

MEMO

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From: Ross Tilghman

Date: 28 April 2008

Subject: 1. SEIS – 2007 Draft Foothills Subarea Plan
2. Balfour Village Traffic Analysis (Kendall to Glacier)
3. Independent Traffic Counts on Mt. Baker Highway

This memo addresses concerns about the limited traffic data for Mt. Baker Highway (Kendall to Glacier) and Kendall Road used in the proposed Balfour Village traffic studies, the same data that is being incorporated in the updated Foothills Subarea Supplementary Environmental Impact Statement (SEIS). Specifically, this memo presents new, weeklong traffic counts that show higher volumes than previous short duration counts, and new information about seasonal traffic patterns that demonstrates the pronounced influence of recreational traffic on the Foothills' highways. The memo concludes with specific recommendations for evaluating new development's traffic impacts and for long-range traffic planning in the Foothills Subarea.

Specific Concerns

Previous traffic analyses for Balfour Village and for the Foothills Subarea Plan have provided very limited data using different traffic count methods. For example:

- Balfour Village's study of the Kendall intersection with Mt. Baker Highway used only afternoon peak hour counts from a single weekday. A two-hour manual count was made

between 4:00 and 6:00 p.m. Counts were made on December 16, 2004, just nine days before Christmas (referred to herein as “Balfour Village Kendall Count Analysis”).

- Counts made in late December tend not to reflect typical traffic conditions given the influence of this major holiday on vacation patterns, holiday shopping, and holiday parties.
- Furthermore, December tends to experience lower traffic volumes than other months of the year.
- However, the Balfour Village Traffic Impact Analysis failed to discuss these seasonal circumstances.
- The Balfour Village analysis failed to make any seasonal adjustment to the traffic counts.
- The Balfour Village Kendall Count Analysis used volumes significantly below average volumes, based on our counts
- The Balfour Village Kendall Count Analysis is stale, being over 40 months old, too old to provide credible data for traffic analysis purposes.
- The December 16 count was prior to the high ski season and was taken during a low snow period, with far less than typical ski season traffic.

Results of traffic counts performed for Balfour Village at other locations in Whatcom County than Kendall and Maple Falls are not addressed in this memo. That is, those counts and their analyses are outside the discussion of this memo and have been addressed separately by the Tilghman Group in correspondence with John Everett of PDS during 2007 and 2008.

- The Balfour Village analysis did not identify Mt. Baker Highway as a recreation route and did not discuss the influence of recreation traffic for either summer or winter operating conditions. It did not identify weekend volumes when recreation traffic typically peaks. It also did not include any intersections east of Silver Lake Road in Maple Falls.
- None of Balfour Village’s analyses evaluated intersection level of service for two of the three intersections at the triangular junction of Mt. Baker Highway (SR-542) and Kendall Road (SR-547). This is a critical omission given the traffic patterns on Mt. Baker Highway.
- The Foothills Subarea Plan SEIS is incorporating Balfour Village’s peak hour traffic data in its analysis, despite concerns about using a December count, and despite the fact that it is now out of date being over three years old. The shortcomings of those counts will diminish the value of SEIS’s analysis. Based on our 2008 counts, the Balfour Village Kendall counts were significantly below average. Counts that reflect below average traffic volumes will lead to underestimating future traffic volumes and will produce overly optimistic level of service results. Again, no weekend or seasonal volume information is included in the Balfour Village numbers.
- The draft Foothills Subarea Plan reported daily traffic volumes which may also be used in the SEIS (see, for example, Foothills Subarea Plan, Map 6.2 on page 55). Daily volumes were gathered from various counts conducted by the Washington State Department of Transportation (WSDOT) in different months and years. The result of using many different

sources for traffic counts is that no consistency exists between the peak hour and the daily counts since they reflect different patterns from different times of the year. Such peak to daily relationships are important for achieving accuracy, and month-to-month counts are important for representing the full range of traffic patterns occurring on local roads with recreational use.

The memo contains the following sections:

Executive Summary

- A. Results from February and March traffic counts
- B. Estimates of Annual Average Daily Traffic
- C. Other Indicators of Seasonal Recreation Traffic
- D. Conclusions and Recommendations

Terms used in the following discussion include:

Average Weekday Traffic (AWDT) – the average daily volume of traffic occurring on weekdays, typically measured from noon Monday to noon Friday. Monday mornings and Friday afternoons are generally considered unusual and are therefore not included in the average weekday measure.

Annual Average Daily Traffic (AADT) – the total amount of traffic in a year divided by the number of days in the year. This measure includes weekdays, weekends, high volume and low volume days.

Average Weekday PM Peak Hour Traffic – the volume of traffic from the highest hour of each weekday afternoon, averaged for Monday through Thursday. Friday afternoons are not included since they are considered unusual.

EXECUTIVE SUMMARY

Information about the traffic characteristics of the Mt. Baker Highway and connecting highways in the Foothills area is remarkably scarce. As shown in the table below, infrequent counts have been made in recent years. Although Mt. Baker is a long standing recreation destination attracting hikers, fishermen and campers in the summer and skiers in the winter, there is little comprehensive data about its recreation traffic. As new development, such as the Balfour Village project, is proposed in the Foothills Subarea, traffic studies have so far been conducted without the benefit of adequate traffic counts to represent the influence of recreation traffic. Without a complete picture of how traffic operates, traffic studies may underestimate the impact of new development on the Foothills region. As a result, projects may fail to comply with County ordinances, infrastructure may become inadequate, safety may be compromised, and the rural character of the Foothills may be irreparably harmed.

AVAILABLE TRAFFIC COUNTS FOR MT. BAKER HIGHWAY AT KENDALL				
Source	Date	Day	Duration	Notes
WSDOT	July 19 – 23, 2004	Mon – Thu	94 hours	Mid-Summer
Balfour Village	Dec. 16, 2004	Thursday	2 hours (4:00 – 6:00 pm)	Week before Christmas poor ski season
WSDOT	2006	Unknown	Unknown	Listed in WSDOT's Annual Traffic Report
Foothills Friends	Feb 14 - 20, 2008 Mar 14 - 20, 2008	Thu – Wed Fri – Thu	168 hours 168 hours	Included Presidents' Day Weekend Non-holiday week; good ski season

This memo presents findings from independent traffic counts from one week in February, 2008 and one week in March, 2008. The purpose of the counts was to identify daily variations in traffic including on weekends, and to measure ski area traffic over the Presidents' Day holiday weekend, typically one of the busiest ski weekends of the year. As a point of comparison, a non-holiday week in March was also counted.

Traffic counts were conducted by a professional count firm, All Traffic Data Services, Inc., from its Bellevue, Washington office, using automated counters. (See the Appendix for more information about this firm). Five count locations were selected to identify volumes at Kendall (at all three corners of the SR-542/SR-547 intersection), Maple Falls and Glacier. Two counters were placed at each location to provide redundancy in case one malfunctioned.

These new counts greatly expand the number of hours and days of traffic data compared to what had been previously available. Balfour Village's analysis relied on a single 2-hour count on a single day. By measuring traffic on an hourly basis for each day of the week, the new counts presented here provide a much broader sample from which to determine the average weekday peak hour volume, the average weekday daily volume, weekend daily volumes and the hour with highest volume during the entire week.

Findings

Key findings from these two weeks of counts include:

1. Peak hour volumes on Kendall Road, west of its intersection with Mt. Baker Highway (SR-542), were 22% higher in February and 29% higher in March than the numbers reported in the Balfour Village traffic studies. This result confirms concerns that Balfour Village's December count was a low one, and underscores the concern about using a low count in the Foothills Subarea Plan SEIS.
2. Average weekday volumes on Kendall Road were also higher than those used in the draft Foothills Subarea Plan SEIS by 13% in February and 24% in March. Again, concerns about seasonal variation are confirmed and show that low volumes form the basis of the SEIS's traffic analysis.
3. Friday peak hour volumes were frequently among the highest on Kendall Road and Mt. Baker Highway. This reflects the overlap between weekday and recreation traffic.
4. Weekends were consistently and significantly higher than weekdays on Mt. Baker Highway for both peak hour and daily volumes. Weekend volumes ranged from 30% to 100% higher than the average weekday, and peak hour volumes showed a similar pattern. This large increase is due to recreational traffic.
5. Between at least SR-9 and the Mt. Baker Ski Area (and generally in sections where the highway is two lanes), Mt. Baker Highway is operating at or very near its capacity during the ski season's busiest days, including the Presidents' Day holiday weekend.
6. WSDOT does not currently designate Mt. Baker Highway a recreation route for traffic analysis purposes. In part, this results from very limited traffic count data from the highway.
7. Recreation traffic comprises a significant share of traffic on Mt. Baker Highway, based on information from the National Forest Service concerning summer and winter visitation. It accounts for 40%-50% of the *average daily* volume through Glacier and Maple Falls. Immediately east of Kendall, it accounts for 20%-25% of the average daily volume and over 50% on busier days.
8. Winter recreation traffic appears to be nearly as great as summer traffic. This pattern differs from many mountain area recreational routes elsewhere in the state where summer months have traffic substantially higher than winter months.
9. Existing WSDOT non-recreational adjustment factors typically applied to counts from a given month to account for such seasonal traffic variations do not adequately estimate traffic conditions for Mt. Baker Highway given its recreational use. Current WSDOT recreational route adjustment factors also do not reflect the highway's particular combination of winter and summer peaks.

Conclusions

1. Volumes reported in the Balfour Village traffic analysis and being used in the Foothills Subarea Plan SEIS are out of date and much lower than current volumes on Kendall Road.
2. Weekend days have higher traffic volumes than weekdays. Therefore, traffic analyses, including Balfour Village's study, that rely exclusively on weekday counts are addressing the lowest volume period of the week in the Foothills Subarea, and omit the critical weekend volume and compounding effect of recreational traffic.
3. Volumes during the higher days of the ski season appear to have Mt. Baker Highway operating at capacity. This at-capacity condition would exist in most segments where the highway has two lanes and would extend from at least SR-9, and perhaps nearer Bellingham, past Glacier.
4. It is likely that volumes during many different hours of winter and summer create unacceptable levels of service for Foothills' roads, falling below the County's adopted policy of LOS C. (It should be noted that Balfour Village's Traffic Impact Analysis omitted level of service analysis for two of the three intersections at the Mt. Baker Highway/Kendall Road junction).

Recommendations

1. To address the influence of recreational traffic and the potential overlap with traffic from new development, it is recommended that:
 - a. Area-wide planning studies, such as the Foothills Subarea Plan SEIS, identify the potential for traffic demand to exceed capacity on existing Foothills roads when considering zoning designations and land use changes. Analysis of Friday and weekend conditions would address this potential.
 - b. Traffic studies for new developments incorporate a weekend analysis, especially for retail and recreation uses that would generate peak volumes on a weekend. Weekend traffic is currently greater both in the peak hour and across the day than weekday traffic.
 - c. A design-hour volume including recreation traffic be developed with which to test the operating quality of key road segments and intersections with new development traffic. This would be an additional test to the average weekday conditions now used for analysis and would indicate the adequacy of potential mitigation measures (such as intersection reconfigurations) to handle design-hour volumes.
2. Mt. Baker Highway should be recognized as a recreation route for planning purposes.
3. Additional counts should be conducted at Kendall, Maple Falls and Glacier to collect seasonal volumes. Recurring counts every two months at identical locations would suffice.
4. New seasonal factors should be developed from those counts and applied to subsequent counts obtained on both Mt. Baker Highway and Kendall Road to calculate annual average daily traffic and corresponding peak hour volumes.

