

Chapter 6—Local Roadway Operations

What is in this chapter?

The SR 520 transportation team studied traffic volumes on local streets around SR 520 to determine current traffic conditions within the study interchange area between 84th Avenue NE and 108th Avenue NE. This information provided the basis for forecasting traffic conditions in the year 2030 under the No Build and Build Alternatives and performing an intersection operations analysis.

To determine the effects of the No Build Alternative, the transportation team compared existing conditions against traffic operations in the year 2030 if the project were not built. The transportation team then compared the No Build Alternative with the Build Alternative to determine the relative effect of the project if it were built. This chapter presents the results of that analysis.

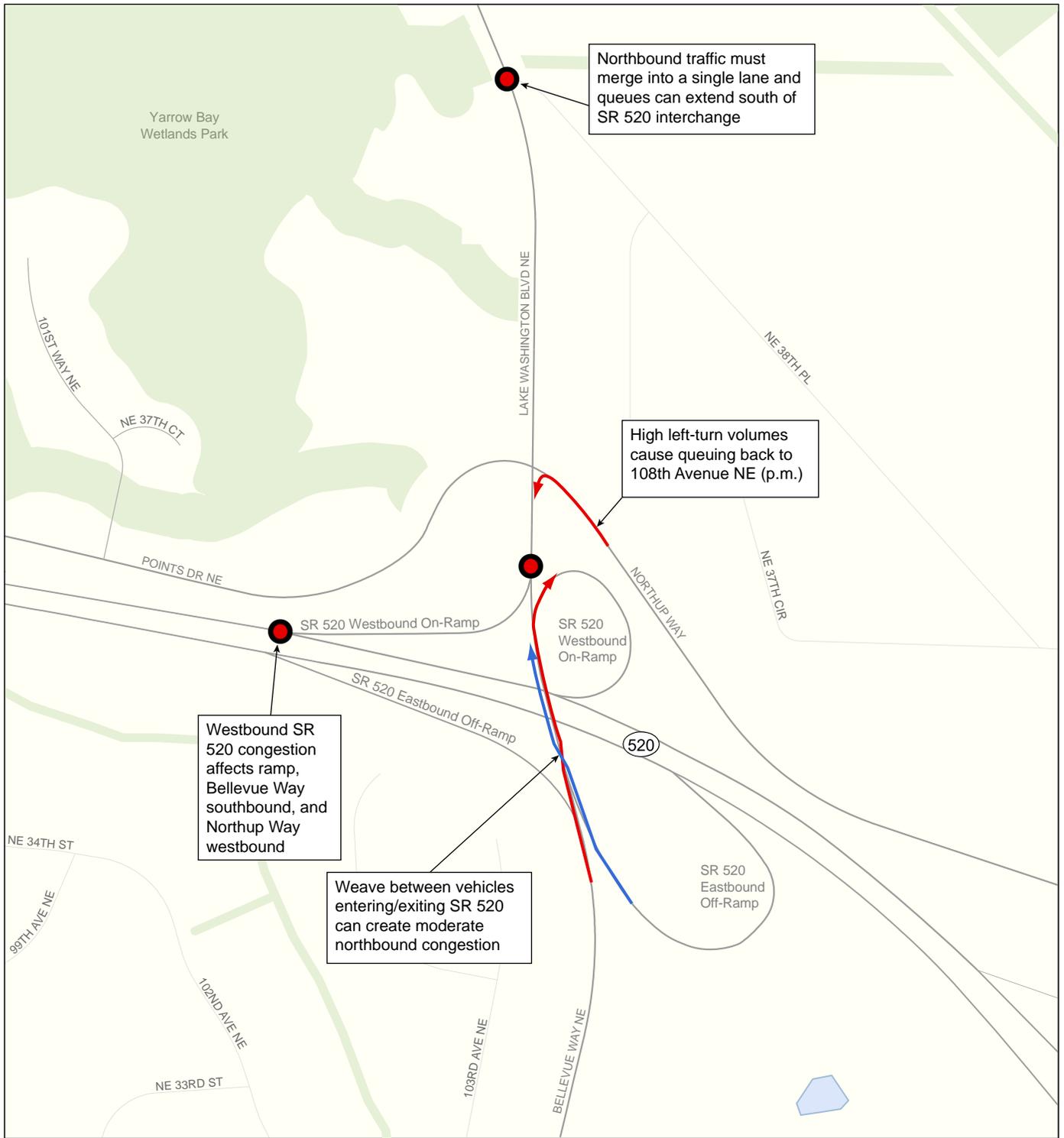
What is local traffic like today?

The local streets within the project's interchange area are typically congested during the morning and afternoon peak hours at the following locations:

- 84th Avenue NE northbound is congested during the afternoon commute period due to congestion on SR 520 that backs up onto and beyond the westbound on-ramp.
- Bellevue Way southbound and Northup Way westbound are affected by congestion on westbound SR 520, which backs up onto and beyond the on-ramps during the afternoon peak hour.
- Bellevue Way northbound traffic is affected by a lane drop north of NE 38th Place.
- The Northup Way/108th Avenue NE intersection operates over capacity, which can back up traffic on the westbound 108th Avenue NE off-ramp from SR 520.

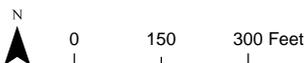
These congestion points are shown in Exhibits 6-1 and 6-2 and discussed in detail later in this chapter.





- Congestion Location
- Direction of Travel

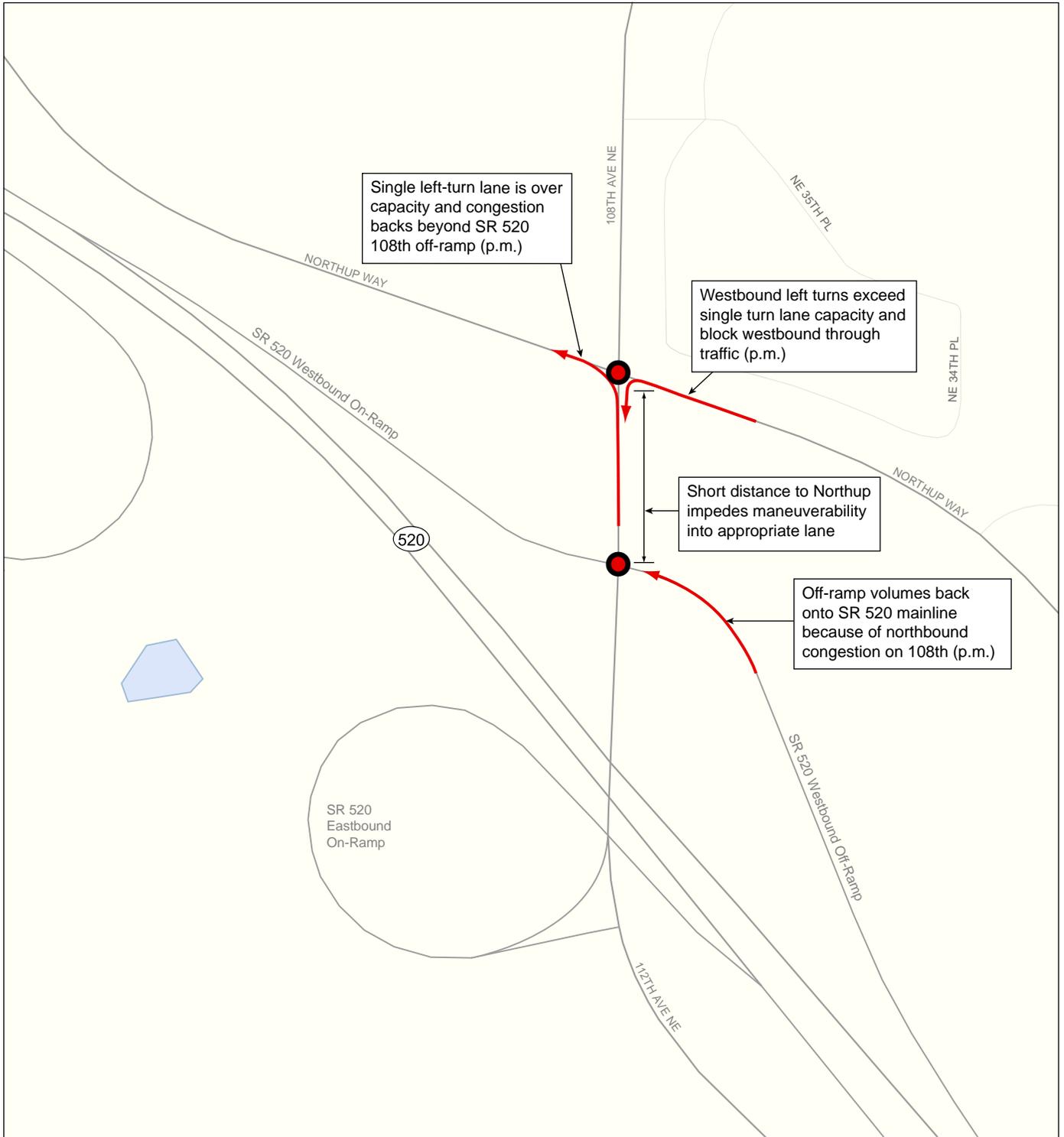
NOTE: Unless otherwise noted, queues occur at these locations during both the a.m. and p.m. peaks.



Source: King County (2008) GIS Data (Streams, Streets, Water Bodies), Microsoft Corporation (2009), Bing Maps, <http://www.bing.com/maps/>, CH2M HILL (2008) GIS Data (Park). Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.

Exhibit 6-1. SR 520/Bellevue Way NE Interchange Area Existing Congestion Points

Medina to SR 202: Eastside Transit and HOV Project



-  Congestion Location
-  Direction of Travel

NOTE: Unless otherwise noted, queues occur at these locations during both the a.m. and p.m. peaks.



Source: King County (2008) GIS Data (Streams, Streets, Water Bodies), Microsoft Corporation (2009), Bing Maps, <http://www.bing.com/maps/>, CH2M HILL (2008) GIS Data (Park). Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.

Exhibit 6-2. SR 520/108th Avenue NE Interchange Area Existing Congestion Points

Medina to SR 202: Eastside Transit and HOV Project

How would traffic volumes change between now and the year 2030?

