

N/NE Quadrant and I-5 Broadway/Weidler Plans

I-5 Broadway/Weidler Interchange Improvements Report



October 2012

Recommended Draft



The N/NE Quadrant and I-5 Broadway/Weidler Plans Project is a collaborative effort by the City of Portland and the Oregon Department of Transportation to integrate urban design and land use planning with freeway planning and concept-level engineering in the North/Northeast portion of the Central City, which includes Lower Albina and the Lloyd District.

I-5 Broadway/Weidler Interchange Improvements Report

The overall project purpose is to...
Improve safety and operations on I-5
in the vicinity of the Broadway/Weidler
interchange.

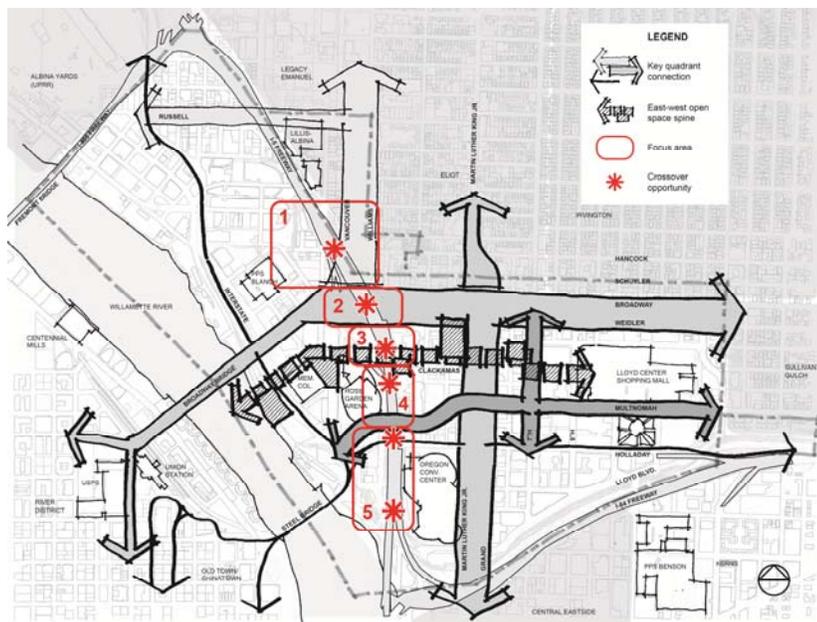
OBJECTIVES

ODOT and the City, through the Stakeholder Advisory Committee (SAC) and extensive public outreach, explored and found solutions to meet the following objectives:

EASE CONGESTION LEVELS AND IMPROVE SAFETY

ENHANCE PEDESTRIAN AND BICYCLE ROUTES

IMPROVE FREIGHT MOVEMENT



Integration of Transportation and Land Use Concepts in the N/NE Quadrant Plan

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Acronyms and Abbreviations

BPS	Bureau of Planning and Sustainability, City of Portland
CoP	City of Portland
ODOT	Oregon Department of Transportation
PBOT	Portland Bureau of Transportation, City of Portland
ROW	Right-of-Way
SAC	Stakeholder Advisory Committee
TDM	Transportation Demand Management
TSM	Transportation System Management
TSP	Transportation System Plan
V/C	Volume-to-Capacity ratio

Glossary of Related Planning Efforts

<p>Central City 2035</p>	<p>Central City 2035 (CC2035) is an update to the 1988 Central City Plan, which is the existing plan and policy for downtown and the central areas of Portland, Oregon. In coordination with the Portland Plan, this plan will address challenges and opportunities in the Central City to ensure that this unique economic, transportation, cultural and educational hub will be a vibrant resource for all Portlanders over the next 25 years. This effort will examine issues and opportunities within each of the Central City’s quadrants.</p>
<p>Facility Plan</p>	<p>A planning statement that Oregon state agencies prepare in order to better plan state facility needs and to comply with state law. The Oregon Department of Transportation (ODOT) prepares this type of document to inform decision makers, including the Oregon Transportation Commission, of its intent relative to the future development of its transportation infrastructure.</p>
<p>I-5 Broadway/Weidler Interchange Improvements Report</p>	<p>This overall document, which has been prepared to document the recommendations of the project’s SAC relative to transportation improvements that have been developed, analyzed and narrowed to the Recommended Concept described in Section 5.</p>
<p>N/NE Quadrant and I-5 Broadway/Weidler Plans</p>	<p>The combined efforts of ODOT and the City of Portland’s Bureau of Planning and Sustainability and Bureau of Transportation to plan land use, urban design and transportation improvements within the North/Northeast Quadrant of Portland’s Central City. The transportation improvements are planned for both the I-5 freeway and the local street network near the I-5 Broadway/Weidler Interchange.</p>
<p>N/NE Quadrant Plan</p>	<p>The North/Northeast Quadrant Plan (N/NE Quadrant Plan) is the first of the quadrant-level planning efforts associated with Central City 2035. This planning effort addressed challenges and opportunities related to land use, urban design, the Willamette River and multimodal transportation infrastructure.</p>
<p>Portland Plan</p>	<p>The Portland Plan is a strategic plan for the City of Portland that sets broad goals for improving equity, prosperity, educational outcomes and human and environmental health in Portland. The Comprehensive Plan will implement the Portland Plan policies that relate to state-mandated long-range planning that guide land use, transportation, conservation, and capital projects. CC2035 will be adopted as a district plan of the Comprehensive Plan. The North/Northeast Quadrant Plan will be part of the CC2035 Plan.</p>

I-5 Broadway/Weidler Interchange Improvements

Purpose of this Report — Relation to the Facility Plan

This report summarizes the process and steps that the Oregon Department of Transportation (ODOT) and two bureaus of the City of Portland, the Portland Bureau of Transportation (PBOT) and the Portland Bureau of Planning and Sustainability (BPS), have taken to date to address long-standing transportation issues in the North/Northeast Quadrant of Portland's Central City. In conjunction with the project's Stakeholder Advisory Committee (SAC) and an extensive public process that also examined potential land use changes and related opportunities in the North/Northeast Quadrant study area, the project team solicited, developed and evaluated a wide range of ideas and improvement concepts for both the Interstate 5 (I-5) freeway and local transportation issues in and around the I-5 Broadway/Weidler Interchange area.

This report provides an overview of this nearly two-year process as the project team, the SAC and numerous area stakeholders have contributed, shaped and narrowed the many improvement concepts. The result of this process, the project team's Recommended Concept, is described in Section 5 of this report. This document introduces and provides the background for a related document, called the ***Facility Plan for the I-5 Broadway/Weidler Interchange***. This plan is a technical and state-required document that specifically outlines ODOT's intentions relative to this segment of the I-5 facility and the interchange.

Purpose of the Facility Plan for the I-5 Broadway/Weidler Interchange

State of Oregon agencies prepare facility plans for state-owned infrastructure so that they and decision-makers may effectively manage, maintain and prioritize potential additions to or expansion of this infrastructure. The Facility Plan for the I-5 Broadway/Weidler Interchange represents a discussion draft of a facility plan that ODOT staff will present to the Oregon Transportation Commission (OTC) later this year regarding recommended improvements to I-5 in the area around the I-5 Broadway/Weidler Interchange between Interstate 84 (I-84) and Interstate 405 (I-405) at the Fremont Bridge. This Facility Plan will represent and confirm, if adopted by the OTC, the state's long-range intent relative to this section of I-5 and the I-5 Broadway/Weidler Interchange.

1. Introduction (The Story)

Combining Land Use and Transportation Planning

Portland is nationally recognized for innovations linking land use and transportation planning. Portland's Downtown Plan, adopted in 1972, and the Central City Plan, adopted in 1987, established a framework for land use and transportation within the central city.

In the summer of 2010, ODOT, PBOT and BPS initiated a partnership to begin co-developing land use and transportation concepts for the North/Northeast quadrant of the central city (N/NE Quadrant) through an iterative process involving the public and area stakeholders. The project includes identifying specific improvements to the I-5 freeway within the overall project study area (see Figure 1), between I-84 and I-405 (at the Fremont Bridge), and improvements to the I-5 Broadway/Weidler Interchange area.

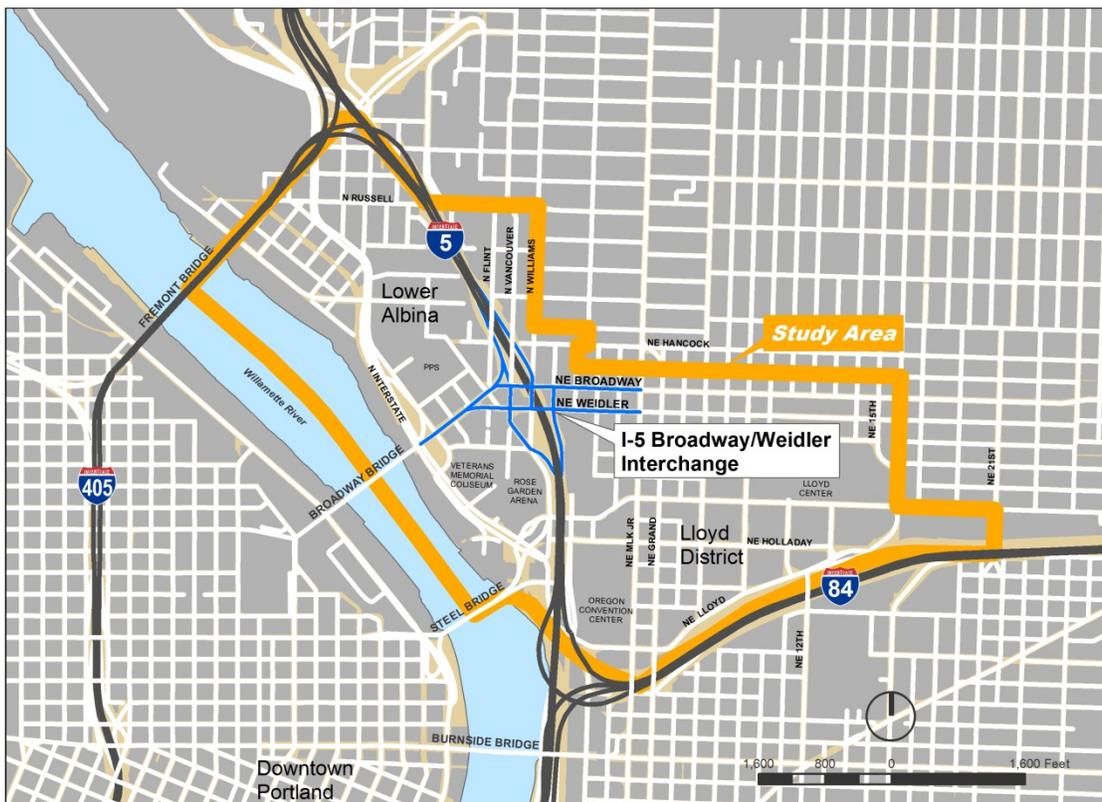


Figure 1: Study Area for the N/NE Quadrant and I-5 Broadway/Weidler Plans Project

This joint effort represents a new land use-transportation approach in planning improvements to urban freeway interchanges. This approach combines the planning of local strategies for land use, urban design and local transportation improvements, typically a City responsibility, with the planning of interstate freeway improvements, which is an ODOT responsibility. The project's approach for freeway improvements was to address long-demonstrated safety and operational issues that, if scaled according to community aspirations, would contribute to the continued vitality of the Central City and the mobility needs of the region and state. Due to multiple constraints, freeway improvements were to focus on existing safety and reliability issues and not necessarily increase capacity to meet future travel demands.

This collaborative approach between ODOT, the City and the North/Northeast Portland community, examined transportation and land use solutions concurrently over the course of a five-phase process (see Section 2: The Plan Development and Public Involvement Process). In the end, it resulted in land use and transportation changes in the quadrant that are mutually agreeable to both the City of Portland and to ODOT.

Though developed within the same process, the land use and transportation improvement plans resulted in two distinct groups of documents for the two partnering agencies as shown in Figure 2. The land use changes and urban design strategies for the City are documented in the North/Northeast Quadrant Plan (as part of the 2035 Central City Plan); the transportation changes are documented in this report and ODOT’s Facility Plan. The integrated plans most closely overlap in five focus areas near the I-5 freeway and the I-5 Broadway/Weidler Interchange. These focus areas are shown in Figure 2 where the freeway and local transportation improvements have the potential to directly support the proposed concept for the N/NE Quadrant Plan. The improvements in these five areas are discussed in Section 5 and detailed in Appendix S-G: Summary Urban Design Studies.

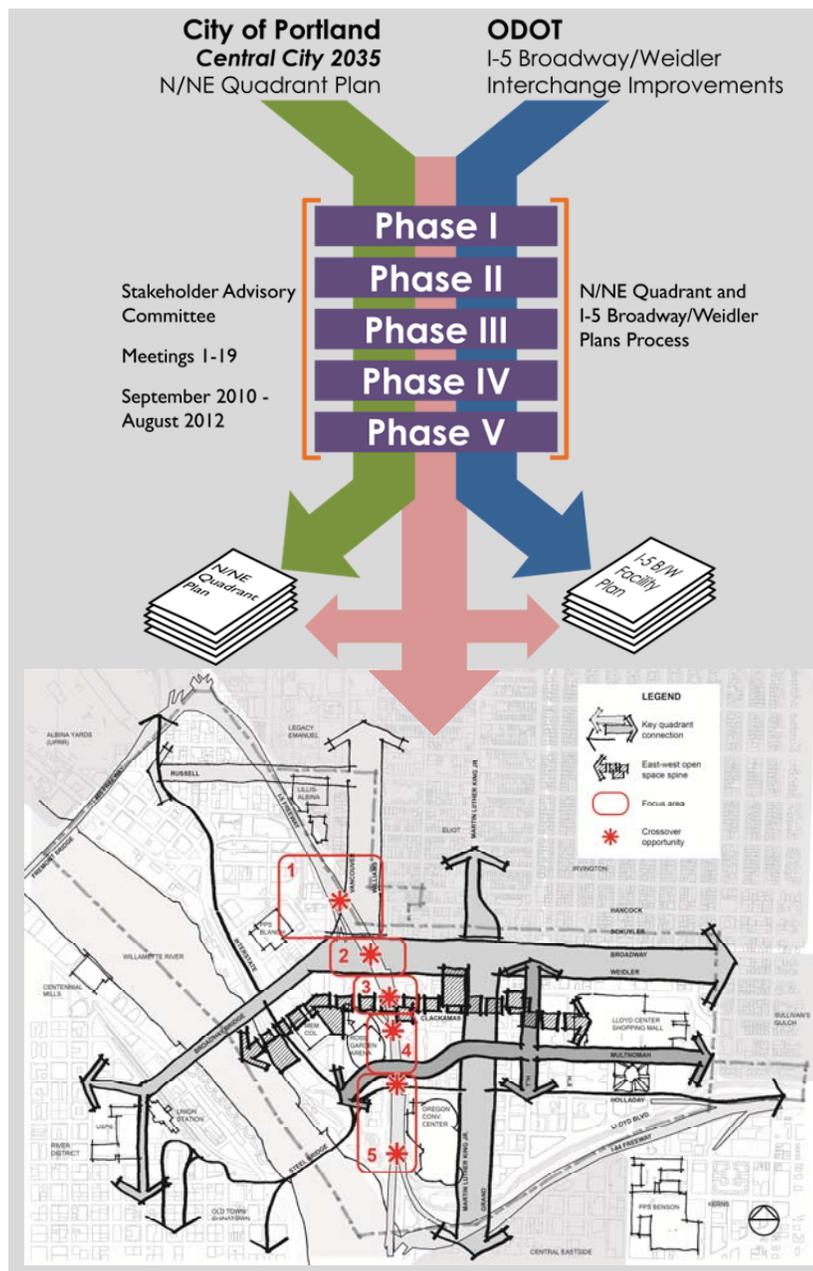


Figure 2: Joint Effort for the N/NE Quadrant and I-5 Broadway/Weidler Plans Project: Examining Land Use and Transportation Elements Concurrently

Previous Studies of I-5 Freeway Issues between I-84 and I-405

Previous studies by ODOT and the City of Portland have attempted to address the considerable safety and operational issues of the I-5 freeway between I-84 and I-405 (Fremont Bridge). This segment of I-5 has not been improved since it was built in the 1960s and it remains one of the few sections of freeway in the region where there are only two through lanes in each direction. The safety and operational issues here derive largely from the close spacing of the I-84, Broadway/Weidler, I-405 and Greeley interchanges that occur within this short segment of I-5 and the high proportion of traffic volume entering onto and exiting from I-5 that create “weave” maneuvers between motorists entering and exiting the freeway.

As these studies were conducted and concept plans developed over the past 25 years, both ODOT and the City of Portland recognized that, although they addressed the safety and operational issues of the I-5 freeway between I-84 and I-405, the physical impacts of the solutions were greater than anyone desired. These previous efforts relied on the use of braided ramps to eliminate the weave conditions. While the traffic benefits of these solutions were demonstrated, concerns over their cost, the widened freeway footprint and the visual impacts of multiple new structures prevented their implementation. Figure 3 shows the I-5: Greeley – N. Banfield Modified Concept from 1990-1996.



Figure 3: I-5: Greeley – N. Banfield Modified Concept (1990-1996)

As additional studies were undertaken, the extent of proposed freeway improvements, and the financial costs and community impacts associated with them, began to narrow. Yet even with the last major look at potential improvements to I-5 in the study area in 2007, the project costs, right-of-way (ROW) needs and the associated community impacts were found to be too great to move forward with implementation. These three factors resulted in improvement proposals that had little community support beyond the operational benefits to the freeway. See Appendix F: Building the System: I-5 between I-84 and I-405, History of Freeway Improvement Plans, for a summary of improvement plans for this segment of freeway over the last 25 years.

With the Recommended Concept as described in Section 5, the extent (or scope) of the freeway improvements, and the financial costs and community impacts associated with the concept, has been narrowed considerably. Freeway safety and operations have been demonstrated to improve and the project costs appear relatively manageable. The greatest proportional decrease in scale occurred by reducing the amount of additional ROW needed and the community impacts associated with the Recommended Concept. This narrowing of the scope of the project, and its related costs and impacts, is illustrated in Figure 4.

