July 21
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CAP Report
Appendix J //

Surface Street Network and Circulation

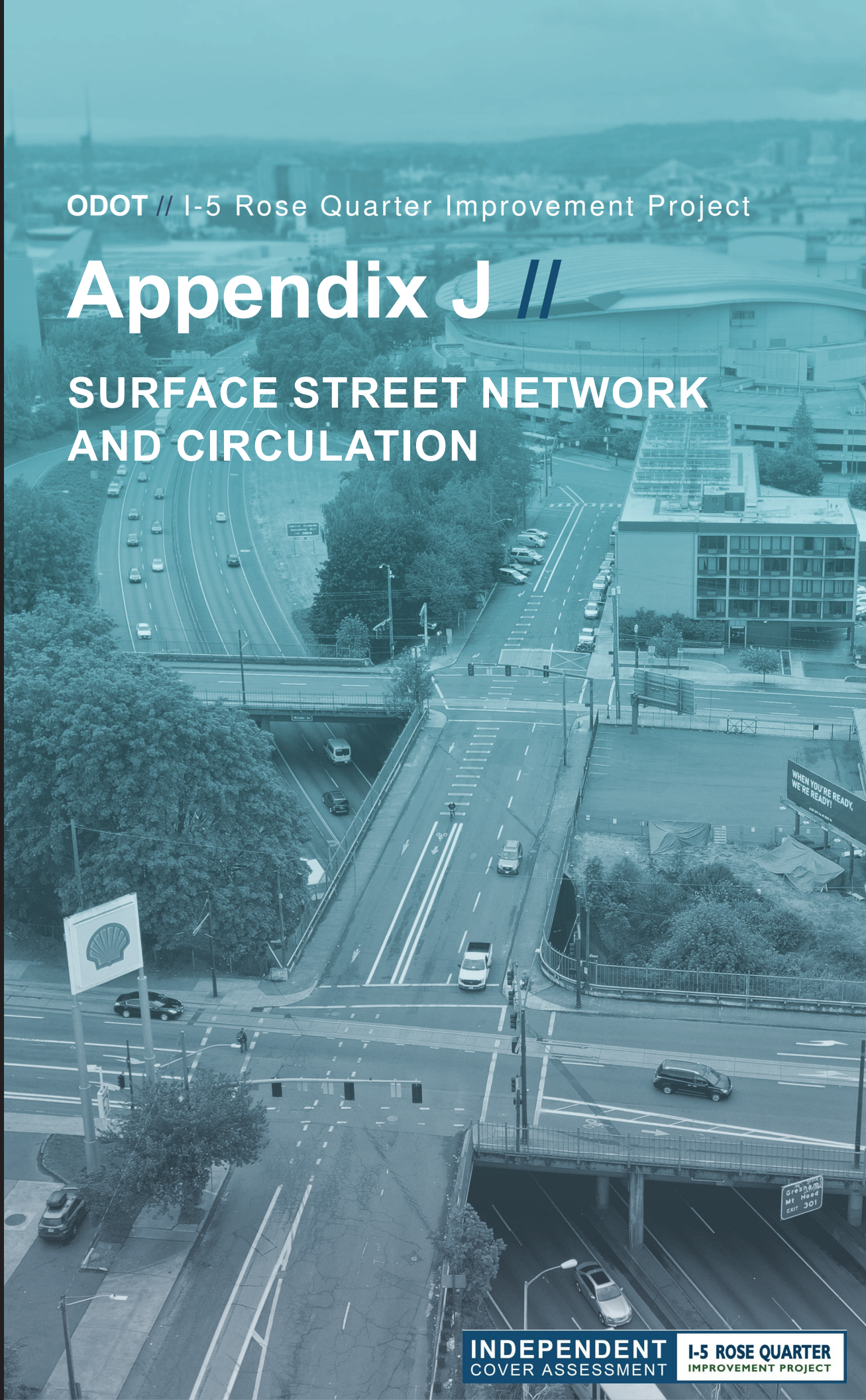
Task 2.3.1

ODOT EA:
PE002591000J71

ODOT // I-5 Rose Quarter Improvement Project

Appendix J //

SURFACE STREET NETWORK AND CIRCULATION



INDEPENDENT COVER ASSESSMENT | I-5 ROSE QUARTER IMPROVEMENT PROJECT

2.3.1 Surface Street Network and Circulation

1 Introduction

The objective of the local street network is to support the Neighborhood Framework being developed as part of the Independent Cover Assessment (ICA) and to bring to life the community vision and restorative justice outcomes that have been prioritized for the I-5 Rose Quarter Improvement Project (RQIP) through the public and stakeholder engagement process.

1.1 Background

The I-5 RQIP adds auxiliary lanes and shoulders on the I-5 mainline to reduce congestion and improve safety on the section of the freeway between I-84 and I-405. The project also redesigns overpasses and neighborhood streets, creating a cover over the highway at the area around the Broadway-Weidler interchange that can support local circulation needs, enhance public spaces, and provide economic development opportunities.

The RQIP 20% Design, building from the federally-approved Environmental Assessment (EA), included several local street network changes including:

- Relocating the southbound (SB) on-ramp from Wheeler Avenue to a new counterflow segment and on-ramp on the east side of N Williams Avenue, south of Broadway.
- Separated bicycle facilities along Broadway/Weidler and Vancouver/Williams as well as separated bike signals at key intersections.
- A new pedestrian- and bicycle-only bridge connecting N Winning Way over I-5 to NE Clackamas Street. The “Clackamas Crossing” allows pedestrians and bicyclists to avoid the Broadway- Weidler-Vancouver-Williams “box” and would form part of the Green Loop alignment.
- A new roadway connection over I-5 connecting NE Hancock Street and N Dixon Street. The Hancock- Dixon connection would provide a local street alternative for pedestrians, bicyclists, and traffic looking to avoid “the box”.

It is noted that since the RQIP 20% Design the Hancock crossing alignment was modified to avoid an impact to the Paramount Apartments parking lot and support Albina Vision Trust's affordable housing and theater development. The RQIP 20% design was amended in March 2021 to replace the Dixon Hancock connection with a Hancock to Flint connection which is to be referred to the amended 20% Design. The RQIP team has stated they are committed to providing a local street connection across I-5 north of the Broadway/Weidler interchange and will use the outcomes of this study and work with the community to identify the best crossing point and connection into the Lower Albina neighborhood.

The RQIP 20% Design street network addresses many of the existing traffic operational issues in the area by relocating the SB on-ramp movements to the eastern edge of the box. The design allows for efficient movement of vehicles to and from the freeway and meets Oregon Department of Transportation’s (ODOT) and Portland Bureau of Transportation’s (PBOT) traffic performance metrics. Whilst there are improvements for pedestrians, bicyclists, and transit; the design also provides several challenges to developing a street network that can support the restorative justice outcomes of the project including:

- Creating irregularly shaped land parcels and several that are fronted by freeway ramps that may be difficult to program and access.
- Focusing traffic at a few key intersections, leading to large intersections and streets that are more difficult for pedestrian movement and less supportive of neighborhood-scale development.
- Several complex intersections that are more difficult for pedestrians, bicyclists, and drivers to navigate.
- Some unintuitive circulation, including the counterflow section of N Williams Avenue between Broadway and Vancouver, that makes it difficult for people to move around and violates typical driver expectations, especially for those unfamiliar with the area.

1.2 Design Approach

The intent of the ICA is to explore highway cover scenarios that provide restorative justice outcomes from the opportunities created by the I-5 RQIP. The ICA team developed three highway cover scenarios based on the stated ESC's Values and Outcomes and input from stakeholder workshops. The overarching highway cover outcomes were identified as: creating community wealth, community health, community cohesion, and mobility. The ICA team developed Neighborhood Framework Principles that outline strategies and tools for the community's vision to be achieved on and around the cover. The scenarios developed by the ICA team support that framework and seek to maximize the amount of high-quality, developable and usable land on and around the cover to create the greatest potential for restorative justice outcomes for the Black Historic Albina community.

For local street circulation, this requires a fundamental shift in design approach from designing for the operation of vehicle movements through the center of the neighborhood with pedestrian and active transportation users accommodated on the edges; to an approach that provides safe, appealing, and pedestrian-oriented streets through the neighborhood that are fundamental to the character and experience intended for this neighborhood and consistent with other neighborhoods in the Central City.

The scenarios developed by the ICA team include a revision of the street hierarchy to better reflect the City of Portland's modal hierarchy prioritizing pedestrians, bicyclists, and transit before traffic operations. Freight movements are also an important consideration for this area. The design approach rebalances street cross-sections to provide additional space for sidewalks, protected bike facilities, street trees, and other amenities, to provide smaller-scale streets and experiences that are conducive to the character and type of program that can support the community vision.

The ICA team developed the following key objectives for the local street network that would support the neighborhood framework. The street network needs to:

- Create developable and accessible land parcels.
- Create direct and efficient networks for all modes.
- Be safe and comfortable and minimize conflicts.
- Reduce complexity and confusion and make navigation logical.
- Create neighborhood-scale streets.

1.3 ICA Scenarios

The ICA team developed several concepts, from which three primary scenarios were carried forward. The major street network changes that support these scenarios are described in **Table 1**.

- **20% Design**: this scenario is described above and has been used as a baseline to compare the ICA-developed scenarios. It references the design included in the *20% Design Package (Refined Facility Plan / NEPA Design Concept)* submitted to ODOT.
- **Scenario 1 – Flint and Broadway Boulevards**: this scenario modifies the 20% Design to re-orient the restored neighborhood and create pedestrian-scale development opportunities along the Flint corridor and restore the Hancock connection straight across the highway, as opposed to connecting it to Dixon.
- **Scenario 4 – Center on the Cover**: this scenario relocates the I-5 ramps south of the cover and merges Vancouver and Flint, removing Vancouver between Hancock and Broadway. This creates a large and flexible, programable development space.
- **Scenario 5 – Restore the Grid**: this scenario relocations the I-5 ramps south of the cover and restores the street grid by reestablishing the Flint and Hancock connections.

Table 1: Major Street Network Changes

Element	Scenario 1	Scenario 4	Scenario 5
Create one continuous cover instead of two separate covers	X	X	X
Cover the ramps (as much as possible) with structures	X		
Reconnect Hancock and Flint	X		X
Reconfigure the Green Loop corridor through the new neighborhood and remove the Clackamas Crossing	X	X	X
Merge Flint and Vancouver		X	
Relocate the southbound (SB) off-ramp south of the cover		X	X
Relocate the northbound (NB) on- and off-ramps south and east of the cover		X	X

Table 2 compares how these scenarios meet the local street circulation objectives described in Section 1.2.

Table 2: Evaluation of Design Scenarios in Meeting Local Street Circulation Objectives

Objective	20% Design	Scenario 1	Scenario 4	Scenario 5
Create developable and accessible land parcels	**Low** • Scenario creates a number of irregularly shaped land parcels. Access to some parcel frontages is limited by the freeway ramps.	**Medium** • Scenario improves shape and size of land parcels. Access to some parcel frontages is limited by the freeway ramps.	**High** • Scenario improves shape and size of land parcels and allows access on all frontages. The realignment of Vancouver will result in some increased traffic passing existing development.	**High** • Scenario improves shape and size of land parcels and allows access on all frontages.
Create direct and efficient networks for all modes	**Low** • The Hancock-Dixon connection provides a route for pedestrians and bicyclists to bypass the high-stress Broadway - Weidler - Vancouver - Williams "box" and a direct connection to the Lower Albina neighborhood. The need to realign the Hancock-Dixon connection to avoid property impacts removes a direct connection to the Lower Albina neighborhood. An alternative alignment for Hancock to cross I-5 and connect with Flint will be provided. • The Clackamas Crossing provides a route for pedestrians and bicyclists to bypass the high-stress Broadway - Weidler - Vancouver - Williams "box" but does not provide a direct route through the neighborhood for the Green Loop. • Sidewalks and separated bike facilities along Broadway and Weidler provide pedestrians and bicyclists with a direct east-west connection through the area. • The northbound on-ramp location prevents sidewalk construction on the west side of Williams between Broadway and Hancock.	**Medium** • The realignment of the Hancock-Dixon connection to avoid property impacts removes a direct connection to the Lower Albina neighborhood. • Scenario increases the cover and reconnects Flint over the freeway. The Hancock-Flint connection restores the street grid north of Broadway and provides a route for pedestrians and bicyclists to bypass the high-stress Broadway - Weidler - Vancouver - Williams "box". • Realigning the Green Loop onto the south side of Weidler provides pedestrians and bicyclists, including less comfortable users, with a direct route through the neighborhood. (Note: this option could still allow for the Clackamas Crossing). • The northbound on-ramp location prevents sidewalk construction on the west side of Williams between Broadway and Hancock.	**Low** • The realignment of the Hancock-Dixon connection to avoid property impacts removes a direct connection to the Lower Albina neighborhood. • Increasing the cover and merging Vancouver into the Flint alignment at Hancock allows for a larger programmable space, but: ▪ Presents some traffic circulation challenges with out-of-direction travel, additional turns, and an additional signal for southbound transit headed to the Rose Quarter Transit Center. ▪ Out-of-direction travel for southbound freeway traffic from Vancouver and an additional signal added to this movement. ▪ Less intuitive connections for pedestrians and bicyclists traveling southbound on Vancouver and east-west on Hancock with connections needed through the large block that will require design of transitions and crossings for pedestrians and bicyclists to make these movements. • Realigning the Green Loop onto Broadway and Weidler provides pedestrians and bicyclists, including less comfortable users, with a direct route through the neighborhood. • Relocating the ramps to the south end of the cover allows the four intersections comprising "the box" to have smaller roadway footprints; more space is available for pedestrian and bicycle facilities. • Relocating the NB on-ramp allows sidewalk construction on both sides of Williams between Broadway and Hancock. • Traffic operations at the southbound ramps do not allow for a crosswalk on the east leg of the intersection. As a result, a sidewalk was not provided on the east side of Wheeler between the SB ramp and the Rose Quarter Transit Center.	**High** • The realignment of the Hancock-Dixon connection to avoid property impacts removes a direct connection to the Lower Albina neighborhood. • Scenario increases the cover and reconnects Flint over the freeway. The Hancock-Flint connection restores the street grid north of Broadway and provides a route for pedestrians and bicyclists to bypass the high-stress Broadway - Weidler - Vancouver - Williams "box". • This scenario recreates the street grid and provides the most direct and complete network for pedestrians, bicyclists, transit, and local traffic circulation. • Realigning the Green Loop onto Broadway and Weidler provides pedestrians and bicyclists, including less comfortable users, with a direct route through the neighborhood. • Relocating the ramps to the south end of the cover allows the four intersections comprising "the box" to have smaller roadway footprints; more space is available for pedestrian and bicycle facilities. • Relocating the NB on-ramp allows sidewalk construction on both sides of Williams between Broadway and Hancock. • Traffic operations at the southbound ramps do not allow for a crosswalk on the east leg of the intersection. As a result, a sidewalk was not provided on the east side of Wheeler between the SB ramp and the Rose Quarter Transit Center. • To accommodate the relocation of the northbound ramps and allow protected signal phases for pedestrian crosswalks requires 1st

Objective	20% Design	Scenario 1	Scenario 4	Scenario 5
			• To accommodate the relocation of the northbound ramps and allow protected signal phases for pedestrian crosswalks requires 1st Avenue to be closed to automobile traffic north of Broadway.	Avenue to be closed to automobile traffic north of Broadway.
Be safe and comfortable and minimize conflicts	**Medium** • This circulation system increases space and protection for pedestrians and bicyclists compared to existing conditions. • Green Loop crosses the I-5 mainline via the Clackamas Crossing and bypasses the ramp terminals on Broadway and Weidler with limited interaction with roadway traffic. The Clackamas Crossing is in a location that is often inactive and some users may not use the facility for personal security concerns. • Most crosswalks and bike crossings are provided some form of signal phasing to separate them from conflicting turning movements including: ▪ 27 crosswalks and bike crossings with either no turning movement conflicts or that are provided a dedicated crosswalk and/or bike phase that runs at different times to conflicting turning traffic. ▪ 7 crosswalks and bike crossings are provided with leading pedestrian intervals (LPIs) and/or leading bicycle intervals (LBIs). Once the leading interval is done, conflicting turns are permitted across the pedestrian or bike movements. ▪ 1 crosswalk (at Broadway & Victoria) runs with the conflicting southbound right-turn permitted across pedestrians using the west crosswalk. • Ramp terminal locations create challenges for safe and comfortable pedestrian and bike movements. The complex five-way intersection at the southbound off-ramp terminal has multiple crosswalks and a narrow median refuge. There is no sidewalk on the westside of Williams north of Broadway that may result in illegal and dangerous crossing of the northbound on-ramp.	**Medium** • This circulation system increases space and protection for pedestrians and bicyclists compared to existing conditions. • Green Loop crosses the I-5 mainline via the Clackamas Crossing and bypasses the ramp terminals on Broadway and Weidler with limited interaction with roadway traffic. The Clackamas Crossing is in a location that is often inactive and some users may not use the facility for personal security concerns. • Most crosswalks and bike crossings are provided some form of signal phasing to separate them from conflicting turning movements including: ▪ 27 crosswalks and bike crossings with either no turning movement conflicts or that are provided a dedicated crosswalk and/or bike phase that runs at different times to conflicting turning traffic. ▪ 7 crosswalks and bike crossings are provided with leading pedestrian intervals (LPIs) and/or leading bicycle intervals (LBIs). Once the leading interval is done, conflicting turns are permitted across the pedestrian or bike movements. ▪ 1 crosswalk (at Broadway & Victoria) runs with the conflicting southbound right-turn permitted across pedestrians using the west crosswalk. • Ramp terminal locations create challenges for safe and comfortable pedestrian and bike movements. The complex five-way intersection at the southbound off-ramp terminal has multiple crosswalks and a narrow median refuge. Modifications to this intersection under this scenario make some improvements with shorter crossings for pedestrian and bicyclists. There is no sidewalk on the westside of Williams north of Broadway that may result in illegal and dangerous crossing of the northbound on-ramp.	**High** • This circulation system relocates the ramp terminals to the south end of the cover, allowing the four intersections comprising the “box” to have smaller roadway footprints; this allows reallocation of more space to pedestrians, bicyclists, and streetscape elements. • All crosswalks and bike crossings along the Green Loop are provided dedicated phases separated from conflicting turning movements. Other locations were not studied in detail, but are expected to be similar to Scenario 5 with some differences at signals along the Vancouver corridor. • The crosswalk on the south leg of the northbound ramp terminal intersection is long and should be separated into a two-stage crossing with a pedestrian island. The bike crossing across the ramp terminal is long, but is provided a protected signal phase with no conflicting turning movements.	**High** • This circulation system relocates the ramp terminals to the south end of the cover, allowing the four intersections comprising the “box” to have smaller roadway footprints; this allows reallocation of more space to pedestrians, bicyclists, and streetscape elements. • All crosswalks and bike crossings along the Green Loop are provided dedicated phases separated from conflicting turning movements. These are also provided for most other crosswalks and bike crossings including: ▪ 22 crosswalks and bike crossings with no turning movement conflicts or that are provided a dedicated crosswalk and/or bike phase that runs at different times to conflicting turning traffic. ▪ 4 crosswalks with low-volume conflicting turns permitted at the same time as the crosswalk including the SB RT from Vancouver to Broadway; the SB LT from Vancouver to Weidler; the EB LT from Weidler to Williams; and the EB LT from Weidler to 1st. LPIs and BPIs could be explored at these locations. • The crosswalk on the south leg of the northbound ramp terminal intersection is long and should be separated into a two-stage crossing with a pedestrian island. The bike crossing across the ramp terminal is long, but is provided a protected signal phase with no conflicting turning movements.

Objective	20% Design	Scenario 1	Scenario 4	Scenario 5
Reduce complexity and confusion and make navigation logical	**Medium** • Counterflow section between Williams-Vancouver and Broadway-Weidler is not intuitive for pedestrians, bicyclists, or motorists, especially for first-time users. • This scenario requires northbound bicyclists on Williams to transition from the right- to the left-side of the street at a new signal at Hancock.	**Medium** • Counterflow section between Williams-Vancouver and Broadway-Weidler is not intuitive for pedestrians, bicyclists, or motorists, especially for first-time users. • This scenario requires northbound bicyclists on Williams to transition from the right- to the left-side of the street at a new signal at Hancock.	**Medium** • This scenario returns the circulation system to a more intuitive local street network (without contraflow lanes). • The realignment of Vancouver to Flint introduces some complexity for local street navigation at the north end of the cover. Southbound local traffic that misses their turn at Tillamook will have to go to Weidler to turn around and recirculate north on Williams. • The new "jog" from southbound Flint to southbound Vancouver/Wheeler introduces two closely-spaced turning movements that increases its complexity to navigate. • This scenario carries a left-side bike lane northbound on Wheeler/Williams from the Rose Quarter Transit Center and does not require bicyclists to transition from the right- to the left-side of the street.	**High** • This scenario returns the circulation system to a more intuitive local street network (without contraflow lanes) and emphasizes a strong and legible street grid with good local connectivity. • This scenario carries a left-side bike lane northbound on Wheeler/Williams from the Rose Quarter Transit Center and does not require bicyclists to transition from the right- to the left-side of the street.
Create neighborhood-scale streets	**Medium** • This scenario focuses the functions of the interchange (including significant roadway space) to a relatively compact footprint primarily on the cover above the I-5 mainline. Within this footprint, there are limited opportunities for street parking and it results in larger and more complicated intersections for bikes, pedestrians, and vehicles. • Non-standard left-side travel lanes on Williams between Broadway and Weidler have large continuous footprint devoted to traffic to/from freeway ramps.	**Medium** • This scenario focuses the functions of the interchange (including significant roadway space) to a relatively compact footprint primarily on the cover above the I-5 mainline. Within this footprint, there are limited opportunities for street parking and it results in larger and more complicated intersections for bikes, pedestrians, and vehicles. • Non-standard left-side travel lanes on Williams between Broadway and Weidler have large continuous footprint devoted to traffic to/from freeway ramps. • Reconnecting Flint across the freeway provides an opportunity to re-orient neighborhood scale development onto the Flint and Hancock corridors outside of the "box". • Shifting the Green Loop to run through the neighborhood along both Weidler will help activate that street frontage.	**High** • This scenario locates the ramp terminals away from the cover above the I-5 mainline, enabling the intersections comprising the "box" to have smaller footprints. Consequently, more space is available on the cover for pedestrian, bicycling, and streetscape features. • Shifting the Green Loop to run through the neighborhood along both Broadway and Weidler will activate both street frontages.	**High** • This scenario locates the ramp terminals away from the cover above the I-5 mainline, enabling the intersections comprising the "box" to have smaller footprints. Consequently, more space is available on the cover for pedestrian, bicycling, and streetscape features. • Shifting the Green Loop to run through the neighborhood along both Broadway and Weidler will activate both street frontages.

