Appendix F Performance Measures

F.1 Introduction

In its proposed scope of work for this project, the City requested some evaluation of *performance measures*. In theory, the usefulness of a performance measure is clear: a city would like to know how effectively the actions it is taking are achieving the goals it wishes to achieve.

The City's overarching transportation goal is expressed in the TMS project work program: *to have a transportation system that better balances its support for all modes of travel and for the vision for future development expressed in its Comprehensive Plan.* The City's use of the term "balance" has been confirmed by the Technical Advisory Committee for this project: more weight needs to be given to actions that support modes of travel that are alternatives to automobile travel. The City wants to continue to move its transportation planning toward a greater consideration of how all modes of travel fit with each other and within broader City goals for quality of life and development. To that end, the recommendations in this report for a Transportation Mobility Strategy (TMS) address ways for the City to continue a shift in emphasis about how the transportation system gets developed to give more attention to (1) alternative modes of travel, and (2) development patterns that support more efficient and less disruptive travel.

Appendix A, Framework for the Transportation Mobility Strategy, describes some of difficulties for the kind of clean, technical connection from data, to evaluation, to selected action that many people believe should exist.[1] In summary:

- Cities never pursue a single objective on any major policy issue. They have multiple, overlapping and competing objectives.
- The difficulties of multi-objective evaluation (like, for example, benefit-cost analysis) are well known. There are a lot of technical problems with definitions, data and measurement, modeling of cause and effect, and overlapping goals and tradeoffs.

[1] The TMS report and Appendix A also address another issue raised in the scope of work: about *outputs* and *outcomes*, terms that have some precedent in Olympia's process and documents for transportation planning. While this Appendix does not address outputs and outcomes specifically, they are related to performance measures. The TMS report discusses outputs and outcomes in greater detail.

- If too few objectives are measured, important considerations and tradeoffs are left out. If too many are measured, the problem of *weighting* their relative importance becomes very complex in a public setting.
- Even if the there are only a few measures, there is still a lot of room for debate about relative importance (weighting), which will affect the ranking of possible actions.

Our conclusion, supported by the professional literature and years of practical experience, is that performance measures can be useful inputs into a public debate about a preferred action, but they rarely, if ever, can lead to an irrefutable argument for preferred action. That conclusion influences our recommendations in this appendix about specific performance measures for transportation in Olympia.

F.2 A FRAMEWORK FOR THINKING ABOUT MEASURES OF TRANSPORTATION PERFORMANCE

There is an extensive literature on the theory and practice of performance measures. For the purposes of this evaluation, it is worth noting that:

- Measures are about performance. They are developed to see if a desired performance is being achieved.
- Because of the complexity and multiple aspects of what is typically trying to be achieved, measures are usually not unambiguous. They need evaluation and interpretation.
- The evaluation methods (how measures are used and interpreted) depend in part on the type of questions being asked. Some evaluations are *after-the-fact*: measures are collected as a means for estimating the extent to which desired or forecasted performance was achieved. Other evaluations are *before-the-fact*: measures are used to forecast future performance. The measures for both types of evaluation clearly overlap and in many cases may be identical: measures used to evaluate past performance are the basis for forecasting future performance.
- One clear distinction regarding measures is between those that relate to technical performance and those that relate to process. A closely related idea is that measures may address implementation (Did we do what we said we would do?) or outcomes (Did we achieve what we said we would?). If the proposed public actions

are not implemented, or are implemented partially or poorly, then it is harder, if not impossible, to attribute the success or failure in achieving desired outcomes to public action.

- Measures are related to but not the same as *benchmarks*. The *measures* of performance by are value neutral: they simply describe some aspect of what has occurred. *Benchmarks* usually add a normative element: "These are our targets; this is what we want the measures to show; how close did we get to our target?"

Given these points, this discussion of measures makes a distinction between measures of (1) implementation, action, and process, and (2) measures of the performance of the transportation system.

- **Measures of implementation** (outcomes, outputs, and actions). Chapter 3.3 of the TMS report discusses outcomes, outputs, and actions (in the form of a work plan) for the City. It describes several actions that they City can take that are expected to lead toward greater achievement of its performance objectives for the transportation system. The City should keep track of (in other words, measure) whether, the extent to which, and when it takes these actions. A necessary condition for evaluating whether actions are effective in achieving performance targets for the transportation system is to know whether and how the actions have been implemented. These types of measures are addressed in Chapter 3.3, Implementation.
- **Measures of transportation performance.** There can be some overlap with measures of implementation. For example, some people might classify "build more sidewalks" as an implementation measure, others as a crude measure of performance (on the assumption that more sidewalks will lead to better performance of alternative modes and greater livability). Given the definitions and logic described in this appendix, our recommendation is that such instances be treated as implementation measures. A performance measure would look at use (e.g., Did more people use sidewalks?) and other effects (e.g., Do people rate the areas with sidewalks as more livable? Did the number of vehicle trips for some area drop from what it would have been?). The rest of this appendix addresses only measures of transportation performance.