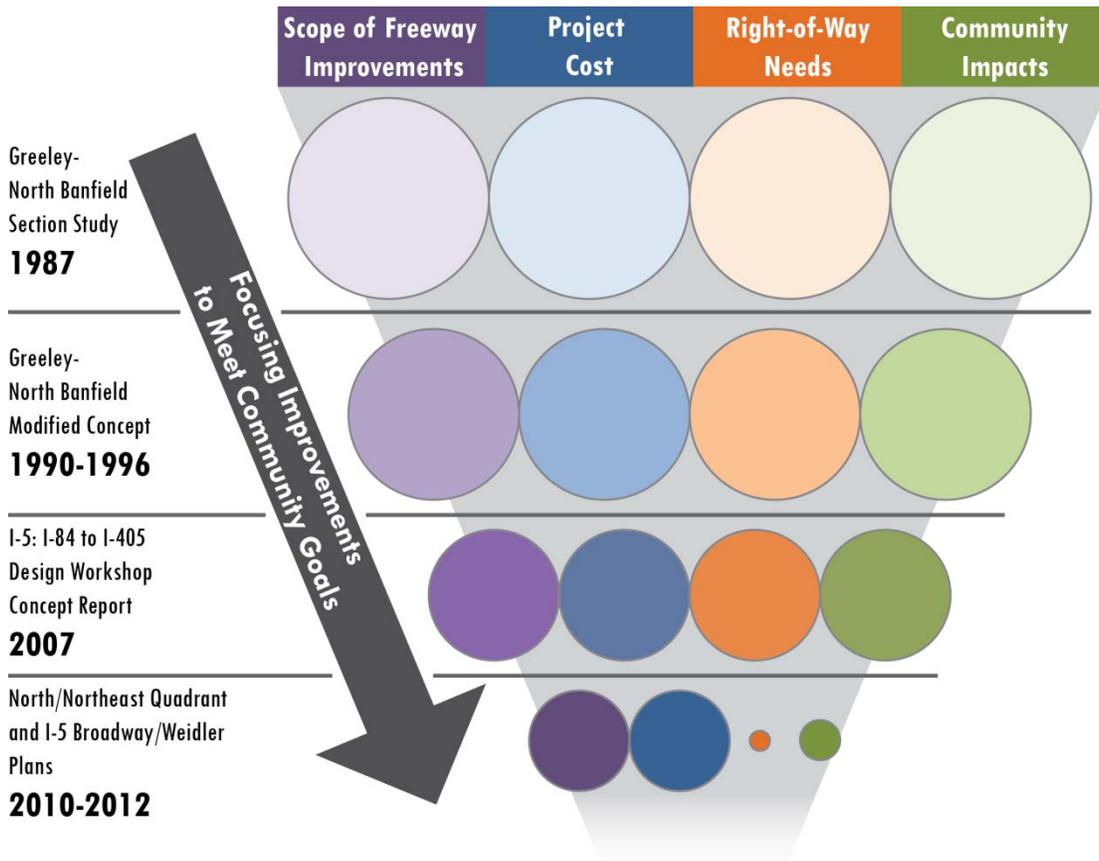


Figure 4: Extent of Freeway Improvements, Costs and Community Impacts from Studied Improvements to I-5 between I-84 and I-405 over Time

The result of the close collaboration between ODOT, the City, the project’s SAC and the public is that an appropriately-scaled set of improvements has been developed and evaluated that benefits the project partners and the community. This considerable narrowing, or focusing, of the extent of freeway improvements is critical for several reasons summarized below.

For the community and neighborhoods immediately surrounding the freeway, the reduction in community impacts means that the displacements experienced during the original construction of I-5 freeway in the area will not be repeated or exasperated.

For the project’s SAC, the reduction in impacts and the additional benefits of enhanced connectivity in the study area demonstrates that their work on project goals and objectives are now reflected in the resulting Recommended Concept (as described in Section 5).

For the City of Portland, the scale and nature of the project’s Recommended Concept can be seen to improve transportation elements in the North/Northeast Quadrant that facilitate the continued growth and evolution of the quadrant as a vital Central City district and to support the land use and urban design goals and elements of the City’s North/Northeast Quadrant Plan.

And for ODOT, the reduced scale of the project’s Recommended Concept demonstrates safety and operational improvements to the mainline of the I-5 freeway and yet the reduced costs, the greatly reduced ROW needs and greatly reduced community impacts mean that an implementable project is achievable for this critical segment of freeway.

2. The Plan Development and Public Involvement Process

The Process: The Stakeholder Advisory Committee and Public Outreach

ODOT and the City undertook a comprehensive public process, complete with a diverse and inclusive Stakeholder Advisory Committee (SAC), a professional process facilitator, numerous outreach events in the community, study area tours and many briefings with potentially affected stakeholders and property owners.

An integral component of the process was the knowledge and input from the 30-member SAC; the committee members brought broad-ranging perspectives in the study area to advise the partner agencies at each step of the process. The SAC, which included members representing neighborhood, business, bicycle, pedestrian, transit, freight, rail, event facility and property owner interests, was one of the primary means of ensuring that the public had multiple opportunities to provide meaningful input into the planning process. The five step project process is shown in Figure 5 and includes each of the significant project milestones as supported by the SAC.

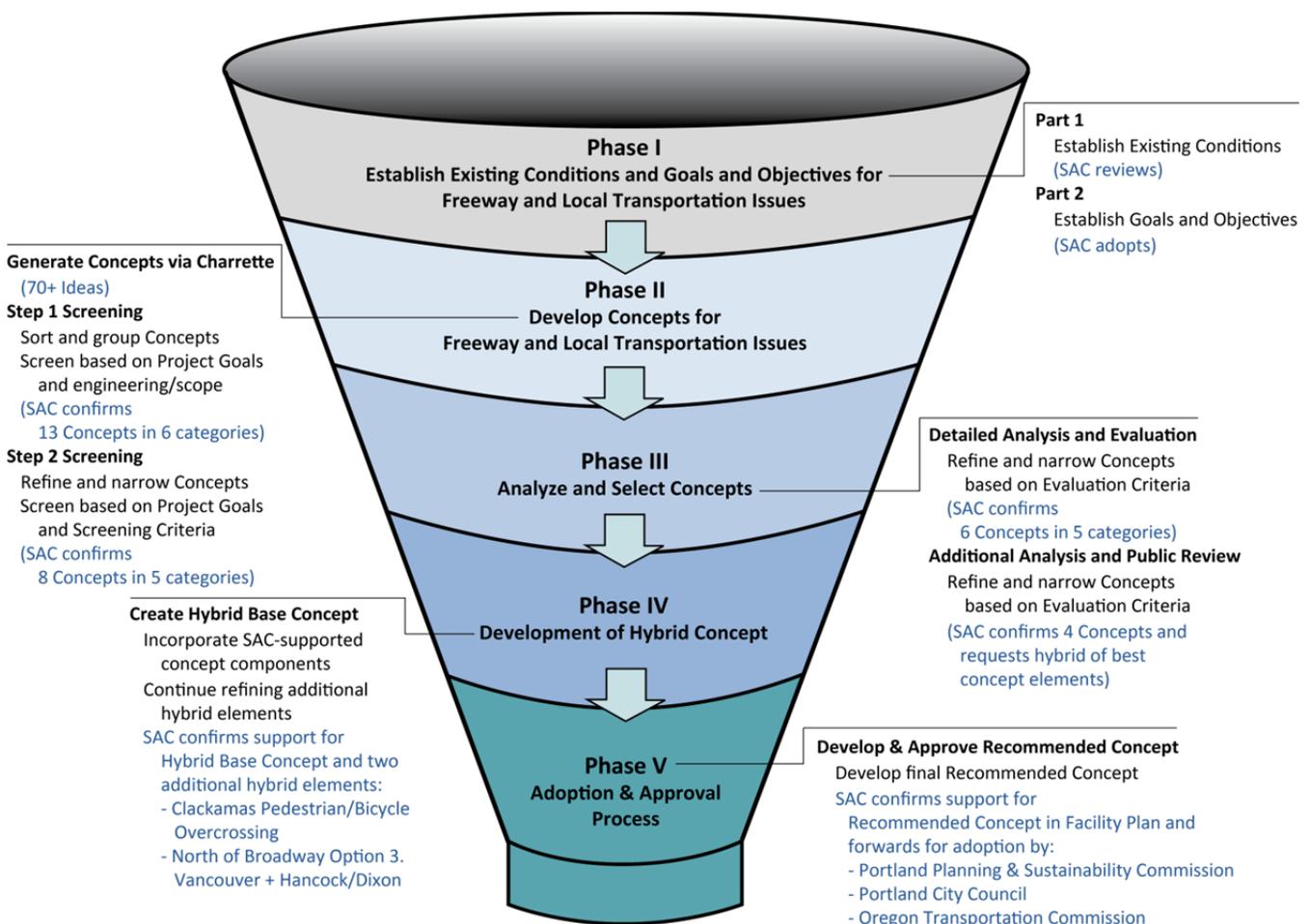


Figure 5: The Five-Phase Project Process (Transportation Focus)

The role of the SAC was to advise and direct project staff throughout the planning process and to make recommendations to the Portland City Council, the Portland Planning and Sustainability Commission and the Oregon Transportation Commission. SAC members were expected to solicit input from their stakeholder groups and constituencies, report back to the committee, represent the broader interests of those groups at meetings and promote public involvement in project events.

The SAC and its subcommittee meetings were held approximately monthly, and served as ongoing opportunities to share information and receive feedback from stakeholders and members of the general public. Subcommittees of the SAC met periodically to address specific issues, such as transportation, land use and urban design. Members of the public were invited to join the subcommittee to have more in-depth participation in the process. Project meetings and events were held within or near the study area. Event locations included the Rose Garden Arena, Calaroga Terrace, the Lloyd Center mall, the Leftbank Annex, the Metro Regional Center and ODOT Region One Headquarters (just across the Willamette River from the N/NE Quadrant study area).

In all, 19 full SAC meetings and 13 subcommittee meetings were held. All meetings were open to the public and included opportunities for public comment. A summary of the public events, which complemented the SAC and subcommittee meetings, is shown in Table 1.

Table 1: Project Events Hosted by the N/NE Quadrant and I-5 Broadway/Weidler Plans Project

Event	Date	Approximate Attendance
Community Walks: Lower Albina & Lloyd District	September 2010	10, 10 (2 days)
Open House: Central City 2035 (CC2035) & N/NE Quadrant & I-5 Broadway/Weidler Plans	October 2010	100
Open House: N/NE Quadrant Plans & Rose Quarter District Plan	November 2010	150
Charrette: Land Use/Local Transportation N/NE Quadrant & I-5 Broadway/Weidler Plans	February 2011	17, 18 (2 days)
Charrette: I-5 Freeway & Local Transportation N/NE Quadrant & I-5 Broadway/Weidler Plans	April 2011	38, 14, 22 (3 days)
Open House: N/NE Quadrant & I-5 Broadway/Weidler Plans	June 2011	102
Open House: N/NE Quadrant & I-5 Broadway/Weidler Plans	February 2012	100
Development Forum: Lloyd District N/NE Quadrant & I-5 Broadway/Weidler Plans	February 2012	14
Community Walk: N/NE Quadrant & I-5 Broadway/Weidler Plans	April 2012	17
Stakeholder Meetings with Project Staff: N/NE Quadrant & I-5 Broadway/Weidler Plans	Throughout Project Process	Varied

In addition to the SAC meetings and public events, the Bureau of Planning and Sustainability maintained a project website to serve as the primary source of information for the public and as a means to solicit and receive public feedback. The website included project information and regular updates, documents, a calendar of events, meeting agendas and minutes, links to other related planning efforts and staff contact information. The bureau also conducted a survey in the summer of 2011 and maintained an electronic mailing list to provide frequent updates to interested parties. See Appendix S-I: Summary Public Involvement Report for additional details of the public involvement efforts.

Project briefings were also provided to the Portland Planning and Sustainability Commission, the Historic Landmarks Commission and the Design Commission during the process. The project plans will undergo a formal public hearing process before the Portland Planning and Sustainability Commission, the Portland City Council and the Oregon Transportation Commission prior to adoption.

3. Existing Conditions: What We Started With

Phase I, Part 1: Establish Existing Conditions for Freeway and Local Transportation Issues

In order to understand, inventory and document the nature of transportation issues in the N/NE Quadrant during Phase I of the project, the project team undertook analysis of transportation facilities and conditions in the project area. This documentation included findings relative to all transportation modes using the I-5 freeway and local transportation network. This effort allowed the project team and the SAC to develop and evaluate potential solutions to address the issues and opportunities that were present. The findings of this effort were compiled in Appendix B: Transportation Existing Conditions Report. A summary of the findings is presented in this section.

Transportation Background: The Community

The varied landscape that today comprises the N/NE Quadrant is rooted in a vibrant history that spans over 150 years. Early development in this area focused on access to the Willamette River and included a river ferry linking downtown to Lower Albina at the foot of Russell Street as well as the extensive Albina railroad yards. What is now Lower Albina was incorporated as part of the City of Albina in 1887. That year also marked the opening of the original Morrison Bridge as the first Willamette River bridge crossing. The bridge spurred additional development along the east side of the river as a streetcar line was built running up Mississippi Avenue from the City of East Portland (incorporated in 1891). The riverfront in Lower Albina remains part of Portland's deep water port and remains industrial in character. Commercial development was located primarily along Russell Street and Williams Avenue. The southern portion of Albina was home to a vibrant jazz music scene focused along Williams Avenue.

Many of the fundamental characteristics of today's Lloyd District/Rose Quarter area came with the opening of the Lloyd Center mall and the Veterans Memorial Coliseum in 1960. The 1960s also brought the construction of the I-5 freeway cutting mostly north-south through the study area. The Lloyd Center mall and the redevelopment surrounding it has essentially created a second commercial and activity core within the Central City that was built at a more auto-oriented scale than downtown Portland.

The profound changes that construction of the Veterans Memorial Coliseum and I-5 freeway brought to the surrounding neighborhoods in the early 1960s understandably remain a sensitive issue. While the coliseum and freeway construction benefitted the desire for regional civic facilities and improved regional and state mobility, these improvements came with the displacement of residents and a commercial district that were the heart of Portland's African-American community. The impacts of these displacements continue to resonate with members of the community to this day and set an important context for any future improvements within the North/Northeast Quadrant.

Land-Use Context

Within the N/NE Quadrant, a number of broad primary use categories have been identified:

- Employment, office: 6-20 story development
- Mixed, commercial/residential: scale varies
- Residential: 2-6 story development
- Regional attraction: scale varies
- Employment, industrial: 1-3 story development

While the permissive Central Commercial (CX) zone pervades much of the N/NE Quadrant, roughly 32 acres of vacant or underutilized land currently exist. Figure 6 shows a considerable amount of underutilized land within the central Lloyd District area of the quadrant. Despite the relatively slow pace of development in the quadrant, some recent projects have leveraged the unique historic character of the quadrant and repurposed buildings that existed before freeway construction in the area. Figure 7 shows the Left Bank building where considerable private investment has rejuvenated one of the more significant buildings remaining from the period prior to construction of the coliseum and the freeway.



Figure 6: Underutilized Land Remains Available for Development in the N/NE Quadrant



Figure 7: Recent Investment in the Quadrant Exemplified by the Leftbank Building Renovation

Transportation Background

The N/NE Quadrant includes a range of existing transportation facilities including three Willamette River bridges, four light rail transit lines, the Eastside Esplanade pedestrian/bicycle path and three major freeway interchanges along I-5.

Transportation – The Role and Function of I-5

I-5 provides the main north-south through-route serving the west coast of the United States from Mexico to Canada and links population centers from Southern California, eastern portions of the Bay Area in Northern California, the Rogue Valley in Southern Oregon, the Willamette Valley, the Portland-Vancouver metropolitan area and the Puget Sound region. Within the N/NE Quadrant, I-5 connects with the western terminus of I-84, which is the east-west freeway for the state of Oregon. On the northern edge of the project study area, I-5 intersects with I-405 and the Fremont Bridge; I-405 acts as part of the downtown freeway loop on the western edge of downtown Portland.

I-5 is identified as part of the National Truck Network which designates highways (including most of the Interstate Highway System) for use by large trucks. In the Portland-Vancouver area, I-5 is the most critical component of this national network as it provides access to the transcontinental rail system, deep water shipping and barge traffic on the Columbia River, connections to the ports of Vancouver and Portland as well as the majority of the area's freight consolidation facilities and distribution terminals.

Freight volumes moved by truck to and from the region are projected to more than double over the next 25 years. Vehicle-hours of delay on truck routes in the Portland-Vancouver area are projected to increase by more than 90 percent over the next 20 years. Growing demand and congestion will result in increasing delay, costs and uncertainty for all businesses that rely on this corridor for freight movement.

Historic Traffic Volumes on I-5

Figure 8 shows historic traffic volumes on I-5 through central Portland spanning the time from when I-5 opened in 1966 through 2009. When I-5 opened in 1966 it carried an average of 60,000 vehicles per day in both directions. By the mid-1970s typical weekday traffic had increased to over 100,000 vehicles per day and to over 140,000 per day by the mid-1990s through the mid-2000s. Average daily volumes have been relatively flat for the past 15 years, with a recent decline to below 140,000 for 2008 and 2009. The decline in the past two years is likely attributable to reduced trips resulting from reduced economic activity. A similar reduction in average daily volumes can be seen during the recession years in the early- to mid-1980s.

Figure 9 shows that truck traffic on I-5 in Portland's Central City has increased at a higher rate than overall traffic. Daily truck volumes on I-5 at the Marquam Bridge averaged less than 6,000 per day from the late 1960s through the mid-1970s. During the 1990s truck volumes grew to nearly 10,000 per day and growth in the 2000s has increased average daily truck volumes to over 12,000 per day. The existing conditions analysis also revealed that a significant portion of I-5 and some local streets connecting with freeway ramp terminals were near capacity as indicated by volume-to-capacity ratios (V/C) between 0.81 and 0.99. A V/C ratio of 1.0 indicates that a transportation facility is at capacity for motor vehicles. Significant congestion typically occurs with the V/C ratios found on the freeway and local streets near the I-5 Broadway/Weidler Interchange.

