

APPENDIX F

TRANSPORTATION Analysis and Level of Service Standards

EXISTING TRAFFIC OPERATIONS

Base Year Traffic Volumes

The base year (2000) traffic volumes for this study were collected from several different sources. The traffic volumes for the State Route segments were provided by WSDOT in the 1998 Annual Traffic Report. Other sources include Kitsap County Public Works Department, the Olhava Master Plan Development, and Poulsbo Place Development traffic studies prepared by Gibson Traffic Consultants (GTC). The counts were conducted at various times between 1994 and 1999. In each case, the traffic counts were updated by an appropriate growth rate (indicated by the Kitsap County transportation model) to the 2000 base. On roadway segments where counts were not available, base year traffic volumes were calculated from the 1994 transportation model. The existing 2000 Average Daily Traffic (ADT) volumes for this study are shown on Map F-1.

Methodology

Traffic analysis of the existing roadways was conducted to identify deficiencies. The acknowledged source for determining intersection and roadway capacity is the current edition of the Transportation Research Board Highway Capacity Manual (HCM) - Special Report 209. Capacity analyses are described in terms of Level of Service (LOS.) LOS is a qualitative term that describes the operating conditions a driver will experience while traveling on a particular street or highway during a specific time interval. It ranges from LOS A (little or no delay) to LOS F (long delays, congestion). LOS for roadway links is determined by calculating a volume-to-capacity (V/C) ratio. The V/C ratio is developed by comparing roadway travel volumes to roadway capacity.

The V/C comparison of roadway links using ADT volumes gives a general assessment of the operation of a roadway. Typically, for urban roadways, analysis of intersections for peak hour traffic conditions can provide a more detailed description. In this study, the V/C results were used to determine which roadways might require additional improvements, or further analysis.

The County has adopted LOS D as the minimal standard for roadways and intersections within the urban growth area. The City has adopted LOS E as acceptable for AM or PM peak hour conditions only, with LOS C as the optimal traffic volume. Table F-1 shows the relationship between LOS and V/C ratios, comparing Kitsap County to the City of Poulsbo.

Table F-1 LOS and V/C Comparison		
Level of Service	Volume-to-Capacity Ratio Kitsap County	Volume-to-Capacity Ratio City of Poulsbo
A	< 0.59	< 0.60
B	0.60 to 0.69	0.61 to 0.70
C	0.70 to 0.79	0.71 to 0.80
D	0.80 to 0.89	0.81 to 0.90
E	0.90 to 0.99	0.91 to 1.00
F	≥ 1.00	> 1.00

Roadway Capacity Evaluation

The maximum theoretical vehicle-carrying capacity of a roadway is determined to be approximately 18,000 to 22,000 vehicles per lane per day. There are, however, many factors that can reduce the *actual* capacity of particular roadway segments. These factors include lower posted speeds, the presence of driveways or cross-streets, narrow lane widths, and pedestrian activity. The placement of traffic signals can also lower the capacity of a roadway segment.

Roadway capacity values were assigned to the roadway segments in this study based on the factors described above. Specifically, the capacity values used were taken from Appendix C “Generalized Service Volumes for Snohomish County Arterials (maximum two-way weekday traffic by level of service)” of the Snohomish County Transportation Needs Report. In that report, several tables were prepared showing the estimated daily capacity under various roadway conditions. The factors used in the Snohomish County data are reflective of other counties in Western Washington, and are appropriate to Kitsap County transportation planning efforts. In this study, tables from Group 1 (un-signalized) and Group 3 (signalized) of the Urban Area Standards were used to identify roadway capacities.

Based on the existing year 2000 ADT volumes shown on Table F-2, and the methodology described above, Table F-2 LOS and V/C Comparison was prepared for existing conditions.

