Green Loop Whitepaper Discussions: Environmental

First Meeting date: March 30, 2016

In attendance: Marc Asnis, Mark Raggett, Pei Wang, Derek Dauphin, Jeff Caudill, Roberta Jortner, Emily Meharg, Kathryn Hartinger, Mindy Brooks (BPS); Ross Swanson, Allan Schmidt (Parks and Recreation); Marie Walkiewicz (BES); Greg Raisman (PBOT)

Second Meeting date: April -. 2016

In attendance: Marc Asnis, Lora Lillard (BPS); Jenn Cairo, Emily Roth (Parks and Recreation)

Summary:

Two internal brainstorming sessions were held to discuss the Green Loop's role as a linear open space and how to incorporate more natural features. The loop will create a special quality/distinct place for users while also actively restoring biodiversity back into the Central City. The concept is a "big idea" from the Central City 2035 Plan and in part a direct response to the long range health and environmental goals and policies embedded in Portland's Climate Action and Comprehensive Plan. Following in the footsteps of recent urban greenway success stories such as the High Line in NYC and the 606 in Chicago, we are looking to create a similar public works project that can provide Portlanders with a unique way to experience nature in the city. A lot of this will be achieved through increased tree canopy, seasonal flowers, and other types of vegetation that in addition to placemaking will also help address environment performance objectives: managing stormwater, mediating air and water pollutants, addressing urban heat island effects, etc.

Comments from the session:

Soil and Water:

- Need to look at soil and water first – everyone starts with trees because they can see them, but what is under them is almost more important
- Planting strips and soil wells are generally not large enough to accommodate large, dense canopy trees.
- Water should be part of habitat features in landscape of the loop.

Climate Change:

- The effects of climate change are starting to take effect on the current list of approved trees and plants.
- Use native plants to address climate change.

Trees and Landscaping:

- Large street trees desirable along most of the loop
- What species of trees would best be suited to the urban landscape of the Central City? Need to be targeted with appropriate species…
- Interest in using the loop to carry more tree canopy – have new policies to help accomplish
- Balance large canopy trees with broader habitat opportunities and species diversity
- Potential for "edible landscapes?"

- They've got butterflies on Black-Eyed Susans in downtown Chicago – cities have done this before

Habitat:

- Need to identify the creatures/critters we are solving for – they have different needs and would benefit from different design solutions
- Consider the needs of migrating vs. native and local species
- Effects of new development on adjacent habitat-improved areas (new condo tower adjacent to Tanner Springs park causing excess glare cited)
- Consider that some species don't necessarily want to live in the trees – some species of pollinators are "ground-nesters" which could present challenges

Design:

- Need to balance habitat enhancements with motor vehicle access, street lighting needs.
- Character of loop segments and environmental quality will vary around Central City
- Some segment landscape designs could be "messier"
- Looking for diversity in natural environment character as well – where is the shrubs place? Maybe South Waterfront Park @ RiverPlace
- If we decide to do a "Green factor" it could make a big difference.
- Design competition for the green elements of the loop? Tap into expertise on how to integrate.
- How to achieve some of these objectives in the short term…how to phase? Loop likely won't get built all at once
- Find innovation/innovative set of blocks on both sides of the river
- Industrial districts may respond better to history and culture rather than environment
- Important to identify partners along alignment – maybe "Redd" at SE 8th and Salmon?
- Where could we test some new landscape ideas or techniques?

THE 'GREEN LOOP'

A 21ST CENTURY PUBLIC WORKS PROJECT FOR PORTLAND

CENTRAL CITY 2035

Bureau of Planning and Sustainability
Innovation. Collaboration. Practical Solutions.

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URBAN DESIGN STUDIO

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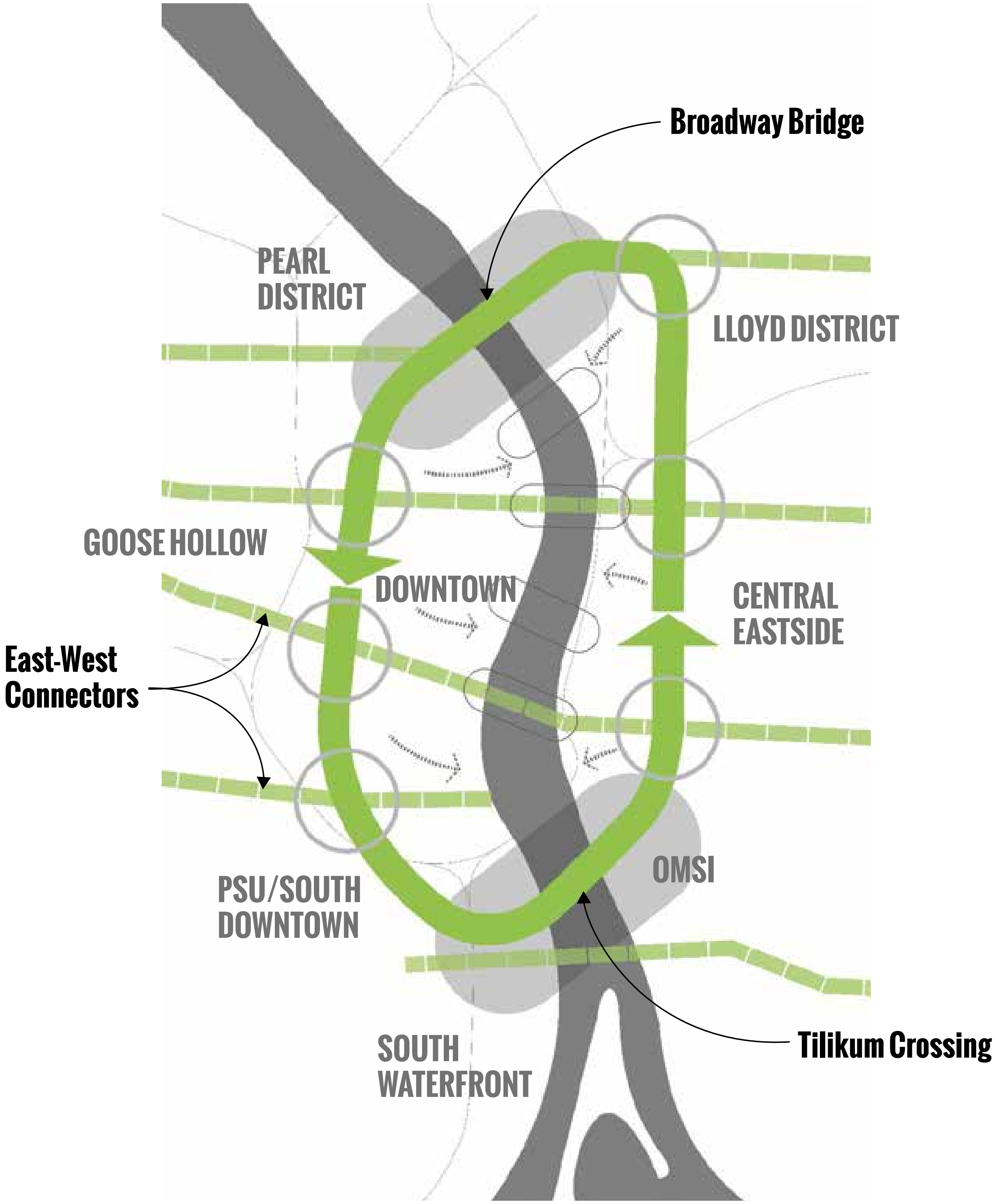

Broadway Bridge
PEARL
DISTRICT
LLOYD DISTRICT
GOOSE HOLLOW
DOWNTOWN
CENTRAL
EASTSIDE
East-West
Connectors
OMSI
PSU/SOUTH
DOWNTOWN
SOUTH
WATERFRONT
Tilikum Crossing

THE GREEN LOOP CONCEPT IS A SIX MILE LINEAR PARK THAT INVITES RESIDENTS, EMPLOYEES, AND VISITORS TO EXPERIENCE PORTLAND'S CENTRAL CITY IN AN ENTIRELY NEW WAY.

The Green Loop concept emerged as part of the Central City 2035 Plan, a partnership between the Bureau of Planning and Sustainability, Portland Parks and Recreation, Portland Bureau of Transportation and the Bureau of Environmental Services.

THE CONCEPT IS...

Envisioned as an easy and smooth pathway through the Central City's parks and open spaces, the "Green Loop" is a six mile linear park that invites residents, employees and visitors to experience Portland's urban core in an entirely new way.

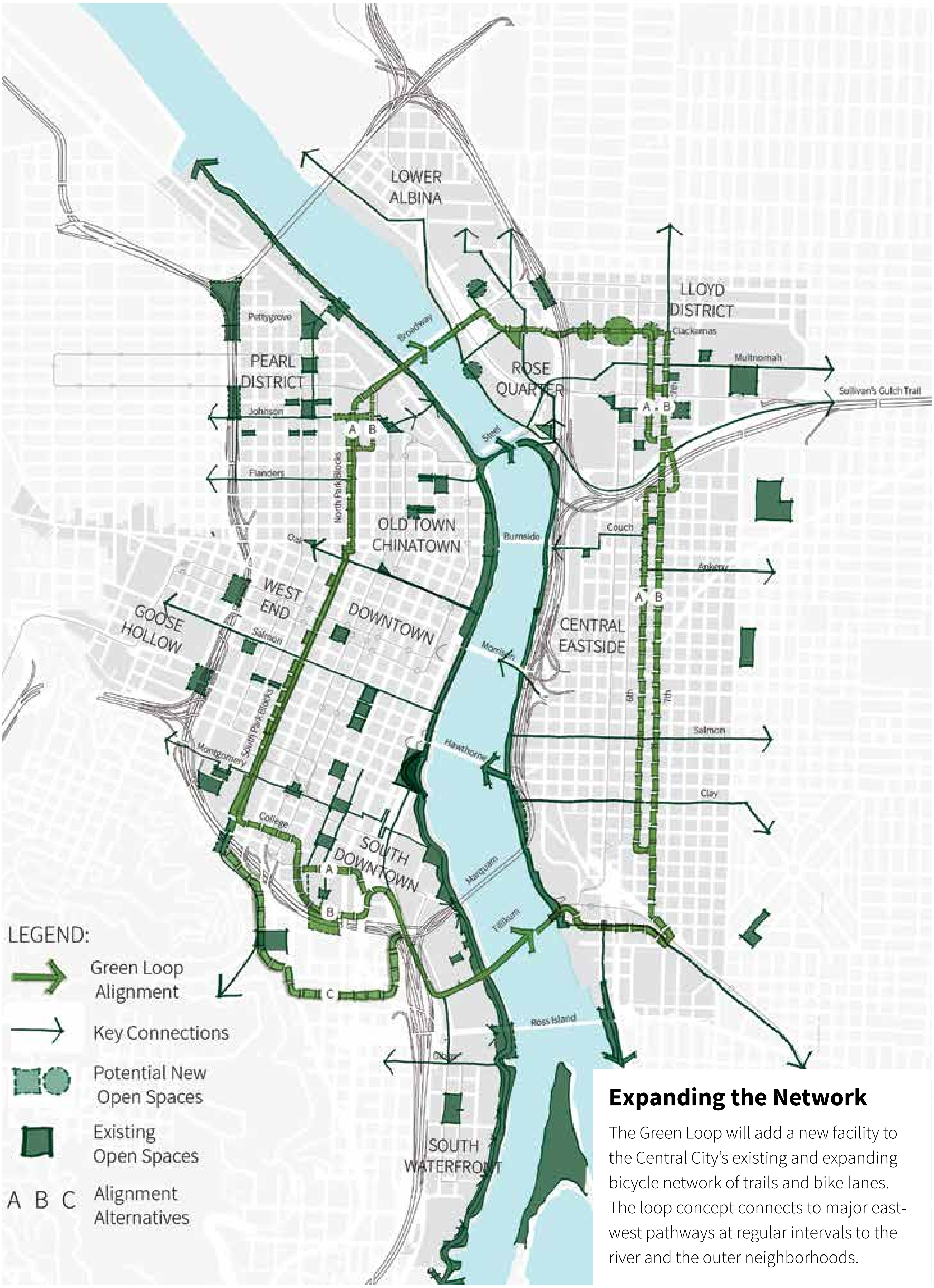
The path invites people to take a break from work, walk, run or ride among trees and in beautiful parks, enjoy restaurants and shops, or just breathe fresh air and get some exercise. On both sides of the river, people can see, touch and learn about cutting-edge technologies and fabrications, new street design, high performance buildings and experience civic works of art. For many, the Loop will become part of their regular commute from home to work in the Central City.

A signature 21st century place, completely unique to Portland and open to all, this "Central Path" embodies community aspirations to be a greener, healthier and more sustainable city. It reflects the best of Portland: people being active, living, working and visiting in the Central City, enjoying parks, trees and gardens, spending time at food carts, coffee bars, and riding bikes.

It will be our "Urban Promenade," promoting walking, jogging, biking and connecting people to light rail and streetcar as ways to get to hard-to-reach places. It will be an amenity that draws people from around the region to a different kind of recreational destination, an urban trek through the city — safe, green, active, vibrant and fun for all ages and abilities.

This "Way Around" takes advantage of existing public rights-of-way and proposes to bring new life and energy to connecting the Park Blocks, Tillikum Crossing, the Central Eastside and the Lloyd District to the Central Business District. A relatively low cost opportunity; it increases efficiency and expands access to many of the Central City's most distinctive places.

It is the next big idea in a list of innovative and collaborative successes; places that include Tom McCall Waterfront Park, Pioneer Courthouse Square and the Portland Transit Mall. Someday soon, it could well stand as the latest in a long history of wonderful examples of this community's ability to work together to bring big ideas to fruition.



Expanding the Network

The Green Loop will add a new facility to the Central City's existing and expanding bicycle network of trails and bike lanes. The loop concept connects to major east-west pathways at regular intervals to the river and the outer neighborhoods.

BUILDING ON SUCCESS

The Vera Katz Eastbank Esplanade

Portland is a national leader in developing a culture of walking and bicycling.

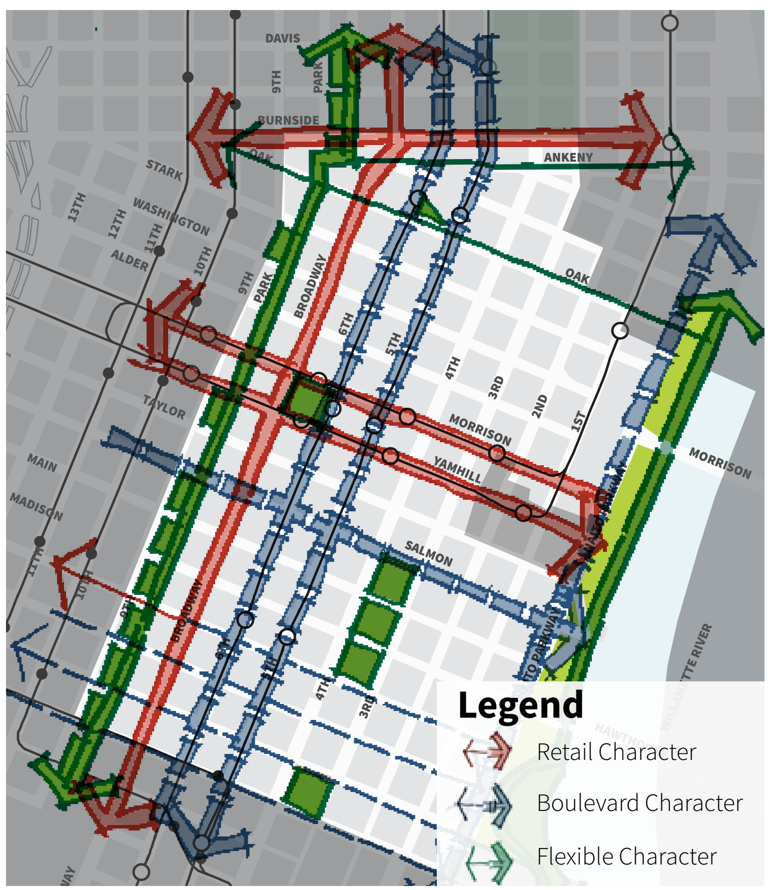
Today, Portland boasts one of the nation's highest percentage of bicycle commuters with a 7.2% work commute rate in 2015, but other American cities are catching up fast. While the Central City includes numerous streets with striped bicycle lanes, it has relatively few physically separated paths and trails, mostly found along the riverfront, blocks away from the concentration of retail, businesses, and attractions. This limits Central City ridership from a large swath of less confident cyclists who are looking for a more park-like, low stress experience. While 40% of the Central City land area is made up of streets, most look and function the same and face similar challenges to accomodate all modes of transportation. The uniformity of the streets also presents wayfinding concerns for 'interested but concerned bicyclists as well as walkers and joggers who are less confident navigating in the Central City.

Intentional Street Design

The Green Loop is part of the street hierarchy and character development concept which advocates for more diverse streets in the Central City. More intentional street design can create new urban experiences and help prioritize different functions for different streets.

Existing Separated Paths

The proposed Green Loop alignments, which will enhance and add new linear parks, will add a new system to the concentration of walkers, joggers, and bikers currently most comfortable along the riverfront, through the heart of downtown and the east side of the Central City.



Downtown District Map, Central City 2035 Plan

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THE GREEN LOOP IS ABOUT...

HEALTHY CONNECTED CITY

City Greenways Network

The Green Loop serves as the hub of the network, linking the city's communities safely and directly to regional attractions and destinations. The system will provide safe and attractive pedestrian, jogging and bicycle connections between natural areas, parks, neighborhoods, schools, and commercial districts. Distinctive street design, landscaping, tree plantings, and sequences of parks along the greenways extend the experience of open spaces and nature into the streets of neighborhoods.


Citywide Trail
Springwater Corridor


Raised Cycle Track and Sidewalk
NE Cully Avenue


Enhanced Greenway Corridors
NE Klickitat Street

THE GREEN LOOP IS ABOUT...

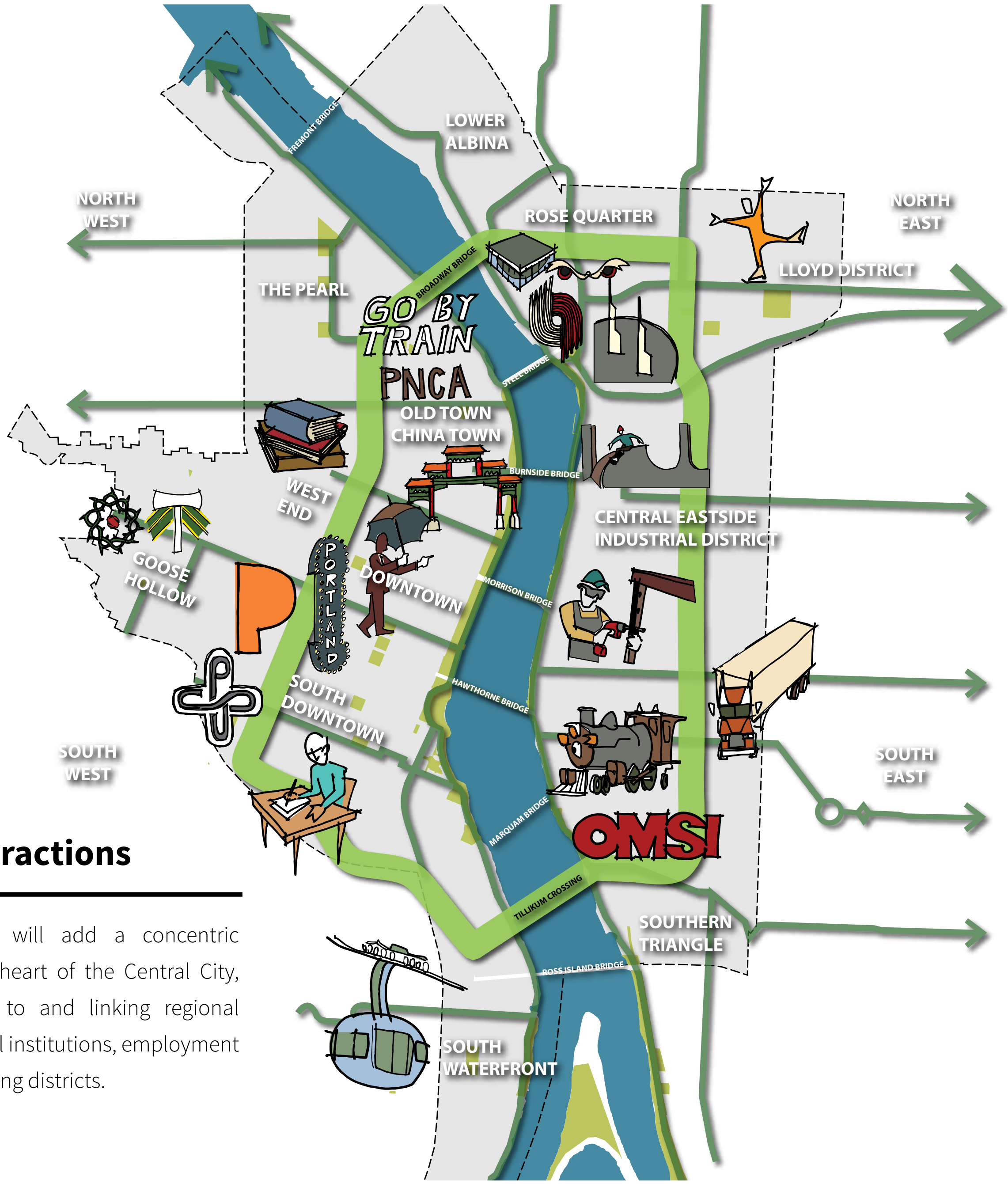
ADVANCING EQUITY

The Green Loop will increase accessibility and activity for all Portlanders.

While Portland is projected to grow substantially over the next few decades, it is safe to say that many of Portland's major public institutions, cultural attractions and regional destinations will remain in the Central City. The Green Loop will be free to use and will help Portlanders reduce transportation costs while helping to promote a healthy lifestyle. The ways that Portlanders will use the Green Loop will be as different as the people themselves.

How the Loop will Advance Equity

- Increases affordable, healthy access to Central City destinations/ attractions.
- Builds a system of facilities targeting 8-80 year old rides and accomodates all abilities.
- Provides pathways attractive to non-typical walk/bike commuters.



Linking Attractions

The Green Loop will add a concentric loop through the heart of the Central City, improving access to and linking regional attractions, cultural institutions, employment centers and shopping districts.

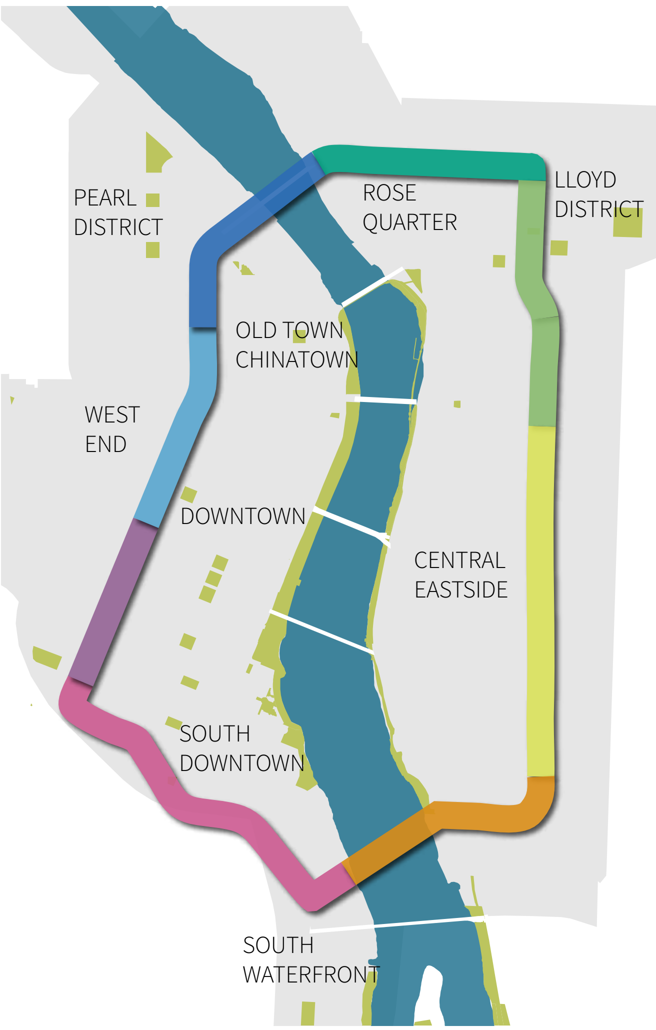
- **Supports and advances community sourced design.**
- **Linked to transit hubs for easy connections.**
- **Hub of future City Greenways system, reaching all neighborhoods of Portland.**

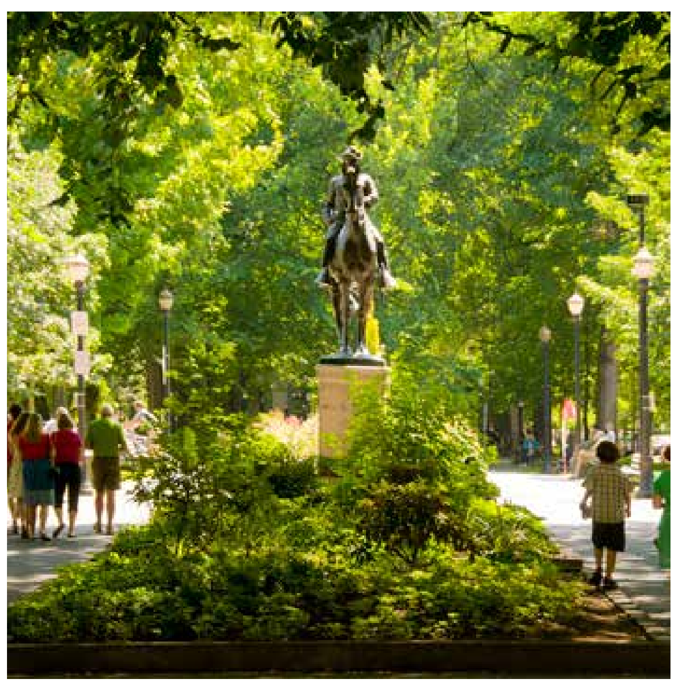
THE GREEN LOOP IS ABOUT...

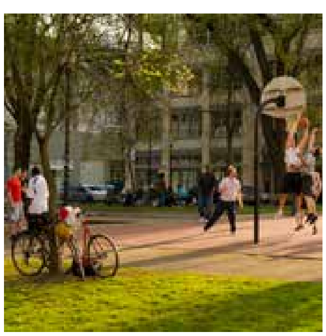
PLACEMAKING

The Green Loop will move through the Central City districts.

The distinct identities and conditions of each district will help inform the design and placemaking strategies for the loop's different segments, creating a variety of experiences. Pathway design, furnishings and plantings will respond to local context, helping to contribute and stregthen the distinct identities of Central City's districts from the downtown retail core to the industrial eastside to the Rose Quarter.





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RIP CITY
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THE GREEN LOOP

KEY OBJECTIVES

Improve Health

Promoting daily physical exercise by walking, biking or jogging into and around the Central City.

The loop concept elevates the public health of Portlanders by creating an active transportation corridor and a recreational walking and jogging route through the Central City, expanding opportunities for healthy activities to a large population of employees, visitors, and residents.

Connect and Create Parks

Developing strong connections between existing parks and creating new ones.

The Central City features a wide variety of different open spaces, ranging from historic parks to newer designs that blend the boundary between park and street space. The Green Loop is a connected park system, providing a continuous link to open spaces and within areas of the Central City that lack public open spaces, it could catalyze the creation of future open spaces and gathering areas.

Support Businesses

Bringing people closer to local businesses, employment districts, institutions and attractions.

The Green Loop works within existing infrastructure to expand transportation options for workers commuting to jobs on both sides of the Willamette River. The loop and its connections will create higher visibility for local business, stores, and shops. New examples of Portland's street furniture (benches, streetlights, water fountains, tree grates, etc.) designed and manufactured in Portland, showcase local creativity, design talent and skilled craftsmanship.

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Increase Pathways

Adding safer, more intuitive park-like pedestrian pathways through the Central City.

The small blocks and numerous streets of the Central City contribute to its reputation as a highly pedestrian-friendly environment. The Green Loop will be a safe, accessible path separated from vehicular traffic that connects many places that are not currently navigable, accessible, or intuitive.

Encourage Biking

Increasing the amount of "Interested but Concerned" cyclists riding into the Central City.

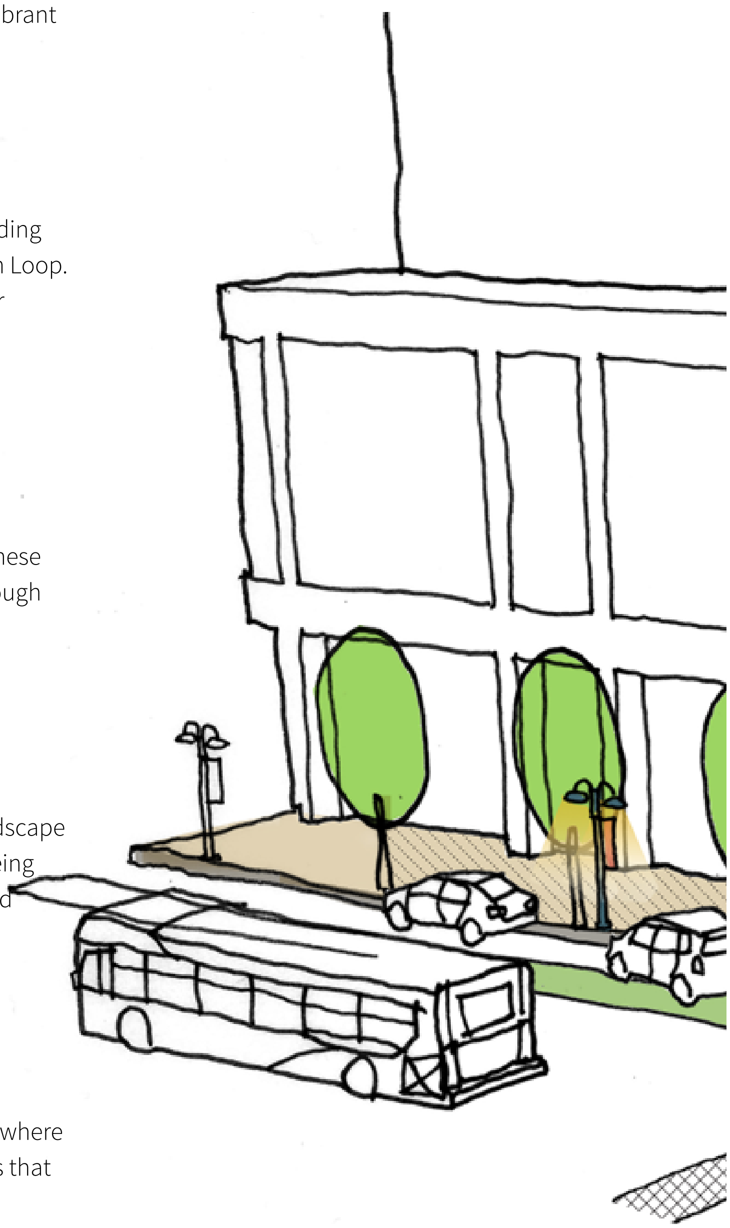
The loop concept proposes a system of clear, physically separated routes that will provide potential new riders with greater comfort and access to more places. It will include strategies to reduce conflicts between cyclists and pedestrians and cars, offering greater safety. It builds on the bicycle infrastructure in place across the Central City and connects bridges.

Grow and Build Green

Providing a local response to global climate change for future generations.

Connections and public spaces along the Green Loop will feature more large canopy trees and state of the art surface stormwater management facilities. The improved landscape will increase habitat opportunities for native species of trees, birds, and pollinators, and it will encourage more active transportation, reducing auto dependence and Portland's overall carbon emissions Building and site development along the Loop will be encouraged to contribute to a 'living laboratory' that focuses on innovative ways to improve energy performance.

DESIGN PRINCIPLES



1 Building Orientation
New development will be encouraged to orient its storefronts or building lobbies toward the Green Loop. New ground floor activity will provide greater visibility to the loop and create a safe and more vibrant environment.

2 Multi-Use Path
Paths that can accomodate a variety of different active uses including walking, jogging, and biking will be a defining feature of the Green Loop. Depending on the context these uses can be clustered together or separated by greenery or other features.

3 Physical Separation
The Green Loop concept includes physically separated paths to minimize conflicts between cyclists, pedestrians, and vehicles. These separated corridors will create safer, more intuitive pathways through the Central City for walkers, bikers and joggers.

4 Connected Canopy
A key wayfinding element of the Green Loop will be a distinctive approach to trees and other green features. The character of landscape plantings will vary along different segments of the Green Loop, being responsive to adjacent needs while helping to clarify the route and improve environmental performance.

5 Branding/Identity
The paths and adjacent properties will feature wayfinding and environmental design tools to help residents and visitors identify where they are while reflecting the local character of the various districts that the loop moves through.

6 Unique Street Furnishings
Street furnishings along the Green Loop will help distinguish the path, emphasizing its linear park environment and supporting activity nodes. The specific amenities and their locations will vary with right-of-way width and the adjacent ground floor uses.

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HOW DO YOU KNOW YOU'RE ON THE GREEN LOOP?

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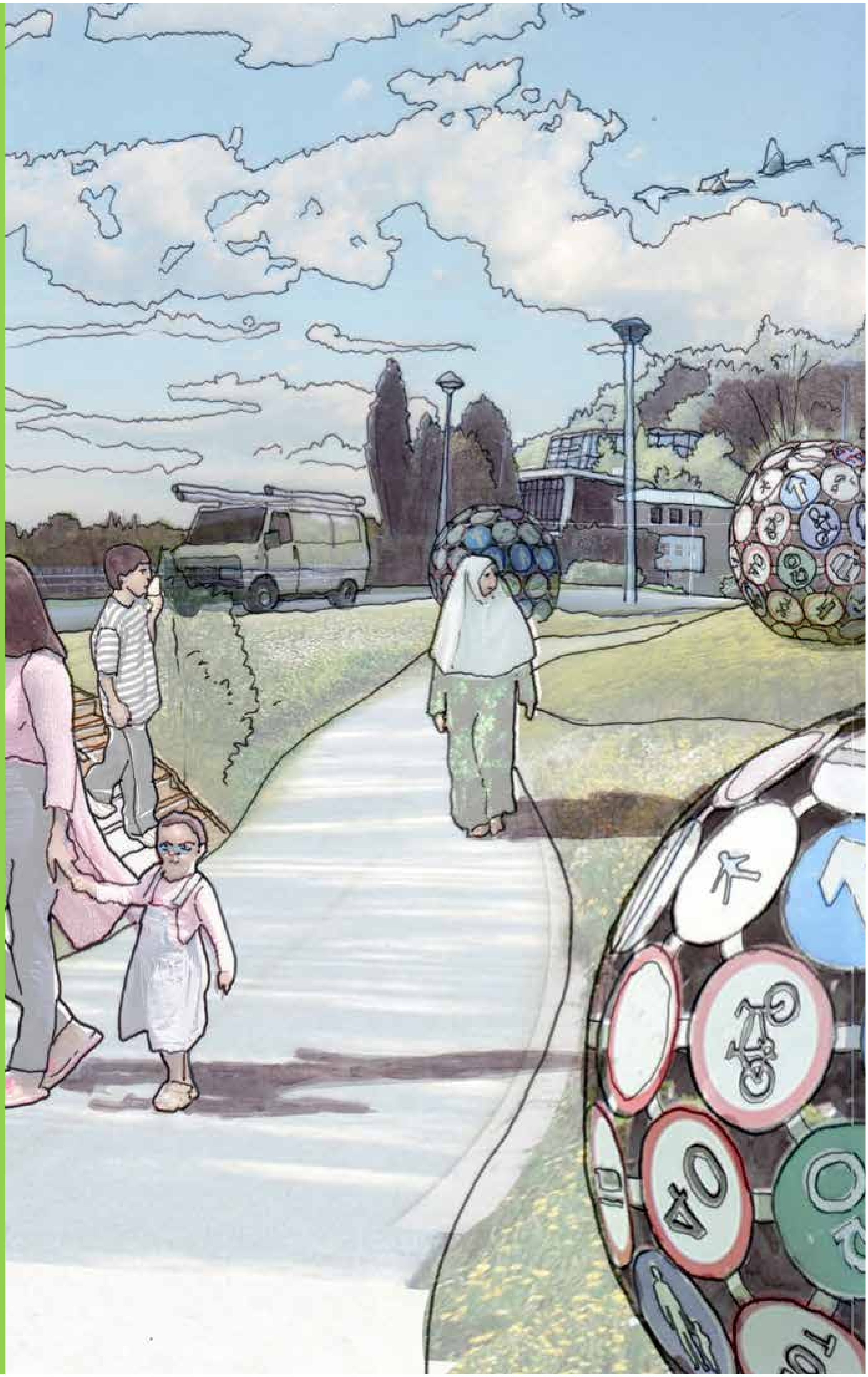
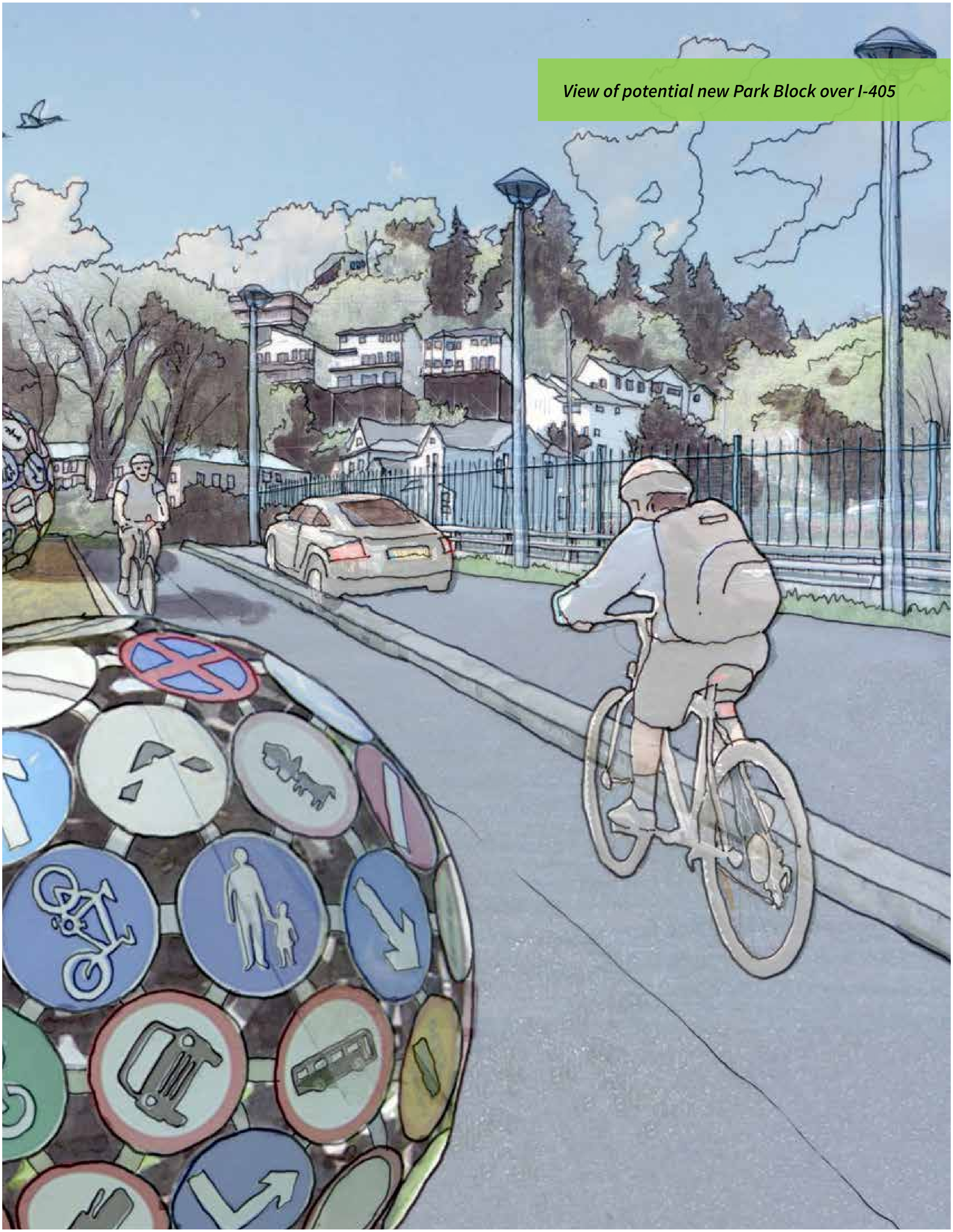
APPENDIX





View of potential new Park Block over I-405

THE GREEN LOOP PRECEDENTS

Cultural Trail - Indianapolis, IN

The Indianapolis Cultural Trail is an 8 mile bike and pedestrian path in downtown Indianapolis. The goal of the trail is to connect neighborhoods, cultural districts, and entertainment amenities while serving as the downtown hub for the city's greenway system. The path has been a catalyzing agent of economic development within the city's downtown districts, providing an estimated $864.5 million dollars in economic impact and approximately 11,000 new jobs.
Source: http://www.indyculturaltrail.org/about

Vester Volgade - Copenhagen, DK

Vester Voldgade has reduced vehicle traffic and increased the boulevard atmosphere with rows of trees, new open spaces, and wide promenades, making room for pedestrians and cyclists on the former high traffic road. Four lanes have been reduced to two, and a large strip of parking spaces has been removed to accomodate seating and other furnishings. Three new squares are connected physically and visually by Vester Volgade and its rows of trees and paving, which carry through to the squares themselves.

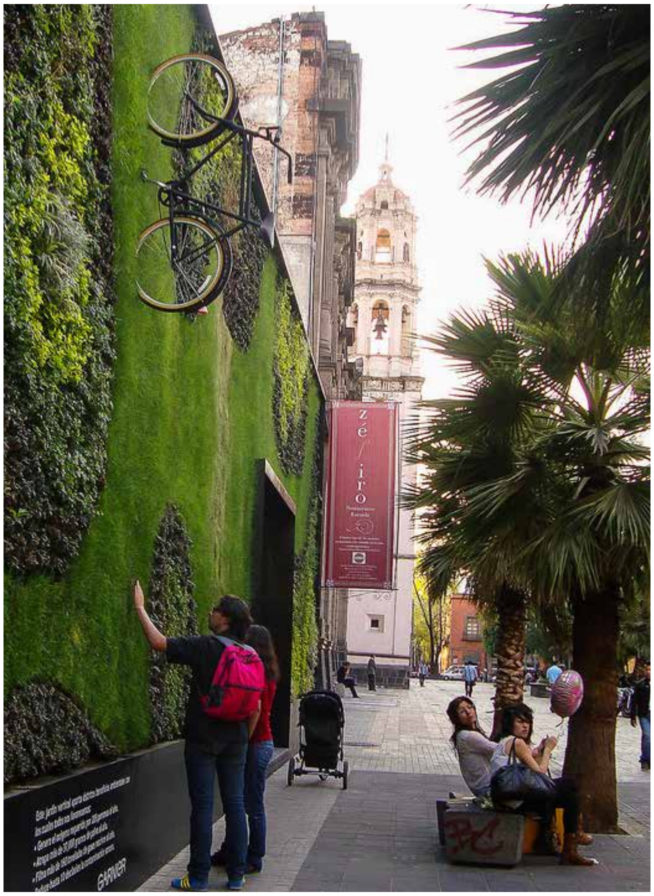
The 606 - Chicago, Ill


The 606 Trail is a 2.7 mile recreational trail that bisects four inner city Chicago neighborhoods. Similar to New York City's High Line, the infrastructure project converted a dormant elevated freight line into a unique urban park. However, unlike the High Line, which focuses more on passive open spaces, the 606 prominent feature is a multi-use path for walkers, joggers, and cyclists. The total cost of the project was $75 million, which was predominately provided by federal government funds to reduce traffic congestion and improve air quality in cities in addition to private donors and the local city government.

Brooklyn Waterfront Greenway - Brooklyn, NY

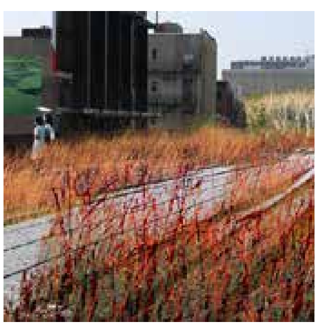

The proposed Brooklyn Greenway will add miles of new physically separated pathways in the predominately industrial naval yards. The collaborative effort between local government and the Regional Planning Association will help residents and tourists safely connect to existing and future parks along the Brooklyn pier.

THE GREEN LOOP PRECEDENTS











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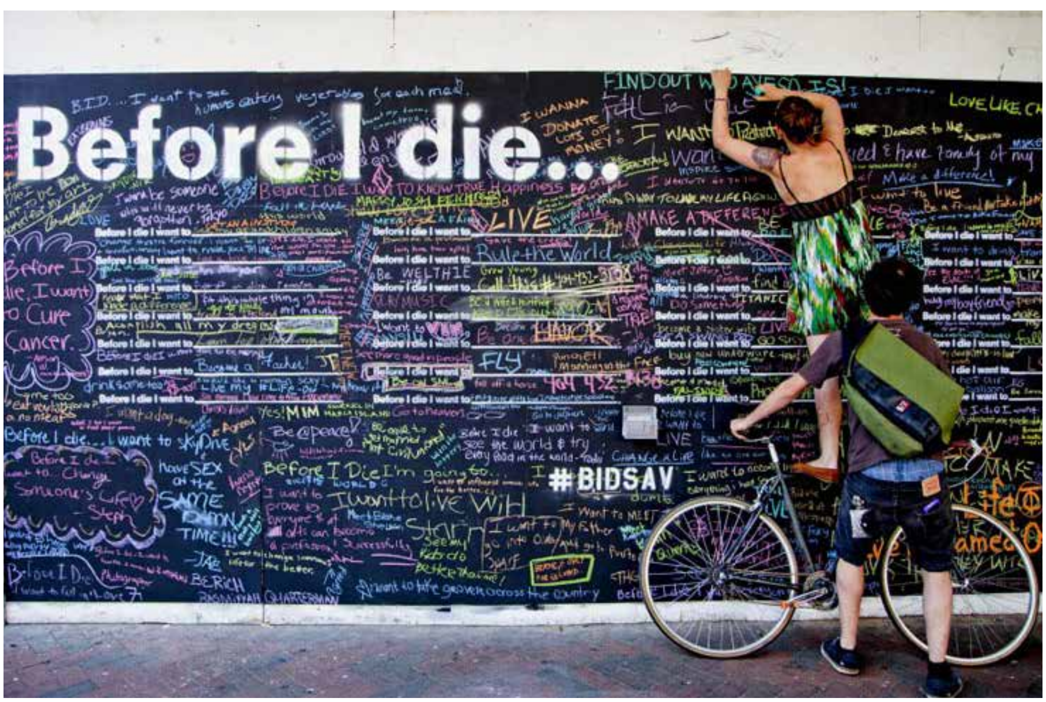
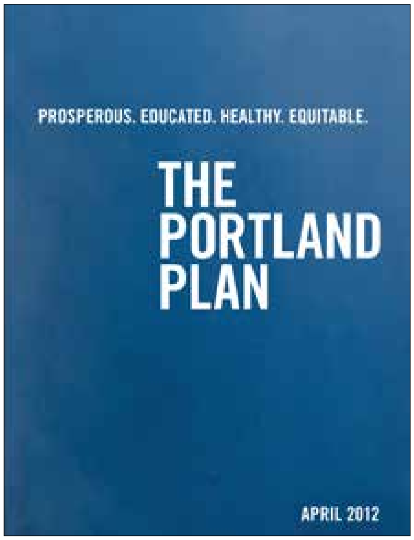
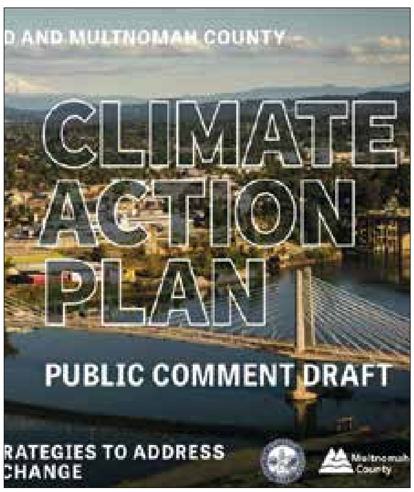

Before I die...
#BIDSAV

BACKGROUND & CONTEXT



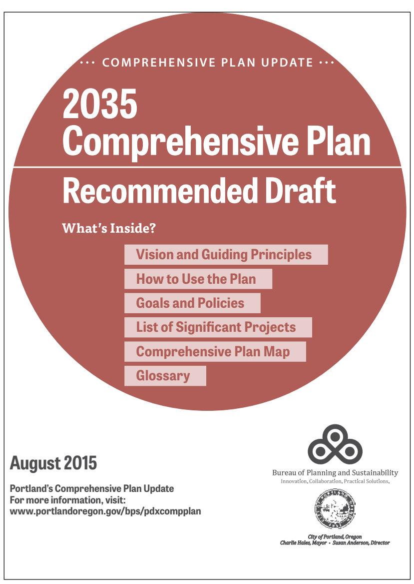
Portland Plan

The 2012 Portland Plan builds on extensive community involvement and envisions an equitable, healthy, educated and prosperous city that increases opportunities for all and includes a strategic plan of projects to help guide implementation. Its "Healthy Connected City" strategy describes a series of active neighborhoods, centers and signature natural areas, all connected by a comprehensive and diverse network of corridors and connections. The system of connections includes "greenways," a distinctive set of park-like corridors that are designed to encourage active transportation – walking, rolling, jogging and biking. These facilities offer a clear and different choice from the more urban, busy and transit-rich development corridors. They are intended to link people to parks, open spaces and natural resource areas.



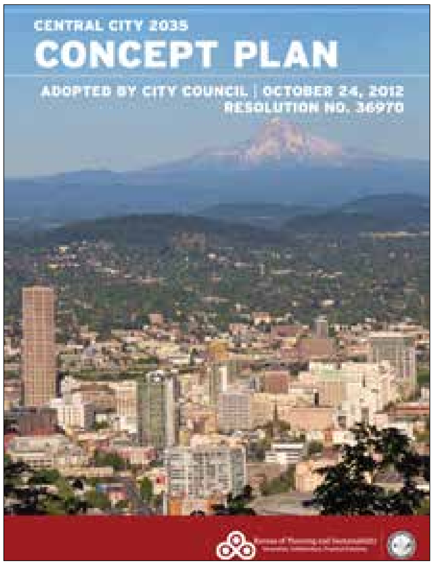
Climate Action Plan

The origins of the "green loop" concept can be traced back to larger planning initiatives that address much larger regional and societal trends and set aggressive growth and sustainability targets for the City of Portland. The 2015 Climate Action Plan set ambitious new goals for carbon and greenhouse gas reduction citywide. As transportation contributes to almost a third of the city's total generated carbon, part of the plan focuses on improvements existing movement systems and the creation of new facilities that will discourage single-occupancy auto trips. The "green loop" will create a connected system of public open spaces and connections that promote more walking, biking and transit trips, contributing to a smaller citywide carbon footprint.



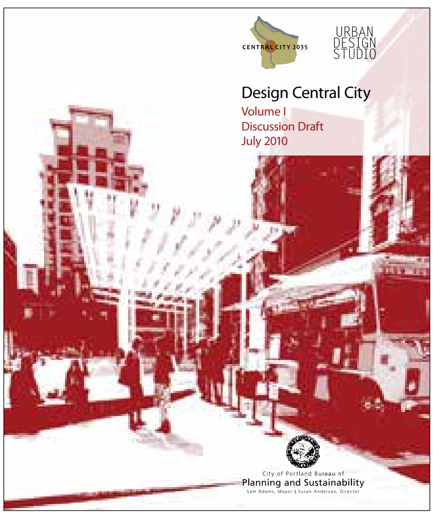
Comprehensive Plan Update

The 2035 Comprehensive Plan Update is a 20 year plan that sets the framework for the physical development of the city and will help implement the Portland Plan. Enhance Portland's public realm, integrate nature into the city, and link people, places, and wildlife through active transportation facilities, green infrastructure investments, urban tree canopy, and habitat connections.



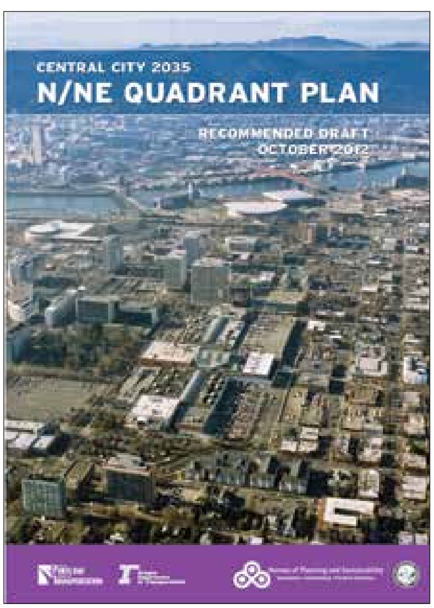
Central City 2035: Concept Plan

The specific "green loop" concept was the result of work by the urban design subcommittee of the CC2035 Concept planning process during the Spring and Summer of 2012. The urban design subcommittee included members of the steering committee, representatives from city agencies and invited design professionals. The subcommittee worked through multiple urban design alternatives, exploring and evaluating different directions, before helping to develop the proposed urban design concept diagram and framework map for the CC2035 Concept Plan.



Central City 2035: Design Central City

The background document for the Central City 2035 Concept Plan (CC2035) process, Design Central City Volume 1, identified three primary urban design issue areas in the Central City: the river, the east side and the public realm. The "public realm" section outlined issues facing the existing system of streets and parks, including active recreation space deficiencies, habitat opportunity areas, street homogeneity and unclear connectivity. These issues were tested and refined through a series of urban design workshops and stakeholder interviews, ultimately being finalized by the CC2035 advisory group in 2011.



Central City 2035: Quadrant Plans

The North/Northeast Quadrant Plan, adopted with CC2035 in the Fall of 2012, proposed a set of new street design typologies. The intent behind the proposal was to be more intentional about the relationship of land uses and the way buildings relate to the street. Called the "Street & Development Character Concept" it proposed three types of street environments: Retail/Commercial, Boulevard and Flexible. The "green loop" would be classified as signature part of the "flexible" design type, more oriented to walking and biking, inclusive of (or linking) open space opportunities, and a strong green character.

View of potential SE 6th Ave in the Central Eastside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URBAN
DESIGN
STUDIO

Our mission is to advance the design quality of places citywide.

Understanding Spatial Equity in Portland, Oregon

December 2016

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Executive Summary

Research Aims

This research began as a catalyst for understanding how to best generate opportunities to enhance social equity outcomes within the Green Loop planning process. Qualitative focus groups and participatory mapping exercises were utilized to engage the following research questions:

1. What mobility barriers do residents outside of the central city--particularly those in neighborhoods at risk of or currently undergoing gentrification--experience that might limit active transportation choices such as walking or biking?
2. How do these barriers impact perceptions or interest in central city investments in the Green Loop?
3. What ideas do residents have for overcoming these barriers?

Participatory mapping exercises with residents in targeted neighborhoods were utilized to clarify neighborhood-level patterns of mobility and to identify problem areas in movement both within neighborhoods and from neighborhoods to the central city.

Data

This report is based upon data gathered in Portland, OR between October of 2015 and March of 2016. Findings presented here draw from 8 focus group discussions that also integrated community-based participatory mapping exercises. Groups were convened in areas that had previously been identified as vulnerable to displacement (Bates 2013). A total of 82 participants were recruited; the engagement of low-income and minority individuals was a central goal of this research as such voices are typically marginalized within standard channels of public outreach and engagement.

Key Findings

- More than 2/3 of participants in this study, a majority of whom are low-income and racial/ethnic minorities, did not report travelling downtown in a typical week.
- There are key demographic differences in patterns of mobility.
- Participants in this study reported multiple barriers to daily mobility, including a lack of safe and accessible sidewalks, inadequate lighting and shelter at transit stops, concerns about traffic congestion, issues of affordability linked to parking fees and the cost of public transit, and issues with language barriers and discrimination on public transit.
- Participants highlighted ongoing concerns about the inequitable distribution of resources and a perception that city resources are most likely to benefit residents who are more affluent and live closer to downtown.
- Residents in North and outer SE Portland want their neighborhoods to thrive; community members have clear ideas about how to enhance livability, while also maintaining economically and racially diverse communities.
- Targeted investments to support ongoing community work, while creating spaces for community participation in planning processes, are critically important to creating a city that is safe, affordable, and accessible for everyone.

Implications

As a means of reducing carbon emissions, Portland's Climate Action Plan sets an objective for 2030 calling for vibrant neighborhoods in which 90% of Portland residents can easily walk or bicycle to meet all basic daily, non-work needs. As of 2015, however, 40 percent of Portlanders lived in neighborhoods that lacked access to the goods and services that would fulfill this objective (Climate Action Plan 2015: 72). The current research study suggests that significant challenges remain in pursuit of the Portland Climate Action Plan's vision and that the barriers to "complete neighborhoods" are particularly acute for low-income and minority residents living in North and outer Southeast Portland.

Individuals represented in this study have limited accessibility to safe and walkable streets, lack access to robust public transit lines, and face a number of cumulative disadvantages (such as rising rents and increasing cost of living across the city) that place them farther afield from the vision set forth in the Portland Plan. Planning for the future requires fuller attention to the demographic and spatial inequities in Portland.

Recommendations

In the closing sections of this report, we detail a series of recommendations drawn from the findings of this research. In pursuit of meeting city-wide goals for neighborhood livability, these recommendations are meant for any city agencies or offices working to address inequity in relation to gentrification, housing and environmental justice. We provide five recommendations. In brief, we recommend that city offices must:

1. **Address Perceptions of Inequity:** This research finds that residents in N/NE and outer SE neighborhoods believe city investments to be inequitable when it comes to infrastructure and development. City agencies must make efforts to both distribute resources more equitably; to be transparent in the rationale behind investments across the city; and make efforts to address the legacies of disinvestment and displacement that impact our most vulnerable residents.
2. **Encourage Economic Development in Neighborhood Hubs:** A consistent finding across neighborhoods in this study was the desire to develop jobs and opportunities within neighborhoods, not just in the central city. Targeted investments in small businesses N/NE and outer SE neighborhoods would help to distribute economic resources more equitably, while also enhancing neighborhood livability.
3. **Make Targeted Investments to Enhance Ongoing Community Work:** Community organizations and non-profits are already working hard to make neighborhoods more livable for residents. City agencies, when considering new projects in vulnerable neighborhoods must continue to look to local organizations for their knowledge and expertise and work to support and supplement community work, not supplant it. This may mean providing financial resources to community organizations to continue their work.
4. **Enhance Strategies for Public Outreach and Engagement:** In relation to the recommendation above, community organizations already know how to engage communities. When considering new infrastructure projects or development, city agencies should work with community organizations to determine the best methods of outreach and communication, while also working to provide the financial resources for a robust public engagement process. This

often means providing food, child-care, transportation and other financial resources to help solicit the fullest community engagement possible.

5. **Develop and Implement Anti-Displacement Strategies:** Given Portland's ongoing housing crisis, city agencies contemplating infrastructure changes must begin to consider the impacts of such projects on housing and rental markets; if property values are predicted to rise with the implementation of a particular project, the city must make a concerted effort to prevent displacement. This may require that the city engage with property owners or landlords, as well as tenants.

Overview

This investigation is part of a research partnership between the Institute of Sustainable Solutions at Portland State University and the City of Portland's Bureau of Planning and Sustainability, with the goal of discerning how public investments in the Central City might be enhanced to serve marginalized residents.

One such investment is the Green Loop, a proposed 6-mile biking and walking path to encourage active transportation in the Central City, providing a safe connection through "the region's hub of civic, cultural, and recreational attractions and activities" (BPS 2015c).1 This research seeks to clarify how the Bureau of Planning and Sustainability might best ensure that this amenity is accessible to everyone. This study began by exploring barriers to the utilization of public space and active transportation for low-income communities and communities of color. It also sought to clarify how investment in future Central City public infrastructure—such as the Green Loop—might merge with, and expand upon, existing community efforts to enhance accessibility of public spaces.

Through partnerships with local non-profit organizations and stratified recruitment of diverse participants via face-to-face and online outreach, we enlisted more than 80 participants from areas in North, Northeast, and Southeast neighborhoods experiencing gentrification, or at increased risk of gentrification or displacement. We conducted eight focus groups that included both discussion and community-mapping components.

The research evolved in response to encompass the emergent finding that many participants did not feel investments in Central City transportation infrastructure were relevant to their daily lives. Community members reported significant mobility barriers within their own neighborhoods that took precedence over any budding interest or desire to travel downtown. In response, the research team shifted the focus from the idea that increased access (via greenways and other related amenities) was key to inciting downtown travel, to encouraging a broader dialogue about how people utilize facilities in their own neighborhoods, and what mechanisms might increase mobility and active transportation within these specific areas. This modified trajectory allowed us to ask questions about people's patterns regarding alternative modes of travel and transportation in their own communities, with the notion that understanding how to enhance mobility in a more localized manner might also help contribute to increased traffic in the Central City.

The following report is a summary of our findings, and addresses the following research questions:

- What might increase active transportation outside of the Central City?
- What mobility barriers persist in North, Northeast and Southeast Portland neighborhoods?
- How might the city amplify ongoing efforts in different neighborhoods to increase overall mobility and active transportation?

The findings presented here indicate participants' overwhelming concerns regarding inequitable investments in the Central City while barriers to active transportation persist in their own communities, with special attention paid to safety concerns such as the lack of sidewalks, lighting, safe routes to school, and bike facilities and infrastructure. Participants reported great affection and a deep sense of pride for their respective neighborhoods, but desire additional resources that would enhance safety while subsequently aiding in increased connectivity with the rest of the city. The participatory mapping data collected illustrates the patterns of movement within the city, revealing that much of our respondents'

[1] See Appendix for additional information about the Green Loop

daily travel behaviors are contained within their own neighborhoods, be it due to personal preference, barriers to mobility and downtown travel, or a combination of both.

Vulnerability and Gentrification in Portland

The Portland metropolitan region is experiencing rapid urban growth. For instance, the region attracted 33,500 newcomers in 2014 alone (Christensen 2015). Longitudinally speaking, the area has fielded a 35% growth in population since 1990, with median home prices and rents continuing to surge at a pace incongruous with median incomes. Additionally, the last three decades have seen a significant decrease in the number of affordable housing units (Berube et. al. 2003; Leo 1998 as cited in Northwest Pilot Project 1994). Portland's housing crisis and resultant displacement have been an ongoing concern, and leave an estimated 1,800-2,700 individuals houseless on any given night (PHB, 2015b).

Given these rapid changes within Portland, research has sought to uncover how ongoing investments and developments impact low-income and minority communities. Bates' (2013:9) report establishes the following definition of gentrification that informs this study:

> Gentrification occurs when a neighborhood has attractive qualities—for example, location or historic architecture—but remains relatively low value. This disconnect between potential value and current value (called "the rent gap") may occur due to historic disinvestment by public and private sectors. When the area becomes desirable to higher-income households and/or investors, there are changes in the housing market. As demand rises for the neighborhood, higher-income households are able to outbid low-income residents for housing, and new development and economic activity begins to cater to higher-income tastes. Lower-income households and/or households of color migrate out of the neighborhood and new in-migrants change the demographics of the neighborhood.

Bates (2013) clarifies the dynamics by which neighborhoods become less affordable over time, and articulates how housing and rental prices have broader impacts on a range of neighborhood-level changes. She argues that Portland must become proactive in planning around growth and development, through both the use of market and regulatory mechanisms, in order to meet its goals for livability and equity. She notes that the Portland Plan's vision for livability "recognizes that the city is healthier with mixed-income and racially/ethnically diverse neighborhoods" (p.16). Building upon Bates' work, this report draws upon qualitative data in order to better understand the on-the-ground dynamics of mobility and active transportation in the neighborhoods that are most vulnerable to gentrification and displacement.

Planning for the Future: Climate Change, Neighborhoods and Mobility

Portland's Climate Action Plan sets an objective for 2030 calling for vibrant neighborhoods in which 90% of Portland residents (and 80% of Multnomah County residents) can easily walk or bicycle to meet all basic daily, non-work needs. This goal functions as a means of reducing carbon emissions and increasing neighborhood livability (BPS 2014). In pursuit of such, the city has made efforts to make the 20-minute neighborhood accessible for all.2 However as of 2015, 40 percent of Portlanders lived in neighborhoods that lacked access to the goods and services that would fulfill this objective (BPS 2015a: 72). Highlighted

[2] "20-minute neighborhoods" mean that one can fulfill daily needs within a 20-minute walk from home. BPS measures the "completeness" of a neighborhood in achieving this goal by taking into account proximity to grocery stores, schools, libraries, parks and gathering places, as well as the range of choices linked to housing or transit.

below, the neighborhoods that rank lower on the "completeness" scale have more limited access to amenities.

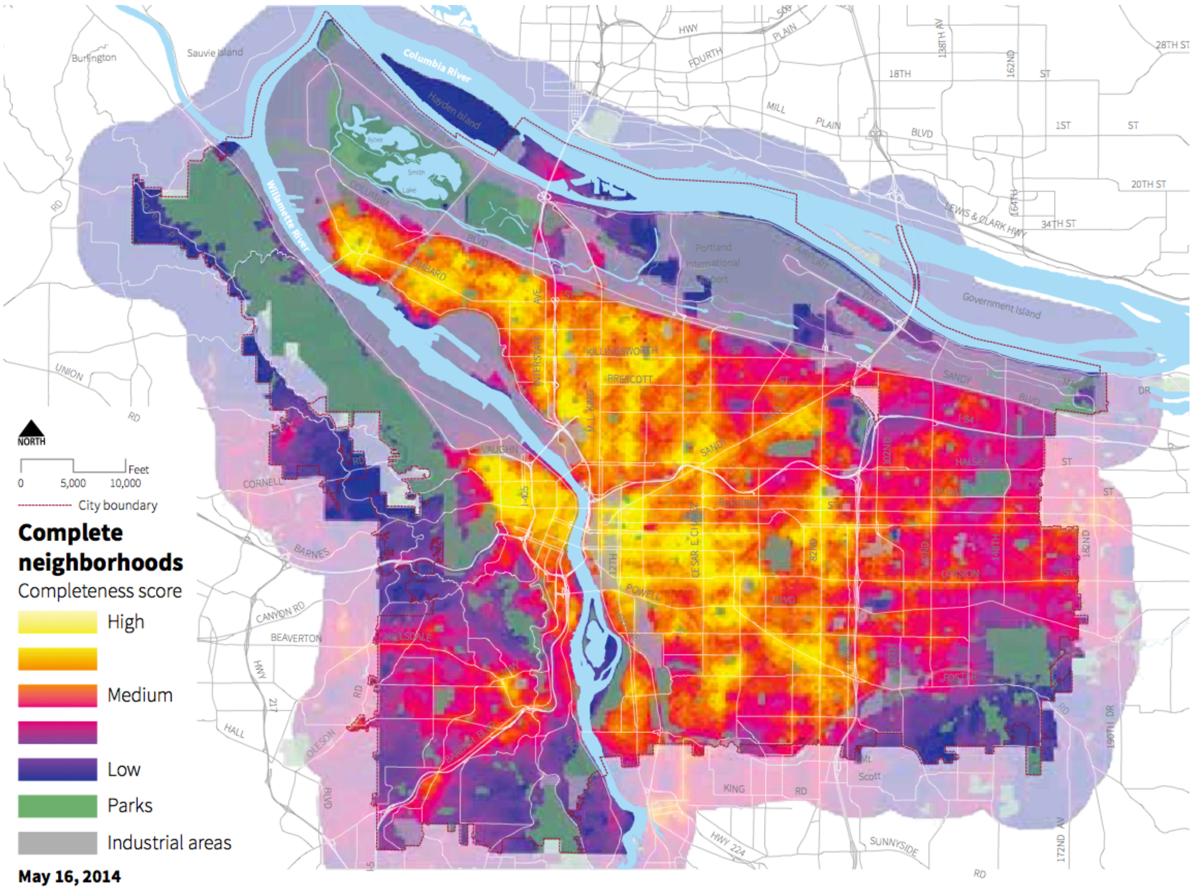

Figure 1 Mapping "complete neighborhoods" from the Bureau of Planning and Sustainability

For the current study, neighborhoods selected to host focus groups were primarily located in areas that have lower "completeness" scores or (as detailed below) have features that make the neighborhoods more vulnerable to displacement.3 As such, the data presented in this report: 1)illuminates the specific mechanisms that limit accessibility and mobility in underserved neighborhoods; 2) generates insights about which barriers to active transportation remain most significant in these neighborhoods; and 3) clarifies where people do and do not travel on a routine basis. These data sets reveal important insights about how to build upon existing neighborhood strengths in an effort to reach climate-related goals, and convey the notion that inspiring residents to embrace active transportation requires an understanding of daily behavioral patterns, as well as the challenges that our most vulnerable community members face.

[3] See Appendix for a combined map of completeness score and vulnerability risk.

Methods and Demographics

This report is based upon 8 large focus groups conducted in the city of Portland between October 2015 and March 2016. The engagement of low-income and minority individuals was a central goal of this research, as such voices are typically marginalized within standard channels of public outreach and engagement. Also of importance to this project was a focus on Eastside neighborhoods either currently experiencing or at-risk of displacement and gentrification.

Focus groups were held either in partnership with a local non-profit or service organization, or at a public library branch with adequate meeting space. In two different instances, two groups were held concurrently. Groups were convened in areas that had previously been identified as vulnerable to displacement (Bates 2013). Below, the neighborhoods that hosted focus groups are highlighted by yellow circles, overlaid upon the number of vulnerability risk factors identified by BPS. Two groups were held in the Cully neighborhood, two were held in the Hazelwood/Centennial area, and the remaining four groups were held in the Kenton, Montavilla, Lents, and Powellhurst-Gilbert neighborhoods.

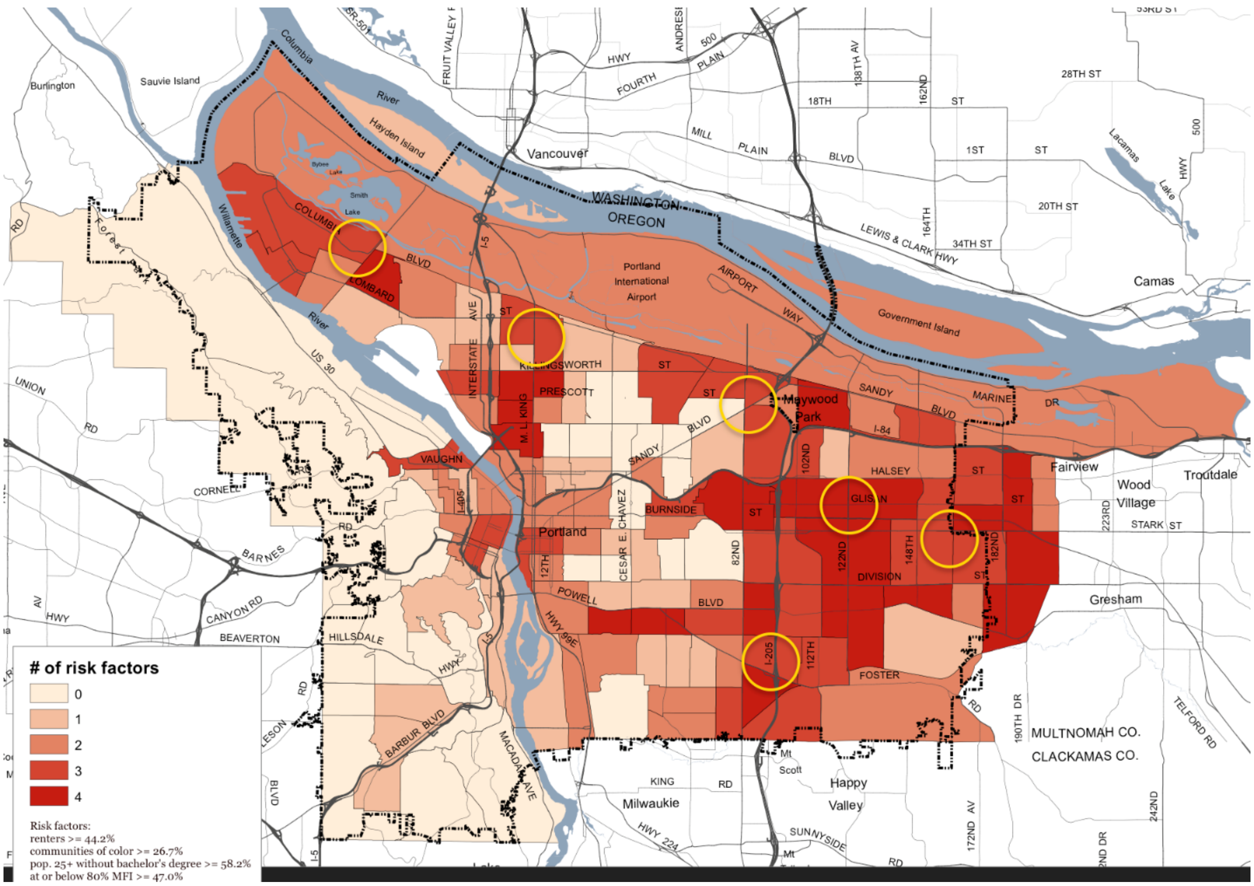

Figure 2 Bates 2013, Appendix A: Vulnerability Risk, with the current study's focus group neighborhood sites identified in yellow circles. 2 focus groups were held in Cully and 2 in the easternmost area of Hazelwood/Centennial.

Participant Recruitment and Community Engagement: A total of 86 participants were recruited with the goal of soliciting many diverse viewpoints. Initial outreach to non-profit organizations and those entities that serve immigrants, low-income individuals, racial and ethnic minorities, and women was done in the fall of 2015 to discern where partnerships to conduct the research might be built.

This outreach resulted in semi-formal partnerships whereby the local organizations (Rose CDC, Rosewood Initiative, and Hacienda CDC) clarified their own research interests and the PSU research team worked to support their goals. In the Lents neighborhood, a community bike ride was organized with Rose CDC (with support from Bicycle Transportation Alliance) prior to the focus group discussion. In the Cully neighborhood, the PSU research team worked to train Cully community members to facilitate two focus group discussions in Spanish. These collaborations generated valuable insights and a culturally responsive research design that centered on community engagement. Participants were recruited through the common channels of communication in each of these organizations, with additional support and management from the PSU research team.

The remaining 3 focus groups were conducted in the public meeting spaces at the Kenton, Midland, and Gregory Heights library branches. Recruitment for these focus groups relied upon research team announcements at public meetings, fliers posted in the public library, in-person outreach at each library branch 1-2 weeks before the focus group, and through various online platforms such as neighborhood Facebook pages. Interested participants were screened via a demographic questionnaire that asked basic questions about race, income, and their neighborhood; participants who were racial or ethnic minorities or were had a reported annual household income of less than $40,00 were prioritized for inclusion in the groups, which filled quickly. All focus groups provided food, childcare, and a $25 grocery store gift card, and translation services were offered during participant recruitment.

Participant Demographics: All participants were asked to complete a demographic questionnaire on the day of the focus group, though not all participants elected to complete every demographic question. As such, we report on the data we do have from our 86 total participants. Please see Appendix for additional demographic information.

- A majority of participants were non-white, with 59 individuals identifying as black, Latino/a, or other non-white racial/ethnic group (out of 86 reporting).
- More than 75% of participants reported an annual household income below $39,999 (57 out of 73 reporting).
- A majority of participants were women: Of our 86 participants, 23 were men and the remaining 63 participants were women.
- There was an even spread of participants across age groups. Of the 80 participants who reported their age, 34 were between the ages of 18 and 34; 38 were between the ages of 35 and 54; and 18 participants were 55 or older.

Discussion and Mapping Exercise: Focus groups lasted approximately two-and-a-half hours. Questions were asked about barriers to mobility, neighborhood livability, movement to and from the Central City, and perceptions of infrastructure changes in Portland. Discussions also solicited suggestions for enhancing movement and mobility.

Following initial discussions of around 45 minutes, participants were given instructions about the mapping exercise. Each participant had a series of sticky dots that were coded and linked to the demographic information they provided (though all information remained anonymous). Participants were asked to place four different types of sticky dots that corresponded to four different sets of places: a) places they go in an average week; b) places they don't go or avoid; c) areas that restrict mobility; d) barriers traveling to downtown from their neighborhood. After the mapping exercise, participants were then asked to discuss their placement of dots and to articulate their reasons for placing dots in certain areas.

Figure 3 Research Assistant Santiago Mendez leads community members in the mapping activity.

Spatial Analysis and Geocoding: The location and participant code of each sticky dot were entered into a table for spatial analysis. Sticky dot locations were manually geocoded using the QGIS open source geographic information systems (GIS) software package. The table included the location, as a latitude and longitude, participant code, and type of sticky dot. Using the MMQGIS plugin for QGIS, a hexagonal grid was created that represented the distance that a person was willing to walk in 20 minutes. Each hexagon was approximately 1.66km in area and 1.6km along the diagonal. The count of each point type was computed for each hexagon.

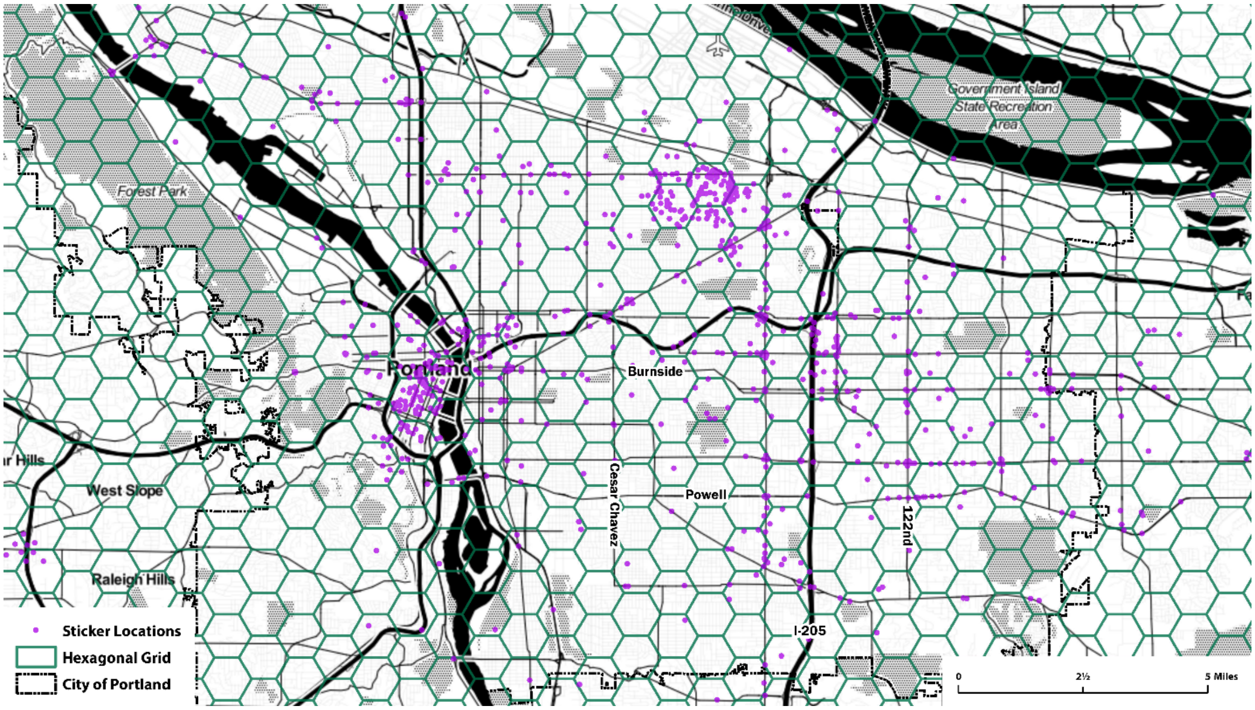

Figure 4 A hexagonal grid and the points representing each sticky dot location after geocoding.

In total, 919 sticky dots were placed across the 8 focus groups, 67 of those dots were excluded because they were more than half a mile outside the city of Portland boundary (map which includes the city boundary). Of the 852 used in this analysis, 818 were inside the Portland city limits and the remaining were just east or just south of the city boundary. With the resulting dataset, maps were created to determine: 1) the places that a participants reported travelling to regularly in an average week using a minimum bounding geography (coverage); 2) hexagonal and point-based heatmaps for each type of sticky dot; and 3) clustering analysis for barriers to getting downtown.

Findings

In the following section, we detail a range of themes that emerged in the focus group discussions, and maps where appropriate.

Patterns of Mobility: Where Do People Go?

In each focus group, participants were asked to identify (using sticky dots on the map) the primary places they traveled to in a "typical week." Participants could place up to seven dots on the map. Most participants placed 3-5 dots, though a small minority placed just 1 or 2 dots (most of whom were retirees) or placed all 7. After placing these dots on the map, group discussion asked people to reflect on where they did (or did not) travel, and any challenges they encountered along the way. We also asked people to think about hypothetical travel, inquiring about where they *might* go in the city and what might make it challenging for them to get there. We reflect on common themes related to these questions below.

Travel to downtown: When residents of outer Portland travel downtown, they do so for specific shopping or entertainment reasons. Many residents in neighborhoods with easy access to light rail regularly utilized public transportation to get downtown, though many also reported driving to the central city as well. A small minority of participants reported using a bike to travel to the downtown area; the participants who did bike downtown typically did so for work or business. Overall, despite some travel to downtown for special cultural or music events on the waterfront or specific shopping excursions (Powell's and the Saturday market in particular), the residents we spoke with did not travel to the central city with much frequency, noting a clear preference to have access to additional entertainment and shopping amenities in their own neighborhoods.

The following map illustrates the range of places that people reported going in an average week. The hexagons capture the number of points placed within the hexagon on the map. To better visually understand these results, however, in the map below, the larger the hexagon, the higher the number of points placed on the map.[4] Of note is the fact that, while a number of individuals did report going to the Central City in a typical week, the majority of destinations people travel to are either in their neighborhood (which explains the high concentration of points in the Cully neighborhood where we had a large number of focus group participants), or spread across the East side.

This means that 88.6 percent of reported travel destinations in a typical week are on the east side of the Willamette River and more than two-thirds of participants did not report travelling downtown in a typical week.

Of the 370 sticky dots placed on locations people reported traveling to (within our study area), 42 points (placed by 27 individuals) were on the West side of the Willamette River. This means that 88.6 percent of reported travel destinations in a typical week are on the east side of the Willamette River and more than two-thirds of participants did not report travelling downtown in a typical week.

[4] The hexagons were distorted in size after the points were aggregated below it in order to help better visualize primary travel destinations.

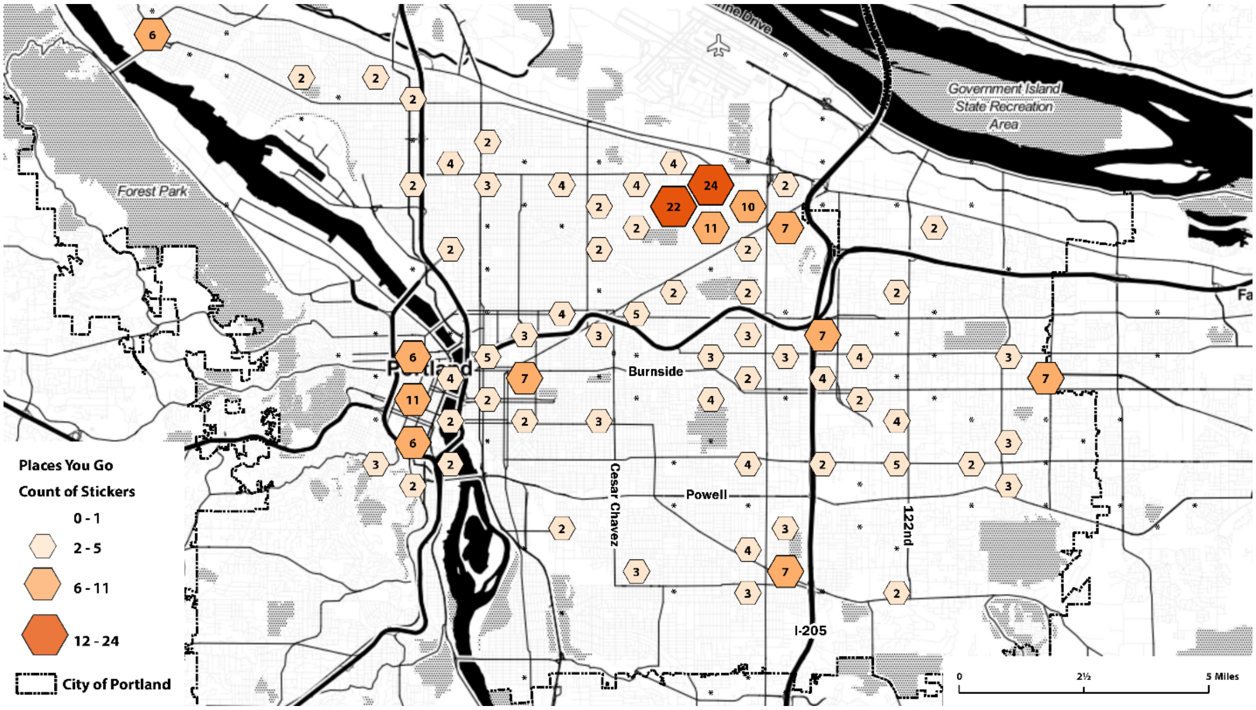

Figure 5 Places respondents reported travelling to in a typical week. 27 of 86 participants (31.4%) placed dots West of the Willamette River, meaning that 2/3 of participants do not report traveling downtown in a typical week.

Barriers to Mobility: Walking, Biking & Public Transit on the East Side

In every focus group, participants were asked about challenges or barriers to getting where they needed to go. These questions were posed with regards to destinations both within their own neighborhoods, and those located in other parts of the city or downtown. As Figure X demonstrates, mobility barriers were widely distributed across the East side, with a majority of the challenges to movement being placed in and around the neighborhoods that hosted the focus groups.

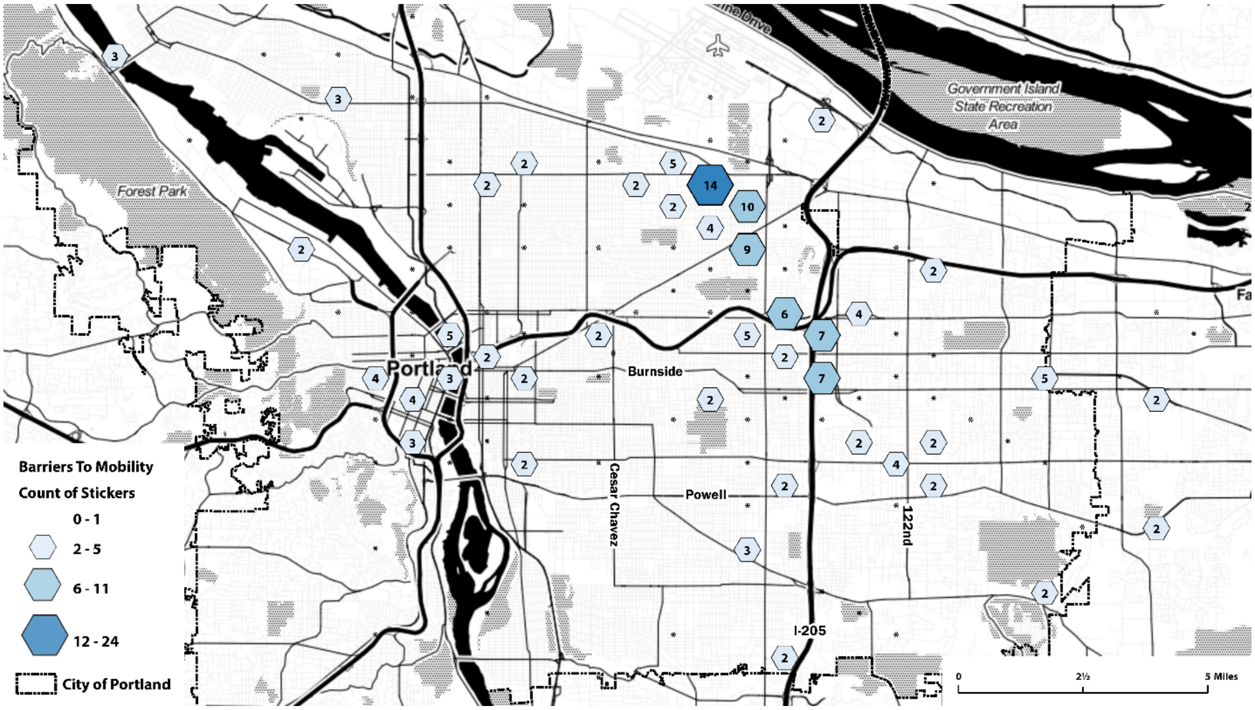

Figure 6 Barriers to mobility.

Barriers to Walking: Across all focus groups, participants reported being very concerned about a lack of safe and accessible infrastructure for walking. This concern was amplified for those participants with disabilities or with small children.

At the Rosewood Initiative group, one person noted:

> "They need to improve on sidewalks. I mean, they're putting bike lanes out here. But you can't…You're putting a bike lane right next to a rocky road with potholes and… People can't even walk, let alone ride a bike…out here."

In the Midland Library focus group, two participants offered their insights on sidewalks when the conversation focused on walking:

> Respondent 9: "There's actually one spot that I walk everyday on Foster. And there's no sidewalks. And it's so sketchy. And it's just a short amount of time. But I feel so scared when I'm like walking on that because I'm so close to traffic. And, you know, it's before the sun comes up, you know. So it's dark."

> Respondent 3: "Sidewalks aren't really an issue because there aren't any… My wife is blind with a cane. And it's pretty hard to navigate around there when everything looks the same. So that's a big issue for her."

In both Cully focus groups, concerns about unsafe infrastructure emerged. This quote from one mother summarizes the comments made by many others:

> "The main barrier we have is that there are a lot of streets that don't have sidewalks. There are a lot of potholes. Sometimes you can't even walk with a stroller or ride a bike… There's many streets that have been constructed that are good, but there are also many that truthfully are bad.

> You can't even drive through them by car. That's one of the main barriers for me, personally. The streets and sidewalks to ride by-bike and to be safe with the kids."

The lack of safe and accessible walking infrastructure was discussed in every focus group. Participants noted that the lack of safe spaces to walk deterred them from making certain non-essential trips, created anxiety about their children's safety, and reduced their active transportation choices (as many people reported resorting to driving or getting a ride for even small distances).

Barriers to Public Transit Use: Coupled with the lack of safe walking infrastructure, many participants described a lack of affordable and frequent transit service as a significant barrier to their daily mobility. While this research study did not explicitly ask questions about the public transit system, participants consistently steered discussions toward their concerns about the bus and light rail systems.

> Participants reported being afraid of certain transit stops or transit centers after dark, particularly the Gateway transit center, 122nd and Burnside, and many of the major intersections on 82nd Avenue.

A common thread to these conversations was the lack of frequent and extensive service on the east side of the river. In many discussions, participants reported needing to take multiple transit lines in order to get to school, work, or the grocery store, often finding that they would have to wait a long time between transfers. Also of concern to many people was the lack of shelter and lighting at transit stops; across multiple groups, participants reported being afraid of certain transit stops or transit centers after dark. Of particular concern were stops around the Gateway transit center, 122nd and Burnside, and many of the major intersections on 82nd Avenue.

One woman from the Rosewood Initiative group sums up the common concerns of many:

> "So I can get off bus 20 on 122nd and Stark. And I have to wait another thirty, thirty-five minutes for bus 71. And it's not in the safest place. Like, they have no lights surrounding their bus stop leaving it very like…I don't feel safe."

In addition to the lack of frequent service, many participants reported that paying for public transit was often quite challenging. Given the low-incomes of many of our participants, the cost of a full adult fare could be a significant deterrent to travel. Participants also discussed the fact that the many amenities in relation to public transit tend to be available only to those with smart phones and that, without such technology, necessary informational tools (such as maps, schedules, and arrival times) are difficult to access.

In the Cully focus groups, many participants also noted that language barriers and previous negative experiences with discrimination made it challenging to routinely take public transit. Highlighting these language barriers, one person noted:

> "I've noticed that on the MAX they speak both Spanish and English and I think that that similarly, bus stops should be said in both Spanish and English on the bus because there are people that are recent immigrants that don't yet speak English. And also other languages like Vietnamese, or other languages because not all of us speak Spanish or English. There are many different languages."

Cully participants, all of who identified as Hispanic or Latino, discussed their experiences with discrimination and many shared negative experiences they had on public transit. In the examples they gave, participants perceived that drivers gave differential treatment and service based. The following example shared by one woman was not uncommon, as other participants responded that they had had similar experiences:

> "I was leaving the store right across the street and an American lady came walking by me and started to signal for the bus to stop. The bus stop was where I was standing. So the bus stopped for her. And then when I crossed the street to also get on the bus, since the bus driver saw a Mexican person running to get on the bus, she didn't stop. It's something like discrimination for us Hispanics. Not all, some bus drivers are really nice, but some are really mean. They prefer their own race."

Overall, despite the fact that public transit was the focus of this research, participants consistently reported numerous ways that their daily movements and experiences were impacted by the public transit system's inadequacy.

Barriers to Biking on the East Side: Not all focus group participants owned a bike. However, those who did were asked about specific challenges they experienced riding in both their neighborhoods and downtown (cycling downtown is discussed in further detail below). Participants who biked consistently pointed that debris and broken glass in the bike lanes in their neighborhoods was an ongoing problem. One participant in Lents conveys how the unsafe bike infrastructure is a real challenge:

> "I ride my bike quite a lot and have the same troubles as walkers. It's kind of frightening on the main streets. Like one right out here, coming up from that way, I don't know if there's a dedicated bike lane on 122nd. But even if there is, right next to somebody who's doing forty or forty-five it's kind of nerve-wracking. And a lot of the times, to be safe, I'll stay on the sidewalk. But all of a sudden, the sidewalk ends sometimes with a curb. It will drop with no way to get back up. So you're going to have to ride…You have to kind of share the curbs. There's a lane. There's a car parked here. Then that little bit of space between the car, you know."

At the Rosewood Initiative group, participants discussed concerns about unsafe bike lanes but also noted that a lack of bike shops in the area (and the expense of maintaining a bike) meant that many people rode on unsafe bikes. Two participants, who volunteer at Rosewood Initiative's bike repair night had the following discussion:

> Respondent 20: "I see kids ride up. No brakes or lights. Tires that are… just off the rims, like so flat… getting kids in the local neighborhood schools in here with their bikes …It can't be near as fun as it could be when you're riding a bike that have tires that have like five PSI pressure in them when they're supposed to have like fifty, you know? It just doesn't work right."
>
> Respondent 18: "You see kids breaking [with] their feet."
>
> Respondent 20: "Flintstone style, yeah."
>
> Respondent 18: "We get a lot of that here. We get bikes where we make sure the tires aren't about to blow, make sure the brakes work properly. So just try to keep them safe."

This conversation highlights the complex issues surrounding barriers to bicycling. On the one hand, a lack of clean and safe infrastructure deters potential riders and makes existing riders feel unsafe. On the other hand, financial barriers and a lack of bike-related services means that those who do ride bikes may be doing so in unsafe ways, or without having access to fully functioning equipment.

"I don't know if there's a dedicated bike lane on 122nd -- but even if there is, right next to somebody who's doing forty or forty-five, it's kind of nerve-wracking. And a lot of the times, to be safe, I'll stay on the sidewalk."

In keeping with many participant's broad requests for additional sidewalks and enhanced infrastructure, cyclists in these focus groups reported a desire to see improved bike lanes to increase mobility choices and to respond to the needs of low-income residents who have been pushed out of the city's core. A biker in the Rosewood Initiative group offered this:

> "Especially in this neighborhood, I'm wanting to see… Knowing the changing demographics of a lot of these neighborhoods in outer Portland, because we're always talking about downtown…Like, forget downtown. Let's look at outer Portland. How do we change this built environment that's a suburban car-oriented environment, when we have a lot of people who aren't car drivers, mostly because you can't afford it?"

To summarize, the participants in these focus groups are some of the more marginalized residents of the city. Participants reported a number of everyday barriers that reduced their mobility. From a lack of safe and accessible walking and biking infrastructure, to larger economic concerns about the affordability of public transit and bike ownership, the circumscribed patterns of mobility highlighted earlier are better understood when these challenges are taken into account.

Barriers to Traveling Downtown

In an effort to understand how or why residents outside of the central city might choose to travel downtown, a series of questions and mapping exercises sought to isolate how residents moved outside of their communities and into the downtown area. Questions were asked about what might bring someone to downtown, what might make it harder to travel downtown, and their overall interest in seeing investments in the downtown area.

Although a number of individuals reported traveling to the Central City in a typical week, participants typically described a range of barriers to traveling downtown that were significant. These barriers span from mobility-related interferences—such as infrequent bus service, freeway congestion, or the high cost of parking—to broader safety concerns. However, many participants also expressed a general disinterest in traveling downtown altogether. It should also be reiterated that many Latinos and Latinas in the Cully focus groups—most of whom do not speak English as their first language— felt that language barriers and discrimination when riding public transit greatly discouraged or prevented them from getting around the city/downtown. Figure 7 below (Barriers to Downtown) reflects responses to the request to have participants place sticky dots on specific barriers they experience when traveling from their neighborhood to the central city area. These are distinct points from those reflected in Figure 6 (Barriers to mobility) above.

Across all focus groups, traffic congestion on highways and bridges were pointed out as key deterrents to downtown travel, as was the cost and availability of parking. A number of participants also placed "barriers to downtown" dots on areas they found to be unpleasant to visit (areas on the waterfront and in the downtown area where many houseless individuals tend to congregate was repeatedly brought up as a concern when visiting downtown).

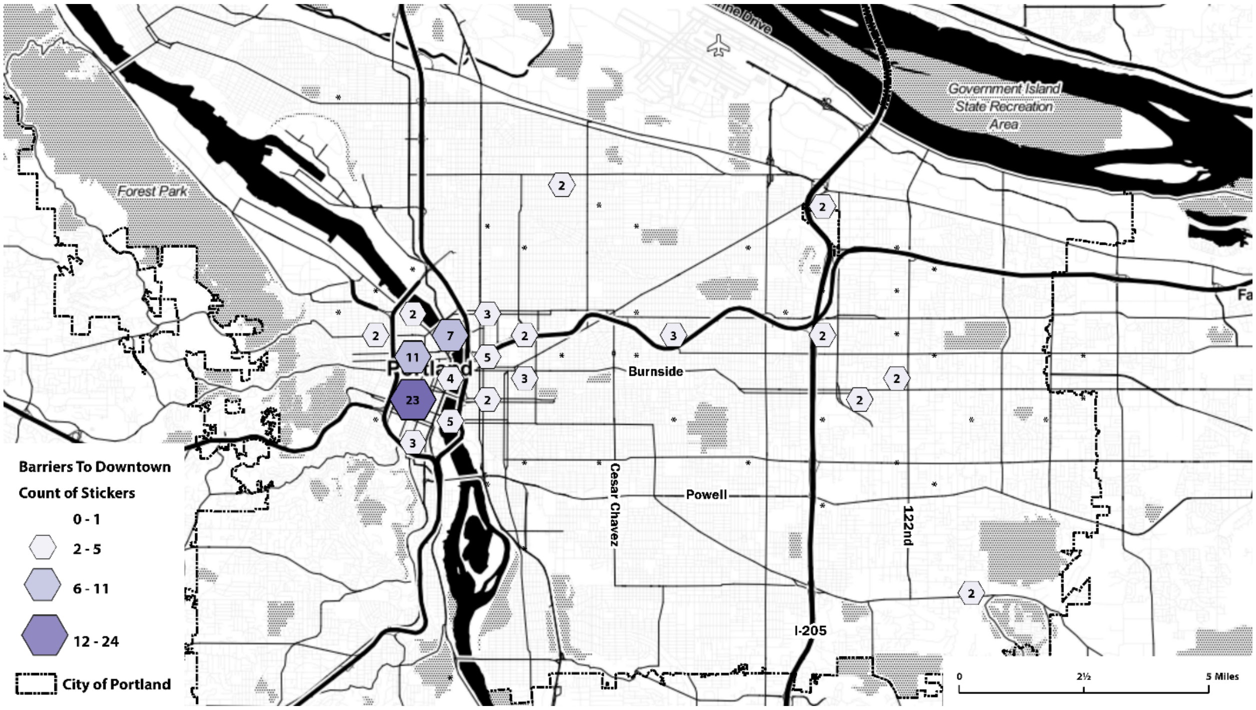

Figure 7 Barriers to Downtown.

The most common deterrent to traveling downtown were concerns about traffic congestion and a lack of parking at an affordable rate. In one of the Cully focus groups, a Latina mother with small children noted,

> "I like to go downtown, to the stores that are in downtown but it's really difficult to find a parking spot. And when you're walking, there's a lot of traffic. So, since I travel with my two kids, that's why I avoid going [downtown]."

This sentiment was repeatedly expressed across many focus groups, but a woman from the Gregory Heights focus group exemplifies the general frustrations nicely, as she actually finds it more convenient to walk across the river rather than find parking downtown:

> "I hate paying for parking [group chuckling with her]… Like I would seriously rather park on the East side and walk across or something like that. I hate just paying for parking. It's finding parking, also."

This notion of parking on the East side and walking or riding public transit into downtown was repeated in at least three focus groups.

Barriers to Bicycling Downtown: When participants who owned bikes were asked about what prevented them from biking in the Central City, respondents consistently cited concerns about a lack of safe places to lock bicycles, as well as overall safety issues related to biking more broadly. As one participant in the Powellhurst-Gilbert area noted,

> "Everybody don't like to drive cars [sic]. If I could ride a bike, I'd ride a bike. I mean, but you know it's not really safe, in a lot of spots to ride a bike. Nothing is marked. And it's just like somebody said, a free-for-all out there."

Similar sentiments were echoed by others who noted the difficulty in transitioning across multiple types of bike infrastructure, like this quote from a woman in the Kenton focus group:

"[The city is not] consistent with the bike lanes. Downtown gets a lot of love for the bike lanes but hardly anywhere else… So like just riding into St. Johns, I can't take Lombard. But I have to like zigzag through all the neighborhoods, all the streets…because otherwise, I can't get across the cut. That doesn't make sense… Why do I have to ride for forty minutes just to get to St. Johns [group laughing] when it's ten minutes away!?"

A final complication mentioned as barrier to bicycling to or from downtown was the lack of bike racks on public transit. This was a particularly acute problem for the participants in the Kenton area and in further East neighborhoods. Participants who did wish to travel downtown by bike often wanted to be able to bike one half of their trip and then take public transit for the other. However, the small number of bike racks on the bus and MAX lines meant that many people reported being passed by multiple busses that already had the limited number of bikes aboard. This was challenging primarily for those who wanted to ride less frequent bus lines or who wished to put their bike on transit in the evening hours. As one Kenton participant summed up:

"It's kind of tricky to do a bike and bus, because the buses usually only have two bike racks. So if those are full, you're stuck waiting for the next bus. Or you're just stuck. So I mean that's a barrier for me, because I would like to bus and bike. But I know there's areas where I can't do that."

Overall, participant's collective responses suggest that while some individuals would like to travel downtown and would do so with some infrastructure enhancements, a majority of individuals find the barriers to downtown travel to be cumbersome enough that they infrequently choose to travel to the central city.

Perceptions of Downtown Investments as Inequitable

When asked explicitly about their interest in additional biking and walking investments in the downtown area, residents of outer East and North Portland were overwhelmingly opposed to additional infrastructural investments within the central city, and certainly did not feel that such would increase the frequency of their downtown travel. In fact, the question often dredged up feelings of inequity experienced by participants, prompting them to openly question them the city of Portland's funding priorities. During the focus groups, participants were given a short primer on the Green Loop concept and asked about their perceptions of the proposed idea. In the Kenton focus group, a respondent again noted the "love" that the central city receives:

"Like I said… I feel like downtown Portland gets a lot of love already. And I know that there are needs, particularly Greeley [Avenue]. And I know the City is aware of that. And why that's not prioritized is not clear to me." [Group agreement]

In the Gregory Heights focus group, a similar conversation emerged:

Respondent 9: "They kind of need to stop paying attention to [downtown]." [Lots of agreement] [Group laughing]"

Research Facilitator: "So investing in the Central City is not necessarily going to encourage you to go down there more?"

Respondent 3: "No."

Respondent 5: "It's just going to piss us off."

> Respondent 8: "It's just magnifying inequity in the city. The city is so inequitable. It really is."

Respondent 8 above went on to say,

> "Any time we talk about like where we're putting money, it's always about the West Side. You know, everybody is getting displaced out this way… And they're getting pushed to places that still don't have bus…You know, once that infrastructure comes in, it seems like those are the people that are leaving, you know, they just continue to get pushed and pushed. Whereas, I think anytime we start talking about West Side stuff and putting more money in West Side it really, to me, magnifies what Portland does to people."

There were some who expressed a desire for increased bike safety downtown and half a dozen people did note that enhanced central city infrastructure would encourage them to ride their bikes downtown or make them more likely to ride. Overall, participants in focus groups would rather see allocated resources funneled into rudimentary improvements—such as more sidewalks and bike lanes—in outer east side neighborhoods.

In particular, many participants noted the impact that enhanced bicycling infrastructure within each neighborhood would have a more significant impact on their daily lives and would increase livability within their local area. At the Rosewood Initiative focus group, for example, this participant points out the interconnected nature of safe streets, bike lanes, and neighborhood vitality:

> "Maybe if that kind of stuff they're doing in the bike lanes [downtown], if it was out here, then I think the environment would change. Number one, I don't think there would be as much crime. I think people would be more aware and how… they can't just…come driving down here real fast anymore, you know what I'm saying? [This neighborhood] needs to change… in order for it to change, the city is going to have to do something about the bike lanes, this street [162nd Avenue]."

Discussion

The 20 Minute Neighborhood: An Ideal for Everyone

At the beginning of every focus group, participants were asked what they liked the most about the neighborhood they lived in, and at the conclusion of each group, asked how they would spend city resources to enhance mobility and livability.

Given the fact that many of the neighborhoods that hosted these focus groups are located in areas with a lower "completeness" score, it is not surprising that residents defined their favorite things mostly in terms of people and relationships, rather than the accessibility of amenities (BPS 2010b). For many participants, knowing their neighbors and feeling that other people were looking out for them were the main benefits of their communities.

One participant from Kenton described a small town feel in her neighborhood: "I really like my block because everybody kind of knows everybody. And we all watch out for each other." Here, she illustrates the importance of not only *knowing* everyone in her neighborhood, but also having a sense of reliance upon her neighbors. Neighborhoods were also detailed as having an "interconnectedness" and "different and strong circles of a helping community."

Many participants have lived in their neighborhoods for several years. These data indicate that once they build connections with their neighbors, residents place those relationships at high value and come to depend on each other for varying reasons. Along with enjoying these connections, some participants added that their neighborhoods were "pretty" and "tranquil."

Participants also cited diversity as a value in their neighborhoods. One respondent articulated this sentiment in the Rosewood Initiative group: "What I like about this community, it is very diverse, colorful, interesting. No matter who you are, you can basically find whatever you want whether it's food or other things. I just really like the diversity of this community."

In the Lents focus group, a surprising amount of excitement emerged in relation to the Belmont goats' presence in the neighborhood. The small herd of goats currently resides on land owned by the Portland Development Commission, and people noted that these animals provided a unique and affordable cultural amenity from which they derived much joy. People used the example of the goats to clarify their interest in additional activities, investments, and mechanisms to increase a sense of community within their local environment.

Despite the fact that participants were highly critical of the lack of infrastructure and safe places for walking and biking, people did consistently point out that they felt that they had access to amenities that they appreciated, even if they wished for additional accessibility. One woman who had recently moved back to the Cully neighborhood said this:

> "I lived in this community and I came back for the activities that take place. Participating in ABC (Andando en Bicicletas en Cully- a community organization) gives you the opportunity to get out as a family, you have fun… I come all the way [to the organization's offices] daily, and I'm always on the bus because my daughter goes to a school that is far away from our home. Every day from Monday to Friday. And since I buy the monthly transit pass, I find it easy to go to the library, the church. In other words, I don't depend on my husband. I am independent. I love Cully."

These comments reflect the dialogue that emerged as people sought to clarify what they wanted to see in the future of their neighborhood and Portland more broadly. A number of residents explicitly discussed the 20-minute neighborhood as an ideal. People did not feel that their neighborhoods should be excluded from the density of amenities and transportation choices just because they were located further from the central city.

Promoting Active Transportation in Neighborhood Hubs

The findings of this report suggest that many low-income and minority residents do not frequently travel to the central city--both because of a lack of interest and barriers to doing so. However, the residents represented in this study do desire a greater range in active mobility, by way of walking, biking, and using public transit.

The ethos of Portland has traditionally been one in which all forms of active transportation are celebrated and supported. However, we find that this ideal is not equally available to all Portlanders. As such, finding mechanisms to support active transportation within neighborhoods hubs is a critical first step in encouraging people to be active, to take fewer car trips, and to integrate a multiplicity of modes of travel into their routines. If, for instance, residents in a range of geographically-dispersed neighborhoods can begin to feel safe traveling to their local grocery store by bike, there will then be fewer challenges to encouraging trips across integrated bike lanes and greenways as that infrastructure is built. Additionally, when people feel safe walking to the library or to school, such will become a more viable mode of transportation.

When it comes to central city development and infrastructure, the findings of this report suggest that, while individuals throughout the city would like a downtown that they can take pride in, there are more pressing and urgent needs that they would prefer to see addressed in order to enhance safety and access in their respective neighborhoods. And as such, these needs take precedence over additional downtown investment. It is plausible that participants in this study can and will be able to take advantage of the improved public spaces that the Green Loop concept might provide, but it is clear that sufficient mobility barriers persist throughout North and outer SE Portland areas, and deter many people from electing to integrate multiple forms of active transportation into their daily lives.

Policy Recommendations

Address Perceptions of Inequity

The findings presented here suggest that residents of participating neighborhoods perceive there to be ongoing issues of inequitable distribution of city resources. This sentiment was expressed in all 8 focus groups and reflected overarching feelings that many neighborhoods were not prioritized for safety and infrastructure enhancements. Given this finding, it is critical that, as the city continues to develop and grow, there is increased transparency in decision-making around planning projects. This, along with enhanced opportunities for public engagement that strives to make participation feasible for low-income and minority residents, would likely aid in building trust and cooperation across neighborhoods, and work to better unify the city.

In order to offset the feelings of inequality repeatedly conveyed in focus groups, specific plans for targeted investments in geographically diverse neighborhoods are crucial. As such, in this process, it is important to partner with community organizations to support neighborhood-level ideas for increasing active transportation, and make subsequent progress towards meeting comprehensive planning goals. To this end, we offer some final suggestions about how to move towards a more comprehensive and equitable approach to planning.

Encourage Economic Development in Neighborhood Hubs

Aside from the identification of infrastructural needs in the neighborhoods that hosted focus groups, participants frequently discussed the need for additional jobs and opportunities for people in their communities. Some of this work is already being done through the Portland Development Commission's Neighborhood Prosperity Initiative & Main Street Network – which is a citywide initiative to foster economic opportunity throughout Portland (including the Neighborhood Prosperity Initiative areas in Hollywood, Cully, Parkrose, Rosewood, Division-Midway, and 82nd and Division). The development of business districts in these areas is already in progress, and additional investment, support, and engagement from city agencies will be needed to ensure that opportunities for new businesses are shared amongst diverse groups of people.

We would suggest that, given the noted barriers to public transit utilization in many of the neighborhoods represented in this study, a collaboration coordinate between TriMet and PDC might ensure that the any business development that occurs is accessible by way of public transit. In some cases, higher frequency bus lines or additional lighting or shelters at bus stops might be important in driving and sustaining local businesses.

Make Targeted Investments to Enhance Ongoing Community Work

The neighborhoods represented in this study are incredibly unique, diverse, and innovative in their own ways. Although this report highlights residents' calls for additional investment, support, and engagement in their neighborhoods, it is also critical to augment and support the ongoing work that many communities are already engaged in. The future of Portland is dependent upon neighborhood livability across an increasingly large geographic space. As such, we highlight the important work of the three organizations whose partnerships made this research possible.

The Rosewood Initiative, a non-profit organization aimed at strengthening the Rosewood neighborhood community, continues to make concerted efforts to support bike accessibility, commuting and safety in east Portland. On Thursday evenings, for instance, the Initiative hosts a bike repair night, where volunteers not only fix bikes free of charge, but also teach community members the skills necessary to repair and maintain their bikes themselves. Additionally, the Rosewood Initiative holds bicycle faires, part swaps, commuter workshops and other related events, such as the 2014's well-attended Bike Safety Fiesta—over 800 people from the surrounding communities came to enjoy festivities with their neighbors while learning about the logistics of safe biking, which was one of the main concerns our focus group participants relayed when asked about barriers to cycling in Portland. The organization is a vital resource for the outer Southeast Portland neighborhood.

Rose Community Development Corporation has done significant work to increase community cohesion in the Lents neighborhood. Rose CDC, in partnership with Livable/Green Lents, is responsible for increased utilization of the Green Ring, a six-mile loop that connects many of the neighborhood's hubs, including Glenwood, Bloomington and Lents parks, which houses the Lents Community Garden, as well as the Foster Floodplain Natural Area. The bike route also provides easy access to the Holgate branch of the Multnomah County Library, the Green Lents Tool Library and the Lents Farmers Market, in addition to many schools in the neighborhood.

Despite the marked progress of these organizations in increasing the visibility of the Green Ring, the route itself is in need of infrastructure improvements. In September, members of our research team rode the Green Ring with Lents residents, as well as from leaders from Rose CDC, the Bicycle Transportation Alliance and Livable Lents, and all agreed that the route would feel easier to traverse with additional signage, well-defined bike lanes and protected crossings—for instance, the route intersects with busier sections of both SE Foster road and SE Woodstock boulevard at pedestrian crosswalks, where cars do not feel compelled to stop. Residents specifically expressed that they would feel more secure if there were beacons or bicycle signals in such high-traffic areas. Rose CDC (who also supports the Lents Youth Initiative) and Livable/Green Lents have done important work to promote active transportation. Additional resource and support for this work will undoubtedly enhance active transportation in the Lents area.