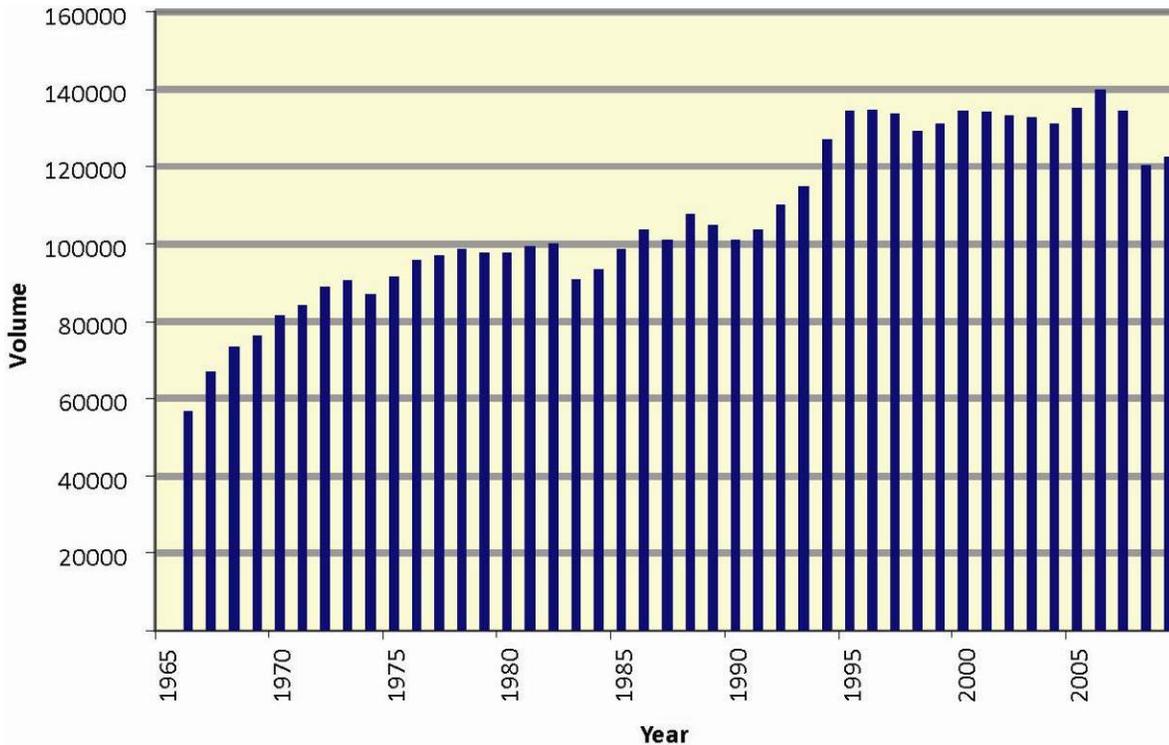


Figure 8: Historic Traffic Volumes on I-5 at Holladay Street (Average Daily Two-Way Traffic)

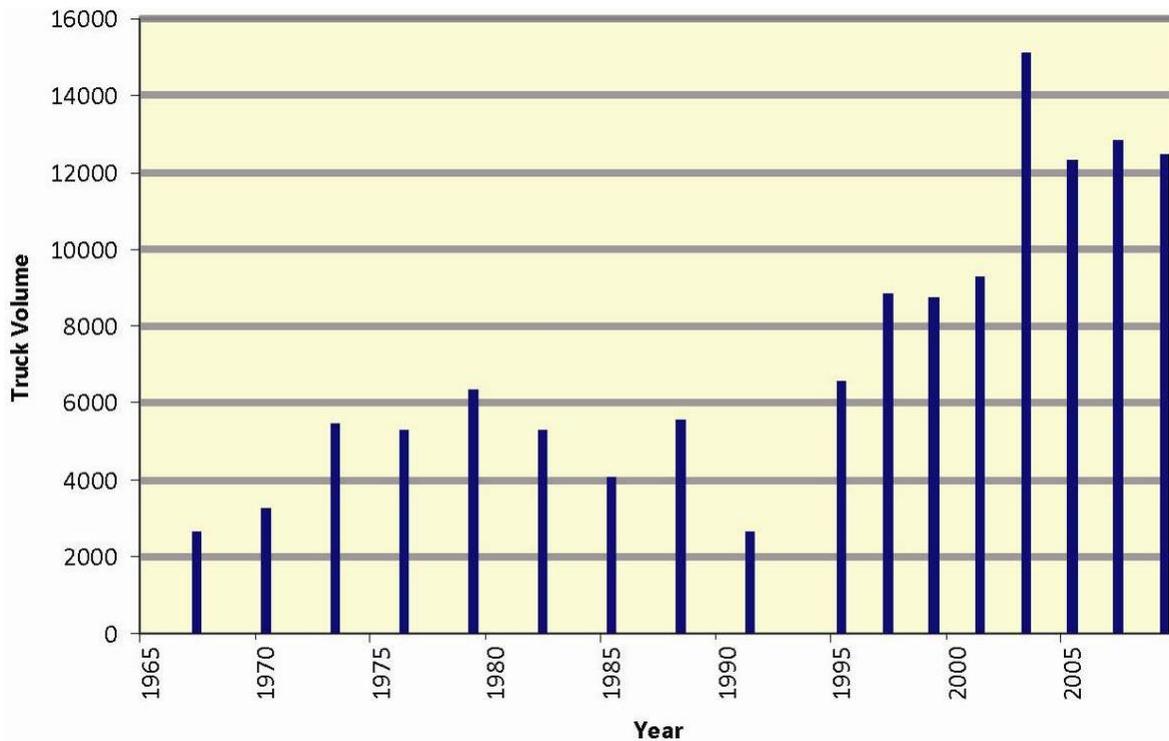


Figure 9: Historic Truck Volumes on I-5 at Marquam Bridge (Average Daily Two-Way Traffic)

I-5 Traffic Bottleneck and the Spreading of Peak Hour Congestion

In the context of the regional freeway network, the N/NE Quadrant sits at a crossroads of three regionally significant freight and commuter routes: I-5, I-84 to the south and I-405 to the north. As a result, the freeway interchanges within the N/NE Quadrant experience some of the highest traffic volumes found in the state. Table 2 shows the average daily traffic volumes entering and exiting I-5 over the two-mile segment within the N/NE Quadrant study area.

Table 2: Average Daily Traffic Volumes Entering and Exiting I-5 in the Study Area

I-5 Direction	Total Ramp Volumes Entering I-5	Total Ramp Volumes Exiting I-5
Northbound	29,970	37,530
	Includes entrance ramps from: <ul style="list-style-type: none"> • I-84 • Broadway/Williams Avenue 	Includes exit ramps to: <ul style="list-style-type: none"> • Weidler Street/Victoria Avenue • I-405 • Greeley Avenue
Southbound	34,020	47,200
	Includes entrance ramps from: <ul style="list-style-type: none"> • Greeley Avenue • I-405 • Wheeler/Winning/Williams 	Includes exit ramps to: <ul style="list-style-type: none"> • Broadway/Vancouver Avenue • I-84 • Morrison Bridge/Hwy 99E

Recent trends for I-5 traffic (no growth in daily traffic volumes and increasing truck traffic) are consistent with the volume data which indicate that the two through lanes for I-5 through central Portland are operating at capacity during peak hours. The congested conditions lead some users whose trips have flexibility to choose to travel earlier or later (which spreads congestion to both before and after typical peak traffic hours) or to use different travel routes. To the extent possible, major freight haulers in the area attempt to avoid operating on congested facilities in peak hours. Growth in peak period truck traffic on I-5 indicates that freight operations on I-5 during peak periods is required for various business reasons. Figure 10 represents traffic analysis that has shown that peak period congestion for I-5 in the N/NE Quadrant has been spreading beyond the typical peak traffic hours.

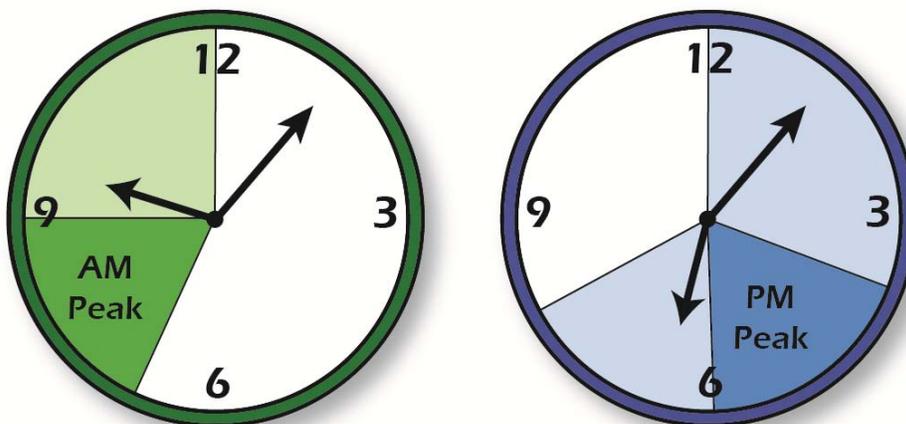


Figure 10: Peak Period Congestion on I-5 Spreading beyond Typical Peak Hours

Freeway Safety and High Frequency of Collisions

Freeway vehicle collisions within the N/NE Quadrant continue to be a major safety concern. Rear end collisions make up nearly three-quarters of all incidents on I-5, while sideswipe collisions comprise nearly one-fifth of incidents. While the severity of crashes, as indicated by the number of fatal accidents, is relatively low, incidents involving property damage and injury occur frequently within the quadrant and contribute to congestion on this segment of the freeway. This condition is exacerbated by the lack of emergency shoulders on this stretch of I-5.

Figure 11 shows the number of collisions on I-5 in the project study area and the rate of collisions per one-tenth mile segments. The figure shows that the highest frequency of collisions occurred in the southbound direction south of the I-5 Broadway/Weidler Interchange (156 collisions). The highest frequency of accidents northbound also occurred south of the I-5 Broadway/Weidler Interchange (122 collisions). Overall the southbound direction had a higher level of collisions over this five-year time period with 292, compared to northbound with 180 collisions. I-5 in the project area experiences the highest crash rate in the state of Oregon.

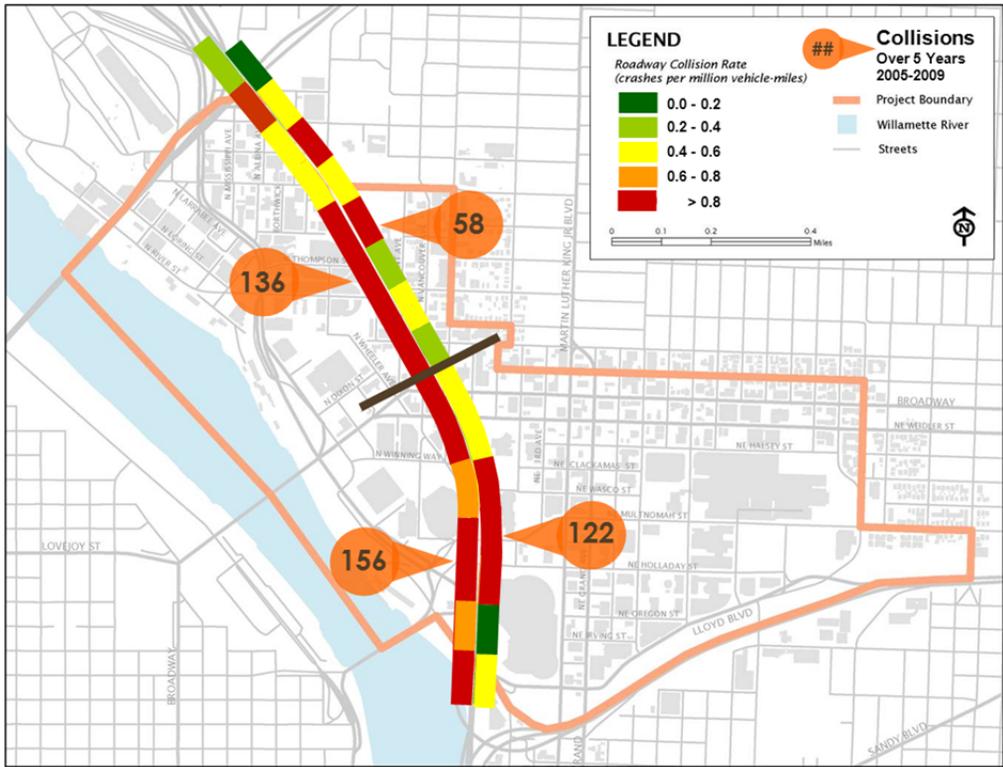


Figure 11: Freeway Collision Rate and Frequency

Weave Movements and Operational Issues

Over its nearly two-mile course through the N/NE Quadrant study area, I-5 connects with five entrance and exit ramps northbound and six entrance and exit ramps southbound. As drivers enter and exit I-5 at these closely-spaced intervals and weave with each other in lane-changing maneuvers, “turbulence” or “friction” occurs and slows overall traffic. Figure 12 illustrates the weave movements for vehicles entering and exiting the freeway.

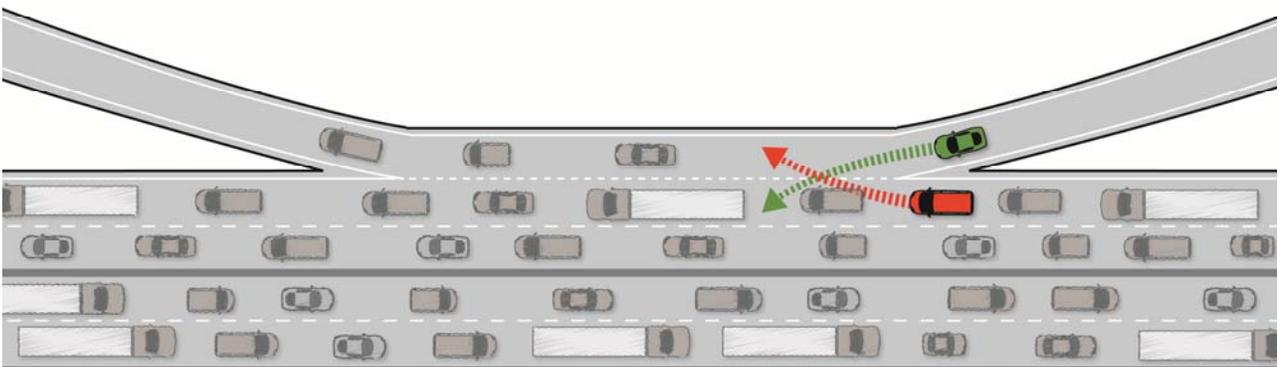


Figure 12: Weave Maneuvers from Entering and Exiting Traffic in Close Proximity

The turbulence in traffic flow caused by these weave maneuvers is especially acute in the N/NE Quadrant as drivers coming from entrance ramps or bound for exit ramps must make these lane changes within very short distances. This is especially true for the segment between the I-84 and I-405 interchanges as motorists use I-5 for overall through trips along I-5, for traveling between I-84 and I-405 and to access use the Broadway/Weidler Interchange for regional destinations like the Rose Garden Arena, the Veterans Memorial Coliseum, the Oregon Convention Center and the Lloyd Center mall.

Table 3 shows the distances between entrance and exit ramps on I-5 between interchanges where these weaves occur. Each of the distances noted for these weave transitions is well below current freeway design standards. In the shortest weave section, only 1,075 feet is available for drivers to merge onto I-5 from Broadway northbound in the same area where drivers are exiting from I-5 onto I-405 and the Fremont Bridge.

While the northbound Broadway to I-405 weave section is the shortest, it has the fewest accidents of the four weave sections associated with the interchange. This is due in part to this weave section having lower volumes and allowing two lanes the opportunity to access the I-405 exit ramp. The southbound Wheeler/Winning Way to I-84 weave section is somewhat longer at 1,300 feet, but it has the highest rate of crashes. This is due to higher overall volumes, higher volumes of vehicles making the conflicting weave movements and that all I-5 southbound traffic destined for I-84 must weave over into the single, outermost auxiliary lane.

Table 3: Weave Distances between Entrance and Exit Ramps in the Study Area

I-5 Direction	Weave Section	Weave Distance
Northbound		
	I-84 to Weidler	1,360 feet
	Broadway to I-405	1,075 feet
Southbound		
	I-405 to Broadway	2,060 feet
	Wheeler/Winning to I-84	1,300 feet

The slowing not only impacts the outer through traffic lane, where the weave movements are occurring for vehicles entering and exiting the freeway in this short section. As other drivers attempt to avoid the slowing in the outer through lane, they often attempt to move over to the second (and only other) through traffic lane. Drivers attempting to access the second lane to avoid the weave-related congestion, they encounter higher speed traffic. This significantly contributes to the high collision rates noted earlier and shown in Figure 11.

Transportation – The Local Street Network

The N/NE Quadrant contains a number of auto, transit, bicycle, pedestrian and freight connections of local and regional significance. The major city traffic streets serving the N/NE Quadrant include Broadway, Weidler Street, Grand Avenue, Martin Luther King Jr. Boulevard, Lloyd Boulevard and Interstate Avenue.

Bicycle Network Cross-Roads

As a major crossroads for bicycle traffic, the N/NE Quadrant was found to include some of the highest bicycle ridership in the city. Both the Broadway Bridge and the Steel Bridge provide critical routes for bicyclists into and out of the north downtown area. These bridge approaches concentrate traffic for all modes crossing the Willamette River including bicycle trips. Major east-west bicycle facilities extend east of the Broadway Bridge via Broadway and Weidler and east of the Steel Bridge via Multnomah and Lloyd Boulevard. Major north-south bicycle facilities extend north of the bridges via Wheeler, Flint, Vancouver and Williams. In 2011, the two highest-volume bicycle count locations in Portland were at the intersections of Vancouver and Russell (4,105) and Interstate Avenue and Lloyd Boulevard just east of the Steel Bridge (3,995).

Pedestrian Network and Safety

As an urban Central City area with multiple commercial and regional facilities, the N/NE Quadrant has a significant amount of pedestrian activity and yet it also faces a number of existing pedestrian mobility issues. Streets with high volumes of both vehicles and pedestrians, especially before and after events at the Rose Garden Arena, the Veterans Memorial Coliseum and the Oregon Convention Center, provide only minimal accommodations for pedestrians. Barriers, both physical and perceptual, created by the constrained or infrequent crossings of the freeway and high-traffic local streets, largely impede walking activity except when large events dictate no other choices for pedestrians.

A large volume of spectators accessing Rose Quarter events on the west side of I-5 park on the east side of the freeway and walk to the Rose Garden Arena and the Veterans Memorial Coliseum. The combination of large volumes of pedestrians, accessing and exiting the venues over a compressed time period, and the minimal pedestrian facilities available to them at the existing freeway crossings constitutes a significant safety hazard. These conditions are most acute on the Broadway and Weidler Street overcrossing structures built in the 1960s.

Pedestrian-Vehicle Collisions

The highest rates of pedestrian-vehicle collisions were found to occur east of I-5 focused along Multnomah Street, Grand Avenue and the Broadway/Weidler Street/15th Avenue area. The majority of the incidents occurred east of Martin Luther King Jr. Boulevard in the vicinity of the Lloyd Center mall.

Of the two pedestrian fatalities within the study area during the study period, the one in closest proximity to the interchange area was located at the high pedestrian activity intersection of Multnomah Street/Wheeler Street. Pedestrian use is heavy here due to its proximity to the Rose Garden Transit Center, the Rose Garden Arena, the Veterans Memorial Coliseum, and close access to the Steel Bridge and the Eastbank Esplanade.



Figure 14: Major Pedestrian Movements

Pedestrian facilities within the N/NE Quadrant included the following functional classifications:

- Pedestrian Districts – Give priority to pedestrian access in areas of high pedestrian activity
- Pedestrian-Transit Streets – Create a strong and visible relationship between pedestrians and transit
- City Walkways – Provide safe, convenient, and attractive pedestrian access to activities along major streets; provide connections between neighborhoods; and provide access to transit
- Off-Street Paths – Serve recreational and other walking trips
- Local service Walkways – Serve local circulation needs for pedestrians

The majority of the streets within the study area are within designated Pedestrian Districts. The Steel Bridge, Interstate Avenue, and Holladay Street are designated as Pedestrian-Transit Streets; the Broadway Bridge, Broadway, Weidler Street, Martin Luther King Jr. Boulevard, Multnomah Street, 7th Avenue and 9th Avenue are designated as City Walkways. Finally, the Eastbank Esplanade along the east side of the Willamette River is designated as an Off-Street Path. Figure 14 shows the major pedestrian movements nearest the interchange area.

