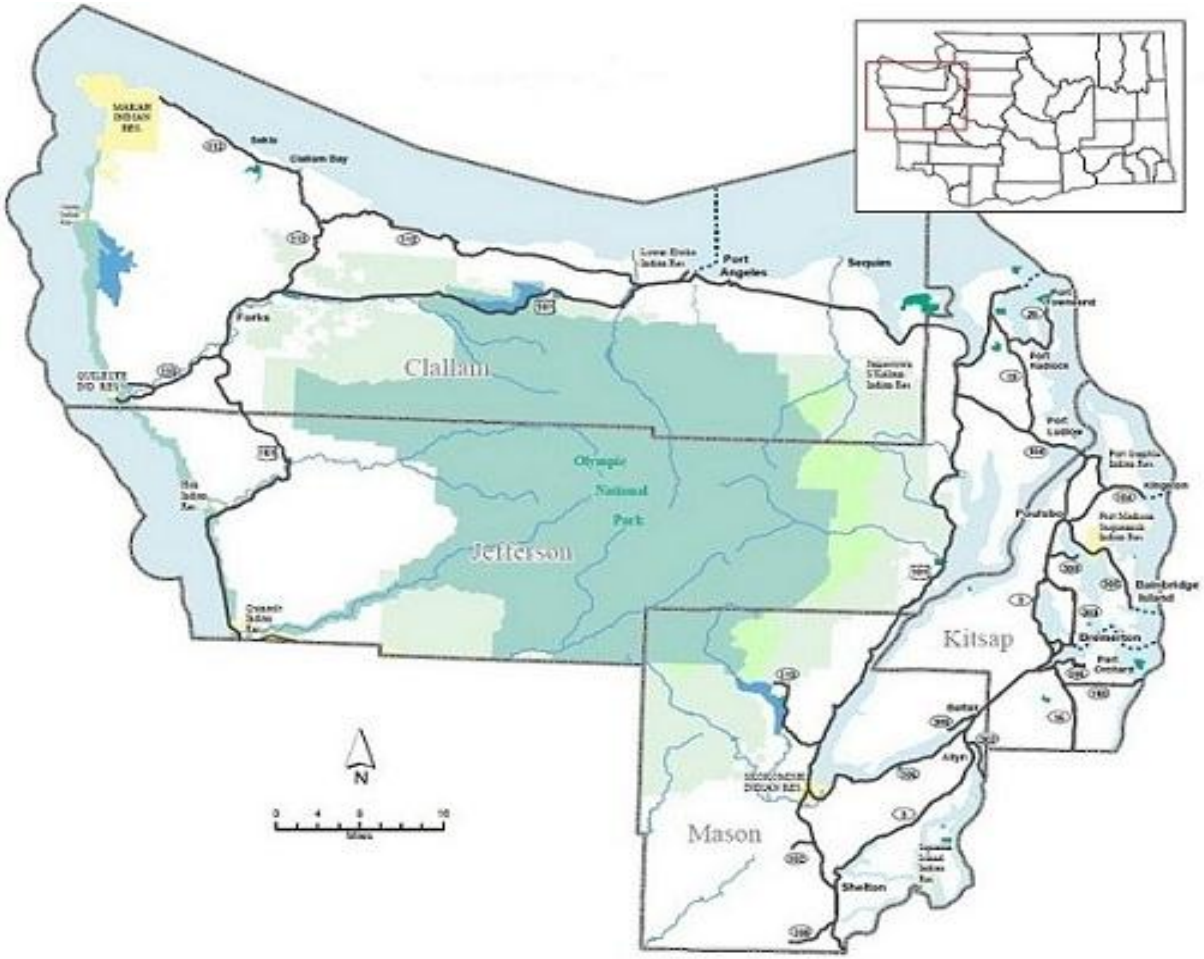
PRTPO Travel Demand Model Feasibility and Level of Service Consistency Report



Prepared for

Washington State Department of Transportation
Peninsula Regional Transportation Planning Organization

Prepared by

Kitsap County Public Works
Transportation Planning

Purpose

The Washington State Department of Transportation sought input into the feasibility of developing a regional transportation model and an assessment of Level of Service standards for the Peninsula Regional Transportation Planning Organization (PRTPO). The PRTPO consists of; Clallam, Jefferson, Kitsap and Mason counties.

Development of a regional model is one of the desired, yet unfunded, tasks outlined within the PRTPO's Unified Planning Work Program - 2012. The PRTPO feels that development of a regional travel demand model is important to the long-range planning and development of a properly functioning regional transportation system.

Much of the Peninsula relies upon US 101 as primary access across the Olympic Peninsula, and SR 3 as primary connection between the Kitsap and Olympic Peninsulas. These primary routes are heavily used for both freight and commuting purposes throughout the region. As regional population increases, so too does traffic congestion. The ability of the PRTPO to model projected growth and development, and to model the effects of alternative land use and population scenarios, is critical to planning for a transportation system that will effectively handle that growth as it occurs. A single regional model developed on a single software platform, which could be accessed and used by all member agencies, would be a valuable tool in evaluating current and future traffic conditions, both at the local and regional levels. This modeling capability would also help to ensure that all agencies are Growth Management Act (GMA) compliant in their consistency with neighboring and regional transportation planning efforts.

The last portion of this report compares the differing Level of Service (LOS) methodologies used by agencies within the PRTPO, and reviews them for GMA consistency.

Approach

The overall approach began with a discussion with the PRTPO to determine the needs and expectations of each member agency and the organization as a whole. Building a consensus on what the model will be used for, either regional and/or local modeling efforts, was essential to determining the scope and feasibility of a model development plan. Existing modeling efforts were reviewed to determine how much data already exists, at what detail that data exists, what software was being used, and what level of effort would be required to incorporate that data into a consolidated regional model on a single software platform.

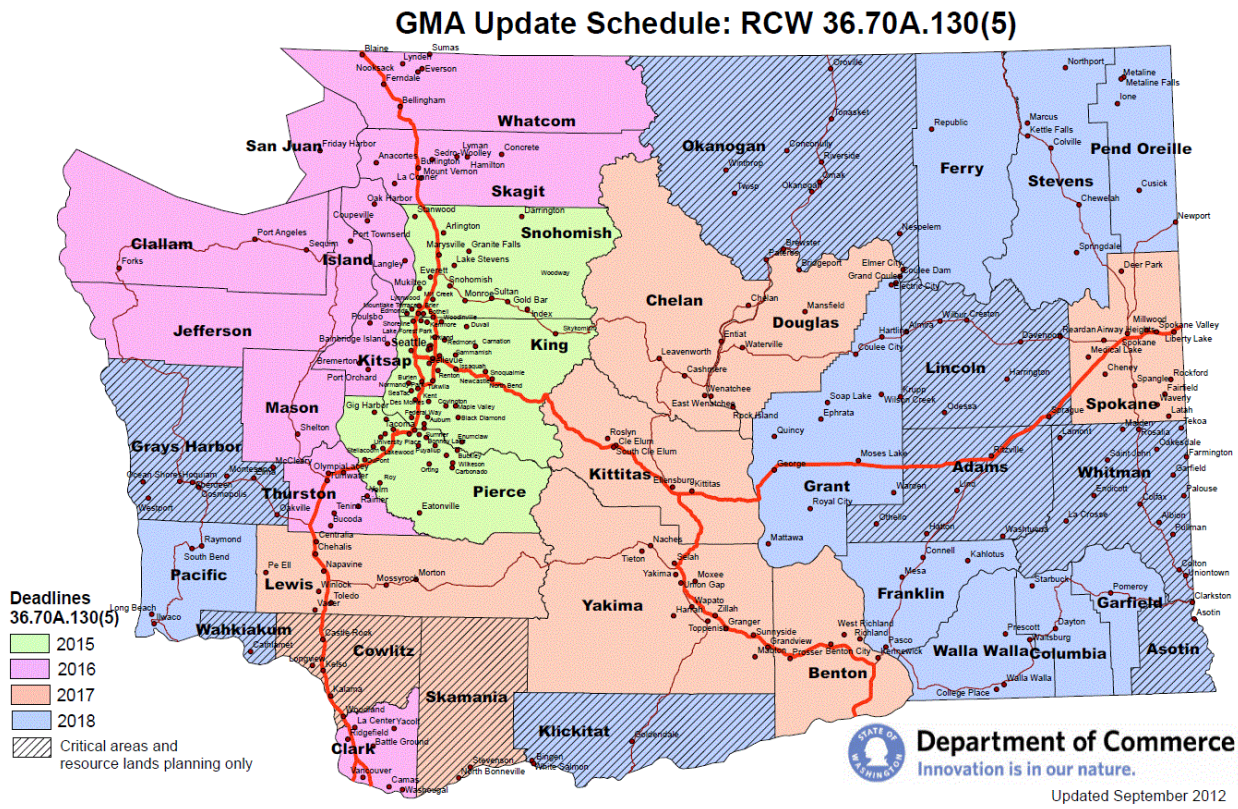
Agencies without travel demand models often have Geographic Information System (GIS) data that can prove very useful in model development. Some modeling platforms are better than others at being able to integrate GIS data, depending on the format, allowing member agencies to assist in model data updates. Knowing what type of data exists, land use, traffic volumes and intersection control among others, was important in developing an optimal recommendation on a modeling software platform, as well as cost estimates for both development and maintenance of a regional model.

Staff from the various PRTPO member agencies were consulted and assisted in gathering information about existing data from their respective agencies. In most cases the actual data was not collected, but information about the data was. In other words, what data exists, how up to date the data was and in what format. This exercise showed where critical data exists, where data is missing or out of date as well as geographic gaps in the data. This information was important in determining the scale of the data collection effort that would be needed to develop a regional model. A spreadsheet summarizing this information is included as Appendix 2.