Table F-2					
LOS and V/C Comparison					
Existing 2000 ADT Volumes					
Roadway	Link	ADT	Capacity	V/C Ratio	LOS
SR 3	S of Finn Hill	33,579	72,000	0.47	A
	N of Finn Hill	25,170	72,000	0.35	A
	S of Thompson	19,785	36,000	0.55	A
	N of Thompson	18,386	36,000	0.51	A
SR 305	N of Lincoln Drive	18,537	17,664	1.05	F*
	N of SR 307	24,045	32,000	0.75	C
	Bet. Viking & SR 3	20,467	32,000	0.64	B
SR 307	NE of SR 305	14,834	14,720	1.01	F*
	E of Big Valley Rd.	12,985	14,720	0.88	D
Big Valley Rd	N of SR 397	1,983	16,560	0.12	A
Little Valley Rd	S of SR 307	1,488	16,560	0.09	A
Thompson Rd	W of SR 3	807	16,560	0.05	A
Noll Road	S of Lincoln Drive	1,600	14,720	0.11	A
	S of Hostmark	3,223	14,720	0.22	A
	N of SR 305	984	14,720	0.07	A
Viking Way	N of Sherman Hill	16,061	38,400	0.42	A
	N of Lindvig	10,410	14,720	0.71	C
Front Street	N of Hostmark	9,471	14,720	0.64	B
	S of Lindvig	16,410	14,720	1.11	F*
Lincoln Drive	W of SR 305	2,125	14,720	0.14	A
	W of Caldart Ave.	9,189	14,720	0.62	B
	E of Pugh Road	6,610	14,720	0.45	A
Hostmark St.	E of SR 305	9,718	14,720	0.66	B
	E of Caldart	4,877	14,720	0.33	A
Mesford St.	E of Caldart	3,651	14,720	0.25	A
Finn Hill Road	NW of SR 3	8,297	16,560	0.50	A
	SE of SR 3	10,089	16,560	0.61	B
* projects have been planned & funded to resolve LOS deficiencies					

TRAFFIC VOLUME FORECAST

Methodology

Future-year traffic volume forecasts for this study were calculated using the Kitsap County transportation model. KJS Associates originally created the model in 1991. The process used in developing the transportation model is described in the “Kitsap County Travel Demand Forecasting Documentation” and “Travel Demand Model Enhancements for MultiModal Analysis.” The current model is calibrated to a 1994 base year and has a 2012 horizon year. To determine the traffic volumes for the 2006 and 2012 horizon in this study, a portion of the model growth increment was applied to actual year 2000 traffic volumes as described below.

Olhava Master Plan Development

A major portion of the traffic growth expected in the Poulsbo UGA is from the Olhava Master Plan Development (MPD) located near the SR 3/SR 305 interchange. When the original Olhava Master Plan was prepared in 1994, full project build-out was anticipated by 2004. The 1994 Kitsap County model assumes completion of the project on schedule. However, as of January 2000, construction of the project has not started. For this study it was assumed that full development of the Olhava MPD will occur at a steady pace between the year 2000 and 2012. To more accurately reflect anticipated traffic volumes for 2006 and 2012, we have separated the Olhava traffic growth from the rest of the traffic growth in the UGA and applied it independently to the base year volumes as described below.

2006 Horizon

The Kitsap County model volumes reflect an 18-year growth increment (1994 to 2012). Over the last six years (1994 to 2000) approximately one-third of the growth anticipated in the area, and included in the traffic model, has already occurred. However, none of the Olhava MPD traffic growth has occurred. Therefore, to more accurately reflect the 2006 horizon, one-half of the total Olhava MPD traffic growth and one-third of the other background traffic growth in the UGA was applied to the adjusted 2000 base year volumes. The resulting 2006 ADT volumes used for this study are shown Map F-2.

2012 Horizon

To calculate the 2012 horizon traffic volumes was applied 100 per cent of the projected Olhava MPD traffic and two-thirds of the other background traffic growth in the UGA to the adjusted 2000 base year volumes. The resulting 2012 ADT volumes used for this study are shown on Map F-3.

2006 TRAFFIC OPERATIONS AND NEEDS ASSESSMENT

Future Traffic Operations

To assess the roadway improvement needs within the Poulsbo Sub Area, we have prepared V/C comparisons for the 2006 horizon year have been prepared. The roadway capacities used for the 2006 scenario include all of the planned roadway improvements identified earlier. Table F-3 (2006 LOS) was calculated using the methodology described earlier in this report.