Access to Lower Albina and Freight Uses

Within the N/NE Quadrant, Lower Albina is a designated Freight District bounded by River Street, Knott Street, Interstate Avenue, and Albina Avenue. Mainly zoned for industrial uses, Lower Albina supports a wide range of both new and older industrial businesses.

Freight facilities within the N/NE Quadrant fall within the following functional classifications:

- Freight Districts – Provide safe and convenient truck mobility and access in industrial and employment areas
- Regional Truckways – Facilitate interregional movement of freight
- Priority Truck Streets – Serve as the primary route for access and circulation in Freight Districts, and between Freight Districts and Regional Truckways
- Major Truck Streets – Serve as principle routes for trucks in a Transportation District
- Truck Access Streets – Serve as access and circulation routes for delivery of goods and services to commercial and employment neighborhoods
- Local Service Truck Streets – Serve local truck circulation and access
- Railroad Main Lines – Transport freight cargo and passengers over long distances
- Railroad Branch Lines – Transport freight cargo over short distances on local rail lines

Regional Truckways are designated along the Fremont Bridge, I-405, I-5, and I-84. Priority Truck Streets are designated along Interstate Avenue and Tillamook Street near the Lower Albina Freight District. Major Truck Streets include Interstate Avenue and Larrabee Avenue between Tillamook Street and the Steel Bridge; along Broadway and Weidler from the Steel Bridge to Grand Avenue; and along Martin Luther King Jr Boulevard and Grand Avenue. The majority of the remaining street network is designated as Truck Access Streets and Local Service Truck Streets.

Local Street Conditions for Motor Vehicles

Similar to the freeway data collection, daily volumes were collected on specific corridors within the study area to get a better understanding of the flow of motor vehicles over the course of a day. This helped to identify the more heavily utilized corridors in the study area, as well as when peak periods might occur on those corridors.

The Broadway/Weidler street couplet in the study area serves multiple functions to connect east-west with the Broadway Bridge, to provide access to the Broadway/Weidler commercial corridor near the Lloyd Center, to provide access to multiple regional destinations in the study area and to distribute vehicles to and from the I-5 Broadway/Weidler Interchange. It is not surprising then that analysis of traffic volumes found that the highest level of activity on study area corridors occurred at Broadway and near I-5 with approximately 30,800 daily trips. Though smaller in volumes, the Vancouver/Williams couplet forms a critical north-south link within the study area. And both of these couplets converge at the I-5 Broadway/Weidler Interchange.

The intersection of these high traffic streets occurs within the interchange area at six intersections known to transportation engineers and planners as “the Box” (shown in Figure 15). The top three ranked collision intersections in the N/NE Quadrant are all located in the Box. They are:

- Weidler Street at Vancouver Avenue
- Broadway at Vancouver Avenue
- Broadway at Williams Avenue

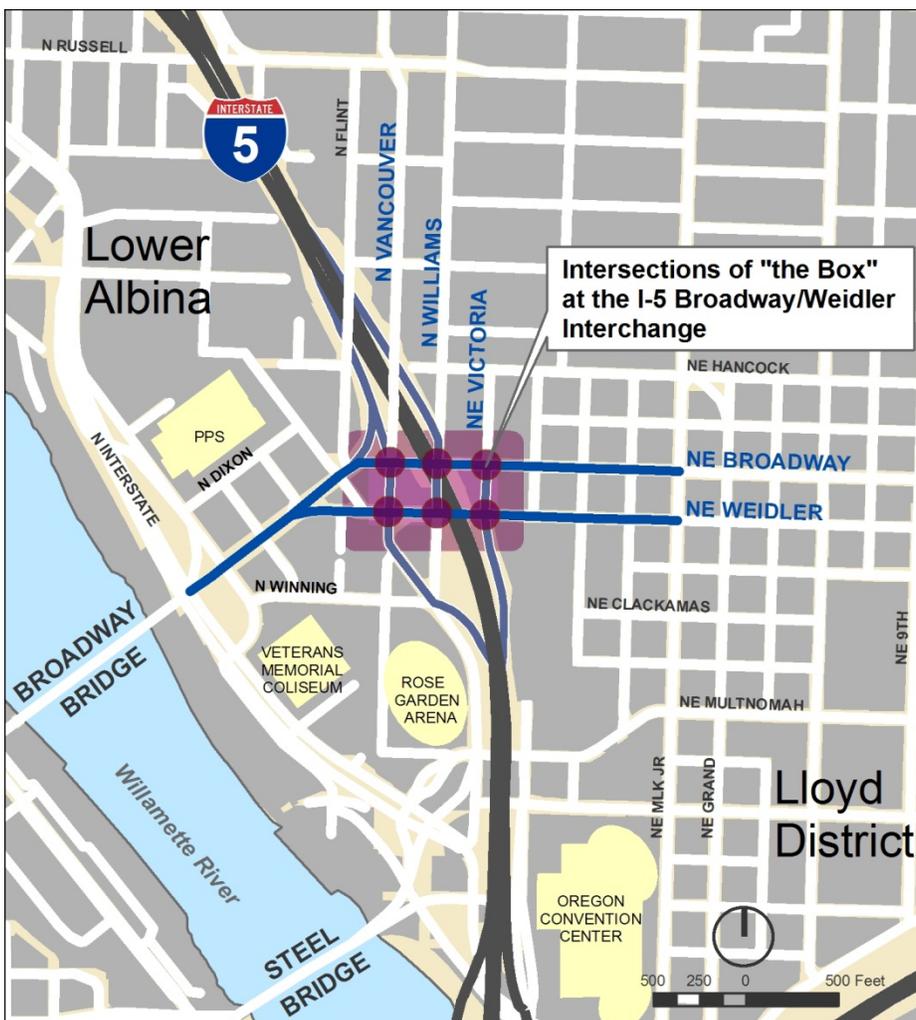


Figure 15: Constrained Intersections in the Area Known as “the Box”

Regional Destinations

The N/NE Quadrant with its mix of residential, industrial, office, and event space, draws visitors from around the Portland region. Regional destinations in the N/NE Quadrant include the Rose Garden Arena and the Veterans Memorial Coliseum, the Oregon Convention Center, the Lloyd Center mall, the Lower Albina Industrial District, government centers along Lloyd Boulevard (Metro, State of Oregon and Bonneville Power Administration offices) and commercial office towers along 7th and 9th Avenues. Figure 16 highlights the regional destinations within the study area.



Figure 16: Major Regional Destinations

Transit

The N/NE Quadrant is well-served by transit and the distribution of the routes provides sufficient geographic coverage so that many users in the quadrant walk relatively short distances (typically less than 500 feet) to access a transit line.

Transit service is provided in the N/NE Quadrant via ten bus routes and four MAX light rail lines: the Red, Blue, Green and Yellow lines. Transit is focused along the major corridors serving Broadway, Weidler Street, Martin Luther King Jr. Boulevard, Multnomah Street, Interstate Avenue, Vancouver Avenue, Williams Avenue, 9th Avenue and 15th Avenue. Within this immediate area, the following bus lines access the study area:

- Route 4 – Division/Fessenden
- Route 6 – Martin Luther King Jr Blvd
- Route 8 – Jackson Park/NE 15th
- Route 9 – Powell/Broadway
- Route 35 – Macadam/Greeley
- Route 44 – Capitol Hwy/Mocks Crest
- Route 70 – 12th Ave
- Route 73 – NE 33rd Ave
- Route 77 – Broadway/Halsey
- Route 85 – Swan Island

Corridors with the heaviest transit on/off patronage are along the MAX lines with the east/west corridor along Holladay Street (due to three MAX routes serving this corridor). Bus on/off patronage is highest in the study area along the Martin Luther King Jr. Boulevard/Grand Avenue couplet, the Broadway/Weidler couplet, and on Multnomah Street near the Lloyd Center.

In the area around the Box, existing bus routes use Broadway and Weidler Street for east-west operations and use Vancouver Avenue and Williams Avenue for north-south operations. The extension of the Portland Streetcar from northwest Portland across the Broadway Bridge to the Lloyd District, the Oregon Convention Center and down to the Oregon Museum of Science and Industry will operate along Broadway and Weidler Street beginning in September 2012. For the community, the City and other key stakeholders like TriMet, direct access to and from the Rose Quarter Transit Center (Rose Quarter TC) added emphasis on ensuring that north-south connectivity on the Vancouver/Williams couplet was maintained.

Connectivity

Although the City and the community wish to see additional development and improved urban design characteristics in the study area as it evolves toward becoming a more vibrant Central City complement to downtown Portland, it lacks frequent and welcoming connections across the I-5 freeway. For nearly a mile (0.8 mile) between Multnomah Street and Russell Street, the only connections across the freeway, in a critical area of the Rose Quarter and the Lloyd District, are the streets of the Box area (via Broadway, Weidler Street and Williams Avenue). In addition to the constrained sidewalks and bicycle facilities, these streets, especially Broadway and Weidler Street, further discourage non-vehicular travel due to their heavy traffic volumes associated with both arterial traffic and freeway interchange traffic. Figure 17 notes the limited opportunities to cross the freeway between Multnomah Street and Russell Street except within the constrained Box area.



Figure 17: Limited Number of Existing Crossings of the I-5 Freeway

The Environment and Cultural Resources

An Environmental Baseline Report (Appendix I) was prepared to provide an inventory of physical and cultural environmental features that should be considered during the development of interchange improvement concepts. This assessment did not consider the potential for site specific impacts but rather it identified the environmental conditions and constraints to consider when developing and evaluating the improvement concepts. The report also identified certain environmental elements that should be pursued further during the next study phase which will include completing an analysis that addresses compliance with the National Environmental Policy Act (NEPA).

The following summarizes the findings from the Environmental Baseline Report and describes issues to be considered during subsequent analyses.

- **Air Quality** – The traffic analysis prepared for both the freeway mainline and the local street system indicates that queuing is likely to be reduced compared with existing conditions and would likely not have a negative air quality impact. Some intersections will likely require a “hot spot” analysis during the NEPA phase to measure potential CO impacts.
- **Archaeology** – Background research found limited information on archaeological resources in the project area. However, the project location near the Willamette River indicates that a cultural resources investigation would likely be required during the NEPA phase.
- **Biology** – The assessment did not identify any biological resources directly at risk. However, construction noise and vibration could be a source of disturbance for certain bird species in the general area and should be addressed during the NEPA phase.
- **Hazardous Materials** – There are potentially hazardous sites in the vicinity of the reconfigured I-5 Broadway/Weidler Interchange that may require soil testing prior to excavation.
- **Historic** – The Bekins Building (407 N Broadway) and the Veterans Memorial Coliseum are on the Federal Register of Historic Places. Two other buildings in the immediate interchange study area (the Leftbank Building and the Paramount Apartments) have previously been determined to be eligible for the Federal Register. Additional historic analysis will be required during the NEPA phase. In addition to the assessment of the Federal Register status, the Environmental Baseline Report included structures identified in the Bosco-Milligan Foundation’s *Cornerstones of Community: Building of Portland’s African American History*.
- **Noise** – The Environmental Baseline Report included an inventory of potential noise sensitive facilities. A noise analysis will be conducted during the NEPA phase and the potential for noise mitigation through design will be considered.
- **Water Quality and Hydrology** – The majority of the I-5 facility in this area drains to a separated storm sewer, while the local streets in the area drain to a combined sewer overflow. Stormwater improvements associated with a project in this area would represent an improvement over existing conditions and would comply with current regulatory standards.
- **Wetlands** – No wetlands were identified in the immediate area of the interchange improvements.
- **Geology** – No specific geological issues were identified in the study area.
- **Socio-Economic and Environmental Justice** – The study area has a slightly higher percentage of individuals below the poverty level than the city as a whole and has a median income slightly lower than the city overall. I-5 currently bisects neighborhoods in this area and provides only a limited number of existing crossing facilities. The Broadway/Weidler couplet provides the only east-west crossing of the freeway between Multnomah Street and Russell Street.

The Environmental Baseline Report did not identify any environmental issues that would clearly limit the ability to design and implement interchange improvement concepts. However, there are several issues that merit the additional, detailed analysis that will be completed as part of the NEPA phase.

4. Developing and Narrowing the Concepts

Phase I, Part 2: Establish Project Goals and Objectives

Phase II: Develop Concepts for Freeway and Local Transportation Issues

The Concepts: from Project Goals and 70+ Ideas to a Recommended Concept

In order to address the freeway and local transportation issues in the Rose Quarter, the project team undertook establishing the existing conditions and issues for the freeway and local transportation network in the Rose Quarter as noted in Section 3. Based on these understandings, the project team and the SAC established the project purpose and goals for the project at the SAC meeting in January 2011. The project purpose, the transportation needs for the project and the project goals are documented below.

Project Purpose

The purpose of the transportation elements of this project is to address the need to improve safety and operations on I-5 in the vicinity of the I-5 Broadway/Weidler Interchange, support the goals of the N/NE Quadrant and serve the mobility needs of the region and state in a manner consistent with the overall goals and policies of the city, region and state.

The aim of the overall project is to integrate land use, urban design, and transportation strategies, policies and plans for the N/NE Quadrant and the I-5 Broadway/Weidler Interchange that balance, complement, enhance, protect, respect, revitalize, support, and sustain economic, environmental, and social interests.

Transportation Issues to Address

The identified transportation issues for the project to address and improve, specifically from the freeway and local transportation improvements perspective, are demonstrated by the following deficiencies.

Safety Issues on I-5 Freeway

- I-5 in the project area experiences the highest crash rate in the state of Oregon.
- In the project area, I-5 lacks standard safety shoulders in both northbound and southbound directions.
- In the project area, the distances between interchanges are far below standards.
- In the project area, the distances provided for weave movements are far below standards.

Congestion on I-5 Freeway

- In the project area, congestion and delays to motorists and freight commerce occur on the most critical north-south link in the region and the state.
- In the project area, the effects of congestion are spreading from morning and afternoon peak hours to off-peak hours throughout the day

Substandard Interface between I-5 Freeway and Local Streets

- The I-5 Broadway/Weidler Interchange configuration is not typical interchange layout and therefore can be difficult to navigate for motorists unfamiliar with the interchange area.
- The congested and substandard Broadway/Weidler overcrossings of the I-5 freeway currently provide the only east-west multimodal connections for 4,150 feet (0.8 mile) from Multnomah Boulevard to the south and Russell Street to the north within a growing urban district of the central city.

Substandard Local Street Network Connecting near the Freeway Interchange Area

- All transportation users, regardless of mode, along Broadway/Weidler and the surrounding interchange area suffer from the concentration of traffic in the area often referred to as “the Box” (i.e., the six intersections along Broadway and Weidler where all the primary east-west traffic they carry in the district intersect with the significant north-south traffic of Vancouver and Williams and all the traffic coming from or accessing the I-5 Broadway/Weidler Interchange).

Significant Additional Benefits of the Project

Several significant additional benefits are expected to be gained as a result of the project but were not necessarily considered the primary rationale for it. The following significant additional benefits are expected to be realized from the I-5 Broadway/Weidler Interchange Plan as noted below.

Seismic Upgrades to the Overcrossing Structures of I-5

- Reconstruction of the crossing structures over I-5 in the Rose Quarter (i.e., the Broadway, Weidler, Williams and Vancouver structures) would bring these overcrossings up to current seismic design standards. These structures provide access to two major bridges (the Broadway and Steel Bridges) and to the regional freeway network of I-5, I-405 and I-84.

Multimodal Upgrades to Broadway/Weidler/Williams/Vancouver

- Reconstruction of the crossing structures over I-5 in the Rose Quarter (i.e., the Broadway, Weidler, Williams and Vancouver structures) would facilitate upgrading the pedestrian and bicycle facilities on these critical overcrossings. These structures provide the primary north-south and east-west circulation for pedestrians, bicyclists and transit to traverse the freeway and the primary multimodal connection between the Lloyd District to the east and the Rose Quarter to the west.

Improved Freeway Facilities and Local Transportation Improvements Support the Land Use and Urban Design Elements of the N/NE Quadrant Plan

- In addition to facilitating rerouting of existing traffic movements during project construction, the incorporation of a “lid” structure over the freeway in the Broadway/Weidler/Williams area would provide opportunities for development or open space once construction concluded. These opportunities were identified as part of the land use/urban design analysis.
- By moving some of the freeway-bound traffic from existing bottlenecks in the “box” area, traffic volumes could be better balanced on the local street network.
- Reconstruction of the crossing structures over I-5, and the resulting improvements to pedestrian and bicycle facilities, also better facilitate the land uses and urban design characteristics envisioned by the City’s N/NE Quadrant Plan. This plan, with its aspirations for a greater mix of land uses, greater intensity of development and fewer per capita auto trips, relies on the improved connectivity that the Recommended Concept provides.
- New overcrossings at Hancock/Dixon (pedestrians, bicycles and autos) and at Clackamas (pedestrians and bicycles only) would provide greater access and route alternatives to the now-congested “box” area of Broadway/Weidler between Flint Avenue and Victoria Avenue.

Goals and Objectives

In part because the I-5 Broadway/Weidler Interchange Plan is part of a larger, joint effort with City of Portland to also develop a land use and urban design plan for the N/NE Quadrant (the N/NE Quadrant Plan of the 2035 Central City), the goals and objectives for the overall project go beyond those typical for a transportation project. The overall project goals and objectives, as developed and approved by the SAC, that were used to develop, analyze and prioritize elements of the plan are described below.

1. A diverse mix of commercial, cultural, entertainment, industrial, recreational and residential uses, including affordable housing:

- a. Provide opportunities for a variety of desired land uses in the quadrant and its subdistricts.
- b. Foster distinct and complementary subarea identities within the quadrant.
- c. Encourage uses that complement regional facilities including the Rose Garden, the Veterans Memorial Coliseum, the Oregon Convention Center and the Lloyd Center, while seeking to balance the episodic nature of these attractions with additional activities.
- d. Increase residential density and improve jobs to housing ratio in the quadrant.
- e. Increase affordable housing close to multimodal transportation systems and other appropriate locations.
- f. Preserve existing housing in the quadrant.
 - Consider the impacts of proposed freeway interchange improvements on nearby residential dwelling-including land use and zoning impacts.
- g. Provide open space, parks and recreation opportunities.
- h. Provide access and highlight the quadrant's relationship to the Willamette River

2. Economic development that supports existing and new business opportunities and more job creation, especially those paying family wages:

- a. Create opportunities for new employment and a variety of employment types and levels.
- b. Maintain or increase development potential where appropriate, e.g. through zoning, infrastructure and creation of new parcels.
- c. Foster increase in future high density commercial development in appropriate locations while supporting and encouraging industrial activities in current industrial areas.
- d. Retain and support existing and local businesses in the quadrant.
- e. Support and strengthen the retail environment.

