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Developing Guidelines for Incorporating Managing Demand into WSDOT Planning and Programming

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Metric Conversion

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
LENGTH				
in	inches	25.4	millimeters	mm
ft.	feet	0.305	meters	m
yd.	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
VOLUME				
fl. oz.	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft^3	cubic feet	0.028	cubic meters	m^3
yd^3	cubic yards	0.765	cubic meters	m^3
NOTE: volumes greater than 1000 L shall be shown in m^3				
MASS				
oz.	ounces	28.35	grams	g
lb.	pounds	0.454	kilograms	kg
T	Short tons (2000 lb.)	0.907	megagrams (or "metric ton")	Mg (or "t")
TEMPERATURE (exact degrees)				
°F	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	°C

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16. Abstract

The purpose of this research was to develop guidelines for WSDOT's business areas to incorporate demand management strategies appropriate to the context of the land use and transportation environment to meet their objectives. The products of this research included a technical memorandum summarizing and synthesizing a review of the literature, a summarization of main themes gleaned from interviews with staff of WSDOT of applicable business areas and staff of partner agencies, and PowerPoint presentations of draft findings and recommendations. Research products also include a Mobility Gap Analysis Tool to be used in conjunction with WSDOT's Highway Segment Analysis Program, for calculating the number of motor vehicles needed to be removed from the state highway to restore travel speeds of 70 percent posted speed limit. Research products also include a final report on recommendations for the corridor planning process, a creative thinking exercise, summaries of primary TDM strategies for consideration by WSDOT region staff as part of a web-based resource tool developed by the University of Washington, and a final report with recommendations. The recommendations were developed for statewide planning and programming, with emphases on the Highway System Plan and the State Public Transportation Plan, corridor studies, the Commute Trip Reduction Program, construction mitigation, and implementation of the Growth Management Act and the State Environmental Policy Act.

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Executive Summary

Incorporating transportation demand management (TDM) into WSDOT's planning processes can be most successful if it is approached not only by making specific adjustments to current analysis methods and tools, but by concurrent changes in policy and direction that WSDOT executive leadership provides to its staff.

The Moving Washington approach recognizes, in concept, the importance of using all the tools in the toolbox to cost effectively achieve the state transportation policy goals. This includes the mobility goal of maintaining the predictable movement of goods and people throughout the state of Washington. CUTR's guidelines assert that all three methods: (1) managing travel demand, (2) optimizing traffic flow, and (3) accommodating travel demand by increasing capacity, should be used concurrently. However, the current approach is to analyze which one of the three methods provides the most benefit for the cost. This pits one strategy against another instead of using all three in tandem. This uses a method that favors the vast bank of data and analysis tools for computing highway capacity. Because the standard methodology relies upon a long history of investing in data collection and analysis that is tailored toward determining needed physical highway capacity improvements on a segment by segment basis, there is the desire to measure TDM using these same methods and express the effects of TDM in terms of volume to capacity (v/c) improvements.

However, TDM approaches mobility from a different angle. Highway capacity analysis does not capture the effects of a vehicle trip not taken during the morning peak as a direct result of a TDM strategy. The Strategic Assessment Office requires a high standard of proof in the effectiveness of TDM. However, there also is not a corresponding history of investment in the particular kinds of data needed to "prove the case" of TDM. The current CTR program does not supply all the necessary data.

CUTR's guidelines recommend a sustained investment in the collection of the right types of data that demonstrate the effects of TDM. Accumulating a sufficient data set for this purpose may take three years or longer. In the meantime, to set the spirit of Moving Washington in motion, the implementation of TDM should be started, with support from WSDOT executive leadership. This particularly means a change in the way corridor planning is conducted. With the possible exception of entertaining different assumptions as inputs to current analysis methods, WSDOT staff presently will do nothing differently until WSDOT executive leadership specifically directs them to changes in approach.

For example, current methodology pursues the identification of transportation needs as the starting point for corridor planning. "Needs" are equated to deficiencies in sustaining 70 percent of the posted speed limit by highway segment. This is a measure of motor vehicle throughput, with no data available to supply confident assumptions regarding average vehicle occupancy to compute person throughput.

A high level screening tool is applied that calculates speeds by highway segment. The outcome of this screening is the identification of performance gaps where highway segments dip below 70 percent of the posted speed limit. These highway segments are then sent to each WSDOT Region. The WSDOT Region develops solutions to raise performance to or above the 70 percent threshold. The WSDOT Region analyzes different solutions using standard traffic analysis tools, such as the Highway Capacity Manual and various traffic simulation models to demonstrate that the proposed solutions work in the form of an improved v/c ratio. WSDOT analysts want a method to translate the effects of TDM solutions

upon v/c ratio, to compare against a strategic capacity improvement or a transportation systems management (TSM) improvement to determine which one of the three strategies works best.