Critical in the definition of transportation performance measures are the ideas of *relative performance* and *standardization*. An example explains the concepts:

Suppose the desire is for more and higher quality travel by bicycles. Obvious measures of *implementation* would be (1) Did the City build more bike lanes or paths? and (2) Did the City improve existing bike paths? Measures of *transportation performance* would be (1) Did more people use the bike paths?, (2) Did the number of trips by bike increase?, and (3) Did biker satisfaction (as measured, for example, by surveys) increase?

But there are a lot of other factors affecting the performance of the bike systems besides City action. Perhaps natural events (e.g., a hard winter; a flood) reduced ridership. Perhaps gas prices dropped to $1 per gallon, or rose to $5 per gallon. And even if there are no big external effects, what if, over a five-year period, bike ridership increased at 1% per year while population increased at 2% per year, or VMT increased at 4% per year?

Standardization attempts to control for some of those issues. It is typically done by either (1) dividing some measure of change in transportation performance by some other standard measure of change, or (2) comparing rates of change. Consider again the bike example. Assume that the desired measure of performance is some estimate of bike ridership: number of riders, trips, or miles traveled.

- Creating a fraction. Assume number of bike miles traveled can somehow be measured over time. Assume that it grows. Is any amount of growth a success? Probably not. If bike miles grow 2% while the City's population grows 5%, things are probably moving in the wrong direction. Thus, a typical way to control for this is to divide the transportation measure (the numerator) by estimate population (the denominator) to create a fraction called "bike miles per capita." That would let people know whether bike miles are growing faster than population, which is probably desired.
- Comparing rates. In the same example, one could compare the growth rate of bike miles to the growth rate of population (or something else). This is really just a different way of illustrating the same idea of relative change.

There are many ways any measure of transportation performance might be standardized. It could be tied to the rate of growth in population, employment, housing starts, vehicle miles traveled, consumer prices, and so on. There is no simple answer on how to standardize: it depends on exactly what one cares about. Our advice is to (1) remember the distinction between objective measures and normative benchmarks; and (2) take separate measures of the desired numerators and the potential denominator. That will provide the ability to create different types of standardized measures as necessary and appropriate when it is time to evaluate.

Regarding benchmarks, neither this appendix nor the TMS recommendations in the main report contain recommendations about specific benchmarks. The ATAC did not discuss benchmarks and we lack a sufficient basis for making the normative judgments required to create benchmarks. Thus, a recommendation for the TMS is that the City consider whether it wants to move beyond measures to establish benchmarks now, or to simply collect measures and deal with the normative issues in a future evaluation. In our opinion, either course is acceptable and both have been used by other jurisdictions.

The problem with multi-modal LOS

In a memorandum called *Multi-Modal Level of Service and Concurrency,* Transpo Group summarized examples of recent policy and technical research and findings relating to multi-modal level of service (LOS) or quality of service (QOS), proposed changes to Washington's Growth Management Act (GMA) relating to LOS policy, and examples of locally adopted, multi-modal concurrency policies from Redmond and Bellingham, Washington.

The problems with reported multi-modal measures are several. Many studies have been conducted to ascertain if and what form of multimodal level of service (LOS) measures are useful as part of long-range planning and concurrency management under Washington State's Growth Management Act (GMA). The notion sounds correct, but there are inherent limitations to these measures when examined.

Others have tried and found multi-modal LOS examples too difficult to realistically integrate them into their concurrency program. Non-motorized LOS/QOS measures (especially pedestrian measures) developed elsewhere are generally helpful in corridor-specific applications, but are insufficient tools in the analysis of bicycle and pedestrian system connectivity.

Both Redmond and Bellingham drafted their concurrency program refinements focusing on **person-trip capacity**, supportive transportation-efficient land use policy, with emphasis on integrating non-motorized improvements through mitigation. Redmond's draft program is well-defined, but use of modeling data makes it cumbersome and requires extensive staffing to calculate, update and maintain. Bellingham's adopted concurrency program is more difficult to describe and understand, issues that can be overcome, but is easier to implement and maintain as it uses standard tools and data for the auto and transit performance measures rather than complex modeling.

As noted in Appendix G, *GMA, Concurrency, and SEPA* the Bellingham concurrency model appeared to best fit for Olympia to pursue in refining its concurrency program.