3. Enhanced fish and wildlife habitat, increased access to nature, and a sustainable built environment:

- a. Create opportunities for new strategically located parks and open space.
- b. Maintain and create new access points to the river.
- c. Enhance and create new fish and wildlife habitat, tree canopy, and green infrastructure in appropriate locations.
- d. Support sustainable development goals and practices, including understanding and impacts of the Lloyd Eco-District.

4. Infrastructure for healthy, livable, safe and vibrant communities (e.g. open space and parks, river access, schools, etc.) that respects and complements adjacent neighborhoods:

- a. Create sensitive transitions between the more highly urban Central City and adjacent residential neighborhoods.
- b. Foster concepts that support high-density development in the Lloyd District in appropriate locations and minimize their impacts on adjacent neighborhoods-Eliot, Irvington, and Sullivan's Gulch.
- c. Provide for amenities and services, such as parks, schools and connections, at a level appropriate to support the type and intensity of development proposed.

5. A full multimodal transportation system that addresses present and future transportation access and needs, both locally and on the freeway system:

- a. Improve multimodal transportation accessibility and connectivity within and through the quadrant (e.g. via new or improved connections across freeway and in the district)
- b. Encourage the use of transportation modes other than single occupancy vehicles to reduce auto emissions and vehicle miles traveled.
- c. Improve circulation for all modes in the Rose Quarter Transit Center.
- d. Accommodate present and future multimodal access needs of the quadrant
- e. Improve freight access from freeway and railroads to industrial areas and major destinations.
- f. Increase safety within the quadrant for all modes.
- g. Provide a street hierarchy system that supports the quadrant's desired urban form, land use and livability goals.
- h. Provide parking and transportation demand management strategies that better support the needs of the quadrant.
- i. Support the ODOT High Speed Rail study, including analysis of alternative routes and station locations from existing rail facilities.

6. Improve the local circulation system for safe access for all transportation modes within the quadrant and at freeway interchanges:

- a. Provide affordable, reliable, time saving and effective range of multimodal transportation solutions.
- b. Connect regional trail system via local pedestrian and bicycle network.
- c. Improve freeway operations for transit (C-TRAN), freight and auto.
- d. Improve local access across freeways and rail crossings via improved, safer crossings and additional separated facilities for cars, pedestrians and cyclists.
- e. Improve access to transit for residents, employees and visitors.
- f. Seek to significantly reduce accident potential.
- g. Minimize local land use impacts of transportation infrastructure.
- h. Improve rail operations for freight and passengers.

7. Equitable access to community amenities and economic opportunities:

- a. Avoid/minimize/mitigate involuntary displacement of quadrant residents, businesses and jobs.
- b. Provide for a broad array of employment types and encourage living-wage jobs.
- c. Provide for diversity of housing types that meets the needs of all income-levels and a variety of household types and lifestyles.
- d. Provide for amenities and services, such as parks, natural areas, schools and connections, at a level appropriate to support the type and intensity of development proposed.
- e. Increase the capacity of existing residents and business owners to share in the benefits from growth in the quadrant.
- f. Ensure that the plan compliments economic development and housing strategies to build capacity for existing area residents and businesses.
- g. Ensure that infrastructure improvement do not have disproportionate public health impacts.
- h. Ensure that plan proposals address the needs of local residents and businesses while recognizing the importance of the quadrant's region-serving facilities and infrastructure.
- i. Ensure the plan broadly supports the equity objectives established through the Portland Plan process.

8. Protection and enhancement of the cultural heritage of the area and its sub-districts:

- a. Preserve, enhance and celebrate historic and cultural resources.
- b. Avoid/minimize/mitigate demolition of historic and cultural resources.
- c. Avoid or minimize adverse impacts on cultural or high priority community sites.

9. Develop an implementable improvement plan:

- a. Ensure plan proposals are reasonable and implementable.
- b. Ensure capital costs are within project limits.
- c. Ensure plan proposals are consistent with relevant adopted local, regional and state land use and transportation goals and policies.
- d. Ensure plan concepts and proposals are consistent with relevant goals and objectives of the Portland Plan and Central City 2035 processes.

10. Improve urban design conditions:

- a. Ensure that the freeway and local street improvements support the urban design objectives of the overall N/NE Quadrant Plan.

The project considered how each of the transportation concepts developed and analyzed would accomplish the above goals. Specific freeway and local transportation evaluation criteria and measures were developed where applicable and are listed in the following subsection, Evaluation Criteria.

Evaluation Criteria

After the goals and objectives were established, project staff and the SAC worked to develop corresponding evaluation criteria to measure how well various concepts were addressing the goals. The following evaluation criteria were considered by the SAC at its meeting on July 28, 2011. The SAC largely supported the staff-recommended evaluation criteria at this meeting but additional fine tuning on the criteria occurred via additional correspondence with SAC members in August 2011. Table 4 summarizes the final evaluation criteria that were used in Phase III for evaluating the transportation concepts.

The column on the right contains evaluation criteria specific to the freeway interchange and related local transportation interface elements of the project. Each evaluation criterion is tied to one or more goal or objective. They are generally more specific or quantitative than the objectives and are tailored to the infrastructure project characteristics of the freeway planning elements.

Please see Appendix O: Phase III Evaluation Criteria for a detailed list of the corresponding evaluation measures that were used to analyze the concepts in Phase III. The results of this analysis are shown in Appendix P: Phase III Evaluation Worksheet and Supporting Documents.

Table 4: Evaluation Criteria for Evaluating Interchange Improvement Concepts in Phase III

Project Goals	Evaluation Criteria for Interchange Improvements
1. A diverse mix of commercial, cultural, entertainment, industrial, recreational and residential uses, including affordable housing.	<ul style="list-style-type: none"> • Minimize the need to purchase property for right-of-way. • Minimize residential units displaced and impacts to existing residential development.
2. Economic development that supports existing and new business opportunities and more job creation, especially those paying family wages.	<ul style="list-style-type: none"> • Minimize businesses displaced and impacts to existing businesses.
3. Enhanced fish and wildlife habitat, increased access to nature, and a sustainable built environment.	<ul style="list-style-type: none"> • Improve local connectivity. • Enhance the street tree canopy. • Reduce storm water run-off and energy use.
4. Infrastructure for healthy, livable, safe and vibrant communities (e.g. open space and parks, river access, schools, etc.) that respects and complements adjacent neighborhoods.	(Covered by other criteria relative to Goals 5 and 6.)
5. A full multimodal transportation system that addresses present and future transportation access and needs, both locally and on the freeway system	<ul style="list-style-type: none"> • Improve pedestrian and bicycle infrastructure and minimize pedestrian and bicycle conflicts with motor vehicles. • Identify and address system-wide transportation impacts of proposed interchange improvements on traffic diversion, local access and circulation, transit operations, freight movement and on land uses. • Reduce auto use and emissions. • Improve freeway safety.
6. Improve the local circulation system for safe access for all transportation modes within the quadrant and at freeway interchanges.	<ul style="list-style-type: none"> • Improve local circulation and freeway crossing opportunities. • Improve weaving conditions and through-traffic performance on the freeway near the I-5 Broadway/Weidler Interchange. • Lower likelihood of collisions on I-5 between Broadway and I-84. • Minimize construction impacts on land uses and transportation network and transit operations.
7. Equitable access to community amenities and economic opportunities.	<ul style="list-style-type: none"> • Minimize negative impacts to access, circulation and parking for major destinations/facilities and events.
8. Protection and enhancement of the cultural heritage of the area and its sub-districts.	<ul style="list-style-type: none"> • Minimize impacts to existing historic and culturally significant structures and high-priority community sites. • Minimize negative traffic pattern changes in residential neighborhoods.
9. Develop an implementable improvement plan.	<ul style="list-style-type: none"> • Estimate costs of improvements to the I-5 Broadway/Weidler Interchange and related local transportation improvements.
10. Improve urban design conditions.	<ul style="list-style-type: none"> • Improve connections between complementary land uses and major destinations. • Optimize development and open space opportunities.

70+ Concepts and Ideas – Identifying Concepts

In conjunction with the project’s Stakeholder Advisory Committee (SAC), the city hosted a land use, local transportation and urban design charrette in February 2011. This charrette process resulted in ideas for an evolving land use, urban design vision for the N/NE Quadrant.

In April 2011, ODOT hosted a charrette that focused on transportation improvements to I-5 and the surrounding local transportation system. Since this charrette was focused on specific ideas for improving freeway operations and safety and the local street network, it had a more technical tone than the prior land use/urban design charrette which had resulted in ideas for a broad vision. Similar to the earlier charrette, the transportation charrette was implemented in conjunction with the SAC and included the following steps:

- March 30, 2011 – SAC work session that provided context and elicited ideas on freeway operations, ramp locations, interchange function, overcrossings and a range of other local and freeway transportation improvements.
- April 11, 2011 – Public work session, similar to the March 30th SAC work session, which generated additional ideas on a range of improvements.
- April 12, 2011 – Staff work session which processed ideas received from the earlier sessions. Included a midday public check-in period.
- April 13, 2011 – Additional staff work session which further refined 6 specific concepts for freeway improvements and reported to a public open house that evening.

Phase II

Develop Concepts

70+

Ideas Generated

**Freeway/Local Transportation
Interface Charrette**

More than 70 overall concepts and concept elements (individual components of an overall concept) were received from the SAC and the public during the transportation charrette process. Each of these concepts and elements were compiled and organized in a master matrix so that they could be grouped and sorted according to similar elements and so their characteristics could be noted. See Appendix G: Freeway Charrette Concepts Matrix for the details of the concepts generated. Figure 18 shows charrette participants sorting through the transportation issues and developing concepts while Figure 19 shows some of the early charrette sketches.

Concepts and Elements

In order to manage and describe the various components included in the wide range of ideas received during the transportation charrette, terminology was developed to provide consistency. Two key terms used were “concepts” and “elements.” *Concepts* referred to ideas that included a group of ideas that defined all of the key elements that were needed to make an idea work for the freeway and local transportation system. *Elements* referred to the individual building block ideas that comprised overall or complete concepts. Elements included things such as specific ramp and crossing locations, interchange location, interchange type, braided ramps, etc. One concept would have likely included several different elements.

Concepts for Further Study

Since many of the more than 70 concepts and ideas included common or very similar elements, the concepts were grouped and sorted by major common elements so that they could be evaluated for addressing the project goals and objectives and by their performance, costs, impacts, etc.

Range of Concepts

The broad array of concepts ranged from doing nothing (2035 No-Build) to operational improvements on the freeway (such as adding safety shoulders, braiding exit and entrance ramps, and extending auxiliary lanes) to new interchange types that would be new to the Portland area (such as a roundabout-controlled diamond interchange or a diverging-diamond interchange). Some concepts also included de-coupling either the Broadway/Weidler or Vancouver/Williams couplets in order to simplify the interchange configuration.



Figure 18: Participants Developing Improvement Concepts at the Freeway/Local Transportation Interface Charrette (April 2011)



Figure 19: Early Concept Sketches from the Freeway/Local Transportation Interface Charrette

Table 5 shows how the concepts were grouped into categories with similar concepts and elements so that they could be analyzed for addressing the project goals and objectives and by their performance, costs and impacts. This process and the concept categories were supported by the SAC at its meeting on May 26, 2011. After the May SAC meeting, project staff recommended including a sixth category of Concepts for Further Study: Transportation System Management (TSM)/Transportation Demand Management (TDM)/Operations Management. The SAC supported adding the TSM/TDM/Operations Management category in June.

Table 5: Concept Categories for Further Study from the Freeway/Local Transportation Interface Charrette (April - June 2011)

Concept Categories	Attributes or Notes
1. 2035 No-Build	Allows for a baseline comparison
2. Mainline Operational Improvements to Freeway	This category of operational improvements was intended to avoid replacing the five main structures over the freeway
3. Rebuild the Structures over the Freeway	This category would include operational improvements that would require replacing the five main structures over the freeway
4. Enhance the Broadway/Weidler Interchange	
5. New Concepts for the Broadway/Weidler Interchange	
6. Transportation System Management/ Transportation Demand Management	The TSM/TDM/Operations Management category was added by the project team and approved by the SAC in June 2011

There were many consistent improvement elements that were generated by or submitted subsequent to the charrette work sessions. Table 6 summarizes the major individual elements recommended to be considered for inclusion in the complete concepts.

Table 6: Major Elements for Further Study from the Freeway/Local Transportation Interface Charrette (April 2011)

Area	Major Elements for Further Study	Element Options
Freeway	1. Add Freeway Crossings	<ul style="list-style-type: none"> • Pedestrian/bicycle only • Pedestrian/bicycle/vehicle
	2. Remove Freeway Crossings	
	3. Add Collection/Distributor (C/D) Roads	
	4. Add Braided Ramps	
	5. Change Ramp Layouts or Locations	
Local Transportation	6. De-Couple Existing Couplets	<ul style="list-style-type: none"> • Broadway/Weidler • Vancouver/Williams
	7. Local Street Changes	
	8. Pedestrian/Bicycle Changes	

Elements Not Recommended for Further Analysis in Phase II, Step 1 Screen

Certain elements that were included in the submitted concepts were not recommended to be studied further because they were either out of the adopted project scope and purpose, would reduce the lengths of the weaving sections on I-5 or they required heroic engineering that would not be feasible or would be very costly. Table 7 provides a summary of the elements that were not recommended to be studied further.

Table 7: Elements Dropped from Further Study after Phase II Screening, Step 1 (May 2011)

Element Dropped from Further Study	Rationale for Not Studying Further
1. Remove I-5	<ul style="list-style-type: none"> Beyond the scope of this project
2. Move Interchange North	<ul style="list-style-type: none"> Beyond the scope of this project Would significantly reduce lengths of weaving distances on I-5
3. Move Interchange South	<ul style="list-style-type: none"> Beyond scope of this project Would significantly reduce lengths of weaving distances on I-5
4. Double Deck I-5 through Quadrant	<ul style="list-style-type: none"> Beyond the scope of this project
5. Initiate New Water Taxi/Ferry Service	<ul style="list-style-type: none"> Beyond the scope of this project
6. Build New Bridge over Willamette River	<ul style="list-style-type: none"> Beyond the scope of this project
7. Build Braided Ramps North of Broadway/Weidler Interchange	<ul style="list-style-type: none"> Not suggested in charrette
8. Widen I-405 Freeway	<ul style="list-style-type: none"> Beyond the scope of this project
9. Make Changes to I-5/I-405 Freeway Loop	<ul style="list-style-type: none"> Beyond the scope of this project

Appendix H: Freeway/Local Transportation Interface: Charrette Summary includes a summary of the outcomes of the charrette. The charrette summary also included one-page descriptions of the proposed concepts that included transportation elements that were dropped from further consideration. The concepts or elements that were dropped in this screening did not address the project goals and objectives adopted by the SAC, were beyond the scope of this project or were not feasible due to significant engineering or cost constraints.

Table 8 expands on concept categories from Table 5 to show specific complete concepts within the categories. A total of 13 full concepts were developed and analyzed using the project goals and objectives. Narrowing the complete concepts to 13 (with additional sub-options) within the six categories was supported by the SAC at its meeting on June 16, 2011. The concepts were illustrated and described in Appendix J: Freeway/Local Transportation Interface: Concepts for Further Study. One example concept, Concept 4b – Folded Diamond, is shown in Figure 20.



Figure 20: Example Concept (4b. Folded Diamond) for Phase II Analysis

Table 8: 13 Concepts for Further Study, Phase II Step 1 Screening (June 2011)

Concepts by Category	Overall Concept Count
1. 2035 No-Build	1
2. Mainline Operational Improvements (which eliminate or shift weave movements off mainline of freeway)	
2a. Braided Ramps	2
2b. Collector-Distributor (C-D) Roads	3
3. Rebuild the Structures with Mainline Operational Improvements (which may include extending auxiliary lanes and adding shoulders but may not necessarily include eliminating or shifting weaves off mainline)	4
4. Enhance the Broadway/Weidler Interchange with Mainline Operational Improvements (including extending auxiliary lanes and adding shoulders in all options)	
4a. Split Diamond Interchange	5
4b. Folded Diamond Interchange	6
4c. Three-Point Interchange (maintain Broadway/Weidler couplet)	7
5. New Concepts for the Broadway/Weidler Interchange with Mainline Operational Improvements (including extending auxiliary lanes and adding shoulders in all options)	
5a. Standard-Diamond Interchange (de-couple Broadway/Weidler)	8
5b. Single-Point Urban Interchange (SPUI; de-couple)	9
5c. Diverging Diamond Interchange (DDI)	10
5d. Roundabout-Controlled Diamond Interchange	11
5e. Three-Point Interchange (de-couple Broadway/Weidler)	12
6. TSM/TDM/Operations Management	13

Phase II Step 2 Narrowing: from 13 to 8 Concepts

At the July 28, 2011, SAC meeting, the project team recommended that of the 13 concepts, Concepts 5b, 5c, 5d and 5e be dropped from further consideration based on the Phase II screening factors (see Table 9: Summary Evaluation Matrix for Phase II Screening). This recommendation was based on the following findings for each of the concepts:

Concept 5b – Single-Point Urban Interchange (SPUI; de-couple)

- Pedestrian and bicycle safety concerns
- Poor north/south connectivity
- Large overall project footprint
- Limited developable parcels

Concept 5c – Diverging Diamond Interchange (DDI)

- Poor north/south connectivity
- Large overall project footprint
- Limited developable parcels

Concept 5d – Roundabout-Controlled Diamond Interchange

- Pedestrian and bicycle safety concerns
- Poor north/south connectivity
- Large overall project footprint
- Limited developable parcels

Concept 5e – Three-Point Interchange (de-couple)

- Pedestrian and bicycle safety concerns
- Poor north/south connectivity
- Large overall project footprint
- Limited developable parcels

The project team recommended these concepts be dropped from further consideration: 5b, 5c, 5d and 5e

The SAC agreed and also recommended that Concept 5a be dropped from further consideration.

After discussion of the evaluation results at the July meeting, the SAC supported dropping those four concepts from further study. Additionally, the SAC found that Concept 5a – Standard-Diamond Interchange (de-couple Broadway/Weidler), had performed similarly to the other concepts within Category 5 (New Concepts for the Broadway/Weidler Interchange) and should be dropped from further study for the following reasons:

Concept 5a – Standard-Diamond Interchange (de-couple Broadway/Weidler)

- Risk of exit ramp queues spilling back onto freeway
- Created wide (7 lane) combined arterial with degradation of operations occurring at multiple intersections
- North/south connectivity shifted mostly to Wheeler and Flint
- Would impact private properties due to acquisition or access or parking changes

This action left eight concepts for further evaluation in Phase III of the study. See also Appendix N1: The 8 Concepts. In addition to narrowing the remaining concepts and approving the Phase III evaluation criteria, the SAC also supported allowing project staff to optimize and potentially combine design elements of the remaining concepts as performance evaluations in Phase III warranted.