Table F-3 LOS and V/C Comparison 2006 ADT Volumes On Existing Road Network					
Roadway	Link	ADT	Capacity	V/C Ratio	LOS
SR 3	S of Finn Hill	42,755	72,000	0.59	A
	N of Finn Hill	30,304	72,000	0.42	B
	S of Thompson	25,886	36,000	0.72	C
	N of Thompson	25,064	36,000	0.70	C
SR 305	N of Lincoln Drive	25,998	38,400	0.68	B
	N of SR 307	32,673	38,400	0.85	D
	Bet. Viking & SR 3	32,693	56,000	0.58	A
SR 307	NE of SR 305	17,718	32,000	0.55	A
	E of Big Valley Rd	15,413	32,000	0.48	A
Big Valley Rd	N of SR 397	2,337	16,560	0.14	A
Little Valley Rd	S of SR 307	1,754	16,560	0.11	A
Thompson Rd	W of SR 3	1,804	16,560	0.11	A
Noll Road	S of Lincoln Dr.	1,741	14,720	0.12	A
	S of Hostmark	4,020	14,720	0.27	A
	N or SR 305	1,782	14,720	0.12	A
Viking Way	N of Sherman Hill	17,581	38,400	0.46	A
	N of Lindvig	15,825	17,764	0.90	D
Front Street	N of Hostmark	10,118	14,720	0.69	B
	S of Lindvig	17,810	14,720	1.21	*
Lincoln Drive	W of SR 305	2,859	14,720	0.19	A
	W of Caldart Ave	13,303	14,720	0.90	D
	E of Pugh Road	9,084	14,720	0.62	B
Hostmark St	E of SR 305	11,458	14,720	0.78	C
	E of Caldart	5,928	14,720	0.40	A
Mesford St	E of Caldart	4,464	14,720	0.30	A
Finn Hill Road	NW of SR 3	11,255	16,560	0.68	B
	SE of SR 3	12,907	16,560	0.78	C
<p>* Under the roadway link analysis that determines levels of service by comparing roadway volumes to roadway capacity, Front Street would operate at unacceptable service levels in 2006. However, the City has previously done intersection-level analysis on this corridor, which indicates that the planned improvements to intersections along Front Street would allow it to operate within acceptable levels. The City will want to continue to monitor the actual operation of Front Street to determine if those planned intersection improvements will be sufficient in the future.</p>					

Map F-3 shows the projected Average Daily Traffic volumes for 2006 on the existing roadway network.

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Needs Assessment

As previously described in this report, there are many roadway and intersection improvements planned for construction in and near the Poulsbo UGA. The projects range from significant capacity improvements on State facilities to pedestrian and bicycle improvements on City streets. Most of the improvements are identified in current 6-year planning documents and are scheduled for completion by the 2006 horizon. Analysis indicates that with these planned roadway improvements, all of the area roadway network can accommodate the traffic growth expected in the Poulsbo Sub Area, with the exception of Front Street, which is described below.

Front Street

Front Street is a two-lane roadway that serves as the primary route through the City of Poulsbo central business district (CBD). The area is fully developed and currently carries a high volume of traffic but is not projected to experience a large traffic increase. The portion of Front Street between Lindvig Way and NE Sunset Street currently (2000 horizon year) operates at or near capacity and will degrade slightly by the 2006 horizon year as surrounding development occurs. The City of Poulsbo has plans to implement intersection improvements at locations along Front Street. Prior planning studies that have included peak hour intersection analysis indicate that with intersection improvements such as widening and turn pockets, Front Street between Lindvig & Jensen Way can accommodate the light traffic growth that is expected. It is recommended that the City continue to monitor the operation of Front Street to ensure that the planned improvements will be sufficient.

2012 TRAFFIC OPERATIONS AND NEEDS ASSESSMENT

Future Traffic Operations

To assess the long-term roadway improvement needs within the Poulsbo Sub Area, V/C comparisons have been prepared for the 2012 horizon year. The roadway capacities for 2012 include all planned improvements listed previously in this report. The 2012 LOS listed in Table F-4 was calculated using the methodology described earlier in this report.