1.4 Summary of Key Findings

The following sections in this report provide more detailed information and evaluate the different modal impacts of the ICA design scenarios. Key findings for the surface street network include:

Shift in Design Approach

- To support restorative justice outcomes and the community's vision for the neighborhood requires a fundamental shift in design approach from an auto-focused street network and circulation system to a pedestrian-oriented street scale that improves pedestrian safety and experience and supports placemaking and wealth creation outcomes.
- This shift in design approach necessitates increasing the amount of right-of-way dedicated to pedestrians, bicyclists, and streetscape amenities and reducing space dedicated to automobiles. This results in cross-section changes, but property impacts are expected to fit mostly within the 20% Design with more detailed study needed to determine if there are additional property impacts on Broadway between Victoria and 2nd to accommodate the northbound ramp relocation.

Pedestrian Experience

- There is an opportunity to bring the Green Loop through the neighborhood, delivering people to the neighborhood, and providing opportunities for more Portlanders to celebrate Black culture and history.
- The ICA scenarios include protected signal phasing to separate key pedestrian crossings and bike movements, including the Green Loop, from conflicting turning movements. This requires increased cycle lengths at a few key intersections (requiring coordination with and approval from the City). There are three pedestrian crossing locations (and no bike crossing locations) that are assumed to be served concurrently with low-volume permissive vehicle turning movements; while partial or complete protection is likely also feasible at these locations, this should be confirmed in later planning analysis.

Traffic Tradeoffs and Transit Impacts

- The trade-offs described above will increase vehicle delay at some intersections. Further analysis will be needed to explore the interaction of intersections and to prioritize progression to clear queues along key movements coming off the freeway.
- Transit routes through the area serve critical equity populations and will play an important role in restoring the neighborhood. The out-of-direction impacts of Scenario 4 introduce transit delay and operational challenges that would need to be mitigated. Differences in transit delay between the other scenarios are generally small and Scenario 5 is not uniformly worse than the 20% design or Scenario 1 and at some locations reduces delay. Travel time impacts will need more detailed analysis and options to address any impacts could include signal timing adjustments, dedicated transit lanes, and repurposing Williams for two-way bus operations from Hancock through the SB ramps.

Freight Accommodations

- Shifting the freeway ramps to the south end of the cover would introduce new movements to reconnect to and from the major freight network on Broadway & Weidler. Although the major freight network in this area is primarily along Interstate and can be accessed from other interchanges, large truck turning movements can be accommodated at the Broadway / Weidler interchange under these scenarios. Some design adjustments and lane signage may be necessary to accommodate large trucks turning from the SB off-ramp.

1.5 Coordination with City of Portland

The City of Portland has not been engaged in the ICA project and there are several elements included in the revised design approach that would require coordination and approval from the City. These include:

- Street designations: confirming proposed changes to the street, transit, bikeway, and walkway designations included in the City's Transportation System Plan, PedPDX, and other plans and policies.
- Green Loop alignment: the Clackamas Crossing forms part of the existing alignment for the Green Loop. Shifting the alignment through the restored neighborhood would require a change to the existing Facility Plan.
- Cycle lengths: changes to signal cycle lengths are required at intersections in the box and at the southbound ramps intersection to meet traffic operation standards and to allow for crosswalks and bike crossings to be separated from conflicting traffic movements. These outcomes are in line with the City's modal hierarchy, but the necessary tradeoffs will need to be confirmed.
- Signal coordination: the relocation of the ramps changes traffic patterns in the area. Ensuring that traffic can be cleared out to and from the ramp terminals will require a new signal coordination pattern that will need to be balanced with progression of the local street network along Broadway and Weidler.
- Large truck turning movements: large truck turning movements can be accommodated under the ICA design scenarios, but the assumptions of the analysis should be confirmed to determine if there are opportunities to tighten turning radii or make other design changes that would further enhance the design approach.
- Sidewalk on Wheeler: to meet traffic operations standards, a crosswalk is not included on the east leg of the southbound ramp terminal intersection nor is a sidewalk provided along the east side of Wheeler. There are no destinations along this side of Wheeler but the street is designated a Major City Walkway in PedPDX and this tradeoff will need to be discussed.

2 Modal Evaluations

The following report sections compare the modal networks for the 20% Design and the ICA scenarios and evaluate their impacts on the major transportation modes including active transportation, transit, freight, and automobile traffic.

2.1 Active Transportation

The study area is an important active transportation node. It is a major east-west route connecting the Broadway Bridge and the Lloyd District and north-south route connecting the Rose Quarter and the Albina neighborhoods. The active transportation network plays a critical role in accessing local businesses, major destinations such as the Moda Center and the Memorial Coliseum, and in providing access to transit.

2.1.1 Existing Conditions

Pedestrians are not prioritized in the area currently. Most sidewalks are minimum width and "curb-tight" providing little separation from fast-moving traffic. There are several missing sidewalk segments and crosswalks often run concurrently with high-volume and multi-lane turning movements.

The study area includes the intersection of two major bikeways. The north-south bikeway along the Williams-Vancouver couplet is one of the highest volume bicycle routes in the City. It includes on-street bike lanes along most of its length except in the southbound segment between Broadway and Weidler, where bicyclists share the outside lane with transit.

Westbound bicyclists along Broadway and eastbound bicyclists along Weidler are provided with on-street bike lanes. A bike signal is provided at the Broadway & Williams intersection where there is a major right-turn movement onto the I-5 NB on-ramp, however at the NB and SB off-ramps, bicyclists have uncontrolled crossings of the right-turn movements off the freeway.

A significant volume of bicyclists moves between the Williams-Vancouver bikeway and the Broadway Bridge. Currently, most southbound bicyclists connect via Russell to Flint and turn onto Broadway to avoid the SB off-ramp. Most northbound bicyclists use the bike box provided on Williams at Broadway to turn left. The bike box also provides the start of the transition from a right-side bikeway on Williams south of Weidler to a left-side bikeway north of Broadway.

2.1.2 Design Approach

The 20% design incorporates a number of significant active transportation improvements including separated bike facilities and dedicated bike signals at a number of intersections to improve active transportation conditions along the major street network. The 20% design prioritizes traffic movement to and from the freeway and through the box and uses parallel routes including the Clackamas Crossing and the Hancock-Dixon Connection to provide low-stress, alternative routes for active transportation users to bypass the heavy traffic movements in the box. The Clackamas Crossing would also form part of the City of Portland's Green Loop alignment connecting back to the Broadway Bridge via Winning Way.

The Green Loop is a City of Portland initiative to create a six-mile linear park that connects people through the inner city and linking regional attractions, cultural institutions, employment centers, and shopping districts. The Clackamas Crossing is the currently approved alignment for the Green Loop and any changes to the alignment will need to be approved by the City of Portland.

There are several changes to the project since the 20% Design that require a shift in design approach. The neighborhood framework developed by the ICA team to support restorative justice outcomes requires a shift to the modal hierarchy and the way that space is allocated on the street network. The ICA designs move towards creating a pedestrian-scale street system that can support the creation of quality and accessible land parcels by allocating more space to pedestrians, bicyclists, and streetscaping elements and bringing people to the neighborhood by realigning the Green Loop through the neighborhood.

In addition, since the 20% Design the Hancock Crossing alignment was modified to avoid an impact to the Paramount parking lot and support Albina Vision Trust's affordable housing and theater development. The RQIP project team has stated they are committed to providing a local street connection across I-5 north of the Broadway/Weidler interchange and will use the outcomes of this study and work with the community to identify the best crossing point and connection into the Lower Albina neighborhood. This design configuration is assessed as the RQIP Amended 20% Design)

2.1.3 Active Transportation Network

The ICA design scenarios include street network changes that will impact active transportation. The major active transportation network changes are described below.

Modal Hierarchy

The ICA design scenarios shift further towards the City of Portland's modal hierarchy with more emphasis on pedestrians, bicyclists, and transit users before automobile traffic. **Figure 1** shows revisions to the City of Portland's Transportation System Plan (TSP) pedestrian network designations that would be required under each of the proposed scenarios. **Figure 2** shows required revisions to the TSP bicycling network designations.

Green Loop Alignment

One of the major changes to the design approach is to bring the Green Loop through the neighborhood. The Green Loop is intended to provide a safe, comfortable, and enjoyable active transportation facility that connects key destinations and neighborhoods in the inner-city. The design of the facility through the restored neighborhood needs to be consistent with the experience being developed for other parts of the Green Loop. It will also provide access to the neighborhood and future development and need to accommodate key pedestrian and bicycling routes that go through the neighborhood.

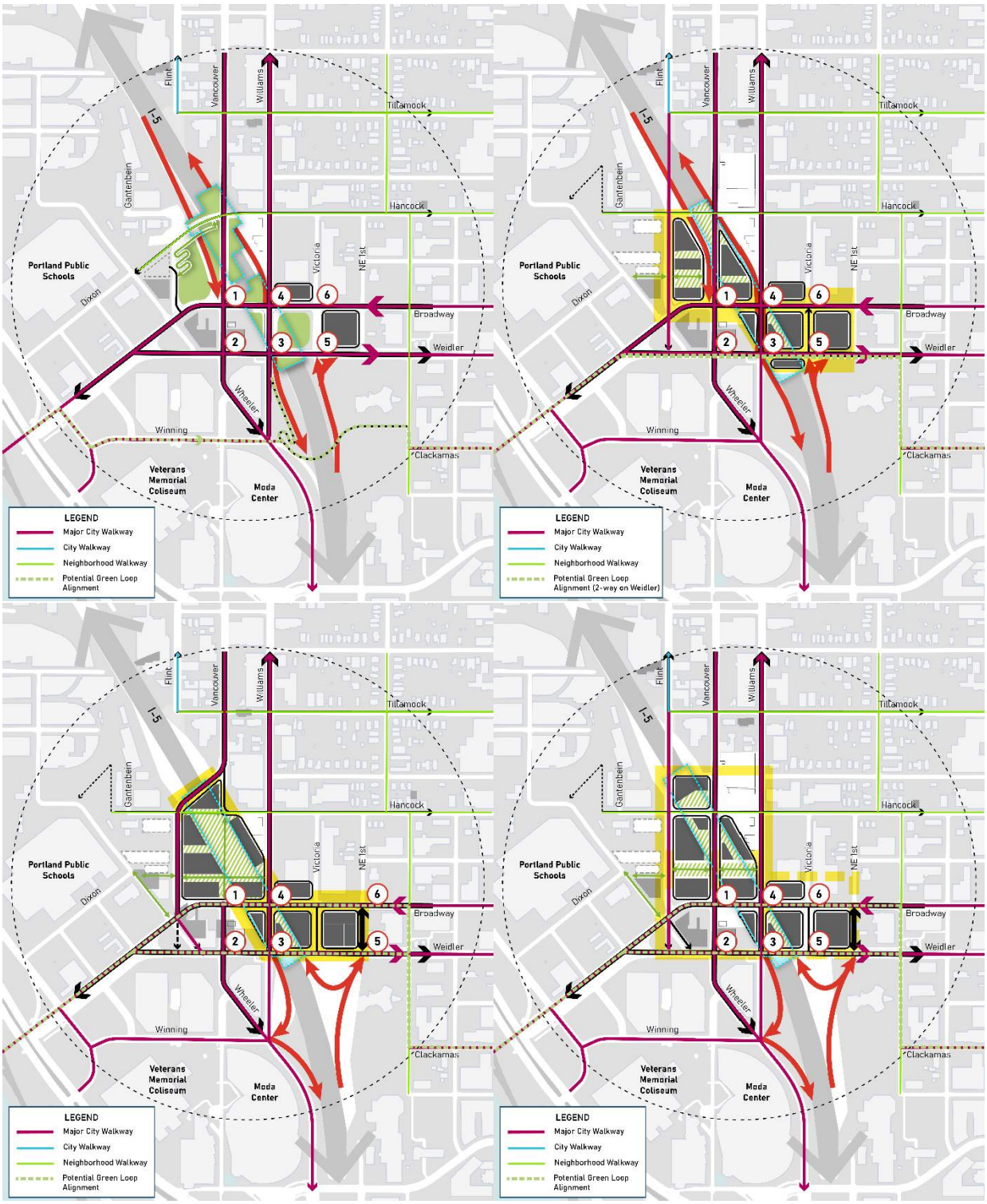


Figure 1: Pedestrian TSP Designations for Each Scenario (clockwise from top left: 20% Design, Scenario 1, Scenario 5, Scenario 4).

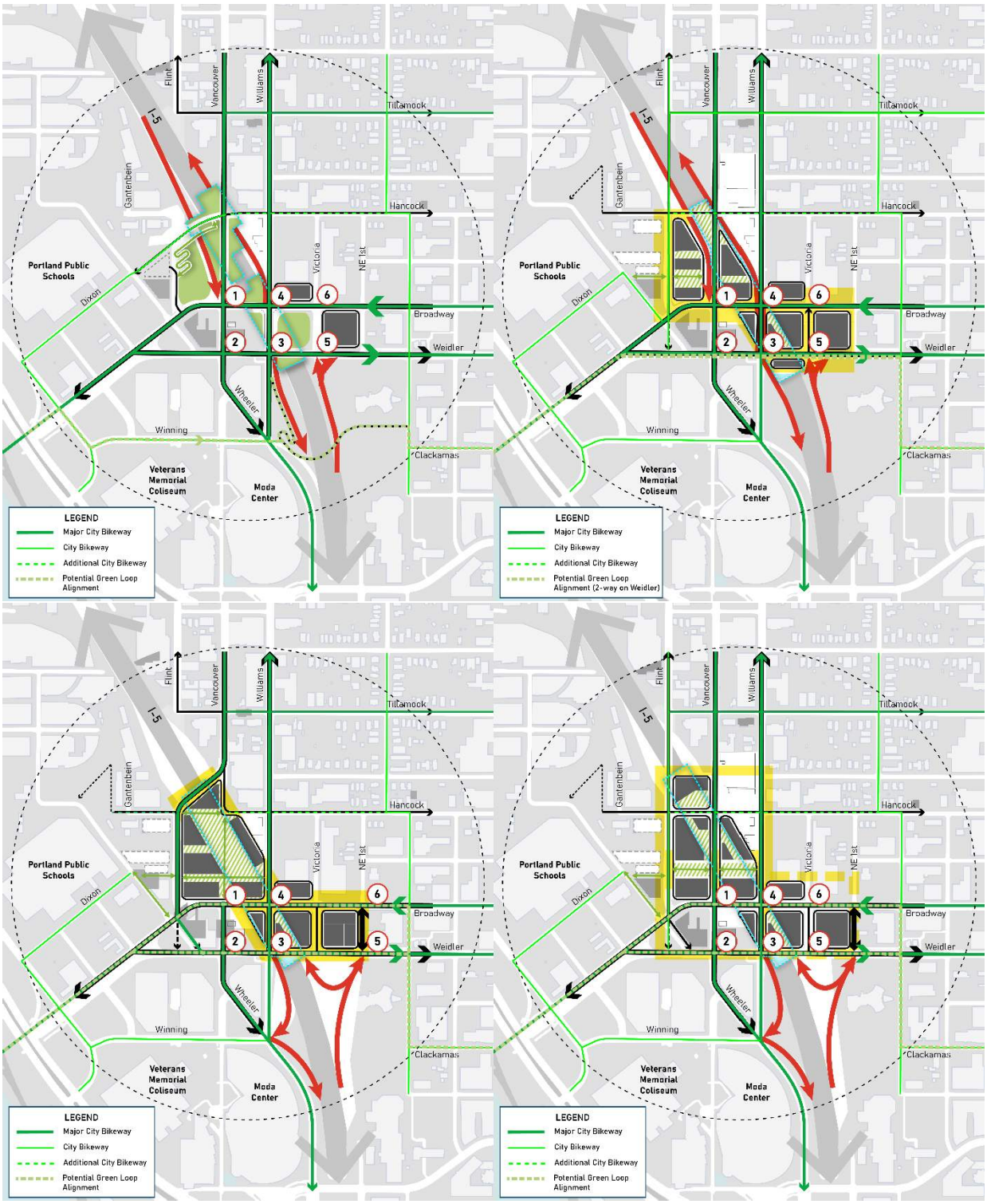


Figure 2: Bicycling TSP Designations for Each Scenario (clockwise from top left: 20% Design, Scenario 1, Scenario 5, Scenario 4).

Bringing the Green Loop through the neighborhood and designing it to be comfortable for all ages and abilities removes the need for a parallel route and the Clackamas Crossing. The ICA scenarios incorporate the Green Loop as follows:

- Two-Way Green Loop: Scenario 1 incorporates a two-way Green Loop that includes a two-way bikeway and widened sidewalk along the south side of Weidler. An illustrative cross-section of this concept is shown on **Figure 3**.
- One-Way Green Loop: Scenarios 4 and 5 incorporate a one-way Green Loop that includes a one-way bikeway and a widened sidewalk on the south side of Weidler and the north side of Broadway. An illustrative cross-section of this concept is shown on **Figure 4**.
- Provide physical separation from traffic movements and protected signal phasing to separate crosswalks and bike crossings from conflicting turning movements.

Figure 5 shows an illustrative concept of the pedestrian-scale environment that could be created from the reprioritization of active transportation modes and bringing the Green Loop through the study area.

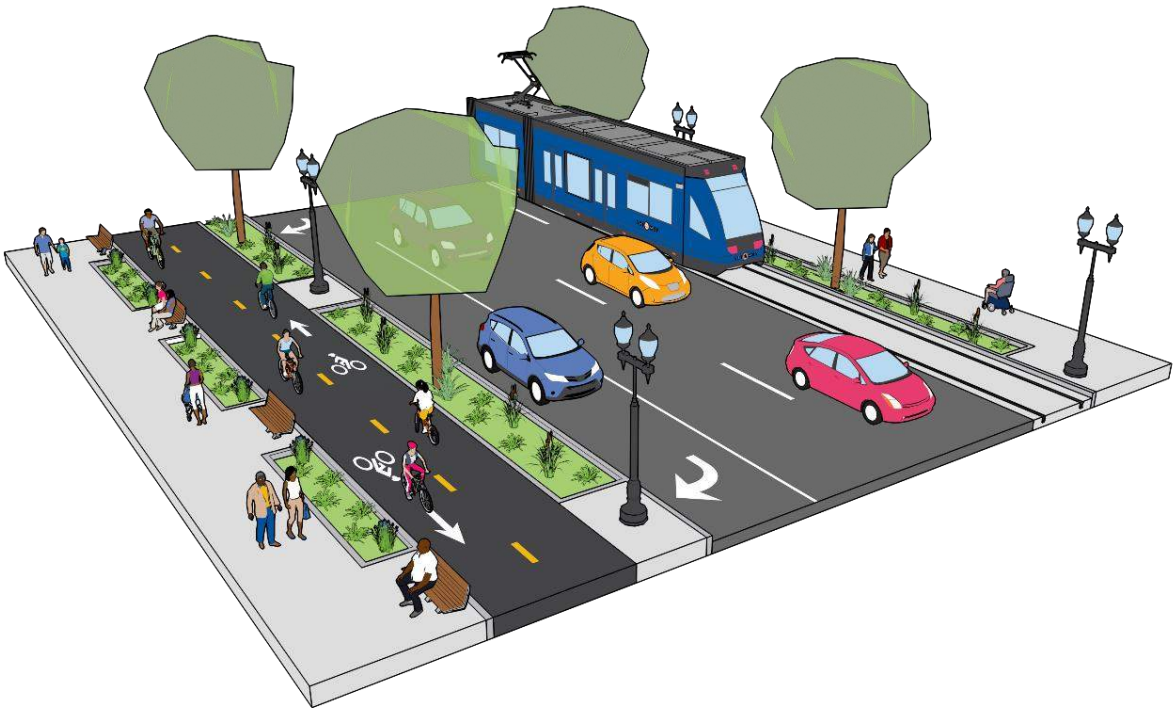


Figure 3: Perspective showing the design of a two-way Green Loop on Weidler as part of Scenario 1.

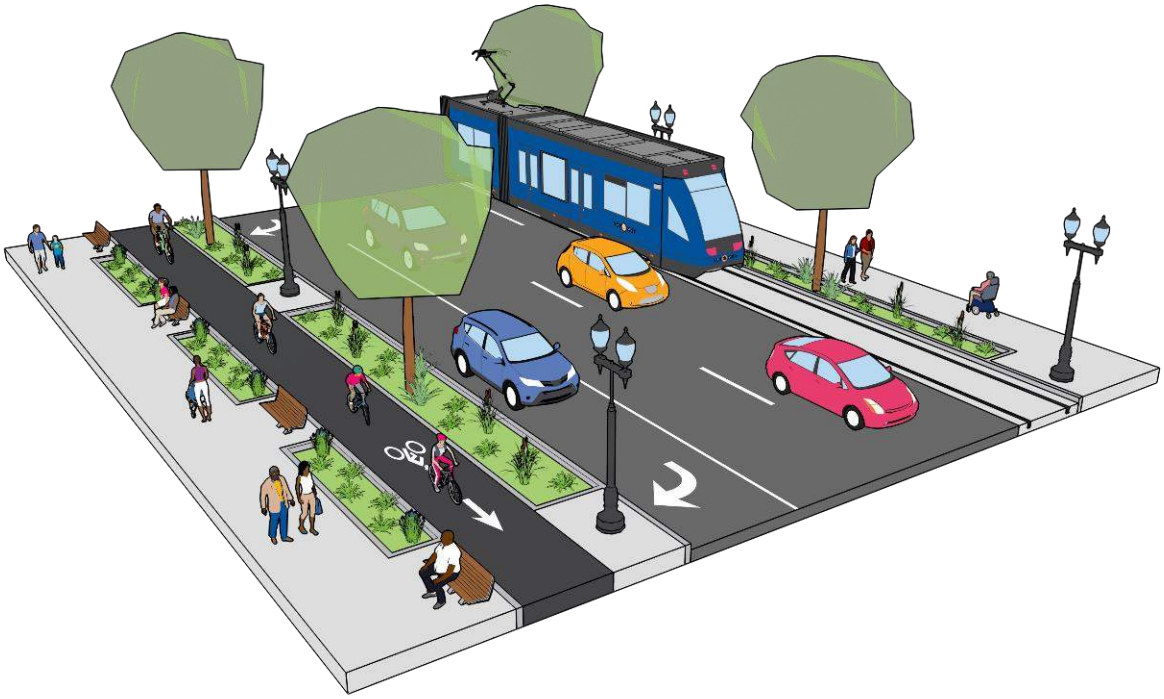


Figure 4: Perspective showing the design of a one-way Green Loop on Weidler and Broadway as part of Scenarios 4 and 5.

