Normal Conversation (3 ft. distance)	60

⁸ United States EPA, 1971

Table 3.3-3 Continued

Noise Source	dB(A)
Moderate Rainfall	50
Quiet Residence, Library	40
Bedroom at Night or Whisper	30
Rustle of Leaves	10
Threshold of Hearing	0

Source: EPA, 1978; EPA, 1972

Construction noise would result in temporary annoyance and possibly increased speech interference near the construction site. These impacts would temporarily affect adjacent uses in the site vicinity, particularly academic uses in nearby buildings (Kincaid Hall, Benson Hall and Bloedel Hall); construction noise may also be perceived by pedestrians in the area, including users of the Burke-Gilman Trail to the south. Construction-related noise would be temporary in nature and could result in temporary impacts to adjacent University uses. To minimize the potential for construction activities to interfere with academic and other activities at the adjacent buildings and uses, measures such as limiting the use of higher noise equipment, ensuring properly sized/maintained mufflers and other silencers, and limiting the hours of construction would be implemented (See **Section 3.3.3**, Mitigation Measures, for detail).

Vibration

Operation of heavy construction equipment during construction of the Proposed Action, such as drilling rigs, excavators, and haul trucks, would create waves that radiate along the surface and downward into the earth; the waves dissipate with distance from the source. These surface waves can be felt as ground vibration and create the potential to affect sensitive research uses that employ highly sensitive equipment such as electron microscopy.

Given that the adjacent engineering, physics/astronomy and forestry programs do not typically employ highly sensitive equipment, vibration conditions at adjacent buildings would be typical of University of Washington construction projects and would not be anticipated to result in significant impacts. However, to the extent feasible, construction activities would utilize practices that would minimize vibration levels, such as the use of sawcutting for concrete removal in lieu of using impact tools.

Trees

The site contains 87 existing trees, of which 43 would be considered to be exceptional per City of Seattle Director's Rule 16-2008. Approximately 38 existing trees would be removed as part of the proposed *Life Sciences Building Project*, including approximately eight meeting the definition of exceptional trees; approximately 35 existing trees meeting the definition of exceptional trees would be retained on the site (including the mature Deodar cedar trees along NE Stevens Way and the majority of the grove in the eastern portion of the site). The

Life Sciences Building would be located to minimize impacts to major structural roots of the existing Deodar cedars and a temporary bridge would be provided over the Deodar cedar root area to minimize impacts from construction vehicles. Tree replacement on the site would be intended to meet or exceed the typical University of Washington requirement to provide a tree replacement ratio of 1:1. Proposed tree removal and replacement would be intended to meet or exceed the City of Seattle's tree replacement requirements and would be in accordance with the University of Washington's Tree Management Plan.

The landscape design for the proposed *Life Sciences Building Project* would be consistent with the University's landscape design standards and is intended to protect the existing trees on the site to the extent feasible. The proposed design would follow the character of the woodland landscape where buildings and circulation spaces respond to the natural sloped conditions of the area, and circulation pathways, terraces and exterior spaces would be woven into the landscape design. The proposed landscaping would surround the building and create terraces at entry points and gathering areas on the site. New landscaping would include hardscape areas, planted areas, and site furnishings such as seating, benches, and site lighting.

Alternative 2 – No Action Alternative

Under Alternative 2, the proposed *Life Sciences Building Project* would not be constructed and no construction-related impacts would occur.

Cumulative Impacts

As indicated in **Chapter 2** (Proposed Action and Alternatives) of this SEIS, there are several known separate projects on the University of Washington campus and in the vicinity of the site where certain phases of construction could occur during anticipated construction of the *Life Sciences Building Project*. These separate projects include: UW Burke-Gilman Trail Improvement; UW Police Department Building; UW Southwest Campus Central Utility Plant; UW Rainier Vista/Montlake Triangle; UW Medical Center Phase 2; Sound Transit University Station; UW Computer Sciences; UW North Campus Student Housing; and, Bryant Building Park (refer to **Chapter 2**, Proposed Action and Alternatives, for additional detail on these separate projects and **Figure 2-13** of Chapter 2 for a map of the separate projects in the site vicinity).

All temporary construction activities associated with these separate projects would occur in compliance with applicable University of Washington and/or City of Seattle regulations and guidelines, including hours of construction activity. Additionally, all area projects would prepare Construction Management Plans to control and mitigate potential transportation issues during the construction process.

Air Quality

Construction-related air pollutants and emissions associated with the development of the proposed *Life Sciences Building Project* would be generated during the same general timeline as air pollutants and emissions associated with some of the separate projects in the site vicinity. Construction-related air pollutants and emissions from the *Life Sciences Building Project* would combine with pollutants and emissions from separate projects in the site vicinity to cumulatively increase emissions on a temporary basis in the general area.

However, it is anticipated that potential air quality impacts associated with construction would be temporary in nature and impacts would primarily be localized to the immediate vicinity of the construction activity at the alternative sites: Kincaid Hall, Benson Hall and Bloedel Hall, as well as users of the Burke-Gilman Trail to the south. Cumulatively, no significant short-term or long-term impacts on air quality would be anticipated with the construction of the known separate projects together with the *Life Sciences Building Project*.

Greenhouse Gas Emissions

As described above, it is not possible to determine the impact that a single development project will have on global climate change. Nonetheless, King County's SEPA Guidance Greenhouse Gas Emissions Worksheet was used to estimate emissions for the lifecycle of the proposed *Life Sciences Building Project* (see **Appendix C**).

Noise

Noise associated with the construction of the *Life Sciences Building Project* and other separate projects in the area would result in a cumulative increase in noise in the area and could create a temporary annoyance and possible increased speech interference. These impacts would temporarily affect adjacent uses in the site vicinity, particularly uses that are the most proximate to the construction areas. Noise impacts associated with construction activities on the alternative sites would primarily be localized to the immediate vicinity surrounding the individual sites; to the extent that construction sites are located adjacent to each other they could result in a cumulative increase in noise for nearby uses. Noise associated with construction-related traffic would result in a cumulative increase in noise along area roadways as additional construction traffic is combined with existing traffic in the area. Measures such as limiting the hours of construction, implementing a Construction Management Plan, and the types of equipment used would be implemented for each individual project to reduce the potential for noise impacts. No significant short-term or long-term noise impacts would be anticipated with the construction of the known separate projects together with the Proposed Action.

Vibration

Construction-related vibration associated with the development of the *Life Sciences Building Project* would be generated during the same general timeline as vibration associated with separate projects in the site vicinity. However, it is anticipated that potential vibration impacts associated with construction would be temporary in nature and impacts would primarily be localized to the immediate vicinity of each individual construction site (including Kincaid Hall, Benson Hall, Bloedel Hall). Because the other separate projects in the site vicinity are not located immediately adjacent to the alternative sites, it is anticipated that no significant short-term or long-term cumulative impacts from vibration would occur with the construction of the known separate projects, together with the development of the proposed *Life Sciences Building Project*.

Trees

Tree removal associated with the construction of the *Life Sciences Building Project* and other separate projects in the area would result in a cumulative loss of trees within the area. It is anticipated that applicable tree removal and replacement standards would be followed for each project, as applicable. To the extent that these projects are under the authority of the University of Washington, tree removal and replacement would be provided on each individual project site and would be intended to meet or exceed the City of Seattle's tree replacement requirements and be in accordance with the University's Tree Management Plan. With the implementation of mitigation measures (e.g., tree replacement), significant construction-related tree impacts on a cumulative basis would not be anticipated.

3.3.3 Mitigation Measures

The following measures would be implemented to mitigate potential construction impacts from the development of the proposed *Life Sciences Building Project*.

Air Quality

The following measure would be implemented to mitigate potential construction-related air quality impacts from the development of the *Life Sciences Building Project*.

- Site development would adhere to the Puget Sound Clean Air Agency (PSCAA) regulations regarding demolition activity and fugitive dust emissions, including: wetting of exposed soils, covering or wetting of transported earth materials, washing of truck tires and undercarriages prior to travel on public streets, and prompt cleanup of any materials tracked or spilled onto public streets.

- The University and project contractor would coordinate to temporarily duct and protect air intakes of adjacent buildings to minimize the potential for the intake of fugitive dust and exhaust fumes.
- A survey of potential hazardous materials within the existing buildings would be conducted prior to demolition on the site. In the event that hazardous materials are found onsite, the materials would be treated and/or removed in accordance with all applicable regulations and standards.

Greenhouse Gas Emissions

The following measure would be implemented to mitigate potential GHG emission impacts from the development of the *Life Sciences Building Project*.

- Continued implementation of the University's Transportation Management Plan (TMP) would reduce vehicle trips to the campus (including the *Life Sciences Building Project*), thereby reducing GHG emissions. Implementation of a Construction Management Plan would also help to control transportation issues during construction and could reduce construction-related GHG emissions.

Noise

Because of the proximity of academic and other University uses near the site, the University agrees that the mitigation of construction-related noise impacts is important and they are committed to the measures listed below. The following measures would be implemented to mitigate potential construction-related noise impacts from the development of the *Life Sciences Building Project*.

- Placement of materials and backing up of trucks could be done without warning beepers (with a flagger walking behind the vehicle).
- Alternate white noise backup warning systems would be installed (as allowed by Washington State construction safety regulations, WAC 296-155-605).
- Low noise portable air compressors would be used where feasible.
- Nighttime activities would not exceed allowable noise levels.
- The use of noise impact-type equipment, such as pavement breakers, pile drivers, jackhammers, sand blasting tools, and other impulse noise sources would be limited to work activity between 8 AM and 5 PM on weekdays.
- Whenever appropriate, hydraulic impacts tools with electric models would be substituted to further reduce demolition and construction-related noise.
- Loud talking, music, or other miscellaneous noise-related activities would be limited.

- Construction noise would be reduced with properly sized and maintained mufflers, engine intake silencers, engine enclosures, and turning-off idling equipment.
- Truck haul routes would be jointly developed by the UW, SDOT and DPD and approved by SDOT.

Vibration

The following measures would be implemented to mitigate potential construction-related vibration impacts from the development of the *Life Sciences Building Project*.

- To the extent feasible, construction activities would utilize practices that would minimize vibration, such as the use of sawcutting for concrete removal in lieu of using impact tools.
- Orientation would be provided for all construction workers to inform them of the importance of minimizing impacts to adjacent buildings, including vibration.
- Advanced notification could be provided to surrounding buildings and uses to inform them of construction activities that would cause vibration (e.g., drilling of soldier piles). Early notification would allow surrounding uses to prepare in advance of potential vibration activities.

Trees

The following measure would be implemented to mitigate potential construction-related tree impacts from the development of the *Life Sciences Building Project*.

- The existing Deodar cedar trees along Stevens Way NE would be retained as part of the project and protected during construction. The building would be located to minimize impacts to major structural roots of the existing Deodar cedar trees and a temporary bridge would be provided over the Deodar cedar root area to minimize impacts from construction vehicles.
- Tree removal and replacement would be intended to meet or exceed the City of Seattle's tree replacement requirements and be in accordance with the University's Tree Management Plan.

3.3.4 Significant Unavoidable Adverse Impacts

Construction of the proposed *Life Sciences Building Project* would result in some construction-related air quality, GHG emissions, noise, vibration, and tree impacts that would be unavoidable with the proposed project. However, with the implementation of proposed mitigation measures, construction activities would not be anticipated to result in significant impacts to surrounding uses.

3.4 TRANSPORTATION

This section of the Draft SEIS describes and evaluates the potential impacts associated with the transportation from the *Life Sciences Building Project* under Alternative 1 (Proposed Action) and Alternative 2 (No Action Alternative). Transportation impacts (vehicle circulation, pedestrian circulation and parking) evaluated in this section include impacts associated with construction and operation of the *Life Sciences Building Project*.

3.4.1 Affected Environment

Site

The approximately 3.1-acre proposed Life Sciences Building site is located in the Central Campus of the University of Washington and is generally bounded by Stevens Way NE to the north, vegetated open space areas associated with Garfield Place NE to the east, the Burke Gilman Trail to the south, and Kincaid Hall to the west (see **Figure 2-1** of Chapter 2 for a map of the University of Washington campus).

Vehicular access to the site is provided from Garfield Place NE (to the east) via a gravel roadway that travels along the southeast portion of the site; Garfield Place NE connects with Stevens Way NE to the northeast of the site to provide vehicular circulation to the surrounding campus area. An existing gravel parking area (a portion of University Parking Area C10) is located adjacent to the gravel roadway and the Plant Lab Building; this area provides parking for approximately four vehicles. Bicycle parking is also provided on the site, including approximately 18 bicycle lockers in the northwest corner of the site (within the Kincaid Hall plaza) and approximately 62 bicycle parking stalls at the southwest corner of the site (adjacent to the Burke Gilman Trail near the Kincaid Hall loading area).

Several existing pedestrian pathways traverse through and adjacent to the Life Sciences Building site to provide pedestrian connections with Stevens Way NE. The primary pedestrian pathway connection is located along the western edge of the site (between the existing Greenhouse and Kincaid Hall) and provides an accessible connection between Stevens Way NE, the Burke Gilman Trail, and the Hitchcock Bridge (which provides pedestrian and bicycle access over NE Pacific Street to the Health Sciences Center). Gravel pedestrian pathways are located along the north portion of the site and provide direct access from Stevens Way NE to the existing buildings on the site. An additional paved pathway is also located near the eastern edge of the site and provides access between Stevens Way NE, the Burke Gilman Trail and the T-Wing Overpass (which provides direct access over NE Pacific Street to the Health Sciences Center). See **Figure 2-2** of Chapter 2 for a map of the existing site survey.

Surrounding Area

Primary transportation facilities in the vicinity of the Life Sciences Building site include Stevens Way NE (to the north) and the Burke Gilman Trail (to the south). Stevens Way NE is one of the primary internal vehicular roadways through the Central Campus Area and connects with Memorial Way NE at the north end of the Central Campus and NE Grant Lane at the southwest portion of the Central Campus. The roadway also serves as the primary transit route through the Central Campus and includes numerous transit stops.

The Burke Gilman Trail is a heavily used regional multi-use trail that connects the City of Seattle with the Cities of Kenmore and Bothell to the northeast. The approximately 20-mile trail travels through a portion of the University of Washington campus, including to the south of the proposed *Life Sciences Building Project* site. The Burke Gilman Trail is approximately 13 feet wide in the vicinity of the project site and provides connections to the Health Sciences Center and University of Washington Medical Center, as well as areas to the east and west. Improvements to the Burke Gilman Trail are currently being designed as part of a separate project and would include widening of the trail in several areas.

3.4.2 Environmental Impacts

Alternative 1 – Proposed Action

Construction Traffic

During construction, the proposed staging area would be located on the eastern portion of the project site. The approximately 12,000-square foot staging area would be located to avoid the existing trees that are to be retained as part of the project and would be adjacent to the proposed construction access roadway to the site.

Construction access to the site for the development of Phase 1 (demolition of the smaller greenhouse and construction of the new greenhouse) would occur from the west of Kincaid Hall and connect with the proposed construction access roadway along the south portion of the project site; construction traffic would exit the site to the east via Garfield Lane NE to Stevens Way NE. During Phase 2 (demolition of the remaining onsite structures and construction of the Life Sciences Building), construction traffic would continue to access the site from the west of Kincaid Hall and travel along the southern portion of the site through a 25-foot wide roadway between the excavation area and the new greenhouse; construction traffic would continue to exit the site as described for Phase 1. During construction, existing buildings to the west and east of the site (i.e., Kincaid Hall) will maintain access from Stevens Way NE using their existing driveways; however, construction traffic are anticipated to use portions of these driveways at times during the construction process which could result in temporary increased congestion at these access points.

It is estimated that construction under Alternative 1 would require approximately 24,700 cubic yards (cu. yd.) of cut material and 4,660 cu. yd. of fill material. With a 20 percent expansion rate, and assuming 22 cubic yards capacity per truck, this would result in approximately 1,600 truck trips generated to and from the site during the development of the proposed *Life Sciences Building Project*. Truck trips associated with the construction process would be distributed over multi-day periods and during non-peak times, so significant traffic impacts associated with the estimated truck traffic would not be anticipated.

Pedestrian and bicycle routes through and adjacent to the site would be temporarily affected by construction of the *Life Sciences Building Project*. Bicycle and pedestrian traffic that currently utilizes the Stevens Way NE sidewalk that is adjacent to the site would likely be rerouted to the north side of Stevens Way NE. Bicycle and pedestrian traffic on the Burke Gilman Trail adjacent to the site may also be rerouted during construction. Trail users could be rerouted to the north onto Stevens Way NE and reconnect with the Burke Gilman Trail to the west of the Physics/Astronomy Auditorium and west of the School of Environmental and Forestry Sciences. If necessary, the exact route for rerouting Burke Gilman Trail traffic would be reviewed and approved by the University of Washington and the City of Seattle.

During construction, the existing four vehicle parking stalls on the site are anticipated to be temporarily displaced. Parking would be available in the site vicinity (Lot C10 to the west and C7 to the north) for staff to utilize the Plant Lab during Phase 1 of construction. Existing bicycle parking on the site includes approximately 18 bicycle lockers in the northwest corner of the site (within the Kincaid Hall plaza) and approximately 62 bicycle parking stalls at the southwest corner of the site (adjacent to the Burke Gilman Trail near the Kincaid Hall loading area). These existing bicycle parking areas would be temporarily displaced during construction of the *Life Sciences Building Project* and provisions for temporary replacement bicycle parking would be provided by the University of Washington.

Development of a construction management plan would help alleviate construction impacts on the surrounding on- and off-campus roadway networks. It is suggested that construction truck trips be limited to non-peak hours and a construction truck route be defined to reduce the impacts on the adjacent roadway systems. This plan should also include a safe route around the construction site for pedestrians and bicyclists and could include provisions for the temporary replacement of existing bicycle parking.

Operational Traffic

Subsequent to construction, vehicular access to the proposed *Life Sciences Building Project* would continue to be provided from the east side of the site via a paved driveway through the northeast portion of the site that would connect the building with Garfield Lane NE and Stevens Way NE (see **Figure 2-4** of Chapter 2 for the site plan and illustration of proposed access to the site). The paved driveway would provide vehicular access with the proposed loading dock and loading areas for the Life Sciences Building. Access would primarily be for building facilities staff and loading/unloading and no visitor or staff parking would be provided. Similar to the parking procedures for many other University buildings on campus,

no new general public parking would be provided on the site. Staff, visitors and students would be anticipated to parking in surrounding University Parking Areas (i.e., University Parking Area C10 to the west, the Central Plaza Garage to the north, or University Parking Area E1 to the east).

Pedestrian and bicycle access would be restored subsequent to construction of the proposed *Life Sciences Building Project*. The pedestrian sidewalk along the southside of Stevens Way NE (approximately 400 linear feet) would be replaced at the same width and material as the existing conditions. In addition, new informal gravel pathways would be provided beneath the existing retained trees along the south side of Stevens Way NE to provide additional pedestrian connections between the *Life Sciences Building Project* and Stevens Way NE.

The existing pedestrian pathway between Kincaid Hall and the project site would be replaced with a new pathway to restore the connection between Stevens Way NE, the Burke Gilman Trail, and the Hitchcock Bridge. This connection serves as an important link between the Central Campus and South Campus, and provides a direct connection to Hitchcock Hall and the Health Sciences Center. A plaza area would also be provided within this area between Kincaid Hall and the *Life Sciences Building Project* to provide a gathering space and event space area with seating for visitors and pedestrians/bicyclists.

New bicycle parking spaces would be provided at the western edge of the site, near the plaza adjacent to the Burke Gilman Trail. The number of bicycle parking spaces would be consistent with University of Washington requirements (approximately 50 to 100 bicycle parking spaces).

Alternative 2 – No Action Alternative

Under Alternative 2 – No Action Alternative, development of the *Life Sciences Building Project* would not occur at this time. The existing transportation conditions would remain on the site and no construction-related transportation impacts would occur at this time.

3.4.3 Mitigation Measures

The following mitigation measures would be implemented to minimize potential transportation-related impacts from the proposed *Life Sciences Building Project*.

- Construction activities would occur in compliance with applicable University of Washington and City of Seattle regulations and would include the preparation of a Construction Management Plan to control and minimize potential construction-related transportation issues.
- The proposed *Life Sciences Building Project* would enhance the existing pedestrian and bicycle connection between Stevens Way NE and the Hitchcock Bridge (to the west of the site and adjacent to Kincaid Hall). The proposed connection would be ADA accessible and include enhanced features including seating areas and an adjacent

plaza/gathering space between Kincaid Hall and the proposed *Life Sciences Building Project*.

- The proposed *Life Sciences Building Project* would provide new bicycle parking spaces near the plaza adjacent to the Burke Gilman Trail. The number of bicycle parking spaces would be consistent with University of Washington requirements.
- The proposed *Life Sciences Building Project* would fall under the provisions of the University of Washington's Transportation Management Plan (TMP), including elements such as parking pricing and the U-Pass Program to help reduce single-occupancy vehicle trips and encourage transit use, carpooling and other alternative modes of transportation.

3.4.4 Significant Unavoidable Adverse Impacts

With the implementation of the mitigation measures described above, significant unavoidable adverse transportation impacts would not be anticipated.

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Historic and Cultural Resources Report

DRAFT—Cultural Resources Inventory for the
University of Washington Life Sciences Building Project,
City of Seattle, King County, Washington

Submitted to:
EA Engineering, Science, and Technology, Inc.

Submitted by:
Historical Research Associates, Inc.
Chrisanne Beckner, MS
Alexander Stevenson, MS
Jenny Dellert, MA

Seattle, Washington
June 2015



HISTORICAL
RESEARCH
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This report was prepared by HRA Principal Investigator Alexander Stevenson, MS, who meets the Secretary of the Interior's professional qualifications standards for archaeology, Architectural Historian Chrisanne Beckner, MS, who meets the Secretary of the Interior's professional qualifications standards for architectural history, and Archaeologist Jenny Dellert, MA, who meets the Secretary of the Interior's professional qualification standards for archaeology. This report is intended for the exclusive use of the Client and its representatives. It contains professional conclusions and recommendations concerning the potential for project-related impacts to archaeological resources based on the results of HRA's investigation. It should not be considered to constitute project clearance with regard to the treatment of cultural resources or permission to proceed with the project described in lieu of review by the appropriate reviewing or permitting agency. This report should be submitted to the appropriate state and local review agencies for their comments prior to the commencement of the project.

Executive Summary

The University of Washington (UW) proposes to construct a new Life Sciences Building on its Seattle Campus at a site bounded by Kincaid Hall to the west, W Stevens Way NE to the north, the Burke-Gilman Trail to the south, and open space areas associated with Garfield Place to the east. The project will entail demolition of two existing greenhouses and associated buildings on the site, and construction of an approximately 173,000 square-foot (sq ft) new Life Sciences Building and a greenhouse of approximately 25,000 sq ft.

The Project is subject to state permitting oversight and review under the State Environmental Policy Act (SEPA) for which UW is considering the environmental impacts. Historical Research Associates, Inc. (HRA), was retained by EA Engineering, Science, and Technology, Inc., to conduct a cultural resources inventory of the area of impacts (AI), defined as the area where ground disturbance was anticipated, as well as the view shed that the new Life Sciences Building would impact.

Literature review as well as surface and subsurface archaeological inventory revealed that the AI had been the subject of significant development and installation of underground utilities. No archaeological resources were identified during this inventory. Site 45KI957, a precontact lithic scatter, was documented just south of the greenhouses within the AI in 2009. While no subsurface inventory was performed within the site boundaries during the 2014 inventory, using data from the current effort as well as previous cultural resources inventory work along the Burke-Gilman Trail, it appears that this site is not in primary context. HRA recommends this resource as ineligible for the National Register of Historic Places (NRHP) because it does not meet any of the necessary criteria for listing. No further cultural resources work (e.g., archaeological monitoring) is recommended for archaeological resources; however, HRA recommends that ground-disturbing activities take place under an inadvertent discovery plan so that in the unlikely event of an archaeological discovery during construction protocols for dealing with the resource are outlined and available to construction personnel.

HRA inventoried four previously unrecorded buildings, structures, and objects within the AI that meet the age criteria to be assessed for eligibility to the NRHP. HRA also performed research under the guidance of the 2003 University of Washington Master Plan–Seattle Campus (UW Master Plan). A combination of archival research and field survey leads HRA to recommend that three of these four resources be found eligible for listing in the NRHP. Of these resources, HRA recommends that only one would be adversely impacted by the Project. The Plant Lab, which dates from 1939, is

significant for its architectural qualities and is proposed for demolition under the current project. HRA recommends mitigation efforts including Department of Archaeology and Historic Preservation (DAHP) Level II documentation and/or public education efforts as mitigation for adverse impacts.

If the Project is subject to major changes, HRA recommends further cultural resource review.

