# CAPSTONE REPORT

## URBAN DESIGN

**Tu Nguyen**
School of Urban Studies
June 2025

UNIVERSITY of WASHINGTON | TACOMA


Husky UW Tacoma Mascot .
Photo courtesy of Tu Nguyen.

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# STUDENTS' VISION FOR THE UWT CAMPUS

## URBAN DESIGN CAPSTONE

## Manifesto

The University of Washington Tacoma is a public university that brings together a community of diverse students, staff, faculty, businesses, and residents. Using thorough analysis, collaborative discussions, and active participation, our team determined four core values into our work, we aim to create urban environments that emphasize the importance of strong, integrated networks that link people to each other, to nature, to essential services. we will design for accessibility, ensuring that urban spaces are well connected and that are clear pathways for both physicals and social interactions. it is a challenge that requires reflections, imagination, and perseverance. These values will be the cornerstone of our proposals, influencing both the overall design directions and the specific elements we introduce. By focusing on these guiding principles, we aim to contribute to the creation of urban spaces that are not only functional, but also meaningful and transformative for the communities we serve.

### Our Values & Goals

**Diversity, Equity, and Inclusion**

- Promoting representation, fairness, and belonging for all individuals, especially marginalized groups.

**Climate Action**

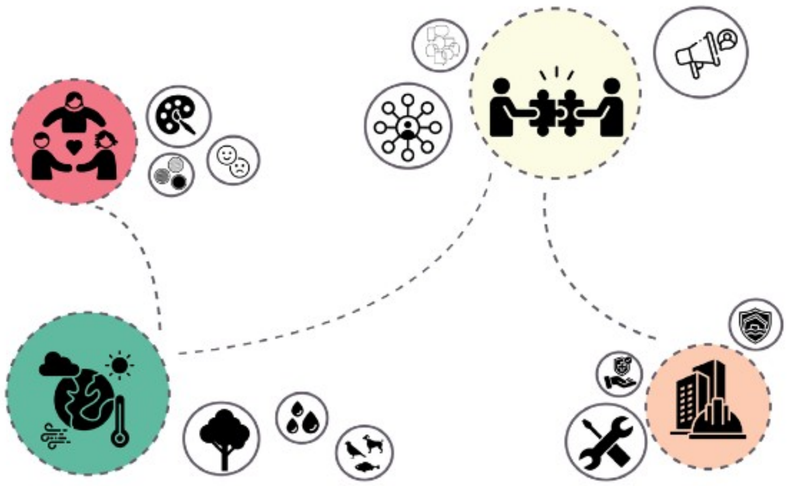
- Implementing strategies to mitigate and adapt to climate change through sustainable practices.

**Community Connection**

- Strengthening relationships and fostering collaboration between the campus and surrounding communities.

**Safety**

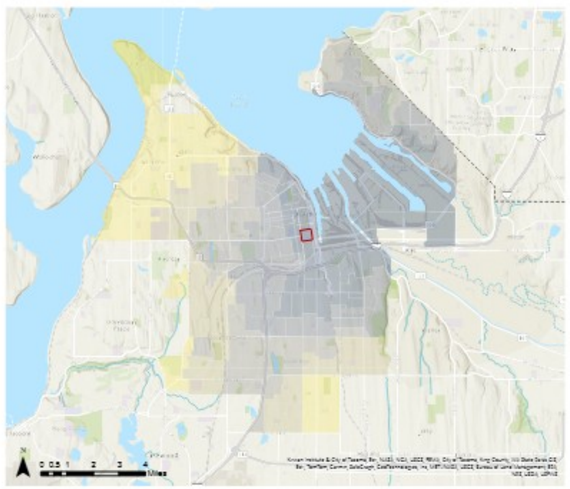
- Ensuring a secure and accessible environment that promotes physical and psychological well-being for all users.



Infographic of capstone's goal. Photo courtesy of Tu Nguyen.

UWT's limited tree canopy and a high impervious surfaces contribute to urban heat island effects and reduced comfort. Key issues include uneven sunlight exposure and lack of vegetation to buffer wind. However, existing green spaces along the PLT and staircases are assets that can be connected into green clusters to support biodiversity and microclimate stability. Strategic tree planting presents an opportunity to expand canopy cover, reduce heat, improve air quality, and enhance ecological connectivity across campus.

## NOx-Diesel Emission Map

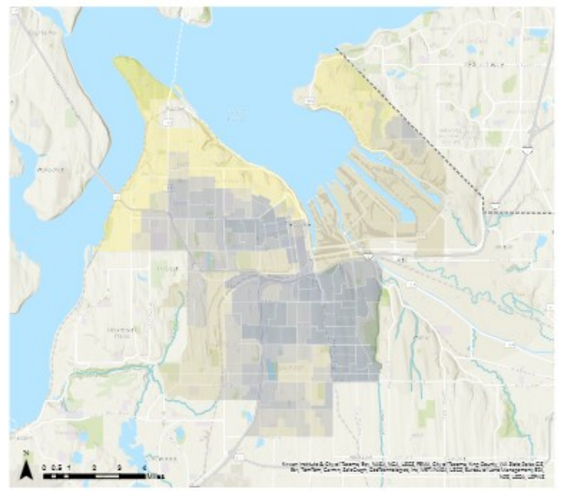



Pollution emission in Tacoma. Photo courtesy of City of Tacoma.

## Tree Canopy Coverage Map


Tree coverage throughout Tacoma. Photo courtesy of City of Tacoma.

## Urban Heat Island Effect




Urban heat in Tacoma. Photo courtesy of City of Tacoma.

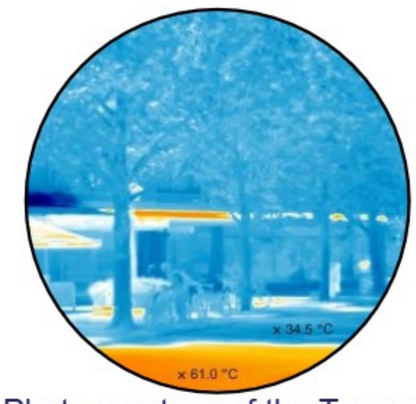
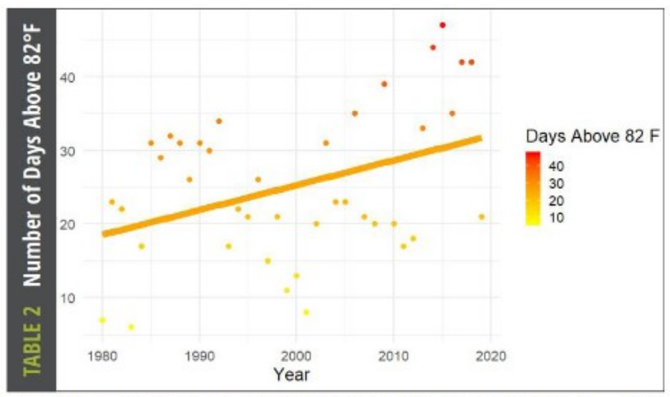



Photo courtesy of the Tacoma Community Forestry

"Direct shading by trees has a significant impact on the surrounding environment, providing local protection from heat waves"




Urban heat trends over the years in Tacoma . Photo courtesy of 2020 Earth Economics.

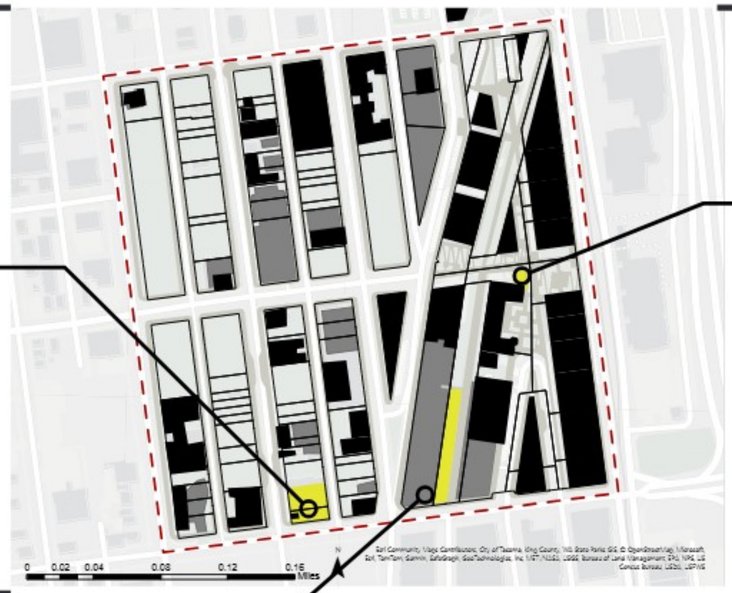
# Rain Garden

- **Supports Local Wildlife:** These plants provide essential habitat and food sources for native pollinators, birds, and small animals, helping maintain biodiversity.
- **Reduces Resource Use:** Native species are adapted to the local climate and soil, requiring less water, fertilizer, and maintenance, which conserves resources and reduces chemical runoff.
- **Prevents Soil Erosion:** Their root systems help stabilize soil, reducing erosion, improving water absorption, and managing runoff, especially on slopes and in rainy areas.
- **Improves Air Quality:** These plants aid in carbon sequestration and filter pollutants from the air, beneficial in urban areas with poor air quality.