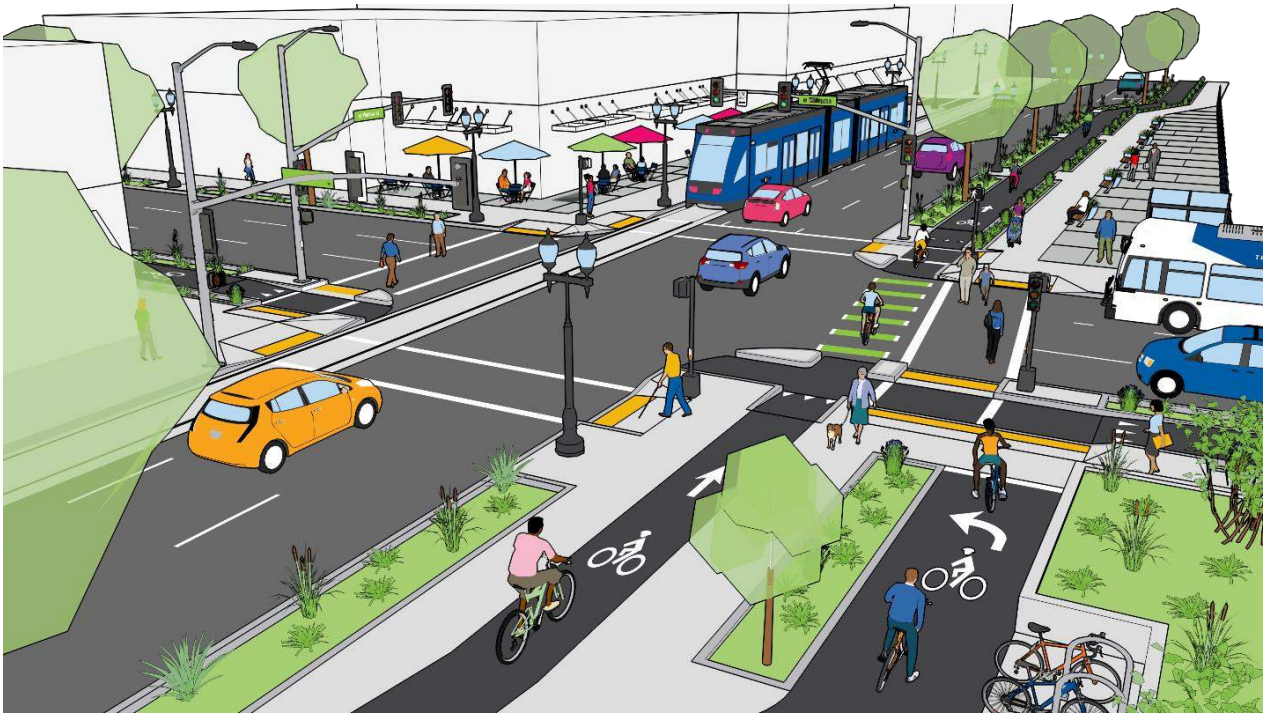


Figure 5: Perspective of Intersection Design Opportunities for a one-way Green Loop on Weidler as part of Scenarios 4 and 5 (illustrative concept looking east along Weidler at the intersection with Williams).

Role of Flint Avenue

Flint plays a critical role in the ICA design scenarios. Scenarios 1 and 5 include reconnecting Flint across the highway to provide additional local street circulation options for pedestrians and bicyclists. Scenario 4 includes a realignment of Vancouver onto Flint to create a large programmable space for the community.

For Scenario 1, reconnecting Flint focuses development opportunities along Flint as a high-quality, pedestrian-scale street environment outside of the concentrated traffic environment of "the box". It also allows for local circulation around the box using the Hancock-Flint connection as a replacement for the Hancock-Dixon connection.

For Scenario 4, realigning Vancouver onto Flint provides some community benefits but has impacts on active transportation users, particularly southbound bicyclists headed to the Rose Quarter that are taken out of direction and east-west pedestrians and bicyclists using Hancock.

For Scenario 5, reconnecting Flint helps to restore the grid and provides additional development opportunities. It also provides an alternative active transportation route, particularly for users headed to the Broadway Bridge.

Design Standards

The ICA scenarios shift the design approach to prioritize the inclusion of high-quality active transportation facilities that meet the City's recommended sidewalk and bikeway design standards.

For sidewalks, the designs incorporate 15' sidewalks wherever possible (12' minimum width). The minimum width includes at least an 8' sidewalk and 4' minimum planting strip to provide space for street trees and other streetscape elements as well as providing a buffer between pedestrians and moving traffic to improve the pedestrian experience. Larger planting spaces were used where possible to increase the range of street trees and planting options.

Sidewalk-level bikeways are the preferred design standard for the major streets through the area including Broadway, Weidler, Vancouver, and Williams. The design of these facilities includes:

- Physical separation from moving traffic lanes using planting and furnishing zones to provide a buffer between bicyclists and moving traffic.
- Physical separation from pedestrians using planting and furnishing zones to indicate the delineation of space for different users.
- For Scenarios 4 and 5: creating a center-running northbound bike lane from the Rose Quarter Transit Center that transitions directly into a left-side bikeway on Williams north of the SB ramp intersection. This matches the situation of northbound bicyclists through the Rose Quarter Transit Center and avoids the need for a new signal at Hancock Street to transition the bike lane from the right- to the left-side as proposed in the 20% Design and Scenario 1.

At intersections, the revised signal timing plans for 5 incorporate separate phases for all Green Loop movements that conflict with left- or right-turning movements as well as at most other major pedestrian and bike crossings. The only locations that do not include separate pedestrian or bike crossing phases

are at the following intersections, where turning movement conflicts are under the typical threshold where separation is considered (i.e., 100 vehicle per hour during the peak periods). These include the:

- West leg of the Broadway & Vancouver intersection.
- East leg of the Weidler & Vancouver intersection.
- North leg of the Weidler & Williams intersection.
- North leg of the Weidler & 1st Avenue intersection.

Active Transportation Network Features

Figure 6 shows key changes to the active transportation network for ICA Scenario 5 as an example of where new features can enhance the network and where certain features could not be included without further analysis and design refinement.

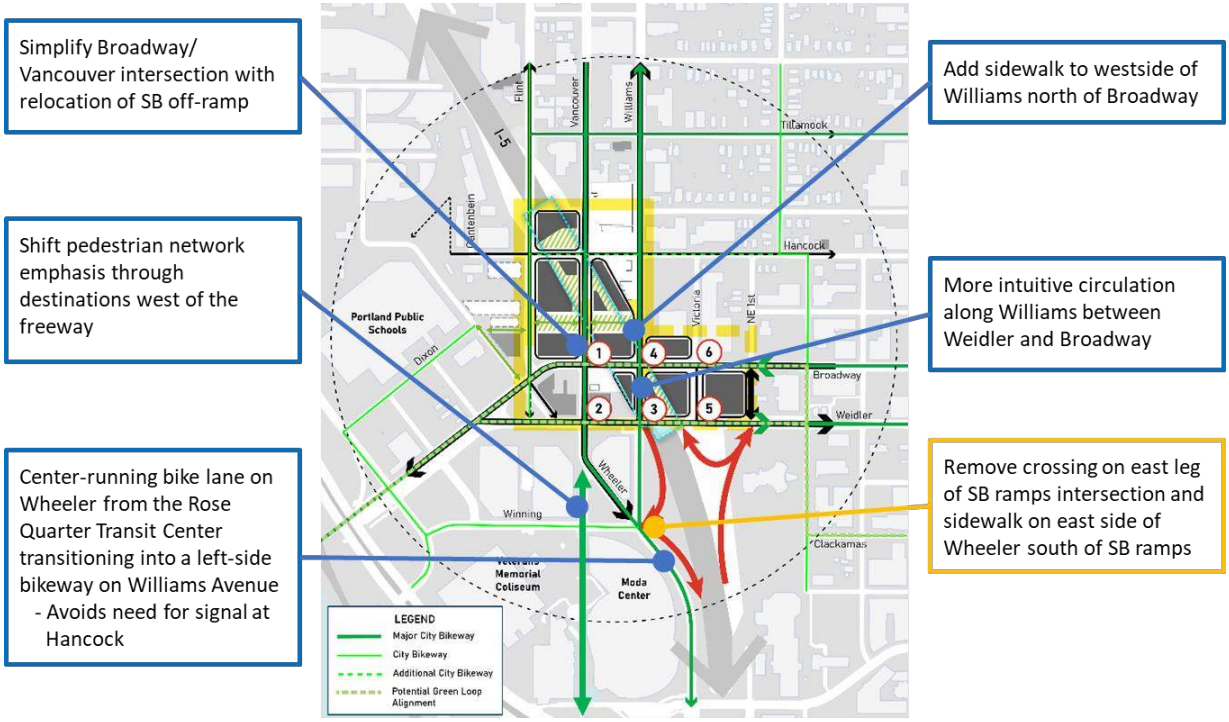


Figure 6: Active Transportation Features for Scenario 5.

2.1.4 Evaluation of Active Transportation Networks

An assessment of the comparative active transportation benefits and impacts for each scenario is included in **Table 3**.

*Table 3: Potential Impacts to Active Transportation**

Function	Streets	20% Design	Scenario 1	Scenario 4	Scenario 5
General	Create conditions that make walking and bicycling more attractive than driving for trips of three miles or fewer.	• The 20% Design improves conditions for walking and bicycling. It includes enhancements along Broadway, Weidler, Vancouver, and Williams, as well a low-stress pedestrian and bicycling bridge across I-5 that forms part of the Green Loop alignment using the Clackamas Crossing. • The 20% Design connects Hancock across I-5 to provide a local street connection around the box.	• Scenario 1 improves conditions for walking and bicycling. It includes enhancements along Broadway, Weidler, Vancouver, and Williams. • The Green Loop would be shifted to the south side of Weidler and be accommodated with widened sidewalks that provide dedicated, separated space for pedestrians and bicyclists. The Green Loop connects people to the new neighborhood and providing access to it makes these modes more attractive. • Scenario 1 reconnects Hancock and Flint to provide a local street connection around the box.	• Scenario 4 improves conditions for walking and bicycling. It includes enhancements along Broadway, Weidler, Vancouver, and Williams. • Broadway and Weidler host the green loop with widened sidewalks that provide dedicated, separated space for pedestrians and bicyclists. The Green Loop connects people to the new neighborhood and providing access to it makes these modes more attractive. • Scenario 4 has some circulation challenges at the north end of the cover, which could make walking and bicycling more challenging.	• Scenario 5 improves conditions for walking and bicycling. It includes enhancements along Broadway, Weidler, Vancouver, and Williams. • Broadway and Weidler host the green loop with widened sidewalks that provide dedicated, separated space for pedestrians and bicyclists. The Green Loop connects people to the new neighborhood and providing access to it makes these modes more attractive. • Scenario 5 has the best connections at the north end of the cover for local travel and reconnects Hancock and Flint to provide a local street connection around the box.
Green Loop	Winning Broadway Weidler Clackamas Crossing	**Low** • The Green Loop is accommodated on a new Clackamas Crossing ped/bike bridge and along Winning Way and avoids all major traffic intersections. • The Green Loop would not connect through the restored neighborhood. • Will require transitions at Larrabee to cross users to single-direction facilities over the Broadway Bridge.	**Medium** • The Green Loop would connect through the restored neighborhood on a two-way facility on the south side of Weidler. • The Green Loop will interact with several major traffic intersections on Weidler requiring physical separation and separate signal phases. • Will require transitions at Larrabee and 2nd to return to single-direction facilities over the Broadway Bridge.	**High** • The Green Loop would connect through the restored neighborhood on one-way facilities on Broadway and Weidler. • Relocating the ramps to the south end of the cover allows the four intersections comprising “the box” to have smaller roadway footprints; more space is available for pedestrian and bicycle facilities (including the Green Loop). • The Green Loop will interact with several major traffic intersections along Weidler, including a long crossing at the northbound ramp terminal, requiring physical separation from other movements and separate signal phases.	**High** • The Green Loop would connect through the restored neighborhood on one-way facilities on Broadway and Weidler. • Relocating the ramps to the south end of the cover allows the four intersections comprising “the box” to have smaller roadway footprints; more space is available for pedestrian and bicycle facilities (including the Green Loop). • The Green Loop will interact with several major traffic intersections along Weidler, including a long crossing at the northbound ramp terminal, requiring physical separation from other movements and separate signal phases.
Major East-West Walkways and Bikeways	Broadway Weidler	**Low** • Concentration of freeway traffic creates several large intersections with complex crossing movements. • Most, but not all, right-turn conflicts are proposed to have separate crossing or bike signal phases. Five east-west crossings will permit conflicting turning movements permitted across the crosswalk (though these will all be provided LPIs and/or BPIs).	**Medium** • Concentration of freeway traffic creates several large intersections with complex crossing movements. • Most, but not all, right-turn conflicts are proposed to have separate crossing or bike signal phases. Five east-west crossings will operate with conflicting turning movements permitted across the crosswalk (though these will all be provided LPIs and/or BPIs).	**High** • Major City walkway and bikeway on Broadway has no conflicts with freeway traffic resulting in higher-standard design. • Major City walkway and bikeway on Weidler will interact with several major traffic intersections and require physical separation and separate signal phases. • Only one east-west crosswalk will operate with conflicting turning movements permitted across the crosswalk.	**High** • Major City walkway and bikeway on Broadway has no conflicts with freeway traffic resulting in higher-standard design. • Major City walkway and bikeway on Weidler will interact with several major traffic intersections and require physical separation and separate signal phases. • Only one east-west crosswalk will operate with conflicting turning movements permitted across the crosswalk.
Major North-South Walkways and Bikeways	Vancouver Williams Flint	**Medium** • Flint is disconnected at the highway, disrupting an existing City Walkway and key southbound bikeway to the Broadway Bridge.	**Medium** • Flint is connected across the highway and forms a key part of the neighborhood framework with pedestrian-scale development and activity.	**Low** • Southbound bicyclists and pedestrians will be taken out of direction with the realignment of	**High** • Southbound bicyclists and pedestrians will have direct routes along Vancouver and Flint with less

Function	Streets	20% Design	Scenario 1	Scenario 4	Scenario 5
		• The northbound on-ramp does not allow a sidewalk on the west side of Williams, north of Broadway. • Northbound bicyclists need to transition from the right- to the left-side of the street at a new signal at Hancock. • Several complex intersection designs (such as the five-leg Vancouver/Broadway intersection) and the counter-flow segment of Williams creates some pedestrian and bicyclist navigation challenges and difficult crossings.	• The northbound on-ramp does not allow a sidewalk on the west side of Williams, north of Broadway. • Northbound bicyclists need to transition from the right- to the left-side of the street at a new signal at Hancock. • Several complex intersection designs (such as the five-leg Vancouver/Broadway intersection) and the counter-flow segment of Williams creates some pedestrian and bicyclist navigation challenges and difficult crossings.	Vancouver or will need to connect through the superblock. • Local connections at the north end of the superblock are more challenging given the curvilinear alignment of Vancouver. • A left-side bikeway will be developed from the Rose Quarter to avoid having to transition northbound bicyclists from the right-side of the street. • Southbound ramp signal timing does not allow a crosswalk on the east leg of the intersection or a sidewalk on the east side of Wheeler, south of Winning.	complicated intersections and lower-volume streets. • Flint is connected across the highway and forms a key part of the neighborhood framework with pedestrian-scale development and activity. • A left-side bikeway will be developed from the Rose Quarter to avoid having to transition northbound bicyclists from the right-side of the street. • Southbound ramp signal timing does not allow a crosswalk on the east leg of the intersection or a sidewalk on the east side of Wheeler, south of Winning.
Neighborhood Walkways / Greenways	Hancock Connector	**High** • Initial design included the Hancock-Dixon connection that provided a direct, local street east-west connection to bypass “the box” and connect to the Lower Albina neighborhood. • A new alignment for the Hancock connector will be selected to avoid impacts to the Paramount and Albina Vision Trust properties.	**High** • Extending Flint and connecting it to Hancock provides a local street bypass around “the box”. • Hancock can be extended to connect to development west of the highway.	**Medium** • Hancock can be extended to connect to development west of the highway and will require a greenway connection through the large community space. The curvilinear geometry of the street network at the north end of the cover makes these connections more challenging.	**High** • Extending Flint and connecting it to Hancock provides a local street bypass around “the box”. • Hancock can be extended to connect to development west of the highway.
	Winning Clackamas 2nd Avenue Flint Tillamook	**High** • The Clackamas Crossing and Hancock connector provide local active transportation connections with a “box around the box”. • 2nd Avenue not required as part of the Green Loop north of Clackamas. • Flint disconnected north of the highway – all active transportation functions shift to Vancouver-Williams. • No change to Tillamook.	**High** • Reduced role for Winning without Clackamas Crossing. • Increased role for 2nd Avenue to connect Clackamas with the Green Loop on Weidler. • Flint is connected across the highway providing a local active transportation function. • No change to Tillamook.	**Medium** • Reduced role for Winning without Clackamas Crossing. • Increased role for 2nd Avenue to connect Clackamas with the Green Loop on Broadway/Weidler. • Flint disconnected north of highway – all active transportation functions shift to Vancouver-Williams. • Potential for increased traffic on Tillamook from local traffic circulation diverted from Hancock.	**High** • Reduced role for Winning without Clackamas Crossing. • Increased role for 2nd Avenue to connect Clackamas with the Green Loop on Broadway/Weidler. • Flint is connected across the highway providing a local active transportation function. • No change to Tillamook.

* Note: all scenarios and impacts compared to existing conditions

2.2 Transit

The study area is a critical nexus for transit serving north and northeast Portland. The transit network includes the A Loop and B Loop Streetcar lines along Weidler and Broadway respectively and bus lines including Line 17 that serves the Broadway-Weidler corridor into Downtown, Lines 4 and 44 that serve the Albina neighborhoods and connect to Downtown through the Rose Quarter, and Line 85 that serves Swan Island. These lines play an important role now and will also be important in supporting long-range plans and accommodating future growth in the region. Some key statistics showing the importance of the bus lines that run through the corridor are included in **Table 4**.

Transportation is the second highest living expense behind housing and providing access to affordable, expedient, and reliable transit service is essential to providing equitable outcomes. Transit can support the restorative justice outcomes of the neighborhood and help to build generational wealth. Fast and reliable transit service needs to be maintained through the neighborhood to provide these benefits to the populations that rely on these services.

Table 4: Key Statistics for TriMet Routes Serving the Area (provided by TriMet within ¼ mile of bus route)

	Line 4	Line 44	Line 17	Line 85
	Serves Albina neighborhoods	Serves Albina neighborhoods	Serves Broadway / Weidler corridor	Serves Swan Island
Residents	44,000	58,000	72,000	-
Poverty Level	19%	16%	17%	-
Non-White	34%	28%	29%	-
Private Jobs	79,000	97,000[1]	97,000	-
Schools	33	~60	49	-
Daily Rides[2]	6,890	4,940	6,500	450

[1] Includes family-wage jobs in Mock's Crest
[2] Based on Fall 2019 ridership data

2.2.1 Design Approach

The restorative justice outcomes proposed by the Neighborhood Framework require a rethink of the purpose and use of streets through the cover area. The previous design applied a "box within a box" concept with vehicular movements at the center and active transportation users routed outside on the Hancock-Dixon connection and Clackamas Crossing. The emphasis on pedestrian-scale development to materialize the community's vision and priorities for the neighborhood requires a shift in thinking to bring people through the heart of the community.

Streets that were previously optimized for traffic flow also operated reliably for transit. Scenario 1 still reflects that approach with many of the features from the 20% Design carried over into that scenario. Scenarios 4 and 5 shift the freeway ramps to the south end of the cover and distribute freeway ramp traffic to a broader network of streets. This results in changes to traffic patterns and a reallocation of street right-of-way. Some of these changes will impact transit and others will provide transit benefits. An assessment of potential benefits and impacts is included in Section 2.2.3.

2.2.2 Transit Network

Figure 7 shows revisions to the City of Portland's Transportation System Plan (TSP) transit network designations that would be needed for each of the proposed scenarios.

A review of relevant planning documents showed that some signal upgrades were completed along the Broadway, Weidler, Vancouver, and Williams corridors as part of the Enhanced Transit Corridors (ETC) project, but there are no other plans identified for these corridors.

2.2.3 Evaluation of the Transit Network

Potential impacts to bus and streetcar operations, including increased delays, impact riders in the area and from a much broader area and are an important consideration to ensure that the design scenarios maintain or improve current transit operations.

Given the level of modeling conducted for this stage of the project, the project team was not able to conduct travel time runs to accurately compare travel time improvements or delays. However, the following assessments were conducted to identify potential impacts and to determine if those impacts are intractable or whether there are design options that should move forward with further study of potential mitigations of any impacts.

Qualitative Impact Assessment

The qualitative impact assessment considered potential impacts and improvements resulting from:

- Out-of-direction travel.
- Additional turns and operational delays.
- Expected impacts from increased or reduced traffic volumes.
- Additional signals or obvious signal phasing impacts, e.g., removing the SB on-ramp from the Broadway/Vancouver intersection will result in one less phase at that signal.
- Impacts on stop locations and connections between stops.

A summary of the potential benefits and impacts of each scenario on transit is included in **Table 5**.