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1. Introduction and Project Description

The University of Washington (UW) proposes to construct a new Life Sciences Building on its Seattle Campus (the Project) at a site bounded by Kincaid Hall to the west, W Stevens Way NE to the north, the Burke Gilman Trail to the south, and open space areas associated with Garfield Place to the east (Figure 1-1). Plans for the new building are unavailable at this time, but the Project will entail demolition of two existing greenhouses and associated buildings on the site, and construction of an approximately 173,000 square-foot (sq ft) new Life Sciences Building and a greenhouse of approximately 25,000 sq ft. The existing greenhouses slated for demolition and some of the surrounding buildings are over 45 years old. The project is therefore subject to review under the Washington State Environmental Policy Act (SEPA) as well as the 2003 University of Washington Master Plan—Seattle Campus (UW Master Plan), which outlines a review process for all projects that may alter buildings 50 years old or older on campus.

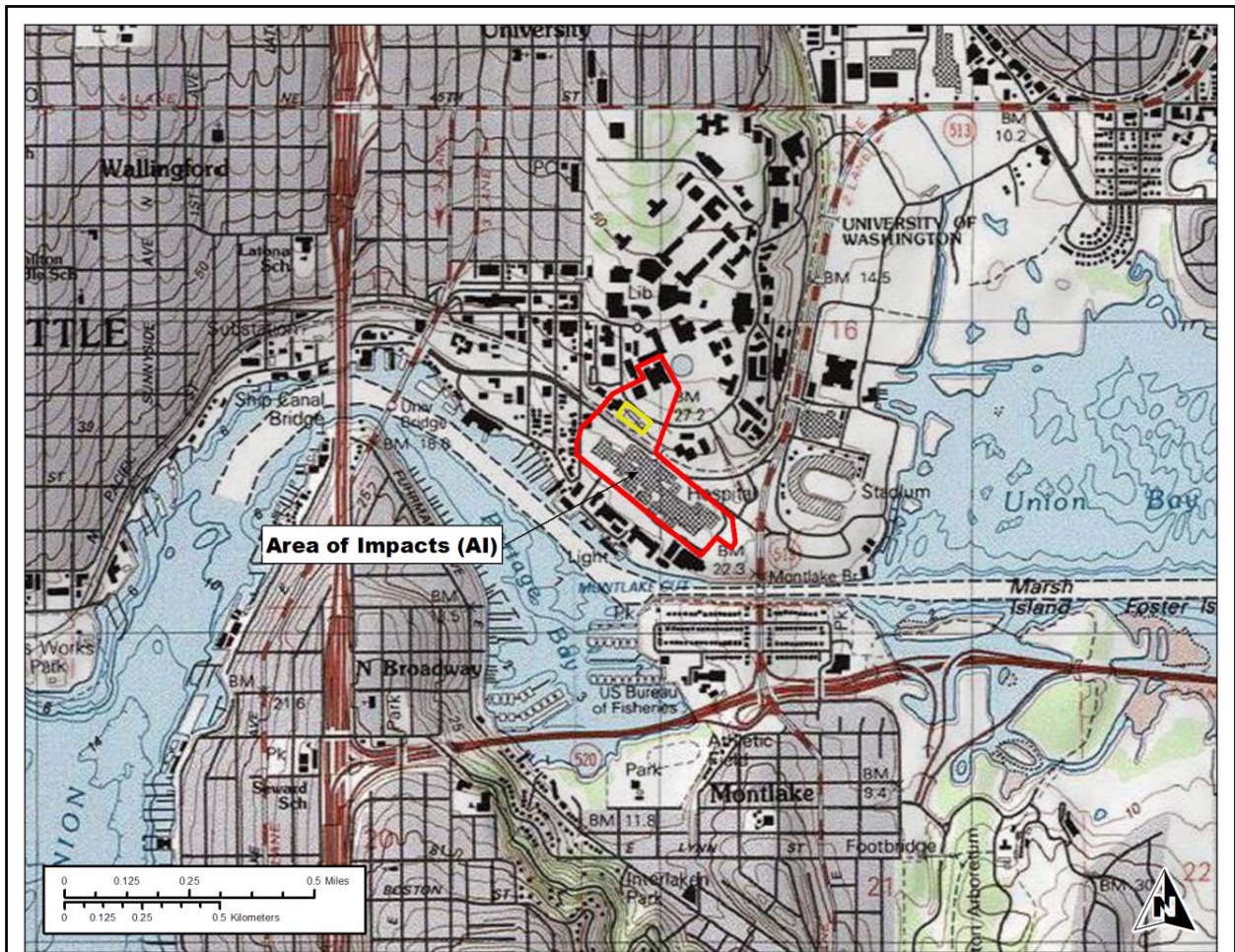
Preliminary ground-disturbing activities include geotechnical boring for site characterization and contaminant testing purposes. A total of 10 bores were drilled up to 20 ft below ground surface (ftbs) and revealed only the presence of intact glacial sediment overlaid by fill or disturbed glacial sediment. At later stages of the project, ground-disturbing activities will consist of demolition and removal of all existing buildings, as well as some landscaping, trees and paved driveways and/or pathways.

Historical Research Associates, Inc. (HRA), was retained by EA Engineering, Science, and Technology, Inc., to perform a cultural resources inventory and Historic Resources Addendum (Section 1.1.1) for this Project. The results of this inventory are reported here.

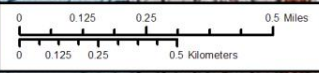
1.1 Regulatory Context

The Project is subject to state permitting, oversight, and review under SEPA, for which UW is considering the environmental impacts. This archaeological and architectural inventory is intended to identify resources that need to be considered during SEPA review.

In addition to the usual SEPA process, UW outlines its own process for considering the potential effects of new project planning on campus buildings and features in the 2003 UW Master Plan. The campus master plan calls for the production of a Historic Resources Addendum for any project that makes exterior alterations to a building over 50 years old. The addendum provides context and analysis to insure that important elements of the campus, its historical character and value, environmental considerations, and landscape context are preserved, enhanced, and valued (UW Master Plan 2003:26).



Area of Impacts (AI)



Legend

- Area of Impacts
- Area of Direct Impacts

Figure 1 Project Location Map
UW Life Sciences Bldg CR Services



HISTORICAL
RESEARCH
ASSOCIATES, INC.

Date: 9/26/2014

Coord./Project	Datum	Scale
NAD 1983 UTM Zone 10N Transverse Mercator	NAD83	1:24,000
Township/Range	Quadrangle	
T25N-R04E	Seattle North, WA	

Historical Research Associates, Inc., Seattle, WA
Service Layer Credits: Copyright:© 2013 National Geographic Society, i-cubed

Figure 1-1. Area of impacts and vicinity.

A Historic Resources Addendum details the history, physical attributes, and significance of buildings and features that the proposed development could potentially impact. When significant resources are potentially impacted, a Historic Resources Addendum provides possible mitigation measures.

This cultural resources inventory incorporates elements of a Historic Resources Addendum for all historic-era architectural resources within the Area of Impacts.

1.2 Area of Impacts

The area of impacts (AI) includes potential direct impacts to archaeological resources as well as direct and indirect impacts to architectural resources (Figure 1-2). The AI includes buildings, structures, and landscape features adjacent to the proposed new UW Life Sciences building location. HRA's inventory and evaluation was conducted to take into account SEPA's condition to consider whether the construction of this facility would impact any historic properties (listed or eligible for listing in federal, state, or local historic registers) immediately adjacent to the proposed building location.

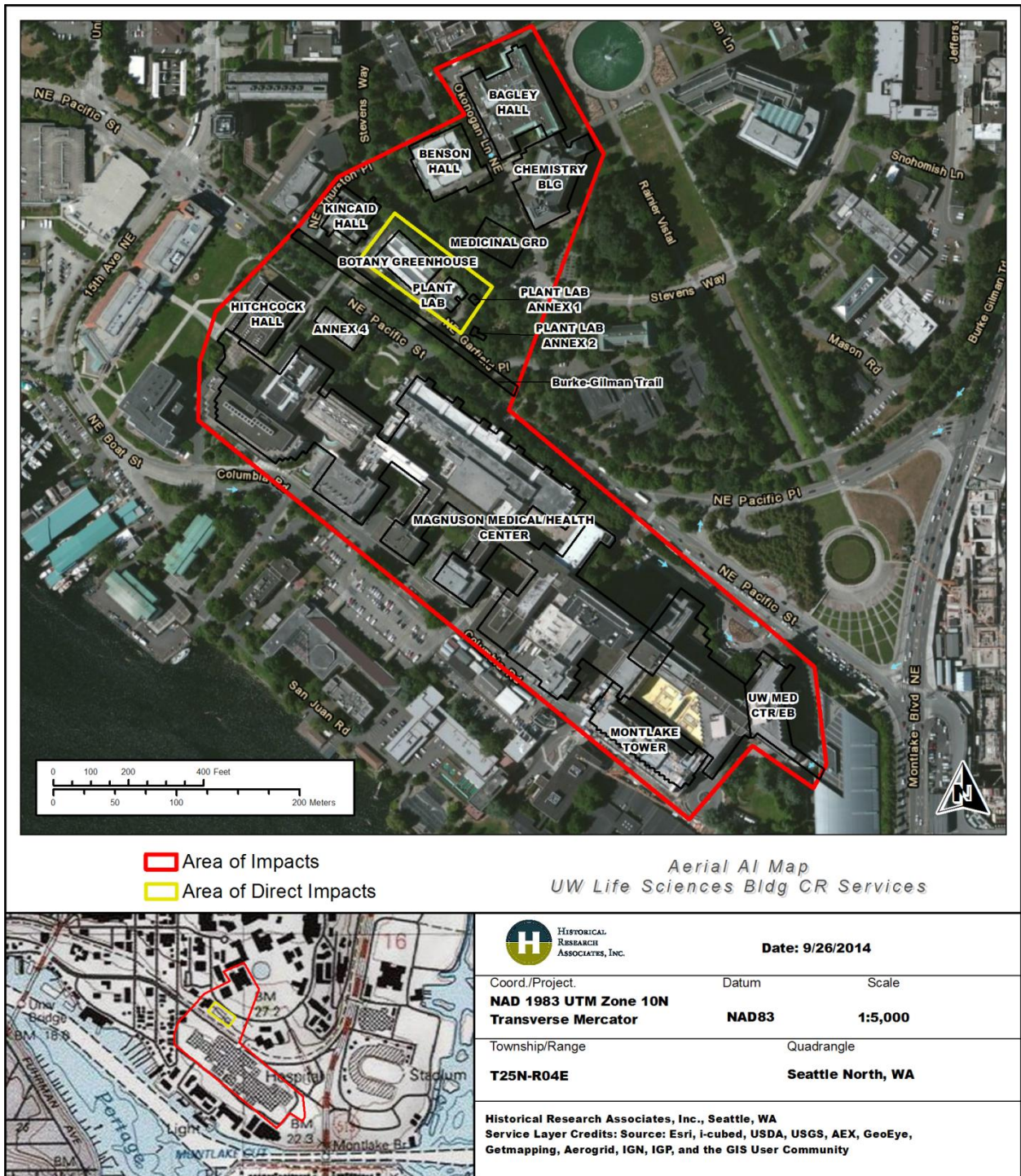


Figure 1-2. AI location on aerial photograph.

2. Archival Research

This chapter provides a review of archival data including previous cultural resources surveys; documented archaeological sites, buildings, structures, and objects; and historic maps. Understanding previous cultural resource surveys and known cultural resources and historic properties in the vicinity of a project is important for understanding how intensively work has been conducted in the area. This archival research is necessary for developing expectations for this Project, which will be outlined in Section 5.

2.1 Research Methods and Materials Reviewed

HRA archaeologist Jenny Dellert, MA, conducted an archival record search for records pertaining to resources locations within ½ mile (mi) of the AI. Ms. Dellert searched the Department of Archaeology and Historic Preservation's (DAHP's) online database (Washington Information System for Architectural and Archaeological Records Data [WISAARD]) for archaeological site records, cultural resource survey reports, historic property inventory (HPI) forms, historic register information, and cemetery records. Dellert also reviewed the statewide archeological predictive model on DAHP's WISAARD for probability estimates for archaeological resources and to aid in developing the field strategy.

2.2 Archival Research Results

2.2.1 *Previous Cultural Resources Studies*

Twenty-three previous cultural resource studies were conducted within ½ mi of the Project (Table 2-1). These studies have included both surface and subsurface survey. None of these studies has identified archaeological resources within or adjacent to the AI (see Section 2.2.2 below). However, these studies have identified and recorded historic-era buildings within the AI.

Importantly, Stevenson and Dellert (2013) reported results of a cultural resources inventory project just south of the Greenhouse and Plant Lab. They reported sediments in this area consisting of fill/disturbed sediment overlaying intact glacial till.

Table 2-1. Previous Cultural Resources Studies within ½ mi of the AI.

Reference	NADB#	Title	Distance from AI	Cultural Materials Identified Within or Adjacent to the AI
Courtois et al. 1998	1339816	<i>Sound Transit Central Link Light Rail Draft Environmental Impact Statement Historic and Archaeological Technical Report</i>	Adjacent	None
Courtois et al. 1999	1339836	<i>Central Link Light Rail Transit Project Final Environmental Impact Statement Technical Report</i>	Adjacent	None
Rooke 2002	1341144	<i>Letter to Jay Grenfell regarding Cingular Wireless Tower WA-539 (Cavilier Apartments)</i>	~ 1/2 mi northwest	Eight previously inventoried historic properties, no new cultural materials observed
Courtois & Associates 2003	1350148	<i>Preliminary Report on University of Washington Main Campus Seattle-Significant Buildings and Features Completed Prior to 1953, in Select Campus Area</i>	Encompasses	Several historic properties discussed, limited fieldwork conducted-no historic properties identified adjacent to Project
Emerson 2009a	1352771	<i>Letter to Adam Escalona regarding SE01126.A UW Medical BB Tower</i>	Encompasses	UW Medical BB Tower
Emerson 2009b	1352800	<i>Letter to Adam Escalona regarding SE01124.A Suzzallo Library</i>	~ 1/2 mi north	Suzzallo Library
BOLA 2008a	1353338	<i>Johnson Annex-UW Historic Resources Addendum</i>	~ 1/2 mi north	Archival research only for Johnson Annex; no fieldwork and no new resources
BOLA 2008b	1353339	<i>Cunningham Hall-UW Historic Resources Addendum</i>	~ 1/2 mi north	Archival research only for Cunningham Hall; no fieldwork and no new resources
BOLA 2010	1353812	<i>Husky Union Building-UW Historic Resources Addendum</i>	~ 1/2 mi northwest	Archival research only for Cunningham Hall; no fieldwork and no new resources
Parametrix et al. 2010	1354602	<i>SR520, I-5 to Medina: Bridge Replacement and HOV Project, Cultural Resources Report for Section 6(f) Environmental Evaluation</i>	Adjacent	Several historic properties discussed, limited fieldwork conducted-no historic properties identified adjacent to Project

Table 2-1. Previous Cultural Resources Studies within ½ mi of the AI.

Reference	NADB#	Title	Distance from AI	Cultural Materials Identified Within or Adjacent to the AI
Blukis Onat et al. 2005	1680617	<i>Preliminary Ethnographic and Geoarchaeological Study of the SR520 Bridge Replacement and HOV Project</i>	Adjacent	Identified 14 archaeological probability areas through archival research and limited fieldwork-no new resources identified during field reconnaissance adjacent to Project
Elder 2011	1682027	<i>Cultural Resources Investigations at the Bryant Building Section 6(f) Replacement Site</i>	~ 1/2 mi southwest	Brick, mortar, concrete, glass, ceramic, and metal fragments, one wire nail, charcoal, and slag in fill deposits
Elder and Reed 2011	1682029	<i>Results of Archaeological Monitoring of Geotechnical Borings within the SR520 Limits of Construction</i>	Adjacent	None
Elder et al. 2011a	1680657	<i>Section 106 Technical Report (Volume I Archaeology and Volume II Built Environment) SR520 Bridge Replacement and HOV Program, I-5 to Medina: Bridge Replacement and HOV Project</i>	Adjacent	Montlake Boulevard Pedestrian Overpasses (North and South) and Bloedel Hall are eligible under Criterion C; the Burke-Gilman Trail was previously determined not eligible
Elder et al. 2011b	1681090	<i>Section 106 Technical Report (Volume I Archaeology) SR520 Bridge Replacement and HOV Program, I-5 to Medina: Bridge Replacement and HOV Project</i>	Adjacent	This is part of the larger report compiled in Elder et al. 2011a
ICF and Gray Lane 2011	1681089	<i>Section 106 Technical Report SR520 Bridge Replacement and HOV Program, I-5 to Medina: Bridge Replacement and HOV Project</i>	Adjacent	This is part of the larger report compiled in Elder et al. 2011a, no specific historic properties discussed
Minor and Meijer 2011	1680887	<i>Cultural Resource Inventory for Anderson Hall, University of Washington Campus, Seattle, Washington</i>	~ 1/8 mi north	Archival research only for Anderson Hall; no fieldwork and no new resources. Anderson Hall was previously determined eligible for NRHP by DAHP in December 2002, an updated HPI form was completed

Table 2-1. Previous Cultural Resources Studies within ½ mi of the AI.

Reference	NADB#	Title	Distance from AI	Cultural Materials Identified Within or Adjacent to the AI
Walker Gray et al. 2011	1681091	<i>Section 106 Technical Report (Volume II Built Environment) SR520 Bridge Replacement and HOV Program, I-5 to Medina: Bridge Replacement and HOV Project</i>	Adjacent	This is part of the larger report compiled in Elder et al. 2011a
Elder and Cascella 2013	1683661	<i>SR520 Bridge Replacement and HOV Program, I-5 to Medina: Bridge Replacement and HOV Project Corridor Archaeological Landform Sensitivity Assessment</i>	Adjacent	None
Stevenson and Dellert 2013	1684507	<i>University of Washington Burke-Gilman Trail, Rainier Vista to 15th Avenue NE Segment, Cultural Resources Inventory Project, Seattle, King County, Washington</i>	Adjacent	None
Stevenson and Little 2014a	1685157	<i>Archaeological Inventory for the University of Washington Burke-Gilman Trail, Brooklyn Avenue NE to 15th Avenue NE (Garden Reach) Segment, City of Seattle, King County, Washington</i>	0.3 miles west	None
Stevenson and Little 2014b	1685154	<i>Archaeological Inventory for the University of Washington Burke-Gilman Trail, University Bridge to Brooklyn Avenue NE (Neighborhood Reach) Segment, City of Seattle, King County, Washington</i>	0.5 miles west	None
Stevenson and Little 2014c	1685155	<i>Archaeological Inventory for the University of Washington Burke-Gilman Trail, Pasadena Place NE to University Bridge (Northlake Reach) Segment, City of Seattle, King County, Washington</i>	0.5 miles west	None
Stevenson et al. 2014	1685156	<i>Cultural Resources Inventory for the University of Washington Burke-Gilman Trail, Rainier Vista to Northeast 47th Street (Forest Reach) Segment, City of Seattle, King County, Washington</i>	0.25 miles east	None

2.2.2 Previously Recorded Archaeological Sites

Two isolates and two archaeological sites have been documented within ½ mi of the AI (Table 2-2). One isolate (45KI952) is an amber glass bottle circa 1920s–1930s. The bottle has a circular suction mark with feathering at the base, indicative of the Owen’s Automatic Machine, used exclusively by Owens-Illinois Glass Company. The bottle was found in fill during construction excavation, approximately 4 ft below ground surface (Boggs 2009a). In the same general location as 45KI952, the remnants of an abandoned wood-stave pipeline and associated metal pipeline were identified as Site 45KI955. The metal pipeline was directly above and ran parallel to the wooden pipe, so it was thought to be a replacement/improvement. The pipeline is probably associated with the sewage system constructed in Seattle during the early 1900s, as its trajectory was downhill toward Hudson Bay (Boggs 2009b).

Table 2-2. Previously Recorded Archaeological Isolates and Sites within ½ mi of the APE.

Site Number and Name	Site Type/Description	Distance from AI	Eligibility for NRHP	Reference
45KI952	Historic Bottle Isolate, circa 1920s to early 1930s	~ 1/2 mi southeast	Not Evaluated	Boggs 2009a
45KI955	Historic Public Works	~ 1/2 mi southeast	Not Evaluated	Boggs 2009b
45KI957 <i>UW Greenhouse Site</i>	Multicomponent-Prehistoric Lithic Material and Historic Debris	Within	Not Evaluated	Louderback and Jolivette 2009
45KI1181	Precontact Isolate	1/2 mi west	Not eligible	Stevenson and Little 2014b

The second archaeological site (45KI957, UW Greenhouse Site) is a prehistoric lithic scatter located on an eroded slope above the Burke-Gilman Trail, behind the Botany Greenhouse. Materials observed were two lithic quartzite flakes and a chert projectile point mixed with historic-period debris (iron fragments, hardware, gardening tags, and ceramic sherds) in redeposited sediment on the surface. The soil was most likely redeposited during construction of the former railroad line that the Burke-Gilman Trail currently resides on and again disturbed during use of the greenhouse (Louderback and Jolivette 2009). This site is located within the AI (see Figure 7-1).

Stevenson and Little (2014b) identified a single precontact isolate approximately 0.5 miles west of the AI. This isolate was observed in fill and has been determined not eligible for listing in the National Register of Historic Places (NRHP).

2.2.3 Cemeteries

No cemeteries were identified within the ½-mi radius search of the Project.

2.2.4 Historic Buildings, Structures, and Objects

Four previously recorded buildings, structures, and objects (BSOs) were identified within the AI (Table 2-3). Of these, only Bagley Hall has been found eligible for listing in the NRHP by DAHP. The UW segments of the Burke-Gilman Trail and the Medical Center and Magnuson Health Sciences Center were found ineligible for listing by DAHP in 2013. Surveyor Sonja Molchany recommended that the Northern Pacific Railroad Bridge was ineligible in 2013, but the resource’s eligibility has not yet been determined by DAHP (Table 2-3).

No properties within the AI were found on the local landmarks list for Seattle. Only Bagley Hall appears on the Washington State Register of Historic Places (WHR) (DAHP 2009).

Table 2-3. Historic-era BSOs Identified Adjacent to the AI.

Historic/Common Name	Description	Eligibility Status	Reference
<i>Bagley Hall</i>	Legacy data. No description available.	Eligible (NRHP and WHR)	DAHP 2009
<i>Burke-Gilman Trail (University District Segments)</i>	Paved bicycle and pedestrian pathway constructed atop a former railroad grade, with a single-span concrete-arch viaduct near Rainier Vista area.	Not Eligible	DAHP 2013a
<i>Medical Center/BB Tower and Magnuson Health Sciences Center</i>	Sixteen-story medical facility built and expanded over fifty years beginning in approximately 1947.	Not Eligible	DAHP 2013b
<i>Northern Pacific Railroad Bridge</i>	Former railroad bridge dating from 1914, now used as a pedestrian bridge and part of the Burke-Gilman Trail.	Recommended Not Eligible	DAHP 2013c

2.2.5 Historic-Period Map Research

General Land Office (GLO) plats

Historic nineteenth-century plats created by the U.S. Surveyor General (USSG) General Land Office (GLO) depict no features in the project area. The closest cultural feature is the Native American overland trail used to travel between Portage Bay (Lake Union) and Lake Washington, which runs through the AI (see Figure 4-1). A U.S. Geological Survey (USGS) land classification sheet produced

from an 1887 survey shows the future UW campus to be “cut areas not restocking” (USGS 1890). This is likely in anticipation of further development by the burgeoning City of Seattle.

Sanborn Maps

The area surrounding UW was not included on early Sanborn Map Company maps. The earliest Sanborn map to include UW was created in 1905 (Sanborn 1905). This map shows nine buildings on the campus, but does not depict the area of the current AI. The southern portion of campus, which includes the area corresponding to the current AI, is included first on the 1919 Sanborn map (Sanborn 1919). This map includes the Northern Pacific Railroad Company (NPRR) alignment (which is south of the AI), and highlights the growth of the UW campus north of the AI, but little development within the AI. Between 1919 and 1930, four buildings were built on the UW campus adjacent to the AI (Sanborn 1930), including the College of Forestry, the Medicinal Garden Department, a theater, and a small unknown building situated near 15th Avenue NE.

2.2.6 DAHP Predictive Model

The DAHP predictive model for archaeological sites is based on statewide information, using large-scale factors. Information on geology, soils, site types, landforms, and from GLO maps was used to establish or predict probabilities for archaeological resources throughout the state. The DAHP model uses five categories of prediction: Low Risk, Moderately Low Risk, Moderate Risk, High Risk, and Very High Risk. The DAHP predictive model map indicated that the AI is located in a Very High Risk area. However, given the previous modifications in the vicinity with the construction of railroad lines, roadways, and the university, and the land alterations associated with the Alaska–Yukon–Pacific Exposition (discussed below), HRA anticipates that the probability for intact archaeological resources is Low to Moderate.

2.2.7 UW Campus Maps

HRA reviewed maps and planning documents for the UW campus that are available through UW’s Special Collections. Maps and planning documents from the 1890s through the 1980s show that the greenhouses and gardens within the AI date from the early half of the twentieth century, while nearby classrooms and medical buildings date from the last half of the twentieth century.