Scope Refinement

A meeting with the PRTPO members was held on January 24, 2013 at the regularly scheduled PRTPO TAC meeting, to discuss the modeling needs and expectation of the group. The group expressed a desire to have a model developed that would meet the modeling needs of the region, and support the Regional Transportation Plan.

Members also wanted a model that individual member agencies could use, on an as-needed basis, to support local planning efforts. All PRTPO member agencies are required by the Growth Management Act (GMA) to update their respective comprehensive plans by 2016.



Members also requested that different scales of model be considered, ranging from a model of state routes only, to the inclusion of local roads and varying transportation modes from cars to pedestrians.

Existing Data Availability and Suitability

It was determined that gathering information about existing data, at least some of the most critical data for model development, would provide a good picture of overall data availability and suitability for developing a regional model. Information about existing data was collected from all tribes, counties and cities in the PRTPO region.

Information was collected on data for the following;

- Current Modeling Efforts
- Population and Housing
- Employment
- Traffic Counts
- Roadway Characteristics
- Transit Routes and Ridership
- Level of Service Standards
- Non-motorized Plans

Several models are currently in use, or are being developed, by the different local agencies.

Existing Models	Base - Forecast
○ TMODEL – Mason Co	2005 – 2025
○ EMME2 – Shelton	2005 – 2025
○ Visum	
▪ Poulsbo	2006 – 2025
▪ Clallam / Carlsborg	2006 – 2025
▪ Jefferson/Quimper	2007 – 2031
○ TransCAD	
▪ Port Angeles	2010 – 2035 (under development)
▪ Kitsap	2010 – 2025
○ Spreadsheet Model	
▪ Sequim	2012 – 2032
▪ WSDOT	2008 – 2030

WSDOT has Visum and EMME2 software, but primarily use it for review of models developed by other jurisdictions. WSDOT does not have a travel demand model for the PRTPO area, but does have a spreadsheet model of highways and primary arterials.

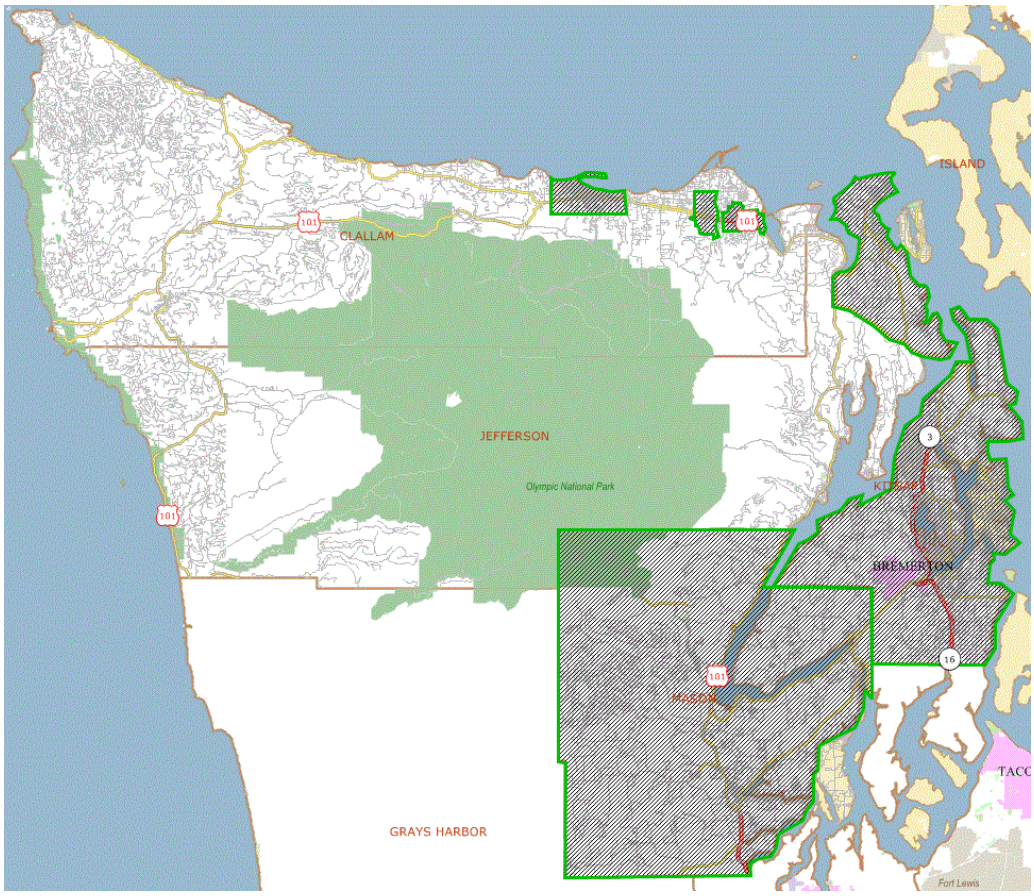
The City of Shelton and Mason County models were converted to TransCAD and incorporated into the Kitsap County model in 2010. Given that two entire counties and the City of Port Angeles are currently

in the same software, it would seem that TransCAD would be a good choice for a regional model. However, with WSDOT, Poulsbo, Carlsborg and Quimper Peninsula all modeled in Visum, this too could be a viable option for a regional model. All things being equal, and considering that the model developer will likely be responsible for maintenance and operation of the model, it would seem reasonable to leave the choice of software up to the developer. TransCAD and Visum are both excellent products, and would be more than sufficient for a regional model.

PTV Visum

Caliper TransCAD Transportation Planning Software

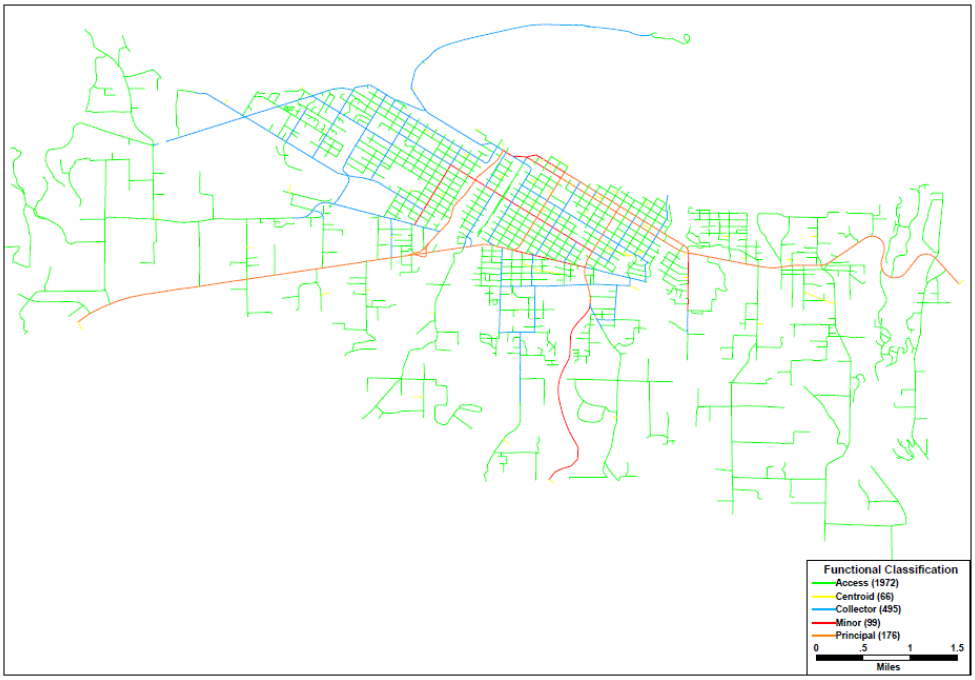
Other than the Kitsap County model, all models are developed, maintained and operated by consultants. Many members of the PRTPO TAC and Executive Council have expressed their desire to have the developer of the regional model also be the one who maintains and runs it. This would mean that an agreement between the model developer and PRTPO, and/or member agencies, would need to be established.



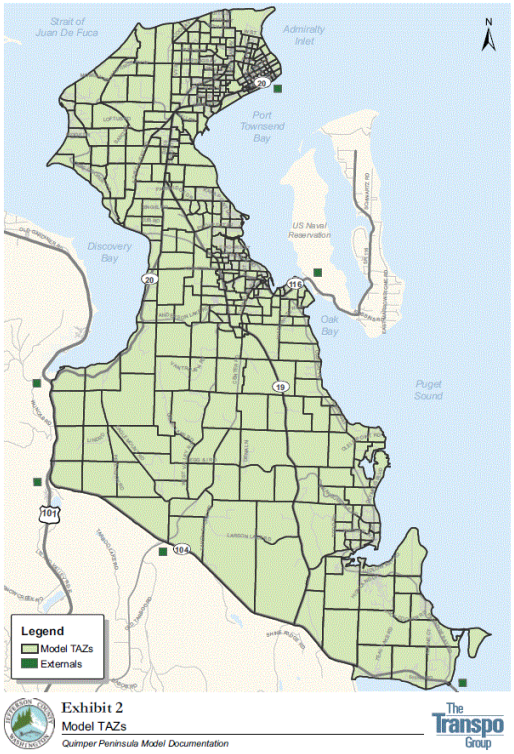
Areas with Existing Model Framework

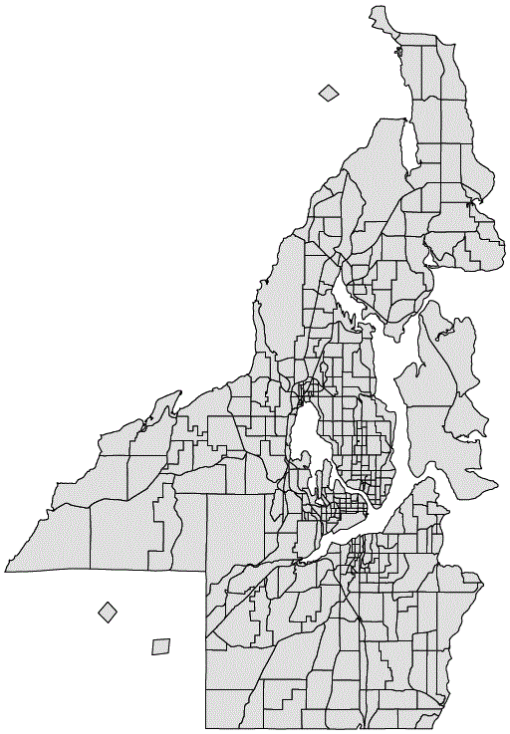
Most of the urbanized areas have recent models, with Transportation Analysis Zones (TAZ) and good road network detail. This leaves only the rural areas between them as gaps that would need to be filled. TAZs outside of urban areas are typically much larger geographically and relatively easy to define with

assistance of local planners. Even the Sequim spreadsheet model has TAZs already developed. All jurisdictions have roadway data available in GIS format, which will help greatly filling in the gaps.