In the Cully neighborhood, Hacienda CDC has proven their efficacy in many avenues of community enhancement. However, they have specifically championed bicycling and active living within the surrounding Latino and immigrant populations by way of the organization Andando en Bicicletas en Cully (ABC), which translates in English to "Riding Bikes in Cully." ABC aims to encourage and fortify the Cully cycling community by leading group bike rides in the neighborhood and hosting maintenance and training workshops, which in turn empowers residents to feel apart of the greater Portland community, as bike culture is certainly an integral part of the city's ethos. They have also successfully advocated for safe bicycle storage and better infrastructure in Cully.

These three organizations reflect just some of the ongoing community organizing and local level leadership that make Portland varied neighborhoods unique. These organizations have clear ideas, organized leaders and reflect the needs of the community. City agencies and offices should continue to find ways to support and facilitate the efforts of these groups.

Enhance Strategies for Public Outreach and Engagement

Marginalized communities often experience a range of barriers to participating in planning processes, therefore efforts to enhance equity must include extensive public outreach work in order to engage a diverse range of community members. The most important strategies to achieve effective public involvement are in the targeted recruitment methods, community partnerships, and incentives, which should be tailored to reflect the needs of different communities and populations.

In an effort to engage a diverse group of people for this study, face-to-face interaction proved to be the most successful recruitment strategy. In this project, we partnered with libraries and community organizations with existing programs that supported active transportation programs. To recruit participants for library-based focus groups, we left in informational flyers with accompanying slips of paper with a link to the survey in key locations throughout the building, and conducted face-to-face recruitment for one evening several days before and the hour right before the focus group.

In this way, the research team was able to meet and engage community members that already made use of public library facilities, expressed palpable interest in the study's subject matter, and might be open to coming back over the weekend to participate in a focus group. Face-to-face interactions also reduce anxiety about the research process, and allow for people to receive immediate answers regarding any concerns they may have.

In soliciting community partnerships, the research team worked with BPS, as well as a panel of advisors from a number of city agencies and offices, to generate a longer list of community organizations that had existing programs in support of active transportation in targeted neighborhoods. Following discussion and engagement, successful partnerships were established with Rosewood Initiative, Rose Community Development Center, and Hacienda Community Development Center. In these cases, we made ourselves present at meetings and built rapport with their community leaders. Additionally, when working with Hacienda, there were always one or two bilingual members of the research team present to aid in translation. The success of these partnerships can largely be accredited to research team's effort to augment existing community work.

A final tactic for increasing the participation of underrepresented groups--especially in marginalized communities--is the provisioning of resources to support a wide range of participants. Low income and minority individuals often have low representation in public involvement processes for several reasons--whether it be insufficient knowledge of participation opportunities, necessary childcare, inadequate leisure time, or a lack of trust in the research process—and it is the responsibility of the entity conducting outreach efforts to provide resources to make participation possible. In this study, this meant providing translation services, food, financial incentives in the form of a gift card, and child-care services.

In sum, community outreach efforts must be thorough, flexible, and strategically tailored to each target audiences. Personal connections and face-to-face recruitment should be coupled with financial incentives and other resources that make participation possible for vulnerable populations.

Develop and Implement Anti-Displacement Strategies

A significant contributing factor to inequitable access to transportation infrastructure and public spaces stems from the ongoing problems linked to gentrification and displacement. As a result, community organizations have galvanized around efforts to mitigate the consequences of these phenomena. Organizations such as the Community Alliance of Tenants, OPAL Environmental Justice Oregon, APANO, and Portland Tenants United have been at the forefront of many of these discussions and sustained engagement with community organizations is essential as city agencies work to develop policies and solutions to our housing crisis.

Intended to guide equitable investment practices and encourage broad public involvement, policies include resolutions to "create a stronger voice for underrepresented communities in decision-making and planning"; "anticipate gentrification and displacement, and take measures to prevent and mitigate it" as well as "restore communities that have suffered" from the harms of these devastating trends; and finally to fund these anti-displacement measures by "capturing increased property value as revenue" when plans and investment drive up the cost of housing" (PHB 2015a). The current study suggests that such anti-displacement policy suggestions have significant traction across many East side neighborhoods, where residents demonstrate the desire to transition from the "neighborhoods as spokes" planning model towards one with self-sustaining "lively neighborhoods" (Jacobs 1973).

While a thriving city center is undoubtedly salient to the sustainability of commercial, business, and tourism economies, these investments should not outpace investments in neighborhood centers. The Anti-Displacement PDX campaign phrased this in terms of a need to "ensure that new development and investment creates more opportunities for communities of color and low-income residents," and builds upon the idea of the 20-minute neighborhoods in order to promote "walkable access to commercial services and amenities." (PHB 2015a). With that, investment in active transportation infrastructure is most equitable when it aids in connecting residents to services and amenities within their own neighborhoods.

Concluding Thoughts

- **Equity Is Not a Trade-Off**: While investments in the central city are important for a variety of reasons, there does not need to be an "either/or" approach to planning for the broader metro area; as investments and plans are made to develop cycling and pedestrian infrastructure downtown, simultaneous efforts can and should be made in other parts of the city. We suggest building upon current discussions around walkability, cycling, and public safety to generate plans and investments outside the city's core. For both planners and residents alike, broader messages about larger, comprehensive plans and efforts to enhance safety and recreational facilities are vital to assuaging feelings of distrust amongst local residents. When local residents can see that their concerns and interests are taken seriously, and when requests for additional investments are realized, perceived inequities in investment may lessen.

- **Investments Outside the Central City Will Enhance Mobility City-Wide**: A key finding in this study is that many residents outside the downtown area simply don't travel to the central city with much frequency. However, investments that develop pedestrian and cycling infrastructure and enhance public transit access will increase neighborhood-level mobility which can, in turn, increase mobility patterns more broadly. If residents in outer SE and N/ NE Portland feel safe riding their bike to a grocery store in their neighborhood, it's then plausible that they might consider walking or riding a bike in other parts of the city. A connected and mobile city requires safe and accessible infrastructure throughout the entire city.

- **Community Building Is Part of Planning for the Future:** The 2.5 hour focus groups that were convened for this study were loud, engaging, and exciting events. Participants shared a variety of visions for the future, concerns about current development in the city, and had a chance to share dinner and meet new people in their neighborhood. Participants overwhelmingly reported that the event was enjoyable, that they learned something new, and that they felt that getting together with their neighbors to talk, voice concerns, and think about the future was a positive experience. We would suggest that every effort is made to continue to allow residents to voice opinions and share their stories with decision-makers. For many residents, being heard by city staff and city officials would be vital in reducing feelings of inequity. The focus groups convened for this study met in local neighborhoods, in public libraries and community spaces, offered childcare and food, and generally provided as many supports as possible for people to participate. As we think about building and equitable and inclusive city, it is important to convene meetings for residents where they live, at times that are convenient, and to also provide child care and food for residents who lead busy lives with multiple obligations. We would also again like to highlight the great work being done by many local organizations to help build community; we would encourage the city to learn from the work community members are already doing and to supplement and add on to those efforts.

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Appendix: The Green Loop

The "Green Loop" is conceptualized as a six-mile linear park meant to invite "residents, employees and visitors to experience Portland's urban core in an entirely new way" (BPS, 2015:4b). The Green Loop will encircle the central city including the north and south park blocks, the Moda Center coliseum by the Broadway Bridge, Lloyd District, Central Eastside, the newly developed Tilikum Bridge, and finally, multiple encirclements within and around the south waterfront business district and Portland State University, a campus of around 28,000 students over 50 acres (Portland State University, 2016). The Green Loop is overseen by the Bureau of Planning and Sustainability and the City of Portland office. The funding of design of the Green Loops Project is currently in flux and evolving (BPS, 2015a). PBOT's report indicates that the Green Loop will reduce transportation costs and increase healthy lifestyles for Portland residents, advancing equity and accessibility.

Portland GREEN LOOP Economic Analysis

NeRC

Northwest Economic Research Center
College of Urban and Public Affairs

DRAFT FINAL REPORT
AUGUST 2016

Portland State University

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The Portland Bureau of Planning and Sustainability (BPS) develops creative and practical solutions to enhance Portland's livability, preserve distinctive places and plan for a resilient future. BPS collaborates with community partners to provide:

- Comprehensive land use, neighborhood, district, economic, historic and environmental planning, and urban design.
- Research, policy and technical services to advance green building, energy efficiency and the use of solar and renewable energy, waste prevention, composting and recycling, and a sustainable food system.
- Policy and actions to address climate change.

NERC is based at Portland State University in the College of Urban and Public Affairs. The Center focuses on economic research that supports public-policy decision-making, and relates to issues important to Oregon and the Portland Metropolitan Area. NERC serves the public, nonprofit, and private sector community with high quality, unbiased, and credible economic analysis. Dr. Tom Potiowsky is the Director of NERC, and also serves as the Chair of the Department of Economics at Portland State University. Dr. Jenny H. Liu is NERC's Assistant Director and Assistant Professor in the Toulan School of Urban Studies and Planning. The report was researched and written by Dr. Jenny H. Liu. Research support was provided by Michael Paruszkiewicz, Wei Shi and Emma Willingham.

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Portland State UNIVERSITY

Executive Summary

The Portland "Green Loop" is a proposed 6-mile linear open space running through the heart of the city, connecting existing and new open spaces, parks, gathering areas, and walking and biking pathways. As envisioned, the Green Loop concept requires significant infrastructure investments, and would result in both short-term and long-term impacts on transportation (for all travel modes), environment and economic development. The goal of this project is to characterize, quantify and analyze these costs, benefits and impacts, particularly focusing on case studies of similar infrastructure investments in active transportation and analyses of property value impacts, economic (input-output) impacts and preliminary business/retail activity impacts. Our key findings are as follows:

Case Studies & Interviews

The research team examined eight case studies in North American cities that have or plan to undertake significant active transportation infrastructure investments. We then conducted in-depth interviews with planning officials in three cities to obtain further insight into their planning, implementation and evaluation processes. We find that significant public outreach, often to underserved areas, is highlighted as key to both development and success of the infrastructure investments. By integrating new infrastructure improvements with preexisting networks, these cities both reduced the cost of improving active transport and arguably smoothed adoption by users. Finally, performance and outcome measurements are cited as key to assessing and understanding the effectiveness, efficiency and equity of these programs and investments.

Property Value Impacts

We find that introducing advanced bicycle and pedestrian infrastructure like the Green Loop provides positive amenity values for nearby residential properties, even after controlling for other factors that influence property values. We estimate that average property values will increase by approximately 0.05% for single-family homes, and between 6.46% and 7.96% for multi-family homes. The most significant impacts will be concentrated in neighborhoods that are located closest to the Green Loop, allowing for easier access to the amenity.

Economic Impacts

IMPLAN, an input-output (I/O) based economic model, is utilized to estimate macroeconomic impacts of two hypothetical test scenarios that illustrate a range of impacts associated with different levels of infrastructure investments. The Low Investment test scenario is estimated at $10,427,929 in general infrastructure investments with 2% going towards public art installations, and the alternative High Investment test scenario is estimated at $67,973,039 with seven potential signature park sites. The scenarios create 156 to 783 full-time equivalent jobs, and generates $22 to $114 million in economic output, concentrated in construction, architecture, engineering, and related services, and food services industry sectors.

Business Activity Impacts

Research has shown that active transportation infrastructure has potentially positive impacts on business activities and economic vitality in a region, and a preliminary benefits transfer analysis based on estimates from Clifton et al. (2012) and Dill and Carr (2003) is conducted to understand how local businesses might be affected. Our preliminary analysis shows small increases of 0.18% to 0.20% in annual sales in supermarkets, convenience stores, drinking places and restaurants that are located in close proximity to the Green Loop. Further research that specifically examines changes in both bicycle and pedestrian mode share in conjunction with business activity impacts before and after street infrastructure improvements or conversions will be necessary to accurately characterize how active transportation infrastructure affects businesses and economic development. Additional impacts may be likely if additional consumers or tourists are attracted to the Green Loop.

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I. Introduction and Context

This economic analysis is envisioned as a two-phase project with Phase I incorporating elements of a cost-benefit analysis and economic impact analysis funded through ISS, and with a Phase II focusing on a citywide greenway network (Green Loop would be one component of this citywide network) economic analysis with additional livability, equity and sustainability components funded through a competitive proposal at the National Institute for Transportation and Communities (NITC). This report is the culmination of Phase I of the project.

The "Green Loop" concept is an approximately 6-mile linear open space proposed through the heart of Portland. It would include and connect open spaces, parks, gathering areas, and walking and biking pathways attractive to walkers and bikers who may be uncomfortable using the current facilities downtown. It would run north-south on both sides of the Central City, approximately 10 blocks in from the riverfront trail system, and be linked to the bridges, surrounding districts and neighborhoods by east-west connections. The project is intended to spur additional economic development in the Central City and make it easier for pedestrians and cyclists to explore the area.

As envisioned, the Green Loop concept requires significant infrastructure investments, and would result in both short-term and long-term impacts on transportation (for all travel modes), environment and economic development. The goal of this project would be to characterize, quantify and analyze these costs, benefits and impacts in a comprehensive and unbiased manner. In addition, this research serves to establish an analytical foundation for the impacts of urban greenways for further research.

As part of this research process, the NERC team first conducted a thorough literature review of the current state of research on the economic impacts of infrastructure investment, traffic changes, bike facility investment, and similar infrastructure projects, among other topics, as well as a comprehensive methodology review to assess various approaches to the quantification of costs and benefits of bike and pedestrian infrastructure. Then, we draw key lessons from case studies of North American cities with similar urban greenway or bicycle/pedestrian infrastructure projects and/or bicycle/pedestrian plans. These case studies are complemented by semi-structured interviews of several key planners from selected urban areas. Finally, based on the literature and methodology reviews, case studies and interviews, in addition to scenarios developed by BPS and Portland Bureau of Transportation (PBOT), we analyze property value impacts, economic impacts of infrastructure investments and preliminary quantitative sustainability impacts.

II. Literature and Methodology Review

Regions investing in active bicycle infrastructure have seen considerable economic impacts, including increased economic activity, job creation, business vitality, tourism, and property value improvements. The wider usage of active transport modes that follows infrastructure improvements for both commuting and recreation may bring additional impacts to public health, environment, and household finances. The following discussion of recent studies and the experiences of regions making such investments covers each of these interrelated impacts.

II-1. Economic Impacts

Investment into bicycle and pedestrian related transportation infrastructure introduces new spending into the local economy, which has a well-established multiplier effect throughout the entire regional economy. Typically, input-output models are used to evaluate this overall economic impact, which can take the form of direct infrastructure investment, indirect bicycle-related industry effects (including tourism), and general impacts on businesses serving the area of investment.

Infrastructure Investment Impacts

There are two main infrastructure project costs: capital costs and operating costs (Transportation Research Board, 2006). Capital costs are expenditures directed to the construction of facilities and equipment such as on-street facilities (bike lanes, wide curb lanes, striping, and signed routes), off-street facilities (like shared-use trails and paths), and the equipment such as signs, signals, barriers, and parking. In practice, identifying the cost for bicycle and pedestrian-related infrastructure is challenging, since much of this infrastructure - like roadway shoulders and sidewalks - are incorporated with overall roadway projects (Vermont Agency of Transportation, 2012). Operating costs for this type of infrastructure typically include securing, policing, and maintaining the facilities, including maintenance of pavement, drainage, traffic controls and landscape (Transportation Research Board, 2006).

Both the direct and indirect economic impacts of constructing and operating active transport facilities in can be estimated using a macroeconomic input/output (I/O) model such as REMI and IMPLAN. One such analysis of bicycle infrastructure in Vermont indicated that the expenditure on such facilities creates construction jobs as well as supports the professional/technical services sectors. Every one million dollars of active transport program/planning spending was found to support nearly 32 workers (Vermont Agency of Transportation, 2012). The study estimated total economic contributions to be $17 million in output, 233 jobs and $10 million in labor income.

Bicycle Industry Impacts

Investments in bicycle infrastructure are generally positively correlated with an increase in the usage of bicycles (Pucher et al., 2010), which can impact related businesses' bottom lines. Many regions and cities, including Wisconsin, Iowa, Minnesota, and Colorado, have conducted studies to evaluate these impacts (Flusche, 2012). Bicycle industry subsectors include manufacturing, wholesale and distribution, retail and service, and other services[1]. Taking into account spill-over effects to other bicycle-related

[1] The manufacturing subsector includes manufacturing of bicycles, parts and accessories; wholesale and distribution also includes importing; retail and service is usually the largest subsector and includes sales and repair; other services include event promotion, industry representation and other ancillary services (Dean Runyan Associates Inc., 2014).

activities like entertainment and recreation, one study estimated that nationally, bicycle-related activities produce a $133 billion economic contribution, $17.7 million in federal and state taxes, and 1.1 million jobs (Outdoor Industry Foundation, 2006).

Impacts of the specific subsectors of the bicycle industry are expressed in terms of employment, personal income and output through input/output economic impact models. These types of economic impact studies are a way of characterizing the economic contribution or economic significance of the existing bicycle industry within a geographic area. For example, the Wisconsin Department of Transportation used REMI to estimate that the Wisconsin bicycle industry contributes over 2,102 jobs directly in the state, and another 1,316 jobs indirectly. This corresponds to approximately $377 million in annual economic output and $108 million of personal income (Bicycle Federation of Wisconsin & Wisconsin Department of Transportation, 2011). A similar approach was taken to evaluate the economic impacts of bicycle-pedestrian oriented business in Vermont, which found a contribution of $56 million of output, $26 million in earnings and 1,025 jobs (Vermont Agency of Transportation, 2012). A recent Oregon bicycle industry study used an industry survey to show that there are over 400 bicycle retail and service businesses, and several emerging manufacturers in Oregon, especially in the Portland metropolitan area. They found a total of 2,645 jobs, both full-time and part-time, were engaged in the bicycle industry, contributing $83.3 million in industry earnings in 2012 (Dean Runyan Associates Inc., 2014).

Other important components of the economic impact of the bicycle-related industry are tourism, events and recreation. Measuring the economic impacts associated with these components typically begin with characterizing expenditures from visitors and event participators for lodging, retail purchases, entertainment and goods and services (Bicycle Federation of Wisconsin & Wisconsin Department of Transportation, 2011). Many international and domestic cities these types of impacts ("Implement a US Bicycle Route: Economic Impacts," 2015). For example, a study in Quebec, Canada showed that cycle tourists spend 6% more than other types of tourists with an average expenditure of $214 per day. Colorado's economy benefits from $250-300 million stemming from bicycle tourism and bicycle-focused events, particularly in ski resort areas (Argys & Mocan, 2000). A recent economic benefit study of bicycling in Michigan created an analytical framework to evaluate tourism impacts of bicycling ("Community and Economic Benefits of Bicycling in Michigan," 2015). The authors conducted intercept surveys at six bicycle-related events (as case studies for all bicycle-related events in the state) and online surveys for other events to gather information on trip expenditure patterns, which provided input data for IMPLAN modeling. They found that out-of-state participants in bicycling events spent approximately $15.6 million dollars in Michigan, translating to a total of $21.9 million in total economic impacts for the state.

Business Vitality/Consumer Spending

Evidence shows that active transportation infrastructure might positively impact business districts' prosperity and economic vitality (Drennen, 2003; Flusche, 2012). There are many case studies from North American and European cities that compare sales and customers' expenditures before and after the construction of bike facilities, which collectively establish that cyclists and pedestrians indeed enhance retail activity in shopping districts that support regional business (Flusche, 2012; Jaffe, 2015). Jaffe's 2015 study further summarizes 12 case studies from cities around the world that illustrate the effects of losses in parking spaces and conversions to bike lanes on business opportunities, and found that there is little to no impact on local business, and in some cases bike lanes might even increase business. On the other hand, although the majority of the research in this area points to positive business impacts of active transportation infrastructure, one short-term impact study of Vancouver, B.C. found a small net decrease in sales after the implementation of a separated bike lane (Stantec, 2011).

In addition, travel mode choice has been shown to be correlated with different consumer expenditure behaviors. An analysis of 78 businesses in the Portland metropolitan area found that people who bike or walk spend similar amounts or more on average than their counterparts who drive, since non-drivers tend to travel more frequently to these destinations than drivers. Specifically, cyclists tend to spent less on grocery trips, but more at restaurants, bars, and convenience stores (Clifton et al., 2012). A survey of the East Village in New York City found that cyclists spend an average of $163 per week compared to an average of $143 in spending by drivers (Jaffe, 2015).

II-2. Property Value Impacts

In general, the literature supports the hypothesis that bicycle and pedestrian related facilities or greenway infrastructure tend to have positive impacts on property values (Cortright, 2009; Lindsey, Man, Payton, & Dickson, 2004a; Nicholls & Crompton, others, 2005). Hedonic pricing analysis is the most commonly used methodology to explore the impacts of bicycle facilities and greenways on property value (Brander & Koetse, 2011; K. Krizek, 2007; Lindsey et al., 2004a).

Cortright (2009) analyzed 15 different housing markets around United States, and found that walkability had positive impact on home values in 13 out of 15 housing markets. Another study found that proximity to trails and greenways (trails with greenbelts) are correlated with 2%, 4%, and 5% increases in home price (Asabere & Huffman, 2009). Even after controlling for spatial autocorrelation between greenspaces and property values – that is, the correlation between the values of neighboring homes or likelihood of green spaces - empirical studies have found that greenspaces had a significant positive impact on residential property values (Conway, Li, Wolch, Kahle, & Jerrett, 2010). Other efforts have expanded beyond single-family property impacts and found that walkability benefits commercial as well as multi-family residential property values, but the same benefits were not evident in industrial properties (Pivo & Fisher, 2011).

Research has shown that proximity to green space predicts an increase in land value. Coupled with the existence of recreation travel to green areas and its associated travel costs, this change in market price identifies recreational green space as a source of economic value. A 2011 ‘metaregression’ of thirty-eight contingent valuation studies regarding urban and peri-urban green space found that areas with a recreation use component are valued approximately 322% more highly than land that serves preservation or aesthetic uses (Brander & Koetse, 2011). A 2001 Vermont park user survey also found that 64% of respondents stated that they valued recreational use most highly (out of eleven possible uses), and analysis of a subsequent willingness-to-pay survey question resulted in an allocation of 28.3% value to recreation, over twice the allocation of the next most-valued use (Manning & More, 2002).

The below hedonic property value model represents the general form for such models:

$$P_i = \beta_0 + \beta_1 H_i + \beta_2 S_i + \beta_3 N_i + \varepsilon_i$$

Here, the dependent variable is P_i, home sale price. H_i is a vector of property characteristics (which would include proximity to advanced bike facilities and density of these facilities in a buffer zone), S_i is a vector of school characteristics, and N_i is a vector of neighborhood characteristics (Liu & Renfro, 2014). Furthermore, the unique structure of Oregon's property tax system via Measure 5 and Measure 50 has led to large heterogeneity across properties in terms of property tax liabilities, this analysis follow's Liu and Renfro's (2014) specification to also include an AV/RMV-ratio (assessed value to real market value ratio) variable to capture the capitalization effects of varying property tax liability. This model utilizes an ordinary least squares (OLS) mixed-effects approach to incorporate a combination of time-variant and –invariant variables, and each coefficient describes the marginal value to the homeowner of improvements or amenities in each vector. A prior effort to construct a model relating walkability (in strict terms of proximity) to property value found no impact of walkability on property values in industrial zones, so it is likely that green space or other active transportation infrastructure will be similarly irrelevant; our estimation and analysis will not include an industrial component (Pivo & Fisher, 2011).

While many property value models that relate green space (and trail infrastructure) and walkability to residential property values have been developed, there are fewer empirical studies that consider commercial or industrial property. A commercial property value model can take on the same form as above, with a modified set of explanatory variables. One previous effort to analyze the value of office space in Peoria, Illinois included Moody's commercial property price index (CPPI), "green" building elements, floor size, parking ratio, existence of food service facilities, number of stories, years of construction and renovation, proximity to transit, location (urban or suburban), and class of building (Monson, 2009). Additionally, prior studies have found that traffic-calming measures, including changes to roadways that intend to reduce traffic speeds or motor vehicle traffic volume or to improve safety for all users, improve business in commercial zones (Drennen, 2003; Jaffe, 2015). For commercial properties, building characteristics may include square footage, LEED certification, and age. The neighborhood characteristics (N_i) vector is the location of the key greenspace and walkability variables, as well as proximity measures (greenspace and CBD or neighborhood centroid), median income by census tract (as a proxy for consumer spending), and crime rate.

For property value models, a semi-logarithmic approach is preferred, because in addition to narrowing output value range and minimizing heteroscedasticity, this form provides coefficients that directly represent percent impact on the dependent variable (Gulyani, Bassett, & Talukdar, 2012). Our proposed model takes the following form, and can be applied to both residential and commercial property types, given adequate property sales data:

$$\ln P_i = \beta_0 + \beta_1 H_i + \beta_2 S_i + \beta_3 N_i + \varepsilon_i$$

In following sections, we will apply the above hedonic price property value model to properties sold in the City of Portland. The estimated coefficients can subsequently be used to predict property value changes impacted by the Green Loop concept. However, due to limited data and sample size of commercial and industrial property sales, we focus only on residential properties in this study.

II-3. Additional Sustainability Impacts

There are many social and environmental benefits that the proposed Green Loop project would provide that are not accounted for in the property value, economic impact or business activity analysis. This section provides a brief overview of these benefits and a basic benefits transfer framework through which they can be analyzed.

Mode Shift

The literature shows that construction of new bike lanes and paths increases the percentage of recreational and commuting cyclists, and improvements to existing facilities draw increased active transportation traffic as well (Barnes, Thompson, & Krizek, 2006; Dill & Carr, 2003; Nelson & Allen, 1997; Tilahun, Levinson, & Krizek, 2007). A 2006 study of mode shift in the Minneapolis-St. Paul area following the construction of extensive new urban bicycle facilities in the 1990s found that bicycle mode share increased by 0.3 percentage points (an increase of 17.5% - from 1.7% to 2.0%), and a cross-sectional 1997 analysis of data from 18 U.S cities found that each mile of bikeway per 100,000 residents was associated with a 0.069% increase in bicycle commuting (Barnes et al., 2006; Nelson & Allen, 1997). In 2003, Dill and Carr (2003) repeated that same methodology, incorporating more explanatory factors and data from 35 cities, and found a rate of almost 1% increase in mode share per additional mile of bikeway per square mile.

Additionally, Dill and Carr found that infrastructure improvements were the **only** class of explanatory variable with a statistically significant impact on bicycle mode share — socioeconomic traits, public support for cycling, and even weather patterns proved ultimately irrelevant. The authors caution that no cause-and-effect relationship can be inferred, but nonetheless affirm that if new facilities are constructed they will certainly be used (Dill & Carr, 2003). A stated preference study conducted in Minneapolis-St. Paul found that cyclists are willing to travel for up to twenty minutes longer in order to use a path separated from automobile traffic and on-street parking (Tilahun et al., 2007).

It is worth noting that there is a countervailing force at work: in heavily congested urban areas, any reduction in traffic resulting from modal shift towards bicycling is likely to be quickly dissipated, as driving commuters respond to increased lane space and shift their behavior accordingly (Cervero, 2002; Noland, 2001). This phenomenon results from latent demand — demand that expands with supply. It is probable that any free lane space or reduction in traffic will be short-lived at best, leaving greenhouse gas and congestion impacts nullified. If latent demand is not a factor, the reduction in vehicle miles traveled can be estimated by applying mode substitution factors and transportation elasticities to estimate mode shift (Litman, 2013). This ratio is more difficult to determine for cycling, because bicycle trips do not automatically replace car trips — individuals are more likely to choose an active mode of transport for shorter trips. A 2001 study of shopping trip transport choice in Austin, Texas, found that 73% of walking trips were substitutes for driving trips, but all such trips were very short in duration, totaling an average of 2.1 miles per individual per month (Handy & Clifton, 2001).

Assuming any reduction in motor vehicle miles traveled and increases in active transportation mode shares persist in the long run, the additional sustainability-related benefits derived from these investments into active transportation infrastructure and resulting mode share shifts can be categorized into the following: greenhouse gas emission (GHG) savings, congestion time savings, public health benefits, social benefits and ecosystem services. While these potential benefits may not be easy to quantify, they may nonetheless be significant.

GHG Emission Savings

It has been documented that carbon dioxide and carbon dioxide-equivalent emissions have negative environmental, economic and societal impacts, and these impact may be measured by quantifying the economic costs of coastal destruction, increased disease, decreased food production, and other factors. These impacts are typically aggregated and measured as the marginal cost of an additional metric ton of CO_2 emissions, and termed the social cost of carbon, or SCC. A U.S government interagency working group consisting of scientific and economic experts from Council on Environmental Quality, National Economic Council, Office of Energy and Climate Change, and Office of Science and Technology Policy, EPA, and the Departments of Agriculture, Commerce, Energy, Transportation, and Treasury publishes estimates starting in 2010 with updates and revisions in 2013 and 2015. These estimates were created by averaging predictions from the three prevalent integrated assessment models (DICE, FUND, and PAGE), and Figure X below presents the SCC forecast out to 2050 at varying discount rates (Interagency Working Group on Social Cost of Carbon, 2013).

Social Cost of CO_2, 2015-2050 [a] (in 2007 Dollars per metric ton CO_2)
Source: Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866 (May 2013, Revised July 2015)

	Discount Rate and Statistic			
Year	5% Average	3% Average	2.5% Average	3% 95th percentile
2015	$11	$36	$56	$105
2020	$12	$42	$62	$123
2025	$14	$46	$68	$138
2030	$16	$50	$73	$152
2035	$18	$55	$78	$168
2040	$21	$60	$84	$183
2045	$23	$64	$89	$197
2050	$26	$69	$95	$212

[a] The SC-CO_2 values are dollar-year and emissions-year specific.

Figure X. Estimate of Social Cost of CO_2 (2010-2050)

Regardless of the dollar amount attributed to the known damage caused by increased GHGs, transportation contributes to total emissions. According to a 2010 report for the Transportation Research Board, the United States collectively emits 7,150 million metric tons of CO_2e per year, and over a quarter of that comes from the transportation sector. Of that quarter, 61% comes from passenger cars and light trucks — approximately 18% of total U.S. emissions (Gallivan & Grant, 2010). The United States Environmental Protection Agency (EPA) produces similar estimates, reporting that in 2013, transportation was responsible for 27% of total emissions, and points out that this number has increased 16% since 1990 (although new fuel economy standards implemented in 2005 have partially reversed this trend) ("Greenhouse Gas Emissions," 2015). Reducing automotive travel, and thus GHG emissions, is a vital part of the effort to control global warming. The proposed Green Loop concept, as investments into active transportation infrastructure that can potentially increase cycling and pedestrian mode shares, can contribute towards reducing GHG emissions and lowering social costs of carbon.

Congestion Time Savings

Reducing the number of vehicles on the road provides another benefit—savings in the form of time for commuters. The value of travel time, or VTT, is calculated as the product of time spent traveling and a given unit cost. This unit cost varies depending on a variety of factors, including trip characteristics and individual traveler preferences, but is usually estimated at 25-50% of the prevailing wage (Victoria Transport Policy Institute, 2013). Congestion imposes additional costs in the form of uncertainty, because the perceived value of time, especially when commuting, increases if delays are unexpected (Economic Development Research Group Inc., 2005).

One interesting exception to the standard VTT model occurs when individuals choose to walk or bicycle to work: many who do so report that they actually derive value from their commute, enjoying the first 20-40 minutes (although this effect decreases or disappears after 90 minutes) (Victoria Transport Policy Institute, 2013). By facilitating easier active transport commutes in the central Portland area and decreasing congestion, the Green Loop potentially increases VTT savings in two different ways.

Public Health Benefits

"The built and natural environment in which they live, by the social environment and by personal factors such as gender, age, ability and motivation" (Edwards & Tsouros, 2006) are essential factors in people's decision to participate in physical activities such as bicycling, jogging or walking. Infrastructure investments such as the proposed Portland Green Loop serves a crucial role in the promotion of active transport by "creating environments and opportunities for physical activity and active living" (WHO, 2006), leading to lower inactivity rates, which tend to decrease healthcare costs and productivity costs related to poor health. A 2006 report published by the National Cooperative Highway Research Program (NCHRP) looked at ten different attempts to quantify these costs on an annual basis and produced a median result of $128 worth of health cost savings per capita per year (the lowest value was $19, and the highest was $1,175) (Transportation Research Board, 2006).

In order to determine the value of public health benefits derived from the Green Loop Project, it would be necessary to identify the total number of new users, and multiply that by estimated annual health benefit (Atlanta Beltline Community Connector, 2013). Individual willingness to engage in cycling in Portland can be characterized along a continuum, ranging from "unwilling to bike at all" to "fearless" of even the most dangerous routes. The majority (about 60%) falls into a group termed "Interested but Concerned" in a report for the Portland Office of Transportation (Geller, 2009). These individuals like the idea of cycling, but safety concerns keep them off of roads. By creating a more welcoming and car-free environment, the Green Loop Project has the potential to attract new cyclists from this demographic.

Social Benefits

There is a large body of recent literature that investigates the social benefits of green space (Kuo, 2011). Such studies indicate that green spaces, especially in urban environments, are linked to reductions in crime, increased perceptions of connectivity and support and stronger community engagement.

Kuo and Sullivan (2001) found conducted regression analysis of the relationship between vegetation and number of police reports filed in 98 inner-city apartment buildings in the Ida B. Wells public housing project in Chicago over the course of two years. They showed that the existence of vegetation outside of buildings was connected to significant reductions (approximately 40%) in both violent crime and property crime. A 1992 comparison of violent incident rates in Alzheimer's patients across five assisted living facilities in British Columbia found that facilities that had recently been remodeled to provide residents with access to green space halted the conventionally-expected increase in violence over time (due to the degenerative nature of the disease). At facilities without green space, violent incidents increased by 681%, while at those with gardens, the rate actually declined by 19% (Mooney & Nicell, 1992).

An analysis of information compiled in the 2000-2001 Los Angeles Family and Neighborhood Study across sixty-five census tracts in Los Angeles determined that residents in areas with parks (as identified using county geographical data) report higher levels of mutual trust and willingness to help one another, even when a variety of other demographic and locational attributes are taken into account (Cohen, Inagami, & Finch, 2008). In 2009, Dutch researchers examining data from the second Dutch National Survey of General practice (DNSGP-2) in comparison to the National Land Cover Classification (NLCC) database found that, over a sample of over 10,000 individuals, proximity of less than 1km to green space was related to a higher perception of social connectivity and support and lower reported levels of loneliness. A wide variety of controls were used, including actual level of social engagement (as measured by reported interactions), and proximity to green space was the only reliable predictor of perceived social support and decreased loneliness (Maas, van Dillen, Verheij, & Groenewegen, 2009).

Taken together, the above studies offer support for the social and psychological value of green space.

Ecosystem Services

The proposed Green Loop Project is described as featuring a "dense, tree-lined path" for cyclist and pedestrian use. A widely-cited article from the 1997 edition of *Nature* identifies seventeen different types of economic benefits that can be derived from natural environmental features, and of these seventeen, six are considered to have major importance in urban areas: air filtration, micro-climate regulation, noise reduction, rainwater drainage, and recreational or cultural values (Bolund & Hunhammar, 1999; Costanza, 1997). A lined path of the type proposed offers all of these services, and although these benefits will be small in scope when compared to others described in this section, this distinct benefit type remains notable.

III. Case Studies

III-1. Overview

As part of our background research for this project, NERC reviewed reports on similar active-transport infrastructure initiatives across the nation, and interviewed key individuals who were involved in both the preliminary and implementation phases of each city plan to better understand the costs, benefits and impacts associated with the initiatives. We examined eight North American cities: Austin, TX; Chicago, IL; Denver, CO; Indianapolis, IN; Minneapolis, MN; New York, NY; Vancouver, BC; and Washington, DC, all of which had either updated their bicycle/pedestrian plans in the last five years or have implemented pilot infrastructure projects for cyclists or pedestrians.

In general, all plans researched featured community outreach prominently—it appears that the lowest-cost way to determine what a community needs is to ask. Almost all plans used bicycle and pedestrian counts to measure success, and three cities—Indianapolis, New York City, and Vancouver BC—conducted economic impact analyses of some part of their plan. Complete summaries of the above active transportation plans can be found in Appendix A1 of this report.

The city of Austin, Texas, has long sought to improve active transportation with a series of city plans, the most recent of which is the 2014 Austin Bicycle Master Plan. In this plan, the city describes improvements that took place following the previous Plan (issued in 2009), including 84 miles of bikeway construction and a documented 100% increase in bicycle mode share throughout the city, bringing the share of commuters choosing bikes to as high as 13% in some areas. Proposed future improvements include construction of 247 additional miles of bikeway (featuring physically protected lanes), increased efforts to shift short trips from automotive to bicycle mode by improving facilities, and connection of all desirable destinations to further increase mode share. These new improvements are estimated to cost $161 million, and such funds have traditionally been provided by the city general fund, voter-approved bonds, federal grants, and the local transportation fund (2014 Austin Bicycle Master Plan, 2014).

The Chicago Streets for Cycling 2020 plan includes the ambitious goal of providing bicycle facilities within a half-mile of every Chicagoan, and emphasizes the greater need for bikeways in more densely-populated areas. Additionally, the plan notes that improved infrastructure is best located in areas where ridership is already fairly high. When complete, their active transport network will be 645 miles long. Funding is will be derived from a federal grant, as well as various local sources. Notably, the city plans to pair bike lane installation with arterial resurfacing projects, thereby minimizing costs (Chicago Streets for Cycling 2020, 2012).

In Denver, Colorado, the Denver Moves Plan (2011) lays out a $119 million plan to construct an additional 270 miles of active transport paths, in addition to many “ease-of-use” improvements (such as intersection treatments) and removal of existing barriers. Funding is anticipated to come from state and federal grants. Metrics for success include traffic counts, mode shift estimates, crash data, geographic equity, and active transport infrastructure spending (Denver Moves, 2011).

Indianapolis, Indiana, is home to the Indy Cultural Trail, one of the first projects of its kind: an urban trail designed to create a sense of place and community while uniting all corners of the city. This trail, which cost approximately $63 million dollars to complete, was funded initially using $27.5 million from local investors and stakeholders, and later with $35.5 million in federal grants (including a $20.5 million Transportation Investment Generating Economic Recovery, or TIGER, grant from the Federal Department of Transportation) ("FAQs," Indyculturaltrail.org). In our interview with an involved city official, it was emphasized that the two-phase construction of the trail was essential—the first section (about 4 miles) allowed planners to learn from the experience and construct the second half more efficiently. Additional greenways improvements are discussed in the Indy Greenways Full Circle Master Plan, which focuses on enhancing access to the Cultural Trail (referred to as an "engine" of the greenway system). Major plan objectives include completing and improving existing bikeways, creating a 64-mile circle that connects four parks at each corner of the city, and working to close existing network gaps. New construction is anticipated to total 139 miles, and cost a total of $44.2 million. An economic impact analysis conducted as part of the Full Circle Plan estimates that 90% of that cost will be recouped via increased property tax revenues (Indy Greenways Full Circle Master Plan, 2014).

The Minneapolis Bicycle Master Plan, released in 2011 and updated in 2015 to emphasize the importance of protected bikeways, sets the goal of constructing 183 miles of bikeways at a cost of $270 million, over the course the next 30 years. Progress is to be assessed by a wide variety of counts, including traffic counts, mode shift calculations, crash data, bicycle theft data, complaint counts, and counts of events designed to provide bicycle-related education and outreach (Minneapolis Bicycle Master Plan, 2011).

New York City released their comprehensive transportation strategy, Sustainable Streets, in 2008. Although this is a plan that includes all types of transportation, the goal of doubling bicycle commuting by 2015 is explicitly stated. Improvements include 200 miles of new bicycle facilities by 2009 and completion of the 1997 New York City Bicycle Master Plan (which delineates 909 miles of bikeways). Metrics for success include overall measures, such as number of bicycle commuters, number of crashes, and number of active transport facilities. Additionally, the New York City Department of Transportation funded an economic impact analysis, which used sales tax data to calculate economic activity before and after bicycle facility implementation. In general, the study finds that active transportation infrastructure improves economic activity (NYCDOT, 2008; 2012).

The city of Vancouver, British Columbia, most recently updated their greenways plan in 2010. The goal is to create a city-wide network of 17 bike routes, totaling 87.5 miles in length, that will combine with neighborhood-funded and -maintained greenways to create a complete network that leaves no resident with no more than a 25-minute walk or 10-minute bike ride away from such a facility. An additional notable goal is the city's effort to integrate public transportation and active transport, making all parts of the city accessible without the use of a car ("Greenways for walking and cycling", Vancouver.ca). In 2011, a short-term (two-month) impact analysis was conducted in order to determine the impact of two separated bike lanes built in the downtown area. This study indicated a small negative impact, but due to its short-term nature, it is unclear whether this negative impact was sustained. Evidence from other such studies indicates that it probably was not, but nonetheless, this short-term negative impact must be taken into consideration (Stantec, 2011).

In Washington, D.C., the 2005 Bicycle Master Plan, which focuses on improving existing bikeways and decreasing collisions, was followed in 2010 by a downtown bike lane pilot project that sought to monitor the success of three separate infrastructure improvements with the goal of applying the findings to future projects. Results for each of the three areas were distinct and are presented separately, but across all locations, public perception of the projects was favorable and bicycle improvements did not appear to come at a cost of automotive inconvenience.

III-2. Lessons from Interviews

Following our examination of active transportation plans in various cities around North America, we conducted semi-structured telephone interviews with planning officials in Chicago, Austin and Indianapolis in order to obtain further insight into their individual planning, implementation and evaluation processes. The subsequent paragraphs describe key lessons gleaned from these interviews.

Chicago

Chicago is of particular interest due to the emphasis on equity and distinct neighborhood traits—both concepts emphasized by the city contact, who sees the greenway plan as part of achieving broader social welfare goals. Additionally, young professionals—a demographic associated with economic growth--are typically more attracted to areas with healthy active transport systems.

The conversation hinged on Chicago's broad and inclusive approach to design: multiple public engagement events are continuously underway (including the "Slow Roll" neighborhood movement, originally out of Detroit, which organizes weekly bike rides geared towards riders of all ability levels), and our contact made particular note of the differing needs and traits of Chicago's nine neighborhoods, and indicated that spending time "on the ground" in each is vital to a successful plan. Chicago tracks mode share on a number of different levels—traffic counts occur in each neighborhood (at both rush hour and on a 24-hour basis), in addition to monthly counts at six downtown locations and quarterly counts at twenty locations along arterial routes. Infrastructure improvements are simultaneously noted, in order to connect changes in patterns with such improvements.

Austin

In our interview with a contact in Austin, public engagement was similarly key to developing the updated bike plan. An online survey was use to capture citizens' attitudes towards bicycling (similar to Geller's "Four Types of Cyclists" report referenced in Section XX). Specific efforts were made to hold planning meetings in neighborhoods with higher minority populations, in the interest of promoting equity. Most notably to our purposes, the city has put extraordinary effort into quantifying the impacts and benefits of bike facilities via the "Think Bike" workshop, a collaborative effort between the city of Austin and the Dutch Bike Embassy. The primary quantitative tool used was a new web-based transportation planning software called the MOVE Meter (developed by Dutch consulting team MOVE Mobility) that creates detailed maps showing congestion levels, trip lengths, and more; which can then be used to run hypothetical infrastructure scenarios and predict the changes that may occur in response. Using preexisting data, these predicted changes can then be translated into quantified impacts on health, time-saving, decreased costs, and more.

Indianapolis

To see a close parallel to the Green Loop concept, we look to Indianapolis, where the success of the Indy Cultural Trail described by our contact offers an example of the way in which a well-designed pedestrian thoroughfare can increase both active transport and sense of community and place. This trail, originally conceived as an urban version of the popular local Monon Trail, was funded by a variety of stakeholders, including local merchant associations and nonprofit organizations, all of which joined voices with the public in creating the initial design. Even during implementation, the plan remained dynamic, changing in accordance with community input.

III-3. Case Study Conclusions

In conclusion, all of the cities we examined as case studies significantly increased their bicycle facilities, and experienced increasing bicycle mode share in the past decade. Key lessons from these case studies are summarized in the table below, and detailed summaries of each city's bicycle/pedestrian infrastructure background, active transportation plans and evaluation methods are included in Appendix A1. Most cities consider safety, equitable accessibility, economic vitality, and health and environmental impacts as important goals in their plans. Some cities, such as New York, Austin and Minneapolis, also conducted multi-dimensional evaluation processes for their active transport plans or projects. However, we did not find consistent practices for the evaluation of urban greenways, thus limiting the comparability of projects and impacts. However, common themes do have significance for this project and are summarized below:

- **Public Engagement:** All cities engaged in significant public outreach, often to underserved areas. This technique was highlighted in the interviews, where our contacts unanimously cited this as key to both development and success.
- **Integration into Existing Networks:** By pairing new infrastructure improvements with preexisting networks, these cities both reduced the cost of improving active transport and arguably smoothed adoption by users.
- **Performance and Outcome Measurements:** Assessment is key to determining the efficacy of any public service. The cities that we researched noted plans to engage in a wide variety of assessment techniques, usually emphasizing changes in mode share and traffic counts.

By learning from other cities' greenway improvement experiences, the City of Portland can approach this infrastructure change in a way that is both equitable and efficient.

Table 1. Key Lessons from Case Study Cities

City	Total Active Transportation Infrastructure	Key Lessons
Austin	210 (2014)	• Implemented protected bike lanes • Captured short trips into bike trips • Built a comprehensive bicycle network • Multidimensional benefits analysis covers topics of mobility, environment, public health and livability.
Chicago	645 (by 2020)	• More focus and experience on protected bike facilities • Separate pedestrian plan provides tools and strategies for safer streets
Denver	270 (by 2020)	• Multiple facility types manual • 80% of moderate to high ease-of-use facilities
Indianapolis	250 (by 2024)	• Bike facility economic impact analysis examined impacts to property value, property tax, job creation, economic potential and retail sales • Cultural trail – connecting existing greenways system
Minneapolis	210 (2014)	• Public engagement during planning process • 6E strategy: education, encouragement, enforcement, engineering, equity and evaluation
New York	431 (2014)	• Multidimensional evaluation metrics of street redesign treatments • Economic impacts analysis of pilot projects
Vancouver, BC	88 (by 2020)	• Bicycle/pedestrian safety treatments study • Business impact study of pilot project
Washington, DC	131 (2014)	• Pilot study of evaluating facility treatments

IV.Economic Analysis

IV-1. Property Value Impacts

Following the traditional housing hedonic pricing model described previously in the literature review section, property values are typically determined by a combination of characteristics such as property characteristics (property size, age, taxation, etc.), regional and location characteristics (public school quality, safety, distance to central business district (CBD), land use pattern, etc.), and overall regional economic conditions. In addition to these characteristics, many studies identified access to transportation, especially access to bicycle and pedestrian facilities, as having potentially positive impacts on property values (Asabere & Huffman, 2009; Cortright, 2009). Therefore, we extend the general form of the hedonic pricing model to the following: $\ln P_i = \beta_0 + \beta_1 H_i + \beta_2 S_i + \beta_3 N_i + \varepsilon_i$

$$P_i = \beta_0 + \beta_1 H_i + \beta_2 N_i + \beta_3 B_i + \delta Y_i + \varepsilon_i$$

where, the dependent variable P_i is the property sale price, H_i is a vector of property characteristics, R_i is a vector of neighborhood characteristics include schools, neighborhood amenities and location, B_i is a vector of bicycle facility characteristics, and Yi is a vector of sale year dummy variables that captures the overall economic conditions. The estimators β_i and δ represent the marginal value of these factors to a homebuyer, and the ε (error) term represents the remaining residuals.

In order to construct the dataset for our estimation, Multnomah County residential property tax rolls (including property sales) from 2010-2013 were collected and aggregated. Basic property characteristics are included for each property in this dataset, including property square footage, year built, property code (indicating type of property), as well as property taxes assessed. In addition, we include a property tax variable, AV/RMV ratio (property assessed value (AV) divided by real market value (RMV)), which describes the percentage of a property's real market value on which property taxes are assessed. Previous studies (Liu & Renfro, 2014) have found that differential property tax liabilities such as those posed by Oregon's Measure 5 and Measure 50 have significant effects on property values. Typically, higher AV/RMV ratios, indicating relatively higher property tax liabilities, result in lower property sale prices, even after controlling for all other property and neighborhood characteristics. We also include the property sale year variable as a dummy variable to reflect general market and economic conditions during the year when the transaction took place.

Using the geo-location of each property, additional neighborhood and location amenity variables for each property were matched and joined. For example, literature has shown that school quality as an important determinant for property values. Each property in our dataset was matched to an elementary school catchment area, and standard testing reading and math scores, which served as proxies for school quality, were assigned to properties within catchment areas. A dataset showing incidence of crime in 2012 (number of crimes per 1000 residents) were assigned to each neighborhood in Portland to serve as a measure of neighborhood safety. Additionally, distance to CBD (central business district), representing access to jobs and public services, and population density, as a measure of the urban form of the area, are also determinants of property value. The distance from the each neighborhood centroid to downtown was assigned to properties to measure distance to CBD. Similarly, the population density of each Census block group was assigned to the spatial matched properties.

Two key variables are constructed to represent advanced bike facilities[2] characteristics at each property: distance to nearest advanced bicycle facility and advanced bike facility density within a half-mile radius (half-mile is a commonly used buffer zone distance for measuring bike facility accessibility in bike/greenways studies (Lindsey et al., 2004a)). The first variable represents the availability and ease of access to advanced bike facilities from each property, and the second variable represents the extent of the advanced bike facility network around the property. Figure X shows the geographic distribution of advanced bike facilities in Portland (both distance to nearest facility and density of bike facilities). Although properties are, on average, only 0.68 miles (3,602 feet) away from the nearest advanced bike facility and have more than 0.74 miles (3,896 feet) of facilities within a half-mile radius, the spatial distribution of the bike amenities are not equally spread within the city boundaries, and drop off significantly along the edges of the city.

Transactions which did not accurately reflect actual market value of properties were dropped from the dataset, including “distressed” transactions such as foreclosures and short sales or transactions not classified as “arm’s length”. Finally, because we will only consider residential properties, including both single-family homes (SFH) and multi-family homes (MFH: townhomes or individually owned condominiums), all other property types were dropped from the dataset. The distribution and value of property transactions by neighborhoods between 2010 and 2013 is shown in Figure X below.

[2] Given the types bike/pedestrian facilities proposed in the Green Loop concept, we will only consider the impact of prioritized bike facilities, which include cycle tracks, buffered or separated bike lanes and Bike Boulevards, on property values in order to property characterize the potential impacts of the Green Loop. We will refer to these types of bike/pedestrian facilities as “advanced bike facilities” in the rest of this report.

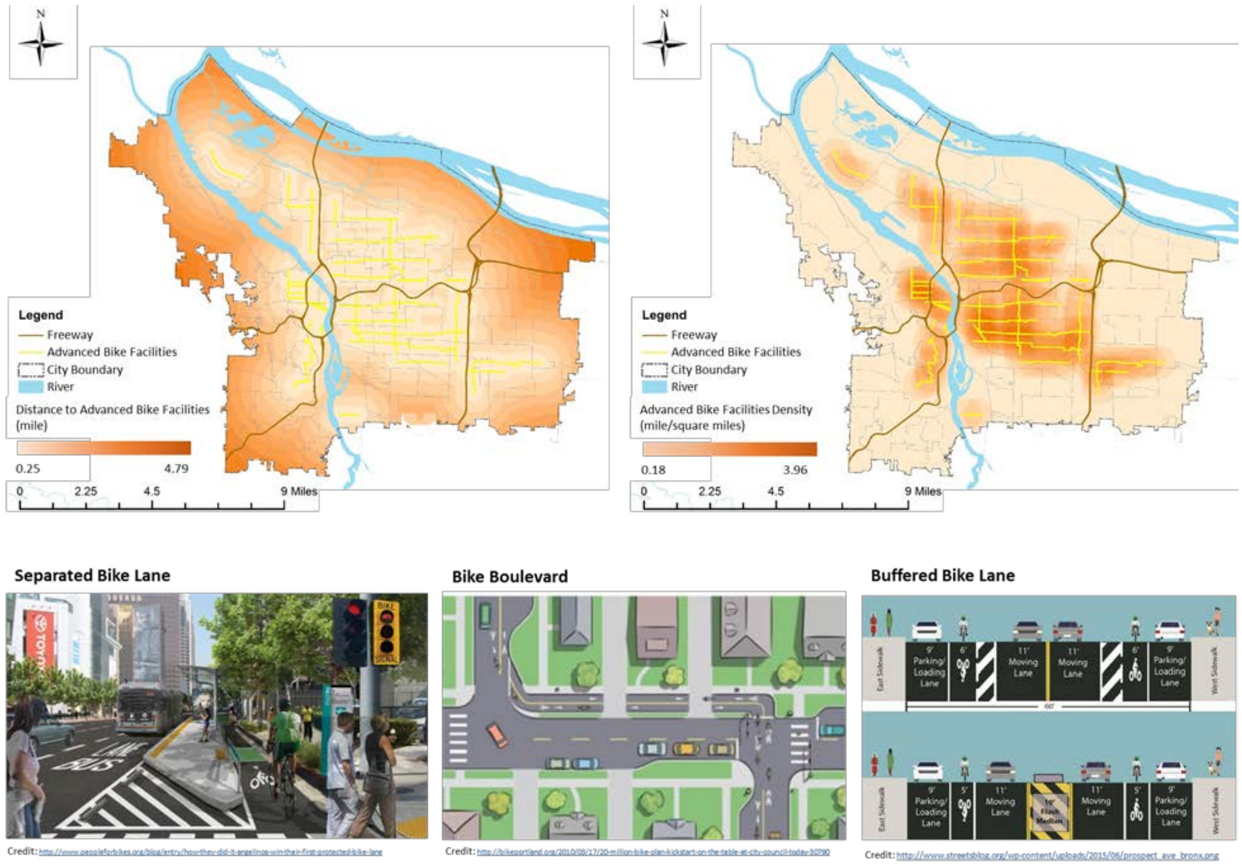


FIGURE X. Distribution (distance to nearest and density) of Advanced Bike Facilities in Portland

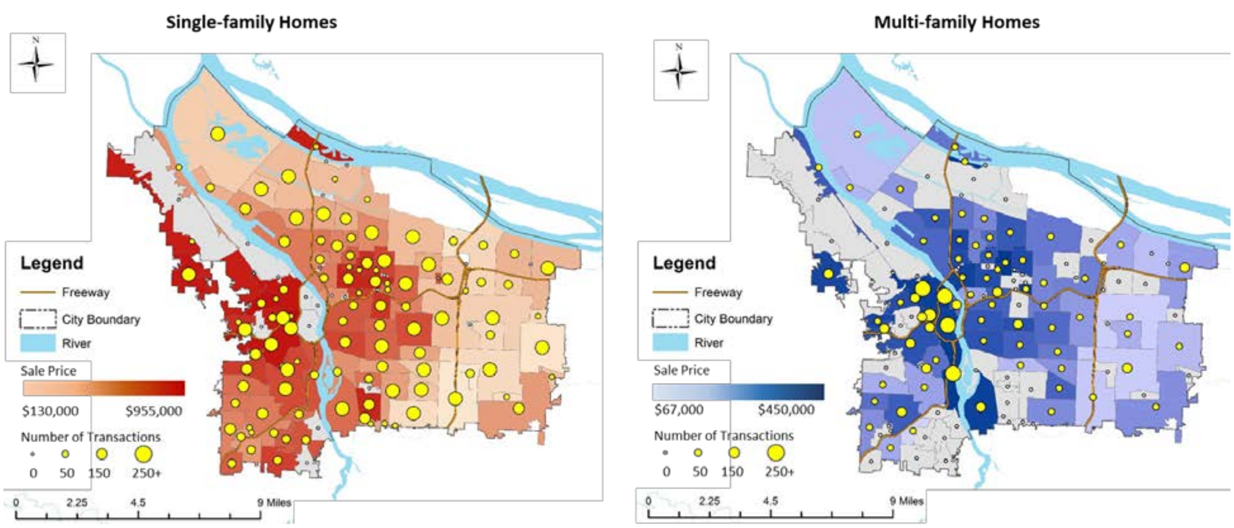


FIGURE X. Distribution and Values of Property Transactions by Neighborhoods (2010-2013)

Table 1. Variable Descriptive Statistics

Variables	Average (N=21100)	Single-family Home (N=17600)	Multi-family Home (N=3500)
Sale characteristics			
Sale price	$314,199	$316,573	$302,264
Property characteristics			
Age of property	59.55	65.46	29.85
Size of property (sqft)	1625	1721	1140
AV/RMV ratio	65.33	62.72	78.46
Neighborhood characteristics			
Reading score	75.34	73.31	85.52
Math score	67.93	65.73	78.99
Distance to CBD (mile)	4.15	4.45	2.63
Crime rate per 1000 residents	84.9	70.3	158.8
Population density (person/square mile)	7481	6835	10731
Bicycle facility characteristics			
Distance to nearest bike facility (feet)	3514	3723	2463
Bike facility density (feet in half-mile radius buffer zone)	4012	3693	5613

Table X above illustrates the descriptive statistics of our cleaned dataset of property sales between 2010 and 2013, including variables that describe property, neighborhood and bicycle facility characteristics. Overall, residential real estate in Portland sold at an average price of $314,199, with single family homes valued at approximately $316,573 and multi-family homes at $302,264, respectively. When compared to multi-family homes, single-family homes tend to be older (building age is 65 years on average compared to nearly 30 years), larger (1721 sq-ft compared to 1140 sq-ft) and have lower property tax liabilities as a percentage of their real market values (RMV). In addition, single-family houses are typically located in lower density area further away from the CBD. Multi-family homes are typically located in more central locations with better access to advanced on-street bike facilities, both in terms of distance to the nearest facility or availability of a denser network of bike facilities.

Regression Models – Ordinary Least Square (OLS)

We first estimated a pooled regression model with properties from both residential types, and found that the residential property type (single-family home or multi-family home) significantly influences property value. We then proceeded to estimate a restricted model to check for any structural change in the determinants of property values for the two different types of homes, and found evidence that supports structural change (Chow test - $F = 155$, $p<0.01$). This indicates that the determinants of property value may affect single-family homes and multi-family homes differently, which may be due to differences in consumers' preference for amenities and neighborhood characteristics when they are in the market for SFHs as opposed to MFHs. Therefore, we estimate two separate models – SFH Model (Model 1) and MFH Model (Model 2) – for the ordinary least squares (OLS) specification.

Table 2. OLS Regression Model Results

Variables	SFH Model (Model 1)	MFH Model (Model 2)
N	17600	3500
(Intercept)	50650 ***	-25750
	(9503)	(31210)
Property characteristics		
Age of property	310 ***	-887 ***
	(35.2)	(73.5)
Size of property	158 ***	322 ***
	(1.2)	(4.5)
AV/RMV ratio	-204 ***	-805 ***
	(72.6)	(188)
Neighborhood characteristics		
Reading score	904 ***	1704 **
	(193)	(681)
Math score	532 ***	-1026
	(161)	(656)
Distance to CBD	-22740 ***	-28930 ***
	(753)	(2399)
Crime rate per 1000	-226 ***	38**
	(20.2)	(16.3)
Population density	-1.18 ***	1.40 ***
	(0.37)	(0.23)
Bike facility characteristics		
Distance to nearest bike	-0.46	-2.63 ***
facility (feet)	(0.30)	(-0.85)
Bike facility density	2.39 ***	6.02 ***
(feet in half-mile buffer zone)	(0.25)	(0.55)
Sale year (Reference = 2010)		
2011	-15730 ***	-10420
	(2650)	(6548)
2012	-3499	14760 **
	(2538)	(6598)
2013	29320 ***	41310 ***
	(2470)	(6185)
Adjusted R^2	0.669	0.694
F statistics	2738	611
(p value)	(0.000)	(0.000)

Notes: *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

For single-family homes, property values are positively related to the size of the property and age of the property, and estimated coefficients are statistically significant at the 1% level. Each additional square-feet contributed approximately $158 worth of marginal value, while building age contributed $310 for each additional year. This may be because older homes in Portland tend to have larger lots with bigger yards (which is not captured in other variables in our model), and historical construction and design may provide desirable attributes for home purchasers as well. In addition, a single family home with higher percentage of property real market value that is assessed property taxes (as indicated through the AV/RMV ratio) has a property value that is $204 lower for each percentage point, all else equal. As expected, neighborhood characteristics are significant determinants of property values for single family homes: homes located in school districts with better reading and math scores in elementary schools are more valuable; properties closer to CBD, with easier access to transit and public service, also have higher values; neighborhoods with higher population density and higher crime rates tended to have lower property values. Bicycle facility characteristic coefficients indicate positive and statistically significant effect of availability of advanced on-street bike facilities within a half-mile buffer zone – each additional foot increases property values by $2.39 and proximity to these bike facilities increases values by $0.46, after controlling for all other variables, after controlling for other determinants. These results, taken together, indicates that consumers who are in the market for SFHs prefer to be both closer to advanced bike facilities, and to have access to a dense network of bike facilities. An additional quarter mile[3] of bike facilities within a property's half-mile radius buffer zone is estimated to increase SFH property values by approximately $3,155 while being a quarter mile closer to the nearest bike facility increases these values by $607. Year of sale fixed effects estimates are generally statistically significant.

For multi-family homes, we found that coefficient estimates were similar to single-family homes for a few characteristics, but found that others did not match both in terms of sign (negative or positive) and magnitude. Each additional square-feet of space contributed $322 to multi-family home values, and each additional percentage point of its AV/RMV ratio negatively impacted values by $805. Multi-family home values are positively driven by population density and lower building age, indicating differing preferences for this population. It is reasonable to suspect that these properties are usually located in mixed-use zones (both commercial and residential) with convenient access to a varieties of activities, which is correlated with both higher densities and relatively higher crime rates. Both estimated bicycle facility characteristic coefficients are positive and statistically significant. Being an additional foot closer to advanced on-street bike facilities results in a $2.63 increase in MFH property values, and an additional feet of advanced bike facility density in a property's half-mile buffer zone translates to an increase of $6.02. This means that an additional quarter mile of bike facilities within a property's half-mile radius buffer zone is estimated to increase MFH property values by approximately $7,946, and being a quarter mile closer to the nearest bike facility increases these values by $3,472.

For both residential property types, increases in the provision of bike infrastructure in the form of advanced bike-priority facilities lead to significant increases in property values. However, this impact is of greater magnitude for multi-family homes than for single-family homes.

[3] Each mile is equivalent to 5280 feet. A quarter mile is equal to 1320 feet.

Regression Models – Spatial Autoregressive Model (SAR)

Homebuyers and realtors often assess a given property value by referring to prices of nearby sold or listed properties (using a comparable sales assessment approach), since properties that are more close by are better indicators of how much a property is truly worth (Cellmer, 2013; Conway, Li, Wolch, Kahle, & Jerrett, 2010). This is specified in the form of a spatial dependency effect (spatial autocorrelation) and can be included in the hedonic property value models in the form of property value correlations with property values of homes sold in close proximity. Ignoring this spatial autocorrelation may lead to inefficient coefficient estimations in the OLS specification (Conway et al., 2010). Therefore, in this section, we extend the OLS regression specification and utilize a spatial autoregressive model (SAR) to control for the spatial autocorrelation effect through spatial regression techniques.

There are two common used spatial models: the spatial lag model, and spatial error model. Spatial lag model interprets spatial dependence as consequence of omitted variables. The general spatial lag model form is:

$$Y = \rho WY + X\beta + \varepsilon$$

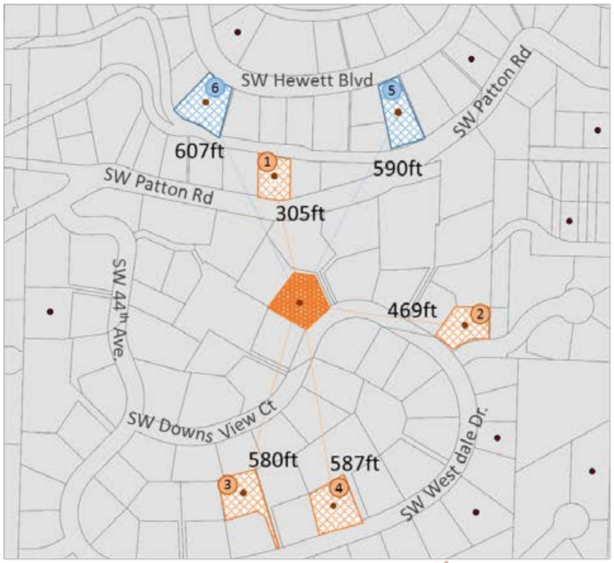
where ρWY is a spatially lagged dependent variable to represent the omitted variable in regression. p is the spatial lag parameter, while W is the spatial weighting matrix representing interaction between different locations (Conway et al., 2010). On the other hand, the spatial error model interprets spatial dependence as model misspecifications. The general spatial error model form is:

$$Y = X\beta + \lambda W\varepsilon + v$$

where the original error term from OLS is modeled as an autoregressive error term $\varepsilon = \lambda W\varepsilon + v$. λ is the spatial error parameter, while $W\varepsilon$ is the spatial error, which should be interpreted as the mean error from neighboring locations, and v is the independent model error (Cellmer, 2013; Conway et al., 2010).

A spatial weighting matrix W is constructed using two specific neighboring methods commonly used in the literature: k nearest neighbors (4-nearest neighbors) and specific distance based neighbors (within one-mile). This spatial weighting matrix is a representation of which properties are hypothesized to have the most impact on the property values at hand: k-nearest neighbors will capture the k nearest properties sold while the specific distance based method captures all properties sold within a specified circumference. These methods are illustrated in the figure below. Furthermore, the weighting matrix is row-standardized for further testing and modeling.

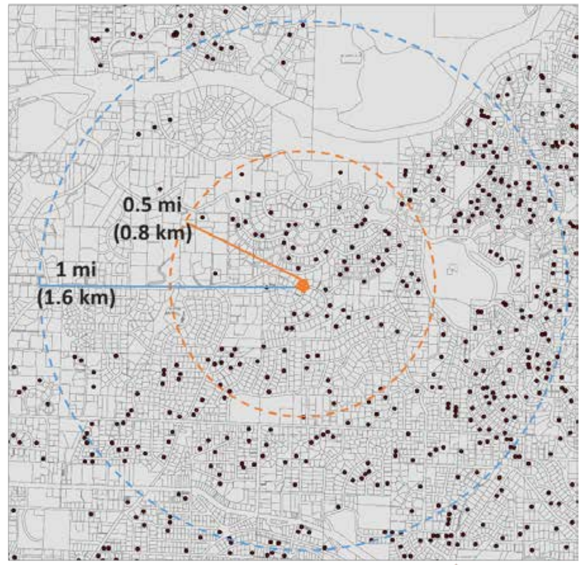
K nearest neighbors



Row-standardized weighting matrix for property

ID #	1	2	3	4	5	6
K=4	0.25	0.25	0.25	0.25	0	0
K=6	0.17	0.17	0.17	0.17	0.17	0.17

Specific distance based neighbors



Row-standardized weighting matrix for property

ID #	1	2	3	....	85	...	372
D = 0.5 mi	0.012	0.012	0.012	0.012	0.012	0	0
D = 1 mi	0.003	0.003	0.003	0.003	0.003	0.003	0.003

• Properties sold between 2010-2013

Figure 2. Spatial weighting matrix diagrams for two neighboring methods

LM (Lagrange Multiplier) tests are conducted first to determine the existence of the above described spatial dependence in OLS property value model. The technical procedure is attached in Appendix A2. The results show significant autocorrelation in both the lag term and error term in both the SFH and MFH models. The lag term spatial autocorrelation was stronger in the SFH model (Model 1), while the error term spatial autocorrelation was stronger for the MFH model (Model 2). In order to avoid overestimation of coefficients within the OLS property value model due to spatial autocorrelation, we proceed with a spatial lag model for SFHs (Model 3) and a spatial error model for MFHs (Model 4) using the 4-nearest neighbors weighting matrix method.[4]

Compared with the OLS models, the coefficients from spatial autoregressive models are smaller in magnitude, following the hypothesis that the OLS property value models tend to produce overestimations in the effects of variables on property values. By introducing spatial autocorrelation terms, the new estimated coefficients from Models 3 and 4 are more reliable, and we observe improvements in overall model fit as well. Similar to the OLS specifications, we see positive impacts of property size on property values and negative (although smaller) impacts remained for AV/RMV ratios for both SFHs and MFHs. Single family home property values increased with age ($135 per year) while multi-family property values decreased with age ($582 per year). Neighborhood characteristics impact

[4] Statistical tests showed better results with the 4-nearest neighbors method compared to the within one-mile distance neighbors method.

property values in similar ways when compared to our previous models, although again with attenuated coefficient estimates.

In single family homes, the bicycle facility characteristic coefficient again indicates positive and statistically significant effect of availability of advanced on-street bike facilities within a half-mile buffer zone – each additional foot increases property values by $0.84, after controlling for all other variables. Proximity to these bike facilities also increases property values of single family homes by $1.53 for each feet. These results reinforce OLS model results that indicate SFH buyers prefer to be close to advanced bike facilities, and to have access to a dense network of bike facilities. An additional quarter mile of bike facilities within a property's half-mile radius buffer zone is estimated to increase SFH property values by approximately $1,109 while being a quarter mile closer to the nearest bike facility increases these values by $2,020.

For multi-family homes, only the estimated the density of bicycle facility coefficient remains positive and statistically significant while being an additional foot closer to advanced on-street bike facilities results in a $1.95 increase in MFH property values, although this result is not statistically significant. Increases in the density of advanced bike facilities within a MFH property's half-mile buffer zone translates to an increase of $5.46. This means that an additional quarter mile of bike facilities within a property's half-mile radius buffer zone is estimated to increase MFH property values by approximately $7,207.

Table 3. Spatial Autoregressive Model Results for Portland Property Sales Price during 2010-2013

Variables	**SFH Spatial Lag Model (Model 3)**		**MFH Spatial Error Model (Model 4)**	
(Intercept)	-5189 *** (1331)		-2351 (52549)	
Property characteristics				
Age of property	135 *** (28)		-582 *** (112)	
Size of property	124 *** (1.2)		322 *** (4.4)	
AV/RMV ratio	-300 *** (45)		-352* (193)	
Neighborhood characteristics				
Reading score	577 (-)		118 (1120)	
Math score	94 *** (13)		-76 (1059)	
Distance to CBD	-11448 *** (546)		-32864 *** (4342)	
Crime rate per 1000	-104 *** (16)		45 (34)	
Population density	0.36* (0.21)		1.5 *** (0.45)	
Bike facility characteristics				
Distance to nearest bike facility (feet)	-1.53 *** (0.21)		-1.95 (1.70)	
Bike facility density (feet in half-mile buffer zone)	0.84 *** (0.17)		5.46 *** (1.10)	
Sale year (Reference = 2010)				
2011	-14754 *** (1694)		-17680 *** (5051)	
2012	-1828 (-)		-743 (5335)	
2013	30173 *** (1475)		29775 *** (4910)	
	Log- Likelihood	-228040	**Log- Likelihood**	-45213
	AIC	456110	**AIC**	90458
	Rho	0.389	**Rho**	0.640
	LR test	3207.1 (0.000)	**LR test**	1412 (0.000)

Notes: *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Estimated Property Value Impacts of Green Loop

We estimate the overall impact on Portland property value as a result of proposed Green Loop infrastructure investments by applying coefficients from the above estimated models to properties across the city. The proposed Green Loop concept translates to additional advanced on-street bike facilities, decreasing the proximity of nearest bike facilities for many households and increasing the density of the bike facility network within each household's buffer zone. Multnomah County valid tax rolls for all residential properties in year XXXX were utilized, totaling 174,453 properties, including 156,052 single-family homes and 18,401 multi-family homes.

The addition of Green Loop bike infrastructure does not produce large changes in proximity to nearest advanced on-street bike facilities for most properties, but does significantly increase the density of bike facility length within a half-mile buffer zone of each property. In other words, we would expect more potential impacts to result from the increase in bike facility network density rather than from ease of access (distance to nearest facility).

Table 4. Descriptive Statistics for All Residential Properties

Variables	Average (N=174453)	Single-family Home Average (N=156052)	Multi-family Home Average (N=18401)
Property characteristics			
Age of property	61.95	65.64	30.67
Size of property (sqft)	1643	1704	1124
AV/RMV ratio	66.85	65.56	77.76
Neighborhood characteristics			
Reading score	73.81	72.72	83.13
Math score	66.28	65.09	76.35
Distance to CBD (mile)	4.43	4.60	2.97
Crime rate per 1000	82.4	73.16	160.8
Population density (person/square mile)	7230	6837	10409
Bicycle facility characteristics			
Distance to nearest bike facility (feet)			
Original	3663	3762	2822
Green Loop Scenario A	3644	3760	2662
Green Loop Scenario B	3643	3759	2656
Green Loop Scenario C	3644	3760	2666
Bike facility density (feet in half-mile buffer zone)			
Original	3751	3548	5135
Green Loop Scenario A	4130	3613	8510
Green Loop Scenario B	4199	3616	9140
Green Loop Scenario C	4112	3610	8373

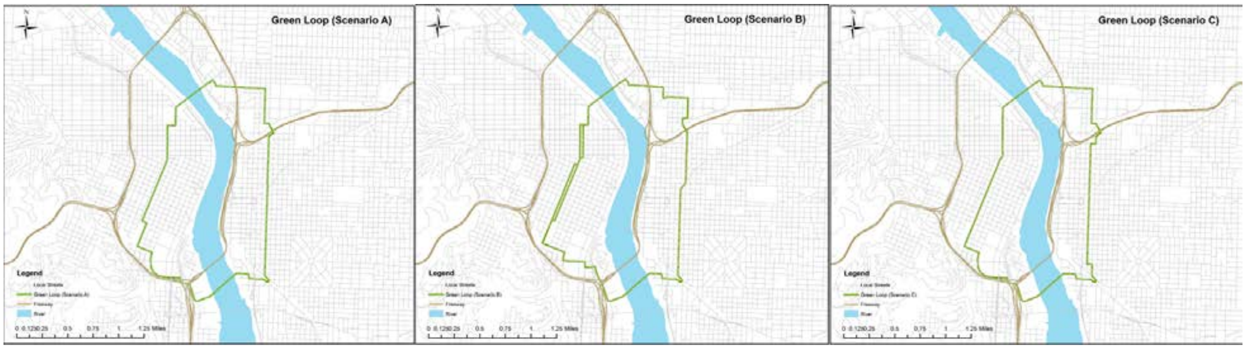


Figure 3. Green Loop Scenario A/B/C

We apply coefficient estimates from both the OLS and SAR model specifications for both single family and multi-family homes, and find that the introduction of Green Loop will generally increase property values. An average single-family home in Portland will have property values that increase from $333,135 to between $333,285 and $333,300 depending on the specific scenario (A,B or C), an average growth of around 0.05%. For multi-family homes, the average property value increases from $308,103 to between $327,999 and $332,642 depending on the specific routing scenario, an average increase of approximately 6.46% to 7.96%. Using coefficients from spatial autocorrelation models (which tend to be lower than OLS estimates), Green Loop infrastructure impacts on average property values still range from 5.88% to 7.26% for the various scenarios.

If we isolated only those properties where property values have been impacted, the effects are larger in magnitude. Table 5 illustrates property value changes for the properties affected (excluding all properties where property values are unchanged) by Green Loop infrastructure under the three routing scenarios. Because there are only very limited numbers of single family homes in close proximity to the Green Loop, we observe smaller property value impacts for these properties, averaging 1.45% using the OLS model and 0.82% using the SAR model. However, almost half of all multi-family properties benefit from higher values as a result of the proposed Green Loop concept, resulting in average increases of over 10% for all impacted multi-family homes.

Figure 4 below shows estimated aggregate changes of total property values in Portland. The total value increase exceeds $350 million for all three scenarios, with larger impacts concentrated in multi-family homes. This increase in property values could potentially cause positive impacts on Multnomah County's property tax base and resulting property tax revenue, although the interactions of assessed value, real market value and compression resulting from Measure 5 and Measure 50 will require additional analysis.

Table 5. Average Property Value Change in Impacted Properties by Scenario and Model

	Scenario	# of affected properties	OLS Model		SAR Model	
			Before	After	Before	After
Single-family home (SFH)	**A**	3527	$544,056	$552,075	$565,277	$569,945
			+1.47%		+0.83%	
	B	3740	$545,236	$553,350	$565,053	$569,770
			+1.49%		+0.84%	
	C	3533	$544,056	$551,647	$565,277	$569,699
			+1.40%		+0.78%	
Multi-family home (MFH)	**A**	8610	$375,817	$420,108	$373,489	$413,507
			+11.79%		+10.71%	
	B	8817	$374,059	$425,258	$371,637	$417,919
			+13.96%		+13.96%	
	C	8610	$375,817	$418,149	$373,498	$411,895
			+11.26%		+10.28%	

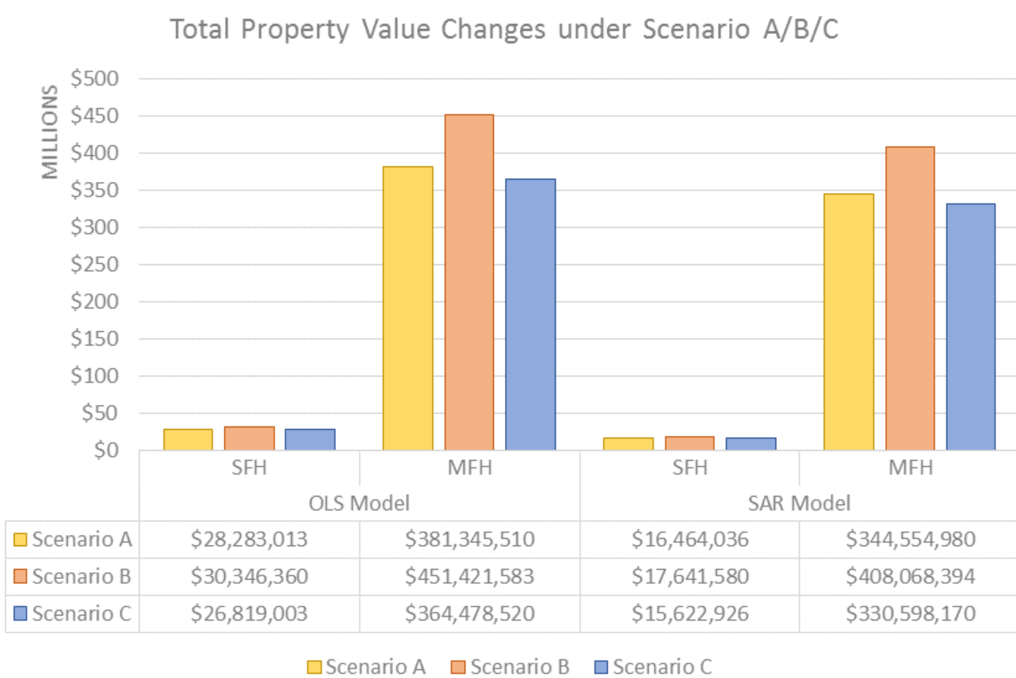


Figure 4. Total Property Value Impacts by Scenario and by Model

OLS Model | SAR Model

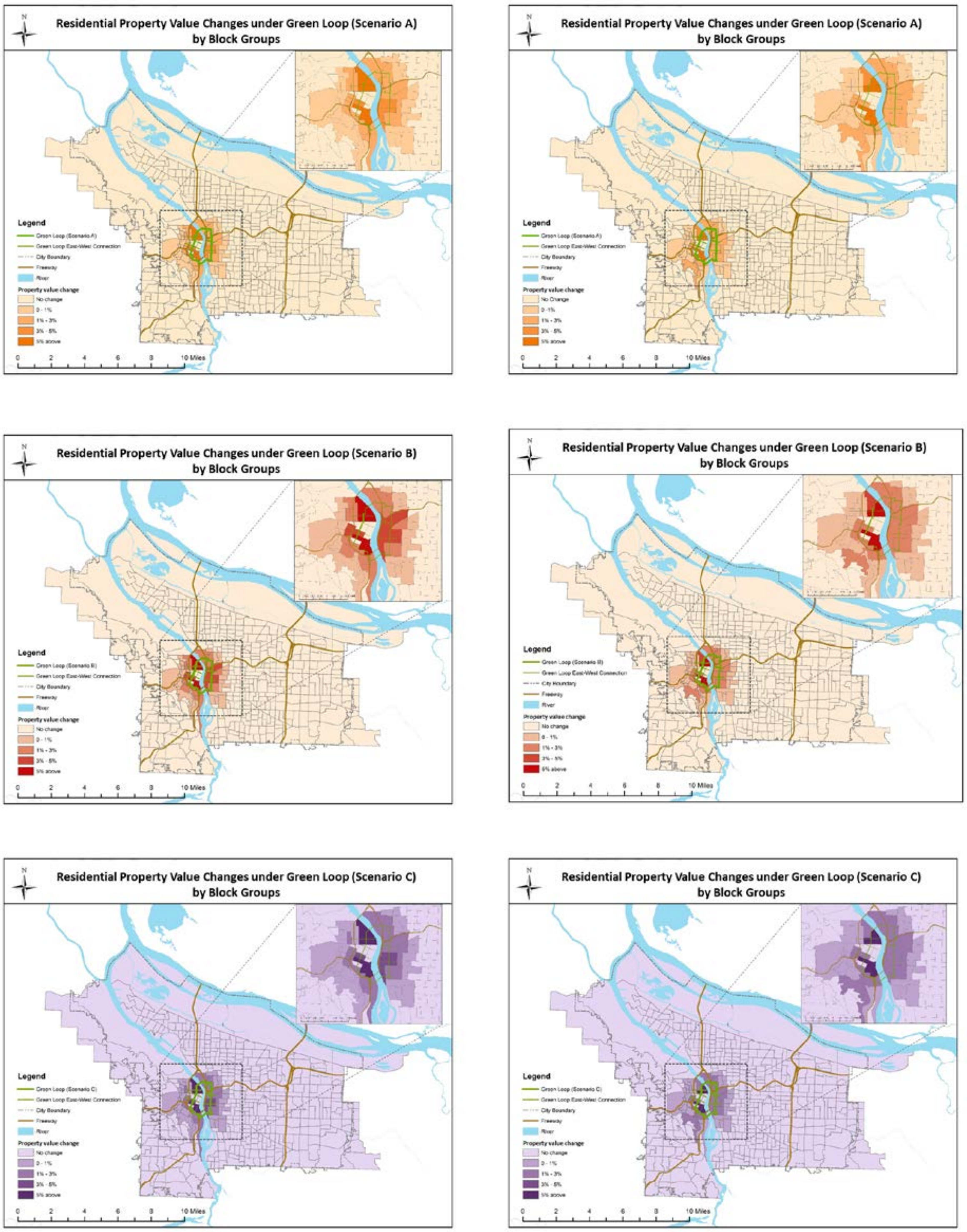


Figure 5. Geographical Distribution of Property Value Impacts by Scenario and by Model

Distribution of Property Value Impacts

Geographic Distributional Impacts

The above figures illustrate the geographic distribution of property value impacts across Census block groups, and find that properties with close proximity to the proposed Green Loop concept will see more property value impacts mainly due to higher density of advanced on-street bike facilities. We further parse property value changes in different geographic scales other to better understand how each sub-geography within central Portland neighborhoods or City Center sub-districts are affected by property value increases.

Since the proposed Green Loop concept is geographically located in the city center area, neighborhoods in central Portland are expected to see the most property value increases. Using the coefficients estimates from the SAR model, we estimate that 11 neighborhoods will observe property value changes, resulting in an overall property value increase of 5.27% and an average per unit increase of 0.98% for SFHs and 9.98% for MFHs. Among the impacted neighborhoods, the estimates show that the Old Down/Chinatown and Lloyd neighborhoods will benefit most from property value gains (Figure 6 & Table 6), possibly due to the greater prevalence of multi-family properties (as opposed to single-family homes or commercial properties) in these neighborhoods.

Using City Center sub-districts as geographic units and applying estimated coefficients from the SAR model, we find that 9 sub-districts will experience property value increases as a result of infrastructure investments from the Green Loop concept (with the exception of the Lower Albina sub-district). Total property values (and, thus, the property tax base) will experience growth of 10.95% in these sub-districts, with an average per unit increase of 2.13% for SFHs and 11.33% for MFHs. Similar to the central Portland neighborhood analysis, the Old Down/Chinatown and West End sub-districts benefit the most from property value gains (Figure 7 & Table 7).

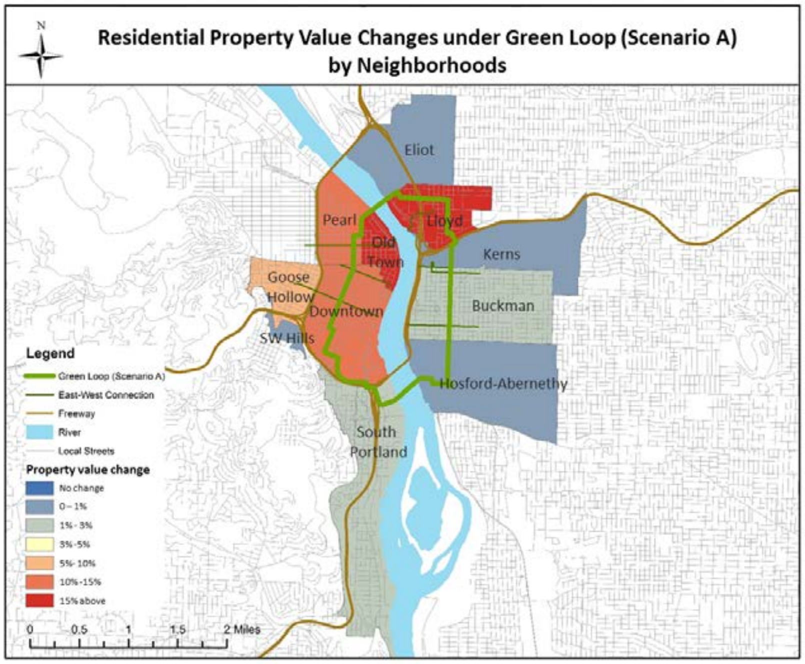


Figure 6. Property Value Changes by Neighborhoods under Scenario A

Table 6. Residential Property Value Changes by Central Portland Neighborhoods

Neighborhoods	SFH			MFH			Total	
	#	Avg. Value	%	#	Avg. Value	%	Value	%
Eliot	770	+$1,408	+0.37%	98	+$5,987	+1.41%	$1,670,886	+0.50%
Lloyd	8	+$8,868	+1.80%	87	+$46,212	+20.34%	$4,091,388	+17.26
Kerns	837	+$410	+0.09%	154	+$117	+0.05%	$361,188	+0.09%
Buckman	1185	+$3,037	+0.63%	118	+$25,963	+7.52%	$6,602,479	+1.08%
Hosford-Abernethy	2248	+$1,590	+0.33%	116	+$5,557	+1.62%	$4,218,932	+0.38%
Old Town/Chinatown	0	--	--	361	+$70,803	+24.40%	$25,559,883	+24.40%
Pearl	28	+$14,876	+2.98%	3033	+$51,903	+12.69%	$157,838,327	+12.59%
Downtown	8	+$9,513	+1.27%	1947	+$52,658	+13.16%	$102,601,230	+13.06%
Goose Hollow	194	+$4,861	+0.70%	954	+$20,171	+5.96%	$20,186,168	+4.41%
SW Hills	123	+$4,692	+0.71%	127	+$21,891	+7.36%	$3,357,273	+2.81%
South Portland	1348	+$1,231	+0.28%	1538	+$7,007	+1.77%	$12,436,154	+1.02%
Total	**6749**	**+$1,828**	**+0.39%**	**8533**	**+$38,280**	**+9.98%**	**$338,923,908**	**+5.27%**

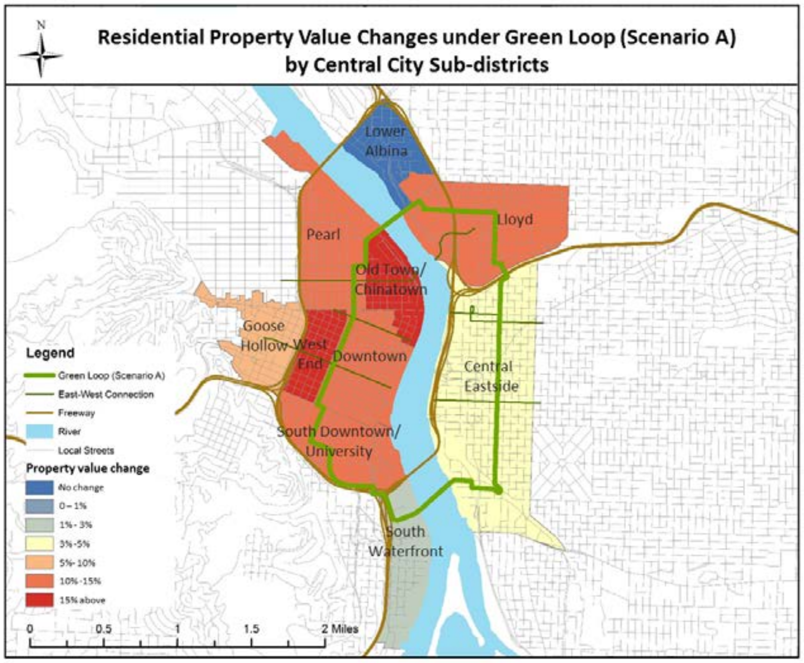


Figure 7. Property Value Changes by City Center Sub-districts under Scenario A

Table 7. Residential Property Value Changes by Central Portland Sub-districts

Sub-districts	**SFH**			**MFH**			**Total**	
	#	Avg. Value	%	#	Avg. Value	%	#	Avg. Value
Lower Albina	1	0	0	0	--	--	0	0
Lloyd	18	+$4,691	+0.79%	140	+$33,667	+13.97%	$4,797,818	+10.82%
Central Eastside	123	+$12,033	+2.76%	11	+$50,334	+18.15%	$2,033,733	+3.59%
Old Town/Chinatown	0	--	--	361	+$70,803	+24.40%	$25,559,883	+24.40%
Pearl	28	+$14,876	+2.98%	3211	+$49,026	+11.88%	$157,839,014	+11.78%
Downtown	0	--	--	377	+$59,541	+14.88%	$22,446,957	+14.88%
West End	1	+$15,173	+1.86%	481	+$59,933	+15.19%	$28,842,946	+15.14%
Goose Hollow	71	+$7,855	+1.45%	860	+$25,782	+8.03%	$22,730,225	+7.22%
South Downtown	7	+$8,705	+1.19%	1089	+$47,062	+11.68%	$51,311,453	+11.56%
South Waterfront	1	0	0	766	+$11,804	+2.84%	$9,041,864	+2.84%
Total	**250**	**+$10,459**	**+2.13%**	**7296**	**+$44,132**	**+11.33%**	**$324,603,893**	**+10.95%**

Further Distributional Impacts

Our estimations show that over 10,000 properties are positively impacted by infrastructure investments or improvements from the Green Loop concept. However, since the Green Loop concept is geographically located in central areas of Portland and bike facility impacts deteriorate as we move further away, most positive property impacts are estimated to be spatially concentrated in close-in areas. The following analysis examines the demographic characteristics of Census block groups where positive property values are expected from the Green Loop, and compares to overall demographic characteristics of Portland.

With respect to race and ethnicity, Portland's 442 block groups are on average 79.01% white while the 52 Green Loop impacted block groups have an average of 83.55% white. Our tests indicate that the racial and ethnic compositions are statistically significantly different between these geographic areas. Within these impacted block groups, only 16 of them have lower percentages of white population when compared Portland's median. In other words, the positive property value impacts from the Green Loop concept may disproportionately benefit Portland areas with higher proportions of white residents. However, the Green Loop may benefit a wider range of the population who hold jobs or go to school or engage in recreational activities in central Portland, but are not captured in the property value impact analysis.

The impacted block groups hold significant larger young populations as well as more educated populations (with education attainment of college or higher). It makes intuitive sense that Green Loop impact properties tend to be dominated by multi-family properties, which tend to attract a younger demographic. On the other hand, within the impacted block groups, we observe a higher than average percentage of populations living below 200% of the poverty line. More than half of the Green Loop impacted block groups have an average poverty level above Portland as a whole.

The proposed Green Loop concept is spatially concentrated in Portland's city center, which results in disproportionate distributions in property value impacts amongst different demographic groups. The impacted population tends to be white, young and well-educated but with lower-than-average income levels. These demographic characteristics generally mirror those of Portland city center residents where many young professionals or students reside in multi-family residences.

Table 6. Demographic Characteristics (City of Portland and Green Loop Impacted Block Groups)

Category	**Indicators**	**Portland Overall (N=442)**		**Green Loop Impacted Block Groups (N=52, Scenario B)**		**Difference**
		Median	Mean	Median	Mean	t statistics
Ethnicity	% white	80.98%	79.01%	85.62%	83.55%	- 3.37 ***
Age	% young adults (18-34)	26.57%	28.05%	41.98%	43.60%	- 6.32 ***
Education	% college or higher	79.56%	75.66%	90.54%	88.46%	- 9.37 ***
Poverty	% below 2 times poverty line	34.43%	35.17%	39.10%	39.98%	-1.83 *
Income	Household annual income	67980	78690	61580	74710	0.61
Notes: *** significant at 1% level; ** significant at 5% level; * significant at 10% level.						

IV-2. Economic Impacts

This section describes the economic impact analysis conducted to characterize Green Loop infrastructure investment scenarios to the regional and state-level economy. This analysis provides a quantitative benchmark measure of the scope and scale of the investment in terms of its economic contributions and activities (i.e., employment and wages) and fiscal (i.e., taxes) contributions at the local, regional, and state levels. Since the Portland Green Loop is still in its conceptual stage of development, we assume that funding for the Green Loop concept infrastructure investments come from an external source (e.g., Federal grants or philanthropy).

Economic Impact Analysis - Description of IMPLAN

Northwest Economic Research Center (NERC) used the data on employment and output changes as inputs for IMPLAN, an input-output (I/O) based economic model that estimates the total macroeconomic impacts resulting from changes at a detailed geographic and economic level. A portion of the new wages paid to the firm's employees will be spent on the output of other firms. Likewise, a portion of the new intermediate materials purchased by the expanding business will increase the sales of other firms, which will hire additional workers, who will spend some of their additional income, and so on. The direct impacts estimated through BPS and PBOT's infrastructure investment scenario development process are NERC's primary inputs to IMPLAN.

IMPLAN models a region's economy as a highly interconnected network of firms and households spread across the state. It is constructed from Social Accounting Matrices (SAMs), which are based on the input-output tables of purchases and sales across industries available from the Bureau of Economic Analysis (BEA) and supplementary data from other publicly available sources. IMPLAN's matrices reflect the actual industry interactions

IMPLAN Impacts

The impact summary results are given in terms of employment, labor income, total value added, and output:

Employment represents the number of annual, 1.0 FTE jobs. These job estimates are derived from industry wage averages.

Labor Income is made up of total employee compensation (wages and benefits) as well as proprietor income. Proprietor income is profits earned by self-employed individuals.

Total Value Added is made up of labor income, property type income, and indirect business taxes collected on behalf of local government. This measure is comparable to familiar net measurements of output like gross domestic product.

Output is a gross measure of production. It includes the value of both intermediate and final goods. Because of this, some double counting will occur. Output is presented as a gross measure because IMPLAN is capable of analyzing custom economic zones. Producers may be creating goods that would be considered intermediate from the perspective of the greater national economy, but may leave the custom economic zone, making them a local final good.

within and between regions, and include the government sector which is often omitted from this type of analysis. Put simply, they present a map of the economy that illustrates the flow of money, resources, and employment through the sectors of a geographic area. IMPLAN thus simulates the wave of spending and hiring spurred by changes in one or more industries. In addition to results in the private sector, the model estimates impacts to disposable income and tax revenue.

The magnitude of these simulated changes relies on estimations of the historical relationships between households, industries, and the government sector. In the model, a production function for each industry describes the numerous resources from other industries and households each industry requires to produce its output. When the industry's sales increase, the specific number of additional employees it will hire and the amount of additional material inputs it purchases in IMPLAN's simulations are based on the past hiring and purchasing activity in that industry and region.

Ultimately, IMPLAN's analysis produces results of three types: direct, indirect, and induced.

- **Direct Impacts**: These are defined by the model and placed in the appropriate industry. They are not subject to multipliers. In this case, revenue and employment were aggregated from BPS and PBOT infrastructure investment scenarios and allocated to the appropriate industries.
- **Indirect Impacts**: These impacts are estimated based on national purchasing and sales data that model the interactions between industries. This category reflects the economic activity necessary to support the direct impacts of other firms in the supply chain – the "ripples" in the economy resulting from an initial direct impact.
- **Induced Impacts**: These impacts are created by the change in wages and employee compensation. Employees change purchasing decisions based on changes in their income and wealth.

Economic Impact Analysis – Results

Working with a few conservative estimates of potential investment scenarios, we find that even a relatively low-level of infrastructure investment may yield high economic impacts. General infrastructure investments for the Green Loop concept include striping, stormwater drainage, bollards, art boxes, planters, trees, paving, lighting, seating, etc. A **Low Investment** test scenario is estimated at $10,427,929 with 2% going towards public art installations. An alternative **High Investment** test scenario identifies seven sites where potential signature park investments may be made, and is estimated at $67,973,039. Note that these are hypothetical scenarios meant to illustrate the range of economic impacts associated with different levels of infrastructure investments.

Employment impacts from the low and high investment scenarios are presented in Table 1. Direct impacts In the **Low Investment** scenario are a total of 156 full-time equivalent jobs: 92 in industries directly involved in the project, 22 in industries that interact with those directly involved, and 42 induced by changes in compensation and spending behavior. In the **High Investment** scenario, the effects are more than quadrupled—462 jobs are directly created, another 111 emerge in related industries, and 210 are induced by increased wages, for a total of 783 new full-time jobs.

Figure 2 describes the industries that these new positions would emerge in—the blue chart shows the **Low Investment** scenario, and the green chart shows the **High Investment** scenario. As would be expected, construction is the sector with the largest increase, where the majority of direct employment occurs. The next greatest sector of increase is architecture, engineering, and related services, where direct employment also occurs, and the remainder of employment occurs across a variety of industries. The differences in facility provision between scenarios are visible—note the presence of ornamental and architectural metal products and greenhouse, nursery and floriculture provision in the **High Investment** scenario, which incorporates more signature park and public art investments than the **Low Investment** scenario. The remaining sectors are largely those expected to experience increases in employment with increases in income—health services, retail, and real estate.

The other employment impacts—labor income, total value added, and output—follow directly from the increase in jobs, and thus proportionately mirror them (some variation occurs due to the types of emergent jobs). In the **Low Investment** scenario, new workers earn over $11 million while adding $13.5 million in value and producing $22.5 million in output. In the **High Investment** scenario, those numbers are, again, more than quadrupled, with workers earning $54.9 million, adding $67.6 million in value, and producing $114.2 million in output.

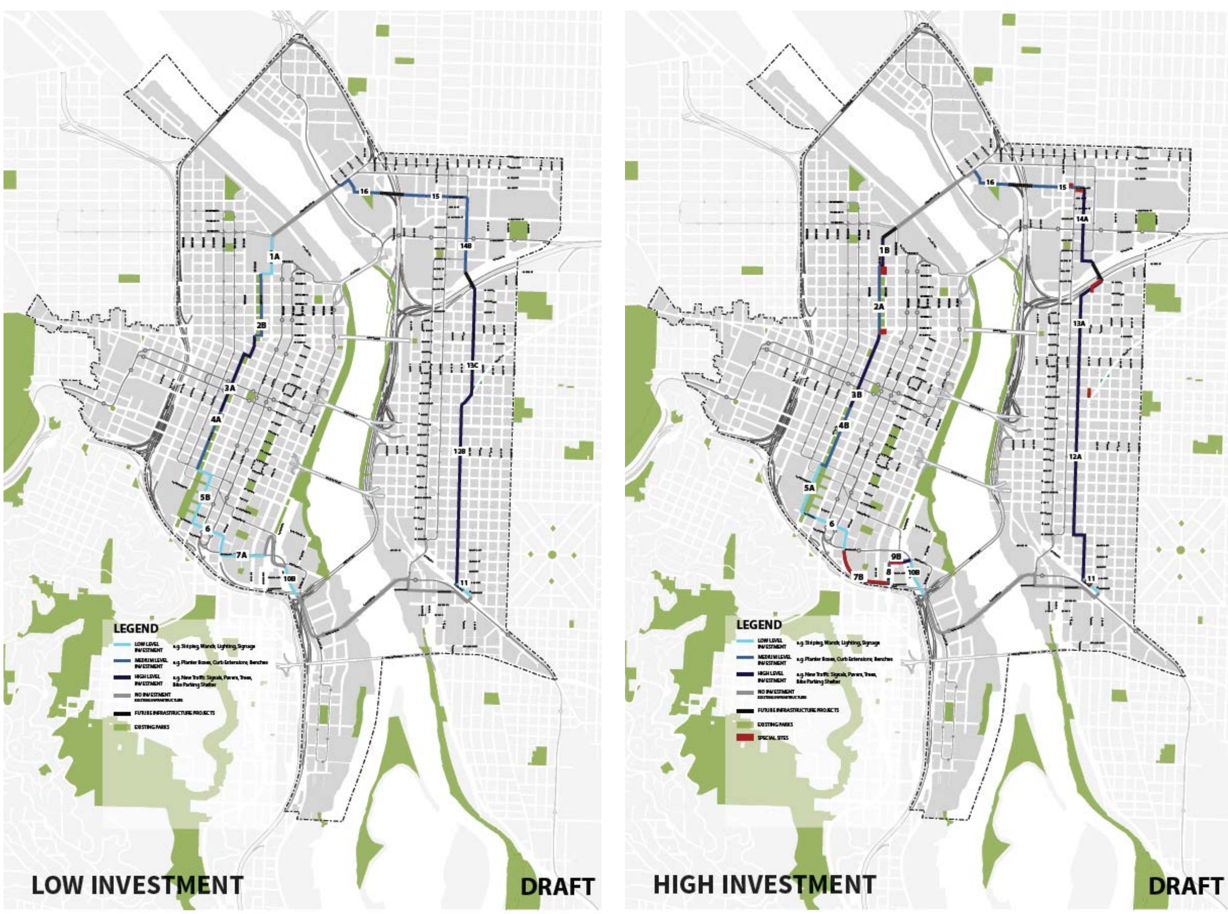


Figure 1 – Low and High Investment Scenarios

Table 1 – Green Loop Economic Impact Summary by Investment Scenario

	Impact Type	Employment	Labor Income	Total Value Added	Output
LOW INVESTMENT	Direct Effect	92	$7,637,933	$8,115,530	$13,205,929
	Indirect Effect	22	$1,404,599	$1,980,569	$3,406,832
	Induced Effect	42	$2,036,227	$3,436,662	$5,887,918
	Total Effect	**156**	**$11,078,759**	**$13,532,761**	**$22,500,678**
HIGH INVESTMENT	**Impact Type**	**Employment**	**Labor Income**	**Total Value Added**	**Output**
	Direct Effect	462	$37,657,391	$40,385,368	$67,289,278
	Indirect Effect	111	$7,180,266	$10,181,050	$17,765,643
	Induced Effect	210	$10,092,591	$17,033,768	$29,183,320
	Total Effect	**783**	**$54,930,248**	**$67,600,186**	**$114,238,241**

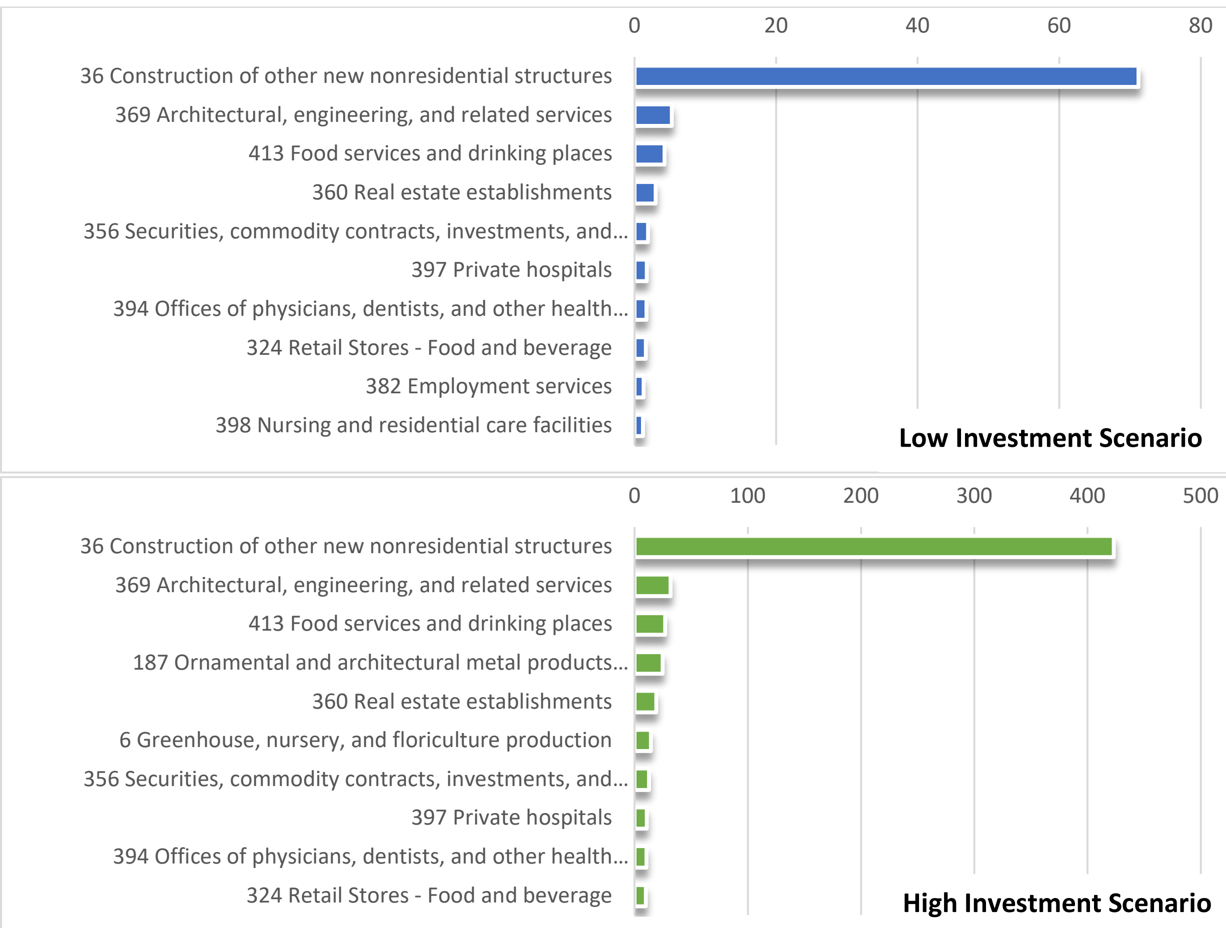


Figure 2 – Top 10 Industries by Employment Impact

IV-3. Business Impacts

Research has shown that active transportation infrastructure has potentially positive impacts on business activities and economic vitality in a region (Drennen, 2003; Flusche, 2012). Several case studies examine Northern American and European cities to compare business activities (sales) and consumer expenditures before and after the construction or improvements of bike facilities, and they have generally shown that an increase in cyclists and pedestrians enhances the level of retail activity in shopping districts that support regional businesses (Flusche, 2012; Jaffe, 2015). Jaffe (2015) summarizes 12 international case studies where street parking lanes have been converted to bike lanes, and finds that little to no impacts (and positive impacts in a few cases) of such conversions on local business activities.

Clifton et al. (2012) examine how travel modes may be related to consumer expenditure behaviors through surveys and analysis of consumers at 78 businesses in the Portland metropolitan area. The authors found that people who bike or walk tend to spend on average similar amounts or more than their driving counterparts, attributed to higher frequency of visits by non-drivers when compared with drivers. A survey of East Village, New York, found that cyclists spend about $163 per week on average compared to $143 among drivers (Jaffe, 2015). The specific type of retail businesses also matters – the Portland study found that while cyclists spend less on grocery trips, they typically spend more at restaurants, bars, and convenience stores (Clifton et al., 2012). The below tables summarize research literature that examine the business impacts of lane removal/conversions and the relationship between transportation mode and consumer spending.

Table 2 - Business impacts of lane removal in selected cases

City	Actions	Outcomes
City of Vancouver[5]	Install protected bike lanes by removing 172 parking spots, restricting turns in five locations and altering loading zones	Revenue and shopping frequency decreased range from 3%to 11%
Toronto – Bloor St.[6]	Remove parking to bike lane	Merchant: 75% think a bike lane or widened sidewalk would improve or no effect on business; Visitors: - Mode share: 46% walk, 12% bike, 32% public transit, and 10% car; - Spending: in category, walkers spend most; - 62% of responses want bike lane & less parking
Seattle – 65th St.[7]	Remove 12 parking spots and striped a bike lane	Sale index exploded 400 percent compared with surrounding neighborhoods

[5] Stantec. (2010). Vancouver Separated Bicycle Lanes Business Impact Study. Retrieved from http://www.peoplepoweredmovement.org/site/images/uploads/penv3-BusinessImpactStudyReportDowntownSeparatedBicycleLanes-StantecReport.pdf

[6] Sztabinski. (2009). Bike Lane, On-Street Parking and Business. Retrieved from http://www.bikeleague.org/sites/default/files/bikeleague/bikeleague.org/programs/bicyclefriendlyamerica/bicyclefriendlybusiness/pdfs/toronto_study_bike_lanes_parking.pdf

[7] Jaffe. (2013). No, Bike Lanes Don't Hurt Retail Business. Retrieved from http://www.citylab.com/work/2013/09/no-bike-lanes-dont-hurt-retail-business/6833/

Seattle – Greenwood	Remove a traffic lane and parking to bike lanes	No negative compared with surrounding neighborhoods			
NYC - Vanderbilt Ave.[8]	Remove two traffic lane, add one median center lane and two bike lanes		1st year	2nd year	3rd year
		V Ave.	39%	56%	102%
		comparisons	19%	46%	64%
NYC – Ninth Ave.	Remove parking, add one bike lane		1st year	2nd year	3rd year
		Ninth Ave.	17%	47%	49%
		comparisons	25%	27%	26%

Table 2. Mode share and shopping frequency/spending

City	Method	Results
San Francisco (Bent & Snga, 2009)	Survey on 1187 people to examine the spending patterns of travelling to downtown SF	Driver 16%, $88/visit, 4 days/m, $259; Transit 60%, $40/visit, 7 days/m, $274; Walker 21%, $47/visit, 8 days/m, $291.
Davis (Popovich & Handy, 2014)	Two cross-sectional online surveys, use binomial regression model for estimate frequency of downtown shopping, and linear regression to estimate spending in downtown	Shoppers who enjoy biking statistically more frequent (0.185) shopping in downtown than car uses Shoppers who bike to downtown spent slightly more than car uses range from $7 to $12 per time, however not statistically significant
Portland (Clifton et al., 2012)	Survey from customers at restaurants, drinking places, convenience stores and supermarket patrons	Average month spending: Supermarket: car $440, bike $338, walk $386; Convenience stores: car $69, bike $82, walk $65; Drinking places: car $41, bike $82, walk $64; Restaurants: car $41, bike $48, walk $32.
NY East Village – 1st and 2nd Ave[9]	Install protected bike lane	Bike and pedestrian spend are $163, $158 per week, while drives are$143

Estimated Business Impacts

In order to understand the local business activity impacts of the proposed Green Loop, we utilize estimates from Clifton et al. (2012) in a preliminary benefits transfer analysis. We focus on establishments within a half-mile buffer around the Green Loop, estimate their retail sales before and after Green Loop infrastructure upgrades based on Scenario A for illustration.

We retrieve all Portland area business establishment data from the Reference USA database, which includes geographical location, business types, number of employees and retail sales. The distribution of businesses by industry sector within a half-mile buffer around the Green Loop (establishments with no NAICS Code or retail sales were dropped) are shown in Table 1. Following Clifton et al. (2012), Table 2 isolates the retail and food related businesses in the buffer zone, and Table 3 below summarizes their findings regarding the relationship between mode share and monthly spending for four categories of

[8] NYCDOT. (2012). The Economic Benefits of Sustainable Streets. Retrieved from http://www.nyc.gov/html/dot/downloads/pdf/dot-economic-benefits-of-sustainable-streets.pdf
[9] Transportation Alternatives. East Village Shoppers Study. Retrieved from https://www.transalt.org/sites/default/files/news/reports/2012/EV_Shopper_Study.pdf

businesses: supermarkets, convenience stores, drinking places and restaurants. Businesses along the Green Loop which fall into one of these categories are summarized in Table 4.

