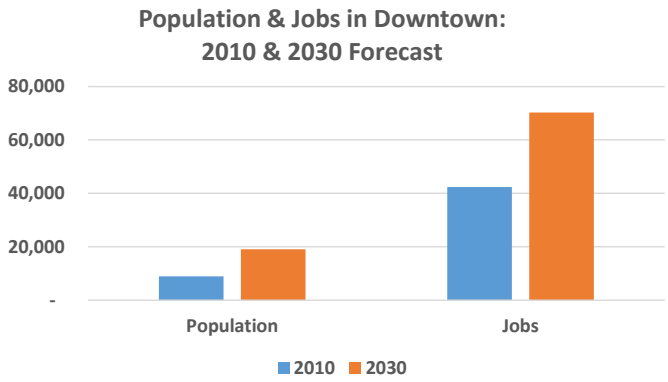
Downtown Livability Initiative Land Use Scenario Intersection Analysis Technical Memo (April 2015)

Summary

This technical memo documents transportation modeling analyses and findings of a land use scenario developed for the Downtown Livability Initiative (DLI). The DLI was guided by a Citizen Advisory Committee (CAC) and included a targeted review of specific regulations for land use and urban design in Downtown Bellevue. The objectives of the DLI are to: better achieve the vision for Downtown as a vibrant, mixed-use center; enhance the pedestrian environment; improve the area as a residential setting; enhance the identity and character of Downtown neighborhoods; and incorporate elements from the Downtown Transportation Plan (DTP) Update and the East Link design work.



The Downtown Transportation Plan (DTP) land use scenario is a 2030 forecast for employment and population developed as part of the DTP Update. It forecasts a total of 70,300 jobs and 19,000 residents for Downtown and is consistent with the Puget Sound Regional Council's (PSRC) forecast. As recommended by the CAC, the DLI scenario assumes the same number of jobs and residents in 2030 as was assumed in the DTP scenario. Both the DLI and the DTP scenarios assume the same transportation system improvements. The difference is that the DLI scenario redistributes some of the forecast jobs from the Downtown Core to areas north, south and east of the Core, but still within Downtown. Conversely, it redistributes a portion of forecast residential units to the Downtown Core from areas north and south. Various transportation modeling and analysis tools were used to assess the transportation impact of the DLI scenario and compare the results to that of the DTP scenario. A summary of the findings from these analyses is as follows:

- Compared to the DTP scenario, the DLI scenario would improve overall traffic operation in the Downtown area, based on a calculation of vehicle delay at signalized intersections:
  - Average delay per vehicle at Downtown intersections would decrease by nearly 8%, from 49 seconds to 45 seconds in the PM peak hour (4PM to 6PM) in 2030.
  - The total vehicle delay would decrease by more than 8% from 1611 hours to 1472 hours in the PM peak hour in 2030.
- According to the model analysis, most noticeable travel time improvements would be expected in the Downtown Core, while a slight degradation is predicted in the Downtown fringe area. However, with signal timing optimization, the slight degradation in traffic operation in the Downtown fringe area could be mitigated.

These results suggest that, with redistribution of the projected job and population growth in the DLI scenario, average vehicle delay and total vehicle delay on the Downtown roadway network would be lower in comparison to the DTP scenario. The detailed land use scenario descriptions, analysis methodology and analysis results are documented in the sections below.

Land Use Scenarios

Downtown Transportation Plan Update Land Use Scenario: The DTP update, with technical work occurring between 2011 and 2013, addressed a 2030 time horizon for its transportation analysis. Inputs to the transportation model included the 2030 land use forecast for Downtown Bellevue of 70,300 jobs and 19,000 residents. This is an increase of 42,321 jobs and 8,887 residents from 2010. The 2030 forecast is generally consistent with the Puget Sound Regional Council's (PSRC) forecast for Downtown and represents the share of regional growth that Downtown Bellevue is expected to accommodate by 2030.