F.3 OLYMPIA'S EXISTING PERFORMANCE MEASURES

The City currently employs a variety of performance measures for motorized, transit, and non-motorized travel, as described below.

F.3.1 MOTOR-VEHICLE TRAVEL

Level of service (LOS)

As part of its concurrency ordinance and Comprehensive Plan policies, Olympia uses the following Motor Vehicle LOS standards (street segment & intersection):

- Downtown and High Density Residential Corridors – LOS "E" will be acceptable
- Remainder of City and Urban Growth Area – LOS "D" will be acceptable; for some intersections LOS "F"
- On I-5 and SR 101 within Urban Growth Management Boundary – LOS "D" mitigated will be acceptable – consistent with RTP– where funding sources and list of facilities and programs have been developed that support alternative to drive-alone

Transportation Design Standards

The City's Engineering Designs and Development Standards (EDDS) are consistent with Comprehensive Plan Policy as a manifestation of Complete Streets, and serves as an excellent guide for City to achieve its goals and vision for multi-modal transportation sustainability. Major additions to the City's EDDS were completed in 2006 that focused on sustainable design standards for arterial, collector and local streets, emphasis on reducing lane widths, design speed (eliminating streets with 40 and 45 mph design speeds) and curb (intersection) radius for greater attention to transit, bike and pedestrian access and safety.

Mode-Share Shift

Olympia's Comprehensive Plan identifies a future target mode share of 60% Drive Alone. The Olympia Commute Trip Reduction Plan (citywide) is being prepared and will be presented to Council in January, 2009. The CTR law specifies that all jurisdictions now have a goal of a 10% reduction in the drive alone rate by 2011. For Olympia, the 2007 (last survey) drive alone rate is 74.4% so the citywide goal is a 67% drive alone rate.

The City's Downtown Parking and TDM Plan targets a 10% reduction in downtown drive-alone in Olympia by year 2011. The 2010 Commute Trip Reduction targets are: drive alone (59%), rideshare (17%), bike (4%), walk (8%), telecommute (2%), and transit (10%).

Olympia's Growth and Transportation Efficiency Center (GTEC) program goals and targets are to expand CTR efforts beyond 7,400 affected employees to 20,000 downtown employees

Partnership of the City, State, Downtown Association, Intercity Transit, TRPC and County Health (STEPS) – for outreach, services and infrastructure to reach aggressive 10% reduction in drive-alone trips between 2008-2011.

The planned GTEC goals are aggressive and will take a multifaceted, focused approach, including a package of services, facilities and programs, in order to meet diverse needs of commuters. Existing City plans and policies support GTEC, although amendments to zoning code have been identified.

The Washington State Bicycle Facilities and Pedestrian Walkways Plan includes a statewide target to double the percentage of trips made by walking and biking. In lieu of the Comprehensive Plan/RTP mode-share targets, this benchmark appears easily attained within Olympia's urban area.

The problems with measuring and tracking progress of mode-share shift are several:

(1) How is mode-share estimated? For Olympia's practical approach that means use of TRPC's Regional Travel Demand Model.

(2) What are the plan, program and policy measures that Olympia can implement to realistically affect mode share, and how are these impacts accounted for?

(3) Are model measurements and local policy initiatives accounting for the larger issues affecting a person's mode choice? People's choice to travel and by what mode is greatly influenced by:

- marketplace factors affecting fuel price, and
- national and state transportation pricing and fuel taxing policies, or the absence thereof which continue to encourage greater drive-alone travel behavior.

Vehicle Miles Traveled (VMT)

The RTP evaluated regional travel characteristics comparing current and future VMT estimates. Future VMT estimates were summarized for several different long-range plan scenarios based on differing land use/transportation relationships. VMT statistics were summarized, but neither the RTP nor the City's Comprehensive Plan includes specific VMT benchmarks.

Olympia's Climate Change Report identifies a possible benchmark and long-term goal to reduce greenhouse gas by 7 percent (below 1990 levels), by 2012. Similar to Washington State, Olympia could pursue VMT per capita reduction as a direct surrogate for greenhouse gas measures and benchmarks. The State's VMT per capita reduction benchmarks (compared to levels in 1990) are:

- 18% by 2020
- 30% by 2035
- 50% by 2050

Similar to the mode-share issues noted above, VMT is also difficult to measure and track. Section F.3.1 discusses recommended steps to measure and track progress on VMT per capita.

Greenhouse Gas (GHG) – Relating to Transportation

The City's Climate Change Report identifies a possible benchmark and long-term goal to reduce GHG by 7 percent (below 1990 levels), by 2012; as recommended by the Mayors for Climate Protection Agreement. The report stated similar long-term goals consistent with statewide law enacted by the Legislature and policy directives advanced by the Governor.