Table 9: Summary Evaluation Matrix for Phase II Screening, Step 2 (July 2011)

Freeway/Local Transportation Interface Concepts Summary Evaluation Matrix - 07/28/11	2011 Existing Conditions	1. 2035 No-Build	2. Mainline Operational Improvements		3. Rebuild the Structures with Mainline Operational Improvements	4. Enhance the Broadway/Weidler Interchange with Mainline Operational Improvements			5. New Concepts for the Broadway/Weidler Interchange with Mainline Operational Improvements						6. TSM/TDM/ Operations Management	
			1. 2035 No-Build	2a. Braided Ramps		2b. Collector/Distributor (CID) Roads	3. Rebuild the Structures	4a. Split Diamond Interchange	4b. Folded Diamond Interchange	4c. Three-Point Interchange (couplet)	5a. Standard Diamond Interchange (de-couple Broadway/Weidler)	5b. Single-Point Urban Interchange (SPUI; de-couple Broadway/Weidler)	5c. Diverging Diamond Interchange (DDI)	5d. Roundabout-Controlled Diamond Interchange		5e. Three-Point Interchange (de-couple Broadway/Weidler)
1. A full multimodal transportation system that addresses present and future transportation access and needs, both locally and on the freeway system																
a. Improve multimodal transportation accessibility and connectivity within and through the quadrant	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
b. Increase safety for all modes	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
c. Improve freight access from freeway to industrial areas and major destinations	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
2. Safe traffic operations and freight mobility on I-5 and locally, with improved interface between the freeway and local street systems and increased local connectivity to adjacent land uses	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
a. Improve freeway operations for freight and auto	◆	◆	■	■	■	■	■	■	■	■	■	■	■	■	■	■
b. Improve freeway safety	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
c. Improve local circulation system for safe access for all modes in the quadrant and freeway interchange	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
3. Equitable access to community amenities and economic opportunities																
a. Avoid/minimize/mitigate involuntary displacement of quadrant residents and jobs	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
4. Protection and enhancement of the cultural heritage of the area and its sub-districts																
a. Avoid/minimize/mitigate demolition of historic and cultural resources	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
b. Avoid/minimize/mitigate impacts to parks and schools	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
5. Urban design																
a. Improve freeway edge conditions	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
b. Urban redevelopment opportunities	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
c. Improve continuity of urban uses across the district	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Very Good
 Good
 Moderate
 Moderate to Poor
 Poor

Phase III: Analyze and Select Concepts

Phase III Analysis: from 8 Concepts to 6

The evaluation of the eight remaining concepts in Phase III proceeded from the summer 2011 through December. During the analysis, the project team discovered several items. First, in addressing the two weave conditions south of the I-5 Broadway/Weidler Interchange, the team found that:

- braided exit and entrance ramps southbound between Weidler and I-84 had the greatest improvement to freeway operations
- a C/D road northbound between I-84 and Weidler had the best chance of improving freeway operations

Therefore, the project team recommended to the SAC transportation subcommittee meeting on October 12, 2011, to combine Concepts 2a – Braided Ramps, and 2b – C/D Roads, into one concept, 2 – Braided Ramp/CD Road. This combined concept featured the braided ramps southbound and the C/D road northbound between the I-5 Broadway/Weidler Interchange and I-84. As project engineers more closely examined the physical layout requirements of this option, they found that, with the braided ramp/CD road concept, freeway improvements would affect three structures over the freeway at Broadway, Weidler and Williams. Therefore these structures would need to be replaced in this concept. .

The project team also found that a stand-alone TSM/TDM concept (Concept 6), which included even more aggressive TSM/TDM measures than those already contained in regional transportation plans, would not be enough to address the existing safety and operational issues found on the freeway and the connecting surface streets. Therefore the project team recommended that the more aggressive TSM/TDM measures found in Concept 6 be added to each of the remaining five “build” concepts. This recommendation was also supported by the SAC transportation subcommittee at its October meeting. This resulted in five “build” concepts and the 2035 No-Build concept (six total) left to analyze in the remainder of Phase III.

See Appendix N2: The 6 Concepts

Results of Phase III Analysis: Narrowing the 6 Concepts to 4 and Moving toward a Hybrid

The results of the Phase III analysis were presented to the SAC transportation subcommittee on December 8, 2011. The project team presented these results via a summary table of overall findings (see Figure 21: Overall Findings of Phase III Analysis). This figure represents a composite of the scoring from the Phase III analysis found in Appendix P: Phase III Freeway Interchange/Local Transportation Interface Worksheet.

From these results, the subcommittee recommended the following:

- Discontinue work on Concept 4a – Split Diamond, and Concept 4b – Folded Diamond.
- Work to identify the best elements of each of the three remaining “build” concepts:
 - 2 – Braided Ramp/CD Road,
 - 3 – Rebuild the Structures, and
 - 4c – Three-Point Interchangeand include the identified elements in a hybrid concept.

The subcommittee’s recommendation to drop concepts 4a and 4b was based on the following findings for each of the concepts:

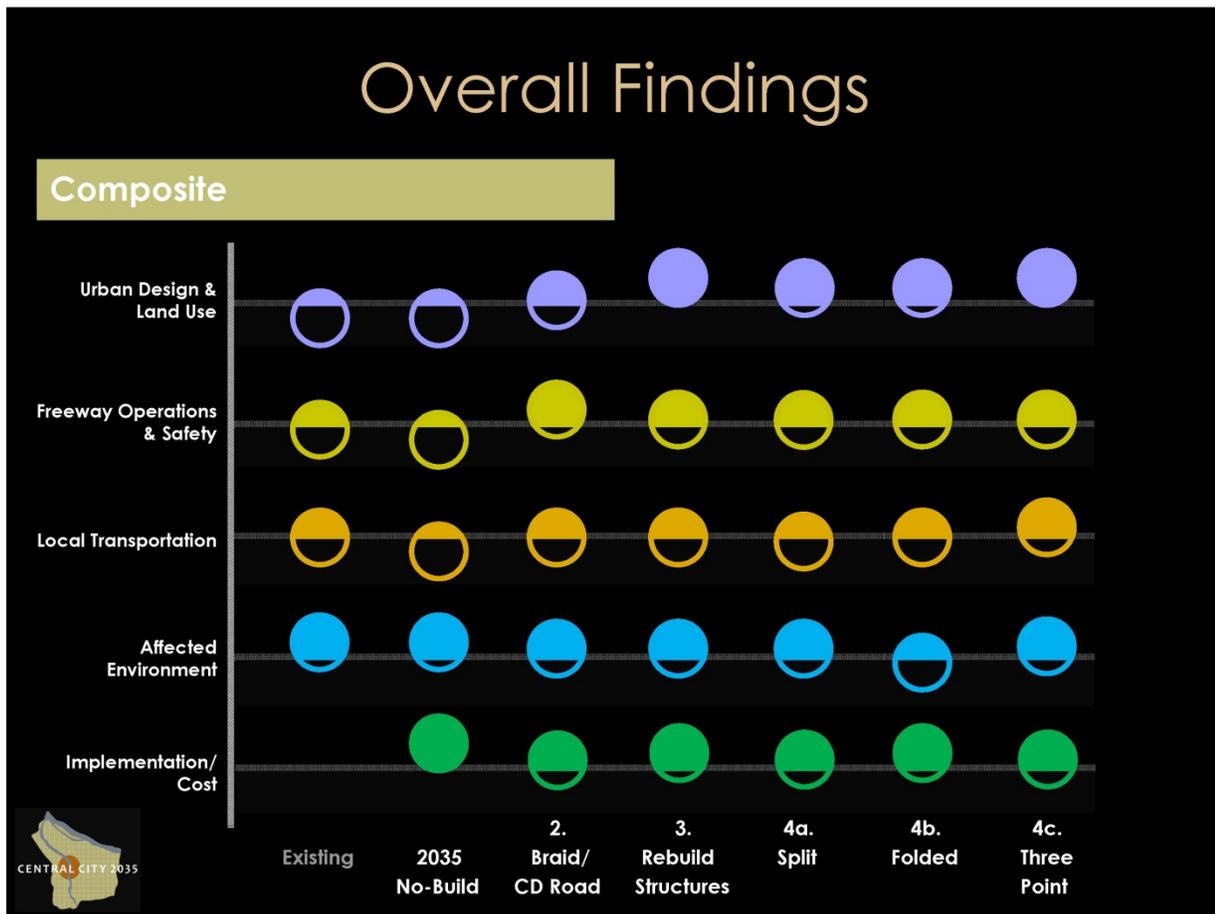
Concept 4a – Split Diamond

- Similar in many ways to 4c – Three-Point Interchange but not as good for urban design or local transportation
- Increased traffic volumes adjacent to important community properties (e.g., Leftbank Building, Paramount Apartments)
- Traffic queuing issues and increase in “box” area average intersection delay
- Impacts to bike, transit and freight connections, including increased out-of-direction travel

Concept 4b – Folded Diamond

- Largest overall project footprint relative to other concepts
- Most impacts to businesses and residences near the loop ramps, including the Leftbank Building, the Paramount Apartments and the Crowne Plaza Hotel

This subcommittee recommendation was unanimously supported by the SAC at its meeting on January 19, 2011. The SAC also directed project staff to weigh SAC-identified benefits and concerns regarding proposed hybrid concept elements the remaining three concepts as discussed at the January meeting.



Note: Concepts that scored higher in the Phase III analysis have circles that are higher respective to the five baselines.

Figure 21: Overall Findings of the Phase III Analysis

Forming a Hybrid Base Concept

At its February 2012 meeting, the SAC was presented with a Hybrid Base Concept that incorporated elements of the three build concepts that remained after the Phase III analysis. At the time, the Hybrid Base Concept (illustrated in Figure 22) included:

1. Transportation System Management (TSM) and Transportation Demand Management (TDM) strategies.
2. Mainline Freeway Safety Elements including:
 - a. Extending auxiliary lanes in both directions.
 - b. Adding full-width shoulders in both directions.
3. Re-building of the five structures over I-5 (Weidler, Broadway, Williams, Vancouver and Flint) to provide the clearance necessary for the Mainline Freeway Safety Elements. The Weidler, Broadway and Williams structures would be rebuilt to include a lid over portions of the freeway. Opportunities to reconfigure the Vancouver and Flint structures to improve neighborhood connectivity were to be considered. All enhanced structures over I-5 would include improved facilities (wider sidewalks, bicycle lanes, etc.) for all modes.
4. A move the southbound on-ramp from Wheeler/Winning Way to Weidler (at Williams).
5. Reverse traffic flow on Williams between Broadway and Weidler with a two-way bicycle/pedestrian facility in the median.

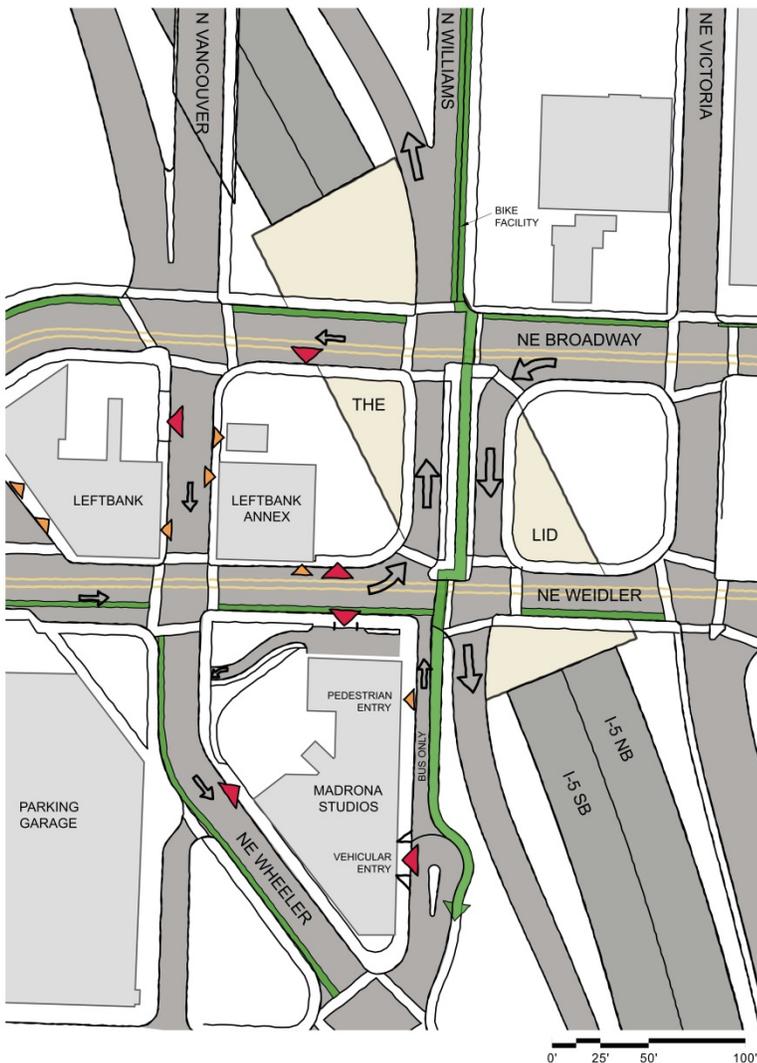


Figure 22: Hybrid Base Concept (illustrative concept drawing, February 2012)

The rationale for the specific elements of the Hybrid Base Concept was noted as follows:

1. TSM and TDM measures represent low cost strategies for managing traffic operations and minimizing demand. While local, regional and state policies call for extensive use of these strategies, this recommendation will help to ensure that ODOT and the City of Portland fully commit to maximizing TSM and TDM strategies in the N/NE Quadrant and on I-5.
2. An auxiliary lane with widened shoulders will improve traffic operations and safety.
3. Rebuilding structures would be required to add the auxiliary lane and would provide improved bicycle and pedestrian facilities. The rebuilding of these structures would provide an opportunity to build a lid over the freeway that would facilitate traffic movements during construction and could include usable public space or development opportunities afterward.
4. Moving the I-5 southbound entrance ramp from Wheeler/Williams/Winning Way to Weidler (at Williams) would reduce traffic on Wheeler south of Weidler.
5. Operating Williams with reverse traffic flow and a two-way bicycle/pedestrian facility in the median for the block between Broadway and Weidler would allow westbound traffic destined for I-5 south to turn south one block to the east of where they currently turn. It would therefore reduce traffic on Vancouver. In addition the two-way bicycle/pedestrian facility in the median would allow for bicycles and pedestrians to continue north from the Eastbank Esplanade and Rose Quarter to Williams Avenue.

The Hybrid Base Concept also included four elements that required further refinement based on technical assessments of bicycle and pedestrian operations, urban design/land use potential, traffic operations and safety. These additional four elements were:

1. I-5/I-84 Southbound Braided Ramp
2. A multi-use path (MUP) connecting the Eastbank Esplanade to NE Broadway along the east side of I-5
3. Clackamas Pedestrian/Bicycle Overcrossing
4. Two "North of Broadway" options for rebuilding the Vancouver and Flint overpasses:
 - a. Keep Vancouver and Flint at their current locations
 - b. Realign Vancouver west to align with Flint or DixonInclude a freeway lid where feasible when rebuilding Vancouver and Flint overpasses

The SAC supported the joint staff recommendation to move forward with the Hybrid Base Concept and directed staff to continue to analyze the four elements that required additional study.

Opportunity to Create Supplementary Crossings

As early as the Freeway and Local Transportation Charrette in April 2011, a number of concepts and ideas had identified opportunities for and benefits of adding east-west crossings of the freeway. The potential for adding a Clackamas Pedestrian/Bicycle Overcrossing and the options for rebuilding the Vancouver and Flint overpasses (items three and four in the list above) were seen as chances to create a supplementary freeway crossing both south and north of the Box. Such a scenario would provide alternative routes for transportation users so they could avoid the Box area, and its interchange traffic, entirely. The supplementary crossing locations are shown in Figure 23.



Figure 23: Potential Supplementary Routes for Crossing I-5

Phase IV: Final Development of the Hybrid Concept

Two Refinement Elements Dropped

At the March 15, 2012, SAC meeting, project staff presented the following joint staff recommendations regarding the four hybrid bridge concept elements that required additional assessment:

- Discontinue refinement of the Southbound Braided Ramps.
- Discontinue refinement of a multi-use path (MUP) immediately east of I-5 between Multnomah and Weidler was not recommended to be included in the project.
- Continue work to ensure that a Clackamas Pedestrian/Bicycle Overcrossing could be integrated with a proposed development plan on the east side of the freeway.
- Continue to refine and evaluate the North of Broadway options.

The SAC supported these joint staff recommendations, supported the project team to move forward with the Hybrid Base Concept and directed staff to continue to analyze and refine the North of Broadway options. The rationale for each of these joint staff recommendations is summarized below.

Rationale for Dropping Southbound Braided Ramps from the Hybrid Base Concept

Braided ramps, which eliminate weave movements, have been shown to be an effective strategy to improve the safety and operations of an urban freeway. However, the Southbound Braided Ramps were not recommended for further refinement as part of the Hybrid Base Concept for the following reasons:

- Many of the safety and operational benefits could be achieved with the auxiliary lane extensions included in the Hybrid Base Concept.
- Concerns about potential visual impacts of the braided ramp structures, which would be located beyond the existing footprint of I-5 and would require new support columns along Wheeler Avenue in the vicinity of the Rose Garden Arena and the Rose Quarter TC, remained.
- Braided ramps were estimated to add an additional \$150 million to the capital cost of the Hybrid Base Concept.

If after base improvements are implemented and safety and operational issues remain, the Southbound Braided Ramps would receive additional consideration since they show promise for further improving safety and operations within the project area. Project staff further recommended that other elements of the Hybrid Base Concept should not preclude the ability to implement the Southbound Braided Ramps, if needed, at some point in the future. Figures 24 and 25 are illustrations that were developed to show how the braided ramp structures might have looked from below. Opportunities were identified to utilize landscaping, walls, water, lighting and other techniques to enhance the look and feel of areas near the freeway.