## The Giving Garden

"The Giving Garden at the University of Washington Tacoma"

© Images courtesy of 2024 University of Washington Tacoma




## The Rain Garden

The Rain Garden located outside of Metro Coffee that treats rainwater

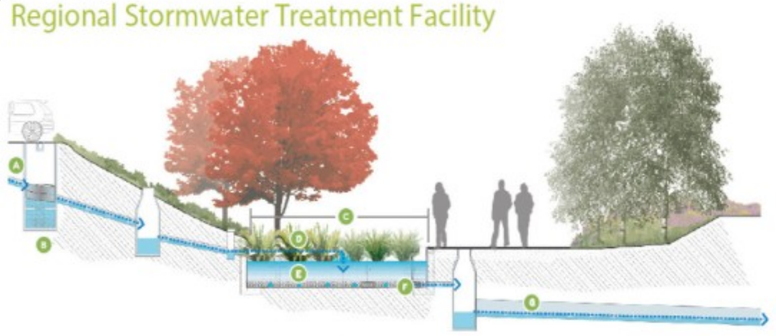
© Images Taken by Tu Nguyen

## Prairie Line Trail

"The Prairie Line Trail bio-retention facility (aka "rain garden") treats runoff from 42 acres"

© Images courtesy of 2024 University of Washington Tacoma

## Regional Stormwater Treatment Facility



(A) untreated stormwater into facility (B) swirl separator (C) bioretention facility (D) water tolerant plants (E) special soil media (F) underdrain to collect treated stormwater (G) clean stormwater out to city system

© Images courtesy of 2024 University of Washington Tacoma

## Plant Species

Wood Sorrels

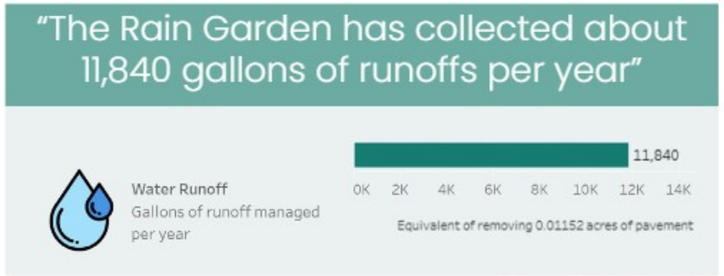
Western Sword Fern

Rough Wallflower

Gilled Mushroom and Allies

Different plant species. Photo courtesy of 2024 University of Washington Tacoma

"The Rain Garden has collected about 11,840 gallons of runoffs per year"




© Stewardship Partners, 2024

*Indentifying existing green stormwater infrastructors and its impact on UWT*


# Tree Types Analysis

**Douglas Fir (Pseudotsuga menziesii)**
A native evergreen, it provides shade, improves air quality, and historical to the West Coast. Douglas Fir also offers habitat and food for native wildlife.

**Japanese Maple (Acer palmatum)**
Japanese maples is not native but it does attract pollinators such as bees and butterflies. Provides shade and lowers nearby surface temperatures.

**Black Poplar (Populus nigra)**
Not native but is major part in supporting wildlife. Black Poplar absorbs pollutants and serves as a natural windbreak. It has potential for being invasive due to the aggressive growth.

## Common Tree

Douglas Fir

Japanese Maple

Black Poplar

Hornbeam

## BENEFIT OF TREES

**89%** Provide Shade

**61%** Store Carbon

**71%** Filter Water

**70%** Provide Wood for Lumber & Paper

**85%** Home for Wildlife

*Analyzing existing tree types and tree canopy. Map data courtesy of Washington Forest Protection Association.*

# Sunlight & Potential Green Cluster Network

## Sun & Wind Diagram

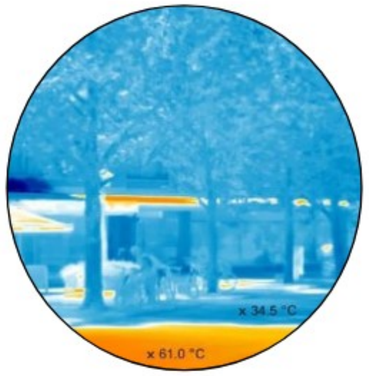

- Building Footprint
- Potential Green Clusters & Network
- Tax Parcels UWT
- Summer Solstice - June 21
- Full Year Sun Exposure
- Winter Solstice - December 21
- Building Footprint
- Wind Patern

**Sunlight Patterns:**
Sun exposure influences plant health and biodiversity in green spaces.

**Wind Patterns:**
Vegetation like trees and shrubs can act as windbreaks, stabilizing microclimates within clusters.

**Green Cluster:**
Connecting the greens along the PLT with the staircase creates a green cluster network that promotes ecological connectivity. Allowing movement of wildlife and plant species.

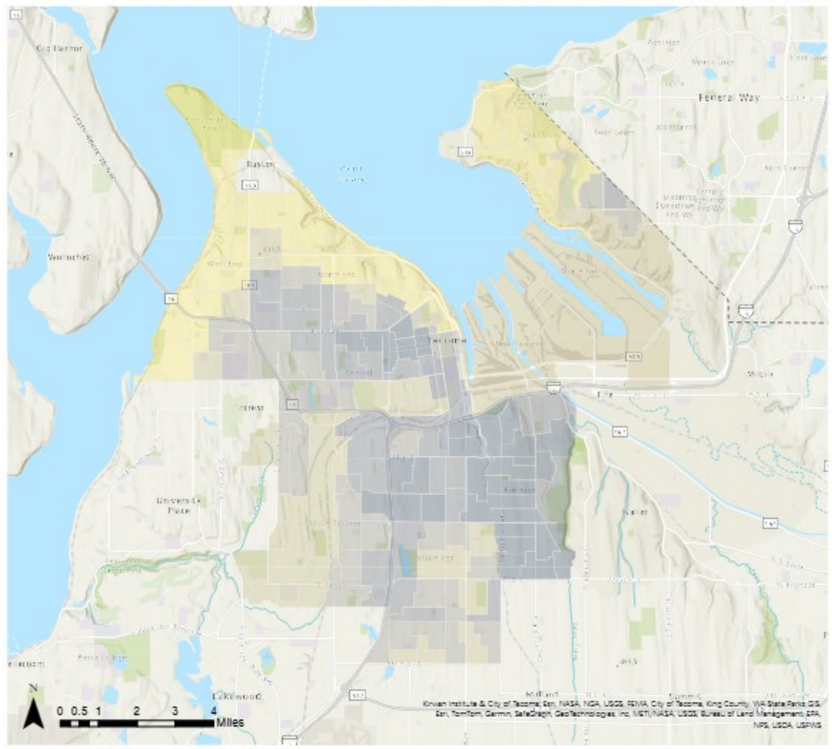
**Urban Heat Islands (UHIs):**
Our campus located downtown where the areas is limited on tree canopy and more of impervious surfaces are more prone to urban heat islands (UHIs), causing higher temperatures.




"Direct shading by trees has a significant impact on the surrounding environment, providing local protection from heat waves"

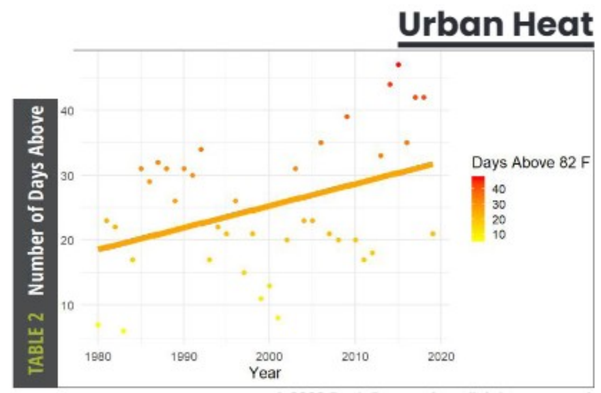
© Images Courtesy of the Tacoma Community Forestry

## Urban Heat Island Effect




Urban Heat Island Effect

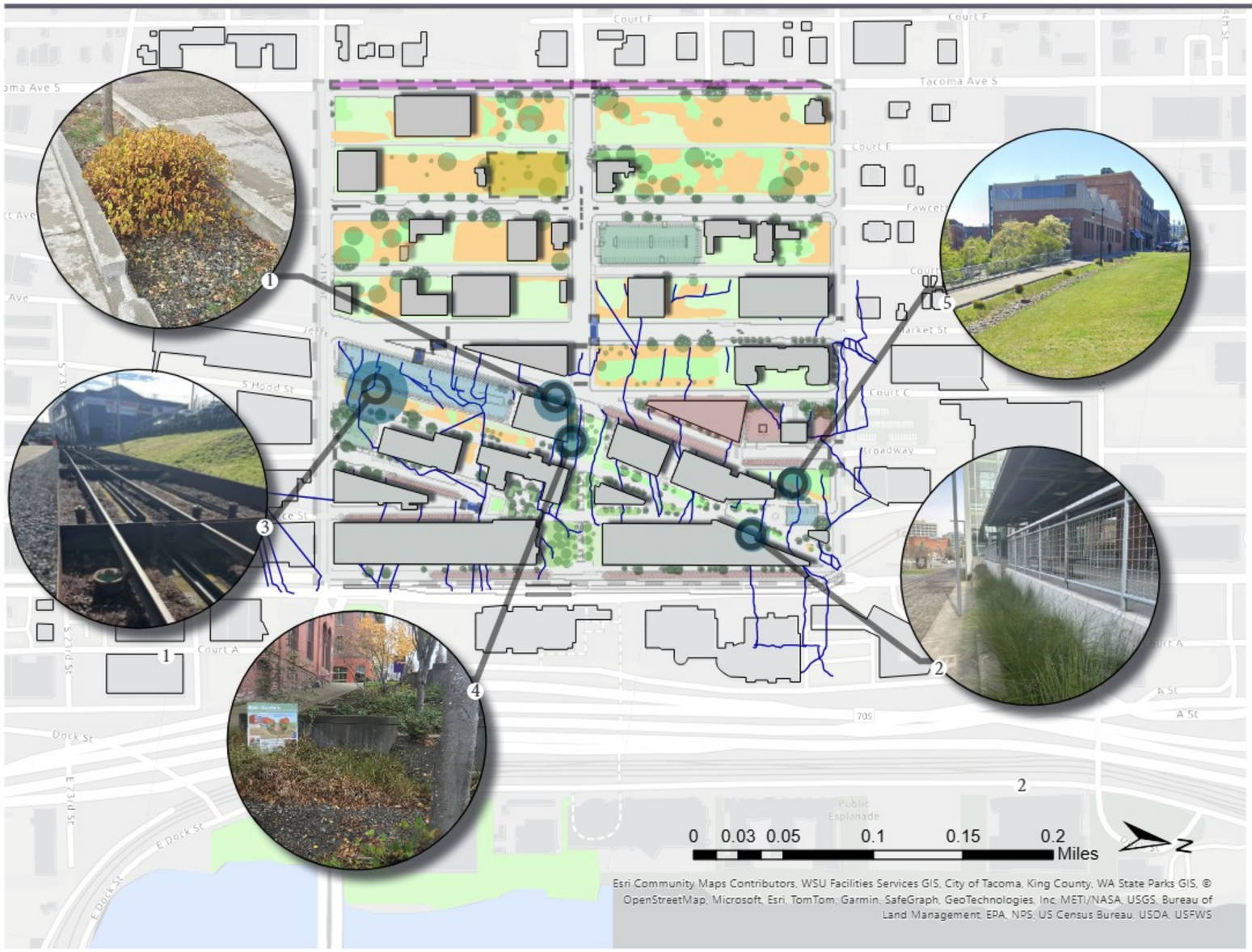
- 87.13 - 87.55 (Very High)
- 86.75 - 87.13 (High)
- 86.52 - 86.75 (Moderate)
- 85.86 - 86.52 (Low)
- 82.69 - 85.86 (Very Low)