The Governor's Climate Challenge Executive (Order 02-07) is in partial response to Legislative action under ESSHB 2815, and seeks a variety of methods to reduce GHG. Through ESSHB 2815, the Legislature has directed WSDOT to reduce GHG by measure of VMT per capita, includes the following VMT per capita reduction benchmarks (compared to levels in 1990):

- 18% by 2020

- 30% by 2035
- 50% by 2050

Further refinement to the RTP and Olympia's land use and multi-modal transportation system plans should also address the GHG reduction performance measure, supported by best measurement techniques in the application of the TRPC Regional Travel Demand Model.

Street Pavement Condition

Olympia's Street Repair Program includes a target/benchmark where 100% of City's street lane miles are in fair or good condition. In 2006, 82% of the City's streets were in fair or good condition.

F.3.2 TRANSIT TRAVEL

Level of service

Olympia's Transit LOS policy specifies cooperation with Intercity Transit to implement transit LOS standards that are identified in the RTP, yet the RTP does not include LOS standards.

Service standards

Intercity Transit has a range of service standards relating to transit operating environment, route design, transit-supportive development, bus route type, policy and target headways, route performance standards, route loading standards, transit centers/accessibility, passenger loading, standards for disabled services, vehicle sizes and substitutions during non-peak hours.

F.3.3 NON-MOTORIZED TRAVEL

Level of service

Olympia's Comprehensive Plan includes a policy recommendation to consider a non-motorized LOS standard.

Sidewalk Priorities

Olympia's Sidewalk Program identified project needs and priorities consistent with the Comprehensive Plan, by completing sidewalks near the following priorities:

- **Priority 1** Schools, parks, public buildings, churches/places of worship, shops/malls, and community and senior centers
- **Priority 2** High density corridors, downtown, school walking routes, and transit routes

- **Priority 3** Street characteristics - street functional classification, presence of bike lane/shoulder (buffer), missing link, consideration when sidewalks are missing on both sides of street

Bike Lanes

Olympia's Draft Bicycle Master Plan (BMP) divided all facilities identified in Comprehensive Plan into short-, mid- and long-term needs.

There is a three-tiered priority listing for marked bike lanes on arterial and major collector streets.

Trails

Top priority is given to trails that provide a direct connection (a) into Downtown, (b) to high-density corridors, and (c) allowing bicyclists to avoid difficult intersections or corridors.

Neighborhood Connections

Recommended priorities from Olympia's Neighborhood Connections Study include recommend non-motorized connections to schools, parks, transit centers and route, and:

- Trails such as the Chehalis Western Trail, Olympia Woodland Trail or new trails such as the Percival Canyon Trail.
- East-west routes that improve access between Cain Road and Boulevard, this being one of the areas of the City where streets are least connected.
- To allow a bicyclist to avoid major intersections, highway interchanges and arterials without a bicycle facility.

Olympia's Neighborhood Connections Study defined criteria to prioritize connections including: (a) pedestrian/bicycle facilities (quality of connection), (b) ownership (ease of acquisition for connection development), (c) land use (neighborhood design), (d) work required (constructability), and (e) importance (bonus points). The Study did not recommend specific changes to either the City Code, Comprehensive Plan or design standards (EDDS), or changes or amendments to the Regional Trails Plan.

The Regional Trails Plan identifies critical cross-regional and intra-city (Olympia) non-motorized connectors, but does not prioritize shared-use trail development above any other component of the transportation network; leaving it to local agencies to prioritize projects as part of their transportation needs and projects.

F.4 Recommendations

This section summarizes our recommendations for new and revised measures of Olympia's motorized, non-motorized, and transit system.