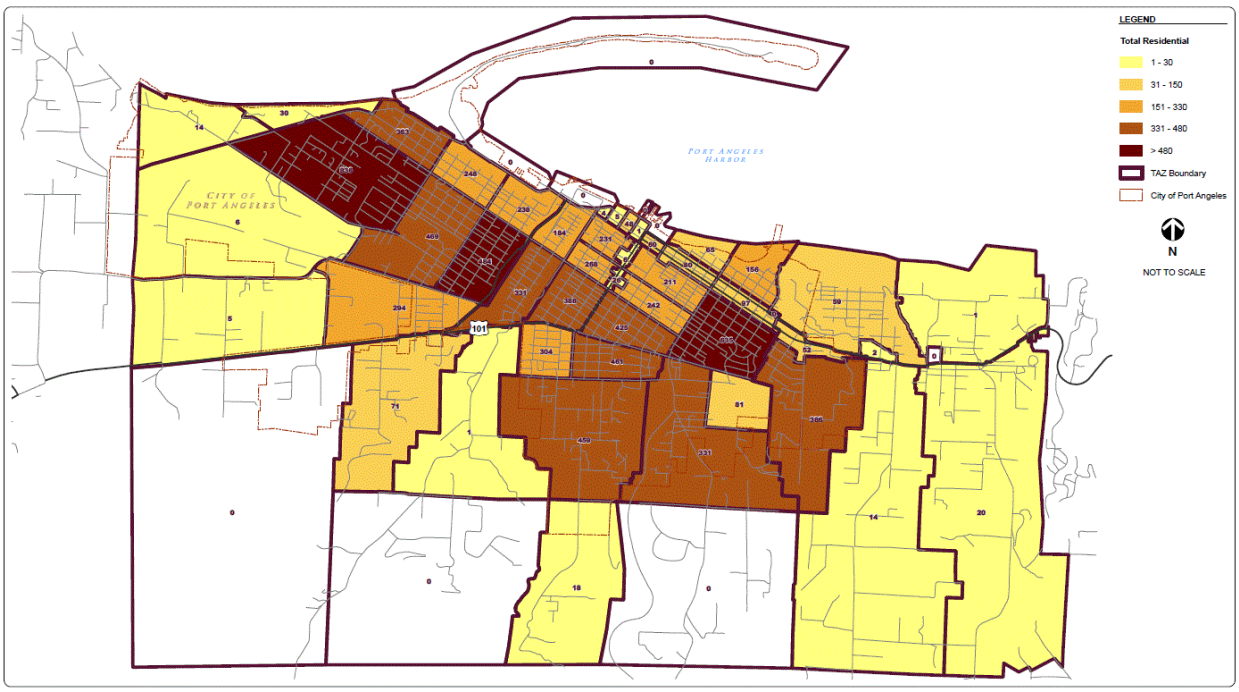


Source: Port Angeles Travel Model





Population and Employment are already in the existing models, but would need to be updated to the new base year, probably 2014/15, if the model is to be used for the 2016 GMA required comprehensive plan updates. Forecast data would also need to be updated and synchronized to a common future year, probably 2035. A good deal of data exists at the local levels in GIS format, and will likely be sufficient to fill in the gaps. Data is also available from the State and Census Bureau to fill in the rural area gaps, but collecting data from local sources is always preferred where possible. This effort would require a fair amount of coordination among the member agencies, and could probably be done through the PRTPO Technical Advisory Committee.



FEHR PEERS

PORT ANGELES - TOTAL RESIDENTIAL

Traffic counts for base year model calibration would need to be updated. However, counts that are 4-5 years old are often still very useful. Most jurisdictions have up to date counts for their high traffic locations, and also have counts collected during development reviews or other periodic studies. WSDOT also conducts traffic counts at regular intervals, and at automated count stations in key locations. While traffic count data is quite robust, some traffic counts will still likely need to be taken. Local review of current counts will determine the number of new counts required, but given the amount of current counts available this effort should be minimal.

Member agencies may incur some costs if counts are either too old or non-existent on modeled roadways. Counts can either be collected by individual agencies or through a traffic count consultant. Consultant rates can run from $100 to $175 for an intersection count depending on size and complexity, and roadway tube counts range from $70 to $250 depending on the number of counts needed and locations. Given the number of counts currently maintained across the region, costs for additional counts needed to support the model could range from $15K – $25K, unless member agencies were able to collect the counts in-house.

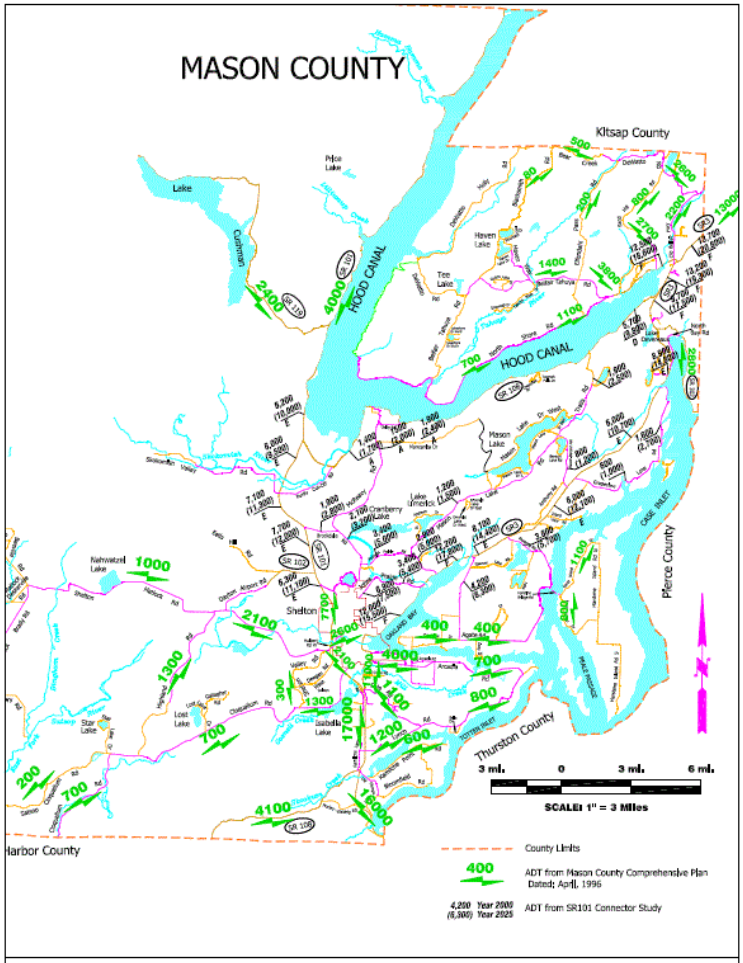
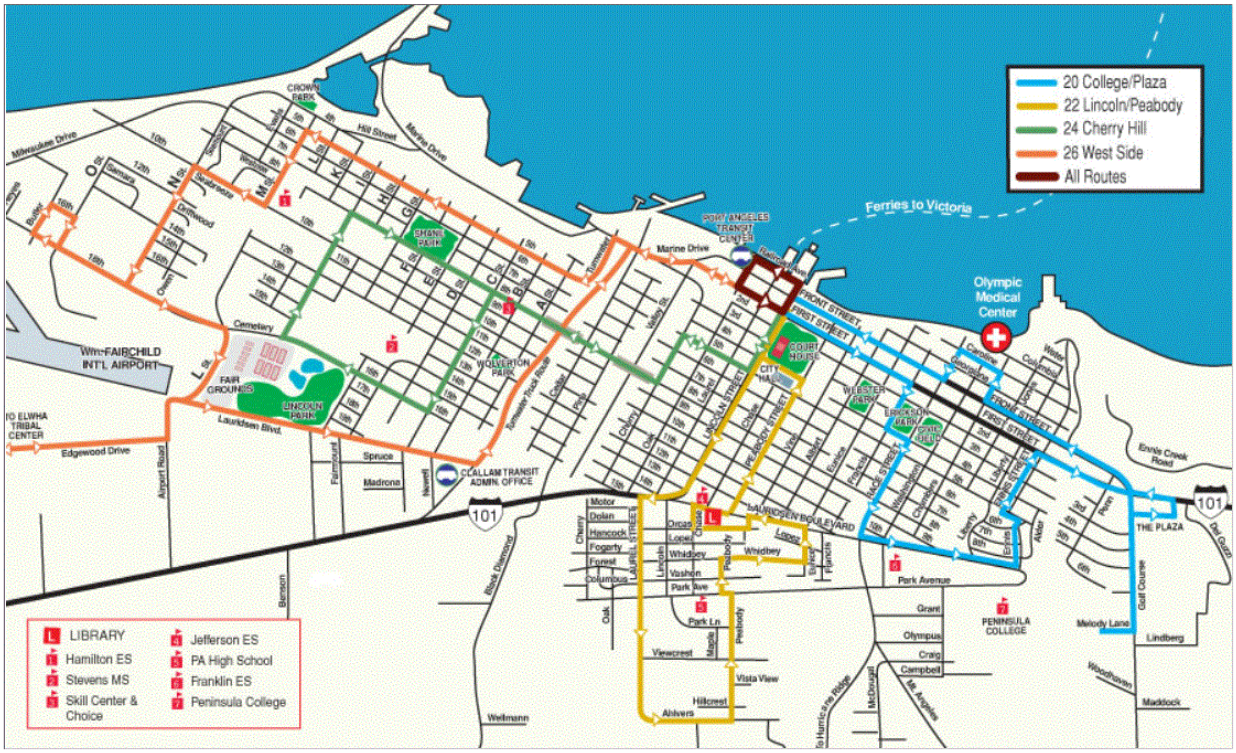