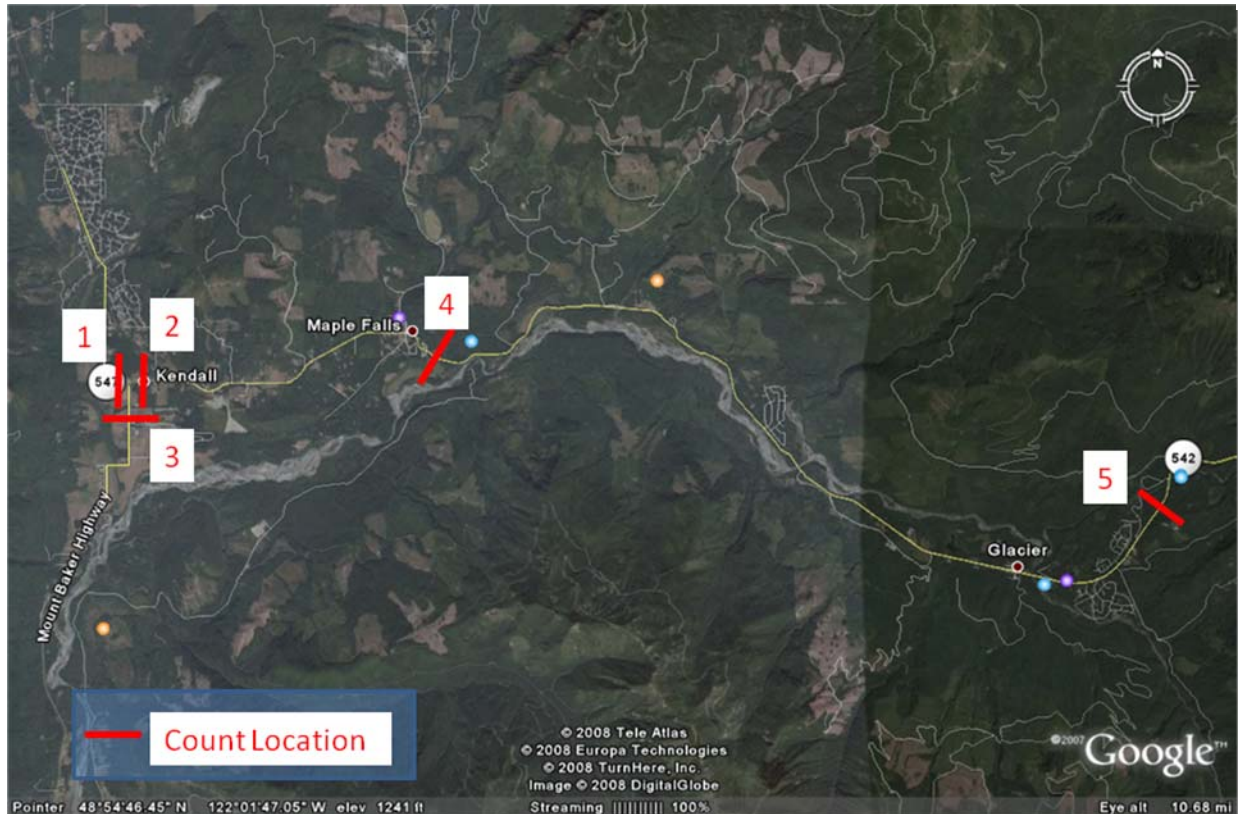
A. RESULTS FROM FEBRUARY AND MARCH TRAFFIC COUNTS

Traffic counts on Mt. Baker Highway and Kendall Road were completed for two separate weeks, one in February and one in March, 2008. The February count included the seven day period beginning on Thursday, February 14, 2008 and ending on Wednesday, February 20, 2008. The March count began on Friday, March 14, 2008 and ended on Thursday, March 20, 2008.

The February count was timed to capture the Presidents' Day holiday weekend which is typically one of the busiest ski weekends of the year. The March count was timed to capture a non-holiday week, just before spring break at most schools in Washington State.

Figure 1 shows the five count locations used for both months. Automated counters were deployed at each location, recording traffic in each direction of travel for each hour of the day. Two counters were used at each location to provide redundancy in case of a malfunction. All counters, however, performed well for the duration of the counts.

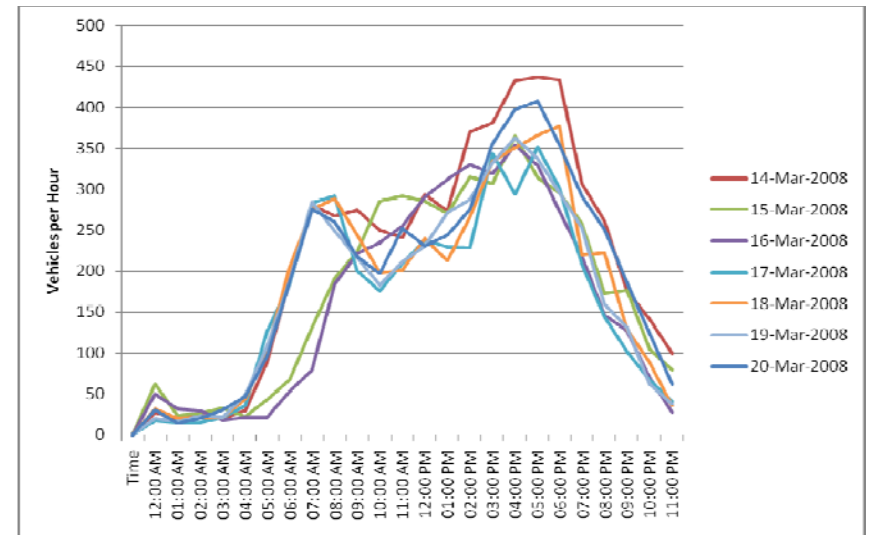
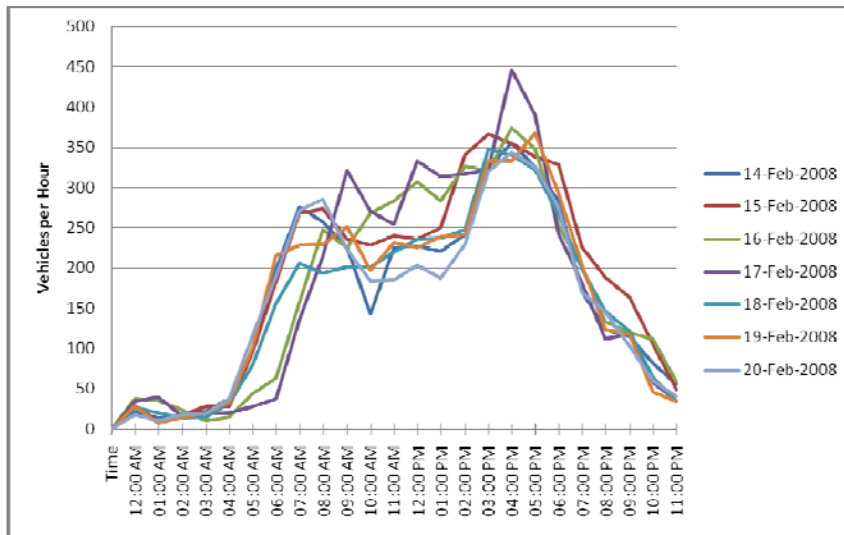
Figure 1. Automated Traffic Counter Locations



Findings

Count summaries are included in the Appendix for each location, showing volumes by hour for all seven days in February and in March. An average peak hour volume and a daily volume have been calculated for the weekdays (excluding Presidents' Day which occurred on a Monday). The results for each location are described below.

Location 1– Kendall Rd. (SR-547) immediately west of the intersection with Mt. Baker Highway (SR-542).



Peak Hour Patterns on Weekdays

- Peak volumes occurred during the late afternoon on all days, between 4 and 5 p.m. in February, and between 5 and 6 p.m. in March.
- In March, the highest hourly volumes of the week occurred on Thursday and Friday. Both days had more high volume hours than any other day.
- Friday’s peak in March was 16% higher than the average weekday peak hour volume. This shows the influence of recreation traffic.
- Peak hour volumes consistently represented about 8.7% of daily traffic in February and 8.5% in March, a relatively low ratio indicating a mild peaking characteristic. This ratio differs from typical urban conditions where the peak is often about 10% of daily traffic. The ratio is important when estimating daily traffic from a peak hour count as traffic impact studies frequently do; using too high a ratio leads to underestimating daily traffic.

Peak Hours on Weekends

- In February, Sunday, between 4 and 5 P.M. achieved the highest hourly volume of the week. It was approximately 25% higher than the average weekday peak.
- Volumes exceeded the average weekday peak in 5 different hours during February primarily on Friday, Saturday, and Sunday. In March, volumes exceeded the average in 7 different hours, mainly on Thursday and Friday.

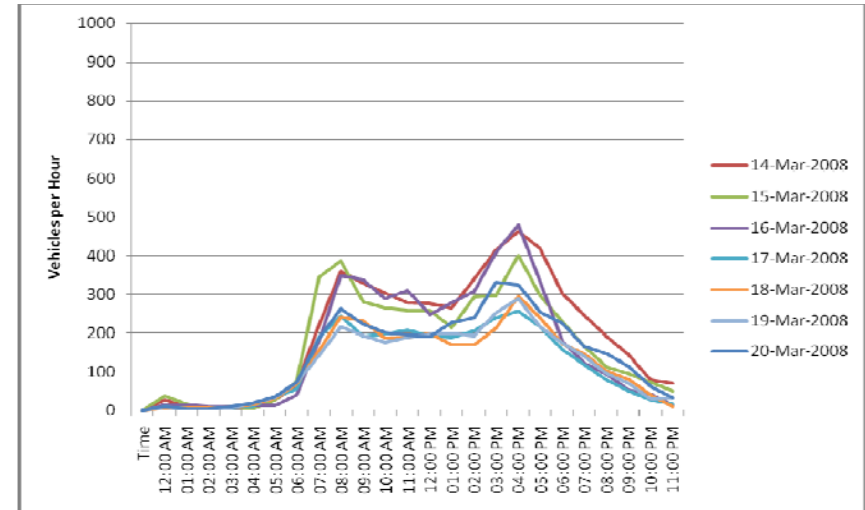
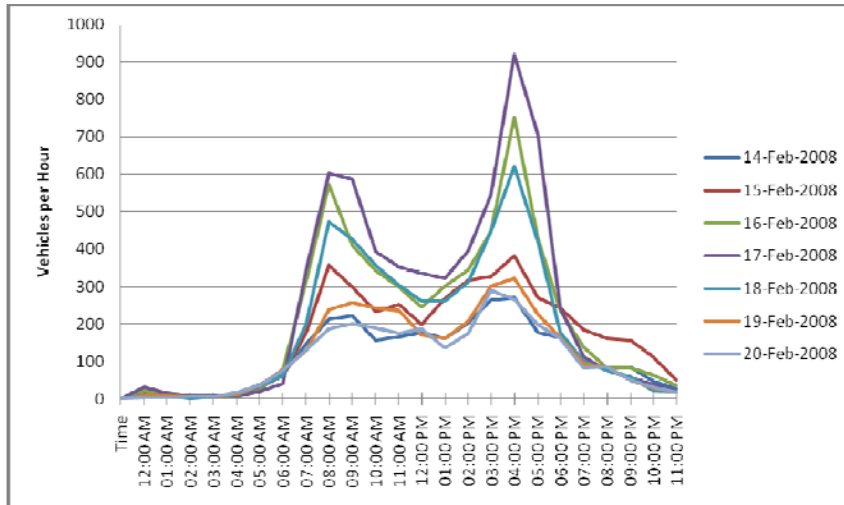
Daily Patterns

- Friday had the highest daily volumes in both February and March. In February, Friday was 13% greater than the average weekday volume and in March 18% higher. This was due to higher volumes each hour from 9 a.m. through the end of the day.
- In both February and March, weekend midday volumes (9 a.m. to 2 p.m.) were 20 – 30% higher than on weekdays.

