

## Turning, Queuing, and Channelization

### Introduction

*How was turning, queuing, and channelization addressed in the preferred alternative?*

Lane channelization and turn pocket storage lengths were identified in the preferred alternative based on initial information available from the SDEIS. However, storage lengths and channelization were not analyzed in detail for the preferred alternative, as they were developed to fit within the environmental and operational effects evaluated in the SDEIS. Further analysis was requested to address the channelization and storage lengths as originally defined in the preferred alternative.

*What issues are we trying to resolve?*

As part of the design refinements associated with ESSB 6392, the project team sought confirmation that the number of lanes shown in the preferred alternative was necessary based on traffic forecasts and operations. In comment letters on the SDEIS, the Seattle City Council and Mayor expressed a desire for WSDOT to reduce the width of the corridor and associated roadways wherever possible in order to limit environmental impacts of the project. These comments echo those heard from many community members as well, asking that the project team eliminate any unneeded lanes. Specific areas studied included:

- Reducing the westbound off-ramp to a single lane.
- Reducing the number of turn lanes needed at the intersections of 24th Avenue and East Lake Washington Boulevard, and Montlake Boulevard and Lake Washington Boulevard.
- Reducing the number of lanes on Montlake Boulevard through the interchange.

### Addressing the problem

*How will we identify possible solutions?*

Traffic modeling performed for the year 2030 (PM peak hour) identified potential modifications to channelization that could reduce the project footprint while maintaining safety, transit reliability, pedestrian connectivity, and limiting adverse effects on the SR 520 corridor. VISSIM was used for traffic modeling.

### Recommendations

*What did we consider?*

The following design modifications were considered:

- Converting the westbound SR 520 off-ramp to a single lane from SR 520 to Montlake Boulevard.

- Converting the westbound SR 520 off-ramp to a single lane from SR 520 and expanding to two lanes west of Foster Island.
- Closing the southbound left turn from 24<sup>th</sup> Avenue East onto East Lake Washington Boulevard.
- Reducing the number of lanes on East Lake Washington Boulevard between 24<sup>th</sup> Avenue East and Montlake Boulevard.
- Reducing the number of lanes through the SR 520/Montlake interchange.

*What are the options presented for TCT consideration?*

*Converting the westbound off-ramp to a single lane from SR 520 to Montlake Boulevard.* The transportation team modeled a single lane off-ramp and carried the configuration through to the Montlake Boulevard intersection. This conversion would reduce the footprint of the preferred alternative, however the simulation model showed that traffic congestion would extend from the Montlake Boulevard intersection back onto the SR 520 corridor and across the floating bridge. This condition would introduce safety concerns for the SR 520 corridor as well as substantial delays for the traveling public.

*Converting the westbound off-ramp to a single lane from SR 520 and expanding to two lanes west of Foster Island.* This option reduced the footprint of the preferred alternative on Foster Island while still maintaining necessary lane alignments at the intersections of Montlake Boulevard and 24<sup>th</sup> Avenue East. In combination with the direct-access ramp, the traffic volume exiting at the combined Lake Washington Boulevard and Montlake interchange ramps would operate within State standards. On the western edge of Foster Island, the ramp expands to two lanes to keep traffic congestion from Montlake Bridge openings from adversely affecting the SR 520 mainline traffic operations. Exhibit 1 illustrates the recommended single lane off-ramp configuration. The orange shaded area represents the reduction in roadway width compared to the published preferred alternative footprint.

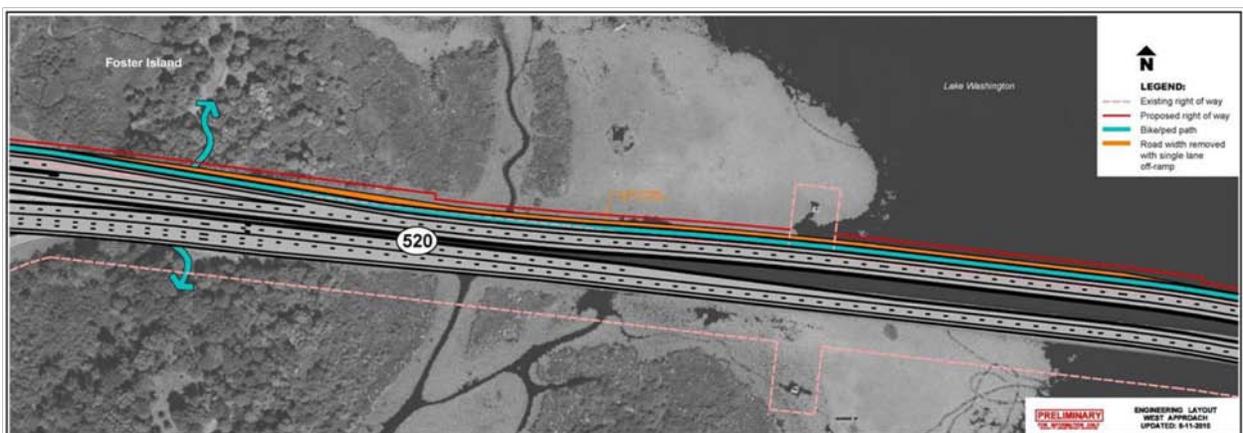


Exhibit 1. Westbound SR 520 single lane off-ramp.