Figure VIII - 1-3
Mason County Transportation Element
Average Daily Traffic Volumes
Nov 2005

SKILLINGS CONNOLLY

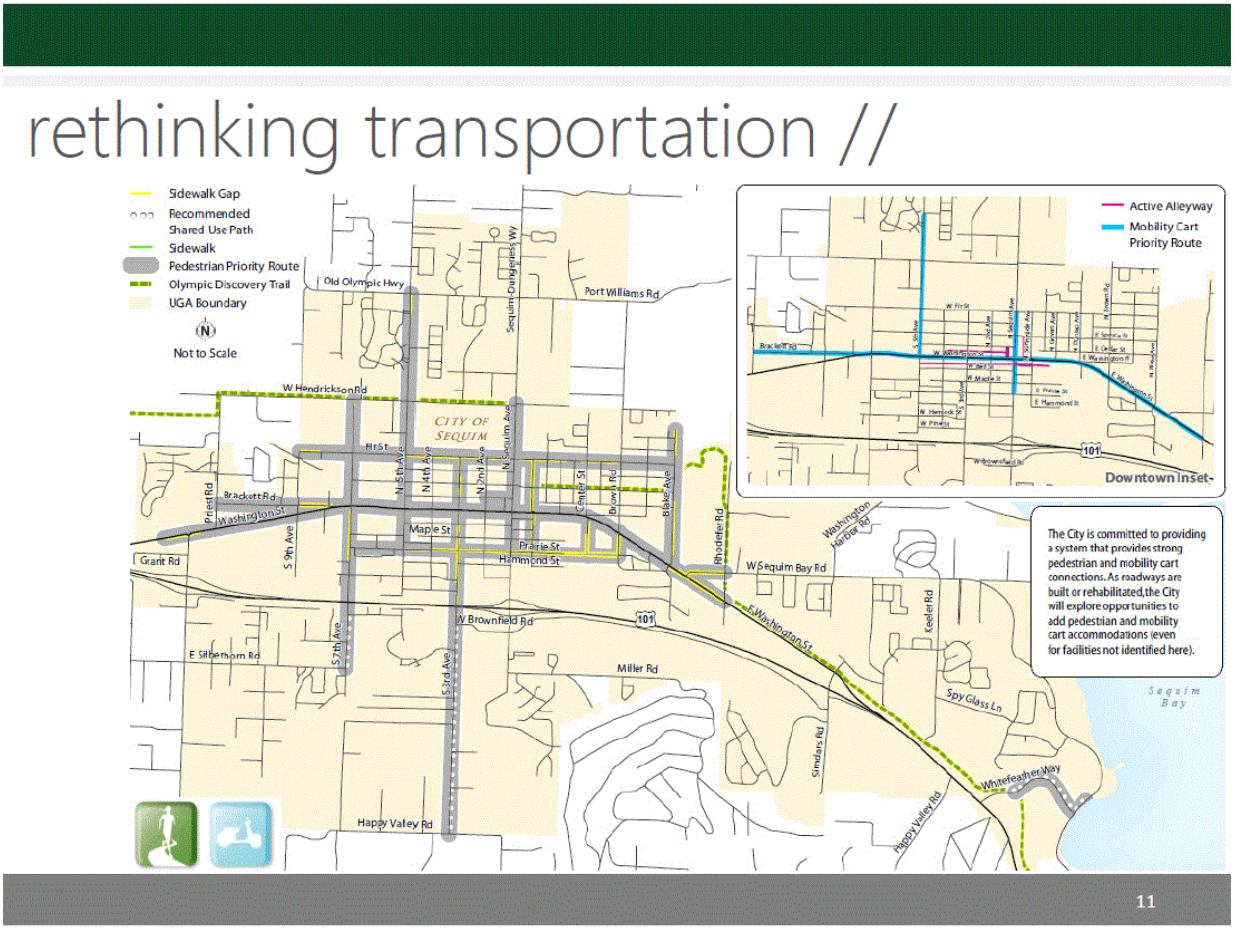
Transit routes and stops in Kitsap and Mason counties are available in GIS format. Jefferson and Clallam transit routes are mapped and could be made available in GIS format fairly easily. This data makes the inclusion of transit routes fairly easy, and fulfills the GMA requirement regarding inclusion of transit routes in models.



Source: Clallam Transit

Data for non-motorized modes of travel is quite sparse for the region. There are sections on non-motorized transportation in all the local plans, but supporting data such as bicycle and pedestrian counts are few.

Throughout Washington State there are jurisdictions developing Level of Service (LOS) standards and travel models for non-motorized modes of transportation. The City of Bellingham has been on the cutting edge of this topic for several years now and has developed a spreadsheet based model where trip credit is given based on how complete the system is in a given area. This seems to be working well for traffic studies and concurrency determinations. Level of service standards for non-motorizes modes are being developed in places like Sequim and Port Angeles, and Kitsap is starting to lean in that direction. While most jurisdictions are either developing, or thinking of developing standards, including these modes into a travel demand model could prove challenging at this time. Modeling capabilities are advancing rapidly on this front, and most modeling software has provisions for non-motorized modes. It may be premature at this time to include these modes into a regional scale model, but this issue is advancing rapidly, and should be monitored and reconsidered as it matures.



Source: City of Shelton, Transportation Master Plan Update, FHER & PEERS

Given the amount of data available in existing models and GIS based formats, it would appear that a model of all State routes with primary arterials and transit routes could be developed with a moderate amount of effort. However, given that population and employment will need to be developed in the rural "gap" areas regardless of what level of model is built, it would seem that a model including all arterials, collectors, and transit routes, could be developed with only slight additional effort. A model at either level of detail would satisfy the level of service monitoring and forecasting requirements of GMA. However, the model with less detail would be of limited use to individual communities, where greater detail is needed for many traffic studies or concurrency testing.

Model Development Costs

Several different types of models can be considered which would satisfy the basic needs of GMA for monitoring and reporting level of service, and forecasting future traffic. Models range from simple spreadsheet models, to software based 4-step travel demand models, to more complex activity based models.

Spreadsheet models use traffic count trends and estimates of future traffic growth rates based on estimated population growth and land use patterns. These models work fine for what they are, but they lack the ability to easily predict changes in traffic patterns that may result from different growth alternatives, changes in the roadway network or how traffic may shift to alternate routes as congestion increases. The city of Sequim and WSDOT are both using spreadsheet models.

Software based 4-step models like TransCAD or VISUM, are much more robust. These models have the ability to identify roadway capacity deficiencies and test different land use or roadway configuration scenarios. They can be used to predict shifts in traffic from road closures due to construction projects or natural disasters. They are also GIS based, which enables more accurate model development, as well as better data visualization and understanding. Model results can also be output to GIS files, allowing easier data sharing with any jurisdiction with a GIS system, giving them the ability to use the data as needed.

Activity based models expand upon the 4-step method by adding a great amount of detail, and unfortunately, complexity to the model. The Puget Sound Regional Council has been developing a new activity based model for the past ten years. It is still a work in progress. The following is an explanation of what these models do, taken from PSRCs web site.(http://www.psrc.org/data/models/abmodel/)

"The basic organizing principle is an individual's daily activity pattern, including such activities as going to work or school. Relationships are established between the state of the transportation system (i.e., level of congestion and/or accessibility) and the extent to which it influences substitution of activities outside the home with those inside the home. In other words, a highly congested transportation system will generate less demand for travel than a system with relatively little congestion, all else being equal.

The activity pattern-tour-trip segment relationship provides an individual's overall travel behavior linked together by mode, destination, time-of-day, and other activities in the daily pattern. This approach differs from traditional trip-based modeling where trip segments are largely treated as unrelated events.

An activity-based model system is a highly disaggregate environment, representing the travel behavior of each individual and household separately. Disaggregation avoids the errors and biases associated with generalization and averaging that plague trip-based modeling and lends itself to a more realistic and accurate portrayal of travel behavior and demand."

There are very few of these next-generation models currently in use. Several models, like the PSRC model, are in development, and it would be a good idea to keep an eye on them as they progress to see if they could someday be used for the PRTPO region.

Model development costs can vary greatly depending on the type and scale of model desired. A spreadsheet model covering a majority of the PRTPO region has already been developed by WSDOT. This model could be expanded to cover additional roadways (transit routes) at a relatively low cost, probably somewhere around $40 - $50K.

At the other extreme would be an activity based model, which could cost millions to get calibrated and running properly.