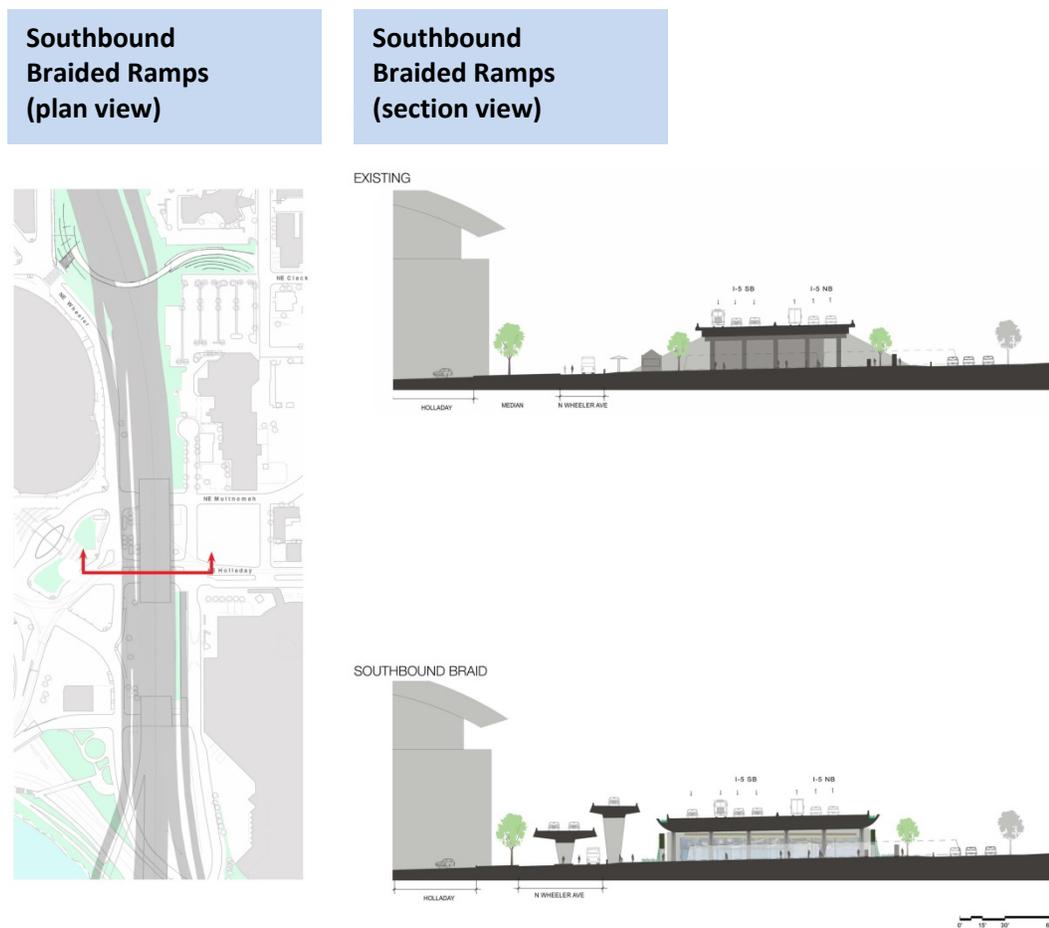


Figure 24: Southbound Braided Ramps (illustrative concept drawings, March 2012)



Existing



With Southbound Braided Ramps

Figure 25: Southbound Braided Ramps (illustrative concept drawings, March 2012)

Rationale for Dropping the Eastside Multi-Use Path (MUP) from the Hybrid Base Concept

The analysis in Phase III had identified a range of potential benefits and impacts associated with creating a multi-use path (MUP) along the east side of I-5. However, the MUP was not recommended for inclusion as part of the Hybrid Base Concept for the following reasons:

- The mitigation for impaired north-south pedestrian and bicycle access, associated with earlier interchange concepts, was no longer necessary. The Hybrid Base Concept provided for reasonable north-south bicycle and pedestrian connections west of I-5 using Wheeler, Williams and Vancouver Avenues.
- The east side multi-use path would create a difficult crossing at the eastern edge of the I-5 northbound exit-ramp to Weidler.
- The east side MUP would require additional property acquisition and would displace approximately 25 off-street parking spaces.
- The MUP was estimated to add an additional \$2 - \$4 million to the capital cost of the Hybrid Base Concept.

Clackamas Pedestrian/Bicycle Overcrossing

Throughout the concept development and analysis phases, project staff and the SAC had thought it highly desirable to provide a pedestrian and bicycle crossing of I-5 connecting from the vicinity of Winning Way, Wheeler Avenue and Williams Avenue (on the west side of I-5) to the vicinity of Clackamas Street at 2nd Avenue (on the east side of the freeway). This overcrossing would improve pedestrian and bicycle access to the Rose Garden Arena, the Veterans Memorial Coliseum and potential future Rose Quarter development.

Concepts were prepared that depicted a potential overcrossing and described some of the challenges of providing good physical connections on both sides of the freeway (see Figure 26).

Benefits

- Would improve pedestrian and bicycle access to the Rose Quarter.
- Would support redevelopment opportunities at the Rose Quarter and on the east side of I-5.
- Would improve pedestrian safety by shifting some event-based pedestrian activity from Weidler Street and the Box area to the new overcrossing.
- Could be designed to allow for southbound braided ramps if those are desired in the future.

Issues

- Potential development on the east side of I-5
- Capital cost estimated at \$15 - \$20 million.

The Clackamas Pedestrian/Bicycle Overcrossing was recommended to be included as part of the Hybrid Base Concept. The City and ODOT agreed to continue to work with the proposed development on the east side of the freeway to ensure that the overcrossing could be accommodated with the proposed development.

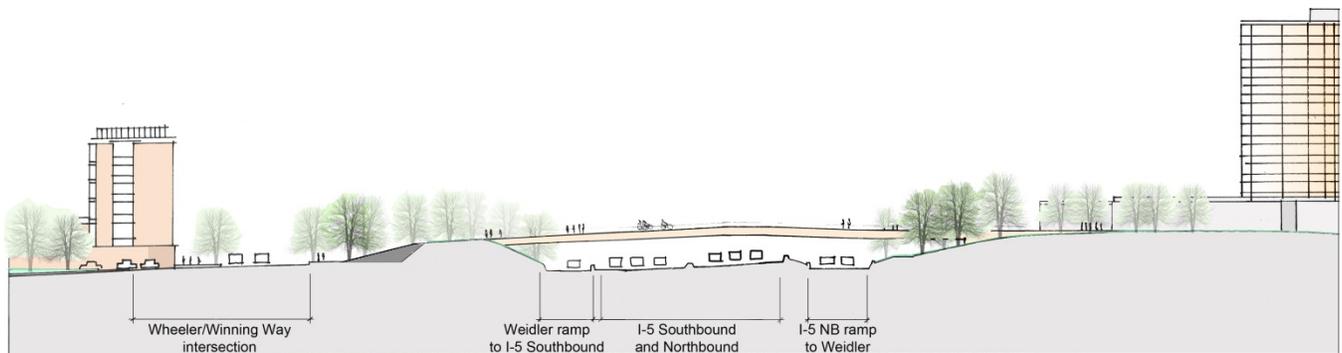


Figure 26: Clackamas Pedestrian/Bicycle Overcrossing, Cross Section (illustrative concept drawing, March 2012)

North of Broadway Options

The I-5 Broadway/Weidler Interchange project presented a unique opportunity to improve the local street system just north of Broadway in addition to overall operational improvements to the transportation network. Because the existing Flint and Vancouver structures over the freeway must be rebuilt as part of the Hybrid Base Concept, they could be built in a configuration different than their current layout. This opportunity also presented a number of challenges since no option was without impacts. Several concepts were developed and deemed worthy of serious consideration, in addition to the option of rebuilding the structures in their current locations. All options considered would work with the other major elements of the Hybrid Base Concept. All new structures would meet current design standards for seismic safety, sidewalks and bike lanes where applicable.

Initial North of Broadway Options Considered through March 8, 2012 (see Figure 27):

1. Rebuild

This option would have removed and rebuilt the existing freeway overcrossings in their current locations. Although the replacement structures would meet current design standards, this option would not have eliminated the five-legged intersection at Vancouver & Broadway. Removing the Vancouver leg from the intersection would have reduced accident potential and improved driver expectations within the interchange area.

2. Align Vancouver with Flint (Flint)

This option would have replaced the existing Flint and Vancouver freeway overcrossings with a single, new overcrossing connecting Vancouver to Flint. The new Vancouver/Flint overcrossing would have provided for a local street connection with Hancock to the east and a local street connection to the west. The intersection of Flint and Broadway would have been signalized, the existing access to Wheeler from Broadway would have been closed and access to Wheeler would have been provided via Dixon. Flint would have been connected south of Broadway, across Weidler, and continue as a through-street connection to Winning Way between the two city parking structures.

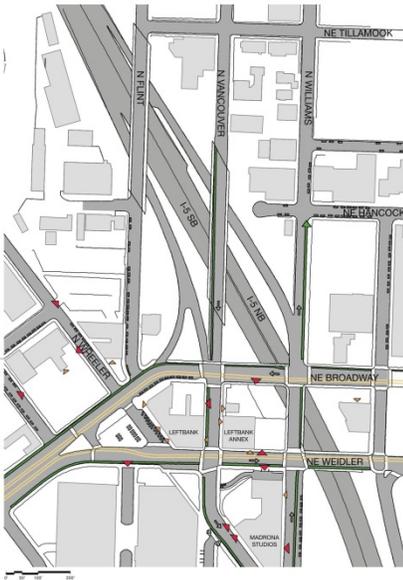
3. Align Vancouver with Dixon (Dixon)

This option would have replaced the existing and Vancouver freeway overcrossings with a single, new overcrossing connecting Vancouver to Dixon at Wheeler. The new Vancouver/Dixon overcrossing would have provided for a local street connection with Hancock to the east and a local street connection to the west. Wheeler would have been connected as a two-way street to a signalized intersection at Broadway and Flint would have been closed at Broadway. The south leg of the Wheeler /Broadway intersection would have been a new, north/south through-street connection across Weidler to Winning Way between the two city parking structures.

4. Align Vancouver with Dixon and Form Couplet (Dixon Couplet)

This option would have replaced the existing and Vancouver freeway overcrossings with a single, new overcrossing connecting Vancouver to Dixon at Wheeler. The new Vancouver/Dixon overcrossing would have provided for a local street connection with Hancock to the east and a local street connection to the west. Wheeler would have been paired with Ross as a one-way couplet with northbound traffic on Wheeler and southbound traffic on Ross.

Existing Conditions



Option 1. Rebuild



Option 2. Align Vancouver with Flint



Option 3. Align Vancouver with Dixon



Option 4. Align Vancouver with Dixon and Form Couplet



Figure 27: Initial Options North of Broadway (illustrative concept drawings, March 2012)

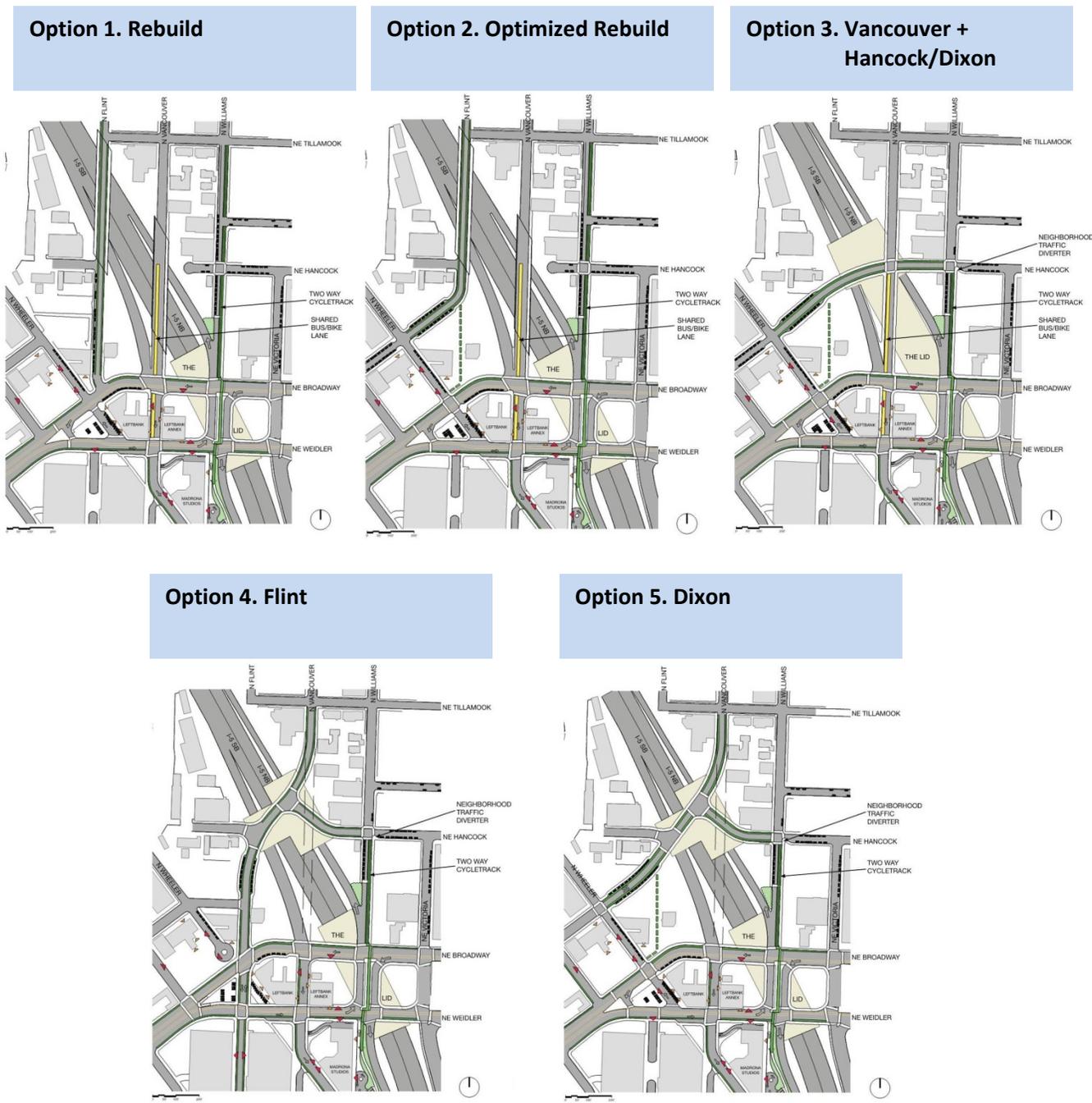


Figure 28: Refined Options North of Broadway (illustrative concept drawings, April 2012)

After an SAC work session on March 20, 2012, where the four North of Broadway options of early March were examined in greater detail, project staff presented additional refinements on a total of five modified options to the SAC on April 10, 2012. The SAC discussed the pros and cons related to each of the then five options, shown in Figure 28, in order to prepare for their May recommendation.

The North of Broadway Recommendation

The SAC recommended Option 3 Vancouver + Hancock/Dixon that included replacing the existing Vancouver structure in its current location and replacing the existing Flint structure with a new east-west structure connecting Hancock Street on the east side of the freeway with Dixon Street on the west side. The recommendation also included extending Flint Avenue as a through-street between the two parking structures on Weidler Street near the Veterans Memorial Coliseum and adding two short bicycle/pedestrian pathways (one connecting Flint Avenue/Tillamook Street to Williams Avenue and one connecting the Hancock /Dixon overcrossing to Broadway).

The rationale for this recommendation included:

- Providing improved an improved east-west connection
- Maximizing street connectivity for all modes
- Maintaining a direct north-south route for transit, pedestrians and bicycles
- Supporting redevelopment of the area west of I-5 and north of Broadway
- Providing a greater opportunity for an additional freeway lid

5. Description of the Recommended Concept

Previous sections describe the collaborative study process that provided an opportunity for local neighborhoods, local businesses, the SAC, ODOT, and the City of Portland to understand each other's goals, objectives and concerns and to prepare together a consensus recommendation for freeway operations and safety improvements and improved multi-modal safety, access and mobility on the local street system. Section 4 describes range of ideas and options that were collected and evaluated and it presents a brief summary of the technical analysis and rationale that led to narrowing over 70 general concepts to a consensus recommended concept that includes both freeway and local street improvements.

The Recommended Concept represents a true consensus, in that each party did not get everything they wanted, yet they recognized the need to compromise in order to significantly improve operations and safety for all transportation modes, to narrow the impacts to the surrounding community and to support the goals of the complementary land use plans. This section provides a description of the recommended freeway and local street concept elements.

In addition to the physical description included in this section, ODOT's Facility Plan for the I-5 Broadway/Weidler Interchange Improvements, a separate but related document, provides a summary of key elements of this report including the project purpose, the land use/transportation connection and the recommended plan elements.

Elements of the Recommended Concept

The consensus elements included in the Recommended Concept are organized into four subsections of the study area:

- I-5 Broadway/Weidler Interchange area (including the freeway mainline and shown in Figure 29: Overall Project Extent)
- North of Broadway area (shown in Figure 30: Enlarged "Box" Area)
- South of Weidler Street area (also shown in Figure 30: Enlarged "Box" Area)
- Freeway Mainline Improvements near the Rose Quarter TC (shown in Figure 31)

The following describes the consensus elements included in the Recommended Concept.

The I-5 Broadway/Weidler Interchange Area

The I-5 Broadway/Weidler Interchange Area refers to project elements related to the freeway mainline, exit and entrance ramps and other traffic operations elements in the vicinity of the freeway ramps.

Transportation System Management (TSM) and Transportation Demand Management (TDM) Strategies

- Major freeway projects in the metropolitan area typically utilize TSM techniques to manage freeway traffic using methods such as ramp meters and variable message signs. ODOT will explore the role that emerging, state-of-the-art TSM techniques such as variable speed limits could have in improving traffic operations.
- TDM refers to strategies aimed at reducing the number of motor vehicle trips using roadway and highway facilities. Trip reductions are typically achieved by incentives that make carpooling or alternative modes (e.g. walking, bikes, transit) more attractive. TDM strategies and policies are identified in Portland's Transportation System Plan (TSP), the Regional Transportation Plan (RTP), the Oregon Transportation Plan (OTP) and the Oregon Highway Plan (OHP). ODOT and the City of Portland will explore ways to cost-effectively maximize the ability of TDM measures to reduce motor vehicle trips in the vicinity of the interchange.



Figure 29: Overall Project Extent of the Recommended Concept

Mainline Freeway Safety Elements

The Recommended Concept would modify the mainline of I-5 by adding several key safety and operational improvements (see Figure 29). It would extend the existing auxiliary lanes approximately 4,300 feet in both northbound southbound directions and add full-width shoulders (both inside and outside) in both directions in most of the areas where the auxiliary lane would be extended. The northbound auxiliary lane would extend the existing auxiliary lane that enters I-5 northbound from the I-84 westbound entrance ramp. This lane currently ends at the exit ramp to Weidler Street, but with the project, the lane would be extended as a continuous lane to the Greeley Avenue exit ramp.

The southbound auxiliary lane would extend the existing auxiliary lane that enters I-5 southbound from the Greeley Avenue entrance ramp. This lane currently ends in the vicinity of the Broadway overcrossing structure. With the project, the lane would be extended as a continuous lane to the exit ramp to the Morrison Bridge and southeast Portland/OMSI.

The addition of full-width shoulders between the Greeley Avenue entrance ramp and the Morrison Bridge would increase safety and reduce traffic congestion related to vehicle breakdowns and crashes in this constrained portion of I-5.