Table 1. Business Types in City Center affected by Green Loop

Sectors	Store Number		Total Employees		Annual Sales	
	Stores	%	Person	%	Sale Value	%
Manufacturing	753	6.6%	7,483	7.0%	$2,452,442,000	9.0%
Wholesale	319	2.8%	4,143	3.9%	$7,624,122,000	27.9%
Retail	1,316	11.5%	13,928	13.0%	$3,229,534,000	11.8%
Information, & Tech Service	3,615	31.7%	26,377	24.6%	$4,132,903,000	15.1%
Finance & Insurance	597	5.2%	7,890	7.4%	$3,177,691,000	11.6%
Real Estate	556	4.9%	4,913	4.6%	$1,161,933,000	4.3%
Health Care & Social Assistance	1,924	16.8%	12,460	11.6%	$1,876,049,000	6.9%
Arts, Entertainment & Recreation	147	1.3%	1,469	1.4%	$98,123,000	0.4%
Accommodation & Food Service	954	8.4%	16,705	15.6%	$1,011,247,000	3.7%
Other	1,239	10.8%	11,781	11.0%	$2,526,427,000	9.2%
Total	**11,420**	100%	**107,149**	100%	**$27,290,471,000**	100%

Table 2. Retail, Accommodation and Food Services in City Center affected by Green Loop

Sectors	Store Number		Total Employees		Annual Sales	
	Stores	%	Person	%	Sale Value	%
Bulk Products & Appliances	414	18.2%	4,496	14.7%	$1,472,776,000	34.7%
Food and Beverage Stores	125	5.5%	1,065	3.5%	$246,276,000	5.8%
Health and Personal Care	67	3.0%	388	1.3%	$94,663,000	2.2%
Clothing and Accessories	265	11.7%	2,564	8.4%	$400,606,000	9.4%
Musical Instrument, Book Stores	96	4.2%	862	2.8%	$137,077,000	3.2%
General Merchandise Stores	32	1.4%	1,302	4.3%	$280,037,000	6.6%
Others	317	14.0%	3,251	10.7%	$598,099,000	14.1%
Accommodation	76	3.3%	4,288	14.0%	$379,886,000	9.0%
Food Services and Drinking Place	878	38.7%	12,417	40.5%	$631,361,000	14.9%
Total	**2,270**	100%	**30,633**	100%	**$4,240,781,000**	100%

Table 3. Survey Result of Mode Choice and Average Monthly Spending in Portland

	Automobiles		Transit		Bike		Walk	
	Mode share	Monthly Spending	Mode share	Monthly Spending	Mode share	Monthly Spending	Mode share	Monthly Spending
Supermarket	86%	$440	9%	$301	4%	$338	1%	$386
Convenience Store	59%	$69	28%	$60	7%	$82	6%	$65
Drinking Places	43%	$41	27%	$36	22%	$82	7%	$64
Restaurant	64%	$41	22%	$49	8%	$48	6%	$32

Source: Clifton et.al (2012)

Table 4. Selected Business Types around Green Loop

Sector	Number of Stores	Total Employees	Total Sales
Supermarket	40	496	$125,114,000
Convenience Store	26	139	$35,054,000
Drinking Place	75	723	$41,109,000
Restaurant	771	11,346	$569,687,000
Total	**912**	**12,704**	**$770,964,000**

Studies found that higher levels of bicycle infrastructure are positively related to higher shares of bicycle commuting in US cities, although a causal relationship has not been confirmed (Dill & Carr, 2003; Nelson & Allen, 1997). Following Dill and Carr (2003), their regression result indicates that each additional mile of on-street bike lane per square mile in the city is significantly associated with a 1% increase in bicycle commuting mode share. Given that the Green Loop approximately 6.36 miles in length, and the Portland city center area is approximately 4.65 square miles, back-of-the-envelope calculations indicate that the Green Loop may introduce a 1.4% increase in bicycle mode share.[10]

If we assume that the total number of consumers and the average spending patterns within each travel mode are constant, the only changes to retail sales result from shifts in modal shares. We will further assume (for simplicity) that all of the increase in bicycle mode share is directly transferred from automobile users.

$$\text{Original Annual Sale} = 12 * \sum_{modei=1}^{4}(\text{total\_customer} * mode\_split_{modei} * monthly\_spending_{modei})$$

$$\text{New Annual Sale} = 12 * \sum_{modei=1}^{4}(\text{total\_customer} * new\_mode\_split_{modei} * monthly\_spending_{modei})$$

where modes 1-4 represent driving, transit, bike and walk.

Therefore, new estimated annual sales for each business category (supermarket, convenience store, drinking places, restaurants) can be calculated as

$$\text{Original annual sale} / \sum_{modei=1}^{4}(mode\_split_{modei} * monthly\_spending_{modei}) * \sum_{modei=1}^{4}(\text{new\_}mode\_split_{modei} * monthly\_spending_{modei})$$

The new estimated annual sales due to bicycle mode share increase (from the construction of the Green Loop) is $722,382,869, representing an increase of 0.18% compare with original sales numbers. However, to be more accurate, we expect that impacts of the Green Loop should be most significant and likely to occur in those businesses directly adjacent to users of the Green Loop infrastructure, particularly due to higher visibility and exposure to users. If we narrow our analysis to consider only business establishments directly along the Green Loop, we find a total of 106 establishments, of which 39 are retail and food related businesses (summarized in Table 6). Similar to the above procedure for

[10] Note that this rough calculation of increased mode share represents an increase in commuting mode share (Dill & Carr, 2003), and may or may not apply to recreational or shopping trips.

predicting new annual sales, new annual sale of the directly adjacent businesses on the Green Loop due to bicycle mode share increase is estimated to be $11,167,908, an increase of 0.20%.

If we consider establishments directly along Green Loop and also include businesses on intersecting streets within 100 feet (of the intersection) to capture some spillover effects, there are 276 total business establishments, of which 85 are retail and food related businesses (summarized in Table 8). We estimate that the additional annual sales revenue of these businesses along the Green Loop due to bicycle mode share increase to be approximately $18,167,221, representing a 0.21% increase.

Overall, our preliminary analysis of retail business activities related to the Green Loop concept shows small increases of 0.18% to 0.20% in annual sales based on Portland-specific research (Dill and Carr, 2003; Clifton et al., 2012). Further research that specifically examines changes in both bicycle and pedestrian mode share in conjunction with business activity impacts before and after street infrastructure improvements or conversions will be necessary to characterize how active transportation infrastructure affects businesses and economic development.

Table 5. Annual Retail Sales Changes before and after Green Loop installation

Sectors	Original Annual Sales	New Annual Sales	Percent change
Supermarket	$125,114,000	$124,651,078	-0.37%
Convenience Store	$35,054,000	$35,148,646	+0.27
Drinking Places	$41,209,000	$41,585,864	+1.16%
Restaurants	$569,687,000	$570,997,280	+0.23%
Total	**$770,964,000**	**$772,382,869**	**+0.18%**

Table 6. Selected Business Types along Green Loop

Sector	Number of Stores	Total Employees	Total Sales
Supermarket	1	4	$1,009,000
Convenience Store	1	3	$756,000
Drinking Place	1	4	$227,000
Restaurant	19	182	$9,154,000
Total	**22**	**193**	**$11,146,000**

Table 7. Annual Retail Changes before and after Green Loop installation

Sectors	Original Annual Sales	New Annual Sales	Percent change
Supermarket	$1,009,000	$1,005,255	-0.37%
Convenience Store	$756,000	$758,049	+0.27
Drinking Places	$227,000	$229,634	+1.16%
Restaurants	$9,154,000	$9,174,970	+0.23%
Total	**$11,146,000**	**$11,167,908**	**+0.20%**

Table 8. Selected Business Types along Green Loop (plus establishments on crossing streets within 100 feet to Green Loop)

Sector	Number of Stores	Total Employees	Total Sales
Supermarket	1	4	$1,009,000
Convenience Store	2	6	$1,512,000
Drinking Place	1	4	$227,000
Restaurant	31	306	$15,381,000
Total	**35**	**320**	**$18,129,000**

Table 9. Annual Retail Changes before and after Green Loop installation

Sectors	Original Annual Sales	New Annual Sales	Percent change
Supermarket	$1,009,000	$1,005,255	-0.37%
Convenience Store	$1,512,000	$1,516,098	+0.27
Drinking Places	$227,000	$229,634	+1.16%
Restaurants	$15,381,000	$15,416,234	+0.23%
Total	**$18,129,000**	**$18,167,221**	**+0.21%**

V. Conclusions and Further Research

As many cities are investing and committing significant resources to enhance bicycle and pedestrian mobility and to promote active transportation through infrastructure upgrades and improvements, it has become crucial for practitioners, planners and other stakeholders to understand the impacts of such policies and resource allocation decisions. In this study, we integrate analysis of case studies from active transportation infrastructure investments in numerous cities and state-of-the-art research methodologies in this field to characterize, quantify and estimate the potential property value impacts, the economic (input-output) impacts, preliminary business/retail activity impacts, distributional impacts and additional sustainability impacts of the Portland "Green Loop" concept.

We find that significant public outreach, often to underserved areas, is highlighted as key to both development and success of the infrastructure investments. By integrating new infrastructure improvements with preexisting networks, these cities both reduced the cost of improving active transport and arguably smoothed adoption by users. Interviewees cite performance and outcome measurements as key to assessing and understanding the effectiveness, efficiency and equity of these programs and investments.

In terms of economic (input-output) impact, we estimate that investments into Green Loop infrastructure will generate approximately $22 to $114 million in economic output, with 156 to 783 full-time equivalent jobs, depending on the particular test scenario estimated. In addition, we find that introducing advanced bicycle and pedestrian infrastructure such as those envisioned as part of the Green Loop concept provides positive amenity values for nearby residential properties, even after controlling for other factors that influence property values. We estimate that average property values will increase by approximately 0.05% for single-family homes, and between 6.46% and 7.96% for multi-family homes. The most significant impacts will be concentrated in neighborhoods that are located closest to the Green Loop, allowing for easier access to the amenity.

Many other social and environmental benefits such as greenhouse gas emissions savings from modal shifts, congestion time savings, public health benefits from increases in physical activities, social benefits of green spaces in urban environments or changes in ecosystem services that may be provided through enhanced natural environmental features along the Green Loop are additional considerations that will require further research. Additionally, we find that the following future research directions will greatly enrich the understanding of the linkages and interactions between active transportation infrastructure and economic outcomes going forward:

1. Given the significant economic impacts of the central city Green Loop estimated in this study, it is intuitive to expand our analysis framework to understand the economic impacts of a citywide bike facility network. It would be essential to characterize the bike network in a larger *network* context rather than the typical segmental approach in order to examine how the "citywide" network of bike facilities connects to the urban transportation system and contributes to the economy.
2. As cities are investing in different types and levels of active transportation infrastructure with varying objectives and outcomes, we find that it is critical to understand the differences in the impacts of different types of infrastructure investments (e.g. Are cycle tracks preferred to bike lanes without any separation from vehicular traffic? If so, how much and in what types of neighborhoods?). This type of research will greatly aid in policy and resource allocation decisions to place the most effective and efficient types of infrastructure within different neighborhood and policy contexts.

3. Although this report presents preliminary estimations of the business/retail and economic development impacts of active transportation infrastructure, further research is needed to accurately characterize these impacts. Research efforts utilizing more rigorous econometric methodologies to examine business/retail changes before and after street infrastructure improvements will provide much needed economic evidence for cities and neighborhoods looking to expand or improve their active transportation infrastructure.

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A1. Appendix – Case Studies

Austin, TX

Austin released its bicycle plan in 2014 highlighting three best practices: implementing protected bicycle lanes, capturing short trips, and building a complete bicycle network. This plan proposes a connected and protected active transportation network system, which provides people of all ages and abilities a safe and convenient transportation option. Austin utilizes ridership, safety, connectivity, equity, and city image measures to evaluate its bicycle programs. The plan also incorporates multidimensional benefits of the bicycle network system, such as its potential for reducing motor vehicle trips, increasing regional mobility and congestion management, boosting affordability (as a low-cost transportation option), public health improvement and environmental benefits.

Background

Prior to April 2014, the Austin region had 288 miles of active transportation facilities in total, including 57.6 miles of urban trails (shared-use paths), 2.6 miles of protected bicycle lanes, 17.8 miles of buffered bicycle lanes and 210 miles of bicycle lanes. Austin's bike lane network grew from 126 miles in 2009 to 210 miles in 2014, accompanied by a citywide bicycle mode share[11] increase to 2 percent in 2011, nearly doubling rates from 2009. In a 32 square miles region surrounding central Austin, the reported bicycle mode share ranged from 5.5 percent to 13 percent from different sources, which significantly relief the congested traffic in Central Austin ("2014 Austin Bicycle Master Plan," 2014). Since 2009, the city completed numerous new projects and removed barriers to cycling, including the creation of new bicycle lanes, and the widening or buffering of existing lanes. For other projects, appropriate measures are taken to increase efficiency: for example, projects in construction and in design, and restriping projects are often coordinated with scheduled street resurfacing or other street maintenance ("2014 Austin Bicycle Master Plan," 2014).

Active Transportation Plans and Implementation

Austin's most recent Bicycle Master Plan identifies "five elements of a strong, comprehensive bicycle system":

1. Create an all ages and abilities bicycle network;
2. Provide comprehensive end-of-trip facilities;
3. Fully integrate cycling with transit service;
4. Maintain and expand the bike share system;
5. Provide superior bicycle facility maintenance.

("2014 Austin Bicycle Master Plan," 2014, p. 40-41)

Planned bicycle facilities include protected bicycle lanes, urban trails and dedicated bikeways, quiet streets, intersection treatments, bike lanes, buffered bike lanes, and shoulder and traffic calming ("2014 Austin Bicycle Master Plan," 2014). According to the plan, the selection of on-street bicycle facility for a given street depends on overall traffic speed and volume (see Table 1).

[11] "Mode share" describes the percent of commuters who choose a certain mode of transport at least three days per week.

Table 1 Austin bicycle facilities selection criteria

		Average Annual Daily Traffic (vehicle per day)		
		Less than 3,000	3,000-9,999	10,000+
85th Percentile Speed (MPH) Meaured or Projected	< or =30	Shared*	Bike Lane	Buffered
	31-40	Bike Lane	Buffered	Protected
	41-50	Buffered	Protected	Protected
	> 50	Protected	Protected	Protected

Source: City of Austin, 2014, 2014 Austin Bicycle Plan, p. 59.

Three issues thought to influence bicycle mode share have recently come to the fore, and subsequently are highlighted in Austin's plan. (2014):

First, the largest group, and those most likely to switch their transport mode, are those termed "interested but concerned:" individuals who are intrigued by the idea of a bike commute, but are afraid for their personal safety (Dill & McNeil, 2012). To induce such individuals to take up cycling, it may be necessary to provide protected bicycle lanes. Austin was selected as one of six US cities to participate in the Green Lane Project, an effort by the national organization PeopleForBikes to catalyze the implementation of protected bicycle lanes similar to those found in many bike-friendly European countries. During its two-year participation (2012-2014), the city increased the number of buffered or protected bicycle lanes from 5 miles to 20 miles ("2014 Austin Bicycle Master Plan," 2014). The 2014 plan highlights further expansion of such lanes.

Second, the Plan emphasized that short trips are those most easily converted into bike trips. Austin estimates that a protected bike lane network would make bikes the vehicle of choice for 15 percent of trips under three miles and 7 percent of 3-9 mile trips, resulting in a total reduction of 7 percent from automotive trips to the so-called "ring of congestion" located around the central city ("2014 Austin Bicycle Master Plan," 2014). According to the two above principles, the implementation of protected bicycle lanes should focus where short trips most frequently occur, including the central city, major transit stations, schools, and parks. Additionally, it is possible to convert longer trips to a series of short trips by incorporating public transit so that short bicycle trips can be combined with longer transit trips. This is best facilitated by the creation of protected bicycle lanes on streets surrounding major transit stations, coupled with the provision of secure bicycle parking at the station and bike share system facilities. When bicycle travel is incorporated into public transit in this way, the transit catchment area grows by a factor of 16, expanding from a quarter-mile radius to a two-mile radius ("2014 Austin Bicycle Master Plan," 2014).

Third, Austin identified the importance of building a "complete" bicycle network, defined as one that serves all ages and abilities (See Figure 1). The complete bicycle network is an incentive for people more likely to use bicycles. Focus on this particular attribute resulted in the highly successful plan implemented in Seville, Spain, where 87 miles of protected bicycle lanes were installed, and bicycle mode share increased from 0.5 to 7 percent over a period of three years ("2014 Austin Bicycle Master Plan," 2014).

Figure 1. Austin all ages and abilities network

Source: City of Austin, 2014 Bike Plan Update, p. 25.

In order to achieve the goals of increase bicycle usage and safer streets, appropriate programs are integrated into the implementation of the plan, including bicycling and safety education, encouragement and promotion, equity and access, bicycle laws and enforcement, and evaluation ("2014 Austin Bicycle Master Plan," 2014).

Evaluation

In accordance with the above three principles, periodic goals and corresponding benchmarks are set for measuring the success of the bicycle programs. Measured attributes include ridership, safety, connectivity, equity, and overall support for the multiple goals delineated in Imagine Austin, a comprehensive city plan ("2014 Austin Bicycle Master Plan," 2014).

The plan also includes a multidimensional analysis of expected benefits. Data from other cities that have completed all ages and abilities bicycle network is examined, and benefits are calculated by forecasting the increase of bicycle use and associated decrease in motor vehicle use. Such benefits include the reduction of citywide motor vehicle trips to downtown, regional mobility and congestion management advantages, boosted affordability (as a low-cost transport option), public health benefits, and environmental benefits ("2014 Austin Bicycle Master Plan," 2014).

Chicago, IL

Chicago released the Chicago Streets for Cycling Plan 2020, an updated bicycle and pedestrian plan, in 2012. The plan identifies a 645-mile network of on-street bikeways that provide a bicycle accommodation within a half-mile of every Chicagoan. The plan proposed ambitious goals, including constructing a large number of protected bike lanes. Currently, the city is wrapping up the first phase of the plan, which includes the construction of approximately 100 miles of protected bike lanes.

Background

Chicago has installed over 200 miles of on-street bike facilities, including 40 miles of marked shared lanes (cars and bicycles share the same lane, but a cautionary marking indicated bike traffic), 18 miles of buffer protected bike lanes, and 12 miles are barrier protected bike lanes prior to 2012 ("Chicago Streets for Cycling 2020 Plan," 2012). Between 2000 and 2010, Chicago constructed many new and innovative bicycling facilities, and witnessed the bicycle mode share increased from 0.5% to 1.3%. Although Chicago bicycling ridership increased at a rate higher than almost every major city in the US, the rate of crashes increased at much lower rate during the same time period ("Chicago Streets for Cycling 2020 Plan," 2012).

Aiming to offer safer active transportation infrastructures and help with the improvement of quality of life and economic growth, the City of Chicago issued the Chicago Streets for Cycling 2020 Plan and Chicago Pedestrian Plan in 2012.

Active Transportation Plans and Implementation

Both the Cycling Plan and the Pedestrian Plan were developed through a public engagement process. In terms of the Cycling Plan, large public meetings were led by Chicago Department of Transportation (CDOT) to engage Chicagoans in facilities destination and alignment decision-making, and new facility promotion through a robust outreach process; meanwhile, neighborhood meetings, organized by the public, were held to reach more residents ("Chicago Streets for Cycling 2020 Plan," 2012). A similar process was undertaken in the development of the Pedestrian Plan. Various approaches, including public meetings, opportunities for comment on the project website, an interactive on-line meeting, mail-in comment cards, and a final downtown walking workshop were provided to residents to enable them to engage in the plan development process ("Chicago Pedestrian Plan," 2012).

Chicago Streets for Cycling 2020 Plan

Three key principles of the Cycling Plan:

1. Provide a bicycle accommodation within ½ mile of every Chicagoan.
2. Provide a greater number of bikeways where more people live.
3. Increase the amount of infrastructure where ridership is high, while establishing a strong backbone of infrastructure where ridership is currently lower.
   ("Chicago Streets for Cycling 2020 Plan," 2012)

The Cycling Plan identifies a 645-mile network of on-street bikeways that enable residents feel safe and comfortable to ride through Chicago neighborhoods. The bikeways system is composed of three smaller route classifications: Neighborhood Bike Routes, which utilize residential streets; Crosstown Bike Routes, which use collector and arterial roadways; and Spoke Routes, which connect all corners of the city to downtown ("Chicago Streets for Cycling 2020 Plan," 2012). According to the Plan, by 2020, the system will consist of 310 miles of neighborhood bike routes, 275 miles of crosstown bike routes, and 60 miles of spoke routes. Altogether, the Plan aims to build more protected bike lanes than any other city in the country.

Figure 2. Chicago crosstown bike routes and spoke routes rendering

Source: Chicago Department of Transportation, 2012, Chicago Streets for Cycling 2020 Plan, p. 26, 28

There are three implementation phases of the bikeway network:

1. Build 100 miles of protected bike lanes, as well as the first 10 miles of neighborhood greenways, by 2015.
2. Construct the remainder of the network through 2020, including an additional 50 miles of protected bike lanes. Strong focus is placed on the neighborhood bike routes, and proposed additions include 30 miles of neighborhood greenways and 40 miles of bike lanes. Additional improvements include measures to make intersections safer and the improvement of bicycle accommodations along existing barriers to cyclist travel, such as bridges and viaducts.
3. Fill gaps in the network and expand the number of bikeways in neighborhoods with little cycling activity currently. In 2018, details of this phase will be updated in accordance with progress on implementation of the previous two phases and the impacts of all the new facilities installed. (“Chicago Streets for Cycling 2020 Plan,” 2012):

In accordance with the first phase, CDOT installed 51.25 miles of new and restriped bikeways in 2014, including 36.5 miles of barrier and buffer-protected bike lanes. Altogether, 85.5 miles of protected bike lanes have been constructed since 2011 (“2014 Bikeways - Year in Review,” 2015). Additional improvements include the expanded use of bike boxes, green pavement markings and intersection markings.

The Chicago Pedestrian Plan

In addition to the Chicago Streets for Cycling Plan 2020, the city introduced the Chicago Pedestrian Plan in 2012. This separate plan provides guides, tools, policies and programs to improve all aspects of the street environment, with the goal of eliminating pedestrian fatalities over the next ten years. Through these tools and actions, the city hopes to achieve maximal safety, connectivity, livability and health, which in turn will have a positive economic impact (“Chicago Pedestrian Plan,” 2012). This plan lists sixteen tools and strategies for safer streets, including “marked crosswalks, in-road State Law Stop for Pedestrians signs, pedestrian refuge islands, signals and beacons, accessible pedestrian signals, pedestrian countdown timers, leading pedestrian intervals, lagging left turns, road diet, speed feedback signs, roundabouts, chicanes, vertical traffic calming, skinny streets, bump-outs, and neighborhood traffic circle” (“Chicago Pedestrian Plan,” 2012, p. 16).

Evaluation

The bicycle crash analysis report, also released in 2012, identifies all of the factors that contribute to bicycle crashes in Chicago between 2005 and 2010 by laying out various types of crash data and information, and then sets goals for improvement. The report includes detailed descriptions the crashes involving pedestrian injuries and fatalities in the city over the described time period, previous recommendations include changes to roadway design, education and marketing, and data and reporting (“City of Chicago 2012 Bicycle Crash Analysis,” 2012).

Denver, CO

Denver, CO, initiated its non-motorized transportation system plan, Denver Moves, in 2011. It planned to add 270 miles of multi-use facilities to the existing 172 miles (as of 2011), with 80% of the final network composed of moderate to high ease-of-use facilities. There are 3 phases of implementation, with Phase I concentrating on near-term projects to achieve connectivity and equity goals in the downtown area. In 2014, the city created an additional plan, Denver Moves: Enhanced Bikeways, which focuses on downtown on-street bicycle facilities to supplement Denver Moves.

Background

The city of Denver has over 100 miles of multi-use trail, 100 miles of bike lanes, 39 miles of sharrows (defined below), and nearly 400 miles of signed bike routes as of 2014.[12]

Aiming to expand transportation and recreation system in Denver, the city initiated Denver Moves, the most recent comprehensive active transportation action-oriented plan, in 2011. The plan describes a toolbox of multi-use and bicycle facility types and networks, accompanied with implementation strategies for the future. In addition, the city created an additional plan, Denver Moves: Enhanced Bikeways in 2014, which focuses on downtown on-street bicycle facilities to supplement Denver Moves.

Active Transportation Plans and Implementation

An interactive and transparent public involvement process was undertaken to integrate with Denver Moves network and facility types for final decision-making. Public involvement opportunities include: citizens taskforce, which involves citizens participate in plan draft review and workshops; providing interactive project website, which enables residents identify desired routes and facilities, and comment; large-scale aerial image tour stops to enable residents experience the potential facilities; and draft plan workshop to gain feedback on proposed network and facility types (“Denver Moves,” 2011).

Building upon the existing active transport facilities, the main goals of this plan are:

1. A biking and walking network where every household is within a quarter mile (5-minute walk or 2-minute bicycle ride) of a high ease of use facility.
2. Achieve a 15% bicycling and walking commute mode share by 2020.
   (“Denver Moves,” 2011, p. 4)

The final Denver Moves network is identified through five procedures:

1. Mapping previous existing and planned facilities as potential network choice;
2. Multiple approaches of public involvement;
3. Field feasibility evaluation by transportation planner and engineer;
4. City staff review the network draft to ensure the consistency with other plans;
5. Final feasibility analysis incorporated with public review workshop.
   (“Denver Moves,” 2011)

Finally, a total 442 miles of non-motorized facilities were proposed (see Table 2).

[12] Biking on Denver’s Streets and Trails, access on October, 2015 from https://www.denvergov.org/content/denvergov/en/bicycling-in-denver/streets-and-trails.html

Table 2. Propose non-motorized facility types in Denver Moves

Facility Type	Existing miles	Miles added with Denver Moves	Total network miles	Percentage of system
Multi-use (trails, on sidewalk)	107	24	131	30%
Separated in-roadway (cycle track, bike lanes—regular, buffered, climbing)	51	121	172	39%
Enhanced shared roadway (sharrow, party parking, pave shoulder)	14	63	77	17%
Bike Boulevards	0	62	62	14%
TOTAL	172	270	442	100%

Source: City of Denver, 2011, Denver Moves, p. 5

Proposed facilities types include the following: ("Denver Moves," 2011)

a. Bike Boulevards: streets, typically low-volume, that are re-designed to ease non-motorized transport and provide connectivity between neighborhoods and common destinations (Figure 3).

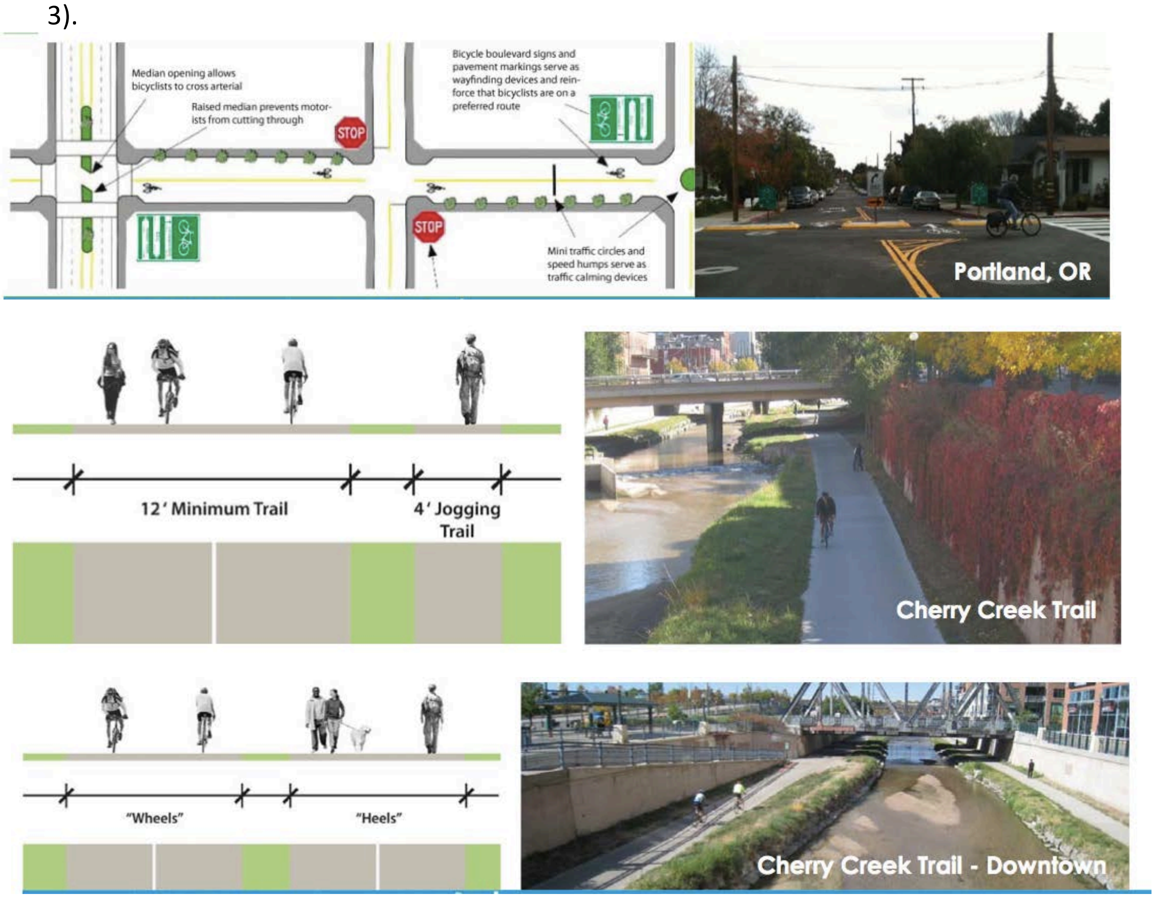

Figure 3. Rendering of Bike Boulevards, Regional Trails and Heels & Wheels Trails

Source: City of Denver, 2011, Denver Moves, p. 16-18

b. Regional Trails: off-street facilities for shared non-motorized use. Such trails provide both recreational opportunities and eased active transport (Figure 3).
c. Heels & Wheels Trails: trails that ease the mix of different types of active transport by adding a parallel trail to the current trail, thus minimizing conflicts between users of different speeds in highly-trafficked segments of trail (Figure 3).
d. Minor Trail: off-street facilities designed for shared non-motorized use, typically in a park, open space, or near a low volume roadway (Figure 4).
e. Cycle Tracks: exclusive bikeways separated from motor vehicle and pedestrian traffic by a median planter strip, parking lane, or both, typically installed on streets with higher traffic volume/speed with long blocks and few intersections (Figure 4).
f. Shared Use Sidewalk: sidewalks designed for bicycle usage to avoid conflicts with motor vehicle traffic. (Figure 4).

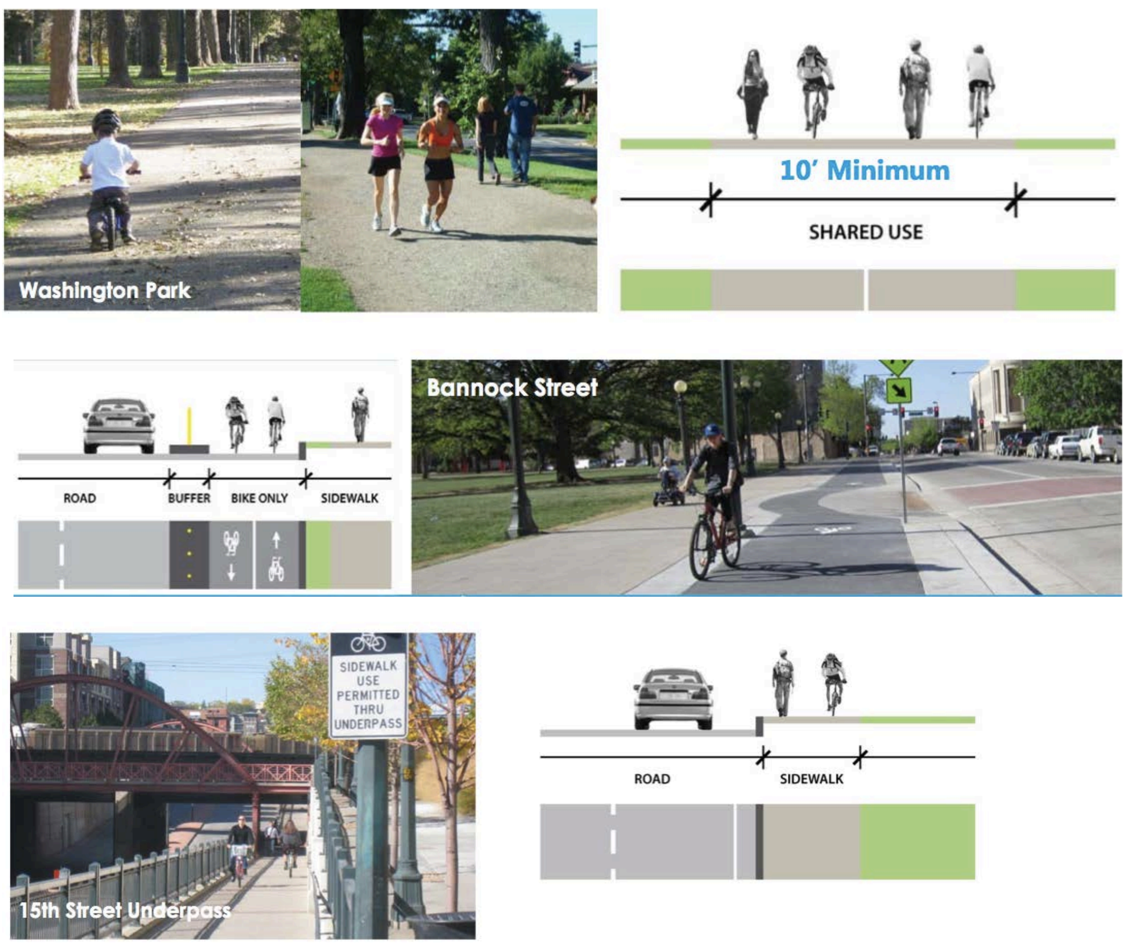

Figure 4. Rendering of Minor Trails, Cycle Tracks, and Shared Use Sidewalk

Source: City of Denver, 2011, Denver Moves, p. 19-21

g. Buffered Bike Lane: bike lanes buffered by a demarcated zone between the bike lane and adjacent travel or parking lane to prevent bicyclists from travelling close to the parking lane, subsequently reducing "dooring" accidents. (Figure 5).
h. Bicycle Lanes: the minimum standard for separate on-street bicycle accommodation. These are a good option for roads of the collector and arterial type because they improve rider comfort and safety when traffic volume and speed are higher at minimal cost (Figure 5).
i. Climbing Lane: hybrid bicycle facilities on roadways with steep grades. In order to account for speed differentials, bicycle lanes are marked in the uphill direction while shared-lane markings suffice in the downhill direction (Figure 5).
j. Shared Roadway/Signed Routes: while this type of roadway includes no specific bicycle design, measures like appropriate signage, good pavement quality, and possibly speed reduction techniques can make them safer for cyclists (Figure 5).

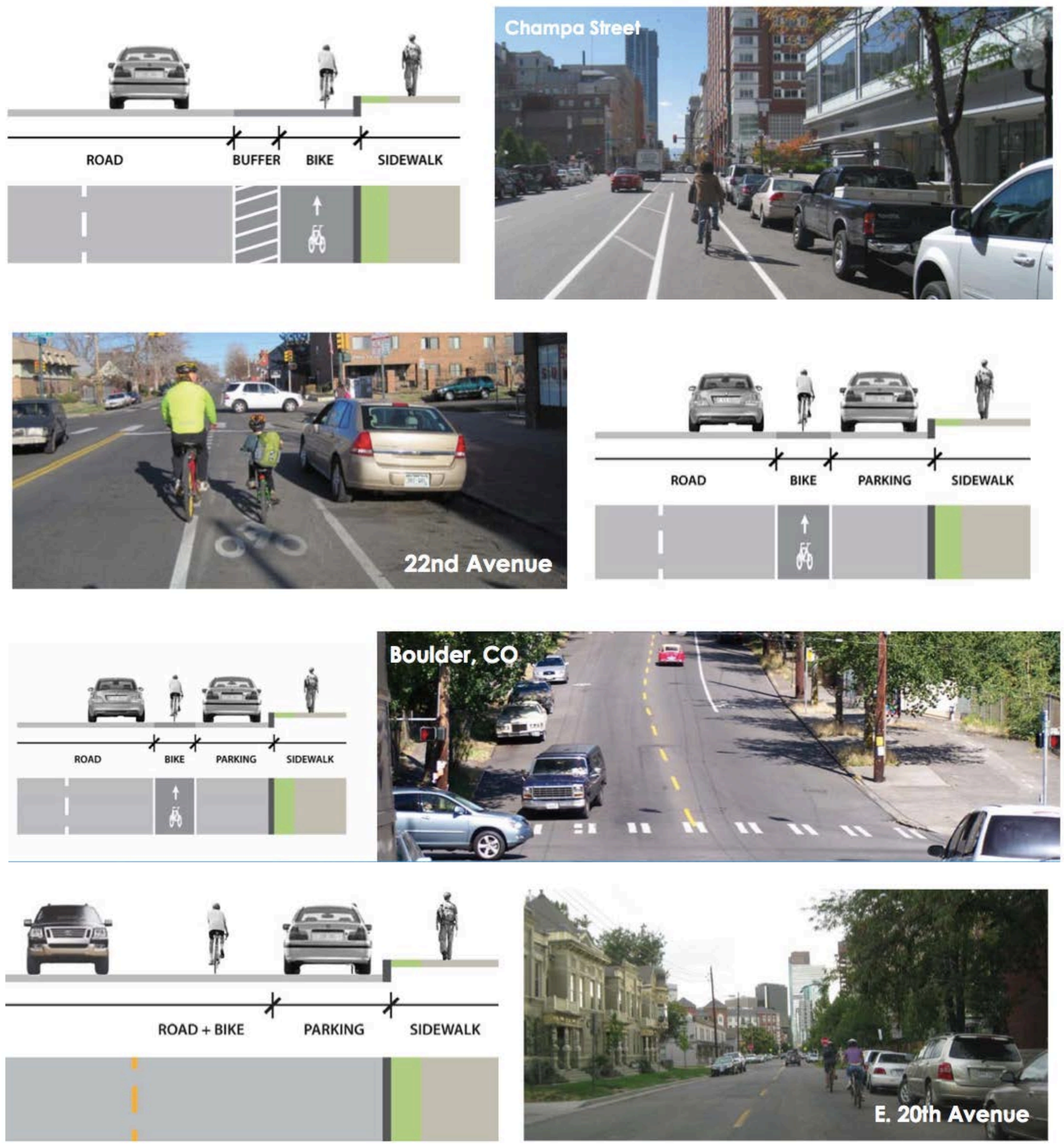

Figure 5. Rendering of Buffered Bike Lane, Bike Lanes, Climbing Lane, and Shared Roadway/Signed Routes

Source: City of Denver, 2011, Denver Moves, 22-25

k. Party Parking Lane: in areas with a low rate of weekday use, marked parking lanes can also operate as bicycle lanes. "Low rate" is defined as 5-10% use of block length for parking during off peak times (Figure 6).
l. Sharrows: also named shared lane marking, are road markings that provide guidance in situations where space is too narrow for a motor vehicle and a bicycle to travel side by side (Figure 6).
m. Paved Shoulder: areas where there is additional space between the outer travel lanes and the edge of the right of way. This space is typically marked off with a solid white line (Figure 6).

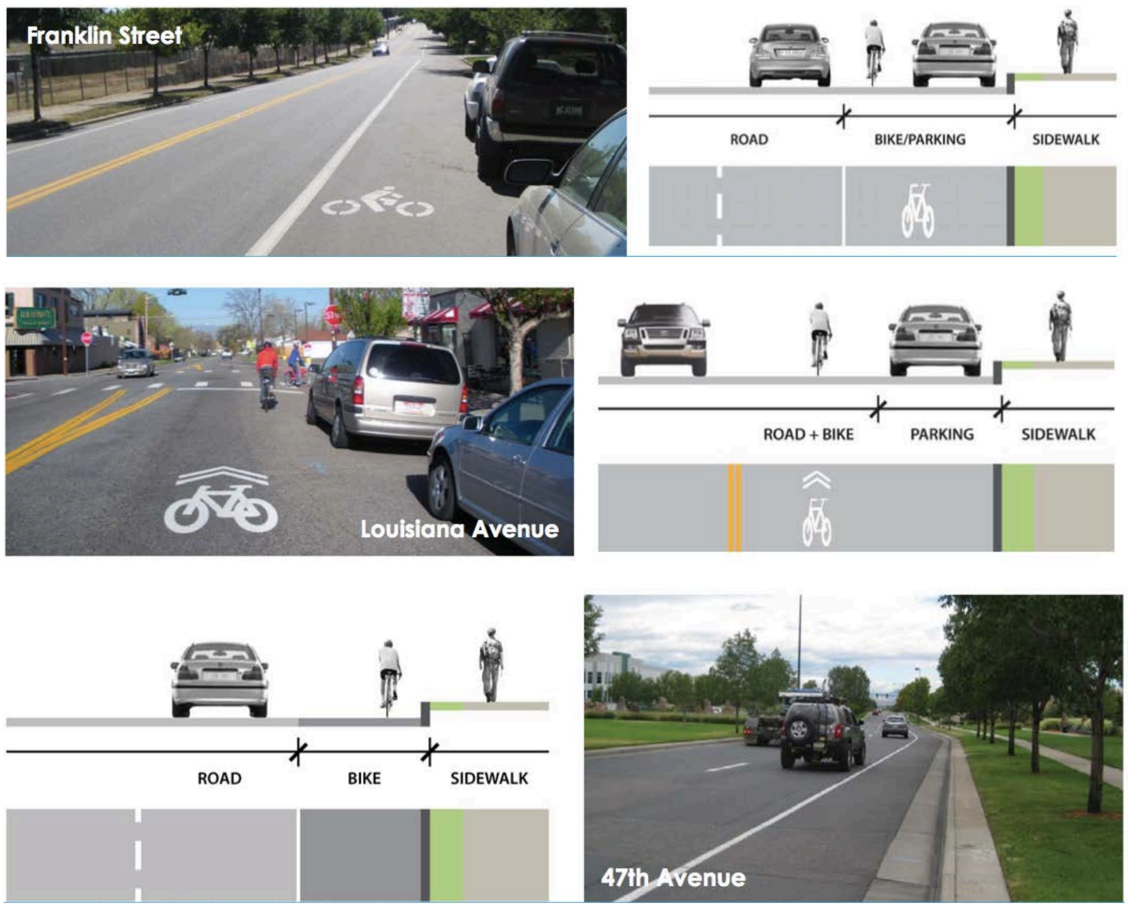

Figure 6. Rendering of Party Parking Lane, Sharrows, and Paved Shoulder

Source: City of Denver, 2011, Denver Moves, p. 26-28

Implementation of the proposed network and facilities includes 3 phases, with priority based on a system of proximity and feasibility criteria (See Table 3). Phase I focuses on connectivity by closing gaps in the existing system, providing active transport geographic equity, and construction of on-street facilities that link regional parks and trails. At the time of the plan's release, progress on Phase I was already underway: measures had been taken to create a cohesive active transport network in the downtown area, and new facility types were being tested. Phases II and III expand changes to cover a larger area and increase the density of the network. The timeline for these phases is left open, so that goals can be adjusted in accordance with available funding.

Table 3. Denver Moves scoring criteria for project phasing prioritization

Proximity Criteria	Scoring
Mitigates pedestrian/bicycle/vehicle conflicts	High=2 Medium=1 Low=0
Connects off-street to on-street bike facilities or sidewalks (500' buffer around trail)	Yes= 1 No=0
Directly adjacent to a school (500' buffer around school)	Yes= 1 No=0
Within a ¼ mile of a park recreation center, or library	Yes= 1 No=0
Within a ¼ mile of a Living Street or Enhanced Transit Corridor	Yes= 1 No=0
Within a ¼ mile of a neighborhood destination	Yes= 1 No=0
Within 1/2 mile of a Denver TOD	Yes= 1 No=0
Fulfills recommendations in Bicycle Master Plan	Yes= 1 No=0
Fulfills recommendations in the Pedestrian Master Plan	Yes= 1 No=0
Fulfills recommendations in the Gulch Master Plan	Yes= 1 No=0
Implementation Feasibility	
Community support	High= 2 Low=1 None=0
Action (trade-off)*	None=2 Medium=1 High=0
Cost**	Low=2 Medium=1 High=0
Opportunity driven	Yes= 1 No=0

*High=Parking Impacts, Medium=Road Diet, Low= Lane narrowing (lane diet) No action needed, add striping/marking
**High=construct future facility, Medium= in-street improvement, pave existing shoulder, Low = add signage/striping

Source: City of Denver, 2011, Denver Moves, p. 39

The plan estimates the total cost of all identified improvements at $119 million (2010 dollars; $66 million in linear projects and $54 in crossing improvements) (Figure 16).

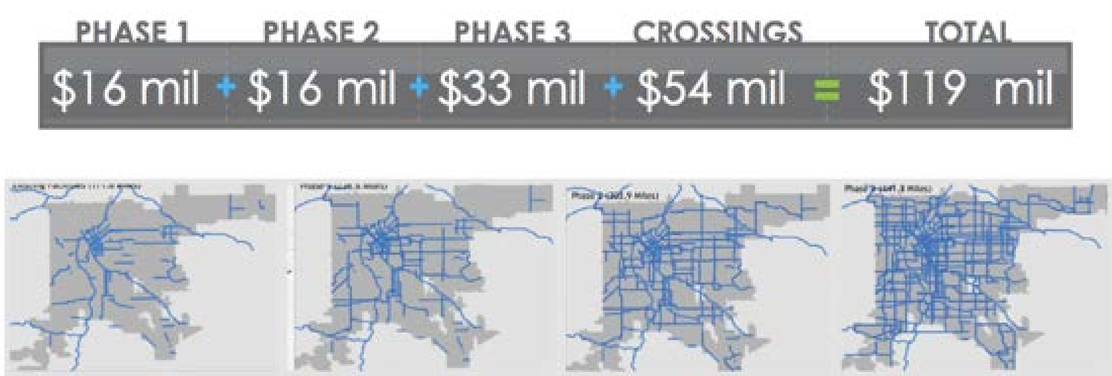

Figure 7. Denver Moves phasing and cost estimation

Source: City of Denver, 2011, Denver Moves, p. 5

In 2014, the enhanced bikeways plan was initiated, with the aim of developing a detailed plan for the network of enhanced on-street bicycle facilities (e.g., cycle-tracks, protected or buffered lanes, signalized or marked intersections) in downtown, with linkages from adjacent neighborhoods to either downtown or off-street facilities, enhancing attractiveness to cyclists of average ability[13]. The recommended network of enhanced on-street bicycle facilities will incorporate the Denver Moves plan.

[13] Denver Moves: Enhanced Bikeways (2014), from https://www.denvergov.org/content/denvergov/en/bicycling-in-denver/streets-and-trails/planning.html

Indianapolis, IN

Indianapolis, IN released the most recent version of their updated its bicycle and pedestrian plan, named "Indy Greenways Full Circle Master Plan," in 2014. This plan describes 250 miles of greenway, including a 64-mile circle that connects the region, major neighborhoods, and city green spaces. Economic impacts of the greenway system are evaluated in the plan in terms of property value, property tax, job creation, economic potential and retail sales. The cultural trail in downtown Indianapolis (launched in 2013) acts as an "engine" of the greenway system, connecting existing regional greenways. Studies show that the place-making and ecological design of the system facilitate recreational riding and spur economic activity and tourism for the city.

Background

The state of Indiana released the Indiana State Trails, Greenways & Bikeways Plan in 2006, with the goal of providing trail access within 7.5 miles or 15 minutes for all residents by 2016. As of 2014, they have met this criterion for 98.2 percent of the city ("Hoosiers on the Move, the Indiana State Trails, Greenways & Bikeways Plan - Progress Report January 2015," 2015). The city of Indianapolis greenways system plan was first drafted in 1994, and then updated in 2002 to identify 14 greenway corridors that would serve as the basis for greenways system improvement.

In 2014, Indianapolis adopted the Indy Greenways Full Circle Master Plan, and identified 9 new greenway corridors in addition to those already described in previous plans. The Plan outlines the comprehensive vision of the greenways development in Indianapolis.

Plans and Implementation

Indy Greenways Master Plan

For the Indy Greenways Master Plan, the city laid out an extensive public-driven planning process starting in 2013. First, potential new routes were developed based on a process of identification and assessment of inventory and existing greenway system, and followed by a series of public engagement events. A second round of public meetings and an economic impact review contributed to the route prioritization for implementation recommendation across the Indy Greenways System. Due to the scale of the master plan and levels of community investment, multiple methods of public engagement were involved, including public meetings, promotion of the process through public information handouts, online public surveys, a project website, social media, and the creation of a project office and consistent office hours, among others. ("Indy Greenways Full Circle 2014-2024 Master Plan," 2014).

Multi-dimensional goals and objectives were designed for guiding the development of the Greenways System:

1. Recreation: Provide opportunities for recreation throughout the city;
2. Access: Identify, promote and increase access to the greenways by residents;
3. Connectivity: Provide connections to neighborhoods, commercial centers, parks, pedestrian and bicycle facilities, and public transportation;
4. Transportation: Provide routes that can be used for alternative transportation;
5. Economics: Provide a positive economic benefit to the community and foster the growth of existing and emerging commercial districts;
6. Environment: Promote responsible and sustainable stewardship of greenway corridors and their resources;

7. Inter-agency coordination: Identify appropriate oversight and coordination with related agencies overseeing similar bicycle and pedestrian functions in the City;
8. World-class: Promote the continued recognition of Indy Greenways as one of the nation's world-class greenways systems.
   ("Indy Greenways Full Circle 2014-2024 Master Plan," 2014, p. 58)

The Plan delineates 250 miles of greenways throughout the City of Indianapolis by 2024 ("Indy Greenways Full Circle 2014-2024 Master Plan," 2014). These greenways provide a 64-mile circle around the city and offer multi-modal connections (bikers, walkers and other users) between four flagship parks in the city.

Indianapolis Cultural Trail

Constructed between 2007 and 2013, the Indianapolis Cultural Trail in downtown Indianapolis acts as a "hub," connecting many greenway trails ("Indy Greenways Full Circle 2014-2024 Master Plan," 2014).

Figure 8. Indianapolis Cultural Trial map, facility examples, and place-making

Sources: Map – Indianapolis Cultural Trial[14], Pedestrian and cycling trail, Indianapolis Cultural Trail[15], Cycling in the United States[16], and Home of Indy 500 embraces bicyclists and pedestrians[17].

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[14] Map-Indianapolis Cultural Trial, from http://indyculturaltrail.org/map/
[15] Indianapolis Cultural Trail, from http://altonrdcoalition.org/wp/category/pedestrians/;
[16] Cycling in the United States, from http://www.skyscrapercity.com/showthread.php?t=519960&page=7.
[17] Home of Indy 500 embraces bicyclists and pedestrians, from https://www.transportation.gov/fastlane/home-indy-500-embraces-bicycle-pedestrian-transportation.

The 8-mile cultural trail was opened in 2013, with the goal of connecting neighborhoods, cultural districts and entertainment amenities. It is also connected to 40 miles of the Indianapolis Parks Greenway Trail System. The total cost is $63 million, composed of $27.5 million private funding and $35.5 million federal transportation funding ($20.5 million of which is from a TIGER grant). No local tax money was used during this process. It estimates $864.5 million in economic impact, including the creation of 11,372 jobs. It has 5 acres of new landscaping, 11.25 acres of paved trails, 8065 cubic yards of topsoil and 25,400 square feet of storm-water planters[18]. In addition, a bike-sharing program with 26 stations and 250 bicycles is available along the trail[19].

Evaluation

The Greenways Full Circle Master Plan includes an economic impact analysis of the proposed greenway system, covering the topics of property value, property tax, job creation, economic potential, and retail sales. They summarized:

- There is 6,371 acres of land with development potential in the ½ mile surrounding the five highest priority future trails.
- After all mixed-use trails are constructed, $39.7 million in new property taxes may be generated by increases in property value. The result is a return of $0.90 on each construction dollar spent on mixed-use trails currently estimated at $44.2 million in total construction costs.
- The construction of 183.3 miles of new mixed-use and residential trails in the county at a construction cost of $183.2 million will create $73.3 million in labor costs creating 1,102 jobs in the process.
- Based on annual trail user counts, the expected retail sales generated by future trails range from $2.7 to $5.7 million supporting 11 to 23 retail employees.
  (“Indy Greenways Full Circle 2014-2024 Master Plan,” 2014)

Wang & Hji-Avgoustis (2011) conducted a cost-benefit analysis of the Indy Cultural trail. Construction and maintenance costs, and benefits of expenditures of residents, job creation and tourism growth were taken into account in the analysis. Additional benefits include urban revitalization, property value increase, recreation and health and reduction of travel cost. The results indicated that without counting tourism benefits, the benefits would not exceed the costs. They emphasize the importance of tourism strategies of the cultural trail.

Further Information

There are four research papers regarding the impact of greenways using the Indianapolis case, in terms of trail usage, property value, recreation, and equity of access. Some studies found neighborhood characteristics, including urban forms and social-demographic characteristics, influence the greenway usage in Indianapolis (Lindsey, Han, Wilson, & Yang, 2006; Ottensmann & Lindsey, 2008). By using data from Indianapolis Greenways, another study shows that some but not all greenways have a positive, significant effect on property value and the recreational value exceed the cost of constructions (Lindsey, Man, Payton, & Dickson, 2004b). In addition, the greenway access for diverse groups should be considered in the planning and implementation process (Lindsey et al., 2001).

[18] Fun Trail Facts - Indianapolis Cultural Trial, from http://indyculturaltrail.org/alongthetrail/facts-and-figures/
[19] Bikeshare – Indianapolis Cultural Trial, from http://indyculturaltrail.org/bikeshare/.

Minneapolis, MN

Minneapolis, MN updated its bicycle plan in 2011. In their plan, they emphasize multiple strategies to strengthen the bicycle network including education, encouragement, enforcement, engineering, equity and evaluation. The city updated their protected bikeway plan for near-term implementation of protected bikeways.

Background

Prior to the end of 2009, there were several types of bikeways throughout Minneapolis: 44 miles of on-street bike lanes, bicycle boulevards, on-street greenways, signed bike lanes, and shared use pavement markings (sharrows), and 84 miles of off-street trails[20]. As of 2014, on-street bikeways has increased to 118 miles, and off-street bikeways to 92 miles[21].

The most recent Minneapolis Bicycle Master Plan was adopted in 2011, with the aim of improving safety and mobility for bicyclists around the city. This plan provides a comprehensive framework for projects and initiative for future active transportation development in Minneapolis. In addition, an updated protected bikeway plan was proposed for near term protected bikeway implementation in 2015.

Plans and Implementation

Minneapolis Bicycle Master Plan

The city took over one year to prepare the plan. A public meeting was held in June 2008 where over 150 people attended. Five additional public meetings were held in 2010 to receive public comments on the draft plan (Pflaum, 2011).

The main guiding principles of the Minneapolis Bicycle Master Plan (2011) are improving safety and mobility, increasing numbers of bicyclists and mode share, and ensuring community support and wise investments. In this plan, they proposed to add 183 miles of bikeways at a cost of $270 million, over the course the next 30 years. The stated goal is to ensure that all residents are within 1 mile of a trail, ½ mile of a bike lane, or ¼ mile of a signed bike route by 2020 (Pflaum, 2011).

The plan poses a need analysis for the “Six E’s”: education, encouragement, enforcement, engineering, equity and evaluation. Addressing these needs will help them to achieve the goal of increasing bicycle mode share, safety and comfort, and accessibility. Under each goal, the six E’s are illustrated by setting initiatives, benchmarks, performance measures and responsible parties. The research team evaluated the bicycle system in terms of bicycle counts, crash and injury reduction, and miles of bikeways, with a final goal of zero deaths (Pflaum, 2011).

Protected Bikeway Update

In 2015, Minneapolis updated the plan to include more protected bikeways in the near-term. Protected bikeways may be one-way or two-way facilities. In street corridors, they may be at street-level or at sidewalk level.(“Protected Bikeway Update to the Minneapolis Bicycle Master Plan,” 2015)

Table 4. Minneapolis bikeway network development

[20] “Improvements making Minneapolis a better biking city”, from http://www.ci.minneapolis.mn.us/news/news_20100105betterbikingcity
[21] “Bicycling in Minneapolis”, from http://www.ci.minneapolis.mn.us/bicycles/

Minneapolis Bikeway Network Development

Bikeway Type	Centerline Miles by Year 1997	2010	2014	This Plan	Long-Term*
Protected Bikeways	62	89	96	144	174
Bike Lanes	19	44	82	50	104
Shared Lanes	1	5	15	11	74
Bike Boulevards			20	20	44
To Be Determined				6	6
Total	**82**	**138**	**213**	**232**	**403**

** Based on existing network, this plan, 2011 Bicycle Master Plan, and other recent planning activities.*

Source: City of Minneapolis, 2015, Protected Bikeway Update to the Minneapolis Bicycle Master Plan, p.1

Midtown Greenway, Minneapolis

Loring Bikeway, Minneapolis

Figure 9. Examples of protected bikeways in Minneapolis

Source: City of Minneapolis, 2015, Protected Bikeway Update to the Minneapolis Bicycle Master Plan, p.2

The implementation of protected bike lanes also involve in an evaluation and engagement process around the city for master plan amendment. The process is:

1. Identify the location of the proposed protected bikeway, considering high bicycle demand, high traffic conflict, good network integration, and public input;
2. Confirm location for further evaluation, and evaluate design and implementation feasibility;
3. Draft recommended protected bikeway corridors and plan document of feasibility analysis results and already-programmed projects;
4. Public review and input;
5. Final draft of bicycle master plan amendment.
   ("Protected Bikeway Update to the Minneapolis Bicycle Master Plan," 2015)

New York, NY

New York, NY created its Bicycle Master Plan in 1997 and released its strategic plan, Sustainable Streets, in 2008. The city aimed to double bicycle commuting between 2007 and 2012 (the goal was reached early in 2011) and to triple it by 2017. With its expansion of bicycle/pedestrian facilities, bicycle safety has improved significantly, even after accounting for the growing number of bicycle commuters in recent years. New York utilizes multidimensional evaluation metrics to study key street redesign treatments. They also evaluate the economic impact of street redesigns by using retail sales as their key indicator of local economic opportunities and vitality.

Background

New York issued the Bicycle Master Plan in 1997. There is no more recent updated bicycle master plan, besides Sustainable Streets, the agency's comprehensive transportation strategic plan, which launched in 2008. The strategy plan laid out the vision of improving safety and mobility for residents, and achieving the final goal of "world-class quality of life" ("Sustainable Streets - Strategic Plan for the New York City Department of Transportation 2008 and Beyond," 2008).

As of 2014, New York had 431.5 miles of on-street bicycle facilities in total, indicating rapid growth compared with the level of 2007 (See Table 5). Over half of the facilities constructed in this time period are exclusive bicycle lanes, but over the last three years, more shared bicycle lanes have been constructed.

Table 5. New York bicycle network expansion from 2007-2014

Miles by Type	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	Total	% of Total
Protected Bicycle Path	0.0	0.8	4.1	9.9	6.1	4.7	5.4	8.9	**39.9**	**9%**
Exclusive Bicycle Lane	35.8	54.4	60.2	16.2	18.3	8.1	18.4	17.3	**228.8**	**53%**
Shared Bicycle Lane	6.2	18.9	24.4	24.4	8.7	13.2	28.6	38.5	**162.9**	**38%**
Total	**42.0**	**74.1**	**88.7**	**50.5**	**33.1**	**26.0**	**52.3**	**64.7**	**431.5**	

Miles by Boro	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	Total	% of Total
Bronx	9.0	14.1	15.8	11.1	6.5	2.2	6.4	18.5	**83.6**	**19%**
Brooklyn	9.1	20.2	31.0	29.0	13.6	8.2	16.2	20.6	**147.8**	**34%**
Manhattan	13.1	10.4	12.8	4.4	5.7	11.4	25.9	10.9	**94.7**	**22%**
Queens	10.8	22.9	19.0	6.1	7.3	3.3	3.9	14.7	**87.9**	**20%**
Staten Island	0.0	6.5	10.1	0.0	0.0	0.9	0.0	0.0	**17.5**	**4%**
Total	**42.0**	**74.1**	**88.7**	**50.5**	**33.1**	**26.0**	**52.3**	**64.7**	**431.5**	

Source: New York City Bicycle Network Expansion[22]

Plans and Implementation

In order to implement and maintain city bicycle network and provide safer bicycle facilities, the 1997 Bicycle Master Plan proposed 909 miles of citywide bicycle network, designed guidelines for implementation of projects and initiatives ("New York City Bicycle Master Plan," 1997).

[22] New York City Bicycle Network Expansion, from http://www.nyc.gov/html/dot/downloads/pdf/bikeroutedetailsfy07-fy14.pdf

In 2008, Sustainable Streets, a transportation strategic plan, were released. It described a comprehensive framework of policies and actions toward goals of safety, mobility, customer service, greening, world-class streets, and global leadership (“Sustainable Streets - Strategic Plan for the New York City Department of Transportation 2008 and Beyond,” 2008). Bicycle and pedestrian facilities and initiatives are important components in this plan to help to achieve the goals.

Evaluation

Comprehensive metrics

Using a cross-section of recent street design projects, NYCDOT evaluates the street project toward safe, sustainable, livable and economically competitive streets (“Measuring the Street: New Metrics for 21st Century Streets,” 2012). The comprehensive metrics include multiple aspects: crashes and injuries, traffic volume, traffic speed, economic vitality, user satisfaction, environmental and public health benefits. This report lists several street design projects, and describes changes after specific treatments in terms of designing safer streets, building great public spaces, improving bus service, reducing delay and speeding, and increasing efficiency in parking and loading. The street redesign treatment inventory are listed below (See Table 6):

Table 6. Street redesign inventory

Strategies	Key treatments	Key Metrics
Designing safer streets	• Simplified intersections • Dedicated left, right, and through lanes • Pedestrian safety islands • Protected bike lanes • Leading pedestrian intervals and split phasing	• Crashes and injuries to motorists and other vehicle occupants, pedestrians, cyclists, and motorcyclists • Vehicle speeds
Building great public spaces	• Create new pedestrian plazas – first using temporary materials, later as capital projects • Street furniture • Seasonal seating platform in curbside lane • Striping and planters • Maintenance agreements with local organizations • Programmed events	• Economic vitality (sales tax receipts, commercial vacancies, number of visitors) • User satisfaction, revealed through surveys • Number of users
Improving bus service	• Offset bus lanes • Transit Signal Priority • Bus bulbs • Bus lane enforcement cameras	• Bus ridership • Bus travel speeds • Economic vitality (sales tax receipts, commercial vacancies, number of visitors)

Reducing delay and speeding	• Adaptive signal control • Signal optimization • Dedicated left, right, and through lanes • Simplified intersections • Neighborhood Slow Zones	• Travel speeds and times • Traffic volumes • Crashes and injuries to motorists and other vehicle occupants, pedestrians, cyclists, and motorcyclists
Efficiency in parking and loading	• PARK Smart • Commercial Paid Parking • Delivery Windows • Muni meters	• Vehicle travel speeds and volumes • Double parking • Parking duration • Number of unique visitors

Source: New York City Department of Transportation, 2012, Measuring the Street: New Metrics for 21st Century Streets, summarized by author

Economic Impact Study

A further economic impact study, the Economic Benefits of Sustainable Streets (2012), follows up to evaluate the improvements on neighborhood economies. The basic hypothesis is that changes in street environment, travel patterns, spending patterns and neighborhood characteristics can directly affect retail sales, and will further influence office and commercial rents, and finally impact businesses' and property owners' bottom lines (New York City Department of Transportation, 2012). They evaluate many potential measures of local economic vitality and found retail sales – specifically by using sales tax data of street-level retail and restaurants and food service businesses – can provide a robust measure of the health of local businesses. The sales comparison between changes in locally based businesses before and after project implementation, and changes in comparison sites over the same time period show that improved accessibility and a more desirable street environment due to the street design projects generate increases in retail sales in the project areas, and have positive impacts on local businesses (New York City Department of Transportation, 2012).

Bicycle Counts and Evaluation

New York City Department of Transportation (NYCDOT) has been tracking long-term trends in New York City cycling using the In-Season Cycling Indicator since 1984. In 2008, DOT began counting cyclists in winter months, and found that off-season cycling has grown significantly. More and more New Yorkers are cycling year round as part of their transportation option[23].

The Transportation Division of the New York City Department of City Planning conducted annual counts on bicycle lanes and paths in Manhattan from 2001-2008. The major findings can be summarized as follows:

1. Both on-street bicycle lanes and off-street path have witnessed a 26 to 30 percent increase during this time period.

[23] NYC DOT – Bicyclist –Bicycle Counts, from http://www.nyc.gov/html/dot/html/bicyclists/bike-counts.shtml

2. Cyclists would like to use bike facilities when they are available, especially on heavy vehicular traffic.
3. The number of female cyclists is increasing faster than their male counterparts, and they are more likely to use greenway rather than on-street facilities.
4. More and more people are using helmets.[24]

[24] NYC DOT – Bicyclists –Network and Statistics, from http://www.nyc.gov/html/dot/html/bicyclists/bikestats.shtml

Vancouver, BC

Vancouver, BC approved its Greenways Plan in July 1995 and updated it most recently in 2010. The city has set a goal of ensuring that a city greenway is located no more than a 25-minute walk or a 10-minute bike ride from every residence in the city, planning 17 routes totaling 140km in length. The city greenway system is supplemented by resident-initiated neighborhood greenways. Vancouver has conducted pedestrian and cycling safety studies that empirically analyze safety issues, strategies and treatments. In addition, the city conducted a business impact study of separated bike lanes in 2010 that examined the impacts of bike facilities on local businesses.

Background

The Vancouver Greenways Plan was approved in July 1995. In the updated 2010 version, the city is working toward the goal of a city greenway system, totalling 140km (87.5 miles) long with 17 routes, which will ensure that every resident can reach a greenway with no more than a 25-minute walk or a 10-minute bike ride[25].

Additionally, there are neighborhood greenways, acting as complement of city greenways, which initiated by local residents to promote partnerships between the City and communities. With the assistance with the design, development and construction process from the city, the community takes the lead to development and maintain the space once completed.[26] There are nine identified neighborhood greenway as of 2015.

Figure 10. Vancouver neighborhood greenways map.

Source: City of Vancouver, Vancouver neighborhood greenways[27]

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[25] City greenway network, from http://vancouver.ca/streets-transportation/city-greenways.aspx

[26] Neighborhood greenways, from http://vancouver.ca/streets-transportation/neighbourhood-greenways.aspx

[27] Vancouver neighborhood greenways, from http://vancouver.ca/images/cov/content/neighbourhood-greenways-2.JPG

Plans and Implementation

Vancouver Transportation 2040, adopted 2012, includes visions to "make walking safe, convenient, comfortable, and delightful"; and "make cycling safe, convenient, comfortable, and fun for people of all ages and abilities", which calls for a low-stress, high quality bike routes system ("Transportation 2040," 2012).

In the plan, the policies and strategies related to bicycle faculties include:

1. Cycling Network
    a. Build cycling routes that feel comfortable for people of all ages and abilities.
    b. Upgrade and expand the cycling network to efficiently connect people to destinations
    c. Maintain bikeways in a state of good repair
    d. Make the cycling network easy to navigate
2. Parking and End-of-Trip Facilities
    a. Provide abundant and convenient bicycle parking and end-of-trip facilities
3. Multi-Modal Integration
    a. Make it easy to combine cycling with other forms of transportation
    b. Provide a public bicycle system
    ("Transportation 2040," 2012, p. 26-30)

Evaluation

Vancouver Separated Bike Lane Business Impact Study

Vancouver Separated Bike Lane Business Impact Study was conducted in 2011 to determine the impact of two separated bike lanes constructed in the downtown area. They surveyed stakeholders including business owners, customers, and employees on both separated bike lane corridors and adjacent corridors to distinguish the impact merely from the impacts of separated bike lanes installation. It is a short-term (one year) business impact study, which indicates negative impacts of separated bike lanes including reductions of sales and profit, due to the effects from the following factors: "loss of parking, reduced visibility; restrictions in turning at specific intersections; reduced access to loading zones and more difficult pedestrian access" (*Vancouver Separated Bicycle Lanes Business Impact Study*, 2011, p. v). This study reminds other cities which conduct similar projects to consider the concerns describing above, at least during the construction periods.

Pedestrian and Cycling Safety Studies

Vancouver also conducted two safety studies, the Pedestrian Safety Study in 2012 and Cycling Safety Study in 2015, which together provide a comprehensive and objective review of the safety of pedestrians and cyclists in the city and an action plan to address each of the identified safety issues. Even though Vancouver has one of the lowest cycling fatality rates when compared to other peer cities in Canada, the United States, and internationally, the study still identified twelve key cycling safety issues include: dooring, conflict zones, right hooks, left crosses, sidewalk cycling, two way stops, non-motor vehicle collisions, high collision corridors, high collision locations, designated bikeways, PM peak, adverse weather and low light (Cycling Safety Report, 2015). A combination of engineering, education, and enforcement measures are proposed to address each of the twelve cycling safety issues, including treatments such as "protected bicycle lanes, buffered bicycle lanes, colored conflict zone markings, and protected bicycle signal phases among others" (Cycling Safety Report, 2015, p. es-vi).

In terms of pedestrian safety issues, the report summarizes the cost effectiveness of various pedestrian treatments according to five peer cities in Canada and the Pacific Northwest (Calgary, Toronto, Seattle, Portland, and San Francisco) as shown in Table 7 (Pedestrian Safety Study, 2012):

Table 7. Cost and effectiveness of pedestrian treatments

Treatment	Relative Cost	Relative Effectiveness
Pedestrian Activated Signals	High	High
Corner Bulges	Moderate	Moderate
Speed Reader Boards	Moderate	Moderate-Low
Pedestrian Countdown Timers	Moderate-Low	Moderate
Crosswalks	Moderate-Low	Low
Pedestrian Scrambles	Moderate-High	High
Audible Pedestrian Signals	Moderate-Low	Moderate-Low
Leading Pedestrian Intervals	Low	Moderate
Left Turn Bays	Varies	Varies
Greenways	Varies	Varies
Crossing Guards	Moderate-Low	Moderate-Low
Yield to Pedestrian Signs	Low	Low
Raised Intersections	Moderate-High	Moderate-Low
Midblock Crossings	Varies	Varies
Raised Crosswalks	Moderate-High	Moderate
Separated vs Mixed Modes	Low	Moderate
New/Upgraded Intersection Lighting	Moderate	High

Source: City of Vancouver, 2012, p. e-10

Washington, DC

Washington, DC created its Bicycle Master Plan in 2005 and initiated an innovative bike lane pilot project in 2010. Bicycle commute mode share has increased in the city with 56 miles of trails, 69 miles of bike lanes and 6 miles of cycle tracks as of 2014. The bike lane pilot project initiated in 2010 was designed to evaluate different facility treatments in terms of facility use, operation efficiency, convenience, comfort and safety. They found that bicycle treatments improved cycling conditions without negatively impacting other modes in the vicinity of the investment.

Background

Washington DC adopted the bicycle master plan in 2005 with no updates since then. At the end of 2014, there were 56 miles of trails, 69 miles of bike lanes and 6 miles of cycle tracks in total in Washington DC, 2600 bike racks installed since 2001, 2000 capital bike share bikes, 202 capital bike share stations, and 85 miles of signed bike routes[28]. With the trend of increase of bike facilities, the bike share for commuting is increasing and the vehicle trip share is decreasing at the same time (Figure 11).

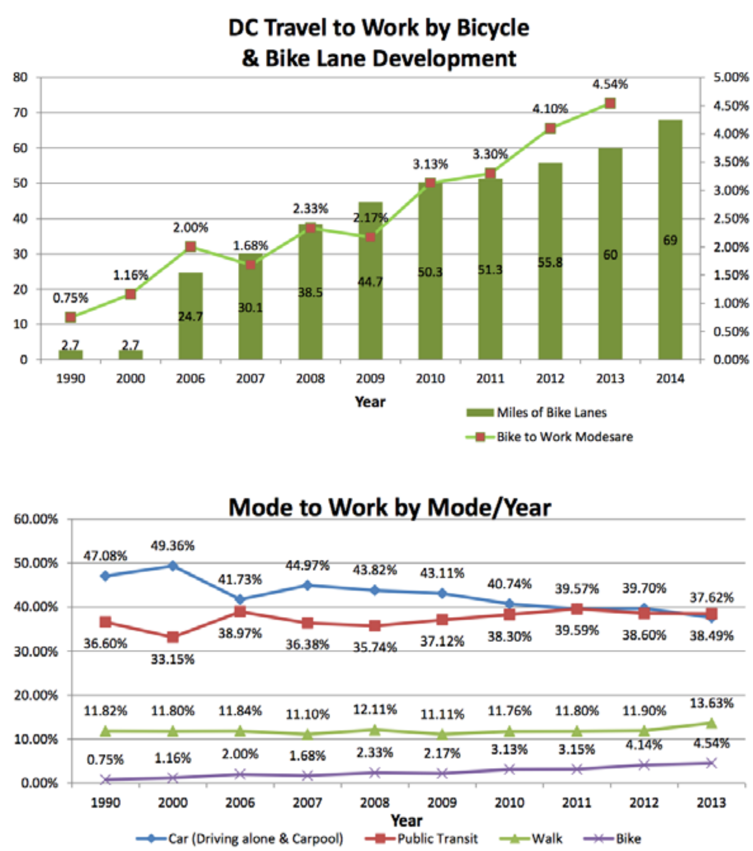

Figure 12. Trends of Bicycle facilities development and mode to work in Washington, DC

Source: 2014 Bike Program Fact Sheet – DDOT

[28] 2014 Bike Program Fact Sheet – DDOT, from http://ddot.dc.gov/publication/2014-bike-program-fact-sheet

Plans and Implementation

The 2005 Master Bicycle Plan presented fourteen core and supporting recommendations in three categories to improve bicycle transportation in DC, including "more and better bicycle facilities, more bicycle-friendly policies and more bicycle–related education, promotion and enforcement" ("District of Columbia Bicycle Master Plan," 2005).

In 2010, the downtown bike lane pilot project was initiated to improve bicycle safety and access in downtown. The city lists several separated bicycle facilities as pilot projects, and monitors the success of these facilities.[29] The results can be used to make improvements and help with the design of other similar projects.

Evaluation

DDOT has conducted evaluations of three innovative bicycle facilities installed in 2010("Downtown Bike Lane Pilot Project - DDOT," 2010):

1. 15th Street – two way cycle tracks
2. Pennsylvania Avenue – center median bicycle lanes
3. Intersection at 16th/U/New Hampshire – intersection treatments (bike box, bike signal, contra-flow bicycle lane).

After these treatments were installed, DDOT evaluated the before and after conditions along the following dimensions: facility use (bicyclist and motor vehicle volumes), efficient operations (LOS), convenience (travel time by bicyclists and motor vehicles), comfort, and safety. Overall, the analysis found that the bicycle treatments improved the conditions for cycling without negatively impacting other modes in the vicinity of the investment. Due to the unique and independent conditions at each facility, key findings are provided separately:

1. 15th St: more bicycle volumes, motor vehicle LOS remains similar, bicycle LOS increases, bicycle crashes remain similar, safer and easier perception from bicyclists, positive attitudes favorable toward cycle tracks.
2. Pennsylvania Ave: bicycle volumes increase by 200%, motor vehicle volumes decrease, arterial LOS remain similar, signal timing for bicyclists varies in different intersections, frequency of bicycle crashes increase, bicyclists know the rules but not obey, safer and easier perception from bicyclists, few bicyclists riding on sidewalks.
3. 16th/U/New Hampshire: bicycle volumes increase, motor vehicle volume/LOS remained constant, few cyclists use bike box, more bicycle crashes, positive perception of the facility.

[29] Downtown bike lane pilot project – DDOT, from http://ddot.dc.gov/publication/downtown-bike-lane-pilot-project-ddot-letter-tpb-may-2010

LENTS GREEN RING

U. S. Department of Transportation
Ladders of Opportunity
"Every Place Counts Design Challenge"

Submittal

Lead Applicant: Mayor Charlie Hales, City of Portland, Oregon
Project Contact: Mark Raggett, Bureau of Planning and Sustainability

6/3/2016

CITY OF PORTLAND, OREGON 1851

Bureau of Planning and Sustainability
Innovation. Collaboration. Practical Solutions.

PBOT
PORTLAND BUREAU OF TRANSPORTATION

LENTS GREEN RING

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LENTS GREEN RING

"The Lents Green Ring presents a compelling way to bridge the barrier of the I-205 Freeway, and a great opportunity for this diverse, vibrant community to pro-actively determine its future"
Mayor Charlie Hales, City of Portland, Oregon

PROBLEM IDENTIFICATION AND COMMUNITY ASSESSMENT

The Interstate 205 Freeway through Portland, Oregon was the last of the proposed Interstate 5 Freeway connecting loops to be constructed in the state. Rife with community pushback, it underwent a lengthy planning process that started in 1968 and lasted until 1983. The controversy existed alongside the 9.2-mile stretch from SE Foster Road to the Columbia River. In the 1970s, many of the higher income inner Portland neighborhoods successfully resisted the construction of I-205 through their communities. Their opposition effectively pushed the interstate farther east, so that it eventually cut through neighborhoods with far less political and economic capital, including Lents. Today, the location of the I-205/Foster/92nd interchange exists on what was formerly the heart of the Lents neighborhood, effectively destroying the core of the community.

Planning for the Interstate 205 Freeway's right-of-way clearance removed approximately 500 dwellings from the neighborhood's housing stock, and its final alignment divided the community in half with a roughly 400-foot-wide swath of concrete lanes, compromised left-over spaces, high levels of noise and degraded air quality (Figure 2, inset). To serve the full diamond interchange that exists today, a Foster/Woodstock couplet was engineered that can accommodate a smooth flow of vehicles through the heart of the neighborhood. The result was a substantial reduction of on-street parking, increased vehicle volumes and speeds and the loss of a safe, comfortable pedestrian environment, all of which negatively affected the business district.

In 1995, the Metro Regional Government's 2040 Growth Concept identified Lents as one of 5 "Town Centers" in the City of Portland – areas that are targeted centers of commercial activity, hubs of neighborhood services, and inclusive of parks and access to transit facilities. The Town Center designation was followed by application of higher density mixed-use zoning to areas surrounding the traditional heart of the neighborhood at SE 92nd and Foster Road (Figure 1). The Lents Town Center was established as an Urban Renewal Area in 1998, enabling the use of tax-increment financing to help fund local improvement projects. The MAX light rail line was constructed along I-205, opening a Lents Transit Station two decades after freeway construction, yet the area has yet to fully recover from the previous damage done.

Unintended consequences of planning efforts that upzoned properties coupled with public investments in infrastructure led to a perception of artificially inflated property values and land speculation. Public sector activities post-construction of I-205, while well intentioned, seemed to slow down and not speed up the reinvigoration of the Lents community. At the same time, the community has evolved and priorities have shifted, so many of the actions and projects called for in the prior plans no longer appeared to reflect the interests of the Lents population.

Today, the Lents community is home to a racially and ethnically diverse cross-section of people, with almost half the population being non-white. When compared to all of Portland, twice as many households in Lents speak languages other than English (Figure 3). This dynamic place and its residents are slowly recovering from the freeways' construction and recent economic downturns, only to see new challenges emerge as the real estate markets shift, the cost of housing rises, risk for gentrification increases and long-standing members of the neighborhood face the pressure of involuntary displacement (Figure 2). Community organizations like Organizing People Activating Leaders (OPAL) Environmental Justice, Revitalizing Outer Southeast Community Development (ROSE CDC), or Green Lents, founded in 2009, have created welcoming places for residents and workers to become a pro-active part of the areas' community-sourced revitalization efforts.

TYPE OF PROJECT: HIGHWAY – Focus on pedestrian/bicycle overpasses or underpasses

The negative impact of the I-205 freeway cannot be overstated. For Lents, two obstacles remain at the heart of the community: the limited mobility choices for businesses and residents due to improved automobile access to the freeway at the mercy of all other modes, and the disenfranchisement and lack of social cohesion that resulted from a community split in half.

From 2005-2014, there were a total of 433 reported crashes in the four intersections on SE Foster and SE Woodstock where the I-205 off- and on-ramps land (Figure 2, inset). Of the 400 crashes, there were 214 reported injuries. In 2011, the Foster Road on-ramp for I-205 had one of Portland's 11 red light cameras installed. At the time of installation, 96th & Foster had the most crashes in the city related to red light disregard. The red light camera is improving the situation at that location, however, red light violations are still reported at the other 3 non-enforced locations.

Recognizing the physical and social barriers of I-205, the community, in partnership with organizations such as Green Lents, ROSE CDC, OPAL and Bicycle Transportation Alliance (BTA) has recently emerged with a collective voice that values transportation options, social capital, shared assets, and community empowerment.

Two and a half years ago, the "Green Ring" concept developed as part of a large effort to identify and mitigate sustainability challenges and to build capacity within the Lents community. The Green Ring is a loop that incorporates low-traffic bicycle and pedestrian-friendly routes to connect people on both sides of the I-205 freeway. Located along the Green Ring are three parks, two schools, and a new community orchard. The Green Ring, simply put, is a potential manifestation of overcoming the physical and social barriers within Lents.

PROJECT LOCATION

The Lents Neighborhood is located roughly 6 miles southeast of downtown Portland, now centered on the I-205 Freeway. It is one of Portland's older neighborhoods, and also one of the largest, at approximately 3.75 square miles. Its borders are SE Powell Blvd. to the north, the city boundary to the south, SE 82nd Avenue to the west and roughly SE 112th to the east (Figure 1).

Essential neighborhood services, like the Fred Meyer grocery store or the sizable Lents Park, are located west of the freeway, necessitating trips from the east through the limited and congested freeway crossing points like the Foster/Woodstock interchange (Figure 1, inset). Conversely, there are a number of natural area resources, like Beggar's Tick Wildlife Refuge or portions of the Johnson Creek watershed, at the southeastern parts of the neighborhood that have been cut off from the western parts of the community. The Lent and Kelly Elementary Schools, each located on opposite sides of the freeway, now require that roughly half of their student populations cross the freeway to get to classes (Figure 5).

CURRENT CONDITION

Like many American cities, Portland's residential streets account for approximately 70% of the road system. On these quieter streets, only 17% of pedestrian and bicycle crashes occur. Portland has utilized these low stress environments to create networks for walking and bicycling, known as "Neighborhood Greenways" throughout the city. Portland Bureau of Transportation's (PBOT) Neighborhood Greenway efforts were recognized with a 2016 NHTSA Public Service Award. Because the Lents Green Ring is aligned along three neighborhood greenways and the Springwater Corridor Trail, it provides low stress connections for vulnerable roadway users through a neighborhood that has had its local street network dramatically affected by a freeway and multiple arterials that feed the freeway.

On the ground, the Lents Green Ring currently is a series of streets and intersections that do not quite reveal the prospective “restitching” of the neighborhood, nor the community amenities it could potentially connect. The area is characterized by large superblocks reminiscent of its rural origins and dead-end streets that back into the freeway or into other large superblocks and simply do not connect. While the Lents neighborhood offers many quiet streets, navigating by bicycle or on foot can be impeded by the lack of an intuitive grid or a wayfinding system that attempts to overcome barriers.

Further, the Springwater Corridor, which constitutes the southern segment of the Green Ring, is bordered by the backside of both residential and employment areas. Several streets and parcels dead-end into the corridor but do not allow access to it. The limited points of entry, coupled with poor lighting and wayfinding on the Springwater Corridor result in fewer “eyes on the street”, and for long stretches, it has attracted several homeless groups. The rows of tents, shopping carts, and personal belongings of a transient population live in plain sight of the corridor, perpetuating concerns over the safety of cyclists and walkers and thus fewer eyes on the street. A few targeted places along the route will benefit from physical design solutions, such as increased access points, to make it more visible, safe and usable.

IMPACT OF THE INFRASTRUCTURE CHALLENGE

While the I-205 freeway is a physical reminder that the Lents community has lacked political power or choice in determining its own outcomes, the Green Ring is a community framework for social equity, connection and empowerment. By partnering with organizations such as Green Lents, local government and federal agencies can help address past injustices. Through an inclusive process to realize this vision for the Green Ring, the project can support self-determination in meeting the identified needs of its community, a cornerstone of social equity.

Despite a deep history of disenfranchisement, Lents thrives today as a community that values diversity, a culture of sharing, fair access to community resources, and full local engagement. “Livable Lents”, a Green Lents program dedicated to increasing inclusivity of community aspirations, needs and priorities recently conducted a listening project. The project collected data from 410 residents, identifying community desires. Among those identified were investments in locally-owned businesses, improved bike and pedestrian infrastructure, and a greater variety of gathering spaces (Figure 4).

The Green Ring can offer more transportation choices to more people, connecting them to other bicycle- and pedestrian-oriented routes, services, and open spaces. The I-205 Multi-use pathway, just west of the freeway, runs north-south connecting the Green Ring to the Lents MAX station and the weekly Lents International Farmers Market. The Springwater Corridor links people to natural areas southeast of Lents along Johnson Creek, such as the Brookside Wetlands, Zenger Farm and Beggar’s Tick Marsh. Among the amenities linked by the Green Ring are the Lents Tool Library, Malden Court Community Orchard, and Lents Community Garden (Figure 5).

While the Green Ring can provide access to amenities along it, the alignment itself circumnavigates Lents Town Center and the local businesses and small grocers sprinkled within it. Potentially mapping and engineering an extension of east-west Green Ring “legs” could provide safer, more intuitive infrastructure to even more community destinations, including Fred Meyer, the area’s closest large grocery store, located just outside the neighborhood boundary.

Supplementary identified community infrastructure that could support (and be supported by) the neighborhood are: a local grocery store inside the Lents Town Center, community libraries, bicycle shops and repair kiosks, interpretive signage, and public art. Providing the Lents community with more active transportation choices, more connections to shared assets, and a voice in the process can help empower neighbors to reinvest in their local communities.

However, in addition to the challenge of identifying the resources to create more community-oriented infrastructure and amenities is the constant requirement for resources and capacity to maintain and support them.

COMMUNITY VISION FOR THE DESIGN SESSION

The vision for the design session is to overcome the barrier of the I-205 Freeway and holistically reconnect the Lents community, and the goal is to forward the Green Ring as a physical and social strategy to help achieve that vision. The first part of the design session would focus on physical improvements to the Green Ring – engineering for better connections, new lighting for added security and a new, multi-lingual wayfinding and signage package to help community residents and visitors navigate through the town center. The second part of the design session would focus on local empowerment using the Green Ring as a structure – exploring ways to find additional resources to support engagement by community organizations in planning for – and implementing – land use and transportation projects in the neighborhood.

Realizing the vision of the Green Ring should build upon the work that the Lents community has spearheaded, with an inclusive process that opens dialogue between the community and agencies and between neighbors.

Potential physical design solutions should explore traffic-controlled crossings at key intersections from the Green Ring and its connections to multiple destinations, new pavement to replace existing gravel pathways at the southwest corner of the route, and increased access into the Springwater Corridor. Special focus on pedestrian-scaled lighting throughout the system would improve safety and usability. In addition, design for the Green Ring should reflect the Lents community with multi-lingual signage and wayfinding. During the past year, Portland State University students worked with the community to develop branding for potential Green Ring signage and wayfinding. Building on these efforts to translate materials into multiple languages, plan and engineer the location, type and specifications for signage would support better access to amenities within the Green Ring and beyond it to ensure its success.

Just as the Green Ring physically connects shared community assets, it socially connects and has been shepherded by a group of non-profits in Lents, including Green Lents, ROSE CDC, OPAL Environmental Justice, PSU Institute for Sustainable Solutions and the Bicycle Transportation Alliance. While the collaboration between community organizations and the Lents neighborhood has moved the Green Ring concept to its current state, limited resources have limited the ability of each organization to sustain the momentum until it can thrive on its own. Identifying opportunities for additional resources in the traditionally less-affluent community would reduce barriers to involvement in planning and implementation processes, strengthening collaboration and repairing past divisive infrastructure efforts. The Design Challenge can assist the community in developing a five-year strategy to address not only the physical barriers, but the social barriers as well. The action plan could include a recommended toolkit with resources, linking projects and stewardship programs to potential grant opportunities and funding sources. It could also recommend an organizational chart effectively determining roles and responsibilities and the structure to move projects like the Green Ring forward. The result is a community with expanded access to resources and decision-making, because it would stretch non-profit resources to engage in other future planning and infrastructure projects.

HISTORY OF THE INFRASTRUCTURE CHALLENGE AND COMMUNITY

The original town-site of Lents was platted in 1892 and given a family name in honor of Oliver P. Lent. At the time, the town-site was one half mile outside the City of Portland boundary. The farm-to market Foster Road became a well-traveled diagonal corridor that traversed the area and linked the rural areas around Lents to the regional markets and port hub in downtown Portland. A lively commercial district soon developed around the intersection of SE 92nd and Foster Road, with businesses catering to the residents of the Lents community. The area and its economic development prospered and grew.

In 1912 Lents was annexed to Portland and was served by interurban rail lines, helping it to grow with the city. Lents evolved from a streetcar suburb with a rural character to a neighborhood just inside the city limits bur far from the city center and political power. Post World War II, the suburban development building boom fueled by freeway construction would have a profound effect on the Lents community.

Lents' current status is that of a community still trying to recover from the impact of the I-205 Freeway, the final segments of which opened in 1983. As the pedestrian environment deteriorated, so too did the business community in Lents. Former Lents consumers could now drive from Lents down the freeway to shopping malls and other freeway-oriented commercial centers with more convenient automobile access. As a real and perceived pattern of disinvestment followed, it indirectly became more accessible to less-entitled populations in the Portland area – communities of color, non-English-speaking immigrants, those with less income, and those with lower levels of educational attainment.

CURRENT FUNDING STATUS

In 1998 the City of Portland partnered with the Portland Development Commission and established a 15 year, $75 million dollar urban renewal district. Its charter is to assist in the development of the Metro 2040 planning of a "Lents Town Center" to be located in the original downtown core area of S.E. 92nd Avenue and Foster Road. Ten years later, on June 25, 2008, the Portland City Council amended the Lents Town Center Urban Renewal Area boundaries and increased funding by another $170 million dollars for neighborhood improvements.

PROJECT PRIORITY

The Metro Regional Government's Regional Transportation Plan (RTP) calls for a "Lents Town Center Active Transportation Demonstration Project" which would double the amount of bikeways in Lents and through the community. The project would also make improvements to existing facilities, such as some segments along the Green Ring. In addition, it calls for roughly 4 miles of new sidewalks, and for the undertaking of "encouragement programs" to support the investments in new infrastructure.

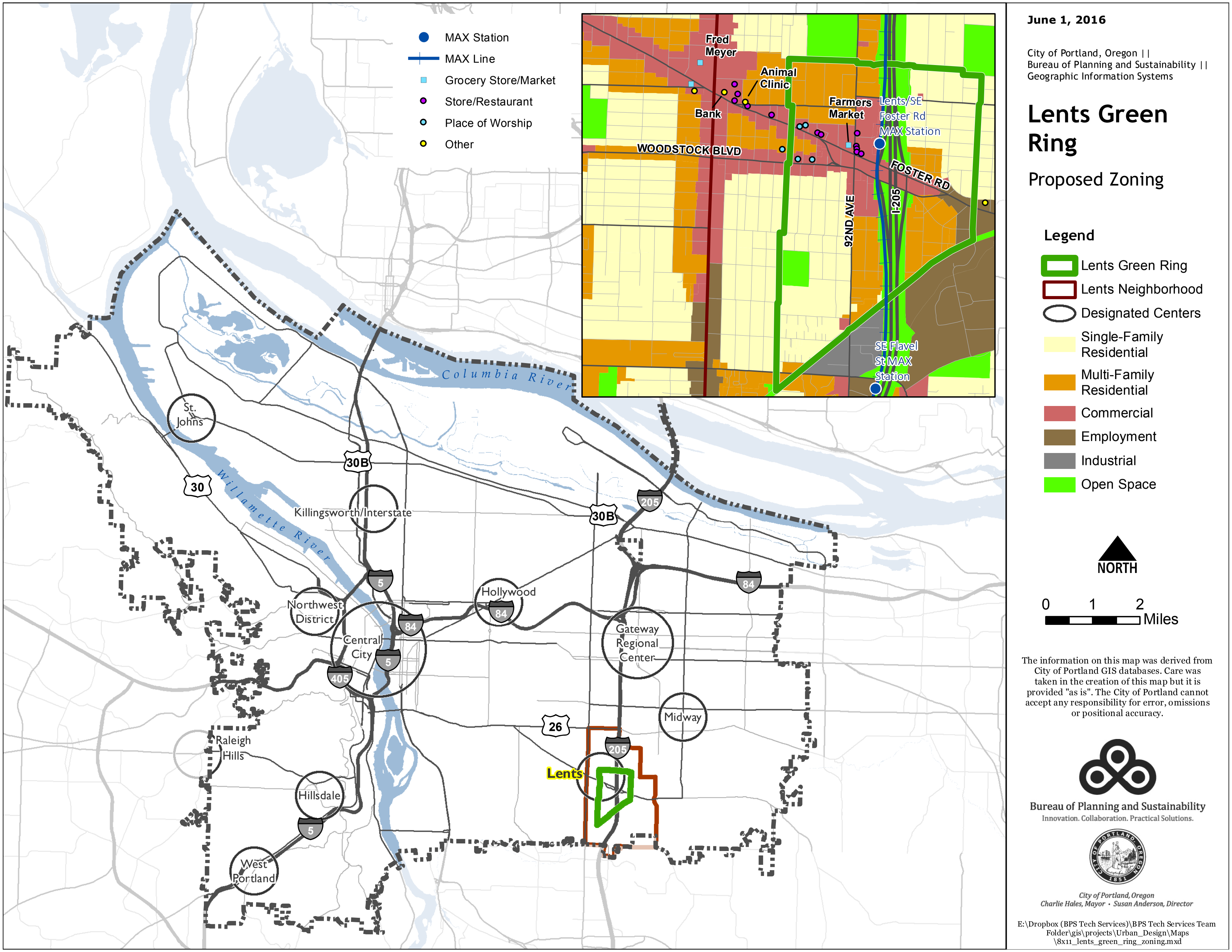


Figure 1. Context Map and Zoning

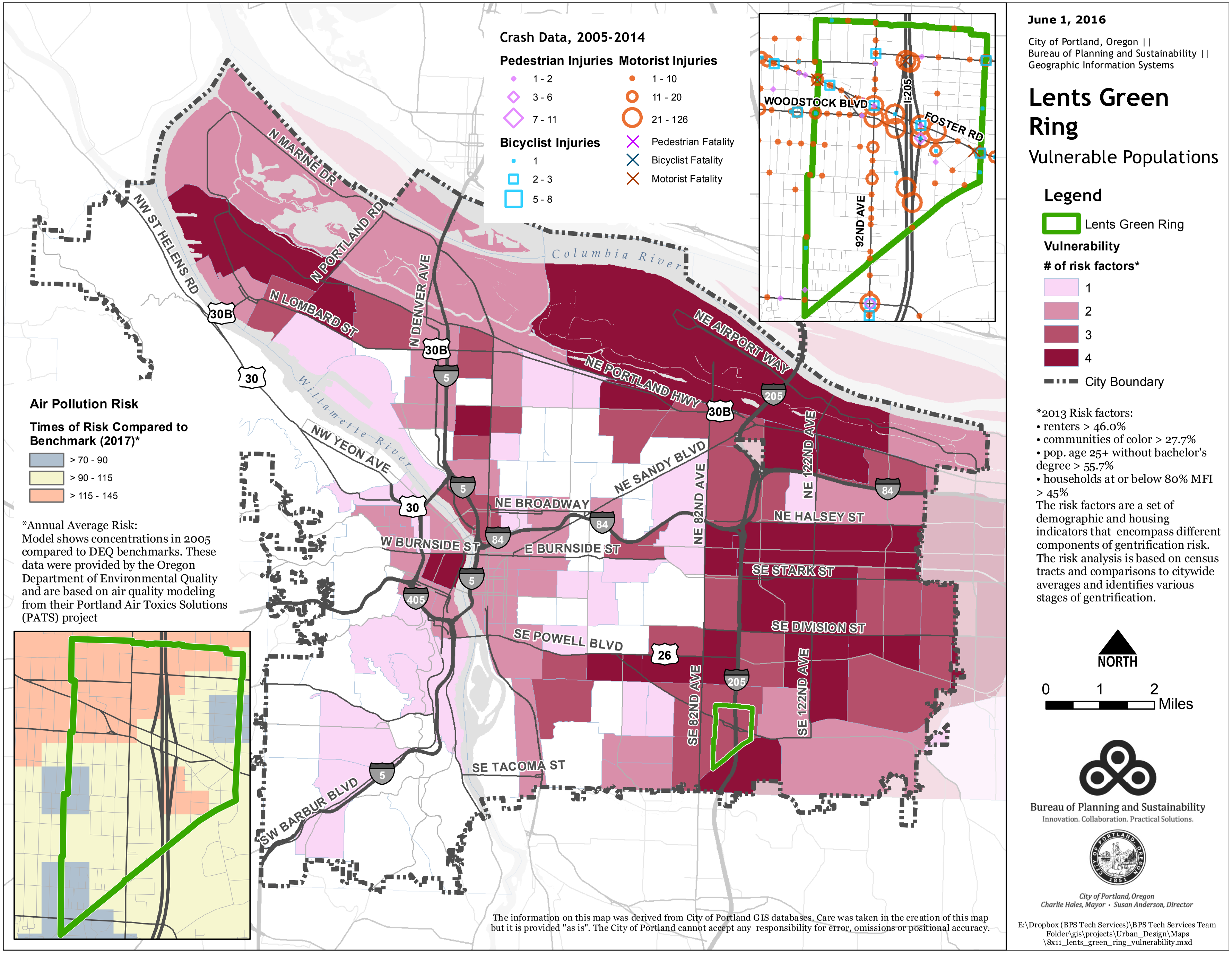
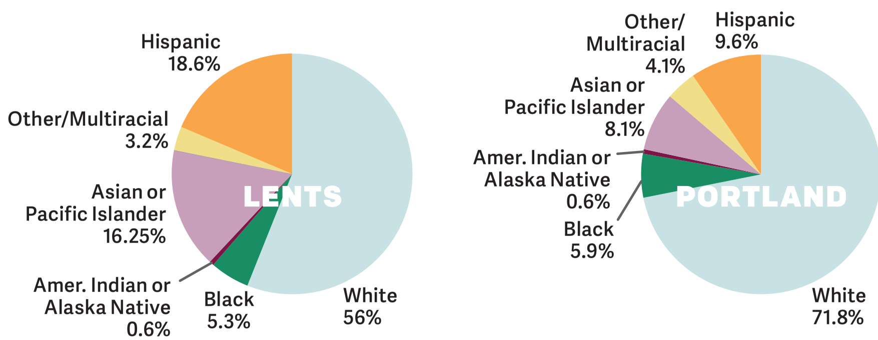


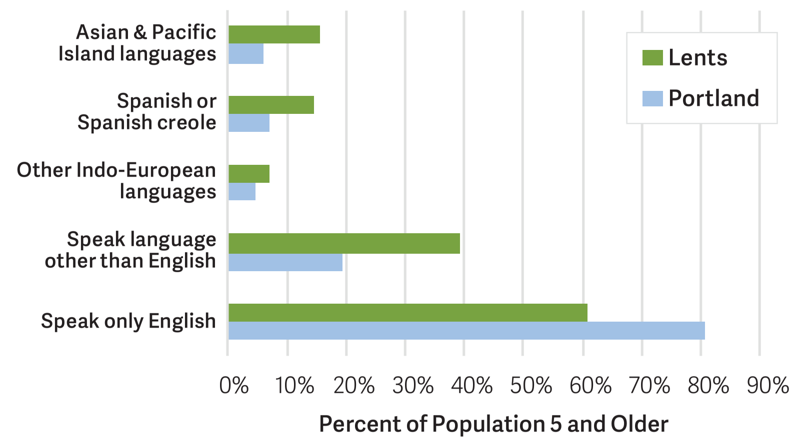
Figure 2. Lents: Vulnerability Risk, Crash Data and Air Quality

LENTS IS DIVERSE

Race and ethnicity in Lents and Portland (2014)

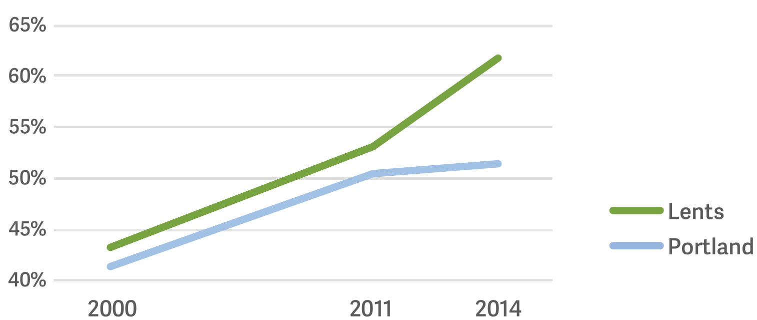


Languages spoken at home (2014)



HOUSING COST BURDEN IS RISING

Households paying more than 30% of income on rent



Data source: US Census and American Community Survey estimates
Lents study area: ZIP Code Tabulation Area 97266

[collaborative]AP

PROJECT TEAM

Collaborative Advocy Planning is a group of six students in PSU's Master of Urban and Regional Planning program, with interests in community and economic development, environment, urban design, equity, and sustainability.

CONTACT lentsstrong@gmail.com

Figure 3. Lents: Race and Ethnicity, Languages and Housing Costs

Transportation Map of Assets and Concerns

Livable Lents Listening Project

The map includes points from the Livable Lents Listening Project's 2015 survey outreach and the Lents Strong action plan. More than 500 Lents community members were asked to identify assets (green) and areas that need improvement (red), refined to include specific transportation and safety-related concerns.

Image Collage:

1- SE Foster Road looking west
2- SE Foster Road looking east
3- Lents Park
4- Community intersection painting in Lents
5- Future Malden Court Community Orchard
6- Gravel pathway, SE corner of Green Ring
7- Access point to Springwater Corridor Trail
8- Homelessness on Springwater Corridor Trail

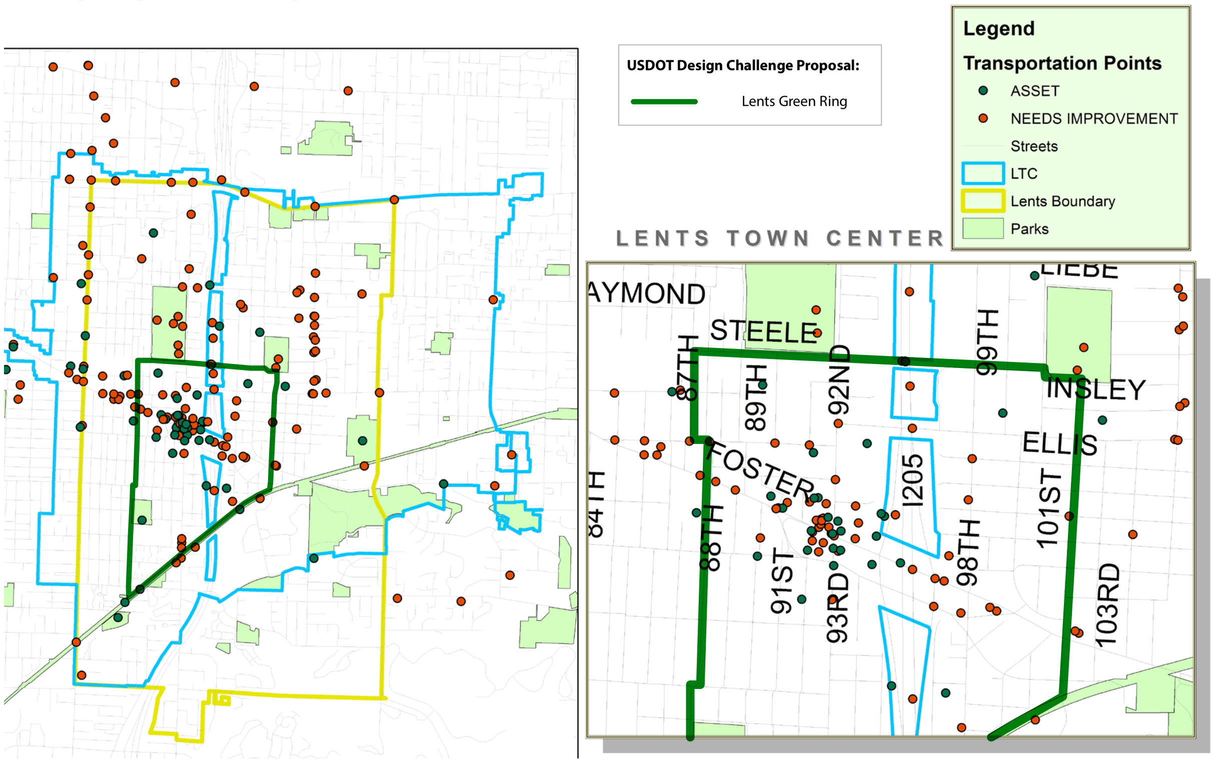


Figure 4. Livable Lents Listening Project Transportation Map and Image collage

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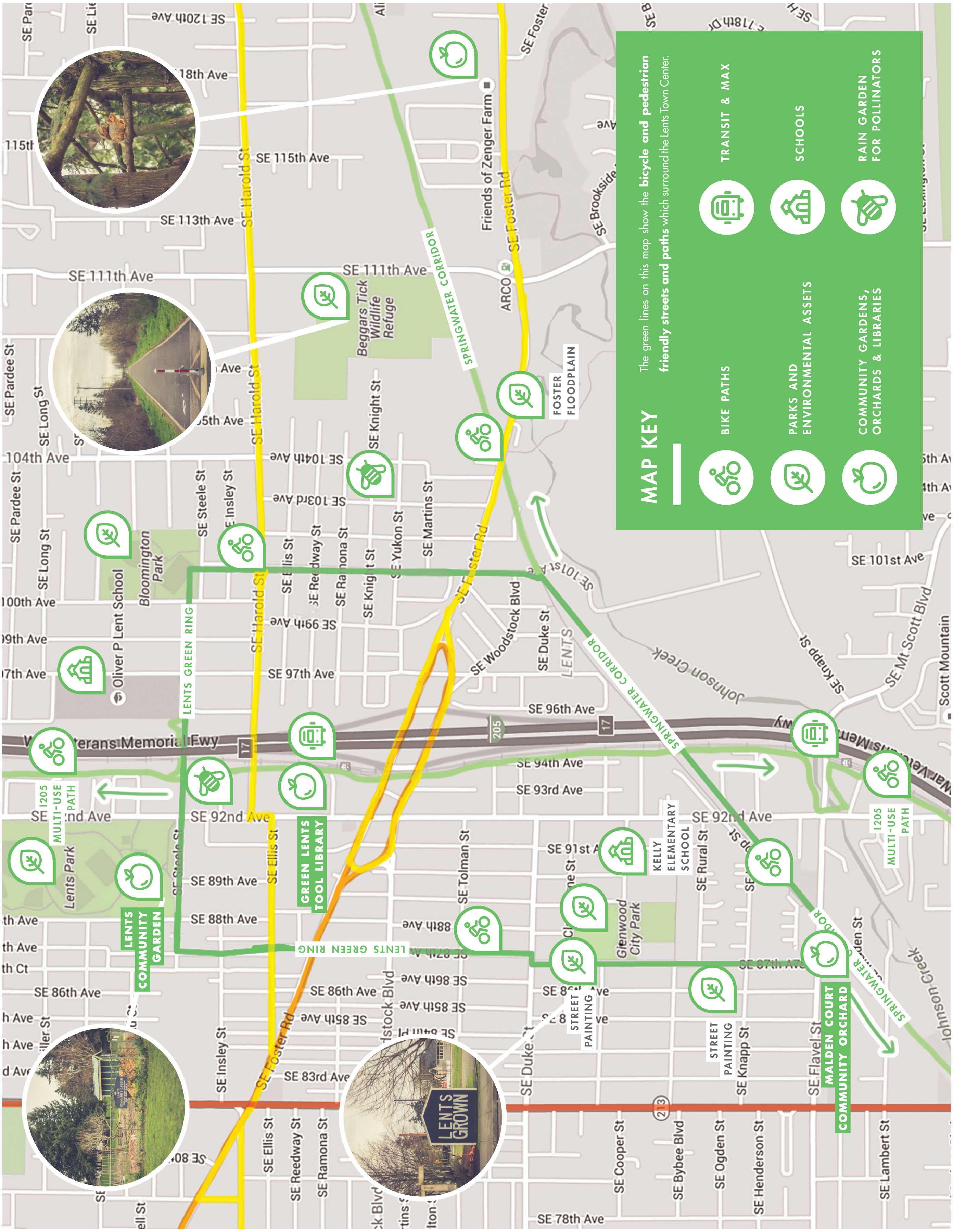


Figure 5. Lents Green Ring Community Amenities and Destinations

Green Lents

Thursday, June 2, 2016

US Department of Transportation
1200 New Jersey Ave, SE
Washington, DC 20590

Attn: Stephanie Jones, Chief Opportunities Officer
RE: Every Place Counts Design Challenge

Dear Stephanie Jones,

I am writing this letter to confirm our commitment as a community partner on the Lents Green Ring initiative. The Lents Neighborhood of Portland, Oregon, has a long standing history of bearing the brunt of poor planning decisions. Interstate 205 is commonly referred to as one of the best examples of this disproportionate impact born by the residents of this low-income and increasingly diverse community. Originally its own city, Lents was a self sufficient community with a fully functional main street featuring a grocery, pharmacy, bakery, and light rail stop at in the early at the time of its annexation by Portland in 1912. In the early 1970s this historic community was divided in half when I-205 was built on what had been the main street and business corridor for the Lents community. In 1998 the Lents Town Center was designated as an Urban Renewal Area and, after a century neglect, is currently experiencing a long overdue influx of development funds and projects.

To the West of I-205, Lents is developing as a neighborhood economic center, with hundreds of new housing units being created in the next 3 years and new businesses moving in to rebuild the local town center. To the East, Lents has an abundance of green space including access to riverside parks, neighborhood playgrounds, botanical gardens, forested trails with views of the Cascade Mountains and the Columbia River Gorge. Neighborhood residents are required to navigate the barrier created by I-205 to go about their daily lives.

The Lents Green Ring plays a critical role in connecting the residents of Lents to the benefit of the development benefits that is happening in their neighborhood. Green Lents projects are based on a foundation of collaborative partnerships, inclusive community engagement, and dedication to enhancing livability for all who live here. The Lents Green Ring is one such project. It is as much a strategy for uniting community members in creating a more livable place, as it is an infrastructure improvement. The project concept has been developed collaboratively between multiple local organizations, and has been informed by community surveys and discussions with over 500 residents in 6 different languages.

I hope that you strongly consider selecting the Lents Green Ring for the Every Place Counts Design Challenge.

Sincerely,

Nathan Jones

Nathan E. Jones

Green Lents Board of Directors

nejones7@gmail.com

Mailing 8931 SE Foster Rd., Suite 100, Portland, OR 97266 | *Physical* 11741 SE Foster Rd, Portland, OR 97266
www.greenlents.org | facebook.com/green.lents | Instagram @greenlents | twitter @greenlentsnow
Board of Directors: Jalene Littlejohn *Chair*, David Nemo *Treasurer*, Renee Orlick *Records Keeper*, Nathan Jones
getinvolved@greenlents.org | 971-266-4196

OPAL
Environmental Justice Oregon
opalpdx.org
2407 SE 49th Ave. Portland, OR 97206 | 503-342-8910

June 1, 2016

US Department of Transportation
1200 New Jersey Ave, SE
Washington, DC 20590

Attn: Stephanie Jones, Chief Opportunities Officer
RE: Every Place Counts Design Challenge

Dear Ms. Jones,

The Lents Green Ring concept is an active transportation project which can increase crossing safety on major arterial roadways, connect to transit, connect to neighborhood schools, and/or are concurrent with new developments planned in the Lents neighborhood. The Lents Green Ring utilizes existing active transportation networks of neighborhood greenways and the Springwater Corridor to improve environmental function of urbanized areas by establishing public access to natural areas and utilizes "green streets" to serve multiple neighborhood objectives around connectivity, green infrastructure and natural habitats. Historically an independent small town until joining the City of Portland in 1912, city and regional planning agencies split the neighborhood in half with the construction of the I-205 freeway, splitting the community physically and psychologically in two. The Lents Green Ring concept can bridge the significant infrastructure divide and help to mend a great injustice in one of the most diverse and last-remaining affordable neighborhoods in the City of Portland.

The Lents Green Ring is a nearly complete greenway of designated bike paths and also includes the I-205 multi-use path and Green Line light rail. This area includes a number of key frequent service transit lines and active transportation networks connecting the Lents neighborhood with the surrounding areas. A number of neighborhood groups and community-based organizations have conducted outreach, informed design and are invested in the implementation of the Lents Green Ring within the broader Lents community because of the high potential for this project to improve pedestrian and residential mobility and safety while providing opportunities for community stewardship and investment and connecting existing assets such as Lents Park, Kelly and Lents Elementary schools, and the Green Lents Community.

The Lents Green Ring project implementation can educate and engage the neighborhood's diverse population on issues facing the neighborhood's environment. OPAL Environmental Justice Oregon has invested staff time and resources into aspects of the Lents Green Ring project throughout the last 4 years, focusing primarily on youth leadership development and engagement, however with no sustained funding to work in this geographic areas, our efforts are loosely organized with other organizations and individuals who are most invested in bringing positive outcomes and driving attention and resources to the community. OPAL has found that youth activities often result in engagement of the whole family, as youth are able to bridge language and cultural divides within their households and amongst adult members. By cultivating long- term relationships with and among youth and connecting them with a wide range of adults working for community health and sustainability, we are increasing the capacity and leadership potential both of local youth and of local community efforts and organizations. Our vision is long range, which is why we are eager to support this application at this time.

Thank you for the consideration,

Vivian Satterfield
Deputy Director

Building Power for Environmental Justice and Civil Rights in Our Communities

rose
community development

June 1st, 2016

U.S. Dept. of Transportation:
Attn: Stephanie Jones, Chief Opportunities Officer
RE: Every Place Counts Design Challenge

ROSE Community Development supports the Lents Green Ring project in Portland Oregon. ROSE is an affordable housing agency that connects our community to build good homes, healthy families and neighborhoods of opportunity in outer southeast Portland. Since 1992, ROSE has been a catalyst for neighborhood mprovement. ROSE was created in by a group of neighborhood leaders who sought to revitalize a part of town that prosperity left behind and that is currently home to a large share of the city's low-income people, communities of color, and families with children. ROSE has developed over 430 affordable housing units and two parks. Beyond affordable housing, ROSE has taken on a variety of neighborhood improvement initiatives, including in-home child care networks, community gardens and after-school programs.

ROSE supports the development of the Lents Green Ring (LGR) concept because Lents is home to 141 families and individuals that live at 4 affordable housing properties scattered around the Lents Neighborhood. The residents of Lents feel the impacts of the I-205 freeway, which cuts through the middle of the neighborhood. Construction of the freeway in Lents has led to disinvestment, loss of jobs, lethargic redevelopment activity, poor air quality, safety concerns for children trying to get to and from school on opposite sides of the freeway, and an over-burdened local street system suffering from high traffic volumes.

ROSE's goal is that all residents would have access to a safe and livable neighborhood. This includes safe access to schools, parks, businesses, healthy food, and transit stops. The Lents Green Ring doesn't just plan to be a network of safe routes to walk, bike or skate, but an opportunity to engage neighbors in community building. ROSE has staff members dedicated to engaging children, teens, and families in community building opportunities, and certainly hopes to continue engaging residents in Lents Green Ring projects.