*Analyzing exsiting sunlight and wind patterns and urban heat island effect in Tacoma. Map data courtesy of City of Tacoma.*

# UW Tacoma Capstone : Urban Design Analysis & Collaboration CE




Exisiting Building
Green space
Soil and dry vegetation
Water
Low Filter Parking
Tree cluster
Medium Filter Parking
Surface Waterflow
High Filter Parking
Exisiting LID Solutions

**1. Rain Garden** outside of Tioga Library


**2. Rain Garden** outside of Joy building that treats roof runoff


**3. Bioretention Facility** on the Prairie Line Trail near Milgard UWT


**4. Rain Garden** outside of Metro Coffee


**5. Natural Storm Water Filter** outside of Dougan


**Runoff Coeficient**

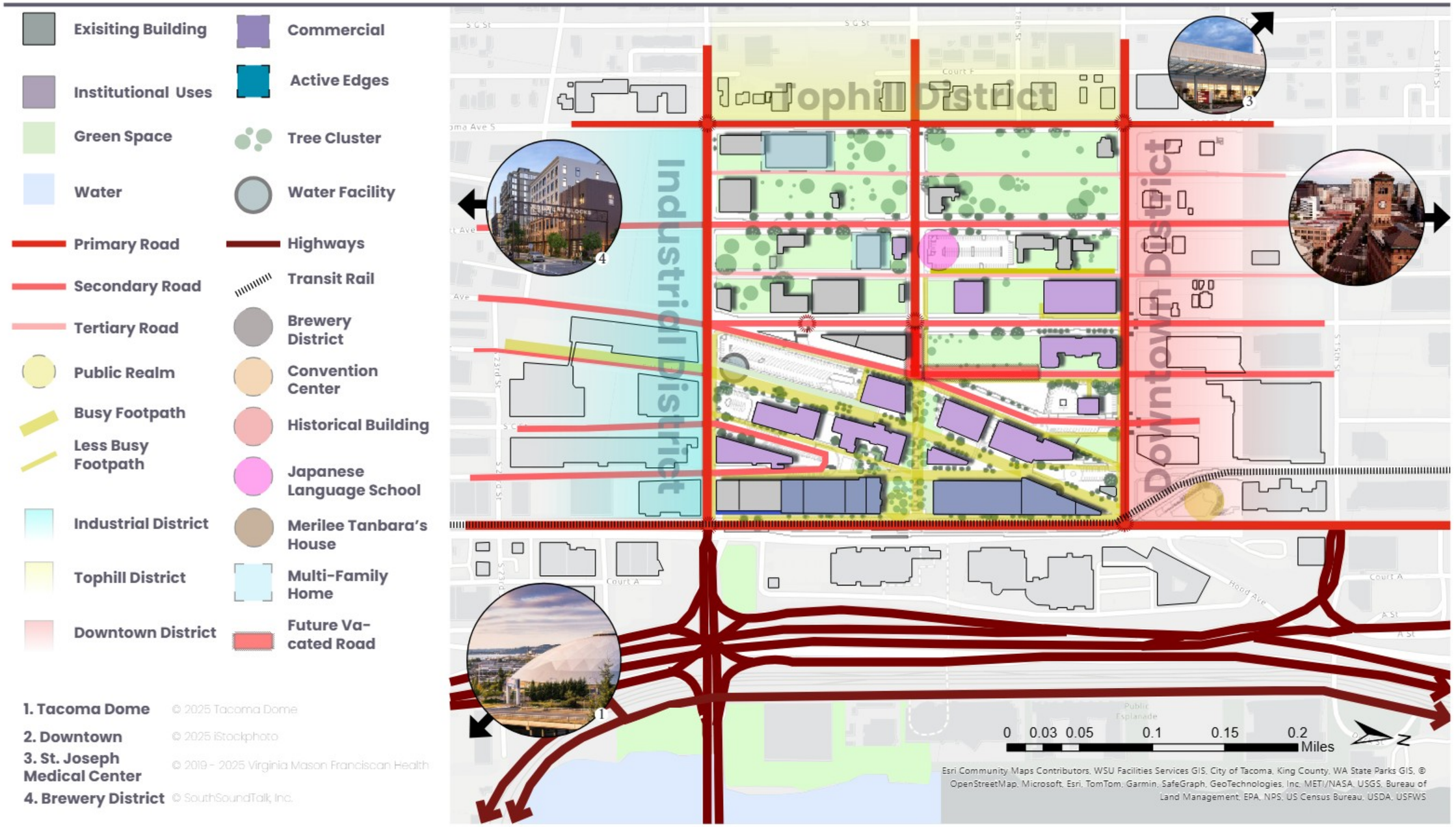
| | |
|---|---|
| Roof Tops | 90 |
| Vegetation | 15 |
| Tree Canopy | 15 |
| Soil & Dry Vegetation | 22 |
| Impervious | 90 |
| Graved Parking | 55 |

### Key Takeaway

**Problem:** 75% of stormwater runoff enters Puget Sound untreated, contributing to pollution.
**Surface Water Flow Issues:** Impervious surfaces increase runoff (~90) and overwhelm natural filtration.
**Data-Driven Approach:** Using runoff coefficients (e.g., gravel: 55, vegetation: 15) will help optimize stormwater management.

*In collaboration with the civil engineering, existing GSI analysis and runoffs. Team:*
*Tim Colby, Carson Omilusik, Chad Anglemyer, Tu Nguyen, Asad Hussein.*

# UW Tacoma: Urban Design Form Analysis



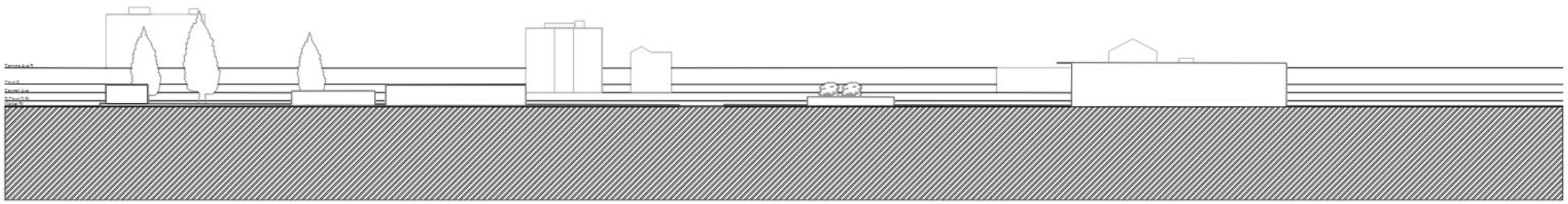

*Existing site analysis of the University of Washington Tacoma and surrounding communities.*

# EXISTING DRAWING

The UW Tacoma site plan covers 46 acres in downtown Tacoma, with a 200-foot change in elevation from east to west. The design works with the steep slope by using stairs, ramps, and accessible walkways to connect different levels of campus. It reuses historic warehouse buildings and ties in with the city's street grid. The plan includes open green spaces, wide pedestrian paths, and stormwater features. It supports walking, biking, and public transit, while preserving views of Mt. Rainier.


*Existing site plan of University of Washington Tacoma*

- Site Section



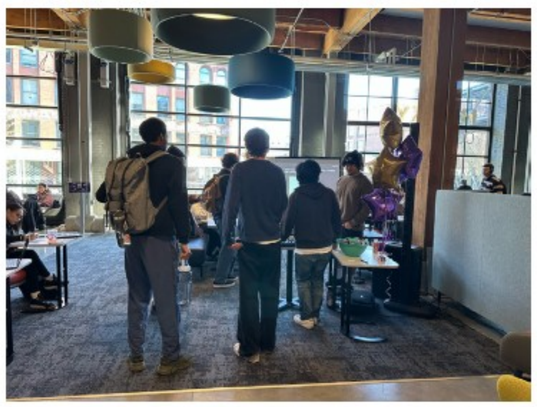
0 ft 50 ft 100 ft 200 ft

*Existing site cross-section of Market Street at the University of Washington Tacoma.*

# Community Engagement Campaign

## Method

In November 2024, we developed a marketing strategy to engage students on campus. This included launching a website, planning events, distributing flyers, posting on social media, and creating survey questions. Our official two-week community campaign launched at the beginning of January 2025. During that time, we held three engagement events and received 126 student survey responses. By the end of January, we wrapped up our events, closed the survey, and began analyzing the results.





