

PBOT Evaluation of Build v No Build conditions for bicycling with the I-5 Rose Quarter Improvement Project

Using the Oregon Department of Transportation's (ODOT) Environmental Assessment (EA) of the I-5 Rose Quarter Improvement Project as its basis, this document offers the following:

1. a comparison of conditions along bicycle travel routes for the Build and No Build scenarios,
2. recommendations to include network improvements that would support those changes, and
3. considerations for project design of bikeways included in the Build scenario.

Diagrams on the following pages are derived from Figure 22 ("Primary Bicycle Travel Routes") of the EA. They reflect a subset of potential travel routes in the "Build" scenario. It's important to note that except for changes in the Vancouver-Williams corridor, all bicycle travel routes available in the No Build will remain in the Build scenario. Those changes include the elimination of N Flint Avenue and two-way bicycle traffic on N Williams between Weidler and Hancock.

Comparison. The analysis comparing the No Build and Build scenarios considers two principal elements: the potential delay for people bicycling and the relative quality of the bikeways between the two scenarios. These elements are based on Portland's Transportation System Plan's (TSP) description of how to implement Major City Bikeways. Almost all corridors affected by the Build scenario are classified as Major City Bikeways. The specific TSP language is (emphasis added):

***Improvements:** Major City Bikeways should be designed to accommodate large volumes of bicyclists, to maximize their comfort and to minimize delays by emphasizing the movement of bicycles. Build the highest quality bikeway facilities. Motor vehicle lanes and on-street parking may be removed on Major City Bikeways to provide needed width for separated-in-roadway facilities where compatible with adjacent land uses and only after performing careful analysis to determine potential impacts to the essential movement of all modes. Where improvements to the bicycling environment are needed but the ability to reallocate road space is limited, consider alternative approaches that include property acquisition, or dedication, parallel routes and/or less desirable facilities. On Major City Bikeways developed as shared roadways, use all appropriate tools to achieve recommended performance guidelines. Where conditions warrant and where practical, Major City Bikeways should have separated facilities for bicycles and pedestrians.*

This analysis quantifies "delay" by both relative distances traveled and by any change in the number of signalized intersections through which people bicycling must pass. This information is shown in the tables on the following pages. Cells shaded orange highlight conditions leading to potential increases in delay. Cells shaded green highlight conditions leading to potential decreases in delay.

"Highest quality bikeways" is qualitatively assessed assuming: protected bicycle lanes, off-street pathways and neighborhood greenways are of the highest and of equivalent quality. These are followed in order by buffered bicycle lanes, unbuffered bicycle lanes and then shared roadways. This information is visually displayed in the graphics on the following pages, with green segments indicating the use of better facilities in the Build than the No Build condition and yellow segments indicating lower quality conditions in the Build than the No Build condition. Grey segments show comparable conditions in the Build and No Build scenarios. As noted above, most No Build routes will remain available in the Build scenario. All yellow segments are accompanied by suggestions to improve conditions along that part of the network.

Generally, the Build scenario offers bicycle facility improvements on affected roadways relative to the No Build scenario. Delay is increased in most comparisons because of either increased travel distance, riding through more signalized intersections, or both.

Listed below are the principal movements analyzed with the identified origin and destination points and specific routing. The route used for the No Build comparison is identified when necessary. PBOT selected origin and destination points at bikeway intersections that reflected changes between the Build and No Build scenarios or that best represented the geographies under consideration. They may vary from the specific origins and destinations used in the project's Environmental Assessment as PBOT was interested in looking at an overall network effect. Multiple routing options for the Build scenario are considered when they seem to offer the potential for benefit.

1. Russell Street to and from the Broadway Bridge

- a. Inbound measured from Russell/Vancouver to Larrabee/Broadway; inbound measured along three separate routes:
 - i. Vancouver to Broadway (No Build)
 - ii. Vancouver to Hancock-Dixon multi-use path
 - iii. Vancouver to Hancock-Dixon to Larrabee
- b. Outbound measured from Larrabee/Broadway to Russell/Williams

2. Russell Street to and from the Steel Bridge

- a. Inbound measured from Vancouver/Russell to Interstate/Wheeler
- b. Outbound measured from Interstate/Wheeler to Russell/Williams