Exhibit F-1, Transportation performance measures

Mode		Transportation Performance Measure	Frequency (annual unless noted)
Auto	General	Miles (Lane-Miles) of New Public Street	
		Drive-alone commuter trip rate	Biennial
	Concurrency	Level of Service (LOS) – intersections not meeting LOS standard (measured side-by-side with Person-Trip Capacity until Concurrency Program transition)	
		Person-Trip Capacity – person-trips (conversion from vehicle trips) and person-trip capacity measured at Concurrency Service Area gauging stations (see Appendix F – Performance Measures)	Annual (until transition)
		Mobility Index – average weekday vehicle traffic count recorded at Concurrency Service Area gauging stations	
	Safety	Number of property-damage, injury and fatality accidents per 1,000 population	
		Number of pedestrian and bicycle crashes	
	Operations	Percent of signs and markings in *fair* or *better* condition	
		Travel time on select corridors (delay and fuel consumption)	
		Reduced electrical consumption (traffic signal and street lights)	
		Metered parking spaces managed to maintain 85% occupancy or less (central city and system-wide)	
	Maintenance	Percent of pavement lane-miles in *fair* or *good* condition	
		Pothole repair response time within 8 hours or less, 100% of the time	
	Household Activity Survey	Household Activity Survey: Household (HH) income, persons per HH, vehicle ownership per HH, no. workers per HH, no. licensed drivers per HH, daily vehicle trips per HH, daily vehicle driver trips per HH, and daily vehicle passenger trips per HH – summarized by Concurrency Service Area, city and region (see Appendix F – Performance Measures)	baseline survey updated one year prior to Comp Plan updates
	Regional Travel Demand Model	Regional Travel Demand Model: Housing (population) and employment, lane-miles of arterials and highways exceeding Volume-to-capacity policy thresholds, vehicle-miles of travel (VMT) per capita – by region, city and Concurrency Service Areas)	every five years (consistent with RTP updates)
Transit	Concurrency	Person-Trip Capacity – person-trips (conversion from transit passenger counts) and person-trip capacity (frequency and transit vehicle passenger capacity) measured at concurrency gauging stations (see Appendix F – Performance Measures)	
		Mobility Index - Pedestrians and Cyclists Accessing Transit – averaged transit boardings and alightings collected at and summarized by Concurrency Service Area gauging station (coordination with IT)	
	Operations	Frequency of service (buses per hour, one direction).	
		Span. Hours the CTN runs at the above frequency on weekdays and weekends.	
		Speed. Average speed of CTN, including stops, as a percentage of posted speed limit.	
		Reliability. Coefficient of variation between actual headways of consecutive buses and scheduled headways.	
		Percentage of bus stops with shelters.	
		Percentage of bus stops with benches.	

	Household Survey	Public transit passenger trips per household - summarized by Concurrency Service Area, city and region	updated one year prior to Comp Plan updates
	TDM	Number of Public and Private Telework Parking Cashout awards	
		Number of Downtown Transit Passes provided by (a) Private Business and (b) Public Agencies.	
Bicycle	General	Miles of New (a) Bike Lanes, (b) Shared-Use Paths/Trails, and (c) Shared-Lane Facilities	
		Number of New (a) Pubic and Private Bicycle Parking Spaces	
	Concurrency	Mobility Index - Bicycle Volume Counts – seasonal and average counts collected at and summarized by Concurrency Service Area gauging station	
	Connectivity Index	Intersection density and route directness index (RDI) calculated and summarized by Concurrency Service Area and Schools (elementary and middle schools)	baseline indices updated one year prior to Comp Plan updates
	Maintenance	Percent of bike lanes swept every two weeks	
	Household Survey	Household Activity Survey: Bicycle trips per household - summarized by Concurrency Service Area, city and region	Baseline Indices Updated one year prior to Comprehensi ve Plan Updates
Pedestrian	General	Miles of New (a) Sidewalks and (b) Shared-Use Paths/Trails	
		Number of New (a) Arterial and Collector Street Pedestrian Crossings, (b) Neighborhood Connectors, and (c) Curb Ramp Replacements	
	Concurrency	Mobility Index - Pedestrian Volume Counts – seasonal and average counts collected at and summarized by Concurrency Service Area gauging station	
	Connectivity Index	Intersection density and route directness index (RDI) calculated and summarized by Concurrency Service Area and Schools (elementary and middle schools)	Baseline Indices Updated one year prior to Comprehensi ve Plan Updates
	Household Survey	Household Activity Survey: Pedestrian trips per household - summarized by Concurrency Service Area, city and region	
Land Use		Vacant land type and density summarized by Concurrency Service Area	
		Redevelopable land type and density (net new) summarized by Concurrency Service Area	
Schools	School Access Counts (coordinated with schools)	Number of students enrolled (per public school)	
		Typical weekday student (a) bus passengers, (b) bike rack use, and (c) School Crosswalk student use counts (per public school as applicable)	Monthly / Annual Average
Fuel		Retail price per gallon of gas	Monthly Average

Source: Transpo Group and ECONorthwest

Note: Mobility index measurements are split into different modes. We recommend that motor-vehicles, bicycles, pedestrians, and transit are measured exclusively from each other and compared to themselves, in order to avoid a side-by-side comparison of volume.

Note: this table does not include benchmarks. Appendix D, *Evaluation of Transit and Master Plan*, includes suggested benchmarks for transit.