Downtown Livability Initiative Land Use Scenario: The DLI enlisted a CAC between May 2013 and June 2014 to develop a set of Land Use Code recommendations intended to enhance livability in Downtown Bellevue. In the report delivered to Council in January 2015, the CAC recommended an increase in the maximum allowable density and/or building height in a number of Downtown zoning districts. The CAC recommendations do not change the 2030 land use forecast that was used in the DTP analysis, which is still tied to Downtown Bellevue's share of regional growth. Rather, the recommendations affect the geographic distribution of employment and residential growth by 2030 in Downtown Bellevue based on the following:

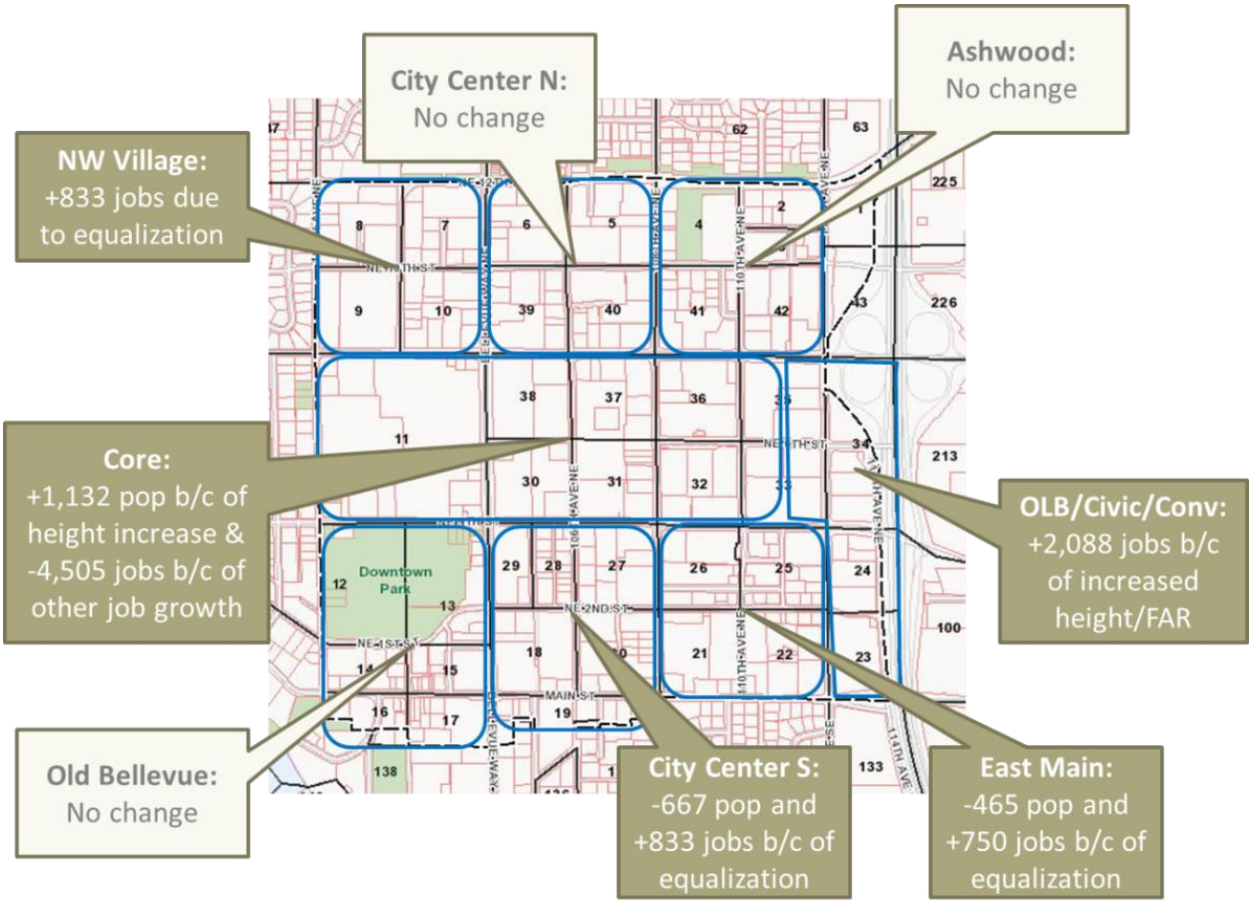
- Increased maximum building height from 450 feet to 600 feet in O-1 District where residential density is currently unlimited, creating the potential to increase the amount of residential development in O-1 above current zoning.
- Increased building height and density in Downtown OLB District and the eastern part of Civic Center, creating the potential to increase the amount of office and hotel development above current zoning.
- Equalization of nonresidential and residential potential building size in MU District, creating the potential to increase the amount of office development in the MU district above current zoning.