As discussed in Chapter 5, regional population and employment are forecasted to increase between now and the year 2030, which would result in increased traffic volumes. West of I-405, traffic volumes are forecasted to increase 13 percent during the morning and 28 percent during the afternoon within the interchange influence area identified for the project (see Exhibit 6-3). As discussed in Chapter 4, the percentages shown in Exhibit 6-3 represent an area-wide growth rate that encompassed many local roads within the interchange influence area (indicated by the green box).

Population growth is expected to be slow in the Point Cities area, but more than double in Downtown Bellevue, with employment increasing by nearly half of the current number of jobs. The anticipated level of growth would not substantially increase traffic volumes on local streets in the neighborhoods near the 84th and 92nd Avenue areas. The most substantial changes in traffic volumes are expected to occur in the SR 520/Bellevue Way NE and 108th Avenue NE interchange areas, which provide a direct link between the cities of Kirkland and Bellevue. Traffic volumes at the SR 520/Bellevue Way and 108th Avenue NE interchange areas would be affected by this growth.

With the Build Alternative, traffic volumes at the SR 520/84th and 92nd Avenue NE interchanges are expected to be similar to the No Build Alternative. With the project improvements, circulation at these interchanges would change to ramp termini intersections. Improvements to the SR 520/Bellevue Way and 108th Avenue NE interchanges would also change traffic patterns and traffic volumes. Traffic volume changes on the local streets are identified later in this chapter under the discussion of each interchange.

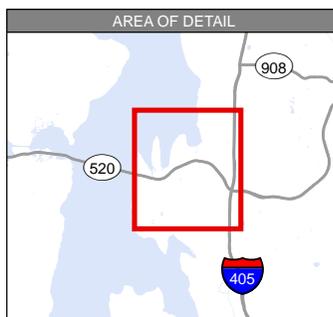
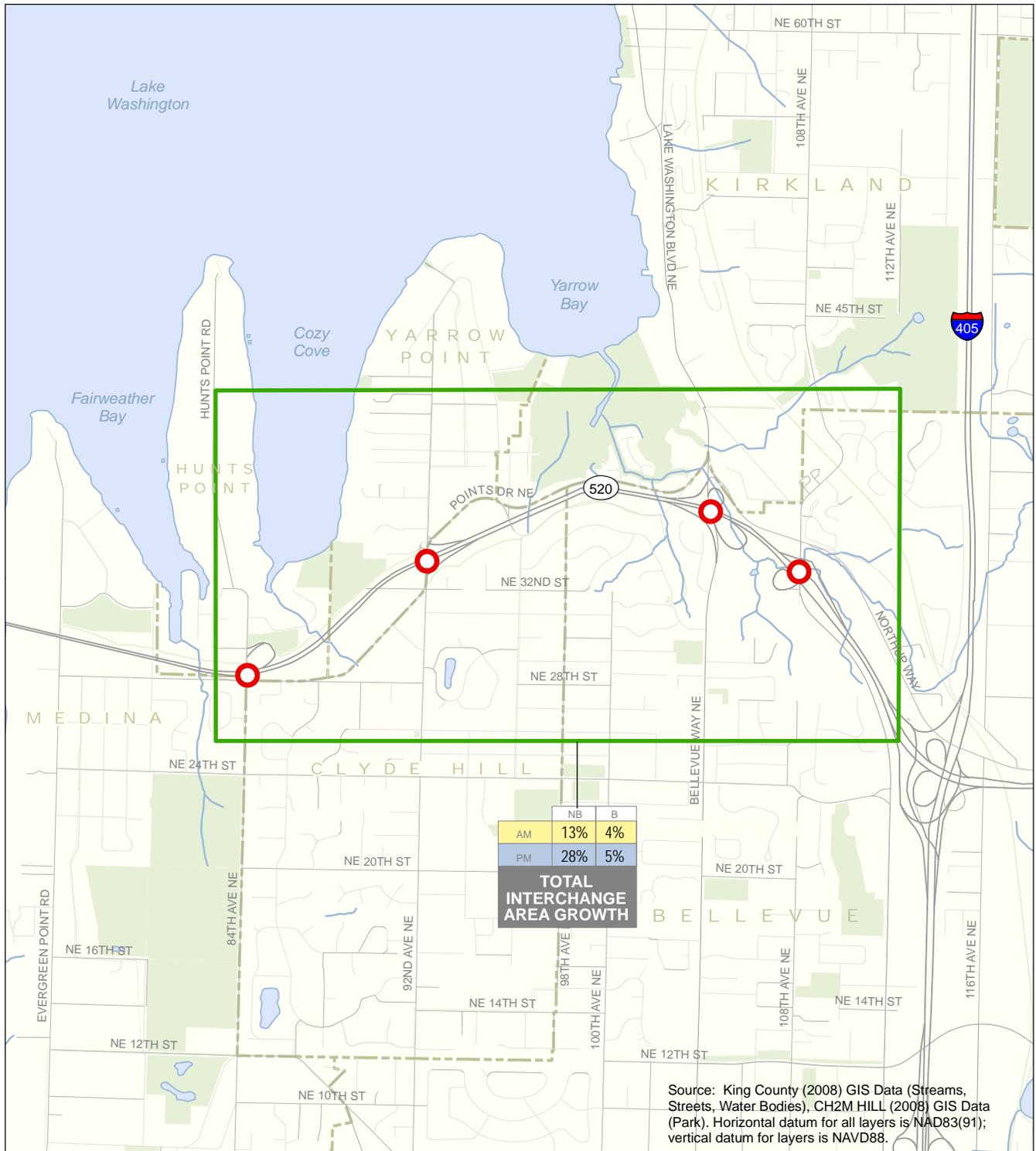
SR 520/84th Avenue NE Interchange Area

Existing Conditions

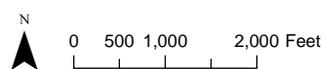
Currently, 84th Avenue NE connects Hunts Point to communities to the south and provides access to SR 520. Exhibits 6-4 and 6-5 show local traffic volumes within the SR 520/84th Avenue NE interchange area.

The study intersections at the SR 520/84th Avenue NE interchange are unsignalized. Control and design of the intersections in this study area





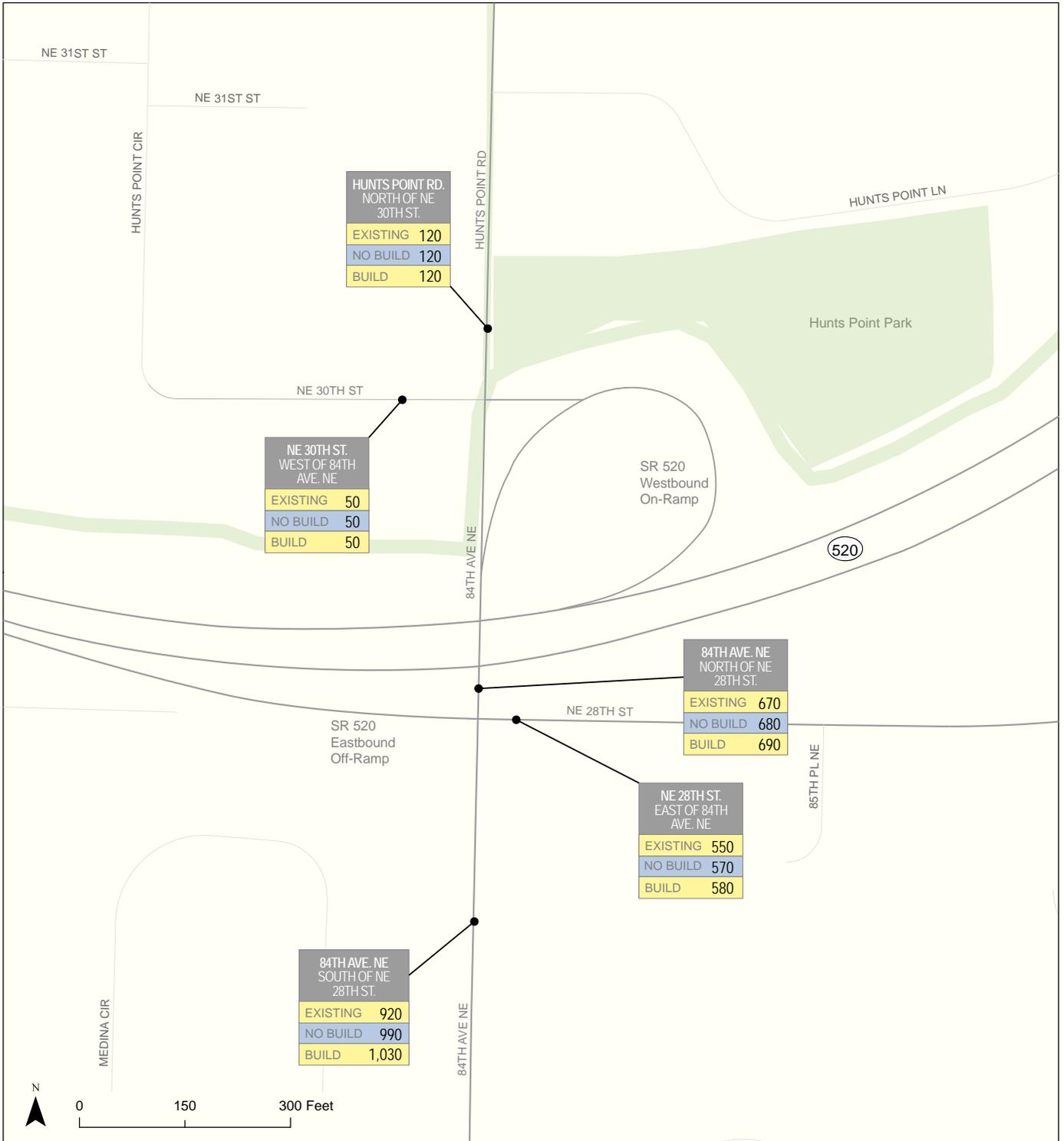
- Study Interchange
- Interchange Influence Area



	Year 2030 No Build		Build	
	NB	B	NB	B
A.M. Peak Hour	AM	7%	4%	
P.M. Peak Hour	PM	11%	5%	

% Change vs. Existing ± % Change vs. No Build

Exhibit 6-3. Future Traffic Volume Changes
Medina to SR 202: Eastside Transit and HOV Project