ROSE CDC's Lents Youth Initiative (LYI) has a special role to play in the LGR. LYI has been active in supporting and developing the Lents Green Ring through its work at the nexus of three main problem areas- youth, community, and environment- and creates positive outcomes in those areas, focused on the Lents neighborhood. LYI equips neighborhood youth to become conservation leaders in outer SE Portland using 3 main goals; a) offer leadership & career development opportunities for underserved neighborhood youth, b) increase the capacity of local organizations to complete projects that address issues of sustainability, health, environmental justice & equity, and c) increase social & environmental capital in the neighborhood through LYI partnerships.

We sincerely hope the Lents Green Ring is chosen, in order to further the great work started here with the Lents Green Ring!

Sincerely,

Nick Sauvie

Nick Sauvie
Executive Director

5215 SE Duke Street Portland, OR 97206 · tele 503.788.8052 · fax 503.788.9197 · www.rosecdc.org

TRIMET

June 1, 2016

Stephanie Jones
Chief Opportunities Officer
US Department of Transportation
1200 New Jersey Ave, SE
Washington, DC 20590

RE: Every Place Counts Design Challenge

Dear Ms. Jones:

I am writing to express TriMet's support for the City of Portland's application for the Every Place Matters Challenge. The Lents Green Ring will serve a neighborhood that has been significantly impacted by the construction and presence of the I-205 freeway in the 1970s and 1980s and is still looking for ways to recover from the impacts.

TriMet provides bus, light rail and commuter rail service in the Portland, Oregon region with about 100 million boarding each year. Our transportation options connect people with jobs, educational opportunities and their communities, while easing traffic congestion and reducing air pollution, making our region a better place to live.

The Lents Green Ring will provide comfortable walking and biking access in a community with low car-ownership. Unfortunately due to confused priorities at the time the area was developed decades ago, the neighborhood suffers from a lack of complete walking and biking infrastructure. The enhanced Lents Green Ring network will help with access for the "first and last mile" of trips taken by transit.

Due to the population served, the high use of transit, the lack of basic walking and biking infrastructure, and the challenges that I-205 present for the Lents community, TriMet is happy to support the Lents Green Ring application.

Sincerely,

Alan Lehto
Director of Planning & Policy

Tri-County Metropolitan Transportation District of Oregon
1800 SW 1st Ave, Suite 300, Portland, Oregon 97201 • 503-238-RIDE (7433) • TTY 503-238-5811 • trimet.org

618
NORTHWEST
GLISAN
SUITE 401
PORTLAND
OREGON
97209
BTAOREGON.ORG
T503
226
0676
F503
226
0498

May 31, 2016

US Department of Transportation
1200 New Jersey Ave, SE
Washington, DC 20590-0001

Attn: Stephanie Jones, Chief Opportunities Officer
RE: Every Place Counts Design Challenge

Dear Stephanie,

I am writing to express my support for the Every Place Counts Design Challenge application submitted by the City of Portland for the Lents Green Ring project to transform the Green Ring into a project that is supportive of active transportation. The I-205 freeway currently divides adjacent neighborhoods in the project area, creating barriers to opportunity. This freeway is splitting the community in two and separating both sides from grocery stores and amenities like parks and natural areas. The Lents Green Ring seeks to improve access to reliable, safe and affordable transportation for these communities by building walking and biking connections across I-205.

The Lents Green Ring currently lacks key physical infrastructure to improve healthy and safe access to grocery stores, schools, transit stations, parks and natural areas. The Lents Green Reing does not have adequate lighting, multi-lingual signage and engineering, and there are safety concerns for children trying to get to and from school on opposite sides of the I-205 freeway.

The proposed project submitted by the City of Portland rightly identifies the need to invest and improve safety and access for people biking, walking and taking transit along the Lents Green Ring.

The Bicycle Transportation supports the City of Portland's Proposal, which would improve access to reliable, safe and affordable transportation for communities in the Lents neighborhood of East Portland. Thank you for your consideration of this project in the Every Places Counts Challenge application.

Sincerely,

Elizabeth Quiroz
East Portland Advocate & Equity Manager

Portland State University

Institute for Sustainable Solutions

jsherman@pdx.edu
http://www.pdx.edu/sustainability

US Department of Transportation
1200 New Jersey Ave, SE
Washington, DC 20590
Attn: Stephanie Jones, Chief Opportunities Officer

RE: Every Place Counts Design Challenge June 1, 2016

The Institute for Sustainable Solutions at Portland State University enthusiastically supports the Lents Green Ring application to the U.S. Department of Transportation's "Every Place Counts" Design Challenge since this proposed project, aimed at mitigating infrastructure challenges, builds off existing partnerships and efforts focused on creating a more vibrant and thriving community in east Portland's Lents neighborhood.

Established in 2006, the Institute for Sustainable Solutions (ISS) is the central hub for sustainability at Portland State University (PSU), fostering innovative cross-disciplinary research, critical skill-building curriculum, and effective community engagement to solve challenges in Portland and beyond. ISS administers the 10-year, $25 million challenge grant made to the University by the James F. and Marion L. Miller Foundation in September 2008, and brokers action-oriented partnerships between PSU and community-based organizations, government agencies, and for-profit companies in order to develop applied teaching and research projects that deliver sustainability outcomes in the world. Portland State takes seriously its role as an urban-serving university; for decades, PSU has been nationally recognized for our commitment to engaging students and faculty in the community in order to "Let Knowledge Serve the City." To that end, ISS has been providing technical support to the Lents Green Ring project since 2014. During that time, we have connected faculty researchers and students in GIS, urban and regional planning, community development, graphic design, urban ecology, and civil and environmental engineering courses with community-based organizations to implement myriad projects that advance the local community's vision for a better connected and more vibrant place.

As is noted in the application, the Interstate 205 freeway has created a considerable infrastructure challenge in the Lents community, splitting the neighborhood in half and separating diverse and lower-income residents from vital services and amenities like grocery stores, schools, and open spaces. This infrastructure challenge has helped trigger disinvestment in the Lents neighborhood, despite multiple attempts from the city to spur growth. In this context, residents and community-based organizations developed the concept for the Lents Green Ring, which is an infrastructure project that builds sidewalks and bicycle lanes around the neighborhood and across the freeway, reconnecting people to parks and amenities while creating a focal point for community development.

The "Every Place Counts" Design Challenge would provide a significant platform to accelerate the community's efforts. While the overarching concept is in place, wayfinding, lighting, multi-lingual signage and engineering at key links are still needed are still needed for this physical infrastructure project to improve healthy and safe access to grocery stores, schools, transit stations, parks, and natural areas. While tackling significant infrastructure challenges, the Lents Green Ring project also presents a unique opportunity to both build the capacity of advocacy organizations and support community self-determination through expanded access to resources and decision-making—helping to support local organizations engage in future planning and infrastructure projects.

Portland State University looks forward to continuing to support this innovative community project, and we enthusiastically hope the U.S. Department of Transportation will select the Lents Green Ring for the "Every Place Counts" Design Challenge. Thank you for your consideration.

Sincerely,
/s/
Jacob Sherman
Sustainability Curriculum Coordinator
Institute for Sustainable Solutions

Green Loop Whitepaper Discussions:
PARKING
DRAFT 5-1-16

Meeting date: 4-25-16

In attendance: Malisa McCready, Colleen Mosser, Grant Morehead, PBOT; Marc Asnis, Pei Wang, Nicholas Starin, Mark Raggett, BPS

Implementation of the "Green Loop" concept, as envisioned, will likely impact existing on-street parking spaces around much of its anticipated alignment. On-street parking currently provides many functions for the Central City – it increases accessibility to Central City businesses and destinations, provides a revenue stream for the Bureau of Transportation, and can create a physical safety barrier between moving motor vehicles and the pedestrian environment along the sidewalk.

This meeting was an information-sharing session regarding the opportunities, challenges and existing efforts currently under way that target management of the public on-street parking system in the Central City.

Meeting notes:

GENERALLY, ON ON-STREET PARKING:

- PBOT is currently collecting a large amount of "baseline" data to better understand what resources, types of spaces and utilization occurs today

- Prioritization of use in curb zone along blocks is important – in many cases it is on-street parking, but with loop that priority could shift to open space, active transportation

- There are some 15,000 metered spaces in system today

- There are 3.5 miles of truck-loading spaces in the Central City today, which seems excessive. There may be the potential to reclaim some of those spaces and/or reduce the time window for loading to 7 – 11AM

- Moving away from single space meters system-wide

MORE LOOP-RELATED IDEAS ON PARKING:

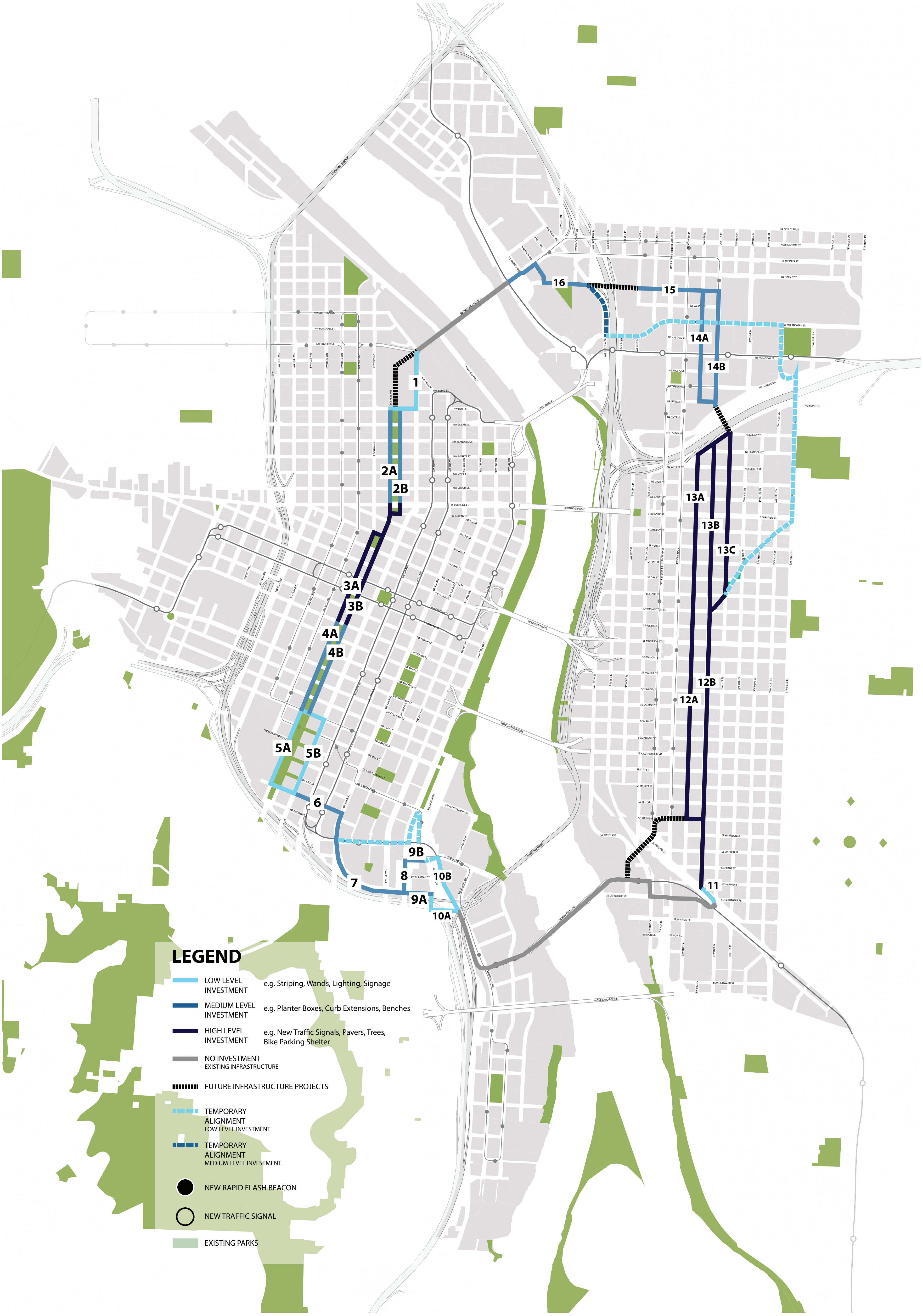
- Potential to charge more for parking 1 -2 blocks just off loop alignment, recoup some revenue lost from reconfiguration of existing on-street spaces

- Potential to use capacity in public parking structures, generally after 3PM to mitigate some loss of on-street spaces

- Need to look at space (roadway width) for angled parking. North Park Block roadways may actually be too narrow for angled parking

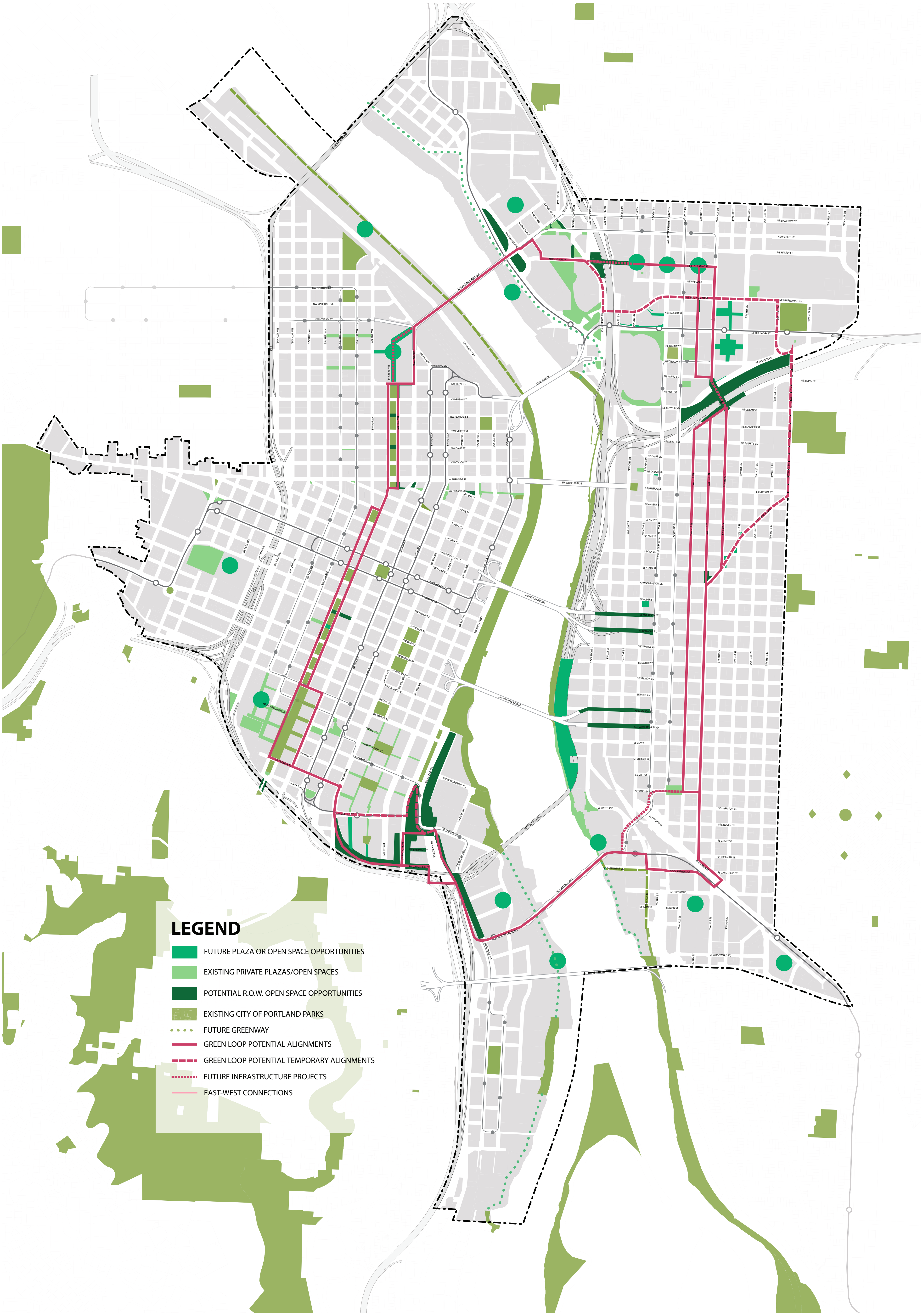
- In Central Eastside, temporary ordinance will allow monthly commercial parking on existing surface lots, which could reduce some pressure for on-street spaces

- In Central Eastside, $500K surcharge from parking permit fees will be spent in district on “mode-shift” only – encourage non-auto modes for transportation. Eventually to be combined with __% from parking meter revenue, ala GoLloyd



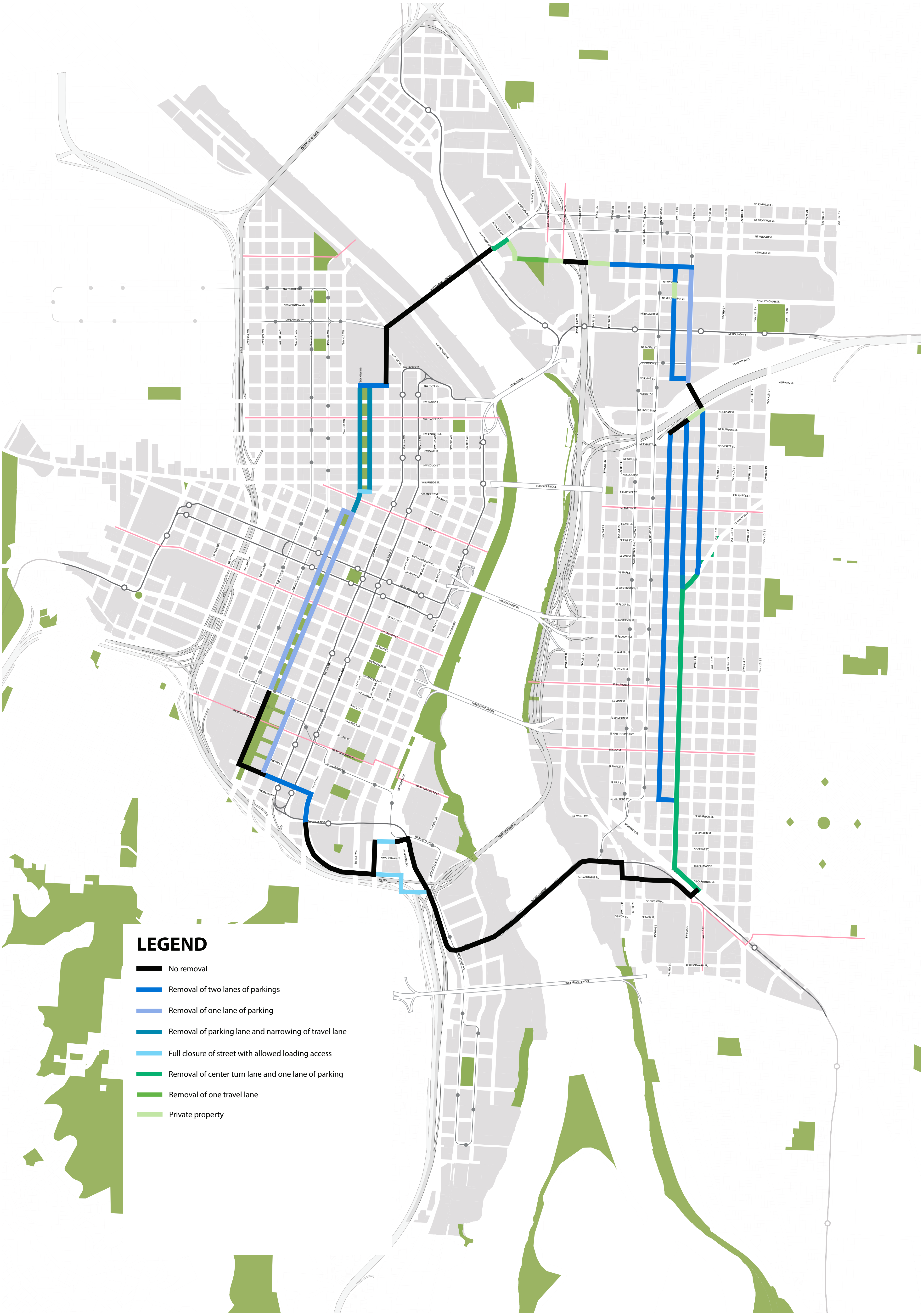
Potential Green Loop Alignments

Investment Map



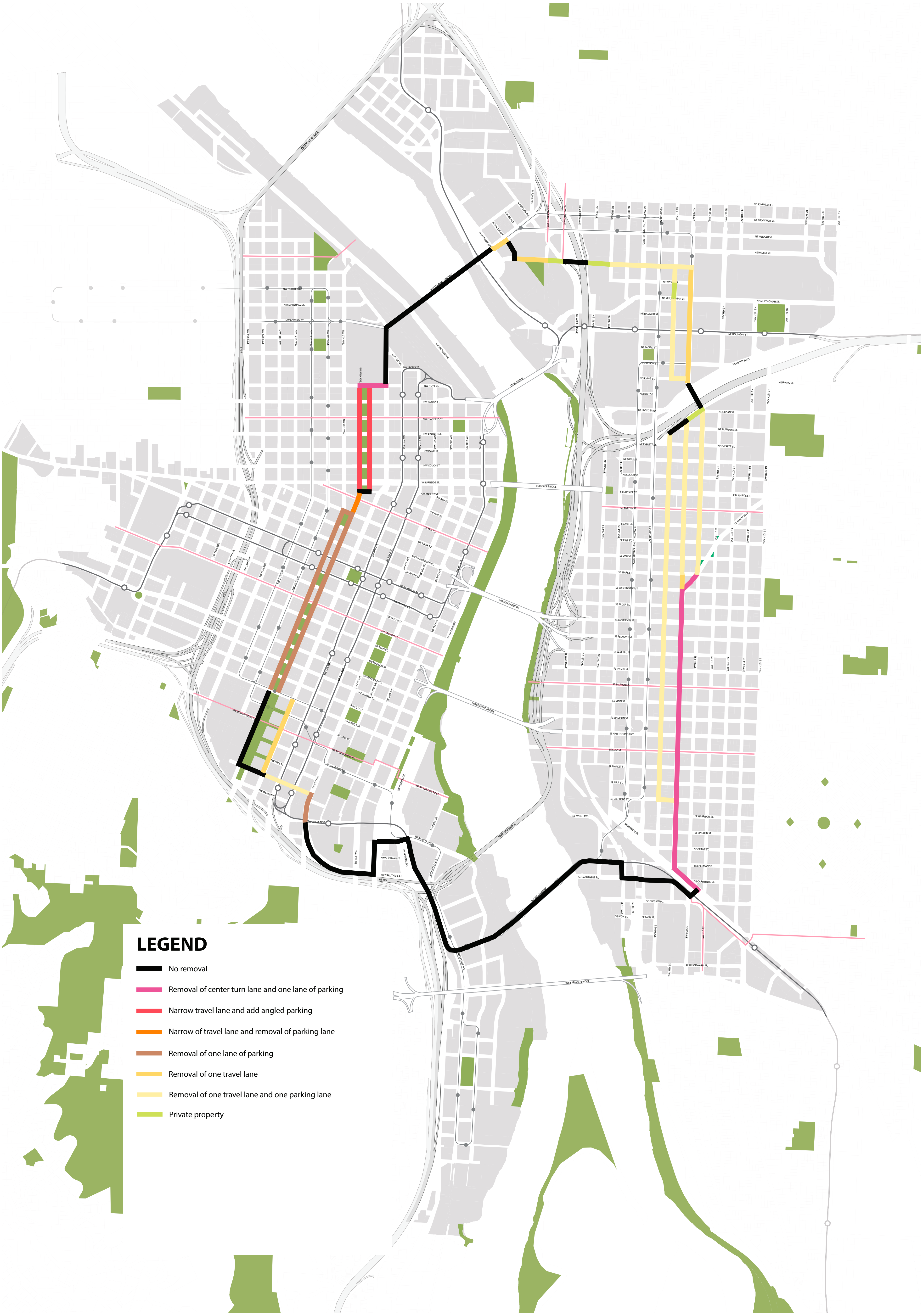
Potential Green Loop Alignments

Parks and Open Spaces



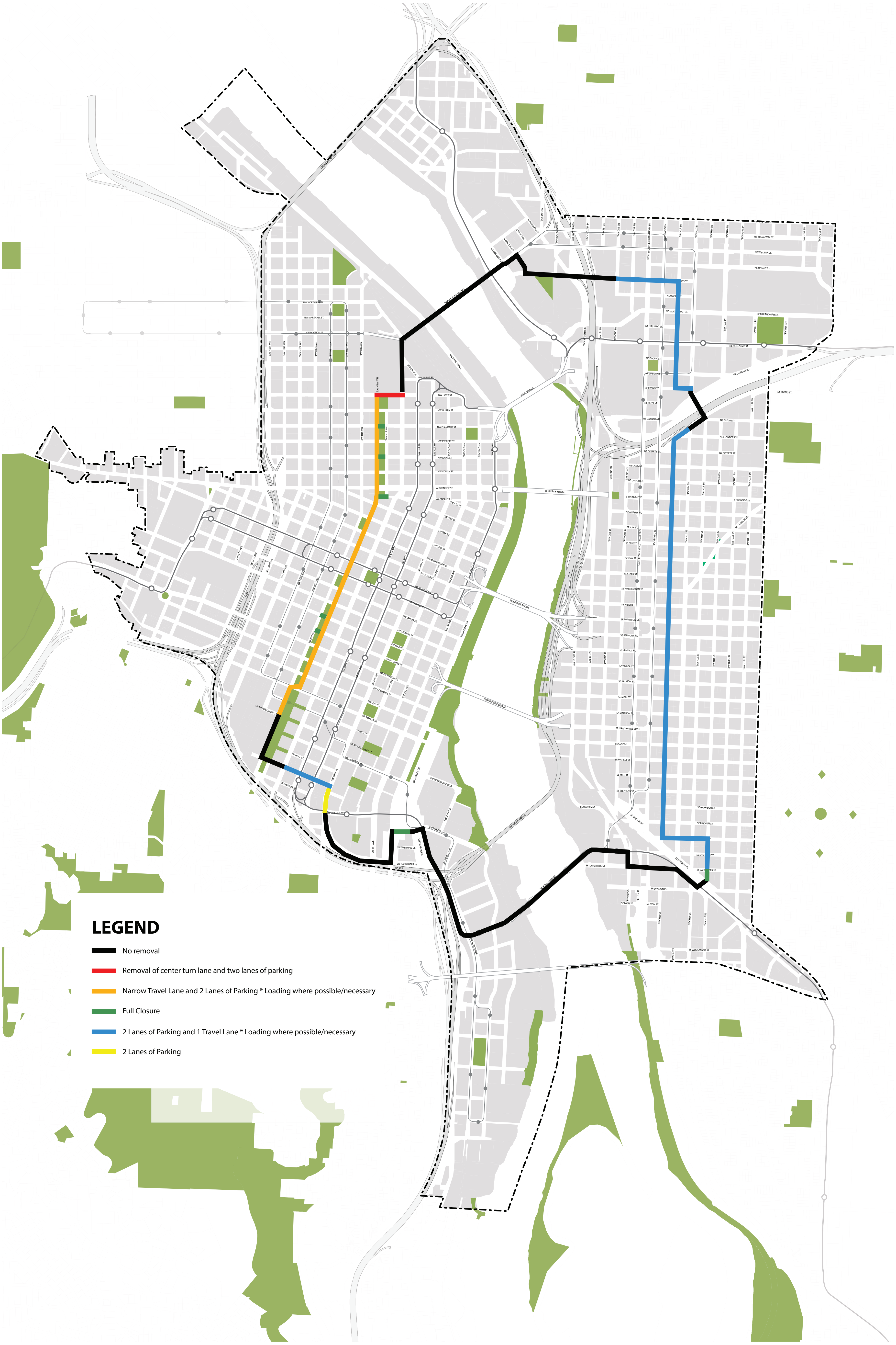
Potential Green Loop Alignments

Lane Removal -- Mobility Bias



Potential Green Loop Alignments

Lane Removal -- Access Bias



Potential Green Loop Alignments

Lane Removal -- Parks and Open Space Bias

Green Loop:

Running and Jogging

DRAFT 02/23/16

Opportunity

The Green Loop has the potential to be a facility that attracts runners and joggers who want to take advantage of an intuitive system of connected parks and open spaces that support the flow of active transportation – cycling and running, with

What the Green Loop can Address

While the Green Loop will not end homelessness, it is intended to be an inclusive and safe place that feels comfortable for all users. The opportunities to address some of the challenges should be explored further as design and engineering move forward.

Potential areas that the Green Loop could address include programs and facilities, such as, but not limited to, the following:

Programs

- Park “hosts” or “rangers”
- Programming of regularly-scheduled events, gatherings and/or services for at-risk populations (e.g. “Night Strike” at the Burnside Bridge) along alignment
- Stewardship opportunities in maintenance of open spaces, cleaning, management, etc.
- Employment opportunities, career-building growth potential

Facilities

- Use of Crime Prevention through Environmental Design (CPTED) in facility design and engineering
- Public restrooms, “loos”, cleaning stations, water fountains, showers, etc. along route
- Storage units for belongings at key locations
- Signage and wayfinding to guide at-risk populations toward key services

Coordination

The Green Loop’s success at addressing these issues and serving as an inclusive facility will rely on collaboration with several agencies and organizations, including:

- Government: Portland Housing Bureau, Multnomah County
- Social Services: Central City Concern, Rescue Missions, Sisters of the Road, etc.
- Adjacent private businesses to help sponsor some of the programming and facilities

Related Articles

The North Park Blocks saw a rise in homeless camping at the end of summer 2015, which was covered by the Oregonian:

http://www.oregonlive.com/portland/index.ssf/2015/09/north_park_blocks_summer_of_la.html#incart_2box_portland_index.ssf

http://www.oregonlive.com/opinion/index.ssf/2015/09/time_to_say_enough_to_misbehav.html

In September 2015, in response to managing public space issues, the Mayor's Homelessness Initiative collaborated with providers to direct services toward homeless people with high-intensity street engagement, a storage area program, and a one-point contact system: https://www.portlandoregon.gov/mayor/article/542326

Green Loop:

Homelessness

DRAFT 02/23/16

CURRENT ISSUES AND CHALLENGES

Open spaces within the Central City should provide comfortable and accessible places for all Portlanders. However, spaces that are attractive to disenfranchised and homeless populations often produce the opposite effect – spaces dominated by one user group, which may feel to others unsafe and unwelcoming.

Some of the challenges related to homelessness and public open spaces include:

- Mistreatment of public spaces
- Blocking of public spaces
- Aggressive behavior
- A preponderance of drug paraphernalia, such as needles, and other litter
- Offensive public nuisances, such as drinking, urinating, defecating and noise within public spaces
- Lack of storage for one's belongings, resulting in large amounts of "stuff" being stored and guarded within public spaces
- Unsafe and uncomfortable spaces for all Portlanders

WHAT THE GREEN LOOP CAN ADDRESS

While the Green Loop will not end homelessness, it is intended to be an inclusive and safe place that feels comfortable for all users. The opportunities to address some of the challenges should be explored further as design and engineering move forward.

Potential areas that the Green Loop could address include programs and facilities, such as, but not limited to, the following:

Programs

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- Government: Portland Housing Bureau, Multnomah County
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RELATED ARTICLES

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http://www.oregonlive.com/portland/index.ssf/2015/09/north_park_blocks_summer_of_la.html#incart_2box_portland_index.ssf

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Green Loop Alignments
Investment Segments

DRAFT
Nov 2015

Disclaimer:

The level of investment calculations for each segment are for conceptual modelling purposes only and do not represent an actual estimate for street furnishings or transportation functions that will be needed.

Lane Removal Bias:

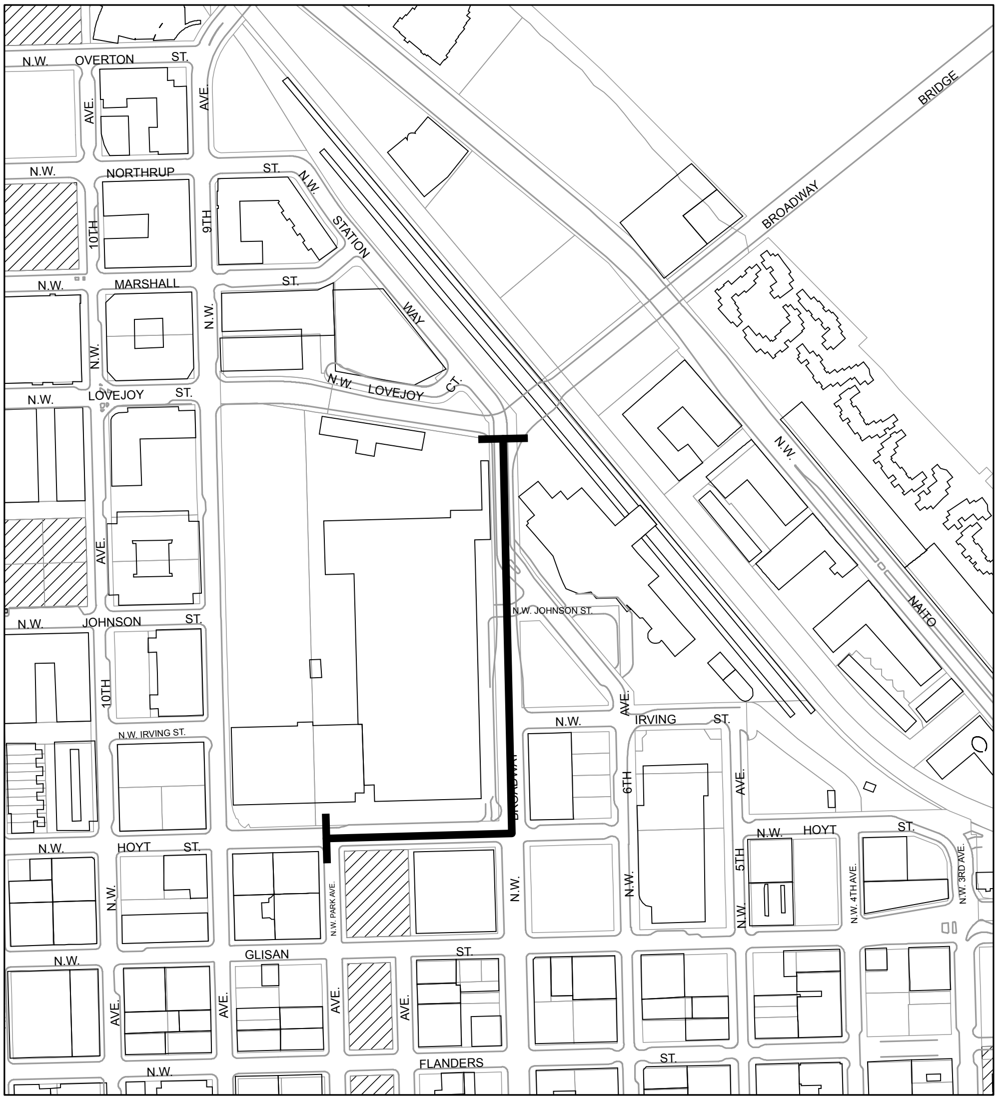
Mobility Bias: Alternative prioritizes preserving travel lanes and providing at least 16' for Green Loop facilities.

Access Bias: Alternative prioritizes preserving and adding parking and provides at least 16' for Green Loop facilities.

Open Space Bias: Alternative prioritizes the creation of as much public open space as possible and providing at least 20' for Green Loop facilities.

Lane removal alternatives do not account for alignments moving through private property. Supplementary maps will be provided within Green Loop binder.

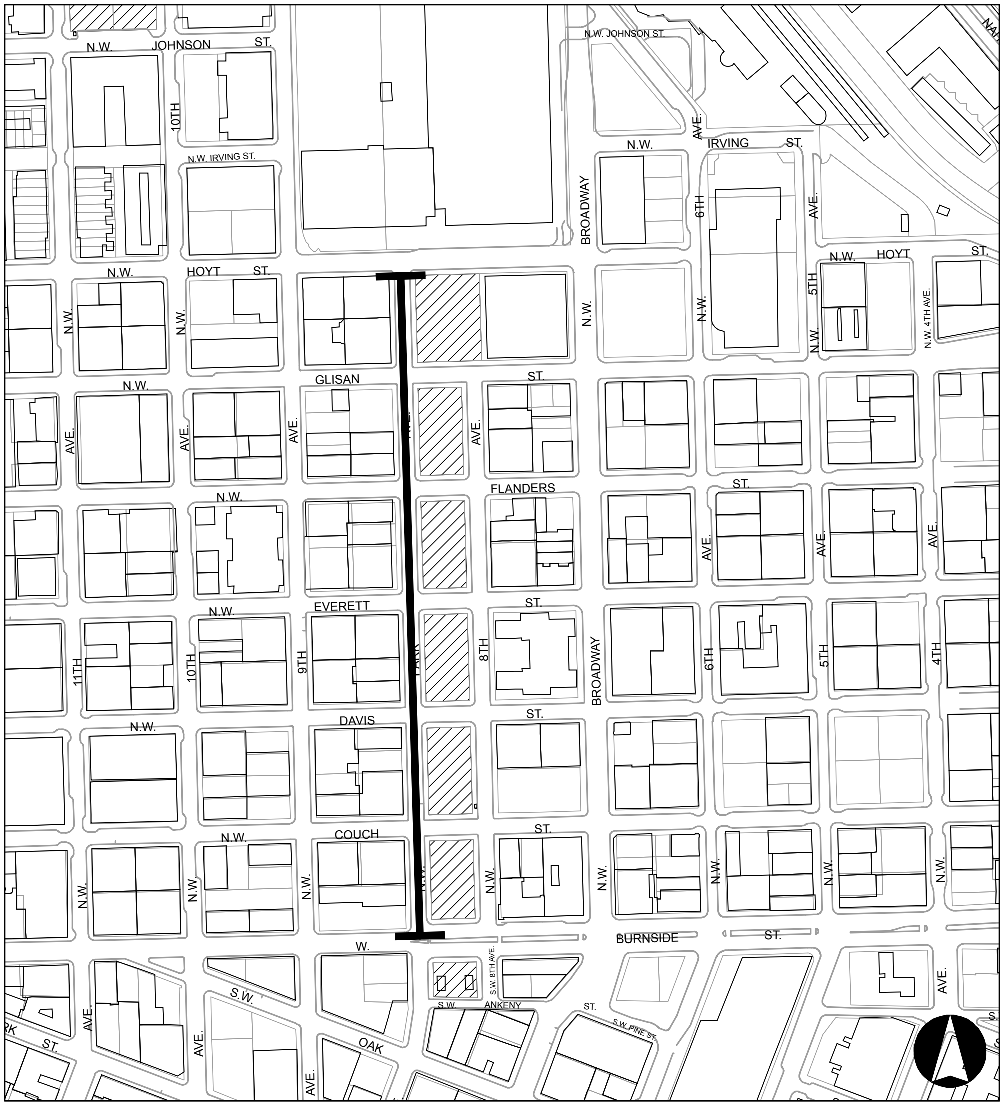
DRAFT
Nov 2015



Segment 1: Broadway Bridge to NW Park Ave.
Distance: 1300 ft.
Investment: Low

Lane Removal Mobility Bias Alt.: 2 Parking Lanes (16’)
Lane Removal Access Bias Alt.: 1 Center Turn Lane, 1 Parking Lane (18’)
Lane Removal Open Space Bias Alt.: 1 Center Turn Lane, 2 Parking Lanes (28’)
* Loading where possible/necessary

Segment	Level of Investment	Type	Metric	Price	Total Cost
1	**LOW**	Striping	1300 FT	$1 per foot	$1,300
1	LOW	Wands	130	$70 Each	$9,100
1	LOW	Signage	4	$150 Each	$600
1 Total					$11,000

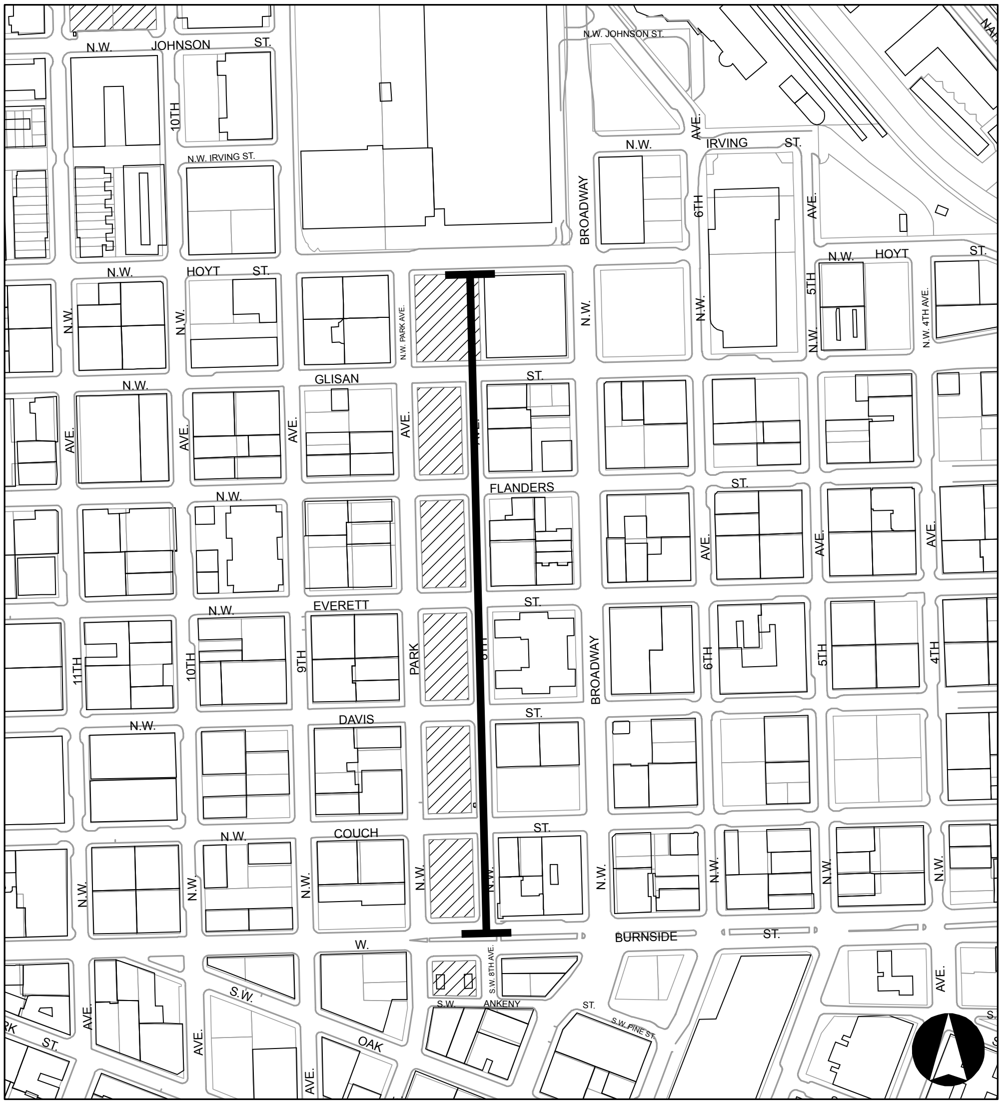


DRAFT
Nov 2015

Segment 2A: NW Hoyt St. to W Burnside St.
Distance: 1500 ft.
Investment: Medium
Lane Removal Mobility Bias Alt.: 2 Parking Lanes (16')
Lane Removal Access Bias Alt.: Narrow Travel Lane (10')
Lane Removal Open Space Bias Alt.: Narrow Travel Lane and 2 Parkings Lanes (28')
* Loading where possible/necessary

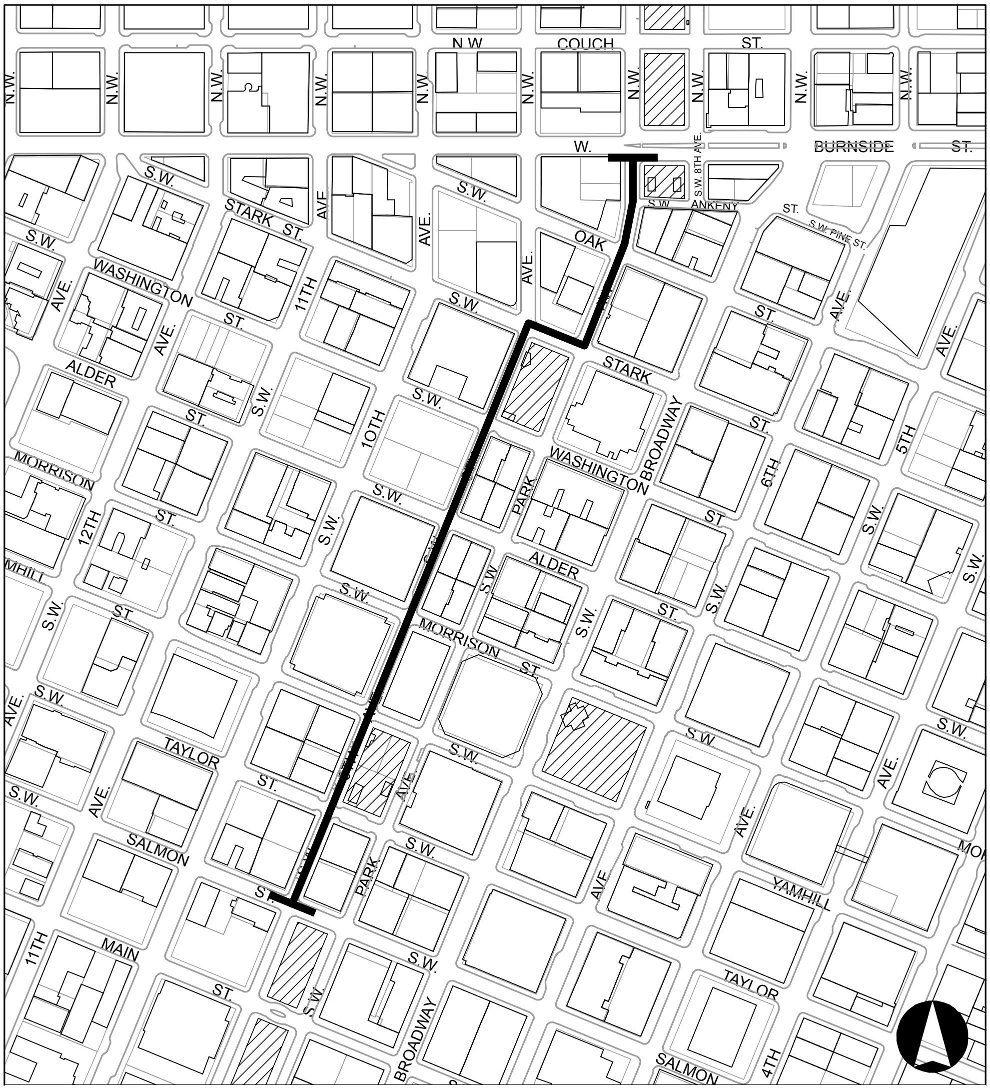
Segment	Level of Investment	Type	Metric	Price	Total Cost
2A	**MEDIUM**	Minimum Full Signal Intersection	3	250,000 Each	$1,000,000
2A	MEDIUM	Striping	1500 FT	$1 per foot	$1,500
2A	MEDIUM	Art Box	65	$200 Each	$13,000
2A	MEDIUM	Signage	3	$150 Each	$450
2A	MEDIUM	Woodchips	7500 SQFT	$4 SQFT	$30,000
2A	MEDIUM	Curb Extension	10	$20,000	$200,000
2A Total					$1,244,950

DRAFT
Nov 2015



Segment 2B: NW Hoyt St. to W Burnside St.
Distance: 1500 ft.
Investment: Medium
Lane Removal Mobility Bias Alt.: 2 Parking Lanes (16’)
Lane Removal Access Bias Alt.: Narrow Travel Lane (10’)
Lane Removal Open Space Bias Alt.: Narrow Travel Lane and 2 Parking lanes (28’)
* Loading where possible/necessary

Segment	Level of Investment	Type	Metric	Price	Total Cost
2B	**MEDIUM**	Minimum Full Signal Intersection	3	250,000 Each	$1,000,000
2B	MEDIUM	Striping	1500 FT	$1 per foot	$1,500
2B	MEDIUM	Art Box	65	$200 Each	$13,000
2B	MEDIUM	Signage	3	$150 Each	$450
2B	MEDIUM	Woodchips	7500 SQFT	$4 SQFT	$30,000
2B	MEDIUM	Curb Extension	10	$20,000	$200,000
2B Total					$1,244,950

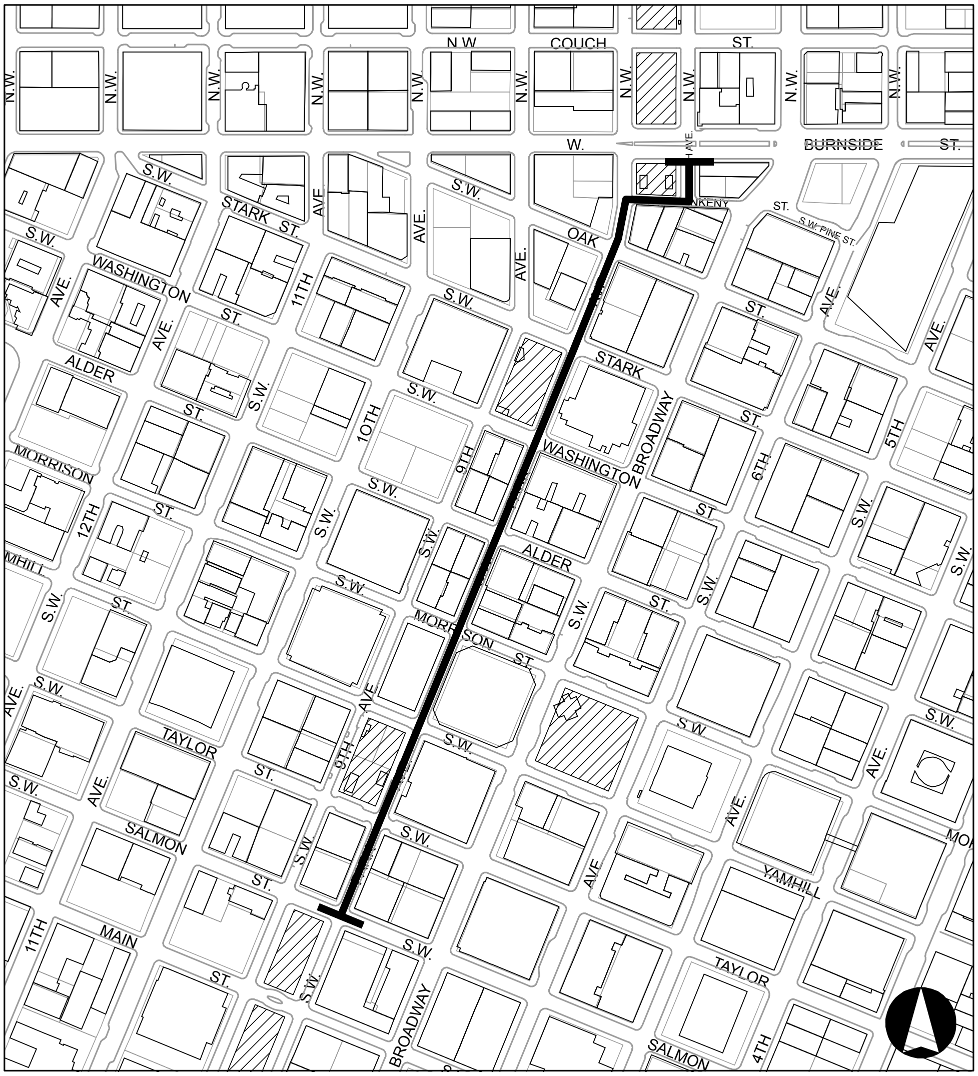


DRAFT
Nov 2015

Segment 3A: W Burnside St. to SW Salmon St.
Distance: 2080 ft.
Investment: High
Lane Removal Mobility Bias Alt.: Narrow Travel Lane and 1 Parking Lane (18′)
1 Parking Lane (8′) [SW Stark to SW Salmon]
Lane Removal Access Bias Alt.: Narrow Travel Lane and 1 Parking Lane (18′)
1 Parking Lane (8′) [SW Stark to SW Salmon]
Lane Removal Open Space Bias Alt.: Narrow Travel Lane and 2 Parking lanes (28′)
* Loading where possible/necessary

Segment	Level of Investment	Type	Metric	Price	Total Cost
3A	**HIGH**	Pavers	30,000 SQFT	$43 SQFT	1,290,000
3A	HIGH	Striping	2,080 FT	$1 Per foot	$2,080
3A	HIGH	Planter Box Separation	80	$500	$40,000
3A	HIGH	Curb Extensions	8	$10,000 - $20,000	$160,000
3A	HIGH	Minimum Full Signal Intersection	3	$250,000 Per Signal	$750,000
3A	HIGH	Signage	3	$150 Each	$450
3A Total					$2,242,530

DRAFT
Nov 2015



Segment 3B: W Burnside St. to SW Salmon St.
Distance: 2200 ft.
Investment: High
Lane Removal Mobility Bias Alt.: Narrow Travel Lane and 1 Parking Lane (18’)
1 Parking Lane (8’) [SW Stark to SW Salmon]
Lane Removal Access Bias Alt.: Narrow Travel Lane and 1 Parking Lane (18’)
1 Parking Lane (8’) [SW Stark to SW Salmon]
Lane Removal Open Space Bias Alt.: Narrow Travel Lane and 2 Parking lanes (28’)
* Loading where possible/necessary

Segment	Level of Investment	Type	Metric	Price	Total Cost
3B	**HIGH**	Pavers	30,000 SQFT	$43 SQFT	1,290,000
3B	HIGH	Striping	2,200 FT	$1 Per foot	$2,200
3B	HIGH	Planter Box Separation	80	$500	$40,000
3B	HIGH	Curb Extensions	8	$10,000 - $20,000	$160,000
3B	HIGH	Minimum Full Signal Intersection	3	$250,000 Per Signal	$750,000
3B	HIGH	Signage	3	$150 Each	$450
3B Total					$2,242,650

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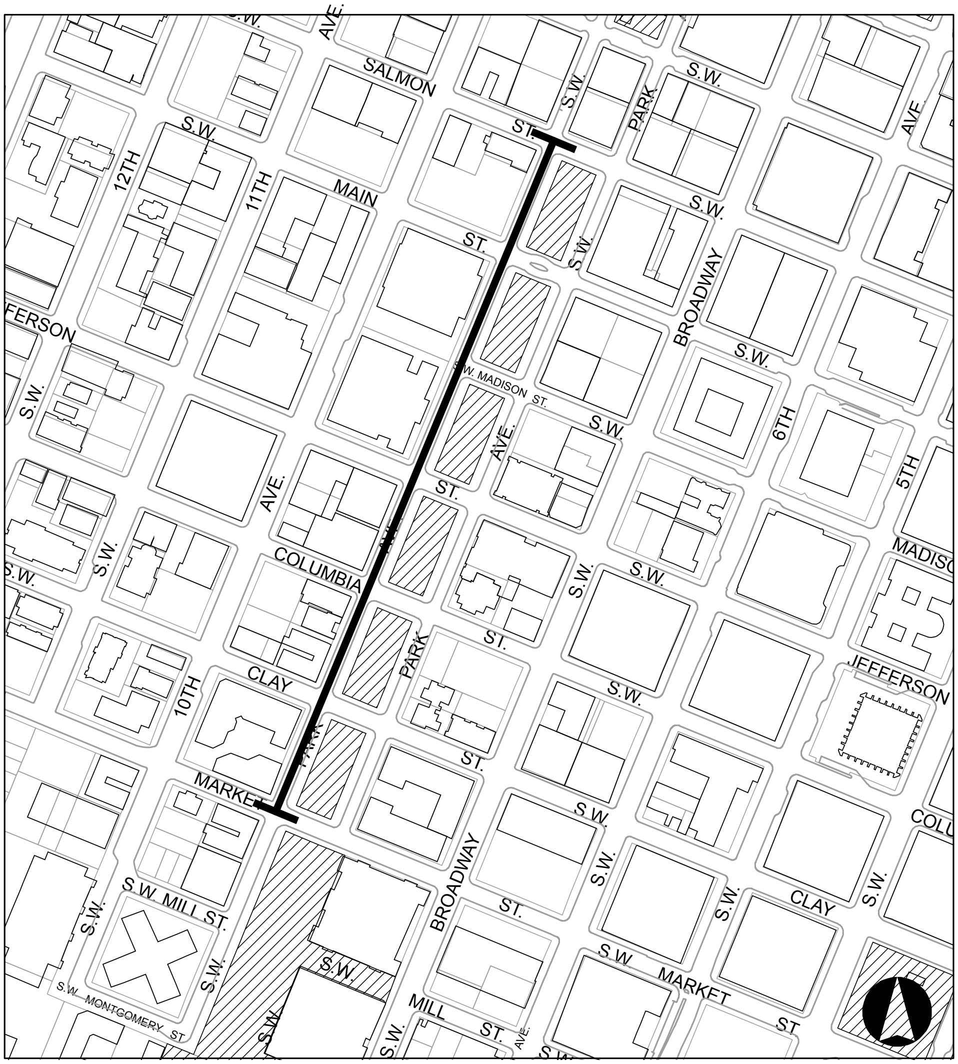
Nov 2015



Segment 4A: SW Salmon St. to SW Market St.
Distance: 1500 ft.
Investment: High
Lane Removal Mobility Bias Alt.: 1 Parking Lane (8')
Lane Removal Access Bias Alt.: 1 Parking Lane (8')
Lane Removal Open Space Bias Alt.: Narrow Travel Lane and 2 Parking lanes (28')
* Loading where possible/necessary

Segment	Level of Investment	Type	Metric	Price	Total Cost
4A	**MEDIUM**	Rapid Flash Beacon	2	$50,000 - 70,000	140,000
4A	MEDIUM	Minimum Full Signal Intersection	2	250,000 Each	$500,000
4A	MEDIUM	Striping	1500 FT	$1 per foot	$1,500
4A	MEDIUM	Art Box	75	$200 Each	$15,000
4A	MEDIUM	Signage	3	$150 Each	$450
4A	MEDIUM	Curb Extension	12	$10,000 - $20,000	$240,000
3A Total					**$896,950**

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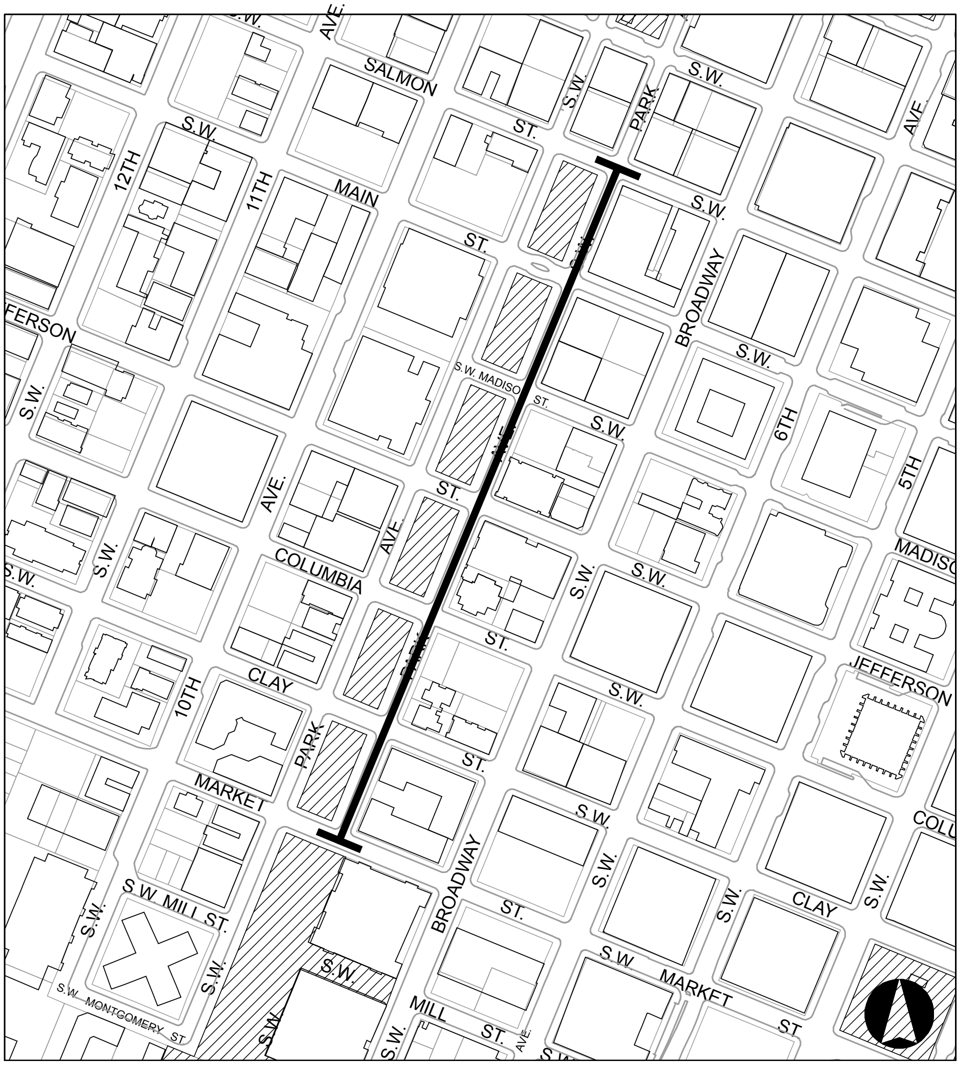
Nov 2015



Segment 4B: SW Salmon St. to SW Market St.
Distance: 1500 ft.
Investment: High
Lane Removal Mobility Bias Alt.: 1 Parking Lane (8')
Lane Removal Access Bias Alt.: 1 Parking Lane (8')
Lane Removal Open Space Bias Alt.: Narrow Travel Lane and 2 Parking lanes (28')
* Loading where possible/necessary

Segment	Level of Investment	Type	Metric	Price	Total Cost
4B	**MEDIUM**	Minimum Full Signal Intersection	2	250,000 Each	$500,000
4B	MEDIUM	Striping	1500 FT	$1 per foot	$1,500
4B	MEDIUM	Art Box	75	$200 Each	$15,000
4B	MEDIUM	Signage	3	$150 Each	$450
4B	MEDIUM	Curb Extension	12	$10,000 - $20,000	$240,000
4B	MEDIUM	Rapid Flash Beacon	2	$50,000 - 70,000	$140,000
4B Total					$896,950

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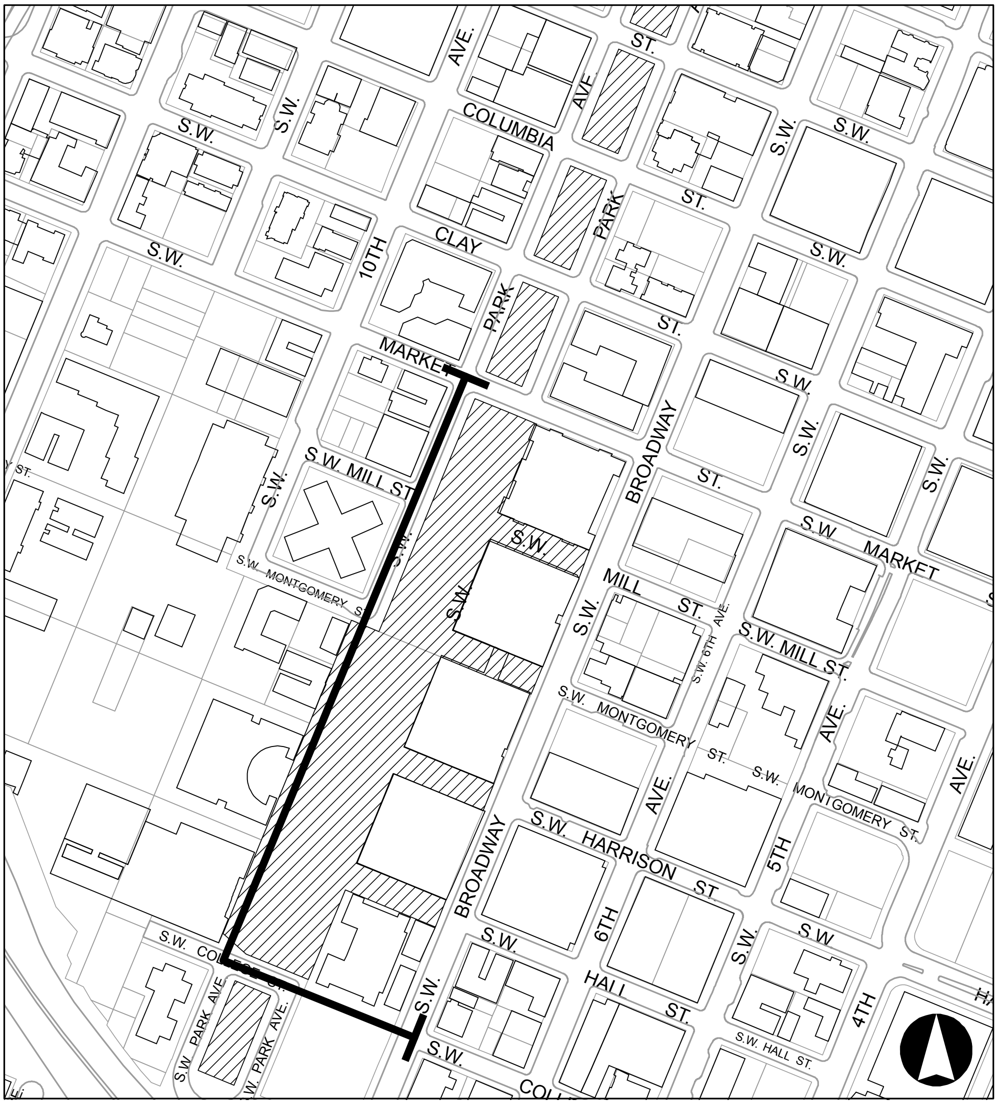

Segment 5A: SW Market St. to SW College St.
Distance: 1700 ft.
Investment: Low
Lane Removal Mobility Bias Alt.: 2 Parking Lanes (16')
Lane Removal Access Bias Alt.: No Removal
Lane Removal Open Space Bias Alt.: Narrow Travel Lane and 2 Parking lanes (28')
* Loading where possible/necessary

Segment	Level of Investment	Type	Metric	Price	Total Cost
5A	**LOW**	Striping	1700 FT	$1 per foot	$1,700
5A	LOW	Art Box	85	$200 Each	$17,000
5A	LOW	Signage	3	$150 Each	$450
5A Total					$19,150

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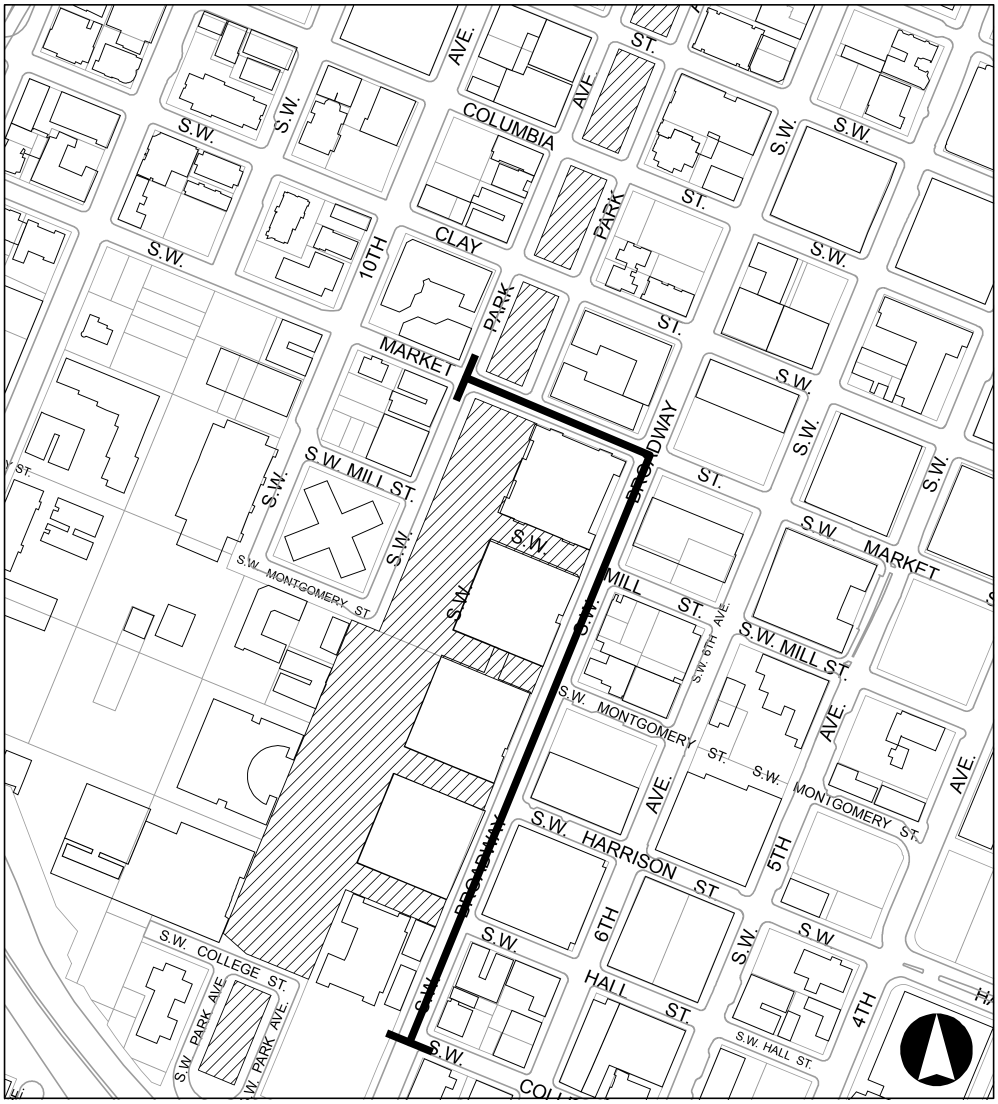

Segment 5B: SW Market St. to SW College St.
Distance: 1700 ft.
Investment: Low
Lane Removal Mobility Bias Alt.: 1 Parking Lane (8')
Lane Removal Access Bias Alt.: 1 Travel Lane (10')
Lane Removal Open Space Bias Alt.: N/A

Segment	Level of Investment	Type	Metric	Price	Total Cost
5B	**LOW**	Striping	1700 FT	$1 per foot	$1,700
5B	LOW	Planter Box Separation	85	$200 Each	$17,000
5B	LOW	Benches	16	$500 Each	$8,000
5B	LOW	Signage	3	$150 Each	$450
5B Total					$27,150

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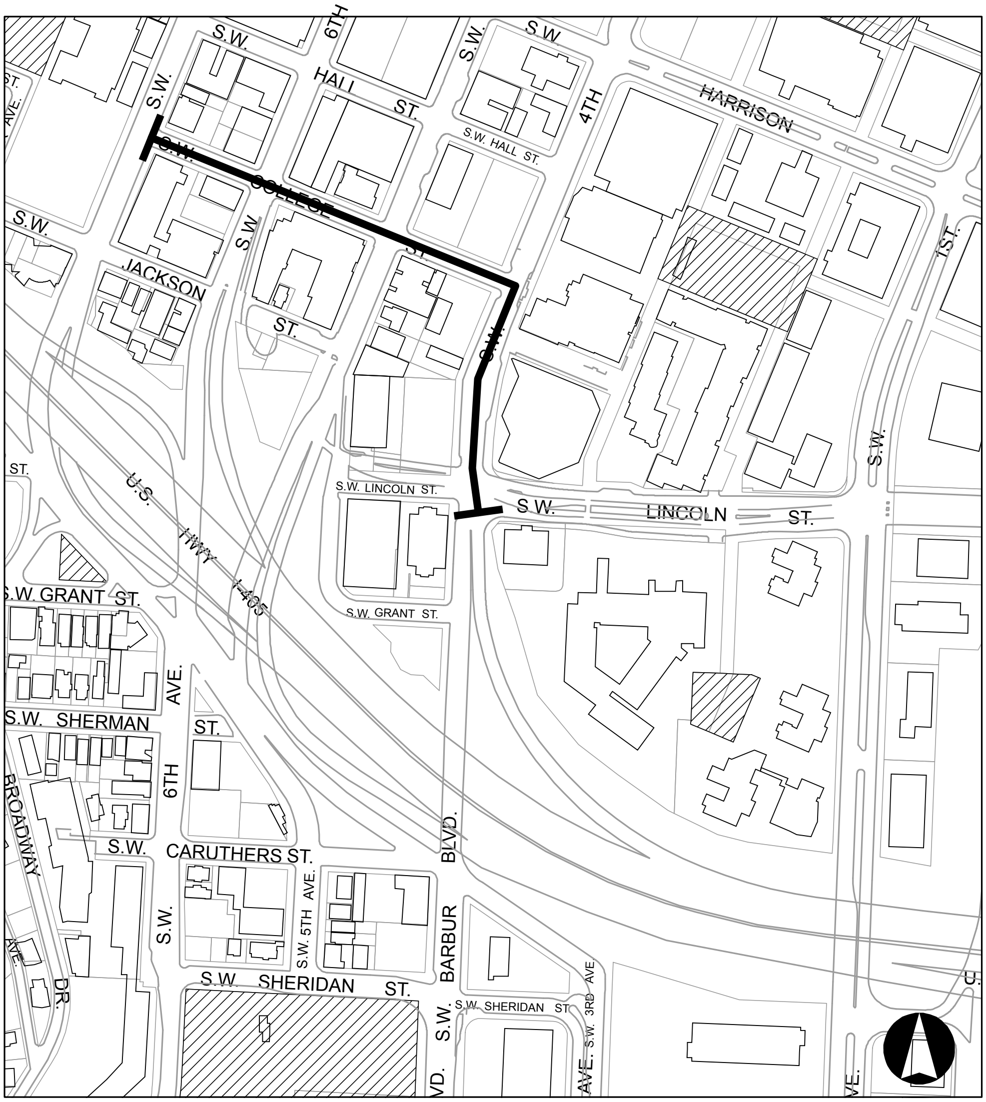

Segment 6: SW College St. to SW 4th Ave.
Distance: 1700 ft.
Investment: Low
Lane Removal Mobility Bias Alt.: 2 Parking Lanes (16')
Lane Removal Access Bias Alt.: 1 Travel Lane and 1 Parking Lane (18') [SW College Ave]
1 Parking Lane (10') [SW 4th Ave]
Lane Removal Open Space Bias Alt.: 1Travel Lane and 2 Parking lanes (28') [SW College Ave]
2 Lanes of Parking (16') [SW 4th Ave]
* Loading where possible/necessary

Segment	Level of Investment	Type	Metric	Price	Total Cost
6	**LOW**	Striping	1300 FT	$1 per foot	$1,300
6	LOW	Art Box	65	$200 Each	$13,000
6	LOW	Signage	2	$150 Each	$300
6	LOW	Curb Extension	12	$20,000	$240,000
6 Total					$254,600

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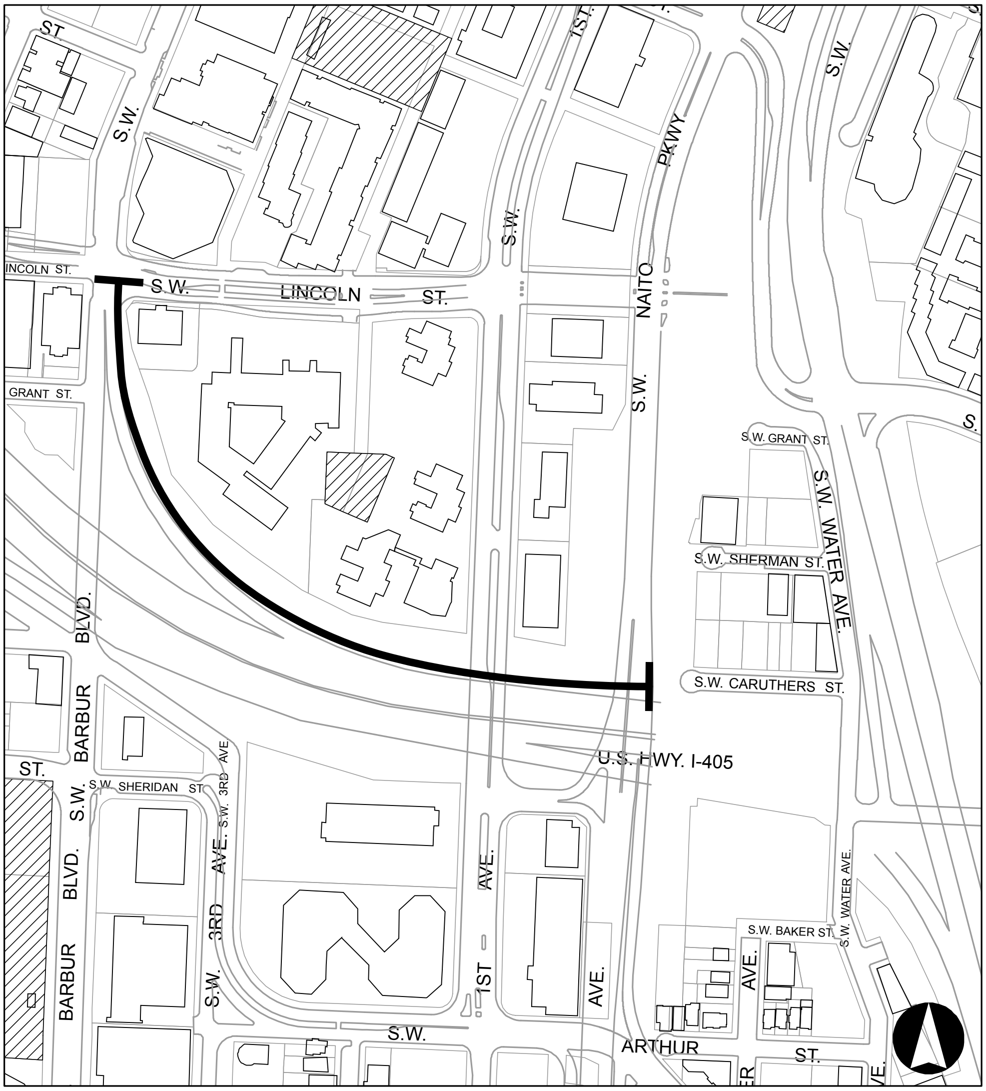
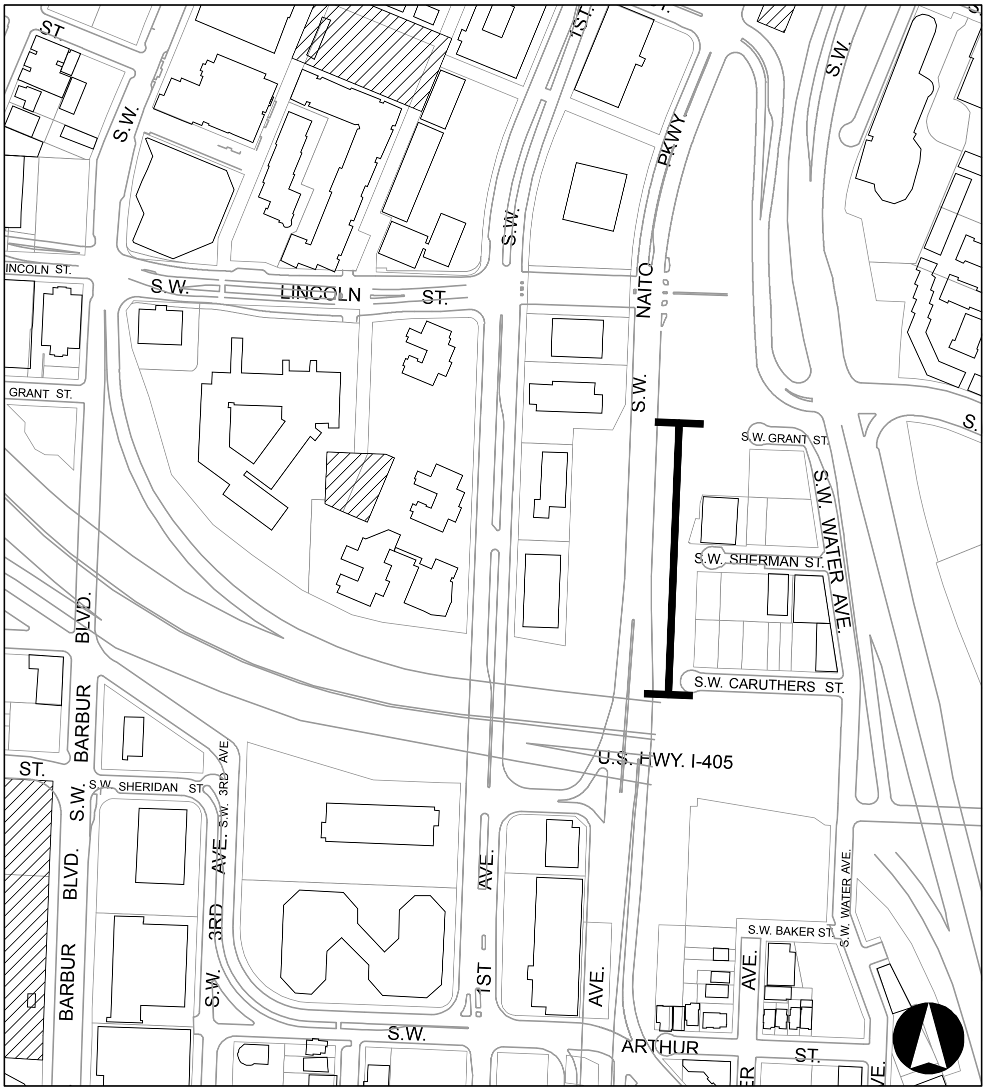


Segment 7: SW 4th Ave. to SW Naito Pkwy
Distance: 1500 ft.
Investment: Medium
No Lane Removal

Segment	Level of Investment	Type	Metric	Price	Total Cost
7	**MEDIUM**	Asphalt	25,000 SQFT	$6 SQFT	150,000
7	MEDIUM	Striping	1500 FT	$1 Per foot	$1,500
7	MEDIUM	Minimum Full Signal Intersection	2	$250,000 Per Signal	$500,000
7	MEDIUM	Grading	100	$75 per cubic yard	$7,500
7	MEDIUM	Pedestrian Scale Lighting	40	$15,000	$600,000
7	MEDIUM	Signage	3	$150	$450
7 Total					$1,259,450



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Segment 8: SW Naito Pkwy ROW
Distance: 600 ft.
Investment: Medium
No Lane Removal

Segment	Level of Investment	Type	Metric	Price	Total Cost
8	MEDIUM	Asphalt	9,000 SQFT	$43 SQFT	$387,000
8	MEDIUM	Striping	600 FT	$1 Per foot	$600
8	MEDIUM	Pedestrian Scale Lighting	20	$15000 Each	$300,000
8	MEDIUM	Signage	2	$150	$300
8	MEDIUM	Benches	4	$3,000	$12,000
8	MEDIUM	Bike Parking	5	$200	$1,000
8 Total					$700,900

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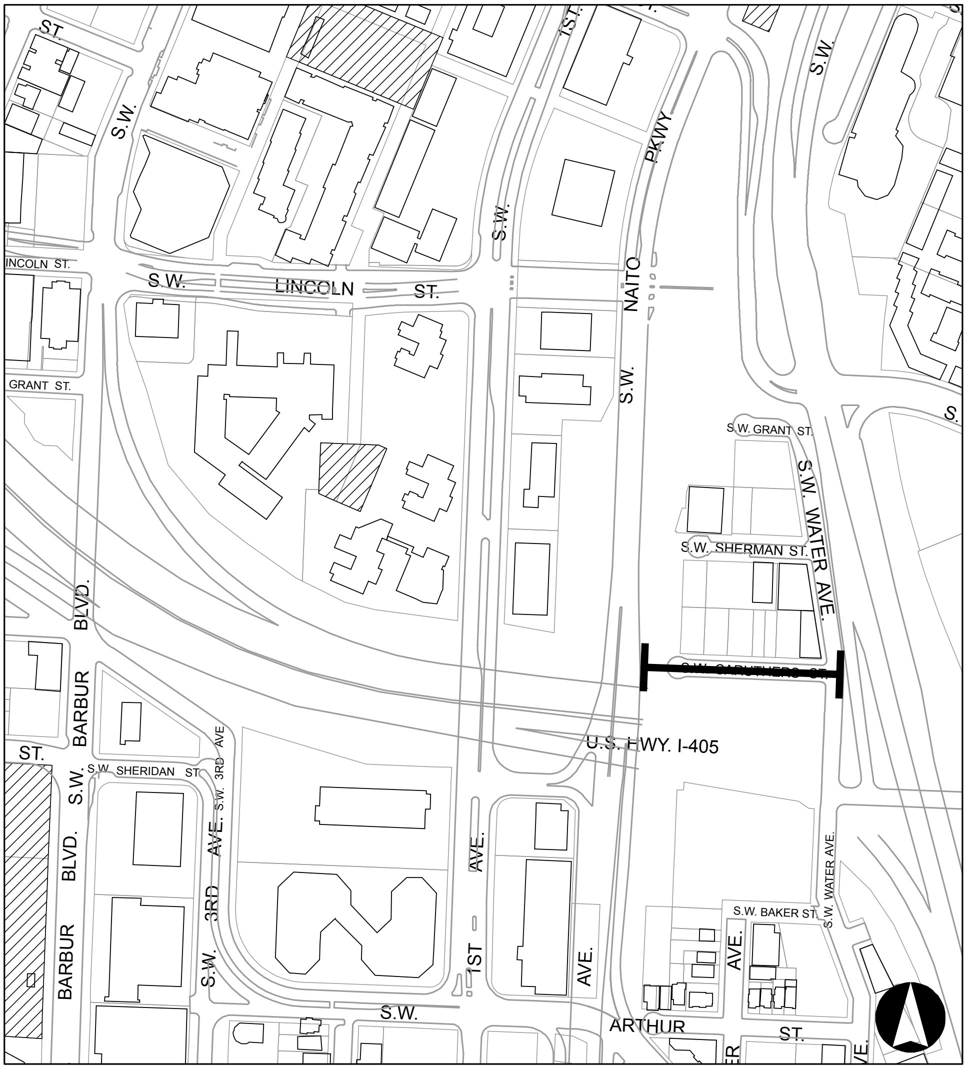
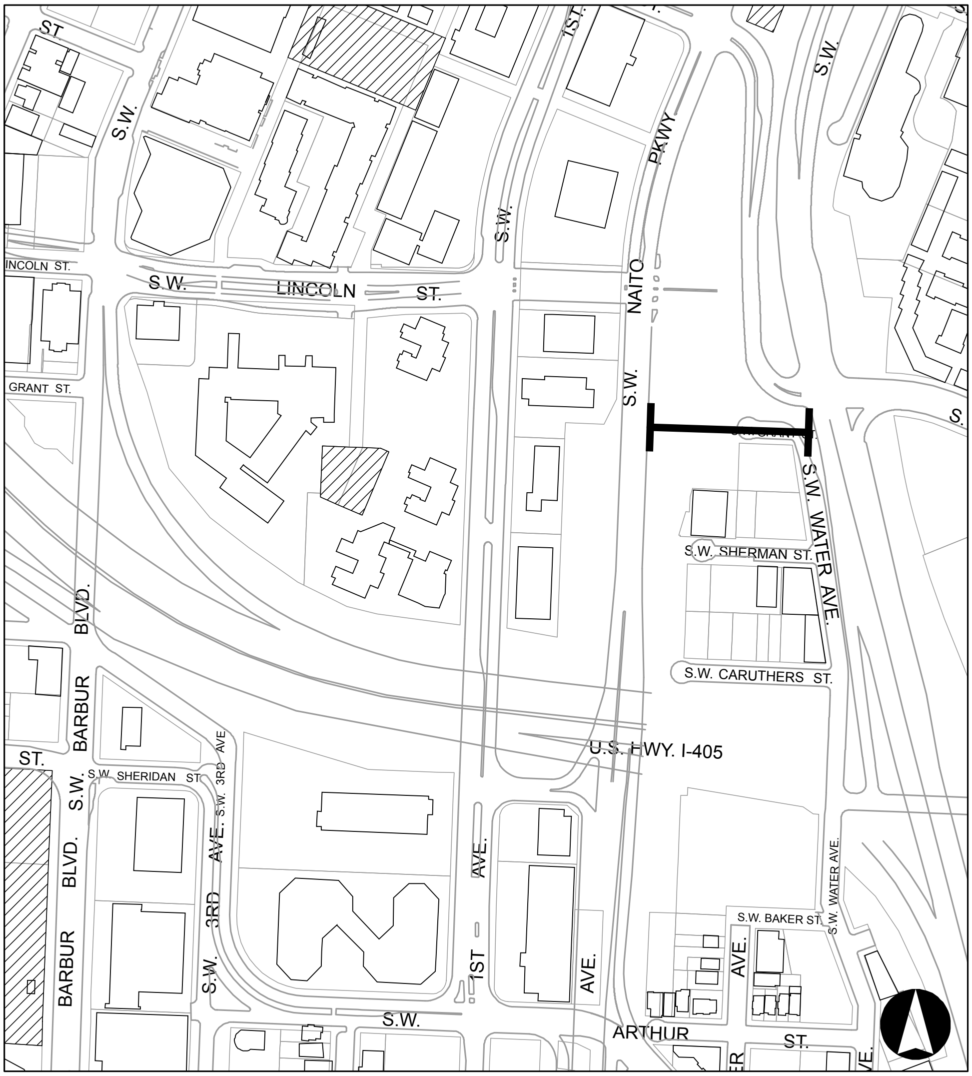


Segment 9A: SW Caruthers St.
Distance: 350 ft.
Investment: Medium
Lane Removal Mobility Bias Alt.: Full closure of street
* Loading where possible/necessary
Lane Removal Access Bias Alt.: N/A
Lane Removal Open Space Bias Alt.: Full closure of street
* Loading where possible/necessary

Segment	Level of Investment	Type	Metric	Price	Total Cost
9A	**MEDIUM**	Pavers (Brick)	10000 SQFT	$43 SQFT	$430,000
9A	MEDIUM	Grading	1200	$75 per cubic yard	$90,000
9A	MEDIUM	Planter Box Separation	15	$200 Each	$3,000
9A	MEDIUM	Striping	350 FT	$1 Per foot	$350
9A	MEDIUM	Pedestrian Scale Lighting	10	$15000 Each	$150,000
9A	MEDIUM	Signage	2	$150	$300
9A	MEDIUM	Benches	5	$3,000	$15,000
9A	MEDIUM	Bike Parking Shelter	1	$30,000	$30,000
9A	MEDIUM	Curb Extension	4	$20,000	$80,000
9A	MEDIUM	Public Art	3	2% of total project cost	
9A Total					798,650



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Segment 9B: SW Grant St.
Distance: 320 ft.
Investment: Medium
Lane Removal Mobility Bias Alt.: Full closure of street
* Loading where possible/necessary
Lane Removal Access Bias Alt.: No Removal [Path goes on adjacent vacant parcel]
Lane Removal Open Space Bias Alt.: Full closure of street
* Loading where possible/necessary

Segment	Level of Investment	Type	Metric	Price	Total Cost
9B	MEDIUM	Pavers (Brick)	9600 SQFT	$43 SQFT	$412,800
9B	MEDIUM	Grading	1000	$75 per cubic yard	$75,000
9B	MEDIUM	Planter Box Separation	15	$200 Each	$3,000
9B	MEDIUM	Pedestrian Scale Lighting	10	$15000 Each	$150,000
9B	MEDIUM	Street Lighting	16	$5000 Each	$80,000
9B	MEDIUM	Signage	2	$150	$300
9B	MEDIUM	Benches	5	$3,000	$15,000
9B	MEDIUM	Bike Parking Shelter	1	$30,000	$30,000
9B	MEDIUM	Curb Extension	4	$20,000	$80,000
9B	MEDIUM	Public Art	3	2% of total project cost	
9B Total					846,100

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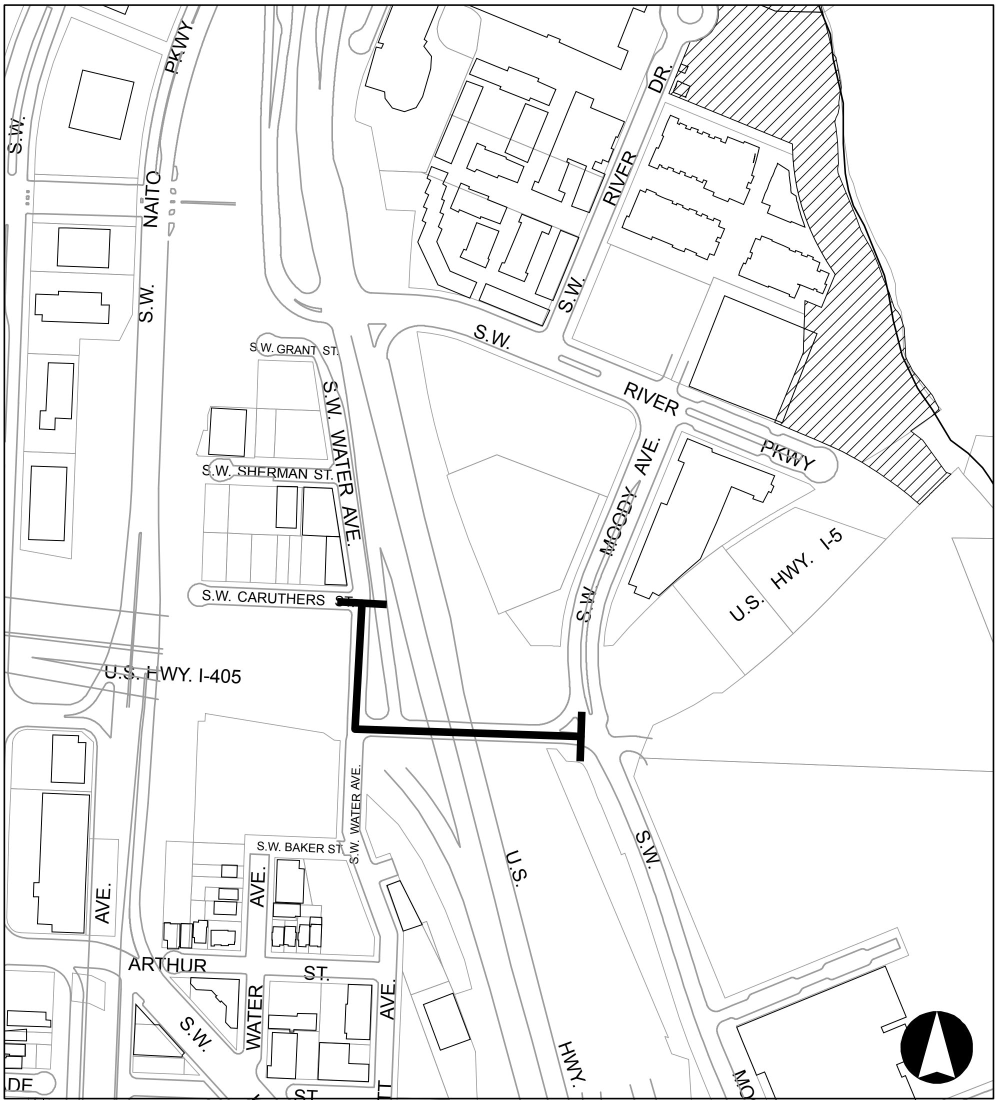

Segment 10A: SW Water Ave to SW Moody Ave
Distance: 750 ft.
Investment: Low
Lane Removal Mobility Bias Alt.: Full Closure
Lane Removal Access Bias Alt.: N/A
Lane Removal Open Space Bias Alt.: N/A

Segment	Level of Investment	Type	Metric	Price		Total Cost
10A	LOW	Striping	750 FT	$1 per foot		$750
10A	LOW	Wands	40	$150 Each		$6,000
10A	LOW	Pedestrian Scale Lighting	10		$15,000	$150,000
10A	LOW	Signage	3	$150 Each		$450
10A Total						$157,200

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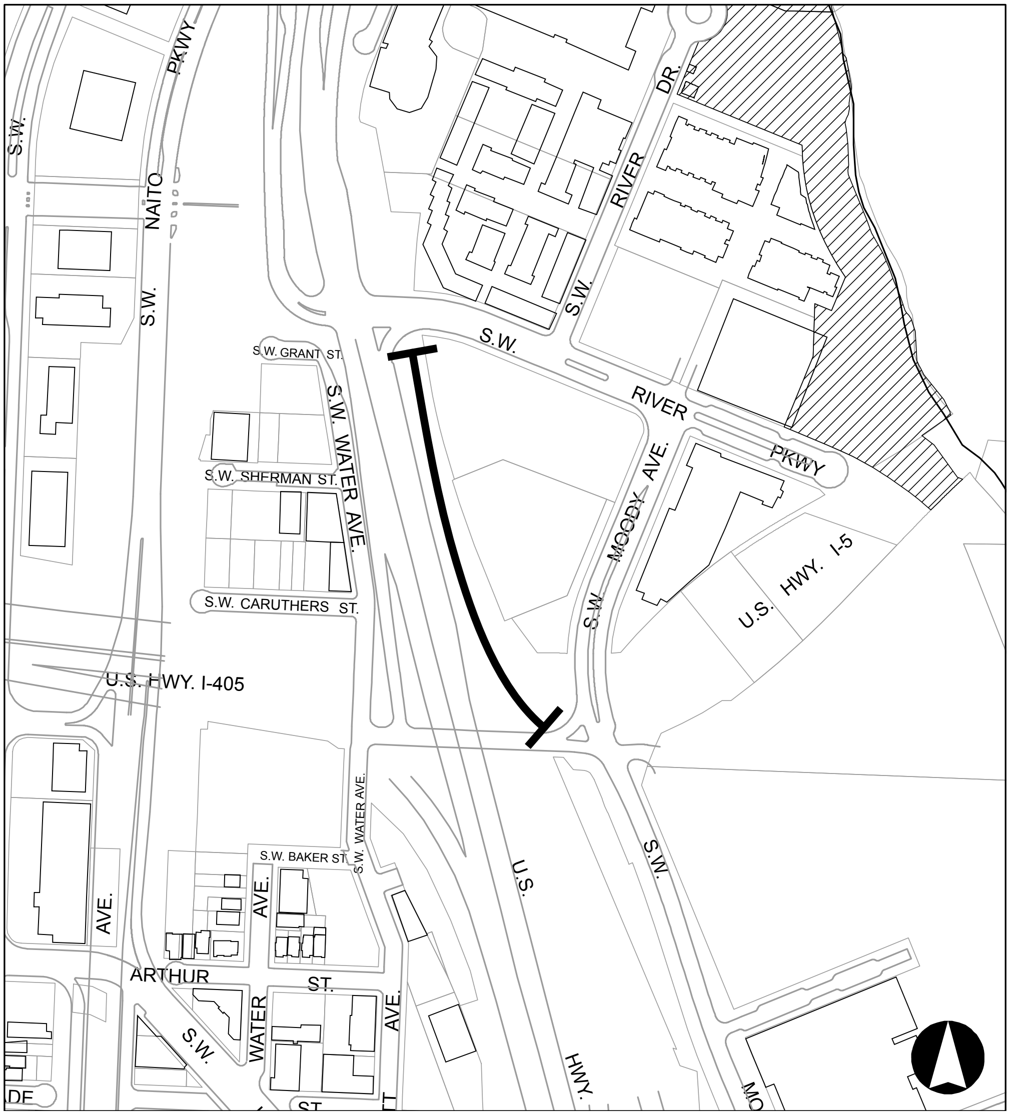

Segment 10B: Harbor Drive Multi Use Path to SW Moody Ave
Distance: 880 ft.
Investment: Low
No Lane Removal

Segment	Level of Investment	Type	Metric	Price	Total Cost
10B	LOW	Pedestrian Scale Lighting	10	$15,000	$150,000
10B	LOW	Signage	2	$150 Each	$300
10B Total					$150,300

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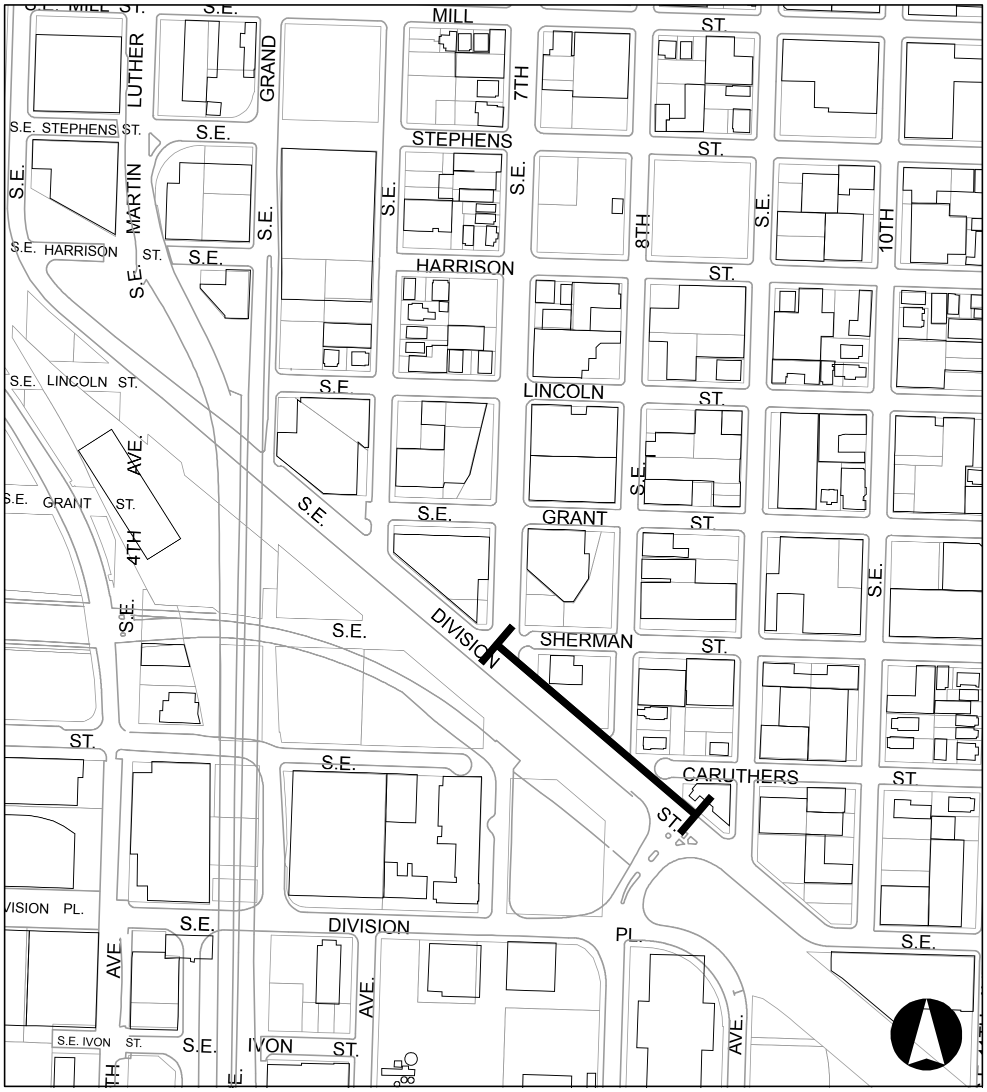
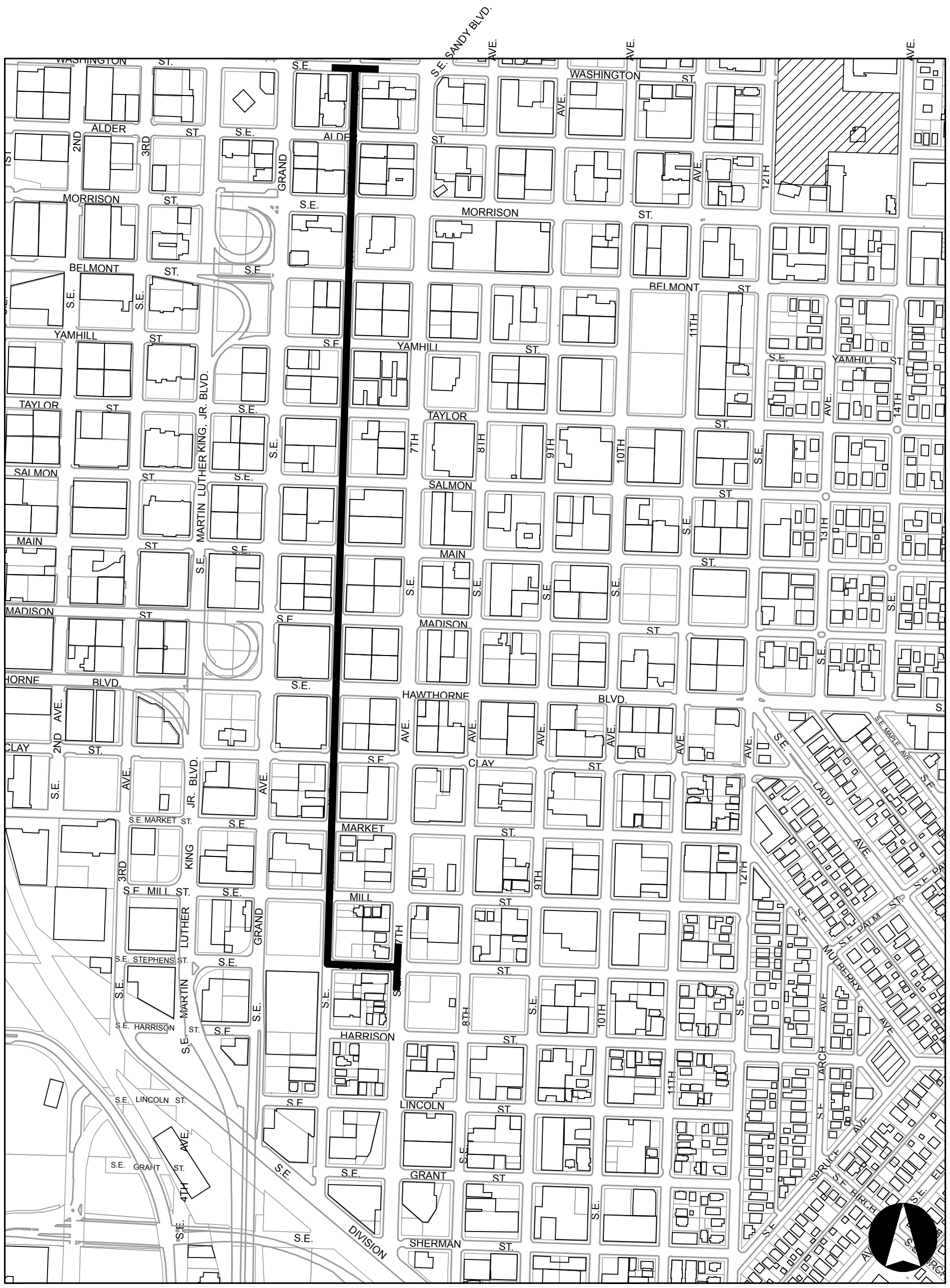


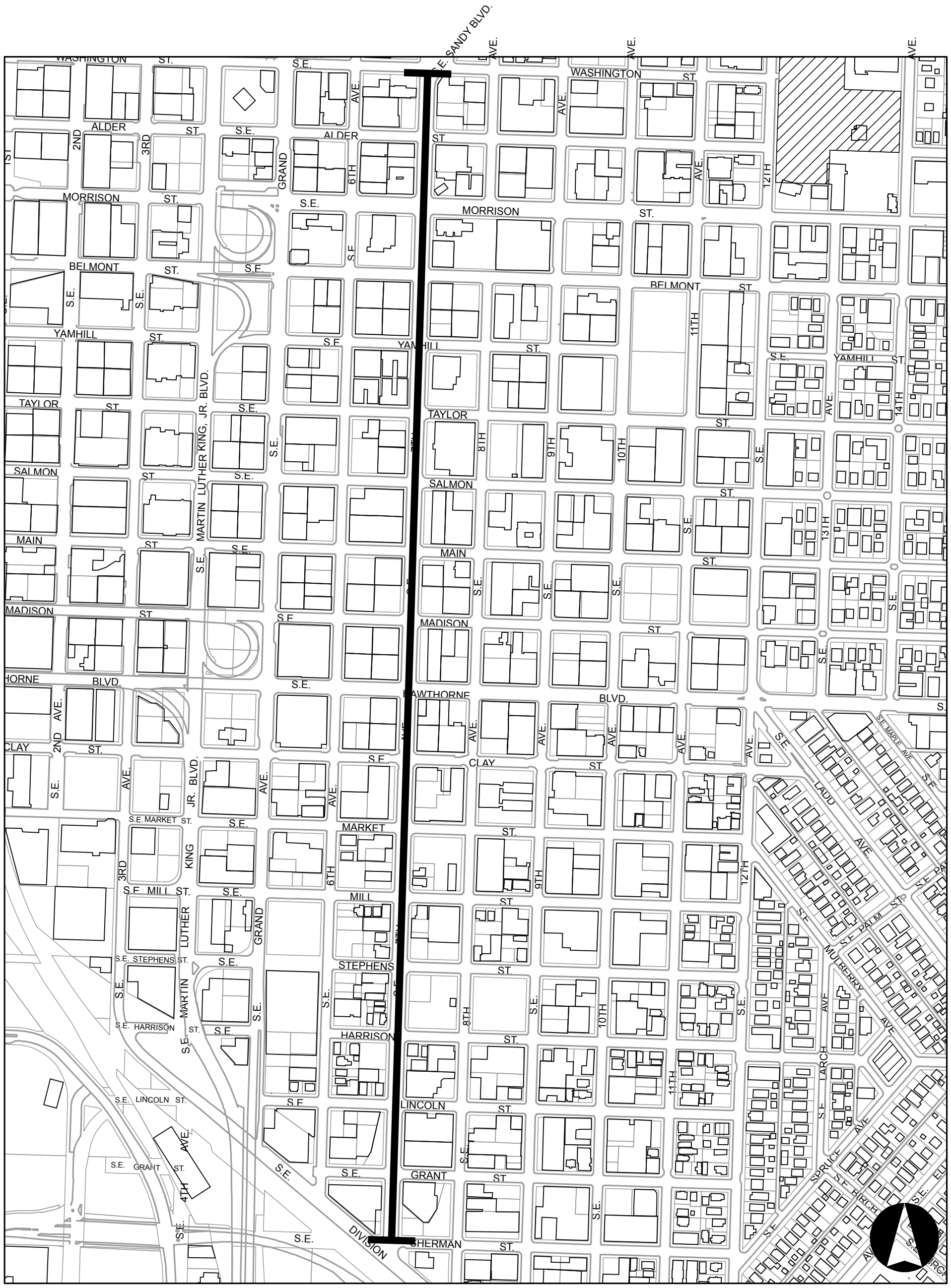
Segment 11: SE Division St.
Distance: 550 ft.
Investment: Low
Lane Removal Mobility Bias Alt.: Center Turn Lane and 1 Parking Lane (18′)
Lane Removal Access Bias Alt.: Center Turn Lane and 1 Parking Lane (18′)
Lane Removal Open Space Bias Alt.: N/A

Segment	Level of Investment	Type	Metric	Price	Total Cost
11	LOW	Striping	550 FT	$1 per foot	$550
11	LOW	Planter Box Separation	50	$200 Each	$10,000
11	LOW	Pedestrian Scale Lighting	5	$15000 Each	$75,000
11	LOW	Signage	2	$150 Each	$300
11 Total					$85,850



Segment 12A: SE 6th Ave from SE Sherman St. to SE Washington St.
Distance: 3600 ft.
Investment: High
Lane Removal Mobility Bias Alt.: 2 Parking Lanes (16')
Lane Removal Access Bias Alt.: 1 Parking Lane and 1 Travel Lane (18')
Lane Removal Open Space Bias Alt.: 2 Parking Lanes and 1 Travel Lane (26')
* Loading where possible/necessary

Segment	Level of Investment	Type	Metric	Price	Total Cost
12A	HIGH	Striping	$3,600	$1 per foot	$3,600
12A	HIGH	Bollards	180	$820 Each	$147,600
12A	HIGH	Signage	4	$150 Each	$600
12A	HIGH	Benches	12	$3,000	$36,000
12A	HIGH	Street Trees	30	$1,000	$30,000
12A	HIGH	Bike Parking	26	$200	$5,200
12A	HIGH	Pedestrian Scale Lighting	45	$15,000	$675,000
12A	HIGH	Minimum Full Signal Intersection	4	$250,000 Per Signal	$1,000,000
12A	HIGH	Curb Extension	26	$10,000 - $20,000 Each	$520,000
12A Total					$2,418,000



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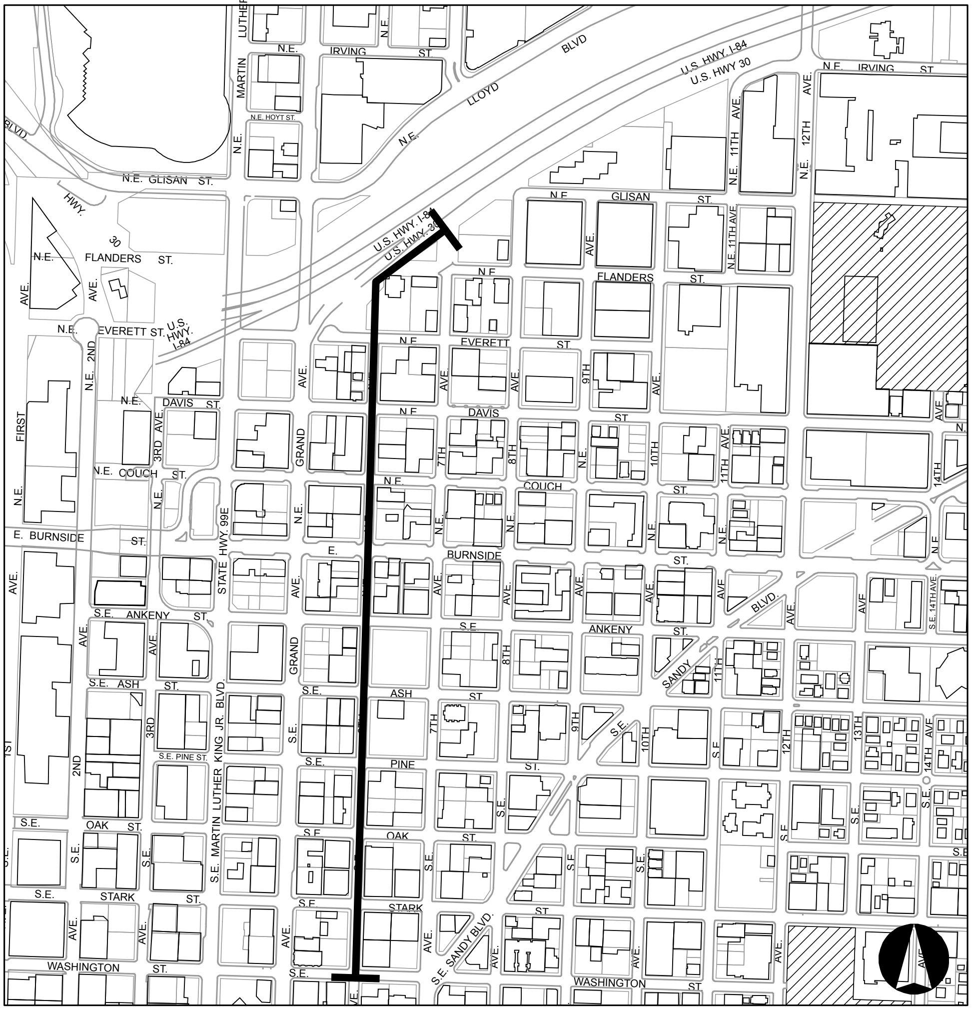
Segment 12B: SE 7th Ave from SE Sherman St. to SE Washington St.
Distance: 4400 ft.
Investment: High
Lane Removal Mobility Bias Alt.: Center Turn Lane and 1 Parking Lane (18′)
Lane Removal Access Bias Alt.: Center Turn Lane and 1 Lane of Parking (18′)
Lane Removal Open Space Bias Alt.: N/A