3. Environmental Context

This chapter provides a brief overview of the local environment, including historic modification to this landscape and natural resources. Understanding the local environment including geology, climate, flora, and fauna is important for understanding how people used the landscape in the past. This environmental context is necessary for developing expectations for this Project, which will be outlined in Section 5.

3.1 Topography and Geology

The AI is located on the southern portion of the UW campus, approximately ¼ mi north of the Montlake Cut and east of the modern-day shoreline of Lake Union, approximately 33 ft above mean sea level (amsl).

The AI is located within the Southern Puget Sound Basin, a portion of the Puget Trough Physiographic Province (Franklin and Dyrness 1973). The north–south trough of the Puget Lowland separates the Olympic Mountains to the west from the Cascade Range on the east. The lowland was carved out during the last major glaciation of western Washington which ended approximately 16,000 years before present (B.P.) (Alt and Hyndman 1995; Booth et al. 2004; Dethier et al. 1995; Easterbrook and Rahm 1970:49; Galster and Laprade 1991:249). As glaciers retreated, they left thick sediment deposits. This sediment forms the parent material of many soils throughout this part of King County, including the AI (Snyder et al. 1973). Sediments at the surface across the AI are glacial till deposited during the Vashon Stade of the last major glaciation (Booth et al. 2009). As glaciers retreated, the land on which they rested began to rebound, and would have become available for colonization by plant and animal communities as the climate began to ameliorate.

3.2 Climate and Vegetation

Between approximately 13,000 and 12,000 years ago, the region had developed a much cooler and drier climate, which supported an ecosystem characterized by lodgepole pine (*Pinus contorta*), sedges (*Cyperaceae* sp.), sage (*Artemisia*), and a variety of grasses and herbs. After 12,000 years ago, the climate warmed while continuing to dry, and Douglas fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*), and red alder (*Alnus rubra*) joined the developing parkland forest. By around 6,000 years ago, the climate of the region had cooled and moistened to levels comparable to today's maritime regime, producing the current western hemlock vegetation zone. Presently, uplands are moderately to heavily forested with Douglas fir, western hemlock, and western red cedar (*Thuja plicata*). Red alder and big-leaf maple (*Acer macrophyllum*) represent secondary species in forested

habitats and are dominant in disturbed areas (Barnosky 1984; Barnosky et al. 1987; Brubaker 1991; Whitlock 1992).

3.3 Fauna

During the late Pleistocene, western North America would have provided habitat for a number of animal taxa not found in the region after about 11,000 B.P. (Gilmour 2011). These animals would have done well in the developing forested parkland environment in the Puget Sound region, which would have provided food for both grazers and browsers and, in turn, food for large carnivores. Climatic changes undoubtedly reduced the habitat for these animals, which would eventually become extinct across the North American landscape.

Throughout the Holocene, and prior to extensive Euroamerican influence in the area, larger terrestrial mammals would have included elk (*Cervus elaphus*), deer (*Odocoileus* spp.), black bear (*Ursus americanus*), coyote (*Canis latrans*), and mountain lion (*Felis concolor*) (Johnson and Cassidy 1997). Smaller mammals that inhabited the area included snowshoe hare (*Lepus americanus*), raccoon (*Procyon lotor*), and beaver (*Castor canadensis*) (Kruckeberg 1991; Larrison 1967). Avifauna found in the Puget Sound region include raptors such the bald eagle (*Haliaeetus leucocephalus*) and waterfowl (*Aix* and *Anas* species). Freshwater fish including trout (*Salmo* sp.), suckers (*Castomidae* spp.) and minnows (*Gila* sp.) would have been readily available in in Lake Washington and Lake Union. Pacific salmon and trout (*Oncorhynchus* spp.), including land locked Kokanee (*O. nerka*), would have also been readily available in the region and from waterways near the AI (Berge and Higgins 2003; WDFW 2012). Freshwater mussels (*Unionidea*) are found in Lake Washington and Lake Union (Xerces 2010).

4. Cultural Context

This chapter provides a brief overview of nearly 14,000 years of human occupation in North America, focusing specifically on western Washington and the Puget Sound area where possible. Understanding the history of human occupation and land use in an area is crucial for understanding how archaeological data is important and what kinds of archaeological sites may be encountered during a project. This context is necessary for outlining the current state of knowledge about past lifeways and contributes to the development of expectations for this Project, which will be discussed in Section 5.

4.1 Precontact Background

The current understanding of Pacific Northwest precontact lifeways is derived from the archaeological record, which is constantly changing as our knowledge grows. How archaeologists see archaeological data is conditioned by a number of factors, including natural (e.g., rising sea levels) and cultural (e.g., excavation, curation) processes, which selectively modify what remains for modern investigators to be seen (Schiffer 2002). New discoveries can either change or reinforce prior notions of human lifeways, but the continually growing body of archaeological data helps give archaeologists a better understanding of the past (Trigger 2008).

In order to organize current knowledge of Pacific Northwest precontact lifeways, numerous investigators have proposed chronologies for the region's archaeological record (e.g., Ames and Maschner 1999; Kidd 1964; King 1949). Ames and Maschner's (1999) chronology is used here to structure discussion of precontact archaeology and inferred lifeways. Their chronological sequence is divided into three basic developmental periods: Paleoindian, Archaic, and Pacific. The archaeological evidence from these periods suggests a gradual shift from small nomadic groups relying on generalized hunting and gathering to larger sedentary groups with increased social complexity and specialized reliance on marine and riverine resources (Ames and Maschner 1999). In essence, the archaeological record in the region documents a shift from foraging to collecting strategies (*sensu* Binford 1980) and cultural change toward ethnographically observed lifeways.

4.1.1 *Paleoindian (~12,500 B.C. to 10,500 B.C.)*

Evidence for late Pleistocene occupation of western North America comes from a very small number of archaeological sites, including Paisely 5-miles Cave in Oregon (Gilbert et al. 2008) and sites on California's Channel Islands (Erlandson et al. 2011). Data from these sites have reinforced the idea that these first inhabitants of the region lived in small groups, were probably highly mobile, and followed the migration patterns of animals across the landscape. Mounting evidence (e.g.,

Dillehay et al. 2008) suggests that occupants of the “new world” exploited both marine and terrestrial environments, contrary to long held hypotheses (e.g., Martin 1967). Up to now, no archaeological sites dating to the late Pleistocene have been discovered in the Puget Sound region.

The earliest sites in the Pacific Northwest date to the early Holocene and are commonly associated with Clovis points, an iconic large spear point found across much of North America during this time (Meltzer and Dunnell 1987; Osborne 1956). These sites are said to represent the remains of mobile hunting activities and are scarce in the Pacific Northwest. Clovis points have been recovered from sites across the Puget Sound (Osborne 1956). Other early western Washington sites dating to this period include the Manis Mastodon Site (45CA218) near Sequim, and 45KI839 on Bear Creek in Redmond. The Manis Site dates from roughly 11,800 B.P., and consists of the remains of a mammoth found in a peat bog with a human-made bone point lodged in a rib fragment (Waters et al. 2011). Site 45KI839 dates from approximately 10,000 to 12,000 B.P., and consists of a highly diverse stone tool kit (Kopperl et al. 2010). This site has been interpreted as a short term occupation site and has yielded evidence of mammal, fish, and plant exploitation. The Manis and Bear Creek Sites have demonstrated that the earliest inhabitants of western Washington were not simply big game hunters who used large stone tools to kill game. These sites demonstrate the implementation of diverse toolkits and subsistence strategies, signaling an excellent working knowledge of the landscape and available resources.

4.1.2 Archaic (10,500 B.C. to 4400 B.C.)

Sites dating to the Archaic period, especially prior to 5000 B.P., are rare, at least in part because of natural processes such as sea-level rise, which have undoubtedly obscured sites that are currently underwater. The current view of this period is generally one of stasis, but this is likely at least partially conditioned by the rarity of sites dating to this period.

Lifeways during the Archaic period are thought to have changed little from the Paleoindian period. In essence, people are thought to have hunted game and lived in small highly mobile egalitarian groups, as foragers (*sensu* Binford 1980). Microblades and leaf shaped projectile points (i.e., Cascade points) have been used to argue for Archaic period occupation across Western (e.g., Chatters et al. 2011; Greengo and Houston 1965). Identifiable faunal remains are rare at Archaic period sites, making inferences about subsistence difficult, but mammal and fish remains have been reported from Archaic period sites in the Puget Sound region (Chatters et al. 2011; Elder, personal communication 2013; Stilson and Chatters 1981).

The most discussed sites dating to the Archaic period are often referred to as “Olcott” sites (Kidd 1964). These sites typically lack good absolute dates, are highly disturbed, are located near rivers, and contain expedient tools such as scrapers, flaked cobbles, and debitage in addition to large lanceolate and stemmed projectile points. Much discussion of these sites has taken place in the last 50 years (e.g., Chatters et al. 2011; Dancey 1969; Kidd 1964; Morgan 1999; Stilson and Chatters 1981). The sites were thought to represent short-term camps where hunting and game processing was the

primary focus of activity (Kidd 1964). Investigators like Dancey (1969), Morgan (1999), and others have refuted Kidd's (1964) initial interpretation, and Chatters et al. (2011) have recently suggested that "Olcott" sites represent the cultural remains of a group of people well adapted to unpredictability who used both plants and animals but were still highly mobile.

A number of Archaic period sites have been recorded in King County. Greengo and Houston (1965) excavated at the Marymoor site, located in Marymoor Park, during the 1950s. This site yielded a large array of Archaic period artifacts, including large projectile points, modified cobbles, and microblades. The earliest component of the West Point sites (discussed below) also falls into the Archaic period.

4.1.3 Pacific (4400 B.C. to A.D. 1775)

Based on the archaeological record, the Pacific period is the most culturally dynamic precontact period in the Pacific Northwest (Chatters 1987; Larson and Lewarch 1995; Lewarch 2006). Over time, changing technologies and site locations suggest increased sedentism and specialization in the use of particular environments and resources (Ames and Maschner 1999). During this period, evidence of exploitation of the littoral environment increases, and shell middens become a prominent site type across Puget Sound. After about 5000 B.P., populations on or near the Puget Sound coast grew and became more complex in organization. Technological organization and subsistence practices became increasingly complex during the Pacific period as well. During this period, there is apparent increasing emphasis on the use of plants including berries and root-vegetables (e.g., Elder and Sparks 2010). Social stratification and inequality, a hallmark of Northwest coast cultures, is thought to be less pronounced in the Puget Sound than in other parts of the Pacific Northwest; however, objects like labrets, indicative of social stratification, appear early in the Pacific period in the Puget Sound at sites like West Point (45KI248) (Larson and Lewarch 1995). By shortly after 2500 B.P., a variety of bone, chipped stone, and groundstone artifacts represent coastal marine-oriented cultures and inland hunting/fishing/gathering cultures (Ames and Maschner 1999; Nelson 1976, 1990).

Shell midden sites dating to the past several thousand years have been recorded in and around the Puget Sound area. The most well studied shell middens are found around Seattle. The West Point Sites (45KI428 and 45KI429), located at Discovery Park in West Seattle, have been interpreted as long-term camping and food-processing activity areas (Larson and Lewarch 1995). Five distinct cultural components indicate use of the sites between 4200 and 200 B.P. These sites included a number of personal items, including beads, bracelets, and labrets, which may be related to developing social inequality in the region (Ames and Maschner 1999). The West Point Sites also yielded a highly diverse tool kit, including bone as well as ground and chipped stone implements used for capturing and processing prey (Larson and Lewarch 1995). The highly diverse faunal assemblage includes sea mammals, fish, terrestrial mammals, birds, and shellfish, indicating exploitation of a number of available niches.

4.2 Ethnographic Background

The AI is located within the traditional territory of the Duwamish Indians, members of the Coast Salish cultural group that spoke Southern Lushootseed (Suttles 1990). The Duwamish traditionally lived in winter villages on the shores of Elliott Bay, Salmon Bay, Lake Washington, and Lake Union, as well as along the Black, Cedar, and Duwamish Rivers (Ruby and Brown 1992; Stevens 1854; United States Court of Claims 1927). Ethnographer T. T. Waterman (in Hilbert et al. 2001:15–16), who worked in the Puget Sound region during the 1920s, pointed out that the Duwamish, like other groups, identified themselves in relation to their local geography. For example, a group who lived in the vicinity of the AI around Lake Union identified themselves as the *Xa³tcua'bc* (Waterman orthography), or “people of the small lake.” While this distinction is taken into account ethnographically, these groups have historically been grouped into a larger entity (the Duwamish) based on shared culture and language.

Ethnographic and archaeological evidence suggests that the Salish Lushootseed-speaking Duwamish, whose name means “inside [the bay] people,” practiced their life way of hunting, fishing, and gathering for centuries before contact with white settlers (Hilbert et al. 2001). Duwamish settlement and subsistence were inextricably linked throughout the year.

The Duwamish, like other Coast Salish groups, spent the majority of the winter inside large longhouses made from cedar planks that had “shed” roofs, which Waterman and Greiner (1921) note were common among tribes around the Sound. These houses could be massive, providing room for very large extended families and much of the food they would need for the cold months. The houses were often arranged into villages of two to five structures. The Duwamish occupied extended family villages and established a flexible system of intermarriage with the surrounding peoples, including the Sammamish and Snohomish (Ruby and Brown 1992). Winter was spent engaged in storytelling and ceremonial performances (Amoss 1978).

During spring, fall, and summer, people from the winter villages dispersed to hunt, fish, and gather plant foods for immediate consumption and winter storage (Buerge 1984; Haeberlin and Gunther 1930). Summer camps usually consisted of small, temporary reed or grass-mat structures occupied by a single family, although several families might join together to build a larger mat house (Haeberlin and Gunther 1930; Suttles 1990; Suttles and Lane 1990). Upland forested environment, not only attracted and supported deer and elk populations for hunting, but likely also provided a variety of plant resources such as berries, nuts, and root foods.

T. T. Waterman (Hilbert et al. 2001) identified several Duwamish ethnographic place names in the vicinity of the AI (Figure 4-1). He described identifiable physical locations along the lake shores and nearby landforms. Approximately 0.3 mi northwest of the AI is a location called *waq'waqab*, translated as “like a frog.” At this location, a small creek drains into Portage Bay. Along the Portage Bay shoreline, and approximately 0.1 mi south of the AI, Waterman’s informants identified a small promontory (now the location of the UW Boat Club) as *sq'icqs*, “down river promontory.” The

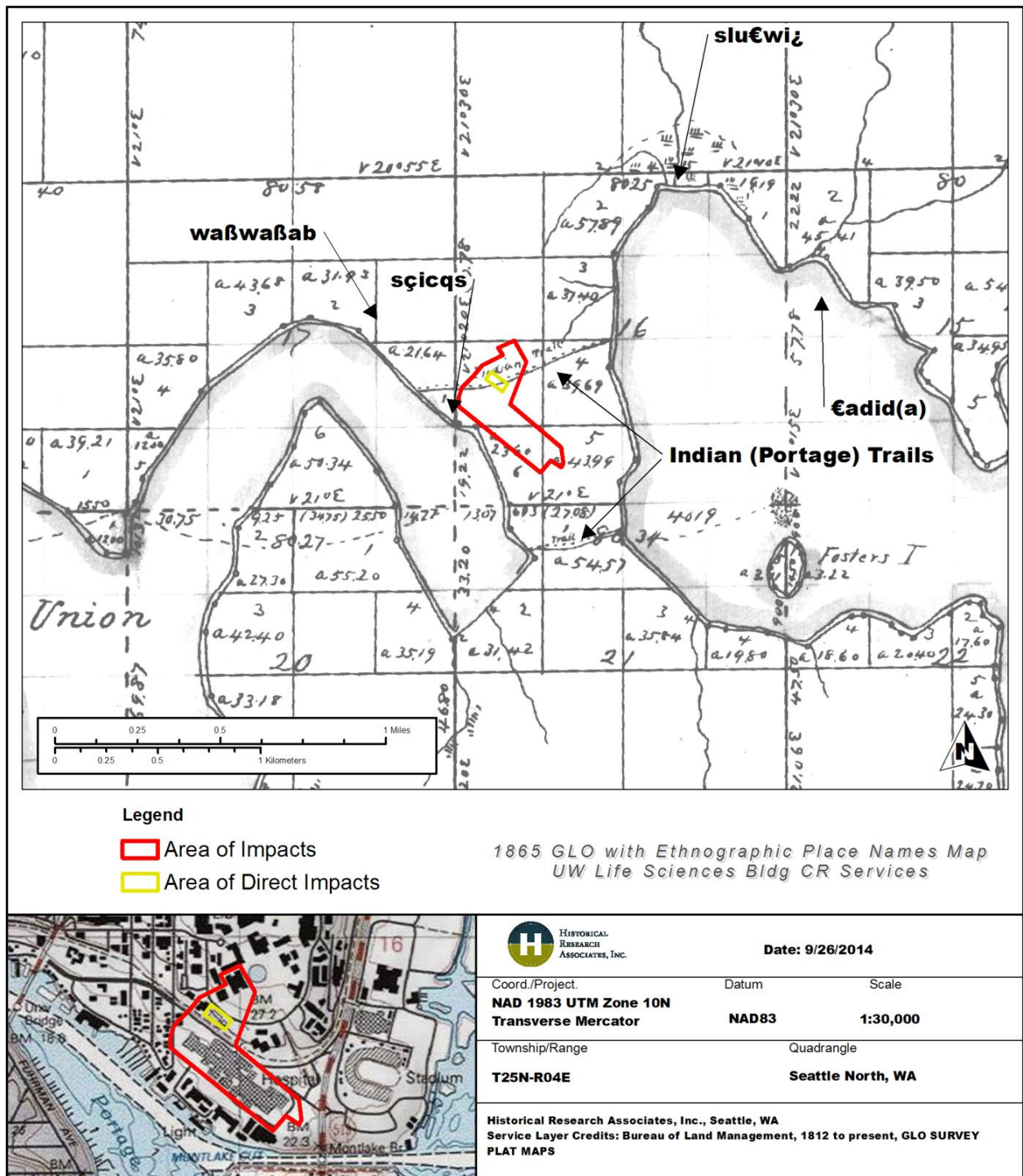


Figure 4-1 Native American place names in the vicinity of the AI (Hilbert et al. 2001; USGS 1865).

marsh between Laurel Point and UW, now filled in, and the location of parking lots for UW and Husky Stadium, was known as *sluʔwit*, translated as “perforation for a canoe.” A village with at least five longhouses was located here, along with a fish weir. This is the closest identified village, roughly 0.75 mi away, to the AI. The small cove west of Laurel Point was referred to as *ʔadid(a)*, or “dear me/for gosh sakes” (Hilbert et al. 2001:77–80; Thrush 2007:251). This location is nearly 1 mi from the AI. An “Indian Trail” depicted on the 1865 GLO connects Lake Washington and Lake Union and passes through the northern portion of the AI (USGS 1865). This trail, along with one located slightly further to the south, both likely canoe portage routes, is evidence of the heavily used transportation corridor stretching between Shilshole Bay and Lake Washington, bringing people from various neighboring tribes into and through the project area vicinity (Miller and Blukis Onat 2004:70; USGS 1865).

4.3 Historic Background

European visitation to the Puget Sound region began in 1792 when George Vancouver and his crew explored the region. Within the next 100 years, native populations would plummet due to repeated outbreaks of introduced diseases such as smallpox, influenza, and typhoid fever (Boyd 1990; Suttles and Lane 1990). Fort Nisqually, located approximately 40 mi southeast of the Duwamish River headwaters, was established as a trading post by the Hudson’s Bay Company in 1833. The Treaty of Washington in 1852 conveyed the territory to the United States, and the Donation Land Claim Act drew settlers into land occupied by the Duwamish and their neighbors. In 1855, members of the Duwamish and neighboring Puget Sound tribes signed the Treaty of Point Elliott, which provided for the removal of tribal members to reservations, including the Port Madison Reservation (Suquamish/Fort Kitsap). Some Duwamish people continued to live in and around Seattle, maintaining friendly relations, working for, and trading with incoming settlers. Many others, meanwhile, relocated to the Port Madison Reservation, but due to undesirable conditions were compelled to leave. Many then attempted to return to their ancestral lands, and a few were able to claim or purchase land (Ruby and Brown 1992; Thrush 2007).

Tribal lands and fishing rights continued to be eroded through the late 1800s and 1900s, culminating, in the late 1900s, in a series of lawsuits and court cases that upheld certain treaty rights (Marino 1990; Ruby and Brown 1992). The Duwamish Tribe is not currently federally recognized, but continues to fight for this distinction.

The first Euroamerican settlers in the vicinity of the project area were the Denny Party, who arrived in 1851 (Bagley 1929). Within a decade, the 302 ambitious settlers living in Seattle had requested and been granted the right to open the State University in the young city. In 1861, the first university building was constructed on 10 acres of “Denny’s Knoll,” which would eventually become Seattle’s commercial downtown district. The population of Seattle boomed in the following decades, to over 40,000 by the late 1880s. The city needed a university as well a major rail line; over the next decade it would get both (Courtois & Associates 2003).

In 1885, the Seattle, Lake Shore & Eastern Railroad (SLS&E) Company became a corporation. The company formed as a result of the efforts of Thomas Burke, a local judge, and Daniel Gilman. Although Seattle was a vibrant city during the late 1880s, major rail road companies like NPRR had yet to build a line through the town. Gilman and Burke, along with others, saw this as an opportunity, and built the SLS&E line to connect the burgeoning city to Canada. After years of dispute between NPRR and the city, the SLS&E line eventually became incorporated into the NPRR line in 1892. The NPRR formally purchased the line in 1913 (Bagley 1929).

The Washington State Legislature chose the present UW campus location was selected in the early 1890s (Courtois & Associates 2003). In 1891, William Boone was the first architect to develop a campus plan (Figure 4-2). While his plan was never realized, it illustrates hypothetical building placement and also appears to show that the campus was forested at the time of his design. Construction on the campus began with the building of Denny Hall in 1895, followed by at least seven more buildings, including Lewis and Clark Halls, the Observatory, the Armory and Gymnasium, the Assay Laboratory (now demolished), Water Tank (later Chimes Tower, demolished), and the Powerhouse (demolished) (Bagley 1929; Courtois & Associates 2003:2; Johnston 2001:1–4).

Over the next two decades, a succession of plans helped guide the growing campus. In 1898, A. H. Fuller designed the Oval Plan for the upper campus. The lower campus remained devoted to pasture land. Fuller's plan drew together existing buildings and prepared for the construction of new buildings around a central oval. This plan influenced the location of the new Science Hall (Parrington), but was soon eclipsed by the Olmsted plans (UW Special Collections 2014).

At the turn of the century, the Olmsted Brothers, descendants of Frederick Law Olmsted, were already well known for their landscape designs. In 1903, they were invited to Seattle and asked to prepare a master plan for the city's parks. The Olmsted plans consisted of a 20-mile-long system of parks that featured their trademark views and winding, scenic boulevards, along with new innovations in public recreation like playgrounds and ball fields. Their plan provided the young city of Seattle with a world-class park system (Williams and Crowley 2001).

While the Olmsteds were planning the city's parks, enrollment at UW was growing. In 1904, the administration invited the Olmsted Brothers to produce a new campus plan to replace Fuller's. Their plan converted the oval to an arts quadrangle and paired it with a science quadrangle to the south to accommodate a growing student body (UW Special Collections 2014). Between 1902 and 1906, the campus population doubled to more than 1,200 students (Ott 2009).

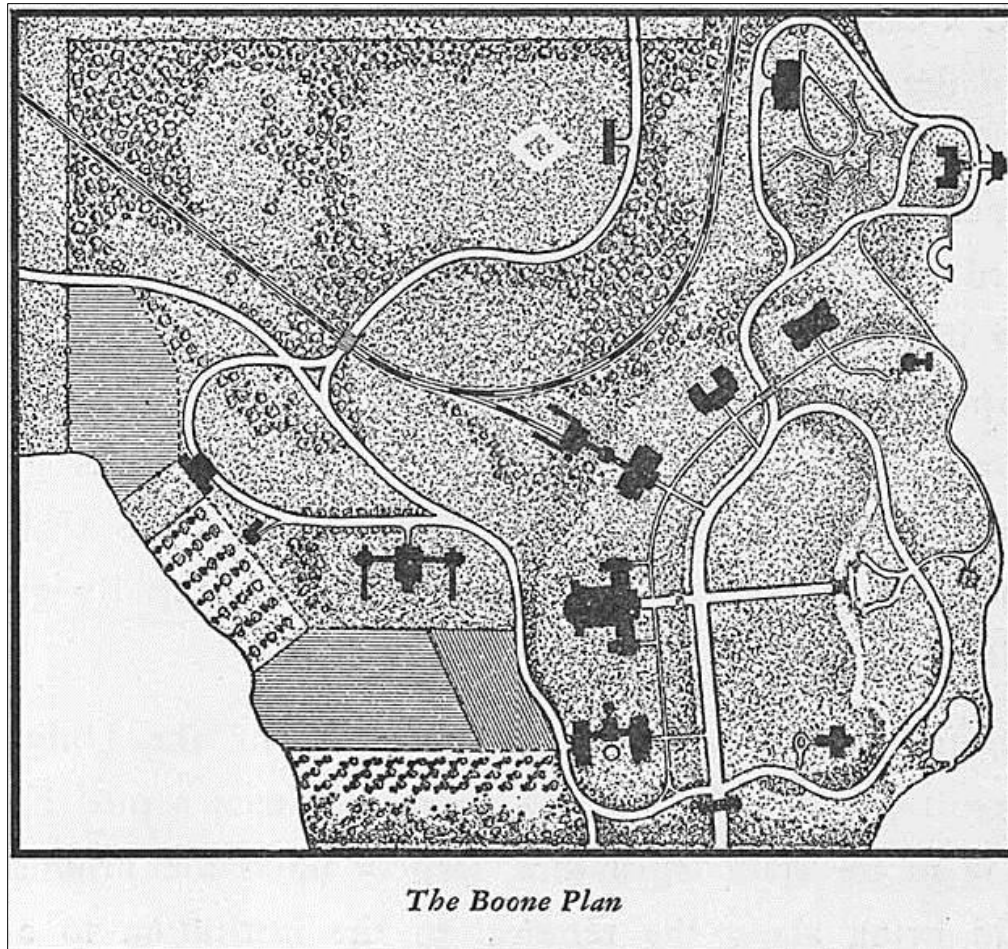


Figure 4-2. William Boone's original 1890 plan for the University of Washington (UW Special Collections).