	LOCATION	
Year 2030	EXISTING	Volume
Year 2030	NO BUILD	Volume
Year 2030	BUILD	Volume

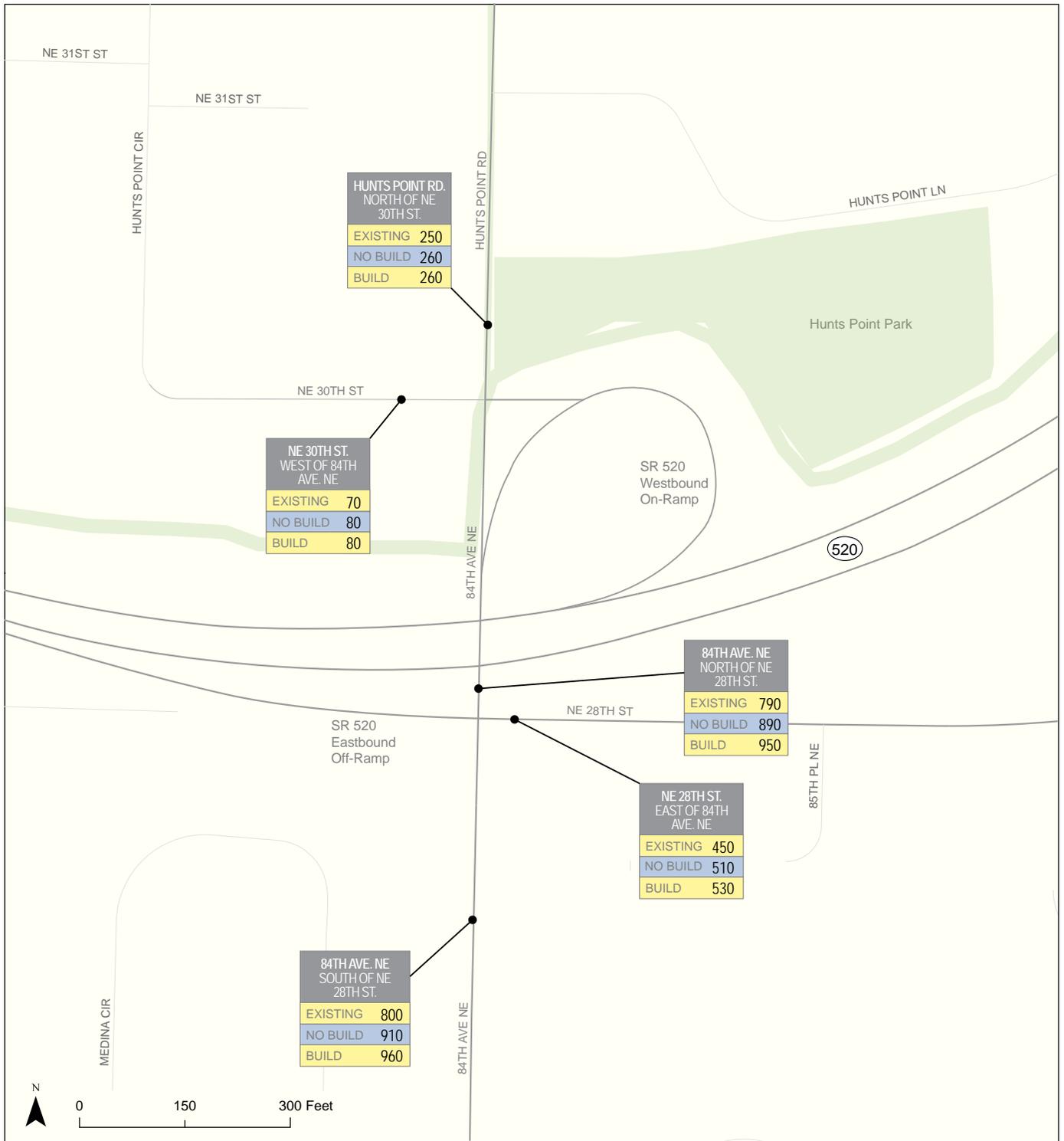
Alternative — Volumes are totals for both directions

Source: King County (2008) GIS Data (Streams, Streets, Water Bodies), Microsoft Corporation (2009), Bing Maps, <http://www.bing.com/maps/>, CH2M HILL (2008) GIS Data (Park). Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.

Exhibit 6-4. SR 520/84th Avenue NE Interchange Area – A.M. Peak Hour Vehicle Volumes

Medina to SR 202: Eastside Transit and HOV Project





	LOCATION	EXISTING	VOLUME
Year 2030		NO BUILD	VOLUME
Year 2030		BUILD	VOLUME

Alternative

Volumes are totals for both directions

Source: King County (2008) GIS Data (Streams, Streets, Water Bodies), Microsoft Corporation (2009), Bing Maps, <http://www.bing.com/maps/>, CH2M HILL (2008) GIS Data (Park). Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.

Exhibit 6-5. SR 520/84th Avenue NE Interchange Area – P.M. Peak Hour Vehicle Volumes

Medina to SR 202: Eastside Transit and HOV Project

are adequate to serve current traffic; however, congestion on SR 520 can spill back on the local streets during the afternoon peak hour, specifically on 84th Avenue NE northbound and NE 28th Street westbound. On average, congestion on SR 520 westbound approaching the floating bridge lasts approximately 4 to 4-1/2 hours. This congestion affects traffic on the local street system. At the peak of congestion, it can take vehicles approximately 30 minutes to travel from NE 24th Street on 84th Avenue NE to SR 520, affecting how traffic circulates on local streets.¹

All intersections at the SR 520/84th Avenue NE interchange currently operate at level of service (LOS) C or better during both morning and afternoon peak hours of the day, as shown in Exhibit 6-6. LOS C indicates that capacity provided at the intersections is technically sufficient for the traffic demand. This calculation, however, does not take into account the interaction of the street system with the freeway, so the LOS C rating does not directly reflect the congestion originating on the freeway.

Year 2030 No Build Alternative

Without the project, the congestion that occurs in the SR 520/84th Avenue NE interchange area today would continue in the year 2030. SR 520 westbound congestion would be worse, lasting over 4-1/2 hours. Traffic would continue to use 84th Avenue NE and NE 28th Street to travel to and from SR 520 and would continue to experience congestion.

As shown in Exhibits 6-4 and 6-5, traffic volumes would increase slightly – 100 vehicles per hour (vph) or less – over current conditions due to increases in regional population and employment.

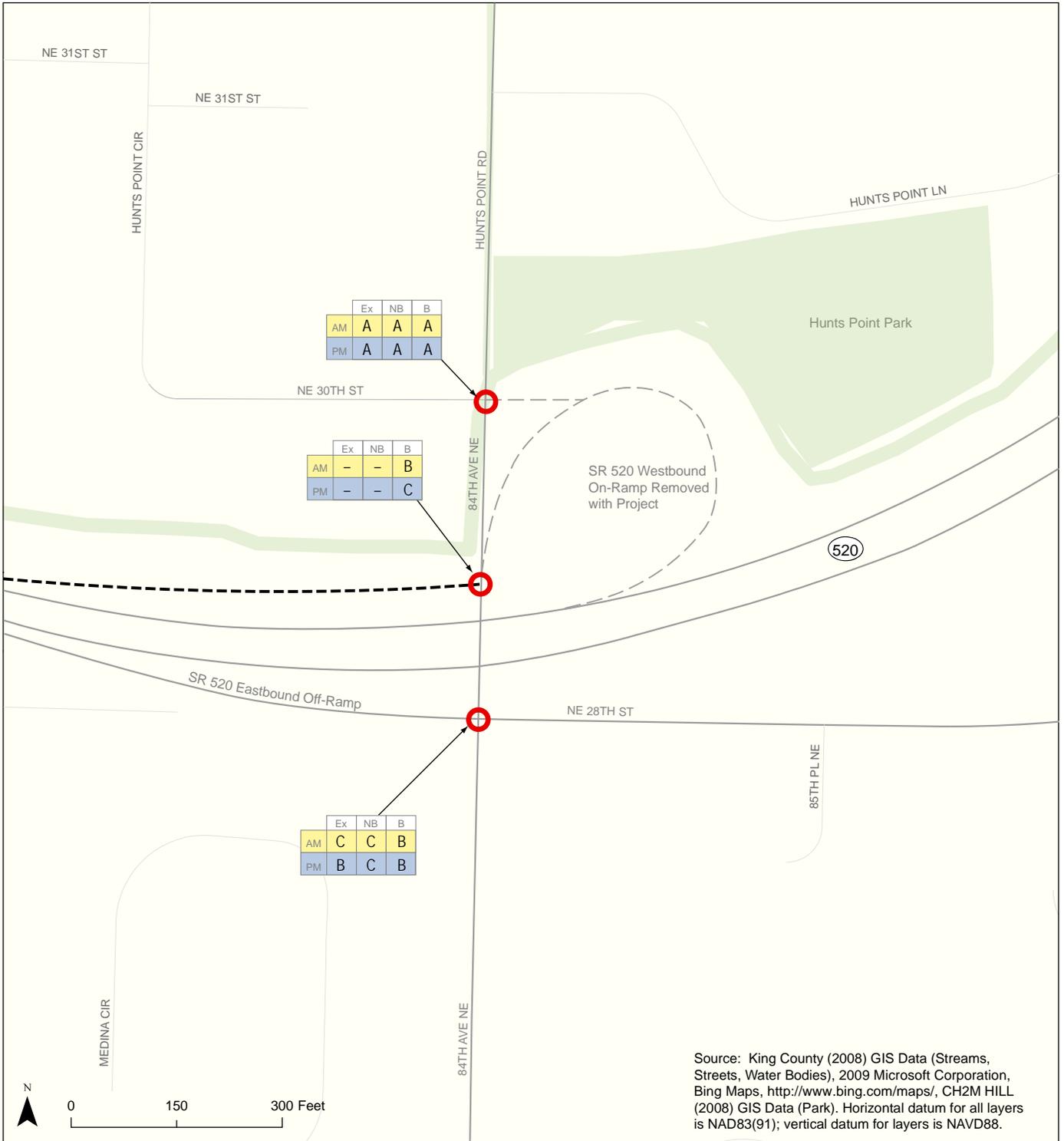
Exhibit 6-6 shows that the LOS at the intersections of this interchange area would generally be the same with the No Build Alternative as with existing conditions (operating at LOS C or better). Again, the LOS C represents the intersection operation only, not outside influences such as congestion from SR 520.