*Community Campaign flyers. Courtesy of Sabien and Tu Nguyen*

# FOOD FOR THOUGHT INSIGHTS

## PROJECT OVERIEW

THIS PROJECT IS BEING CONDUCTED BY THE STUDENTS OF THE SENIOR URBAN DESIGN COHORT. IT AIMS TO FIND OUT WHERE STUDENTS GO TO EAT ON CAMPUS AS WELL AS WHAT FOOD OPTIONS STUDENTS WOULD LIKE TO SEE ON-CAMPUS IN THE NEAR FUTURE.

## STRATEGIES

Several interesting techniques were used at our TPS booth to **attract** and **engage** students. To get folks to stop by, we first provided **complimentary** juice and chips as a tempting perk. We encouraged student to participate and express their opinions by giving them a **QR code** of the **survey.**

## GOALS

**1ST** Food Cost Expected by Students

**2ND** Food Culture & Interest

**3RD** Survey to understand students' food habits on campus

## DATA 1

We ask the student on campus, **"Where do you eat, cook and buy food on Campus?"**





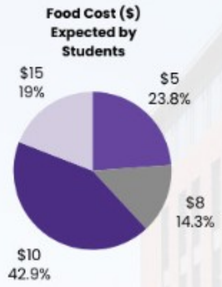

This is the interactive map that we use to ask the students on campus






## DATA 2

**On-Campus Students**
(Community Engagements)





## DATA 3

Survey to understand students' food habits on campus


Making


Eating


Purchase


## TRENDS

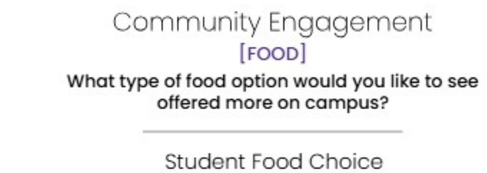
- 27 Students dine at TPS.
- 13 Students purchase food at TPS.
- 6 Students prepare their own food.
- 8 Students bring food from home.

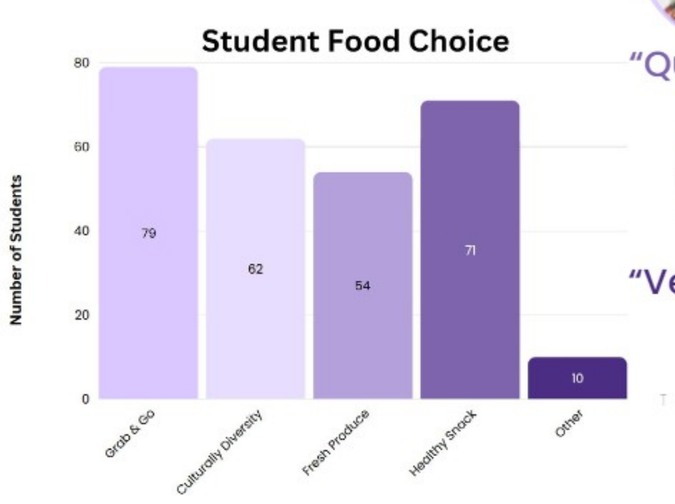
## CONCLUSION

Based on the data and survey results, it can be concluded that the students' favorite place to have food on campus is TPS. Most students prefer to spend around $10 on their meals. Additionally, the majority of students enjoy having a meal, with Mexican food being the most popular choice.

## PHOTOS





## Reflection

At our community event, we connected with an estimated 50 students to learn about their experiences with food on campus. Their feedback suggests that the current campus dining options may not fully meet student needs. Many expressed a desire for more convenient, healthy, and diverse food choices. Students recommended expanding campus dining to offer quicker, more nutritious, and culturally inclusive meals.

*Community Enagement Reflection. Courtesy of Benjamin Smith, Yasir Al Sammarraie, Tu Nguyen*

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# EPA Campus Rainwork Challenge

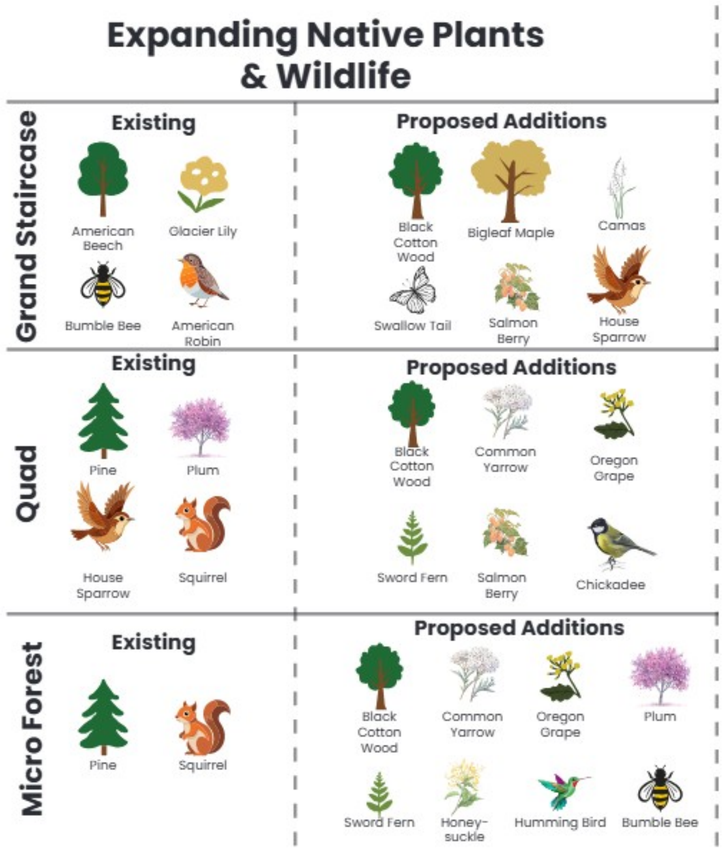

## Abstract:

The EPA Campus RainWorks Challenge is a national student competition that encourages innovative green infrastructure solutions to address stormwater management and promote resilient, sustainable campus environments. As a participant, I focused on redesigning the UW Tacoma Quad as a central stormwater treatment hub that not only manages runoff but also contributes to the educational, social, and ecological functions of the campus.

My contribution emphasized integrating green infrastructure strategies—such as bioswales, native plantings, and pervious surfaces—into a fully ADA-accessible landscape. The design channels and filters stormwater runoff from surrounding hardscapes, helping reduce pollutants like lead and phosphorus before they reach the Thea Foss Waterway. In addition to meeting EPA standards, the project supports year-round accessibility, environmental education, and inclusive use of open space.

The proposal was developed with consideration for UW Tacoma's long-term growth and adaptability, aligning with the design principles of the campus master plan led by Bjarke Ingels Group (BIG). It balances ecological function with the university's goals for connectivity, cultural integration, and flexible public space. The Quad becomes not only a green infrastructure solution but a central gathering space that reflects the university's future vision.


*Wildlife and Tree type and plant species.Courtesy Asad Hussei, Tu Nguyen.*
*Competition Video Link: https://www.youtube.com/watch?v=iLSdtVj7nxA*




### Maintenece

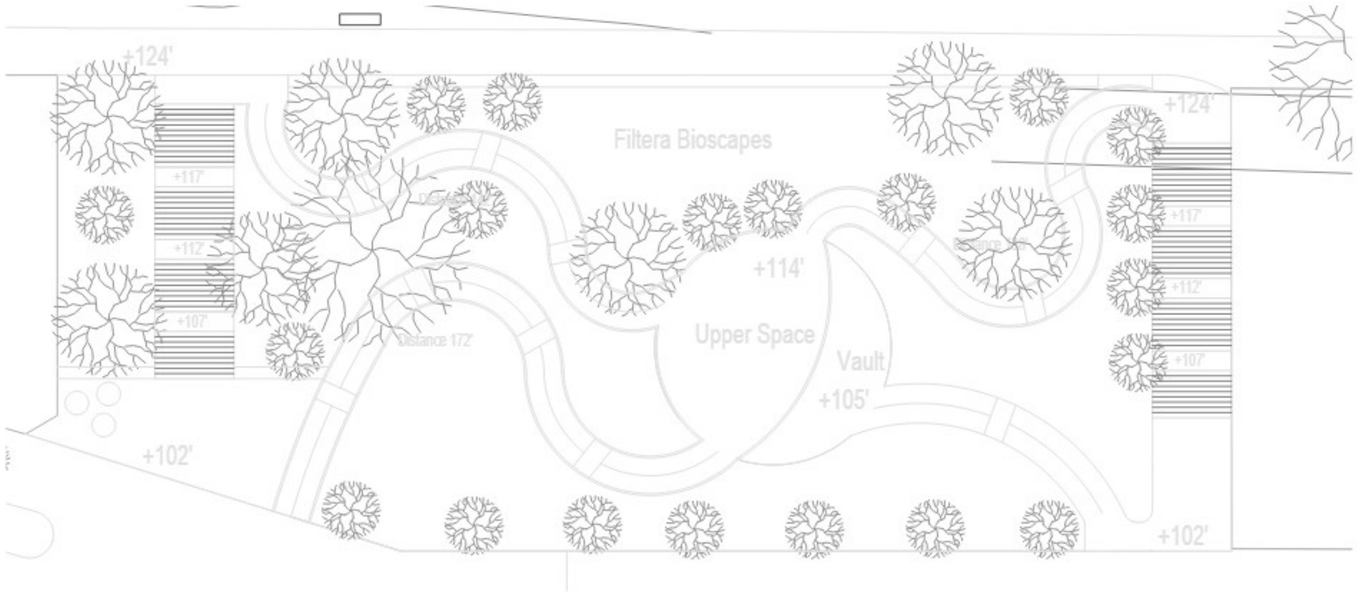
- Sustainable, low-maintenance landscapes at the Grand Staircase, Quad, and Micro Forest sites, featuring native plants like Bigleaf Maple, Cottonwood, Honeysuckle, and Salmonberry.
- Reduced need for regular pruning, with plant selections that control erosion and thrive naturally.
- Integrated green stormwater infrastructure (GSI) to filter runoff and manage water flow.