Segment	Level of Investment	Type	Metric	Price	Total Cost
12B	HIGH	Striping	4400 FT	$1 per foot	$4,400
12B	HIGH	Bollards	220	$820 Each	$180,400
12B	HIGH	Pedestrian Scale Lighting	55	$15,000	$825,000
12B	HIGH	Signage	4	$150 Each	$600
12B	HIGH	Benches	12	$3,000	$36,000
12B	HIGH	Street Trees	30	$1,000	$30,000
12B	HIGH	Bike Parking	26	$200	$5,200
12B	HIGH	Curb Extension	26	$10,000 - $20,000 Each	$520,000
12B Total					$1,601,600



Segment 13A: SE 6th Ave from SE Washington St. to I-84
Distance: 2800 ft.
Investment: High
Lane Removal Mobility Bias Alt.: 2 Parking Lanes (16′)
Lane Removal Access Bias Alt.: 1 Parking Lane and 1 Travel Lane (18′)
Lane Removal Open Space Bias Alt.: 2 Parking Lanes and 1 Travel Lane (26′)
* Loading where possible/necessary

Segment	Level of Investment	Type	Metric	Price	Total Cost
13A	HIGH	Striping	2800 FT	$1 per foot	$2,800
13A	HIGH	Bollards	140	$820 Each	$114,800
13A	HIGH	Signage	3	$150 Each	$450
13A	HIGH	Benches	20	$3,000	$60,000
13A	HIGH	Street Trees	20	$1,000	$20,000
13A	HIGH	Bike Parking	20	$200	$4,000
13A	HIGH	Minimum Full Signal Intersection	1	$250,000 Per Signal	$250,000
13A	HIGH	Pedestrian Scale Lighting	40	$15,000	$600,000
13A	HIGH	Curb Extension	20	$10,000 - $20,000 Each	$400,000
13A Total					$1,452,050

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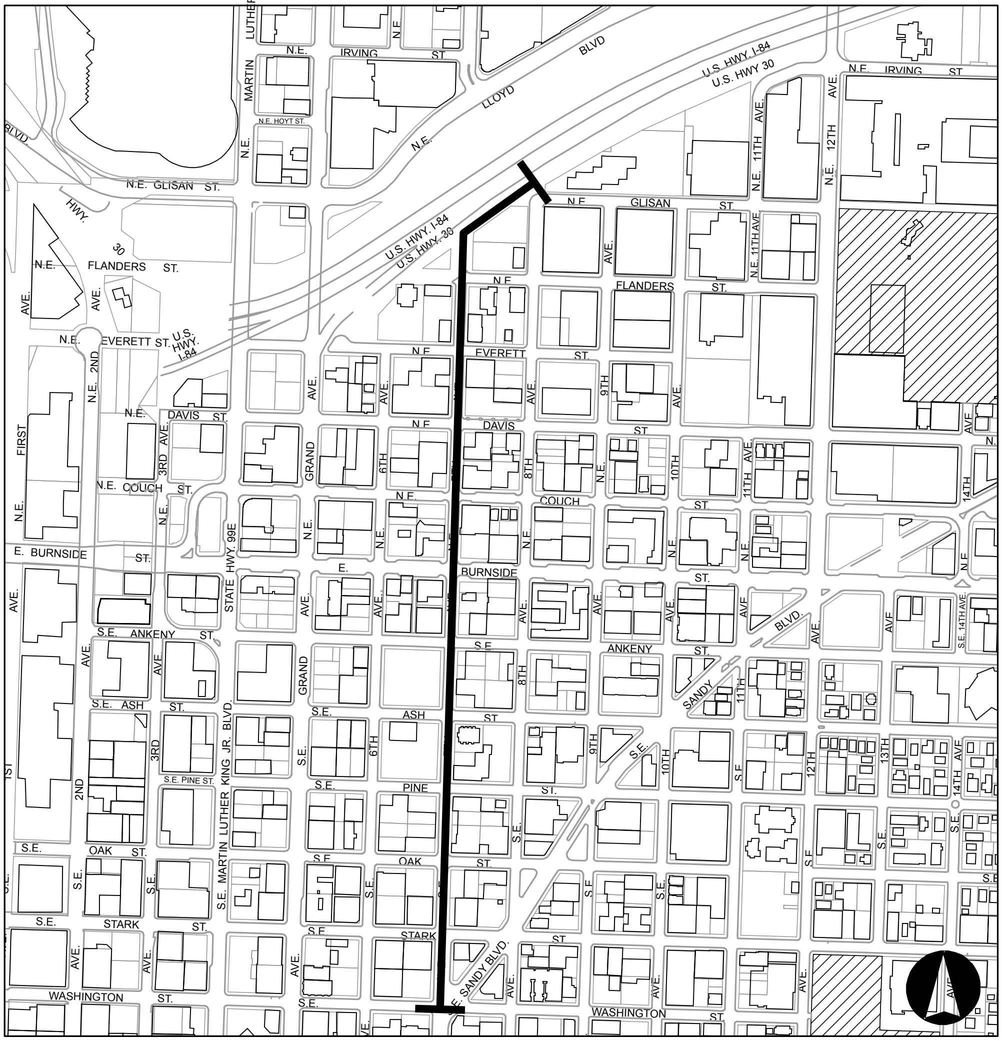

Segment 13B: SE 7th Ave from SE Washington St. to I-84
Distance: 3000 ft.
Investment: High
Lane Removal Mobility Bias Alt.: 2 Parking Lanes (16’)
Lane Removal Access Bias Alt.: 1 Parking Lane and 1 Travel Lane (18’)
Lane Removal Open Space Bias Alt.: N/A

Segment	Level of Investment	Type	Metric	Price	Total Cost
13B	HIGH	Striping	3000 FT	$1 per foot	$3,000
13B	HIGH	Bollards	150	$820 Each	$123,000
13B	HIGH	Signage	3	$150 Each	$450
13B	HIGH	Benches	20	$3,000	$60,000
13B	HIGH	Street Trees	20	$1,000	$20,000
13B	HIGH	Bike Parking	20	$200	$4,000
13B	HIGH	Minimum Full Signal Intersection	1	$250,000 Per Signal	$250,000
13B	HIGH	Pedestrian Scale Lighting	40	$15,000	$600,000
13B	HIGH	Curb Extension	20	$10,000 - $20,000 Each	$600,000
13B Total					$1,660,450

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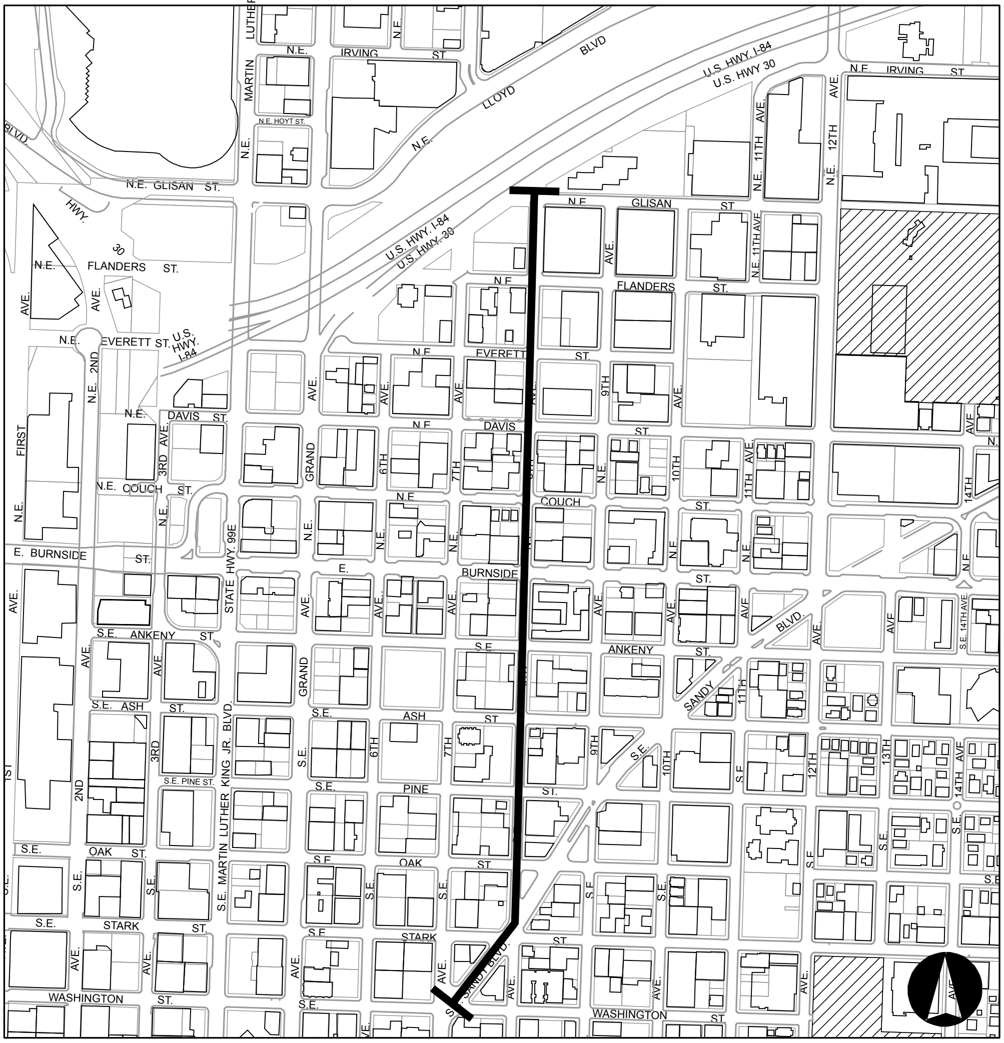

Segment 13C: SE 8th Ave from SE Washington St. to I-84
Distance: 3000 ft.
Investment: High
Lane Removal Mobility Bias Alt.: 2 Parking Lanes (16′)
Lane Removal Access Bias Alt.: 1 Parking Lane and 1 Travel Lane (18′)
Lane Removal Open Space Bias Alt.: N/A

Segment	Level of Investment	Type	Metric	Price	Total Cost
13C	HIGH	Striping	3000 FT	$1 per foot	$3,000
13C	HIGH	Bollards	150	$820 Each	$123,000
13C	HIGH	Signage	3	$150 Each	$450
13C	HIGH	Benches	20	$3,000	$60,000
13C	HIGH	Street Trees	20	$1,000	$20,000
13C	HIGH	Bike Parking	20	$200	$4,000
13C	HIGH	Pedestrian Scale Lighting	40	$15,000	$600,000
13C	HIGH	Curb Extension	20	$10,000 - $20,000 Each	$600,000
13C Total					$1,410,450

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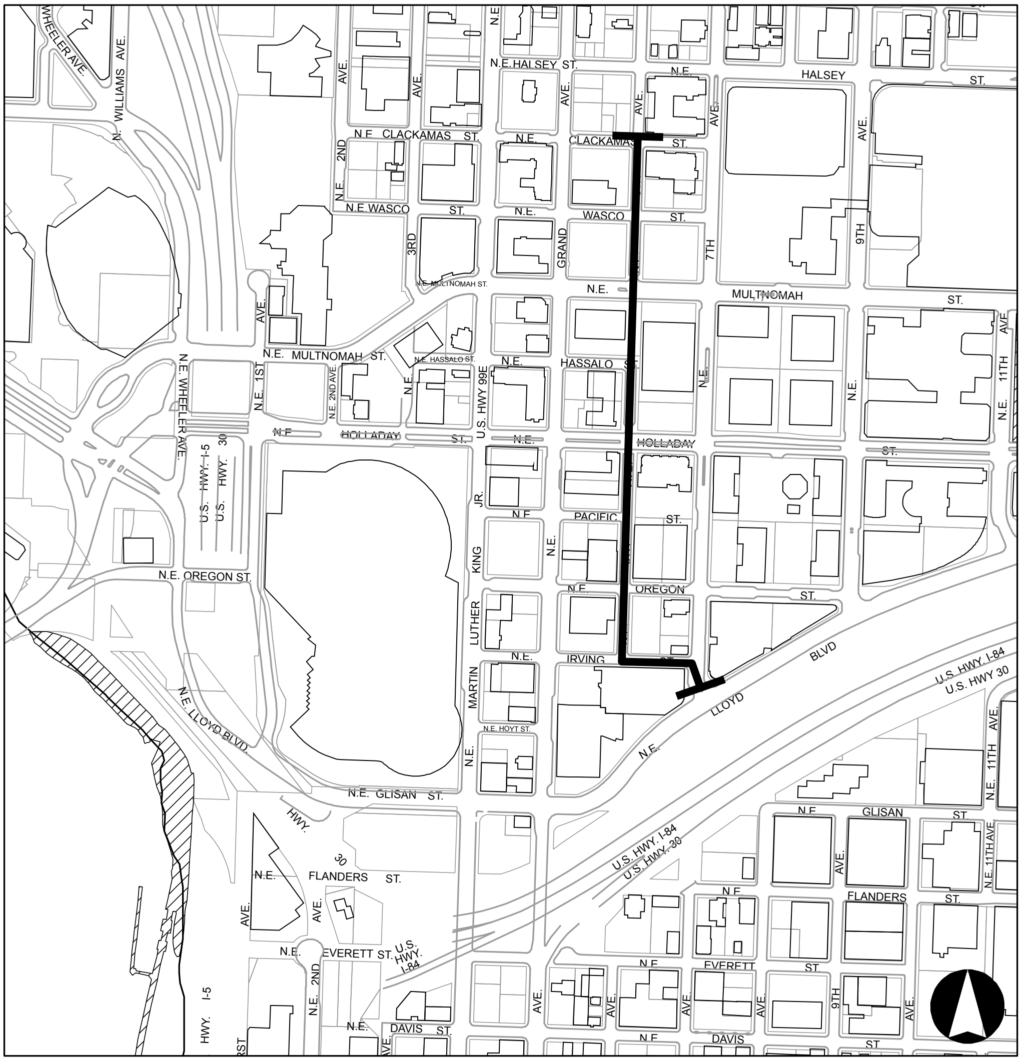

Segment 14A: NE 6th Ave from NE Lloyd Blvd to NE Clackamas St.
Distance: 2200 ft.
Investment: High
Lane Removal Mobility Bias Alt.: 2 Parking Lanes (16')
Lane Removal Access Bias Alt.: 1 Parking Lane and 1 Travel Lane (18')
Lane Removal Open Space Bias Alt.: 2 Parking Lanes and 1 Travel Lane (26')
* Loading where possible/necessary

Segment	Level of Investment	Type	Metric	Price	Total Cost
14A	HIGH	Striping	2200 FT	$1 per foot	$2,200
14A	HIGH	Planter Box Separation	110	$5000 - $7000	$770,000
14A	HIGH	Signage	3	$150 Each	$450
14A	HIGH	Benches	14	$3,000	$42,000
14A	HIGH	Minimum Full Signal Intersection	1	$250,000 Per Signal	$250,000
14A	HIGH	Street Trees	14	$1,000	$20,000
14A	HIGH	Bike Parking	14	$200	$4,000
14A	HIGH	Curb Extension	20	$10,000 - $20,000 Each	$400,000
14A Total					$1,488,650

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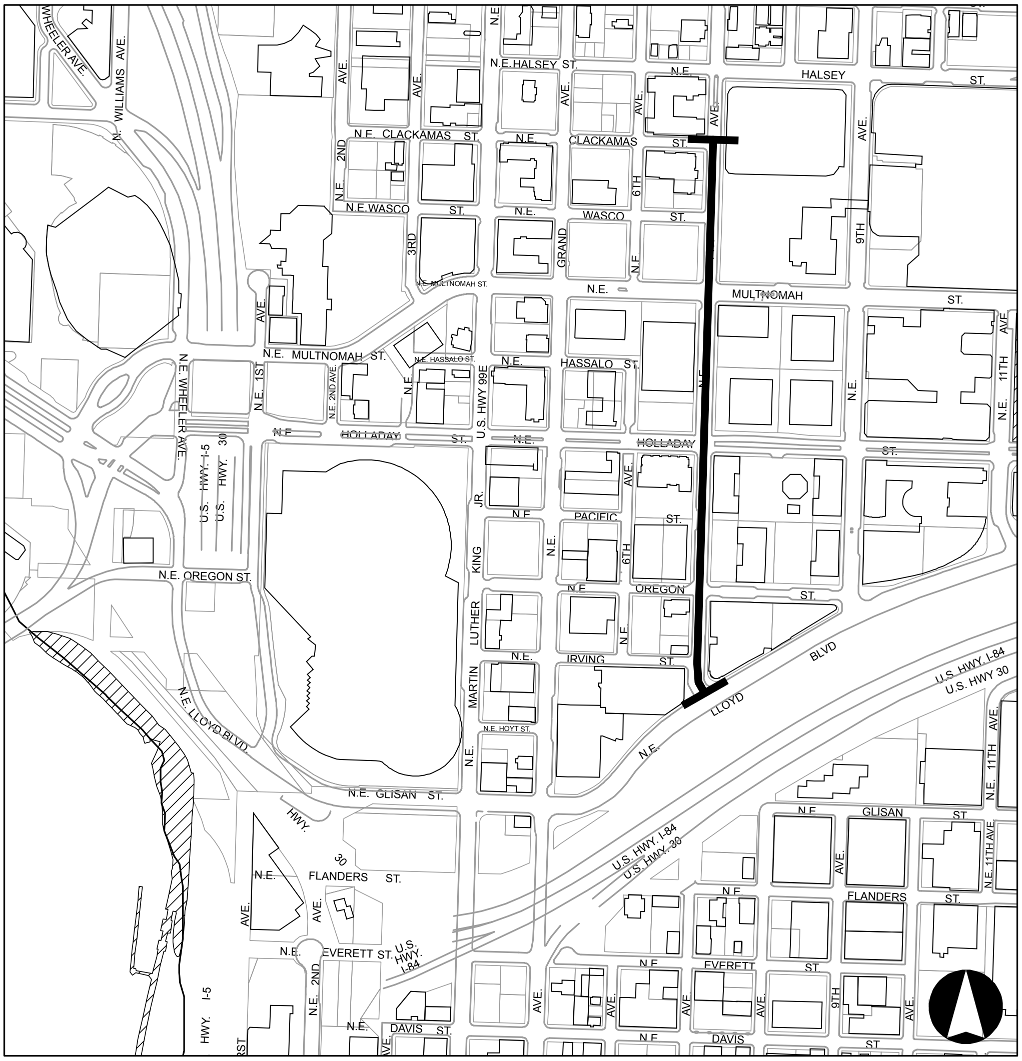

Segment 14B: NE 7th Ave from NE Lloyd Blvd to NE Clackamas St.
Distance: 1900 ft.
Investment: Medium/High ** Need to take into account cost of raising cycletrack
Lane Removal Mobility Bias Alt.: 1 Parking Lane (8')
Lane Removal Access Bias Alt.: 1 Travel Lane (10')
Lane Removal Open Space Bias Alt.: N/A

Segment	Level of Investment	Type	Metric	Price	Total Cost
14B	MEDIUM	Striping	1900 FT	$1 per foot	$1,900
14B	MEDIUM	Planter Box Separation	95	$5000 - $7000	$475,000
14B	MEDIUM	Signage	3	$150 Each	$450
14B	MEDIUM	Benches	20	$3,000	$60,000
14B	MEDIUM	Street Trees	20	$1,000	$20,000
14B	MEDIUM	Bike Parking	20	$200	$4,000
14B	MEDIUM	Curb Extension	17	$10,000 - $20,000 Each	$340,000
14B Total					$901,350

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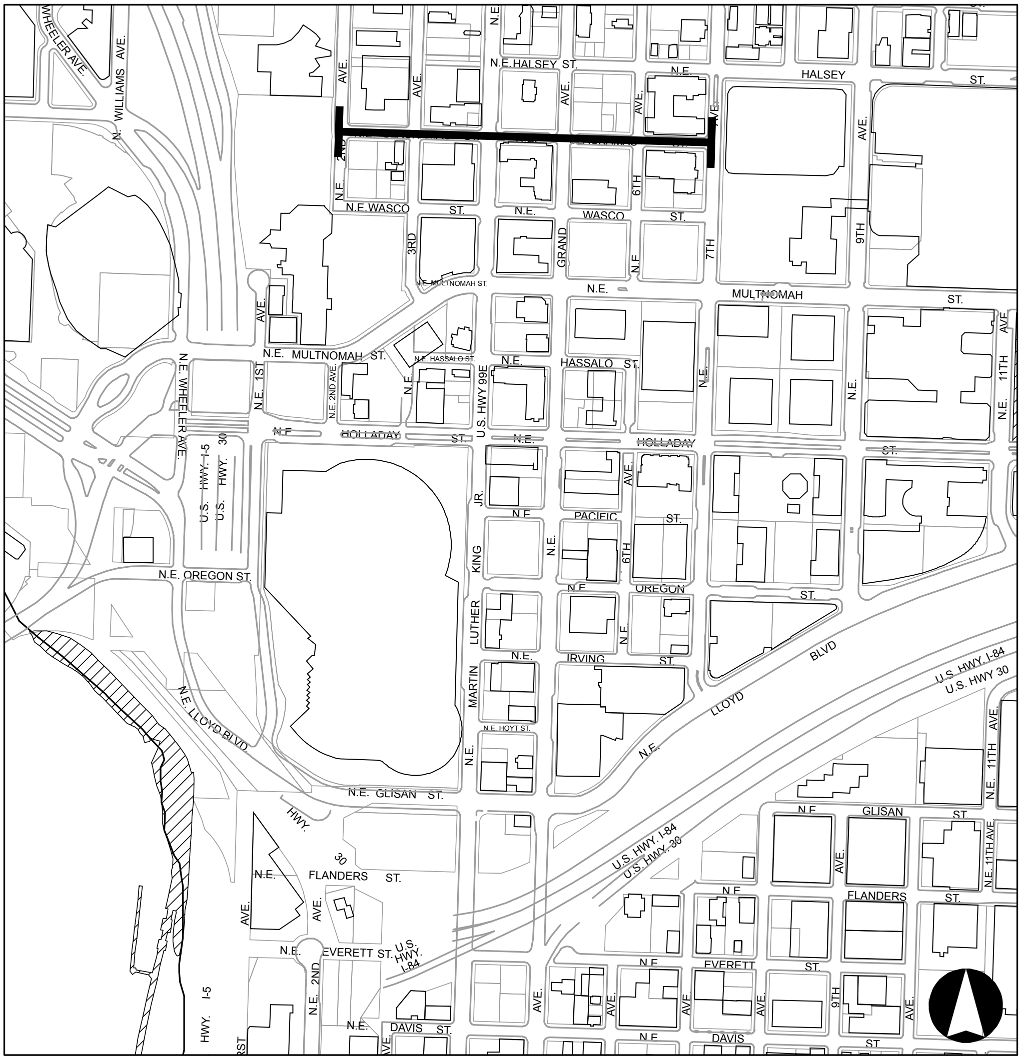

Segment 15: NE Clackamas from NE 7th Ave. to NE 2nd Ave.
Distance: 1350 ft.
Investment: Medium
Lane Removal Mobility Bias Alt.: 2 Parking Lanes (16’)
Lane Removal Access Bias Alt.: 1 Parking Lane and 1 Travel Lane (18’)
Lane Removal Open Space Bias Alt.: 2 Parking Lanes and 1 Travel Lane (26’)
* Loading where possible/necessary

Segment	Level of Investment	Type	Metric	Price	Total Cost
15	MEDIUM	Striping	1350 FT	$1 per foot	$1,350
15	MEDIUM	Planter Box Separation	67	$5000 - $7000	$335,000
15	MEDIUM	Signage	3	$150 Each	$450
15	MEDIUM	Benches	10	$3,000	$30,000
15	MEDIUM	Bike Parking	10	$200	$2,000
15	MEDIUM	Curb Extension	10	$10,000 - $20,000 Each	$400,000
15 Total					$768,800

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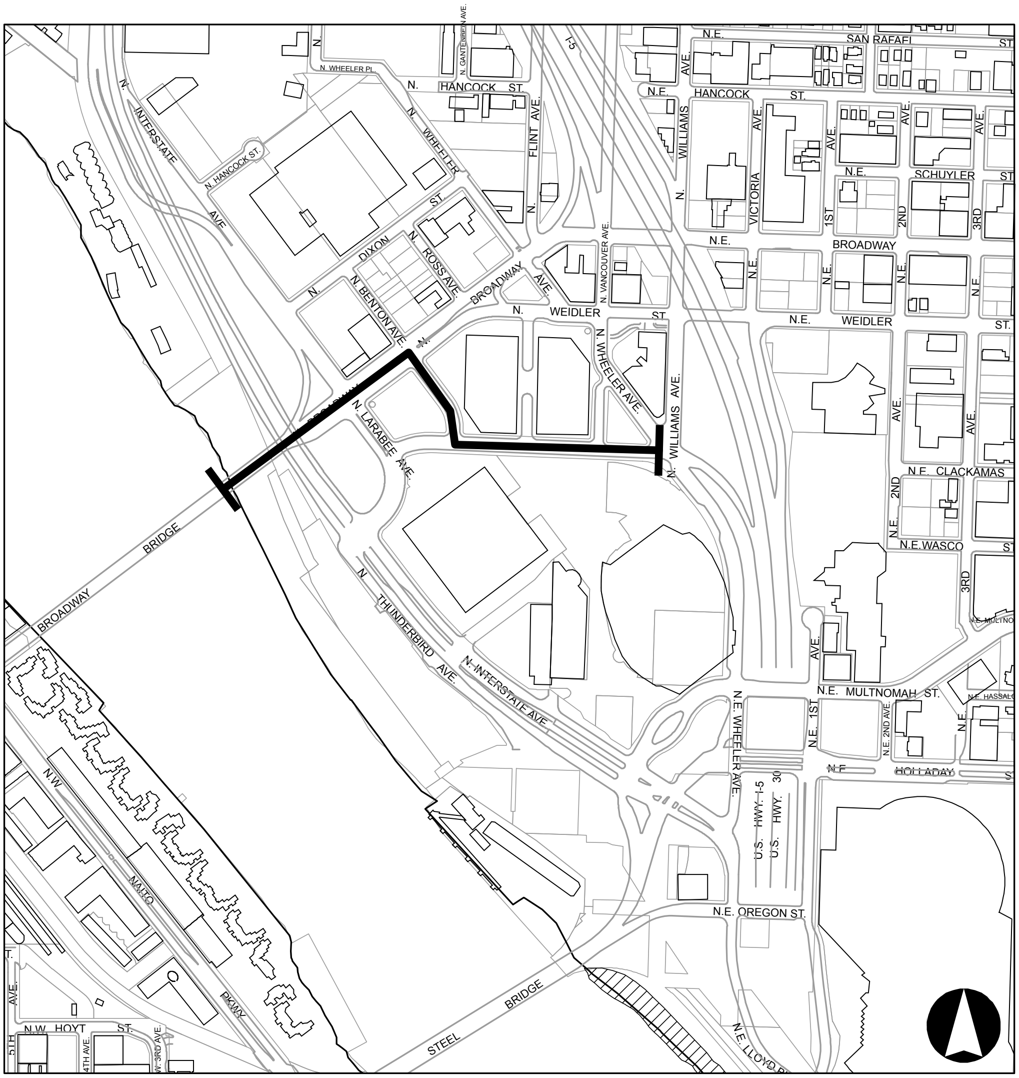


Segment 16: NE Clackamas to Broadway Bridge
Distance: 1950 ft.
Investment: Medium
Lane Removal Mobility Bias Alt.: 1 Travel Lane (10')
Lane Removal Access Bias Alt.: 1 Travel Lane (10')
Lane Removal Open Space Bias Alt.: N/A

Segment	Level of Investment	Type	Metric	Price	Total Cost
16	MEDIUM	Striping	1950 FT	$1 per foot	$1,950
16	MEDIUM	Planter Box Separation	97	$5000 - $7000	$485,000
16	MEDIUM	Signage	3	$150 Each	$450
16	MEDIUM	Benches	5	$3,000	$15,000
16	MEDIUM	Bike Parking	10	$200	$2,000
16	MEDIUM	Curb Extension	6	$10,000 - $20,000 Each	$120,000
16 Total					$624,400

Green Loop Inventory

Existing Street Conditions

October 2015 Draft

PURPOSE

The purpose of the inventory was to catalogue all of the current conditions and relevant street-related information previously uncollected or outdated along the leading rights-of-way alignment options for the Green Loop in Portland's Central City.

METHODOLOGY

What: Data was collected for the following categories: parking, signals and signs, doorways and driveways, and ground floor edges. Parking data included specific time limitations and restrictions for loading, carpools, motorcycles and bicycles, and disabled parking. Doorways and driveways included both pedestrian and vehicle loading building entries, as well as curb cuts and curb extensions.

The data for ground floor edges builds on a previous dataset, confirming and updating the building edges along the rights-of-way studied. Because this dataset is unique to data collected for the Central City, categories for ground floor edges are listed and described below:

- Retail Storefront: This edge is characterized by large, sidewalk-oriented windows and regular or multiple door openings, supportive retail sales and service businesses and uses. This edge type is typically found in front of restaurants, shops, building lobbies, etc.
- Partial Fenestration: This edge has some windows and doors, but not consistently and not necessarily in support of retail uses. This edge type is typically found in front of ground floor office or residential spaces.
- Park, Plaza or Landscaped Edge: This edge is applied to park edges or landscaped setbacks.
- Vacant: This edge is applied to vacant, not surface parking lots. Examples of these include unbuilt blocks or parcels and/or remnants created by infrastructure projects such as freeways.
- Surface Parking: This edge is applied to surface parking lots or areas.

When: This inventory was collected over the spring and summer 2015.

How: Data was collected on foot and/or with Google Maps Street View dated 2014 using an ipad and ArcMap or pencil and paper that was later transcribed into ArcMap.

HOW IT WILL BE USED

This initial dataset compiles current relevant street information that may be used to guide decision-making associated with the Green Loop or other transportation-related projects along the streets inventoried. Initially, it will help in identifying trade-offs, challenges and opportunities to costs and transportation functions related to the Green Loop. Further decision-making and conceptual engineering will require confirmation of the data included in this set.

LEGEND

Doors, Curb Cuts & Extensions

- Building Door
- Vehicle Access Loading Door
- Curb Cut / Driveway
- Curb Extensions
- Bus Stop

Parking Spaces

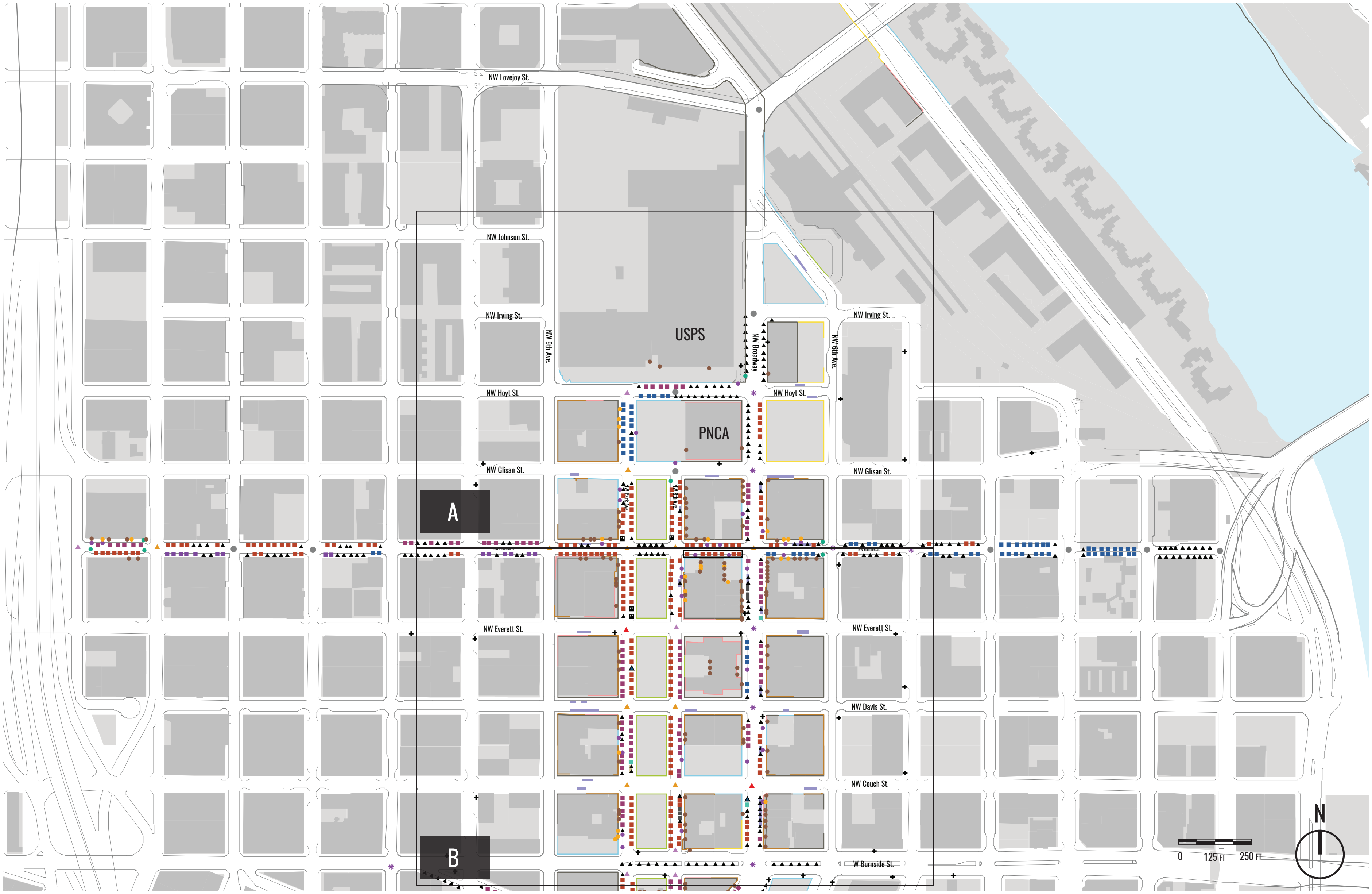
- 5 Minutes
- 10 Minutes
- 15 Minutes
- 20 Minutes
- 30 Minutes
- 1 Hour
- 90 Minutes
- 2 Hours
- 3 Hours
- 4 Hours
- 5 Hours
- None Allowed/Reserved
- Disabled Parking
- Car Share
- Carpool Zone
- Hotel Zone
- Bike Corral
- Truck Loading Zone
- Unlimited/Undefined

Intersection Control

- Traffic Signal
- 4-way Stop Sign
- 3-way Stop Sign
- 2-way Stop Sign
- 1-way Stop Sign
- None

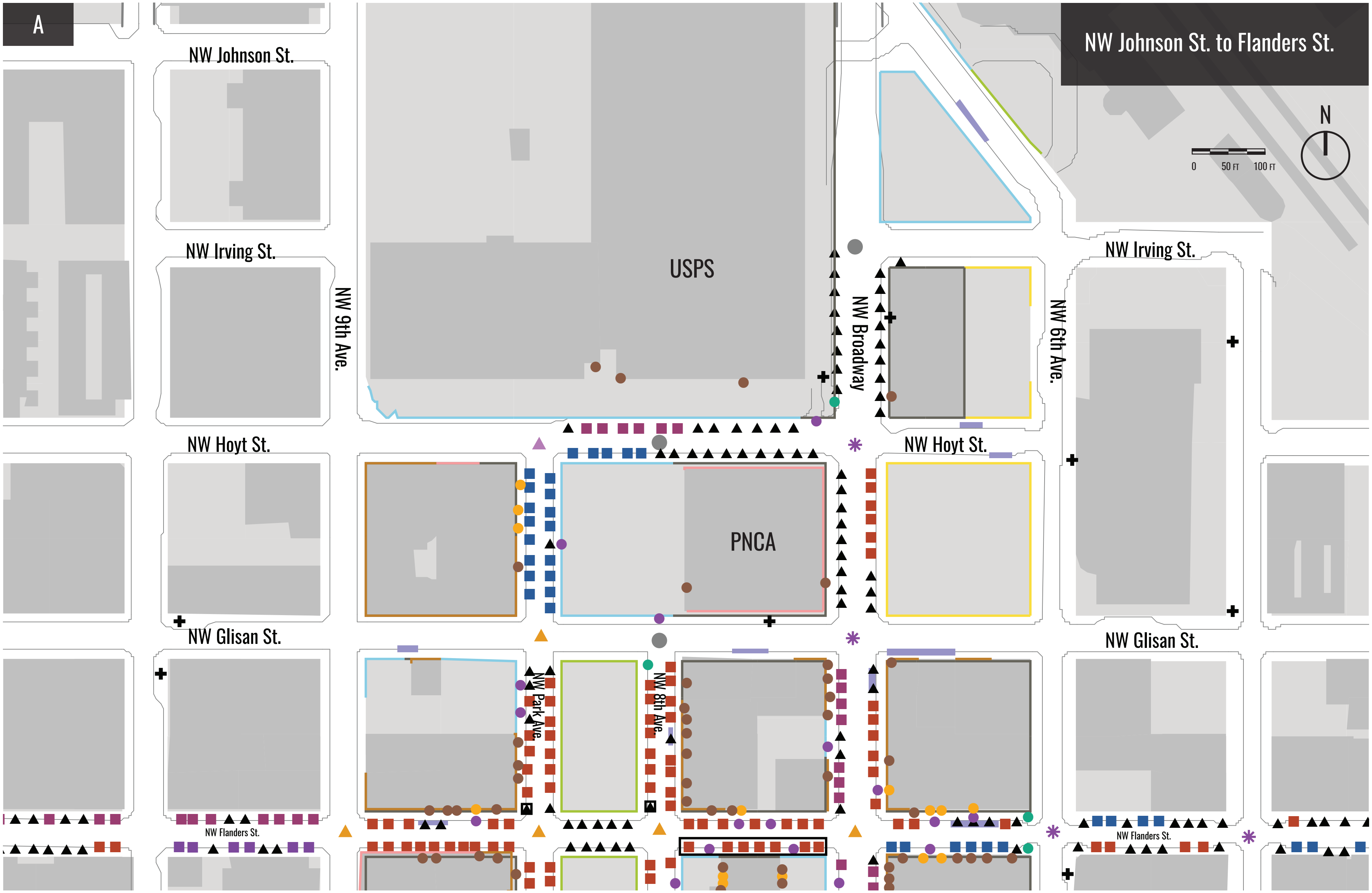
Edges

- Retail Storefront
- Partial Fenestration
- Park, Plaza or Landscaped Edge
- Vacant
- Surface Parking
- No Data



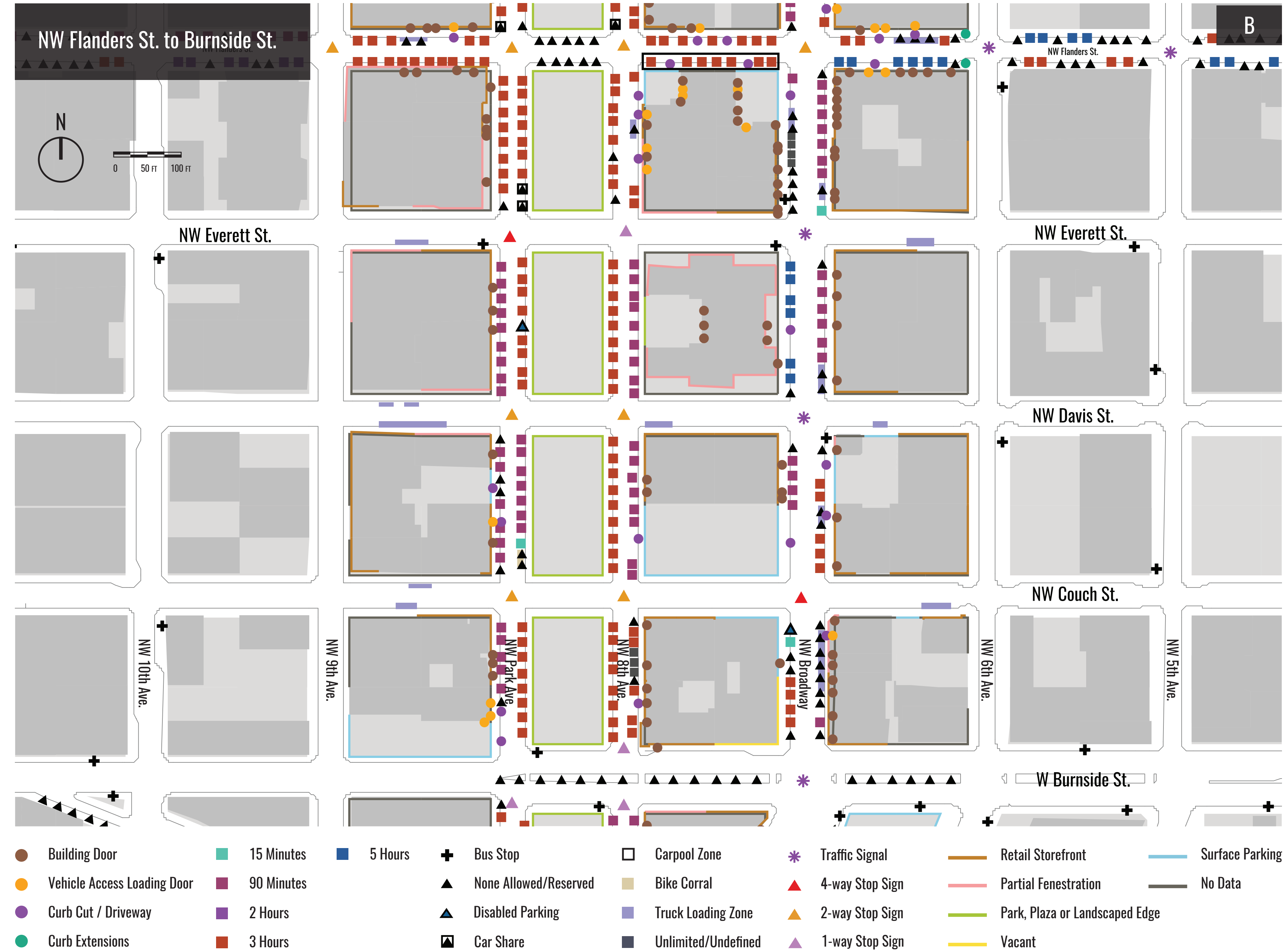
NW Lovejoy St. to W Burnside St.

59529



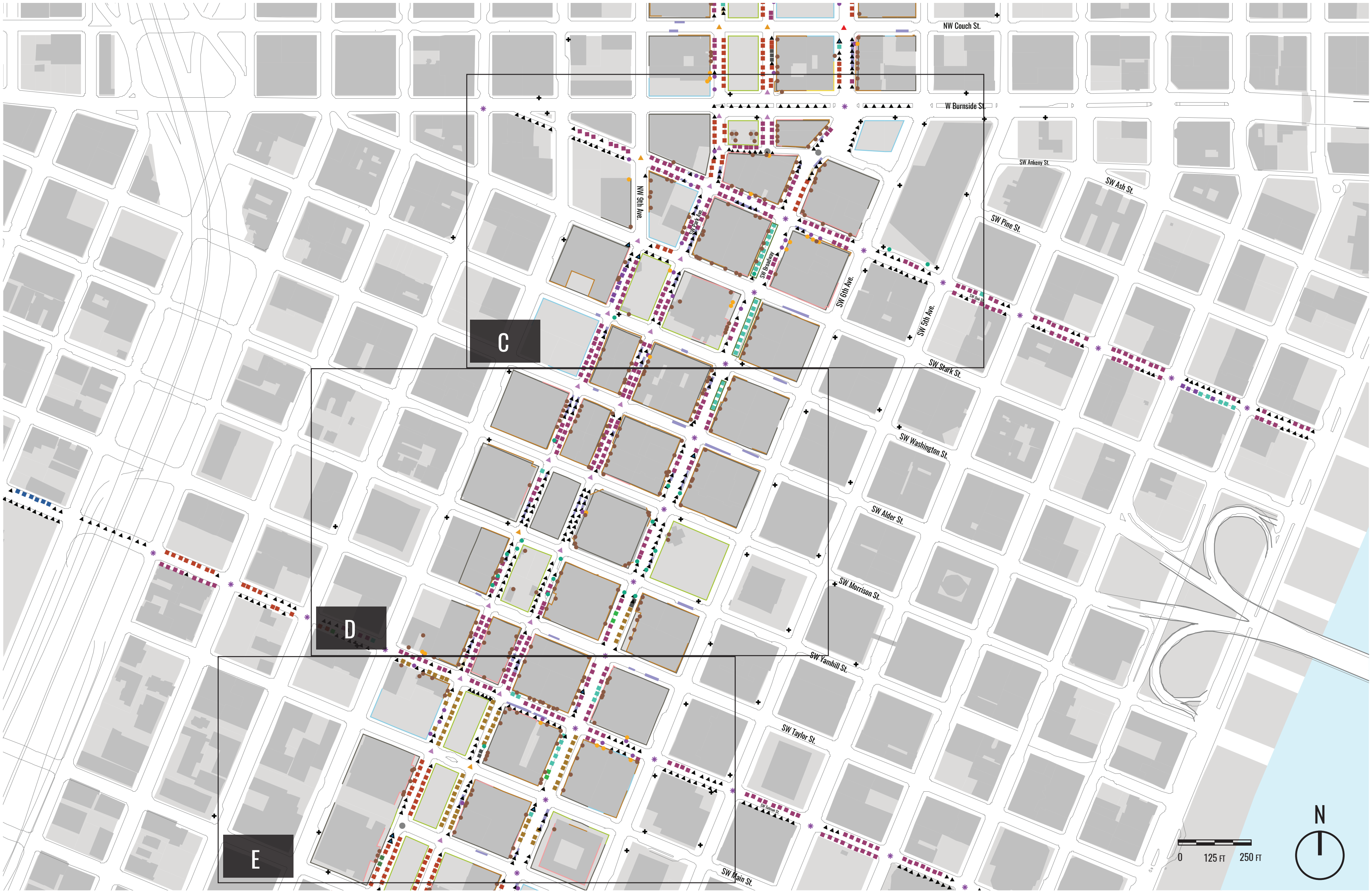
Building Door
Vehicle Access Loading Door
Curb Cut / Driveway
Curb Extensions
90 Minutes
2 Hours
3 Hours
5 Hours
Bus Stop
None Allowed/Reserved
Car Share
Carpool Zone
Truck Loading Zone
Traffic Signal
2-way Stop Sign
1-way Stop Sign
None
Retail Storefront
Partial Fenestration
Park, Plaza or Landscaped Edge
Vacant
Surface Parking
No Data

59530

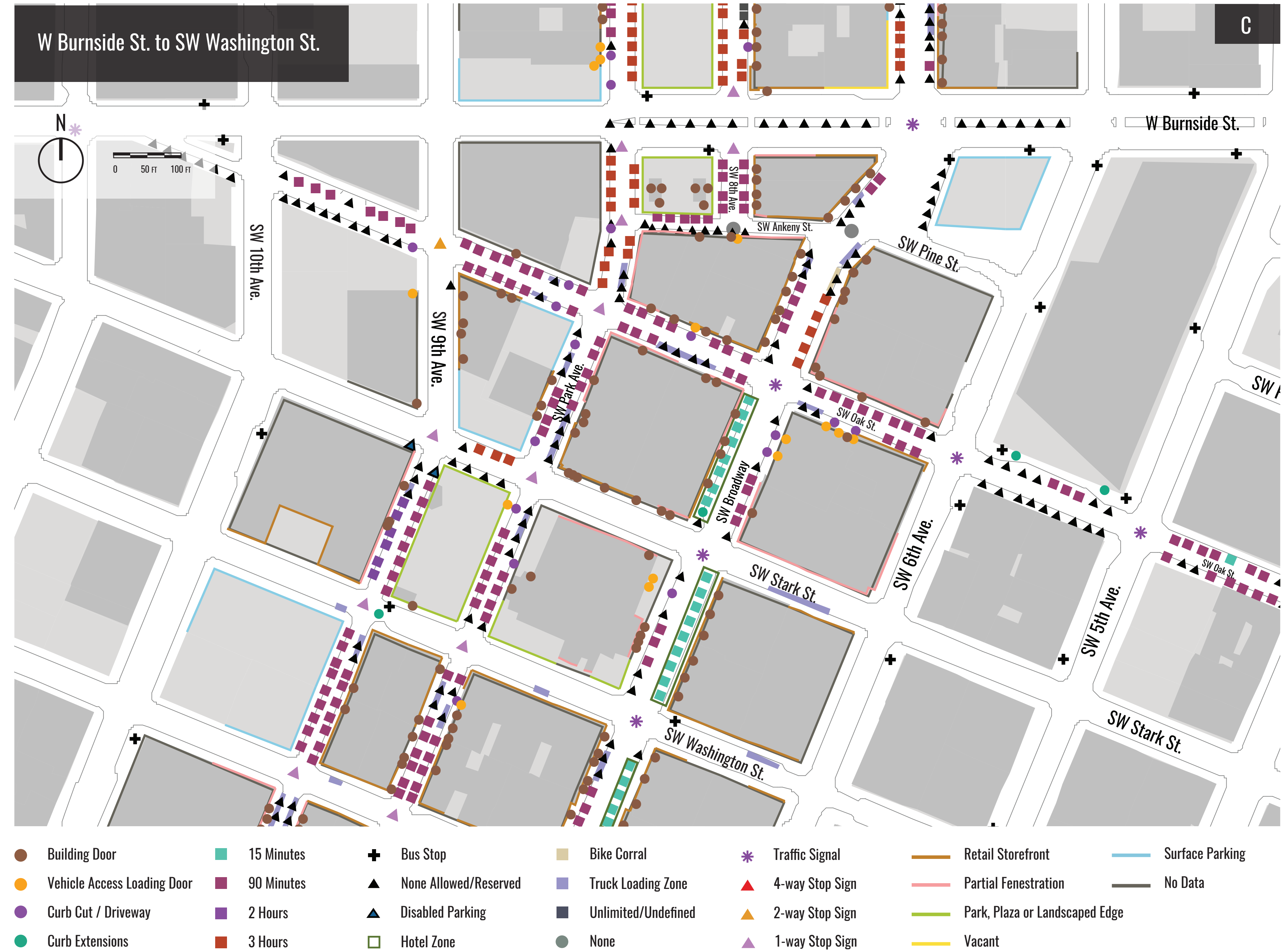


NW Flanders St. to Burnside St.
B
N
0
50 FT
100 FT
NW Flanders St.
NW Everett St.
NW Everett St.
NW Davis St.
NW Couch St.
W Burnside St.
NW 10th Ave.
NW 9th Ave.
NW Park Ave.
NW 8th Ave.
NW Broadway
NW 6th Ave.
NW 5th Ave.
Building Door
Vehicle Access Loading Door
Curb Cut / Driveway
Curb Extensions
15 Minutes
90 Minutes
2 Hours
3 Hours
5 Hours
Bus Stop
None Allowed/Reserved
Disabled Parking
Car Share
Carpool Zone
Bike Corral
Truck Loading Zone
Unlimited/Undefined
Traffic Signal
4-way Stop Sign
2-way Stop Sign
1-way Stop Sign
Retail Storefront
Partial Fenestration
Park, Plaza or Landscaped Edge
Vacant
Surface Parking
No Data

59531



W Burnside to SW Madison St.



W Burnside St. to SW Washington St.
C
N
0
50 FT
100 FT
W Burnside St.
SW 10th Ave.
SW 9th Ave.
SW 8th Ave.
SW Ankeny St.
SW Pine St.
SW Park Ave.
SW Oak St.
SW Broadway
SW 6th Ave.
SW Stark St.
SW Washington St.
SW 5th Ave.
SW Oak St.
SW Stark St.
Building Door
Vehicle Access Loading Door
Curb Cut / Driveway
Curb Extensions
15 Minutes
90 Minutes
2 Hours
3 Hours
Bus Stop
None Allowed/Reserved
Disabled Parking
Hotel Zone
Bike Corral
Truck Loading Zone
Unlimited/Undefined
None
Traffic Signal
4-way Stop Sign
2-way Stop Sign
1-way Stop Sign
Retail Storefront
Partial Fenestration
Park, Plaza or Landscaped Edge
Vacant
Surface Parking
No Data

59533

Building Door
Vehicle Access Loading Door
Curb Cut / Driveway
Curb Extensions
5 Minutes
15 Minutes
1 Hour
90 Minutes
Bus Stop
None Allowed/Reserved
Disabled Parking
Hotel Zone
Bike Corral
Truck Loading Zone
Unlimited/Undefined
Traffic Signal
2-way Stop Sign
1-way Stop Sign
Retail Storefront
Partial Fenestration
Park, Plaza or Landscaped Edge
Surface Parking
No Data

59534

- Building Door
- Vehicle Access Loading Door
- Curb Cut / Driveway
- Curb Extensions
- 5 Minutes
- 10 Minutes
- 15 Minutes
- 1 Hour
- 90 Minutes
- 3 Hours
- Bus Stop
- None Allowed/Reserved
- Disabled Parking
- Bike Corral
- Truck Loading Zone
- Unlimited/Undefined
- Traffic Signal
- 2-way Stop Sign
- 1-way Stop Sign
- None
- Retail Storefront
- Partial Fenestration
- Park, Plaza or Landscaped Edge
- Surface Parking
- No Data

59535

SW Madison St. to College St.

SW Madison St. to Market St.
F
N
0
50 FT
100 FT
Art Museum
SW Madison St.
SW Jefferson St.
SW Columbia St.
SW Clay St.
SW Market St.
SW 11th Ave.
SW 10th Ave.
SW 9th Ave.
SW Park Ave.
SW Broadway
SW 6th Ave.
SW Columb
SW Clay St.
Building Door
Vehicle Access Loading Door
Curb Cut / Driveway
5 Minutes
10 Minutes
15 Minutes
1 Hour
3 Hours
Bus Stop
None Allowed/Reserved
Disabled Parking
Truck Loading Zone
Traffic Signal
1-way Stop Sign
None
Retail Storefront
Partial Fenestration
Park, Plaza or Landscaped Edge
Vacant
Surface Parking
No Data

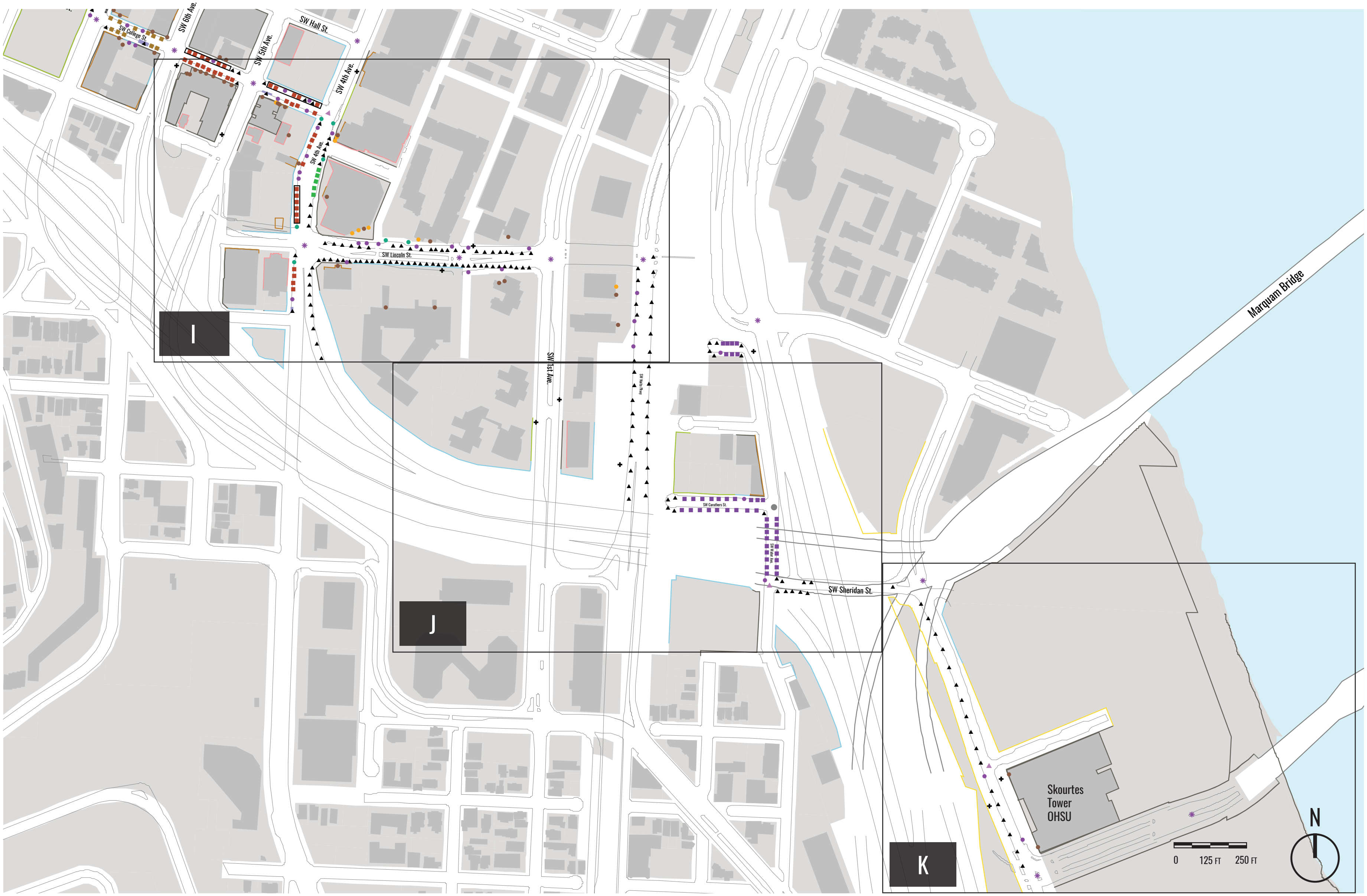
59537

Building Door
Vehicle Access Loading Door
Curb Cut / Driveway
Curb Extensions
5 Minutes
15 Minutes
1 Hour
3 Hours
Bus Stop
None Allowed/Reserved
Disabled Parking
Truck Loading Zone
Unlimited/Undefined
Traffic Signal
1-way Stop Sign
None
Retail Storefront
Partial Fenestration
Park, Plaza or Landscaped Edge
Vacant
Surface Parking
No Data

59538

Building Door	5 Minutes	Bus Stop	Traffic Signal	Retail Storefront	No Data
Vehicle Access Loading Door	1 Hour	None Allowed/Reserved	1-way Stop Sign	Partial Fenestration	
Curb Cut / Driveway	3 Hours	Carpool Zone	None	Park, Plaza or Landscaped Edge	
Curb Extensions	Unlimited/Undefined	Truck Loading Zone		Surface Parking	

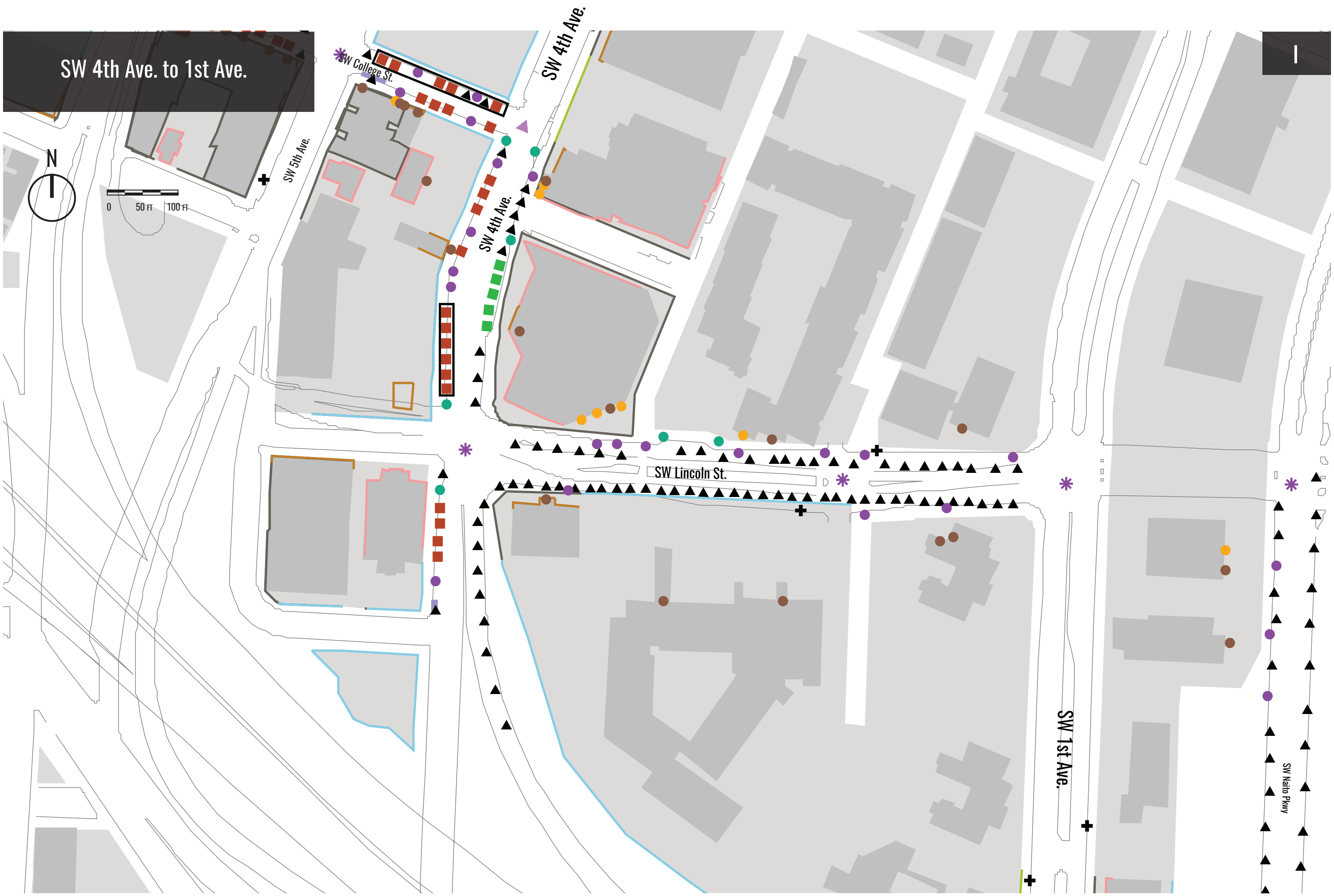
59539



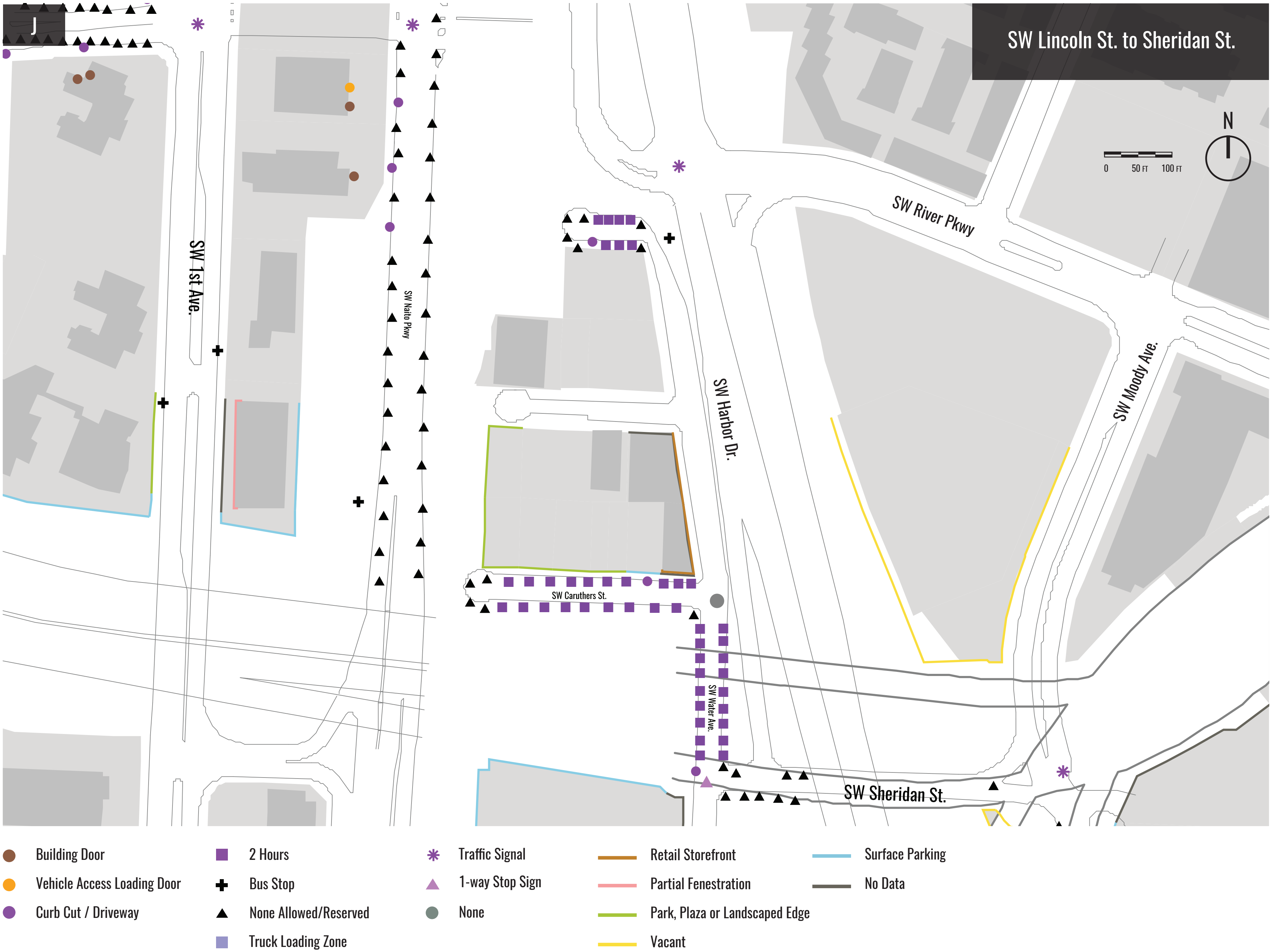
SW College St. to Tilikum Crossing

59540

SW 4th Ave. to 1st Ave.



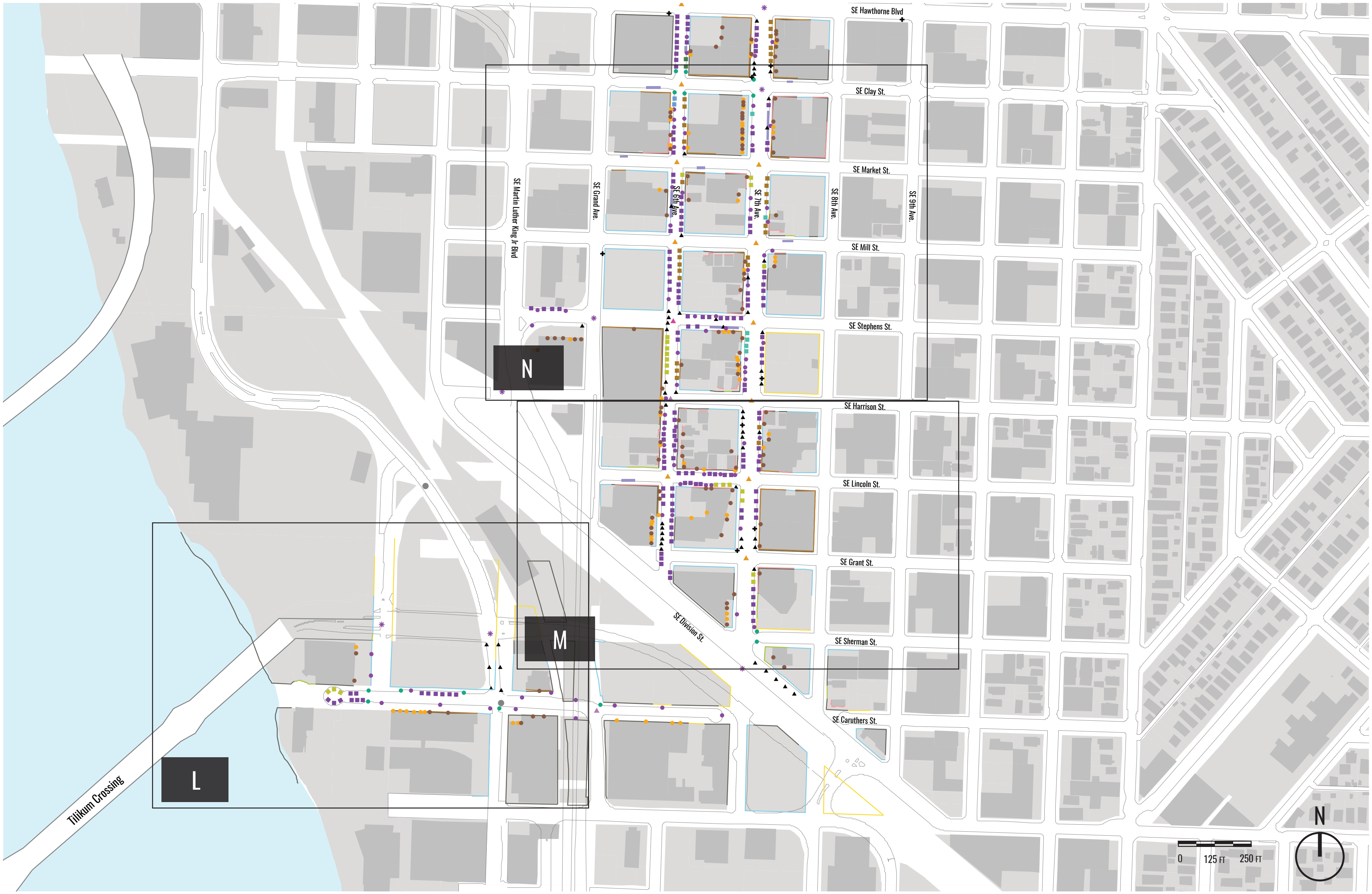
- Building Door
- Vehicle Access Loading Door
- Curb Cut / Driveway
- Curb Extensions
- 5 Minutes
- 3 Hours
- Bus Stop
- None Allowed/Reserved
- Carpool Zone
- Truck Loading Zone
- Traffic Signal
- 1-way Stop Sign
- Retail Storefront
- Partial Fenestration
- Park, Plaza or Landscaped Edge
- Surface Parking
- No Data


J
SW Lincoln St. to Sheridan St.
N
0
50 FT
100 FT
SW 1st Ave.
SW Naito Pkwy
SW River Pkwy
SW Harbor Dr.
SW Moody Ave.
SW Caruthers St.
SW Water Ave.
SW Sheridan St.
Building Door
Vehicle Access Loading Door
Curb Cut / Driveway
2 Hours
Bus Stop
None Allowed/Reserved
Truck Loading Zone
Traffic Signal
1-way Stop Sign
None
Retail Storefront
Partial Fenestration
Park, Plaza or Landscaped Edge
Vacant
Surface Parking
No Data

59542

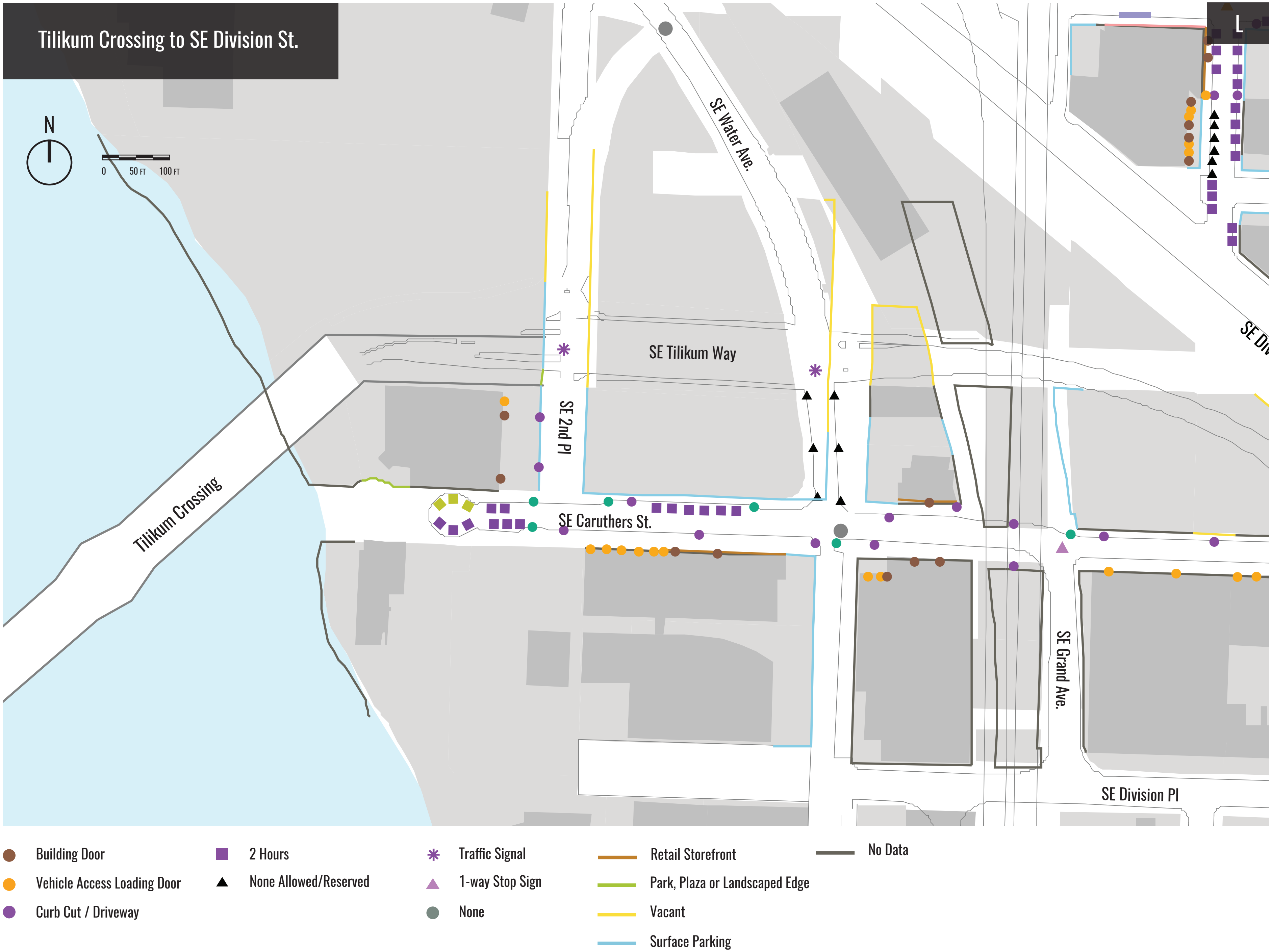

SW Sheridan St. to Tilikum Crossing
K
SW Sheridan St.
N
0
50 FT
100 FT
SW Moody Ave.
Skourtes Tower
OHSU
Tilikum Crossing
Building Door
Curb Cut / Driveway
Bus Stop
None Allowed/Reserved
Traffic Signal
1-way Stop Sign
Vacant
Surface Parking
No Data

59543

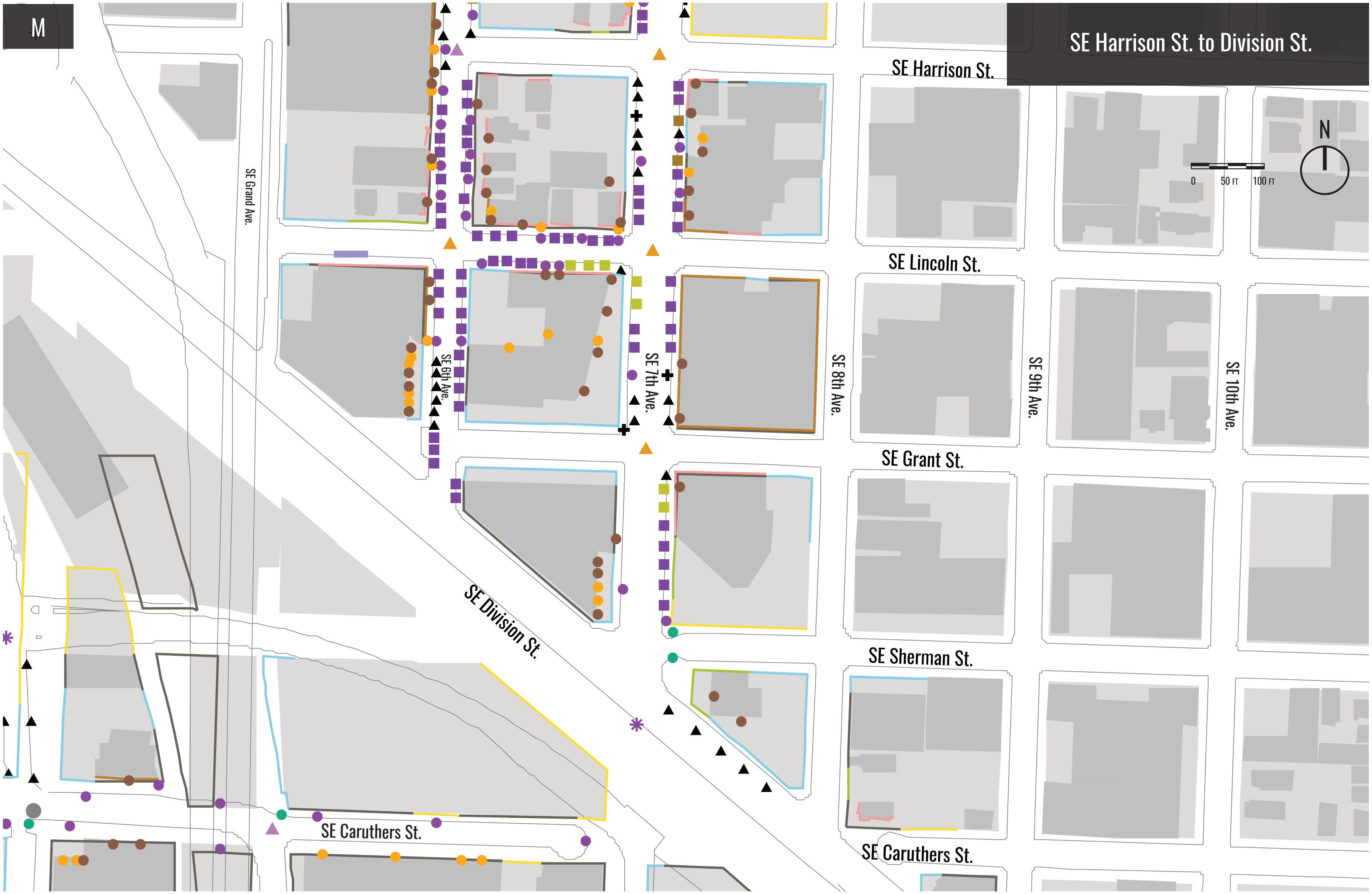


SE Clay St. to Division St.

59544


Tilikum Crossing to SE Division St.
N
0
50 FT
100 FT
SE Water Ave.
SE Tilikum Way
SE 2nd Pl
SE Caruthers St.
Tilikum Crossing
SE Grand Ave.
SE Division Pl
SE Di
L
Building Door
Vehicle Access Loading Door
Curb Cut / Driveway
2 Hours
None Allowed/Reserved
Traffic Signal
1-way Stop Sign
None
Retail Storefront
Park, Plaza or Landscaped Edge
Vacant
Surface Parking
No Data

59545



- Building Door
- Vehicle Access Loading Door
- Curb Cut / Driveway
- Curb Extensions
- 30 Minutes
- 1 Hour
- 2 Hours
- Bus Stop
- None Allowed/Reserved
- Truck Loading Zone
- Traffic Signal
- 2-way Stop Sign
- 1-way Stop Sign
- None
- Retail Storefront
- Partial Fenestration
- Park, Plaza or Landscaped Edge
- Vacant
- Surface Parking
- No Data


SE Clay St. to Harrison St.
N
0
50 FT
100 FT
SE Clay St.
SE Market St.
SE Mill St.
SE Stephens St.
SE Harrison St.
SE Martin Luther King Jr Blvd
SE Grand Ave.
SE 6th Ave.
SE 7th Ave.
SE 8th Ave.
SE 9th Ave.
Building Door
Vehicle Access Loading Door
Curb Cut / Driveway
Curb Extensions
10 Minutes
15 Minutes
30 Minutes
1 Hour
2 Hours
4 Hours
Bus Stop
None Allowed/Reserved
Truck Loading Zone
Traffic Signal
3-way Stop Sign
2-way Stop Sign
1-way Stop Sign
Retail Storefront
Partial Fenestration
Park, Plaza or Landscaped Edge
Vacant
Surface Parking
No Data

SE Stark St. to Clay St.

SE Salmon St. to Clay St.

59549

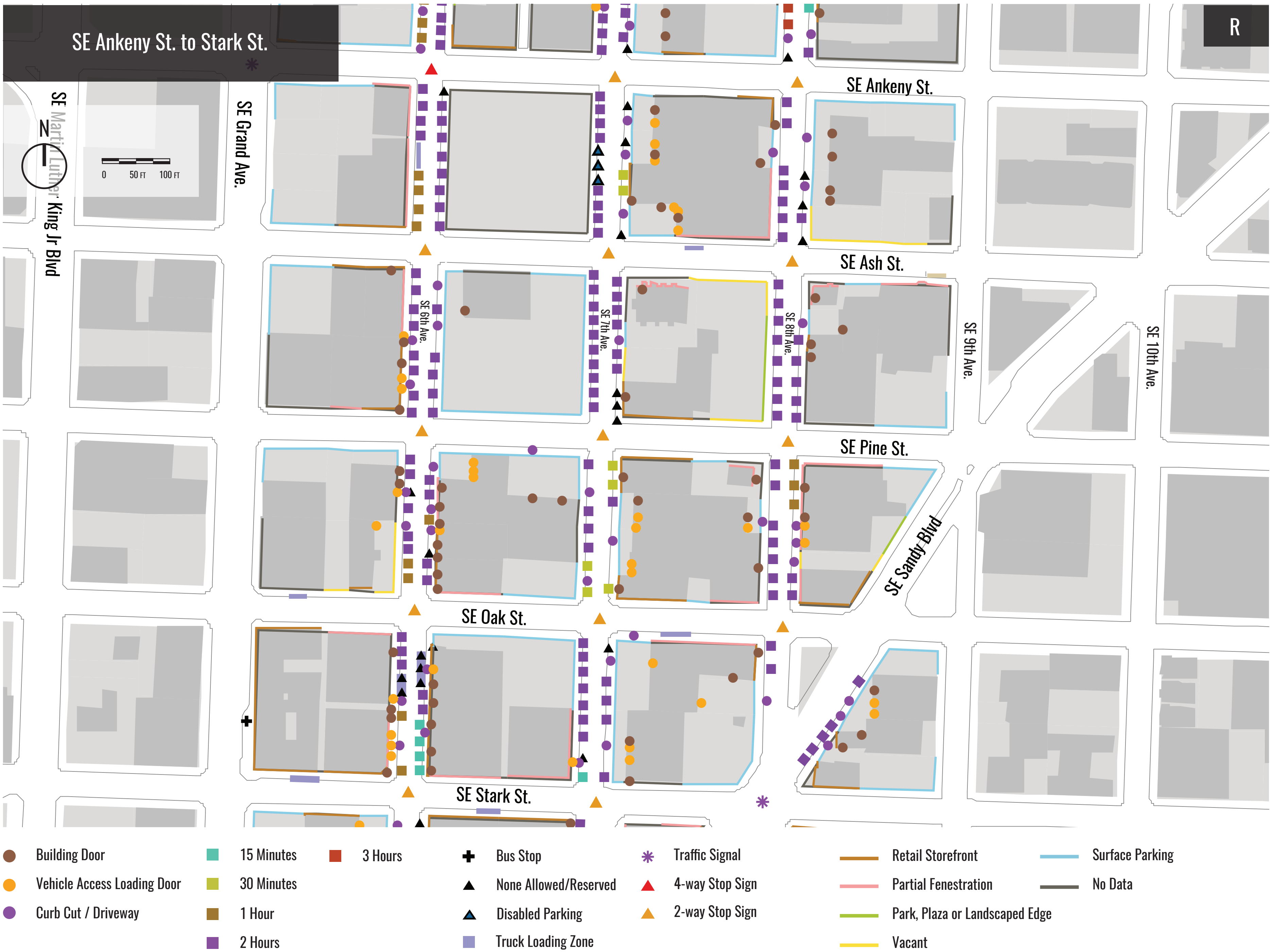

P
SE Morrison St. to Salmon St.
SE Morrison St.
SE Belmont St.
SE Yamhill St.
SE Taylor St.
SE Salmon St.
SE Martin Luther King Jr Blvd
SE Grand Ave.
SE 6th Ave.
SE 7th Ave.
SE 8th Ave.
SE 9th Ave.
N
0
50 FT
100 FT
Building Door
Vehicle Access Loading Door
Curb Cut / Driveway
10 Minutes
30 Minutes
1 Hour
2 Hours
Bus Stop
None Allowed/Reserved
Disabled Parking
Truck Loading Zone
Traffic Signal
2-way Stop Sign
Retail Storefront
Partial Fenestration
Surface Parking
No Data

Building Door	15 Minutes	Bus Stop	Traffic Signal	Retail Storefront
Vehicle Access Loading Door	30 Minutes	None Allowed/Reserved	3-way Stop Sign	Partial Fenestration
Curb Cut / Driveway	1 Hour	Disabled Parking	2-way Stop Sign	Surface Parking
	2 Hours	Truck Loading Zone		No Data

59551

SE Glisan St. to SE Stark St.

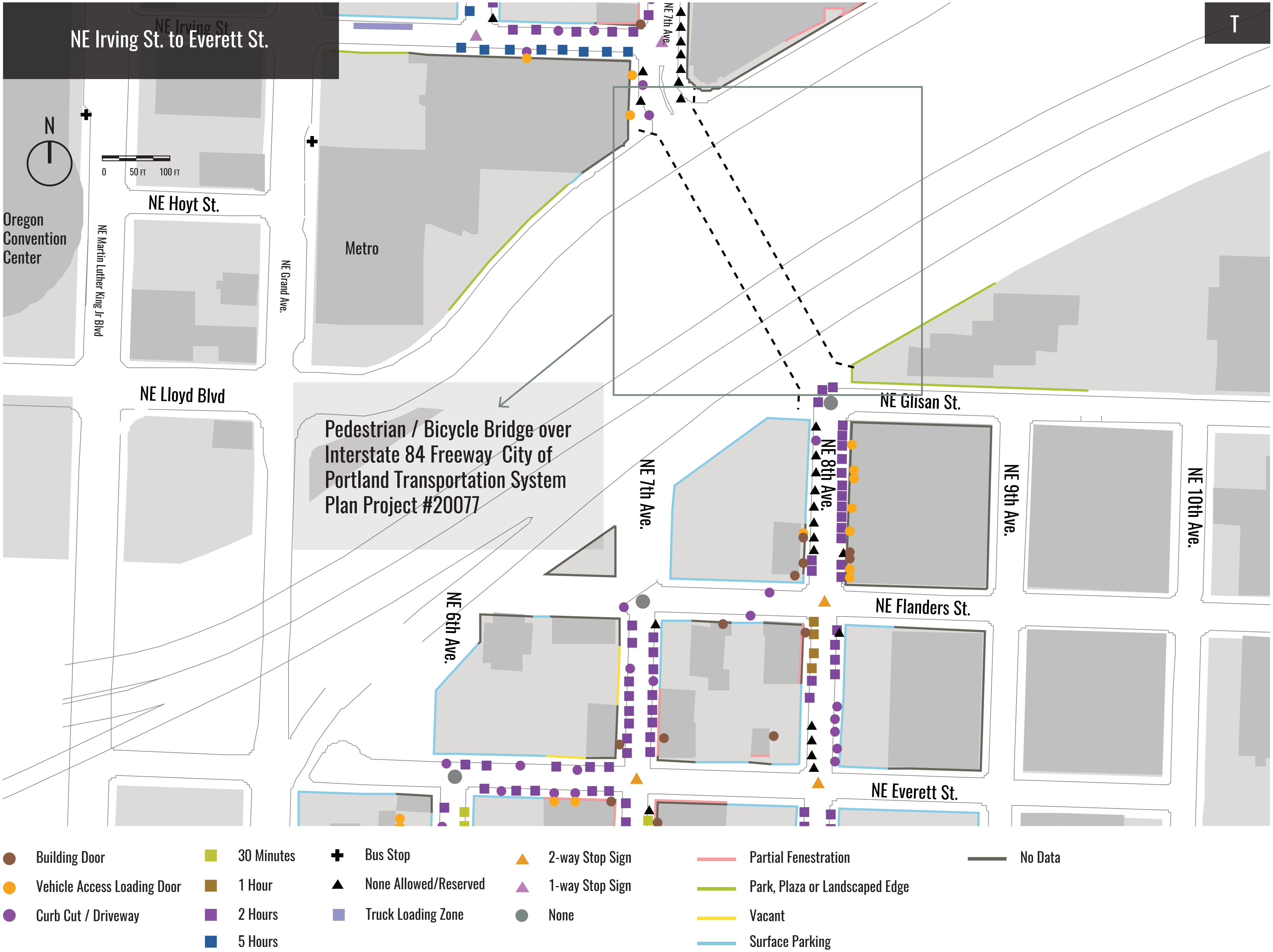
59552

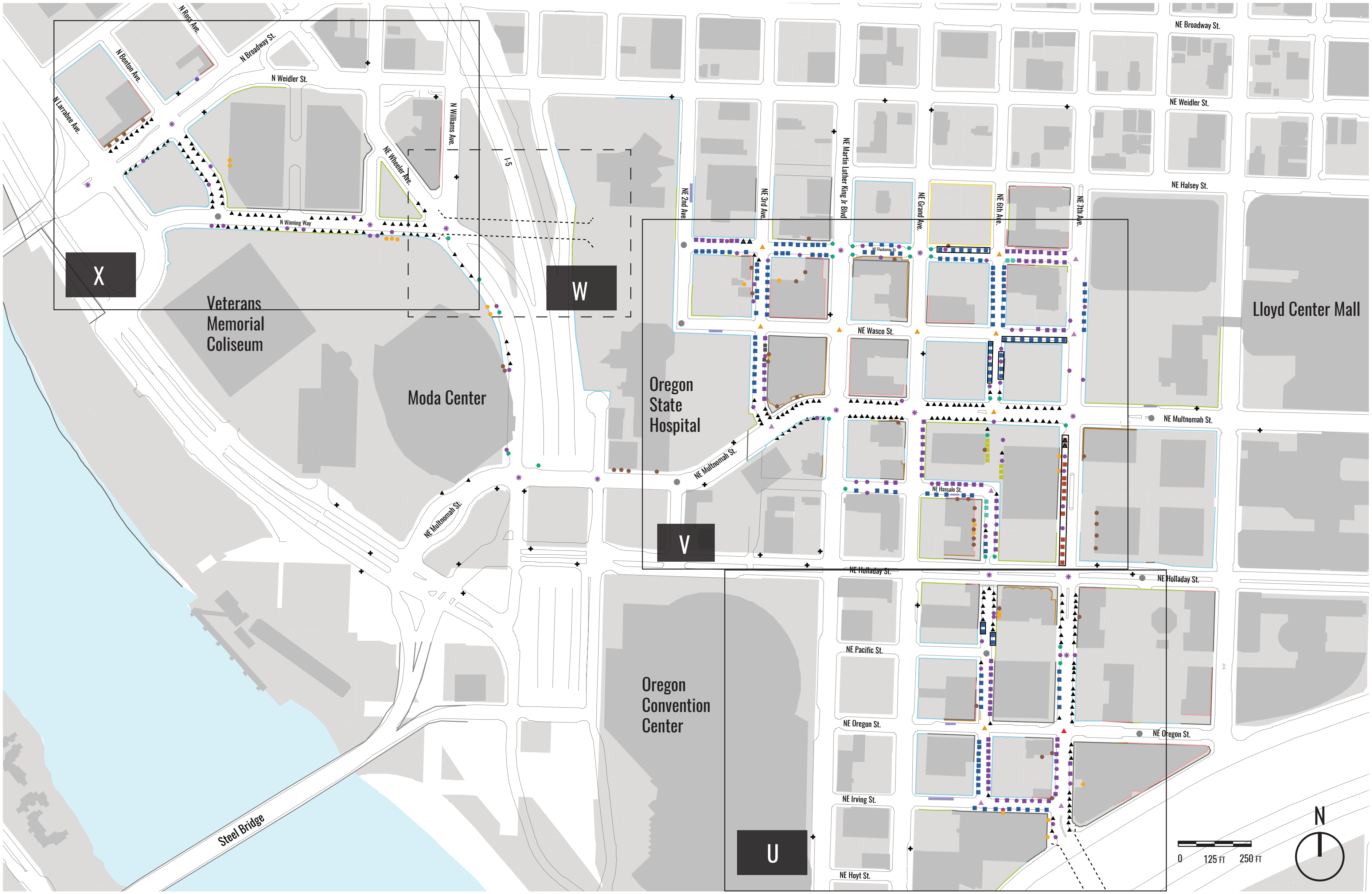

SE Ankeny St. to Stark St.
R
N
0
50 FT
100 FT
SE Martin Luther King Jr Blvd
SE Grand Ave.
SE 6th Ave.
SE 7th Ave.
SE 8th Ave.
SE 9th Ave.
SE 10th Ave.
SE Ankeny St.
SE Ash St.
SE Pine St.
SE Oak St.
SE Stark St.
SE Sandy Blvd
Building Door
Vehicle Access Loading Door
Curb Cut / Driveway
15 Minutes
30 Minutes
1 Hour
2 Hours
3 Hours
Bus Stop
None Allowed/Reserved
Disabled Parking
Truck Loading Zone
Traffic Signal
4-way Stop Sign
2-way Stop Sign
Retail Storefront
Partial Fenestration
Park, Plaza or Landscaped Edge
Vacant
Surface Parking
No Data

59553

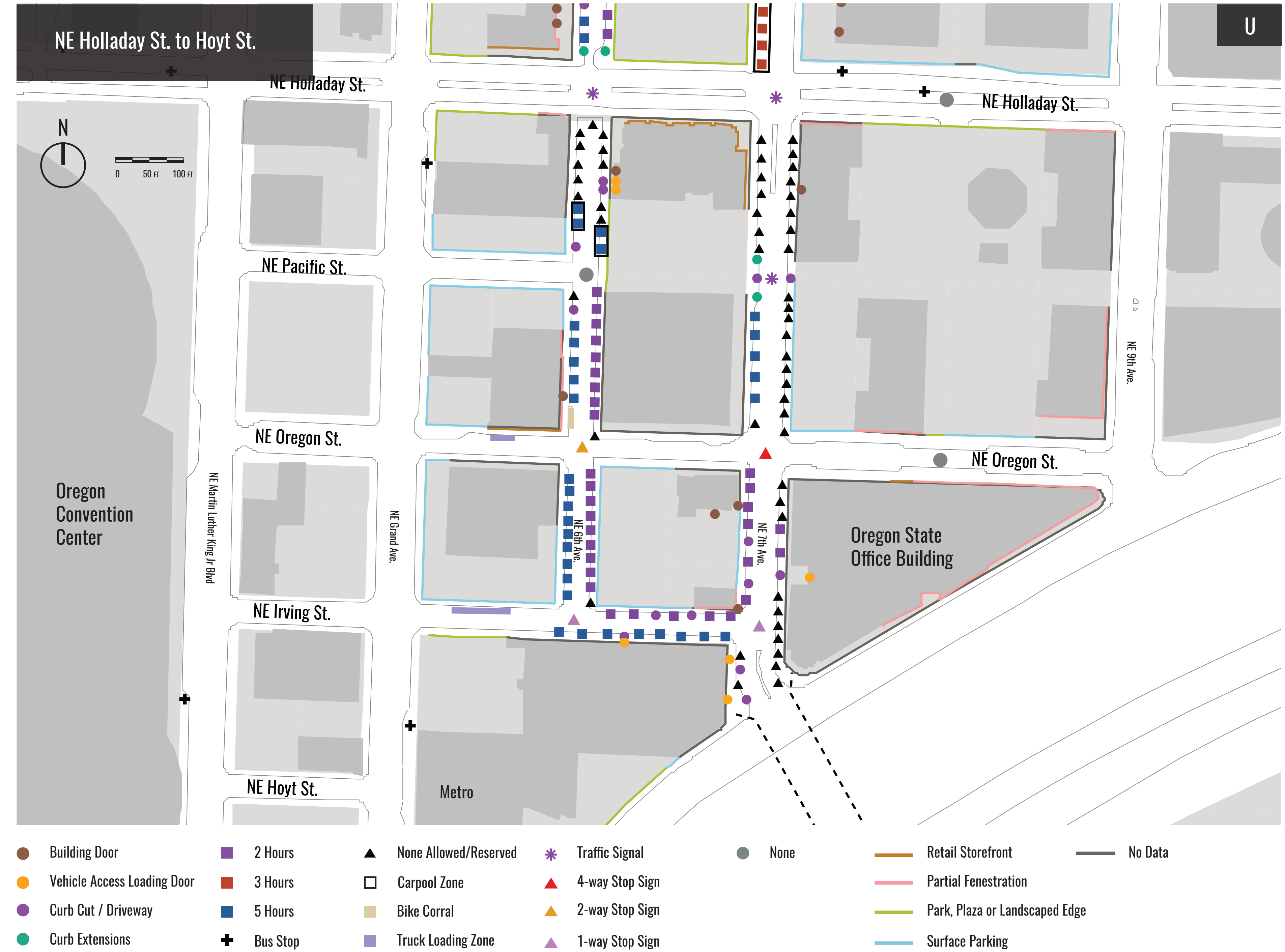
S
NE Everett St. to SE Ankeny St.
NE Everett St.
NE Davis St.
NE Couch St.
E Burnside St.
SE Ankeny St.
NE Martin Luther King Jr Blvd
NE Grand Ave.
NE 6th Ave.
NE 7th Ave.
NE 8th Ave.
NE 9th Ave.
NE 10th Ave.
N
0
50 FT
100 FT
Building Door
Vehicle Access Loading Door
Curb Cut / Driveway
Curb Extensions
15 Minutes
30 Minutes
1 Hour
2 Hours
3 Hours
Bus Stop
None Allowed/Reserved
Disabled Parking
Bike Corral
Truck Loading Zone
Traffic Signal
4-way Stop Sign
2-way Stop Sign
None
Retail Storefront
Partial Fenestration
Park, Plaza or Landscaped Edge
Vacant
Surface Parking
No Data

NE Irving St. to Everett St.

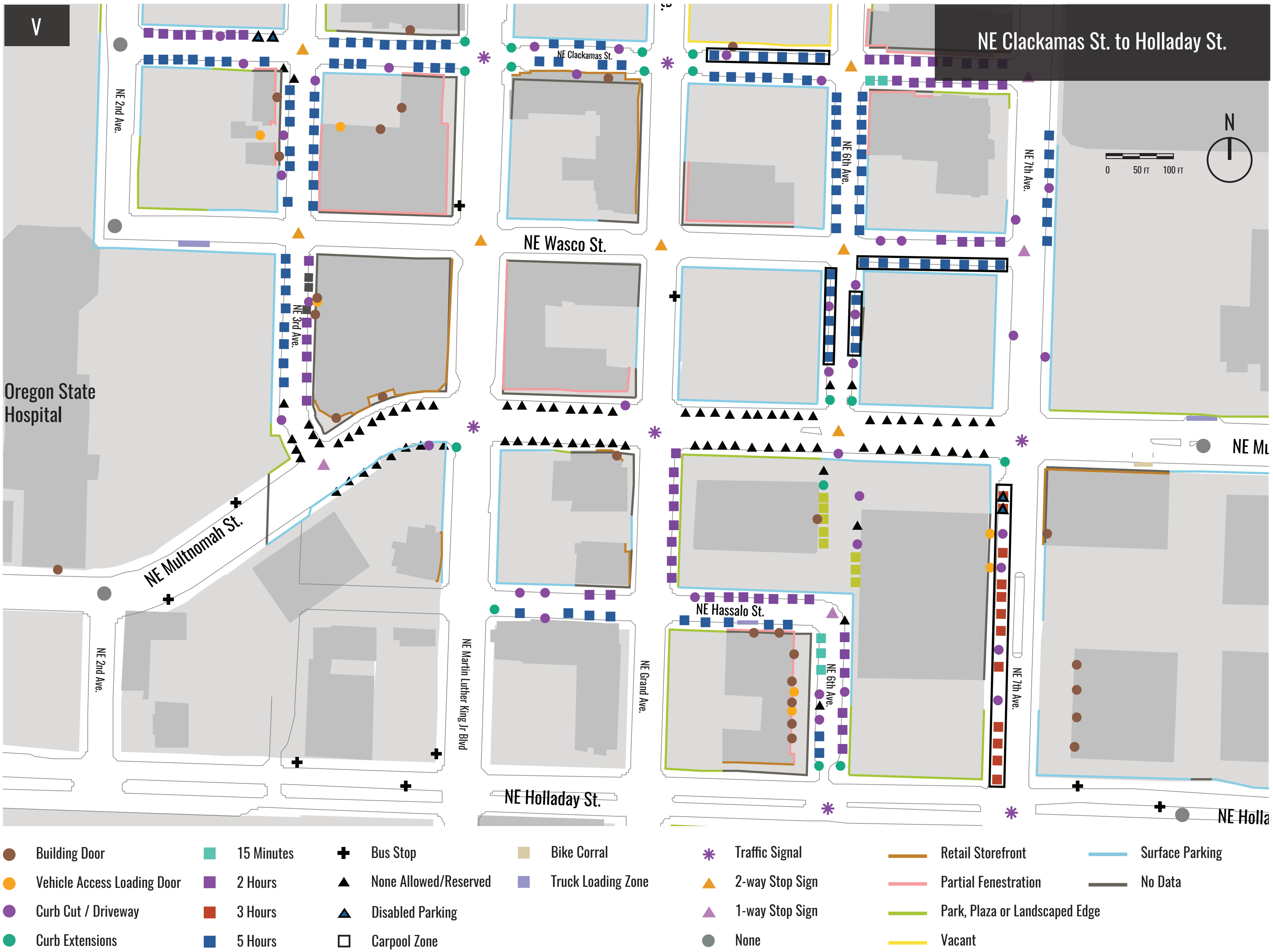




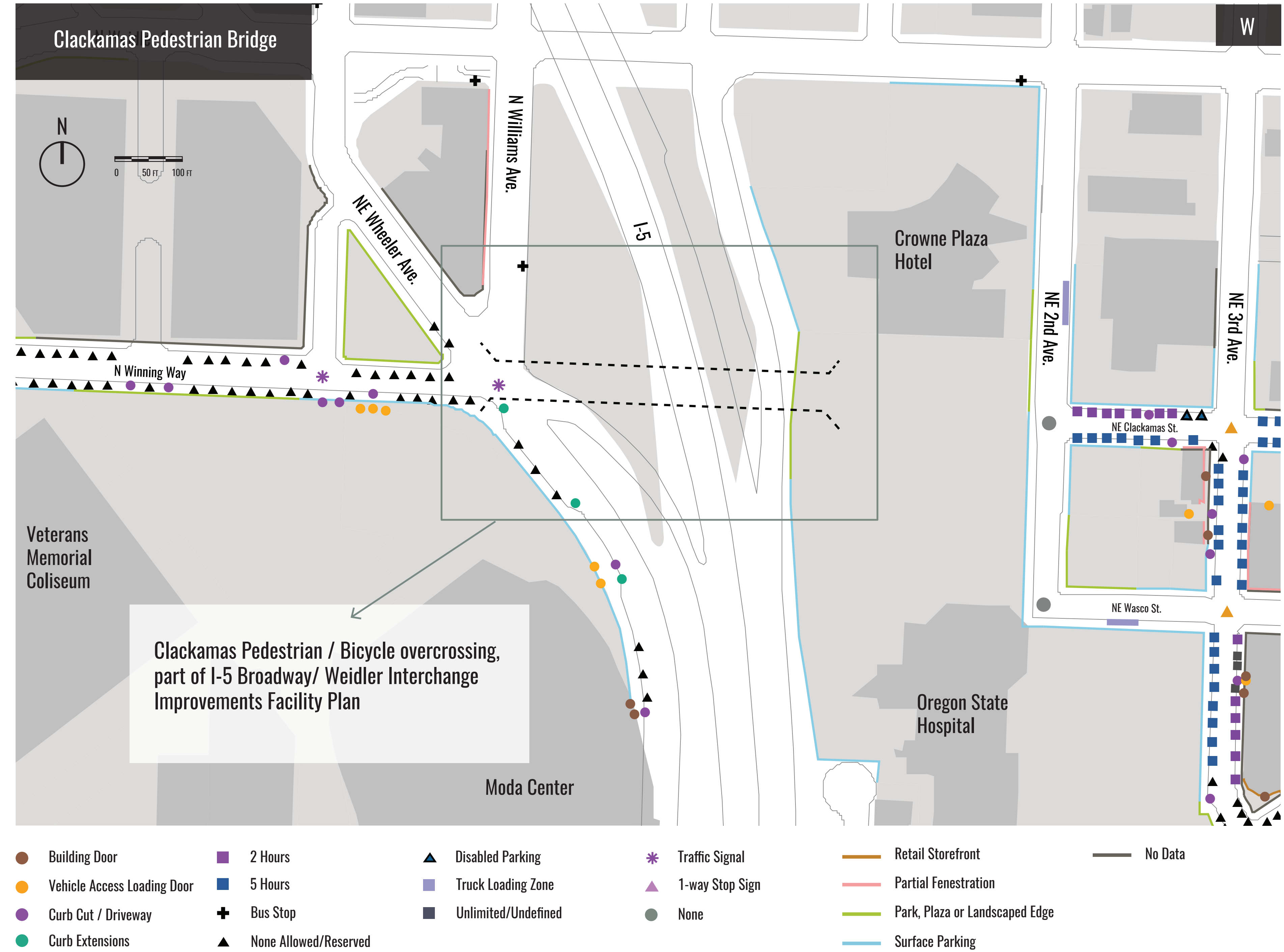
Lloyd District


NE Holladay St. to Hoyt St.
U
N
0
50 FT
100 FT
NE Holladay St.
NE Holladay St.
NE Pacific St.
NE Oregon St.
NE Oregon St.
NE Irving St.
NE Hoyt St.
NE Martin Luther King Jr Blvd
NE Grand Ave.
NE 6th Ave.
NE 7th Ave.
NE 9th Ave.
Oregon Convention Center
Oregon State Office Building
Metro
Building Door
Vehicle Access Loading Door
Curb Cut / Driveway
Curb Extensions
2 Hours
3 Hours
5 Hours
Bus Stop
None Allowed/Reserved
Carpool Zone
Bike Corral
Truck Loading Zone
Traffic Signal
4-way Stop Sign
2-way Stop Sign
1-way Stop Sign
None
Retail Storefront
Partial Fenestration
Park, Plaza or Landscaped Edge
Surface Parking
No Data

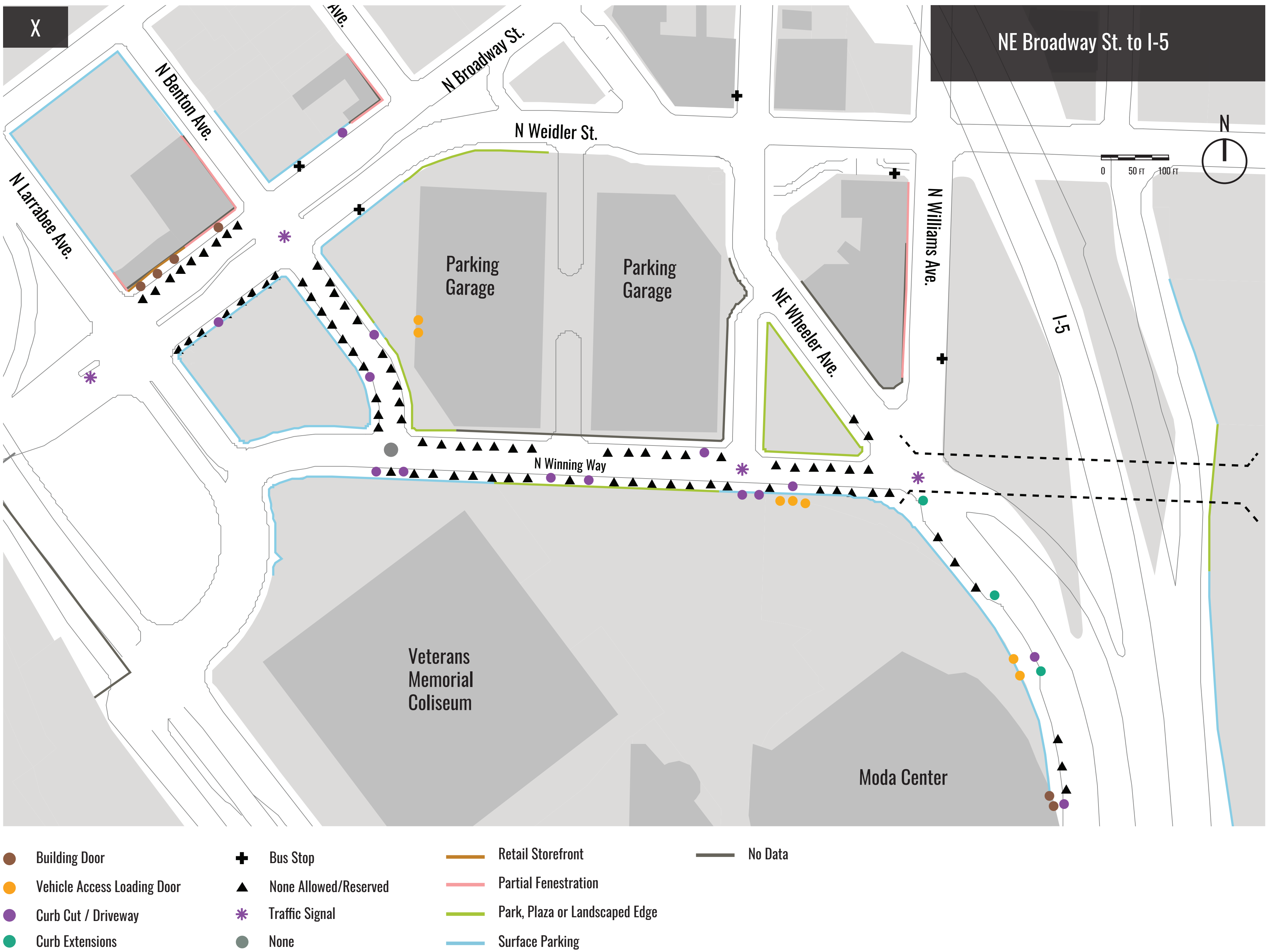
59557


V
NE Clackamas St. to Holladay St.
N
0
50 FT
100 FT
NE Clackamas St.
NE Wasco St.
NE Multnomah St.
NE Hassalo St.
NE Holladay St.
NE 2nd Ave.
NE 3rd Ave.
NE Martin Luther King Jr Blvd
NE Grand Ave.
NE 6th Ave.
NE 7th Ave.
Oregon State Hospital
Building Door
Vehicle Access Loading Door
Curb Cut / Driveway
Curb Extensions
15 Minutes
2 Hours
3 Hours
5 Hours
Bus Stop
None Allowed/Reserved
Disabled Parking
Carpool Zone
Bike Corral
Truck Loading Zone
Traffic Signal
2-way Stop Sign
1-way Stop Sign
None
Retail Storefront
Partial Fenestration
Park, Plaza or Landscaped Edge
Vacant
Surface Parking
No Data

59558


Clackamas Pedestrian Bridge
N
0
50 FT
100 FT
N Williams Ave.
NE Wheeler Ave.
I-5
Crowne Plaza
Hotel
NE 2nd Ave.
NE 3rd Ave.
W
N Winning Way
NE Clackamas St.
NE Wasco St.
Veterans
Memorial
Coliseum
Clackamas Pedestrian / Bicycle overcrossing,
part of I-5 Broadway/ Weidler Interchange
Improvements Facility Plan
Oregon State
Hospital
Moda Center
Building Door
Vehicle Access Loading Door
Curb Cut / Driveway
Curb Extensions
2 Hours
5 Hours
Bus Stop
None Allowed/Reserved
Disabled Parking
Truck Loading Zone
Unlimited/Undefined
Traffic Signal
1-way Stop Sign
None
Retail Storefront
Partial Fenestration
Park, Plaza or Landscaped Edge
Surface Parking
No Data

59559


X
NE Broadway St. to I-5
N Broadway St.
N Weidler St.
N Benton Ave.
N Larrabee Ave.
Ave.
Parking Garage
Parking Garage
NE Wheeler Ave.
N Williams Ave.
I-5
N
0
50 FT
100 FT
N Winning Way
Veterans Memorial Coliseum
Moda Center
Building Door
Vehicle Access Loading Door
Curb Cut / Driveway
Curb Extensions
Bus Stop
None Allowed/Reserved
Traffic Signal
None
Retail Storefront
Partial Fenestration
Park, Plaza or Landscaped Edge
Surface Parking
No Data

59560

THE GREEN LOOP
CONCEPT REFINEMENT SUMMARY

West Quadrant Alignments -- Broadway Bridge to Tillikum Crossing

DRAFT - SEPT. 2015

PROJECT STAFF

Bureau of Planning and Sustainability:
Mark Raggett
Lora Lillard
Courtney Ferris
Marc Asnis
Kathryn Hartinger
Nicholas Starin

Portland Bureau of Transportation:
Greg Raisman
Arnoud Van Sisseren
Mauricio LeClerc

Portland Parks and Recreation:
Allan Schmidt
Ross Swanson

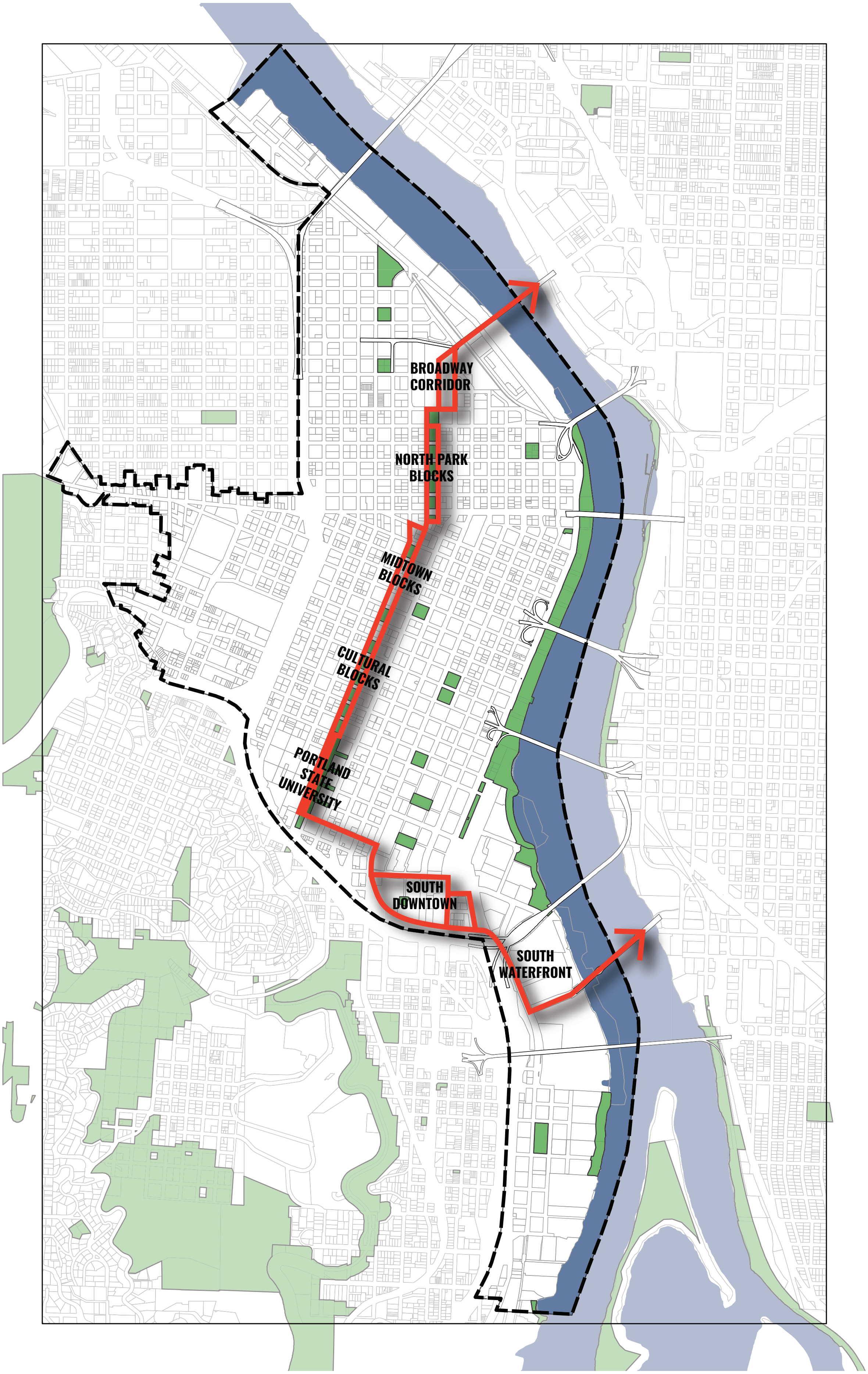
Bureau of Environmental Services:
Ivy Dunlap

CONCEPT REFINEMENT SESSIONS

Meeting #1: February 24th, 2015 -- Broadway Corridor,North Park Blocks

Meeting #2: March 31st, 2015 -- Midtown Blocks

Meeting #3: April 28th, 2015 -- South Park Blocks, Portland State University,
South Downtown, South Waterfront


BROADWAY CORRIDOR
NORTH PARK BLOCKS
MIDTOWN BLOCKS
CULTURAL BLOCKS
PORTLAND STATE UNIVERSITY
SOUTH DOWNTOWN
SOUTH WATERFRONT

59563

TABLE OF CONTENTS

INTRODUCTION x

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NORTH PARK BLOCKS x-x

MIDTOWN BLOCKS x-x

CULTURAL BLOCKS x-x

PORTLAND STATE UNIVERSITY x-x

SOUTH DOWNTOWN x-x

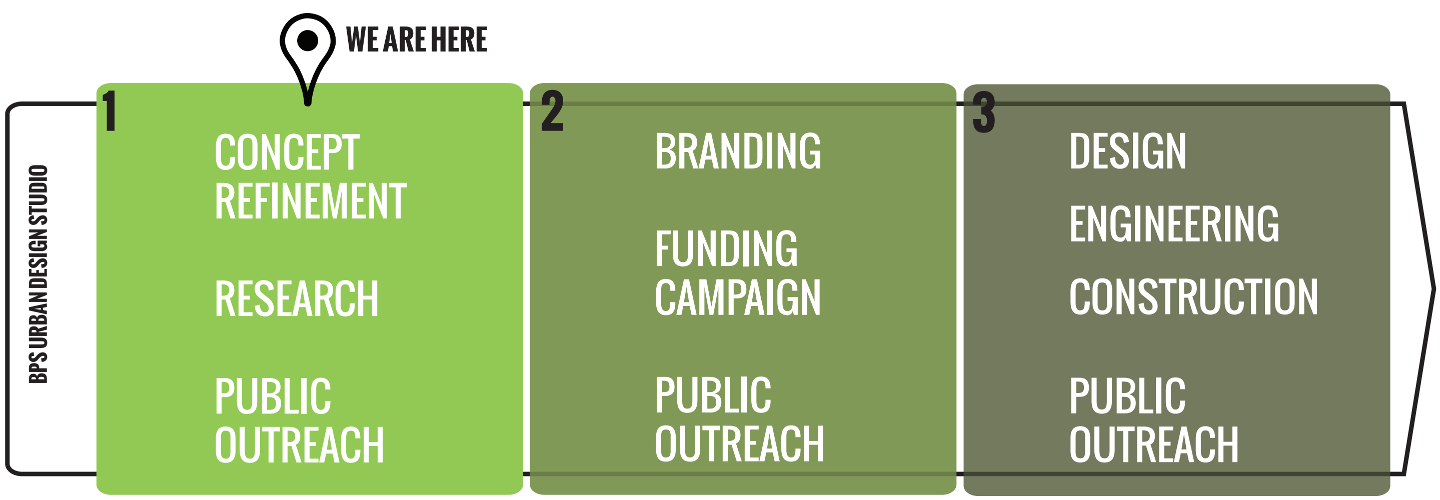
SOUTH WATERFRONT x-x

CONCLUSION x-x

INTRODUCTION

The Green Loop concept, a proposed 6 mile linear park loop, is a long term, multi-partner project for the Central City 2035 planning process. The Green Loop links pedestrians, joggers, and cyclists of all ages and abilities to the regional attractions, cultural institutions, iconic parks and open spaces, employment centers, and shopping districts found within the Central City. The Green Loop will serve as the central hub of a larger city wide network of safe pedestrian paths and bikeways. Portland Bureau of Transportation (PBOT) is leading a separate but complimentary near term effort - the Central City Multimodal Safety and Access Project, a $6 million project to plan and implement bike and pedestrian improvements on the west side of the Central City.