Year 2030 Build Alternative

The Build Alternative would improve westbound SR 520 operations approaching the lake compared to No Build conditions, including the merge from the 84th Avenue on-ramp. These improvements would

¹ From travel time studies conducted for Eastside design workshops.





No Build Existing

	Ex	NB	B
A.M. Peak Hour	C	C	B
P.M. Peak Hour	B	C	B

Build

Alternatives Year 2030

LEVEL OF SERVICE

- A-C No/Little Congestion
- D Moderate Congestion
- E Heavy Congestion
- F Severe Congestion/Over Capacity

Study Unsignalized Intersection

Build Alignment



Exhibit 6-6. SR 520/84th Avenue NE Interchange Area LOS

Medina to SR 202: Eastside Transit and HOV Project

reduce congestion on 84th Avenue NE during the afternoon peak hour. The duration of congestion on SR 520 westbound would be reduced by approximately 1 to 1-1/2 hours.

The SR 520/84th Avenue NE interchange would also be reconfigured, with the westbound on ramp changed from a loop to a half-diamond ramp. The new ramp would have the same storage capacity as it currently does and would maintain an HOV bypass lane. With the new ramp configuration, local traffic traveling northbound on 84th Avenue NE to make a right turn onto NE 28th would no longer be affected by on ramp related traffic congestion. See Exhibit 6-7 for the configuration associated with the Build Alternative.

As shown in Exhibits 6-4 and 6-5, traffic volumes would increase slightly with the Build Alternative, attributed to improved operations on the SR 520 corridor. At the local street level, these increases translate into 60 vph or less. Exhibit 6-6 shows that the LOS at the intersections of this interchange area would generally be the same with the No Build Alternative as it is with existing conditions (operating at LOS C or better).

SR 520/92nd Avenue NE Interchange

Existing Conditions

The SR 520/92nd Avenue NE westbound off-ramp is a five-leg approach intersection. The Points Drive NE approach enters the intersection at a 45-degree angle to the westbound SR 520 off-ramp, providing minimal sight distance. While the delay experienced at the intersection is minimal, the configuration is not standard and can lead to driver confusion.

Yarrow Point and Clyde Hill are connected to downtown Bellevue and SR 520 by 92nd Avenue NE. A parking lot in the northwest quadrant of the SR 520/92nd Avenue NE interchange is used as a pickup/dropoff lot in the morning. Drivers typically wait in this lot (usually under 15 minutes) to drop off students that ride special routes 982 and 986 operated by King County Metro for private schools. The lot has five parking spaces and is over capacity during the morning peak. Vehicles spill out of the lot and park along NE 33rd Street and Points Drive NE, affecting traffic flow as they leave and enter the traffic stream. The overflow of parking is a short-term phenomenon, typically lasting less than 30 minutes when the peak use occurs.





Exhibit 6-7. SR 520/84th Avenue NE Interchange Area – Intersection Detail
 Medina to SR 202: Eastside Transit and HOV Project

Traffic volumes through this interchange are low and vehicles are served with minimal delay. Exhibits 6-8 and 6-9 show traffic volumes on the local streets within the interchange area. During the morning and afternoon peak hours, the unsignalized intersections at the SR 520/92nd Avenue NE interchange operate at LOS B or better, as shown in Exhibit 6-10.

Year 2030 No Build Alternative

As shown in Exhibits 6-8 and 6-9, traffic volumes would increase slightly between now and the year 2030 due to increases in regional population and employment. At the local street level, the greatest increase in volumes would occur at the eastbound SR 520 on-ramp during the p.m. peak hour, with an addition of approximately 200 vehicles per hour. All of the intersections studied in this interchange area would operate at LOS C or better as shown in Exhibit 6-10.

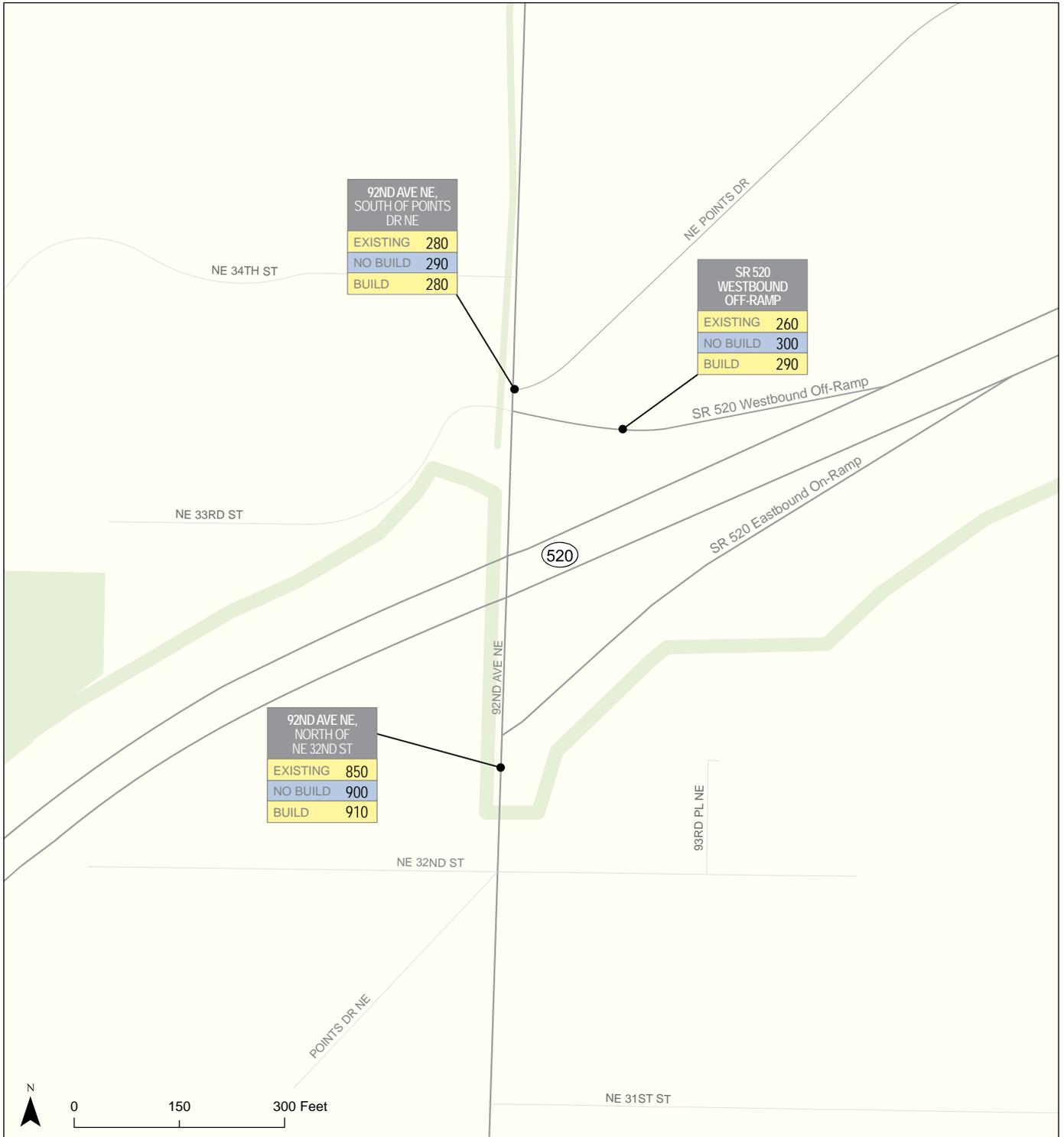
Year 2030 Build Alternative

With the project, traffic volumes near the SR 520/92nd Avenue NE interchange area would be similar to the No Build Alternative. Exhibits 6-8 and 6-9 show that the difference in traffic volumes at the local street level would be negligible. Intersection operations would be the same as with the No Build Alternative.

With the project, the SR 520/92nd Avenue NE interchange would be reconstructed to include a new lid, center freeway transit station, and a roundabout at the SR 520 westbound off-ramp. The roundabout would improve traffic operations at this intersection from LOS C under No Build conditions to LOS A with the project. Exhibit 6-11 shows the proposed interchange configuration.

The interchange lid would provide a connection to the new center freeway transit station. The pickup and dropoff function would be relocated to the lid and designed as a one-way drive (southbound) on the west side of 92nd Avenue NE. This configuration would allow vehicles to park short term to pick up or drop off passengers using the freeway transit station and would improve traffic circulation at the interchange area. The exit of this one-way drive would become the east leg of the 92nd Avenue NE/SR 520 eastbound on-ramp intersection.





Year 2030	LOCATION	Volume
Alternative	EXISTING	Volume
	NO BUILD	Volume
Year 2030	BUILD	Volume