### Wildlife & Pollinators

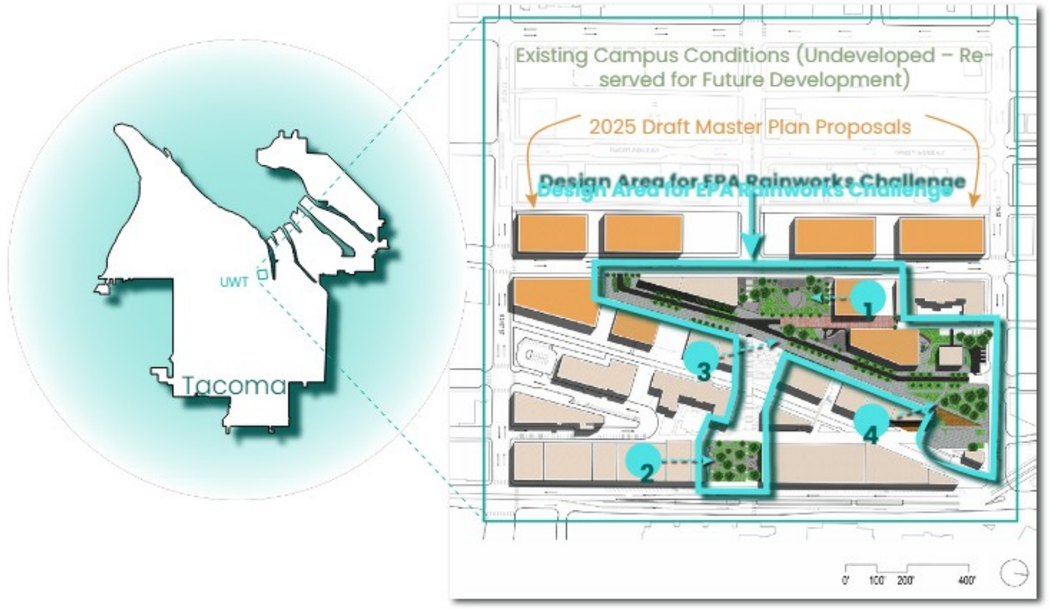
- Native plants provide habitat for a variety of species, including bees, butterflies, birds, and small mammals like squirrels.
- Fosters a thriving, biodiverse ecosystem that strengthens the connection between the community and local ecology.

### Microforest Vision

At the **mini-forest site,** we aim to create a welcoming, shaded space for students and the wider community. Using **native, low-maintenance plants**, the forest will soften the transition from city to campus and **support local ecology**. It will also serve as green stormwater infrastructure, filtering runoff naturally. Educational signs will connect visitors to the **cultural histories of Native American** and **Japanese communities** tied to this land.



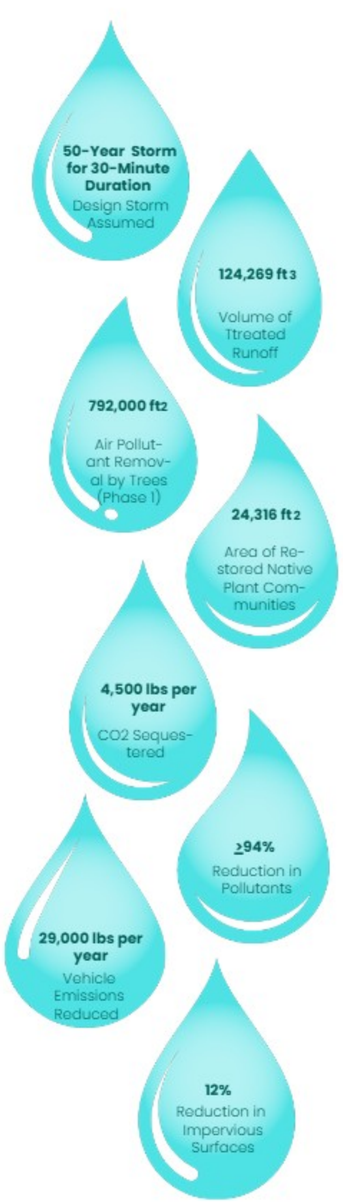
# PROTECTING THE SOUND #50





Existing N. 19th Site Section & Elevation


# AS IT HITS THE GROUND #50




MicroForest GSI Section





*EPA Poster. Courtesy Christy Gonzalez*

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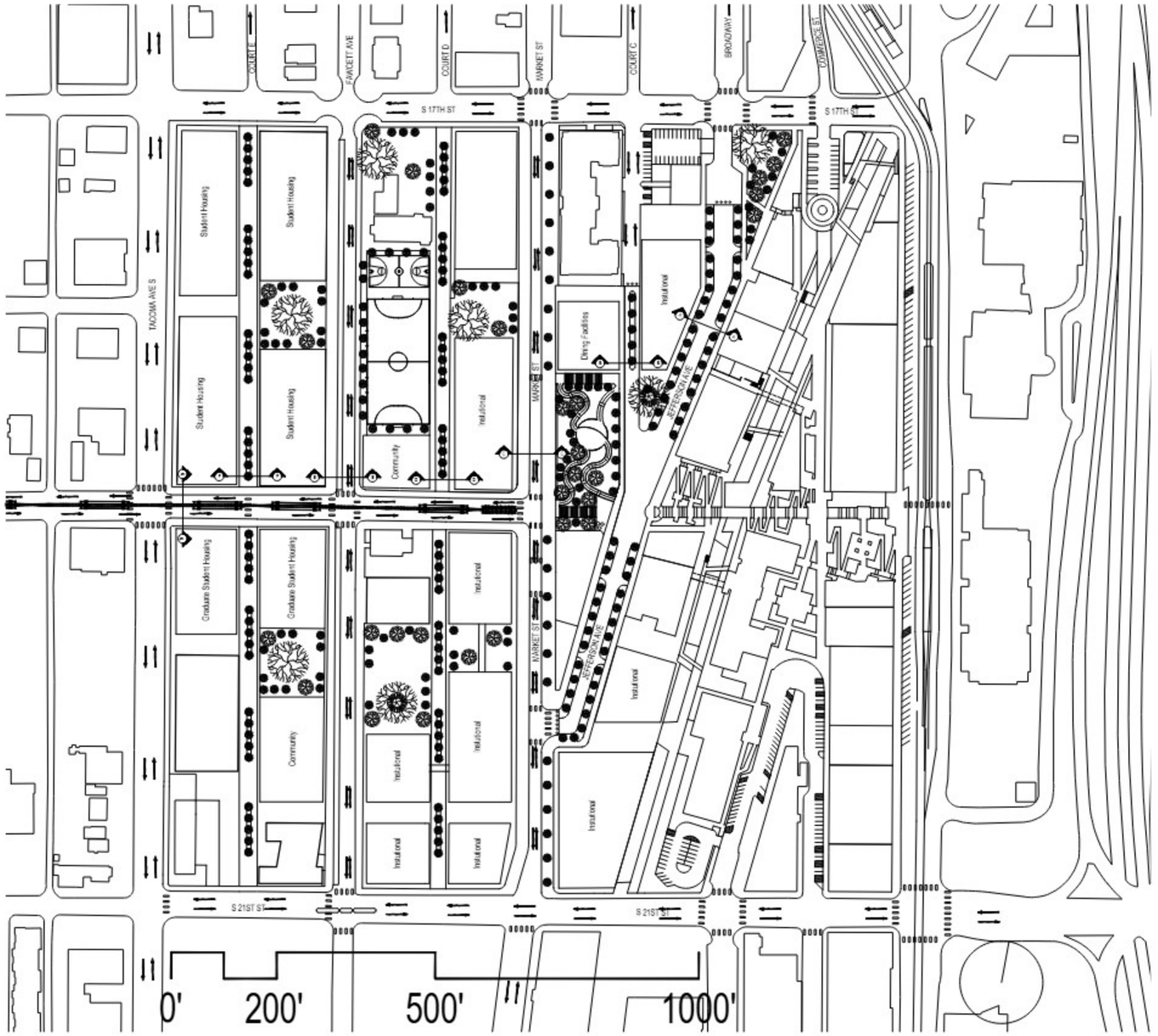
# Urban Design Approach

## Design Proposal Focus: Enhance pedestrian safety, address elevation changes, and strengthen cultural connections by integrating the site's historical landscape.