A software based model such as TransCAD or VISUM, which would provide not only LOS analysis but also allow for the testing of land use and road network alternatives, would probably be most useful to PRTPO member agencies and would likely be the most appropriate model type. A highways and transit routes only model could be completed for about $100k. This model would meet the minimum requirements of GMA reporting and be useful for regional scale modeling. A model of all arterials, collectors and transit routes would probably cost around $200K. Both models would satisfy GMA reporting requirements for member agencies; however the latter model could also be used to conduct studies at the local level due to the greater level of roadway detail.

The actual cost of developing a base year and forecast model would depend upon the workload split between the model developer (consultant) and PRTPO member agencies. An approximation of workload split might look like this.

Primary Tasks	Total Effort	PRTPO Members	Model Developer
1. Create New TAZs (fill in the rural gaps)	10%	20%	80%
2. Allocate Housing and Employment	25%	65%	35%
3. Collect Traffic Counts	10%	75%	25%
4. Consolidate and Update Roadway Networks	15%	5%	95%
5. Coordinate Trip Tables	15%	5%	95%
6. Collect Transit Data	5%	80%	20%
7. Calibrate & Validate Model	20%	0%	100%

Ongoing costs for model maintenance and operation would depend on the update schedule. Ideally, models are updated annually for level of service monitoring and concurrency testing purposes, but in reality, models are usually only updated to support periodic comprehensive plan updates (7-10 years). These longer periodic updates can be very time consuming and costly. A regional model update on this schedule would likely cost almost as much as the initial model development.

In the case of the PRTPO, given that several agencies are interested in using the model for various reasons and at different times (sub-area plans, traffic impact analyses, corridor studies, etc.), it would seem that keeping the model updated on an ongoing basis would be of greatest value to the member agencies. Keeping a model updated on a continual basis does have costs. Land use changes, road network changes and periodic traffic counts can be updated as those changes happen, where they happen. If one area is experiencing rapid growth, those changes can be made in isolation, rather than requiring the entire region update at the same time. These interim minor updates, on an as needed basis, can keep the model up to date on an ongoing basis and be of good consistent value to the member agencies.

Assuming an average consultant labor cost of $125 an hour and approximately 20 hours per month to keep the model updated, the annual cost would be about $30K. Annual software maintenance costs can run between $1,200 and $3,000 depending on the software and should also be taken into account.

Other ongoing costs would depend on the number of modeling requests from the various member agencies and what those requests entail. A request for a traffic impact analysis on a specific development project would probably only cost $500 - $700. A request to analyze land use alternatives for a sub-area plan could run $5,000 - $7,500. And a full Regional Transportation Plan update with different land use alternatives could run in the $8,000 - $10,000 range.

Cost Summary

Actual costs will depend on the amount of member participation, and also depend on whether the work is preformed by consultant or by one of the member agencies.

Startup costs	**Cost Range**	(dependent upon member participation rate)
	From	To
Traffic Counts	$15,000	$25,000
Model Development		
Spread Sheet Model	$40,000	$50,000
Highways and Transit Routes	$75,000	$125,000
Hwy, Arterials, Collectors, Transit	$175,000	$225,000
Software (if PRTPO acquired)	$10,000	$25,000

Ongoing costs	**Cost Range**	
	From	To
Model Maintenance	$15,000	$30,000
Software Maintenance	$1,200	$3,000
Work Requests (each)		
Traffic Impact Analysis	$500	$700
Sub-Area Plan or Corridor Study	$5,000	$7,500
Regional Plan Alternatives	$ 8,000	$10,000

These costs should be monitored over time as it may be more cost effective to have a planner/modeler permanently on staff.

Potential Funding Sources

- PRTPO Executive board may lobby the state legislature for modeling funds to be included in State Transportation budget
- Local jurisdiction funding pro-rata based on usage, data, population or similar measure
- PRTPO Member agencies may seek grant opportunities from various funding sources, however, the agency must have Contract Authority (CA) and be willing to take on the management of the project
- The PRTPO Executive Board may vote to set-aside funds for the model effort in the PRTPO Unified Planning Work Program

In Summary

A large amount of good quality modeling in the urban areas of the PRTPO region has already been done. Two counties, Kitsap and Mason, have their entire counties modeled, and all urbanized areas within the region are modeled, leaving only the rural areas of Jefferson and Clallam counties to be added. With the exception of the Kitsap model, all models were developed and are currently operated by consultants using a variety of modeling software platforms. Visum and TransCAD are the most dominant models, and either software would be suitable for building a consolidated regional model. Given the costs of software and software maintenance, TransCAD is significantly more affordable.

Given the desire of the PRTPO member agencies to have a model in which they can use at their discretion for local transportation studies, and to also support their respective comprehensive plan updates (due in 2016), the more inclusive model (Highways, arterials, collectors, transit routes) would best fit those needs. This model would also meet GMA reporting requirements for all member agencies.

Model development costs can be lowered significantly if done by a member agency rather than by consultant. Member agencies not only have lower burdened rates, but they are also able to provide a portion of their service as “in-kind” because as a member they benefit directly from the work.

When considering all the costs and benefits, the option of the more inclusive model built and operated by a member agency would seem to be the most attractive option, and provide the most functionality for the cost.

Level of Service Consistency

Level of Service (LOS) is a measure of the ability of a road, intersection, trail or bus route to handle the amount traffic using that facility. For this study, the consultant was asked to:

- Gather LOS methodologies from member agencies
- Summarize methodologies and identify potential consistency conflicts
- Develop recommendations to ensure regional multi-modal LOS consistency with State and local policies and regulations

Gather LOS methodologies from member agencies

All agencies that are members of the PRTPO, as well as cities located in Kitsap County, were contacted to discuss their roadway and intersection level of service methodologies (see summary sheet, appendix 2). As expected, all jurisdictions measure Roadway LOS and a few have intersection LOS. In a very few cases, a select set of roads or functional class of road are specifically denoted with an LOS standard that may be different from their generally adopted roadway LOS. Variances did occur throughout the PRTPO in the respective standards and thresholds. Tribal governments did not appear to have any measure of Level of Service, most likely due to the small size of the reservations and the minimal number of tribal roads.

Summarize methodologies and identify potential consistency conflicts

With the exception of WSDOT, all jurisdictions calculate a volume to capacity ratio for roadways. Roadway LOS using Volume/Capacity is an industry standard though there are other methods, for example, DOT uses *vehicle hours of delay by time period* as their measure. The Volume to Capacity ratio must be measured against adopted thresholds and as with the methodologies; these thresholds are industry standards and listed in appendix 1.

Under RCW 47.06.140, WSDOT is required to set the level of service for **highways of statewide significance**, “in consultation” with local agencies. However, WSDOT has the final decision. WSDOT sets LOS and the methodology for measuring LOS for Highways of Statewide Significance. WSDOT also has the authority to determine whether ramps on a highway of statewide significance carry the same designation.

Under RCW 47.80.030, the regional transportation planning organization must “establish” the level of service for state highways (regionally significant highways (non-HSS)), except for highways of statewide significance. RTPO sets LOS for regionally significant highways “in consultation” with WSDOT.

Local agencies establish LOS for local arterials, and incorporate the LOS set by WSDOT and RTPO for state highways.

Level of Service Standards for Highways of Statewide Significance

The LOS standards for Highways of Statewide Significance (HSS) are set by WSDOT. The current standards are a Congestion Index of 6 in rural areas (outside urban growth areas) and 10 in urban areas, measured using a 24-hour methodology. Congestion Index values of 6 and 10 are approximately equivalent to LOS "C" and "D", respectively. The following State Routes are HSS.

SR	Begin SR MP	End SR MP	Description
3	0.00	60.02	US 101 (Shelton) to SR 104
16	18.10	29.19	Kitsap/Pierce County Line to SR 3
19	0.00	14.09	SR 104 to SR 20
20	0.00	12.88	US 101 to Port Townsend Ferry Terminal
101	144.35	356.92	Grays Harbor/Jefferson County to Mason/Thurston County
101	249.65	251.32	Port Angeles Couplet- MP 249.65 to E First St
104	0.20	24.45	US 101 to Kingston Ferry Terminal
104	24.53	24.86	Kingston Couplet-Ferry Terminal to Illinois Ave
304	0.00	3.51	SR 3 to Bremerton Ferry Terminal
304	3.51	3.83	Bremerton Couplet - Ferry Terminal to Pacific Ave
305	0.02	13.52	Winslow Ferry Terminal to SR 3
307	0.00	5.25	SR 305 to SR 104
310	0.00	1.84	SR 3 to SR 304 (Bremerton)

Local Compliance with the Requirements

Cities and counties are required to include the LOS standards for all state routes in the transportation element of their local comprehensive plan. The Metropolitan Planning Organizations and Regional Transportation Planning Organizations certify the transportation-related provisions in local comprehensive plans and staff reviews the plans to ensure that LOS standards adopted by the organizations for regionally significant highways (non-HHS) and LOS standards adopted by WSDOT for statewide significant highways (HSS) are included.

Level of Service Standards for Highways of Regional Significance

The Regional Planning Organizations will measure the LOS for regionally significant state highways on a one-hour p.m. peak period basis. For its own purposes, a local jurisdiction may use its own methodology for analyzing LOS for those highways, but those LOS standards must be consistent with the Highway Capacity Manual LOS criteria. For example, where the regional LOS standard is "D," a local jurisdiction may use an alternative methodology (such as average travel speed, intersection delay, etc.) for calculating a level of service of "D" as long as it is consistent with the Highway Capacity Manual.

Mitigation Strategies (for PSRC/Kitsap County only)

The LOS standard for the central urban Tier 1 routes introduces mitigation when the LOS along a roadway falls below "E". Appendix 1 describes examples of mitigation strategies that could be considered appropriate for use on Tier 1 regionally significant state highways that do not meet the established LOS standard. Puget Sound Regional Council staff is providing this data on possible strategies

for informational purposes only. While PSRC may plan for potential mitigation strategies as part of long-term regional planning, decisions on what strategies are appropriate for any particular situation will be made by WSDOT or the local jurisdiction on a case-by-case basis.

