III. FORECASTING TRAVEL

The Growth Management Act specifically requires Cities and Counties to do travel forecasts for at least ten years based on the adopted land use plans. The standard process for forecasting traffic on a street, road, and highway system is to create a "traffic model" that can mathematically forecast future traffic based on several factors. The most frequently used traffic model methodology employs a "gravity model" which uses land use and land use growth as the primary determinant of traffic growth. This is the type of model which was developed for Skagit county using the TMODEL microcomputer based traffic modeling software. TMODEL is the standard in Skagit County in that it was also used to develop the Anacortes, Burlington, Mount Vernon, and Sedro- Woolley traffic models.

Traffic models are tools that provide valuable information to help transportation professionals study possible scenarios for the future. It is very important to note that even the most sophisticated and complex traffic models do not provide perfect information.

A. TRAFFIC MODEL DEFINITION

The term "traffic model" can be confusing because, loosely used, it can have several different meanings. A traffic model can mean any of the following: 1) any computer method or model that forecasts traffic; 2) a certain type of computerized method which uses a gravity model assumption along with future land use to forecast future traffic: 3) a specific traffic modeling software package; or, 4) an actual model that has been built and calibrated for a specific jurisdiction/ area using a specific software package. The "Skagit County Traffic Model" will refer to 4 above.

Looking at it from another perspective, it can be said that a "traffic model" is each of the following:

1. Spatial Model. Three kinds of spatial or location data are used: point data (for street intersection), linear data (for street links) and area data (for land use).

2. Gravity Model. Similar to the pull of gravity between two objects, the number of trips between two locations (traffic zones) is assumed to be related to both the magnitude of the trip generators (population, housing units, employment, etc.) in those locations (zones) and the distance (or travel time) separating the two locations (zones).

3. Simulation Model. The goal of the actual modeling process (model calibration) is to simulate existing travel patterns and traffic volumes

on the road network based on land use. In this process, trips are distributed from zone to zone and assigned to the road network.

4. Forecasting Model. Once the model is calibrated, future land use forecasts or scenarios (based on comprehensive plan map, growth policies, and economic trends) are input into the model. The model is then run to produce forecasts of future traffic levels on the road network. Different growth scenarios will produce different traffic levels on the network.

For the Skagit County Transportation Element, the focus of the traffic forecasts is on the County road system. However, the traffic model that was developed includes information on all state highways and some city streets. This additional information has been refined and utilized by the RTPO in the development of the Regional Transportation Plan. For detailed information on the technical specifications and land use assumptions of the Skagit County Traffic Model, please refer to the Skagit/Island County Regional Transportation Plan.

B. THE MODELING/FORECASTING PROCESS

There are very specific steps which need to be taken in the process of developing a traffic model and using it to forecast traffic. Some of these are briefly mentioned above. Here all the important steps are listed in a sequential manner. These steps are the following:

1. Model Study Area. Decide on the specific land area that will be included in the traffic model.

2. Network Inventory. Build a computer network inventory of the primary streets, roads and highways in the model area. This inventory includes number of lanes on each road, traffic counts, average speed, and stop controls (traffic signals, stop signs, etc.) among others.

3. Traffic Analysis Zones. Divide the model study area into Traffic Analysis Zones (TAZs). (A typical traffic model will have between 50 and 250 TAZs.)

4. Land Use Data. Collect Employment, Population, and/or Housing unit data for a current or base year for each TAZ.

5. Trip Generation. Calculate trips to be generated by each zone based on the land use and trip generation assumptions.

6. Distribution & Assignment. This is the step referred to as a model "run". The computer distributes trips between pairs of TAZs and then assigns them to paths along the network.

7. Calibration. Calibrate is the process of making adjustments and corrections in the data, functions, parameters and assumptions in the model and doing additional "runs" (distribution & assignment) until base year traffic counts are replicated to a prescribed degree of accuracy.

8. Land Use Forecasts. Prepare one or more growth scenarios by forecasting future (20 year) employment, population, and/or housing units by TAZ.

9. Traffic Forecasts. Replace the base year data with future land use data (growth scenarios) and run the calibrated model on the base year transportation network. This produces future traffic levels on the network.

10. Needs Analysis. Based on a specific level of service (LOS) methodology, base year traffic levels, and future year traffic levels, determine which roads have current improvement needs and which are anticipated to have future improvement needs based on LOS.

11. Network Alternatives. Based on the results of the needs analysis, construct and evaluate several alternatives for future year transportation improvements, and test them to see which will best accommodate future year traffic.