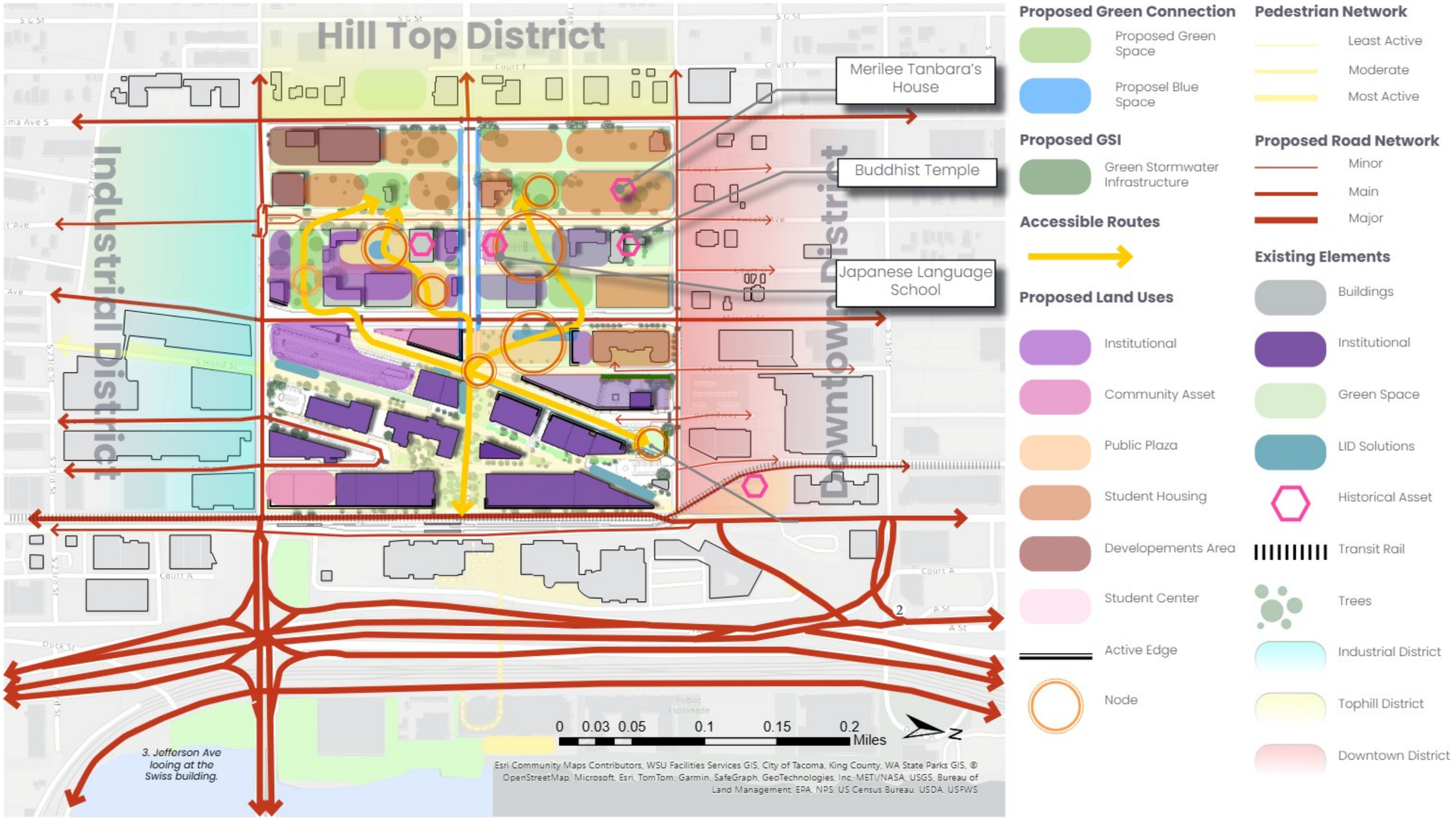
The proposal aims to enhance pedestrian safety, address elevation challenges, and strengthen cultural connections by reactivating the site's historical landscape. Rooted in student feedback and site analysis, the design prioritizes active transportation through ADA-accessible pathways, green stormwater infrastructure (GSI), and student housing. Jefferson Avenue is reimagined as a pedestrian plaza with integrated stormwater treatment, inspired by the EPA RainWorks Challenge channeling treated runoff from the Quad area to the Micro Forest before it flows into the Puget Sound. Planting Japanese Maple in honnor connection to Japanese Learning School and the historical asset. Market Street improvements include widened sidewalks and pocket gardens that serve as noise buffers from adjacent commercial activity. A proposed tram system along 19th Street supports accessible movement across elevation changes, while student housing is strategically placed to serve both undergraduate and graduate populations.

The selected precedents reflect similar goals in climate, user needs, and campus context. Palm Court Plaza at UW Bothell serves as a central gathering space that connects academic buildings through native landscaping, shaded seating, and flexible use for student events supporting our goal of a cultural and communal plaza. West Campus Plaza at UC Davis demonstrates the use of permeable surfaces, drought-tolerant planting, and ADA-compliant paths to manage stormwater and enhance accessibility.



## Urban Framework

# UW Tacoma: Urban Design Framework




*Existing site plan of University of Washington Tacoma*

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# Precedent Studies

## Case Studies I: Palm Court Plaza, University of Washington, Bothell, Washington

**Character**
Central gathering space with open green areas and shaded seating. Reflects the natural environment with native plants.

**Fuction**
Hosts events, classes, and student gatherings. Connects academic buildings, enhancing campus navigation.

**Strategy**
Sustainable materials and native planting for water conservation. ADA-compliant pathways and seating. Designed with input from students and faculty.

Codex,

Campus W

Plaza

Proposed Area

## Case Studies II
## West Campus Plaza , University of California, Davis, California

**Character**
Serves as a central space for student life with open areas, art installations, and green spaces. Modern aesthetics with native plant displays to community farm projects.

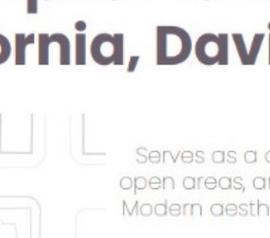
**Fuction**
Hosts events and student interactions. Links academic buildings, dorms, and transportation hubs.

**Strategy**
Uses rain gardens, permeable surfaces, and drought-resistant plants for stormwater management. ADA-compliant pathways and ample seating ensure accessibility.



Vanderhoef Quad

Students on the Quad



Quad

*Design strategies that blend accessibility, sustainability, and community use.*

# Civil Engineering Proposal Jefferson

## Problem statement

**Stormwater runoff in urban areas often carries harmful pollutants—such as lead, zinc, cadmium and much more. These enter local waterways, threatening ecosystems and public health. The Thea Foss Waterway in Tacoma, WA is particularly impacted by these pollutants due to runoff from roads, parking lots, and other impervious surfaces. Traditional stormwater systems are not designed to effectively filter out contaminants. There is a need for sustainable infrastructure solutions that meet the required values set by the EPA.**

For instance lead must be below 15 µg/L currently it sits at 96.88 µg/L. This means we need to reduce lead by at least 84%, another example being phosphorus where we need to reduce by 70%. With the aim to filter out pollutants, the need to support emergency vehicles even on a fully pedestrianized campus, while keeping ADA considerations in mind, pervious concrete was selected.

**This project's challenge is to develop an accurate cost estimate for the remodeling of Jefferson Avenue, incorporating current market rates for labor and materials, contingency costs, and efficiency strategies. The estimate must also address construction preparation, sediment control, and material waste reduction through proper diversion methods, all in full compliance with all applicable standards and codes, Puget Sound Stormwater BMP Cost Database, WSDOT Planning Level Cost Estimation .**

**Pollution Metrics**

| | Before | After | Unit |
|---|---|---|---|
| Lead | 599.6198038 | 35.97718823 | G/yr |
| Zinc | 1598.697309 | 95.92183856 | G/yr |
| Cadmium | 2908.973037 | 174.5383822 | mg/yr |
| Phosphorus | 2067.227647 | 117.8319759 | G/yr |
| Copper | 411.5887382 | 6.173831073 | G/yr |
| Suspended Solids | 420.8726947 | 2.525236168 | kg/yr |
| Nitrogen | 15782.72605 | 741.7881244 | mg/yr |

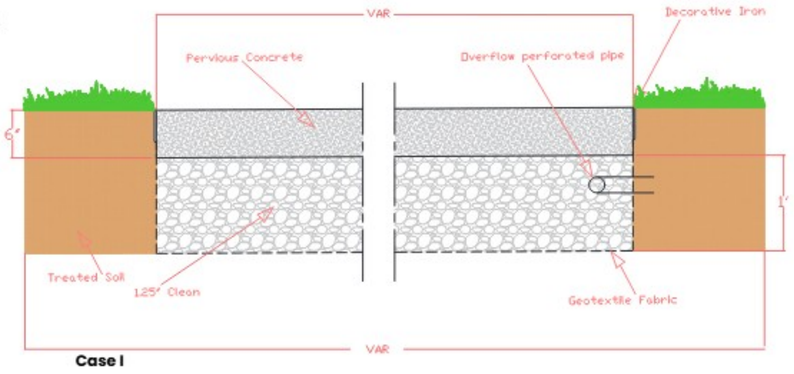
Japanese Maple
Case I

## Tree Proposal

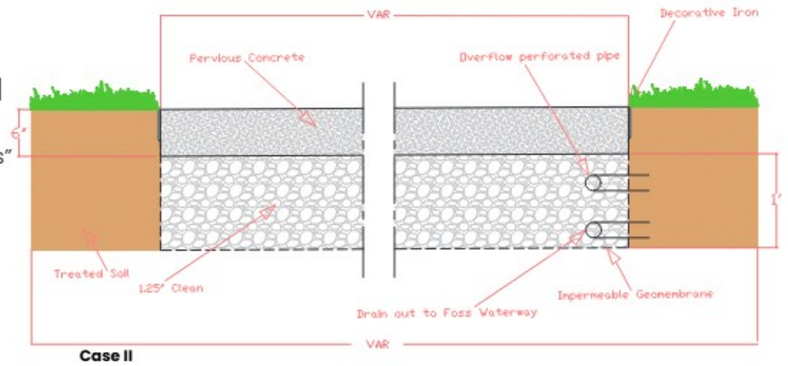
Proposing
"~ 64 number of trees"