.4.1.1 Motorized

The recommended measures for Olympia's motorized system focuses on the City's need to track progress towards its policy goals: shift in mode-share and reduction in VMT per capita. This process is admittedly a bit uncharted. We don't have all the answers today, nor can we predict all outcomes or specify precise measures that Olympia should employ. But we can anticipate how new tracking data should initially be collected, summarized, evaluated and reported.

Olympia can begin tracking its progress towards shifting mode-share and reducing VMT per capita in two ways: by *theoretical* application of the TRPC Model (with its implicit replication of human travel behavior) or by *empirical* means of recording multi-modal traffic. We recommend Olympia proceed with both methods, using each to develop a time-series record of city-wide and localized multi-modal travel data in correlation to growing population (housing and employment). As follow-up to the *Mobility Strategy*, these technical steps are exploratory in nature. Staff will need to periodically examine and either confirm or modify the methods generally described and recommended here.

Theoretical Model Application

TRPC's Regional Travel Demand Model (Model) is theoretical, based on selected surveys of Olympia travelers it replicates their travel behavior (or possible behavior based on land use and transportation system relationships) for the entire region. TRPC's Model is well-defined and is a proven, useful tool for regional and city-wide transportation planning.

Olympia should coordinate with TRPC in the refinement, application and update (every six years) of the Model core variables derived from local household travel activity surveys. The survey data are what drive Model estimates of mode-share and vehicle miles traveled (VMT), from which the City and Region estimates the possible shift in mode-share and reduction in VMT per capita, ultimately comparing Model outputs to their goals.

For the Model to accurately reflect real change in behavior over time, it needs to be regularly refreshed with updated and current surveys of household travel activity. TRPC has conducted household activity surveys to originally develop and update its Model. The last survey was conducted in 1998/1999, surveying over 3,000 Region residents. We recommend that these surveys be conducted more frequently to track local travel behavior as part of the City's Concurrency Program.

In coordination with the City's regular update of its Comprehensive Plan (every 7 years), Olympia and TRPC should employ updates to its Household Activity Survey as follows: Full Household Activity Survey Update. These surveys are typically a random sample of 1,000-1,200 households conducted every 6th and 7th year (one year prior to Comprehensive Plan Update).

Partial Survey Sample Update

In the form similar to the "Nielsen Ratings" system, a sample of the Full Household Activity Survey is to be determined that focuses on recurring participants, from which determinate factors influencing travel and mode-choice can be derived (e.g. the impact of transportation and other cost elasticities). The survey would be conducted every three years following the Full Household Activity Survey.

The survey data products likely to be of best use in Olympia's Concurrency tracking program include:

- Household income
- Persons per household
- Vehicles per household
- Workers per household
- Licensed drivers per household
- Daily vehicle trips per household
- Vehicle driver trips per household
- Vehicle passenger trips per household
- Public transit (bus) trips per household
- Non-motorized trips per household

The survey can be structured for sufficient sampling in each of the City's CSAs (care should be taken in defining appropriate number/size of CSA revisions to best fit with long-range household survey instrument planning).

These surveys can be used to more frequently and systematically update the TRPC Model. Model planning horizon (5-, 10-, 15- and 20-year) data will then be reported for the Region, Olympia, and Concurrency Service Areas (CSA - current and revised – see Concurrency section) for:

- Housing (population) and Employment (current and forecast estimate)

- Lane-Miles of Arterials and Highways Exceeding V/C policy (Concurrency) thresholds
- VMT and VMT per Capita
- Transit passenger estimates (passenger-miles by region, CSA and route)

TRPC's Model is predicated on estimating daily and peak hour vehicle volume and transit ridership conditions for the average (annualized) weekday (usually an average of Tuesday-Thursday, excluding Monday and Friday affected by weekend behavior). However, the Model does not estimate and assign bicycle and pedestrian traffic to the street system, as it does for auto and transit traffic.

Empirical (Counts of Actual Behavior)

There are meaningful and efficient methods by which Olympia can expand its travel analysis program to empirically track multi-modal traffic in key locations of the city, what could arguably be termed - *Concurrency Gauging Stations.* These stations would be carefully selected as the City considers revision to its Concurrency Program and other technical criteria (e.g. location of existing traffic signal technology to record vehicular traffic). Based on the City's four current CSAs, an appropriate number of Concurrency Gauging Stations could range from 20-30, providing appropriate geographic coverage, a range of street types with land use context, and transit and non-transit corridors.