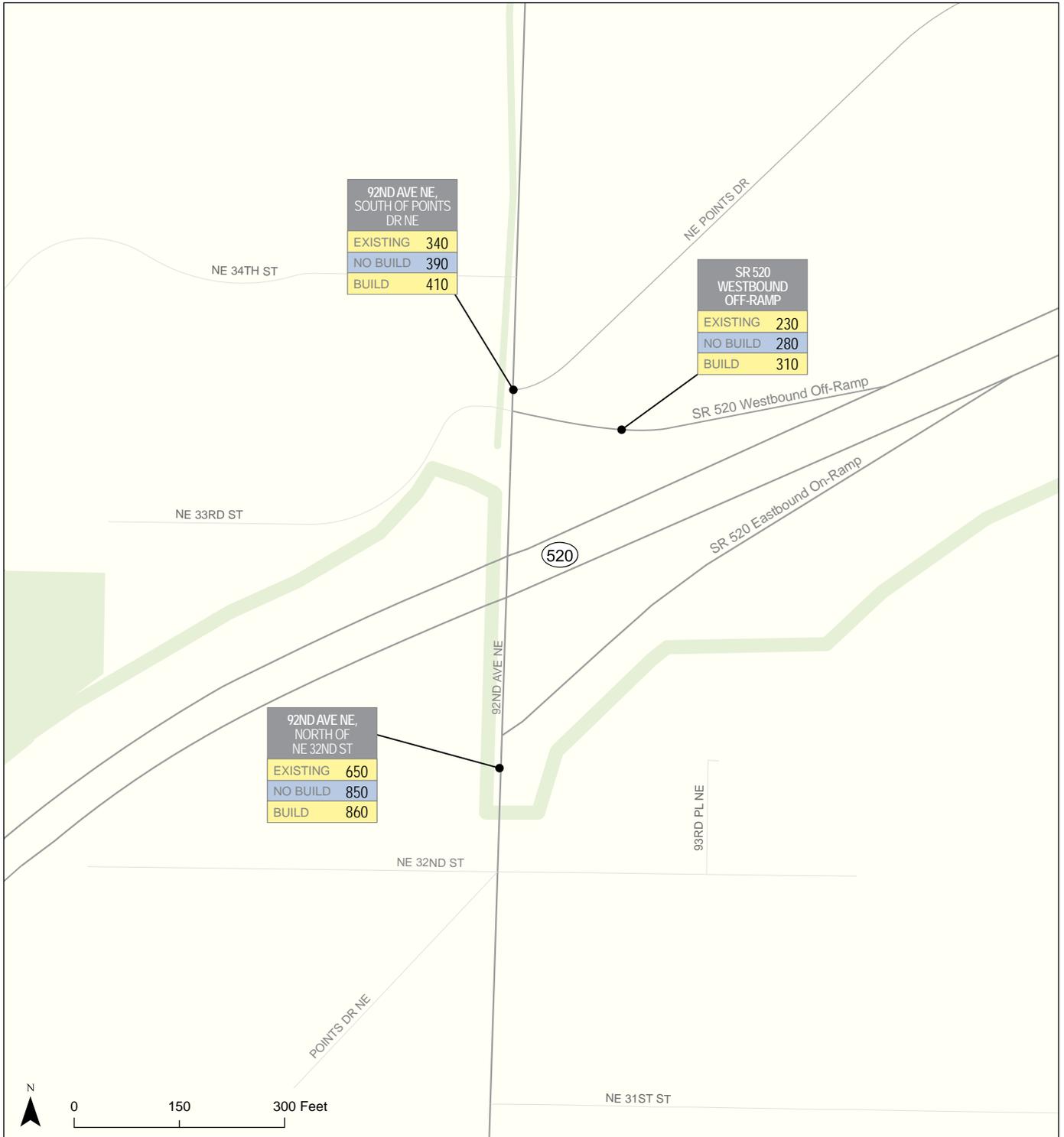
Volumes are totals for both directions

Source: King County (2008) GIS Data (Streams, Streets, Water Bodies), 2009 Microsoft Corporation, Bing Maps, <http://www.bing.com/maps/>, CH2M HILL (2008) GIS Data (Park). Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.

Exhibit 6-8. SR 520/92nd Avenue NE Interchange Area – A.M. Peak Hour Vehicle Volumes

Medina to SR 202: Eastside Transit and HOV Project





Year 2030	LOCATION	Volume
Year 2030	EXISTING	Volume
	NO BUILD	Volume
Year 2030	BUILD	Volume

Alternative

Volumes are totals for both directions

Source: King County (2008) GIS Data (Streams, Streets, Water Bodies), 2009 Microsoft Corporation, Bing Maps, <http://www.bing.com/maps/>, CH2M HILL (2008) GIS Data (Park). Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.

Exhibit 6-9. SR 520/92nd Avenue NE Interchange Area – P.M. Peak Hour Vehicle Volumes

Medina to SR 202: Eastside Transit and HOV Project





	Ex	NB	B
A.M. Peak Hour	C	C	B
P.M. Peak Hour	B	C	B

Alternatives Year 2030

LEVEL OF SERVICE

- A-C No/Little Congestion
- D Moderate Congestion
- E Heavy Congestion
- F Severe Congestion/Over Capacity

Study Unsignalized Intersection



Exhibit 6-10. SR 520/92nd Avenue NE Interchange Area LOS

Medina to SR 202: Eastside Transit and HOV Project



Exhibit 6-11. **SR 520/92nd Avenue NE Interchange Area – Intersection Detail**
 Medina to SR 202: Eastside Transit and HOV Project

This intersection would operate similar to the No Build Alternative at LOS A.

SR 520/Bellevue Way NE and 108th Avenue NE Interchanges

These two interchanges are located approximately 1/4 mile apart and operate as a split-diamond type configuration. Therefore, they are discussed together in this chapter.

Bellevue Way NE provides access between SR 520 and Kirkland to the north¹ and downtown Bellevue to the south. Vehicles traveling on Bellevue Way NE near the SR 520 interchange currently experience moderate traffic congestion at different locations during the morning and afternoon peak hours. The 108th Avenue NE corridor primarily serves trips to and from SR 520 through the interchange, rather than 'through' trips between Bellevue and Kirkland. In addition, 108th Avenue NE provides access to and from the South Kirkland Park-and-Ride and to businesses south of SR 520.

Existing Conditions

The Bellevue Way/Northup Way intersection is currently congested during the afternoon peak hour. Southbound traffic approaching this intersection typically backs up through the Lake Washington Boulevard/NE 38th Place intersection.

Northbound traffic typically backs up from just north of NE 38th Place, where Lake Washington Boulevard is reduced from two lanes to one, to south of the Bellevue Way/Northup Way intersection. These congestion points are shown in Exhibits 6-1 and 6-2.

There is also congestion to the east within the SR 520/108th Avenue NE interchange area. There are only a few hundred feet between the 108th Avenue NE/Northup Way intersection and the SR 520 ramps, providing minimal queue storage between these locations.

Occasionally, congestion extends back onto SR 520. This congestion is caused, in part, by northbound vehicles on 108th Avenue NE waiting to turn left onto Northup Way. These vehicles often spill back from the left-turn only lane, blocking the through lanes.

Eastbound buses on SR 520 that travel to the South Kirkland Park-and-Ride must currently use the Bellevue Way NE exit. Schedules may be

¹ The roadway becomes Lake Washington Boulevard north of its intersection with Northup Way.



negatively affected as buses follow the same route as general-purpose vehicles in exiting the freeway and on the local street, passing through two congested intersections (Bellevue Way NE/Northrup Way and 108th Avenue NE/Northrup Way).

Traffic volumes for local streets within the SR 520/Bellevue Way NE interchange area during morning and afternoon peak hours are shown in Exhibits 6-12 and 6-13. The study intersections at this interchange area currently operate at an overall LOS D or better during the morning and afternoon peak hours as shown in Exhibit 6-14. Configuration of the SR 520/Bellevue Way NE interchange is shown in Exhibit 6-15.

Traffic volumes for local streets within the SR 520/108th Avenue NE interchange area during morning and afternoon peak hours are shown in Exhibits 6-16 and 6-17. The study intersections at this interchange area currently operate at an overall LOS D or better during the morning and afternoon peak hours as shown in Exhibit 6-18. Configuration of the SR 520/108th Avenue NE interchange is shown in Exhibit 6-19.

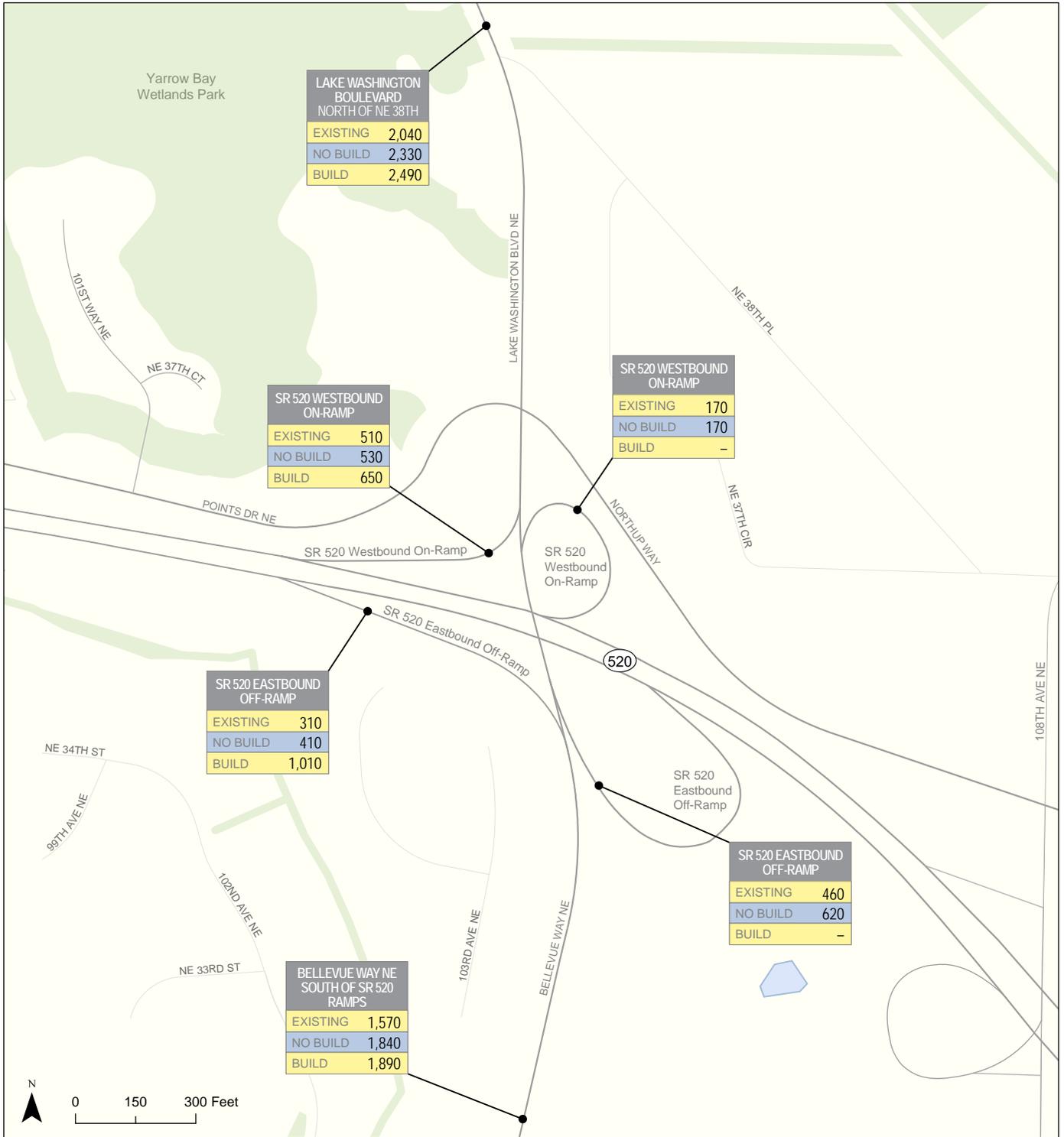
Year 2030 No Build Alternative

Exhibits 6-12, 6-13, 6-16, and 6-17 show traffic volumes for local streets that would increase due to regional population and employment growth between now and the year 2030. The greatest increase is forecasted to be approximately 460 vph at the eastbound on-ramp at the SR 520/108th interchange. The increase in traffic would result in increased congestion during the commute periods, degrading operations to LOS E or F at the following locations (see Exhibits 6-14 and 6-18).

