CHAPTER 2
TRAFFIC CONDITIONS

The SR 99 North study corridor is highly traveled, especially during the a.m. and p.m. peak periods. These high peak period traffic volumes, combined with the large number of signalized intersections, result in poor traffic operations at many locations.

Historical & Existing Trends in Traffic Volumes

Traffic volumes have steadily increased along the study corridor, especially in the area south of the Aurora Bridge. Table 2-1 shows the 1996 and 2001 Average Daily Traffic (ADT) on the SR 99 North corridor at specific locations.

Table 2-1
SR 99 North Corridor Average Daily Traffic Volumes

Location	ADT Values 1996	ADT Values 2001
Broad Street	75,100	83,200
Aurora Bridge	78,800	84,700
N. 85th Street	40,100	41,000
N. 105th St.	34,500	39,600
N. 145th St.	36,300	38,800
Source: City of Seattle Traffic Flow Data		

The entire corridor currently experiences noticeable to significant traffic delays during the a.m. and p.m. peak hours. With projected increases in traffic volumes from 26 to 39 percent in the next 30 years, the delays are expected to not only worsen in the peak hour but to spread across a larger peak period with an increase in the congestion of the off-peak period.

WSDOT Congestion Index

WSDOT has developed a congestion index to report the severity of traffic congestion over a 24-hour period. Index values under the new system range from 1 (little to no congestion) to 24 (theoretically congestion over the entire 24 hours in a day). This congestion indicator enables the comparison of each highway's daily traffic volume to one-hour capacity.

According to Washington's Transportation Plan, the SR 99 North corridor qualifies as a congested highway both now and in the future. The Washington State Transportation Commission adopted thresholds to establish these "congested" highways. An urban highway such as the SR 99 North Corridor is considered congested when the index reaches a value of 10. The existing (2001) congestion index for the SR 99 North corridor from the north end of the Battery Street Tunnel to N. 145th Street is 10. The projected congestion index for the corridor in 2030 is 13 if no corridor improvements are implemented.

Level of Service

Overview of Traffic Characteristics

The SR 99 North corridor consists of two distinct traffic areas. The area from the north end of the Battery Street Tunnel to Green Lake Way is an unsignalized section of the corridor. This section experiences the highest traffic volumes on the corridor with vehicles often traveling 10 to 20 mph over the posted 40 mph posted speed limit. This section has an access management classification of 1 and 3.

The section from Green Lake Way to N. 145th Street is a signalized section with speed limits of 30 to 35 mph from Winona Ave N. to N. 115th Street and 40 mph north of N. 115th Street. This signalized corridor section has an access management classification of class 3 and 4. Descriptions of the access management classifications can be found in Chapter 1 of this study and in Appendix A.

Unsignalized Level of Service

South of Green Lake, the SR 99 North corridor was divided into four segments for purposes of the traffic analysis. These segments were determined based on changes in roadway characteristics, traffic volumes, and adjacent street access. Tables 2-2 and 2-3 show the level of service (LOS) analysis results for the four segments during both the a.m. and p.m. peak periods, respectively.

The unsignalized section of the corridor from the north end of the Battery Street Tunnel to Green Lake Way is currently operating at a poor LOS based on the traffic densities of the segments. Further explanation of the LOS values can be found in Appendix B. The worst traffic congestion in this area occurs northbound during the p.m. peak hour and southbound during the a.m. peak hour, as shown in Table 2-3. Levels of Service (LOS) during these peak travel times include poor operation (LOS E) and failing operation (LOS F).

By the year 2030, conditions for the southbound a.m. peak will have deteriorated to failing LOS values for three of the four segments. Conditions for the northbound direction in the a.m. peak will also worsen as shown in Table 2-2.

Table 2-2
A.M. Peak-Hour Level of Service for the Unsignalized Segment South of Green Lake Way

Segment	2000 LOS		2030 No Build LOS	
	Northbound	Southbound	Northbound	Southbound
Valley Street to Raye Street	C	E	D	F
Raye Street to Bridge Way N./ Fremont Way N.	C	E	D	F
Bridge Way N./ Fremont Way N. to N. 46th Street	C	E	C	F
N. 46th Street to Green Lake Way	C	C	C	D

During the current p.m. peak hour, the SR 99 North corridor experiences high volumes of traffic in both the northbound and southbound directions. As shown in Table 2-3 below, the LOS values northbound and southbound will decline over the next 30 years.

Table 2-3
P.M. Peak-Hour Level of Service for Unsignalized Intersections South of Green Lake Way

Segment	2000 LOS		2030 No Build LOS	
	Northbound	Southbound	Northbound	Southbound
Valley Street to Raye Street	E	D	F	E
Raye Street to Bridge Way N. / Fremont Way N.	F	D	F	E
Bridge Way N./ Fremont Way N. to N. 46th Street	D	D	F	E
N. 46th Street to Green Lake Way	C	B	D	B

Signalized Level of Service

To assess current and future traffic operations for determining LOS at signalized intersections, each traffic signal along the study corridor was modeled using Synchro software. The model was calibrated to more accurately reflect the field conditions; as part of this calibration, the saturation flow rate was changed to 1,700 vehicles per hour per lane. For both the a.m. and p.m. peak hours, this analysis was performed using the current turning movements and intersection geometric conditions.