Historically, the City, TRPC and WSDOT have developed and maintained a fairly rigorous vehicular traffic count program. IT has also kept consistent passenger count histories of their bus route service in Olympia. Olympia has just recently begun programmatic counting of bicycle and pedestrian volumes in specific locations. These count programs should be coordinated (and expanded, if needed) to collect and assimilate multi-modal traffic data (daily and 2-hour PM peak period counts) at each Concurrency Gauging Station for the following:

- Pedestrian and Bicycle Traffic - Access to Transit (bus boarding / alighting)
- Pedestrian and Bicycle Traffic - Corridor (non-transit access)
- Vehicle Traffic – Corridor
- Bus Passenger Counts – On-Board

Bicycle, pedestrian and transit ridership may vary by season, as colder, rainy months yield lower cycling and walking trips. Olympia's new multi-modal count program should include a minimum of three seasonal counts: Summer, Spring/Fall and Winter. In this manner both a peak season non-motorized count (June/September) and a typical (or average) count can be recorded for annual tracking and comparison to the Model estimates.

In addition to empirical counts, the Model's vehicle and transit passenger estimates should be reported at each Concurrency Gauging Station for comparative *theoretical* and *empirical* data tracking.

Olympia should also track the typical or average cost of gas (locally) at the specified times when traffic volume counts are recorded (3 times per year).

These new tracking measures are meant to supplement, not replace Olympia's current Concurrency tracking program that focuses on auto volume-to-capacity measures at specified locations throughout the City. Olympia should continue this program.

Both the theoretical estimates (exclusive to auto traffic and bus passenger estimates) and empirical counts recorded at each Concurrency Gauging Station should be summarized to indicate local variance, if any, between observed and estimated traffic demand. Together these data can be compared with the Household Activity Survey Data for localized trends.

These steps are technical and may be tricky. Initial selection of the Concurrency Gauging Stations may not anticipate unique land use developments which could trigger impacts that skew the data tracking results. Olympia will need to reassess the location of the Concurrency Gauging Stations or summary measurements (derivative indicators) to obviate unanticipated impacts.

Over time, trends in the empirical data (measured counts) and Household Travel Activity Survey should yield sufficient information for making good policy decisions. Other land use and transportation system information should be regularly summarized, including but not limited to changes in: (1) land use type and density, (2) transit service, quality and frequency (see below), and (3) non-motorized system connectivity improvements.

When reviewing all of these indicators key policy questions are to be raised and answered:

- Are we meeting or exceeding the Concurrency LOS standards? Where and why?

- Are we getting more use of alternative modes (relative to historic benchmark) and where specifically are we achieving these results (and is there a direct correlation between non-motorized traffic growth and non-motorized project investments)?

Reporting of the multi-modal traffic and household travel survey data will be conducted every three years. Results will be included in the City's Annual Concurrency Report and used to help guide transportation and land use policy direction, with trend summaries indicating whether the City is achieving its mode-share and VMT per capita reduction goals.

Other changes in land use and transportation system improvements are to be included. If the answers are favorable, and the measurements indicate positive direction towards achieving the City's goals, then the directive is fairly simple: keep to the Plan. If not, Olympia will need to reassess its Concurrency Program, possibly revise its Plan for efficiency and equity, or maybe revise its goals if they are found to be excessive.

.4.1.2 Non-Motorized Recommendations

Our recommendation for revisions to Olympia's Non-Motorized system measurements is to test and establish a GIS-based Connectivity and Route Directness Index.

Additional GIS analysis will be required to confirm the current levels of street and non-motorized connectivity within existing neighborhoods and subareas. The steps to developing the Connectivity and Route Directness indices include:

- Amending City's GIS street centerline file with existing shared-use path and trails facilities to create a Composite Non-Motorized Network. From the Composite Non-Motorized Network a set of connectivity measures can be quantified (e.g. intersection density, node-link ratio, and % 4-way intersections), compared to national data, and used to develop a best fit *Connectivity Index*, summarized by transportation analysis zone (TAZ) geography (as identified through the TPRC Regional Travel Demand Model).
- As an option, Olympia could also conduct more rigorous GIS analysis to test and formalize a *Route Directness Index*, by conducting both a pedestrian and bicycle route analysis. The routing analysis would use and refine the Composite Non-Motorized Network to test and establish:
- Pedestrian and bicycle network "friction factors" to account for unique network characteristics that inhibit non-motorized travel on specific routes (e.g. missing sidewalk, vehicular traffic volume,

presence of bike lanes, etc.) and arterial street crossings (e,g. unsignalized intersections, closed medians, etc).