**Table F-4
LOS and V/C Comparison
2012 ADT Volumes With Planned Network Improvements**

Roadway	Link	ADT	Capacity	V/C Ratio	LOS
SR 3	S of Finn Hill	51,931	72,000	0.72	C
	N of Finn Hill	35,437	72,000	0.49	A
	S of Thompson	31,987	36,000	0.89	D
	N of Thompson	31,742	36,000	0.88	D
SR 305	N of Lincoln Drive	33,458	38,400	0.87	D
	N of SR 307	41,301	38,400	1.08	*
	Bet. Viking & SR 3	44,919	56,000	0.75	C
SR 307	NE of SR 305	20,602	32,000	0.64	B
	E of Big Valley Rd	17,840	32,000	0.56	A
Big Valley Rd	N of SR 397	2,691	16,560	0.16	A
Little Valley Rd	S of SR 307	2,020	16,560	0.12	A
Thompson Rd	W of SR 3	2,801	16,560	0.17	A
Noll Road	S of Lincoln Drive	1,882	14,720	0.13	A
	S of Hostmark	4,818	14,720	0.33	A
	N of SR 305	2,579	14,720	0.18	A
Viking Way	N of Sherman Hill	19,102	38,400	0.50	A
	N of Lindvig	21,241	17,664	1.20	*
Front Street	N of Hostmark	10,765	14,720	0.73	C
	S of Lindvig	19,211	16,560	1.16	*
Lincoln Drive	W of SR 305	3,594	14,720	0.24	A
	W of Caldart Ave	17,416	17,664	0.99	*
	E of Pugh Road	11,557	14,720	0.79	C
Hostmark St.	E of SR 305	13,199	14,720	0.90	D
	E of Caldart	6,979	14,720	0.47	A
Mesford St.	E of Caldart	5,277	14,720	0.36	A
Finn Hill Road	NW of SR 3	14,213	17,664	0.80	D
	SE of SR 3	15,726	17,664	0.89	D

* The City has previously completed intersection-level analysis on this corridor, which indicates that the planned intersection improvements would allow the roadway it to operate within acceptable levels. The City will want to continue to monitor actual operations to determine if those planned intersection improvements will be sufficient in the future.

Map F-3 shows the projected Average Daily Traffic volumes for 2012 on the improved roadway network.

Needs Assessment

The traffic operations analysis for the 2012 horizon year indicates that certain roadway segments may experience capacity deficiency by the 2012 horizon. Those roadways are described below.

Viking Way

According to the way in which the Kitsap County transportation model assigns traffic to the roadways in the subarea, the portion of Viking Way between Lindvig Road and SR 305 is expected to experience a very high level of traffic growth by 2012.

Based on the projected 2012 ADT volume for Viking Way and the volume-to-capacity analysis method utilized in this study, the roadway would need to be widened to five lanes - two lanes northbound and two lanes southbound from Lindvig Way to SR 305. This widening may not be required in 2012 if the expanded UGA has not been fully built-out at that time or if the intersections along the corridor continue to operate sufficiently.

Lincoln Drive

Lincoln Drive is a two-lane collector that travels between downtown Poulsbo and the northeast UGA. The roadway currently (2000 horizon year) operates at acceptable LOS A and B conditions within this area. The traffic model indicates that volumes will increase from approximately 9,000 to 13,000 ADT by the 2006 horizon year and 17,000 by 2012. Current planning calls for the addition of a two-way center turn lane on Lincoln Way between SR 305 and the northeast Poulsbo city limit. With the planned improvement in place, the roadway is expected to operate at LOS E condition west of Caldart Avenue. As development in the area occurs, actual traffic growth on the roadway should be monitored to determine if additional widening might be required.

SR 305

SR 305 is an urban arterial that provides a connection from the Winslow ferry terminal to SR 3. The roadway provides two travel lanes with left turn lanes at major intersections. The roadway is currently operating at or above capacity north of Lincoln Drive. SR 305 was recently widened to 4/5 lanes from the Poulsbo south City limits to SR 307. Additional projects will provide widening to 4/5 lanes from SR 307 to SR 3. With the roadway improvements in place, the roadway will operate at LOS D or better in the Poulsbo UGA, through the 2006 horizon.

Based on projected 2012 ADT volumes and the volume-to-capacity analysis method utilized in this study, SR 305 will degrade to an unacceptable LOS north of SR 307 unless additional improvements are made. However, analysis completed as part of the SR 305 Major Investment Study indicates that with the construction of the proposed improvements, would operate under acceptable service levels. The State and City will likely need to monitor the overall operations of the route over time to ensure that these improvements will be sufficient.