- The Lake Washington Boulevard NE/NE 38th Place (LOS F during the afternoon peak hour)
- The Bellevue Way/Northrup Way intersection (LOS E during the afternoon peak hour)
- The 108th Avenue NE/Northrup Way intersection (LOS F during the afternoon peak hour)

In addition, increased congestion on westbound SR 520 would affect operations on the on-ramps during the evening peak hour.





	LOCATION	EXISTING	VOLUME
Year 2030	NO BUILD	Volume	
	BUILD	Volume	

Alternative

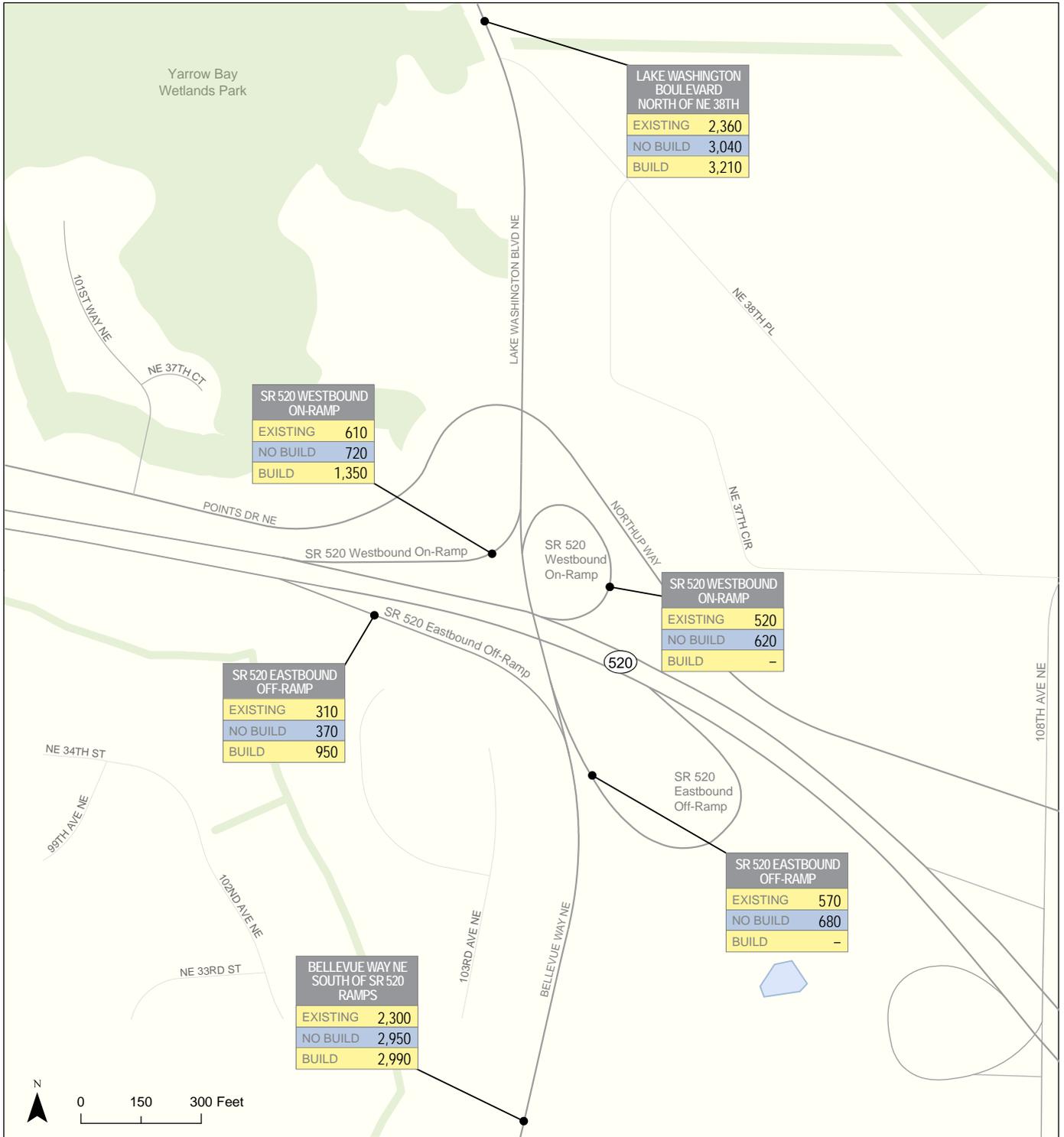
Volumes are totals for both directions

Source: King County (2008) GIS Data (Streams, Streets, Water Bodies), 2009 Microsoft Corporation, Bing Maps, <http://www.bing.com/maps/>, CH2M HILL (2008) GIS Data (Park). Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.

Exhibit 6-12. SR 520/Belevue Way NE Interchange Area – A.M. Peak Hour Vehicle Volumes

Medina to SR 202: Eastside Transit and HOV Project





LOCATION	
EXISTING	Volume
Year 2030 - NO BUILD	Volume
Year 2030 - BUILD	Volume

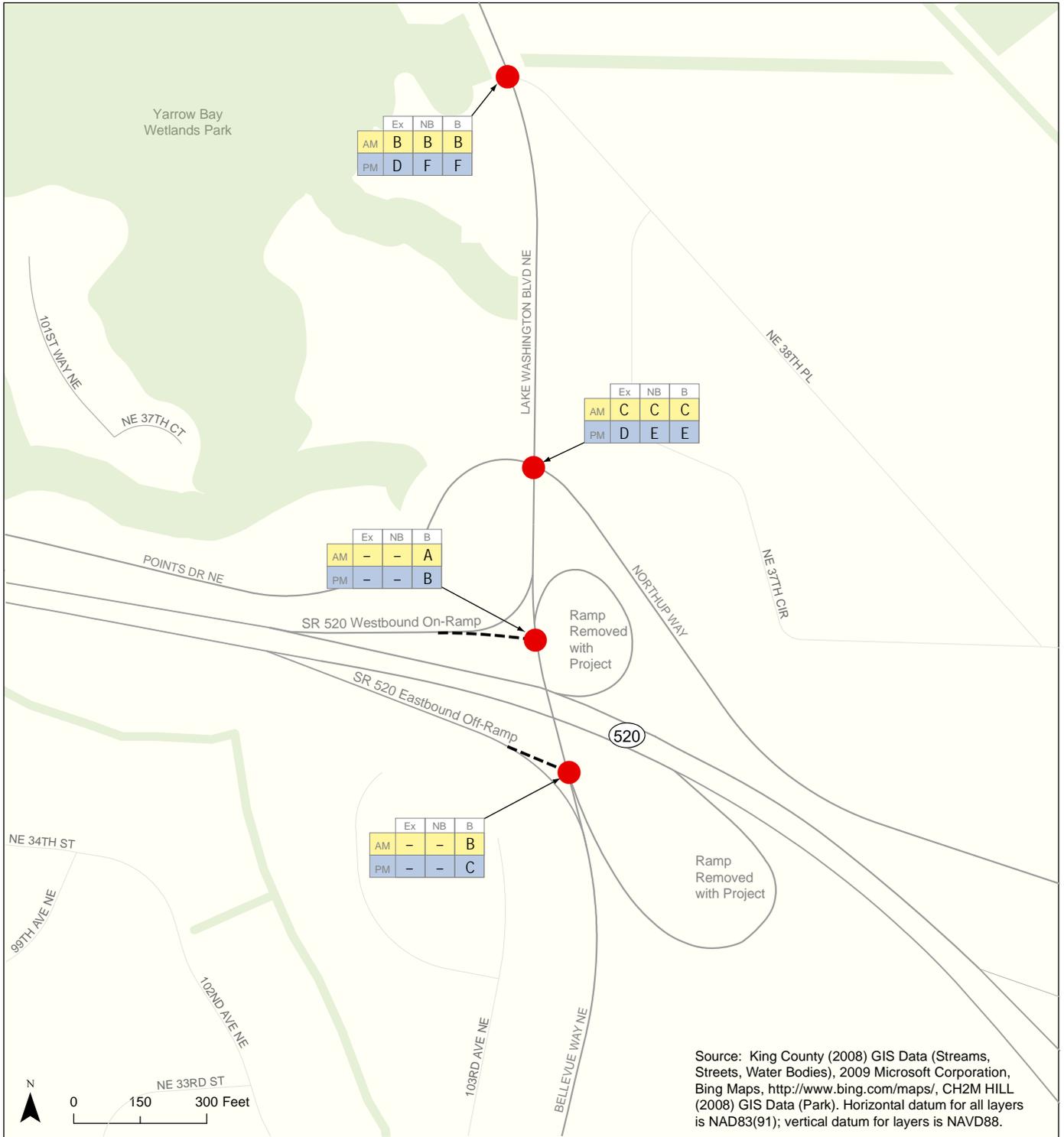
Alternative — Volumes are totals for both directions

Source: King County (2008) GIS Data (Streams, Streets, Water Bodies), 2009 Microsoft Corporation, Bing Maps, <http://www.bing.com/maps/>, CH2M HILL (2008) GIS Data (Park). Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.