In the early years of the twentieth century, Seattle was also preparing to host the 1909 World's Fair, and the university's underdeveloped south campus was chosen as an ideal location. The Olmsteds were hired to prepare a new plan, this one to accommodate the fair and to attract permanent buildings to the campus for the growing university (Bagley 1929; Courtois & Associates 2003). John C. Olmsted's 1906 plan became the design for the Alaska–Yukon–Pacific Exposition (AYPE), as the 1909 World's Fair came to be known. The AYPE was planned for the southern portion of the University Campus, north of the NPRR line, where little previous development had occurred. The 1906 plan focused on major land clearing and construction of large open spaces, generally devoid of trees. Rainier Vista, a greenway reaching southeast from the central campus, was developed under this plan and provided then, as it does today, breathtaking views of Mount Rainier. In order to create these unimpeded views and open spaces, the Olmsted plan required major land-clearing efforts, including logging as well as extensive filling and grading (Ott 2009). Men and horses moved nearly 210,000 cubic yards of sediment during the development of Rainier Vista and the surrounding

area. Some of this earth was used to fill low spots in the design area, but much of it was transported off-site. The plan also called for extensive gardens, including 10,000 rhododendrons, 5,000 roses, and 80,000 dwarf phlox. To prepare for these plantings, Olmsted designed nursery grounds on 20 acres near the southern end of campus (Ott 2009).

The official map of the fairgrounds shows that portions of the southern campus within the AI were generally devoted to open space, with the Japan Building to the west of Rainier Vista and Stock Exhibits south of the railroad tracks (Figure 4-3).

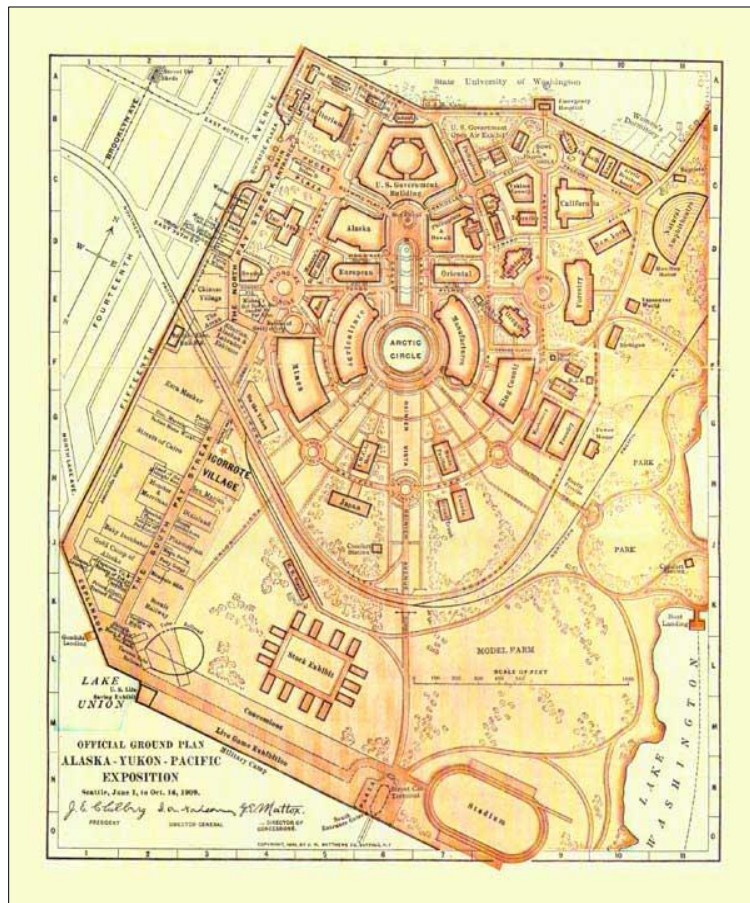


Figure 4-3. Official Ground Plan of the Alaska Yukon Pacific Exposition (UW Special Collections).

The City of Seattle was growing alongside the university campus at this time. This growth came with a necessary expansion of public utilities to supply electricity, water, and sewer services to the buildings surrounding Lake Washington and Lake Union. In 1908, Seattle constructed an 8-ft diameter sewer by tunneling roughly 20 ft below surface in the vicinity of East Pacific Street, adjacent to the AI (Seattle Public Utilities 2013).

The AYPE attracted 3.7 million people, and was considered a successful event, but only a few buildings survived to be used as permanent campus buildings, and many of these have been lost. The New York State Building was used both as the President's House and as the University's Music Building before it was demolished in 1950 (Johnson 2005). The AYPE's Good Roads building was converted to the university's Naval ROTC building and was destroyed by fire in 1968 (Kopkind 1996:147). The Forestry Building, which was believed at the time of its construction in 1900 to be the largest log structure in the world, has also been lost (UW n.d.). Today, more than one hundred years after the exhibition, only four buildings from the AYPE era remain, the Women's Building (now Cunningham Hall, which was recently moved from its original location near the AI), the old Architecture Hall, the Physical Plant Office Building, and the Powerhouse. Elements of early landscape design are still visible in features like Rainier Vista and W Stevens Way NE, which curves around the southern campus. Both were included in Olmsted's AYPE plan.

The AYPE helped kick off an age of university expansion, particularly in the southern portion of campus, though not all of it was academic in nature. For instance, in 1912, College of Engineering students and staff built a nine-hole golf course south of the NPRR line (UW Alumni 1941).

In 1914, the University's Board of Regents invited the Olmsteds back, this time to design a new campus plan to help integrate the remaining AYPE resources with the older campus buildings. This plan was reviewed by a committee of faculty and university regents that included Carl F. Gould, an architect and the founder of the university's architecture department. The committee was unimpressed with the new design. After attempting to work with Olmsted on revised plans, Gould's own firm, Bebb and Gould, prepared a new plan in 1915 that was accepted by the Board of Regents. The Bebb and Gould plan effectively guided the next phase of university development (UW Special Collections 2014).

At the same time, large projects were taking shape on the campus's borders. The locks of the Lake Washington Ship Canal were completed in 1916, and as one historian noted, "by this development the University campus was transformed from an isolated 'country estate' into a riparian property of shipping activity" (UW Alumni 1941).

The First World War changed the look and feel of the campus as the university devoted resources to the U.S. effort overseas. Lewis and Clark Halls were used as naval officers' hospitals, and new buildings supporting Army and Navy training bases were constructed on campus, including one built on the site of the former golf course (UW Alumni 1941). More than 5,000 military personnel went through naval or aviation training on campus before 1919.

The campus's pharmaceutical herb garden also supported the war effort. According to a walking tour prepared by UW, the herb garden, which had expanded to eight acres during the war, provided a thousand pounds of digitalis, used as heart medication, to support the Army medical service (UW Architecture n.d.).

The War also took the lives of former students and faculty. Fifty-eight sycamore trees were planted along Memorial Way to memorialize those who died (UW Alumni 1941).

The University and its assets continued to grow in the 1920s and 1930s. The University's stadium was constructed in 1920, and in 1925, Charles Lathrop Pack donated 2,000 acres to the School of Forestry. In 1927, the Associated Students presented the university with 23 acres of land on the east side of campus.

A 1938 map shows how far the university had expanded since the Boone Plan (Figure 4-4). Note that Rainier Vista is bordered on the west by buildings that remain today, including the Anderson Hall Forestry Lab, Bagley Hall (labeled the Community Building in the image below), and the "Drug Gardens," which remains the university's pharmaceutical herb garden today. South of the NPRR and street-car line, no evidence appears of the buildings now part of the Warren G. Magnuson Health Sciences Center.

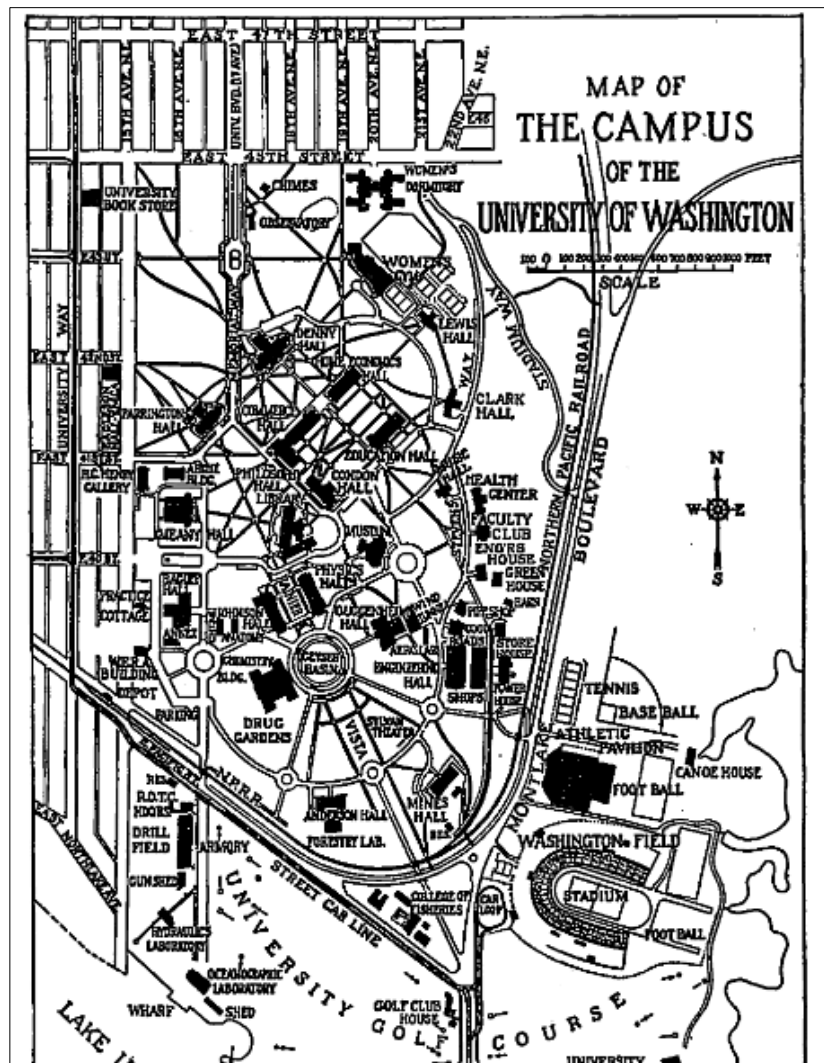


Figure 4-4. A map of the University of Washington campus from the 1938 General Catalog (UW 1938).

Planning for the Magnuson medical complex began directly after World War II on the site of the former golf course and training facilities. University enrollment swelled at the end of the war, and in 1949, the University opened the Health Sciences Building, the first of its sprawling medical complex. In 1959, the University Hospital was opened. The complex was renamed the Magnuson Health Sciences Center in 1978, when it was approximately a third of its current size (Tate 2012).

The University was a hot spot for Vietnam War protests in the 1960s and 1970s, as well as a hotspot for Cold War engineering. In 1961, UW built a nuclear reactor on campus for teaching purposes and in 1965, formed the Nuclear Engineering Department. The reactor has since been decommissioned (Ott 2013).

While development in the southern campus was still sparse, the NPRR, owners of the segment of line within the AI, continued heavy use of the line until 1963 (City of Seattle 2011). The NPRR merged with two other railroad companies, Burlington and The Great Northern, in 1970, and the new company, the Burlington Northern Railroad, abandoned the line that would become the Burke-Gilman Trail in 1971. The first section of the line to be paved and turned into the Burke-Gilman Trail connected Gas Works Park (west of the AI) within Tracy Owen Park in Kenmore (north of the AI).

The south campus began to grow more quickly during the last half of the twentieth century. Between 1960 and 2003, 100 construction projects took place on campus, and many of them were constructed in the open spaces between buildings south of Frosh Pond. Within or adjacent to the AI, Benson Hall was constructed in 1966, Bloedel Hall was completed in 1970, the Kincaid Building in 1971, the Hitchcock Building in 1981, and the Chemistry Building in 1995 (Courtois & Associates 2003).

Along with new buildings came new utilities upgrades. Waterlines, natural gas lines, and a number of other utilities including fiber optic and electrical lines were installed in the vicinity of the AI during the late twentieth century (Jacobs, personal communication 2013; Seattle Public Utilities 2013).

5. Expectations for Prehistoric, Ethnographic Period, and Historic Period Cultural Resources

Based on archival research, as well as the environmental and the cultural settings of the AI, there is a moderate to high probability for observing precontact to ethnohistoric period cultural remains. Settings similar to that of the AI would have been the focus of hunting and gathering activities and would have been ideal locations for long term occupation as well. Expected artifacts and features would relate to these activities. Although the AI has been the subject of significant development over the past 120 years, anticipated materials could include fragments of fire-modified rock (FMR), either singly or in intact clusters (sometimes with charcoal and/or oxidized soils), indicating the presence of cooking or processing hearths; assemblages of lithic and/or bone tools and tool fragments; and isolated lithic or bone tools or tool fragments.

The likelihood of finding historic-period archaeological remains is moderate to high, given the use of the AI as an important transportation corridor early in the history of the development of Seattle. Historic features and artifacts encountered would likely be associated with the SLS&E railroad and NPRR. Some artifacts associated with the AYPE may be encountered as well. Artifacts and features may include railroad spikes, brick, nails, glass and metal refuse, building foundations, and objects related to operation of the railway (e.g., portions of signals).

Because the area surrounding and including the AI is mapped geologically as glacial sediment and is till (Booth et al. 2009) intact archaeological deposits should be found at or near the surface. Glacial sediment has no potential to contain deeply buried cultural materials. By extension, archaeological materials should only be found in soils that are derived from that glacial material.

6. Field Strategy and Methods

6.1 Archaeological Inventory

Surface and subsurface survey were performed along the AI in order to identify archaeological materials and to assess the potential of the AI to contain archaeological materials.

6.1.1 Pedestrian Survey

HRA archaeologists walked parallel transects in unpaved portions of the AI. Surface survey was designed to identify cultural resources visible above ground, as well as marked utilities and other evidence of disturbance. Representative photographs were taken during the course of the survey in order to document the landscape.

6.1.2 Subsurface Survey

Shovel probes (SP) were excavated across the AI in order to identify buried cultural resources. Following Washington State's regulation governing underground utility locates (RCW 19.122) SP locations were marked with white paint three business days prior to fieldwork. The submitted utility locate request indicated a 10-ft radius around each marked location should be searched for the presence of utilities (Figure 6-1).

Shovel probes were only excavated in unpaved areas where utilities were not located. Sediments recovered from each SP were screened through ¼-inch hardware mesh. Observations regarding SP sediments were documented on standardized forms. These observations included sediment grain size (e.g., sand, silt), gravel size and shape, contacts (e.g., abrupt, diffuse), color, presence of water, presence of roots, signs of soil development, origin of sediment, and disturbance. Cultural materials recovered during SP excavation were noted. Precontact and historic artifacts, if observed, would have been photographed from multiple angles. GPS points were taken for each SP in order to document their locations. Shovel probe excavation was terminated when impassible objects (e.g., large cobbles, wood) were encountered or when *in situ* (i.e., in place/not disturbed) glacially deposited sediment was encountered. Shovel probes were excavated to approximately 90 centimeters (cm) if no impassible objects were encountered and the depositional origin of the encountered sediment was not known.



Figure 6-1. SP location marked “Arch” and nearby utility marking.

6.2 Architectural Inventory

Prior to field investigations, HRA’s architectural historian reviewed aerial photographs, historic maps, historic property inventory forms from DAHP’s WISAARD database, former survey reports, and archival materials from UW to determine the history of buildings, structures, and objects within the AI. From this research, HRA identified four BSOs within the AI that had not yet been recorded or assessed for eligibility to the NRHP.

To assess NRHP eligibility and to provide material for a Historic Resources Addendum, HRA performed an architectural field survey on August 27, 2014, recording all results within the WISAARD database following Washington State guidelines. To augment fieldwork, HRA visited the Suzzallo and Allen libraries on the UW campus, reviewing historic campus photos in Special Collections as well as reference materials documenting the history of university buildings. HRA staff also visited the Seattle Public Library and performed personal interviews with facilities staff and with the University’s Greenhouse Manager, Doug Ewing.

Dates of construction differed between sources. For this report, HRA relied on dates published in the UW Master Plan.

7. Archaeological and Architectural Inventory Results

7.1 Archaeological Inventory

Surface and subsurface archaeological investigations were performed on August 26, 2014, by HRA archaeologist Alexander Stevenson. Figure 7-1 depicts the location of shovel probes; however, pedestrian transects are not depicted because they were generally very short and discontinuous.

7.1.1 *Pedestrian Survey*

Pedestrian transects were walked along unpaved and undeveloped portions of the AI where ground disturbance was anticipated (i.e., near the greenhouse and plant lab facilities). Surface survey revealed that much of the AI near the Greenhouse and Plant Lab facility had been paved and/or developed or was covered with vegetation (e.g., ivy). The landscape appeared to have been highly modified as a result of development activities. For example, the ground surface adjacent to Stevens Way was approximately 10 ft higher than 20 ft to the south where the Greenhouses are located (Figure 7-2). No cultural materials were observed at or near the surface.

Utilities were noted along much of Stevens Way. A single electric line, which ran the length of the area where ground disturbance is anticipated, was marked approximately 15 feet south of the curb/sidewalk on the south side of Stevens Way (Figure 7-3).

7.1.2 *Shovel Probes*

A total of seven shovel probe locations were marked prior to utility locates for this Project. The planned shovel probe locations were in areas that were unpaved and appeared undeveloped (Figure 7-1). After utilities were marked at each of the locations, two planned SPs were located in the vicinity of many underground utilities and were thus not excavated (Table 7-1; Figure 7-4). The AI included glacially derived till and/or glaciolacustrine sediment. Shovel probes were not excavated within the documented boundaries of Site 45KI957 (see Figure 7-1).

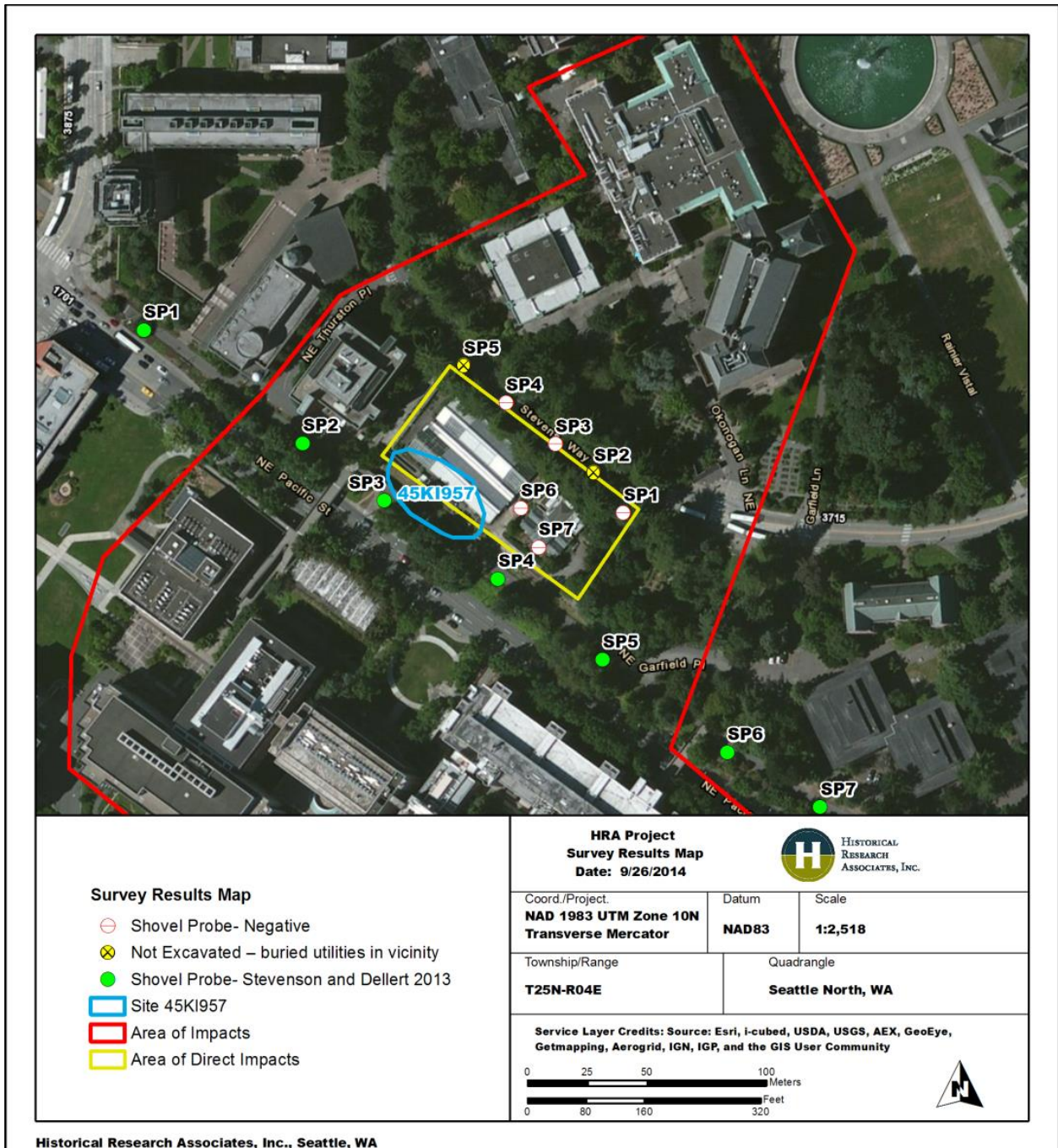


Figure 7-1. Location of shovel probes excavated for this Project, as well as those reported by Stevenson and Dellert (2013) and the location of Site 45K1957.



Figure 7-2. View of west end of Greenhouses from near Stevens Way (view southeast).



Figure 7-3. Electric utility marked south of W Stevens Way NE, view east from SP5 location.

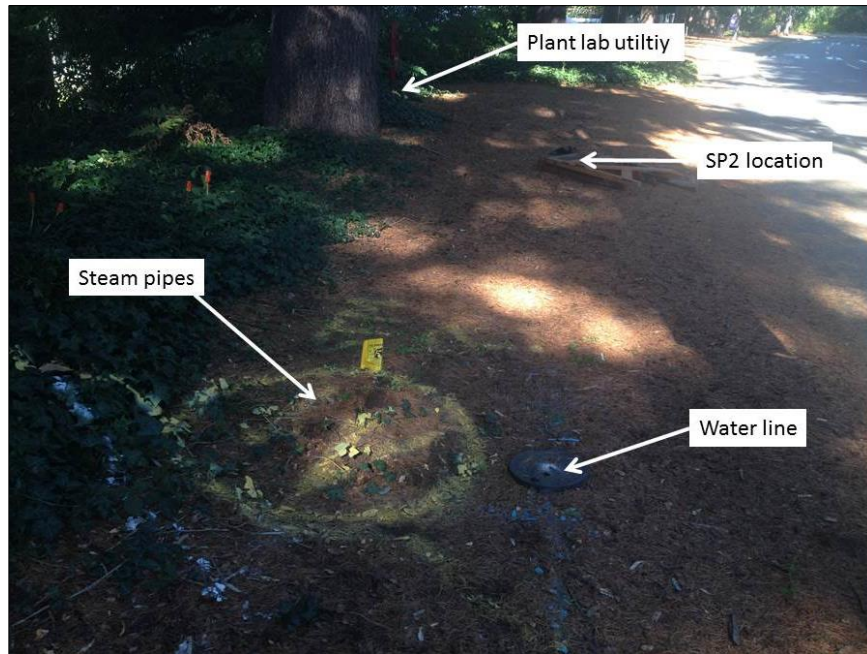


Figure 7-4. SP2 location and utilities marked in vicinity.