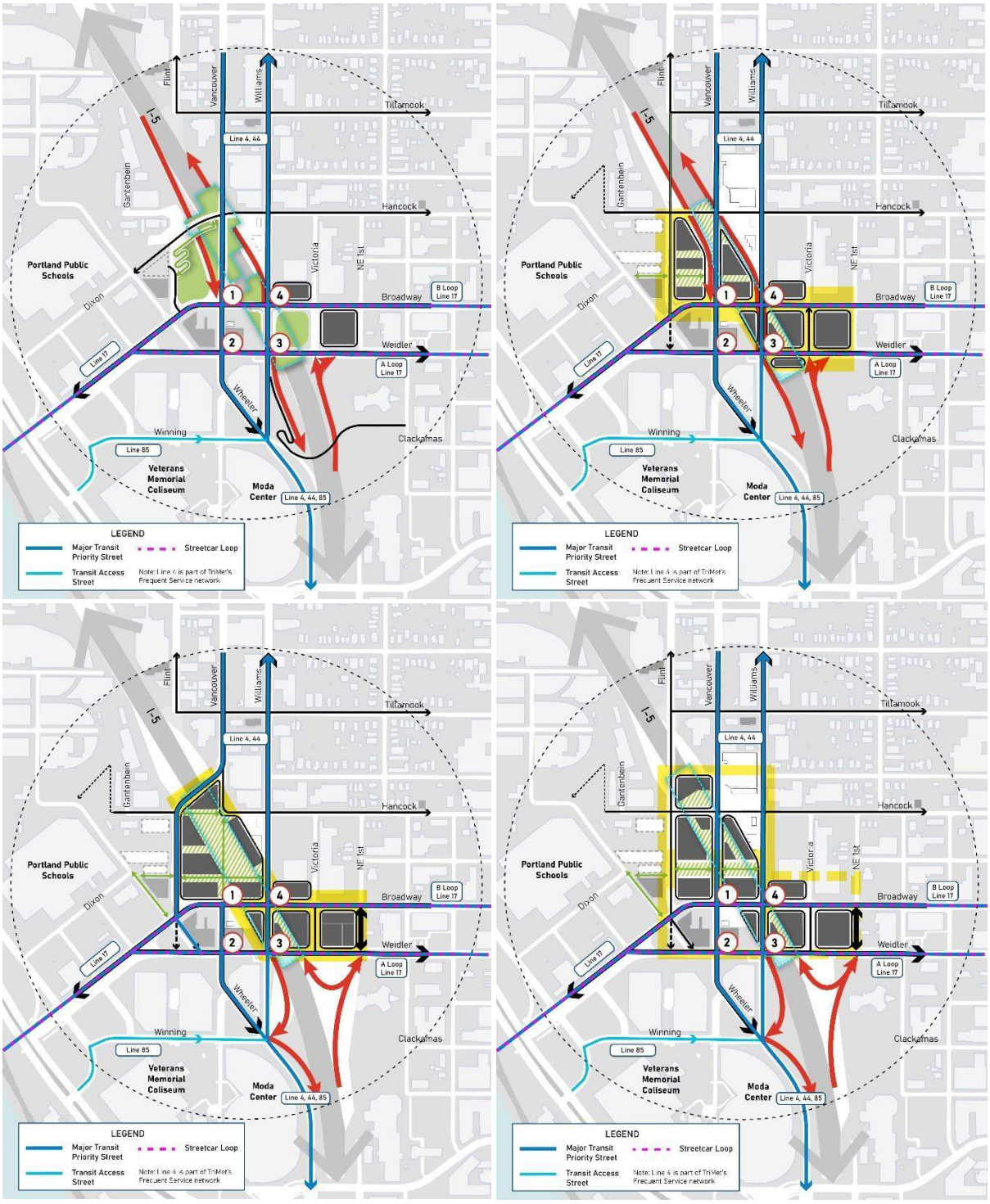


Figure 7: Transit Routes and TSP Designations for Each Scenario (clockwise from top left: 20% Design, Scenario 1, Scenario 5, Scenario 4).

Table 5: Potential Impacts to Transit[1]

Direction and Corridor	Transit Services	20% Design	Scenario 1	Scenario 4	Scenario 5
Eastbound Weidler	A Loop Streetcar 17 Bus	**Some Impact on Transit Travel Times[2]** • Direct connection with no out-of-direction travel. • Little change to streetcar travel times as identified in the 20% Design package. • Increased AM travel time and reduced PM travel time for the Route 17 bus identified in the 20% Design package.	**Some Impact on Transit Travel Times** • Direct connection with no out-of-direction travel. • Similar operations to the 20% Design.	**Some Impact on Transit Travel Times** • Direct connection with no out-of-direction travel. • Relocation of ramps to the south end of the cover will add traffic to some blocks and remove traffic from others. The streetcar lane will be least impacted by any traffic changes. • Increase in AM delay (<20 seconds) and similar PM delay compared to the 20% Design and Scenario 1.[3]	**Some Impact on Transit Travel Times** • Direct connection with no out-of-direction travel. • Relocation of ramps to the south end of the cover will add traffic to some blocks and remove traffic from others. The streetcar lane will be least impacted by any traffic changes. • Increase in AM delay (<20 seconds) and similar PM delay compared to the 20% Design and Scenario 1.
Westbound Broadway	B Loop Streetcar 17 Bus	**Some Impact on Transit Travel Times[2]** • Direct connection with no out-of-direction travel. • Little change to streetcar travel times as identified in the 20% Design package. • Increased AM travel times and similar PM travel times for the Route 17 bus identified in the 20% Design package.	**Some Impact on Transit Travel Times** • Direct connection with no out-of-direction travel. • Similar operations to the 20% Design.	**Potential for Reduced Transit Delay** • Direct connection with no out-of-direction travel. • Relocation of ramps to the south end of the cover will add traffic to some blocks and remove traffic from others. The streetcar alignment could be impacted by increased turning movements from Broadway onto 1st Avenue to access the northbound ramps. The geometry of that intersection requires further study to determine if changes to the streetcar alignment and the stop at 2nd Avenue are needed. • Increase in AM delay (<10 seconds) and reduction in PM delay (20 seconds) compared to the 20% Design and Scenario 1.[3]	**Potential for Reduced Transit Delay** • Direct connection with no out-of-direction travel. • Relocation of ramps to the south end of the cover will add traffic to some blocks and remove traffic from others. The streetcar alignment could be impacted by increased turning movements from Broadway onto 1st Avenue to access the northbound ramps. The geometry of that intersection requires further study to determine if changes to the streetcar alignment and the stop at 2nd Avenue are needed. • Increase in AM delay (<10 seconds) and reduction in PM delay (20 seconds) compared to the 20% Design and Scenario 1.
Northbound Williams	4 and 44 Buses from Rose Quarter	**Little Impact on Transit Travel Times[2]** • Direct connection with no out-of-direction travel. • Signal at Hancock Street may add delay. • Little change to NB Route 4 and 44 bus travel times identified in the 20% Design package.	**Little Impact on Transit Travel Times** • Direct connection with no out-of-direction travel. • Signal at Hancock Street may add delay. • Similar operations to the 20% Design.	**Potential for Increased Transit Delay** • Direct connection with no out-of-direction travel. • Relocation of ramps to the south end of the cover will add traffic to some blocks and remove traffic from others. There will be more traffic on Williams from the relocated SB off-ramp to Broadway and less traffic north of Broadway. • Shifting ramps to south end of cover and restoring the street grid provides opportunities to optimize bus stop locations and maximize transfers and proximity. • Increase in AM delay (<10 seconds) and similar PM delay compared to the 20% Design and Scenario 1.[3]	**Potential for Increased Transit Delay** • Direct connection with no out-of-direction travel. • Relocation of ramps to the south end of the cover will add traffic to some blocks and remove traffic from others. There will be more traffic on Williams from the relocated SB off-ramp to Broadway and less traffic north of Broadway. • Shifting ramps to south end of cover and restoring the street grid provides opportunities to optimize bus stop locations and maximize transfers and proximity. • Increase in AM delay (<10 seconds) and similar PM delay compared to the 20% Design and Scenario 1.
Southbound on Vancouver/ Wheeler	4 and 44 Buses from Rose Quarter	**Some Impact on Transit Travel Times[2]** • Direct connection with no out-of-direction travel.	**Some Impact on Transit Travel Times** • Direct connection with no out-of-direction travel.	**Potential for Increased Transit Delay** • Realignment of Vancouver to Flint introduces: ▪ Out-of-direction travel.	**Potential for Reduced Transit Delay** • Direct connection with no out-of-direction travel.

Direction and Corridor	Transit Services	20% Design	Scenario 1	Scenario 4	Scenario 5
		• Traffic on Vancouver / Wheeler reduced by relocation of the SB on-ramp. • Increased AM travel time and reduced PM travel time for SB Route 4 and 44 buses as identified in the 20% Design package.	• Traffic on Vancouver / Wheeler reduced by relocation of SB on-ramp. • Similar operations to the 20% Design.	▪ Two additional turns: Flint onto Weidler and Weidler onto Wheeler. High-volume left-turns and additional signal wait times will add delay. ▪ Includes an additional signal for SB buses travel to the Rose Quarter TC. ▪ The Vancouver & Weidler stop will need to be relocated either upstream of Broadway or downstream on Wheeler to avoid the left-right turning maneuver. ▪ Closer proximity to the streetcar stop but increased distance between bus stop pairs. • Relocation of ramps to the south end of the cover will add traffic to some blocks and remove traffic from others. There will be less traffic on Vancouver between Broadway and Weidler but more traffic on Wheeler (compared to the 20% Design and Scenario 1). • Traffic / transit movement delay not modeled for this scenario, but will include more delay than Scenario 5.	• Relocation of ramps to the south end of the cover will add traffic to some blocks and remove traffic from others. There will be less traffic on Vancouver between Broadway and Weidler but more traffic on Wheeler (compared to the 20% Design and Scenario 1). • Shifting ramps to the south end of the cover and restoring the street grid provides opportunities to optimize bus stop locations and maximize transfers and proximity. • Increase in AM delay (<10 seconds) and reduction in PM delay (25 seconds) compared to the 20% Design and Scenario 1.
Eastbound on Winning Way	85 Bus to Rose Quarter	**No Impact on Transit Travel Times** • No changes to existing operations.	**No Impact on Transit Travel Times** • No changes to existing operations.	**No Impact on Transit Travel Times** • No changes to existing operations.	**No Impact on Transit Travel Times** • No changes to existing operations.

Notes:

[1] All scenarios and impacts compared to existing conditions.

[2] Based on travel time impacts reported in the RQIP Transit Technical Report.

[3] Traffic / transit operations not modeled for this scenario. Analysis based on expected similarities to Scenario 5 for eastbound, westbound, and northbound transit routes.

Green Time Comparison

This analysis compares the amount of green time that the transit routes receive during the AM and PM peak hours under Scenarios 1 and 5. Results for Scenario 4 were not available at the time of this report but operations are expected to be similar to Scenario 5 for most of the network with the exception of signals along the realigned Vancouver corridor.

The analysis shows that both Scenarios 1 and 5 provide similar amounts of green time to transit movements during the PM peak hour and Scenario 5 provides a little less green time than Scenario 1 during the AM peak hour. The results by direction include:

- Westbound Streetcar (B Loop) and Bus Route 17 (see **Figure 8**): through the box, transit will receive approximately the same amount of hourly green time under both scenarios. Scenario 5 provides less green time at Broadway & Williams, but more green time at Broadway & Vancouver.
- Eastbound Streetcar (A Loop) and Bus Route 17 (see **Figure 9**): through the box, transit will receive approximately the same amount of hourly green time during the PM peak under both scenarios but slightly less green time during the AM peak under Scenario 5. Scenario 5 provides less green time at Weidler & Williams, but more green time at Weidler & 1st Avenue.
- Southbound Bus Routes 4 and 44 (see **Figure 10**): through the box, transit will receive approximately the same amount of hourly green time during the PM peak under both scenarios but slightly less green time during the AM peak under Scenario 5. Scenario 5 provides more green time at Broadway & Vancouver, but less green time at Weidler & Vancouver. Scenario 5 provides less green time at Wheeler & Winning during the AM peak than Scenario 1.
- Northbound Bus Routes 4 and 44 (see **Figure 11**): through the box, transit will receive more hourly green time under Scenario 5. Scenario 5 provides more green time at Wheeler & Winning, Weidler & Williams, and Broadway & Williams than Scenario 1.

Transit Route Green Time

Option 1

Westbound Streetcar

(four streetcars/hr during peak periods)

Option 5

Westbound Streetcar

(four streetcars/hr during peak periods)

Figure 8: Westbound Green Time Analysis.

Transit Route Green Time

Option 1

Eastbound Streetcar

(four streetcars/hr during peak periods)

Option 5

Eastbound Streetcar

(four streetcars/hr during peak periods)

Figure 9: Eastbound Green Time Analysis.

Transit Route Green Time

Option 1

Southbound
Bus Lines 4, 44

(approx. nine
total buses/hr
during peak periods)

Option 5

Southbound
Bus Lines 4, 44

(approx. nine
total buses/hr
during peak periods)

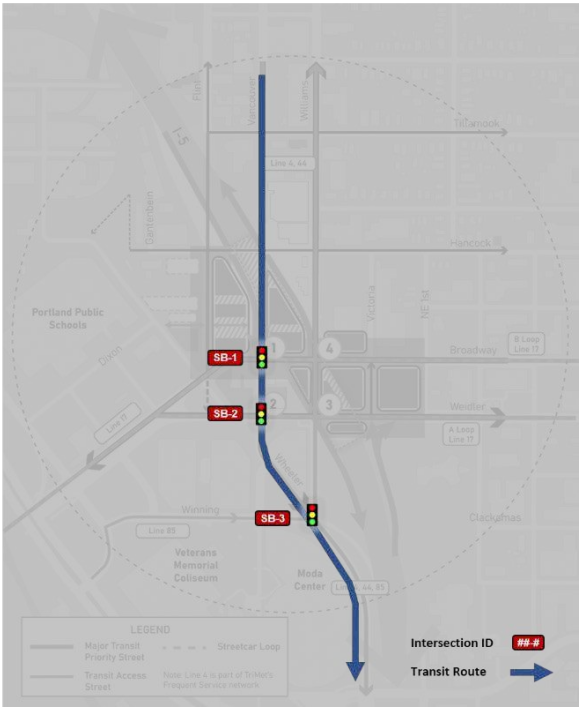


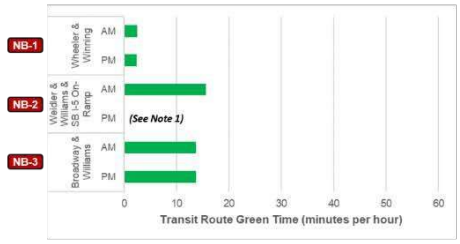
Figure 10: Southbound Green Time Analysis.

Transit Route Green Time

Option 1

Northbound
Bus Lines 4, 44

(approx. nine
total buses/hr
during peak periods)



Option 5

Northbound
Bus Lines 4, 44

(approx. nine
total buses/hr
during peak periods)

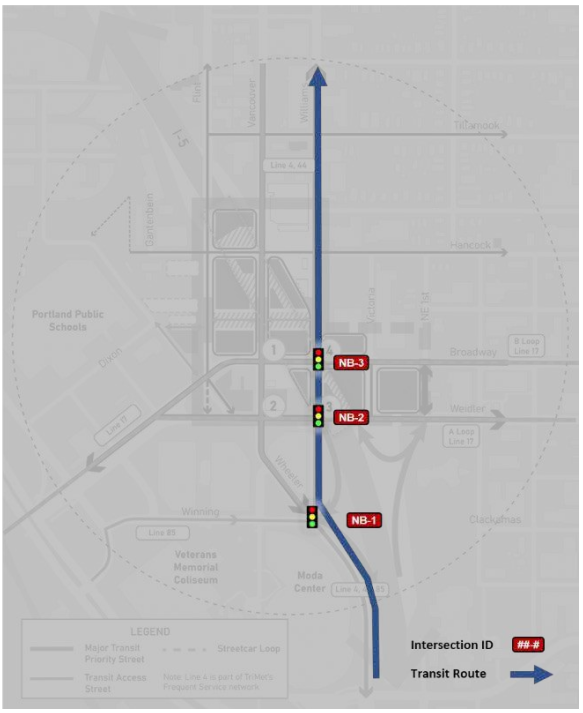


Figure 11: Northbound Green Time Analysis.

Intersection Movement Delay Comparison

This analysis compares reported delays for the major transit movements at the key signalized intersections under each scenario. These are reported from Synchro analysis that reports average delays for the intersection in isolation and does not account for the progression of signals or transit signal priority. More detailed simulation modeling would be needed to compare travel time runs directly with the results included in the Environmental Assessment.

Expected signal delays for the transit movements at key intersections are reported for AM peak hour in **Table 4** and for the PM peak hour in **Table 5**. The analysis shows that there are small differences in delay between scenarios (generally 10 to 20 seconds) and no scenario uniformly outperforms another. Scenario 5 is expected to add transit delay during the AM peak hour and reduce transit delay during the PM peak hour compared to the 20% Design and Scenario 1.

During the AM peak hour, Scenario 5 will reduce delays at some intersections and increase it at others, but overall is expected to increase delays by 10 to 20 seconds on all transit services. During the PM peak hour, Scenario 5 will reduce delays by 20 to 25 seconds for westbound and southbound transit services and operate approximately the same as the 20% Design and Scenario 1 for eastbound and northbound transit services.

*Table 6: Average AM Peak Hour Delay for Transit Movements at Key Intersections (seconds / vehicle)**

Transit Route	Intersection	20% Design	Scenario 1	Scenario 4	Scenario 5
WB B Loop Streetcar / Route 17 Bus	Broadway & 1st	-	-	scenario not modeled	22.4
	Broadway & Victoria	19.0	19.0		-
	Broadway & Williams	11.0	11.0		21.4
	Broadway & Vancouver	8.8	8.8		2.5
	Westbound TOTAL	**38.8**	**38.8**		**46.3**
EB A Loop Streetcar / Route 17 Bus	Weidler & Vancouver	17.8	17.8	scenario not modeled	12.2
	Weidler & Williams	7.0	7.0		7.5
	Weidler & Victoria	2.4	2.4		-
	Weidler & 1st	-	-		25.1
	Eastbound TOTAL	**27.2**	**27.2**		**44.8**
SB Route 4 and 44 Buses	Vancouver & Broadway	30.7	30.7	scenario not modeled	23.3
	Flint & Broadway	-	-		-
	Flint & Weidler	-	-		-
	Vancouver & Weidler	8.4	8.4		15.3
	Wheeler & Winning & Williams (& SB Ramps)	3.8	3.8		14.2
	Southbound TOTAL	**42.9**	**42.9**		**52.8**
NB Route 4 and 44 Buses	Williams & Wheeler & Winning (& SB Ramps)	25.2	25.2	scenario not modeled	52.7
	Williams & Weidler	12.4	12.4		12.1
	Williams & Broadway	21.9	21.9		13.0
	Williams & Hancock	9.3	9.3		0.0
	Northbound TOTAL	**68.8**	**68.8**		**77.8**

* Average delay reported from Synchro. Analysis does not account for interactions between signals, e.g., signal progression and transit signal priority.

*Table 7: Average PM Peak Hour Delay for Transit Movements at Key Intersections (seconds / vehicle) **

Transit Route	Intersection	20% Design	Scenario 1	Scenario 4	Scenario 5
WB B Loop Streetcar / Route 17 Bus	Broadway & 1st	-	-	scenario not modeled	22.6
	Broadway & Victoria	20.2	20.2		-
	Broadway & Williams	5.0	5.0		14.2
	Broadway & Vancouver	36.1	36.1		1.5
	Westbound TOTAL	**61.3**	**61.3**		**38.3**
EB A Loop Streetcar / Route 17 Bus	Weidler & Vancouver	23.0	23.0	scenario not modeled	12.6
	Weidler & Williams	11.7	11.7		16.3
	Weidler & Victoria	24.5	24.5		-
	Weidler & 1st	-	-		31.2
	Eastbound TOTAL	**59.2**	**59.2**		**60.1**
SB Route 4 and 44 Buses	Vancouver & Broadway	30.7	30.7	scenario not modeled	22.9
	Flint & Broadway	-	-		-
	Flint & Weidler	-	-		-
	Vancouver & Weidler	1.4	1.4		16.1
	Wheeler & Winning & Williams (& SB Ramps)	7.4	7.4		12.6
	Southbound TOTAL	**39.5**	**39.5**		**15.6**
NB Route 4 and 44 Buses	Williams & Wheeler & Winning (& SB Ramps)	25.7	25.7	scenario not modeled	52.7
	Williams & Weidler	0.0	0.0		11.5
	Williams & Broadway	41.0	41.0		13.9
	Williams & Hancock	8.5	8.5		0.0
	Northbound TOTAL	**75.2**	**75.2**		**78.1**

* Average delay reported from Synchro. Analysis does not account for interactions between signals, e.g., signal progression and transit signal priority.

Note 1: Scenario 1 modeled as similar to the 20% design.
Note 2: Scenario 4 modeled as similar to Scenario 5.

2.2.4 Potential Transit Mitigations

While further evaluation is needed to accurately quantify the travel time impacts on transit through the restored neighborhood, there are expected to be some impacts on transit service from all of the design proposals and potential mitigations should be explored to maintain or improve transit service in the study area.

Eastbound and Westbound Streetcar and Bus Route 17

Summary of Design Changes:

Direct connection will be maintained for these services with no out-of-direction travel. The network changes to relocate the ramps to the south end of the cover as part of Scenarios 4 and 5, to provide more space to active transportation and streetscaping (all scenarios), and adjusting signal cycle lengths and plans to accommodate protected signal phases (all scenarios) will result in changed traffic patterns and a reallocation of time to different movements at key signalized intersections.

Summary of Impacts:

Under Scenarios 4 and 5, some segments in the eastbound direction along Weidler will increase in traffic and others will decrease (see Figures 15 and 16 in Section 2.4.2 for traffic volume information). Traffic operations analysis shows that Scenario 5 is expected to increase transit delays for eastbound transit movements during the AM peak hour (less than 20 seconds) and be approximately the same as the 20% Design and Scenario 1 during the PM peak. The A Loop Streetcar tracks are in the left-most through lane on Weidler and will be least impacted by these changes and turning movement interactions. The Route 17 bus operates in the right-most lane and has the potential to be impacted by increases to right-turning traffic onto Vancouver/Wheeler and the NB on-ramp. The Scenario 4 and 5 designs provide dedicated right-turn lanes at these intersections to allow for queues to store so they do not block the through lane where the bus will operate.

Traffic operations analysis shows that Scenario 5 is expected to increase transit delays for westbound transit movements during the AM peak hour (less than 10 seconds) but improve delays during the PM peak hour compared to the 20% design (approximately 20 seconds). In the westbound direction along Broadway, traffic accessing the NB on-ramp from the right-most lane on Broadway in Scenario 1 is relocated to the left turn from Broadway onto 1st Avenue, which could improve bus operations in the curbside lane. The B Loop Streetcar tracks are in the left-most through lane on Broadway and will be impacted by additional left-turning movements from Broadway to 1st Avenue. The Scenario 4 and 5 designs provide a dedicated left-turn lane to separate this movement from the streetcar and to store queues so they do not block the streetcar. However, the geometry of this intersection requires further study to determine if realignment of the streetcar line and the station at 2nd Avenue is required as part of this scenario.

Southbound Bus Routes 4 and 44

Summary of Design Changes:

Direct connection will be maintained for southbound bus services with no out-of-direction travel under Scenarios 1 and 5. Network changes to relocate the ramps to the south end of the cover as part of

Scenario 5, to provide more space to active transportation and streetscaping (all scenarios), and adjusting signal cycle lengths and plans to accommodate protected signal phases (all scenarios) will result in changed traffic patterns and a reallocation of time to different movements at key signalized intersections (see Figures 15 and 16 in Section 2.4.2 for traffic volume information).

Scenario 4 realigns Vancouver onto Flint and has the most impact on southbound bus services taking these routes 1 block out of direction and resulting in an additional signal, additional turns, and additional interactions with traffic that will increase service delay. The out of direction routing also requires relocation of at least one bus stop and would increase the distance between stop pairs. This scenario may need to explore alternative alignments for southbound buses.