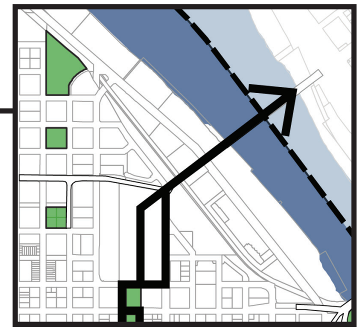
The purpose of this report is to identify the various opportunities and constraints found within each of the West Quadrant districts that the Green Loop passes through. This entails identifying the existing attractions and public open spaces, locating future redevelopment sites, and analyzing the various street alignments and transportation facilities. Similar to the Central City 2035 Quadrants Plans, additional concept refinement reports will be produced for the Southeast and North/Northeast Quadrants segments of the Green Loop. The concept refinement reports are being produced in conjunction with several research initiatives including a NITC research grant for studying the economic development potential for active transportation corridors, cost estimates for how much Green Loop type facilities would cost, as well as how Green Loop type infrastructure can help dismantle racial, social inequities within the built environment. Additionally, BPS and it's partner agencies will continue with public outreach to local communities and stakeholders.



Green Loop Process Timeline

BROADWAY CORRIDOR

EVALUATION SUMMARY



Existing Conditions:

Opportunities:

1. The Broadway Corridor has several notable attractions such as PNCA campus, Union Station, and Greyhound Station.
2. The area is situated in between the well established Pearl District, the burgeoning Skidmore, Old Town/China Town, and the Pearl Waterfront.

Constraints:

1. There is a concentration of urban camping and illegal activity in the area.
2. There are currently several vacant parcels and inactive ground floors.
3. The USPS site, Broadway Bridge, and the Union Station rail lines create major barriers for the movement of people.

Open Space:

Opportunities:

1. PNCA and Portland Parks and Recreation will convert an existing surface parking lot adjacent to the new PNCA building into a new park block.
2. USPS site development scenarios incorporate the Green Loop/linear open space throughout the site.

Redevelopment Sites:

Opportunities:

1. The USPS site is an opportunity for high density employment.
2. The Block U parcel is slated to become the proposed Multnomah County Health Department Headquarters.
3. The Greyhound station could be relocated to the triangular Block Y parcel across from Union Station, which would create a more connected regional transportation hub.
4. Block R is a full block parcel owned by PDC which has 6:1 FAR (Bonus to 9:1) and a maximum height of 250'.

Transportation Options:

Opportunities:

1. Redevelopment of USPS site would create the most direct, safest path from the Broadway Bridge to the North Park Blocks.
2. There are already protect bike lanes on the Broadway Bridge and buffered bike lanes on the on ramps.
3. In close proximity to high capacity transit options including MAX and Streetcar.

Constraints:

1. There is no designated northbound bike route leading to Broadway Bridge.
2. NW Broadway Ave is a high volume traffic street.

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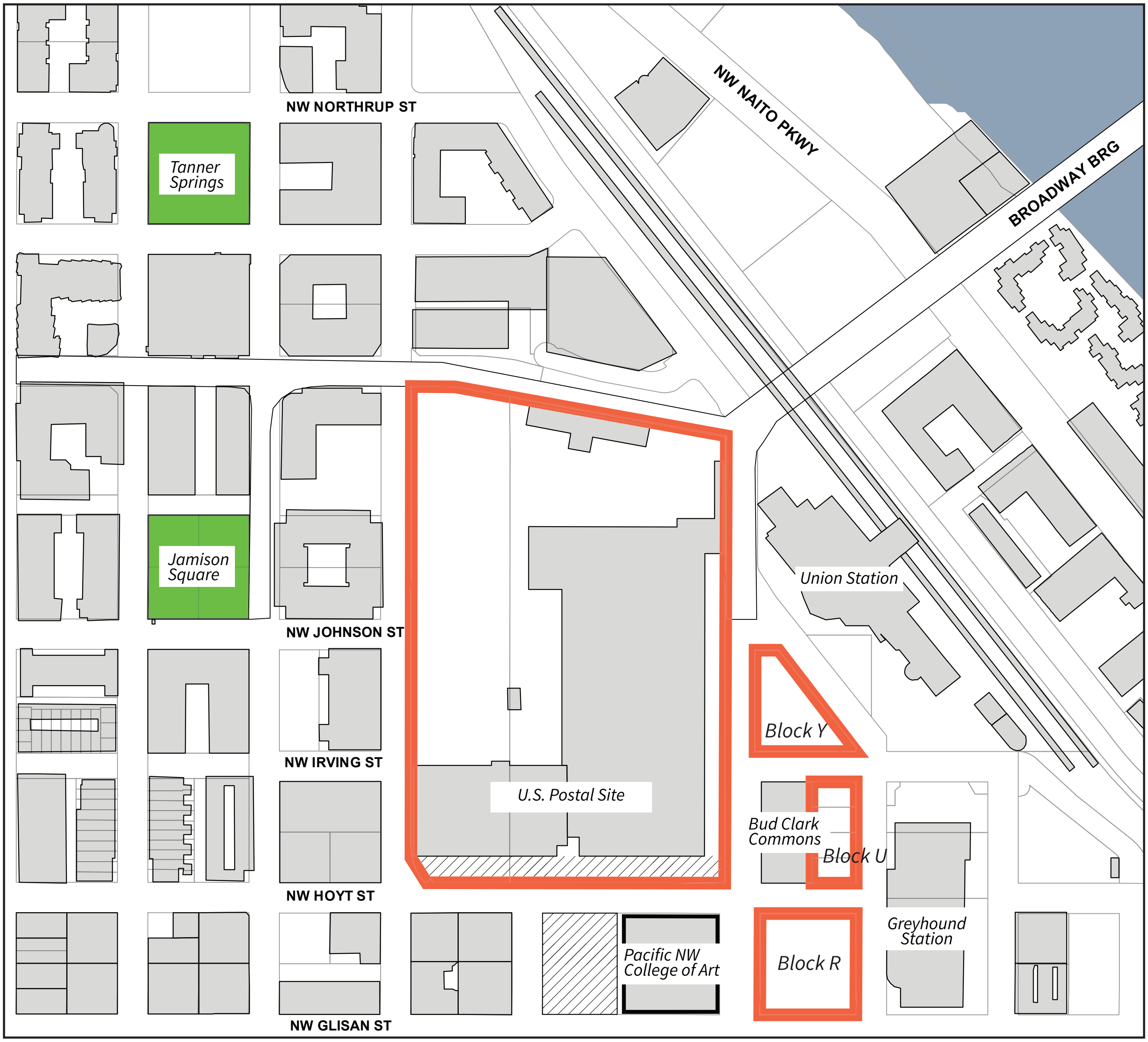
BROADWAY CORRIDOR

EXISTING CONDITIONS



Legend:

Redevelopment Sites

Attractions/Institutions

Potential Open Space Opportunities

Existing Parks

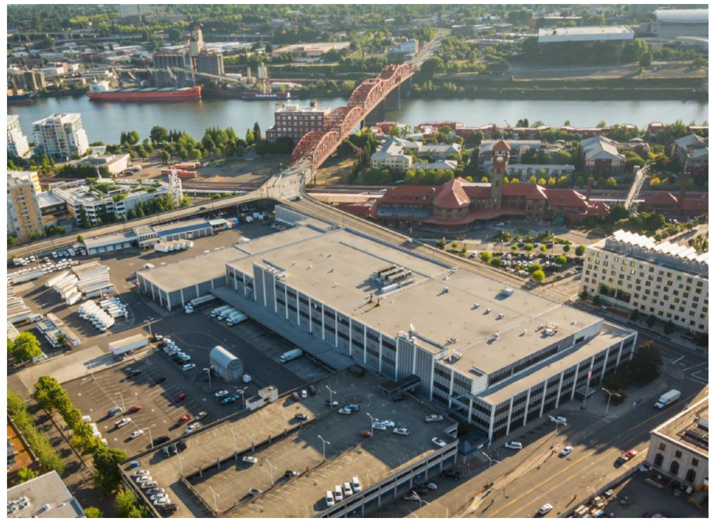


Image courtesy of PDC

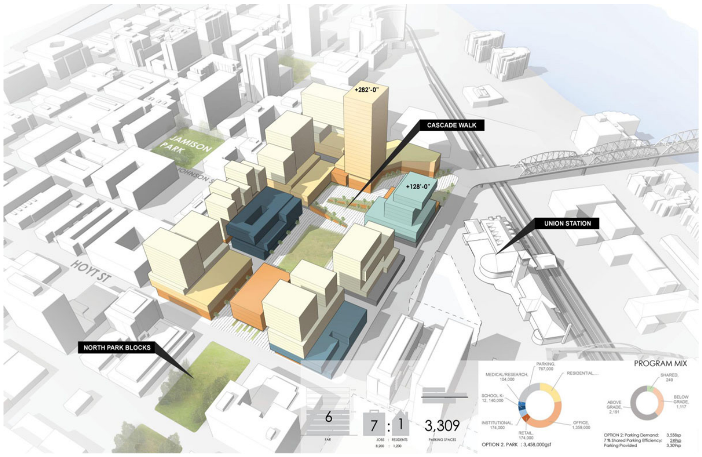
The Broadway Corridor, a 24 acre site on the border between the Pearl District and Skidmore Old Town China Town, is set to become a major redevelopment site for the Central City. The study area consists of several notable attractions including Portland's main U.S. Post Office branch, Union Station, Portland's main Greyhound Station, Pacific Northwest College of Arts, and Bud Clark Commons. The Broadway Corridor has several vacant and underutilized parcels that are ripe for redevelopment, including a half block parcel that is slated to become the new Multnomah County Health Department Headquarters, as well as a full block parcel on NW Broadway and NW Glisan that has the potential to be a sizable development. Portland Development Commission (PDC) in conjunction with ZGF Architects are in the process of developing a feasibility study and framework plan for how this area could be built out over the next few years.

The redevelopment of the USPS site at the Broadway bridgehead could create a signature entry point into the Central City. This segment of the loop provides opportunities to coordinate with adjacent local design firms and cultural institutions, such as PNCA, to create unique context-rich street furnishings and wayfinding. Due to several physical barriers including the heavy railways and the existing USPS site, it is very difficult for people to move through the site. Additional east-west connections throughout the site would be optimal to help people move down to the river and out west toward the Pearl District and the Alphabet District.

BROADWAY CORRIDOR

OPEN SPACE AND REDEVELOPMENT SITES

U.S. POSTAL SERVICE SITE:



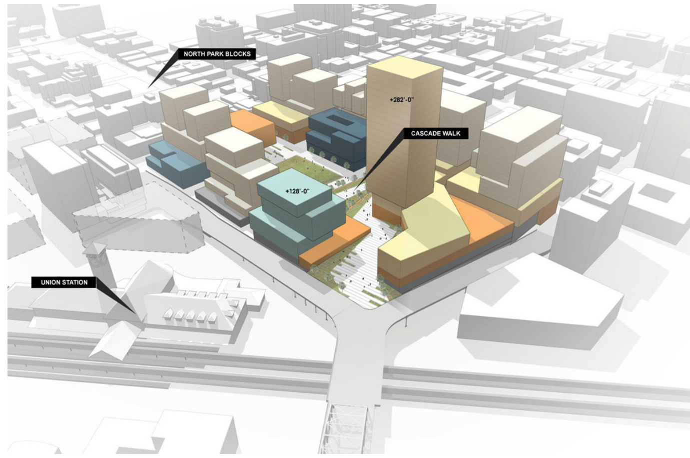


Image courtesy of ZGF

The redevelopment of the USPS Post Office site at the Broadway bridgehead is a key opportunity site for high density employment and could serve as a signature entry point into the Central City. The Green Loop has been established as one of the principles that needs to be considered by the design team when generating different development schemes. This could include extending the North Park Blocks linear open space and create a connection to the Broadway Bridge.

MULTNOMAH COUNTY HEALTH DEPARTMENT HEADQUARTERS:

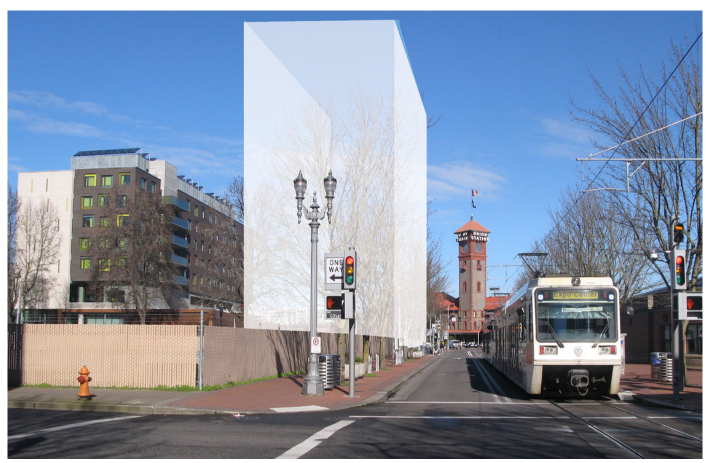


Image courtesy of Multnomah County

The new Multnomah County Health Department headquarters will be placed on the vacant Block U, adjacent to the Bud Clark Commons. The county has recently petitioned to get a height increase from 75’ to 150’. This will bring a sizable amount of new employees into the district who due to the nature of their work could be more open to utilizing active transportation as a means of commuting to work.

59570

PACIFIC NORTHWEST COLLEGE OF ART

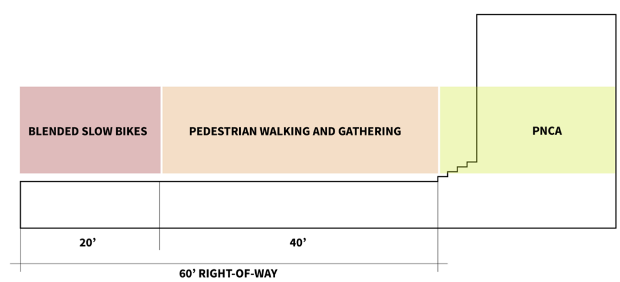
Image courtesy of PNCA

Image courtesy of Allied Works Architecture

PNCA has recently moved into the recently renovated Federal Building on the North Park Blocks as their new academic building. The renovated Federal Building in addition to PNCA's Arthaus Apartments and the Museum of Contemporary Craft has transformed the North Park Blocks into a hub for art and design.

The vacant surface lot adjacent to the new PNCA building will eventually be converted to a new Park Block. In the interim period, the parcel will remain a paid parking lot in order to generate the necessary revenues needed to build the new park. A small public plaza will get built in the interim period to properly showcase the Lee Kelly sculpture, "Memory '99" and provide some outdoor exhibition space for the PNCA student body. The 60' ROW west of the PNCA building will be designated as a circulation zone.

Plan View

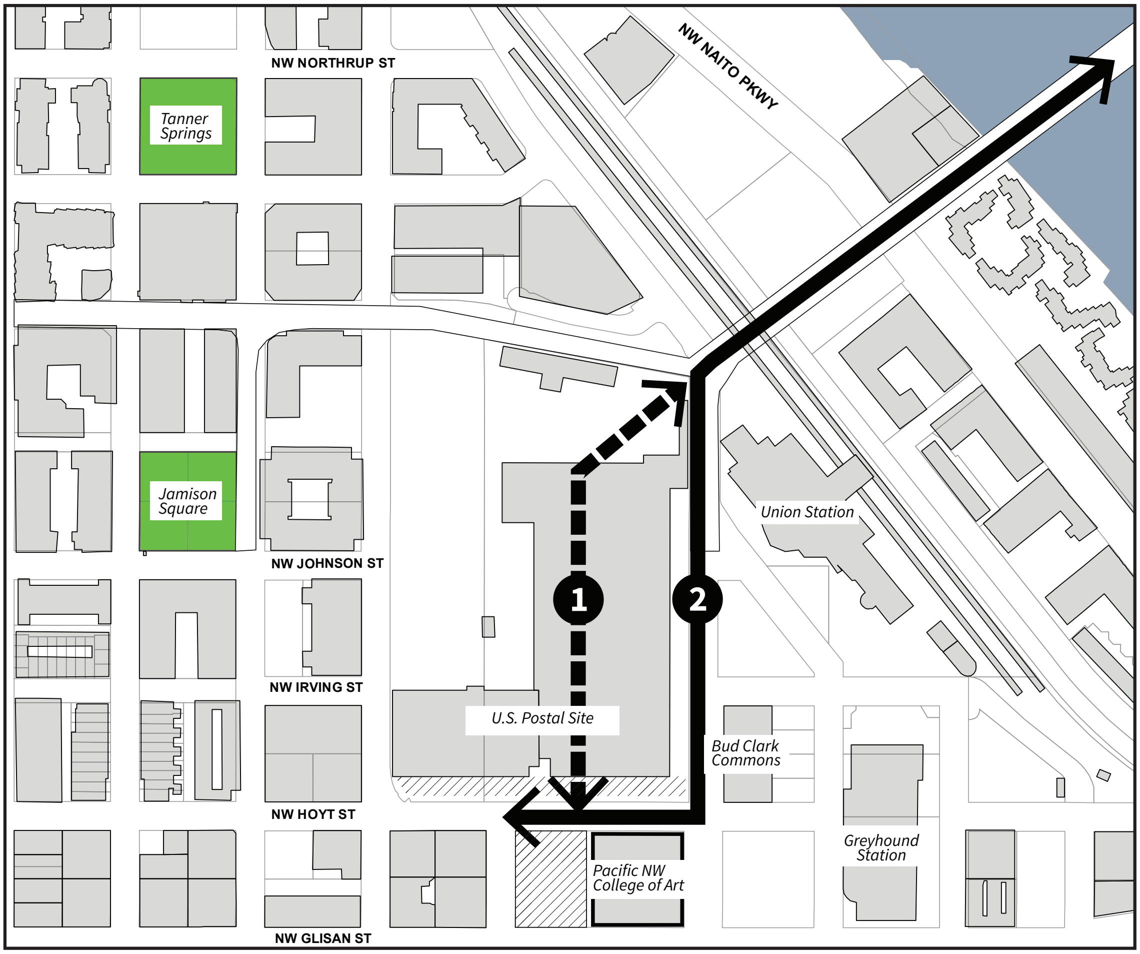


Section View

59571

BROADWAY CORRIDOR

TRANSPORTATION OPTIONS



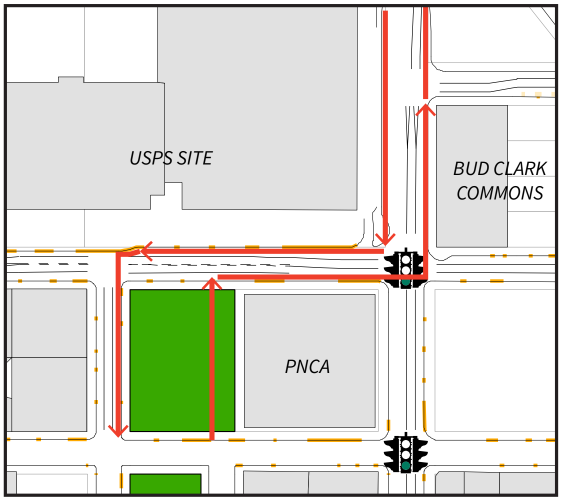
Broadway Bridge to North Park Blocks

The main objective of the Green Loop within the Broadway Corridor segment is to connect pedestrians, joggers, and cyclists from the Broadway Bridge down to the North Park Blocks. The first potential alignment would be to place the Green Loop through the center of the future redeveloped USPS site. The second potential alignment would be to place the Green Loop alignment along the edge of the site on NW Broadway Ave and then turn onto NW Hoyt St.

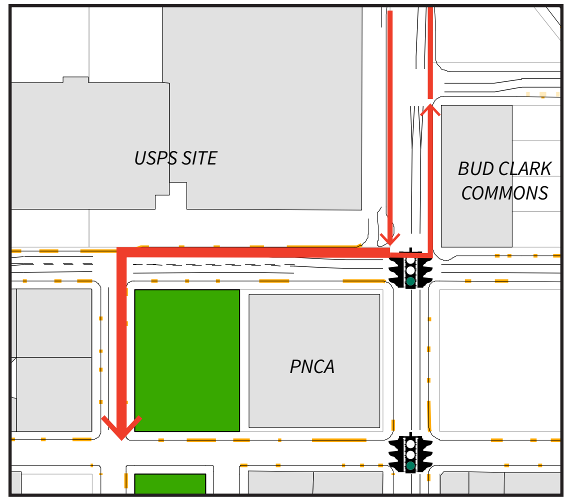
NW Hoyt St. will need to be reconfigured in order to provide riders with a safe connection to and from the Broadway Bridge on-ramp. The connection will be contingent upon the chosen alignment for the North Park Blocks (i.e.: couplet, 2-way on NW Park or NW 8th).

59572

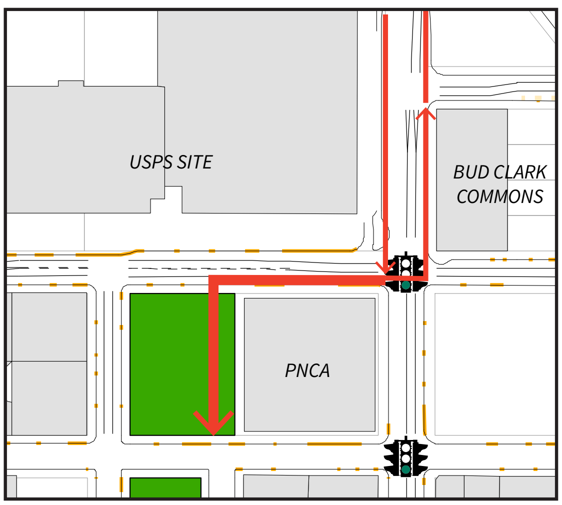
NW HOYT RECONFIGURATION TO NORTH PARK BLOCKS



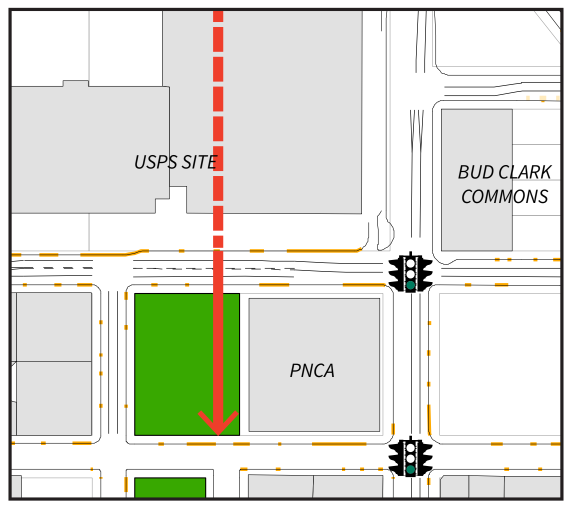
Green Loop couplet on NW Hoyt St. to NW 8th and NW Park Ave.



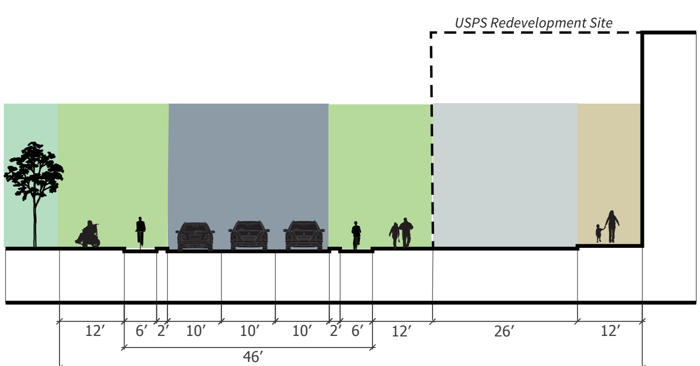
Green Loop on north side of NW Hoyt to NW Park Ave.



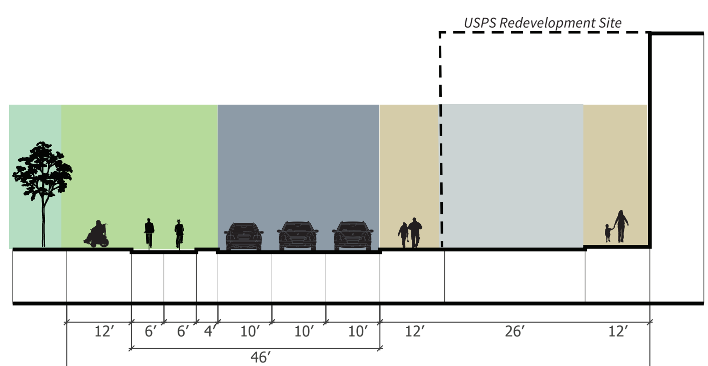
Green Loop on south side of NW Hoyt St. to NW 8th Ave.



Green Loop through USPS Redevelopment



Section of GL couplet on NW Hoyt St. looking west



Section of GL on south side of NW Hoyt St. looking west

NORTH PARK BLOCKS

EVALUATION SUMMARY

Existing Conditions:

Opportunities:

1. Several prominent creative firms, institutions, and residential complexes are located adjacent to the Park Blocks.

Constraints:

1. Concentration of urban campers and illegal activity.
2. Lack of active ground floors on most buildings fronting the park blocks.

Open Space:

Opportunities:

1. Historic muncipal park provides dense canopy trees and assortment of activities.
2. Public art and benches provide enjoyable passive recreation space.

Constraints:

1. Concentration of urban campers around southern portion of park blocks.

Redevelopment Sites:

Opportunities:

1. New hotels in development will lead to more activation of park blocks and potential increase in revenues for surrounding businesses.
2. The Customs House has been renovated into tradition office space.

Constraints:

1. Ankeny comfort stations are out of use.

Transportation Options:

Opportunities:

1. Wide ROW width provides easy implementation for Green Loop facilities.
2. Gradual grade change on NW 8th Ave and NW Park Ave.
3. Park Blocks and low volume traffic on NW 8th Ave and NW Park Ave already provide a relatively low-stress environment for pedestrians and cyclists.

Constraints:

1. Heavy cross traffic on east-west streets especially during rush hour can lead to conflicts.
2. Lack of traffic signal at West Burnside St.
3. No designated bike lanes on either NW Park Ave or NW 8th Ave.

59574

NORTH PARK BLOCKS

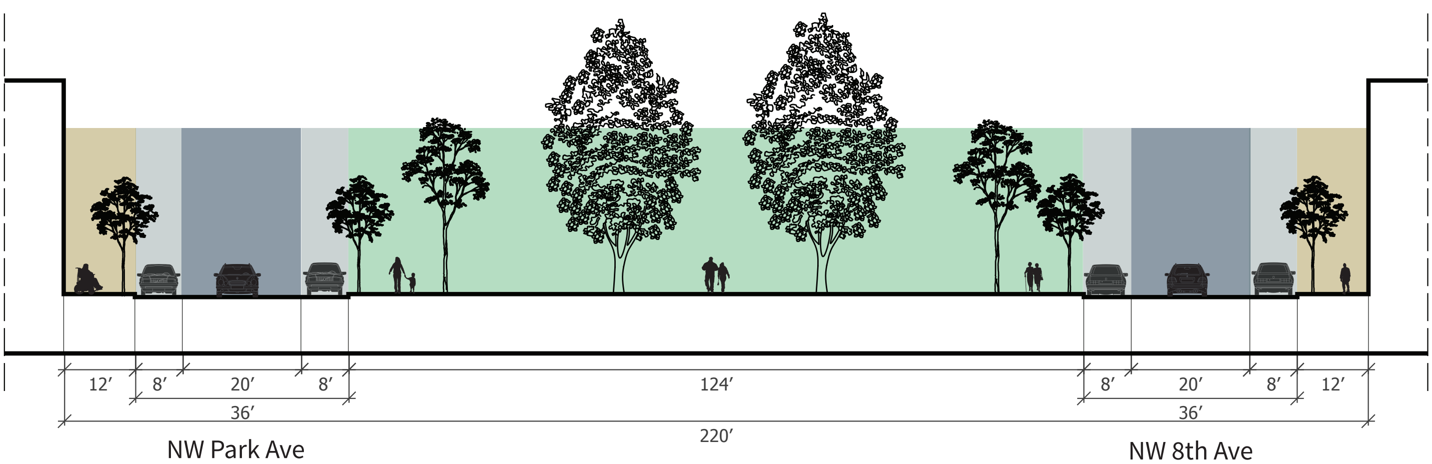
EXISTING CONDITIONS

Legend:

- Redevelopment Sites
- Attractions/Institutions
- Potential Open Space Opportunities
- Existing Parks

The North Park Blocks is a historic municipal park that consists of 5 blocks which serves as a boundary between the Pearl District and Old Town/China Town. The North Park Blocks provides both active and passive recreation opportunities and serves as a “front yard” for local businesses and various institutions. In addition to the dense canopy trees and abundance of park benches, the North Park Blocks provide users with a basketball court, bocce ball court, a playground, and an assortment of public art which contribute to the quiet, low-stress pedestrian experience. As is common with many Central City public spaces, there is a large homeless population that frequently congregates in the park blocks due to it’s proximity to social services such as Central City Concern.

The major institutions adjacent to the North Park Blocks include Pacific Northwest College of Art’s Federal Building and Arthaus, the Emerson School, the International Culinary School, Regional Arts and Culture Council, and Central City Concern.



Section of existing conditions on NW Park Ave and NW 8th Ave looking north

LEGEND

Sidewalk | On-Street Parking | Vehicular Lane | Park Block

NORTH PARK BLOCKS

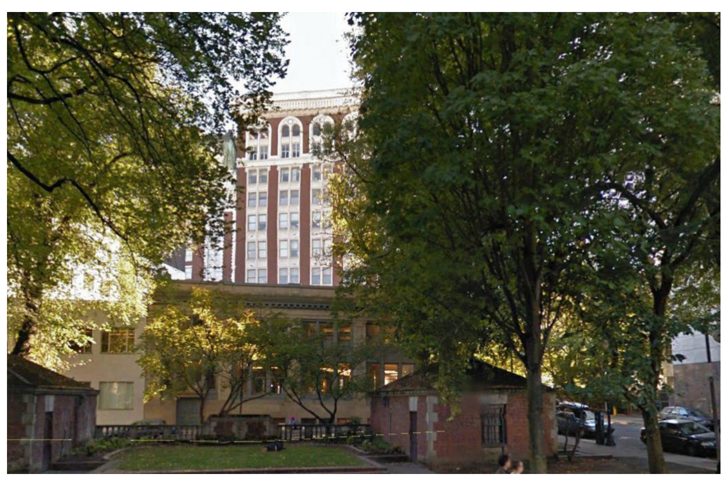
OPEN SPACE AND REDEVELOPMENT SITES

NEW HOTELS: HARLOW BLOCK HOTEL and PEARL HAMPTON INN

Image courtesy of Next Portland

Two new hotels are being proposed on parcels adjacent to the Green Loop alignments. The long vacant Harlow Block building adjacent to the new PNCA building will be converted into a mid-range priced hotel. The historic building is currently being modernized to accomodate hotel guests. A new Hampton Inn & Suites, is a proposed 8-story hotel that would consist of ground floor active retail, and approximately 243 guest rooms on the upper floors on NW 9th Ave. A proposed roof terrace would look down on the North Park Blocks.

NORTH PARK BLOCKS COMFORT STATIONS



The Green Loop could catalyze the renovation of the two brick comfort stations and plaza on the south end of the North Park Blocks. The two brick buildings could either remain a rest station for Green Loop users or could be repurposed as small retail/restaurant spaces and provide services like bike repair.

CLOSURE OF NW FLANDERS ST AND NW DAVIS ST

Rendering of NW Davis St. closure

The potential closure of NW Flanders St. and NW Davis St. could allow for a more fluid connection for Green Loop users as they move through the North Park Blocks. The biggest impediment for creating a low stress environment is the vehicular traffic at the cross streets. As illustrated in the images above, the cross streets could either be permanently closed and depaved or could maintain limited vehicular access and utilize street furnishings like retractable bollards.

59579

NORTH PARK BLOCKS

OPEN SPACE AND REDEVELOPMENT SITES

WEST BURNSIDE ENHANCED EXISTING PLAN (WBEEP)

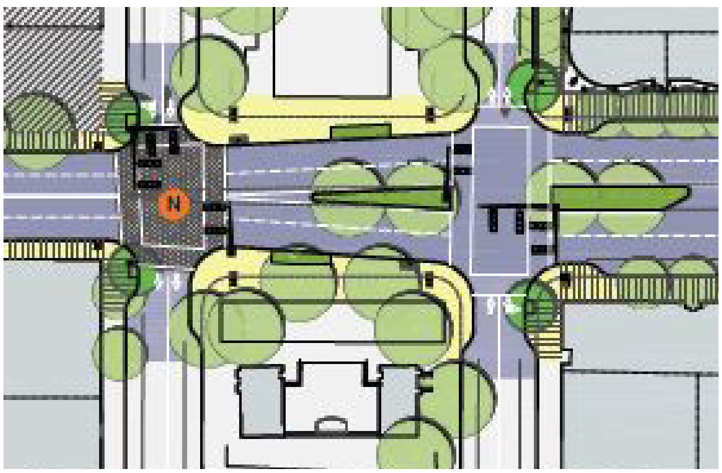
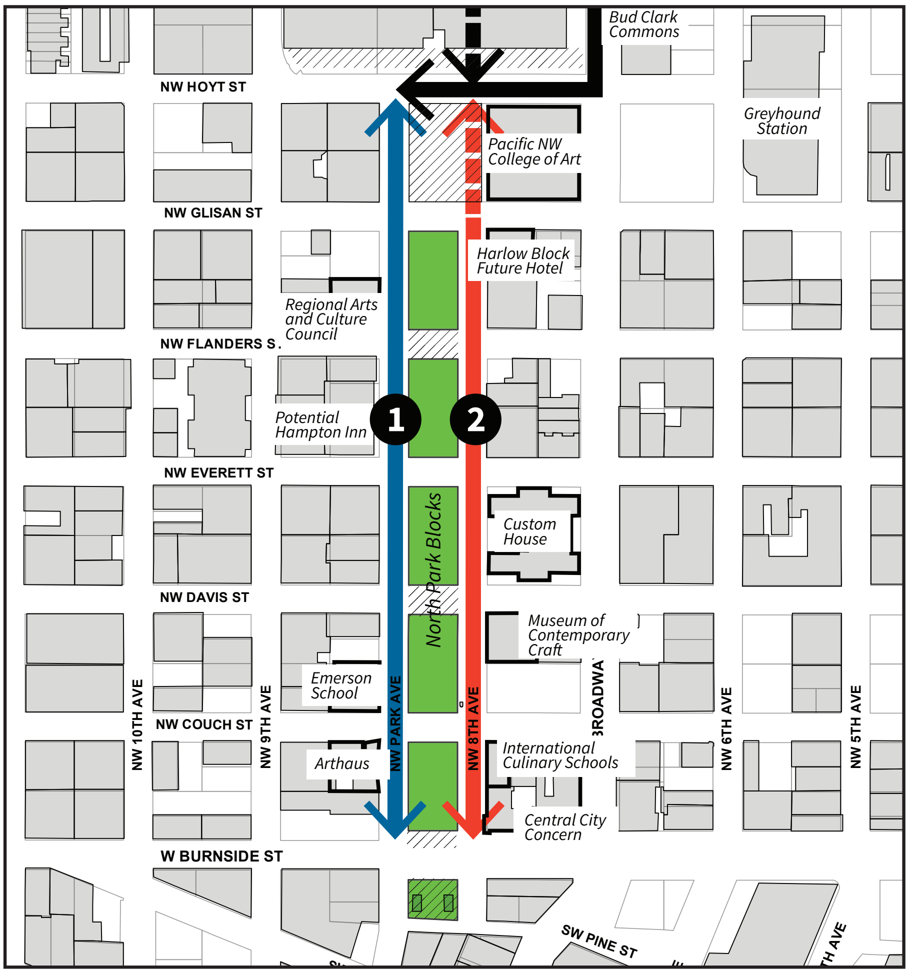


Image courtesy of ZGF

Proposed curb extensions and a new traffic signal at W. Burnside between NW 8th Ave and NW Park Ave would provide a safer connection for Green Loop users. West Burnside St. would be reconfigured by removing the outside turning lanes in both directions. The extra ROW space would be repurposed as extensions of the existing Park Blocks. The use of a special paving pattern at the intersections would also help slow oncoming traffic.

NORTH PARK BLOCKS

TRANSPORTATION OPTIONS



Broadway Bridge to North Park Blocks

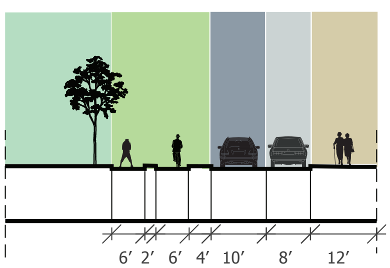
The streets aligning the North Park Blocks [NW 8th Ave and NW Park Ave] are one way streets with 1 travel lane (20'), 2 lanes of parking on either side (8'), and a 12' sidewalk on one side of the street. Both NW 8th Ave and NW Park Ave have a much more gradual grade change compared to SW Broadway Ave. Although there is currently no designated bike lane on the Park Blocks, cyclists can ride on the street with relatively low stress due to the low traffic. The major conflict areas occur at the cross streets with through traffic.

NORTH PARK BLOCKS

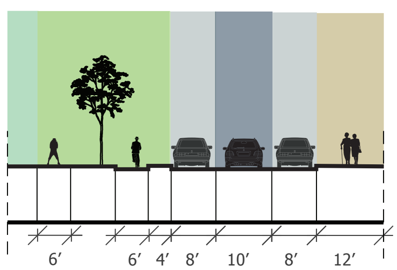
TRANSPORTATION OPTIONS

ALTERNATIVE 1: NORTH PARK BLOCKS COUPLET

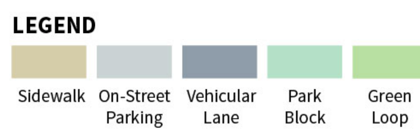
The couplet along NW 8th Ave and NW Park Ave will provide Green Loop facilities on both sides of the Park Blocks. The alternative maintains a one way travel lane and one lane of parking on both streets. The direction of traffic will be reversed so that NW 8th Ave traffic moves northbound and NW Park Ave moves southbound. At NW Davis Ave, the path merges into a bi-directional cycle track on NW Park Ave, removing the parking lane.

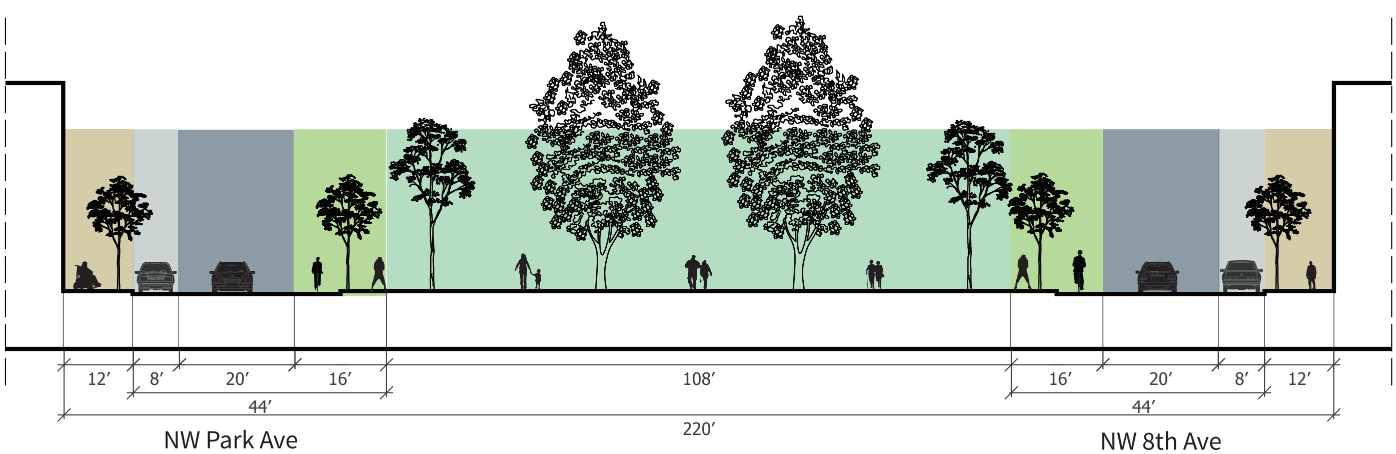


Jogging Path in street



Jogging Path in park



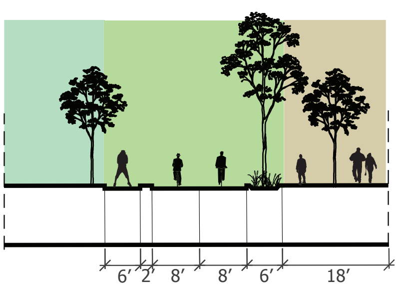


Section of Green Loop couplet on SW Park Ave and SW 8th Ave looking north

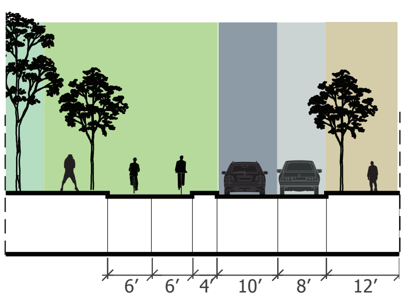
59582

ALTERNATIVE 2: TWO-WAY PATH ON NW 8TH AVE

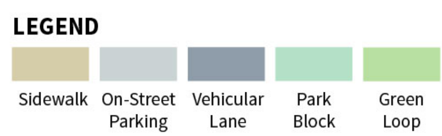
Alternative 2 calls for NW 8th Ave. being designated as the major Green Loop street. The redesign of the street could range from removing all vehicular traffic and parking to maintaining one travel and parking lane. A completely pedestrianized street would provide ample space for a jogging path, bi-directional cycle track, and enhanced stormwater facilities. NW Park Ave. would become the primary traffic street with 2 travel lanes and 2 lanes of parking. Both north and south Green Loop traffic will cross Burnside at NW 8th Ave, with the installation of a new traffic signal.

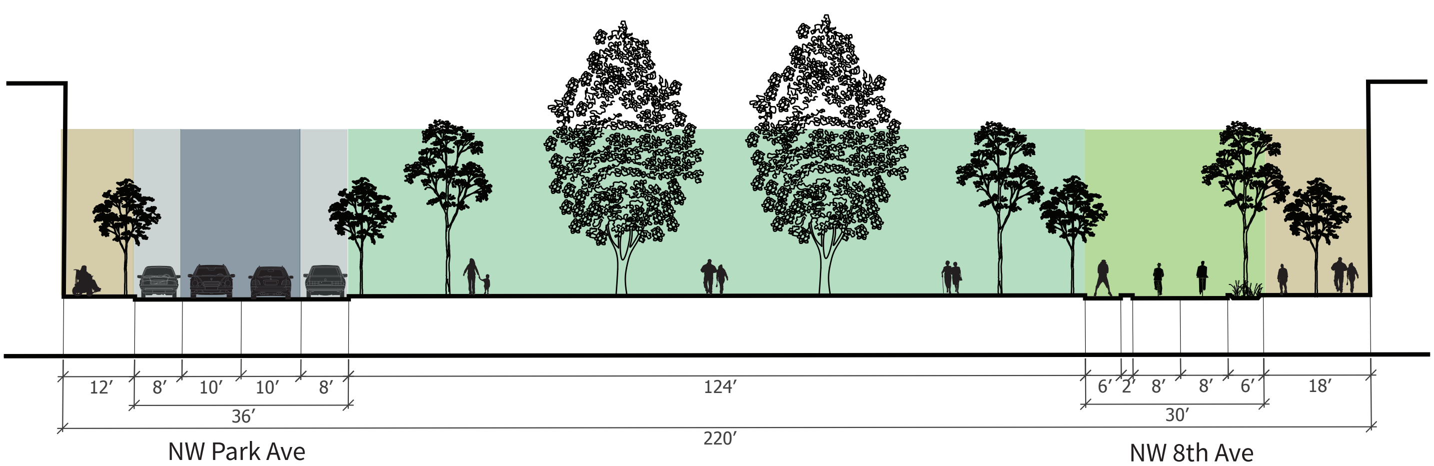


No Vehicular Traffic on NW 8th Ave



Vehicular Traffic on NW 8th Ave





Section of Green Loop on SW 8th Ave looking north

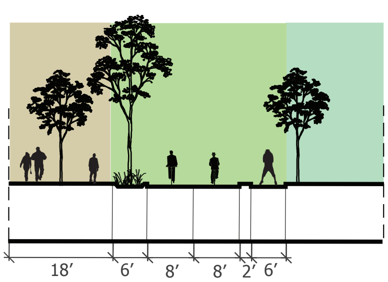
59583

NORTH PARK BLOCKS

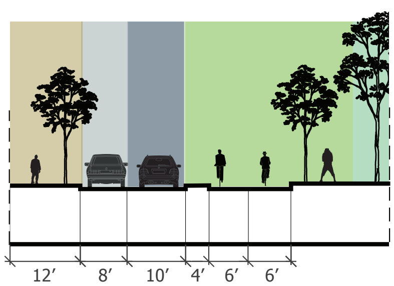
TRANSPORTATION OPTIONS

ALTERNATIVE 3: TWO-WAY PATH ON NW PARK AVE.

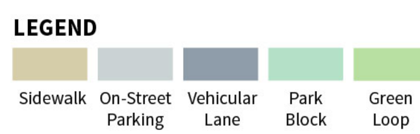
Alternative 3 calls for NW Park Ave. being designated as the major Green Loop street. The redesign of the street could range from removing all vehicular traffic and parking to maintaining one travel and parking lane. A completely pedestrianized street would provide ample space for a jogging path, bi-directional cycle track, and enhanced stormwater facilities. NW 8th Ave. would become primary vehicular street 2 traffic lanes and 2 lanes of parking. Both north and south Green Loop traffic will cross Burnside at NW Park Ave, with the installation of a new traffic signal.

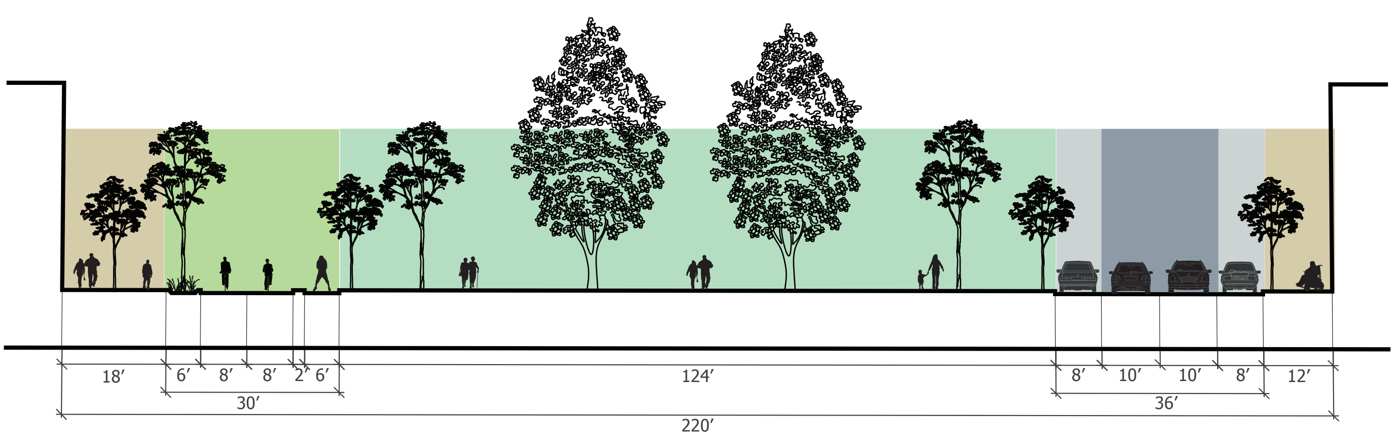


No Vehicular Traffic on NW Park Ave



Vehicular Traffic on NW Park Ave





NW Park Ave

NW 8th Ave

Section of Green Loop on SW 8th Ave looking north

59584

MIDTOWN BLOCKS

EVALUATION SUMMARY

Existing Conditions:

Opportunities:

1. Several buildings have historic and architectural significance.
2. The unique plotting of the blocks creates a unique urban condition unlike any other part of downtown Portland.
3. The buildings are built up to the property line and have active ground floor retails spaces and prominent entrances.
4. Midtown blocks are part of the downtown retail core.

Constraints:

1. Concentration of urban campers and illegal activity in and around O'Bryant Square.

Open Space:

Opportunities:

1. There are two prominent urban parks within the midtown blocks: O'Bryant Square and Director Park.
2. Opportunities to let restaurants, retail to bleed into the street to complete the idea of the "urban room".

Constraints:

1. O'Bryant Square remains inactive as a result of poor design and outdated facilities.

Redevelopment Sites:

Opportunities:

1. Park Avenue West Tower is close to completion on the long vacant parcel adjacent to Director Park.
2. Proposal for a new Hotel Cornelius that would renovate and repurpose two historic buildings.
3. Full block parcel on SW 9th Ave and SW Washington St. which is currently a major food cart pod, could become a sizable development.

Transportation Options:

Opportunities:

1. Close proximity to Portland streetcar on SW 10th Ave. and SW 11th Ave.
2. Green Loop alignments cross the red/blue MAX line.

Constraints:

1. The narrow 50' ROW presents a challenge for accomodating the necessary Green Loop facilities while also maintaining vehicular traffic.

59586

59587

MIDTOWN BLOCKS

EXISTING CONDITIONS

Legend:

Redevelopment Sites

Potential Open Space Opportunities

Attractions/Institutions

Existing Parks

59588

The Midtown blocks are a continuation of the narrow city blocks (100' x 200') that were plotted during the formation of the city. However, despite the original intention of continuing the linear open space started by the North Park Blocks, this segment was acquired by private investors and was developed on. The development of these blocks with the exception of Director Park and O'Bryant Square creates an intense urban environment that is not common within downtown Portland with narrow streets and taller buildings up on the property line. This area is part of the downtown retail core and supports an active mixture of housing, office, retail, and hotels. The scale of retail varies from big traditional retails such as Nordstroms and Target to smaller privately owned shops. The Green Loop would help complete the Park Avenue Vision, which would allow for a meaningful connection between the North and South Park Blocks.

Section of existing conditions on SW Park Ave and SW 9th Ave looking north

MIDTOWN BLOCKS

OPEN SPACE AND REDEVELOPMENT SITES

REDESIGN OF O'BRYANT SQUARE

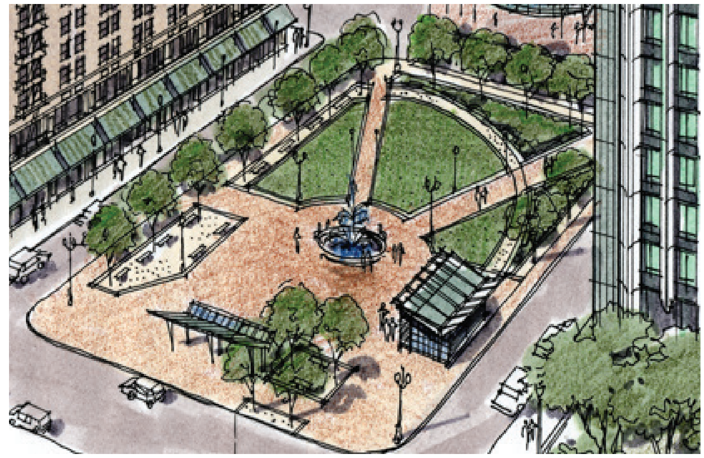


Image courtesy of Sera Architects

The redesign of O'Bryant Square is crucial in order to create a more active link between the North and South Park Blocks. Current issues include lack of visibility due to the elevated grade of the park to accomodate the underground parking. This design has led to criminal activity, a lack of programming within the plaza which leads to scarce activity during most hours of the day. Some of the park features such as the fountain and the street furnishings are outdated and are not serving any purpose. The redesign of O'Bryant Square could incorporate a Green Loop connection within the interior of the plaza and provide a more open, family oriented atmosphere as demonstrated with the design of Director Park.

NEW CORNELIUS HOTEL

Image courtesy of MCA Architects

The renovation of two downtown buildings, the Cornelius building and the Woodlark building will be combined and renovated for a new hotel. The ground floor will incorporate a new restaurant and the hotel lobby will be oriented to SW Park Ave.

REDEVELOPMENT OF SW ALDER BLOCK

Image courtesy of inthepinkandgreen.com

The SW Alder block is currently a major activity node for the surrounding offices due to the array of food carts currently occupying the site. The eventual redevelopment of the full block parcel could lead to a potentially sizable development with the allocated FAR (9:1) and maximum height (250').

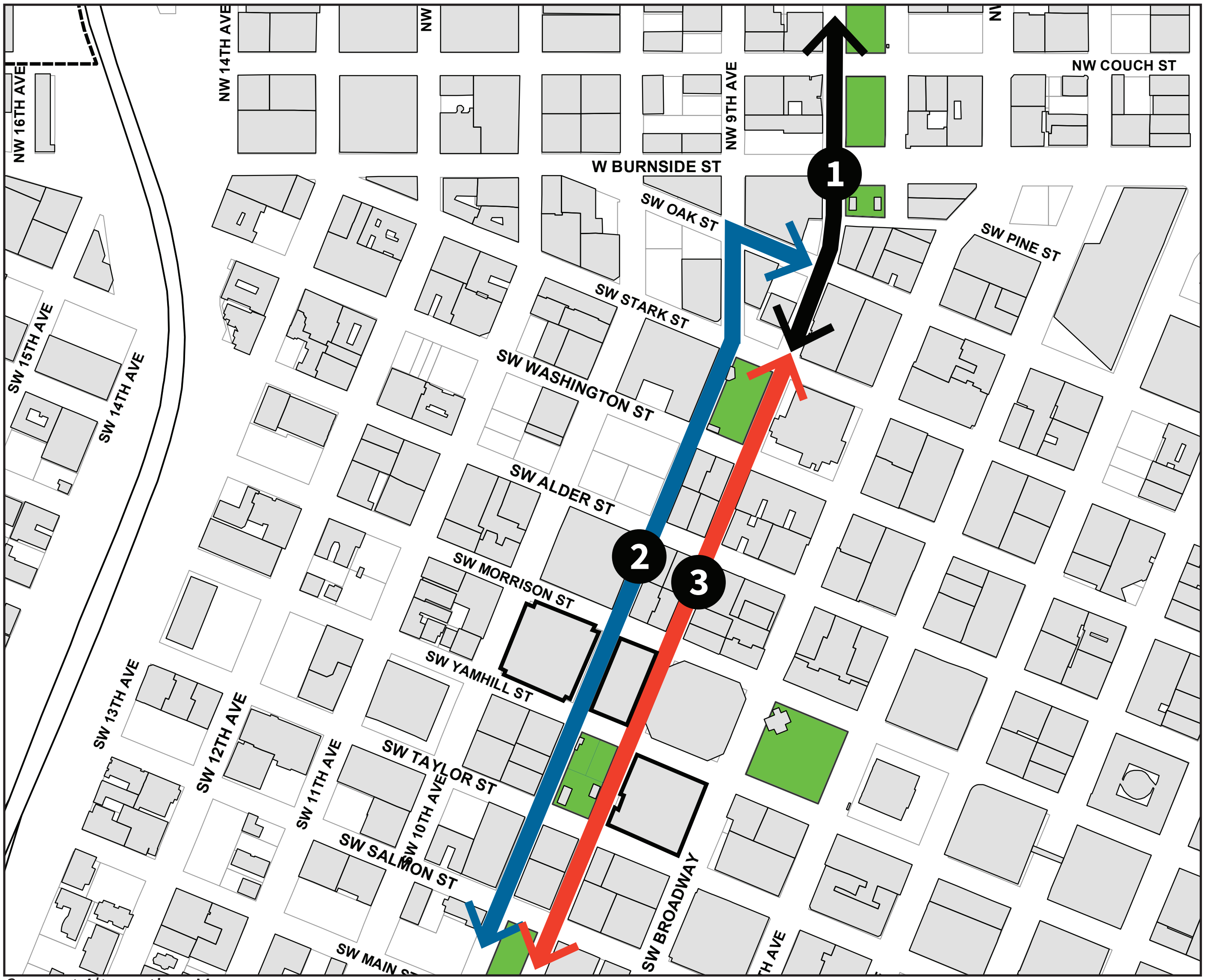
PARK AVENUE WEST TOWER

Image courtesy of TVA Architects

The Park Avenue West, a 30 story mixed use tower that will include office, residential, and retail spaces that when completed will be one of the tallest buildings in Portland. The proposed retail spaces situated on the first two stories of the tower's podium will help activate the ground floor and allow for an influx of new patrons into the retail core.

MIDTOWN BLOCKS

TRANSPORTATION OPTIONS



Concept Alternatives Map

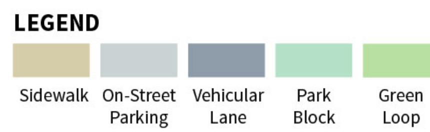
The streets aligning the Midtown Blocks are one way streets with SW Park Ave moving northbound and SW 9th Ave moving southbound. Between W Burnside and SW Stark, the streets measure 60' ROW with 2 travel lanes (20'), 2 lanes of parking on either side (8'), and 12' sidewalks on both sides of the street. From SW Stark to SW Salmon, both streets measure 50' ROW with 1 travel lane (10'), 2 lanes of parking on either side (8'), and 12' sidewalks on both sides of the street with the exception of the Director Park block where one lane of parking has been removed. The major conflict areas for both SW Park and SW 9th occur at the intersections where heavy cross traffic moves through without any signals, stop signs, or other traffic calming devices.

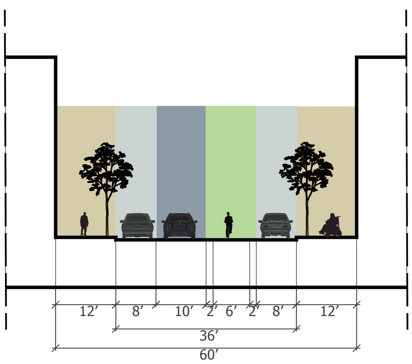
SW Park Ave to SW Oak St

Shift in the Grid: North Park Blocks to Midtown Blocks

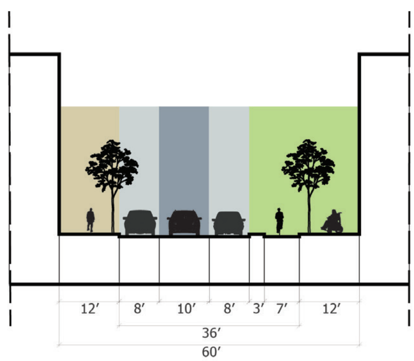
Alternative Summary:

The transition from North Park Blocks south to the Midtown Blocks will require a new traffic signal at NW Park Ave and W Burnside St. The shifting of the street grid at W Burnside St requires the Green Loop to veer from the NW Park Ave/ NW 8th Ave couplet to SW Park Ave/SW 9th Ave couplet. This requires utilizing SW Oak St. as a means of channel-ling bikes and peds over to SW 9th. This new facility will improve the existing 8' bike lane with either a physically protected one-way cycle track or a two-way cycle track de-pending on the desired design alternative for the midtown blocks.

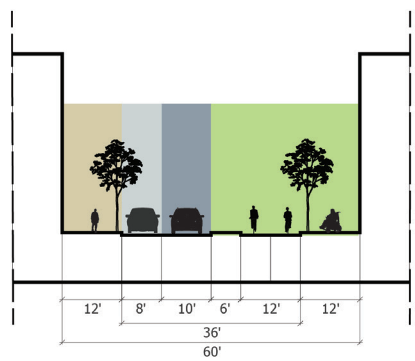




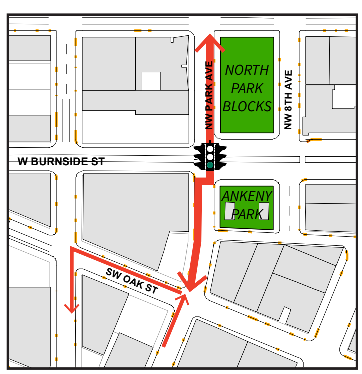
Section of existing conditions on SW Oak St. looking west



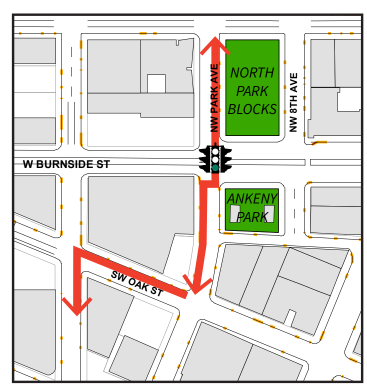
Section of one-way cycle track on SW Oak St looking west



Section of two-way cycle track on SW Oak St looking west



Green Loop one-way cycle track on SW Oak St connecting to SW 9th Ave



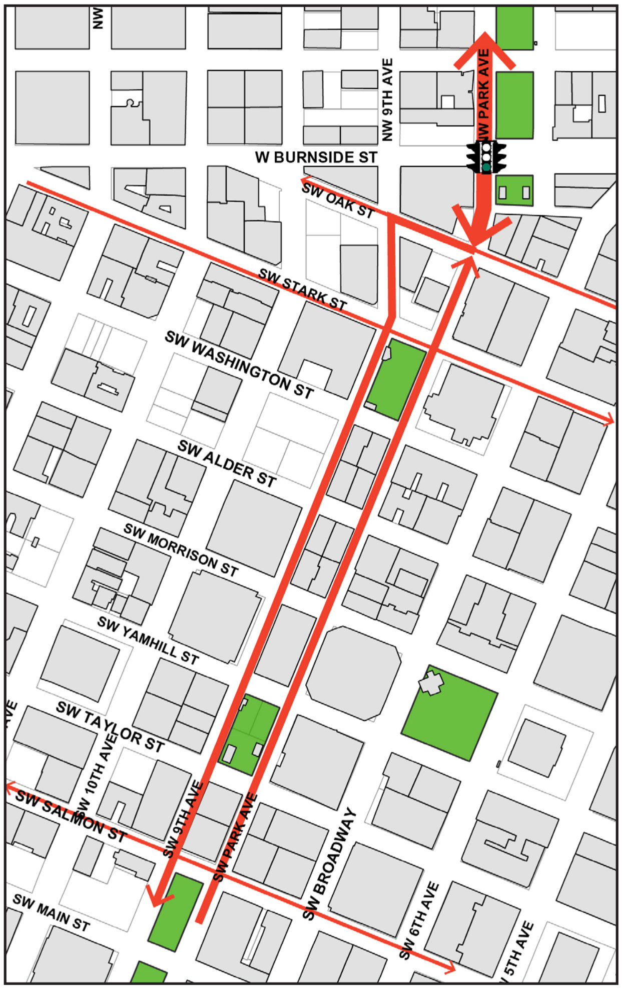
Green Loop two-way cycle track on SW Oak St connecting to SW 9th Ave

59593

MIDTOWN BLOCKS

TRANSPORTATION OPTIONS

ALTERNATIVE 1: MIDTOWN BLOCK COUPLET

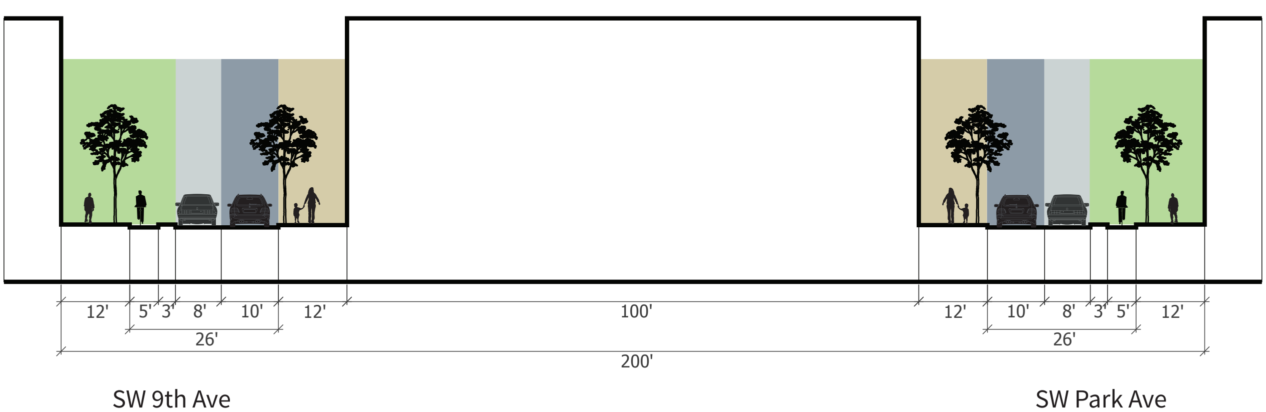


Alternative 1 Map

Alternative Summary:

Alternative 1 calls for a couplet along SW 9th Ave and SW Park Ave which will provide Green Loop facilities on both sides of the Midtown Blocks.

The alignment continues from the north park blocks along NW Park Ave with a 2-way cycle track (14’), one travel lane (10’) heading northbound, one parking lane (8’), and 12’ sidewalks. Due to the ROW width narrowing from 60’ to 50’ at SW Stark, the alignment must split and the southbound traffic will veer onto SW 9th. The start of the couplet can occur either at SW Oak St, a designated westbound bike lane which can connect bikes and pedestrians over to SW 9th, or at SW Stark St where the alignment could intersect a redesigned O’Bryant Square and then head onto SW 9th Ave. Both streets will then consist of a single cycle track (6’), one travel lane (12’),a parking lane (8’), and 12’ sidewalks on both sides of the street. The benefits of this alignment are that the existing ground floor retail on both NW Park Ave and NW 9th Ave will benefit from the increased bike and pedestrian activity from the new facilities while also retaining half of their existing on-street parking. Furthermore, the alignment creates connections to all 3 open spaces within this segment and would be the easiest alignment to implement in the short term.



Section of Green Loop Couplet on SW 9th Ave and SW Park Ave

59594

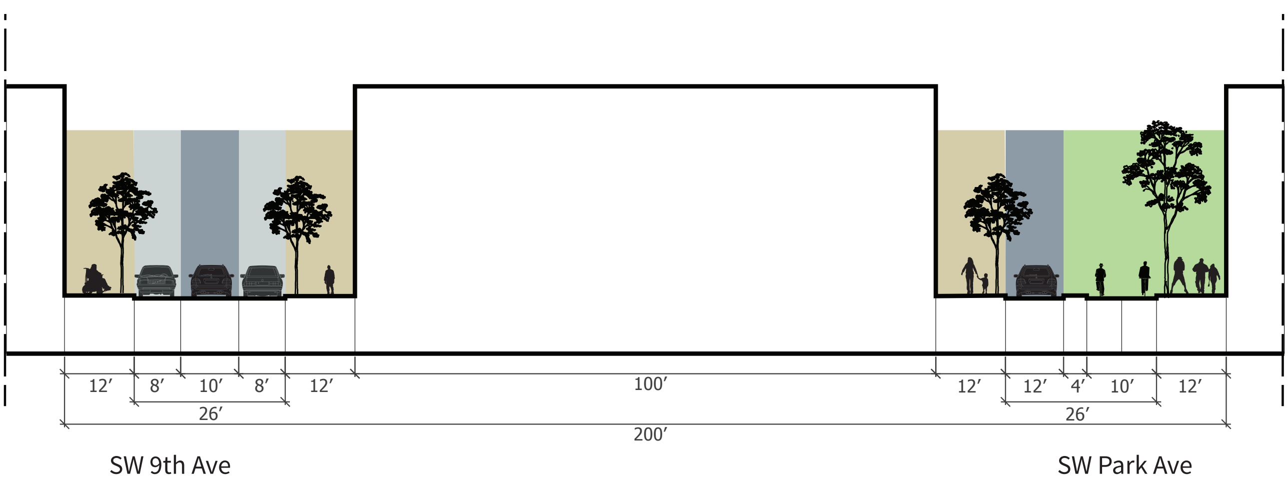
ALTERNATIVE 2: TWO WAY PATH ON SW PARK AVE

Alternative 2 Map

Alternative Summary:

Alternative 2 designates SW Park Ave. as the major Green Loop alignment. The street configuration from W Burnside St to SW Stark St consists of a 2-way cycle track (14'), one travel lane (14'), one parking lane (8'), and sidewalks on both sides of the street (12'). The ROW reduction to 50' requires the removal of a parking lane.

Alternative 2 is the most direct route for "loopers", where they stay on SW Park Avenue exclusively throughout the entire midblock segment. Additionally, the route aligns most closely with the Park Avenue Urban Design Vision which calls for the connection of the 3 open spaces, [Ankeny Park, O'Bryant Square, and Director Park], strengthens the existing street-level retail and promotes a vibrant street level activity. This configuration would be able to most closely accomodate the ideal Green Loop facilities but would not be easy to implement.



Section of Green Loop on SW Park Ave

59595

MIDTOWN BLOCKS

TRANSPORTATION OPTIONS

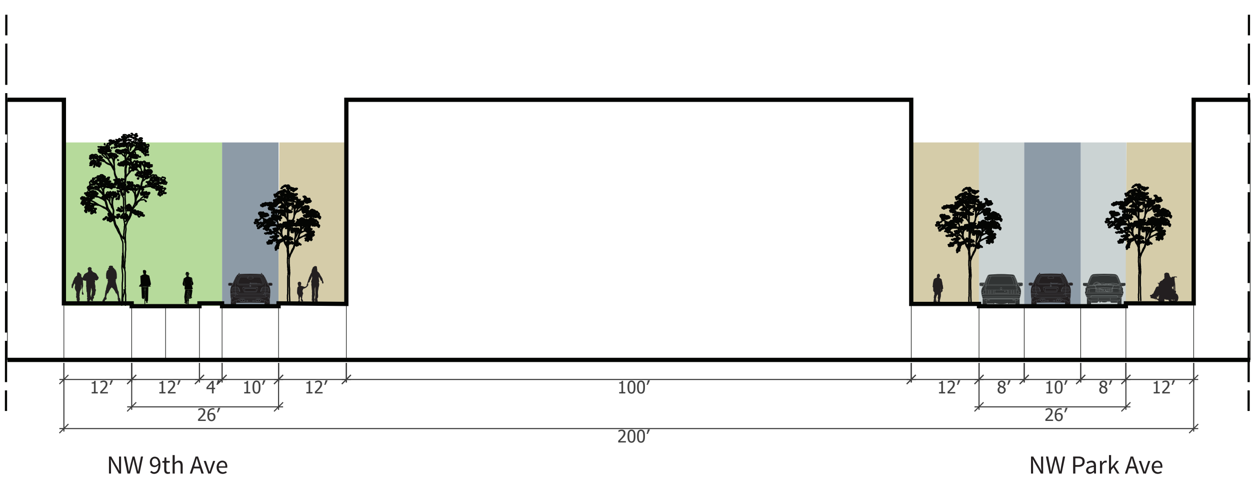
ALTERNATIVE 3: TWO WAY PATH ON SW 9TH AVE

Alternative 3 Map

Alternative Summary:

Alternative 3 designates SW 9th Ave as the major Green Loop alignment. The street configuration from W Burnside St to SW Stark St consists of a 2-way cycle track (14'), one travel lane (14'), one parking lane (8'), and sidewalks on both sides of the street (12'). The alignment would shift over to SW 9th Ave at SW Stark St as part of the redesign of O'Bryant Square. The ROW reduction to 50', then requires the removal of a parking lane in order to accomodate the Green Loop facility.

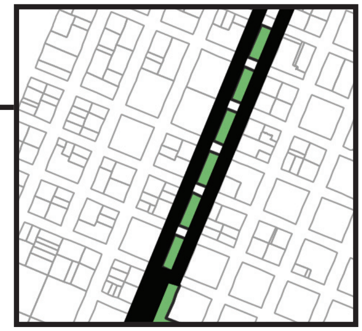
Similar to SW Park Ave, this alignment would be able to connect bikes and pedestrians to the 3 open spaces in the segment and strengthen existing street-level retail and promote a vibrant street level activity. This configuration would be able to most closely accomodate the ideal Green Loop facilities but would not be easy to implement.



Section of Green Loop on SW 9th Ave looking north

CULTURAL BLOCKS

EVALUATION SUMMARY



Existing Conditions:

Opportunities:

1. Home to several cultural institutions, churches and apartments housed in historic buildings.
2. Cultural blocks contain dense canopy trees and rose bushes.
3. An assortment of historic and contemporary public art and statues.
4. Weekly farmer's market takes place in Shemanski Square.

Constraints:

1. Concentration of urban campers and illegal activity in and around Shemanski Square.
2. Lack of activity on the ground floors of the adjacent buildings.

Open Space:

Opportunities:

1. The closure of one block of Main St. next to the performing arts center provides spaces for events such as Music on Main St. concert series.
2. Shemanski Square provides a venue for weekly farmers market.
3. Portland Loo is a valuable amenity for park users.
4. Abundance of benches and congregation spaces.

Constraints:

1. Park is slated for historic designation, which could stagnate improvements.
2. Getting grass to grow is a challenge.

Redevelopment Sites:

Opportunities:

1. Redevelopment of parcel on SW Park Ave and SW Columbia St.
2. Future redevelopment of parcel owned and adjacent to Portland Art Museum.

Transportation Options:

Opportunities:

1. Low volume of vehicular traffic on SW Park Ave and SW 9th Ave.
2. Parking on Cultural Blocks was intended to be temporary.
3. Close proximity to street car lines.
4. Addition of future BRT alignment would help reconfigure SW Jefferson/SW Columbia into a major Green Loop east/west connection.

Constraints:

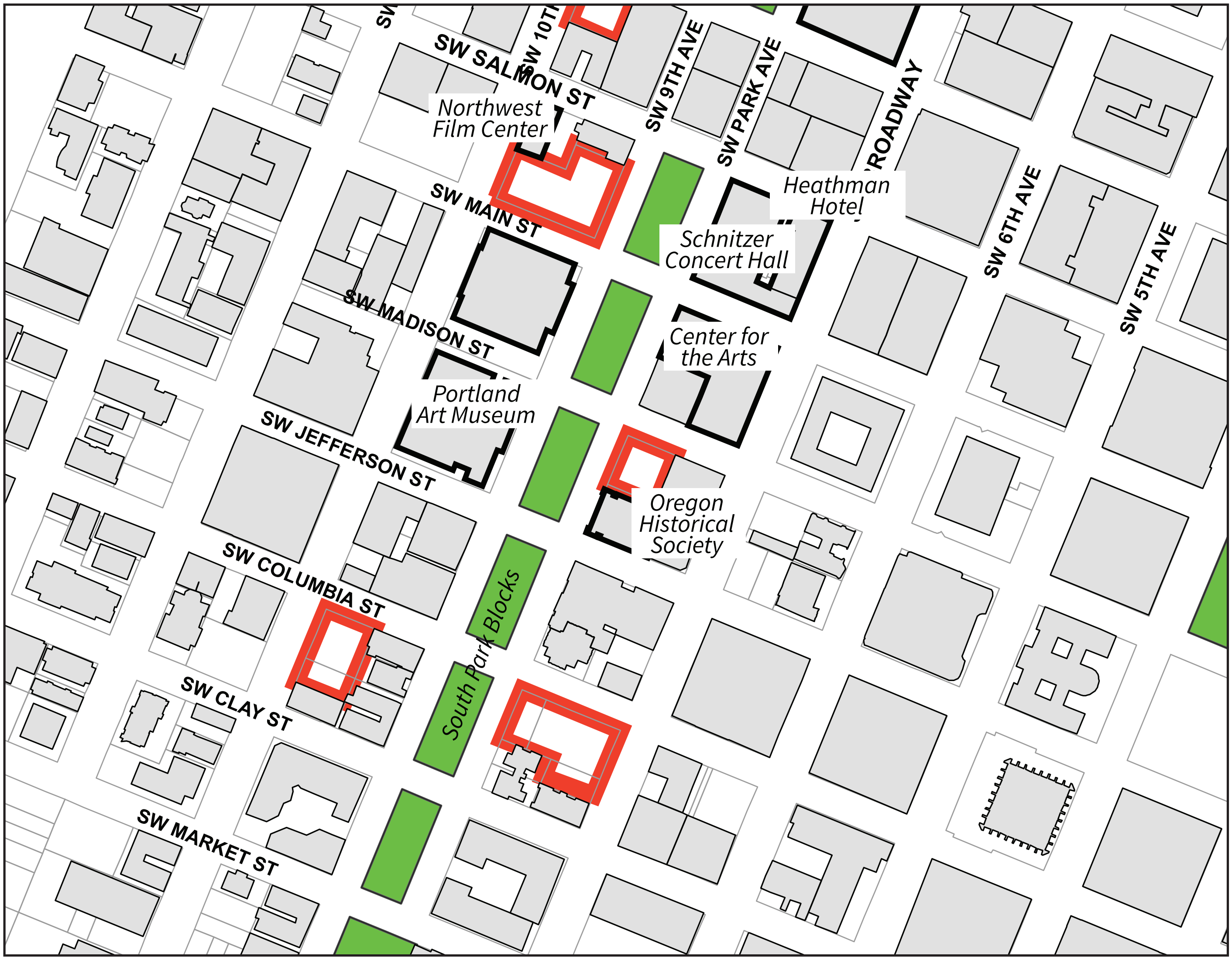
1. Inconsistent crossings create unpredictable conditions.
2. Stop signs at every block prevents flow for cyclists.
3. High vehicular traffic on cross streets to get to freeway leads to unpleasant conditions.

59598

59599

CULTURAL BLOCKS

EXISTING CONDITIONS



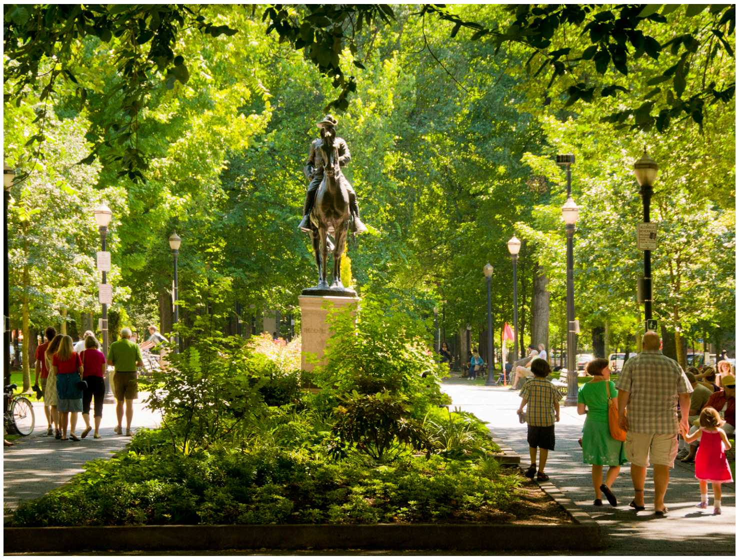
Legend:

Redevelopment Sites

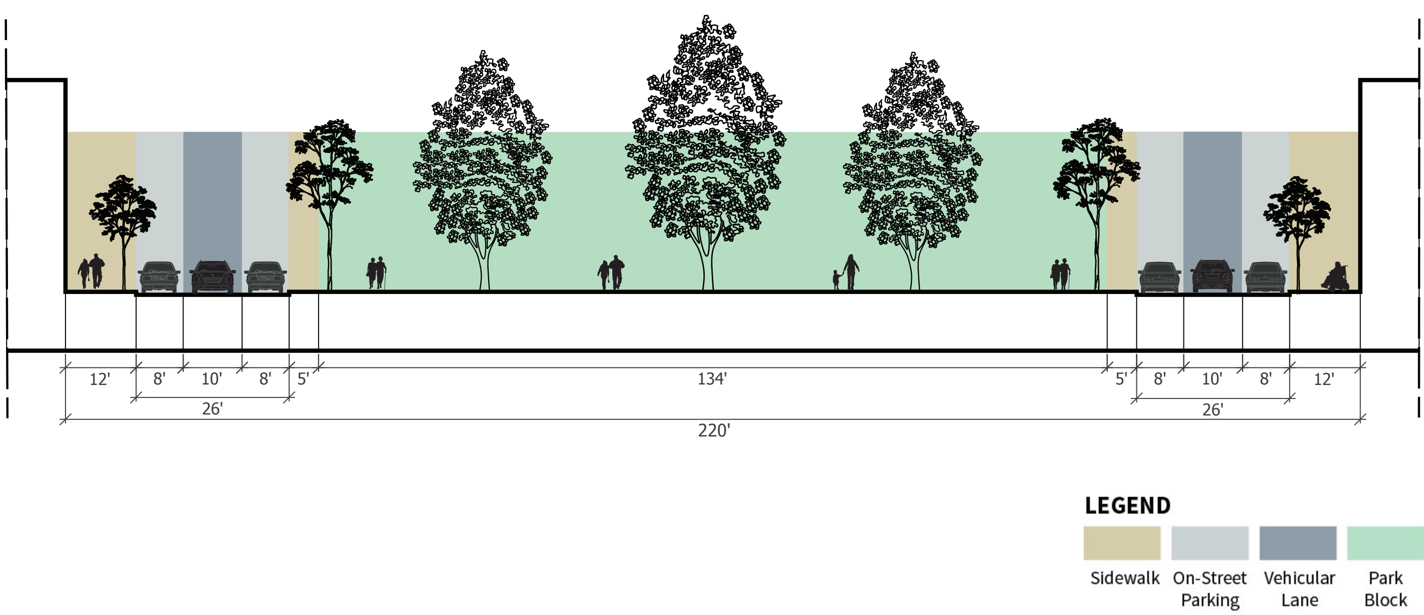
Attractions/Institutions

Potential Open Space Opportunities

Existing Parks



The northern portion of the South Park Blocks (SW Salmon St to SW Market St.) commonly known as the Cultural Blocks was platted as one of the city's first parks. The South Park Blocks are surrounded by Portland's oldest cultural institutions including the Portland Art Museum, the Oregon Historical Center, Portland Center for the Performing Arts, and the Schnitzer Concert Hall in addition to several prominent churches.



59601

CULTURAL BLOCKS

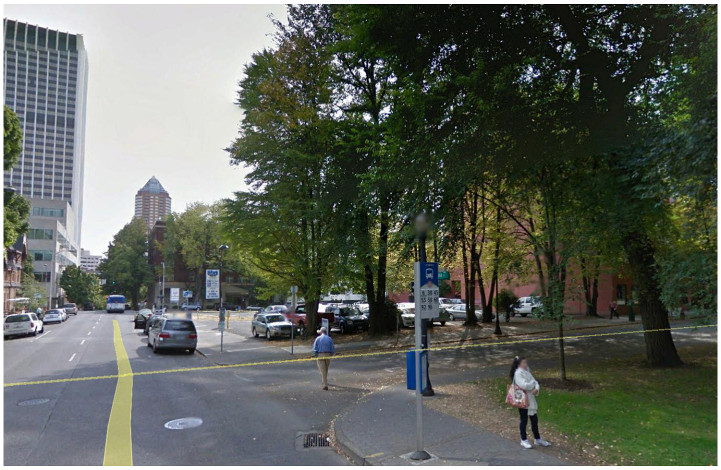
OPEN SPACE AND REDEVELOPMENT SITES

CLOSURE OF SW MADISON ST

The closing of SW Madison between SW Park Ave and SW 9th Ave would provide for a more continuous flow for Green Loop users. The block west on SW Madison has already been closed in order to create an outdoor sculpture garden and pedestrian path for the art museum. The closure of this segment of SW Madison could provide further space for public art to be coordinated within the Park Blocks. The segment could provide limited vehicle access for emergency vehicles by incorporating design features such as retractable bollards.

59602

POTENTIAL REDEVELOPMENT ON SW COLOMBIA ST AND SW PARK AVE



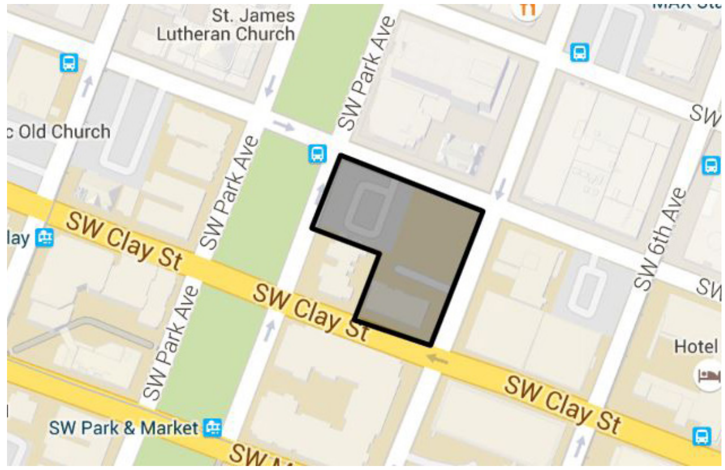


Image courtesy of Downtown Development Group

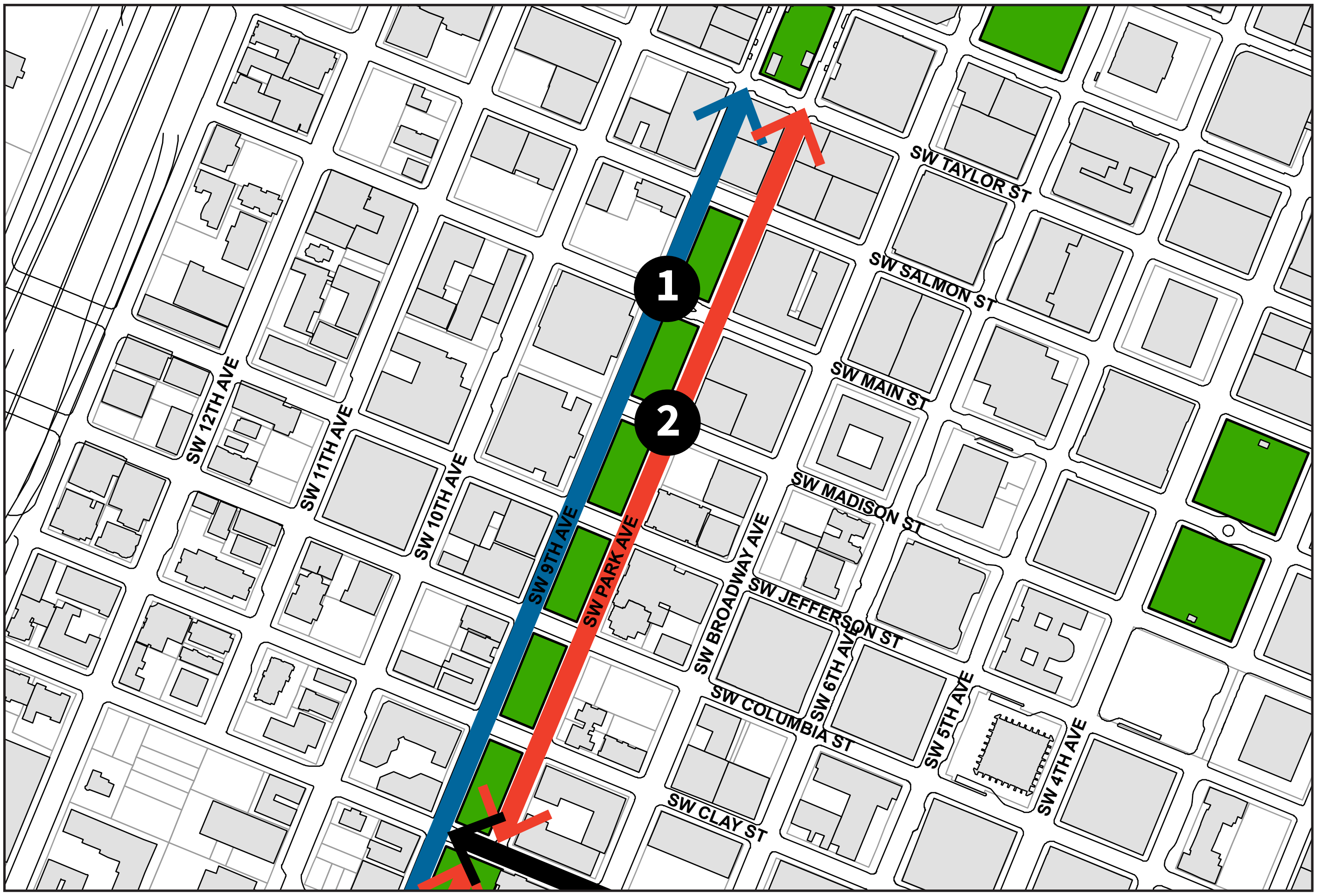
A new mixed use high-rise is being proposed for the 3/4 block on SW Colombia St and SW Park Ave. The project is in it's preliminary stages but would proposed a mix of hotel, office, and retail uses. The site can reach 300' on SW Broadway and 100' on SW Park.

POTENTIAL REDEVELOPMENT ON SW MAIN ST AND SW 9TH AVE

Currently being used as a surface lot, this 3/4 vacant parcel is owned by the Portland Art Museum.

CULTURAL BLOCKS

TRANSPORTATION OPTIONS

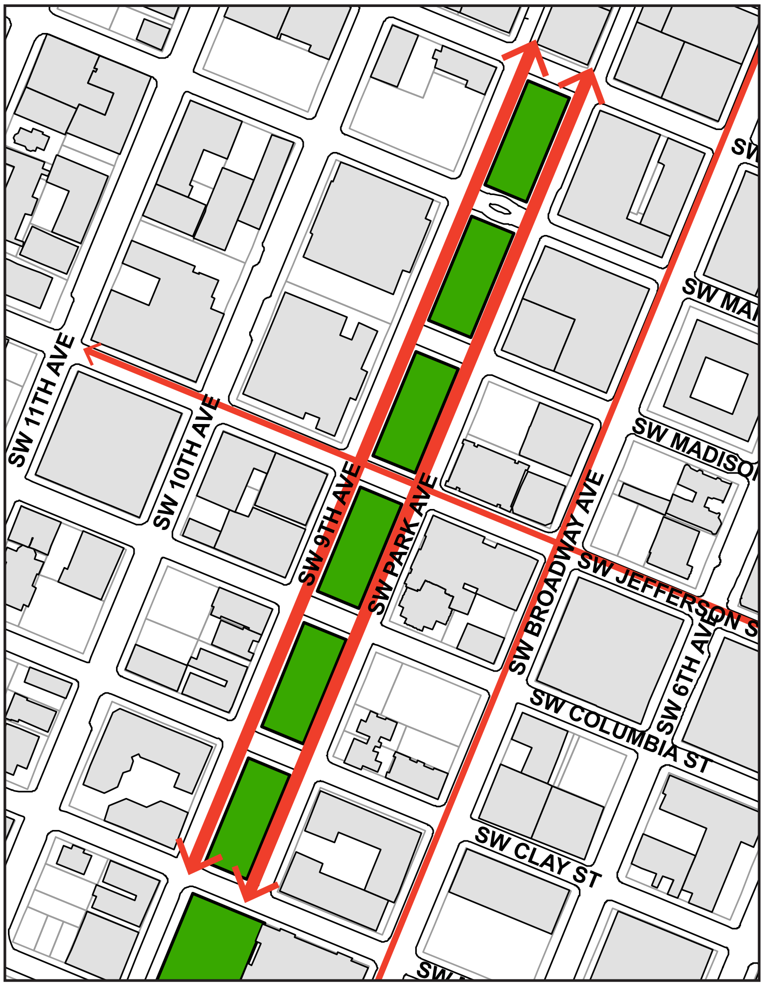


The South Park Blocks span from SW Salmon St to SW Market St with SW Park Ave moving northbound and SW 9th Ave moving southbound. The road width is 26' wide consisting of 1 travel lane (10'), 2 lanes of parking on either side (8'). The ROW width is 42' with a 12' sidewalk on the outer edge of the street and a 5' sidewalk adjoining the park block.

The potential conflict areas occur at the intersections where there is heavy cross traffic on several east/west streets. SW Jefferson St and SW Columbia St will become more congested with the addition of future BRT lines and stations.

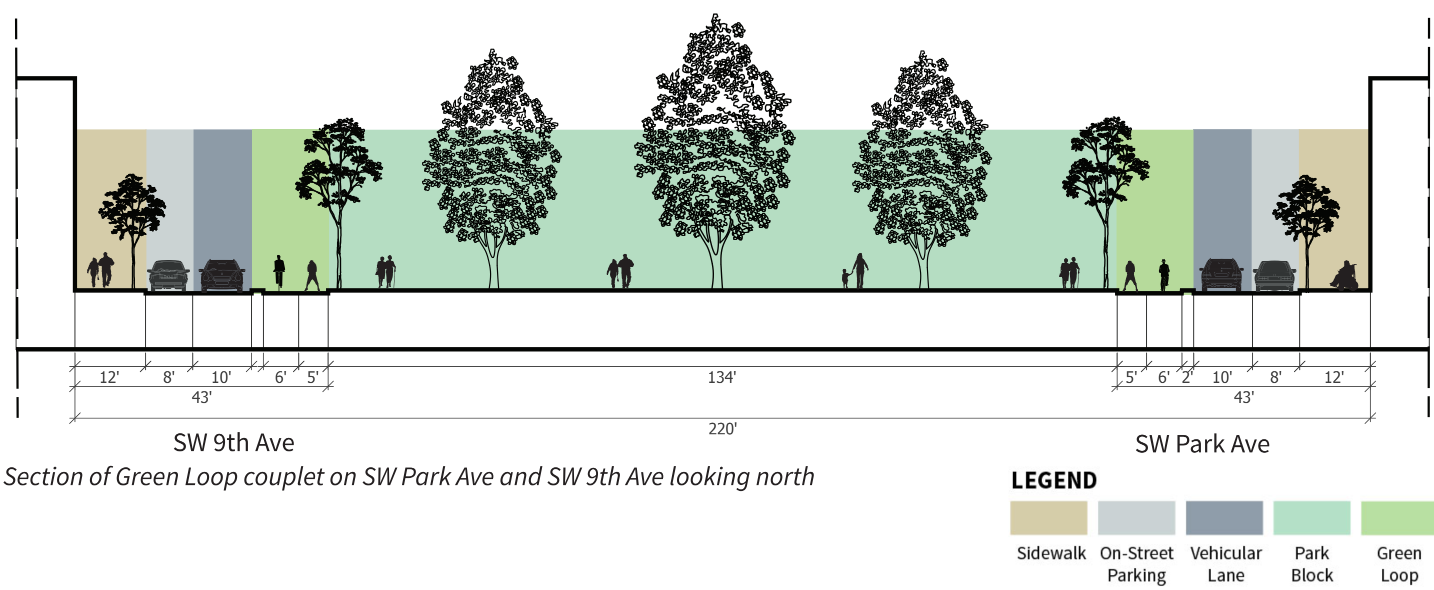
59604

ALTERNATIVE 1: SOUTH PARK BLOCK COUPLET



Alternative Summary:

Alternative 1 calls for a couplet along SW 9th Ave and SW Park Ave which will provide Green Loop facilities on both sides of the South Park Blocks. The alignment continues from the midtown blocks crossing SW Salmon St which is designated as a Green Loop east/west connection. Both streets will then consist of a single cycle track (6'), one travel lane (12'), a parking lane (8'), and a 12' sidewalk on the outer edges. The 5' sidewalk adjoining the park block will be converted to a joggin path. Pedestrians will be directed to walk through the central path within the park blocks.

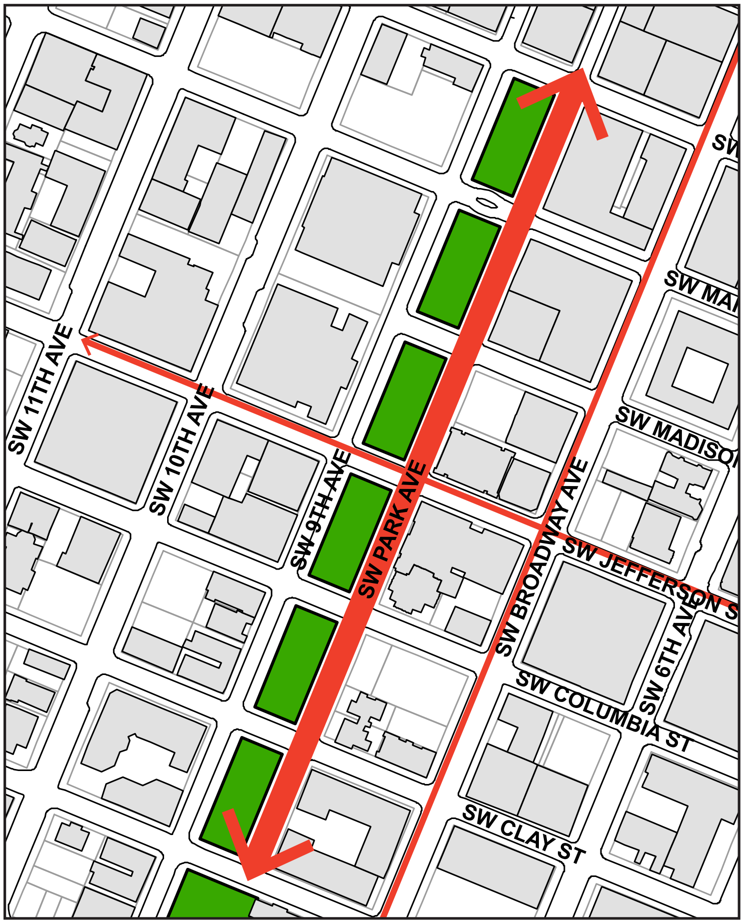


Section of Green Loop couplet on SW Park Ave and SW 9th Ave looking north

CULTURAL BLOCKS

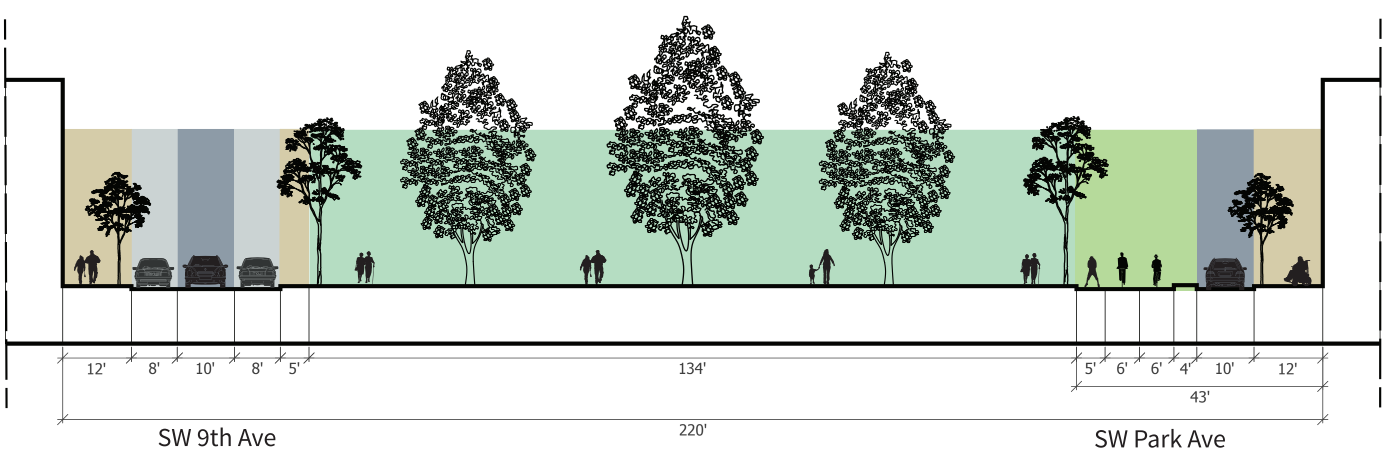
TRANSPORTATION OPTIONS

ALTERNATIVE 2: TWO WAY PATH ON SW PARK



Alternative Summary:

Alternative 2 designates SW Park Ave as the major Green Loop alignment. The street configuration from SW Salmon St to SW Market St consists of a 2-way cycle track (14'), one travel lane (14'), and a 12' sidewalk on the east side of the street. The 5' sidewalk adjoining the park block will be converted to a jogging path. Pedestrians will continue to walk through the central path within the park blocks.

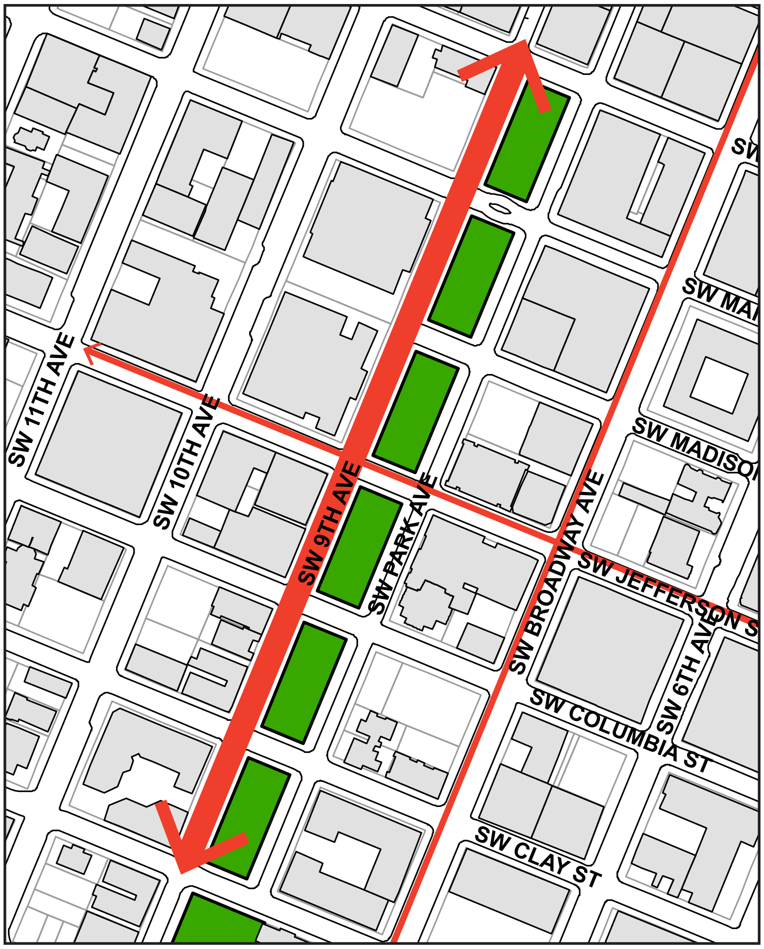


Section of Green Loop couplet on SW Park Ave and SW 9th Ave looking north

LEGEND

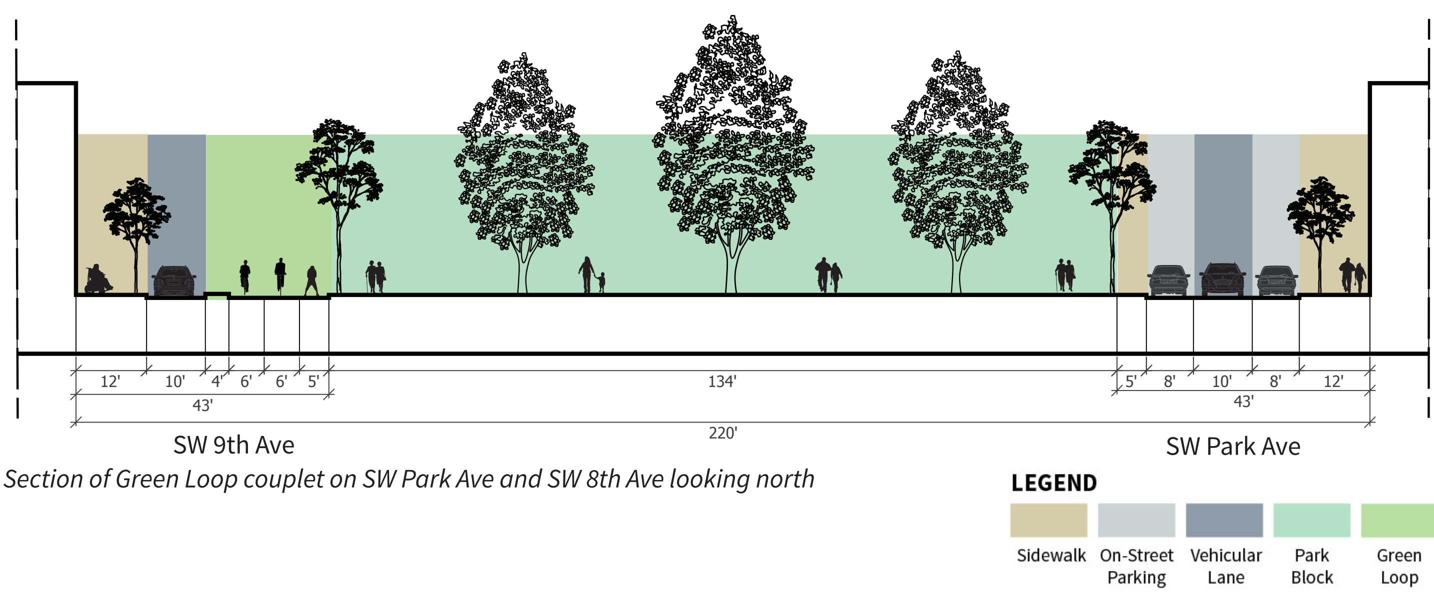
Sidewalk | On-Street Parking | Vehicular Lane | Park Block | Green Loop

ALTERNATIVE 3: TWO WAY PATH ON SW PARK



Alternative Summary:

Alternative 3 designates SW 9th Ave as the major Green Loop alignment . The street configuration from SW Salmon St to SW Market St consists of a 2-way cycle track (14') with a rolled curb, one travel lane (14'), and 12' sidewalk. Pedestrians will continue to walk through the central path within the park blocks.



Section of Green Loop couplet on SW Park Ave and SW 8th Ave looking north

59607

PORTLAND STATE UNIVERSITY

EVALUATION SUMMARY

Existing Conditions:

Opportunities:

1. Used primarily as the PSU Quad, it is already a pedestrian friendly environment.
2. Closed off to vehicular traffic
3. Variety of programming including PSU Farmers Market, Food Carts, and other university related activities.

Constraints:

1. Heavy use of the area could lead to conflicts with Green Loop users.
2. Ground floor edges are not activated.

Open Space:

Opportunities:

1. No cross streets creates one consistent linear open space.
2. Student body creates natural surveillance.
3. Existing outdoor amphitheater is used as an event space.
4. Existing playground at the southern edge.
5. Mature trees, native plantings

Constraints:

1. Lack of public art
2. Outdated park furnishings

Redevelopment Sites:

Opportunities:

1. Several student housing projects in development along SW 4th Avenue and SW Market St.
2. Vikings Pavilion will be a modern sports arena and athletic facility for PSU.
3. The Business School is proposing an expansion of their facilities along SW Broadway Ave.