12 Transportation Needs. Produce improvement projects along with cost estimates from the results from 10. and 11. above. This includes projects to accommodate both current and future needs.

C. COUNTY -WIDE TRAFFIC MODEL

In 1992, Skagit County Public Works Department, in conjunction with Skagit Sub- RTPO, undertook a project to build a traffic model which could be used for both the County's Transportation Element and the RTPO's Regional Transportation Plan. The results of this model have provided a benchmark which can be compared to a yearly statistical analysis model of the County Road System which predicts future traffic levels and therefore, the subsequent future LOS for any given segment of roadway on the County road system.

Traffic Model Coordination

In order to successfully build a County-wide traffic model, a large amount of data is needed. Fortunately, the four largest cities in the County, Mount Vernon, Anacortes, Sedro-Woolley, and Burlington, have developed local traffic models as a part of their GMA transportation planning work concurrent with the County-wide effort. Because of this, the original plan was to coordinate the efforts as much as possible and incorporate much of cities' modeling work into the County-wide model.

The primary coordination goal was to have city model decisions on geography and land use data be compatible with the geography and data needs of the county-wide model.

The most obvious area where the coordination was successful was in the design of traffic analysis zones. Three of the four cities were able to structure their zones in a manner that allowed them to be subdivisions of the County- wide model's zones. County and RTPO staff were then able to easily merge the land use data from the city models' TAZ's to the County-wide TAZ level and utilize it in the modeling process.

The Traffic Model coordination effort has continued beyond the work for the Transportation Systems Plan as RTPO staff refined the Traffic Model results in the development of the Regional Transportation Plan. An updated Traffic Model is currently under development by Skagit County and the RTPO. Future updates to the Transportation Systems Plan will incorporate the results of this study.

D. FORECASTS FOR OTHER MODES

The traffic modeling approach discussed here is good for forecasting future traffic levels for streets, roads, and highways. Forecasts for other modes are handled differently.

1. Transit

While SKAT has not done any long term forecasts of ridership, it does have a Six Year Transit Development Plan for 1999-2005 that established a goal of increasing ridership by 50%. Additional information on revenue forecasts and improvements in services, facilities and equipment over the next six years are available in SKAT's Six Year Transit Development Plan for 1999-2005.

2. Non-motorized Transportation

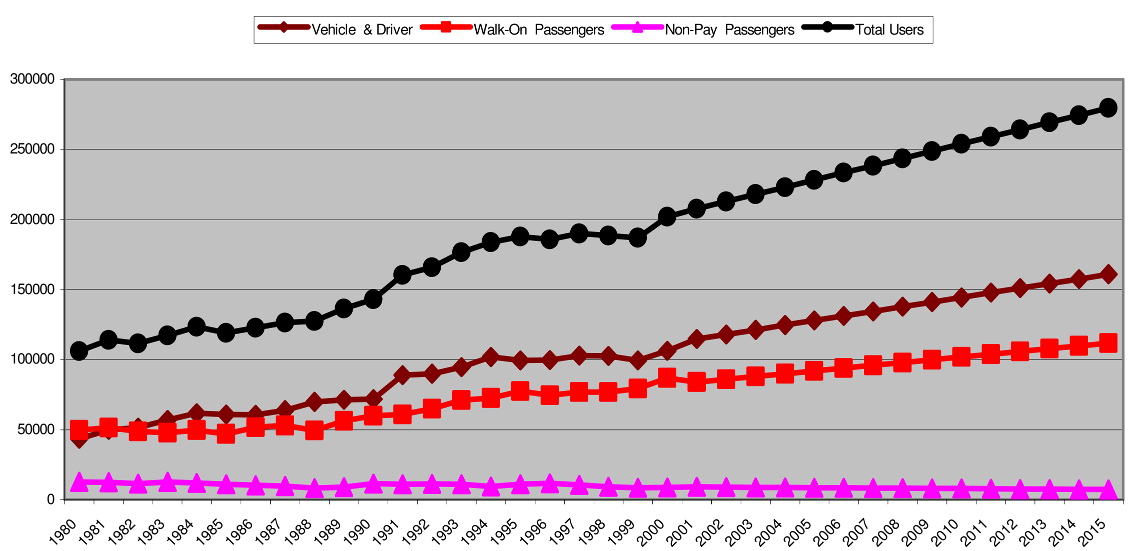
Some bicycle and equestrian use statistics are available from a 1995 survey that was taken as a part of the development of the Parks and Recreation Plan and the Non-motorized Transportation Plan. While there is currently no nationally accepted methodology for forecasting use in rural areas, the experience of other counties in the region indicates that development of non-motorized improvements significantly increases use.