Summary of Impacts:

Under Scenario 5, the relocation of the SB off-ramp to the south end of the cover will remove a phase from the Vancouver & Broadway intersection and reduce traffic volumes and weaving movements on Vancouver between Broadway and Weidler. However, relocating the SB on-ramp back to Wheeler will add traffic back onto Vancouver and increase traffic volumes on Wheeler south of Weidler. Traffic operations analysis shows that Scenario 5 is expected to increase transit delays for southbound transit movements during the AM peak hour (less than 10 seconds) and significantly reduce delays during the PM peak (approximately 25 seconds).

Northbound Bus Routes 4 and 44

Summary of Design Changes:

Direct connection will be maintained for northbound bus services with no out-of-direction travel under all scenarios. Network changes to relocate the ramps to the south end of the cover as part of Scenario 5, to provide more space to active transportation and streetscaping (all scenarios), and adjusting signal cycle lengths and plans to accommodate protected signal phases (all scenarios) will result in changed traffic patterns and a reallocation of time to different movements at key signalized intersections (see Figures 15 and 16 in Section 2.4.2 for traffic volume information).

Summary of Impacts:

Under Scenarios 4 and 5, the relocation of the SB off-ramp to the south end of the cover will increase traffic volumes on Williams between the SB ramps intersection and Broadway. The interaction with additional traffic will likely have an impact on northbound transit travel times. However, some of this may be offset by reduced traffic volumes on Williams north of Broadway (resulting from the relocation of the NB on-ramp). As well, the design of a left-side bikeway along the length of Williams as part of Scenarios 4 and 5 removes the need for the signal at Williams and Hancock and removes any transit delay that may result from that signal.

Traffic operations analysis shows that Scenario 5 is expected to increase transit delays for northbound movements during the AM peak hour (less than 10 seconds) and be approximately the same as the 20% design and Scenario 1 during the PM peak.

Mitigation Strategies

Potential impacts should be explored further and mitigation options to reduce impacts or improve transit through the neighborhood could include:

- 20% Design:
  - Transit signal priority at Williams & Hancock to mitigate signal delays.
  - Prioritization of signals along Vancouver and Broadway to decrease transit delays compared to existing conditions.
- Scenario 1:
  - Transit signal priority at Williams & Hancock to mitigate signal delays.
  - Prioritization of signals along Vancouver and Broadway to decrease transit delays compared to existing conditions.
- Scenario 4:
  - A bus lane and/or queue jump signal on Williams south of Weidler to mitigate additional traffic delays.
  - A bus lane and/or queue jump signal on Vancouver/Wheeler to mitigate additional traffic delays.
  - Providing a bus-only connection through the large community parcel to connect with the Broadway & Vancouver intersection at a bus-only signal phase.
  - Rerouting southbound buses onto Hancock Street and providing a two-way bus connection along Williams from Hancock through the SB ramps intersection to the Rose Quarter.
  - Signal progression along Williams to clear out queues from the off-ramp and allow unobstructed flow of buses when the bus receives a green signal at the SB ramps intersection.
- Scenario 5:
  - A bus lane and/or queue jump signal on Williams south of Weidler to mitigate additional traffic delays.
  - Signal progression along Williams to clear out queues from the off-ramp and allow unobstructed flow of buses when the bus receives a green signal at the SB ramps intersection.
- General:
  - Transit signal priority measures that can prioritize the movement of transit along all corridors.
  - Providing transit only lanes along sections of the corridor that could allow buses to bypass queues and congestion. There are opportunities for short segments of priority lanes between intersections, e.g., along Wheeler south of Weidler. However, to provide continuous transit priority lanes that extend through intersections would require additional right-of-way.
- Bikeway Design:
  - The interaction and design of sidewalk level bike lanes at bus stops will need to be addressed. Ideally, bike lanes will stay at sidewalk level and wrap behind the stop area, which may require additional ROW at intersections with transit stops.

2.3 Freight

The 20% Design and Scenario 1 connect the I-5 ramps directly to Broadway and Weidler, which are Major Truck Streets. Shifting the freeway ramps to the south end of the cover in Scenarios 4 and 5 introduces new movements to connect the new ramp locations to Broadway and Weidler. Although large trucks should be encouraged to use the Going Street interchange to access the major freight network along Interstate, the local street network does need to accommodate truck turning movements.

2.3.1 Freight Network

Figure 12 shows the City of Portland's Transportation System Plan (TSP) freight network designations for each of the proposed scenarios. The City of Portland's TSP identifies Broadway and Weidler as Major Truck Streets with some truck connections for street segments between Broadway and Weidler that distribute traffic to and from the ramp terminals.

Key freight movements were reviewed to ensure that the ICA scenarios do not restrict any freight movements. This included a review of truck access to the Moda Center and Memorial Coliseum, which have their service driveways on Interstate. All existing freight movements are available as part of the ICA design scenarios.

2.3.2 Design Approach

Appendix M in the *20% Design Package (Refined Facility Plan / NEPA Design Concept)* includes a study of the how the 20% Design accommodates truck movements. The design vehicles for turns on the local street network were determined as:

- A WB-67 truck for all movements required to access to and from the freeway from Broadway and Weidler.
- A WB-40 truck for all other local circulation movements.

The 20% Design Package shows how these vehicles were accommodated in making turns for the 20% Design. It shows the required accommodations for the vehicle on both the entry and exit of the turn and categorizes these accommodations using the following codes:

- L: the vehicle stays within its lane.
- C: the vehicle encroaches partially into the adjacent lane.
- F: the vehicle encroaches and uses the full width of the adjacent lane.

2.3.3 Truck Turning Analysis

For the 20% Design, the design vehicle can be accommodated at all intersections using some combination of the above. For example, the westbound left-turn from Broadway to Vancouver is accommodated as a "CF" meaning that a WB-67 making this turn needs to swing wide to encroach partially into the adjacent lane on the approach to the turn and encroaches fully into the adjacent lane on the exit of the turn. See Appendix M of the 20% Design Package for more information on how design vehicles were accommodated under the 20% Design, which will be similar for Scenario 1.

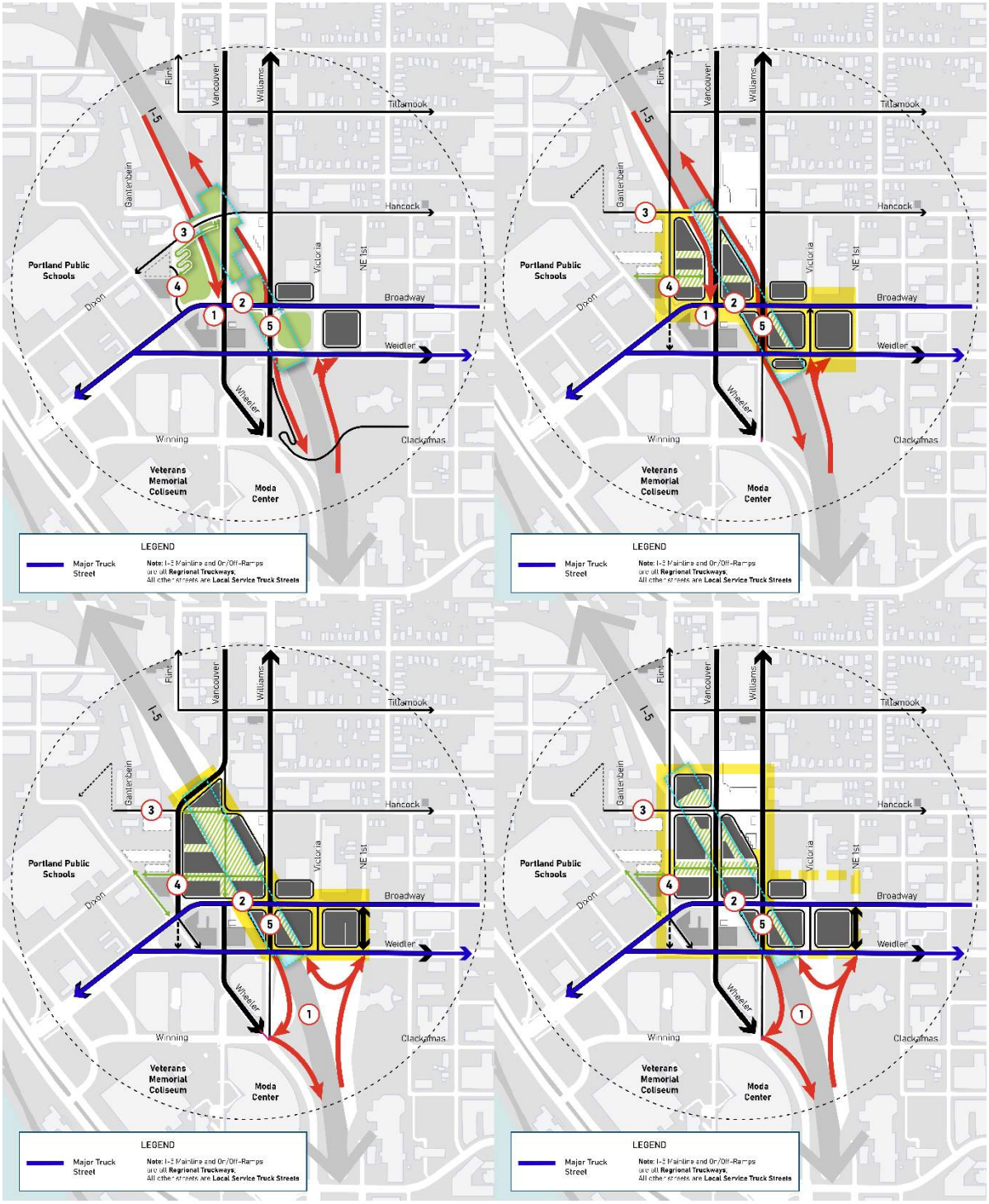


Figure 12: City of Portland TSP Freight Designations for each Scenario (clockwise from top left: 20% Design, Scenario 1, Scenario 5, Scenario 4).

Table 8 shows how design vehicle turns are accommodated under Scenario 1 and are presented in a similar format to the 20% Design Package to allow for comparison. Table 8 shows that Scenario 5 can accommodate all turning movements for a WB-67 to access the relocated freeway ramps and for a WB-40 to negotiate any other turns on the local street network.

For Scenarios 4 and 5, the relocation of the southbound off-ramp means that trucks and freight must make the sharp right-turn from the southbound off-ramp onto Williams to reconnect with the major truck routes on Broadway and Weidler. Table 8 shows that for this right-turn movement:

- An SU-30 and a WB-40 can make this turn side-by-side.
- A WB-67 can be accommodated starting from the exterior lane and encroaching into the adjacent lane on the exit of the turn.

An alternative design was considered that converted Wheeler to a two-way segment between the SB ramps and Broadway. This would allow trucks coming from the I-5 SB off-ramp to go straight through the intersection onto Wheeler to make their turns onto Weidler or Broadway. This is an easier maneuver than the right-turn onto Williams, but results in a number of traffic operational impacts at the Vancouver intersections with Weidler and Broadway. It could also impact the quality of active transportation facilities that could be provided in the segment of Vancouver between Broadway and Weidler, which is constrained by the existing Left Bank buildings on either side of the street.

Adjustments to the Scenario 5 design should be explored further or managing this turning accommodation through signage to communicate to drivers of trucks larger than an SU-40 that their turn will need to be made from the left lane. Further discussion of primary truck routes and design vehicle accommodations should be had with the City of Portland before finalizing the design. This includes encouraging large truck traffic to the Going Street interchange.

Table 8: Design Vehicle Turning Movement Accommodations for Scenario 5

Intersection	Movement	Vehicle				
		Passenger Vehicle	SU-30	T1 Firetruck	WB-40	WB-67
Broadway and Vancouver	LT-WB	Y-LL	Y-LL	Y-LF	Y-LC	Y-CF
	RT-SB	Y-LL	Y-LF	Y-FF	Y-FF	N/A
Broadway and Williams	RT-WB	Y-LL	Y-CF	Y-FF	Y-FL	N/A
	LT-NB	Y-LL	Y-LC	Y-LC	Y-LF	Y-CF
Broadway and Victoria	RT-WB	Y-LL	Y-CL	Y-FF	Y-FF	N/A
	LT-WB	Y-LL	Y-FF	Y-CF	Y-FF	N/A
	LT-NB	Y-LL	Y-LF	Y-LC	Y-LF	Y-LF
	RT-SB	Y-LL	Y-LF	Y-LF	Y-LF	N/A

Intersection	Movement	Vehicle				
		Passenger Vehicle	SU-30	T1 Firetruck	WB-40	WB-67
Broadway and 1st	LT-WB	Y-LL	Y-CF	Y-LF	Y-LF	Y-FF
	LT-NB	Y-LL*	Y-LL*	Y-CC	Y-LC	Y-FF
Weidler and 1st and I-5 NB Ramps	LT-EB	Y-LL	Y-LF	Y-LF	Y-LF	N/A
	RT-EB	Y-LL	Y-LL	Y-CL	Y-LL	Y-CF
	LT-SB	Y-LL	Y-LL	Y-LF	Y-CC	Y-CF
Weidler and Victoria	LT-EB	Y-LL	Y-FF	Y-CF	N/A	N/A
	LT-SB	Y-LL	Y-LC	Y-LC	Y-LC	Y-FF
Weidler and Williams	RT-NB	Y-LL	Y-LL	Y-LC	Y-LL	Y-LF
	LT-EB	Y-LL	Y-CF	Y-FF	Y-FF	N/A
Weidler and Vancouver	RT-EB	Y-LL	Y-LL	Y-LF	Y-LF	Y-CF
	LT-SB	Y-LL	Y-LF	Y-FF	Y-CF	N/A
Winning and Williams and I-5 SB Ramps	RT-SB	Y-LL*	Y-LL*	Y-LL	Y-LC**	Y-LF***

*This vehicle makes the turn from the interior lane simultaneously with a WB-40 in the exterior lane.

**This vehicle makes the turn from the interior lane simultaneously with a SU-30 in the exterior lane.

***This vehicle makes the turn from the exterior lane.

Design Vehicle Movements:

LL = **L**ane to **L**ane - Stays in curb lane of exiting street. Turns into curb lane of entering street.
LC = **L**ane to **C**enterline - Stays in curb lane of exiting street. Uses half of entering street; does not cross centerline of entering street.
LF = **L**ane to **F**ull Street – Stays in curb lane of exiting street. Uses full width of entering street.

CL = **C**enterline to **L**ane - Swings wide to use half width of exiting street before turning; does not cross centerline of exiting street. Turns into curb lane of entering street.
CC = **C**enterline to **C**enterline - Swings wide to use half width of exiting street before turning; does not cross centerline of exiting street. Uses half of entering street; does not cross centerline of entering street.
CF = **C**enterline to **F**ull - Swings wide to use half width of exiting street before turning; does not cross centerline of exiting street. Uses full width of entering street.

FL = **F**ull to **L**ane - Swings wide to use full width of exiting street before turning. Turns into curb lane of entering street.
FC = **F**ull to **C**enterline - Swings wide to use full width of exiting street before turning. Uses half of entering street; does not cross centerline of entering street.
FF = **F**ull to **F**ull - Swings wide to use full width of exiting street before turning. Uses full width of entering street.

* All movements are assumed to not encroach into existing parking lanes. Any proposed parking removal must be noted.

EXAMPLE :
NB LT: *Trimet 40ft bus LC, WB-67 FF*
NB RT: *SU-30 LL, WB-67 FF*

LEGEND
Y = vehicle can negotiate the turning movement
N = vehicle cannot negotiate the turning movement
A = design movement can be accomodated by overswinging - see Design Vehicle Movements nomenclature.
NC = no change proposed from existing condition
NA = turning movement is not applicable for vehicle
- = turning movement not run because existing turning movement is not possible

2.4 Traffic

Under each ICA scenario, a specific set of signalized intersections are integral to the traffic operations of the I-5 Broadway / Weidler interchange. This section summarizes key design elements for these intersections under each ICA scenario including geometric configuration changes, pedestrian and bicycling accommodations, transit features, and potential changes to signal phasing and cycle lengths.

This section also compares traffic operations for the ICA scenarios to the 20% design and identifies the tradeoffs that need to be considered for traffic operations to achieve a more pedestrian-scale street network.

2.4.1 Key Intersection Design Elements

Table 9 outlines key intersection design elements for ICA Scenario 1 – "Flint and Broadway Boulevards".

Table 9: Intersection Design Summary: ICA Scenario 1 – Flint and Broadway Boulevards

Intersection	General Elements	Pedestrian & Bicycle Elements	Transit Elements	Potential Operations
Broadway & Flint Ave	• Four-leg intersection • Close Wheeler north of Broadway	• Four-way intersection • WB protected bicycle lane	• WB streetcar and bus route	• 70-second peak period cycle lengths
Broadway & Vancouver Ave & SB I-5 Off-Ramp	• Five-leg intersection • SB I-5 off-ramp terminal	• Five-way intersection • Pedestrian island on north approach • WB & SB protected bicycle lane	• WB streetcar and bus route • SB bus route and bus-only lane	• 70-second peak period cycle lengths
Broadway & Williams Ave	• Four-leg intersection • Contra-flow lane south of intersection to reduce conflicts between on-ramp traffic • NB on-ramp located immediately north of intersection	• No sidewalk on west side of Williams Ave north of intersection due to NB on-ramp • WB & NB protected bicycle lane	• WB streetcar and bus route • NB bus route	• 70-second peak period cycle lengths • Dedicated north crosswalk + bike phase (protected from WBR turning cars/trucks)
Broadway & Victoria Ave	• Four-leg intersection	• WB protected bicycle lane	• WB streetcar and bus route	• 70-second peak period cycle lengths
Broadway & 1st Ave	• Four-leg intersection (existing)	• WB protected bicycle lane	• WB streetcar and bus route	• Unsignalized

Intersection	General Elements	Pedestrian & Bicycle Elements	Transit Elements	Potential Operations
Weidler St & Flint Ave	• Four-leg intersection • Re-align with driveway to parking garages	• Two-way (EB/WB) Green Loop on south side of Weidler	• EB streetcar and bus route	• 70-second peak period cycle lengths
Weidler St & Vancouver Ave	• Four-leg intersection • Two-way Wheeler; all NB traffic must turn right	• Two-way (EB/WB) Green Loop on south side of Weidler • Pedestrian island on south approach • SB protected bicycle lane	• EB streetcar and bus route • SB bus route	• 70-second peak period cycle lengths • Dedicated east crosswalk phase (protected from WBL turning cars/trucks)
Weidler St & Williams Ave & SB I-5 On-Ramp	• Five-leg intersection • Contra-flow lane through intersection to NB I-5 on-ramp	• Two-way (EB/WB) Green Loop on south side of Weidler • Center-running NB protected bicycle lanes between contra- flow	• EB streetcar and bus route • NB bus-only approach	• 70-second peak period cycle lengths
Weidler St & Victoria Ave & NB I-5 Off-Ramp	• Four-leg intersection • NB I-5 off-ramp terminal	• Two-way (EB/WB) Green Loop on south side of Weidler • Pedestrian island on south approach • EB protected bicycle lane	• EB streetcar and bus route	• 70-second peak period cycle lengths
Weidler St & 1st Ave	• Three-leg intersection (existing)	• Two-way (EB/WB) Green Loop on south side of Weidler	• EB streetcar and bus route	• Unsignalized
Wheeler Ave & Williams Ave & Winning Way	• Four-leg intersection with NB bus-only slip lane	• SB protected bicycle lane • NB protected bicycle lane in slip lane • EB and WB bicycle lanes on Winning; connection to Clackamas Crossing	• SB bus route • NB bus route	• 70-second peak period cycle lengths
Williams Ave & Hancock St	• Four-leg intersection	• Transition of NB bicycle lanes from right to left side of Williams	• NB bus route	• Actuated “free” operation (36-second AM cycle length, 31-second PM cycle length noted in EA)

Table 10 outlines key intersection design elements for ICA Scenario 4 – "Center on the Cover".

Table 10: Intersection Design Summary: ICA Scenario 4 – Center on the Cover

Intersection	General Elements	Pedestrian & Bicycle Elements	Transit Elements	Potential Operations
Broadway & Flint Ave	• Four-leg intersection • Close Wheeler north of Broadway	• Green Loop on north side of Broadway • WB & SB protected bicycle lanes	• WB streetcar and bus route • SB bus route	• 70-second peak period cycle lengths
Broadway & Vancouver Ave	• Three-leg intersection	• Green Loop on north side of Broadway • WB protected bicycle lane	• WB streetcar and bus route	• 70-second peak period cycle lengths
Broadway & Williams Ave	• Four-leg intersection	• Green Loop on north side of Broadway • WB & NB protected bicycle lanes	• WB streetcar and bus route • NB bus route	• 70-second peak period cycle lengths
Broadway & Victoria	• Four-leg intersection	• Green Loop on north side of Broadway	• WB streetcar and bus route	• Unsignalized
Broadway & 1st Ave	• Three-leg intersection (close north leg of intersection)	• Green Loop on north side of Broadway • WB protected bicycle lane	• WB streetcar and bus route	• 90-second peak period cycle lengths • South crosswalk phasing TBD
Weidler St & Flint Ave	• Four-leg intersection • Re-align with driveway to parking garages	• Green Loop on south side of Weidler St • EB & SB protected bicycle lanes	• EB streetcar and bus route • SB bus route turns left onto Weidler	• 70-second peak period cycle lengths
Weidler St & Vancouver Ave	• Four-leg intersection	• Green Loop on south side of Weidler St • EB & SB protected bicycle lanes	• EB streetcar and bus route • SB bus route turns right from Weidler to Vancouver	• 70-second peak period cycle lengths • South crosswalk + bike phasing TBD
Weidler St & Williams Ave	• Four-leg intersection	• Green Loop on south side of Weidler St • EB & NB protected bicycle lanes	• EB streetcar and bus route • NB bus route	• 70-second peak period cycle lengths • Dedicated east crosswalk phase (protected from NBR turning cars/trucks)
Weidler St & Victoria Ave	• Three-leg intersection	• Green Loop on south side of Weidler St	• EB streetcar and bus route	• Unsignalized

Intersection	General Elements	Pedestrian & Bicycle Elements	Transit Elements	Potential Operations
Weidler St & 1st Ave / NB I-5 Ramps	• Four-leg intersection • NB I-5 on- and off-ramp terminal	• Pedestrian island on south approach • Green Loop on south side of Weidler St • EB protected bicycle lane	• EB streetcar and bus route	• 90-second peak period cycle lengths • Dedicated south crosswalk + bike phase (protected from EBR turning cars/trucks)
Wheeler Ave & Williams Ave & Winning Way & SB I-5 Ramps	• Six-leg intersection (Wheeler Ave & Williams Ave and SB off-ramp and SB on-ramp function as paired one-way couplets)	• No crosswalks on east or south approaches • SB & NB protected bicycle lanes	• NB bus route	• 90-second peak period cycle lengths
Williams Ave & Hancock St	• Four-leg intersection	• NB protected bicycle lane on left-side	• NB bus route	• Unsignalized

Table 11 outlines key intersection design elements for ICA Scenario 5 – "Restore the Grid".