Comparison to Balfour Village and 2007 Draft Foothills Subarea Plan

- Peak hour volume (on a weekday) was 22% higher in February and 29% higher in March than that reported in the Balfour Village traffic analysis from December 2004.
- Average weekday volumes in February were at 13% higher than those shown in the draft Foothills Subarea Plan for this location. In March, they were 24% higher.

Location 2 – Mt. Baker Highway (SR-542), east of the intersection with SR-547.



Peak Hour Patterns on Weekdays

- The peak hour occurred between 4 p.m. and 5 p.m. on all days but Thursday in both February and March.

Peak Hours on Weekends

- Weekend volumes consistently exceeded the average weekday peak hour volume. In February, the average weekday peak hour volume was exceeded in 36 hours across the holiday weekend. Furthermore, each day of the holiday weekend significantly exceeded the weekday volume in any given hour between 7 A.M. and 5 P.M. March's volumes, while lower than February's, still exceeded the average weekday peak hour volume in 24 hours mainly on Friday, Saturday and Sunday. The peak hours on those days ranged from 38% to 64% greater than the average weekday peak hour volume. A majority of the high volume hours (14 out of 24) experienced volumes more than 10% greater than the average weekday peak, marking them as significantly higher.
- During the busiest hours, over 85% of traffic was headed in one direction.
- At the highest hour in February, the highway was likely operating near the limit of its capacity.

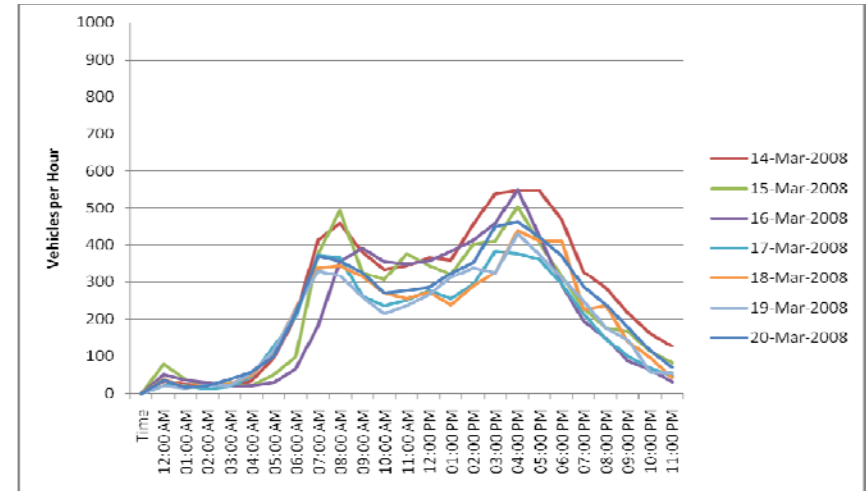
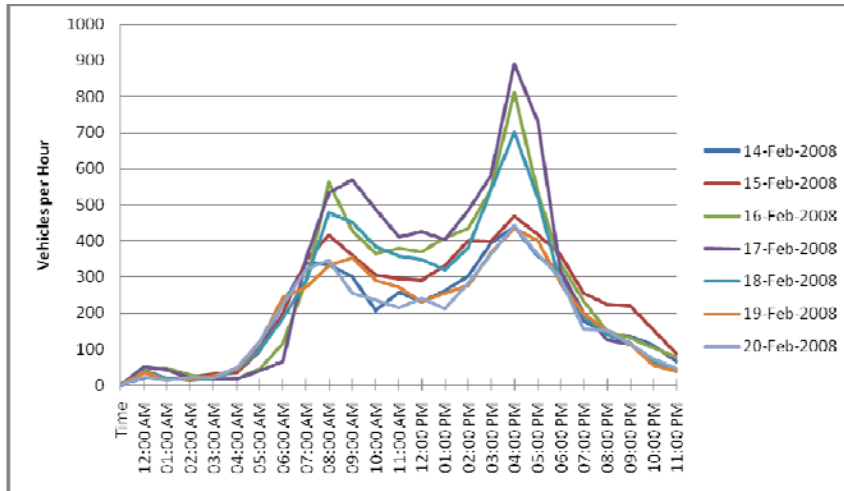
Daily Patterns

- The influence of recreation traffic is pronounced at this location: Friday, Saturday and Sunday (plus the Monday of Presidents' Day) consistently experienced the highest daily volumes in both months, as a result of recreation traffic.
- February's Sunday daily volume was more than double the weekday average, and Saturday's was 84% higher. Similarly, in March, weekend daily volumes exceeded average weekday volumes by a range of 28% to 50%.

Comparison to Balfour Village and 2007 Draft Foothills Subarea Plan

- Weekday peak hour volumes (excluding Fridays) in February were 1% higher and in March were 4% higher than the Balfour Village count from December, 2004.
- Average daily volumes were 8% lower in February and 3.5% higher in March than those shown in the draft Foothills Subarea Plan for this location.

Location 3– Mt. Baker Highway (SR-542), south of the intersection with SR-547.



Peak Hour Patterns on Weekdays

- The peak period occurred consistently between 4 and 5 P.M. on all count days.
- Fridays in both February and March exhibited the broadest peak period with nearly equal volumes occurring for 3 hours between 3 p.m. and 6 p.m.

Peak Hours on Weekends

- Weekend hourly volumes exceeded weekday volumes between 9:00 a.m. and 5:00 p.m. in both February and March.
- The highest hourly volume occurred on Sunday afternoon which in February was double the weekday average, and in March was 28% greater. Recreation traffic accounts for these peaks.
- Morning peaks on weekends including Fridays frequently exceeded the weekday afternoon peak hour volume.
- Overall, weekend volumes exceeded the average weekday peak hour during 17 hours in February and 10 hours in March. This shows that the average weekday peak hour is not even close to being the highest hour of the week.
- Traffic during the peak periods is strongly directional, with 70-75% in one direction. At the highest hour, the highway is likely operating near its capacity.

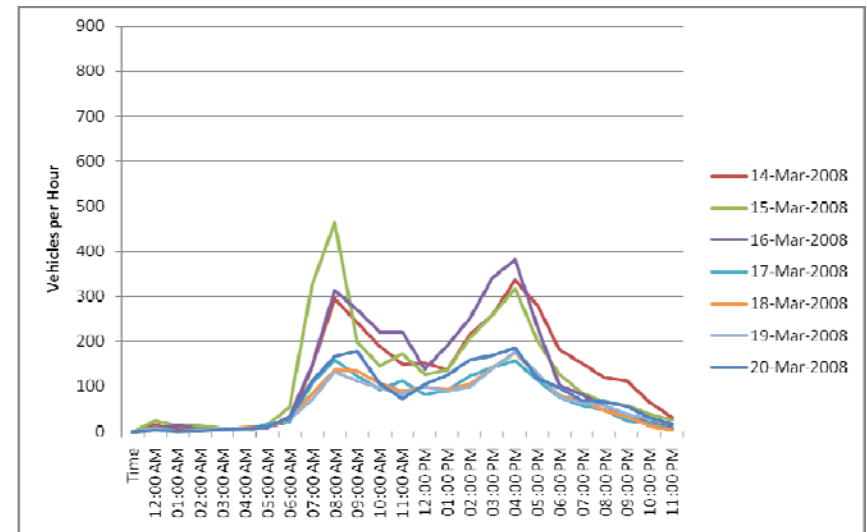
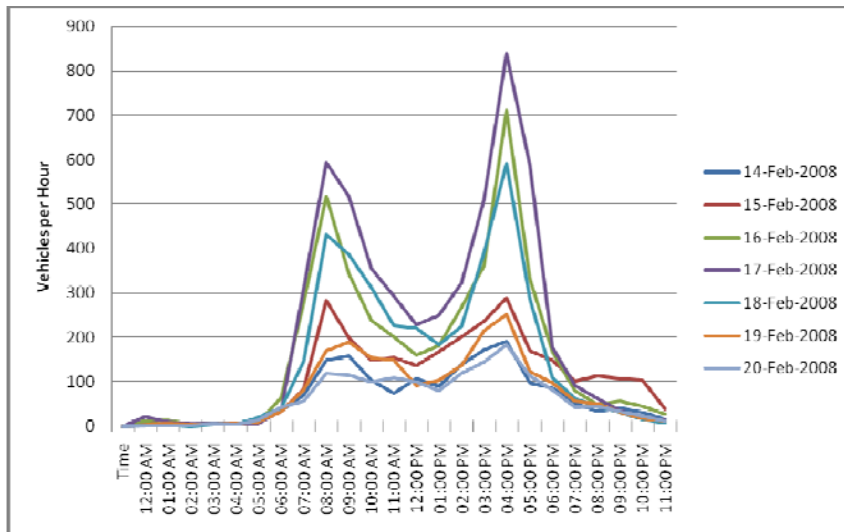
Daily Patterns

- In February, daily traffic on the holiday weekend was from 25% to 47% higher than the average weekday.
- In March, Friday, Saturday and Sunday had the highest volumes for both peak hour and daily counts. Friday showed the highest daily total, 30% greater than the average weekday. This too reflects the influence of recreational traffic.

Comparison to Balfour Village and 2007 Draft Foothills Subarea Plan

- Peak hour volume (on a weekday) was 5% higher in February and 3% higher in March than the Balfour Village count from December 2004.
- In February, average weekday daily volumes were about 3% lower than the volume reported in the draft Foothills Subarea Plan. However, in March, it was over 6% higher. These differences reflect traffic variations that can occur during different months.

Location 4– Mt. Baker Highway (SR-542), at Milepost 26 east of Maple Falls.



Peak Hour Patterns on Weekdays

- Morning and afternoon peak volumes were nearly identical on their respective days.

Peak Hours on Weekends

- Weekend peak volumes in February were up to 4 times higher than the average weekday peak hour volume.
- A pronounced peak occurred Saturday morning in both months (more than 2.6 times greater than the average weekday peak even in March). The morning peaks on Friday and Sunday were also well above the average weekday peak hour volume.
- In February, 32 hours of the week had volumes higher than the average weekday peak hour, while in March 25 hours had higher volumes. That amounts to 15% - 19% of all hours in the week. This means that nearly every hour between 7:00 a.m. and 5:00 p.m. on the weekends exceeded the weekday peak hour.