Transportation Options:

Opportunities:

1. No cross traffic allows for pedestrians and cyclists to move through without fear of vehicular conflict.
2. Wide paths on both sides of the park blocks allow for easy accomodation of Green Loop facilities.

Constraints:

1. Path leading to SW College is very tight.
2. Farmers market presents problems with flow of pedestrians/cyclists.

59609

PORTLAND STATE UNIVERSITY

EXISTING CONDITIONS

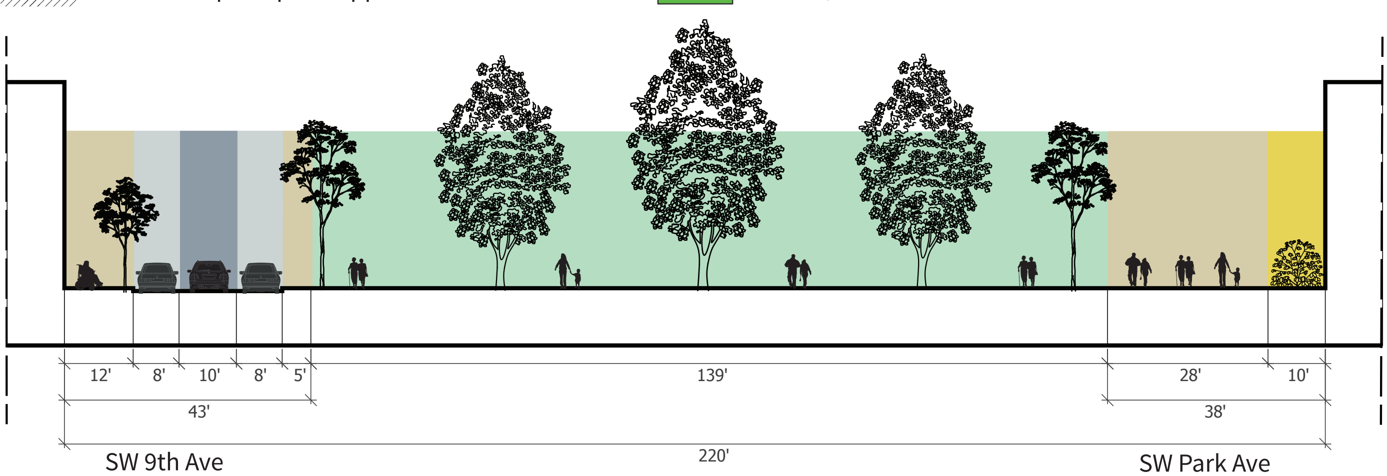
Legend:

Redevelopment Sites

Attractions/Institutions

Potential Open Space Opportunities

Existing Parks



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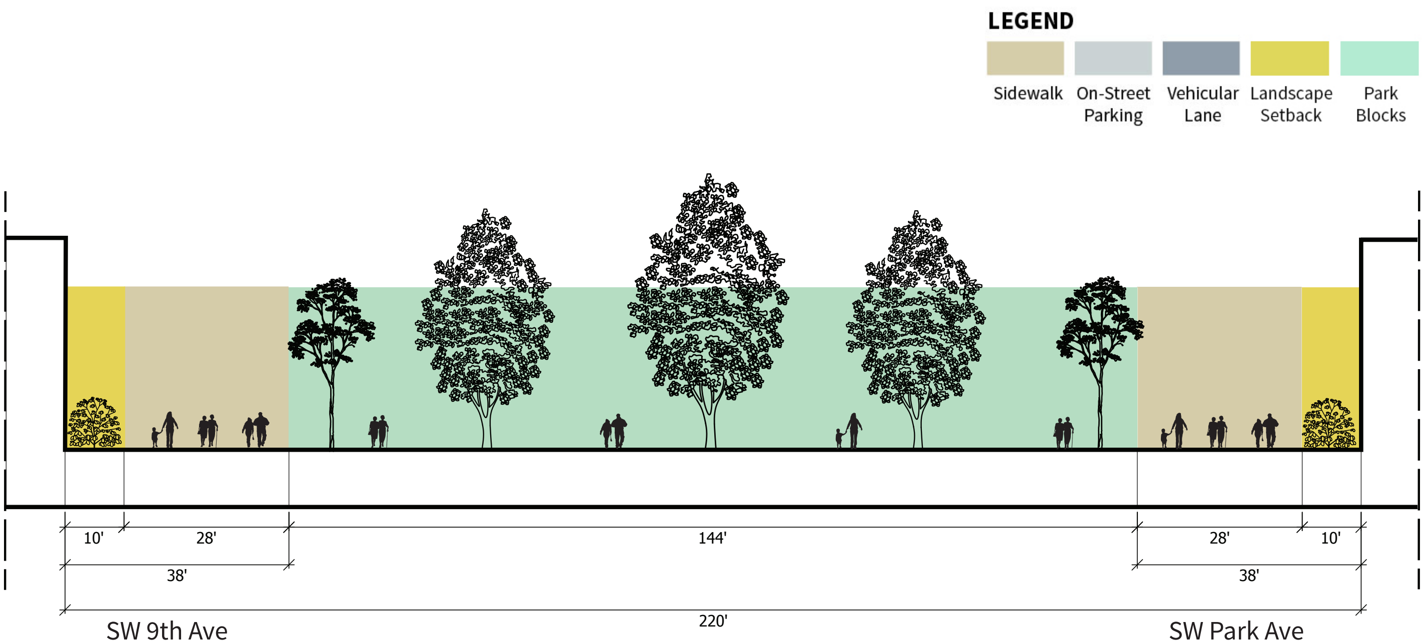
The southern portion of the South Park Blocks (SW Market St. to SW Jackson St.) are primarily used as the main campus green for Portland State University. PSU, Oregon's largest university enrolls 30,000 students annually and is expected to grow. As part of their University District Framework Plan, PSU has laid out a long range plan for growth and development within the South Downtown district. While the University District is greatly accessible by high capacity transit, the area is lacking in safe, intuitive active transportation pathways, specifically in getting students and faculty from main campus down to the Collaborative Life Sciences building in South Waterfront. The university is committed to enabling students and faculty to walk and ride to campus and will be a partner in implementing the necessary multi-modal improvements.



PORTLAND STATE UNIVERSITY

OPEN SPACE AND REDEVELOPMENT SITES

PSU VIKINGS PAVILION

Image courtesy of Next Portland

The Peter W Stott Center is being converted into the Vikings Pavilion and Education Center. The facility will consist of a 5,500 seat pavilion for games, public events, lectures, concerts as well as classroom, tutoring spaces. Similar to the Collaborative Life Sciences Building, the facility will be used by both PSU and OHSU. The Vikings Pavilion is located on the southern edge of the PSU Park Blocks.

PSU SCHOOL OF BUSINESS ADMINISTRATION EXPANSION

Image courtesy of Benisch Architekten

The PSU School of Business Administration is getting proposing a renovation of their existing facility in addition to an expansion. The new addition will have retail spaces along SW 6th Ave. and SW Broadway Ave.

SW 4TH AVE STUDENT HOUSING DEVELOPMENT

Image courtesy of Koz Development

Currently in the pre-application phase, Koz Development is proposing an 8 story, 110 unit student housing development on SW 4th Avenue across the street from the University Place site.

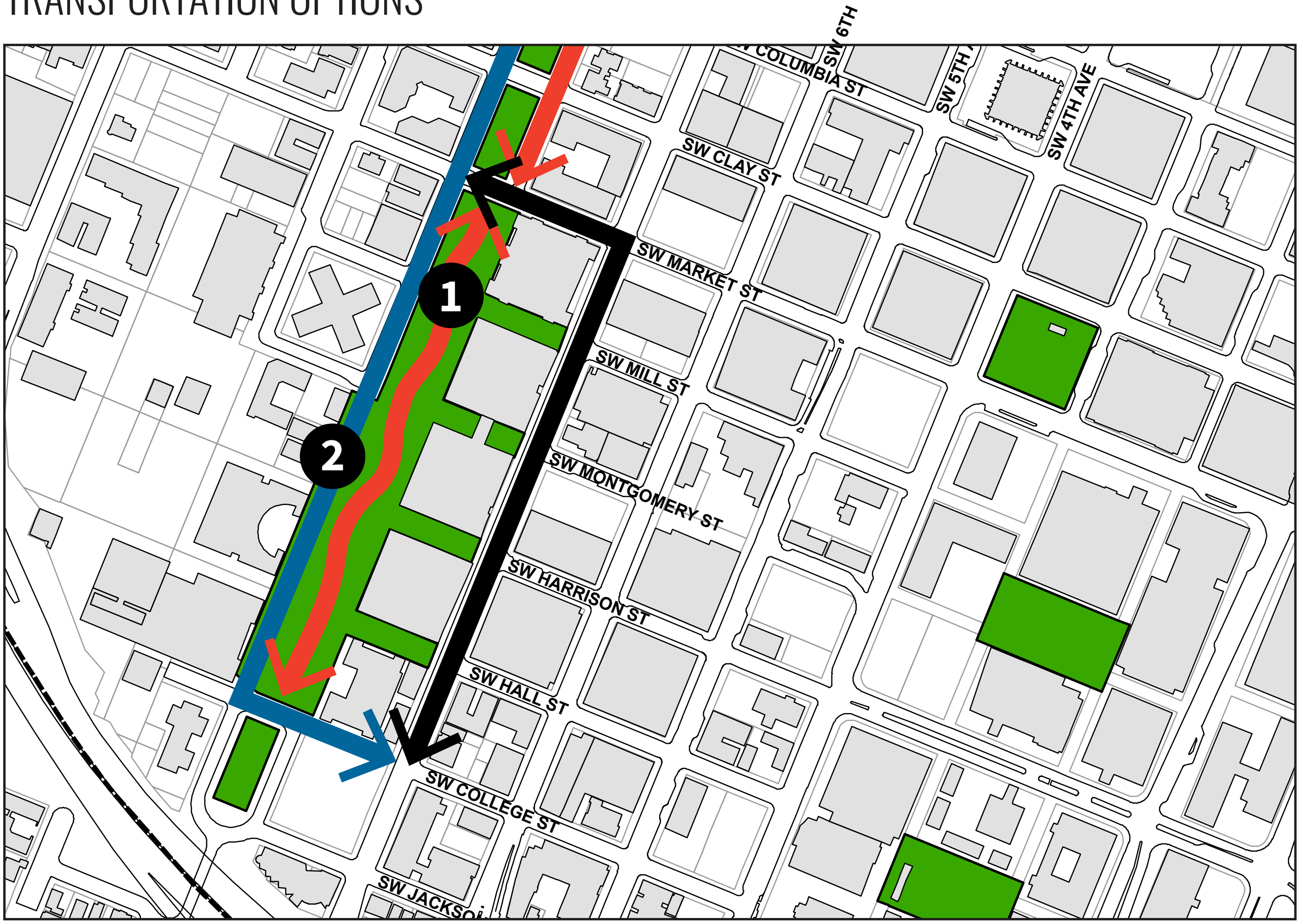
SW MARKET ST STUDENT HOUSING DEVELOPMENT

Image courtesy of Sera Architects

A series of apartments designed by SERA Architects are under construction on the 3/4 block on SW Market St. and SW 12th Ave. The developments which range from 8-10 stories are oriented for PSU students.

PORTLAND STATE UNIVERSITY

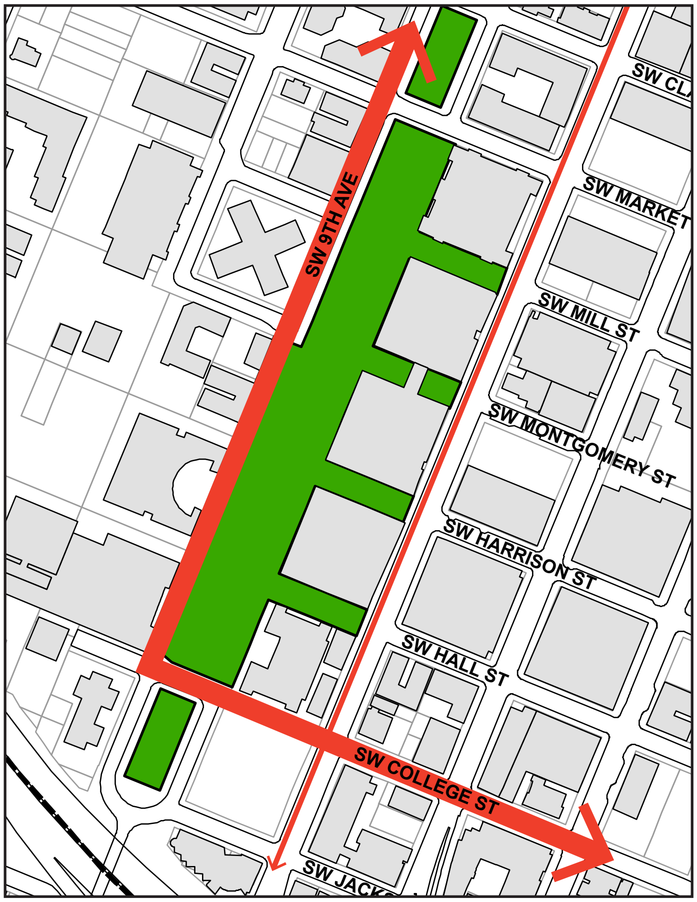
TRANSPORTATION OPTIONS



PSU park blocks span from SW Market St to SW Jackson St. Beginning at SW Market St, SW Park Ave prohibits vehicular access and becomes a pedestrian only path. SW 9th Ave maintains southbound vehicular access until SW Montgomrery St at which point it becomes a pedestrian path. The road width of SW 9th Ave from SW Market St to SW Montgomery St is 26' width consisting of 1 travel lane (10'), 2 lanes of parking on either side (8'). The ROW width is 42' with a 12' sidewalk on west side of the street and a 5' sidewalk adjoining the park blocks. The width of the pedestrian path spans 25' wide with the academic buildings substantially set back from the property line.

A potential conflict would be how the Green Loop facility contends with campus activities such as the Saturday farmer's market.

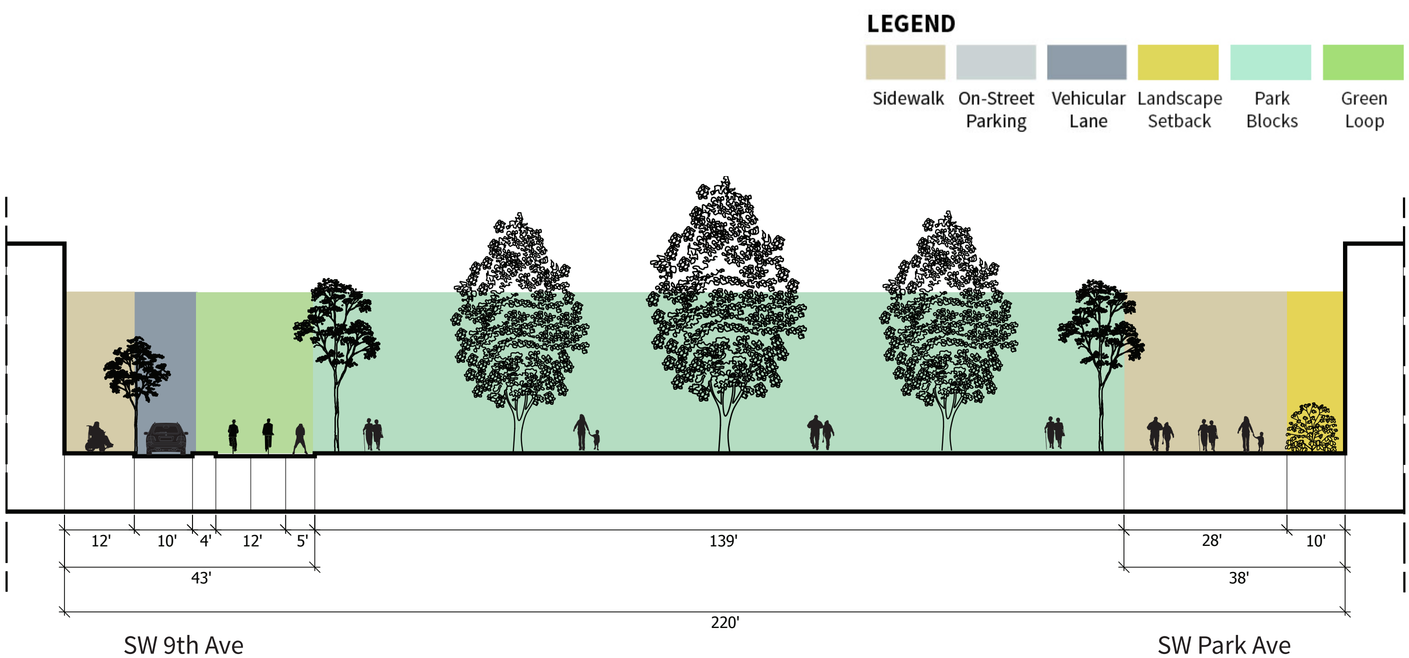
Alternative 1: Green Loop on SW 9th Ave



Alternative 4 Map

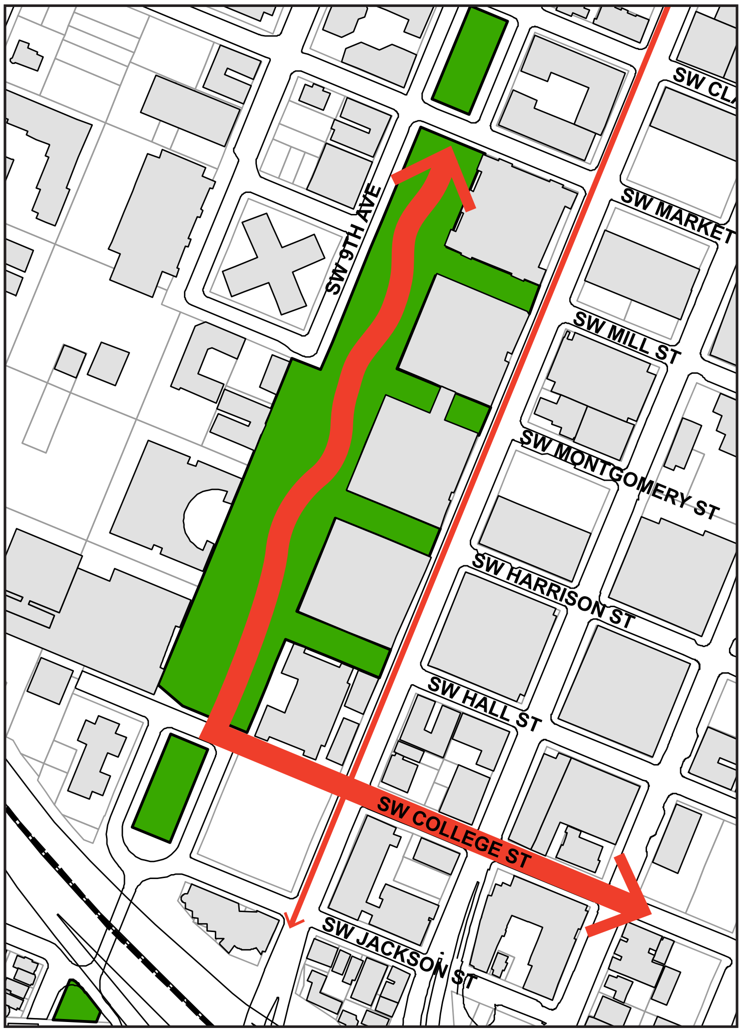
Alternative Summary:

Alternative 1 designates SW 9th Ave as the major Green Loop alignment. The street configuration from SW Market St to SW Montgomery St consists of a 2-way cycle track (14'), one travel lane (14'), and a 12' sidewalk on the west side of the street. The 5' sidewalk adjoining the park block will be converted to a jogging path. Pedestrians continue to walk through the central path within the park blocks or on the Park Avenue pedestrian path. After SW Montgomery St, the 2-way cycle track and jogging path continues and the travel lane gets converted into a pedestrian pathway.



59615

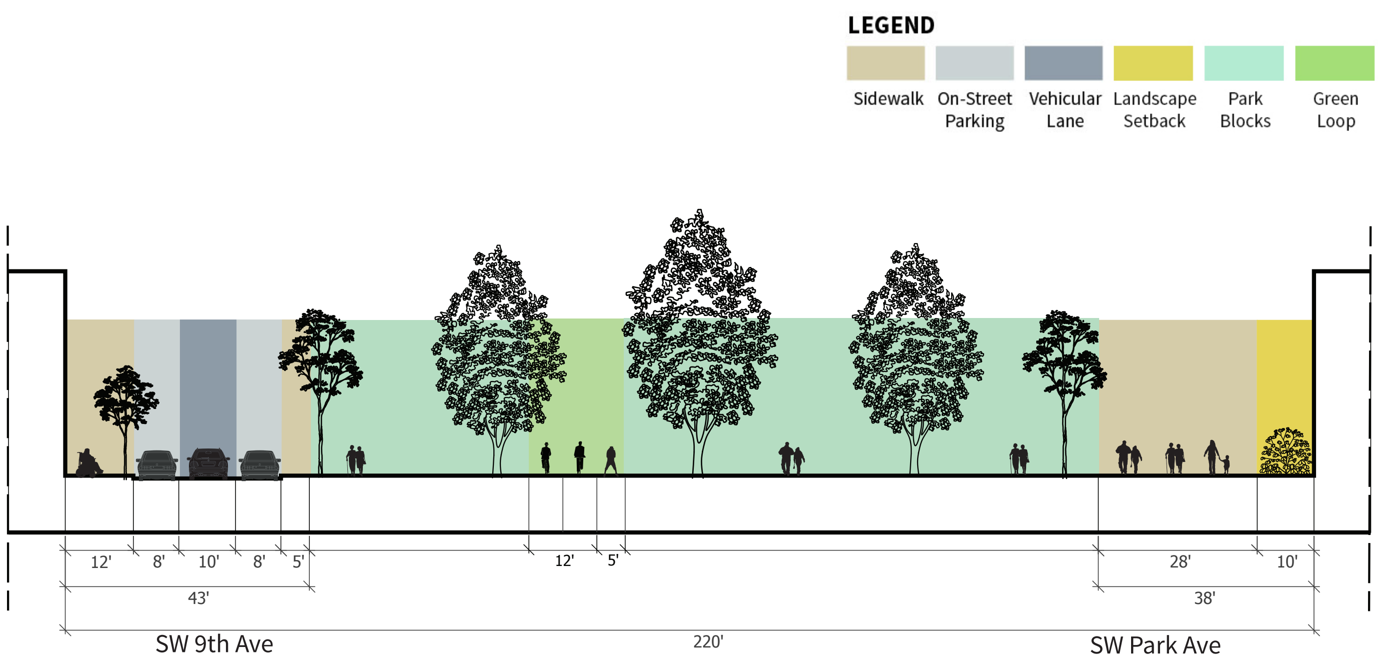
Alternative 2: Central Path through PSU Park Blocks



Alternative 4 Map

Alternative Summary:

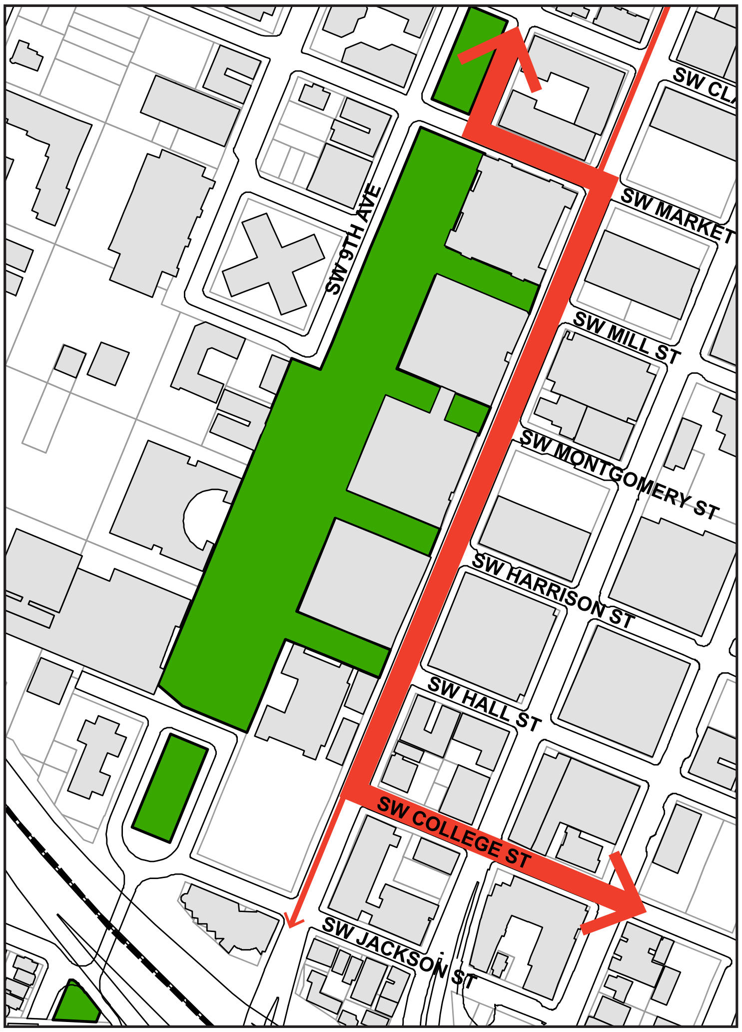
Alternative 2 proposes weaving the Green Loop alignment through the PSU Park Blocks. This alternative is contingent upon the future redesign of the Park Blocks which will be a joint project with PSU and Parks and Recreation. The alignment will need to find a way to integrate a 2-way cycle track (14') and a designated jogging path (5') with the various pedestiran pathways needed for the student body.



Section of Green Loop couplet on SW Park Ave and SW 8th Ave looking north

59616

Alternative 3: Green Loop on SW Broadway Ave

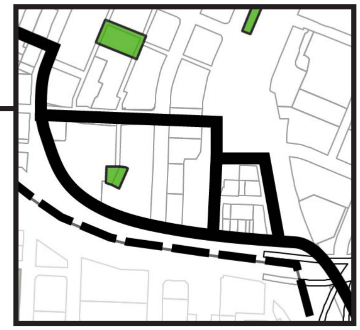


Alternative 4 Map

Alternative Summary:

Alternative 3 proposes shifting the Green Loop alignment from the Park Blocks over to SW Broadway Ave. A two-way cycle track (14') with a rolled curb can be accomodated while maintaining both lanes of parking (8') with the removal of one travel lane and the existing bike lane. SW Market St will need to be configured in order to accomodate Green Loop facilities, vehicular traffic, and street car.

SOUTH DOWNTOWN



EVALUATION SUMMARY

Existing Conditions:

Opportunities:

1. District has excellent transit access with connections to the new Orange Line, Street Car.
2. Close proximity to the historic Halprin Sequence, high density residential towers, South Auditorium office core, and future expansion of the PSU Campus.
3. District has significant redevelopment potential, specifically at the University Place site.
4. SW College St. is considered a PSU main street and has active retail edges and heavy pedestrian traffic.

Constraints:

1. High volume traffic streets and clustering of different transit options can lead to unwelcoming environment for cyclists and pedestrians.
2. Lack of visibility/surveillance on parts of the district whould leads to unsafe conditions.
3. Substantial grade change from PSU to South Waterfront.

Open Space:

Opportunities:

1. Close proximity to Halprin Sequence, Duniway Park.
2. Repurpose excess ODOT right-of-way adjacent to I-405 into a multi-use path.
3. Underutilized PBOT/ODOT properties along SW Naito Pkwy can be repurposed into open space.
4. SW Caruthers St./SW Grant St. slated for proposed hill park.
5. SOMA Parklet and popular food carts on SW 4th Ave.

Constraints:

1. Lack of visibility/active ground floor conditions could lead to unsafe conditions.
2. Inconsistent tree coverage

Redevelopment Sites:

Opportunities:

1. University Place site is slated for major redevelopment with potential student and senior housing, PSU academic facilities and university affiliated hotel.
2. The International School is in the process of expanding on their existing campus with new academic facilities and open spaces.
3. A new Hyatt hotel and affordable housing complex are slated for construction in the Riverplace neighborhood.

Transportation Options:

Opportunities:

1. Close proximity to high capacity transit, the new Tilikum Crossing, and the proposed future BRT line.
2. Proposed new crossings at SW 1st Ave. and SW Naito Pkwy.
3. Opportunity for a future Lombard St. open space on either SW Caruthers St. or SW Grant St.

Constraints:

1. Narrow ROW width for Green Loop facilites on SW Lincoln St.
2. Heavy traffic volumes on SW Naito Pkwy can lead to unpleasant conditions for cyclists, pedestrians.

59619

SOUTH DOWNTOWN

OPEN SPACE AND REDEVELOPMENT SITES

UNIVERSITY PLACE REDEVELOPMENT

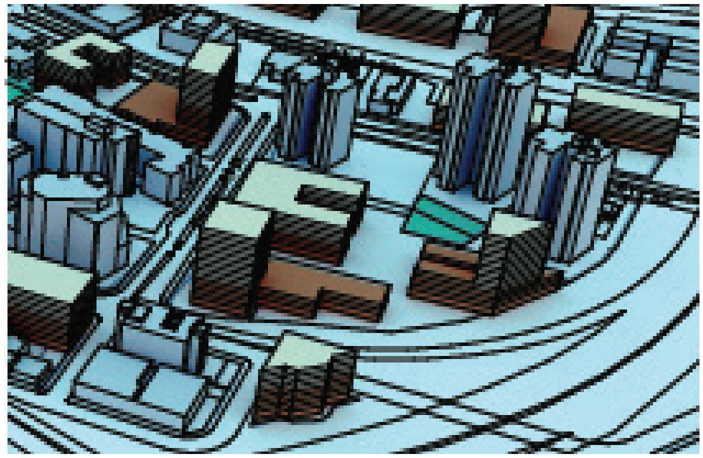


Image courtesy of University Place Hotel

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THE INTERNATIONAL SCHOOL EXPANSION

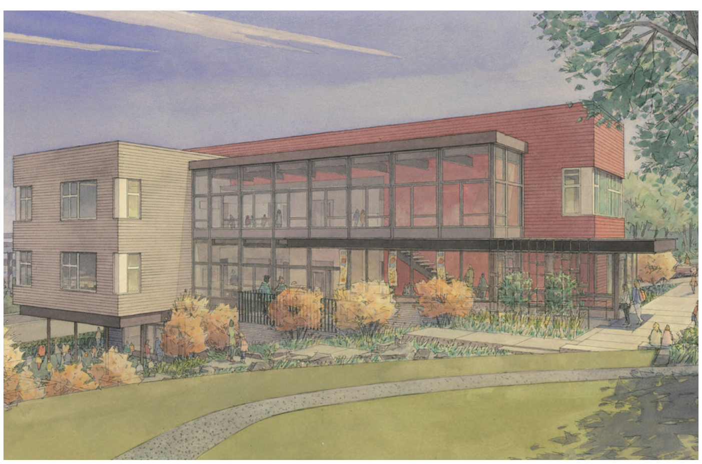

Image courtesy of Mahlum Architects

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59620

RIVERPLACE AFFORDABLE HOUSING

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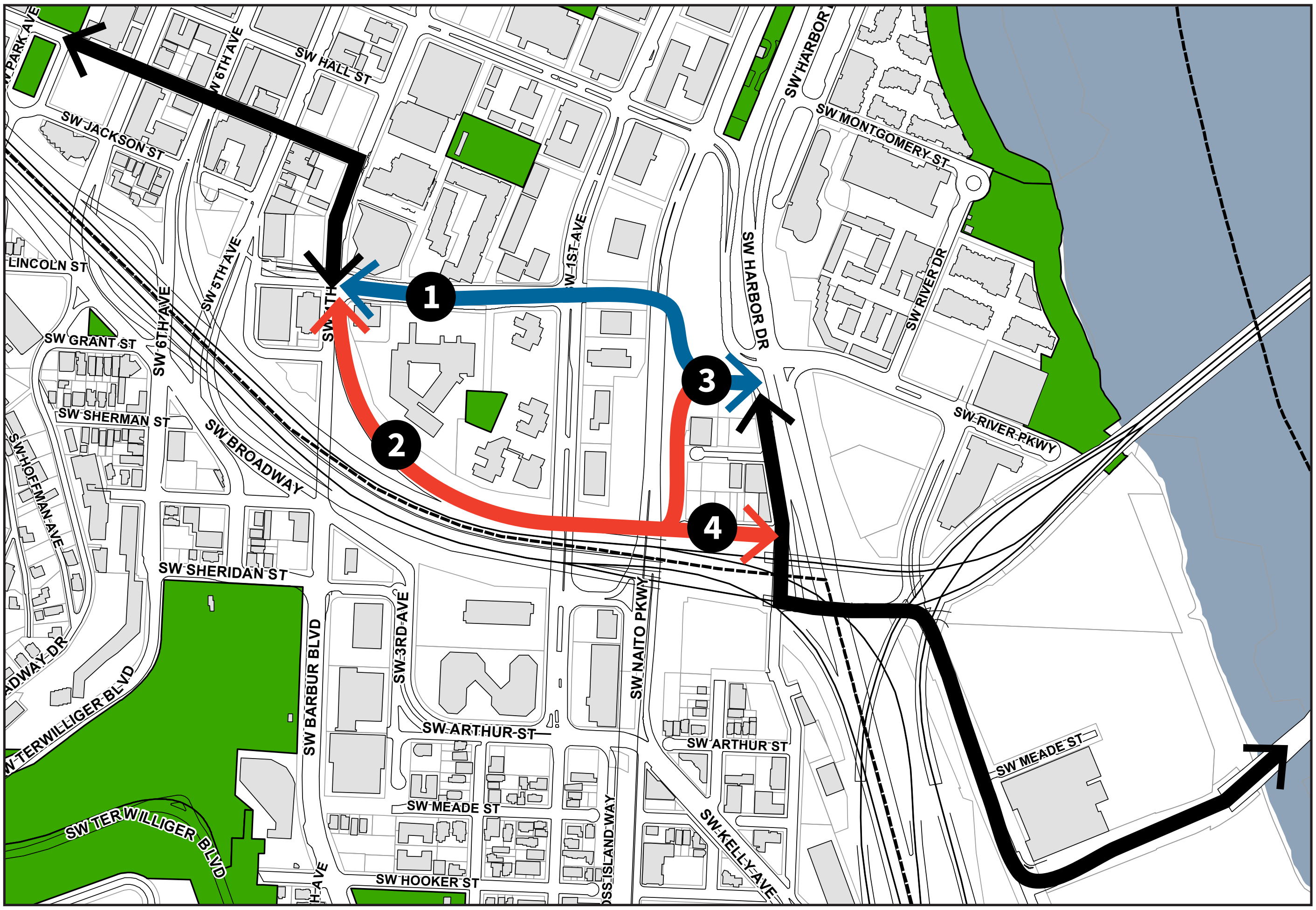
RIVERPLACE: HYATT HOUSE

Image courtesy of TVA Architects

[Text Needed]

SOUTH DOWNTOWN

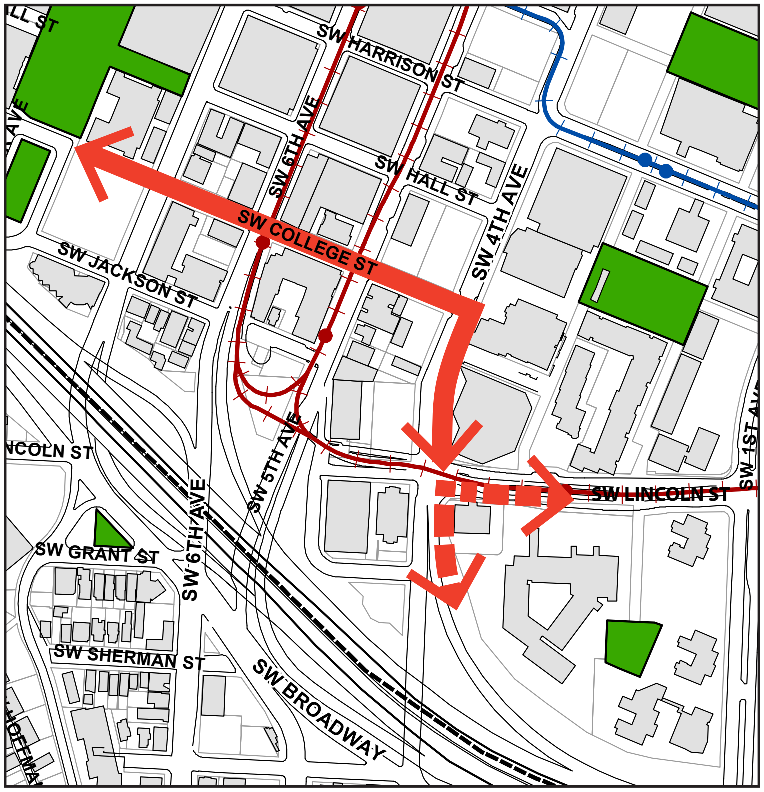
TRANSPORTATION OPTIONS



This segment addresses the challenge of how pedestrians and cyclists will be able to maneuver from SW College St east to SW Naito Pkwy. There are currently two potential green loop routes to get through this segment, reconfiguring SW Lincoln St to accomodate Green loop facilitates or utilize ODOT owned properties on the backside of the University Place Hotel site and create an I-405 multi-use path. Potential conflict areas include: contending with the impending influx of transit activity along SW Lincoln with the new MAX Orange Line, existing bus transit, and a potential new BRT line, creating safe crossings for SW 1st Ave and SW Naito Ave, and creating a safe and comfortable route at all times of day for areas that do not have high visibility.

Segment D addresses the challenge of how pedestrians and cyclists will move from SW Naito Pkwy down to the Tillikum Crossing. The steep elevation change from SW Naito Pkwy down to the Tillikum Crossing is the biggest challenge. All the potential alignments for this segment will require extensive regrading of the right-of-way in order to provide a safe and enjoyable experience. There are existing bike lanes on SW Harrison St heading east which connects cyclists to SW River Pkwy and the new multi-use path underneath the harbor drive overpass. Safety issues have arisen regarding the SW Harbor Drive path due to lack of visibility and lack of constant activity. There is an existing raised 2-way cycle track on SW Moody Ave which provides cyclists with the option of crossing the river on Tillikum Crossing or continuing into South Waterfront.

Alternative 1: SW College St to SW 4th Ave



Alternative 1 Map

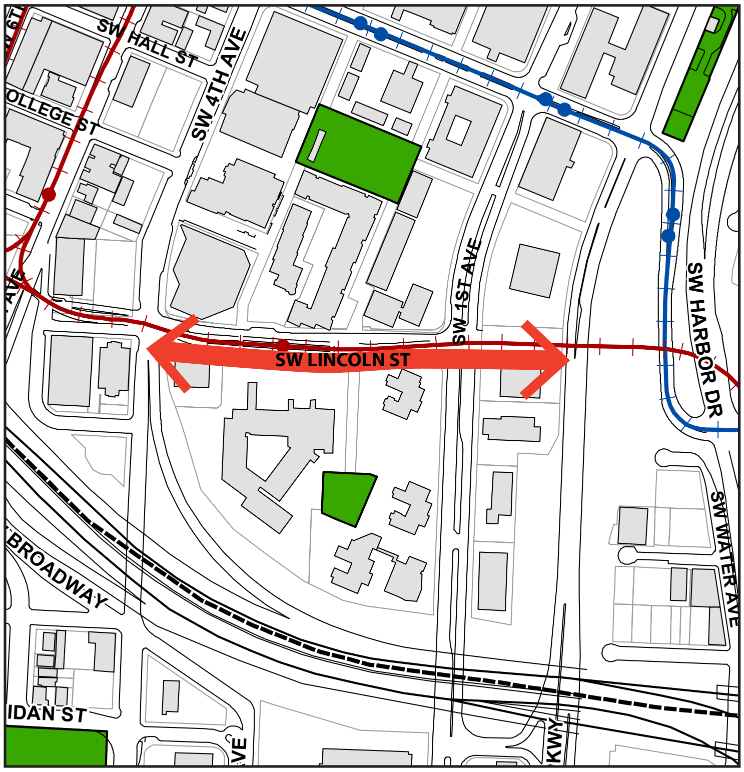
Alternative Summary:

Alternative 1 proposes moving the Green Loop alignment onto SW College St. A two-way cycle track (14') with a rolled curb can be accomodated while maintaining both travel lanes and removing one lane of parking. The alignment will then turn onto the east side of SW 4th Ave.

SOUTH DOWNTOWN

TRANSPORTATION OPTIONS

Alternative 2: Green Loop on SW Lincoln

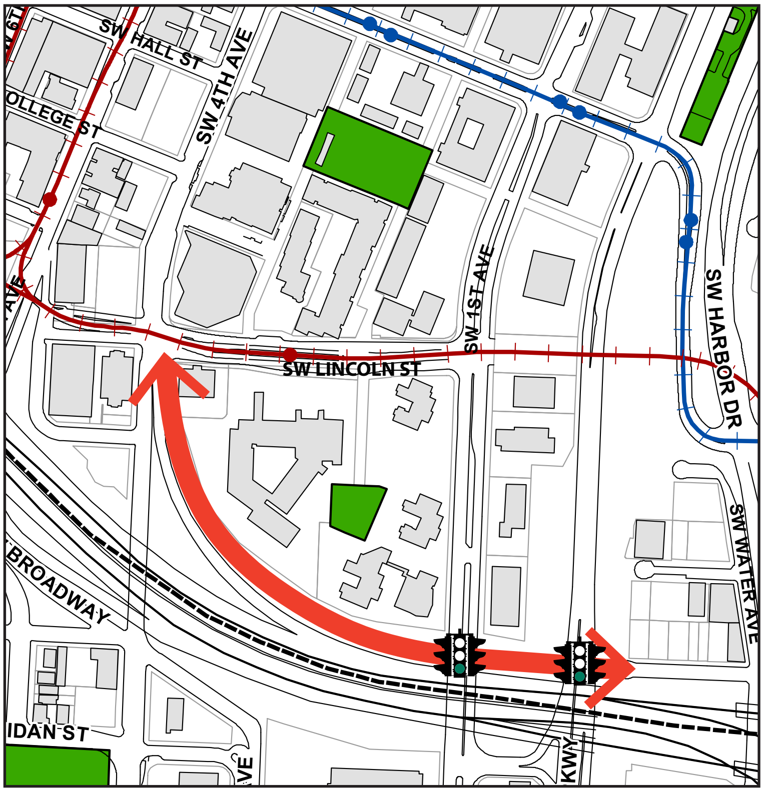


Alternative 2 Map

Alternative Summary:

Alternative 2 proposes the Green Loop to move along a 2-way cycle track on SW 4th Ave and subsequently turn onto the southern side of SW Lincoln St. Currently, SW Lincoln St is a two-way street with the MAX Orange Line situated in the center of the street. The single travel lane splits into two turning lanes when approaching boh SW 1st Ave and SW 4th Ave. SW Lincoln St is the most direct route and also provides openness and high visibility on the street. However, due to the narrow street width and the constraints of the new MAX line, it would be difficult to accomodate the Green Loop facility and would require substantial reconfiguration of the existing streetscape. In order to gain the necessary width for a 2-way cycle track, it would require partnering with PSU to negotiate a building setback on the University Place Redevelopment site as well as merging the two turning lanes when approaching SW 1st Ave.

Alternative 3: Green Loop on I-405 Trail



Alternative 2 Map

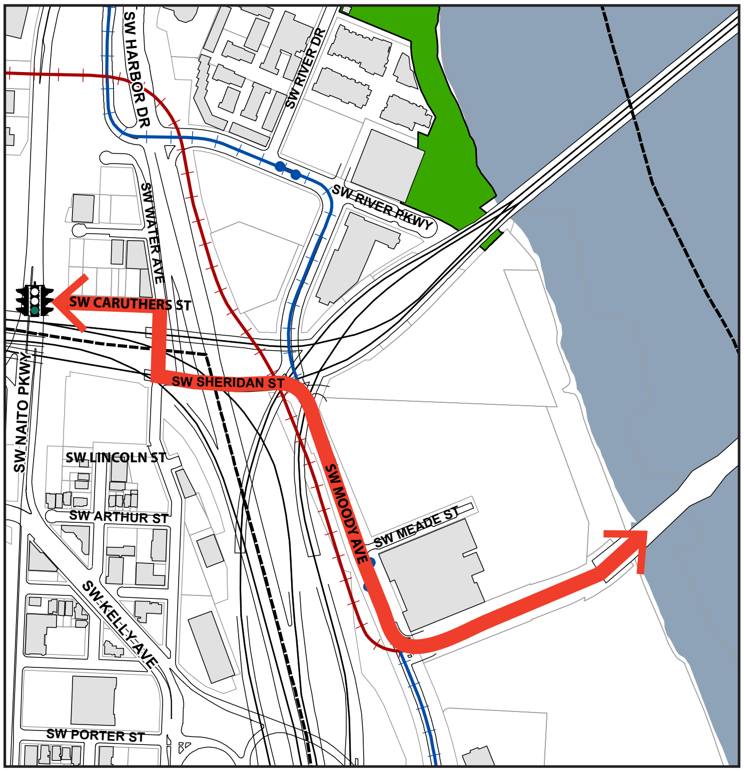
Alternative Summary:

Alternative 3 proposes the Green Loop to move along a 2-way cycle track on SW 4th Ave and transition onto current ODOT owned property situated in between US I-405 and the University Place redevelopment site and the American Plaza Towers. There would need to be signalized improvements at the intersection of SW Lincoln St and SW 4th Ave as well as at SW 1st Ave, and SW Naito Pkwy to ensure safe crossing. Additionally, the trail is not currently paved and will require construction including regrading, clearing of excess shrubbery, and providing proper fencing between the trail and the highway.

SOUTH DOWNTOWN

TRANSPORTATION OPTIONS

Alternative 4: I-405 Trail to SW Caruthers St

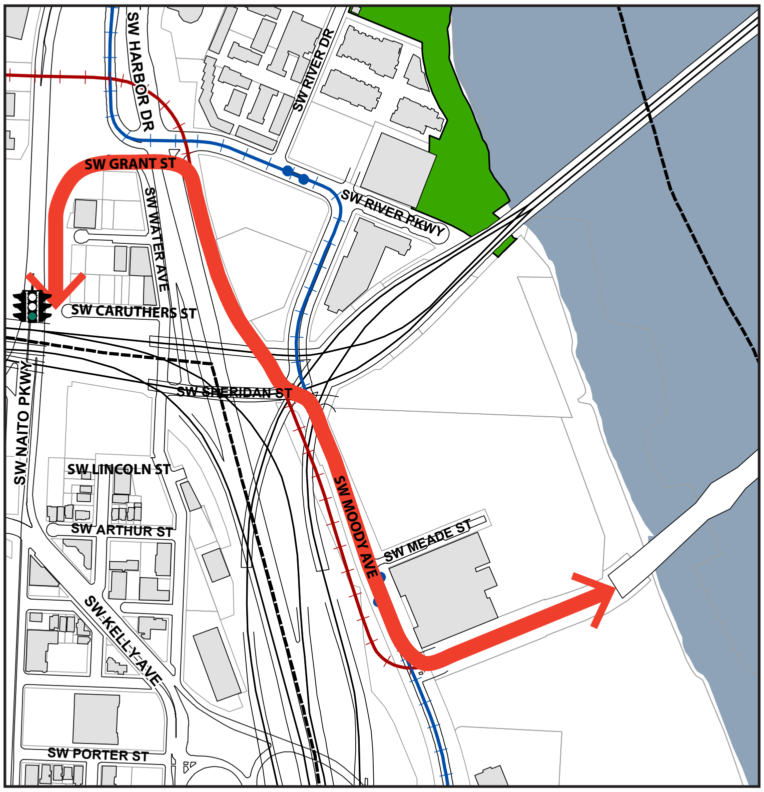


Alternative 2 Map

Alternative Summary:
Alignment proposes the Green Loop to cross SW Naito Pkwy and continue on SW Caruthers ST down to SW Water Ave and SW Sheridan St where "loopers" can easily connect to the Tilikum Crossing. The proposal calls for regrading SW Caruthers ROW which is currently too steep for the "interested but concerned" demographic and exploring the creation of a Lombard Street like hill park. The hill park proposal will require civial engineering to discern whether it is feasible to create a shallow enough grade to meet ADA accessibility. Additionally, the hill park design would need to take into account the International School's curent and future access needs slated for SW Caruthers St.

59626

Alternative 5: I-405 Trail to SW Grant St



Alternative 2 Map

Alternative Summary:
Alignment proposes the Green Loop to cross SW Naito Pkwy and subsequently veer north along a strip of ROW concurrently owned by PBOT and ODOt which borders the western edge of International School property. The Green Loop would gradually descend down to SW Harbor Drive multi use path using SW Grant. Similar to SW Caruthers St, SW Grant St also has a steep drop in elevation, however, ther eis a much wider area available to regrade which could potentially create a much more gradual descent.

59627

SOUTH WATERFRONT

EVALUATION SUMMARY

South Watefront, the southern gateway to the Central City is a desnse, vibrant, walkable mixed use community. It is part of Portland's Innovation Quadrant creating a symbiotic relationship with the Central Eastside Industrial District.

Existing Conditions:

Opportunities:

1. The district is intensely urban, walkable, and mixed use - a national model for Transit Oriented Development.
2. Excellent access to transit and parks.

Constraints:

1. District was in a state of suspended development due in part to the recession.
2. Lack of ground floor active uses.

Open Space:

Opportunities:

1. Green Loop alignment in close proximity to Caruthers Park, an urban park located in the Central District of South Waterfront.
2. The first of three South Watefront Greenway segments have been completed. The North and South segments are in the planning stages.

Redevelopment Sites:

Opportunities:

1. OHSU is beginning to develop the Schnitzer Campus starting with the Collaborative Life Sciences Building.
2. Zidell Yards has started a public/private partnership to develop their property.

Transportation Options:

Opportunities:

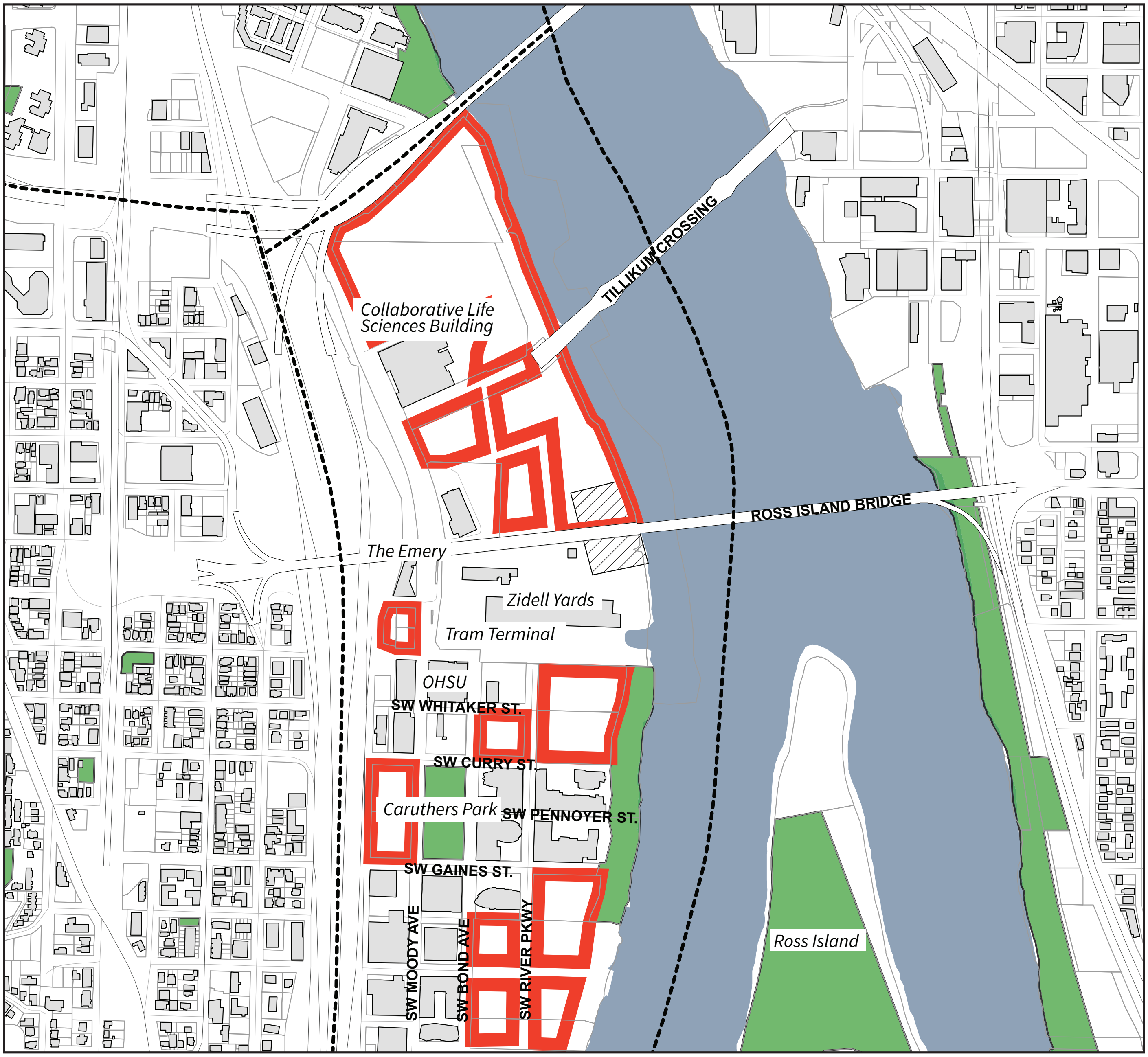
1. South Waterfront will soon be connected with the most diverse multimodal transportation network in the state.
2. Tilikum Crossing, the first multi modal bridge in the U.S. to carry all modes except for private vehicles. It will connect South Watefront to the southern triangle of the Central Eastside.
3. SW Moody Ave already has a comfortable pedestrian walkway and two-way cycle track that leads directly to the Tilikum Crossing.

59628

59629

SOUTH WATERFRONT

EXISTING CONDITIONS



Legend:

Redevelopment Sites

Attractions/Institutions

Potential Open Space Opportunities

Existing Parks

South Waterfront, the southern gateway to the Central City, is a dense, walkable transit oriented development. Historically, an industrial maritime area, it underwent a major brownfield clean up and redevelopment process in the early 2000s which led to a cluster of slim glass residential towers a la Vancouver B.C.'s Yale Town and the inception of OHSU's new medical campus. Lately, the area is in the midst of a major transformation with the expansion OHSU's Schnitzer Campus, the 33-acre Zidell Yards redevelopment site, and additional residential development mostly of the "5 over 1" building type.

The district consists of several notable attractions including the OHSU aerial tram, the recently opened South Waterfront Greenway trail, the Collaborative Life Sciences Building which provides classes for PSU, OHSU, and OSU, as well as a growing number of shops and restaurants that are making South Waterfront a desirable social destination. South Waterfront as a destination is only going to be strengthened with the development of the OHSU Schnitzer Campus and the Zidell Yards 33 acre property.

SOUTH WATERFRONT

REDEVELOPMENT SITES

OHSU CENTER FOR HEALTH AND HEALING

Image courtesy of ZGF

As part of the Knight Cancer Institute expansion, OHSU has planned two new medical facilities to be constructed in the next few years and has plans to continue outward within it's South Waterfront campus.

ZIDELL YARDS MASTERPLAN

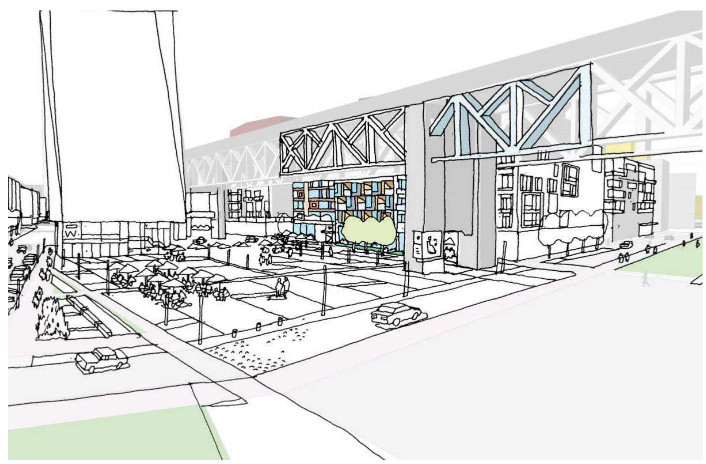


Image courtesy of ZGF

The future redevelopment of the 33-acre Zidell property could bring a new mixed use node to the Central City. The property's proximity to the Willamette provides a rare opportunity for a new development within the Central City to embrace the Waterfront.

59632

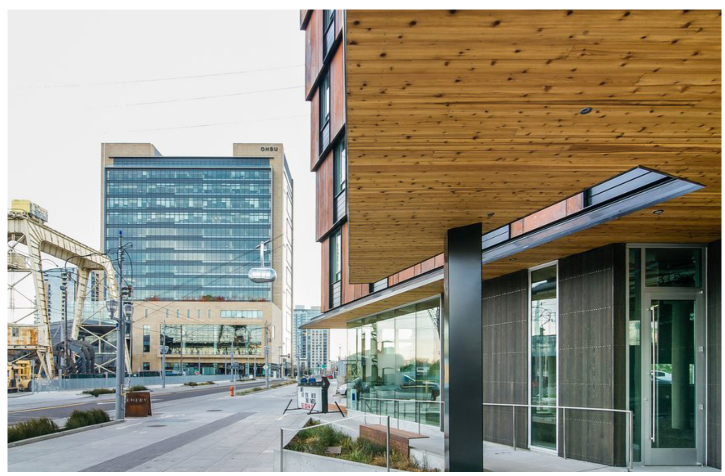
OHSU COLLABORATIVE LIFE SCIENCE BUILDING

Image courtesy of Sera

Image courtesy of OHSU

[Text Needed]

3201 SW MOODY AVE



[Text Needed]

59633

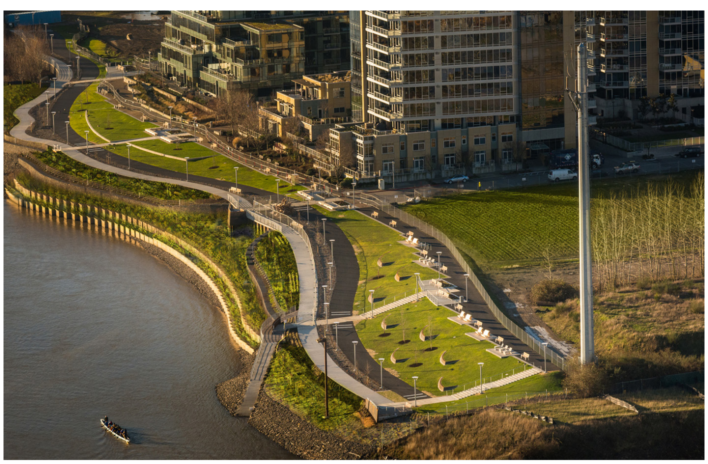
SOUTH WATERFRONT

OPEN SPACE

PROPOSED PARK FOR ZIDELL YARDS

[Text Needed]

WILLAMETTE RIVER GREENWAY TRAIL



Images courtesy of Walker Macy

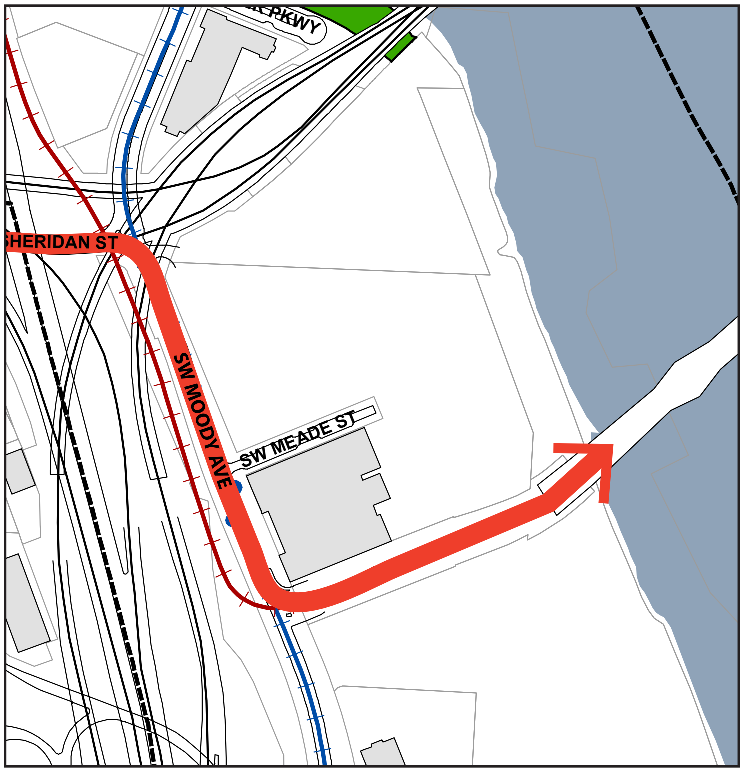
Phase 1 of the South Waterfront segment of the Willamette greenway trail has been completed, building on the existing 318 mile trail system along the east and west banks of the Willamette.

59634

SOUTH WATERFRONT

TRANSPORTATION OPTIONS

Alternative 1: SW Moody St. to Tillikum Crossing



Alternative 2 Map

Alternative Summary:

Alignment 1 proposes synching up with the existing bi-directional cycle track and wide pedestrian paths on SW Moody Ave. Pedestrians and Cyclists can choose to cross over the river using the protected lanes on the TIlikum Crossing or continue on SW Moody Ave into the central district of South Waterfront. There is an option for cyclists and pedestrians to utilize either the SW Harbor Drive multi-use path or SW Sheridan St in order to get onto SW Moody.

Green Loop Refinement Meeting

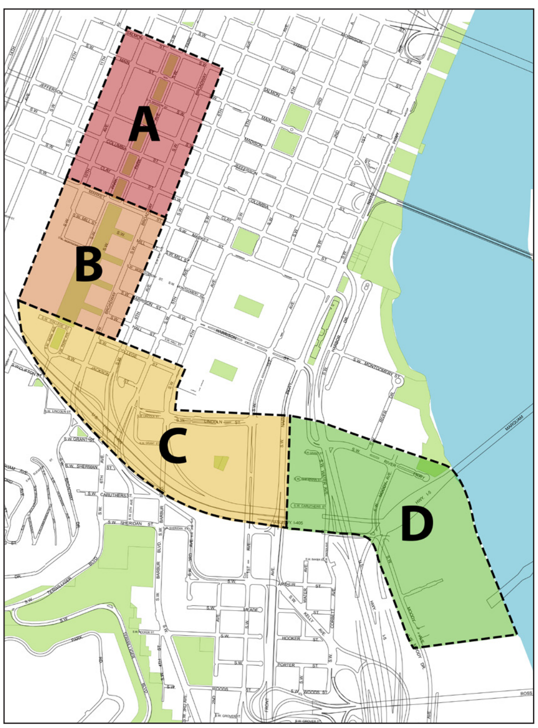
Meeting #3: April 28th, 2015 -- **SW Salmon St. to SW Moody Ave.**

Draft Summary Notes

Staff in attendance:

Mark Raggett - Bureau of Planning and Sustainability
Lora Lillard - Bureau of Planning and Sustainability
Courtney Ferris - Bureau of Planning and Sustainability
Marc Asnis - Bureau of Planning and Sustainability
Kathryn Hartinger - Bureau of Planning and Sustainability
Nicholas Starin - Bureau of Planning and Sustainability
Arnoud Van Sisseren - Portland Bureau of Transportation
Mauricio LeClerc - Portland Bureau of Transportation
Allan Schmidt - Portland Parks and Recreation
Ross Swanson - Portland Parks and Recreation
Kate Washington - Portland State University Graduate Student

The third Green Loop concept refinement meeting on April 28th, 2015 generated several concept design alternatives for multiple segments of the alignment.



Concept Alternatives Segment Map

<u>Concept Design Alternatives:</u>

Segment A: [SW Salmon to SW Market]
South Park Blocks
- Green Loop couplet on either side of the South Park Blocks.
- Designate SW Park Ave as major Green Loop route
- Designate SW 9th Ave as major Green Loop route

Segment B: [SW Market to SW College]
Portland State University Park Blocks
- Green Loop alignment continues on SW 9th Ave and moves along west side of campus.
- Green Loop alignment moves through center of PSU park blocks.

SW Broadway Ave:
- Asymetrical configuration where Green Loop is on west side of street.

Segment C: [SW College to SW Naito]
- Designate SW Lincoln St as primary alignment to SW Naito Pkwy
- Designate I-405 Multi-use path behind University Place site and American Plaza Towers as primary alignment.

Segment D: [SW Naito to SW Moody]
- I-405 Multi-use path to SW Caruthers St. to SW Water Ave. to SW Sheridan to SW Moody Ave.
- I-405 Multi-use path to SW Grant St. to SW Harbor Drive Multi Use Path to SW Moody Ave.
- SW Lincoln St. to SW Grant St. to SW Harbor Drive Multi Use Path to SW Moody Ave.

59636

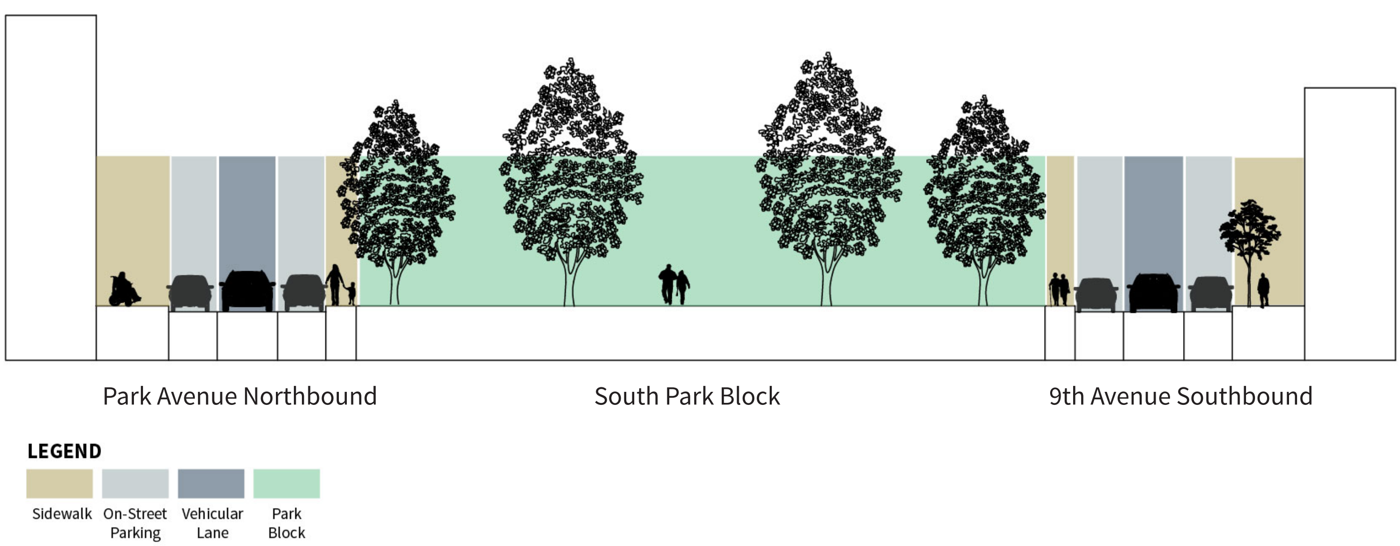
Segment A: Existing Conditions

The South Park Blocks span from SW Salmon St. to SW Market St. with SW Park Ave moving northbound and SW 9th Ave moving southbound. The road width is 26' wide consisting of 1 travel lane (10'), 2 lanes of parking on either side (8'). The ROW width is 42' with a 12' sidewalk on the outer edge of the street and a 5' sidewalk adjoining the park block.

The potential conflict areas occur at the intersections where there is heavy cross traffic on several east-west streets. SW Jefferson St. and SW Columbia St. will become more congested with the addition of future BRT lines and stations.

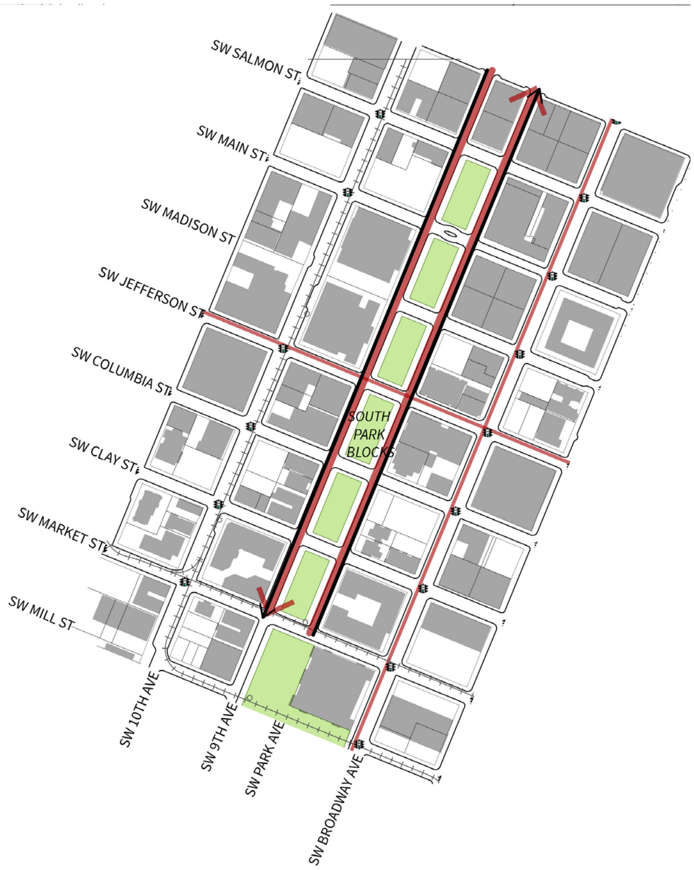
Existing Conditions Map

Photo of SW Park Ave and South Park Blocks



Section of existing conditions on SW Park Ave and SW 9th Ave looking south

Segment A / Alternative 1: Midtown Blocks Couplet



LEGEND

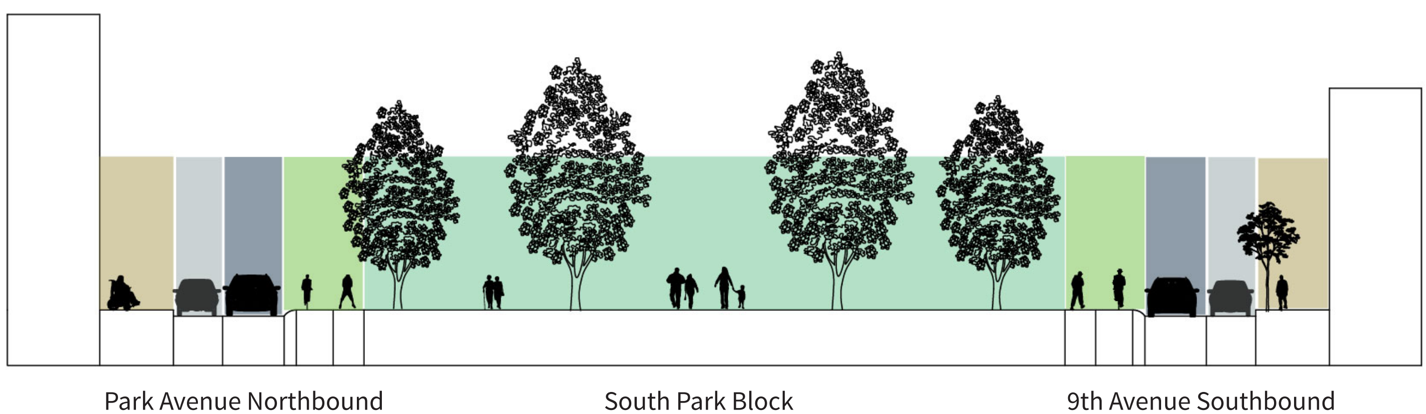
Bike/Pedestrian | Traffic Signal | Parks and Open Spaces | Street Car

Proposed Bike/Pedestrian | Vehicle/Parking

Segment A / Alternative 1 Plan

Alternative Summary:

Alternative 1 calls for a couplet along SW 9th Ave. and SW Park Ave. which will provide Green Loop facilities on both sides of the South Park Blocks. The alignment continues from the midtown blocks crossing SW Salmon St. which is designated as a Green Loop east-west connection. Both streets will then consist of a single cycle track (6') with a rolled curb, one travel lane (12'),a parking lane (8'), and a 12' sidewalk on the outer edges. The 5' sidewalk adjoining the park block will be converted to a jogging path. Pedestrians will be directed to walk through the central path within the park blocks.



LEGEND

Sidewalk | On-Street Parking | Vehicular Lane | Park Block | Green Loop

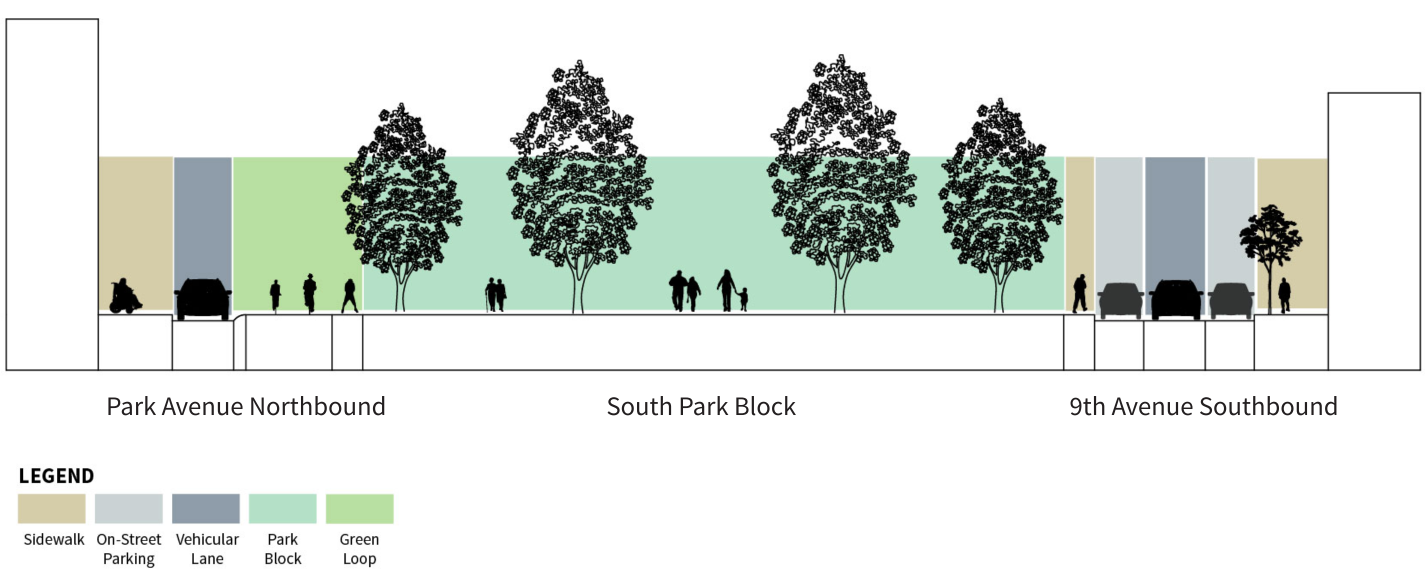
Section of Segment A / Alternative 1 on SW Park Ave and SW 9th Ave looking south

Segment A / Alternative 2: Green Loop on SW Park

Segment A / Alternative 2 Plan

Alternative Summary:

Alternative 2 designates SW Park Ave. as the major Green Loop alignment. The street configuration from SW Salmon St to SW Market consists of a 2-way cycle track (14'), one travel lane (14') and a 12' sidewalk on the east side of the street. The 5' sidewalk adjoining the park block will be converted to a jogging path. Pedestrians will continue to walk through the central path within the park blocks.



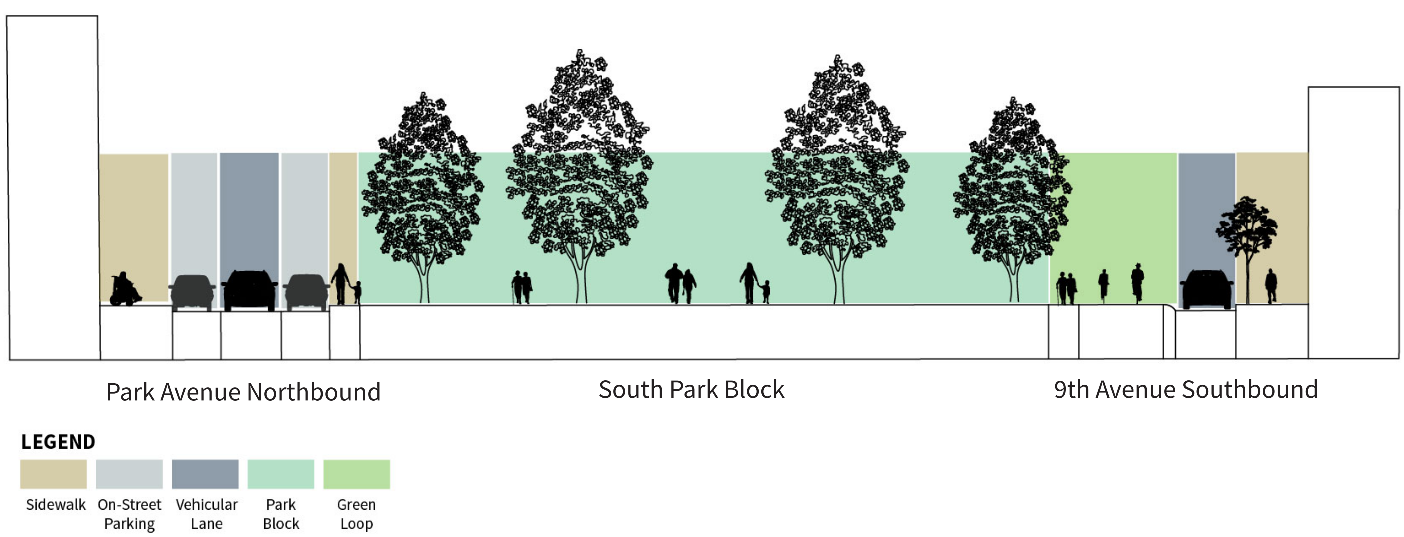
Section of Segment A / Alternative 2 on SW Park Ave and SW 9th Ave looking south

Segment A / Alternative 3: Green Loop on SW 9th

Segment A / Alternative 3 Plan

Alternative Summary:

Alternative 3 designates SW 9th Ave. as the major Green Loop alignment. The street configuration from SW Salmon St. to SW Market St. consists of a 2-way cycle track (14’) with a rolled curb, one travel lane (14’), and a 12’ sidewalk. Pedestrians will continue to walk through the central path within the park blocks.



Section of Segment A / Alternative 3 on SW Park Ave and SW 9th Ave looking south

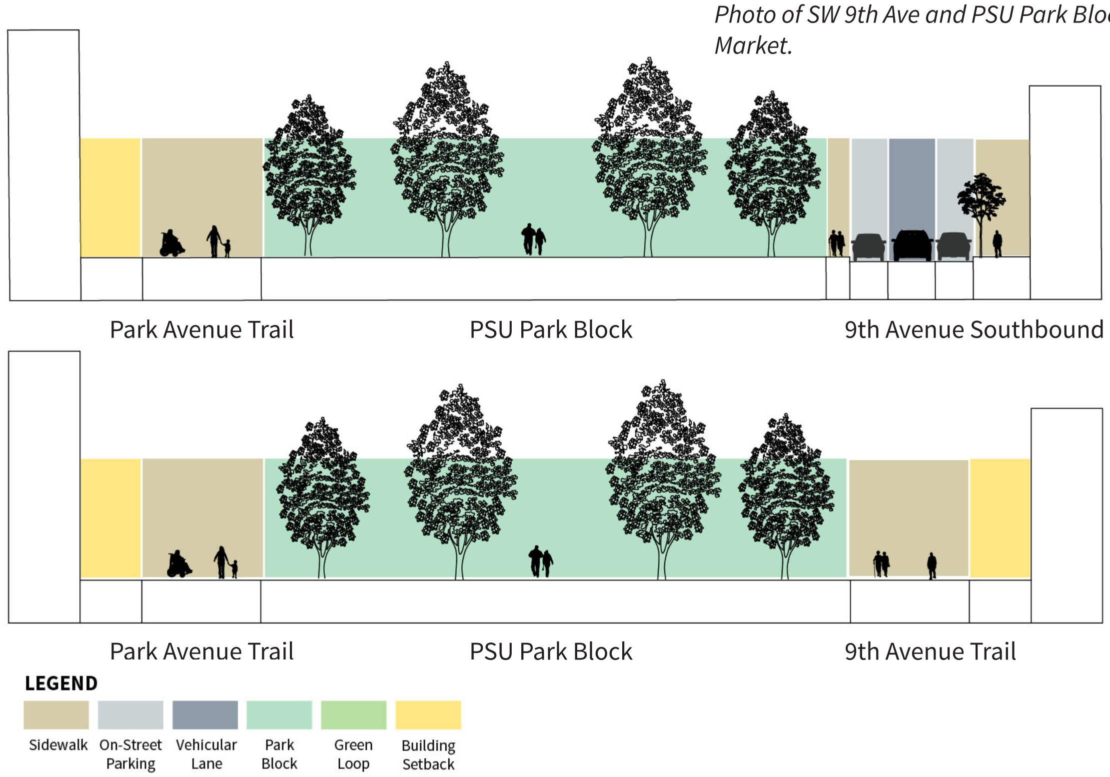
Segment B: Existing Conditions

Existing Conditions Map

PSU Park Blocks span from SW Market St to SW Jackson St. Beginning at SW Market, SW Park Ave prohibits vehicular access and becomes a pedestrian only path. SW 9th Ave maintains southbound vehicular access until SW Montgomery St. at which point it becomes a pedestrian path. The road width of SW 9th Ave from SW Market St to SW Montgomery St. is 26' wide consisting of 1 travel lane (10'), 2 lanes of parking on either side (8'). The ROW width is 42' with a 12' sidewalk on west side of the street and a 5' sidewalk adjoining the park blocks. The width of the pedestrian path spans 25' wide with the academic buildings substantially setback from the property line.

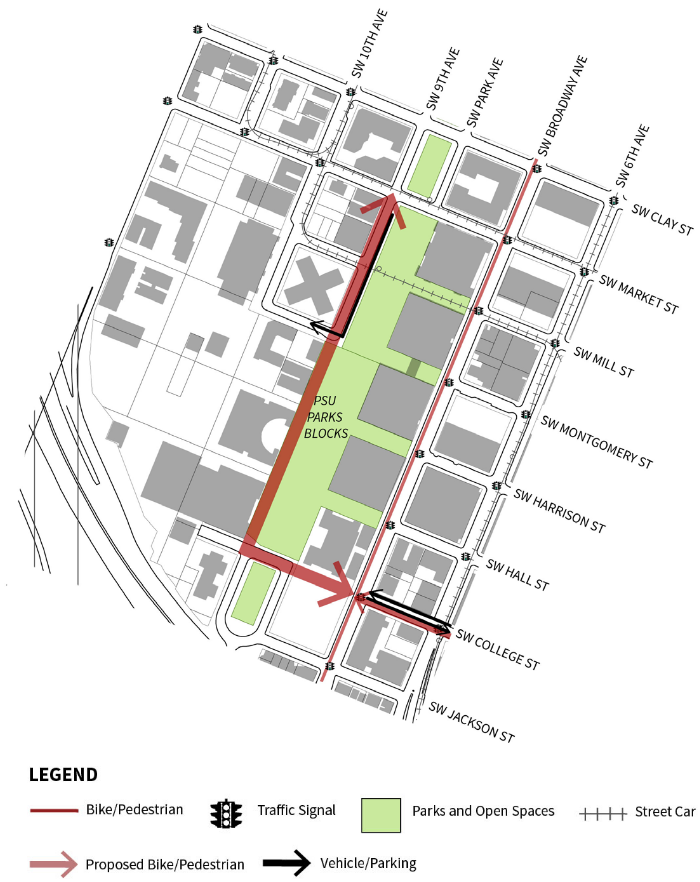
A potential conflict would be how the Green Loop facility contends with campus activities such as the Saturday farmer's market.

Photo of SW 9th Ave and PSU Park Blocks during the Saturday Market.



Section of Segment B / Existing Conditions on SW Park Ave and SW 9th Ave looking south

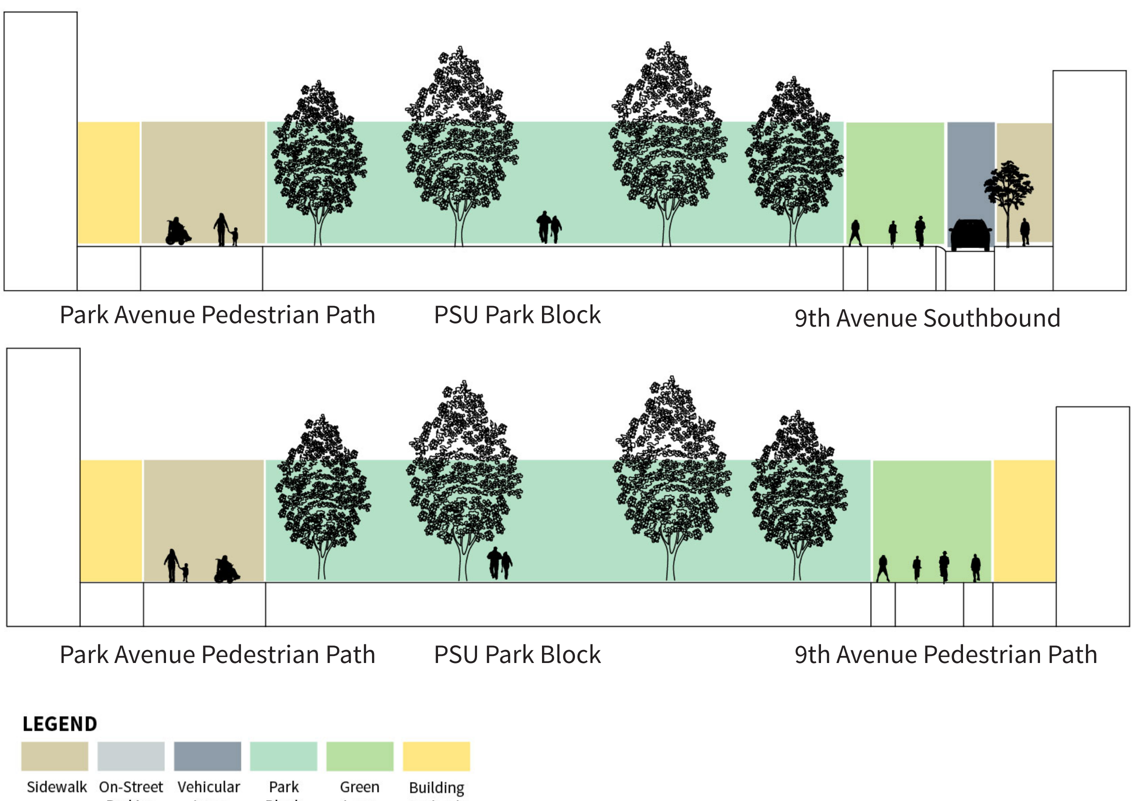
Segment B / Alternative 1: Green Loop on SW 9th Ave



Segment B / Alternative 1 Plan

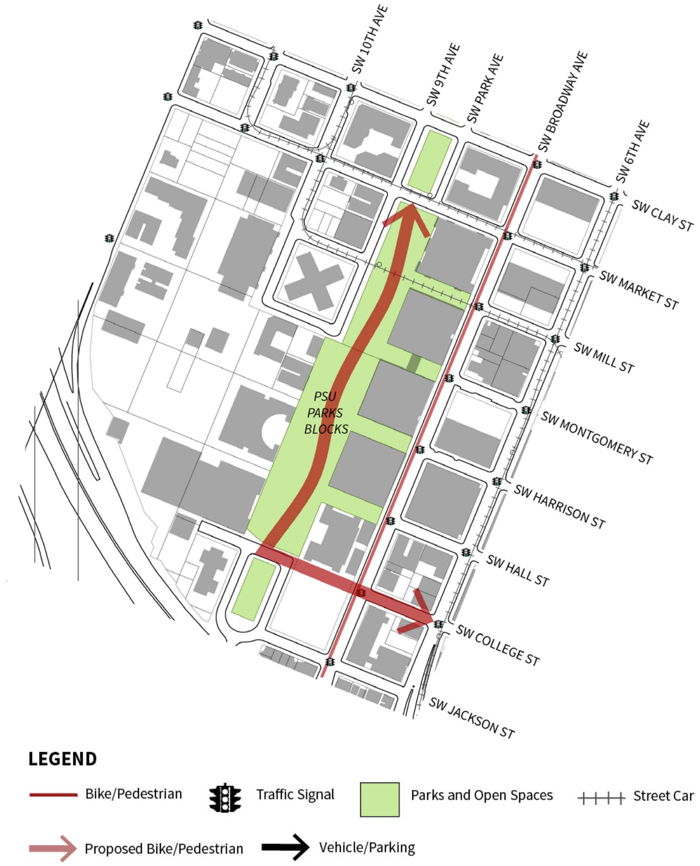
Alternative Summary:

Alternative 1 designates SW 9th Ave. as the major Green Loop alignment. The street configuration from SW Market St to SW Montgomery St consists of a 2-way cycle track (14'), one travel lane (14'), and a 12' sidewalk on the west side of the street. The 5' sidewalk adjoining the park block will be converted to a jogging path. Pedestrians continue to walk through the central path within the park blocks or on the Park Avenue pedestrian path. After SW Montgomery St., the 2-way cycle track and jogging path continues and the travel lane gets converted into a pedestrian pathway.



Section of Segment B / Alternative 1 on SW Park Ave and SW 9th Ave looking south

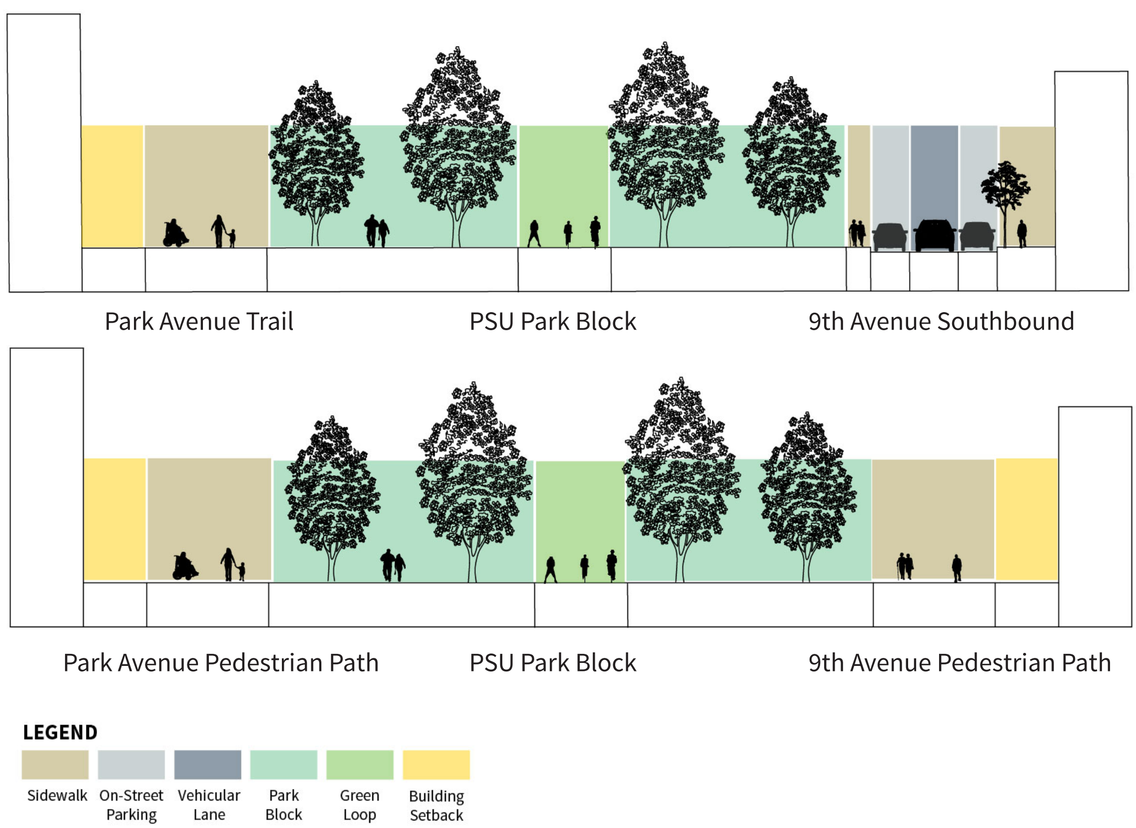
Segment B / Alternative 2: Central Path through PSU Park Blocks



Segment B / Alternative 2 Plan

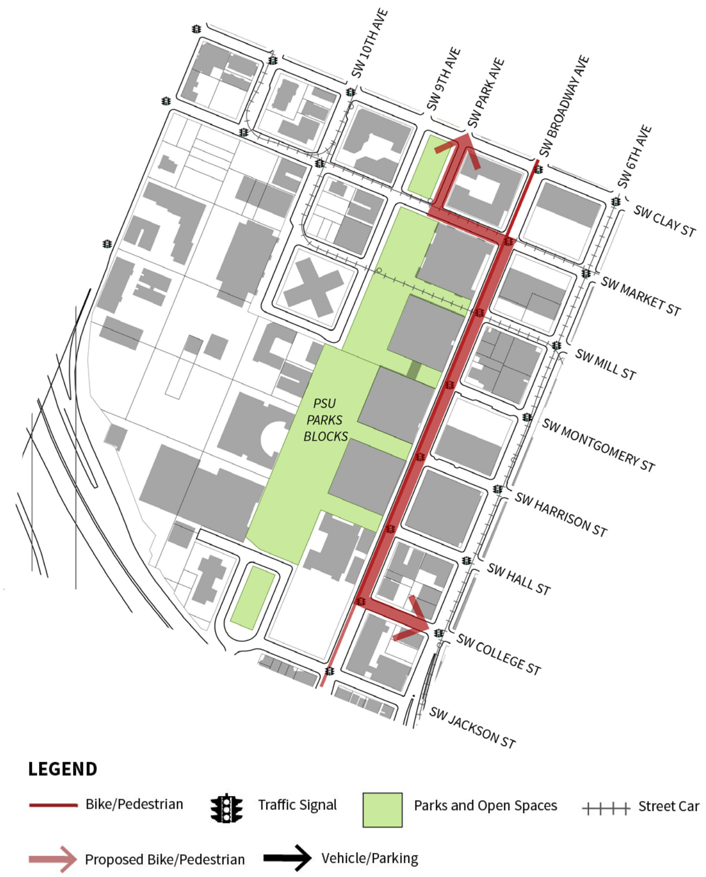
Alternative Summary:

Alternative 2 proposes weaving the Green Loop alignment through the PSU Park Blocks. This alternative is contingent upon the future redesign of the Park Blocks which will be a joint project with PSU and Parks and Recreation. The alignment will need to find a way to integrate a 2-way cycle track (14') and a designated jogging path (5') with the various pedestrian pathways needed for the student body.



Section of Segment B / Alternative 2 on SW Park Ave and SW 9th Ave looking south

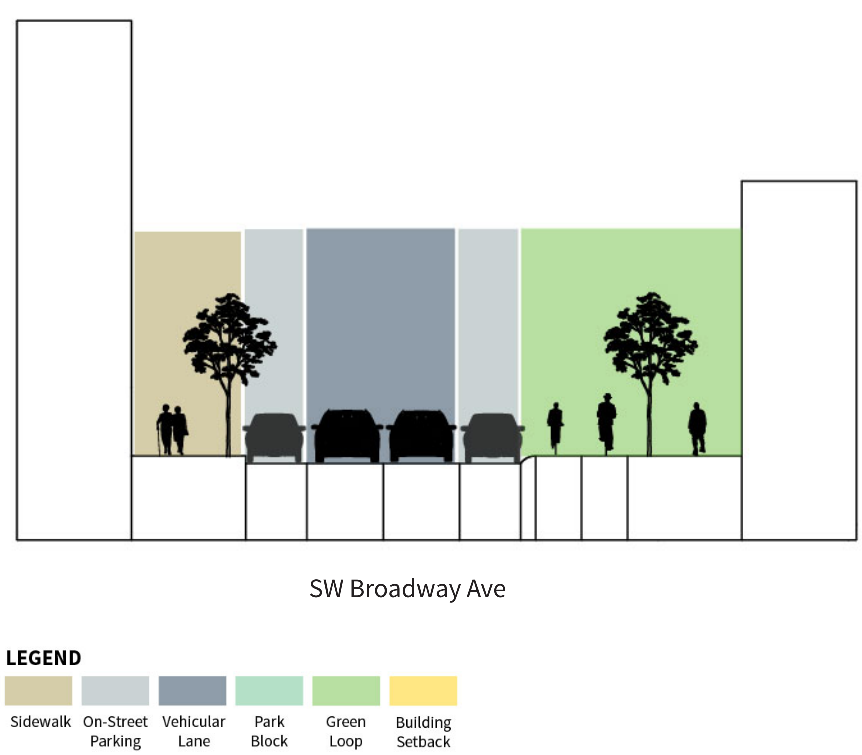
Segment B / Alternative 3: Green Loop on SW Broadway Ave



Segment B / Alternative 2 Plan

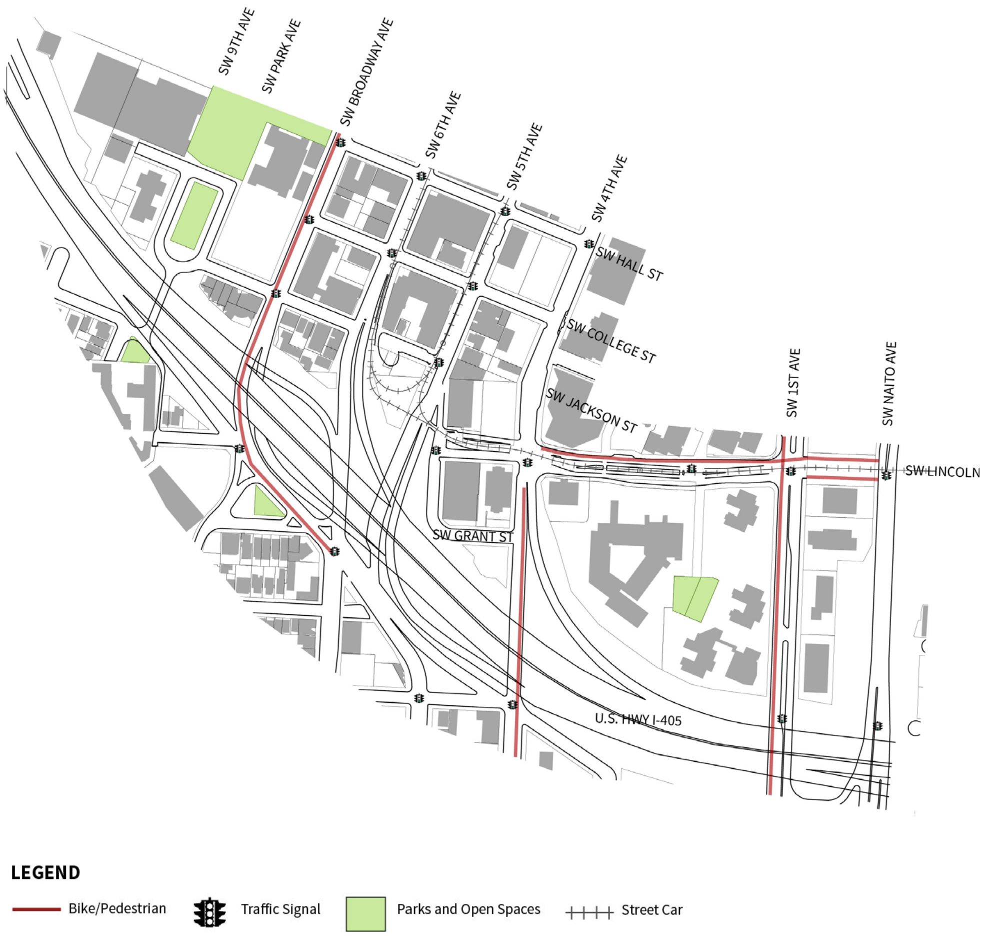
Alternative Summary:

Alternative 3 proposes shifting the Green Loop alignment from the Park Blocks over to SW Broadway Ave. A two-way cycle track (14') with a rolled curb can be accomodated while maintaining both lanes of parking (8') with the removal of one travel lane and the existing bike lane. SW Market St. will need to be configured in order to accomodate Green Loop facilities, vehicular traffic, and street car.



Section of Segment B / Alternative 3 on SW Broadway Avenue looking south

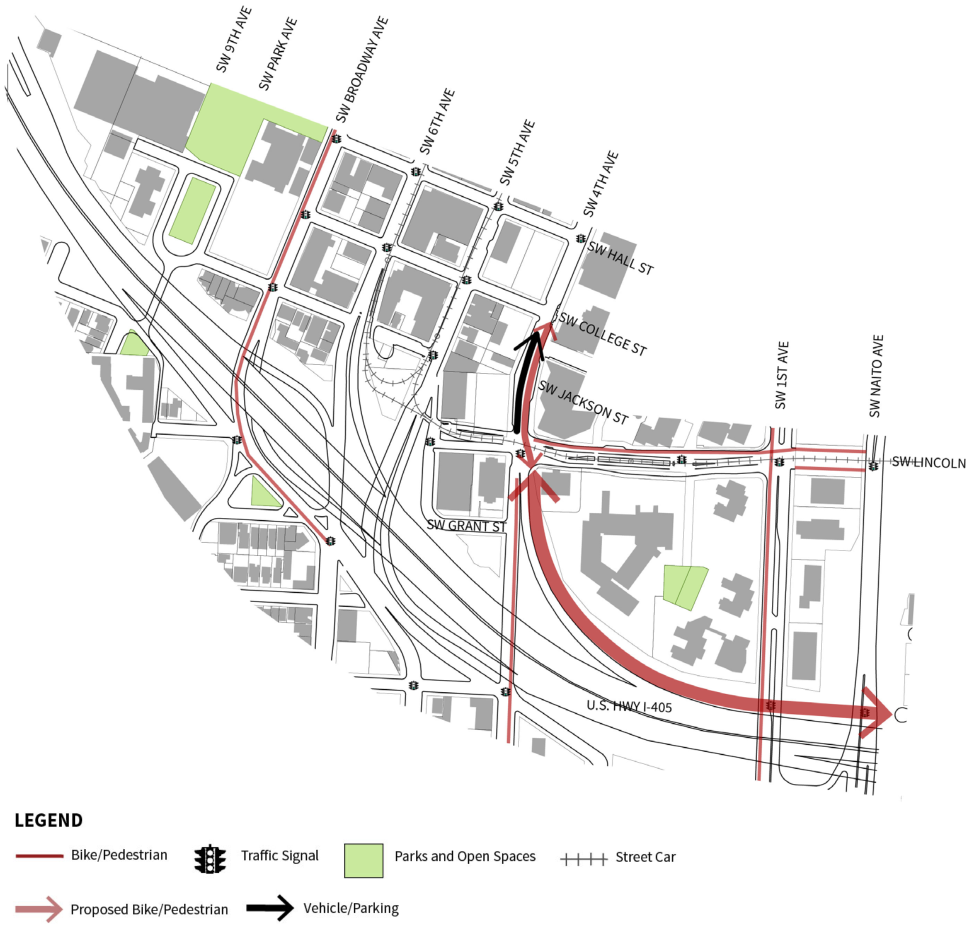
Segment C : Existing Conditions



Existing Conditions Map

Segment C addresses the challenge of how pedestrians and cyclists will be able to maneuver from SW College St east to SW Naito Pkwy. There are currently two potential green loop routes to get through this segment, reconfiguring SW Lincoln to accomodate Green Loop facilities or utilize ODOT owned property on the backside of the University Place Hotel Site and create an I-405 multi-use path. Potential conflict areas include: contending with the impending influx of transit activity along SW Lincoln with the new MAX Orange Line, existing Bus Transit, and a potential new BRT line, creating safe crossings for SW 1st Ave and SW Naito Ave, and creating a safe and comfortable route at all times of day for areas that do not have high visibility.

Segment C / Alternative 1: Green Loop on I-405 Trail



Segment C / Alternative 1 Plan

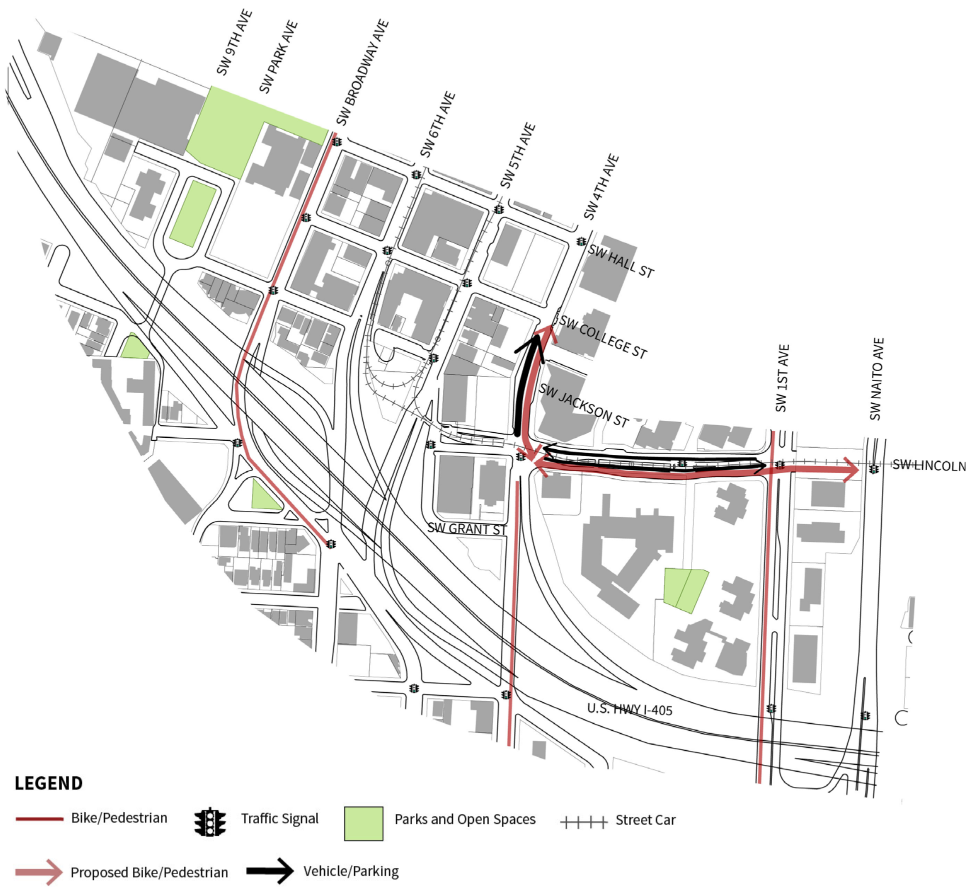
Alternative Summary:

Alternative 1 proposes the Green Loop to move along a 2-way cycle track on SW 4th Ave and transition onto current ODOT owned property situated in between US I-405 and the University Place redevelopment site and the American Plaza Towers. There would need to be signalized improvements at the intersection of SW Lincoln St and SW 4th Ave as well as at SW 1st Ave, and SW Naito Pkwy to ensure safe crossing. Additionally, the trail is not currently paved and will require construction including regrading, clearing of excess shrubbery, and providing proper fencing between the trail and the highway.

Photo of potential new I-405 Trail looking west

Photo of potential new I-405 trail crossing SW 1st Ave looking west

Segment C / Alternative 2: Green Loop on SW Lincoln



Segment C / Alternative 2 Plan

Alternative Summary:

Alternative 2 proposes the Green Loop to move along a 2-way cycle track on SW 4th Ave and subsequently turn onto the southern side of SW Lincoln Ave. Currently, SW Lincoln is a two-way street with the MAX Orange Line situated in the center of the street. The single travel lane splits into two turning lanes when approaching both SW 1st Ave and SW 4th Ave. SW Lincoln St. is the most direct route and also provides openness and high visibility on the street. However, due to the narrow street width and the constraints of the new MAX line, it would difficult to accomodate the Green Loop facility and would require substantial reconfiguration of the existing streetscape. In order to gain the necessary width for a 2-way cycle track, it would require partnering with PSU to negotiate a building setback on the University Place Redevelopment site as well as merging the two turning lanes when approaching SW 1st Ave.

Photo of SW Lincoln St. looking west

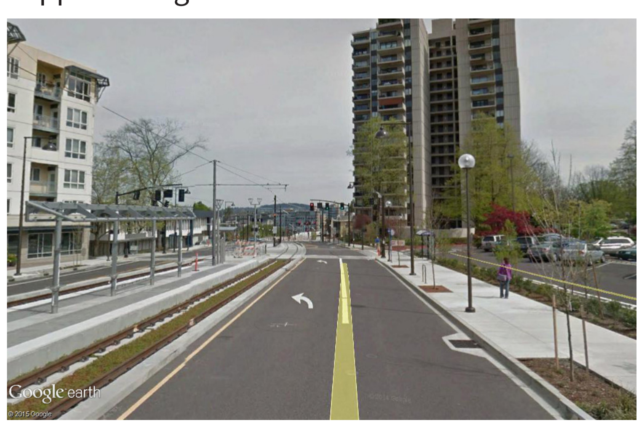
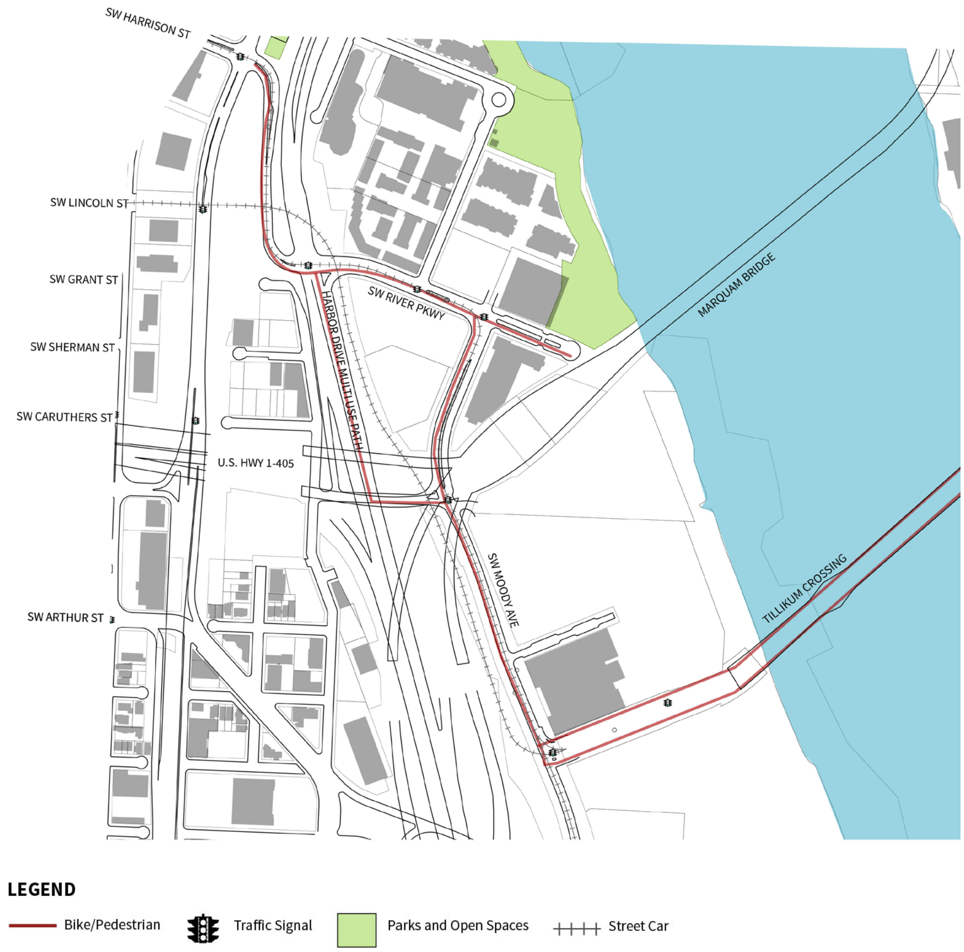


Photo of SW Lincoln St. looking east

Segment D : Existing Conditions



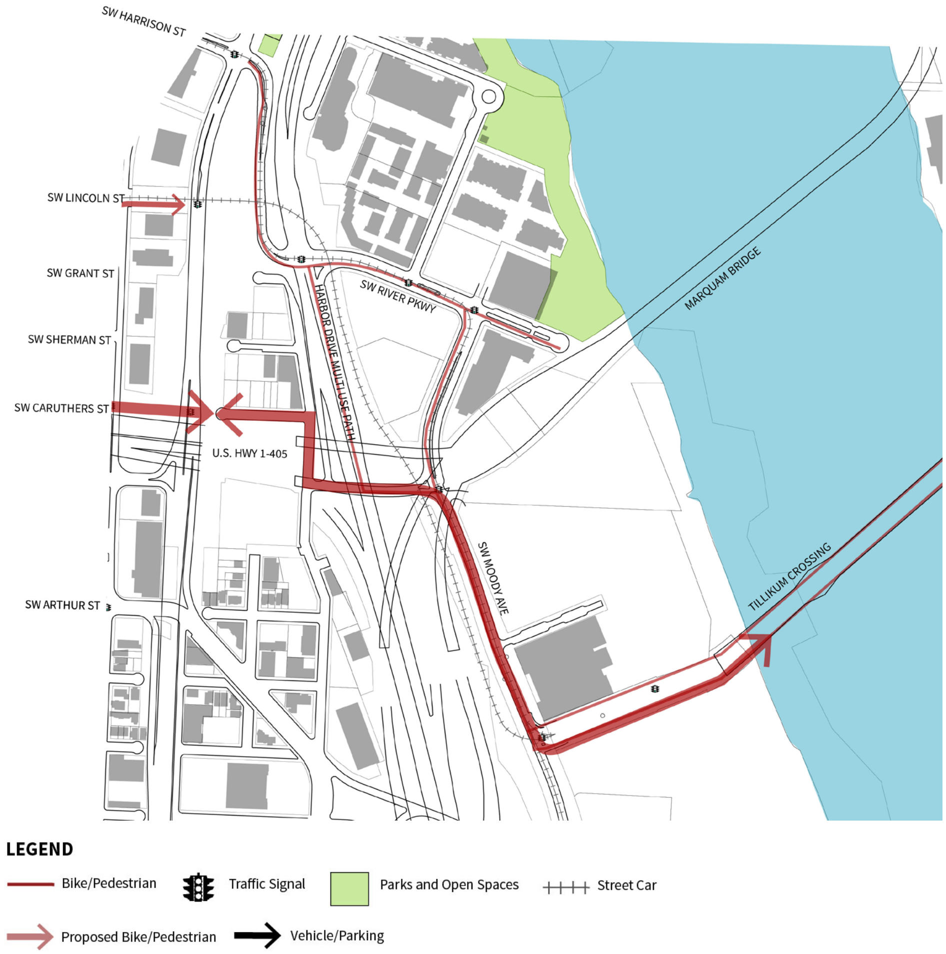
Existing Conditions Map

Segment D addresses the challenge of how pedestrians and cyclists will move from SW Naito Pkwy down to the Tillikum Crossing. The steep elevation change from SW Naito Pkwy down to the Tillkum Crossing is the biggest challenge. All the potential alignments for this segment will require extensive regrading of the right-of-way in order to provide a safe and enjoyable experience. There are existing bike lanes on SW Harrison heading east which connects cyclists to SW River Pkwy and the new multi-use path underneath the harbor drive overpass. Safety issues have arisen regarding the SW Harbor Drive path due to lack of visibility and lack of constant activity. There is an existing raised 2-way cycle track on SW Moody which provides cyclists with the option of crossing the river on Tillikum Crossing or continuing into South Waterfront.