Exhibit 6-13. SR 520/Belevue Way NE Interchange Area – P.M. Peak Hour Vehicle Volumes

Medina to SR 202: Eastside Transit and HOV Project





No Build Existing

	Ex	NB	B
A.M. Peak Hour	C	C	B
P.M. Peak Hour	B	C	B

Build

	Ex	NB	B
A.M. Peak Hour	C	C	B
P.M. Peak Hour	B	C	B

Alternatives Year 2030

- LEVEL OF SERVICE**
- A-C No/Little Congestion
 - D Moderate Congestion
 - E Heavy Congestion
 - F Severe Congestion/Over Capacity

● Study Signalized Intersection

--- Build Alignment



Exhibit 6-14. SR 520/Bellevue Way NE Interchange Area LOS

Medina to SR 202: Eastside Transit and HOV Project



Two lane general-purpose on-ramp

SR 520 westbound on-ramp

SR 520 eastbound off-ramp

Second left turn lane added

SR 520 regional bike/pedestrian path

- New signaled intersections replace loop ramp
- Improves northbound traffic flow

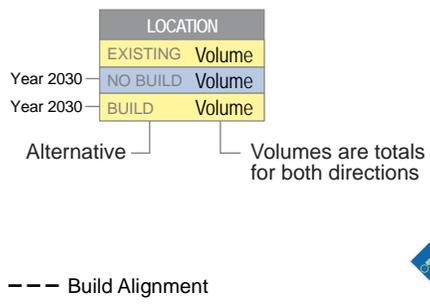
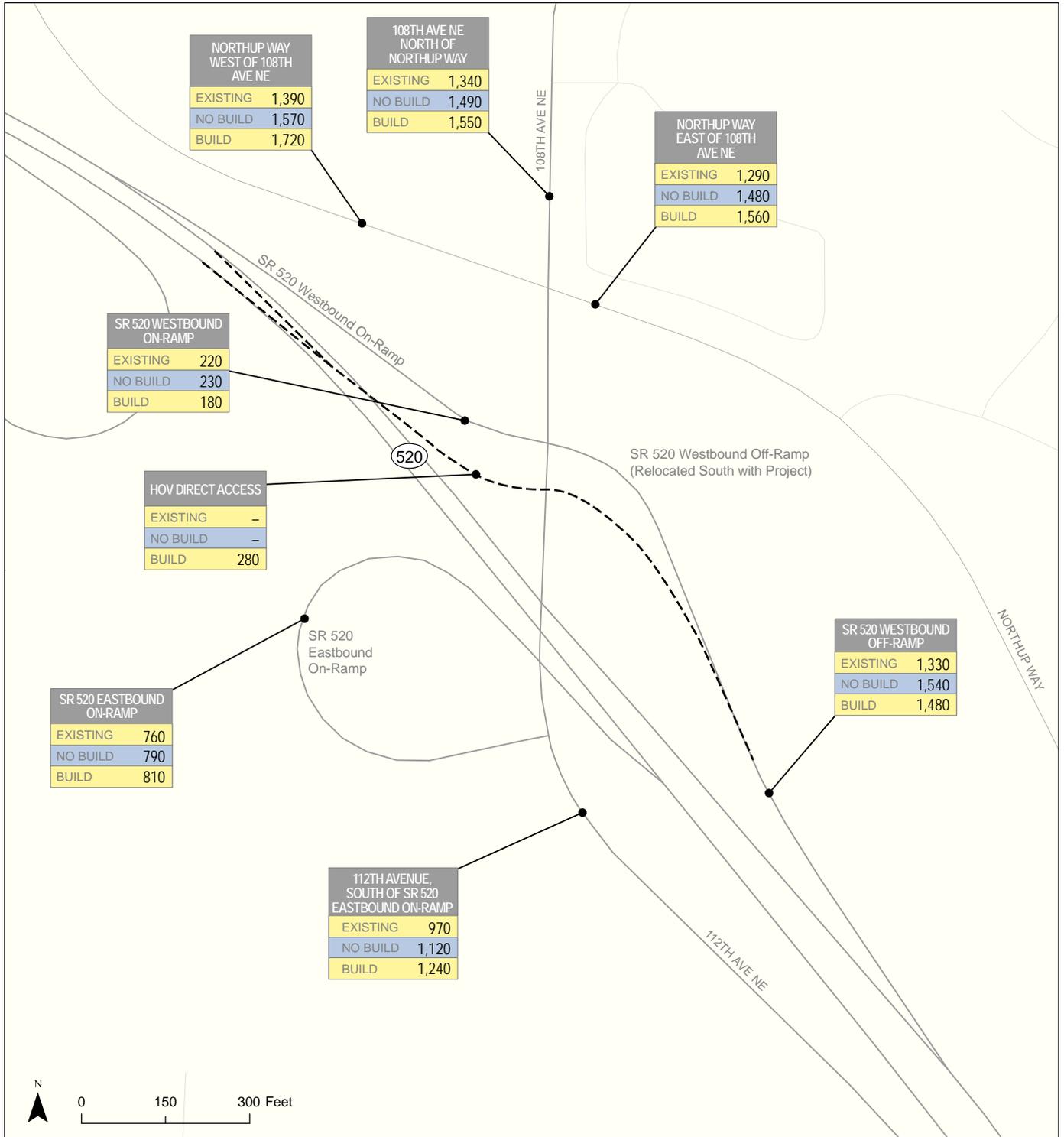
520

Restoration of Yarrow Creek Basin



Exhibit 6-15. SR 520/Bellevue Way Interchange Area – Intersection Detail

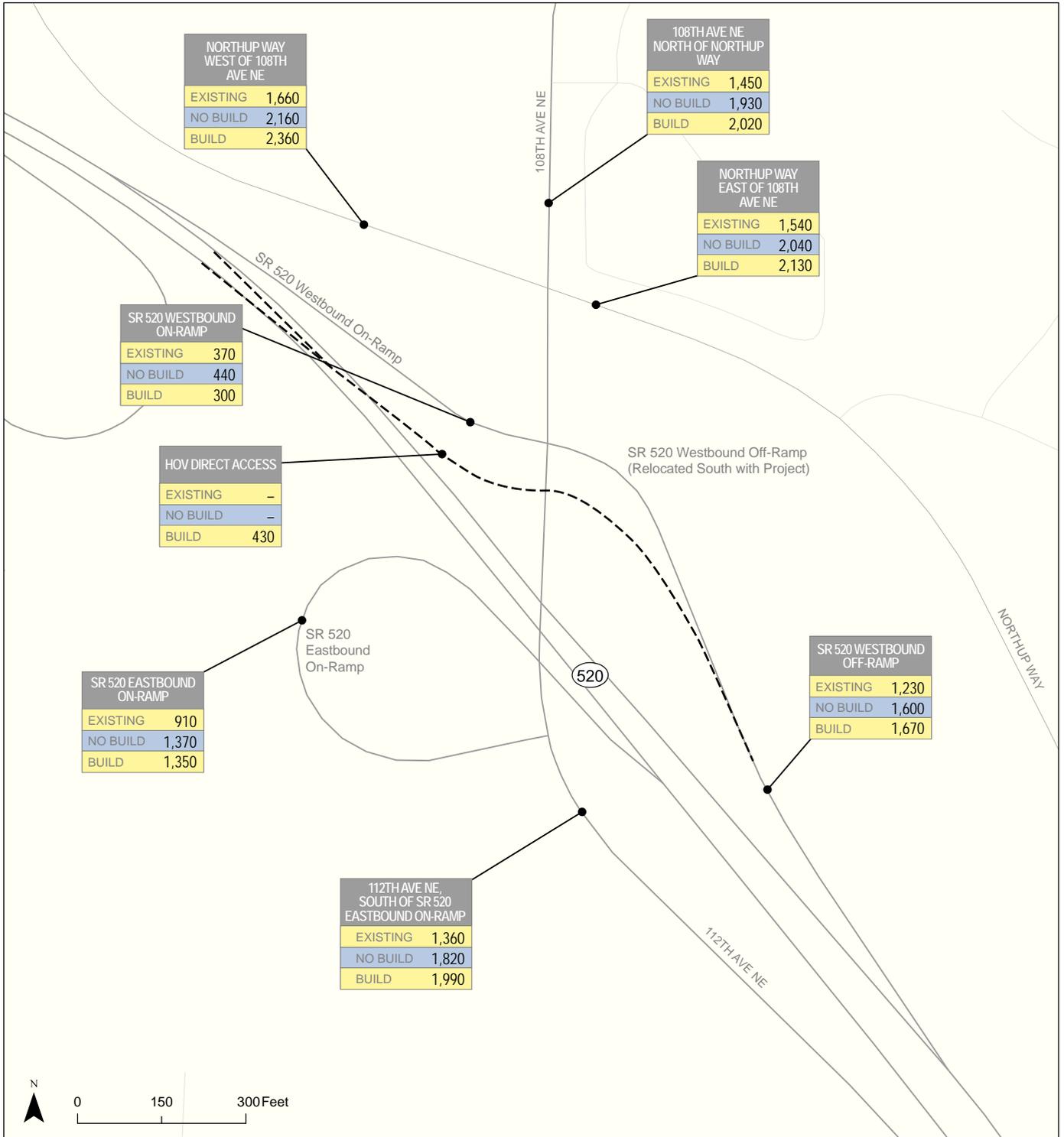
Medina to SR 202: Eastside Transit and HOV Project



Source: King County (2008) GIS Data (Streams, Streets, Water Bodies), CH2M HILL (2008) GIS Data (Park). Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.