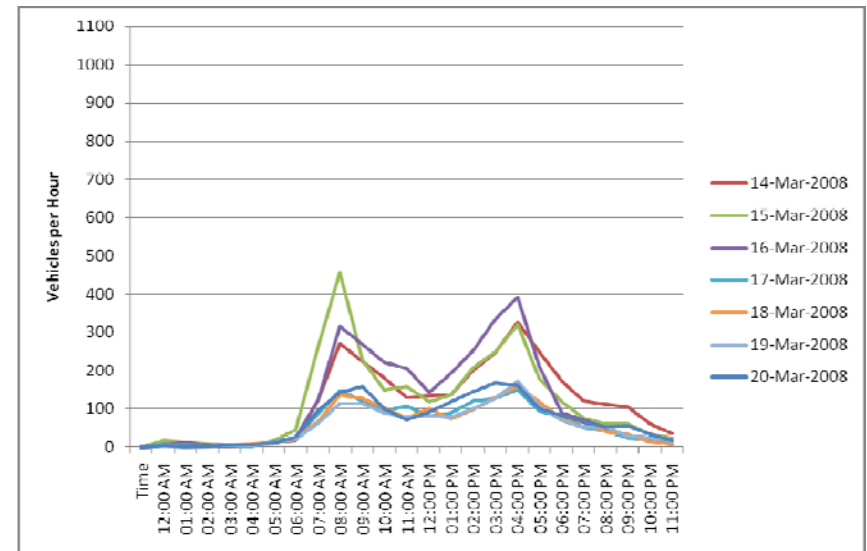
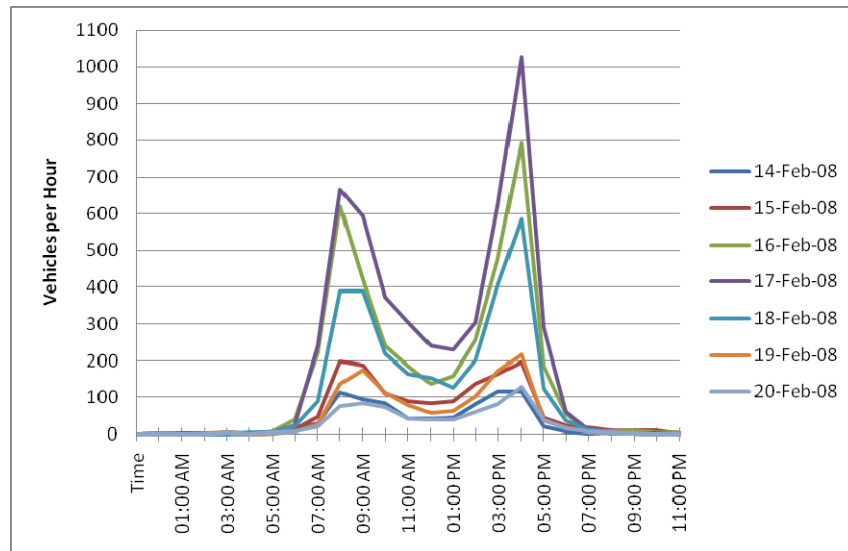
Daily Patterns

- Friday, Saturday and Sunday yielded the highest volumes, indicative of recreational traffic use.
- In March, daily volumes on Friday, Saturday and Sunday were 76% higher than the average weekday volume.
- In February, daily volumes were up to 3 times higher than the average weekday.

Comparison to Balfour Village and 2007 Draft Foothills Subarea Plan

- In February, the average weekday peak hour volume was 7% higher than the volume reported in the Balfour Village traffic analysis. March's volume was 11% lower. Again, the Balfour Village count was a single, 2-hour count in December, 2004.
- Average weekday daily traffic in February and March was 3% - 4% higher than the volume shown in the draft Foothills Subarea Plan. It should also be noted that the Subarea Plan shows the same volume on the west side of Glacier that it does for Maple Falls.

Location 5 – Mt. Baker Highway (SR-542), east of Glacier at National Forest boundary.



Peak Hour Patterns on Weekdays

- Morning and afternoon peak hour volumes are virtually equal each weekday.

Peak Hours on Weekends

- Holiday weekend traffic in February greatly exceeded weekday traffic during all hours. The peak hour was 6.6 times greater than the average weekday peak hour.
- In March, Saturday had the highest peak hour volume, occurring between 8:00 a.m. and 9:00 a.m., nearly 3 times higher than the average weekday peak hour volume.
- The higher weekend volumes are borne out by the number of hours exceeding the average weekday peak hour volume – 35 hours in February and 26 hours in March. Indeed, even in March, most of those hours (19 out of 26) were more than 25% above the weekday peak hour volume. Put another way, between 7:00 a.m. and 6:00 p.m. on Friday, Saturday and Sunday, a total of 33 hours, only 12 hours had volumes lower than the weekday peak. Again, this pattern of high volumes is due to recreational use.
- On the holiday weekend, peak hour volumes on Saturday, Sunday and Monday accounted for 20% of the daily total, a very high proportion.
- During the peaks, volumes are strongly directional with over 90% of vehicles traveling in one direction.
- Due to the almost unidirectional flow during the highest hours in February, the highway was most likely operating at or near its capacity at those times.

Daily Patterns

- Holiday weekend traffic greatly exceeded weekday traffic; the maximum daily volume was over 5 times greater than the average weekday volume.
- In March, Sunday had the highest daily count, 85% greater than the average weekday volume.

Comparison to Balfour Village and 2007 Draft Foothills Subarea Plan

The draft Foothills Subarea Plan count comes from a location almost 2 miles west of the Mt. Baker/Snoqualmie National Forest boundary that served as the count site for this analysis. That location showed the same volume as for Maple Falls, since it captures trips entering and leaving Glacier to and from the west. Balfour Village didn't include Glacier.

Summary Comparison of February and March Counts

The following table summarizes the differences between the two count months by location.

Comparison of February and March Week-Long Traffic Counts															
	1 - Kendall Rd. West of SR-542			2 - Mt. Baker Hwy East of SR-547			3 - Mt. Baker Hwy South of SR-547			4 - Mt. Baker Hwy East of Maple Falls			5 - Mt. Baker Hwy East of Glacier		
	Feb.	March	Mar. vs. Feb.	Feb.	March	Mar. vs. Feb.	Feb.	March	Mar. vs. Feb.	Feb.	March	Mar. vs. Feb.	Feb.	March	Mar. vs. Feb.
Avg. Weekday Daily Traffic (AWDT)	4,056	4,474	418	2,852	3,209	357	4,732	5,216	484	1,746	1,775	29	942	1,628	686
Peak Daily Traffic	4,584	5,316	732	6,162	4,837	-1,325	6,980	6,781	-199	5,293	3,128	-2,165	5,021	3,006	-2,015
Day of Peak Volume	FRI	FRI		SUN	SUN		SUN	FRI		SUN	FRI		SUN	SUN	
Avg. Weekday Peak Hour	356	375	19	294	292	-2	438	429	-9	209	173	-36	155	162	7
Peak Hour	446	437	-9	919	479	-440	891	550	-341	840	463	-377	1,026	458	-568
Day of Peak Hour	SUN	FRI		SUN	SUN		SUN	SUN		SUN	SUN		SUN	SUN	
No. Hours Exceeding Avg. Weekday PM Peak Hour	5	7		36	24		16	14		32	28		34	26	
Weekday PM Pk/AWDT	8.8%	8.4%		10.3%	9.1%		9.3%	8.2%		12.0%	9.8%		16.5%	10.0%	

Source: Tilghman Group

Key points evident from this comparison include:

- February counts captured a ski season peak due to the Presidents' Day holiday weekend that was not replicated in March. It is likely that the February counts represent some of the highest volumes occurring on Mt. Baker Highway during the year. In particular, volumes at locations 2, 3, 4 and 5 probably fall within the highest 5 days of the year for daily volumes and may reflect the highest hourly volume for the year.
- Average weekday volumes in March were typically higher than in February. In the Kendall area, March volumes were 10% – 13% higher. At Maple Falls, March volumes were minimally (2%) higher, but at Glacier they were 73% higher. The large increase at Glacier may reflect either an undercount in February, which is unlikely given the redundant counter system, or a different ski market in March than in February, including some spring break trips from other parts of the country (Washington state schools have a later spring break) making greater use of local lodging.
- Peak daily and hourly volumes for the week occurred almost exclusively on Fridays and Sundays – a result of recreational traffic.
- While February had the highest peak hour volumes, March's peak hour volumes were still significantly greater than average weekday peak hours, ranging from 17% greater (on Kendall Rd. west of SR-542) to 182% greater (at Glacier).

B. ESTIMATES OF ANNUAL AVERAGE DAILY TRAFFIC

Annual average daily traffic (AADT) is simply the total traffic in a year divided by the number of days in the year. To address the variability inherent in traffic volumes occurring in different months of the year, transportation agencies such as the Washington State Department of Transportation (WSDOT) adjust average weekday volumes from a given month to approximate an annual average daily volume. It provides a useful measure for highway planning purposes and for deriving design-hour volumes to evaluate capacity needs. The adjustment process is described below.

Adjustment Factors

WSDOT has developed monthly seasonal factors to expand daily volumes from any month to an annual daily volume. These factors are derived from counts taken at permanent count stations on interstate and rural highways throughout the state. However, no permanent counter exists on SR-542, Mt. Baker Highway. According to WSDOT's Transportation Data Office, Mt. Baker Highway is not currently designated a recreational route (due in part to limited data). Given our count information, we strongly urge that the designation to recreational route be made.

While WSDOT might revise the designation pending review of additional counts, it now assigns the following monthly non-recreational seasonal factors to Mt. Baker Highway east of SR-9. The factors are applied by multiplying the average weekday volume counted in a given month by that month's factor to yield an annual average daily volume. These factors would apply to counts obtained in 2005, 2006 and 2007.

Monthly Non-Recreational Seasonal Factors for SR-542 (Mt. Baker Highway) East of SR-9 to Convert Average Weekday Traffic to Annual Average Daily Traffic

2007 Factors:

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Weekday	1.21	1.10	1.06	1.00	0.97	0.94	0.87	0.85	0.94	1.02	1.08	1.13
Weekend day	1.24	1.12	1.07	0.99	0.94	0.90	0.82	0.78	0.91	1.02	1.12	1.25

2006 Factors:

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Weekday	1.16	1.11	1.09	1.01	1.00	0.95	0.90	0.88	0.95	1.02	1.18	1.08
Weekend day	1.25	1.12	1.04	1.01	0.95	0.88	0.79	0.77	0.87	1.00	1.16	1.19

2005 Factors:

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Weekday	1.16	1.07	1.04	1.03	0.98	0.93	0.85	0.86	0.97	1.04	1.09	1.10

Source: WSDOT Transportation Data Office

While some variation occurs for a given month from year to year, a similar pattern recurs: the highest volumes occur in the summer months and the lowest volumes in the winter. For example, using the 2007 factors, a count in July is assumed to be 26% higher than one in February ($1 \div (0.87/1.10)$). However, Mt. Baker Highway shows a different pattern, needing different factors.

Reported & Calculated Annual Average Daily Traffic

In its annual traffic report, WSDOT shows annual average daily traffic volumes (AADT) for Mt. Baker Highway and SR-547. The latest version is for 2006. These are compared in the following table to the actual weekday counts taken in February and March, 2008, which, for lack of current year factors, are adjusted using an average of the 2005 through 2007 factors.

Annual Average Daily Traffic Comparisons to Illustrate Effect of Monthly (Non-Recreational) Seasonal Factors									
Location	WSDOT 2006	Feb 2008 Count				March 2008 Count			
	AADT	Actual AWDT	Seasonal Factor*	Est'd. AADT	% Change over 2006	Actual AWDT	Seasonal Factor*	Est'd. AADT	% Change over 2006
1. SR-547 West of SR-542	3,600	4,056	1.09	4,420	22.8%	4,474	1.06	4,740	31.7%
2. SR-542 East of SR-547	3,100	2,852	1.09	3,110	0.3%	3,209	1.06	3,400	9.7%
3. SR-542 South of SR-547	4,900	4,732	1.09	5,160	5.3%	5,216	1.06	5,530	12.9%
4. SR-542 at Maple Falls	1,700	1,746	1.09	1,900	11.8%	1,775	1.06	1,880	10.6%
5. SR-542 east of Glacier	1,700	942	1.09	1,205	-29.1%	1,628	1.06	1,725	1.5%

*Average of 2005, 2006 and 2007 monthly seasonal factors for indicated month

AWDT = Average Weekday Daily Traffic

AADT = Annual Average Daily Traffic

Source: WSDOT; Tilghman Group

Accurate seasonal adjustments are necessary to produce credible traffic analyses, particularly when counts from low volume months are used. If the factors were accurate, then the estimated AADT's for both February and March, 2008, should be similar, and should be reasonably close to the 2006 volumes.