3. The Lloyd District to and from the Broadway Bridge

- a. Inbound measured from 7th/Clackamas to Broadway/Larrabee using two separate routes:
 - i. Clackamas to 2nd to Broadway (No Build)
 - ii. Clackamas to Clackamas structure to Ramsay
- b. Outbound measured from Broadway/Larrabee to 7th/Clackamas following reverse of above two inbound routes

4. The Lloyd District to and from the Steel Bridge; this analysis considered two separate origin/destination pairs:

- a. Origin at 7th/Broadway
 - i. Inbound measured from 7th/Broadway to Interstate/Wheeler using three separate routes:
 1. 7th to Multnomah (No Build)
 2. 7th to Clackamas to Clackamas structure
 3. 7th to Clackamas to 2nd to Multnomah
 - ii. Outbound measured from Interstate/Wheeler to 7th/Broadway following reverse of above routes
- b. Origin at 7th/Clackamas
 - i. Inbound measured from 7th/Clackamas to Interstate/Wheeler
 - ii. Outbound measured from Interstate/Wheeler to 7th/Clackamas

Russell to/from Broadway Bridge

This compares inbound routing from Vancouver-Russell to Broadway Larrabee using three different routes and outbound routing from Larrabee-Broadway to Williams-Russell.

The only yellow segment—on N Dixon Street—indicates that people bicycling west along Dixon necessarily use a shared roadway segment west of Wheeler. This is a worse condition than in the No Build where people would use a protected bicycle lane on N Broadway.

While conditions on N Vancouver are the same in the Build and No Build, the green line indicates improvement because people use a buffered lane rather than the shared lane on N Flint.



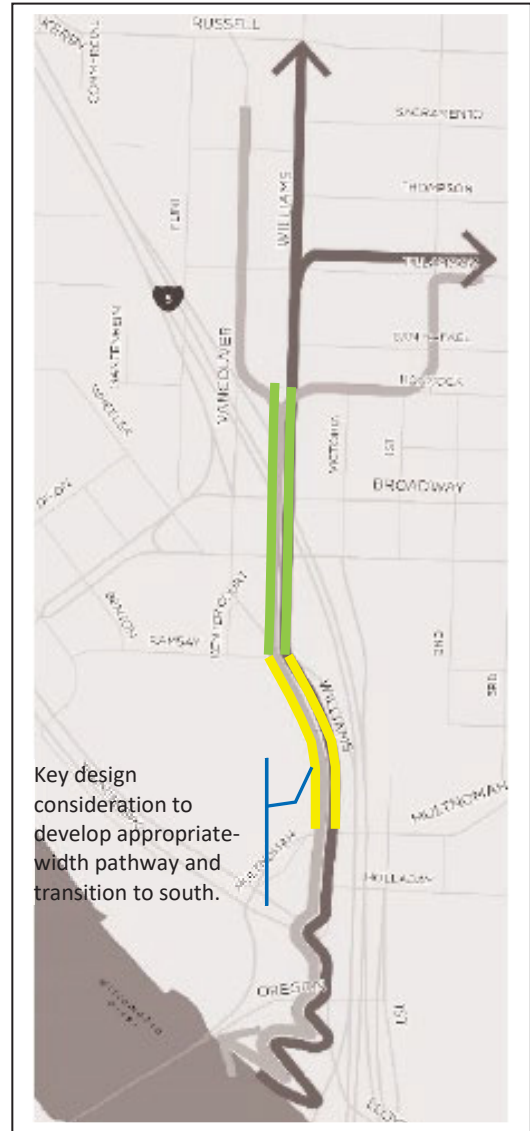
Travel Route <i>(Russell to/from Larrabee-Broadway)</i>	Delay		Comments	Considerations for design
	Distance	# signals		
Inbound				
via Broadway	-	+2	Vancouver buffered lanes improvement over Flint shared roadway.	Bike box at Vancouver-Broadway will need to be of sufficient size to handle all bicycle traffic heading to Broadway Bridge
via Hancock-Dixon MUP	+450'	-	MUP improvement over Flint shared roadway. Increased distance mainly due to switchback pathway.	
via Hancock-Dixon	+110'	+1	Riding in shared roadway on Dixon is worse than protected bicycle lane on Broadway in No Build. Can avoid crossing Larrabee by using Ross or Benton to Broadway. MUP is ~9% downgrade	Dixon will be a shared roadway west of Wheeler. Improvements will be needed to fully leverage new roadway.
Outbound				
Via Weidler-Williams	-	+1	Two-way pathway on Williams is improvement over buffered bicycle lanes on Williams	Transition to left side bikeway on Williams at Hancock will require design attention. This will require sufficient storage for southbound traffic accessing from Vancouver.