Photo of Harbor Drive multi-use path looking north

Photo of redevelopment site adjacent to multi-use path looking south-east.

Segment D / Alternative 1: I-405 Trail to SW Caruthers St.



Segment D / Alternative 1 Plan

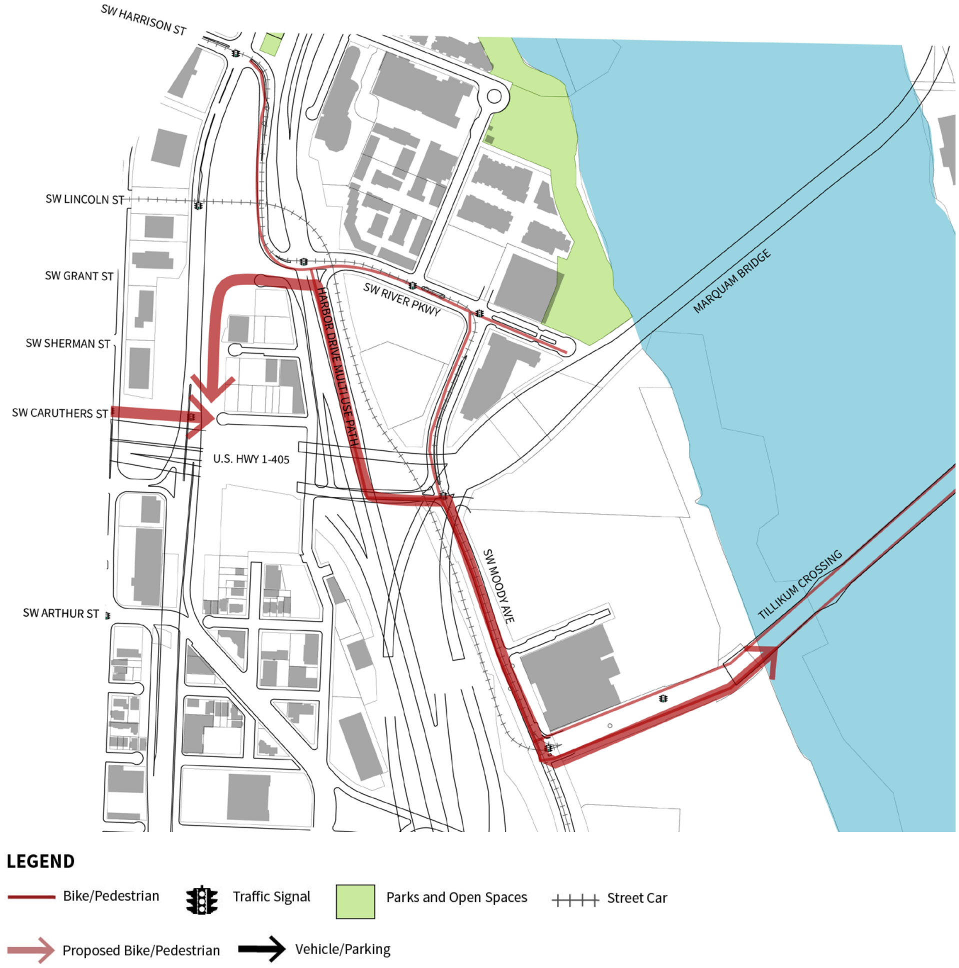
Alternative Summary:

Alternative 1 proposes the Green Loop to cross SW Naito Pkwy and continue on SW Caruthers St. down to SW Water Ave. and SW Sheridan St. where "loopers" can easily connect to the Tillikum Crossing. The proposal calls for regrading SW Caruthers ROW which is currently too steep for the "interested but concerned" demographic and exploring the creation of a Lombard Street like hill park. The hill park proposal will require civil engineering to discern whether it is feasible to create a shallow enough grade to meet ADA accessibility. Additionally, the hill park design would need to take into account the International School's current and future access needs slated for SW Caruthers.

Rendering of potential hill park on SW Caruthers St. looking west from SW Water Ave.

Rendering of potential hill park on SW Caruthers St. looking east from SW Naito Blvd.

Segment D / Alternative 2: I-405 Trail to SW Grant St.



Segment D / Alternative 2 Plan

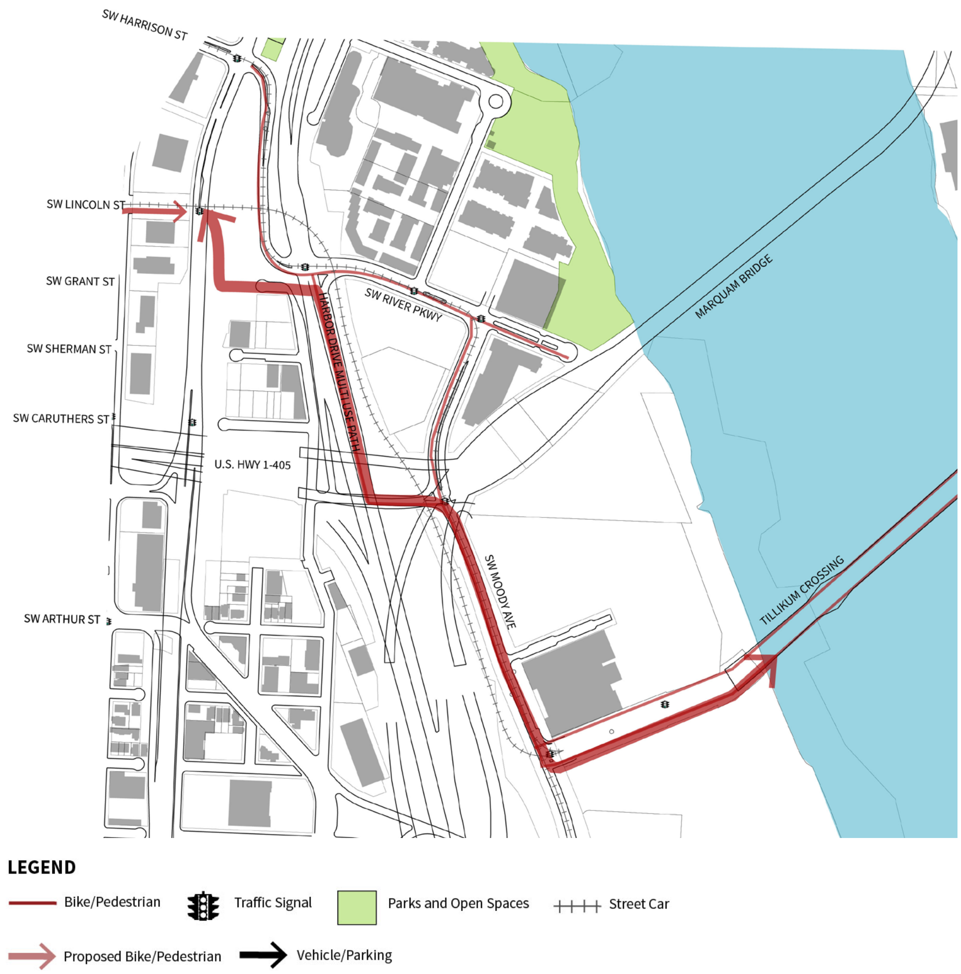
Alternative Summary:

Alternative 2 proposes the Green Loop to cross SW Naito Pkwy and subsequently veer north along a strip of ROW concurrently owned by PBOT and ODOT which borders the western edge of International School property. The Green Loop would gradually descend down to SW Water Ave using SW Grant St.   Similar to SW Caruthers, SW Grant also has a steep drop in elevation, however, there is a much wider area available to regrade which could potentially create a much more gradually descent.   The path then continues onto SW Harbor Drive Multi-use path which smoothly connects to SW Moody.

Photo of International School and ODOT/PBOT owned ROW from SW Grant Ave.

Photo of SW Grant Ave looking west at American Plaza Towers.

Segment D / Alternative 3: SW Lincoln St. to SW Grant St.



Segment D / Alternative 1 Plan

Alternative Summary:

Alternative 3 proposes the Green Loop alignment transition from SW Lincoln St. onto SW Grant St. The alignment would cross SW Naito Pkwy and veer south along a strip of ROW concurrently owned by PBOT and ODOT. The Green Loop would move gradually descend down to SW Water Ave using SW Grant St. This alignment will need to take into account PDC's future plans for redevelopment on the site between the light rail bridge and SW Grant St.

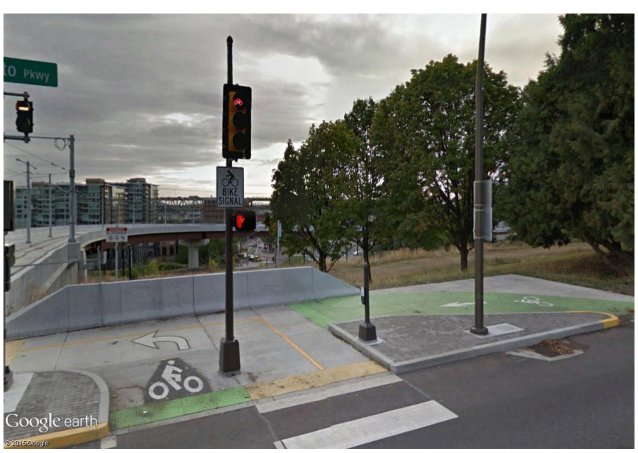


Photo of crossing SW Naito PKwy towards SW Grant St.

Green Loop Refinement: DRAFT Key Objectives/ Evaluation Criteria
03/02/15

The Green Loop is envisioned as a 21st Century Public Works Project for Portland that will become the Central City's signature open space system. The Green Loop will connect neighborhoods and districts with an intuitive pathway that offers safety and accessibility throughout the Central City for all residents, workers, students, and visitors. It builds on a larger goal of being more intentional about the design character and priorities for the Central City's streets.

The following criteria is based on the key objectives and design considerations for the Green Loop concept. The criteria should be used to weigh tradeoffs for each potential alignment and help to guide choices as the concept is refined.

Key Objectives:

Improve Health
Does this alignment support the healthiest outcomes in terms of the following: air quality, less exposure to noise pollution, access to nature and recreation, safest route for walking, jogging, and cycling?

Connect and Create Parks
Does this alignment connect existing parks and open spaces and/or have the highest potential for the creation of new open spaces?

Support Businesses
Can this alignment result in more visibility and patronage to existing businesses and cultural attractions and can it catalyze the creation of more? Will it have the least negative impact to existing businesses?

Expand Pathways
Does this alignment result in the expansion of the Central City's robust pedestrian and jogging network and does it create new pathways where they currently do not exist? Will it make current pathways safer and more intuitive?

Encourage Cycling
Does this alignment cast the widest net to more potential new cyclists by offering the most attractive route to the "interested but concerned" population including families, older adults, women, people of color and those coming from outer neighborhoods?

Grow Green
Does this alignment offer the most potential for highly visible low carbon development including stormwater facilities, green walls, high structured canopy, and carbon neutral buildings and structures?

Green Loop Refinement: DRAFT Key Objectives/ Evaluation Criteria
03/02/15

<u>Design Considerations</u>

Directness

Is this alignment the "path of least resistance", connecting bridges, attractions, and other major facilities in a route that is direct with few significant grade changes?

Ease of Implementation

Can this alignment be successful without multiple steps and phases to make it work?

Ability to Accommodate

Is this alignment most able to accommodate the spatial considerations of the Green Loop, e.g. a two-way separated bicycle facility, pedestrian and/or jogging path, tree canopy, street furnishings, etc.?

Green Loop Refinement Meeting

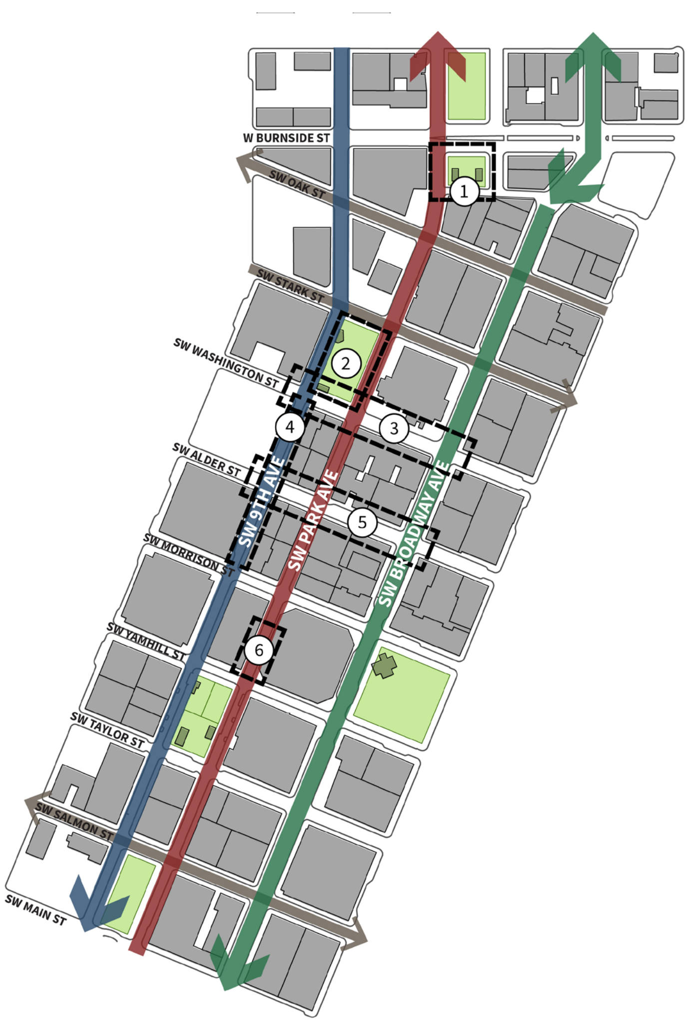
Meeting #2: March 31, 2015 -- W Burnside St to SW Salmon St

Draft Summary Notes

Staff in attendance:

Mark Raggett - Bureau of Planning and Sustainability
Lora Lillard - Bureau of Planning and Sustainability
Courtney Ferris - Bureau of Planning and Sustainability
Marc Asnis - Bureau of Planning and Sustainability
Kathryn Hartinger - Bureau of Planning and Sustainability
Greg Raisman - Portland Bureau of Transportation
Arnoud Van Sisseren - Portland Bureau of Transportation
Allan Schmidt - Portland Parks and Recreation
Ross Swanson - Portland Parks and Recreation

The second Green Loop concept refinement meeting on March 31, 2015 generated several concept design alternatives on 3 different streets and 6 study areas identified for further investigation.



Concept Alternatives Map

<u>Concept Design Alternatives:</u>

Midtown Blocks:

- Green Loop couplet on either side of the Midtown Blocks.
- Designate SW Park Ave as major Green Loop route
- Designate SW 9th Ave as major Green Loop route

SW Broadway Ave:

- Asymetrical configuration where Green Loop is on east side of street.

Study Areas:

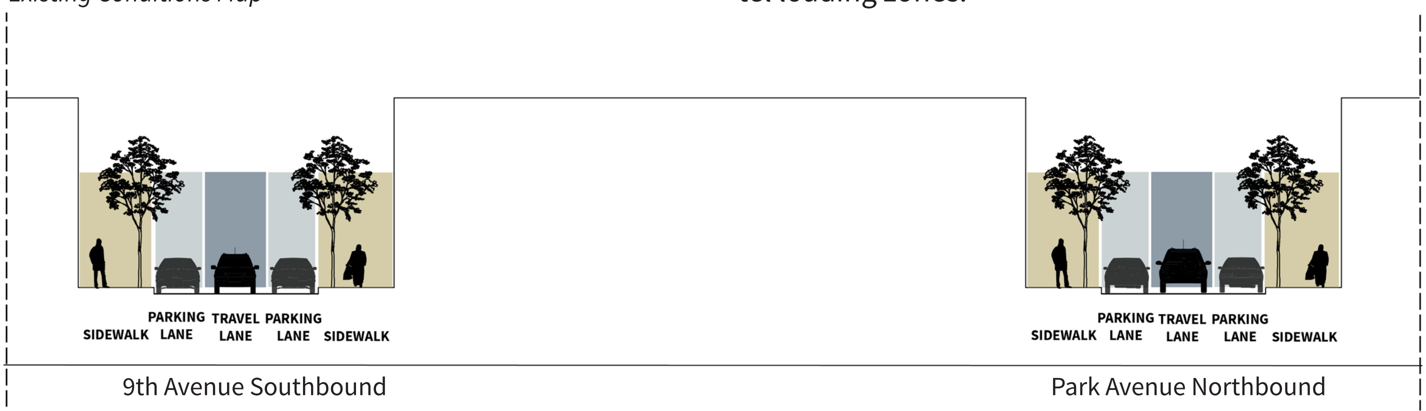
1. Closing off SW Ankeny and redesign of Ankeny Park
2. Redesign of O'Bryant Square
3. Explore traffic slowing strategies for SW Washington
4. Explore "Chicane" street design
5. Explore traffic slowing strategies for SW Alder
6. Explore strategies on how to intersect Park Avenue West Parking Bay

Existing Conditions

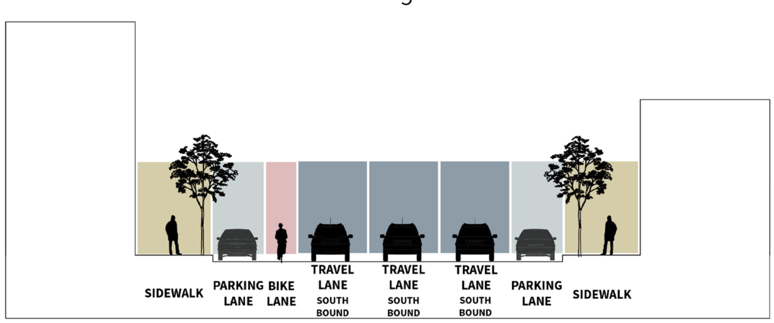
Existing Conditions Map

The streets aligning the Midtown Blocks are one way streets with SW Park Ave moving northbound and SW 9th Ave moving southbound. Between W Burnside and SW Stark, the streets measure 60' ROW with 2 travel lanes (20'), 2 lanes of parking on either side (8'), and 12' sidewalks on both sides of the street. From SW Stark to SW Salmon, both streets measure 50' ROW with 1 travel lane (10'), 2 lanes of parking on either side (8'), and 12' sidewalks on both sides of the street with the exception of the Director Park block where one lane of parking has been removed. The major conflict areas for both SW Park and SW 9th occur at the intersections where heavy cross traffic moves through without any signals, stop signs, or other traffic calming devices.

At W Burnside, SW Broadway turns from a two-way to a one-way street with 3 southbound lanes (30'), 2 lanes of parking (7'), 15' sidewalks on either side and one 6' bike lane. It is a major north/south thoroughfare for downtown, the auto traffic is consistently heavy throughout the day. Broadway is used to travel southbound by cyclists coming off the Broadway Bridge but there is no designated bike lane northbound. In addition to the steep grade changes, the cyclists also have to contend with hotel loading zones.

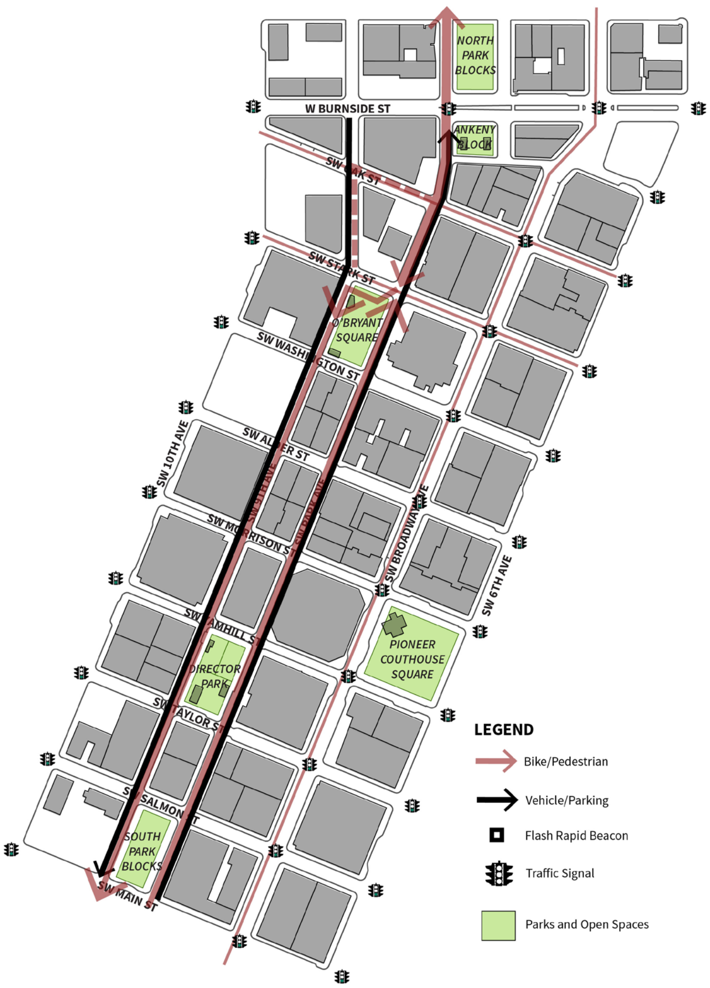


Section of existing conditions on SW Park Ave and SW 9th Ave looking north



Section of existing conditions on SW Broadway Ave

Alternative 1: Midtown Blocks Couplet



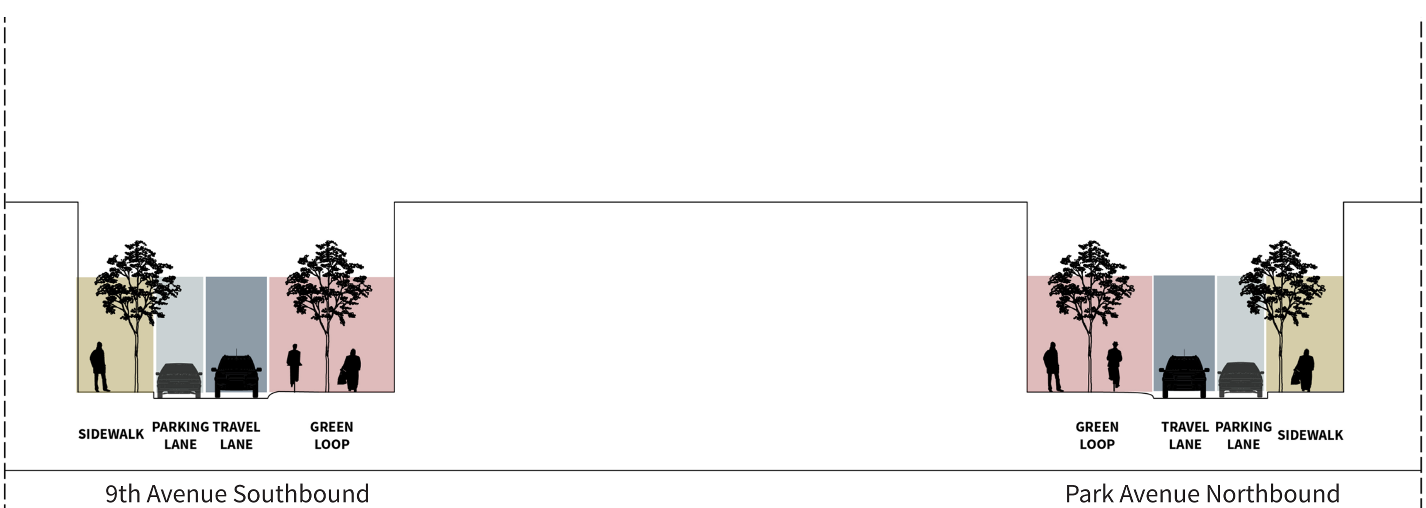
Alt 1 Plan

Alternative Summary:

Alternative 1 calls for a couplet along SW 9th and SW Park which will provide Green Loop facilities on both sides of the Midtown Blocks.

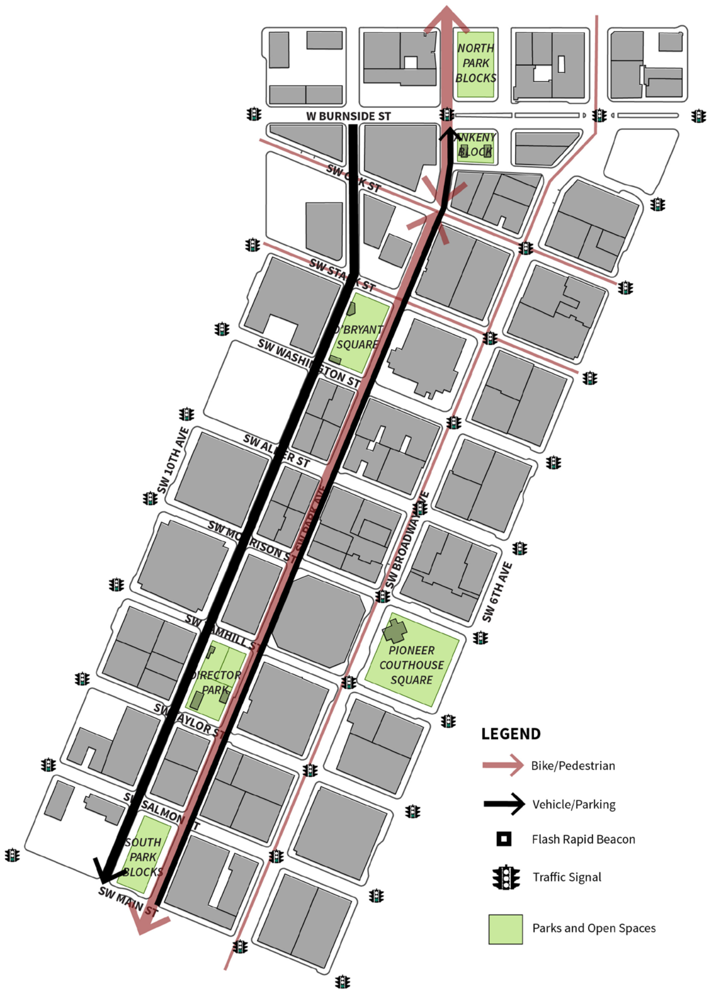
The alignment continues from the north park blocks along NW Park with a 2-way cycle track (14'), one travel lane (14') heading northbound, one parking lane (8'), and 12' sidewalks. Due to the ROW width narrowing from 60' to 50' at SW Stark, the alignment must split and the southbound traffic will veer onto SW 9th. The start of the couplet can occur either at SW Oak, a designated westbound bike lane which can connect "loopers" over to SW 9th, or at SW Stark where the alignment could intersect a redesigned O'Bryant Square and then head onto SW 9th. Both streets will then consist of a single cycle track (6') with a rolled curb, one travel lane (12'),a parking lane (8'), and 12' sidewalks on both sides of the street. The benefits of this alignment are that the existing ground floor retail on both NW Park and NW 9th will benefit from the increased bike and pedestrian activity from the new facilities while also retaining half of their existing on-street parking. Furthermore, the alignment connects "loopers" to all 3 open spaces within this segment and would be the easiest alignment to implement in the short term.

CRITERIA	
IMPROVE HEALTH	●●
CONNECT/CREATE PARKS	●●●
SUPPORT BUSINESSES	●●●
EXPAND PATHWAYS	●●
ENCOURAGE CYCLING	●●●
GROW GREEN	●
DIRECTNESS	●●
EASE OF IMPLEMENTATION	●●●
ABILITY TO ACCOMMODATE	●●
PARKING IMPACTS	●●
TOTAL	**2.3**



Alt 1 Section: Looking North

Alternative 2: Green Loop on SW Park



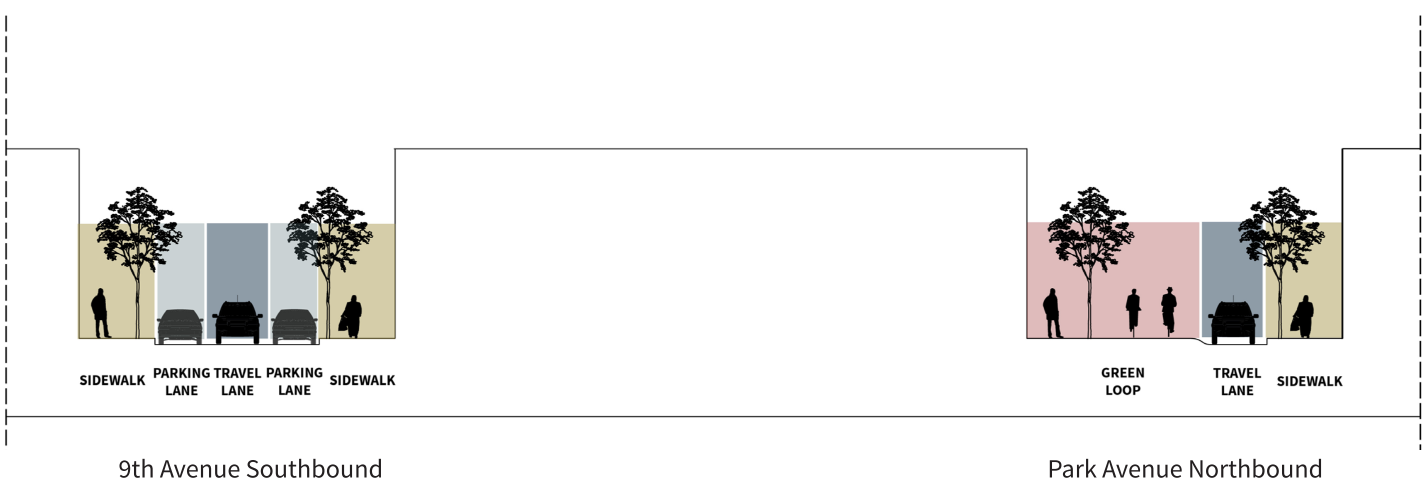
Alt 2 Plan

Alternative Summary:

Alternative 2 designates SW Park Ave. as the major Green Loop alignment. The street configuration from W Burnside to SW Stark consists of a 2-way cycle track (14'), one travel lane (14'), one parking lane (8'), and sidewalks on both sides of the street (12'). The ROW reduction to 50', then requires the removal of the parking lane and potential reduction of the cycletrack with a rolled curb in order to provide a 14' travel lane for emergency vehicles.

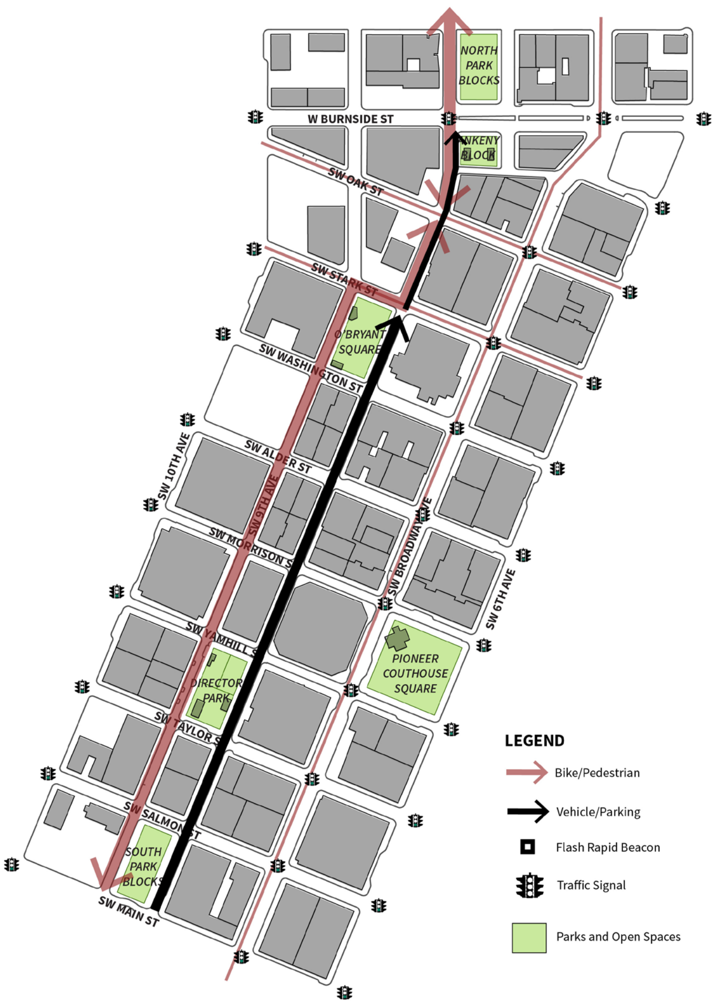
CRITERIA	
IMPROVE HEALTH	●●●
CONNECT/CREATE PARKS	●●●
SUPPORT BUSINESSES	●●
EXPAND PATHWAYS	●●●
ENCOURAGE CYCLING	●●●
GROW GREEN	●●●
DIRECTNESS	●●●
EASE OF IMPLEMENTATION	●
ABILITY TO ACCOMMODATE	●●●
PARKING IMPACTS	●
TOTAL	**2.5**

Alternative 2 is the most direct route for "loopers", where they stay on SW Park Avenue exclusively throughout the entire midblock segment. Additionally, the route aligns most closely with the Park Avenue Urban Design Vision which calls for the connection of the 3 open spaces, [Ankeny Park, O'Bryant Square, and Director Park], strengthens the existing street-level retail and promotes a vibrant street level activity. This configuration would be able to most closely accomodate the ideal Green Loop facilities but would not be easy to implement.



Alt 2 Section: Looking North

Alternative 3: Green Loop on SW 9th



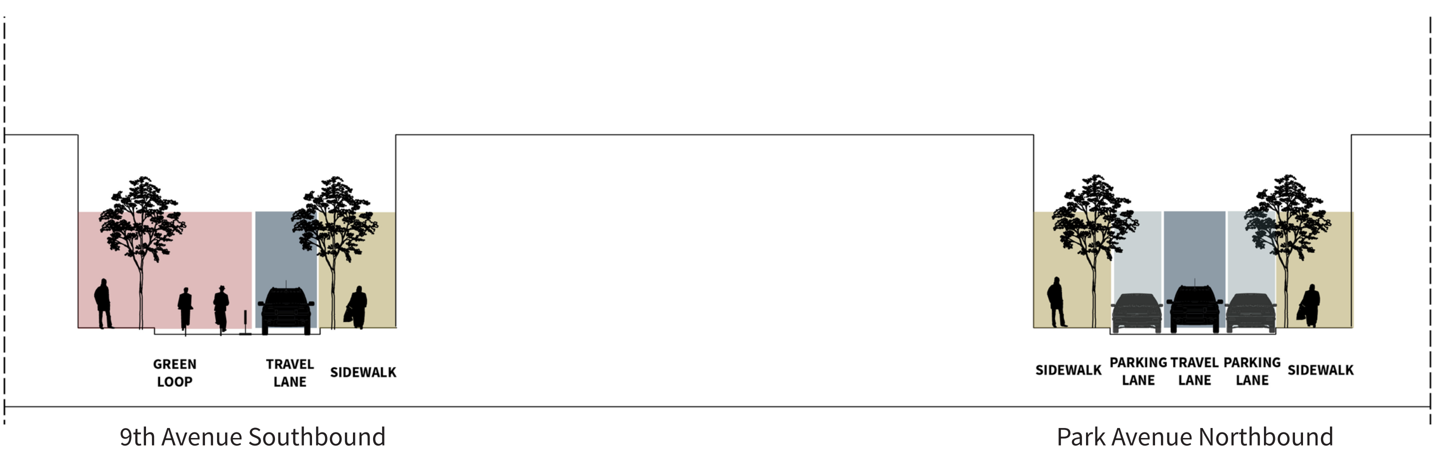
Alt 3 Plan

Alternative Summary:

Alternative 3 designates SW 9th Ave. as the major Green Loop alignment. The street configuration from W Burnside to SW Stark consists of a 2-way cycle track (14'), one travel lane (14'), one parking lane (8'), and sidewalks on both sides of the street (12'). The alignment would shift over to SW 9th at SW Stark as part of the redesign of O'Bryant Square. The ROW reduction to 50', then requires the removal of a parking lane and the potential reduction of the cycle track with a rolled curb in order to provide space for a 14' travel lane for emergency vehicles.

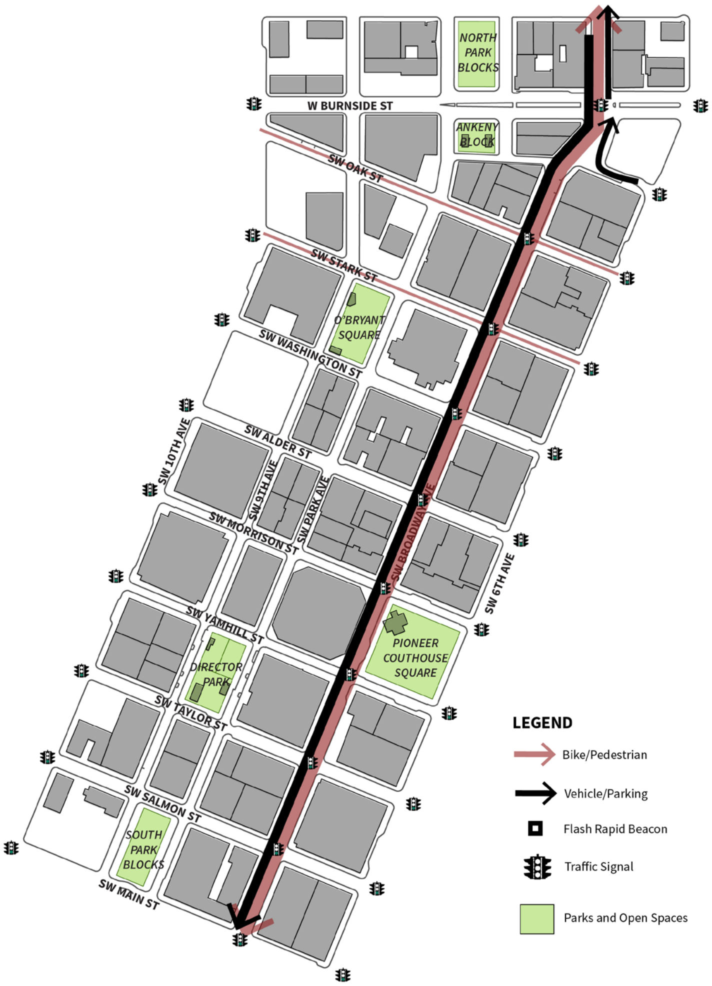
CRITERIA	
IMPROVE HEALTH	●●●
CONNECT/CREATE PARKS	●●●
SUPPORT BUSINESSES	●●
EXPAND PATHWAYS	●●●
ENCOURAGE CYCLING	●●●
GROW GREEN	●●●
DIRECTNESS	●●
EASE OF IMPLEMENTATION	●
ABILITY TO ACCOMMODATE	●●●
PARKING IMPACTS	●
TOTAL	**2.4**

The alignment connects "loopers" to the 3 open spaces in the segment and strengthen existing street-level retail and promote a vibrant street level activity along SW 9th Avenue. This configuration would be able to most closely accomodate the ideal Green Loop facilities but would not be easy to implement.



Alt 3 Section: Looking North

Alternative 4: Green Loop on SW Broadway



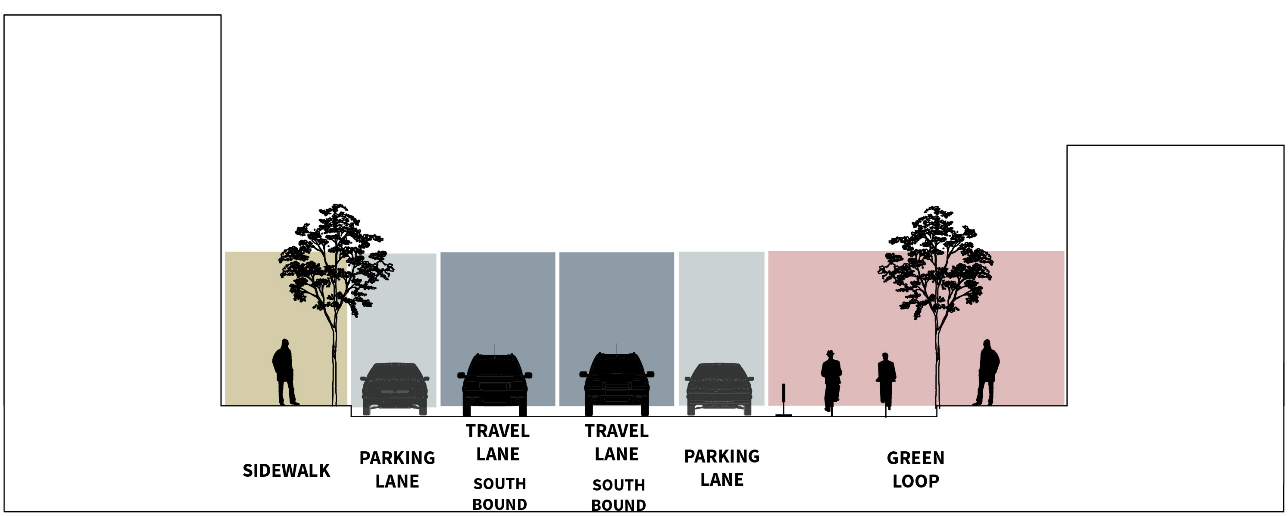
Alt 4 Plan

Alternative Summary:

Alternative 4 calls for the Green Loop alignment along the eastern edge of SW Broadway Ave. A two-way cycle track can be accomodated while maintaining both lanes of parking with the removal of one travel lane, and the existing bike lane. Due to the majority of hotel loading zones being located on the west side of the street, it would be preferable to cluster the Green Loop facilities on the eastern side of Broadway.

CRITERIA	
IMPROVE HEALTH	●●
CONNECT/CREATE PARKS	●
SUPPORT BUSINESSES	●●●
EXPAND PATHWAYS	●
ENCOURAGE CYCLING	●●
GROW GREEN	●
DIRECTNESS	●●●
EASE OF IMPLEMENTATION	●●
ABILITY TO ACCOMMODATE	●●●
PARKING IMPACTS	●●●
TOTAL	**2.1**

The Broadway alignment is a direct route and due to the 80' ROW, it is able to accomodate a 2-way cycle track (14') while maintaining both lanes of parking (7'). Unlike the other 3 alternatives, Broadway only connects "loopers" to one park, Pioneer Courthouse Square.



SW Broadway Avenue looking North

Alt 3 Section: Looking North

Green Loop Refinement: DRAFT Key Objectives/ Evaluation Criteria
03/02/15

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Key Objectives:

Improve Health
Does this alignment support the healthiest outcomes in terms of the following: air quality, less exposure to noise pollution, access to nature and recreation, safest route for walking, jogging, and cycling?

Connect and Create Parks
Does this alignment connect existing parks and open spaces and/or have the highest potential for the creation of new open spaces?

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Can this alignment result in more visibility and patronage to existing businesses and cultural attractions and can it catalyze the creation of more? Will it have the least negative impact to existing businesses?

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Does this alignment result in the expansion of the Central City's robust pedestrian and jogging network and does it create new pathways where they currently do not exist? Will it make current pathways safer and more intuitive?

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Grow Green
Does this alignment offer the most potential for highly visible low carbon development including stormwater facilities, green walls, high structured canopy, and carbon neutral buildings and structures?

Green Loop Refinement: DRAFT Key Objectives/ Evaluation Criteria
03/02/15

Design Considerations

Directness
Is this alignment the "path of least resistance", connecting bridges, attractions, and other major facilities in a route that is direct with few significant grade changes?

Ease of Implementation
Can this alignment be successful without multiple steps and phases to make it work?

Ability to Accommodate
Is this alignment most able to accommodate the spatial considerations of the Green Loop, e.g. a two-way separated bicycle facility, pedestrian and/or jogging path, tree canopy, street furnishings, etc.?

Segment B: From Burnside to Salmon

	Improve Health	Connect/ Create Parks	Support Businesses	Expand Pathways	Encourage Cycling	Grow Green	Directness	Ease of Implementation	Ability to Accommodate	Parking Impact	
1	••	•••	•••	••	•••	•	••	•••	••	••	**2.3**
2	•••	•••	••	•••	•••	•••	•••	•	•••	•	**2.5**
3	•••	•••	••	•••	•••	•••	••	•	•••	•	**2.4**
4	••	•	•••	•	••	•	•••	••	•••	•••	**2.1**

1: Couplet along SW 9th and SW Park
2: Two-way path along SW Park
3: Two-way path along SW 9th
4: Two-way path along NW Broadway (asymmetrical)

Green Loop Refinement Meeting

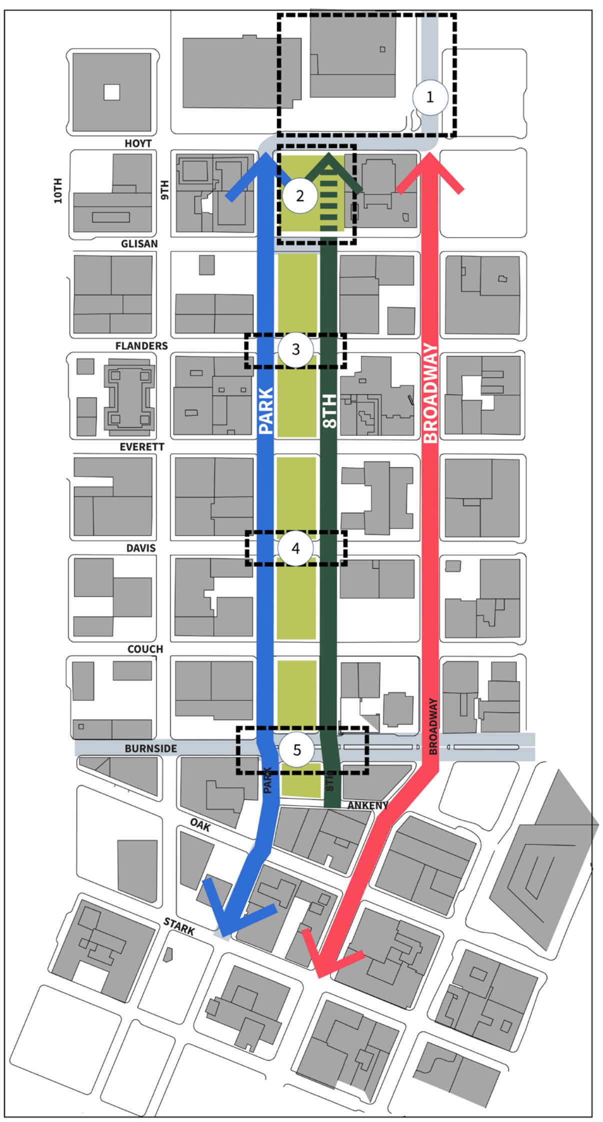
Meeting #1: February 24, 2015 -- Broadway Bridge to **West Burnside St**

Draft Summary Notes

Staff in attendance:

Mark Raggett - Bureau of Planning and Sustainability
Lora Lillard - Bureau of Planning and Sustainability
Courtney Ferris - Bureau of Planning and Sustainability
Marc Asnis - Bureau of Planning and Sustainability
Kathryn Hartinger - Bureau of Planning and Sustainability
Greg Raisman - Portland Bureau of Transportation
Arnoud Van Sisseren - Portland Bureau of Transportation
Allan Schmidt - Portland Parks and Recreation
Ross Swanson - Portland Parks and Recreation

The first Green Loop concept refinement meeting on Feb. 24th, 2015 generated several concept design alternatives on 3 different streets and 5 study areas identified for further investigation.



Concept Alternatives Map

Concept Design Alternatives:

Park Blocks:

1. Green Loop couplet on either side of the Park Blocks.
2. Designate NW 8th as major Green Loop route, 2-way street on NW Park.
3. Designate NW Park as major Green Loop route, 2- way street on NW 8th.

SW Broadway Ave:

4. Green Loop one-way couplets
5. Assymetrical configuration where Green Loop is on west side of street.

Study Areas:

1. Transition onto the Broadway Bridge
2. PNCA Park Block
3. Potential closure of Davis between NW Park and NW 8th to vehicles.
4. Potential closure of Flanders between NW Park and NW 8th to vehicles.
5. Crossing at Burnside

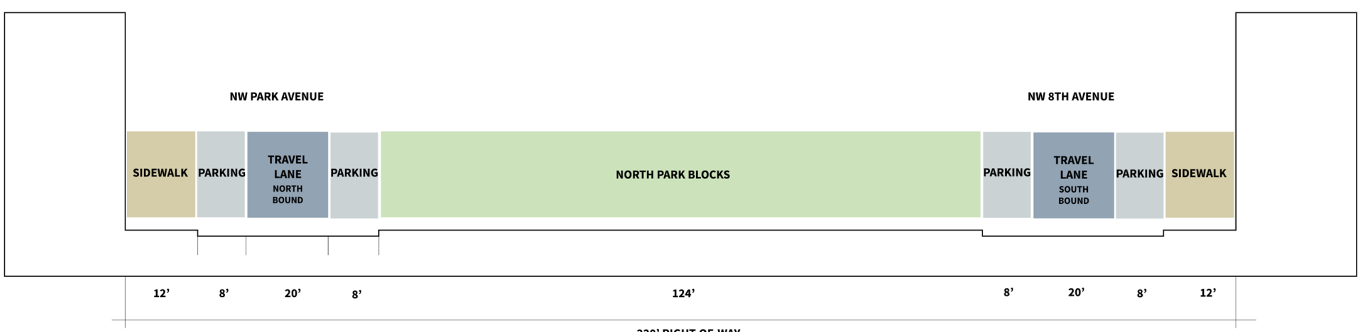
Green Loop Refinement Meeting #1:

Existing Conditions Map

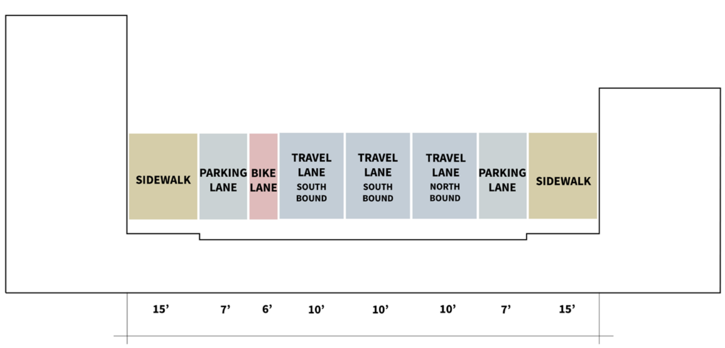
Existing Conditions:

The streets aligning the North Park Blocks [NW 8th Ave and NW Park Ave] are one way streets with 1 travel lane (20'), 2 lanes of parking on either side (8'), and a 12' sidewalk on one side of the street. Both NW 8th and NW Park have a much more gradual grade change compared to SW Broadway. Although there is currently no designated bike lane on the Park Blocks, cyclists can ride on the street with relatively low stress due to the low traffic. The major conflict areas occur at the cross streets with through traffic.

SW Broadway is a two way street with 3 travel lanes (10'); 2 southbound lanes and 1 northbound lane, 2 lanes of parking (7'), 15' sidewalks on either side and one 6' bike lane. It is a major north/south thoroughfare for downtown, the auto traffic is consistently heavy throughout the day. Broadway is used to travel southbound by cyclists coming off the Broadway Bridge but there is no designated bike lane northbound. Broadway has several steep grade changes and causes both cars and bikes to accelerate in speed.

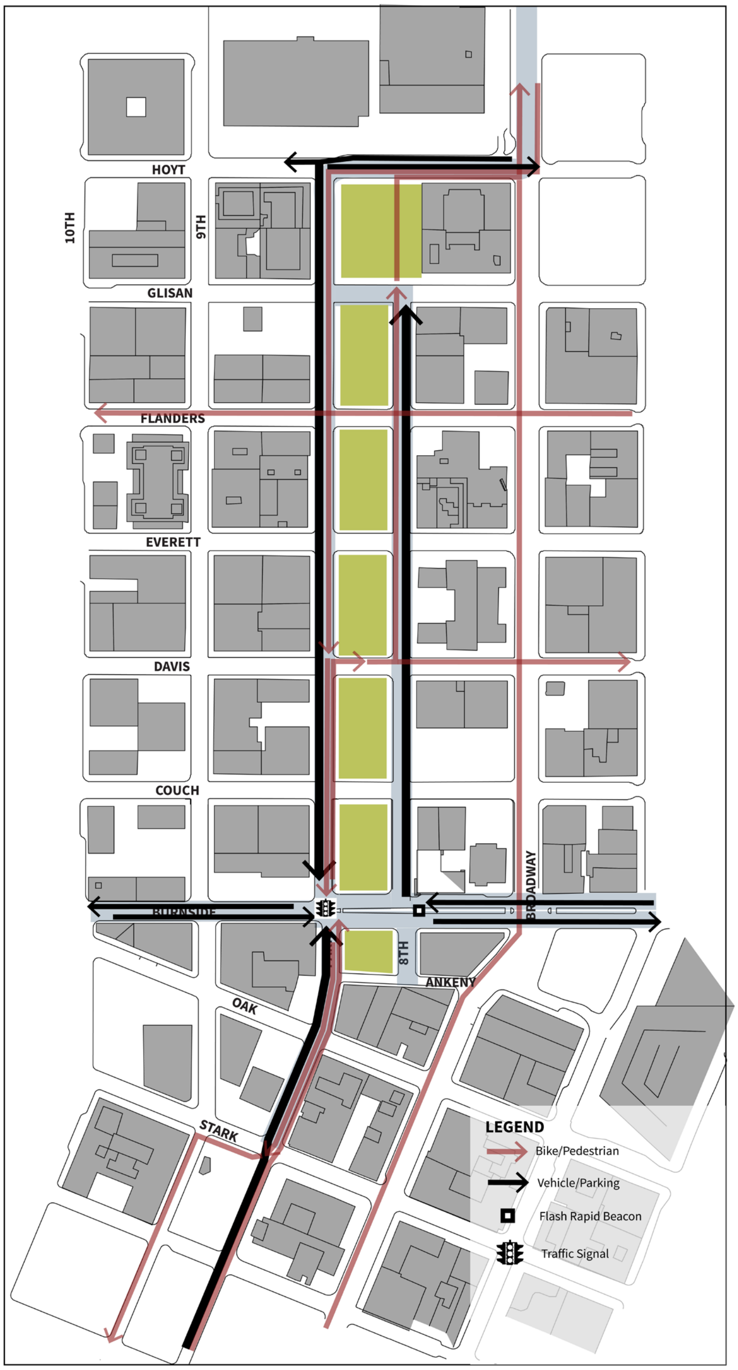


Section of existing conditions on NW Park Ave and NW 8th Ave



Section of existing conditions on NW Broadway Ave

Alternative 1: Park Blocks Couplet



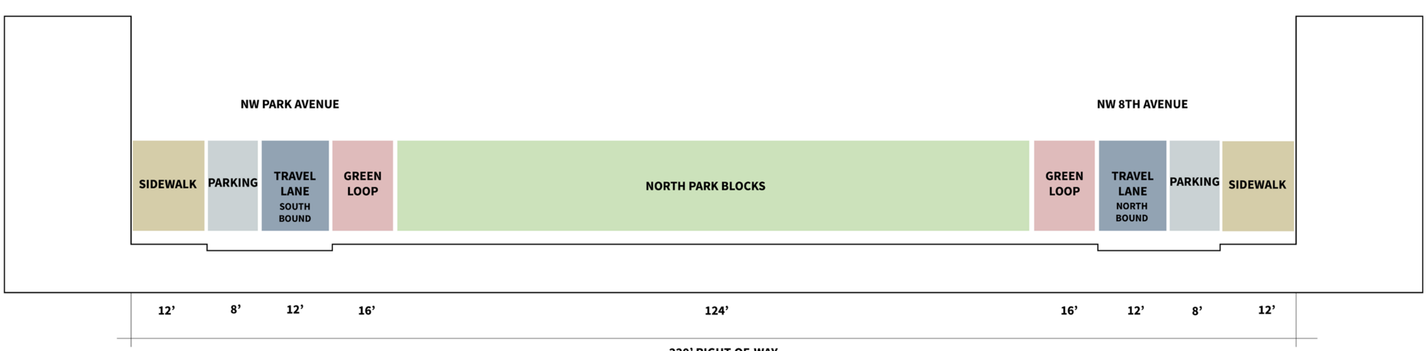
Proposal 1 Plan

Alternative Summary:

The couplet along NW 8th and NW Park will provide the Green Loop facilities on both sides of the Park Blocks. The alternative maintains a one way travel lane and one lane of parking on both streets. The direction of traffic will be reversed so that 8th Ave traffic moves northbound and Park Ave moves southbound. At NW Davis, the path merges into a bi-directional cycle track on Park Ave., removing the parking lane.

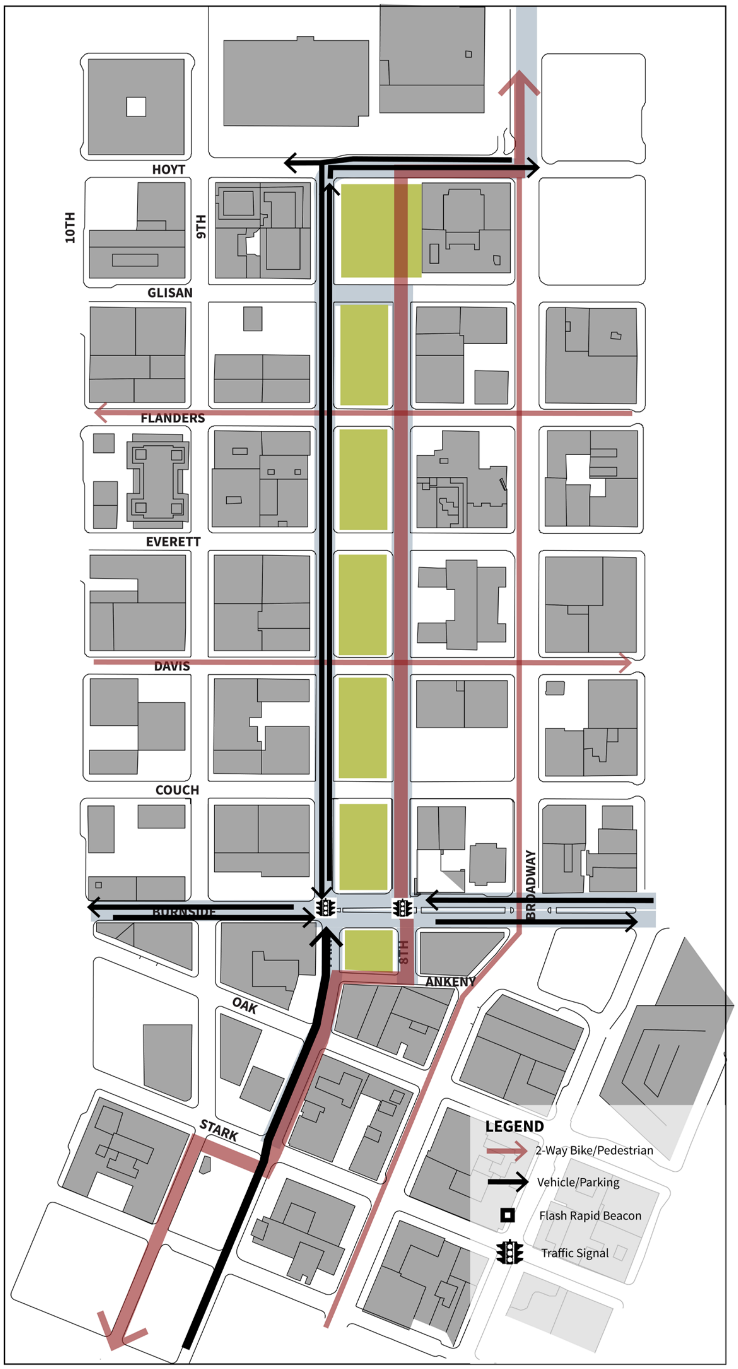
CRITERIA	
IMPROVE HEALTH	●●●
CONNECT/CREATE PARKS	●●●
SUPPORT BUSINESSES	●●
EXPAND PATHWAYS	●●
ENCOURAGE CYCLING	●●●
GROW GREEN	●●
DIRECTNESS	●●●
EASE OF IMPLEMENTATION	●●
ABILITY TO ACCOMMODATE	●●●
TOTAL	**2.5**

** *See criteria details in back of document.*



Proposal 1 Section: Looking North

Alternative 2: Green Loop on NW 8th, 2-Way on NW Park

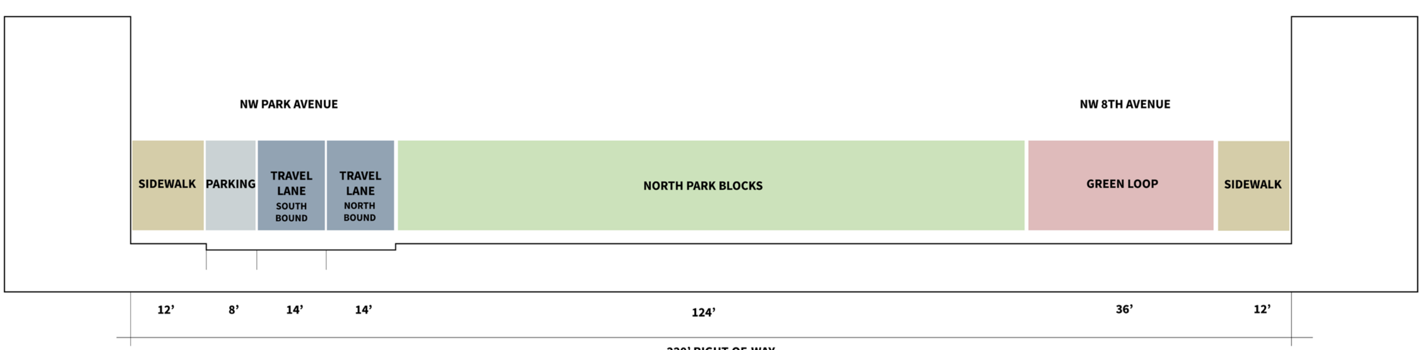


Proposal 2 Plan

Alternative Summary:

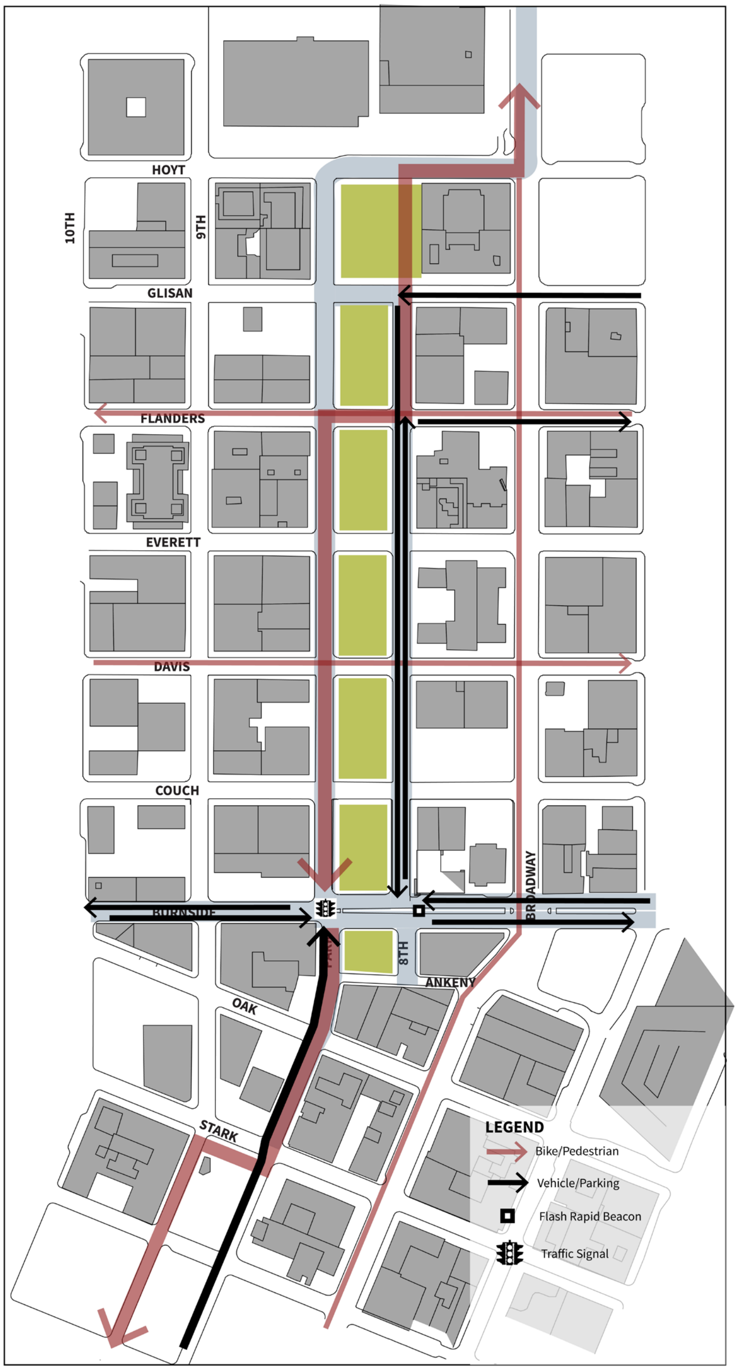
Alternative 2 calls for NW 8th Ave. being designated as the major Green Loop street, removing all vehicular traffic and parking and reconfiguring NW Park Ave. as a 2-way street with 1 lane of parking. Both north and south Green Loop traffic will cross Burnside at NW 8th Ave, with the installation of a new traffic signal.

CRITERIA	
IMPROVE HEALTH	●●●
CONNECT/CREATE PARKS	●●●
SUPPORT BUSINESSES	●
EXPAND PATHWAYS	●●●
ENCOURAGE CYCLING	●●●
GROW GREEN	●●●
DIRECTNESS	●●●
EASE OF IMPLEMENTATION	●
ABILITY TO ACCOMMODATE	●●
TOTAL	**2.4**



Proposal 2 Section: Looking North

Alternative 3: Green Loop on NW Park, 2-Way on NW 8th

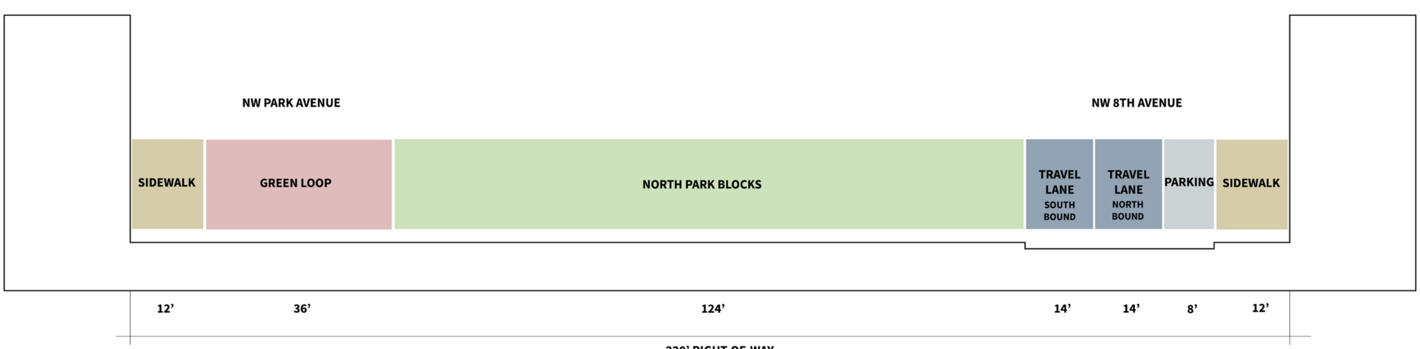


Proposal 3 Plan

Alternative Summary:

Alternative 3 calls for NW Park Ave. being designated as the major Green Loop street, removing all vehicular traffic and parking and reconfiguring NW 8th Ave. as a 2-way street with 1 lane of parking. Both north and south Green Loop traffic will cross Burnside at NW Park Ave, with the installation of a new traffic signal.

CRITERIA	
IMPROVE HEALTH	●●●
CONNECT/CREATE PARKS	●●●
SUPPORT BUSINESSES	●
EXPAND PATHWAYS	●●●
ENCOURAGE CYCLING	●●●
GROW GREEN	●●●
DIRECTNESS	●●●
EASE OF IMPLEMENTATION	●
ABILITY TO ACCOMMODATE	●●
TOTAL	**2.4**



Proposal 3 Section: Looking North

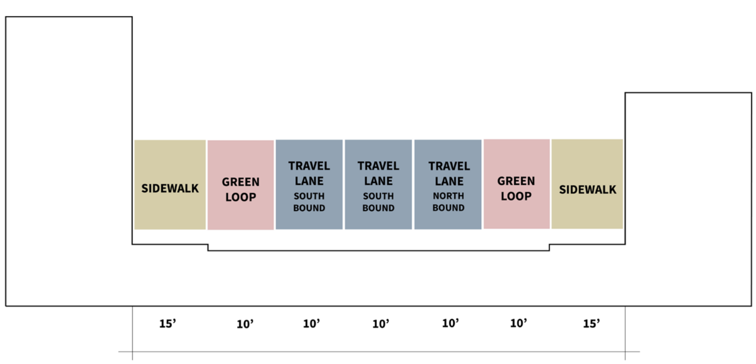
Alternative 4: NW Broadway Couplet

Proposal 4 Plan

Alternative Summary:

Alternative 4 calls for upgrading the existing southbound bike lane on NW Broadway into a one-way cycle track and adding a new northbound cycle track. This configuration would require the removal of both parking lanes or one parking lane and one travel lane.

CRITERIA	
IMPROVE HEALTH	●
CONNECT/CREATE PARKS	●
SUPPORT BUSINESSES	● ●
EXPAND PATHWAYS	●
ENCOURAGE CYCLING	●
GROW GREEN	●
DIRECTNESS	● ● ●
EASE OF IMPLEMENTATION	● ●
ABILITY TO ACCOMMODATE	●
TOTAL	**1.4**



Proposal 4 Section: Looking North

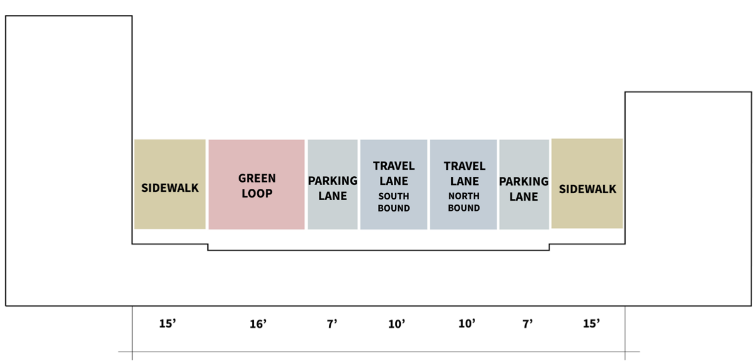
Alternative 5: NW Broadway Green Loop on West Side

Proposal 5 Plan

Alternative Summary:

Alternative 5 calls for upgrading the existing southbound bike lane on NW Broadway into a two-way cycle track. This configuration would require the removal of one southbound travel lane.

CRITERIA	
IMPROVE HEALTH	●
CONNECT/CREATE PARKS	●
SUPPORT BUSINESSES	●●
EXPAND PATHWAYS	●
ENCOURAGE CYCLING	●
GROW GREEN	●
DIRECTNESS	●●●
EASE OF IMPLEMENTATION	●●
ABILITY TO ACCOMMODATE	●
TOTAL	**1.6**



Proposal 5 Section: Looking North

Green Loop Refinement: DRAFT Key Objectives/ Evaluation Criteria
03/02/15

The Green Loop is envisioned as a 21st Century Public Works Project for Portland that will become the Central City's signature open space system. The Green Loop will connect neighborhoods and districts with an intuitive pathway that offers safety and accessibility throughout the Central City for all residents, workers, students, and visitors. It builds on a larger goal of being more intentional about the design character and priorities for the Central City's streets.

The following criteria is based on the key objectives and design considerations for the Green Loop concept. The criteria should be used to weigh tradeoffs for each potential alignment and help to guide choices as the concept is refined.

Key Objectives:

Improve Health
Does this alignment support the healthiest outcomes in terms of the following: air quality, less exposure to noise pollution, access to nature and recreation, safest route for walking, jogging, and cycling?

Connect and Create Parks
Does this alignment connect existing parks and open spaces and/or have the highest potential for the creation of new open spaces?

Support Businesses
Can this alignment result in more visibility and patronage to existing businesses and cultural attractions and can it catalyze the creation of more? Will it have the least negative impact to existing businesses?

Expand Pathways
Does this alignment result in the expansion of the Central City's robust pedestrian and jogging network and does it create new pathways where they currently do not exist? Will it make current pathways safer and more intuitive?

Encourage Cycling
Does this alignment cast the widest net to more potential new cyclists by offering the most attractive route to the "interested but concerned" population including families, older adults, women, people of color and those coming from outer neighborhoods?

Grow Green
Does this alignment offer the most potential for highly visible low carbon development including stormwater facilities, green walls, high structured canopy, and carbon neutral buildings and structures?

Green Loop Refinement: DRAFT Key Objectives/ Evaluation Criteria
03/02/15

<u>Design Considerations</u>
Directness
Is this alignment the "path of least resistance", connecting bridges, attractions, and other major facilities in a route that is direct with few significant grade changes?

Ease of Implementation
Can this alignment be successful without multiple steps and phases to make it work?

Ability to Accommodate
Is this alignment most able to accommodate the spatial considerations of the Green Loop, e.g. a two-way separated bicycle facility, pedestrian and/or jogging path, tree canopy, street furnishings, etc.?

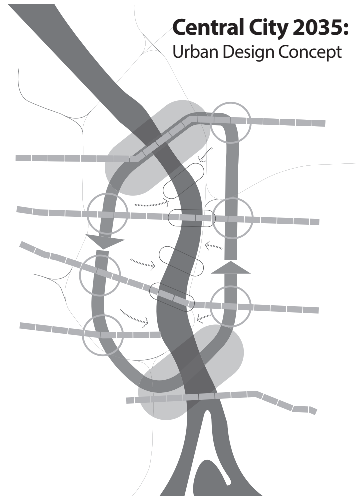
Segment A: From Broadway Bridge to Burnside

	Improve Health	Connect/ Create Parks	Support Businesses	Expand Pathways	Encourage Cycling	Grow Green	Directness	Ease of Implementation	Ability to Accommodate	
1	•••	•••	••	••	•••	••	•••	••	•••	**2.5**
2	•••	•••	•	•••	•••	•••	•••	•	••	**2.4**
3	•••	•••	•	•••	•••	•••	•••	•	••	**2.4**
4	•	•	••	•	•	•	•••	••	•	**1.4**
5	••	••	•••	•	•	•	•	••	••	**1.6**

1: Couplet along NW 8th and NW Park
2: Two-way path along NW 8th (could include vehicle-only street on Park)
3: Two-way path along NW Park (could include vehicle-only street on 8th)
4: Two-way path along NW Broadway (asymmetrical)
5: Couplet along NW Broadway NW 8th

Transportation Proposal: Green Loop

Green Loop Concept:



The Central City 2035 Concept Plan approved by City Council in 2012 included the proposal for a new pedestrian and bicycle loop referred to as the "Green Loop" that would connect existing attractions, open space amenities and districts with a continuous comfortable bicycle and pedestrian pathway.

Issues to Resolve in the Central Eastside

Major issues in the Central Eastside have been identified by the SAC and other stakeholders:

1. Comfortable and well-marked bicycle routes bring cyclists into the district, but inside the district, few routes attract cyclists to specific streets with amenities and signage. The result is that cyclists are often dispersed, sometimes using streets important to trucks.
2. Businesses using freight have concerns about the conflicts between bicycles and trucks.
3. These issues will be compounded due to increased industrial employment uses and residential development in the mixed use areas.

Practical Solutions

As shown in the map to the right, the Central Eastside is at the center of residential and employment growth. In addition, there is substantial growth throughout the region that feeds from and passes through the Central Eastside.

PBOT predicts that by 2035 there will be an additional 120,000 trips each day using the same streets we have today. Improving active transportation options is essential to maintaining the district's freight movement and other core functions. The Green Loop and other transportation proposals are practical solutions to respond to this growth. They are based on a strategy developed with the SE Quadrant SAC's Transportation Working Group last spring. This strategy is simple:

- Identify existing priority freight routes that could be further enhanced for trucks through new signals, one-way streets, and signage.
- Improve a small number of lower priority streets to make attractive for pedestrian and bicycle movement in the district. Focus seating and other furnishing, tree canopy or stormwater treatment to these streets where they will have the least impact on freight.

In the Central Eastside, the Green Loop will connect two new bridges: the future I-84 pedestrian and bicycle bridge connecting to the Lloyd District and the new Tilikum Crossing connecting to OHSU and the South Waterfront area. The result will help channel cyclists onto one path, reducing dispersion and increasing predictability for all modes.

The exact route of the Green Loop will require more outreach, engineering and planning work than is possible during the Central City 2035 Plan timeline.

At the February 5th SAC meeting staff will seek input on the draft criteria presented here that planners will use to conduct future work on the Green Loop in the Central Eastside.

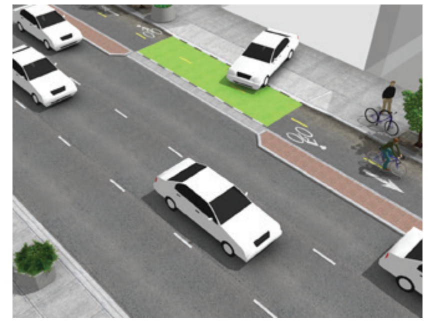
Preliminary Staff Evaluation Included in the November 2014 Bulletin

	Evaluation Criteria						
Options	Least freight impacts	Ability to accommodate a 2-way cycle track	Proximity to retail, commercial, and residential development	Open space opportunities	Ease of implementation	Directness	**Average Rating**
A: Grand Ave	•	••	•••	•	•	•••	1.8
B: 6th Ave	•••	•	•••	••	••	••	2.2
C: 7th Ave	••	•••	••	•••	•••	•••	2.7
D: 9th Ave	••	•	•	•	••	••	1.5

Performance Rating: ••• = Best •• = Average • = Worst

Draft: 01/29/14

Preliminary Evaluation Criteria:



Least Freight Impacts
Freight movement may be impacted by the loss of travel lanes, reduced lane widths and potential loading conflicts with bicycles. Analysis will prioritize alignments with the least negative impact to freight. Where cycle-tracks cross driveways used by businesses, design elements will be included such as colored and textured surfaces, signage, and maintaining sight triangles as shown in this diagram from the National Association of City Transportation Officials (NACTO).

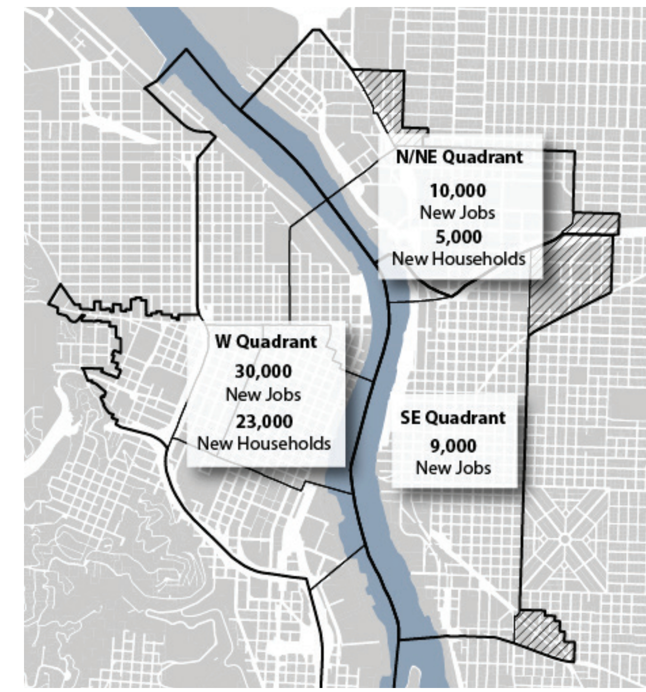
Ability to Accommodate a 2-Way Cycle Track
When fully built out, the Green Loop concept envisions physically separated paths to minimize conflicts between cyclists, pedestrians and freight vehicles. The right-of-way required to meet these needs can be accommodated by taking up a large portion of a narrow street or a smaller portion of a wide street. Pros and cons for each approach will be considered.

Proximity to Retail, Commercial, and Residential Development
In the Central Eastside, many stakeholders have expressed that proximity to Grand and MLK and other mixed-use zoned areas is desired over an alignment that diverts cyclists through industrial areas.

Open Space Opportunities
Where available, stakeholders have made it clear that areas adjacent to the Green Loop should accommodate pedestrians and bicyclists with amenities such as gathering spaces and seating. Throughout the SE Quadrant planning process, participants preferred that these opportunities are within the mixed use areas of the district.

Ease of Implementation
The Green Loop will likely be implemented in steps. The ability for a street to accommodate bicycles more readily and the direct benefit for pedestrians as the project is built out over time should be considered as all alignment options are studied.

Directness
The Green Loop in the Central Eastside must connect the future pedestrian and bicycle bridge over I-84 to the new Tilikum Crossing Bridge in the most direct and flat route possible so that cyclists choose it over other streets. The number of turns and grade changes the route requires will be considered.



At the Center of Growth
The Central Eastside has long been at the center of Citywide and regional growth. The map to the left shows that this will continue to be be true as the predicted employment and residential development occurs through 2035 in the Lloyd District and west side including OHSU expansion at the Schnitzer Campus in the South Waterfront Area. These new residents and employees will travel to and through the Central Eastside.

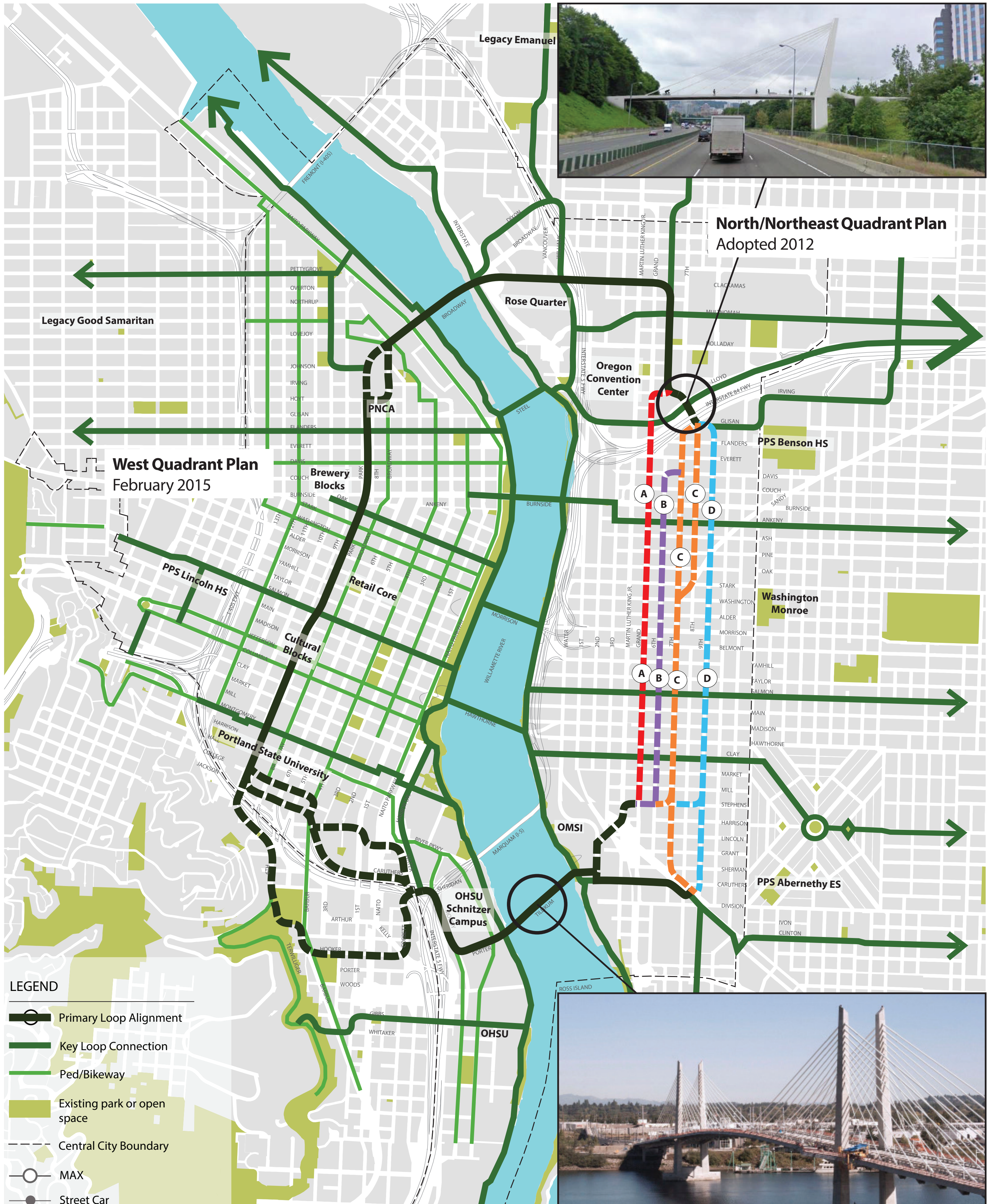
The Portland Plan sets target mode splits (shown below) to accommodate the new trips associated with this growth.

Citywide Mode-Split Targets for 2035 (Portland Plan)

Objectives:

Key objectives for the Green Loop will result in multiple benefits for the Central City:

1. **Improve Health:** Improve health by making it safer and more comfortable to get around by biking and walking.
2. **Connect Parks:** Develop stronger connections between open spaces and catalyze new ones to target limited resources.
3. **Support Businesses:** Increase access to key employment districts throughout the Central City. In the Central Eastside, use signage, wayfinding, and other strategies to reduce conflicts with freight.
4. **Increase Pathways:** Develop more intuitive pedestrian pathways and offer an amenity for walkers and joggers.
5. **Encourage Riding:** Create a system of clear, physically-separated routes to provide the large group of "interested but concerned" potential bicyclists safe and intuitive facilities.
6. **Grow and Build Green:** Encourage the integration of green buildings, stormwater management facilities and canopy while accommodating truck access.



7th Avenue Conceptual Rendering

The following renderings are conceptual. They depict a range of options to be considered for a future Green Loop alignment.

1 New paving treatment with new street furnishings.
2 Stormwater management facilities and denser canopy street trees.
3 Bi-directional cycle track with concrete curb and potentially retractable bollards.
4 Wayfinding/signage to reduce mode conflict and reinforce district maker/doer branding.
5 Existing travel lanes and turning lane are maintained.

6th Avenue Conceptual Rendering

1 New development in EX Zone.
2 Industrial functions maintained.
3 Setback from property line to provide social/gathering space.
4 New paving treatment with new street furnishings.
5 Raised bi-directional cycle track with vegetated curb.
6 One-way travel lane heading southbound is shown (one of many possible options).
7 One lane of on-street parking
8 Signage crossing markings for pedestrians and freight users.
9 Rolled curb design allows freight to drive over edge during loading.

Potential Alignment Options:

At the SAC Meeting, we'll focus on the criteria for choosing an alignment. Preliminary analysis for the four options shown are below:

A: Grand Avenue

Although this option brings the Green Loop where there is the most potential for mixed use, it would have the largest impact on freight movement, the highest costs due to the infrastructure improvements necessary to make it work well, and provides relatively few benefits over other options. **Staff propose that this option be removed from further consideration.**

B: 6th Avenue

This option features mixed use zoning (EXd) along the western side of the street, along with historic buildings and a growing list of new development and building rehabilitation projects. **Staff propose that this option continue to be analyzed.**

C: 7th Avenue

This option includes a segment of EX and takes advantage of the current bicycle lanes by consolidating and separating them from other modes. **Staff propose that this option continue to be analyzed.**

D: 9th Avenue

9th Avenue is furthest from the mixed use areas, and also furthest (and uphill) from the future bridge over I-84. **Staff propose this option be considered as a backup if other options are not supported or feasible.**

Decision-making for the Green Loop's alignment will continue beyond the timeline of the Southeast Quadrant Plan. Future steps will include more stakeholder input as well as the technical analyses necessary to understand tradeoffs for each of the alignments.

District-Wide Proposals: Ground Floor Character

Ground Floor Character refers to the sidewalks and ground floors of buildings that line streets, not the transportation functions of the streets. It assumes all streets remain freight streets. In the Central City, three types of character have been defined. Examples are shown below and mapped for the Central Eastside on the right.

Retail Ground Floor Example

These are highly visible, continuous streets with an active ground floor retail focus. They come in two sizes, "district" scale and "civic" scale based on whether they are important only to the surrounding areas or to the rest of the city.

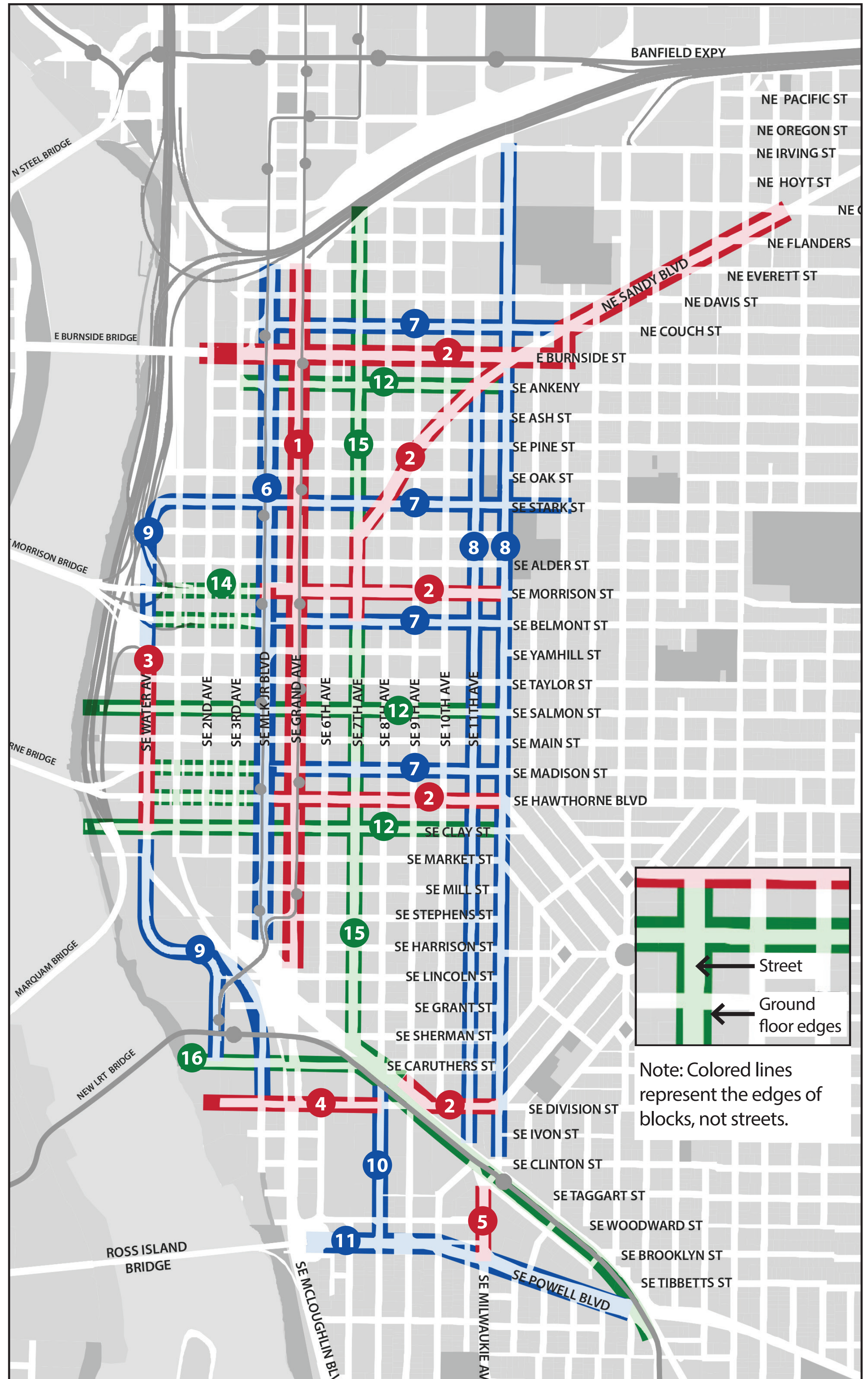
Boulevard Ground Floor Example

These streets can also be very busy and often are the less visible street of a couplet or define a district edge.

They can offer a greener, more landscaped character with fewer retail storefronts, more loading, "back of house" functions, and rear entries.

Flexible Ground Floor Example

Ground floors of these streets should offer wayfinding as primary connections to and across the river and district through signage and visible green features where possible.



Note: Colored lines represent the edges of blocks, not streets.

Proposal Details

1 Reinforce Grand Avenue's historic main street character with frequent building entries, ground floor windows, signage, awnings and active ground floor uses.

2 Prioritize building entries, windows, outdoor gathering and active ground floor uses along key east-west corridors: East Burnside, SE Sandy, SE Morrison, SE Hawthorne and SE Division St.

3 Build on Water Avenue's prominent street identity as a local main street with a high density job and employment focus by adding amenities for workers.

4 Recognize and enhance SE Division Place as the Southern Triangle's key east-west corridor with high visibility for businesses and important freight and transit functions.

5 Connect new development in the Southern Triangle to Brooklyn with focused ground floor active uses along SE Milwaukie.

6 Enhance the character of MLK with greater emphasis on tree canopy, access, safety, movement and flow.

7 Encourage a street character along Couch, Stark, Belmont and Madison that addresses transitions between industrial and mixed use buildings. This can be accomplished by active ground floor and pedestrian amenities along key streets, with supportive functions such as loading and rear entries on other building faces or streets.

8 Maintain the residential edge character with street trees and landscaped building setbacks along these corridors while facilitating access, movement and flow of freight, bicycles and pedestrians.

9 Encourage a consistent street character along Water Ave through 4th Ave Place to the OMSI Station Area that improves access and safety for business users, PCC students, and visitors to the area's cultural attractions. This can be accomplished through street trees, pedestrian scaled furniture and lighting, wayfinding and active ground floor uses in key locations.

10 Emphasize a greater pedestrian focus on 8th Ave that continues across Powell Blvd into Brooklyn.

11 Enrich the pedestrian environment on Powell with development that allows increased setbacks, tree canopy, visible stormwater features and safe crossings.

12 Encourage a street character on Ankeny, Salmon and Clay that strengthens their roles as primary connections to and across the river for pedestrians and cyclists.

13 Reinforce Salmon through the ODOT Blocks as a major east-west connection to the river.

14 Explore opportunities presented by Central Eastside viaducts. On top of viaducts, explore opportunities to provide upper floor building access where possible. Under the viaducts, explore opportunities to create strong and comfortable east-west connections between MLK and Water for cyclists and pedestrians including temporary or permanent repurposing of right-of-way for open spaces, gathering or event space.

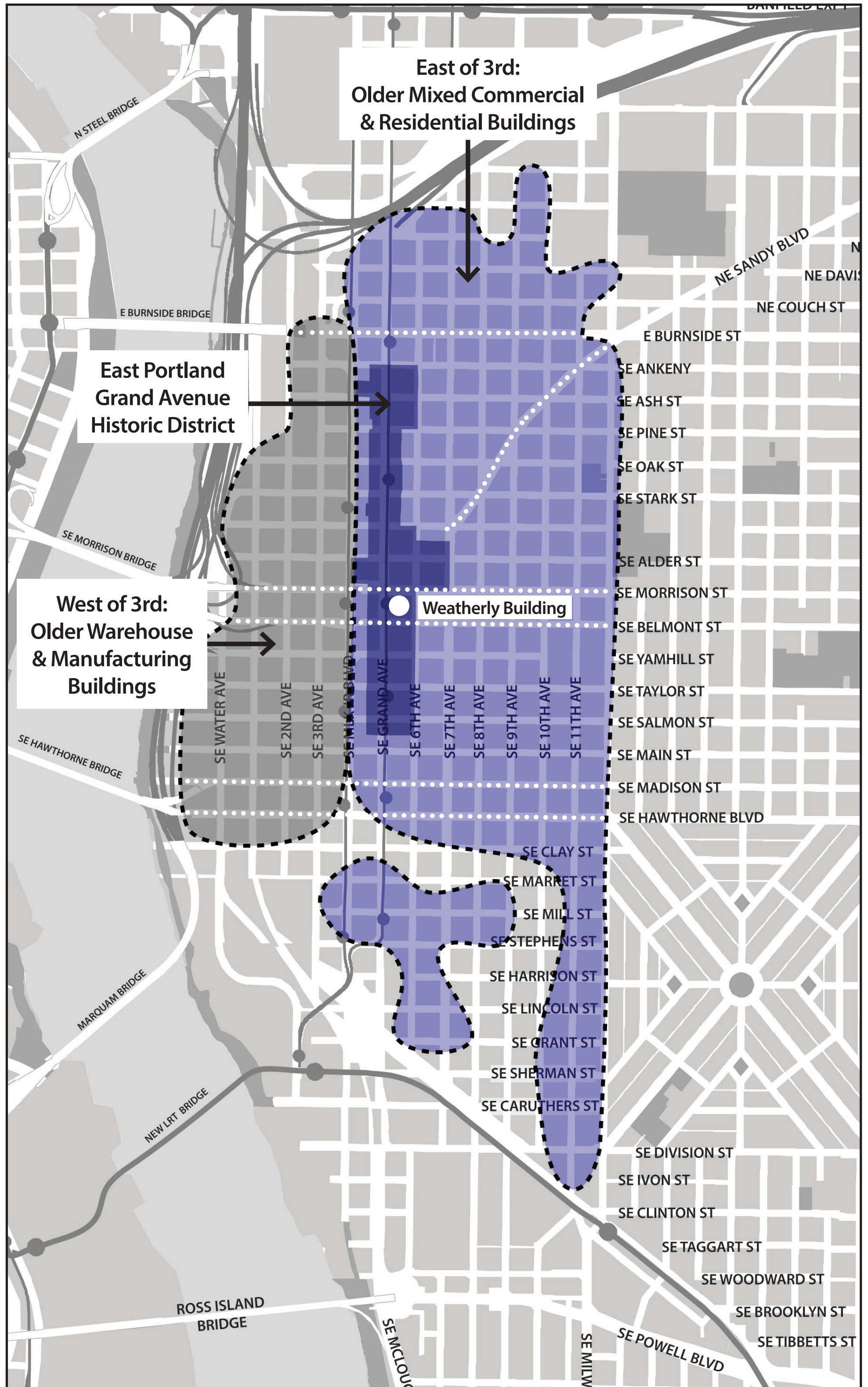
15 Strengthen the street character of the future Green Loop alignment (to be decided) as the premier north-south route for pedestrians and bicyclists with key amenities such as street furnishings, pedestrian-scaled lighting and street trees.

16 Encourage a street character on Caruthers that strengthens its role as a connection to and across the river for pedestrians and cyclists.

District-Wide Proposals Continued

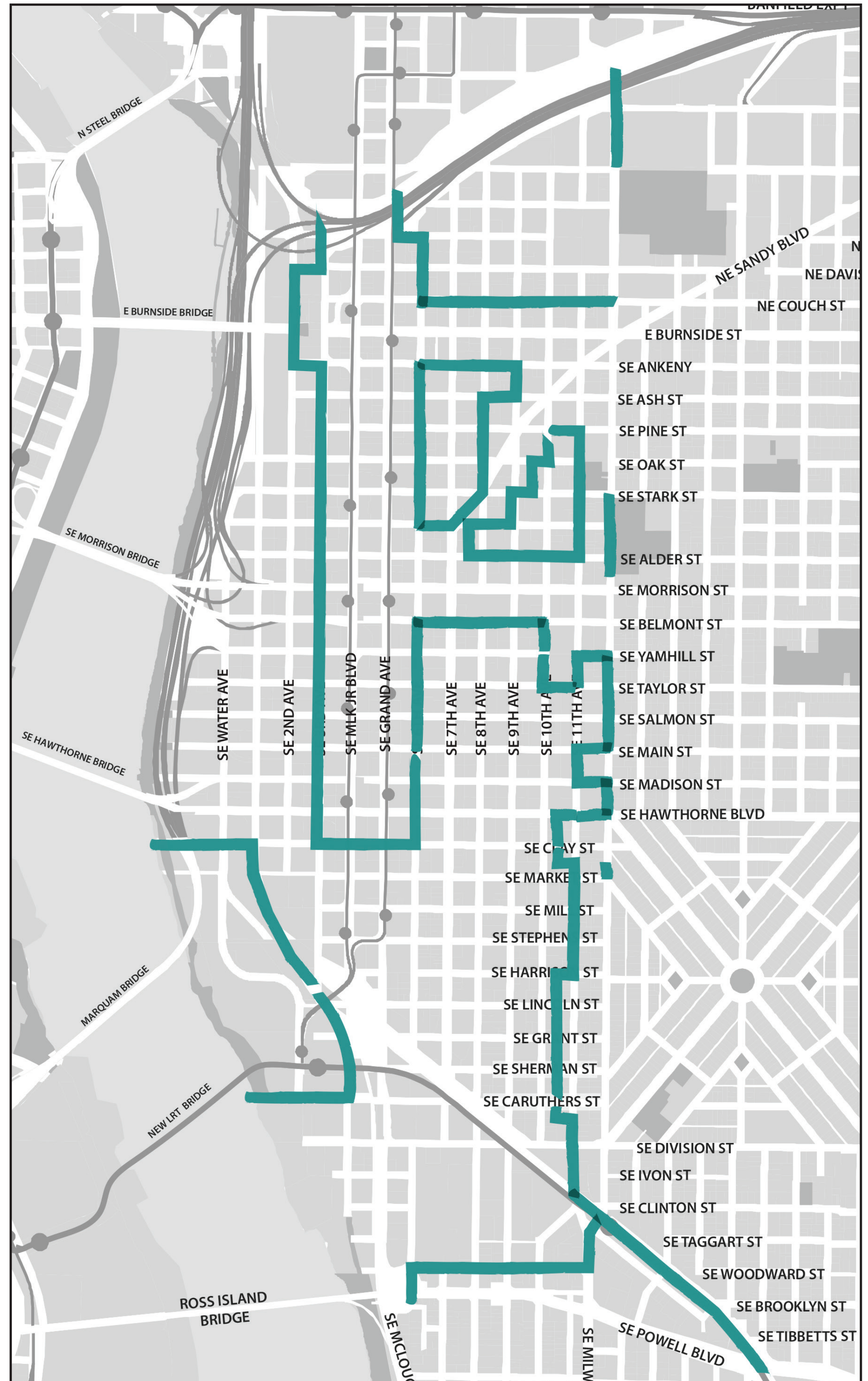
Historic Character

Support the rehabilitation of historic structures in the three areas identified below through improved research and incentives. Update design guidelines for new development that respond to historic character and recognize the Weatherly as the district's iconic skyscraper. Reinforce and reactivate historic main streets: Burnside, Sandy, Morrison, Belmont, Madison and Hawthorne.



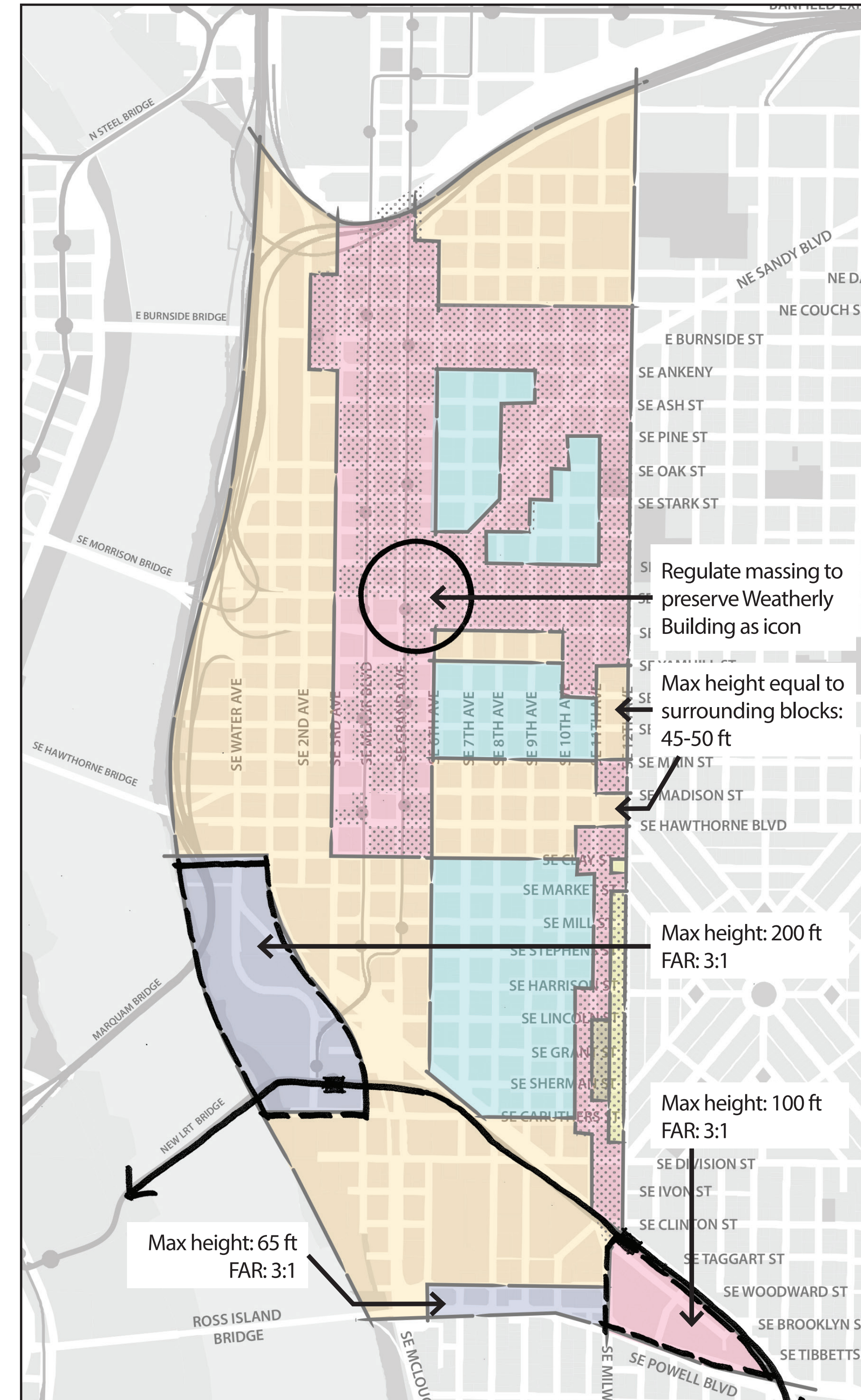
Design Standards for Edges of Zones

The Central Eastside is unique because blocks with mixed use zoning and design standards are across the street from industrially zoned blocks that lack such standards. These edges are outlined below. Building design for these blocks should be oriented toward mixed use corridors with loading and other supportive functions facing industrially zoned areas.



Modifying Height and FAR

No height or floor-to-area ratio (FAR) changes are proposed for industrially zoned areas including those in the EOS. Height and FAR limits are proposed for new mixed use areas around the OMSI and Clinton Station Areas. To reinforce the Weatherly Building's role as a key landmark within the district, the massing of structures in this area is being considered.



Specific Area Proposals

Activating Station Areas

Activate station areas along key access routes and the waterfront. The large block development guidelines described in the middle of this page identify connections through the Southern Triangle between station areas and key access points to the riverfront.

OMSI Station

- Connect activity along Water Ave including the Eastbank Exchange, Water Ave Commerce Center, the future ODOT Blocks project, RiverEast, Viewpoint and PCC CLIMB to the station area to the south. Accomplished through:
  - Ground floor active uses, windows, and entries
  - Pedestrian amenities (lighting, trees, etc.)
  - Activating Old Water Ave
  - Wayfinding and other signage
- Target new gathering and open space along the riverfront and at the station itself.

The Colorado Convention Center (Denver) shows how existing attractions could orient to the station to increase activity and safety.

Granville Island (BC) has an active waterfront and industrial uses coexisting with attractions and transportation infrastructure.

Clinton Station

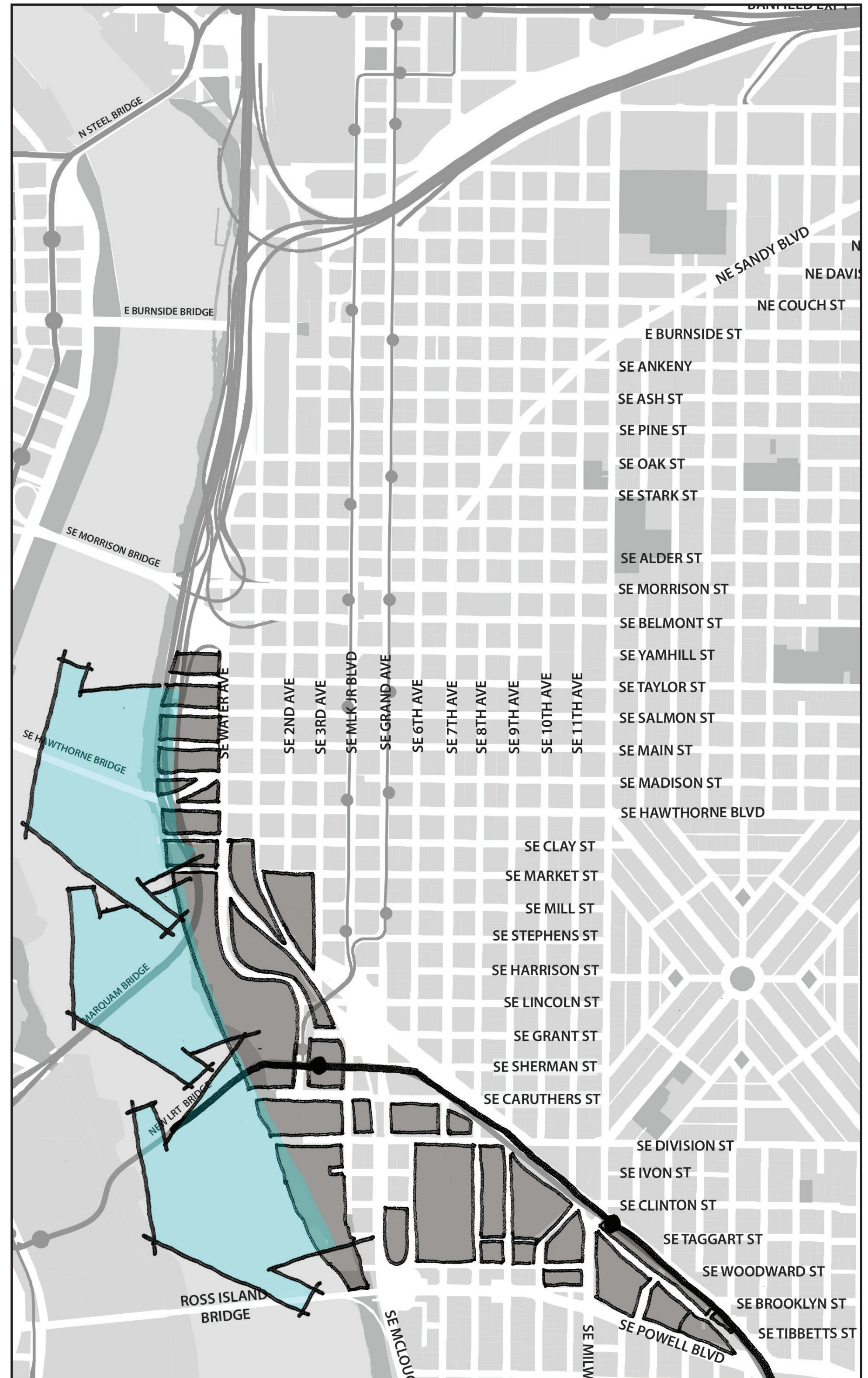
- Improve connections between the station area and the surrounding neighborhoods.
- Improve key east-west routes to connect that station to the Southern Triangle employment area across Milwaukie.
- Target new open space or community services to the station area.
- Encourage ground floor active uses along Gideon and Milwaukie to improve safety and station function.

Mixed use buildings such as this office and retail example from Denver will orient to the station area and key connector streets.

Open space or services such as this community center could be used by adjacent neighborhoods, and other communities via light rail.

Large Block Development in the Southern Triangle

Large blocks represent a unique opportunity for dense, large site development. Integrate this development into surrounding blocks through well designed internal spaces and pedestrian connections. Emphasize views of the downtown skyline, river and Tilikum Crossing bridge. Target active ground floor uses along key connections to and along the waterfront.



Connections and Open Space

Improve pedestrian access to the district and to specific areas of activity and density within the district across barriers such as rail lines, viaducts, highways and freeways through new bridges, paths or other connections. Target new public and private open space within areas of activity and density, especially along the river, within mixed use areas, and around transit station areas.