Table 7-1. Results of Shovel Test Probes in the AI.

Shovel Probe	Maximum Depth Below Surface	Description – <i>Comments</i>	Cultural Materials Identified
1	53	0-24: Light brown to brown fine sand with silt, few round to subround gravels ranging from small pebbles to medium cobbles, some roots; abrupt lower boundary – <i>fill/ disturbed</i>	2 brown glass fragments (0-24 cmbs)
		25-53: Light grey brown compact silt with fine sand, poorly sorted subround gravels ranging from small pebbles to small cobbles, moderately compact – <i>intact glacial sediment</i> <i>Terminated in intact glacial sediment</i>	None
2	-	Not excavated because of numerous underground utilities (see Figure 7-4)	n/a

Table 7-1. Results of Shovel Test Probes in the AI.

Shovel Probe	Maximum Depth Below Surface	Description – <i>Comments</i>	Cultural Materials Identified
3	94	0-94: Light brown fine sand and silt with some round to subround small gravels – <i>fill/disturbed</i> <i>Terminated because of depth</i>	1 clear glass fragment (20-30 cmbs) 2 clear glass fragments, 1 brick fragment (40-50 cmbs) 1 brick fragment (50-70 cmbs)
4	56	0-18: Brown silt and fine sand, loose – <i>duff</i>	None
		18-46: Light brown medium to coarse sand; loose with some round to subround gravels, compact upper 10 cm, abrupt lower boundary – <i>fill/disturbed</i>	1 clear glass fragment (18-35 cmbs)
		46-56: Light grey brown compact silt with fine sand, poorly sorted subround gravels ranging from small pebbles to small cobbles, moderately compact – <i>intact glacial sediment</i> <i>Terminated in intact glacial sediment</i>	None
5	-	Not excavated because of numerous underground utilities (see Figure 6-1)	n/a
6	96	0-15: Angular gravel with grey sand, very compact – <i>fill</i>	None
		15-96: Light grey brown compact silt with fine sand, poorly sorted subround gravels ranging from small pebbles to small cobbles, moderately compact – <i>glacial sediment disturbed above 60 cmbs</i> <i>Terminated because of depth</i>	1 clear glass fragment (55-60 cmbs)
7	95	0-12: Brown silt, high organic content – <i>duff</i>	None
		12-95: Brown medium to coarse sand with silt, few poorly sorted round to subround gravels ranging from small pebbles to medium cobbles – <i>fill/disturbed</i> <i>Terminated because of depth</i>	None

In general, sediments observed were fill/disturbed sand/silt overlaying intact glacial sediment. Fill included poorly sorted gravels, sand and silt not observed in glacial sediment and occasional modern debris. A number of modern or temporally non-diagnostic artifacts were observed up to approximately 60 cmbs. Abrupt boundaries noted in SP1 and SP4 indicate that developed soil

sequences had likely been removed from the vicinity. Deep fill/disturbed sediment noted in SP3 and SP7 reinforce observations made during surface survey suggesting heavy ground surface modification.

Figure 7-1 shows the location of SPs excavated for this Project as well as those reported by Stevenson and Dellert (2013). Sediments observed in these two sets of SPs are very similar with fill/disturbed sediment overlaying intact glacial sediment.

Archaeological Site 45KI957

Archaeological site 45KI957 (discussed in Section 2) is located south of the SPs excavated for this Project and north of those excavated for Stevenson and Dellert (2013). This site consists of a single projectile point and three flakes observed on the surface, within a context of historic-period and modern debris and redeposited soils. Results from the current inventory, as well as Stevenson and Dellert (2013) and observations made by Jolivette and Louderback (2009), suggest that the surface in this area is not composed of an undisturbed soil sequence. While glacial sediment has been observed at some locations within and near the AI and Site 45KI957, all available evidence suggests that the surface has been truncated and is highly modified from its original late-Holocene pre-development form. As such, it is likely that the cultural materials recorded as 45KI957 represent materials that were imported with fill.

7.2 Architectural Inventory

Eight resources were identified within the AI that had not yet been recorded in the state's WISAARD database. Of the eight unrecorded resources, four were found to be 45 years old or older and thus in need of assessment as part of the current project (Figure 7-5; Appendix A). The resources within the AI that are over 45 years of age include Benson Hall (1966); the Botany Greenhouse (1947); the Plant Lab, which includes two annexes (1937–1984); and the Pharmaceutical Herb Garden (1911). The four unrecorded buildings found to be less than 45 years old and not eligible for listing in the NRHP include the Kincaid Building (1971), Hitchcock Building (1982), Health Sciences Annex (1992), and Chemistry Building (1995).

The AI is located in the southern portion of the campus, which was traditionally less densely developed than the central campus. Development took place primarily in the mid- to late twentieth century. Today, this area of campus is generally used by the Engineering, Biology, and Health and Sciences Departments. The project area is bordered by NE Pacific Street and the Burke-Gilman Trail on the south, and W Stevens Way NE on the north. To the east and west of the project area are walkways and academic buildings. The AI is located on an incline and is generally wooded or covered in mature foliage. This foliage obscures some buildings from view.

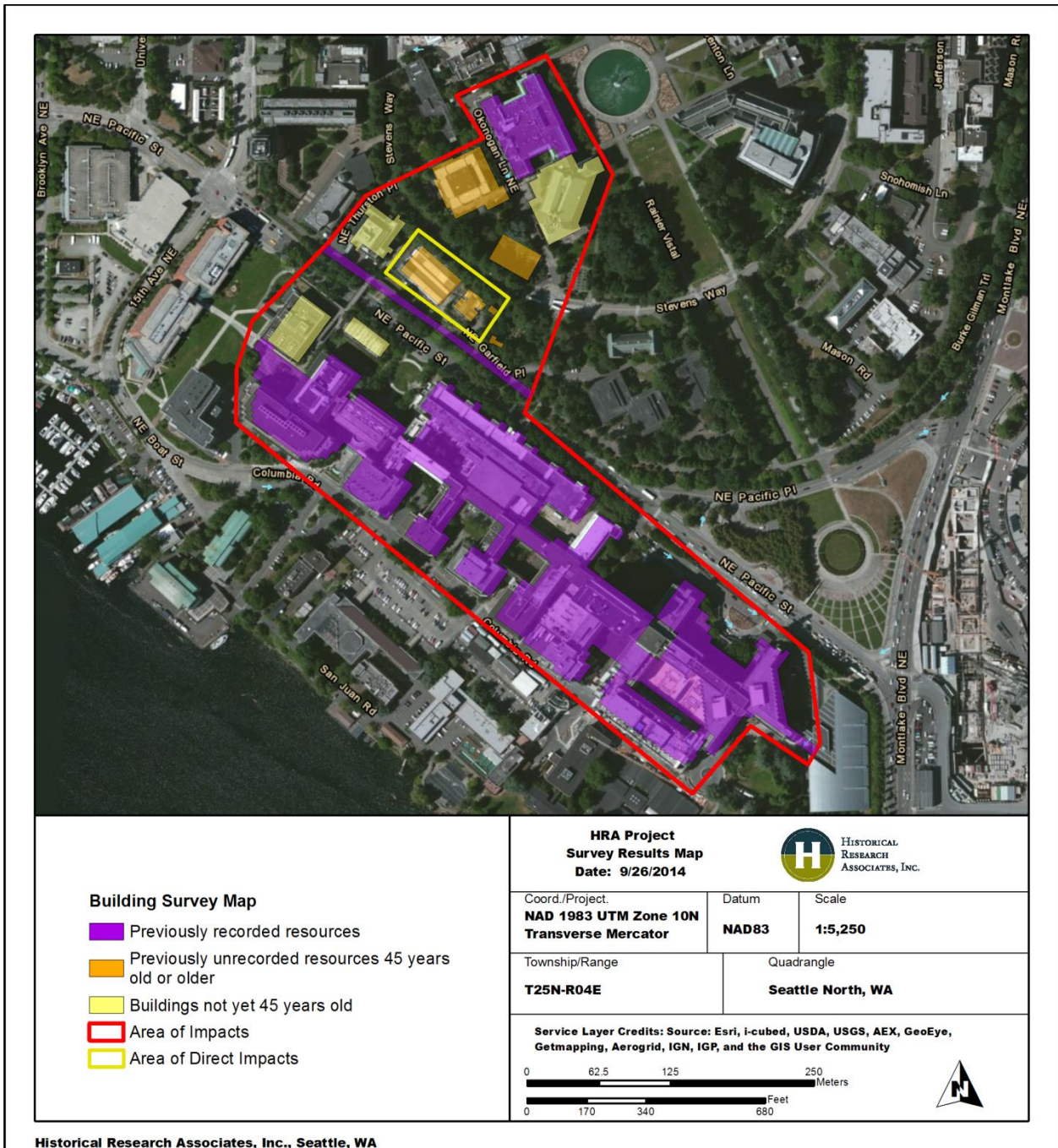


Figure 7-5. DAHP status and age of BSOs within AI.

Below are physical descriptions and eligibility assessments for each of the four resources 45 years old or older and within or adjacent to the project area. Following the UW Master Plan guidance, the assessments take into account, when applicable:

- the age of a resource
- information regarding a resource’s architect
- descriptions of exteriors, interiors, and the surrounding site
- information regarding the distinctive visual characteristics of an architectural style, method of construction, or period
- information regarding the role a resource has played on campus and in the community
- a resource’s character, interest, or value as part of the development, heritage, or cultural characteristics of the campus, city, state, or nation
- information regarding a resource’s associations with historic events with a significant effect on the campus, community, city, state, or nation
- information regarding a resource’s associations with the life of people important to the history of the campus, city, state, or nation
- information regarding a resource’s associations with a significant aspect of cultural, political, or economic history on campus, community, city, state, or nation
- information regarding the prominence of the spatial location, contrasts of siting, age, or scale that make the resource an easily identifiable visual feature that contributes to the distinctive quality of identity of the campus (UW Master Plan 2003:26–27)

7.2.1 Benson Hall (1966)

Benson Hall, originally known as the Chemical Engineering Building, was designed by Bindon, Wright, and Partners and was constructed in 1966 (UW Plan 2003) (Figure 7-6). The building was named after Henry K. Benson, former chair of Chemistry and Chemical Engineering.

The building was constructed soon after the University formed its Nuclear Engineering Department. On the dedication of Benson Hall, the *Puget Sound Chemist* ran an article stating that “the building contains a small-scale paper mill and a refinery-sized glass distillation column for use by undergraduate students. Benson Hall also houses a pulse neutron accelerator and accompanying console facilities for the nuclear engineering department. The building will be home to about 120 undergraduate students in chemical engineering, nuclear engineering and forestry majors” (*Puget Sound Chemist* 1967:15). The Nuclear Engineering Department was disbanded in the early 1990s (*Seattle Times* 1992).



Figure 7-6. Benson Hall, view northwest.

According to UW, “the building incorporated precautionary design for its time. It had a 35 ton sliding door and reverse pressure rooms. These features were incorporated to prevent the accidental escape of radioactive material in the pulse neutron generation lab or particles from escaping when the door was opened. Also a special sump was installed to prevent harmful chemicals from entering Seattle’s sewer system” (UW 2014).

Benson Hall sits on an incline in the southern portion of the university campus, north of the project area. It is bordered by W Stevens Way NE on the southwest and by Okanogan Lane on the northeast. The building faces southeast, with a view of the Pharmaceutical Herb Garden. The project area, located southwest of W Stevens Way NE, is primarily visible from the upper floors of Benson Hall.

The building is highly symmetrical. It stands three stories tall above a daylight basement. It was designed in the International style, square in plan, and constructed of concrete faced with ornamental concrete on the first floor and brick on the upper floors. The building sits atop a concrete foundation and includes a recessed concrete base on the basement and first floor. The upper floors include projecting, flat, unornamented wall surfaces punctuated by large pillars that house mechanical systems and bands of sliding windows on the second and third floors. The building is topped by a shallow mansard copper roof with no eave. A setback penthouse for mechanical systems is invisible from the street below. All doors and sliding windows appear to be steel framed. The building is constructed on a sloping grade and is skirted on all elevations by a continuous raised concrete walkway and plazas with metal railings on the first floor. The basement

level is visible beneath the raised walkway only on the northwest and southwest elevations. The building's primary façade faces southeast, and includes a wide, tiered, concrete staircase from the plaza to the grounds near the pharmaceutical herb gardens. Secondary elevations include similar elements: flat wall surfaces punctuated by large pillars, a recessed first floor, and bands of sliding windows on the second and third floors. The northwest elevation includes a smaller stair from the raised walkway to the ground below.

The building was designed to incorporate strong geometric shapes and projecting and receding elements. For instance, the concrete base is recessed from the piers that support the projecting second and third floors (Figure 7-7). Office walls on the first floor are designed as floor-to-ceiling windows or windows atop light-colored concrete walls with large aggregate. Ornament is simple and includes variations in brick patterns. The walls of the upper floors are clad in running bond with recessed panels of stacked bond beneath the windows.



Figure 7-7. Benson Hall, view west.

The building's lobby retains many of its original materials, including linoleum floors, wood paneled walls, some brick-clad walls, and streamlined aluminum elements, including elevator doors and push bars on exterior doors.

Plans and drawings held by the Campus Engineering Facilities Services show that building alterations have generally taken place within labs and classrooms. Mechanical upgrades occurred throughout the 1970s and 1980s. However, no alterations, beyond minimal repairs, have taken place on the building's exterior or within its first floor lobby (UW Facilities 2014).

7.2.2 Botany Greenhouse (1947)

Constructed in 1947, the Botany Greenhouse was fabricated by the preeminent greenhouse design firm Lord & Burnham (Figure 7-8). Original plans show that it was designed by noted local architect Paul Thiry as two greenhouses connected by a central corridor.



Figure 7-8. Botany Greenhouse, view north.

UW's Botany Greenhouse, designed to be streamlined and modern, holds the University's plant collection, including specimens that can be traced back to the original teaching collection, developed along with the University's early Botany Department in another part of the campus in 1900. The greenhouse includes three different habitats: cool tropical, warm tropical, and xeric (desert).

The Botany Greenhouse is oriented northwest to southeast within the area of direct impacts. The landscape is on an incline and buildings north and west of the greenhouse look down on it from their upper floors. The greenhouse is bordered by W Stevens Way NE on the north and the Burke-Gilman Trail on the south. Farther south is NE Pacific Street. A gravel parking area, plantings, and the campus Plant Lab are located directly southeast of the greenhouse. Northwest of the greenhouse are sloping concrete walkways and retaining walls with climbing vines. These separate the greenhouse from pedestrian paths and Kincaid Hall to the northwest. Chain-link fences control access to some portions of the site.

The UW's Botany Greenhouse is constructed of a steel frame on a concrete foundation with aluminum sash bars around safety-glass panels. The greenhouse is rectangular in plan, made up of two front-gabled greenhouses tied together by a central corridor. All structures have steeply pitched roofs with vents at the ridgeline. Original plans from Campus Facilities show that the building was restored and mechanical systems were upgraded throughout the 1970s, 1980s, and 1990s. A major renovation took place in 1996–97 (UW Facilities 2014). A personal interview with greenhouse

manager Doug Ewing confirmed that the greenhouse was reglazed; at that time its wooden sash bars were replaced with aluminum, and its lapped glass panels were replaced with safety glass. The footprint and frame and the benches, doors, and other interior materials are original, but the skin of the building is new (Ewing 2014; UW Facilities 2014) (Figure 7-9).



Figure 7-9. Interior of Botany Greenhouse, view northwest.

The interior of the Botany Greenhouse includes poured-concrete floors, and framed glass walls with wood doors between each greenhouse and the central corridor. The central corridor is devoted to planning, study, and systems management. Metal cabinets, counters, and shelves line both sides of the corridor. Florescent lights hang from the ceiling, which also includes louvered vents. Plants populate all portions of the greenhouse and parts of the central corridor. A large metal vat in the northwest corner of the corridor holds aquatic plants.

7.2.3 *Plant Lab (1939)*

Constructed in 1939, the Plant Lab complex of buildings was based on designs first drawn in 1927 and then revised in 1937 by campus planners Bebb and Gould. The main building of the Plant Lab, which includes brick offices and a greenhouse, appears to be based entirely on the Bebb and Gould drawings (UW Master Plan 2003) (Figure 7-10).

The Plant Lab is oriented northeast to southwest within the area of direct effects. Like the Botany Greenhouse, the lab is bordered by W Stevens Way NE to the north and the Burke-Gilman Trail to the south. The lab is only minimally visible from these routes. Pathways, plantings, and the Botany

Greenhouse sit northwest of the Plant Lab. The lab is bordered on the east by open space devoted to farming and other landscaping, along with two small annexes. Annex #1 sits northeast of the building; Annex #2 sits southeast of the building. The Plant Lab is surrounded by mature foliage, plantings, and trees. A portion of its greenhouse is visible from the Burke-Gilman Trail.



Figure 7-10. Plant Lab, view north.

The Plant Lab complex consists of buildings in a variety of materials and styles. The main office building is constructed of concrete faced in brick and sits atop a concrete foundation. The building is constructed as a central block with two, recessed, flanking wings. The primary façade faces northeast, but is nearly obscured by mature foliage. The primary façade's central block includes a wood entry door with nine lights topped by a transom and flanked by two double-hung, wood windows with four divided lights per sash. Windows on flanking wings are divided into eight lights. Secondary elevations also include double-hung, wood windows of eight divided lights. Windows include projecting concrete sills and are topped by ornamental details including concrete bars punctuated by concrete diamonds. These sit atop and below courses of header brick in a wall of rug-faced brick in running bond. The building's roofline is further ornamented with a rounded concrete cornice and metal coping. This minimally ornamented building is an example of a simplified Art Deco style.

The main brick building is attached by a brick corridor to a greenhouse on its southwest elevation. The greenhouse includes two side-gabled greenhouses linked by a central, front-gabled corridor. The central corridor is taller than the greenhouses and the attached brick building and its roofline is

extended over the brick building, appearing as a shingled hipped roof on top of the brick building's flat roof.

The attached greenhouse's steel structure includes glass panels atop concrete stem walls. Portions of the roof are constructed of panels in steel frames that open to vent the building. Unlike the Botany Greenhouse, the Plant Lab retains much of its original glazing and original steel structure, as well as wooden elements including windows on the gabled ends. The ventilation system was upgraded in the late twentieth century (Ewing 2014).

The brick building was originally used as offices for the director of the garden and horticultural staff. The building also included lab space for student research (Ewing 2014) (Figure 7-11). The brick portion of the building was designed to hold a lab and fertilizer room on the north and rooms for seeds, herbs, roots, and grinding on the south (UW Facilities 2014). The basement includes work rooms with concrete and vinyl-tiled floors. The lab's greenhouses include concrete floors and benches and beds for holding various plants.



Figure 7-11. Plant Lab, view northeast.

Also part of the Plant Lab are two annexes (Figure 7-12). Annex #1 is a wood building on concrete piers dating from 1963 (UW Master Plan 2003). It has a shallow side-gabled roof with a deep overhanging eave above the entry. The entry faces a wooden porch to the northeast. The building is clad in board-and-batten siding and includes sliding aluminum windows.



Figure 7-12. Plant Lab Annex 1, view southeast.

The final set of buildings includes connected sheds on concrete piers (Figure 7-13). The sheds, known collectively as Annex 2, are clad in horizontal wood boards and include original, double-hung, wood windows with divided lights. The primary building is topped by a shed roof with a slight eave and a hood with knee braces over a central entry door. The shed likely dates from the early years of the Plant Lab, though it appears to have been expanded in more recent years. The UW Master Plan lists the date of construction as 1985 (UW Master Plan 2003; UW Facilities 2014). However, the building's materials and style suggest a construction date in the 1930s or 1940s. HRA suggests that while the original building was likely constructed within the historic period, additions may date from the 1980s. These are generally obscured by vines and other mature foliage growing against exterior walls.

7.2.4 Pharmaceutical Herb Garden (1911)

The Pharmaceutical Herb Garden, constructed as the Botany Department's "Drug Garden," in 1911, and now managed by the Biology Department, contains the University's collection of medicinal herbs from around the world (Figure 7-14). The garden is approximately 2.5 acres and includes planting beds separated by gravel paths. The garden has been altered over the years and does not retain its original footprint. In 1993, the herb garden was improved by the addition of an art installation that includes a storage shed for supplies and an integrated bus station on its southeast corner. The installation was designed by Suzanne Hellmuth and Jock Reynolds.



Figure 7-13. Plant Lab Annex 2, view southeast.



Figure 7-14. Medicinal Herb Garden, view north.

No plans or drawings of the original or current garden remain in the Campus Facilities Collection.

The Pharmaceutical Herb Garden is located north of W Stevens Way NE and is visible from the roadway. The garden sits south of Benson Hall, Bagley Hall, and the Chemistry Building. Both the Chemistry Building and Benson Hall are oriented toward the garden. Pathways lead from building entries to walkways through the garden. Garden beds are located on either side of Okanogan Lane but are screened from Rainier Vista by mature foliage. The Herb Garden is located across W Stevens Way NE from the project area. It is minimally visible from the project area.

Gridded pathways, generally covered in gravel, lead between rectangular planting beds with wooden borders that hold the garden's international collection of medicinal herbs. Small signs on metal posts identify herb varieties.

8. Evaluation of Resources

Below, HRA provides assessments for all previously recorded archaeological and previously unrecorded architectural resources located in the AI. Assessments include recommended determinations of eligibility to the NRHP. Section 8.3 provides assessments of potential impacts to historic-era resources based on a project description that includes demolition of the Botany Greenhouse and the Plant Lab. Recommendations for potential mitigation follow in Section 8.4.

8.1 National Register of Historic Places Criteria

The criteria for listing a property in the NRHP require that, in addition to a building being over 50 years of age, in most cases, and possessing integrity, it must meet at least one of the following criteria, outlined in 36 CFR 60.4 (National Park Service 1991):

- A. Property is associated with events that have made a significant contribution to the broad patterns of our history; or
- B. Property is associated with the lives of persons significant in our past; or
- C. Property embodies the distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction; or
- D. Property has yielded, or is likely to yield, information important in prehistory or history.

8.2 Integrity

“Integrity is the ability of a property to convey its significance” (NPS 1991:44) and is related to how a property’s physical features are tied to and convey its significance. It is based on “why, where, and when a property is important.” In order to retain integrity, a property must retain most of the seven aspects of integrity, which are as follows:

- Location: the place where the property was constructed or the place where the historic event occurred.
- Design: the combination of elements that create the form, plan, space, structure, and style of a property.
- Setting: the physical environment of a historic property.
- Materials: the physical elements that were combined or deposited during a particular period of time, and in a particular pattern or configuration, to form a historic property.

- Workmanship: the physical evidence of the crafts of a particular culture or people during any given period in history or prehistory.
- Feeling: a property's expression of the aesthetic or historic sense of a particular period of time.
- Association: the direct link between an important historic event or person and a historic property.

8.3 Evaluation of NRHP Eligibility for Resources within the AI

8.3.1 *Archaeological Resources*

HRA recommends that Site 45KI957 is not eligible for listing in the NRHP and WHR because it does not represent a site in primary context, is lacking in data potential, and has a lack of integrity. The site lacks association with important national, regional, or local events and individuals and does not represent the work of a master; it therefore is not significant under Criteria A, B or C. Because the site is not in primary context and is likely located in imported fill or highly disturbed sediments, the site also lacks data potential and is therefore recommended not eligible for listing in the NRHP under Criterion D. The site also lacks integrity of location, design, setting, feeling, and association, relating back to its lack of context.

8.3.2 *Architectural Resources*

Of the four historic-era resources assessed under the current project, HRA recommends that three are eligible for listing in the NRHP. Benson Hall is eligible under Criteria A and C for its architectural qualities and its association with campus research and education. The Plant Lab is eligible under Criteria A and C for its architectural qualities and its associations with campus research and education, and the Pharmaceutical Herb Garden is eligible under Criterion A for its associations with important events in local, state, and national history. Discussions of each resource's eligibility recommendations are found below.

Benson Hall

Benson Hall was designed by Bindon, Wright, and Partners, an influential firm that also designed the Seattle City Light Building in 1957, the downtown branch of the Seattle Public Library in 1960, an addition to the Suzzallo Library on the UW campus in 1963, and the library at Pacific Lutheran University in 1966. Bindon and Wright were recognized for their designs by the Seattle chapter of the American Institute of Architects, who granted them awards for the Bethlehem Pacific Coast Steel Corporation Office Building, constructed in 1960, and the Parke-Davis Company Seattle Sales Office Building, constructed in 1965 (DAHP 2014). The firm was also honored for partnering with

Skidmore, Owings, & Merrill to design the Norton Building in Seattle. The building was completed in 1959 and is recognized as Seattle’s first modern office tower.

Benson Hall reflects characteristics found in the Norton Building, including the separation between the base and the projecting upper floors. Both buildings are nearly devoid of surface ornament as is common in the International Style.