- Typical walking and bicycle travel-sheds (e.g. walking = 1 mile, cycling = 3 miles), weighted by access to transit.
- The resulting *Route Directness Index* would be summarized for each land parcel within the urban area, suitable for further aggregation by TAZ and testing of optional Concurrency Service Area boundaries (which should consider major transit routes and Olympia's Comprehensive Land Use Plan designations).
- Formalize either a *Connectivity Index* or *Route Directness Index* (or both) for use in (a) supplemental re-prioritization of Pedestrian and Bicycle Plans (needs assessment), and (b) amending the City's Concurrency Program. Initial connectivity thresholds to be established using available research and assessment of Olympia scores.
- Amend and supplement the City's Sidewalk Program, Bicycle Master Plan, Neighborhood Connections Program and Regional Trails Plan to re-establish pedestrian and bicycle system improvement priorities for the 20-year planning horizon.
- Estimate the future, Composite Non-Motorized Network by adding to the existing network those priority street and non-motorized connections identified in the City's plans.
- Test and establish minimum *Connectivity/Route Directness Index* thresholds by major Land Use Plan subarea for application in the Concurrency Program.
- Amend and supplement the City's Concurrency Program with the *Connectivity/Route Directness Index* (possibly in combination of an additional measure that quantifies the *percentage completion* of priority Pedestrian and Bicycle system plans). Within the Concurrency Program (see Section x) the City can define its multi-modal Concurrency Program to encourage greater development (by mix and density) in areas where the local *Connectivity/Route Directness Index* score meets or exceeds the desired threshold (thresholds established by CSA).

.4.1.3 Transit

The Non-Motorized Modal Report and Addendum A to that report discuss the latest research on development of methods for measuring multimodal LOS and concludes that attempts to create a single set of measure inclusive of all modes is often counterproductive. Our experience supports this and suggests that from a transit quality and operations perspective, closely linked policies that support and monitor performance in a few areas are most important:

- **Land use density in key transit corridors**. In Olympia's case we have identified these corridors through the proposed CTN and recommended actions for achieving transit supportive densities in these corridors.
- **Access to transit for pedestrians**. This emphasizes the linkage between the CTN and pedestrian and bicycle plan priorities established in this and the non-motorized report.
- **Delivery of high quality transit service**. This is described in more detailed in the section immediately below.

Measuring Performance on the CTN

Establishing clear transit service quality standards tied to key corridors or growth centers is integral to a useful set of multi-modal LOS standards and measurements. A key argument against integrating transit into a city's LOS measurement is its relative impermanence. The argument can be made: how do we know the bus will still be on that street 10 years from now? Adoption of a CTN allows the City and IT to establish minimum service quality standards, which in turn:

- Provides a policy basis for measuring transit capacity as part of an integrated LOS standard (since policy guarantees a measurable level of service that can be translated to capacity);
- Provides developers the confidence to develop at higher densities, to make additional investments in transit or pedestrian supportive infrastructure, and/or to construct less off- street parking;
- Provides the City and Intercity Transit justification for investing in high quality transit amenities and pedestrian and bicycle facilities.

Performance criteria for the CTN can be narrowed to a few key dimensions of transit quality that are both definitional and dynamic:

- **Frequency.** The CTN runs every 15 minutes
- **Span.** The CTN runs at the above frequency for at least 16 hours on weekdays and 14 hours per day on weekends
- **Speed.** CTN services have an average operating speed, including stops, of no less than 30% of the speed limit.12

- **Reliability.** Actual headways between consecutive buses will exceed scheduled headways by a coefficient of variation not to exceed 0.30.
- **Loading.** Standing loads but not crush loads are acceptable.

Successful adoption of the CTN will require an agreement between the City of Olympia and Intercity Transit to adopt and manage to these basic performance criteria on CTN corridors.

Customer Satisfaction

Intercity Transit conducts passenger surveys on an occasional basis (this typically occurs at least once every six years). The City should consider coordinating with IT to use feedback from this survey to influence their capital programs. This might involved adding a few strategic questions to their survey instrument focused on items such as pedestrian access and bicycle parking.

Bus stop Amenities and Accessibility

It is challenging to effectively measure and monitor change in the quality of the transit passenger waiting environment without a comprehensive survey of each stop that includes a site visit. In the absence of a detailed survey, there are a few simple measures of available stop amenities:

- Percent of bus stops with shelters
- Percent of bus stops with benches

If a detailed stop inventory was completed, additional measures could be tracked, including:

- ADA accessibility, including quality of signage containing contact information for IT representatives
- Completion of the sidewalk network leading to the stop
- Quality of waiting environment (sidewalk space available, conflicts with other users, other amenities or services)
- Presence of transit information such as schedules and route maps

Measures of pedestrian access and quality of service for transit corridors or stop/station areas can be adapted from those recommended in the Pedestrian and Bicycle Technical Appendices to the Olympia Mobility Study.