Russell to/from Steel Bridge

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principal difference between the Build and No Build scenarios is in the inbound direction. People bicycling south on Vancouver are routed east to N Williams along Hancock Street, where they make use of a two-way pathway on N Williams between Hancock and Ramsay Streets.

There is potential to improve N Williams (currently N Wheeler) south of Ramsay by including a two-way shared pathway along the east side of the roadway. There are significant unknowns about a potential pathway, notably available width. While a wide pathway that provided separate space for people bicycling and walking would represent a significant improvement in the quality of the bikeway along that segment, it would require approximately thirty feet (30') of dedicated space to handle the large volumes of people bicycling and walking in this corridor. A substantially narrower shared facility that did not provide separate space for bicycling and walking could arguably be worse than current conditions. Also a consideration for a pathway along the east side of the roadway is the transition south into the Rose Quarter. Providing adequate signal timing for a scramble movement between the NE and SW corners of the Williams-Multnomah intersection could be challenging. Insufficient time in the signal cycle could introduce significantly additional delay in this corridor. For these reasons this analysis conservatively assumes that conditions between a No Build and Build condition are similar.



Travel Route <i>(Russell to/from Interstate)</i>	Delay		Comments	Considerations for design
	Distance	# signals		
Inbound				
via Vancouver-Williams	+180'	+2	Two-way pathway on Williams is improvement over buffered bicycle lanes on Williams	Storage at Hancock-Williams will be critical as this intersection will now receive all southbound bicycle traffic (under No Build, half of bicycle traffic diverts to Flint). Signal timing and ability to efficiently funnel bikes through eastbound signal will be critical. Pathway and intersection design between Ramsay and Multnomah a key design consideration.
Outbound				
Via Williams	-	+1	Two-way pathway on Williams is improvement over buffered bicycle lanes on Williams	Transition to left side bikeway on Williams at Hancock will require design attention. This will require sufficient storage for southbound traffic accessing from Vancouver.

Lloyd District to/from Broadway Bridge

The analysis of this routing assumes a starting point at NE 7th and Clackamas and an ending point at N Larrabee and Broadway. This starting point is closer to what is considered the “heart” of the Lloyd District at 7th & Multnomah and deviates slightly from the assumed starting point in the EA. It assumes in the No Build condition that people bicycling use established bikeways along 7th Avenue and NE Broadway-Weidler. In the Build condition the assumed routing is directly along Clackamas to the new structure.

A principal benefit of routing along Clackamas is the significant reduction in delay because of the many fewer signalized intersections through which a cyclist must pass.