Benson Hall appears on firm partner John LeBaron Wright’s biography for the American Institute of Architects as one of the firm’s principal works (AIA 1970:1016). Although the firm was prolific, other principal works, including the downtown Seattle branch of the public library, have been demolished, making Benson Hall one of a diminishing number of resources by this firm that retain excellent integrity (Figure 8-1).

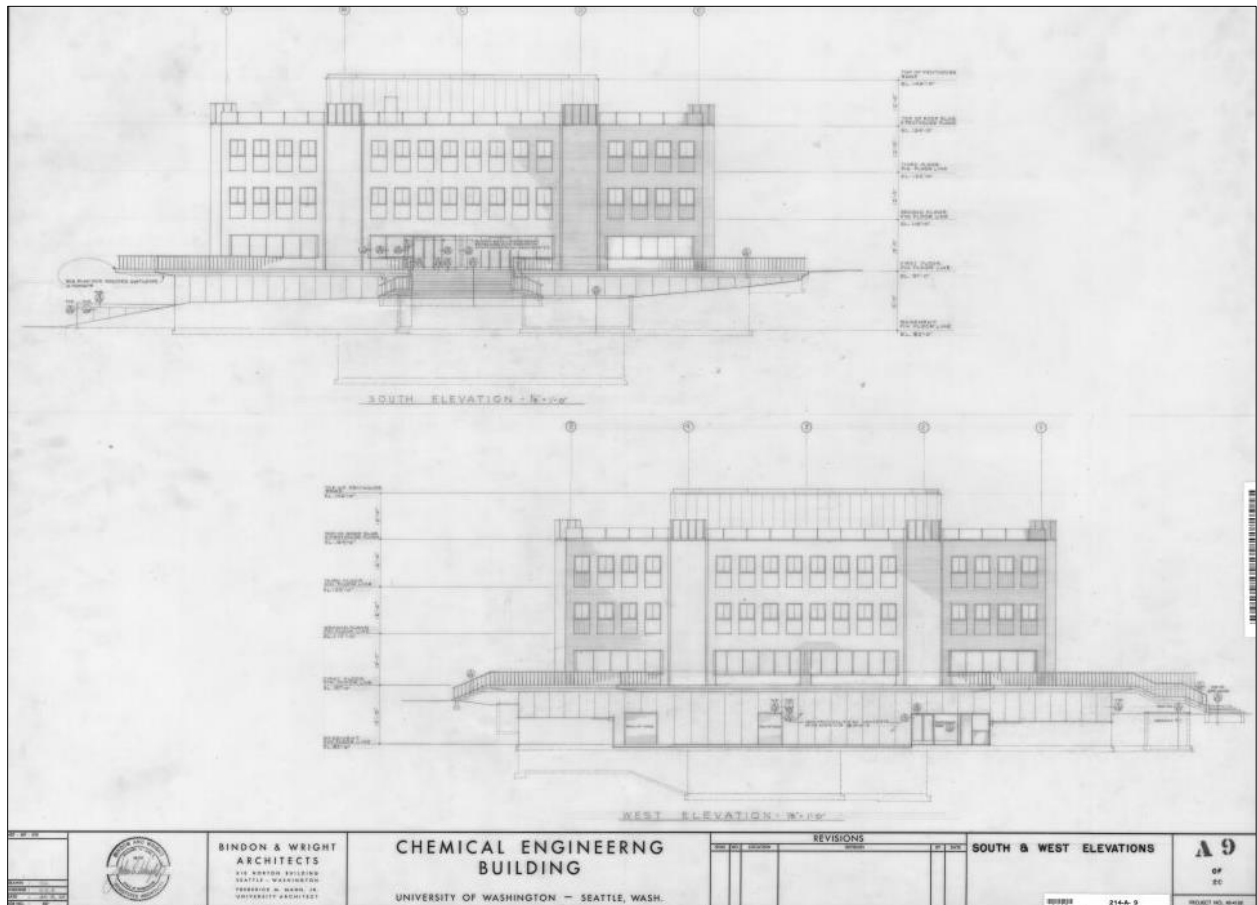


Figure 8-1. Chemical Engineering Building, north and west elevation drawings (UW Facilities)

Benson Hall is significant for its architectural character and for its association with the firm Bindon, Wright, and Partners. It is also significant for its associations with historic events that had a significant effect upon the campus, namely the growth of chemical engineering, nuclear engineering, and forestry research and education at UW in the late twentieth century.

The building is not known to be associated with the lives of specific people significant to our past or with a specific aspect of our cultural, political, or economic history. The building does not appear likely to yield information important in prehistory or history.

HRA recommends that Benson Hall is eligible for listing in the NRHP under Criterion C for its architectural character and under Criterion A for its associations with important trends in our local history.

Botany Greenhouse

The Botany Greenhouse was prefabricated by noted firm Lord & Burnham and designed by a well-respected local architect. Lord & Burnham began constructing greenhouses and the boilers that kept them temperature controlled in the nineteenth century. They became well known for designing large, sometimes Gothic, conservatories including the Conservatory of Flowers in San Francisco, which was constructed in 1878 and listed in the NRHP in 1971. Lord & Burnham also designed the Conservatory at the U.S. Botanic Gardens in Washington, D.C., built in 1933.

Paul Thiry was trained at UW and focused on residential properties until the early 1930s when an influential trip abroad introduced Thiry to European Modernism, which he promoted once he returned to the United States. During World War II, Thiry designed the West Kiln Building on the UW campus (1942), and went on to design the Museum of History and Industry (1950); the North East Branch Library in Seattle, which won the 1955 Seattle AIA Honor Award; and the Washington State Library in Olympia (1959).

The Botany Greenhouse retains its original footprint and continues to be used for its original purpose, to house the university's collection of plants (Figure 8-2).

Lord & Burnham produced a number of greenhouses, solariums, and conservatories between the 1840s and 1980s, when the firm's designs were purchased by Under Glass, which continues to provide greenhouses based on Lord & Burnham plans today.

According to Under Glass, "early greenhouses were made of cypress wood and iron or steel. Experimentation with aluminum as a material for greenhouse construction was started as early as 1932 when the U.S. Botanical Gardens in Washington, D.C. were built. However, it was not until 1955 that greenhouses with exterior members of aluminum had reached a point where they were competitive with wood construction" (Under Glass 2014). The Botany Greenhouse was constructed before aluminum was considered competitive and originally included wood sash bars, which have since been removed.



Figure 8-2. Historic photo of the Botany Greenhouse under construction, 1947 (UW Special Collections).

The Botany Greenhouse at UW is significant for its associations with the history of the Botany Department on the UW campus, and as a midcentury example of a Lord & Burnham greenhouse fabrication of an early Paul Thiry design. The building is also significant for its associations with the University's botanical research and education in the mid-twentieth century. However, the greenhouse has lost a great deal of integrity. As noted by the greenhouse manager, the building has been entirely reglazed, lapped glass panels have been replaced with safety glass, and wooden sash bars have been replaced with metal.

The building retains integrity of site and setting, feeling, and association. However, it has lost integrity of design, materials, and workmanship. Furthermore, though it was designed by a well-known architect, it is not among that architect's principal works and does not represent the building style that Thiry came to be known for. The building is not known to be associated with the lives of specific people significant to our past or with a specific aspect of our cultural, political, or economic history. The building does not appear likely to yield information important in prehistory or history.

Although the building is significant for its associations, HRA recommends that the Botany Greenhouse is not eligible for listing in the NRHP under Criteria A, B, C, or D due to a lack of integrity.

Plant Lab

The Plant Lab was designed by Bebb and Gould, and constructed in 1939 as a combination of offices for horticultural staff and greenhouses for the cultivation of a teaching collection.

Bebb and Gould not only provided the plans for the 1915 redesign of the University campus but were also responsible for the design of many of its buildings, including the Suzzallo Library (1927) and Anderson Hall (1925). The firm also designed the Seattle Times building (1916) and what is now the Seattle Asian Art Museum (1933).

The Plant Lab was known at the time of its construction as the “drug lab,” and was likely associated with the 1911 pharmaceutical “drug garden,” now the “pharmaceutical herb garden,” located to the north of the site. Though plans for the Plant Lab were revised in the 1930s, the existing building retains the original plan, materials, and ornamental details outlined in the Bebb and Gould drawings (Figure 8-3) (UW Facilities 2014).

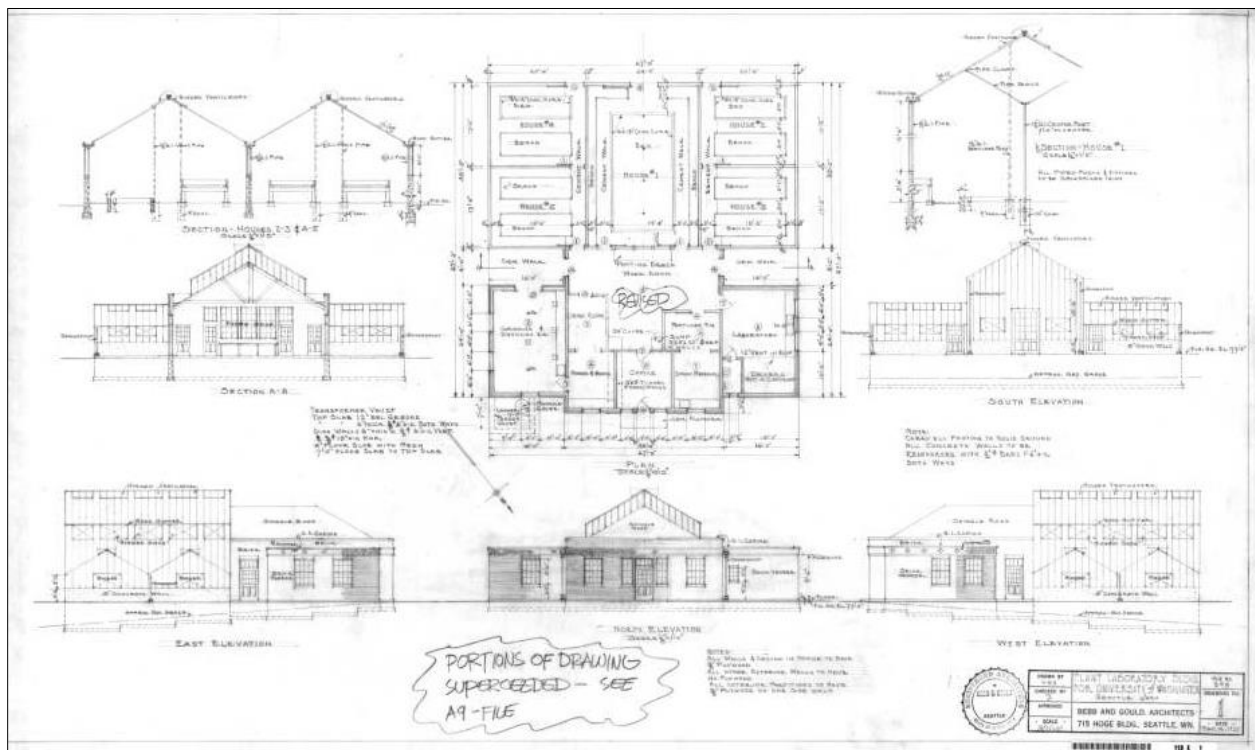


Figure 8-3. Elevation drawings for the Plant Lab (UW Facilities).

Unlike the Botany Greenhouse, this complex retains many of its original materials. The office building is a fine example of a restrained Art Deco style and retains its character-defining features, including its plan, divided windows, and ornamental cornice details, as well as its attachment to the existing greenhouse. The greenhouse also retains original materials and design, including its steel structure, original glazing, and original wooden windows. Facilities records note that alterations to

the buildings have included mechanical upgrades, new finishes and features for the offices and labs, but few alterations to the exterior of the building beyond regular repairs.

The main office building and the attached greenhouse possess excellent integrity of location, design, setting, materials, workmanship, feeling, and association. HRA finds that the offices and greenhouse are significant for their architectural qualities and as an example of a building designed by one of the primary architects of the current UW campus. The complex is also significant for its associations with botanical education and research at the university.

Both Annex buildings appear to retain their original materials, although Annex #2 has been altered and enlarged as recently as 1984. However, neither annex building is significant enough to be recommended individually eligible for listing in the NRHP for its architectural qualities.

HRA recommends that the main building of the Plant Lab, along with its attached greenhouse, is eligible for listing in the NRHP under Criterion C: architecture. The building is also significant for its association with the history of the University's early Botany Department and is also eligible under Criterion A. The building is not known to be associated with the lives of specific people significant to our past or with a specific aspect of our cultural, political, or economic history. The building does not appear likely to yield information important in prehistory or history.

Pharmaceutical Herb Garden

The Pharmaceutical Herb Garden is one of the earliest remaining elements of the university's early Botany program, and is recognized in the Campus Master Plan as a unique and significant landscape (UW Master Plan 2003).

A walking tour brochure provided by UW gave a brief history of the garden. The Pharmaceutical Herb Garden was created in 1911 on 1.5 acres managed by the School of Pharmacy, which grew herbs for the treatment of everything from colds to heart disease. The garden's heyday was around World War I, when it garden grew to eight acres and produced medicinal herbs for shipment overseas. By the end of World War II, pharmaceuticals had embraced synthetic medicines over plant extracts. The garden fell into disrepair and shrank to the 2.5 acres it inhabits today, though even this footprint has been slightly altered by the construction of newer buildings on its boundaries (UW Architecture n.d.; Ewing 2014).

The Pharmaceutical Herb Garden is significant for its association with more than 100 years of pharmaceutical research on the UW campus, and for its association with broad trends in our history, including the production of medicinal herbs for use by armed forces during World War I. The herb garden is not known to be associated with the lives of specific people significant to our past or with a specific aspect of our cultural, political, or economic history. The landscape feature does not appear likely to yield information important about prehistory or history.

The current herb garden is only a remnant of the World War I-era garden. Although its integrity of location has been altered over time, the garden retains integrity of design, workmanship, feeling, and association and has been at or near its current size for more than fifty years.

HRA recommends that the herb garden is eligible for listing in the NRHP as a historic landscape under Criterion A for its associations with important trends in local, state, and national history.

8.4 Impacts Assessment

HRA recommends that three architectural resources within the AI are eligible for listing in the NRHP. The one archaeological resource is not eligible. These resources are listed below along with a recommendation regarding potential impacts under the proposed Project (Table 8-1). A fifth resource, Bagley Hall, determined eligible for the NRHP by DAHP in 2009, is also assessed for potential impacts under the Project. Discussions follow.

Table 8-1. NRHP Eligibility Recommendations and Potential Impacts to Cultural Resources within AI.

Site Number or Historic/Common Name	Age or Date of construction	NRHP Eligibility Recommendation	Impacts Assessment
45KI957	Precontact	Recommended Not Eligible	No Impact
<i>Benson Hall</i>	1966	Recommended Eligible	No Impact
<i>Botany Greenhouse</i>	1947	Recommended Not Eligible	No Impact
<i>Plant Lab</i>	1939	Recommended Eligible	Adverse Impact
<i>Pharmaceutical Herb Garden</i>	1911	Recommended Eligible	No Adverse Impact
<i>Bagley Hall</i>	1937	Determined Eligible by DAHP in 2009	No Impact

8.4.1 *Benson Hall: No Impact*

Benson Hall is recommended eligible for listing in the NRHP under Criteria A and C. As with Bagley Hall, Benson Hall is within sight of the project area, but is separated from the site by W Stevens Way NE. Benson Hall is not associated with the Biology Department and has no association with the buildings proposed for demolition. Furthermore, the building is recommended eligible because of its Modern architectural characteristics and its associations with the history of the UW's Engineering Department. The Project may alter views from the building but will not impact its eligibility or its integrity of location, setting, design, materials, workmanship, feeling, or association. HRA recommends a finding of No Impact.

8.4.2 *Plant Lab: Adverse Impact*

The main building of the Plant Lab is recommended eligible for NRHP listing under Criteria A and C and is slated for demolition under the Project. Demolition is considered an adverse impact. See Section 8 for mitigation recommendations.

8.4.3 *Pharmaceutical Herb Garden: No Adverse Impact*

The herb garden is recommended eligible for listing in the NRHP under Criterion A. It is located across W Stevens Way NE from the project area and its site and setting will not be adversely impacted by the Project. Nor will it lose integrity of design, materials, workmanship, feeling, or association. The building's eligibility is linked to its association with the early Botany program at the University and with that program's importance to the campus war effort, but not specifically for its association with the buildings slated for demolition. Therefore, HRA recommends that the herb garden will not be adversely impacted by the removal of existing buildings and the construction of new buildings serving a similar purpose. HRA recommends a finding of No Adverse Impact.

8.4.4 *Bagley Hall: No Impact*

Bagley Hall is eligible for listing in the NRHP. The Project will demolish buildings and construct a new building within view of Bagley Hall. However, Bagley Hall is in the far northern portion of the AI and separated from the project site by W Stevens Way NE. Bagley Hall is not associated with the University's Biology Department, which manages the buildings slated for demolition, and it appears to have no association with the buildings themselves. Though views from Bagley Hall may be limited by the construction of a new building, Bagley Hall's integrity of location, design, setting, materials, workmanship, feeling, and association will remain intact. HRA recommends a finding of No Impact.

9. Summary and Recommendations

9.1 Archaeological Resources

Pedestrian survey and archival research revealed that the landscape within the AI has undergone extensive historic and recent modification specifically as a result of activities associated with the development of the UW campus and installation of underground utilities.

No archaeological materials were identified during this surface or subsurface inventory.

Although a Native American trail was mapped in the 1860s through the AI, HRA recommends that no further cultural resource investigations are necessary for this Project because:

- Sediments encountered during the current subsurface investigations were disturbed, fill or glacial till, showing truncation of the original soil column; and,
- Cultural materials observed during subsurface survey were recovered from disturbed sediments and/or fill, likely associated with utility installation.

HRA recommends that Site 45KI957, which is located in the AI, is not eligible for listing on the NRHP or WHR because it was observed in fill or highly disturbed native sediments, and the surrounding landscape does not contain intact sediments. It does not meet any of the eligibility criteria for listing on the NRHP and lacks many aspects of integrity. As such, this Project will not impact an NRHP-eligible archaeological site.

HRA recommends that if significant changes are made to the Project, further cultural resource review may be necessary.

Additionally, HRA suggests that all construction activity take place following an inadvertent discovery plan. In the unlikely event that archaeological materials are encountered during construction, this plan would outline the procedures and protocols to follow.

9.2 Architectural Resources

Of the five resources under consideration within the AI, HRA recommends that the project would only adversely impact one. The Plant Lab, which dates from 1939, is significant for its architectural qualities and its historic associations and is proposed for demolition under the current project

Adverse impacts to this building are unavoidable as a result of project needs and constraints. As such, HRA recommends that UW consider mitigation measures, including documenting the resources via a DAHP Level II mitigation report to be shared with the Suzzallo and Allen libraries,

and/or creating interpretive and educational materials to be shared with the public via the University website. This mitigation measure is consistent with DAHP guidelines that are often implemented prior to the demolition of a building, structure, or object. DAHP Level II documentation captures important features and characteristics of the documented structure so that they can be preserved for posterity and for future use.

9.3 Accidental Discovery of Archaeological Resources

In the event that archaeological deposits are inadvertently discovered during construction in any portion of the APE, ground-disturbing activities should be halted immediately, and UW should be notified. UW would then contact DAHP and the interested Tribes, as appropriate, and as described in the recommended inadvertent discovery plan.

9.4 Discovery of Human Remains

Any human remains that are discovered during construction of the Project will be treated with dignity and respect.

If ground-disturbing activities encounter human skeletal remains during the course of construction, then all activity that may cause further disturbance to those remains **must** cease, and the area of the find must be secured and protected from further disturbance. In addition, the finding of human skeletal remains **must** be reported to the county coroner **and** local law enforcement in the most expeditious manner possible. The remains should not be touched, moved, or further disturbed.

The county coroner will assume jurisdiction over the human skeletal remains, and make a determination of whether those remains are forensic or non-forensic. If the county coroner determines the remains are non-forensic, they will report that finding to the DAHP. DAHP will then take jurisdiction over those remains and report them to the appropriate cemeteries and affected tribes. The State Physical Anthropologist will make a determination of whether the remains are Indian or non-Indian, and report that finding to any appropriate cemeteries and the affected tribes. The DAHP will then handle all consultation with the affected parties as to the future preservation, excavation, and disposition of the remains.

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Appendix A. Historic Property Inventory Forms



Historic Inventory Report

Location

Field Site No. 001 DAHP No.
Historic Name: Chemical Engineering Building
Common Name: UW: Benson Hall
Property Address: Okanogan Ln, Seattle, WA 98195
Comments:
Tax No./Parcel No. 1625049001
Plat/Block/Lot
Acreage
Supplemental Map(s)

Township/Range/EW	Section	1/4 Sec	1/4 1/4 Sec	County	Quadrangle
T25R04E	16			King	SEATTLE NORTH

Coordinate Reference

Easting: 1194474
Northing: 851157
Projection: Washington State Plane South
Datum: HARN (feet)

Identification

Survey Name: UW Life Sciences Building Date Recorded: 08/28/2014
Field Recorder: HRA: C Beckner
Owner's Name: University of Washington
Owner Address: 4000 15th Ave. NE
City: Seattle State: WA Zip: 98195
Classification: Building
Resource Status: Comments:
Survey/Inventory
Within a District? No
Contributing?
National Register:
Local District:
National Register District/Thematic Nomination Name:
Eligibility Status: Not Determined - SHPO
Determination Date: 1/1/0001
Determination Comments:



Historic Inventory Report

Description

Historic Use: Education - College	Current Use: Education - College		
Plan: Square	Stories: 3		
Changes to Plan: Intact	Structural System: Concrete - Reinforced Concrete		
Changes to Original Cladding: Intact	Changes to Interior: Unknown		
Changes to Other:	Changes to Windows: Intact		
Other (specify):			
Style:	Cladding:	Roof Type:	Roof Material:
Modern - International Style	Brick - Stretcher Bond	Mansard	Metal
Foundation:	Form/Type:		
Concrete - Poured	Commercial - Campus		

Narrative

Study Unit

Science and Engineering
Education

Other

Date of Construction:	1966 Built Date	Builder:
		Engineer:
		Architect: Bindon, Wright and Partners

Property appears to meet criteria for the National Register of Historic Places: Yes
 Property is located in a potential historic district (National and/or local): Yes
 Property potentially contributes to a historic district (National and/or local):

Statement of
Significance:

Benson Hall was designed by Bindon, Wright, and Partners, an influential firm that also designed the Seattle City Light Building in 1957, the downtown branch of the Seattle Public Library in 1960, an addition to the Suzzallo Library on the UW campus in 1963, and the library at Pacific Lutheran University in 1966. Bindon and Wright were recognized for their designs by the Seattle chapter of the American Institute of Architects, who granted them awards for the Bethlehem Pacific Coast Steel Corporation Office Building, constructed in 1960, and the Parke-Davis Company Seattle Sales Office Building, constructed in 1965 (DAHP 2014). The firm was also honored for partnering with Skidmore, Owings, & Merrill to design the Norton Building in Seattle. The building was completed in 1959 and is recognized as Seattle's first modern office tower.

Benson Hall reflects characteristics found in the Norton Building, including the separation between the base and the projecting upper floors. Both buildings are nearly devoid of surface ornament as is common in the International Style.

Benson Hall appears on firm partner John LeBaron Wright's biography for the American Institute of Architects as one of the firm's principal works (AIA Directory 1970:1016). Although the firm was prolific, other principal works, including the downtown Seattle branch of the public library, have been demolished, making Benson Hall one of a diminishing number of resources by this firm that retain excellent integrity.

Benson Hall is significant for its architectural character and for its association with the firm Bindon, Wright, and Partners. It is also significant for its associations with historic events that had a significant effect upon the campus, namely the growth of chemical engineering, nuclear engineering, and forestry research and education at the UW in the late twentieth century.

The building is not known to be associated with the lives of specific people significant to our past or with a specific aspect of our cultural, political, or economic history. The building does not appear likely to yield information important in prehistory or history.

HRA recommends that Benson Hall is eligible for listing in the NRHP under Criterion C for its architectural character and under Criterion A for its associations with important trends in our local history.

Description of
Physical
Appearance:

Benson Hall, originally known as the Chemical Engineering Building, was designed by Bindon, Wright and Partners and was constructed in 1966 (UW Plan 2003). The building was named after Henry K. Benson, former chair of Chemistry and Chemical Engineering.

The building was constructed soon after the University formed its Nuclear Engineering Department. On the dedication of Benson Hall, the Puget Sound Chemist ran an article stating that "the building contains a small-scale paper mill and a refinery-sized glass distillation column for use by undergraduate students. Benson Hall also houses a pulse neutron accelerator and accompanying console facilities for the nuclear engineering department. The building will be home to about 120 undergraduate students in chemical engineering, nuclear engineering and forestry majors" (Puget Sound Chemist 1967:15). The Nuclear Engineering Department was disbanded in the early 1990s (Seattle Times 1992).