Table 11: Intersection Design Summary: ICA Scenario 5 – Restore the Grid

Intersection	General Elements	Pedestrian & Bicycle Elements	Transit Elements	Potential Operations
Broadway & Flint Ave	• Four-leg intersection • Close Wheeler north of Broadway	• Four-way intersecti on • WB protected bicycle lane	• WB streetcar and bus route	• 70-second peak period cycle lengths
Broadway & Vancouver Ave	• Four-leg intersection	• Green Loop on north side of Broadway • WB & SB protected bicycle lanes	• WB streetcar and bus route • SB bus route	• 70-second peak period cycle lengths • Dedicated south crosswalk phase (protected from WBL turning cars/trucks)

Intersection	General Elements	Pedestrian & Bicycle Elements	Transit Elements	Potential Operations
Broadway & Williams Ave	• Four-leg intersection	• Green Loop on north side of Broadway • WB & NB protected bicycle lanes	• WB streetcar and bus route • NB bus route	• 70-second peak period cycle lengths • Dedicated north crosswalk + bike phase (protected from WBR cars/trucks) • Dedicated west crosswalk phase (protected from NBL turning cars/trucks
Broadway & Victoria	• Four-leg intersection	• Green Loop on north side of Broadway	• WB streetcar and bus route	• Unsignalized
Broadway & 1st Ave	• Three-leg intersection (close north leg of intersection)	• Green Loop on north side of Broadway • WB protected bicycle lanes	• WB streetcar and bus route	• 90-second peak period cycle lengths • South crosswalk phasing TBD
Weidler St & Flint Ave	• Four-leg intersection • Re-align with driveway to parking garages	• Two-way (EB/WB) Green Loop on south side of Weidler	• EB streetcar and bus route	• 70-second peak period cycle lengths
Weidler St & Vancouver Ave	• Four-leg intersection	• Green Loop on south side of Weidler St • EB & SB protected bicycle lanes	• EB streetcar and bus route • SB bus route	• 70-second peak period cycle lengths • Dedicated south crosswalk + bike phase (protected from EBR turning cars/trucks)
Weidler St & Williams Ave	• Four-leg intersection	• Green Loop on south side of Weidler St • EB & NB protected bicycle lanes	• EB streetcar and bus route • NB bus route	• 70-second peak period cycle lengths • Dedicated east crosswalk phase (protected from NBR turning cars/trucks)
Weidler St & Victoria Ave	• Three-leg intersection	• Green Loop on south side of Weidler St	• EB streetcar and bus route	• Unsignalized
Weidler St & 1st Ave / NB I-5 Ramps	• Four-leg intersection • NB I-5 on- and off-ramp terminal	• Pedestrian island on south approach • Green Loop on south side of Weidler St • EB protected bicycle lanes	• EB streetcar and bus route	• 90-second peak period cycle lengths • Dedicated south crosswalk + bike phase (protected from EBR turning cars/trucks)

Intersection	General Elements	Pedestrian & Bicycle Elements	Transit Elements	Potential Operations
Wheeler Ave & Williams Ave & Winning Way & SB I-5 Ramps	• Six-leg intersection (Wheeler Ave & Williams Ave and SB off-ramp and SB on-ramp function as paired one-way couplets)	• No crosswalks on east or south approaches • SB & NB protected bicycle lanes	• NB bus route	• 90-second peak period cycle lengths
Williams Ave & Hancock St	• Four-leg intersection	• NB protected bicycle lane on left-side	• NB bus route	• Unsignalized

2.4.2 Comparison of Traffic Operations

Intersection traffic operations were evaluated for weekday AM and PM peak hour conditions. Intersection traffic volumes were developed from origin-destination traffic volumes provided by ODOT and representing 2045 Build (i.e., with I-5 mainline improvements) conditions. The ICA team's test for feasibility focused this modeling effort on Scenario 5; however, many of the results from Scenario 5 can be considered applicable to the performance of Scenario 4 with the exception of intersections along the realigned portion of Vancouver.

Figures 13 and 14 show future year AM and PM peak hour modeled link traffic volumes for the 20% Design and Scenario 5, respectively. **Figure 15** shows AM and PM peak hour turning movement volumes for Scenario 5.

The performance of individual intersections was evaluated using Synchro 11 traffic analysis software. Given the close spacing between many of the intersections in the project area, a limited amount of traffic simulation work was also conducted using the SimTraffic microsimulation software to identify and qualitatively evaluate any potential "fatal flaw" traffic queuing and blocking issues. Note that, unlike in the Environmental Assessment, detailed VISSIM microsimulation was not conducted. Additional and more detailed traffic analysis is required to more precisely evaluate the operations of closely-spaced intersections and the detailed performance of transit through the study area.

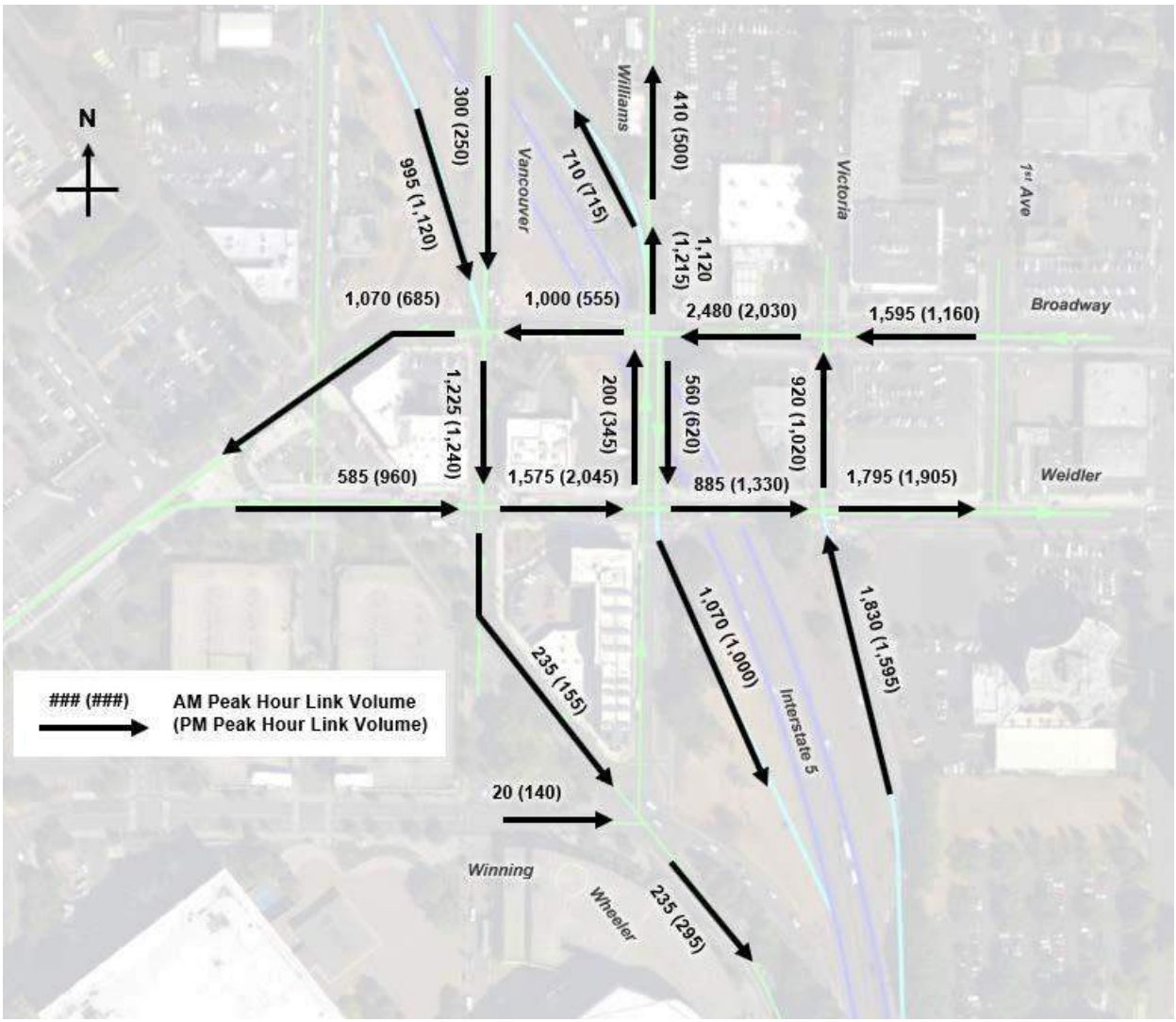


Figure 13: 20% Design and Scenario 1 Modeled Link Traffic Volumes.

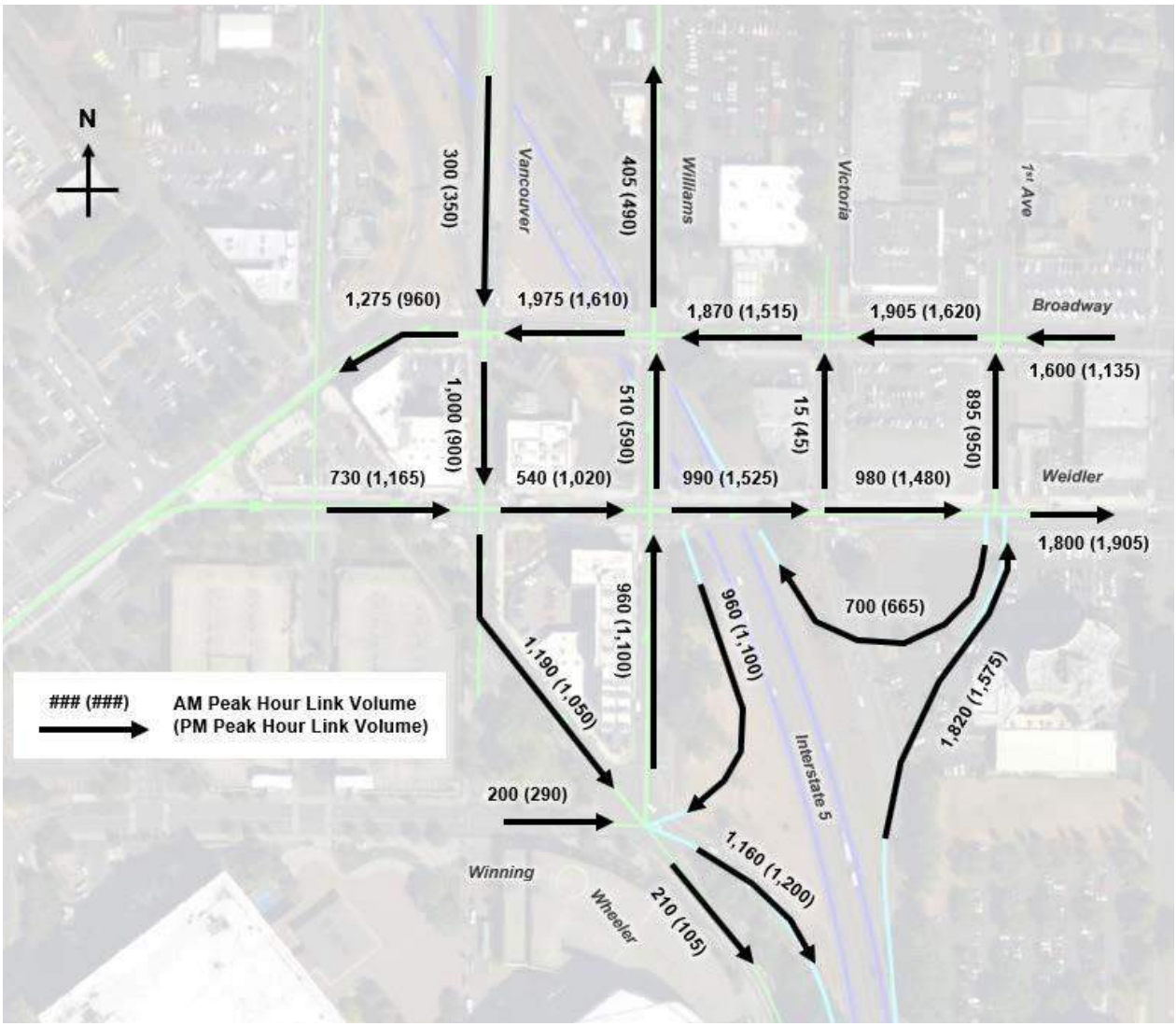


Figure 14: Scenario 5 Modeled Link Traffic Volumes.

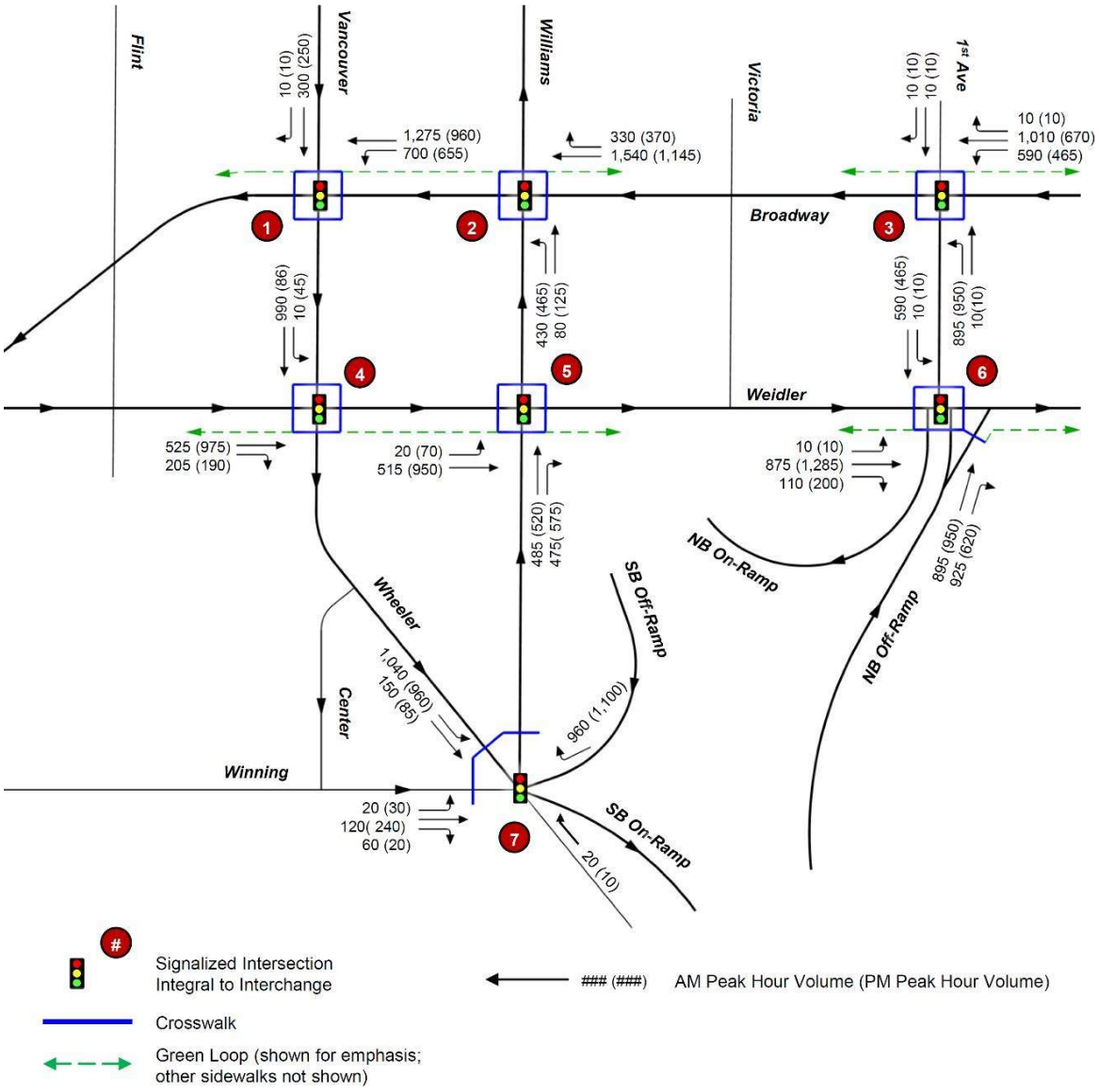


Figure 15: Scenario 5 Modeled Intersection Turning Movement Volumes.

Intersection performance measures including average intersection delay and level-of-service (LOS) were reported from the software and compared between scenarios in **Table 12** for the AM peak hour and **Table 13** for the PM peak hour.

Table 12 Intersection Operations Comparison – AM Peak Hour

Intersection	20% Design	Scenario 1	Scenario 4	Scenario 5
Broadway & Vancouver Avenue	49.2 sec/veh LOS D	49.2 sec/veh LOS D	(Not modelled)	11.3 sec/veh LOS B
Broadway & Williams Avenue	26.5 sec/veh LOS C	26.5 sec/veh LOS C	23.9 sec/veh LOS C	23.9 sec/veh LOS C
Broadway & Victoria	15.4 sec/veh LOS B	15.4 sec/veh LOS B	(Not modelled)	(Not modelled)
Broadway & First Avenue	(Not modelled)	(Not modelled)	36.7 sec/veh LOS D	36.7 sec/veh LOS D
Weidler Street & Vancouver Avenue	13.3 sec/veh LOS B	13.3 sec/veh LOS B	(Not modelled)	15.4 sec/veh LOS B
Weidler Street & Williams Avenue	9.1 sec/veh LOS A	9.1 sec/veh LOS A	14.4 sec/veh LOS B	14.4 sec/veh LOS B
Weidler Street & Victoria Avenue	17.9 sec/veh LOS B	17.9 sec/veh LOS B	(Not modelled)	(Not modelled)
Weidler Street & First Avenue & NB Ramps	(Not modelled)	(Not modelled)	23.7 sec/veh LOS C	23.7 sec/veh LOS C
Wheeler & Winning & Williams & SB Off-Ramp	6.9 sec/veh LOS A	6.9 sec/veh LOS A	21.5 sec/veh LOS C	21.5 sec/veh LOS C

Table 13 Intersection Operations Comparison – PM Peak Hour

Intersection	20% Design	Scenario 1	Scenario 4	Scenario 5
Broadway & Vancouver Avenue	49.2 sec/veh LOS D	49.2 sec/veh LOS D	(Not modelled)	10.4 sec/veh LOS B
Broadway & Williams Avenue	15.2 sec/veh LOS B	15.2 sec/veh LOS B	18.2 sec/veh LOS B	18.2 sec/veh LOS B
Broadway & Victoria	12.2 sec/veh LOS B	12.2 sec/veh LOS B	(Not modelled)	(Not modelled)
Broadway & First Avenue	(Not modelled)	(Not modelled)	37.4 sec/veh LOS D	37.4 sec/veh LOS D
Weidler Street & Vancouver Avenue	20.4 sec/veh LOS C	20.4 sec/veh LOS C	(Not modelled)	14.9 sec/veh LOS B
Weidler Street & Williams Avenue	13.0 sec/veh LOS B	13.0 sec/veh LOS B	20.2 sec/veh LOS C	20.2 sec/veh LOS C
Weidler Street & Victoria Avenue	24.0 sec/veh LOS C	24.0 sec/veh LOS C	(Not modelled)	(Not modelled)
Weidler Street & First Avenue & NB Ramps	(Not modelled)	(Not modelled)	28.0 sec/veh LOS C	28.0 sec/veh LOS C
Wheeler & Winning & Williams & SB Off-Ramp	13.2 sec/veh LOS B	13.2 sec/veh LOS B	23.2 sec/veh LOS C	23.2 sec/veh LOS C

Modeled queue lengths on the I-5 off-ramps were also reported from Synchro and compared between Scenarios in **Table 14** for the AM peak hour and **Table 15** for the PM peak hour.

Table 14: I-5 Off-Ramp 95th Percentile Queue Lengths – AM Peak Hour

Off-Ramp	20% Design	Scenario 1	Scenario 4	Scenario 5
NB Off-Ramp	425'	425'	470'	470'
SB Off-Ramp	375'	375'	345'	345'

Table 15: I-5 Off-Ramp 95th Percentile Queue Lengths – PM Peak Hour

Off-Ramp	20% Design	Scenario 1	Scenario 4	Scenario 5
NB Off-Ramp	1,180'	1,180'	435'	415'
SB Off-Ramp	590'	590'	435'	415'

2.4.3 Summary of Key Traffic Impacts

The shift in design approach to support restorative justice outcomes and the community's vision for the neighborhood necessitates increasing the amount of right-of-way dedicated to pedestrians, bicyclists, and streetscape amenities and reducing space dedicated to automobiles. This requires some tradeoffs to traffic operations:

- Scenario 5 includes protected signal phasing to separate key pedestrian and bike crossing movements, including the Green Loop, from conflicting turning movements. The existing 70 second cycle length can be maintained for signals in the "box". However, this design change requires increased cycle lengths at the intersections shown on **Figure 16** including:
    - Wheeler / Winning / Williams / SB ramps intersection (90 seconds).
    - Weidler / First Avenue / NB ramps intersection (90 seconds).
    - Broadway / First Avenue intersection (90 seconds).

- The change in design philosophy results in fewer through lanes on Broadway and Weidler with some trade-offs including increased vehicle delay at some intersections; though this is expected to be within acceptable ranges. Although no queuing issues or blocking was observed in the Scenario 5 traffic model results, further analysis will be needed to explore the interaction of intersections and to develop new signal progression plans that clear queues along key movements from the freeway.

- Under Scenario 5, maintaining accepted traffic operational standards (including capacity, delay, and queue length requirements) precludes the inclusion of a new crosswalk across the east leg of the Wheeler/Winning/Williams/SB ramps intersection. As a result, a sidewalk is not provided on the east side of Wheeler from the SB ramps south to the Rose Quarter. This is similar to existing conditions. There are no land uses served by that sidewalk and its closure could be

communicated to pedestrians to cross at the intersections at either end of the segment and to use the sidewalk on the westside of the street.

- Further study should be undertaken to refine the design of the ramp terminals to determine if there are any potential improvements that could reduce pedestrian and bicycling crossing distances and crosswalk times.

- Further study of the geometry at the Broadway & 1st Avenue intersection is needed to more accurately understand the potential impacts on adjacent properties and the streetcar alignment and station location at 2nd Avenue. This may have some traffic operational impacts that will need to be tested. Currently, it is assumed that the north leg of the intersection will be closed to traffic to allow for more time to be provided to traffic exiting and entering the NB ramps and to provide crosswalk phases that are separated from conflicting turning movements.