Future traffic demand was estimated using current traffic and turning volumes and adjusting the volumes to reflect anticipated growth along the corridor (see Appendix C for a further description of how LOS was calculated for signalized intersections).

Table 2-4 presents the a.m. and p.m. peak-hour intersection LOS values for both the year 2000 and the future no-build year 2030.

As shown in Table 2-4, under current conditions many of the signalized intersections between Green Lake Way and N. 145th Street experience noticeable to significant travel delays as a result of congestion. Without improvements and with the expected growth over the next 30 years, most of the signalized intersections along the study corridor will be operating with significant travel delays and poor to failing LOS by 2030.

Picture 2-1:

Traffic congestion northbound near SR 99 North and N. 103rd Street

Table 2-4
Summary of Signalized Intersection Level of Service

Intersection of Aurora Ave N. &	A.M. Peak Level of Service		P.M. Peak Level of Service	
	2000	2030	2000	2030
N. 68th Street	A	A	A	A
Winona Ave N.	B	D	B	D
N. 77th Street	A	B	B	C
N. 80th Street	C	F	D	F
N. 83rd Street	A	A	A	B
N. 85th Street	D	F	F	F
N. 90th Street	A	B	A	C
N. 100th Street	A	B	B	E
N. 105th Street	D	F	E	F
N. 115th Street	A	A	B	E
N. 117th Street	A	B	A	C
N. 125th Street	D	F	C	F
N. 130th Street	C	F	D	F
N. 135th Street	A	B	A	C
N. 145th Street	D	F	D	F

Although some intersections shown in Table 2-4 appear to be operating well in 2030 (LOS A, B, or C), this does not mean that the corridor is operating well overall. The major intersections with high volumes of cross-street traffic (e.g., N. 85th Street) can have a lower intersection LOS (LOS D, E, or F). Traffic can back-up north and south bound at these major intersections. Traffic back-ups at the major intersection can reduce the volume of traffic able to reach the next minor intersection. The limited volumes of

traffic able to reach the minor intersections from the heavily congested and backed up major intersections can create a misleading high LOS at the minor intersections.

An example of this can be seen in Table 2-4 for the intersections of N. 80th Street, N. 83rd Street, and N. 85th Street. For the year 2030 the intersections of N. 80th Street and N. 85th Street in the a.m. and p.m. peak periods are LOS F. The intersection between these two is N. 83rd Street, which in the year 2030 is operating at a much higher level of service (A for the a.m. peak and B for the p.m. peak). Traffic is congested north and southbound on SR 99 North at the major intersections of N. 80th Street and N. 85th Street as a result of the high traffic volumes and signal timings, which must also accommodate a high volume of cross-street traffic. The N. 83rd Street intersection, which has a much lower volume of traffic able to reach it from the backed up N. 80th Street and N. 85th Street intersection as well as a lower volume of cross-street traffic, does not experience this level of congestion delay.

The poor LOS at key intersections greatly affects the overall flow of traffic through the corridor, as is present in the arterial level of service summary in the next section.

Signalized Arterial Level of Service

By 2030, traffic volumes are projected to increase up to 39 percent for the a.m. peak hour and up to 26 percent for the p.m. peak hour. The resulting increase in congestion will cause a significant increase in signal delay and total travel time.

The arterial performance of the corridor was obtained from the Synchro traffic simulation model of the signalized section of the corridor for the peak periods. An arterial level of service report was obtained from the Synchro models representing the existing and 2030 no-build cases for the a.m. and p.m. peak hours. The arterial LOS report provided the travel time, arterial speed, and arterial level of service for this section of the corridor. The arterial performance for the peak periods in the existing and the 2030 no-build cases is summarized in Table 2-5 for the a.m. peak hour and Table 2-6 for the p.m. peak hour.

With projected growth, travel times through the signalized section of the corridor will experience significant increases. Table 2-5 shows that the travel time from N. 145th Street to N. 68th Street, in the southbound direction of the a.m. peak hour, will nearly double from 13 minutes to 25 minutes. The p.m. direction northbound also experiences a dramatic increase in travel time from 12 minutes to 26 minutes as shown in Table 2-6.

Table 2-5
Summary of Arterial Performance in the A.M. Peak Hour

	Travel Time (min)	Arterial Speed (mph)	Arterial LOS
Existing northbound	11	22	C
2030 No-Build northbound	14	17	D
Existing southbound	13	22	D
2030 No-Build southbound	25	11	F

Table 2-6
Summary of Arterial Performance in the P.M. Peak Hour

	Travel Time (min)	Arterial Speed (mph)	Arterial LOS
Existing northbound	12	19	D
2030 No-Build northbound	26	9	F
Existing southbound	15	18	D
2030 No-Build southbound	22	12	F

As is shown in the tables above, traffic volumes will have increased significantly by 2030 reducing the performance of SR 99 North for both the a.m. and p.m. peak hours in terms of LOS, arterial speed, and travel time. However, the resulting decrease in performance will not be limited to these peak hours of the day. Congestion will spread across a larger peak period of the day and even into the off-peak hours.