The net differences between the DTP scenario under current zoning and the DLI scenario taking into account the CAC recommendations are that:

- An additional 1,132 residents and 4,504 fewer jobs would be expected by 2030 in the Core area.
- An additional 2,416 jobs and 1,132 fewer residents would be expected by 2030 in the areas north and south of the Core within Downtown.
- An additional 2,088 jobs would be expected by 2030 in the Downtown OLB District.

The redistribution of forecast growth is shown in Figure 1. Detailed land use assumptions for the DLI scenario and comparison by individual Transportation Analysis Zone (TAZ) to the DTP scenario can be found in Table A-1 and Table A-2 in the Appendix.

Figure 1: 2030 Land Use Scenario Comparison – DLI Scenario vs. DTP Scenario



Modeling Methodology and Assumptions

Consistent with the DTP analysis methodology, the Bellevue/Kirkland/Redmond (BKR) travel demand model and dynamic traffic assignment model were used to analyze the travel demand and traffic operation conditions for the DLI 2030 horizon year. Before the BKR model was used in the analysis, the PM peak hour volumes were compared to 2030 DTP model for reasonableness and consistency. The travel demand as forecasted by the BRK model was then input into the dynamic model, called Dynameq, for traffic operation analysis. After that, traffic signal optimization software called Synchro was used to conduct further operational analysis for selected intersections. The methodology was discussed with traffic engineering staff and was deemed a reasonable approach.

Network Assumptions

The DLI scenario uses the same transportation network configuration assumed for the DTP scenario. Both studies include roadway capacity projects that can be realistically expected to be completed by 2030 to support Downtown Bellevue mobility, such as:

- **SR 520:** New ramps to/from the east @ 124th Avenue NE to complete the interchange

- **SR 520:** Slip ramp eastbound under 148th Avenue NE to connect to 152nd Avenue NE
- **I-405**: Southbound braid from SR 520 to NE 10th Street
- **I-405:** Add one auxiliary lane (collector/distributor lane) each northbound and southbound, between SE 8th Street and SR 520. The portion north of Main St will be accomplished through restriping not additional widening.
- **NE 6th Street:** Extend existing HOV facility across I-405 and connect to 120th Ave NE
- **Bellevue Way SE:** Add one HOV lane southbound from 112th Avenue SE to the South Bellevue Park & Ride to align with the forthcoming SB HOV lane between there and I-90.