However, notable differences occur:

- Actual weekday volumes were higher in February than the 2006 Annual Average Daily Traffic at locations 1, 3 and 4. In March, they were higher at locations 1 through 4.
- March's actual weekday and adjusted volumes also significantly exceeded those for February at locations 1, 2 and 3.
- Factoring either February or March volumes by the monthly seasonal factors puts them well above 2006 AADT values at many locations (especially at locations 1 and 3). Recent regional growth may account for some of the increase, but this pattern suggests that a different seasonal profile is needed for Kendall Road and the Mt. Baker Highway to achieve accurate annual average daily volumes. The pattern also suggests that some ski season traffic uses Kendall Rd. to reach Mt. Baker Highway. Skiers drawn from Canada are among those using SR-547 from Sumas to reach Mt. Baker.
- As discussed in the next section, while recreation routes in the state of Washington typically experience higher volumes in the summer, it appears that ski season traffic on the Mt. Baker

Highway reaches volumes as high or higher than summer recreation traffic. For example, a July, 2004 count by WSDOT on SR0542 immediately east of its intersection with SR-547 (Kendall Rd) indicated volumes of 3,330 weekday daily vehicles, a volume nearly matched by the March 2008 count of 3,209 vehicles. Despite the four year difference, one would expect the March volume to be about 15% - 20% less than the July volume, if it followed the assigned monthly seasonal factors. But, clearly, this is not the case.

C. OTHER INDICATORS OF SEASONAL RECREATION TRAFFIC AND DAILY VARIATIONS

Information on recreational traffic was completely absent in the Balfour Village traffic analysis. The Balfour Village counts, being used as a basis for the Foothills Subarea Plan SEIS, reflect periods of low traffic volumes and do not include any weekend traffic.

However, despite the lack of traffic counts from each season of the year on Mt. Baker Highway, other sources of information allow an estimate of recreation traffic to be made for summer and winter months, and for weekdays and weekends. These sources include:

- National Forest Service counts of cars and visitors
- Reports of annual ski passes and tickets sold at Mt. Baker Ski Area
- Recreation route traffic data from WSDOT for other state highways

The following discussion presents estimates of both seasonal and daily variation due to recreation traffic on Mt. Baker Highway.

National Forest Service Traffic Counts

The National Forest Service periodically maintains a traffic counter at White Salmon (approximately mile post 52) at the Mt. Baker Ski Area. This counter is used to identify total annual traffic; data for shorter intervals are not recorded. The most recent data available cover the period from August, 2002 through October, 2003 during which time 168,559 vehicles were counted (a one-way volume). Those 15 months included the 2002-03 winter ski season lasting 5 months. This figure implies an annual average daily volume of 750 vehicles (total two-way volume). By comparison, WSDOT reported an annual daily volume of 520 vehicles in 2005 at milepost 54 though this figure reflects a limited duration count rather than an on-going one.

Except for employees and visitors living and lodging in the Glacier and Maple Falls area, this recreation traffic would pass through Kendall.

National Forest Service Winter Ski Visitor Reports

The National Forest Service also collects sales information from Mt. Baker Ski Area. During the same period for which NFS counted vehicles in 2002-03 at White Salmon, the ski season totalled 107,472 tickets and passes sold. Note that this is a measure of sales, not attendance. To the extent that annual passes are used multiple times, the number of people visiting the ski area would be greater than the sales figure. Assuming a 21 week ski season (147 days) and an average of 2.25 persons per vehicle, ski visitor traffic would amount to 47,750 vehicles for the 2002-03 winter. Adding an extra 5% for employee traffic brings total ski generated traffic to 50,150 vehicles.

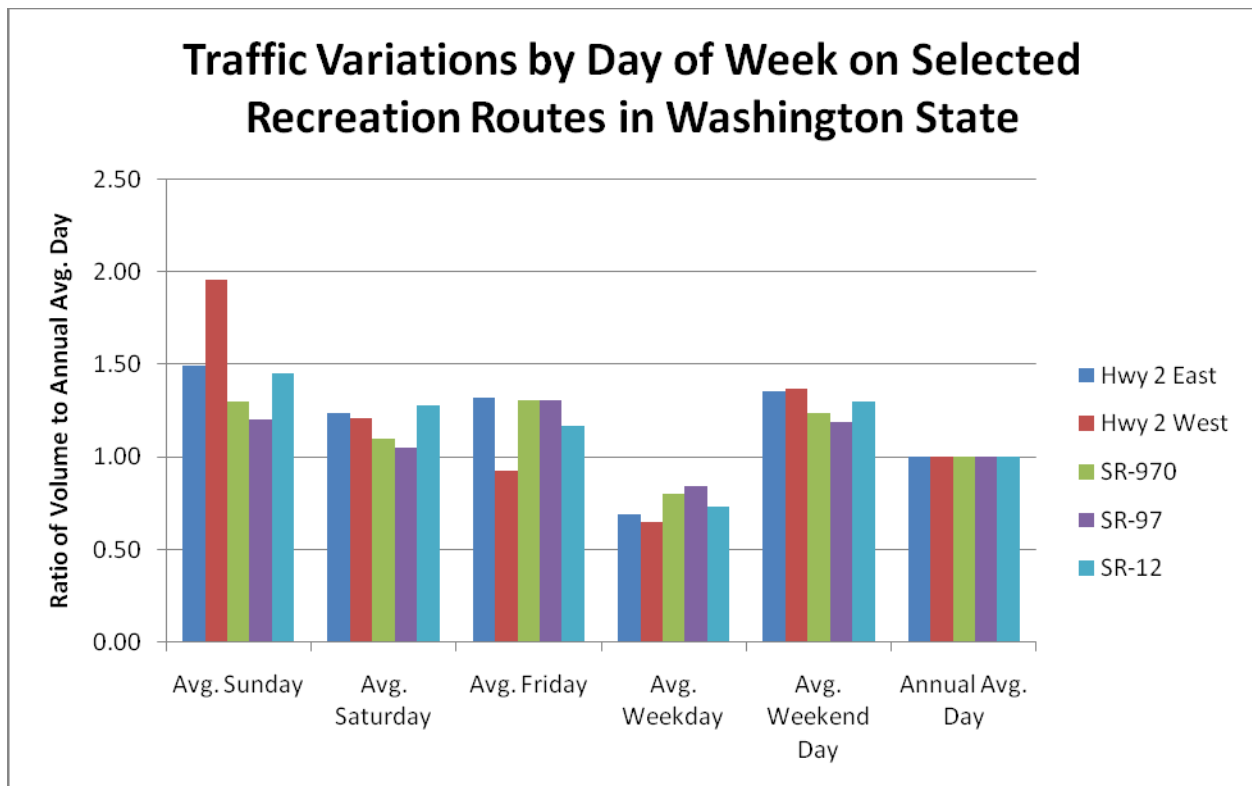
Thus, by this rough estimation, for 2002-03, it appears that approximately 30% ($50,150 \div 168,559$) of the total annual traffic on Mt. Baker occurred during the ski season, with the balance occurring in the other months. The ski season information implies an average daily volume of 680 vehicles in winter (counting both arrivals and departures). Non-ski-season traffic would then amount to 810 vehicles in other months. Weekend volumes would have been higher and weekday volumes lower.

National Forest Service Summer Visitor Estimates

Additional visitor information from the National Forest Service includes an estimate of people using Heather Meadows on Mt. Baker during the summer from late June through September. The NFS estimates that 135,000 to 140,000 persons visited that area and that, based on observations, the average number of people per vehicle was 3.5. Using the lower part of the visitor range, and assuming a 14 week summer period, these estimates correspond to an average daily volume of 790 vehicles (the combination of arrivals and departures). This figure is consistent with the estimate derived above from the National Forest Service traffic count at White Salmon of 750 annual average daily vehicles.

Washington State Recreation Route Traffic Patterns

While the above discussion shows that it is possible to estimate average daily traffic for the winter and summer, it is important to understand the variations that happen on different days of the week. Based on data reported by WSDOT in its 2006 Annual Traffic Report (the most recent version available), daily traffic varies substantially across the week for highways with recreational use. The following figure illustrates daily variations determined by permanent traffic counters at locations with characteristics similar to Mt. Baker Highway in terms of providing access to Cascade mountain destinations, of being on two lane roads and of having comparable total volumes.



Source: WSDOT 2006 Annual Traffic Report; Tilghman Group

The chart shows clearly that these recreation routes experience the lowest traffic volumes on weekdays. Weekend days carry substantially more traffic. In fact, weekend days have higher volumes than even the average annual day.

Using these variations as a surrogate for potential variations on Mt. Baker Highway and applying them to the NFS count at White Salmon yields an average Sunday volume of 1,110 vehicles, and an average weekday volume of 555 vehicles. Note that these volumes reflect only those vehicles travelling to the end of the highway and would not include vehicles with other destinations such as campgrounds and trailheads that operate in the summer and fall.

Whatcom County Counts

Counts conducted by Whatcom County on county highways also show that weekend volumes are higher than weekday volumes. According to May, 2006 counts on South Pass Road at Kendall Rd., and on Silver Lake Rd. north of Mt. Baker Highway, Saturday volumes exceeded average weekday volumes by 21% and 22% respectively. Peak hour volumes were also higher on Saturday than on the weekdays. Higher weekend volumes on these county roads may reflect recreational traffic using Silver Lake Park.

Implications for Mt. Baker Highway

The seasonal indicators described above suggest that, on average, daily winter recreation traffic is only slightly lower than summer traffic (680 compared to 810 daily vehicles, respectively). If these numbers are broadly correct, then recreation traffic accounts for 40-50% of the average daily volume through Glacier and Maple Falls, and 20-25% of the volume on Mt. Baker Highway immediately east of Kendall. As has been seen from the February counts, ski season traffic can have high peaks that greatly increase total volume and would account for as much as 50% of the highest day's total traffic.

To complete an accurate profile of Mt. Baker Highway's seasonal traffic patterns, additional counts would be necessary to determine volumes in other months. Except for the February and March, 2008 counts provided here and to a degree the older WSDOT July, 2006 counts, daily traffic variations by individual month remain largely unknown. Enough evidence, however, already exists to show that the very limited counts used in the Balfour Village study and incorporated in the Foothills Subarea Plan SEIS, do not reflect typical much less high volume weekday periods, and completely omit any weekend conditions.

D. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Counts from two separate weeks during the ski season should be considered a limited sample. However, these two weeks of counts greatly expand the available traffic data for the Mt. Baker Highway and provide the only recent records of ski season traffic patterns including both weekdays and weekends. It is probable that the February count captured one of the highest volume hours of the year. The February and March counts show traffic on Mt. Baker Highway and on Kendall Road to be significantly greater than the currently reported average annual daily volume. Factoring actual counts by standard non-recreational adjustment factors to estimate average annual daily volumes shows that the factors do not appropriately reflect the recreational volume characteristics of this highway.

Concerns about the deficiencies of counts used in the Balfour Village Traffic Impact Analysis and incorporated in the Foothills Subarea SEIS have been supported by the new counts presented here. The Balfour Village counts were made at an inappropriate time, too close to Christmas, and reflect a single weekday, 2-hour count, yielding a peak hour volume considerably lower than the average occurring over many weekdays in both February and March, 2008. In addition, those Balfour Village counts are over 40 months old, and are stale.