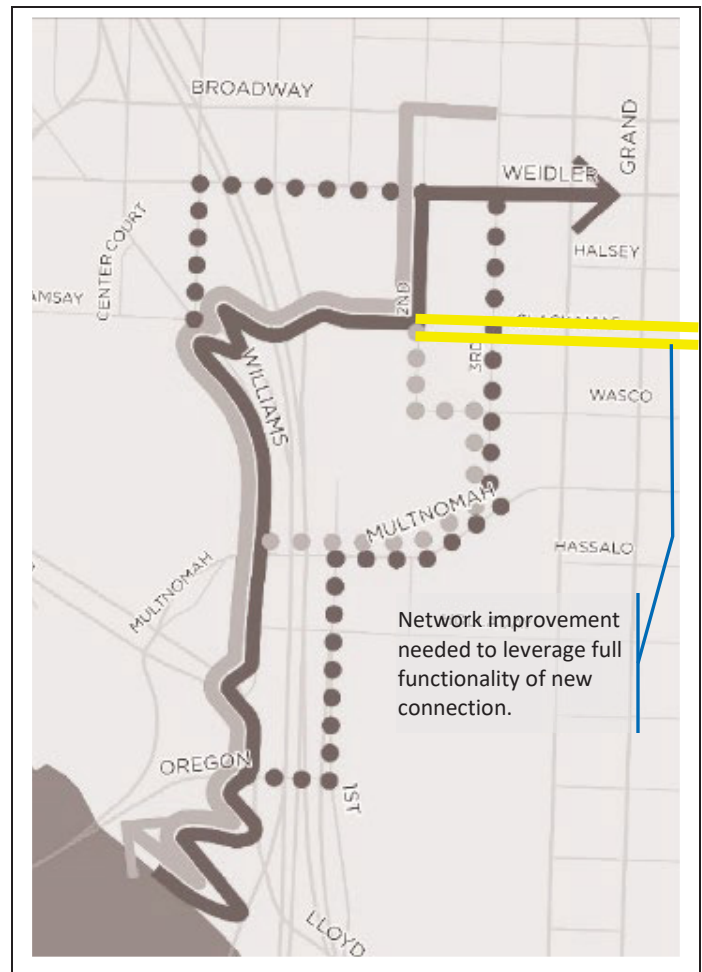
Travel Route <i>(Clackamas/7th to/from Larrabee/Broadway)</i>	Delay		Comments	Considerations for design
	Distance	# signals		
Inbound				
via Clackamas	-520'	-6	Clackamas as a shared roadway offers a lesser quality facility than does 7 th and Broadway-Weidler (protected bicycle lanes in No Build). The Clackamas structure will be an improvement—replacing meager protected or buffered bicycle lanes along Broadway-Weidler in the No Build.	Both Clackamas and Ramsay are shared roadways. Improvements would be necessary to fully leverage benefit of new bridge.
via Broadway	-	-	Using Broadway offers no reduction in delay. However, the bikeway along Broadway in the interchange area will be much improved in the Build scenario beyond what can be provided in the No Build scenario.	
Outbound				
via Clackamas	-230'	-5	Same as for inbound via Clackamas.	Same as above.
via Weidler	-	-	Using Weidler offers no reduction in delay. However, the bikeway along Weidler in the interchange area will be much improved in the Build scenario beyond what can be provided in the No Build scenario.	

Lloyd District to/from Steel Bridge

(starting/ending at 7th and Broadway)

The analysis of this routing assumes a starting point at NE 7th and Broadway and an ending point at N Interstate and Williams (currently Wheeler). The outbound trip ends at 7th and Broadway. A second comparison of this routing (following page) assumes a starting point in the heart of the Lloyd District. The No Build route is 7th Avenue to Multnomah, which is shorter than using Broadway to 2nd to Multnomah. The outbound trip is the reverse.

The Build scenario trip is longer but goes through one fewer signalized intersection than the trip for the No Build scenario.