Roadway LOS standards, PRTPO Counties

The only reason to specifically consider counties separate from cities is that counties have rural roads. Kitsap, Clallam and Jefferson counties use an LOS C for Rural roads and LOS D for Urban roads. Mason County uses LOS C for both Rural and Urban roads. These standards recognize that travelers expect their rural roads to be fairly free flow with an emphasis more on safety rather than throughput. In more "urban areas" of unincorporated counties, the expectation is that some congestion can and should be tolerated in the four county region. These urbanized areas are generally legacy communities from the 1800s that were at one time lumber mills, ports or as in the case of Kitsap County, built up areas that served citizens escaping the Seattle area using the Mosquito Fleet ferry system to travel to rural Kitsap to recreate. These areas are specifically called out in the Kitsap County Comprehensive Plan as Limited Areas of More Intense Rural Development (LAMIRDS) such as Suquamish, Indianola and Manchester. Examples in the other three counties are Belfair and Carlsborg.

Potential Consistency Conflicts

Kitsap County is a member of the Puget Sound Regional Council (PSRC) primarily and the PRTPO as an associate member. The county's funding is solicited through PSRC and is subject to Transportation 2040 the Regional Transportation Planning document, PSRC's multi-county planning policies and the Kitsap Regional Coordinating Council's (KRCC) countywide planning policies. The PSRC allows for a "mitigated E" LOS designation on Highways of Regional Significance (non-HSS routes) that the PRTPO does not recognize.

Roadway LOS standards, PRTPO Cities

Cities are urban by definition and all the cities in the Olympic Peninsula use LOS D as their standard. However, in Kitsap County, Bremerton sets an LOS of E for primary arterials, LOS D for others; Port Orchard, LOS D for all roads; Bainbridge Island LOS D for urban roads and LOS C for suburban and Poulsbo sets their LOS at E for most roads and LOS F for a select set.

Potential Consistency Conflicts

The Growth Management Act allows each jurisdiction planning under GMA to set the threshold at which it will tolerate congestion. All jurisdictions within the PRTPO are consistent with GMA requirements. However, while the Act states that jurisdictions within a county must coordinate their land use actions via County-wide Planning Policies, the Act is vague on cross-county actions. The Olympic Peninsula is a natural boundary that encompasses the three PRTPO counties, cities and tribal lands, with two access points to Kitsap County, the Hood Canal Bridge and SR3. Coordination within that boundary is managed through the PRTPO boards and committees. However, potential conflicts may occur when land use actions in a community in one county directly affect the road network in an adjoining county or city. For example, any development in Belfair, Mason County significantly impacts SR3 and the Old Belfair

Highway as they progress into Kitsap County and Bremerton. Likewise, development in Carlsborg affects traffic to Sequim on SR101.

While there is general consistency in roadway LOS throughout the region, there is no agreed on mechanism to resolve the border issues and in fact, it is somewhat unlikely that one jurisdiction shares information about development within its borders with an adjacent jurisdiction. More importantly, while the SEPA process allows for a jurisdiction to request that infrastructure improvements be a condition of approval for the development, it is only to the extent that the development impacts its infrastructure, that is, its fair share. The potential for inconsistency in LOS standards between the two jurisdictions may make an onerous burden on the development to pay the mitigation funds should their land use action impact the adjacent jurisdiction. Consistency between the two jurisdictions would alleviate this issue as the threshold would be the same for both. This can be done with Inter-local agreements.

Other Possible roadway LOS methodologies

Several potential methodologies are used in the industry depending upon the sophistication of the jurisdiction and the time available to analyze roadway LOS. These include for example:

- Corridor travel time; by which a longer corridor made up of numerous road segments is defined and the time it takes an average driver to traverse the corridor is monitored before and after improvements are made.
- Kitsap County Modified V/C; during the Kitsap County Comprehensive Plan update, the county hired a consultant to develop a more robust set of road characteristics to evaluate road segments and assign capacity based on these criteria, rather than the standard capacity of a road segment as determined by the Highway Capacity Manual. These criteria included spacing between driveways, terrain, speed, on-street parking, transit and shoulder/sidewalk widths (for example). The consultant then derived base capacities with capacity adjustments up or down to account for the above criteria. While not formally vetted, the county felt that the capacities derived from this modified V/C methodology better represented the rural and urban roads than the generic HCM capacities.

Intersection LOS standards

The cities of Poulsbo, Shelton and Sequim analyze intersection LOS and Clallam County analyzes intersections for Carlsborg only. Port Angeles analyzes intersections by hand calculation (modeling data). All use LOS D for intersections, though Shelton has selected a few intersections to function at LOS E. While not explicitly stated, jurisdictions generally base their intersection LOS analysis on average delay at all legs of the intersection.

Other Possible intersection LOS methodologies

- Individual intersection legs. Often it is the case that, even with roadways, there is plenty of capacity on the segment and it is the intersection that is the problem. Many of the most mitigating road improvements occur when the jurisdiction channelizes the intersection to allow for better turn movements or signalization. Analyzing individual legs rather than the whole

intersection can give the jurisdiction a tool to determine what improvements can be constructed at the lowest cost that address the need and mitigate the traffic congestion.

Non-roadway LOS (Non-motorized and Transit)

The consultant did not address non-roadway LOS. While there is much research being conducted at all levels of government, no methodology has been put forth as a standard. Most of the research refers more to the density, or completeness, of the facility within the jurisdiction as opposed to throughput, that is for example, how many transit stops are located per 1,000 population, or how many households are within one-mile access to a non-motorized facility. A fully integrated model of transportation should include these non-roadway facilities, but generally they are difficult to monitor. One solution to this is to adjust the model's Annual Average Daily Traffic count to compensate for lack of data on transit and non-motorized utilization and still recognize that these infrastructures exist. For example, lowering the AADT on a roadway with transit stops recognizes that transit is potentially being used and the same is true of roadways with nearby access to trails, bike lanes or pedestrian paths that might be being used by commuters.

Develop recommendations to ensure regional multi-modal LOS consistency with State and local policies and regulations

The following has been adapted from the WSDOT Regional Coordination of Planning document.

"The Growth Management Act defines a stronger duty for coordination and consistency among local governments than it does between local governments and the state. The preamble explicitly states local governments should cooperate and coordinate with one another in land use planning. The concepts of regional coordination and consistency are also repeated in many of the specific provisions of the Act.

Local comprehensive planning must be internally and externally consistent. Internal consistency is required among and between the elements of the comprehensive plan and the implementing development regulations. External consistency requires local governments with common borders or related regional issues to ensure their plans are coordinated and consistent. Under the GMA, consistency means planning and regulatory provisions are compatible, fit together, and do not thwart each other. The external consistency provision is implemented primarily through county-wide planning policies. County-wide planning policies are a framework agreed upon by counties and cities that provide procedural and substantive direction to the comprehensive plans of each jurisdiction. The Central Puget Sound Growth Management Hearings Board characterizes the relationship between county-wide planning policies and local land use planning and regulation as "a hierarchy of substantive and directive policy. Direction flows first from the county-wide planning policies to the comprehensive plans of cities and counties, which in turn provide substantive direction to the content of local land use regulations, which govern the exercise of local land use powers, including zoning, permitting and enforcement."

The power of county-wide planning policies to support regional planning is limited by the GMA premise that county-wide planning policies may not alter the land-use powers of cities. The growth management hearings boards have identified a three-prong test to prevent county-wide planning policies from needlessly or excessively intruding upon local prerogatives. County-wide planning policies must:

- *meet a legitimate regional objective,*
- *provide substantive direction only to the provisions of a comprehensive plan,*

- *and cannot directly affect the provisions of an implementing regulation or*
- *other exercise of land use powers, and be consistent with other relevant provisions in the GMA.*

The external consistency provision compels cities and counties to ensure their comprehensive plans, including their transportation elements, are compatible with those of bordering jurisdictions, fit together, and do not thwart each other. Recognizing its inherently regional nature, the legislature required an even higher standard for the coordination of transportation planning. The GMA requires local governments to:

- *coordinate levels of service standards within the region,*
- *assess the impacts of their transportation and land use policies on the transportation systems of adjacent jurisdictions,*
- *and describe any other intergovernmental coordination efforts they have undertaken in the transportation element of their comprehensive plan.*

Additionally, the transportation elements of local comprehensive plans and the transportation related county-wide planning policies must be certified by an RTPO to ensure regional consistency. The certification is based on the consistency of the local policies with the RTPO's adopted guidelines and principles and regional transportation plan as well as the general conformity of the local policies with GMA requirements." *(The GMA Concurrency Goal and the State Transportation System)*

As can be seen from the above citation, coordination among the four counties and eight cities, as well as Tribal governments, ports, the WSDOT and WS Ferries is imperative and required.

<u>The following recommendations are made as part of this document:</u>

- Adopt a regional LOS for county rural areas (suggest LOS C)
- Adopt a regional LOS for unincorporated county urbanized areas and all cities (suggest LOS D)
- Where a jurisdiction desires to vary from the above standards, it should justify the variance to the PRTPO Executive Committee and if accepted, incorporate into its Comprehensive Plan, specifically explaining why a select intersection or roadway can and should operate at a lesser standard. For example, statements such as "*the funding is not there to fix that road*", or "*politically it is not wise*", are not valid reasons. Environmental limitations, issues acquiring Right of Way or discouraging land use actions in rural areas are valid reasons
- Adopt a Complete Streets program for cities and consider the same for unincorporated county urbanized areas (complete streets includes non-motorized and transit as well as auto traffic)
- Research non-motorized and transit LOS methodologies, adopt and incorporate them into the Transportation model, if it is developed
- Review all four county-wide transportation planning policies and coordinate where appropriate
- In Urban Growth Areas, counties should adopt the standards of the city associated with the UGA in anticipation of incorporation via an Inter-local agreement
- Monitor legislation at the state level and incorporate into the PRTPO Transportation Plan
- Coordinate land use actions when these will impact the adjacent agency
- Develop a cross-jurisdictional funding ability via policy or SEPA such that the adjacent agency can seek funding for projects within its jurisdiction impacted by an adjoining agency via an Inter-local agreement

APPENDIX 1 - Level of Service letter designations

Level-of-Service A can describe free-flow operations. Traffic flows at or above the posted speed limit and all motorists have complete mobility between lanes. The average spacing between vehicles is about 550 feet (167m) or 27 car lengths. Motorist have a high level of physical and psychological comfort. The effects of incidents or point breakdowns are easily absorbed. An example of LOS A occurs late at night in urban areas, frequently in rural areas.