3. Guemes Ferry - FERRY RIDERSHIP PROJECTIONS, 2001-2015

While it is difficult to project what will happen 15 years from now, long-range projections based on past trends, existing conditions, and the best information available about future development can help guide management decisions for the Guemes Island Ferry system.

The 1991 Guemes Island Ferry Capital Facilities Plan projected "total ridership on the system in the year 2005 to range from 182,000 to 196,500 representing an increase of 28% to 38%." As shown in Figure 3-1 and Table 3.1, actual total ridership on the Guemes Island Ferry system in the year 2000 exceeded the highest 2005 projections in the 1991 Guemes Island Ferry Plan by 5,376 riders.

Figure 3-1 Linear Regression Analysis and Projections of Guemes Ferry Ridership, 2001-2015.



It is evident from Figure 3-1 and Table 3-1, that if the growth trend for the past 21-years continues, then the Guemes Island Ferry will experience 38.5% growth in total ridership over the next 15 years. In addition, if past growth trends continue, then it is likely that vehicle ridership will continue to out-pace walk-on ridership, increasing by 51.2% while walk-on ridership increases by 28.5% over the next 15 years. This is very significant because the growth of vehicle ridership will impact the capacity of the Guemes Island Ferry system.

Table 3-1 Linear Regression Analysis Projections, 2001 - 2015.
(Based on 21-year data set, 1980-2000)

Year	Vehicle & Driver	% Change	Walk-On Passengers	% Change	Non-Pay Passengers	% Change	Totals	% Change
1980	43429		49778		12785		105992	
1981	50029	15.2%	51505	3.5%	12453	-2.6%	113987	7.5%
1982	51427	2.8%	48607	-5.6%	11437	-8.2%	111471	-2.2%
1983	56841	10.5%	47568	-2.1%	12710	11.1%	117119	5.1%
1984	61604	8.4%	49677	4.4%	12042	-5.3%	123323	5.3%
1985	60862	-1.2%	47020	-5.3%	10951	-9.1%	118833	-3.6%
1986	60717	-0.2%	51768	10.1%	10287	-6.1%	122772	3.3%
1987	63702	4.9%	52961	2.3%	9621	-6.5%	126284	2.9%
1988	69777	9.5%	49421	-6.7%	8275	-14.0%	127473	0.9%
1989	71255	2.1%	56103	13.5%	9000	8.8%	136358	7.0%
1990	71874	0.9%	59729	6.5%	11527	28.1%	143130	5.0%
1991	88806	23.6%	60724	1.7%	10868	-5.7%	160398	12.1%
1992	89898	1.2%	64881	6.8%	11122	2.3%	165901	3.4%
1993	94669	5.3%	71101	9.6%	10911	-1.9%	176681	6.5%
1994	101730	7.5%	72554	2.0%	9441	-13.5%	183725	4.0%
1995	99311	-2.4%	77511	6.8%	10986	16.4%	187808	2.2%
1996	99475	0.2%	74536	-3.8%	11740	6.9%	185751	-1.1%
1997	102859	3.4%	76679	2.9%	10460	-10.9%	189998	2.3%
1998	102578	-0.3%	76752	0.1%	9148	-12.5%	188478	-0.8%
1999	99332	-3.2%	79283	3.3%	8324	-9.0%	186939	-0.8%
2000	106410	6.7%	86862	8.7%	8604	3.3%	201876	7.4%
2001	114681	7.2%	83922	-3.5%	9081	5.3%	207685	2.8%
2002	117979	2.9%	85902	2.4%	8943	-1.5%	212824	2.5%
2003	121277	2.8%	87882	2.3%	8804	-1.5%	217963	2.4%
2004	124574	2.7%	89862	2.3%	8666	-1.6%	223102	2.4%
2005	127872	2.6%	91842	2.2%	8527	-1.6%	228241	2.3%
2006	131169	2.6%	93822	2.2%	8389	-1.6%	233380	2.3%
2007	134467	2.5%	95801	2.1%	8250	-1.7%	238518	2.2%
2008	137764	2.5%	97781	2.1%	8112	-1.7%	243657	2.2%
2009	141062	2.4%	99761	2.0%	7973	-1.7%	248796	2.1%
2010	144359	2.3%	101741	2.0%	7835	-1.7%	253935	2.1%
2011	147657	2.3%	103721	1.9%	7697	-1.8%	259074	2.0%
2012	150954	2.2%	105701	1.9%	7558	-1.8%	264213	2.0%
2013	154252	2.2%	107681	1.9%	7420	-1.8%	269352	1.9%
2014	157549	2.1%	109660	1.8%	7281	-1.9%	274491	1.9%
2015	160847	2.1%	111640	1.8%	7143	-1.9%	279630	1.9%
2001-2015 Increase								
	54437	**51.2%**	**24778**	**28.5%**	**-1461**	**-17%**	**77754**	**38.5%**