Cottonwood
Case II

## Street Section: Jefferson Ave

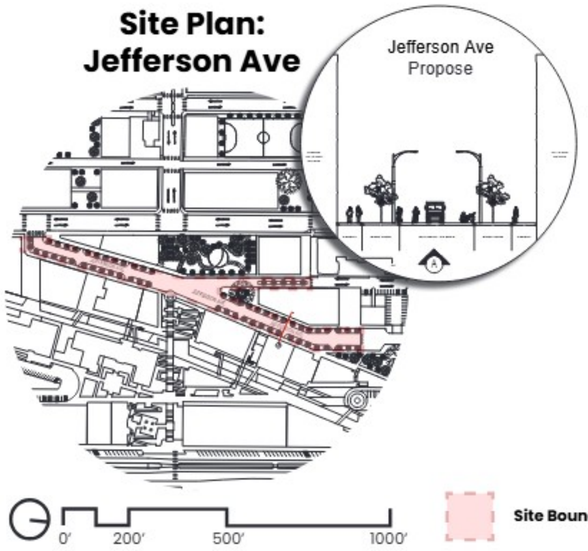



Case I

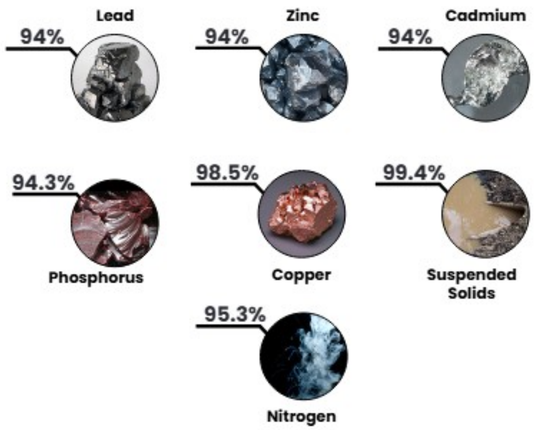



Case II

## Site Plan: Jefferson Ave




## Pollutant Reduction Percentage




## Jefferson Street Cost Estimation

| Product | Cost | Unit |
|---|---|---|
| Asphalt recycling | $7.00 | ton |
| Concrete recycling | $55.00 | ton |
| Rock (1 1/4) | $85.00 | cy |
| Excavation | $5.00 | cf |
| Top Soil | $39.00 | cy |
| Japanese Maple Tree | $130.00 | each |
| Export (soil) | $20.00 | cy |
| Manhole Adjustments | $1,000.00 | each |
| Concrete | $202.00 | cy |
| Labor | $600.00 | hour |
| Tax Rate | 10.60% | |
| 4" underdrain | $15.00 | LF |
| Temporary Fence | $16.00 | LF |
| Profit | 10.00% | % |
| Overhead | 10% | % |
| Permiting | $125,000.00 | Total |

| Product | Cost |
|---|---|
| Asphalt recycling | $24,529.17 |
| Concrete recycling | $60,843.75 |
| Rock (1 1/4) | $228,240.74 |
| Excavation | $765,000.00 |
| Top Soil | $63,916.67 |
| Japanese Maple Tree | $3,900.00 |
| Export (soil) | $140,000.00 |
| Manhole Adjustments | $54,000.00 |
| Concrete | $361,604.94 |
| Labor | $654,257.14 |
| Recycling Haul Cost | $100,000.00 |
| 4" underdrain | $78,000.00 |
| Temporary Fence | $42,400.00 |
| Profit | $297,186.16 |
| Overhead | $270,169.24 |
| Permiting | $125,000.00 |

**Cost Estimate: Tax: $315,017.33 Total: $3,584,065.14**

*Civil Engineering Collaboration, Jefferson Avenue Stormwater Treatment & Cost Estimation, Tim Colby, Chad Anglemyer, Tu Nguyen*

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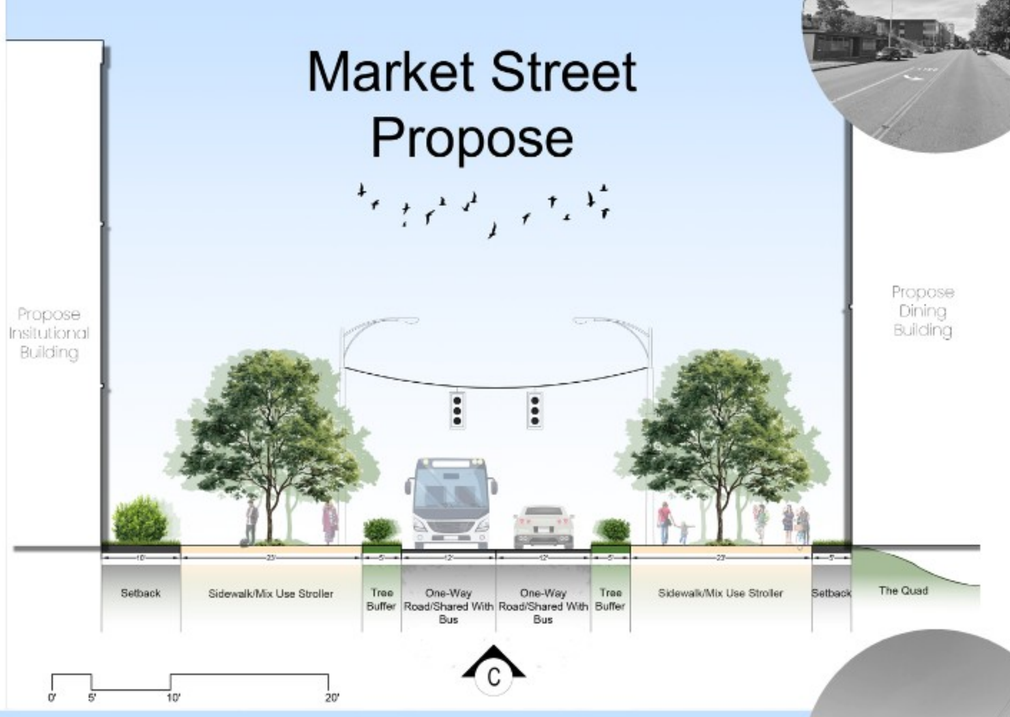
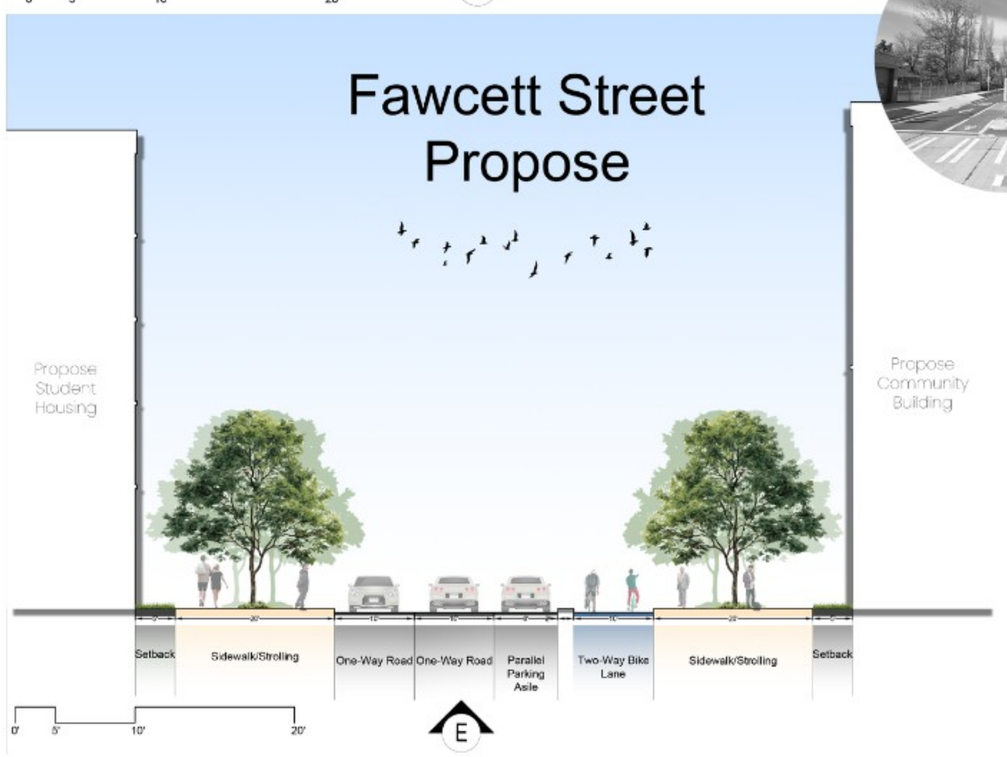
# Street Sections