Model Results

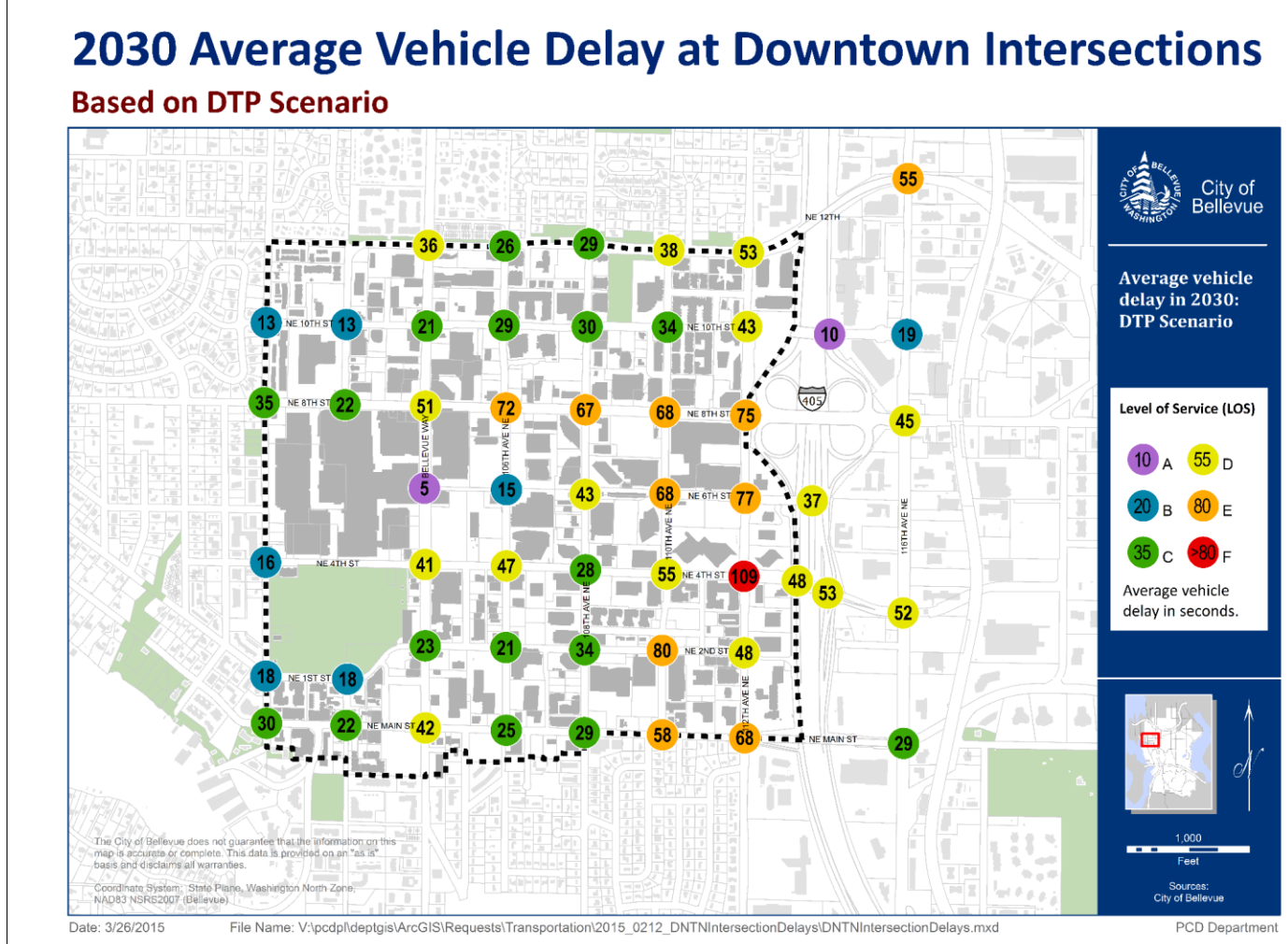
The 2030 PM peak hour is the focus of this modeling analysis. With some job growth redistributed to the Downtown fringe area in the DLI scenario, average intersection delay per vehicle in Downtown as a whole would be expected to drop from over 49 seconds to about 45 seconds, or nearly 8% as shown in Table 1. The expected total vehicle delay in the 2030 PM peak hour would be reduced from 1611 to 1472 hours, a more than 8% time savings compared to the DTP scenario. The average intersection level-of-service (LOS), a qualitative expression of the intersection vehicle delay, would remain at LOS D in both scenarios.