Level-of-Service B describes reasonable free-flow operations. Free-flow (LOS A) speeds are maintained, maneuverability within the traffic stream is slightly restricted. The lowest average vehicle spacing is about 330 feet (100m) or 16 car lengths. Motorist still have a high level of physical and psychological comfort.

Level-of-Service C describes at or near free-flow operations. Ability to maneuver through lanes is noticeably restricted and lane changes require more driver awareness. Minimum vehicle spacing is about 220 feet (67m) or 11 car lengths. At LOS C most experienced drivers are comfortable, roads remain safely below but efficiently close to capacity, and posted speed is maintained. Minor incidents may still have no effect but localized service will have noticeable effects and traffic delays will form behind the incident. This is the targeted LOS for some urban and most rural highways.

Level-of-Service D describes decreasing free-flow levels. Speeds slightly decrease as the traffic volume slightly increase. Freedom to maneuver within the traffic stream is much more limited and driver comfort levels decrease. Vehicles are spaced about 160 feet (50m) or 8 car lengths. Minor incidents are expected to create delays. Example of LOS D is perhaps the level of service of a busy shopping corridor in the middle of a weekday, or a functional urban highway during commuting hours. It is a common goal for urban streets during peak hours, as attaining LOS C would require a prohibitive cost and societal impact in bypass roads and lane additions.

Level-of-Service E describes operations at capacity. Flow becomes irregular and speed varies rapidly because there are virtually no usable gaps to maneuver in the traffic stream and speeds rarely reach the posted limit. Vehicle spacing is about 6 car lengths, however speeds are still at or above 50 mi/h (80 km/h). Any disruption to traffic flow, such as merging ramp traffic or lane changes, will create a shock wave affecting traffic upstream. Any incident will create serious delays. Driver's level of comfort become poor. LOS E is a common standard in larger urban areas, where some roadway congestion is inevitable.

Level-of-Service F describes a breakdown in vehicular flow. Flow is forced; every vehicle moves in lockstep with the vehicle in front of it, with frequent slowing required. Technically, a road in a constant traffic jam would be at LOS F. This is because LOS does not describe an instant state, but rather an average or typical service. For example, a highway might operate at LOS D for the AM peak hour, but have traffic consistent with LOS C some days, LOS E or F others, and come to a halt once every few weeks. However, LOS F describes a road for which the travel time cannot be predicted. Facilities operating at LOS F generally have more demand than capacity.

APPENDIX 1 - Level of Service letter designations

In terms of numerical equivalent (ratio), the following table indicates these ratios.

LOS	V/C Ratio	% of free flow speed
LOS A	< .59	90% or greater
LOS B	.60 - .69	70% to 90%
LOS C	.70 - .79	50%
LOS D	.80 - .89	40%
LOS E	.90 - .99	33%
LOS F	> .99	25% or less

Potential Mitigation Strategies for Regionally Significant State Highways
(For Tier 1 routes that do not meet LOS Standard of "E")
Examples of appropriate mitigation strategies to consider (not an exhaustive list and not listed in any particular order):

- Access management
- Traffic signal installation/upgrade/retiming/coordination
- Turn lanes
- Local street connectivity improvements
- Ramp meters, if applicable
- Transit service improvements
- Transit passenger amenities (bus shelters, bus real-time arrival information, etc.)
- Transit signal priority
- High Occupancy Vehicle (HOV) lanes
- Business Access/Transit (BAT) lanes
- Bus queue jump lanes (special lanes that allow buses to bypass congestion)
- Pedestrian improvements
- Bicycle improvements
- Landscaping improvements
- Transportation demand management (flexible work hours, free bus passes, rideshare programs, etc.)
- Transit oriented development
- Pedestrian oriented development
- Parking ratios, parking pricing
- Peak-period on-street parking restrictions

APPENDIX 2 – Data Collection Summary

PRTPO Travel Demand Model Feasibility Study											
Existing Data Availability											
Jurisdiction	Primary Contact	Population and Housing Data	Base Year	Forecast Year	Zonal Level	Format	Contact	Employment Data	Base Year	Forecast Year	Zonal Level
Kitsap Co.	Jim Rogers 360-337-4921	Yes, Census and OFM mid-range Pop forecasts, and housing estimates.	2010	2025	TAZ, FAZ	GIS and TransCAD	Jim Rogers 360-337-4921	Yes, by sector codes, Man, Retail, FIRES, Const/Res, Gov, ED, WTCU, Col.	2010	2025	TAZ, FAZ
Bremerton	Jim Rogers 360-337-4921	Same as Kitsap Co.	2010	2025	TAZ, FAZ	GIS and TransCAD	Jim Rogers 360-337-4921	Same as Kitsap Co.	2010	2025	TAZ, FAZ
Port Orchard	Jim Rogers 360-337-4921	Same as Kitsap Co.	2010	2025	TAZ, FAZ	GIS and TransCAD	Jim Rogers 360-337-4921	Same as Kitsap Co.	2010	2025	TAZ, FAZ
Poulsbo	Jim Rogers 360-337-4921	Same as Kitsap Co.	2010	2025	TAZ, FAZ	GIS and TransCAD	Jim Rogers 360-337-4921	Same as Kitsap Co.	2010	2025	TAZ, FAZ
Bainbridge Island	Jim Rogers 360-337-4921	Same as Kitsap Co.	2010	2025	TAZ, FAZ	GIS and TransCAD	Jim Rogers 360-337-4921	Same as Kitsap Co.	2010	2025	TAZ, FAZ
Mason Co.	Loretta Swanson (360) 427-9670 ext 769	Yes, Census and OFM Unsure if mid-range population and housing forecasts exist at zonal level.	2010	2025	Census Tract, and TAZ	GIS	Loretta Swanson (360) 427-9670 ext 769	Yes, by sector codes. Unsure if mid-range population and housing forecasts exist at zonal level.	2010		Census Tract
Shelton		Yes, in model	2005	2025	TAZ	EMME/2	Clyde Scott	Yes, in model	2005	2025	TAZ
Clallam Co.	Rich James 360 417-2290	Yes, Census and OFM mid-range Pop forecasts, and housing estimates.	2010	2025	TAZ	GIS and Vissum	Rich James 360 417-2290	Yes, by sector codes, Man, Retail, FIRES, Const/Res, Gov, ED, WTCU, Col.	2010	2025	TAZ, FAZ
Port Angeles	Jim Mahlum 360-417-4701	Yes, Census for base year (2010) - Includes single family and multifamily units. Units were allocated spatially based on water meter data.	2010	2035 - under dev't	TAZ	GIS and TransCAD	Jim Mahlum 360-417-4701	Yes, Includes sector codes: retail, commercial, and other based on ESD data.	2010	2035 - under dev't	TAZ
Sequim	David Garlington 360-683-4908	Yes, Transportation Master Plan update in 2012	2012	2032	TAZ	GIS and Spreadsheet	Kendra Breiland. 206-576-4223, FEHR & PEERS	Yes, Transportation Master Plan update in 2012	2012	2032	TAZ
Jefferson Co.	Josh Peters	2010 data for redistricting from OFM. Forcast data available but not in-house, and Quimper area model	2010	2031	TAZ	GIS	Josh Peters	From quimper traffic study -2008 data for quimper peninsula	2007	2031	TAZ
Port Townsend	Ken Cloe	Census data, and Quimper Peninsula model	2010	2031	TAZ	GIS and model	Ken Cloe	Census data, and Quimper Peninsula model	2010	2031	TAZ
WSDOT	George Kovich 360-704-3207	None						None			