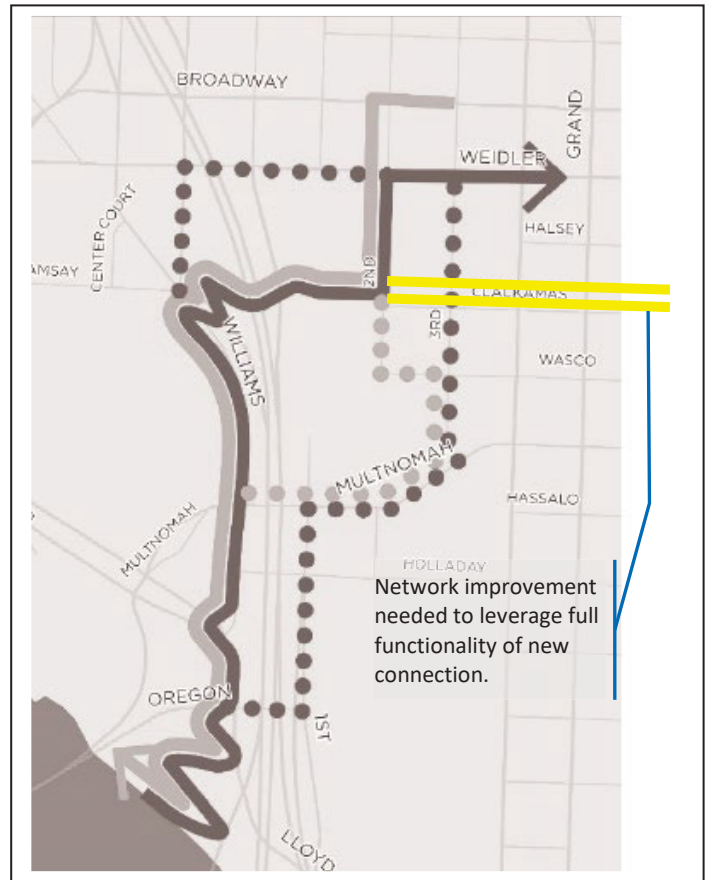


Travel Route (Broadway/7th to/from Interstate/Williams)	Delay		Comments	Considerations for design
	Distance	# signals		
Inbound				
via Clackamas structure	+960'	-1	The No Build route assumes a path south to Multnomah, which is quicker than Broadway to the 2 nd Avenue neighborhood greenway. Because the Build route substitutes a shared roadway on Clackamas for a protected bicycle lane on Multnomah, that segment is worse than the No Build.	Clackamas is a shared roadway. Improvements would be necessary to fully leverage benefit of new bridge.
via 2 nd Avenue	+610'	-1	Shorter than using the Clackamas structure, the use of the shared roadway on Clackamas is worse than using the protected bicycle lane on Multnomah.	
Outbound				
via Clackamas structure	+960'	-1	Similar to inbound direction.	Same as above.
via 2 nd Avenue	+610'	-1	Similar to inbound direction.	

Lloyd District to/from Steel Bridge (starting/ending at 7th & Clackamas)

The analysis of this routing assumes a starting point at NE 7th and Clackamas and an ending point at N Interstate and Williams (currently Wheeler). This starting point is closer to what is considered the “heart” of the Lloyd District at 7th & Multnomah and seems to deviate from the assumed starting point in the EA. It assumes in the No Build condition that people bicycling use established bikeways along 7th Avenue and NE Multnomah. In the Build condition the assumed routing is directly along Clackamas to the new structure.

Because the No Build uses 7th bicycle lanes along 7th Avenue and a protected bicycle lane on Multnomah, the facilities along Clackamas (shared roadway) are worse.



Travel Route (Clackamas/7th to/from Interstate/Williams)	Delay		Comments	Considerations for design
	Distance	# signals		
Inbound				
via Clackamas structure	+960'	-1	Clackamas as a shared roadway offers a lesser quality facility than does 7 th and Multnomah.	Clackamas is a shared roadway. Improvements would be necessary to fully leverage benefit of new bridge.
Outbound				
via Clackamas structure	+960'	-1	Same as for inbound via Clackamas.	Same as above.

Considerations for the design phase

Evaluation of the bicycle routes in the Build scenario lends itself to the following considerations for a design phase:

1. Bicycle facilities should be designed to the highest guidance available and should be sized using appropriate guidance for expected future volumes of people bicycling.
2. To accommodate sufficient width for active transportation facilities (bikeways and sidewalks) motor vehicle travel lanes should also be sized using best practice guidance available at the time of design.
3. Because of the increase in both length of bicycle trips and number of signalized intersections through which people bicycling will pass, attention should be paid to both efficiency and storage.

- a. The intersection of Hancock and Williams will be key to north-south bicycle operations. Operations here will require a diagonal movement northbound to switch from the shared pathway on the east side of the roadway to the left-running (west side) buffered bicycle lane. People bicycling on Vancouver will need to use Hancock eastbound to access the Williams pathway southbound to the Rose



N Williams bicycle traffic. Photo: Jonathan Maus, bikeportland.org

- Quarter. Managing these movements in an efficient manner without delay will require enough storage at Hancock and Williams for the eastbound movement and enough exclusive signal timing to allow high volumes of people bicycling to both continue north and south. The above photo provides a snapshot into a lower range of the northbound volumes to be stored and accommodated through this intersection.
- b. Similarly, sufficient storage area will be needed at the Vancouver-Broadway intersection as people bicycling will need to re-orient from southbound Vancouver east of the intersection to continue west toward the Broadway Bridge.
4. There is the potential for continuing a two-way pathway along N Williams between Ramsay and Multnomah (currently: N Wheeler).
 - a. If built, this pathway will handle similar volumes to the 36-foot-wide pathway to be built further north on Williams between Weidler and Hancock. As per city guidance, a pathway on a Major City Bikeway should have separated space for people walking and bicycling. A pathway that is too narrow could result in worse conditions than in a No Build scenario.
 - b. A pathway built along the east side of Williams will require a diagonal transition south into the transit center. Careful attention will be needed to the operation of a signal to create a protected phase for this movement in order to not create additional delay.