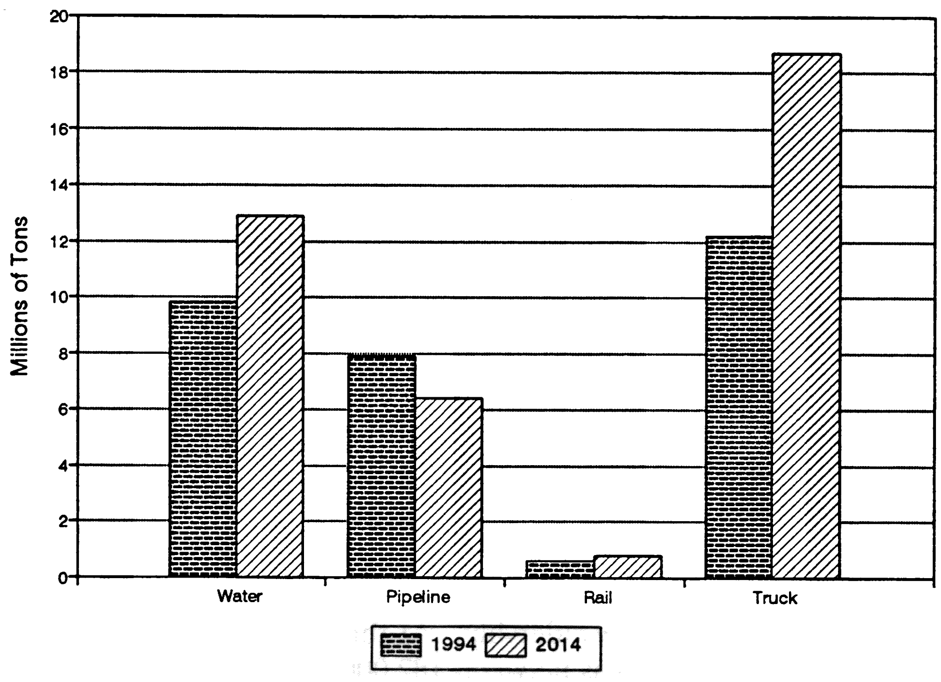
4. <u>Freight Transport</u>

Forecasts for freight and commodity transport were prepared as a part of the Air, Rail, Water and Port Transportation System Study produced for the Skagit Sub-RTPO. These forecasts were based in part on a 1994 survey of over 100 of the largest companies in Skagit County, all of which are involved in some type of goods transport.

The freight transport forecasts show the annual freight tonnage generated in Skagit County increasing from about 30 million tons in 1994 to about 39 million tons in 2014. This is a little surprising since it represents only a 27% increase in the 20-year planning period, much lower than the anticipated population growth percentage. One of the main reasons for this moderate growth is that the refineries show a very small growth in freight tonnage in this period. The biggest growth industries are Other Manufacturing (from 2.1 to 5.1 million tons) and Retail (from 2.1 to 3.8 million tons). Agriculture, Logging, and Multimodal all show virtually no growth in this timeframe.

The modal breakdown of these forecasts gives us another perspective on anticipated growth. While water transport shows very moderate growth (9.8 to 12.9 million tons), Pipeline transport is anticipated to decline from 7.9 to 6.4 million tons. (See Figure 3-2) Rail is expected to show moderate growth (.6 to .8 million tons), but it makes up only a negligible portion of the total. These three modes are dominated by the activities at the March's Point refineries. Freight tonnage for Trucking, which is broadly distributed across all industrial sectors, shows a 53% growth in the 20-year period, from 12.2 to 18.7 million tons.

FIGURE 3-2 Annual Freight Tonnage by Mode



In addition to tonnage forecasts, the Trucking mode has available forecasts by annual truck loads. These are anticipated to increase County-wide from 771,500 loads in 1994 to 1,219,200 loads in 2014. This represents a 58% increase compared to the 53% increase anticipated for trucking tonnage. About 40% of the numeric increase is attributable to gains in Retail, while about 28% of the increase is attributable to gains in Other Manufacturing. The other sectors show more moderate growth in the 20-year planning horizon. Figure 3-3 shows these forecasts.

FIGURE 3-3 Annual Truck Loads by Industry