Additional specific conclusions include:

1. Recreation traffic comprises a substantial portion of total traffic on Mt. Baker Highway in both winter and summer.
2. Mt. Baker Highway presents an unusual traffic pattern for a recreation route. Whereas statewide experience shows recreation routes to have substantially more traffic in summer (even if serving a ski area), it appears that Mt. Baker Highway's peak volume occurs during winter, and that its ski season and summer average weekday volumes are roughly equal.
3. Weekend days have higher traffic volumes than weekdays. Therefore, traffic analyses, including Balfour Village's study, that rely exclusively on weekday counts are addressing the lowest volume period of the week in the Foothills Subarea, and omit the critical weekend volume and compounding effect of recreational traffic.
4. Volumes during the higher days of the ski season appear to have the highway operating at capacity. This at-capacity condition would exist in most segments where the highway has two lanes and would extend from near Bellingham past Glacier.
5. It is likely that volumes during many different hours of winter and summer create unacceptable levels of service for Foothills' roads, falling below the County's adopted policy of LOS C. Certainly, volumes recorded in many hours of February, 2008 would have failed the level of service test.

Recommendations

1. To address the influence of recreational traffic and the potential overlap with traffic from new development, it is recommended that:
 - a. Area-wide planning studies, such as the Foothills Subarea Plan SEIS, identify the potential for traffic demand to exceed capacity on existing Foothills roads when considering new zoning designations and land use changes. Analysis of Friday and weekend conditions would address this potential.
 - b. Traffic studies for new developments incorporate a weekend analysis, especially for retail and recreation uses that would generate peak volumes on a weekend. Weekend traffic is currently greater both in the peak hour and across the day than weekday traffic.
 - c. A design-hour volume including recreation traffic be developed with which to test the operating quality of key road segments and intersections with new development traffic. This would be an additional test to the average weekday conditions now used for analysis and would indicate the adequacy of potential mitigation measures (such as intersection reconfigurations) to handle design-hour volumes.
2. Mt. Baker Highway should be recognized as a recreation route for planning purposes.
3. Additional counts should be conducted at Kendall, Maple Falls and Glacier to collect seasonal volumes. Recurring counts every two months at identical locations would suffice.
4. New seasonal factors should be developed from those counts and applied to subsequent counts obtained on both Mt. Baker Highway and Kendall Road to calculate annual average daily traffic and corresponding peak hour volumes.

Ross Tilghman is a transportation planning consultant with his own firm, the **Tilghman Group**. He has 24 years of experience in analyzing transportation demands for a wide variety of land uses, and in developing solutions to meet transportation needs. Experience with large residential and mixed-use projects in Washington State includes master planning and environmental impact analysis for Snoqualmie Ridge, Semiahmoo, Cascadia, and Lincoln Square, as well as for Galisteo Basin Preserve in Santa Fe, New Mexico. Experience with recreational development includes analyses for ski areas (Early Winters, Santa Fe Ski Area, Crystal Mountain), stadiums, arenas, parks, zoos and convention centers throughout the country. A full member of the Urban Land Institute, Mr. Tilghman serves on ULI's Community Development Council, Blue Flight, and is a frequent participant in ULI Advisory Service Panels advising communities on real estate development challenges nationally. He also provides expert witness services regarding the adequacy of traffic studies, frequently working with the law firm of Bricklin Newman Dold.

Appendix – Traffic Counts

February Counts

Location 1: Kendall Road (SR 547) West of SR-542 Intersection

Hour beginning:	14-Feb-2008		15-Feb-2008		16-Feb-2008		17-Feb-2008		18-Feb-2008		19-Feb-2008		20-Feb-2008	
	Thursday		Friday		Saturday		Sunday		Monday		Tuesday		Wednesday	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
12:00 AM	4	18	8	21	9	29	11	23	9	18	5	24	3	15
01:00 AM	4	10	1	10	12	24	16	24	8	12	3	5	2	9
02:00 AM	8	10	8	10	8	16	6	10	6	8	6	9	8	10
03:00 AM	15	8	18	10	7	4	10	9	11	4	15	6	13	6
04:00 AM	29	9	24	4	12	3	14	6	27	5	26	7	31	7
05:00 AM	82	16	84	12	29	15	22	6	70	10	92	9	101	15
06:00 AM	180	18	165	18	46	18	26	12	139	17	187	29	168	22
07:00 AM	236	40	224	44	128	29	106	30	168	38	194	35	212	60
08:00 AM	152	106	180	93	201	47	178	36	157	37	166	64	178	108
09:00 AM	150	76	172	64	153	72	221	100	144	58	176	75	140	83
10:00 AM	108	35	146	82	182	86	156	114	141	60	135	63	119	65
11:00 AM	130	96	144	96	176	108	153	101	122	98	120	112	94	92
12:00 PM	125	103	130	106	170	137	180	153	144	92	122	104	110	94
01:00 PM	130	91	120	130	148	136	148	165	129	108	120	120	83	105
02:00 PM	102	140	156	184	154	173	140	177	114	134	107	135	107	123
03:00 PM	146	179	165	201	148	173	128	194	145	203	138	196	132	188
04:00 PM	145	211	134	220	136	238	136	310	96	244	105	229	124	220
05:00 PM	103	223	129	209	128	220	120	270	108	214	108	260	94	232
06:00 PM	124	160	143	185	92	160	86	156	96	170	96	197	92	184
07:00 PM	66	106	92	134	89	113	64	118	68	131	80	125	60	110
08:00 PM	46	78	92	96	48	86	40	72	54	92	41	83	60	86
09:00 PM	20	95	66	98	38	82	49	69	40	82	34	84	28	76
10:00 PM	23	59	36	70	37	75	19	39	16	49	16	30	17	43
11:00 PM	16	40	18	32	22	37	12	24	7	27	13	22	12	29
Directional Total	2,144	1,927	2,455	2,129	2,173	2,081	2,041	2,218	2,019	1,911	2,105	2,023	1,988	1,982
Daily	4,071		4,584		4,254		4,259		3,930		4,128		3,970	
Peak Hour	356		366		374		446		348		368		344	
% of Daily	8.7%		8.0%		8.8%		10.5%		8.9%		8.9%		8.7%	
Time of Peak	4-5 PM		3-4 PM		4-5 PM		4-5 PM		3-4 PM		5-6 PM		4-5 PM	

Weekday Avg Pk Hr:	356	Avg. Weekday Daily Volume:	4056
Highest Hour/Avg Pk Hr	1.25	Peak Day / Avg. Weekday:	1.05
# Hours > Avg Pk Hr	5		

Location 2: Mt. Baker Highway (SR 542) East of SR-547 Intersection

Hour beginning:	14-Feb-2008		15-Feb-2008		16-Feb-2008		17-Feb-2008		18-Feb-2008		19-Feb-2008		20-Feb-2008	
	Thursday		Friday		Saturday		Sunday		Monday		Tuesday		Wednesday	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
12:00 AM	6	6	6	5	17	4	27	3	8	2	6	1	3	0
01:00 AM	2	2	5	2	14	1	9	4	5	2	6	1	2	1
02:00 AM	4	0	5	1	6	0	7	1	0	0	4	1	3	2
03:00 AM	2	4	3	2	7	2	4	2	3	2	4	1	2	3
04:00 AM	4	8	2	8	2	2	4	3	1	9	2	10	5	11
05:00 AM	8	30	6	24	9	12	5	13	6	26	8	26	10	24
06:00 AM	32	33	33	28	64	14	36	4	28	33	28	50	24	51
07:00 AM	64	83	92	85	293	22	320	24	141	60	52	76	57	74
08:00 AM	138	73	274	82	506	67	558	44	403	71	154	84	105	83
09:00 AM	135	87	192	105	317	93	500	86	325	101	178	78	108	92
10:00 AM	100	55	142	92	240	103	296	98	216	140	147	95	98	92
11:00 AM	94	72	141	110	181	117	222	129	152	150	129	107	82	94
12:00 PM	86	90	86	113	134	110	178	158	124	136	80	90	91	95
01:00 PM	68	93	110	158	142	158	126	196	104	158	68	94	61	75
02:00 PM	80	123	141	175	146	198	111	285	112	200	82	126	84	92
03:00 PM	102	160	132	194	130	318	106	438	88	360	100	200	134	156
04:00 PM	102	168	158	224	119	633	113	806	100	522	103	219	110	156
05:00 PM	98	80	160	110	104	326	97	611	97	325	106	120	116	82
06:00 PM	120	44	180	62	123	111	54	188	78	100	104	60	91	71
07:00 PM	64	30	140	44	80	58	44	68	49	51	68	25	55	27
08:00 PM	54	24	132	28	47	34	36	38	34	41	60	24	61	23
09:00 PM	50	33	132	24	42	40	35	20	34	24	30	19	34	15
10:00 PM	37	9	94	18	39	23	23	14	15	5	20	8	23	7
11:00 PM	20	6	40	9	22	14	15	3	15	3	12	5	11	5
Directional Total	1,470	1,313	2,406	1,703	2,784	2,460	2,926	3,236	2,138	2,521	1,551	1,520	1,370	1,331
Daily	2,783		4,109		5,244		6,162		4,659		3,071		2,701	
Peak Hour	270		382		752		919		622		322		290	
% of Daily	9.7%		9.3%		14.3%		14.9%		13.4%		10.5%		10.7%	
Time of Peak	4-5 PM		4-5 PM		4-5 PM		4-5 PM		4-5 PM		4-5 PM		3-4 PM	

Weekday Avg Pk Hr:	294	Avg. Weekday Daily Volume:	2852
Highest Hour/Avg Pk Hr	3.13	Peak Day / Avg. Weekday:	2.16
# Hours > =Avg Pk Hr	36		

Location 3: Mt. Baker Highway (SR-542) South of SR-547 Intersection

Hour beginning	14-Feb-2008		15-Feb-2008		16-Feb-2008		17-Feb-2008		18-Feb-2008		19-Feb-2008		20-Feb-2008	
	Thursday		Friday		Saturday		Sunday		Monday		Tuesday		Wednesday	
	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
12:00 AM	17	3	27	11	40	5	38	12	25	11	29	5	18	3
01:00 AM	13	6	15	2	36	9	26	14	14	6	10	4	10	3
02:00 AM	13	6	15	6	19	7	15	4	6	6	10	6	13	9
03:00 AM	6	16	10	20	10	8	8	6	7	13	8	15	6	14
04:00 AM	9	34	8	26	4	12	5	12	6	35	8	34	9	40
05:00 AM	10	96	5	90	14	30	9	30	9	87	10	106	8	112
06:00 AM	31	194	33	166	68	48	42	24	35	149	34	207	22	202
07:00 AM	74	265	98	250	197	93	297	56	124	166	50	221	82	239
08:00 AM	179	155	256	160	433	130	462	72	357	121	154	178	148	198
09:00 AM	136	164	173	187	276	152	429	139	290	161	177	176	102	152
10:00 AM	90	116	151	154	202	164	325	162	196	188	144	146	96	139
11:00 AM	124	134	144	152	189	190	232	178	163	193	139	132	102	112
12:00 PM	98	133	121	171	182	187	215	211	144	204	101	130	110	130
01:00 PM	109	152	139	194	194	214	167	237	129	190	109	145	103	109
02:00 PM	148	155	197	205	194	240	179	307	157	224	128	148	146	138
03:00 PM	186	209	157	243	191	352	140	440	162	378	166	200	195	167
04:00 PM	223	217	235	234	190	622	186	705	212	488	226	208	241	200
05:00 PM	242	116	272	146	205	331	174	558	196	324	270	130	269	93
06:00 PM	222	96	264	100	208	130	125	195	163	120	207	78	207	90
07:00 PM	126	51	194	60	136	98	115	84	126	66	139	57	115	39
08:00 PM	102	40	165	58	101	49	78	48	85	55	114	36	106	46
09:00 PM	114	20	183	37	87	43	71	41	83	31	88	24	87	25
10:00 PM	87	23	130	25	75	28	44	20	50	13	39	17	56	17
11:00 PM	49	15	66	20	52	25	34	9	36	5	27	9	34	11
Directional Total	2,408	2,416	3,058	2,717	3,303	3,167	3,416	3,564	2,775	3,234	2,387	2,412	2,285	2,288
Daily	4,824		5,775		6,470		6,980		6,009		4,799		4,573	
Peak Hour	440		469		812		891		700		434		441	
% of Daily	9.1%		8.1%		12.6%		12.8%		11.6%		9.0%		9.6%	
Time of Peak	4-5 PM		4-5 PM		4-5 PM		4-5 PM		4-5 PM		4-5 PM		4-5 PM	