According to the UW, "the building incorporated precautionary design for its time. It had a 35 ton sliding door and reverse pressure rooms. These features were incorporated to prevent the accidental escape of radioactive material in the pulse neutron generation lab or particles from escaping when the door was opened. Also a special sump was installed to prevent harmful chemicals from entering Seattle's sewer system" (UW 2014).

Benson Hall sits on an incline in the southern portion of the university campus, north of the project area. It is bordered by W Stevens Way NE on the southwest and by Okanogan Lane on the northeast. The building faces southeast, with a view of the Pharmaceutical Herb Garden. The project area, located southwest of W Stevens Way NE, is primarily visible from the upper floors of Benson Hall.

The building is highly symmetrical. It stands three- stories tall above a daylight basement. It was designed in the International style, square in plan, and constructed of concrete faced with ornamental concrete on the first floor and brick on the upper floors. The building sits atop a concrete foundation and includes a recessed concrete base on the basement and first floor. The upper floors include projecting, flat, unornamented wall surfaces punctuated by large pillars that house mechanical systems and bands of sliding windows on the second and third floors. The building is topped by a shallow mansard copper roof with no eave. A setback penthouse for mechanical systems is invisible from the street below. All doors and sliding windows appear to be steel framed. The building is constructed on a sloping grade and is skirted on all elevations by a continuous raised concrete walkway and plazas with metal railings on the first floor. The basement level is visible beneath the raised walkway only on the northwest and southwest elevations. The building's primary façade faces southeast, and includes a wide, tiered, concrete staircase from the plaza to the grounds near the pharmaceutical herb gardens. Secondary elevations include similar elements: flat wall surfaces punctuated by large pillars, a recessed first floor, and bands of sliding windows on the second and third floors. The northwest elevation includes a smaller stair from the raised walkway to the ground below.

The building was designed to incorporate strong geometric shapes and projecting and receding elements. For instance, the concrete base is recessed from the piers that support the projecting second and third floors. Office walls on the first floor are designed as floor-to-ceiling windows or windows atop light-colored concrete walls with large aggregate. Ornament is simple and includes variations in brick patterns. The walls of the upper floors are clad in running bond with recessed panels of stacked bond beneath the windows.

The building's lobby retains many of its original materials, including linoleum floors, wood paneled walls, some brick-clad walls, and streamlined aluminum elements, including elevator doors and push bars on exterior doors.

Plans and drawings held by the Campus Engineering Facilities Services show that building alterations have generally taken place within labs and classrooms. Mechanical upgrades occurred throughout the 1970s and 1980s. However, no alterations, beyond minimal repairs, have taken place on the building's exterior or within its first floor lobby (UW Facilities 2014).

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University of Washington Special Collections

2014 "Campus Plans 1891-1915," No Finer Site. Electronic document,

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Photos



Primary facade, view northwest
2014



Southeast corner, view to the west
2014



Interior treatments, view to the northwest
2014



Historic Inventory Report

Location

Field Site No. 002 DAHP No.
Historic Name: Botany Greenhouse
Common Name: UW: Botany Greenhouse
Property Address: NE Garfield Pl, Seattle, WA 98195
Comments:
Tax No./Parcel No. 1625049001
Plat/Block/Lot
Acreage
Supplemental Map(s)

Township/Range/EW	Section	1/4 Sec	1/4 1/4 Sec	County	Quadrangle
T25R04E	16			King	SEATTLE NORTH

Coordinate Reference

Easting: 1194329
Northing: 850891
Projection: Washington State Plane South
Datum: HARN (feet)

Identification

Survey Name: UW Life Sciences Building Date Recorded: 08/28/2014
Field Recorder: HRA: C Beckner
Owner's Name: University of Washington
Owner Address: 4000 15TH AVE NE
City: Seattle State: WA Zip: 98195
Classification: Building
Resource Status: Comments:
Survey/Inventory
Within a District? No
Contributing?
National Register:
Local District:
National Register District/Thematic Nomination Name:
Eligibility Status: Not Determined - SHPO
Determination Date: 1/1/0001
Determination Comments:



Historic Inventory Report

Description

Historic Use: Agriculture/Subsistence - Horticultural Facility		Current Use: Agriculture/Subsistence - Horticultural Facility	
Plan: Rectangle	Stories: 1	Structural System: Steel	
Changes to Plan: Intact		Changes to Interior: Intact	
Changes to Original Cladding: Extensive		Changes to Windows: Extensive	
Changes to Other:			
Other (specify):			
Style:	Cladding:	Roof Type:	Roof Material:
Other - Agricultural	Glass	Gable - Front Gable	Other
Foundation:	Form/Type:		
Concrete - Poured	Agricultural		

Narrative

Study Unit	Other
Education	
Agriculture	
Date of Construction:	1949 Built Date
	Builder: CE Turnquist Construction Co.
	Engineer: Lord & Burnham
	Architect: Thiry, Paul

Property appears to meet criteria for the National Register of Historic Places: No
 Property is located in a potential historic district (National and/or local): Yes
 Property potentially contributes to a historic district (National and/or local):

Statement of
Significance:

The Botany Greenhouse was prefabricated by noted firm Lord & Burnham and designed by a well-respected local architect. Lord & Burnham began constructing greenhouses and the boilers that kept them temperature controlled in the nineteenth century. They became well known for designing large, sometimes Gothic, conservatories including the Conservatory of Flowers in San Francisco, which was constructed in 1878 and listed in the NRHP in 1971. Lord & Burnham also designed the Conservatory at the U.S. Botanic Gardens in Washington, D.C., built in 1933.

Paul Thiry, was trained at the UW and focused on residential properties until the early 1930s when an influential trip abroad introduced Thiry to European Modernism, which he promoted once he returned to the United States. During World War II, Thiry designed the West Kiln Building on the UW campus (1942), and went on to design the Museum of History and Industry (1950); the North East Branch Library in Seattle, which won the 1955 Seattle AIA Honor Award; and the Washington State Library in Olympia (1959).

The Botany Greenhouse retains its original footprint and continues to be used for its original purpose, to house the university's collection of plants.

Lord & Burnham produced a number of greenhouses, solariums, and conservatories between the 1840s and 1980s, when the firm's designs were purchased by Under Glass, which continues to provide greenhouses based on Lord & Burnham plans today.

According to Under Glass, "early greenhouses were made of cypress wood and iron or steel.

Experimentation with aluminum as a material for greenhouse construction was started as early as 1932 when the U.S. Botanical Gardens in Washington, D.C. were built. However, it was not until 1955 that greenhouses with exterior members of aluminum had reached a point where they were competitive with wood construction" (Under Glass 2014). The Botany Greenhouse was constructed before aluminum was considered competitive and originally included wood sash bars, which have since been removed.

The Botany Greenhouse at UW is significant for its associations with the history of the Botany Department on the UW campus, and as a midcentury example of a Lord & Burnham greenhouse fabrication of an early Paul Thiry design. The building is also significant for its associations with the University's botanical research and education in the mid-twentieth century. However, the greenhouse has lost a great deal of integrity. As noted by the greenhouse manager, the building has been entirely reglazed, lapped glass panels have been replaced with safety glass, and wooden sash bars have been replaced with metal.

The building retains integrity of site and setting, feeling, and association. However, it has lost integrity of design, materials, and workmanship. Furthermore, though it was designed by a well-known architect, it is not among that architect's principal works and does not represent the building style that Thiry came to be known for. The building is not known to be associated with the lives of specific people significant to our past or with a specific aspect of our cultural, political, or economic history. The building does not appear likely to yield information important in prehistory or history.

Although the building is significant for its associations, HRA recommends that the Botany Greenhouse is not eligible for listing in the NRHP under Criterion A, B, C, or D due to a lack of integrity.

Description of
Physical
Appearance:

Constructed in 1947, the Botany Greenhouse was fabricated by the preeminent greenhouse design firm Lord & Burnham. Original plans show that it was designed by noted local architect Paul Thiry as two greenhouses connected by a central corridor.

UW's Botany Greenhouse, designed to be streamlined and modern, holds the University's plant collection, including specimens that can be traced back to the original teaching collection, developed along with the University's early Botany Department in another part of the campus in 1900. The greenhouse includes three different habitats: cool tropical, warm tropical, and xeric (desert).

The Botany Greenhouse is oriented northwest to southeast within the area of direct impacts. The landscape is on an incline and buildings north and west of the greenhouse look down on it from their upper floors. The greenhouse is bordered by W Stevens Way NE on the north and the Burke-Gilman Trail on the south. Farther south is NE Pacific Street. A gravel parking area, plantings, and the campus Plant Lab are located directly southeast of the greenhouse. Northwest of the greenhouse are sloping concrete walkways and retaining walls with climbing vines. These separate the greenhouse from pedestrian paths and Kincaid Hall to the northwest. Chain-link fences control access to some portions of the site.

The UW's Botany Greenhouse is constructed of a steel frame on a concrete foundation with aluminum sash bars around safety-glass panels. The greenhouse is rectangular in plan, made up of two front-gabled greenhouses tied together by a central corridor. All structures have steeply pitched roofs with vents at the ridgeline. Original plans from Campus Facilities show that the building was restored and mechanical systems were upgraded throughout the 1970s, 1980s, and 1990s. A major renovation took place in 1996–97 (UW Facilities 2014). A personal interview with greenhouse manager Doug Ewing confirmed that the greenhouse was reglazed; at that time its wooden sash bars were replaced with aluminum, and its lapped glass panels were replaced with safety glass. The footprint and frame and the benches, doors, and other interior materials are original, but the skin of the building is new (Ewing 2014; UW Facilities 2014).

The interior of the Botany Greenhouse includes poured-concrete floors, and framed glass walls with wood doors between each greenhouse and the central corridor. The central corridor is devoted to planning, study, and systems management. Metal cabinets, counters, and shelves line both sides of the corridor. Florescent lights hang from the ceiling, which also includes louvered vents. Plants populate all portions of the greenhouse and parts of the central corridor. A large metal vat in the northwest corner of the corridor holds aquatic plants.



Historic Inventory Report

Major
Bibliographic
References:

Ewing, Doug

2014 Personal interview with Chrisanne Beckner, by phone, September 3, 2014, Olympia, Washington.

Lange, Greg

1999 Alaska-Yukon-Pacific Exposition's final day is on October 16, 1909, HistoryLink.org Essay #696. Electronic document, http://www.historylink.org/index.cfm?DisplayPage=output.cfm&file_id=696, accessed August 29, 2014.

Ott, Jennifer

2009 The Alaska-Yukon-Pacific Exposition Company signs a lease with the UW Board of Regents providing for the A-Y-P to be sited on campus grounds on September 27, 1906. HistoryLink Essay #8966. Electronic document, http://www.historylink.org/index.cfm?DisplayPage=output.cfm&file_id=8966, accessed August 29, 2014.

Under Glass

2014 "The History of an American Company," High Falls, Under Glass. Electronic document, http://lordandburnham.com/underglass_contact.html, accessed September 3, 2014.

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Williams, David and Walt Crowley

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Photos



Southeast elevation, view to the north
2014



Northwest elevation, view to the northeast
2014



Greenhouse interior, view to the northwest
2014



Historic Inventory Report

Location

Field Site No. 003 DAHP No.
Historic Name: Plant Lab
Common Name: UW: Plant Lab
Property Address: NE Garfield Pl, Seattle, WA 98195
Comments:
Tax No./Parcel No. 1625049001
Plat/Block/Lot
Acreage
Supplemental Map(s)

Township/Range/EW	Section	1/4 Sec	1/4 1/4 Sec	County	Quadrangle
T25R04E	16			King	SEATTLE NORTH

Coordinate Reference

Easting: 1194415
Northing: 850771
Projection: Washington State Plane South
Datum: HARN (feet)

Identification

Survey Name: UW Life Sciences Building Date Recorded: 08/28/2014
Field Recorder: HRA: C Beckner
Owner's Name: Univesrity of Washington
Owner Address: 4000 15TH AVE NE
City: Seattle State: WA Zip: 98195
Classification: Building
Resource Status: Comments:
Survey/Inventory
Within a District? No
Contributing?
National Register:
Local District:
National Register District/Thematic Nomination Name:
Eligibility Status: Not Determined - SHPO
Determination Date: 1/1/0001
Determination Comments:



Historic Inventory Report

Statement of Significance:

The Plant Lab was designed by Bebb and Gould, and constructed in 1939 as a combination of offices for horticultural staff and greenhouses for the cultivation of a teaching collection. Bebb and Gould not only provided the plans for the 1915 redesign of the University campus but were also responsible for the design of many of its buildings, including the Suzzallo Library (1927) and Anderson Hall (1925). The firm also designed the Seattle Times building (1916) and what is now the Seattle Asian Art Museum (1933).

The Plant Lab was known at the time of its construction as the “drug lab,” and was likely associated with the 1911 pharmaceutical “drug garden,” now the “pharmaceutical herb garden,” located to the north of the site. Though plans for the Plant Lab were revised in the 1930s, the existing building retains the original plan, materials, and ornamental details outlined in the Bebb and Gould drawings (UW Facilities 2014). Unlike the Botany Greenhouse, this complex retains many of its original materials. The office building is a fine example of a restrained Art Deco style and retains its character-defining features, including its plan, divided windows, and ornamental cornice details, as well as its attachment to the existing greenhouse. The greenhouse also retains original materials and design, including its steel structure, original glazing, and original wooden windows. Facilities records note that alterations to the buildings have included mechanical upgrades, new finishes and features for the offices and labs, but few alterations to the exterior of the building beyond regular repairs.

The main office building and the attached greenhouse possess excellent integrity of location, design, setting, materials, workmanship, feeling, and association. HRA finds that the offices and greenhouse are significant for their architectural qualities and as an example of a building designed by one of the primary architects of the current UW campus. The complex is also significant for its associations with botanical education and research at the university.

Both Annex buildings appear to retain their original materials, although Annex #2 has been altered and enlarged as recently as 1984. However, neither annex building is significant enough to be recommended individually eligible for listing in the NRHP for its architectural qualities.

HRA recommends that the main building of the Plant Lab, along with its attached greenhouse, is eligible for listing in the NRHP under Criterion C: architecture. The building is also significant for its association with the history of the University’s early Botany Department and is also eligible under Criterion A. The building is not known to be associated with the lives of specific people significant to our past or with a specific aspect of our cultural, political, or economic history. The building does not appear likely to yield information important in prehistory or history.

Description of Physical Appearance:

Constructed in 1939, the Plant Lab complex of buildings was based on designs first drawn in 1927 and then revised in 1937 by campus planners Bebb and Gould. The main building of the Plant Lab, which includes brick offices and a greenhouse, appears to be based entirely on the Bebb and Gould drawings (UW Plan 2003).

The Plant Lab is oriented northeast to southwest within the area of direct effects. Like the Botany Greenhouse, the lab is bordered by W Stevens Way NE to the north and the Burke-Gilman Trail to the south. The lab is only minimally visible from these routes. Pathways, plantings, and the Botany Greenhouse sit northwest of the Plant Lab. The lab is bordered on the east by open space devoted to farming and other landscaping, along with two small annexes. Annex #1 sits northeast of the building; Annex #2 sits southeast of the building. The Plant Lab is surrounded by mature foliage, plantings, and trees. A portion of its greenhouse is visible from the Burke-Gilman Trail.

The Plant Lab complex consists of buildings in a variety of materials and styles. The main office building is constructed of concrete faced in brick and sits atop a concrete foundation. The building is constructed as a central block with two, recessed, flanking wings. The primary façade faces northeast, but is nearly obscured by mature foliage. The primary façade's central block includes a wood entry door with nine lights topped by a transom and flanked by two double-hung, wood windows with four divided lights per sash. Windows on flanking wings are divided into eight lights. Secondary elevations also include double-hung, wood windows of eight divided lights. Windows include projecting concrete sills and are topped by ornamental details including concrete bars punctuated by concrete diamonds. These sit atop and below courses of header brick in a wall of rug-faced brick in running bond. The building's roofline is further ornamented with a rounded concrete cornice and metal coping. This minimally ornamented building is an example of a simplified Art Deco style.

The main brick building is attached by a brick corridor to a greenhouse on its southwest elevation. The greenhouse includes two side-gabled greenhouses linked by a central, front-gabled corridor. The central corridor is taller than the greenhouses and the attached brick building and its roofline is extended over the brick building, appearing as a shingled hipped roof on top of the brick building's flat roof.

The attached greenhouse's steel structure includes glass panels atop concrete stem walls. Portions of the roof are constructed of panels in steel frames that open to vent the building. Unlike the Botany Greenhouse, the Plant Lab retains much of its original glazing and original steel structure, as well as wooden elements including windows on the gabled ends. The ventilation system was upgraded in the late twentieth century (Ewing 2014).

The brick building was originally used as offices for the director of the garden and horticultural staff. The building also included lab space for student research (Ewing 2014).

The brick portion of the building was designed to hold a lab and fertilizer room on the north and rooms for seeds, herbs, roots, and grinding on the south (UW Facilities 2014). The basement includes work rooms with concrete and vinyl-tiled floors. The lab's greenhouses include concrete floors and benches and beds for holding various plants.

Also part of the Plant Lab are two annexes. Annex #1 is a wood building on concrete piers dating from 1963 (UW Plan 2003). It has a shallow side-gabled roof with a deep overhanging eave above the entry. The entry faces a wooden porch to the northeast. The building is clad in board-and-batten siding and includes sliding aluminum windows.

The final set of buildings includes connected sheds on concrete piers. The sheds, known collectively as Annex 2, are clad in horizontal wood boards and include original, double-hung, wood windows with divided lights. The primary building is topped by a shed roof with a slight eave and a hood with knee braces over a central entry door. The shed likely dates from the early years of the Plant Lab, though it appears to have been expanded in more recent years. The UW Master Plan lists the date of construction as 1985 (UW Plan 2003; UW Facilities 2014). However, the building's materials and style suggest a construction date in the 1930s or 1940s. HRA suggests that while the original building was likely constructed within the historic period, additions may date from the 1980s. These are generally obscured by vines and other mature foliage growing against exterior walls.



Historic Inventory Report

Major
Bibliographic
References:

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2014 Personal interview with Chrisanne Beckner, by phone, September 3, 2014, Olympia, Washington.

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1999 Alaska-Yukon-Pacific Exposition's final day is on October 16, 1909. HistoryLink.org Essay #696. Electronic document, http://www.historylink.org/index.cfm?DisplayPage=output.cfm&file_id=696, accessed August 29, 2014.

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N. D. "Spaces and Places," Tour 1. Electronic document,

<http://www.nacuboannualmeeting.org/Documents/2014/UW%20Arch%20Land%20Art%20Audio%20Program%20Brochure%201.pdf>, accessed September 3, 2014.

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2014 Campus Engineering Facilities Services Document Research for the University of Washington, Seattle, Washington. Electronic document,

http://www.washington.edu/facilities/engr/records/order_help, accessed September 8, 2014.

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2014 "Campus Plans 1891-1915," No Finer Site. Electronic document,

<http://www.lib.washington.edu/specialcollections/collections/exhibits/site>, accessed September 4, 2014.

Photos



Greenhouse and brick offices, view to the north
2014



Greenhouse, view to the northwest
2014



Primary facade of brick offices, view to the southwest
2014



Primary facade of Annex #1, view to the southeast
2014



2014



Historic Inventory Report

Location

Field Site No. 004 DAHP No.

Historic Name: Drug Garden

Common Name: UW: Pharmaceutical Herb Garden

Property Address: W Stevens Way NE, Seattle, WA

Comments:

Tax No./Parcel No. 1625049001

Plat/Block/Lot

Acreage

Supplemental Map(s)

Township/Range/EW	Section	1/4 Sec	1/4 1/4 Sec	County	Quadrangle
T25R04E	16			King	SEATTLE NORTH

Coordinate Reference

Easting: 1194449

Northing: 850926

Projection: Washington State Plane South

Datum: HARN (feet)

Identification

Survey Name: UW Life Sciences Building

Date Recorded: 08/28/2014

Field Recorder: HRA: C Beckner

Owner's Name: University of Washington

Owner Address: 4000 15TH AVE NE

City: Seattle

State: WA

Zip: 98195

Classification: Building

Resource Status:

Comments:

Survey/Inventory

Within a District? No

Contributing?

National Register:

Local District:

National Register District/Thematic Nomination Name:

Eligibility Status: Not Determined - SHPO

Determination Date: 1/1/0001

Determination Comments:



Historic Inventory Report

Description

Historic Use: Agriculture/Subsistence - Agricultural Field	Current Use: Agriculture/Subsistence - Agricultural Field		
Plan: Irregular	Stories: 1		
Changes to Plan: Moderate	Structural System: None		
Changes to Original Cladding: Not Applicable	Changes to Interior: Not Applicable		
Changes to Other:	Changes to Windows: Not Applicable		
Other (specify):			
Style:	Cladding:	Roof Type:	Roof Material:
None	None	None	None
Foundation:	Form/Type:		
None	Agricultural		

Narrative

Study Unit	Other
Education	
Agriculture	
Date of Construction:	1911 Built Date
	Builder:
	Engineer:
	Architect:

Property appears to meet criteria for the National Register of Historic Places: Yes
 Property is located in a potential historic district (National and/or local): Yes
 Property potentially contributes to a historic district (National and/or local):

Statement of
Significance:

The Pharmaceutical Herb Garden is one of the earliest remaining elements of the university's early Botany program, and is recognized in the Campus Master Plan as a unique and significant landscape (UW Plan 2003).

A walking tour brochure provided by the UW gave a brief history of the garden. The Pharmaceutical Herb Garden was created in 1911 on 1.5 acres managed by the School of Pharmacy, which grew herbs for the treatment of everything from colds to heart disease. The garden's heyday was around World War I, when it grew to eight acres and produced medicinal herbs for shipment overseas. By the end of World War II, pharmaceuticals had embraced synthetic medicines over plant extracts. The garden fell into disrepair and shrank to the 2.5 acres it inhabits today, though even this footprint has been slightly altered by the construction of newer buildings on its boundaries (UW Architecture, n.d.; Ewing 2014).

The Pharmaceutical Herb Garden is significant for its association with more than 100 years of pharmaceutical research on the UW campus, and for its association with broad trends in our history, including the production of medicinal herbs for use by armed forces during World War I. The herb garden is not known to be associated with the lives of specific people significant to our past or with a specific aspect of our cultural, political, or economic history. The landscape feature does not appear likely to yield information important about prehistory or history.

The current herb garden is only a remnant of the World War I-era garden. Although its integrity of location has been altered over time, the garden retains integrity of design, workmanship, feeling, and association and has been at or near its current size for more than fifty years.

HRA recommends that the herb garden is eligible for listing in the NRHP as a historic landscape under Criterion A for its associations with important trends in local, state, and national history.

Description of
Physical
Appearance:

The Pharmaceutical Herb Garden, constructed as the Botany Department's "Drug Garden," in 1911, and now managed by the Biology Department, contains the University's collection of medicinal herbs from around the world. The garden is approximately 2.5 acres and includes planting beds separated by gravel paths. The garden has been altered over the years and does not retain its original footprint. In 1993, the herb garden was improved by the addition of an art installation that includes a storage shed for supplies and an integrated bus station on its southeast corner. The installation was designed by Suzanne Hellmuth and Jock Reynolds.

No plans or drawings of the original or current garden remain in the Campus Facilities Collection.

The Pharmaceutical Herb Garden is located north of W Stevens Way NE and is visible from the roadway. The garden sits south of Benson Hall, Bagley Hall, and the Chemistry Building. Both the Chemistry Building and Benson Hall are oriented toward the garden. Pathways lead from building entries to walkways through the garden. Garden beds are located on either side of Okanogan Lane but are screened from Rainier Vista by mature foliage. The Herb Garden is located across W Stevens Way NE from the project area. It is minimally visible from the project area.

Gridded pathways, generally covered in gravel, lead between rectangular planting beds with wooden borders that hold the garden's international collection of medicinal herbs. Small signs on metal posts identify herb varieties.



Historic Inventory Report

Major
Bibliographic
References:

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2014 Personal interview with Chrisanne Beckner, by phone, September 3, 2014, Olympia, Washington.

Lange, Greg

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Williams, David and Walt Crowley

2001 John Olmsted arrives in Seattle to design city parks on April 30, 1903. Historylink Essay #3290.

Electronic document, http://www.historylink.org/index.cfm?DisplayPage=output.cfm&file_id=3290, accessed August 29, 2014.

Photos



Planters and garden paths south of the Chemistry Building,
view to the north
2014



Paths within garden
2014

GHG Emissions Worksheet

City of Seattle Department of Planning and Development
SEPA GHG Emissions Worksheet
Version 1.7 12/26/07

Introduction

The Washington State Environmental Policy Act (SEPA) requires environmental review of development proposals that may have a significant adverse impact on the environment. If a proposed development is subject to SEPA, the project proponent is required to complete the SEPA Checklist. The Checklist includes questions relating to the development's air emissions. The emissions that have traditionally been considered cover smoke, dust, and industrial and automobile emissions. With our understanding of the climate change impacts of GHG emissions, the City of Seattle requires the applicant to also estimate these emissions.