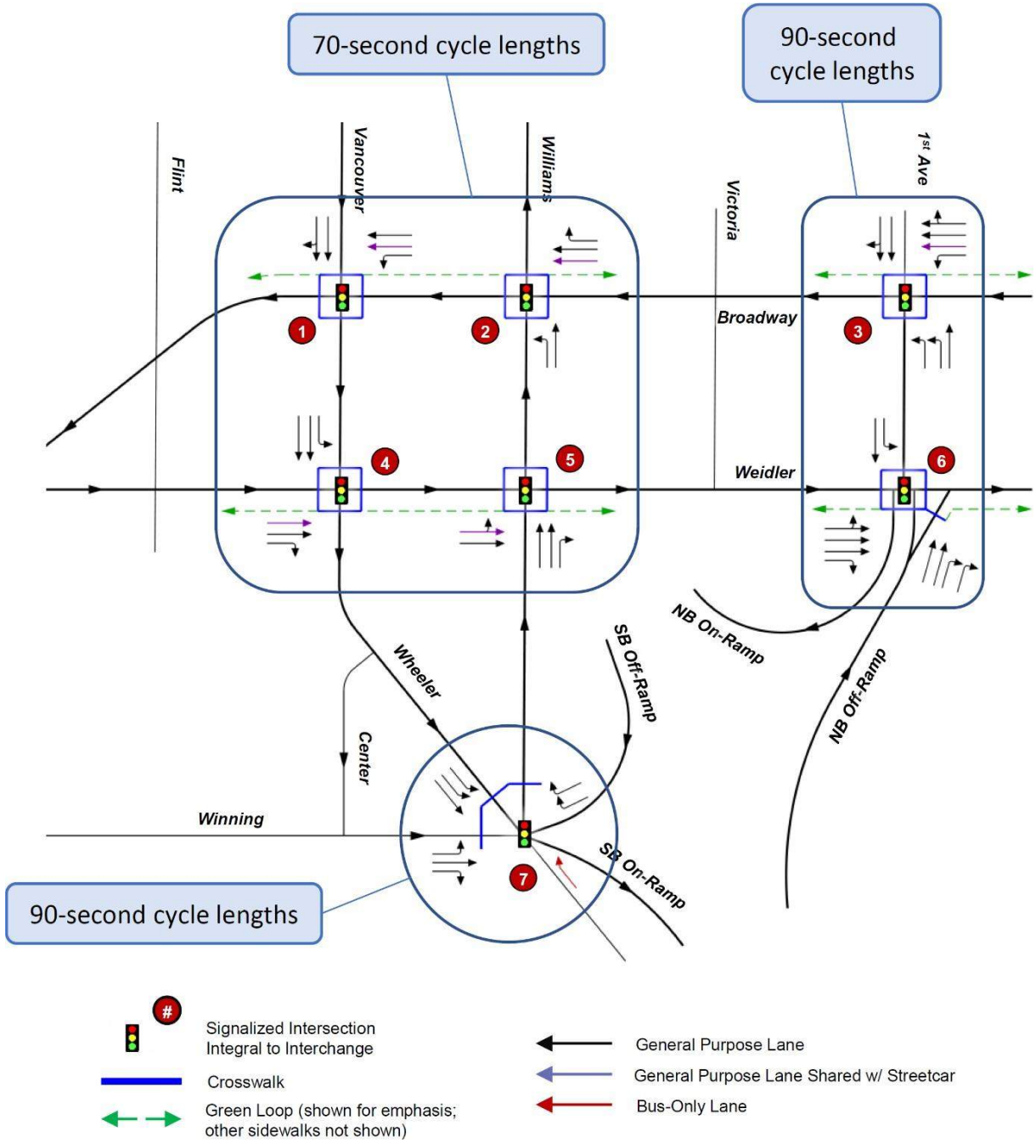


Figure 16: Summary of Cycle Length Changes Needed for Scenario 5.

3 Right-of-Way and Property Impacts

Supporting restorative justice outcomes and the community's vision for the neighborhood requires a fundamental shift in design approach from an auto-focused street network and circulation system to a pedestrian-oriented street scale that improves pedestrian safety and experience and supports placemaking and wealth creation. This shift in design approach necessitates increasing the amount of right-of-way dedicated to pedestrians, bicyclists, and streetscape amenities and reducing space dedicated to automobiles. In general, this results in property impacts that fit within the 20% design. However, there are potential property impacts on the north side of Broadway on either side of 1st Avenue that need further study and were not included in the EA's Area of Potential Impact.

Typical cross-sections and intersection designs were overlaid on the study area to develop a high-level design for Scenarios 1, 4, and 5. These were not prepared to the same design level as the 20% Design more detailed design phases will need to incorporate some of the items described in the modal evaluations above including:

- Design of intersection corners to best manage the interaction of bicyclists with pedestrians and turning traffic.
- Design of sidewalk-level bike lanes to wrap behind transit stops.
- Exploration of dedicated lanes and other transit priority treatments.
- Modifications to accommodate large truck turning movements.
- Further assessment of the geometry of the Broadway & 1st Avenue intersection to determine impacts on adjacent properties and the streetcar alignment.

3.1 Cross-Sections

Cross-sections for the major street network were developed to reallocate more space to pedestrians, bicyclists, and streetscape amenities. This was developed consistent with the City of Portland's sidewalk and bikeway standards as outlined in Section 2.1 and increases space for street trees, plantings, and other street furniture. The sections also reduce the space dedicated to automobiles consistent with the traffic analysis results included in Section 2.4.

Figure 17, Figure 18**, Figure** 19**, and Figure** 20 show representative cross-sections for Weidler, Broadway, Vancouver, and Williams and compares the existing cross-section with the cross-sections proposed as part of the 20% Design (which are similar in most cases to the Scenario 1 cross-sections) and with cross-sections proposed for Scenario 5 (which are similar in most cases to the Scenario 4 cross-sections).

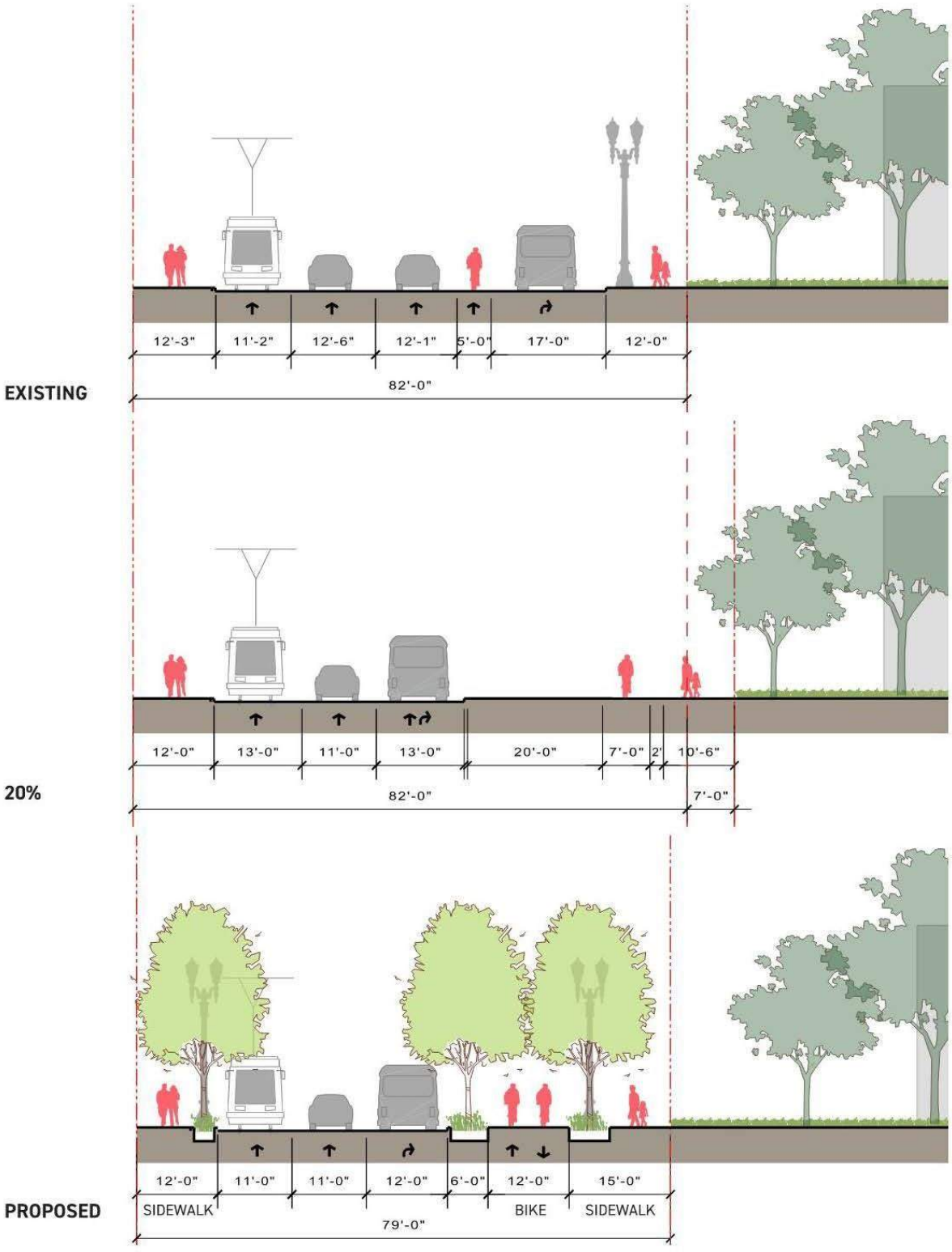


Figure 17: Comparison of Proposed Cross-Sections on Weidler, just west of Vancouver.

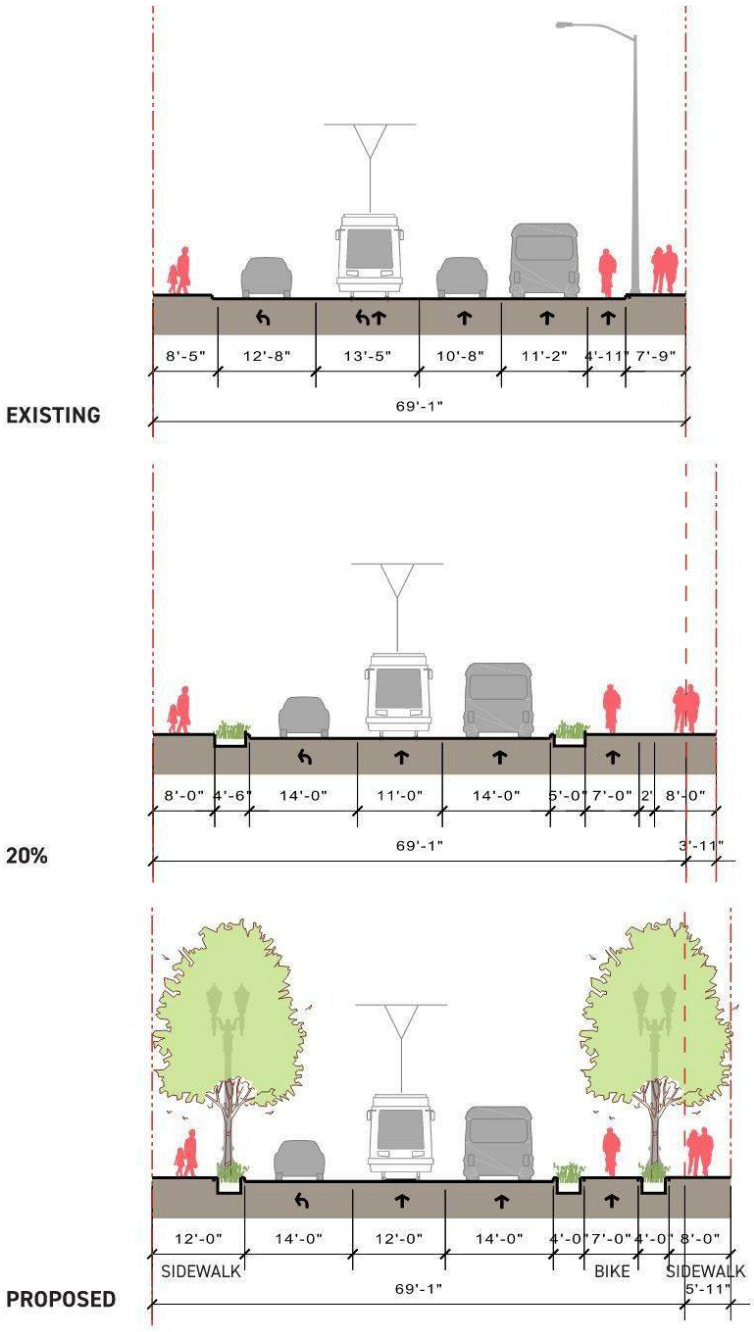


Figure 18: Comparison of Proposed Cross-Sections on Broadway, between Williams and Vancouver.

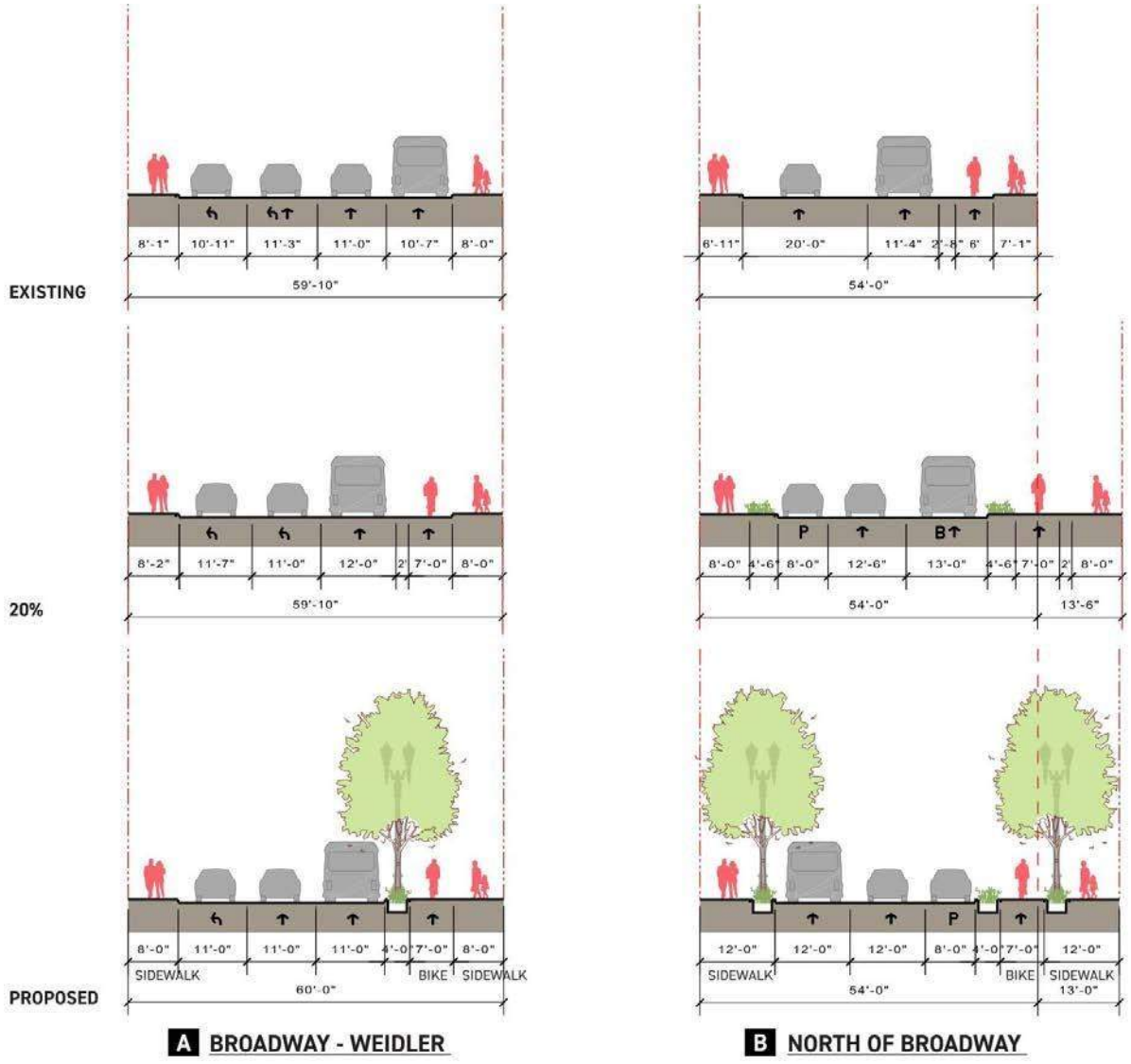


Figure 19: Comparison of Proposed Cross-Sections on Vancouver, (A) between Broadway and Weidler and (B) north of Broadway.

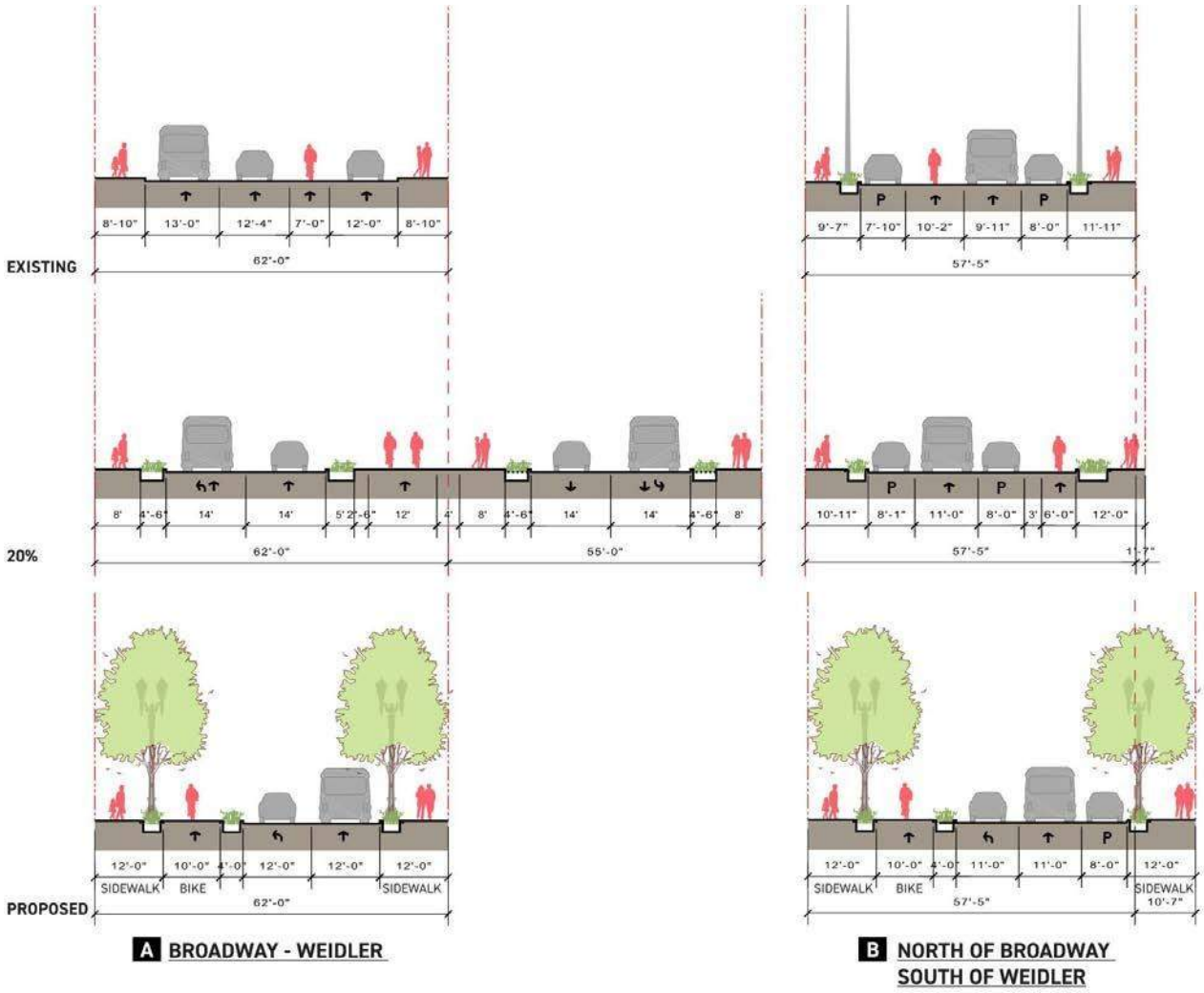


Figure 20: Comparison of Proposed Cross-Sections on Williams, (A) between Broadway and Weidler and (B) north of Broadway and south of Weidler.

3.2 Property Impacts

Applying these cross-sections and the lane allocations included in the traffic operations analysis to the street network allowed the comparison of right-of-way and property needs for each scenario. Property impacts resulting from Scenarios 1 and 5 are shown on **Figures 23 and 24**. It shows that in general, these scenarios fit within the same (or a smaller) footprint as the 20% Design, but that Scenarios 4 and 5 may require some additional property takes that were not identified in the API. These are subject to further study, but include:

- Part of the property on the west side of Williams, north of Weidler.
- Part of the property on the south side of Weidler opposite 1st Avenue.
- Part of the properties on the north side of Broadway between Victoria and 2nd Avenue.