Three Rebuilt Freeway Structures and the Broadway/Weidler/Williams Lid

The existing Broadway, Weidler and Williams structures over I-5 would be replaced in order to accommodate the auxiliary lane extension and widened shoulders. In addition, a lid over the freeway would be included from immediately south of Weidler to immediately north of Broadway. The lid would connect with uses on both sides of the freeway and would provide a complete cover of the freeway in this vicinity. No specific uses have been proposed for the lid, but uses could include public space (park or plaza) or commercial development or a combination of both.

I-5 Broadway/Weidler Interchange Improvements

The replacement structures will include widened sidewalks, bicycle lanes, improved lighting, improved stormwater treatment and opportunities for landscaping improvements.

- **Relocation of Southbound I-5 Entrance Ramp to Weidler/Williams**

The southbound I-5 entrance ramp is currently located one block south of Weidler near where Williams, Winning Way and Wheeler come together at the north end of the Rose Garden Arena. The recommended alternative would move the entrance-ramp north to Weidler. This would require limiting through travel northbound on Williams. Some motor vehicle access would be permitted on Williams north of Winning Way in order to maintain access to facilities at the Madrona Studios, but through-travel on Williams Avenue between Winning Way and Weidler Street would only be permitted for bicycles, pedestrians and buses.

- **Reverse Traffic Flow on Williams**

Williams Avenue between Weidler Street and Broadway would be a non-traditional street that would have three distinct features.

- Two northbound lanes along the western edge of the block. The westernmost lane would have the option of heading straight to the I-5 northbound entrance ramp or turning west onto Broadway. The adjacent lane would provide a choice between the I-5 northbound ramp or northbound on Williams Avenue.
- A wide center median that would include a two-directional, multi-use path and landscaping on both the east and west sides that would be dense enough to limit the visual connection between the northbound and southbound traffic lanes.
- Two southbound lanes along the eastern edge of the block. The easternmost lane would have the option of heading straight to the I-5 southbound entrance ramp or turning east onto Weidler Street. The adjacent lane would travel directly onto the I-5 southbound ramp.

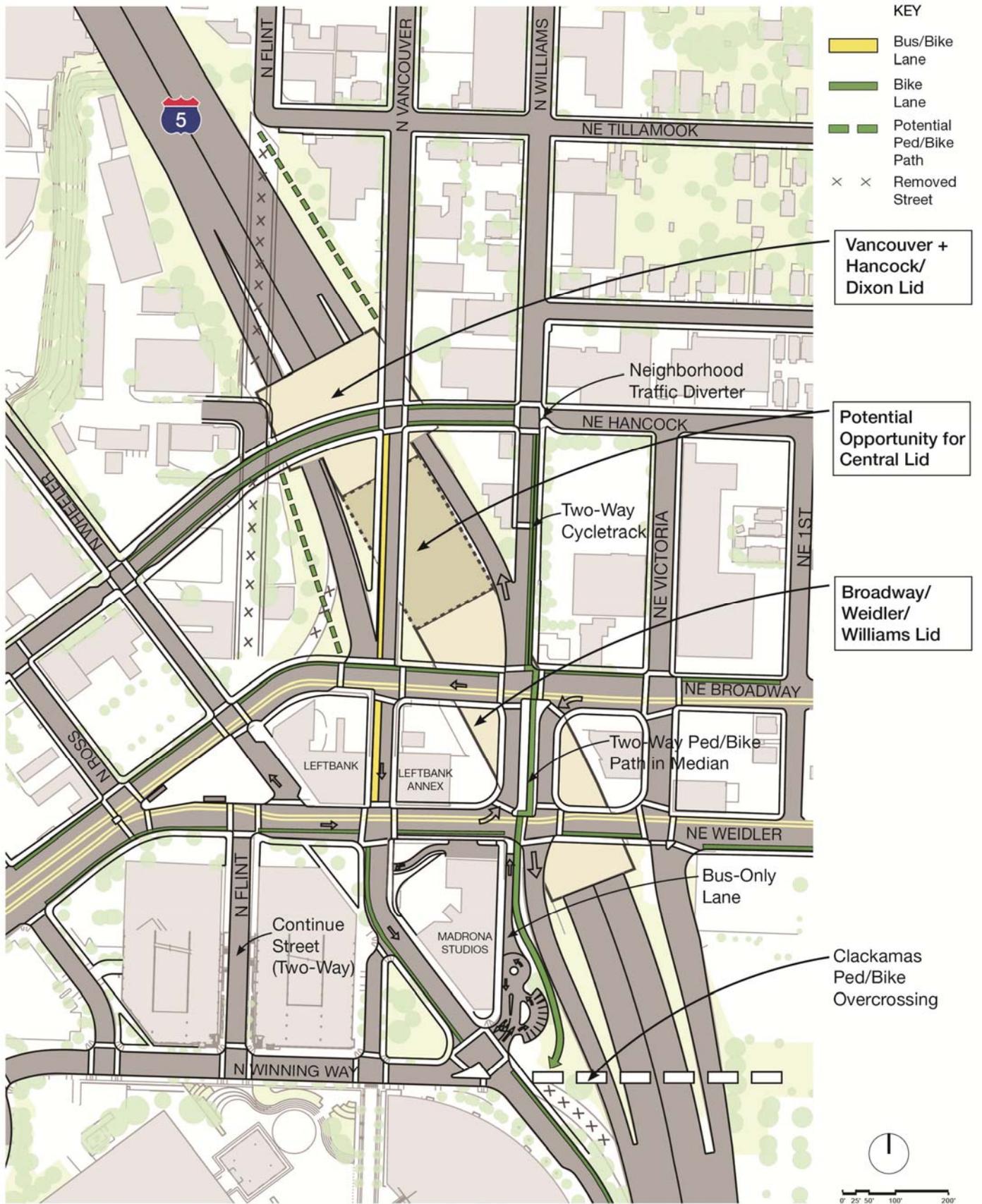


Figure 30: Enlarged “Box” Area of the Recommended Concept

North of Broadway Area - North of Broadway Option 3. Vancouver + Hancock/Dixon

The North of Broadway area refers to the local street system north of Broadway and connections between the local street system and Broadway and Weidler Street. Several local street configurations were considered to improve connectivity and facilitate transit, bicycle and pedestrian movements. Option 3. Vancouver + Hancock/Dixon was selected as the preferred street configuration due to its ability to maintain important existing connections and enhance east-west accessibility across the freeway (see Figure 30).

Major elements in the north of Broadway area include:

- **Rebuild Vancouver in current location**
 - The Vancouver Avenue overcrossing would be removed and replaced in its current location in order to provide adequate width for the auxiliary lane extension and widened shoulders. This would maintain the existing 5-legged intersection at Broadway where Vancouver Avenue alternates the southbound traffic signal with the southbound exit ramp from I-5.
- **Remove Flint south of Tillamook and replace with new pedestrian/bike paths**
 - The existing Flint Avenue overcrossing would be removed and Flint Avenue south of Russell Street would terminate at Tillamook Street. The portion of Flint Avenue between the existing overcrossing and Broadway would be closed as a through street but access would be maintained to provide local access.
- **Add Hancock/Dixon Overcrossing and Hancock/Vancouver Lid**
 - A new overcrossing would be constructed extending Hancock Street west across I-5 connecting with Dixon Street. Traffic calming or diversion measures would be included on the eastern leg of the intersection of Hancock Street and Williams Avenue to ensure that Hancock Street is not used by through traffic. A freeway lid would be included that would encompass the area immediately north and immediately south of the overcrossing.
- **Possible Freeway Lid Connecting Hancock Overcrossing to the Broadway/Weidler Structures**
 - In addition to the freeway lids at Hancock and at the Broadway/Weidler structures, the project will study an additional section of freeway lid that could connect the Hancock Lid with the Broadway/Weidler Lid which could then operate as a single large lid covering the freeway from immediately south of Weidler Street to immediately north of Hancock Street. The assessment of a connecting lid will consider costs, right-of-way impacts, constructability and other elements.

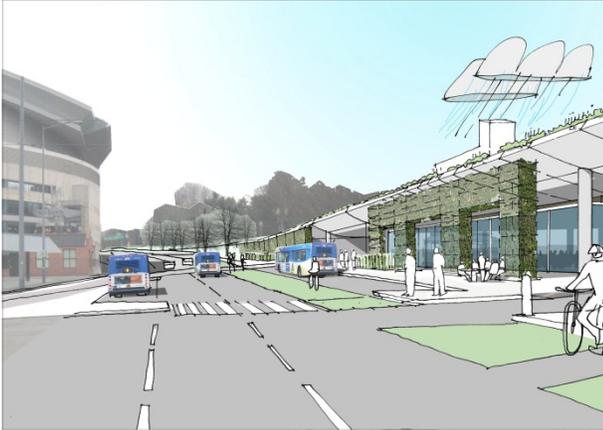
South of Weidler Street Area

The South of Weidler Street area refers to the local street system south of Weidler Street (shown in Figure 30). Two elements south of Weidler Street were included in the recommended concept as described below.

- **Clackamas Pedestrian/Bike Overcrossing**
 - A new pedestrian and bicycle overcrossing would be included connecting from approximately the intersection of Williams Avenue, Winning Way and Wheeler Avenue to Clackamas Street in the vicinity of 2nd Avenue. The overcrossing would be designed to meet Americans with Disability Act (ADA) requirements and provide for smooth bicycle connections at both ends.
- **Continue Flint between Parking Structures**
 - The two city-owned parking structures at the north end of the Rose Quarter front onto Weidler Street. There are currently two separated parking accesses between the two structures: one is accessed from Weidler Street and the other is accessed from Winning Way. The project would include reconstructing the existing accesses into a single roadway that would allow for through travel between the parking structures. This would provide for direct circulation between Weidler Street and Winning Way.

Freeway Mainline Improvements near the Rose Quarter TC

As shown in the plan view of the mainline improvements to I-5 in Figure 29, extension of the auxiliary lanes both northbound and southbound and provision of full safety shoulders extend to the area adjacent to and above the Rose Quarter TC. Figure 31 provides several early illustrations of how the mainline improvements to I-5 could appear adjacent to and above the transit center. The changes to I-5 provide an opportunity to enhance the aesthetic appearance of the freeway structures by wrapping them with new materials designed to maximize natural light and to provide a more cohesive environment for the transit center.



View of Extended Auxiliary Lanes shown at Rose Quarter TC



View of Extended Auxiliary Lanes shown at MAX platform

Figure 31: Mainline Freeway Improvements near Rose Quarter TC (illustrative concept drawings, March 2012)

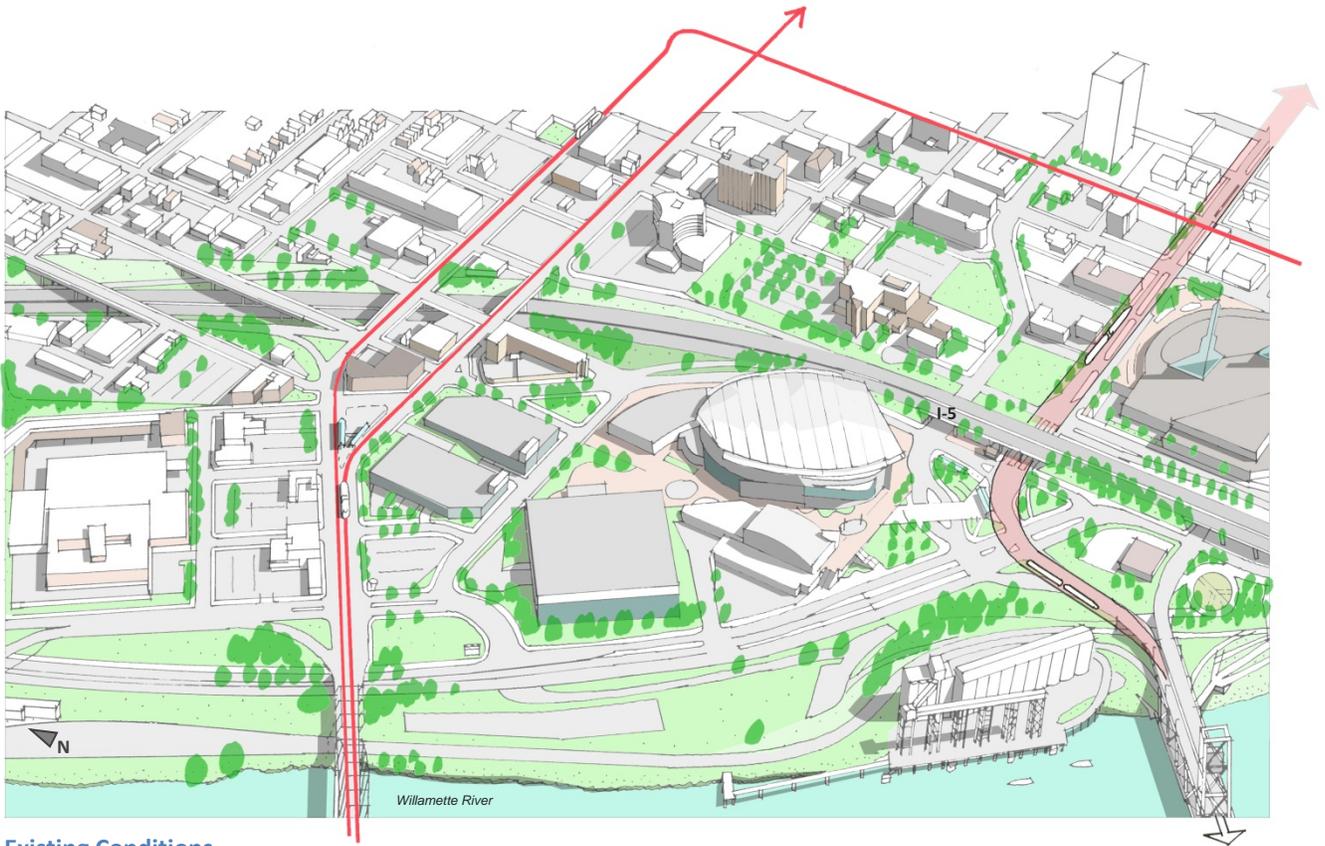
Elements Not Included in the Recommended Concept

Several potential project elements were considered and dismissed (see Section 4). These include interchange, roadway and freeway lane configurations. The concept for a southbound braided ramp was not included in the recommended project due to cost and visual impacts. However, if the recommended project does not improve freeway safety and operations, the southbound braided ramp could be evaluated further to determine if it could address safety and operations problems and if the impacts that were noted could be mitigated.

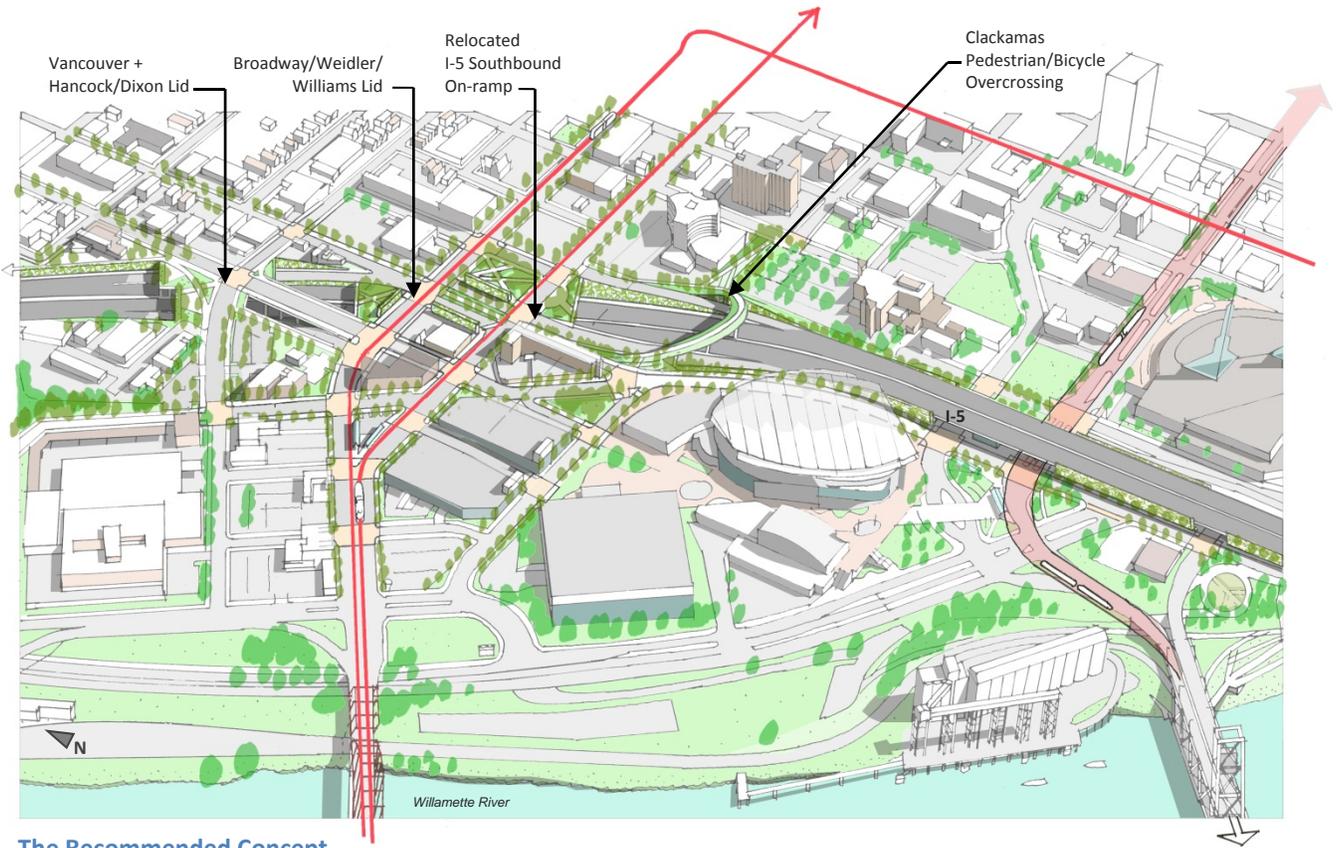
The Facility Plan

An accompanying document to this *I-5 Broadway/Weidler Interchange Improvements Report* is the Facility Plan. ODOT has prepared the *Facility Plan for the I-5 Broadway/Weidler Interchange* to further summarize the transportation needs associated with the freeway and the I-5 Broadway/Weidler Interchange in the project study area, the technical justification for the improvement elements of the Recommended Concept and other factors that ODOT needs to present to decision-makers to confirm the agency's intent relative to this facility in the future.

Figure 32 shows aerial perspectives of the existing conditions in the Rose Quarter and how the area would look with the improvements included in the Facility Plan's Recommended Concept.



Existing Conditions



The Recommended Concept

Figure 32: Aerial Perspectives of Existing Conditions and the Recommended Concept