*Closing the southbound left turn from 24<sup>th</sup> Avenue East to East Lake Washington Boulevard.*

Effects of this option on local traffic operations were estimated using preliminary traffic forecasts from the SDEIS traffic data. Approximately 480 vehicles per hour are estimated to turn left from 24<sup>th</sup> Avenue East to East Lake Washington Boulevard during the PM peak.

If the southbound left turn movement was restricted, traffic would turn right onto Lake Washington Boulevard and then turn left onto Montlake Boulevard. The Montlake Boulevard/Lake Washington Boulevard intersection operates with a volume to capacity ratio of nearly 1.0, so the intersection could not accommodate any additional traffic. Adding traffic volume to the westbound left without adding new lanes would result in a volume to capacity ratio over 1.2, with 20% more cars at the intersection than could be accommodated at the traffic signal. Substantial congestion would result along Lake Washington Boulevard and on Montlake Boulevard, with transit travel times along Montlake Boulevard similar to a No Build configuration (~ 45 minutes) instead of the 7 minutes estimated in the preferred alternative configuration.

To accommodate the added traffic volumes, an additional westbound left turn lane (from Lake Washington Boulevard onto Montlake Boulevard) and northbound through lane (on Montlake Boulevard) would be required. The northbound through lane would be needed to provide added capacity for the movement that is in conflict with the westbound left turn. With these lane additions, the volume to capacity ratio is near that in the preferred alternative. An additional 12 feet of width would be required along Lake Washington Boulevard between 24<sup>th</sup> Avenue and Montlake Boulevard, and along Montlake Boulevard between East McGraw Street and East Hamlin Street.

*Reducing the number of lanes on Lake Washington Boulevard between 24<sup>th</sup> Avenue and Montlake Boulevard.* Assumptions for lane configurations and storage lengths on Lake Washington Boulevard between 24<sup>th</sup> Avenue and Montlake Boulevard are described below and shown in Exhibit 2.

Current traffic operations during the PM peak hour at the Montlake Boulevard/Lake Washington Boulevard intersection are rated at a level of service (LOS) E. In 2030, background traffic volume is expected to increase by about 25 percent, independent of the SR 520 project, resulting in traffic operations of LOS F. When an intersection operates at LOS F it is in failure: vehicles must wait through more than one signal cycle before traveling through the intersection. This also typically indicates severe congestion along the primary corridors.

The preferred alternative would change traffic patterns with the closure of the eastbound Lake Washington Boulevard ramps. Traffic from areas south (Madison Park and Leschi) would access SR 520 using the Montlake Boulevard intersection, resulting in an increase of 300 vehicles per hour through the Montlake Boulevard intersection during the PM peak.

- Westbound thru traffic accounts for 200 vehicles per hour northbound along Lake Washington Boulevard.
- Northbound left turns account for 100 vehicles per hour northbound along Montlake.

To improve transit reliability and travel times on Montlake Boulevard and to minimize traffic congestion along Lake Washington Boulevard, the Montlake Boulevard/Lake Washington Boulevard intersection would be reconfigured to include the following:

- Second northbound left turn lane.
- Eastbound approach lane.
- Westbound approach lane.

The westbound approach lane would extend from 24<sup>th</sup> Avenue to Montlake Boulevard. It would also taper out to include a left, left/through, and right turn lane at the Montlake Boulevard intersection. This westbound approach would operate at LOS E: even with the added lane, traffic backs up to the 24<sup>th</sup> Street intersection. The westbound through lane would operate at almost 5% over capacity. Still, this configuration would result in improved traffic operations through the Montlake Boulevard interchange compared to a No Build scenario.

An eastbound left turn lane was also shown in the preferred alternative at the 24<sup>th</sup> Avenue/Lake Washington Boulevard intersection. This left turn pocket would provide a turn lane for HOV traffic destined for the direct-access ramps to eastbound SR 520. It would also be available for traffic destined to the park north of SR 520. The opposing through movement volume of 610 vehicles per hour would limit opportunities for traffic turning left out of a shared lane, which could result in traffic congestion extending back to the Montlake Boulevard intersection.



Exhibit 2. Lake Washington Boulevard between 24<sup>th</sup> Avenue and Montlake Boulevard.

*Reducing the number of lanes on Montlake Boulevard through the SR 520 interchange.* Further evaluation of the lane configuration through the SR 520 interchange proposed in the preferred alternative did not result in any modifications. During discussions the TCT recommended that northbound right turn access be prohibited to the direct-access ramps, and instead all access to the direct-access ramps would be via Lake Washington Boulevard to 24<sup>th</sup> Avenue. Approximately 100 vehicles per hour would use that route.

### **Final TCT recommendation**

The TCT recommended a number of turning, queuing, and channelization refinements. The recommendations are:

- Modify the westbound off-ramp to be one-lane from the floating bridge to west of Foster Island, expanding into two lanes from west of Foster Island to the Montlake intersection.
- Allow the left turn movement from 24th Avenue to eastbound Lake Washington Boulevard. Continued coordination between the City of Seattle, WSDOT, and the Arboretum and Botanical Garden Committee will be necessary to determine if time of day restrictions for the turning movement could be considered in the future.
- Improve the geometry of the transit/HOV direct-access ramps at the east edge of the Montlake lid to provide a transition between freeway design and local design.
- Provide 11-foot general-purpose lanes and 12-foot transit/HOV lanes on city streets and the westbound off-ramp on top of the Montlake lid.
- Maintain the width of the Portage Bay Bridge described in the preferred alternative, including the planted median.
- Prevent the right turn movement to the direct-access ramps from northbound Montlake Boulevard.