Avg Pk Hr Weekdays:	438	Avg. Weekday Daily Volume	4,732
Highest Hour/Avg Pk Hr	2.03	Peak Day / Avg. Weekday:	1.48
# Hours > Avg Pk Hr by 5%	16		

Location 4: Mt. Baker Highway (SR-542) East of Maple Falls near Milepost 26

Hour beginning	14-Feb-2008		15-Feb-2008		16-Feb-2008		17-Feb-2008		18-Feb-2008		19-Feb-2008		20-Feb-2008	
	Thursday		Friday		Saturday		Sunday		Monday		Tuesday		Wednesday	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
12:00 AM	4	4	4	3	9	3	18	4	3	0	3	1	2	0
01:00 AM	1	1	3	1	10	3	7	2	2	2	5	1	1	1
02:00 AM	3	0	2	1	3	0	4	1	0	0	3	0	0	2
03:00 AM	3	2	3	1	5	1	5	0	3	1	3	1	5	1
04:00 AM	1	2	3	2	1	2	2	1	0	3	2	4	3	1
05:00 AM	4	13	1	12	5	3	1	4	5	14	4	6	2	11
06:00 AM	16	19	18	16	56	8	30	5	23	19	17	17	15	28
07:00 AM	41	29	60	24	260	18	294	16	112	35	47	36	37	20
08:00 AM	118	31	241	41	489	27	562	31	387	44	128	42	78	42
09:00 AM	116	42	151	48	306	38	470	48	314	72	150	40	78	38
10:00 AM	69	35	112	36	196	41	285	70	196	116	100	54	48	52
11:00 AM	42	32	88	66	145	55	209	84	132	94	89	59	58	51
12:00 PM	52	56	60	76	95	64	130	98	98	122	43	48	48	51
01:00 PM	25	65	48	120	83	98	95	155	66	118	40	64	29	52
02:00 PM	45	95	65	135	90	177	72	250	60	164	42	94	48	72
03:00 PM	47	126	75	160	71	289	62	448	38	353	42	172	46	98
04:00 PM	52	140	98	190	64	646	60	780	52	540	54	198	54	130
05:00 PM	48	49	93	77	68	264	54	534	49	238	46	77	63	50
06:00 PM	56	30	110	38	80	88	35	143	40	70	59	38	44	39
07:00 PM	36	16	82	20	47	33	33	58	25	37	35	22	25	19
08:00 PM	23	11	91	22	24	24	32	30	21	23	38	12	32	13
09:00 PM	29	12	93	15	37	20	20	16	19	13	24	7	25	8
10:00 PM	28	4	88	16	25	19	14	7	13	3	12	5	19	4
11:00 PM	11	4	29	9	16	12	11	3	6	2	6	5	9	3
Directional Total	870	818	1,618	1,129	2,185	1,933	2,505	2,788	1,664	2,083	992	1,003	769	786
Daily	1,688		2,747		4,118		5,293		3,747		1,995		1,555	
Peak Hour	192		288		710		840		592		252		184	
% of Daily	11.4%		10.5%		17.2%		15.9%		15.8%		12.6%		11.8%	
Time of Peak	4-5 PM		4-5 PM		4-5 PM		4-5 PM		4-5 PM		4-5 PM		4-5 PM	

Avg Pk Hr Weekdays:	209	Avg. Weekday Daily Volume	1,746
Highest Hour/Avg Pk Hr	4.01	Peak Day / Avg. Weekday:	3.03
# Hours > Avg Pk Hr + 5%	32		

Location 5: SR 542 East of Glacier (Milepost 35)

Hour beginning:	14-Feb-2008		15-Feb-2008		16-Feb-2008		17-Feb-2008		18-Feb-2008		19-Feb-2008		20-Feb-2008	
	Thursday		Friday		Saturday		Sunday		Monday		Tuesday		Wednesday	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
12:00 AM	0	0	0	3	0	0	1	0	2	1	0	2	0	0
01:00 AM	0	0	1	0	3	0	1	2	0	1	0	0	0	0
02:00 AM	0	0	0	1	1	0	3	0	0	0	2	0	0	0
03:00 AM	5	0	3	0	1	1	2	0	1	0	4	0	5	0
04:00 AM	1	1	1	0	1	0	2	0	2	4	0	1	0	1
05:00 AM	3	0	2	1	7	0	4	1	6	0	2	0	4	0
06:00 AM	16	2	13	0	37	2	23	1	22	0	9	0	8	1
07:00 AM	28	2	48	1	217	6	241	1	89	0	24	3	21	1
08:00 AM	110	4	196	3	612	8	654	12	381	7	135	3	76	0
09:00 AM	93	2	181	7	416	6	585	9	378	12	174	1	85	1
10:00 AM	74	10	104	8	234	6	358	16	209	11	104	10	67	8
11:00 AM	34	7	62	29	153	32	262	42	147	16	72	9	34	8
12:00 PM	21	20	39	45	88	49	144	98	91	62	41	18	24	16
01:00 PM	6	40	8	81	53	105	85	145	44	82	16	47	12	29
02:00 PM	7	75	25	113	50	206	47	259	34	166	12	92	10	50
03:00 PM	8	108	12	152	28	448	40	584	24	382	9	165	4	78
04:00 PM	4	111	10	186	16	776	13	1013	9	576	7	211	4	126
05:00 PM	2	18	11	33	7	178	12	280	15	110	2	36	7	33
06:00 PM	2	5	11	12	4	52	1	59	0	36	5	13	5	10
07:00 PM	2	0	11	8	4	6	2	10	4	10	5	4	3	4
08:00 PM	3	2	9	1	3	4	3	1	1	1	0	4	1	3
09:00 PM	2	0	7	4	8	2	1	2	0	2	2	0	1	2
10:00 PM	3	2	6	5	1	3	0	2	0	0	0	1	0	1
11:00 PM	2	0	2	1	2	4	0	0	1	0	0	2	0	0
Directional Total	426	409	762	694	1,946	1,894	2,484	2,537	1,460	1,479	625	622	371	372
Daily	835		1,456		3,840		5,021		2,939		1,247		743	
Peak Hour	116		199		792		1,026		585		218		130	
% of Daily	13.9%		13.7%		20.6%		20.4%		19.9%		17.5%		17.5%	
Time of Peak	3-4 PM		8-9 AM		4-5 PM		4-5 PM		4-5 PM		4-5 PM		4-5 PM	

Weekday Avg Pk Hr:	155	Avg. Weekday Daily Volume:	942
Highest Hour/Avg Pk Hr	6.63	Peak Day / Avg. Weekday:	5.33
# Hours > Avg Pk Hr + 5%	34		

March Counts

Location 1: Kendall Road (SR 547) West of SR-542 Intersection

Hour beginning:	14-Mar-08 Friday		15-Mar-08 Saturday		16-Mar-08 Sunday		17-Mar-08 Monday		18-Mar-08 Tuesday		19-Mar-08 Wednesday		20-Mar-08 Thursday	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
12:00 AM	11	16	23	39	17	33	4	13	6	26	3	17	4	27
1:00 AM	5	14	7	16	9	23	3	12	12	8	5	11	4	10
2:00 AM	11	13	9	17	17	13	8	7	9	12	7	16	4	16
3:00 AM	15	5	23	10	8	10	12	9	15	6	14	7	22	9
4:00 AM	24	5	17	5	13	8	31	5	32	12	34	15	37	10
5:00 AM	80	8	31	12	15	6	107	19	88	14	99	9	86	10
6:00 AM	176	13	56	11	36	17	169	15	185	19	168	19	170	16
7:00 AM	235	46	114	17	64	15	225	59	222	53	225	60	223	53
8:00 AM	180	87	159	32	145	39	188	104	172	117	163	86	165	95
9:00 AM	213	61	164	60	148	74	135	65	158	86	150	67	159	59
10:00 AM	170	80	169	117	151	84	104	72	124	74	114	69	142	55
11:00 AM	148	93	205	87	143	112	107	103	121	80	129	83	145	107
12:00 PM	171	123	159	127	152	139	131	107	129	111	128	103	143	88
1:00 PM	164	109	152	118	170	142	117	113	110	102	149	122	133	111
2:00 PM	180	190	141	174	134	197	116	113	121	145	143	145	147	129
3:00 PM	188	193	134	173	131	188	158	186	150	184	147	185	190	166
4:00 PM	195	238	153	212	120	234	115	179	122	229	127	236	164	234
5:00 PM	198	239	141	173	127	203	111	241	139	227	110	228	167	241
6:00 PM	163	271	129	167	110	164	97	205	164	213	107	189	168	187
7:00 PM	127	180	122	136	92	127	82	127	85	134	93	160	133	159
8:00 PM	142	119	59	114	47	99	43	101	71	152	64	96	121	130
9:00 PM	86	90	70	107	57	70	20	82	45	84	48	83	107	79
10:00 PM	50	91	46	59	25	45	29	38	33	55	23	39	62	62
11:00 PM	30	70	30	49	8	19	14	27	14	22	14	24	30	32
Directional Total	2,962	2,354	2,313	2,032	1,939	2,061	2,126	2,002	2,327	2,165	2,264	2,069	2,726	2,085
Daily	5,316		4,345		4,000		4,128		4,492		4,333		4,811	
Peak Hour	437		365		354		352		377		363		408	
% of Daily	8.2%		8.4%		8.9%		8.5%		8.4%		8.4%		8.5%	
Time of Peak	5-6 PM		4-5 PM		4-5 PM		5-6 PM		6-7 PM		4-5 PM		5-6 PM	

Weekday Avg Pk Hr:	375	Avg. Weekday Daily Volume:	4474
Highest Hour/Avg Pk Hr	1.17	Peak Day / Avg. Weekday:	1.19
# Hours > Avg Pk Hr	7		