Emissions created by Development

GHG emissions associated with development come from multiple sources:

- The extraction, processing, transportation, construction and disposal of materials and landscape disturbance (Embodied Emissions)
- Energy demands created by the development after it is completed (Energy Emissions)
- Transportation demands created by the development after it is completed (Transportation Emissions)

GHG Emissions Worksheet

This GHG Emissions Worksheet has been developed to assist applicants in answering the SEPA Checklist question relating to GHG emissions. The worksheet was originally developed by King County, but the City of Seattle and King County are working together on future updates to maintain consistency of methodologies across jurisdictions.

The SEPA GHG Emissions worksheet estimates all GHG emissions that will be created over the life span of a project. This includes emissions associated with obtaining construction materials, fuel used during construction, energy consumed during a buildings operation, and transportation by building occupants.

Using the Worksheet

1. Descriptions of the different residential and commercial building types can be found on the second tabbed worksheet ("Definition of Building Types"). If a development proposal consists of multiple projects, e.g. both single family and multi-family residential structures or a commercial development that consists of more than one type of commercial activity, the appropriate information should be estimated for each type of building or activity.

2. For paving, estimate the total amount of paving (in thousands of square feet) of the project.
3. The Worksheet will calculate the amount of GHG emissions associated with the project and display the amount in the "Total Emissions" column on the worksheet. The applicant should use this information when completing the SEPA checklist.
4. The last three worksheets in the Excel file provide the background information that is used to calculate the total GHG emissions.
5. The methodology of creating the estimates is transparent; if there is reason to believe that a better estimate can be obtained by changing specific values, this can and should be done. Changes to the values should be documented with an explanation of why and the sources relied upon.
6. Print out the "Total Emissions" worksheet and attach it to the SEPA checklist. If the applicant has made changes to the calculations or the values, the documentation supporting those changes should also be attached to the SEPA checklist.

University of Washington Life Sciences Building Project

Section I: Buildings

Type (Residential) or Principal Activity (Commercial)	# Units	Square Feet (in thousands of square feet)	Emissions Per Unit or Per Thousand Square Feet (MTCO ₂ e)			Lifespan Emissions (MTCO ₂ e)
			Embodied	Energy	Transportation	
Single-Family Home.....	0		98	672	792	0
Multi-Family Unit in Large Building	0		33	357	766	0
Multi-Family Unit in Small Building	0		54	681	766	0
Mobile Home.....	0		41	475	709	0
Education		201.3	39	646	361	210455
Food Sales		0.0	39	1,541	282	0
Food Service		0.0	39	1,994	561	0
Health Care Inpatient		0.0	39	1,938	582	0
Health Care Outpatient		0.0	39	737	571	0
Lodging		0.0	39	777	117	0
Retail (Other Than Mall).....		0.0	39	577	247	0
Office		0.0	39	723	588	0
Public Assembly		0.0	39	733	150	0
Public Order and Safety		0.0	39	899	374	0
Religious Worship		0.0	39	339	129	0
Service		0.0	39	599	266	0
Warehouse and Storage		0.0	39	352	181	0
Other		0.0	39	1,278	257	0
Vacant		0.0	39	162	47	0

Section II: Pavement.....

Pavement.....		0.00				0
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Total Project Emissions:

210455

Definition of Building Types

Type (Residential) or Principal Activity (Commercial)	Description
Single-Family Home.....	Unless otherwise specified, this includes both attached and detached buildings
Multi-Family Unit in Large Building	Apartments in buildings with more than 5 units
Multi-Family Unit in Small Building	Apartments in building with 2-4 units
Mobile Home.....	
Education	Buildings used for academic or technical classroom instruction, such as elementary, middle, or high schools, and classroom buildings on college or university campuses. Buildings on education campuses for which the main use is not classroom are included in the category relating to their use. For example, administration buildings are part of "Office," dormitories are "Lodging," and libraries are "Public Assembly."
Food Sales	Buildings used for retail or wholesale of food.
Food Service	Buildings used for preparation and sale of food and beverages for consumption.
Health Care Inpatient	Buildings used as diagnostic and treatment facilities for inpatient care.
Health Care Outpatient	Buildings used as diagnostic and treatment facilities for outpatient care. Doctor's or dentist's office are included here if they use any type of diagnostic medical equipment (if they do not, they are categorized as an office building).
Lodging	Buildings used to offer multiple accommodations for short-term or long-term residents, including skilled nursing and other residential care buildings.
Retail (Other Than Mall).....	Buildings used for the sale and display of goods other than food.
Office	Buildings used for general office space, professional office, or administrative offices. Doctor's or dentist's office are included here if they do not use any type of diagnostic medical equipment (if they do, they are categorized as an outpatient health care building).
Public Assembly	Buildings in which people gather for social or recreational activities, whether in private or non-private meeting halls.
Public Order and Safety	Buildings used for the preservation of law and order or public safety.
Religious Worship	Buildings in which people gather for religious activities, (such as chapels, churches, mosques, synagogues, and temples).
Service	Buildings in which some type of service is provided, other than food service or retail sales of goods
Warehouse and Storage	Buildings used to store goods, manufactured products, merchandise, raw materials, or personal belongings (such as self-storage).
Other	Buildings that are industrial or agricultural with some retail space; buildings having several different commercial activities that, together, comprise 50 percent or more of the floorspace, but whose largest single activity is agricultural, industrial/ manufacturing, or residential; and all other miscellaneous buildings that do not fit into any other category.
Vacant	Buildings in which more floorspace was vacant than was used for any single commercial activity at the time of interview. Therefore, a vacant building may have some occupied floorspace.

Sources:

Residential 2001 Residential Energy Consumption Survey
 Square footage measurements and comparisons
<http://www.eia.doe.gov/emeu/recs/sqft-measure.html>

Commercial Commercial Buildings Energy Consumption Survey (CBECS),
 Description of CBECS Building Types
<http://www.eia.doe.gov/emeu/cbeecs/pba99/bldgtypes.html>

Embodied Emissions Worksheet

Section I: Buildings

Type (Residential) or Principal Activity (Commercial)	# thousand sq feet/ unit or building	Life span related embodied GHG missions (MTCO2e/ unit)	Life span related embodied GHG missions (MTCO2e/ thousand square feet) - See calculations in table below
Single-Family Home.....	2.53	98	39
Multi-Family Unit in Large Building.....	0.85	33	39
Multi-Family Unit in Small Building.....	1.39	54	39
Mobile Home.....	1.06	41	39
Education.....	25.6	991	39
Food Sales.....	5.6	217	39
Food Service.....	5.6	217	39
Health Care Inpatient.....	241.4	9,346	39
Health Care Outpatient.....	10.4	403	39
Lodging.....	35.8	1,386	39
Retail (Other Than Mall).....	9.7	376	39
Office.....	14.8	573	39
Public Assembly.....	14.2	550	39
Public Order and Safety.....	15.5	600	39
Religious Worship.....	10.1	391	39
Service.....	6.5	252	39
Warehouse and Storage.....	16.9	654	39
Other.....	21.9	848	39
Vacant.....	14.1	546	39

Section II: Pavement.....

All Types of Pavement.....				50
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	Columns and Beams	Intermediate Floors	Exterior Walls	Windows	Interior Walls	Roofs	Total Embodied Emissions (MTCO2e)	Total Embodied Emissions (MTCO2e/ thousand sq feet)
Average GWP (lbs CO2e/sq ft): Vancouver, Low Rise Building	5.3	7.8	19.1	51.2	5.7	21.3		
Average Materials in a 2,272-square foot single family home	0.0	2269.0	3206.0	285.0	6050.0	3103.0		
MTCO2e	0.0	8.0	27.8	6.6	15.6	30.0	88.0	38.7

Sources

All data in black text King County, DNRP. Contact: Matt Kuharic, matt.kuharic@kingcounty.gov

Residential floorspace per unit 2001 Residential Energy Consumption Survey (National Average, 2001)
 Square footage measurements and comparisons
<http://www.eia.doe.gov/emeu/recs/sqft-measure.html>

Floorspace per building EIA, 2003 Commercial Buildings Energy Consumption Survey (National Average, 2003)
 Table C3. Consumption and Gross Energy Intensity for Sum of Major Fuels for Non-Mall Buildings, 2003
http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/2003set9/2003excel/c3.xls

Average GWP (lbs CO2e/sq ft): Vancouver, Low Rise Building
 Athena EcoCalculator
 Athena Assembly Evaluation Tool v2.3- Vancouver Low Rise Building
 Assembly Average GWP (kg) per square meter
<http://www.athenasmi.ca/tools/ecoCalculator/index.html>
 Lbs per kg 2.20
 Square feet per square meter 10.76

Average Materials in a 2,272-square foot single family home
 Buildings Energy Data Book: 7.3 Typical/Average Household
 Materials Used in the Construction of a 2,272-Square-Foot Single-Family Home, 2000
http://buildingsdatabook.eren.doe.gov/?id=view_book_table&TableID=2036&t=xls
 See also: NAHB, 2004 Housing Facts, Figures and Trends, Feb. 2004, p. 7.

Average window size Energy Information Administration/Housing Characteristics 1993
 Appendix B, Quality of the Data. Pg. 5.
<ftp://ftp.eia.doe.gov/pub/consumption/residential/rx93hcf.pdf>

Embodied GHG Emissions.....Worksheet Background Information

Buildings

Embodied GHG emissions are emissions that are created through the extraction, processing, transportation, construction and disposal of building materials as well as emissions created through landscape disturbance (by both soil disturbance and changes in above ground biomass).

Estimating embodied GHG emissions is new field of analysis; the estimates are rapidly improving and becoming more inclusive of all elements of construction and development.

The estimate included in this worksheet is calculated using average values for the main construction materials that are used to create a typical family home. In 2004, the National Association of Home Builders calculated the average materials that are used in a typical 2,272 square foot single-family household. The quantity of materials used is then multiplied by the average GHG emissions associated with the life-cycle GHG emissions for each material.

This estimate is a rough and conservative estimate; the actual embodied emissions for a project are likely to be higher. For example, at this stage, due to a lack of comprehensive data, the estimate does not include important factors such as landscape disturbance or the emissions associated with the interior components of a building (such as furniture).

King County realizes that the calculations for embodied emissions in this worksheet are rough. For example, the emissions associated with building 1,000 square feet of a residential building will not be the same as 1,000 square feet of a commercial building. However, discussions with the construction community indicate that while there are significant differences between the different types of structures, this method of estimation is reasonable; it will be improved as more data become available.

Additionally, if more specific information about the project is known, King County recommends two online embodied emissions calculators that can be used to obtain a more tailored estimate for embodied emissions: www.buildcarbonneutral.org and www.athenasmi.ca/tools/ecoCalculator/.

Pavement

Four recent life cycle assessments of the environmental impacts of roads form the basis for the per unit embodied emissions of pavement. Each study is constructed in slightly different ways; however, the aggregate results of the reports represent a reasonable estimate of the GHG emissions that are created from the manufacture of paving materials, construction related emissions, and maintenance of the pavement over its expected life cycle. For specifics, see the worksheet.

Special Section: Estimating the Embodied Emissions for Pavement

Four recent life cycle assessments of the environmental impacts of roads form the basis for the per unit embodied emissions of pavement. Each study is constructed in slightly different ways; however, the aggregate results of the reports represent a reasonable estimate of the GHG emissions that are created from the manufacture of paving materials, construction related emissions, and maintenance of the pavement over its expected life cycle.

The results of the studies are presented in different units and measures; considerable effort was undertaken to be able to compare the results of the studies in a reasonable way. For more details about the below methodology, contact matt.kuharic@kingcounty.gov.

The four studies, Meil (2001), Park (2003), Stripple (2001) and Treolar (2001) produced total GHG emissions of 4-34 MTCO₂e per thousand square feet of finished paving (for similar asphalt and concrete based pavements). This estimate does not including downstream maintenance and repair of the highway. The average (for all concrete and asphalt pavements in the studies, assuming each study gets one data point) is ~17 MTCO₂e/thousand square feet.

Three of the studies attempted to thoroughly account for the emissions associated with long term maintenance (40 years) of the roads. Stripple (2001), Park et al. (2003) and Treolar (2001) report 17, 81, and 68 MTCO₂e/thousand square feet, respectively, after accounting for maintenance of the roads.

Based on the above discussion, King County makes the conservative estimate that 50 MTCO₂e/thousand square feet of pavement (over the development's life cycle) will be used as the embodied emission factor for pavement until better estimates can be obtained. This is roughly equivalent to 3,500 MTCO₂e per lane mile of road (assuming the lane is 13 feet wide).

It is important to note that these studies estimate the embodied emissions for roads. Paving that does not need to stand up to the rigors of heavy use (such as parking lots or driveways) would likely use less materials and hence have lower embodied emissions.

Sources:

Meil, J. A Life Cycle Perspective on Concrete and Asphalt Roadways: Embodied Primary Energy and Global Warming Potential. 2006. Available: [http://www.cement.ca/cement.nsf/eee9ec7bbd630126852566c40052107b/6ec79dc8ae03a782852572b90061b914/\\$FILE/ATTK0WE3/athena%20report%20Feb.%202%202007.pdf](http://www.cement.ca/cement.nsf/eee9ec7bbd630126852566c40052107b/6ec79dc8ae03a782852572b90061b914/$FILE/ATTK0WE3/athena%20report%20Feb.%202%202007.pdf)

Park, K, Hwang, Y., Seo, S., M.ASCE, and Seo, H. , "Quantitative Assessment of Environmental Impacts on Life Cycle of Highways," Journal of Construction Engineering and Management , Vol 129, January/February 2003, pp 25-31, (DOI: 10.1061/(ASCE)0733-9364(2003)129:1(25)).

Stripple, H. Life Cycle Assessment of Road. A Pilot Study for Inventory Analysis. Second Revised Edition. IVL Swedish Environmental Research Institute Ltd. 2001. Available: <http://www.ivl.se/rappporter/pdf/B1210E.pdf>

Treolar, G., Love, P.E.D., and Crawford, R.H. Hybrid Life-Cycle Inventory for Road Construction and Use. Journal of Construction Engineering and Management. P. 43-49. January/February 2004.

Energy Emissions Worksheet

Type (Residential) or Principal Activity (Commercial)	Energy consumption per building per year (million Btu)	Carbon Coefficient for Buildings	MTCO2e per building per year	Floorspace per Building (thousand square feet)	MTCE per thousand square feet per year	MTCO2e per thousand square feet per year	Average Building Life Span	Lifespan Energy Related MTCO2e emissions per unit	Lifespan Energy Related MTCO2e emissions per thousand square feet
Single-Family Home.....	107.3	0.108	11.61	2.53	4.6	16.8	57.9	672	266
Multi-Family Unit in Large Building	41.0	0.108	4.44	0.85	5.2	19.2	80.5	357	422
Multi-Family Unit in Small Building	78.1	0.108	8.45	1.39	6.1	22.2	80.5	681	489
Mobile Home.....	75.9	0.108	8.21	1.06	7.7	28.4	57.9	475	448
Education	2,125.0	0.124	264.2	25.6	10.3	37.8	62.5	16,526	646
Food Sales	1,110.0	0.124	138.0	5.6	24.6	90.4	62.5	8,632	1,541
Food Service	1,436.0	0.124	178.5	5.6	31.9	116.9	62.5	11,168	1,994
Health Care Inpatient	60,152.0	0.124	7,479.1	241.4	31.0	113.6	62.5	467,794	1,938
Health Care Outpatient	985.0	0.124	122.5	10.4	11.8	43.2	62.5	7,660	737
Lodging	3,578.0	0.124	444.9	35.8	12.4	45.6	62.5	27,826	777
Retail (Other Than Mall).....	720.0	0.124	89.5	9.7	9.2	33.8	62.5	5,599	577
Office	1,376.0	0.124	171.1	14.8	11.6	42.4	62.5	10,701	723
Public Assembly	1,338.0	0.124	166.4	14.2	11.7	43.0	62.5	10,405	733
Public Order and Safety	1,791.0	0.124	222.7	15.5	14.4	52.7	62.5	13,928	899
Religious Worship	440.0	0.124	54.7	10.1	5.4	19.9	62.5	3,422	339
Service	501.0	0.124	62.3	6.5	9.6	35.1	62.5	3,896	599
Warehouse and Storage	764.0	0.124	95.0	16.9	5.6	20.6	62.5	5,942	352
Other	3,600.0	0.124	447.6	21.9	20.4	74.9	62.5	27,997	1,278
Vacant	294.0	0.124	36.6	14.1	2.6	9.5	62.5	2,286	162

Sources

All data in black text

King County, DNRP. Contact: Matt Kuharic, matt.kuharic@kingcounty.gov

Energy consumption for residential buildings

2007 Buildings Energy Data Book: 6.1 Quad Definitions and Comparisons (National Average, 2001)
 Table 6.1.4: Average Annual Carbon Dioxide Emissions for Various Functions
<http://buildingsdatabook.eren.doe.gov/>
 Data also at: http://www.eia.doe.gov/emeu/recs/recs2001_ce/ce1-4c_housingunits2001.html

Energy consumption for commercial buildings and Floorspace per building

EIA, 2003 Commercial Buildings Energy Consumption Survey (National Average, 2003)
 Table C3. Consumption and Gross Energy Intensity for Sum of Major Fuels for Non-Mall Buildings, 2003
http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/2003set9/2003excel/c3.xls

Note: Data in plum color is found in both of the above sources (buildings energy data book and commercial buildings energy consumption survey).

Carbon Coefficient for Buildings

Buildings Energy Data Book (National average, 2005)
 Table 3.1.7. 2005 Carbon Dioxide Emission Coefficients for Buildings (MMTCE per Quadrillion Btu)
http://buildingsdatabook.eere.energy.gov/?id=view_book_table&TableID=2057
 Note: Carbon coefficient in the Energy Data book is in MTCE per Quadrillion Btu.

To convert to MTCO2e per million Btu, this factor was divided by 1000 and multiplied by 44/12.

Residential floorspace per unit

2001 Residential Energy Consumption Survey (National Average, 2001)

Square footage measurements and comparisons
<http://www.eia.doe.gov/emeu/recs/sqft-measure.html>

average life span of buildings,
estimated by replacement time method

	Single Family Homes	Multi-Family Units in Large and Small Buildings	All Residential Buildings
New Housing Construction, 2001	1,273,000	329,000	1,602,000
Existing Housing Stock, 2001	73,700,000	26,500,000	100,200,000
Replacement time:	57.9	80.5	62.5

(national average, 2001)

Note: Single family homes calculation is used for mobile homes as a best estimate life span.
 Note: At this time, KC staff could find no reliable data for the average life span of commercial buildings.
 Therefore, the average life span of residential buildings is being used until a better approximation can be ascertained.

Sources:

New Housing Construction,
 2001 Quarterly Starts and Completions by Purpose and Design - US and Regions (Excel)
http://www.census.gov/const/quarterly_starts_completions_cust.xls
 See also: <http://www.census.gov/const/www/newresconstindex.html>

Existing Housing Stock,
 2001 Residential Energy Consumption Survey (RECS) 2001
 Tables HC1:Housing Unit Characteristics, Million U.S. Households 2001
 Table HC1-4a. Housing Unit Characteristics by Type of Housing Unit, Million U.S. Households, 2001
 Million U.S. Households, 2001
http://www.eia.doe.gov/emeu/recs/recs2001/hc_pdf/housunits/hc1-4a_housingunits2001.pdf

Transportation Emissions Worksheet

Type (Residential) or Principal Activity (Commercial)	# people/ unit or building	# thousand sq feet/ unit or building	# people or employees/ thousand square feet	vehicle related GHG emissions (metric tonnes CO2e per person per year)	MTCO2e/ year/ unit	MTCO2e/ year/ thousand square feet	Average Building Life Span	Life span transportation related GHG emissions (MTCO2e/ per unit)	Life span transportation related GHG emissions (MTCO2e/ thousand sq feet)
Single-Family Home.....	2.8	2.53	1.1	4.9	13.7	5.4	57.9	792	313
Multi-Family Unit in Large Building	1.9	0.85	2.3	4.9	9.5	11.2	80.5	766	904
Multi-Family Unit in Small Building	1.9	1.39	1.4	4.9	9.5	6.8	80.5	766	550
Mobile Home.....	2.5	1.06	2.3	4.9	12.2	11.5	57.9	709	668
Education	30.0	25.6	1.2	4.9	147.8	5.8	62.5	9247	361
Food Sales	5.1	5.6	0.9	4.9	25.2	4.5	62.5	1579	282
Food Service	10.2	5.6	1.8	4.9	50.2	9.0	62.5	3141	561
Health Care Inpatient	455.5	241.4	1.9	4.9	2246.4	9.3	62.5	140506	582
Health Care Outpatient	19.3	10.4	1.9	4.9	95.0	9.1	62.5	5941	571
Lodging	13.6	35.8	0.4	4.9	67.1	1.9	62.5	4194	117
Retail (Other Than Mall).....	7.8	9.7	0.8	4.9	38.3	3.9	62.5	2394	247
Office	28.2	14.8	1.9	4.9	139.0	9.4	62.5	8696	588
Public Assembly	6.9	14.2	0.5	4.9	34.2	2.4	62.5	2137	150
Public Order and Safety	18.8	15.5	1.2	4.9	92.7	6.0	62.5	5796	374
Religious Worship	4.2	10.1	0.4	4.9	20.8	2.1	62.5	1298	129
Service	5.6	6.5	0.9	4.9	27.6	4.3	62.5	1729	266
Warehouse and Storage	9.9	16.9	0.6	4.9	49.0	2.9	62.5	3067	181
Other	18.3	21.9	0.8	4.9	90.0	4.1	62.5	5630	257
Vacant	2.1	14.1	0.2	4.9	10.5	0.7	62.5	657	47

Sources

All data in black text

King County, DNRP. Contact: Matt Kuharic, matt.kuharic@kingcounty.gov

people/ unit

Estimating Household Size for Use in Population Estimates (WA state, 2000 average)
 Washington State Office of Financial Management
 Kimpel, T. and Lowe, T. Research Brief No. 47. August 2007
<http://www.ofm.wa.gov/researchbriefs/brief047.pdf>
 Note: This analysis combines Multi Unit Structures in both large and small units into one category; the average is used in this case although there is likely a difference

Residential floorspace per unit

2001 Residential Energy Consumption Survey (National Average, 2001)
 Square footage measurements and comparisons
<http://www.eia.doe.gov/emeu/recs/sqft-measure.html>

employees/thousand square feet

Commercial Buildings Energy Consumption Survey commercial energy uses and costs (National Median, 2003)
 Table B2 Totals and Medians of Floorspace, Number of Workers, and Hours of Operation for Non-Mall Buildings, 2003
http://www.eia.doe.gov/emeu/cbeccs/cbeccs2003/detailed_tables_2003/2003set1/2003excel/b2.xls

Note: Data for # employees/thousand square feet is presented by CBECS as square feet/employee.
 In this analysis employees/thousand square feet is calculated by taking the inverse of the CBECS number and multiplying by 1000.

vehicle related GHG emissions

Estimate calculated as follows (Washington state, 2006)_

56,531,930,000 2006 Annual WA State Vehicle Miles Traveled

Data was daily VMT. Annual VMT was 365*daily VMT.

<http://www.wsdot.wa.gov/mapsdata/tdo/annualmileage.htm>

6,395,798 2006 WA state population

<http://quickfacts.census.gov/qfd/states/53000.html>

8839 vehicle miles per person per year

0.0506 gallon gasoline/mile

This is the weighted national average fuel efficiency for all cars and 2 axle, 4 wheel light trucks in 2005. This includes pickup trucks, vans and SUVs. The 0.051 gallons/mile used here is the inverse of the more commonly known term "miles/per gallon" (which is 19.75 for these cars and light trucks).

Transportation Energy Data Book. 26th Edition. 2006. Chapter 4: Light Vehicles and Characteristics. Calculations based on weighted average MPG efficiency of cars and light trucks.

http://cta.ornl.gov/data/tedb26/Edition26_Chapter04.pdf

Note: This report states that in 2005, 92.3% of all highway VMT were driven by the above described vehicles.

http://cta.ornl.gov/data/tedb26/Spreadsheets/Table3_04.xls

24.3 lbs CO2e/gallon gasoline

The CO2 emissions estimates for gasoline and diesel include the extraction, transport, and refinement of petroleum as well as their combustion.

Life-Cycle CO2 Emissions for Various New Vehicles. RENew Northfield.

Available: <http://renewnorthfield.org/wpcontent/uploads/2006/04/CO2%20emissions.pdf>

Note: This is a conservative estimate of emissions by fuel consumption because diesel fuel, with a emissions factor of 26.55 lbs CO2e/gallon was not estimated.

2205

4.93 lbs/metric tonne

vehicle related GHG emissions (metric tonnes CO2e per person per year)

average life span of buildings, estimated by replacement time method

See Energy Emissions Worksheet for Calculations

Commercial floorspace per unit

EIA, 2003 Commercial Buildings Energy Consumption Survey (National Average, 2003)

Table C3. Consumption and Gross Energy Intensity for Sum of Major Fuels for Non-Mall Buildings, 2003

http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/2003set9/2003excel/c3.xls