## Jefferson Ave Propose


## Market Street Propose

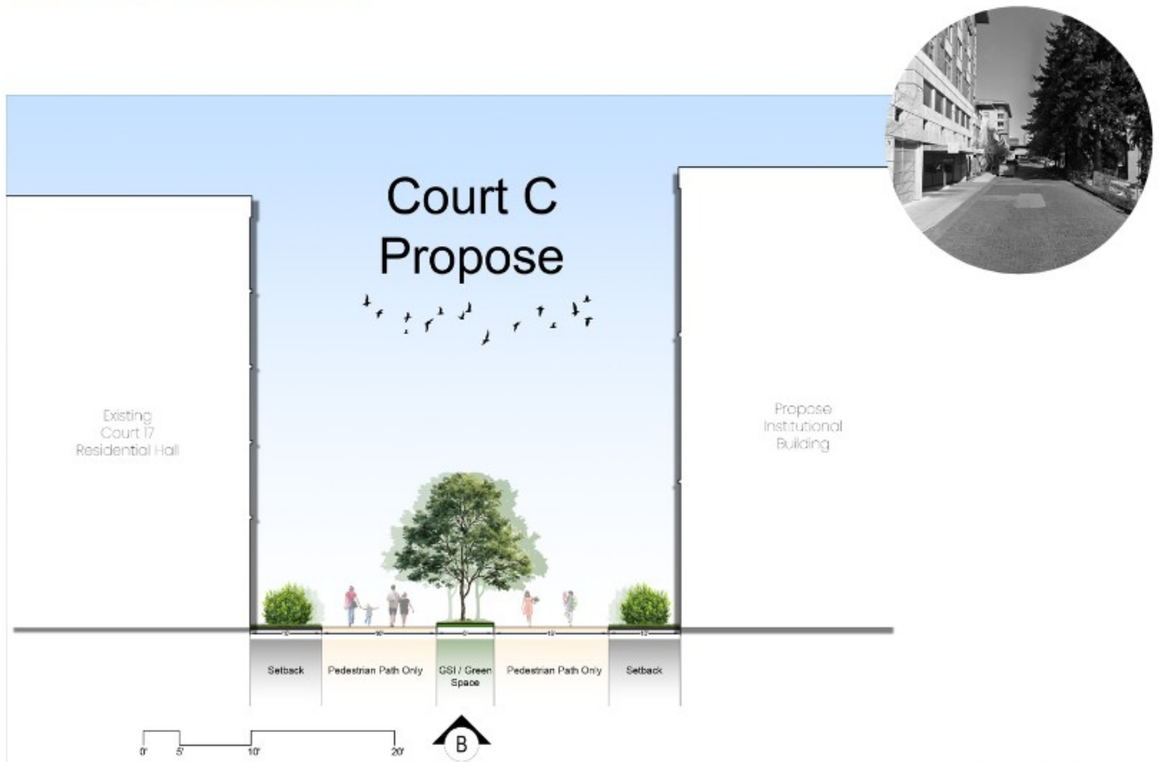



## Fawcett Street Propose

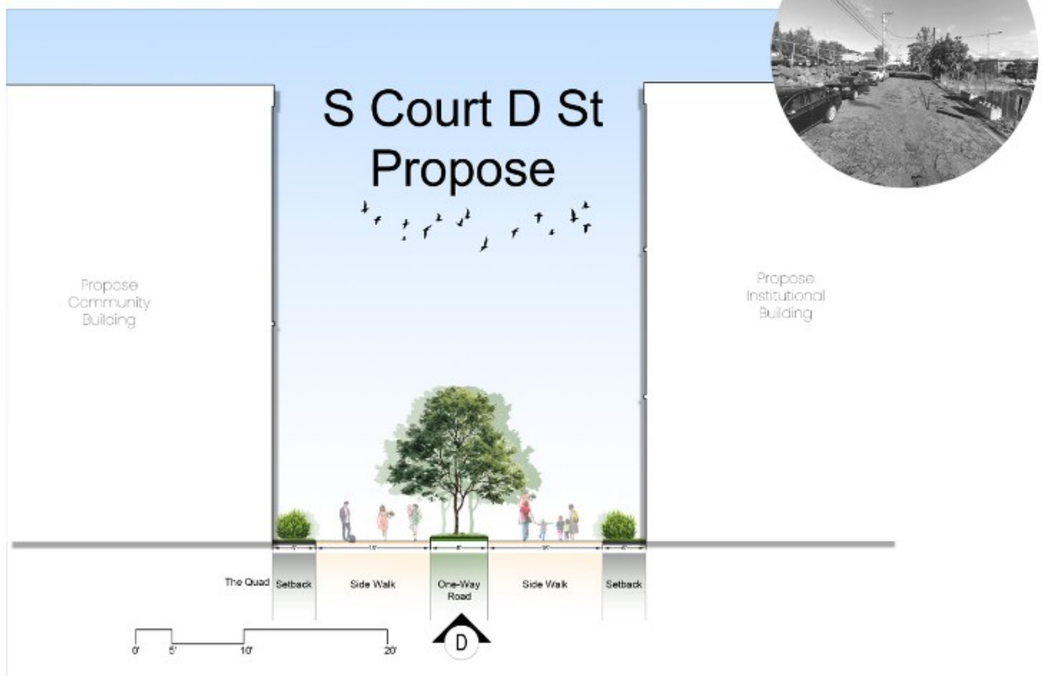


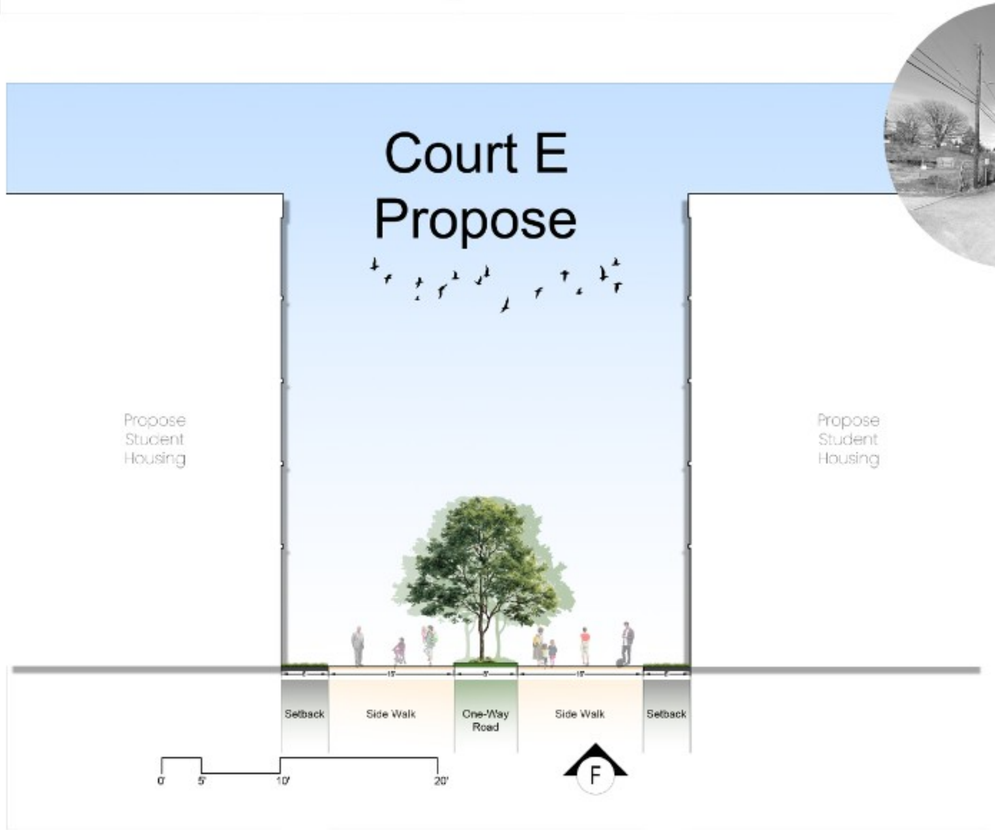

## 19Th Street Propose

# Street Sections






*Exisiting street and street section proposal render. Photo courtesy of 2024 Google*

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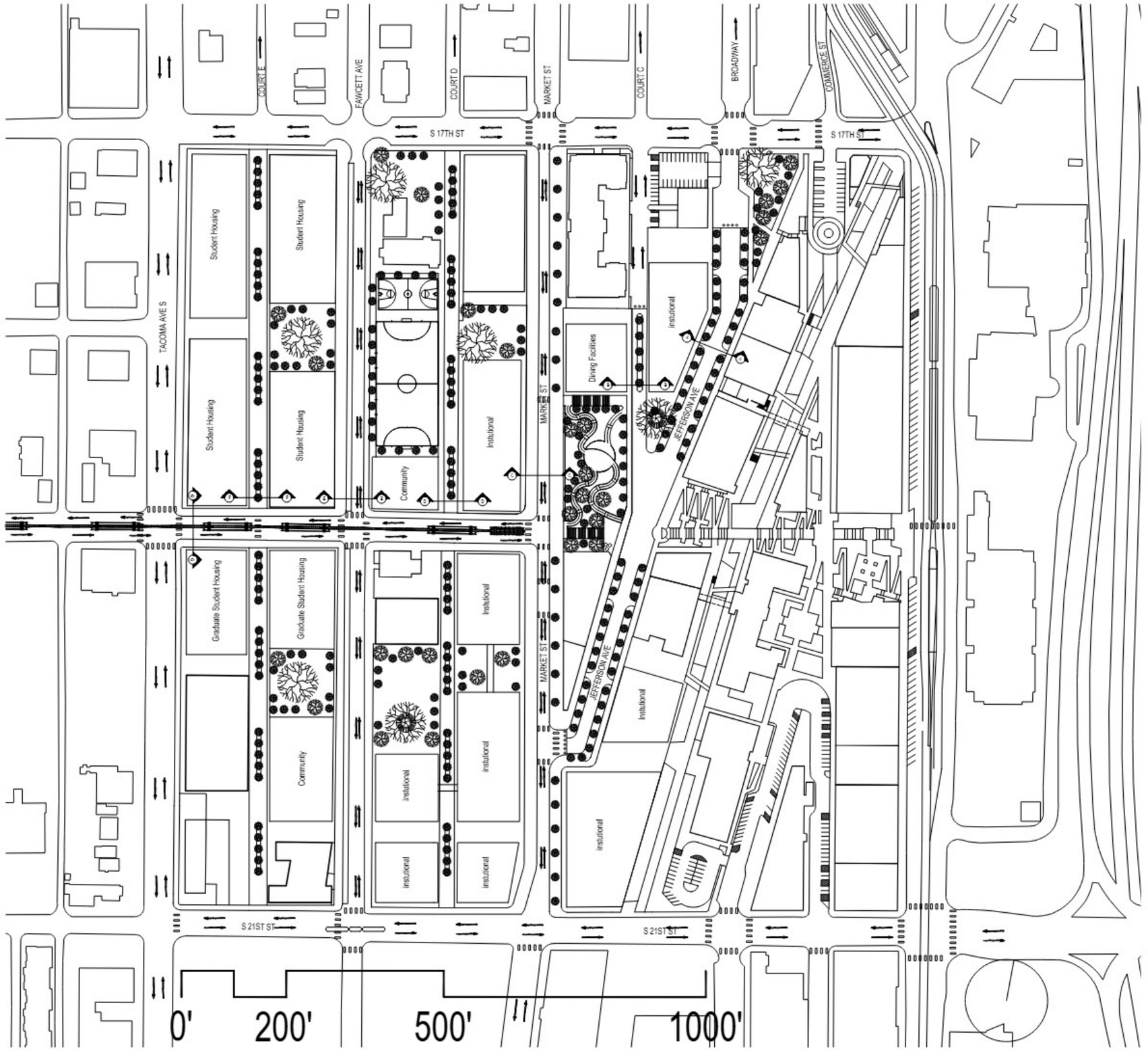
*Render site plan. Photo Courtesy of 2022 Rethinking The Future, Landezine 2009-2025, University of Washington Bothell, T's Phot, regents of the university of california, davis campus.*




*Site plan Technical Drawing*