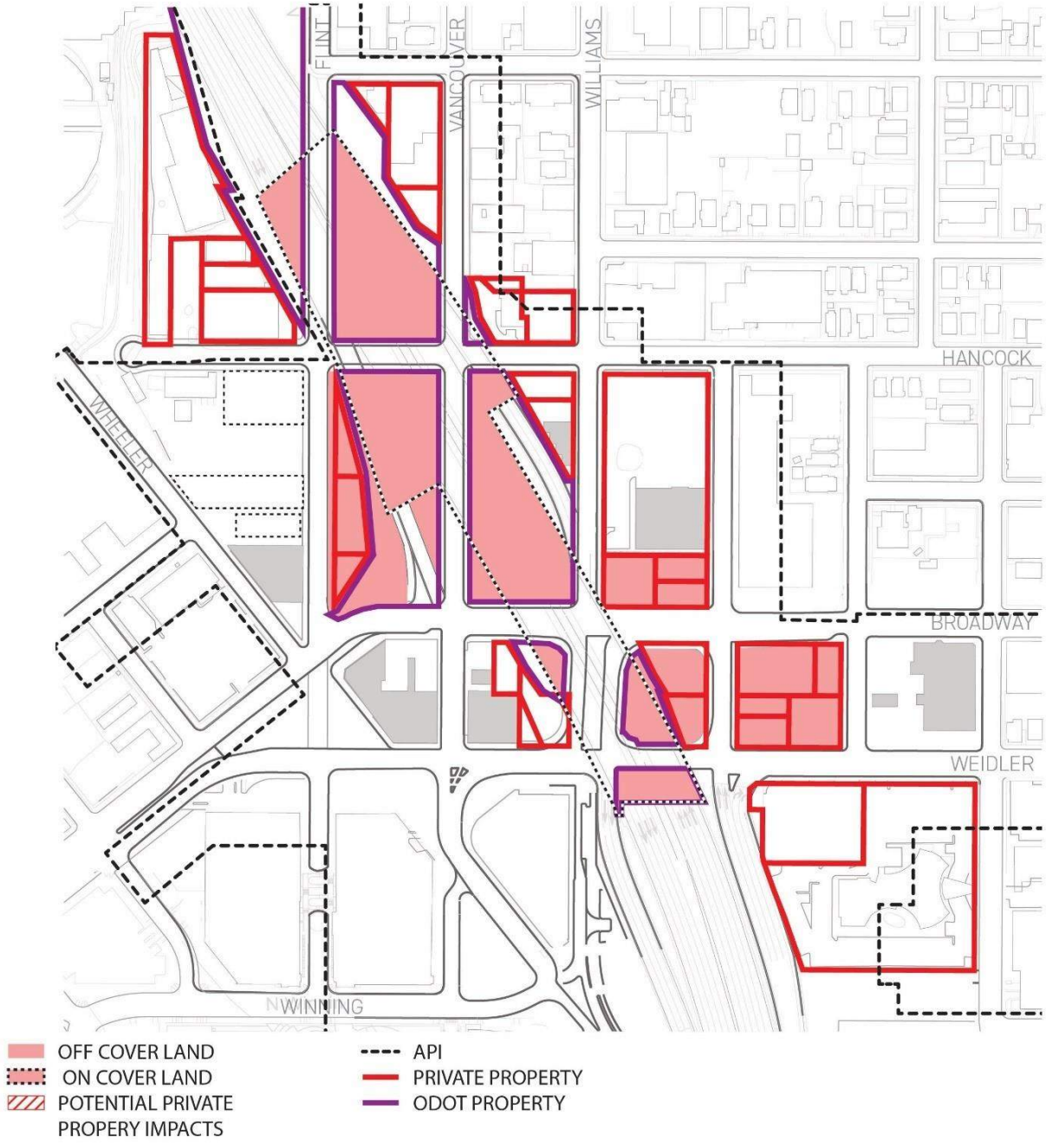


Figure 21: Potential property impacts from Scenario 1.

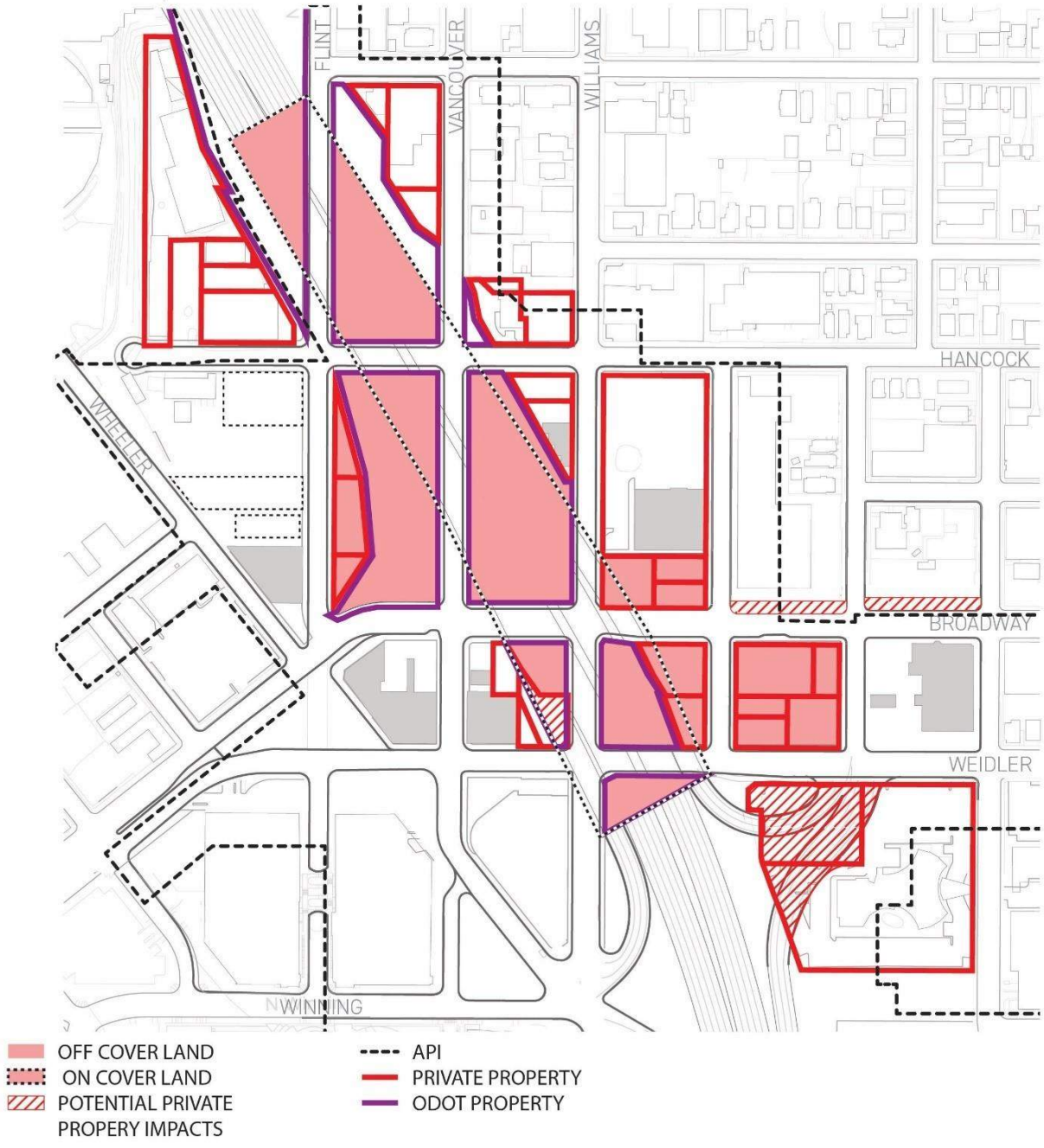


Figure 22: Potential property impacts from Scenario 5.

4 Parking Demand

This section summarizes parking considerations for the project site.

4.1 Project Context

Table 15 summarizes the program area proposed for the project site under each Design Idea.

Table 16 – Project Program Area, by Design Idea

Site Land Use	Program Area, by Design Idea			
	Scenario 1	Scenario 4	Scenario 5	Units
Residential	438,000	672,000	684,000	gross ft^2
	580	900	910	dwelling units
Commercial	194,000	231,000	193,000	gross ft^2
Medical	90,000	83,000	90,000	gross ft^2
Retail	59,000	69,000	67,000	gross ft^2
Cultural	108,000	78,000	99,000	gross ft^2
Total	888,000	1,133,000	1,132,000	gross ft^2

4.2 Policy Context

The City of Portland sets requirements for on-site parking for all development types in Chapter 33.266 of the Zoning Code[1] (last updated March 1, 2020).

Two key criteria determine Zoning Code parking supply requirements for sites in the City:

- Site zoning.
- Proximity to high-frequency transit.

Most of the project area is located in what is presently a CX (Central Commercial) base zone, as noted in **Figure 23** below.

Reduced parking supply requirements apply to sites located close to transit (defined as within 1,500 ft of a transit station or within 500 feet of a transit street with 20-minute peak hour service). The Zoning Code requires the Portland Bureau of Transportation (PBOT) to annually publish a map showing sites that are defined as close to transit. **Figure 24** shows sites in the project area (shaded in blue) that are accordingly defined as close to transit.

[1] "Portland Zoning," City of Portland (accessed May 14, 2021). https://www.portlandmaps.com/bps/zoning/#/map/

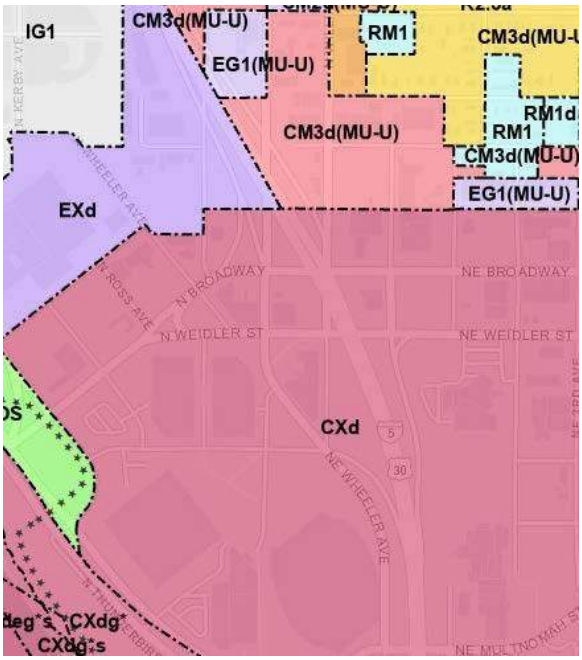


Figure 23 – Zoning in Project Area[2]

Figure 24 – Areas Defined as Close to Transit in Project Area[3]

[2] "Close to Transit Service," Portland Bureau of Transportation. https://www.arcgis.com/apps/webappviewer/index.html?id=6d12cf969149455da98146687aaa68b6.

[3] "Close to Transit Service," Portland Bureau of Transportation. https://www.arcgis.com/apps/webappviewer/index.html?id=6d12cf969149455da98146687aaa68b6.

Given the project site's base zoning and proximity to high-frequency transit, the parking supply requirements shown in **Table 16** below apply.

Table 17 – Zoning Code Parking Supply Requirements Applicable to Project Site

Proposed Site Land Use	Applicable Zoning Code Land Use		Parking Supply Requirements	
			Minimum Number of Parking Spaces	Maximum Number of Parking Spaces
Residential	Household Living	≤ 30 dwelling units	*No minimum*	1.35 spaces / dwelling unit
		31 – 40 dwelling units	0.20 spaces / dwelling unit	
		41 – 50 dwelling units	0.25 spaces / dwelling unit	
		>50 dwelling units	0.33 spaces / dwelling unit	
Commercial	General Office		*No minimum*	3.4 spaces / 1,000 ft^2
Medical	Medical / Dental Office		*No minimum*	4.9 spaces / 1,000 ft^2
Retail	Retail, Personal Service, Repair Oriented		*No minimum*	5.1 spaces / 1,000 ft^2
Cultural	Community Service		*No minimum*	5.1 spaces / 1,000 ft^2

4.3 Parking Demand

This section outlines estimated unconstrained demand for parking within the project site. The Institute of Transportation Engineers' (ITE) *Parking Generation Manual, 5th Edition*[4] is used to estimate unconstrained peak demand for parking at the project site (Unconstrained parking demand reflects the number of parking spaces that can be expected to be occupied near specific land uses, given no constraints on access roadway capacity or on-site parking supply.)

Table 17 below outlines:

- The peak parking demand for each land use.
- The sitewide sum of the peak parking demand for each land use (representing sitewide peak parking demand if parking is *not* shared across uses).
- The maximum hourly parking demand (representing sitewide peak parking demand if parking is shared across uses).

[4] "Parking Generation Manual, 5th Edition," Institute of Transportation Engineers (2019).

Table 18 – Unconstrained Peak Parking Demand (parking spaces), by Design Idea

Proposed Site Land Use	Applicable ITE Land Use		Unconstrained Peak Parking Demand (parking spaces), by Scenario & Land Use		
	Code	Name	Scenario 1	Scenario 4	Scenario 5
Residential	221	Multifamily Housing (Mid-Rise), General Urban / Suburban (< ½ mile to rail transit)	770	1,170	1,190
Commercial	710	General Office Building, General Urban/Suburban	460	550	460
Medical	720	Medical-Dental Office Building, General Urban / Suburban	290	270	290
Retail	820	Shopping Center, non-December, General Urban/Suburban	170	200	200
Cultural	580	Museum, General Urban/Suburban	100	70	90
Total (No Shared Parking)			**1,790**	**2,270**	**2,230**
Maximum Hourly Parking Demand (All Parking Shared)			**1,510**	**1,870**	**1,820**

Notably, Table 15 indicates that, for each design idea, the maximum hourly parking demand (assuming effective parking sharing) is 15 to 20 percent less than the sum of peak parking demanded for each land use. A shared parking supply would therefore be an effective strategy to reduce the overall parking supply needed on-site. **Figure 25, Figure 26 and Figure 27** illustrate the estimated unconstrained parking demand profile for the project site, by hour of the week.

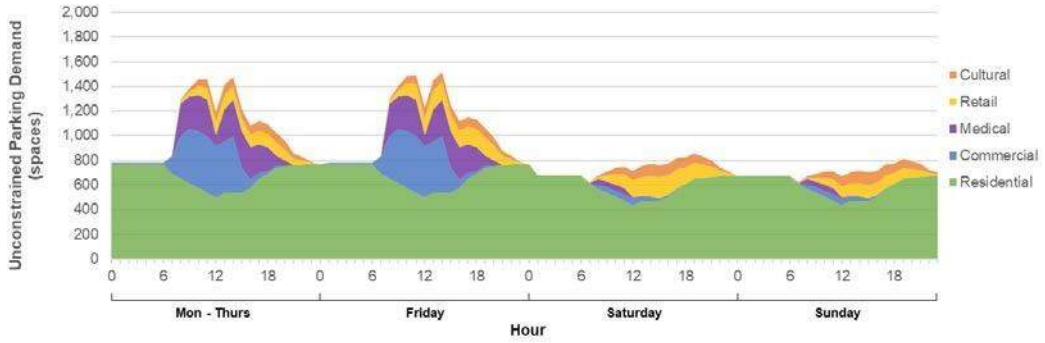


Figure 25 – Scenario 1 Unconstrained Parking Demand, by Hour

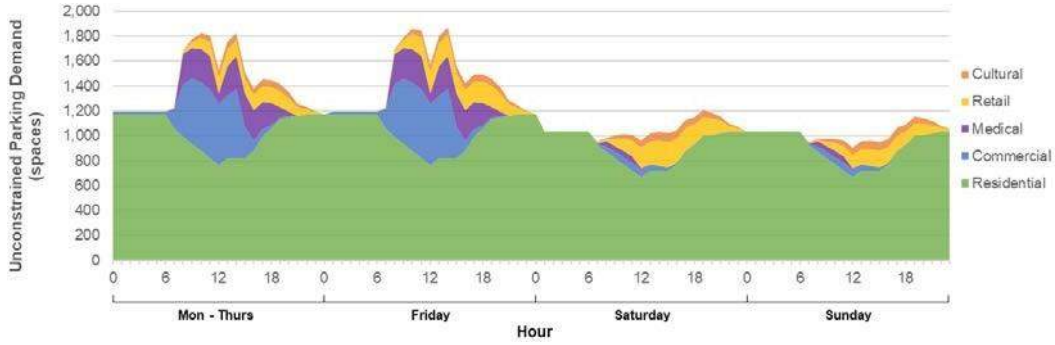


Figure 26 – 4 Unconstrained Parking Demand, by Hour

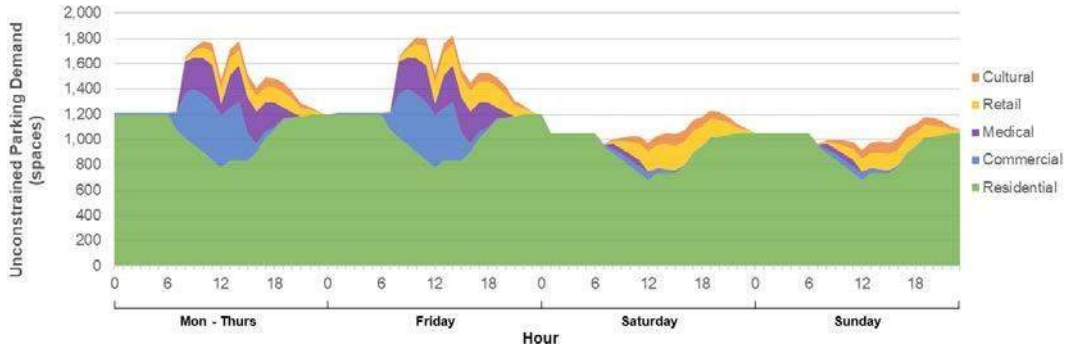


Figure 27 – 5 Unconstrained Parking Demand, by Hour

4.4 Parking Supply

4.4.1 Parking Rates & Quantities

As noted in Section 4.2, the project site is both in a CX (Central Commercial) base zone and close to high-frequency transit. The Zoning Code accordingly allows significant flexibility in the amount of parking that may be supplied on site. **Figure 28** identifies the following parking rates, for each type of use proposed on the project site:

- Zoning Code minimum allowable parking supply (per unit of land use).
- Zoning Code maximum allowable parking supply (per unit of land use).
- Unconstrained peak demand for parking (ITE).

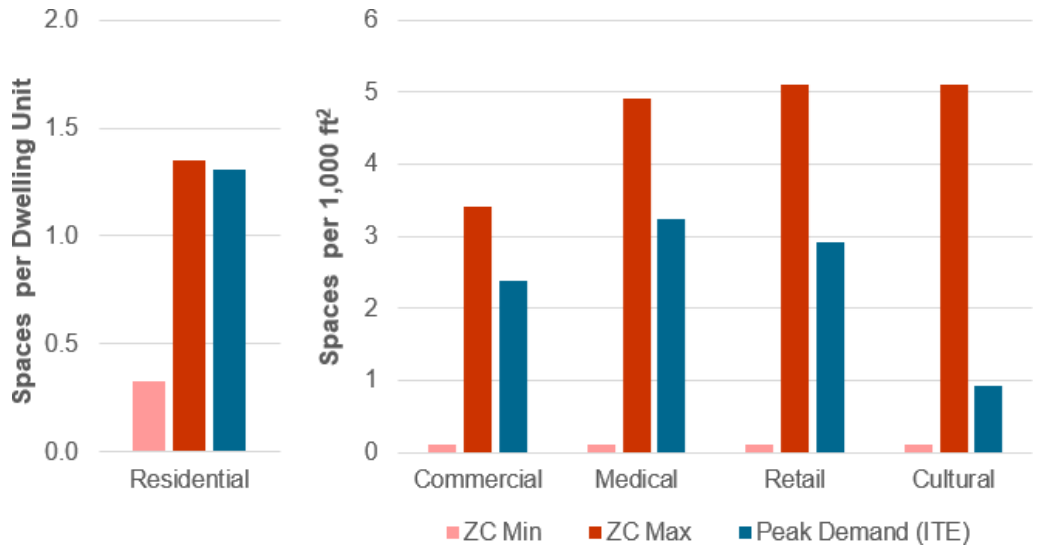


Figure 28: Applicable Zoning Code Parking Minimum and Maximum Rates, Compared with Unconstrained Parking Demand Rates.

Notably, for all uses except residential, the unconstrained peak demand for parking is significantly less than the maximum allowable parking allowed per the Zoning Code.

When the three rates above are applied to the program areas proposed on the project site, the parking quantities shown in **Figure 29** result.

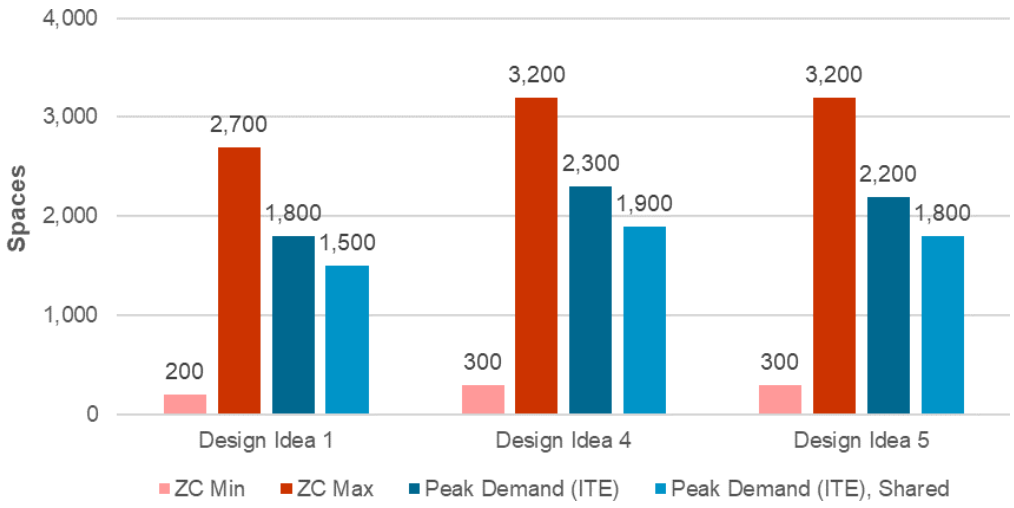


Figure 29: Project Site Parking Requirements and Unconstrained Parking Demanded (w/ and w/o Parking Sharing).

4.4.2 Shared Parking

Shared parking optimizes parking capacity by allowing complementary land uses to share parking supply spaces, rather requiring separate parking facilities for separate uses. Also as noted in Section 4.3, a given parking supply on this project site can be reduced by 15 to 20 percent and still meet the parking demand for each use if parking sharing is enabled. To enable effective parking sharing, the following measures should be taken as part of project implementation:

- No parking spaces should be reserved or dedicated for specific uses.
- Site vehicular circulation and signage should be configured to, where possible, allow continuous access between different parking areas (i.e., if one specific parking area is full, drivers should be able to easily access an adjacent parking area).

4.4.3 Recommendations

The following recommendations are provided for parking supply on the project site:

- Parking supply should not exceed the unconstrained demand for parking (per ITE rates).
- Parking sharing should be implemented on-site (as noted in Section 4.3).
- While parking will enable access to the project site by motorists, provisioning a parking supply less than the unconstrained peak demand for parking should be strongly considered. A smaller parking supply will reduce project capital costs and encourage access by non-car modes (including walking, bicycling, and transit).

5 References

The following documents were reviewed in the preparation of this report.

- PBOT PedPDX – Portland's Citywide Pedestrian Plan, 2019
- PBOT Protected Bike Lane Design Guide, 2018
- PBOT Enhanced Transit Corridors Plan and Rose Lane Project, 2018
- Portland Design Guide for Public Street Improvements, 1993
- NACTO Urban Street Design Guide, 2013
- NACTO Urban Bikeway Design Guide, 2014
- AASHTO Guide to the Development of Bicycle Facilities
- TriMet Design Criteria Manual, Rev. No. 11.1, 2017