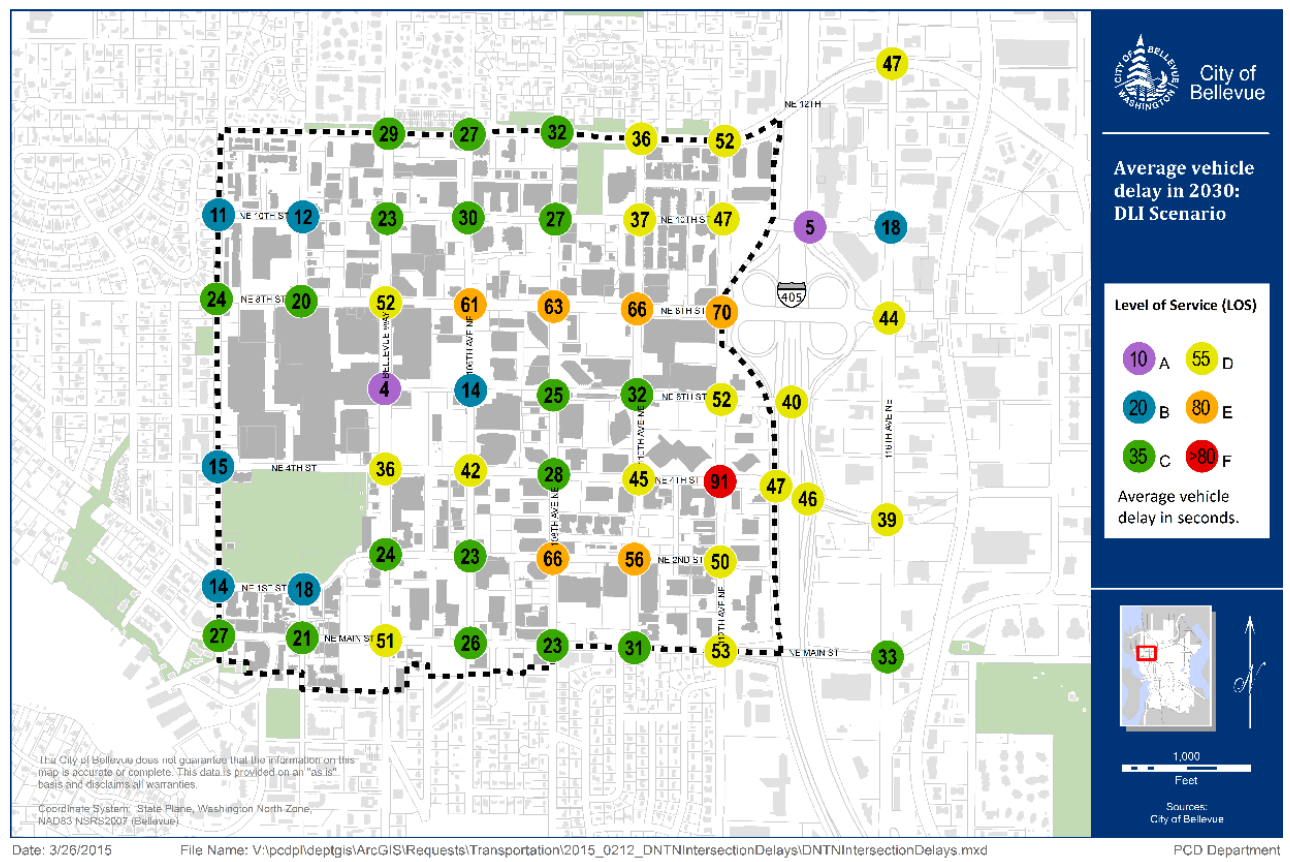
Table 1: Vehicle Delay and LOS in Downtown Bellevue (2030 PM Peak Hour)

Downtown-wide	2030 DTP Scenario	2030 DLI Scenario	Difference	%
Hourly Volume	117,938	116,961	-977	-0.8%
Average Vehicle Delay (sec)	49.2	45.3	-3.9	-7.9%
LOS	D	D	--	--
Total Vehicle Delay (hours)	1611	1,472	-139	-8.6%

Figure 2 shows the LOS and average intersection delay in Downtown Bellevue. More detailed LOS/delay data, as well as throughput and vehicle delay hours (VDH) at each major intersections, can be found in the Appendix.

Figure 2: 2030 PM Peak Hour Average Vehicle Delay and LOS DTP Scenario and DLI Scenario





Note:

With land use redistribution under the DLI scenario, delay at major intersections on NE 8th St., NE 4th St, and 112th Ave NE would be reduced. Although the initial Dynameq model results in the DLI scenario indicated degradation at 110th Ave. /NE 2nd St. and 112th Ave./ NE 2nd St., further analysis using Synchro showed delays at these intersections could be reduced with appropriate signal timing optimization and better coordination. The DLI diagram has incorporated signal timing optimization at selected intersections on NE 2nd St. and Main St.