Location 2: Mt. Baker Highway (SR 542) East of SR-547 Intersection

Hour beginning:	14-Mar-08 Friday		15-Mar-08 Saturday		16-Mar-08 Sunday		17-Mar-08 Monday		18-Mar-08 Tuesday		19-Mar-08 Wednesday		20-Mar-08 Thursday	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
12:00 AM	23	5	24	15	7	7	6	4	5	2	5	3	6	4
1:00 AM	9	2	14	3	9	6	6	1	6	0	4	0	3	1
2:00 AM	4	0	3	3	8	3	1	3	6	2	2	2	3	2
3:00 AM	5	2	8	2	5	5	3	3	5	3	3	4	7	3
4:00 AM	2	5	2	2	5	7	2	9	0	15	3	15	6	14
5:00 AM	5	23	15	12	5	7	4	32	4	28	4	29	12	24
6:00 AM	27	38	53	22	30	11	15	40	23	45	22	51	28	44
7:00 AM	150	71	324	21	158	22	96	93	68	86	62	79	100	86
8:00 AM	272	86	331	57	292	55	143	102	143	99	130	85	167	96
9:00 AM	226	102	199	82	239	97	98	93	141	89	113	80	135	88
10:00 AM	168	135	156	110	177	111	96	102	111	75	80	96	104	96
11:00 AM	124	153	155	105	147	162	102	106	86	102	99	90	92	103
12:00 PM	120	155	118	142	106	143	59	134	73	125	93	103	97	94
1:00 PM	116	149	104	110	100	178	85	103	77	92	100	99	88	138
2:00 PM	150	190	103	190	83	224	81	125	62	108	89	103	105	135
3:00 PM	175	239	93	204	77	329	97	142	85	127	89	164	139	191
4:00 PM	176	286	103	299	84	395	112	145	113	181	118	170	131	193
5:00 PM	217	200	124	173	70	263	105	112	137	101	120	95	141	112
6:00 PM	176	125	109	120	54	124	104	54	109	63	118	55	134	90
7:00 PM	157	88	114	51	56	67	78	40	95	50	87	52	114	50
8:00 PM	146	44	65	47	51	42	52	26	70	32	64	32	114	31
9:00 PM	116	28	58	38	28	26	27	25	48	32	42	28	96	19
10:00 PM	55	23	37	36	21	21	21	7	31	10	24	5	49	12
11:00 PM	47	22	31	20	10	4	13	4	11	0	23	9	27	6
Directional Total	2,666	2,171	2,343	1,864	1,822	2,309	1,406	1,505	1,509	1,467	1,494	1,449	1,898	1,632
Daily	4,837		4,207		4,131		2,911		2,976		2,943		3,530	
Peak Hour	462		402		479		257		294		288		330	
% of Daily	9.6%		9.6%		11.6%		8.8%		9.9%		9.8%		9.3%	
Time of Peak	4-5 PM		4-5 PM		4-5 PM		4-5 PM		4-5 PM		4-5 PM		3-4 PM	

Weekday Avg Pk Hr:	292	Avg. Weekday Daily Volume:	3209
Highest Hour/Avg Pk Hr	1.64	Peak Day / Avg. Weekday:	1.51
# Hours > Avg Pk Hr	24		

Location 3: Mt. Baker Highway (SR-542) South of SR-547 Intersection

Hour beginning:	14-Mar-08 Friday		15-Mar-08 Saturday		16-Mar-08 Sunday		17-Mar-08 Monday		18-Mar-08 Tuesday		19-Mar-08 Wednesday		20-Mar-08 Thursday	
	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
12:00 AM	28	6	52	26	35	17	15	7	30	8	19	3	31	5
1:00 AM	21	4	29	9	28	8	17	4	12	8	13	2	11	6
2:00 AM	14	9	17	7	15	14	5	7	14	9	16	7	17	4
3:00 AM	9	14	11	16	10	9	8	11	10	15	7	14	17	21
4:00 AM	8	27	6	16	7	14	5	39	7	43	12	43	11	46
5:00 AM	7	89	22	29	9	21	14	115	9	103	7	108	7	92
6:00 AM	23	185	45	53	34	33	26	181	27	201	23	200	33	181
7:00 AM	160	253	293	83	141	43	111	262	80	258	82	248	116	255
8:00 AM	291	168	371	120	249	107	170	197	178	168	147	171	183	174
9:00 AM	185	196	178	148	237	155	105	157	154	162	111	149	150	176
10:00 AM	154	180	155	152	187	170	101	136	131	140	80	136	112	158
11:00 AM	145	200	167	209	159	191	127	124	106	149	106	131	121	156
12:00 PM	161	206	141	204	162	197	100	177	111	162	127	139	133	153
1:00 PM	146	214	147	175	147	237	119	136	107	132	148	164	135	189
2:00 PM	223	233	173	228	167	247	133	161	138	152	175	164	160	193
3:00 PM	250	290	175	236	142	317	190	194	166	161	152	174	196	253
4:00 PM	253	295	189	313	179	371	210	168	243	196	244	186	243	219
5:00 PM	306	241	203	204	152	273	250	112	273	139	262	112	273	149
6:00 PM	327	140	173	141	141	150	228	66	260	151	230	81	224	146
7:00 PM	232	97	156	73	116	80	152	64	160	65	178	70	192	96
8:00 PM	190	94	125	52	106	44	112	35	183	53	125	51	176	63
9:00 PM	160	58	118	50	59	29	81	19	98	42	98	46	119	60
10:00 PM	120	42	69	44	42	21	45	23	68	27	46	12	75	40
11:00 PM	96	31	56	27	24	8	34	12	31	12	40	16	48	22
Directional Total	3,509	3,272	3,071	2,615	2,548	2,756	2,358	2,407	2,596	2,556	2,448	2,427	2,783	2,857
Daily	6,781		5,686		5,304		4,765		5,152		4,875		5,640	
Peak Hour	548		502		550		384		439		430		462	
% of Daily	8.1%		8.8%		10.4%		8.1%		8.5%		8.8%		8.2%	
Time of Peak	4-5 PM		4-5 PM		4-5 PM		3-4 PM		4-5 PM		4-5 PM		4-5 PM	

Weekday Avg Pk Hr:	429	Avg. Weekday Daily Volume:	5216
Highest Hour/Avg Pk Hr	1.28	Peak Day / Avg. Weekday:	1.30
# Hours > Avg Pk Hr	14		

Location 4: Mt. Baker Highway (SR-542) East of Maple Falls near Milepost 26

Hour beginning:	14-Mar-08 Friday		15-Mar-08 Saturday		16-Mar-08 Sunday		17-Mar-08 Monday		18-Mar-08 Tuesday		19-Mar-08 Wednesday		20-Mar-08 Thursday	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
12:00 AM	10	5	14	10	4	2	7	3	4	2	4	4	2	1
1:00 AM	4	2	10	3	9	6	2	0	2	0	0	0	2	0
2:00 AM	1	2	8	6	3	2	2	3	2	1	2	1	2	0
3:00 AM	5	1	5	2	4	0	2	1	5	1	5	1	5	1
4:00 AM	4	0	2	2	6	1	1	2	2	7	3	3	4	3
5:00 AM	3	9	10	5	5	4	3	14	3	8	5	6	7	5
6:00 AM	11	11	45	9	24	9	7	15	18	11	11	17	16	13
7:00 AM	120	25	277	48	136	11	73	33	55	30	47	24	82	30
8:00 AM	253	41	409	54	284	29	111	48	102	34	101	32	130	36
9:00 AM	202	40	163	36	217	53	78	45	102	33	81	30	123	55
10:00 AM	130	59	110	36	144	78	61	32	73	33	56	41	72	35
11:00 AM	82	68	118	54	117	105	57	55	44	45	51	32	38	35
12:00 PM	68	84	62	66	56	82	32	51	32	68	55	43	44	60
1:00 PM	49	87	60	77	65	126	27	64	26	68	35	54	34	92
2:00 PM	73	143	46	163	53	198	40	83	35	69	33	66	50	109
3:00 PM	80	178	54	205	49	293	42	101	48	94	33	107	44	125
4:00 PM	83	252	62	254	39	342	44	113	44	130	46	129	48	137
5:00 PM	115	164	56	144	36	195	45	70	60	66	56	72	53	65
6:00 PM	105	77	48	80	24	79	40	37	43	38	48	28	51	47
7:00 PM	92	60	47	39	32	51	40	18	44	24	37	26	49	20
8:00 PM	87	33	44	21	26	32	33	15	31	16	39	18	49	18
9:00 PM	88	25	42	16	19	14	17	7	27	7	26	13	49	7
10:00 PM	48	17	27	13	16	11	16	3	12	2	24	4	26	5
11:00 PM	27	5	16	11	8	1	4	1	4	0	12	5	14	3
Directional Total	1,740	1,388	1,735	1,354	1,376	1,724	784	814	818	787	810	756	994	902
Daily	3,128		3,089		3,100		1,598		1,605		1,566		1,896	
Peak Hour	335		463		381		159		174		175		185	
% of Daily	10.7%		15.0%		12.3%		9.9%		10.8%		11.2%		9.8%	
Time of Peak	4-5 PM		8-9 AM		4-5 PM		8-9 AM		4-5 PM		4-5 PM		4-5 PM	

Weekday Avg Pk Hr:	173	Avg. Weekday Daily Volume:	1775
Highest Hour/Avg Pk Hr	2.67	Peak Day / Avg. Weekday:	1.76
# Hours > Avg Pk Hr	28		

Location 5: SR 542 East of Glacier (Milepost 35)

Hour beginning:	14-Mar-08 Friday		15-Mar-08 Saturday		16-Mar-08 Sunday		17-Mar-08 Monday		18-Mar-08 Tuesday		19-Mar-08 Wednesday		20-Mar-08 Thursday	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
12:00 AM	9	4	9	10	5	2	5	3	3	1	2	2	1	3
1:00 AM	5	0	13	0	8	6	4	1	3	0	0	0	2	0
2:00 AM	1	2	6	2	4	1	2	0	2	1	2	1	2	0
3:00 AM	3	0	7	0	4	1	3	1	5	1	5	1	6	0
4:00 AM	4	1	2	2	6	1	1	2	0	8	3	2	3	4
5:00 AM	4	10	11	6	4	4	2	13	4	9	2	11	4	8
6:00 AM	10	9	35	11	16	9	5	18	10	13	7	13	15	12
7:00 AM	104	20	254	8	116	8	57	29	40	28	41	23	71	25
8:00 AM	243	28	440	18	293	23	110	37	105	31	88	26	116	28
9:00 AM	191	32	199	30	214	54	81	39	97	30	82	33	121	38
10:00 AM	138	44	115	36	148	73	59	34	75	27	53	36	74	27
11:00 AM	71	58	111	49	115	91	55	52	39	37	51	28	42	29
12:00 PM	62	73	61	59	54	89	32	48	29	71	46	38	40	52
1:00 PM	43	94	53	83	61	132	19	69	20	55	29	49	28	91
2:00 PM	66	135	45	163	51	203	39	82	32	67	35	65	45	101
3:00 PM	66	180	44	205	43	291	33	94	44	86	26	101	41	127
4:00 PM	80	247	61	259	34	358	39	110	38	121	44	129	35	126
5:00 PM	106	142	51	129	39	171	34	60	60	59	46	61	49	51
6:00 PM	103	69	44	75	18	72	43	38	39	34	41	29	42	41
7:00 PM	75	46	40	36	24	47	35	16	41	24	32	19	48	17
8:00 PM	87	25	41	19	24	26	27	16	26	14	32	23	37	17
9:00 PM	85	20	42	19	17	13	16	8	26	8	23	7	47	8
10:00 PM	43	17	22	12	13	11	18	2	9	4	20	5	28	6
11:00 PM	32	4	16	9	8	1	4	2	5	2	13	3	16	3
Directional Total	1,631	1,260	1,722	1,240	1,319	1,687	723	774	752	731	723	705	913	814
Daily	2,891		2,962		3,006		1,497		1,483		1,428		1,727	
Peak Hour	327		458		392		149		159		173		168	
% of Daily	11.3%		15.5%		13.0%		10.0%		10.7%		12.1%		9.7%	
Time of Peak	4-5 PM		8-9 AM		4-5 PM		4-5 PM		4-5 PM		4-5 PM		3-4 PM	

Weekday Avg Pk Hr:	162	Avg. Weekday Daily Volume:	1628
Highest Hour/Avg Pk Hr	2.82	Peak Day / Avg. Weekday:	1.85
# Hours > Avg Pk Hr	26		



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