PRTPO Travel Dema									
Existing Data Availa									
Jurisdiction	Format	Contact	Traffic Counts	Year	Contact	Roadway Network	Format	Attributes	Contact
Kitsap Co.	GIS and TransCAD	Jim Rogers 360-337-4921	Yes, Peak hour and daily at permanent count stations on major roads, annual counts on most other roads.	2010 and newer	Jim Rogers 360-337-4921	Yes, up to date.	AutoCAD, ArcMAP GIS, and TransCAD model	Name, Lanes, Functional Classification, Capacity, Speed Limit, length.	Jim Rogers 360-337-4921
Bremerton	GIS and TransCAD	Jim Rogers 360-337-4921	Periodic counts via TIAs. No regular counts taken since 2002	2002 and older	Joe Keller 360-473-5343	Yes	ArcMAP GIS and Kitsap TransCAD model	Name, Lanes, Functional Classification, Capacity, Speed Limit, length.	Jim Rogers 360-337-4921
Port Orchard	GIS and TransCAD	Jim Rogers 360-337-4921	Periodic counts via TIAs. No regular counts taken since 2007	2007	James Weaver	Yes	ArcMAP GIS and Kitsap TransCAD model	Name, Lanes, Functional Classification, Capacity, Speed Limit, length.	Jim Rogers 360-337-4921
Poulsbo	GIS and TransCAD	Jim Rogers 360-337-4921	Traffic study in 2006, and periodic counts as needed	2006 and newer	Andrezj Kasinlak	Yes	ArcMAP GIS, Kitsap TransCAD model, and VISUM Model	Name, Lanes, Functional Classification, Capacity, Speed Limit, length.	Jim Rogers 360-337-4921
Bainbridge Island	GIS and TransCAD	Jim Rogers 360-337-4921	Periodic counts via TIAs. No regular counts taken since 2005	2005	Chris Hammer, 360-870-3740	Yes	ArcMAP GIS and Kitsap TransCAD model	Name, Lanes, Functional Classification, Capacity, Speed Limit, length.	Jim Rogers 360-337-4921
Mason Co.	GIS	Loretta Swanson (360) 427-9670 ext 769	Yes; Mostly daily counts for 1 week using counters. Visual (ESAL) for peak hour truck counts checked daily.	Counts on 07,08s rotated on a 4-year basis	Chuck Greninger (360) 427-9670 ext. 631	Yes in Mobility	CAD, ArcReader, Mobility	Name, Lanes, Functional Classification, Capacity, Speed Limit, length,	Chuck Greninger (360) 427-9670 ext. 631
Shelton	EMME/2	Clyde Scott	At intersections and roadways	2007		yes	GIS and EMME/2 model	Name, Lanes, Functional Classification, Capacity, Speed Limit, length.	Clyde Scott
Clallam Co.	GIS and Visum for Carlsborg	Rich James 360 417-2290	Yes, Peak hour and daily at count stations in Carlsbork 2006, annual counts on most other roads.	Varies	Rich James 360 417-2290	Yes, up to date.	AutoCAD, ArcMAP GIS, and Vissum model for Carlsborg only	Name, Lanes, Functional Classification, Capacity, Speed Limit, length.	Rich James 360 417-2290
Port Angeles	GIS and TransCAD	Jim Mahlum 360-417-4701	Yes, PM peak hour volumes collected in 2010 along major roadways. Count volumes estimated for other facilities based on older counts and roadway characteristics.	2010 and older	Jim Mahlum 360-417-4701	Yes, up to date.	ArcMAP GIS and TransCAD model	Name, Lanes, Functional Classification, Capacity, Speed, Length, Directionality,	Jim Mahlum 360-417-4701
Sequim	GIS and Spreadsheet	Kendra Breiland. 206-576-4223, FEHR & PEERS	Yes, Transportation Master Plan update in 2012	2012	David Garlington 360-683-4908	Yes	GIS	FFC, lanes, traffic volumes, capacities	Kendra Breiland. 206-576-4223, FEHR & PEERS
Jefferson Co.	GIS	Josh Peters	PW Mobility	Various	Josh Peters	Semi-GIS We have road centerlines but much of the data is in Mobility	GIS	Mobility data only	Josh Peters
Port Townsend	GIS and model	Ken Cloe	In Model	2010	Transpo Group	Yes	GIS and Model	Name, Lanes, Functional Classification, Capacity, Speed Limit, length.	Transpo Group
WSDOT			Yes, several permanent count stations, counted continiously and reported annualy, also in spreadsheet forecast model	2011 & 2030	Forest Sutmiller, 360-705-7965	yes	GIS	Name, Lanes, Functional Classification, Capacity, Speed, Length,	WSDOT, Olympic Region Office, or website

PRTPO Travel Dema								
Existing Data Availa								
	Existing		Base	Forecast		Transit		Level of Service
Jurisdiction	Model	Platform	Year	Year	Contact	Routes and Data	Contact	Methodology
Kitsap Co.	Yes, Updated in 2012	TransCAD	2010	2025	Jim Rogers 360-337-4921	Routes available in GIS format, 2012 ridership by route and stop. Park & Ride locations and counts	Jim Rogers 360-337-4921	Roadway, V/C ratio. Nothing for Intersections.
Bremerton	Older EMME/2 model, Currently contracting with Kitsap for modeling	EMME/2, TransCAD	2010	2025	Jim Rogers 360-337-4921	Routes available in GIS format, 2012 ridership by route and stop. Park & Ride locations and counts	Jim Rogers 360-337-4921	Roadway, V/C ratio. Nothing for Intersections.
Port Orchard	None, but city is included in Kitsap model	TransCAD	2010	2025	Jim Rogers 360-337-4921	Routes available in GIS format, 2012 ridership by route and stop. Park & Ride locations and counts	Jim Rogers 360-337-4921	Roadway, V/C ratio. Nothing for Intersections.
Poulsbo	VISUM model, run by consultant in 2006, also included in Kitsap model	VISUM and TransCAD	2006 & 2010	2025	David Evans and Assoc, and Jim Rogers 360-337-4921	Routes available in GIS format, 2012 ridership by route and stop. Park & Ride locations and counts	Jim Rogers 360-337-4921	Roadway V/C ratio, and Intersection HCM
Bainbridge Island	None, but city is included in Kitsap model	TransCAD	2010	2025	Jim Rogers 360-337-4921, Chris Hammer	Routes available in GIS format, 2012 ridership by route and stop. Park & Ride locations and counts	Jim Rogers 360-337-4921	V/C Ratios for roadways, Synchro analysis HCM 2010 methodology for intersections
Mason Co.	Yes. Updated in 2005 (possibly 20087)	TMODEL2	2005	2025	Loretta Swanson (360) 427-9670 ext 769	Mason County Transportation Authority I Transportation Services I Schedules & Route Maps	Mike Oliver (360) 432-5710 MTA GIS Route and Ridership Data, excel.	**Road system: V/C ratio. Intersections: No LOS established. Only 1 collector predicted to operate @ LOS D in 2025.**
Shelton	Yes, 2006	EMME/2	2005	2025	Clyde Scott	Mason County Transportation Authority I Transportation Services I Schedules & Route Maps	Mike Oliver (360) 432-5710 MTA GIS Route and Ridership Data, excel.	V/C ratio for roads, Average delay for intersections
Clallam Co.	Yes, but not updated since 2007	Visum	2006	2025	Rich James 360 417-2290	Routes could be made available in GIS format, 2012 ridership by route and stop.	Jamie Collier Clallam Transit 360 417-1353	LOS A-F, Intersections in Carlsborg
Port Angeles	Yes, Updated in 2011	TransCAD	2010	2035 under dev't	Jim Mahlum 360-417-4701	Routes could be made available in GIS format, 2012 ridership by route and stop.	Jamie Collier Clallam Transit 360 417-1353	Model provides roadway volumes and V/C ratios, but not LOS. Model can produce turn movement forecasts. Intersection LOS evaluated off-model.
Sequim	Yes, updated in 2012 by FHER & PEERS	Spreadsheet	2012	2032	Kendra Breiland. 206-576-4223, FEHR & PEERS	Routes could be made available in GIS format, 2012 ridership by route and stop.	Jamie Collier Clallam Transit 360 417-1353	HCM 2010 calculations for roads and intersections
Jefferson Co.	Quimper Peninsula	VISUM	2008	2031	Transpo Group	Route maps online	Tammi, 360-385-3020 x107	V/C Ratio
Port Townsend	Quimper Peninsula	VISUM	2008	2031	Ken Cloe,	Route maps online	Tammi, 360-385-3020 x108	V/C Ratio
WSDOT	No, but have software for viewing other models	VISUM & Emme/2			Nazmul Alam, 360-357-2722	None		Vehicle hours of delay by time period, for roadways only. See WSDOT Spreadsheet.

PRTPO Travel Dema					
Existing Data Availa					
	Level of Service				
Jurisdiction	Standard	Contact	Additional Data, Studies and Surveys, etc	Non-motorized, Trail Plans, Standards, etc	Contact
Kitsap Co.	LOS 'C' 0.79 rural, LOS 'D' 0.89 urban.	Jim Rogers 360-337 4921	Model Development Report 2012, Capacity Study 2010, Level of Service code and policy available on web, http://www.kitsapgov.com/, Comprehensive Plan updated in 2012.	Non-motorized Plan, to be adopted in 2013	Bill Zupancic 360-337 7210
Bremerton	LOS E for Primary arterials, LOS D for other roads	Joe Keller 360-473-5343	City Code and Comprehensive Plan, LOS Standards etc, available at http://www.ci.bremerton.wa.us/		
Port Orchard	LOS 'D' for roadways, 0.89 V/C ratio	James Weaver			
Poulsbo	LOS E for most roads and intersections, LOS F for a select set.	Andrzej Kasinlak 360-779-4078	2006 Transoprtation Plan update		
Bainbridge Island	LOS 'D' - Urban. LOS 'C' Suburban	Genell Hitch 206-780-3720			
Mason Co.	LOS C for both rural/urban	Loretta Swanson (360) 427-9670 ext 769			
Shelton	LOS 'D' for roads and intersections, some locations set at LOS 'E'.	Website			
Clallam Co.	LOS 'C' rural, LOS 'D' urban.	Rich James 360 417-2290	Carsborg Area Transportation Study, Dec 2007	Non-motorized plan in Countywide Comprehensive Plan and Regional Plans, 1995	Rich James 360 417-2290
Port Angeles	Comprehensive Plan sets standard as average daily LOS D or better for all arterial streets.	Jim Mahlum 360-417-4701	See attached memo.	See upcoming Comprehsive Plan, to be completed by 2015.	Jim Mahlum 360-417 4701
Sequim	LOS D for roads and intersections	David Garlington, 360-683-4908	Non-motorized LOS based on availability of facilities		
Jefferson Co.	LOS C Rural, LOS D Urban	Josh Peters, 360-385-9167			
Port Townsend	LOS D for Roads	Josh Peters, 360-385-9168			
WSDOT	LOS 'C' Rural. LOS 'D' Urban	George Kovich, 360 704-3207			