Exhibit 6-16. SR 520/108th Avenue NE Interchange Area – A.M. Peak Hour Vehicle Volumes

Medina to SR 202: Eastside Transit and HOV Project



Year 2030	LOCATION	
	EXISTING	Volume
Year 2030	NO BUILD	Volume
	BUILD	Volume

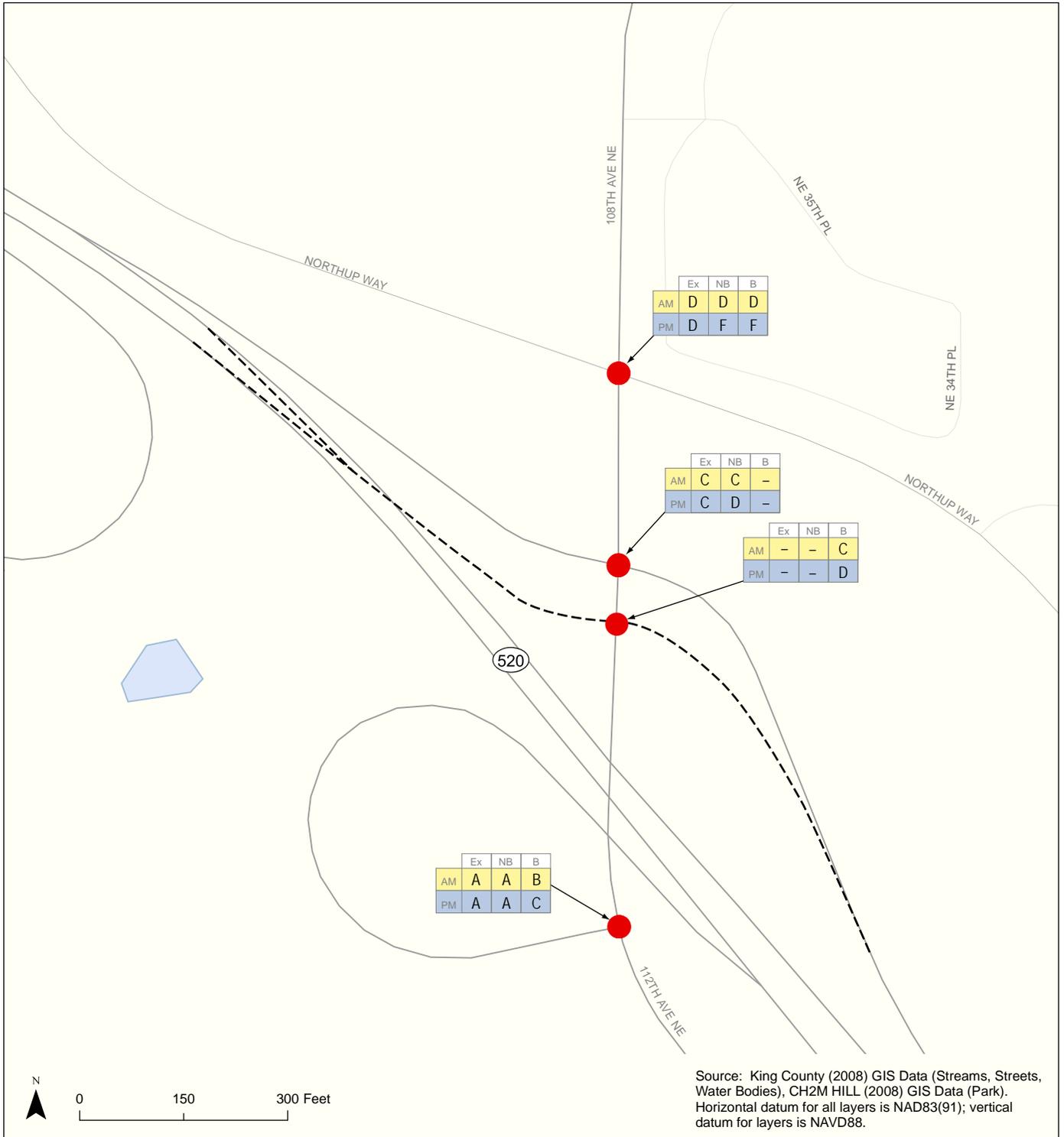
Alternative — Volumes are totals for both directions

--- Build Alignment

Source: King County (2008) GIS Data (Streams, Streets, Water Bodies), CH2M HILL (2008) GIS Data (Park). Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.

Exhibit 6-17. SR 520/108th Avenue NE Interchange Area – P.M. Peak Hour Vehicle Volumes

Medina to SR 202: Eastside Transit and HOV Project



		No Build			Build			
		Existing	Ex	NB	B	Ex	NB	B
A.M. Peak Hour	AM	C	C	C	B			
P.M. Peak Hour	PM	B	C	C	B			

Alternatives
Year 2030

LEVEL OF SERVICE

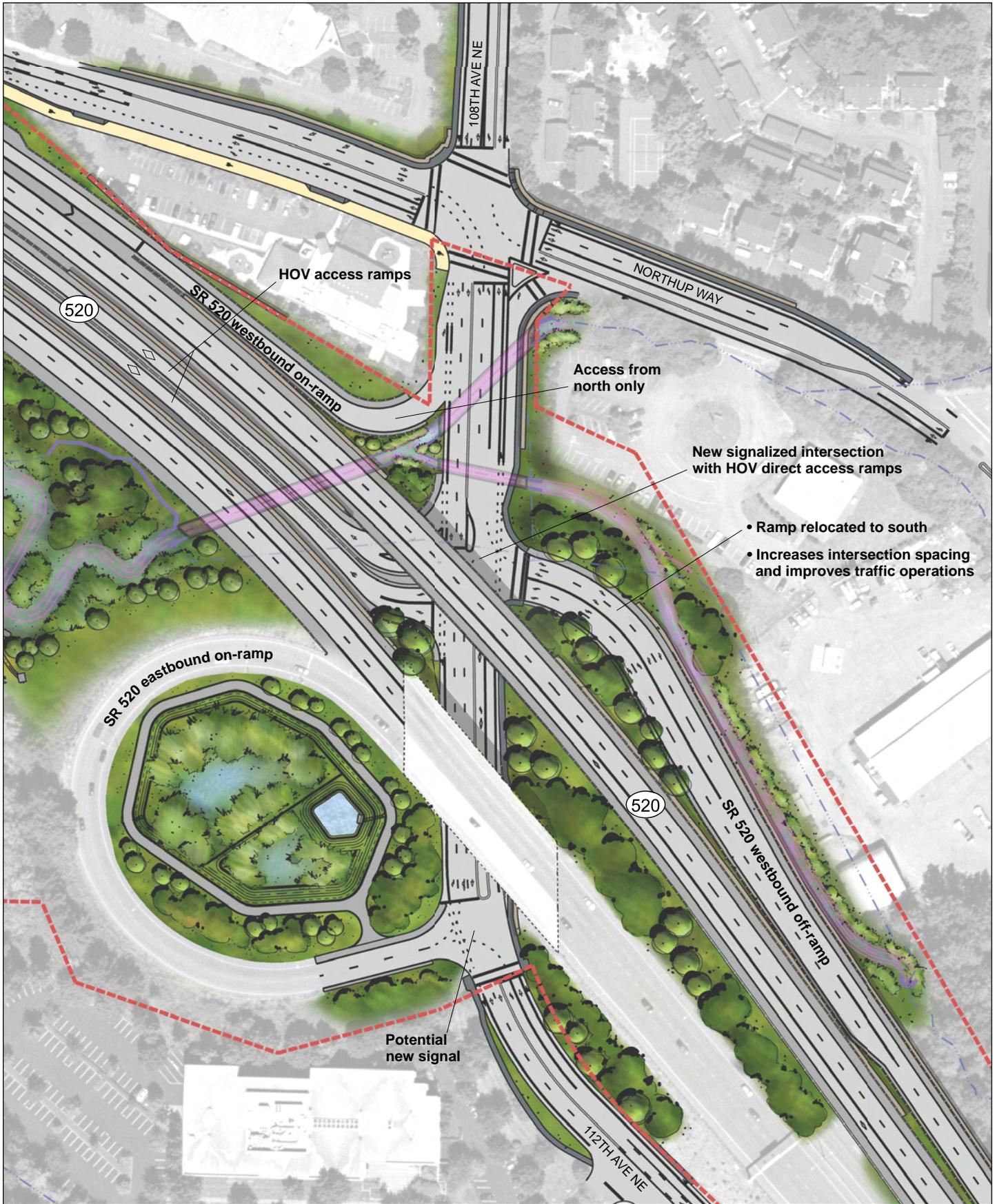
- A-C No/Little Congestion
- D Moderate Congestion
- E Heavy Congestion
- F Severe Congestion/Over Capacity

- Study Signalized Intersection
- Build Alignment



Exhibit 6-18. SR 520/108th Avenue NE Interchange Area LOS

Medina to SR 202: Eastside Transit and HOV Project



- Ramp relocated to south
- Increases intersection spacing and improves traffic operations



Exhibit 6-19. SR 520/108th Avenue NE Interchange Area – Intersection Detail

Medina to SR 202: Eastside Transit and HOV Project

Year 2030 Build Alternative

With the Build Alternative, traffic volumes would increase slightly, with increases on Northup Way (approximately 300 vph) and on 108th Avenue NE (approximately 430 vph). This increase is a result of SR 520 improvements and interchange reconfigurations, including an HOV direct access ramp to/from 108th Avenue NE that would change traffic circulation in the area.

Exhibits 6-12, 6-13, 6-16, and 6-17 show traffic volumes for the Build Alternative. Exhibits 6-15 and 6-19 show channelization associated with the Build Alternative.

With the project, the SR 520/Bellevue Way NE interchange would be reconstructed as a half-diamond configuration, with traffic signals at the westbound and eastbound ramp intersections. The half-diamond interchange would remove the loop ramps, allowing realignment of Yarrow Creek. This would return the stream to a more natural form and remove a series of culverts it currently passes through at the existing interchange. The interchange would also incorporate two nonmotorized paths, facilitating nonmotorized traffic through the area. Chapter 7 describes nonmotorized facilities in detail.

A direct access ramp to and from SR 520 to the west would be provided at 108th Avenue NE. Buses bound for 108th Avenue NE currently exit SR 520 at Bellevue Way NE and travel in congestion on Northup Way and 108th Avenue NE to access the South Kirkland Park-and-Ride. With the HOV lanes moved to the inside on SR 520 and the direct access transit ramp, buses would have improved access to the park-and-ride lot and SR 520.

A second northbound left-turn lane would be provided at the 108th Avenue NE/Northup Way intersection. The additional turn-lane would reduce backups from Northup Way onto the westbound SR 520 off-ramp.

The 108th Avenue NE/SR 520 westbound off-ramp intersection would be shifted to the south and aligned with the direct access ramps to and from the west. More length (storage) would be provided between the SR 520 westbound ramps and Northup Way.

Northbound general-purpose traffic on 108th Avenue NE would no longer be able to access westbound SR 520 from that street. Traffic (about 40 vph during the afternoon peak period) would be routed to Bellevue Way NE to access SR 520 westbound. A second westbound left



turn lane would be added to Northrup Way to accommodate re-routed trips.

The project includes an additional lane southbound on 108th Avenue NE between the SR 520 westbound off-ramp and eastbound on-ramp. The additional lane would improve the flow of traffic from the SR 520 westbound off-ramp, reducing queue spillbacks onto the mainline of SR 520.

While these improvements would improve congestion for specific movements in the area, overall intersection LOS would be the similar to the No Build Alternative.