Because the data do not exist to translate TDM into a change in v/c ratio, the TDM solution will not be selected. WSDOT procedures require documented proof in the analysis. Under the current standard WSDOT approach, TDM will likely never be selected. As a result, no data can be collected to document the impact. With no data to demonstrate impact, TDM cannot be selected under the current method of analysis.

WSDOT executive leadership must lead staff out of this Catch-22 conundrum. However, CUTR's recommendations do not rest merely with a program of data collection and analysis that can turn the effect of a TDM strategy into a measured impact upon v/c ratio for a highway segment with a performance gap.

First, the approach to select which one strategy works the best (TDM vs. TSM vs. strategic capacity improvement) does not effectively harness the power of the three strategies. The Moving Washington approach calls for the implementation of all three strategies. TDM changes the nature of a trip at its source, which is described by a traveler's decisions regarding whether to travel, when to travel, what route to take, what mode to use, and how much money to spend to pay for the trip. A program of data collection and analysis should measure these changes, which will accrue to the transportation system as a whole. This is a recommendation to change the analysis approach. However, the changes should go further than analysis methods.

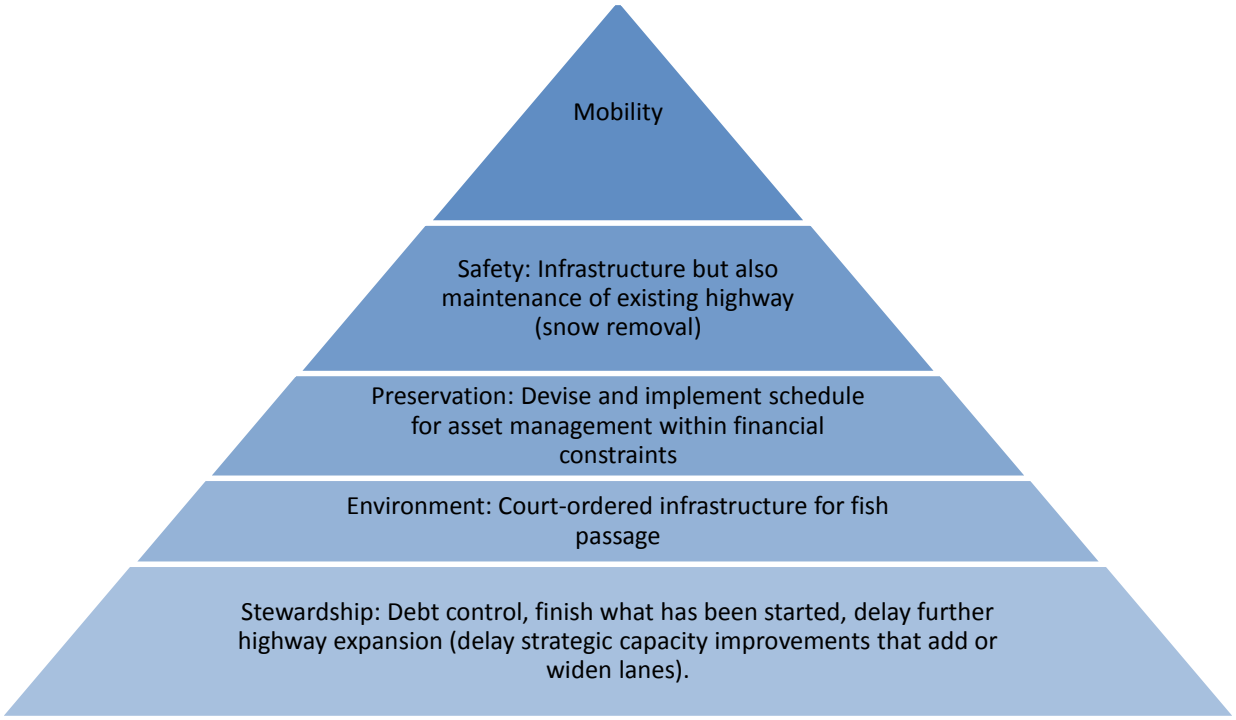

Figure ES-1. Example of a prioritization of state transportation policy goals.

1. Prioritize State Transportation Policy Goals

With a sorely limited amount of funding to manage the Washington State transportation system, WSDOT leadership should start with setting priorities that fit within the financial means of the state. This requires political support. CUTR recommends that WSDOT leadership communicate to state elected officials why prioritization is needed for a rational progression of addressing needs.

CUTR recommends prioritizing the implementation of the state transportation policy goals based upon available and projected revenue. A pyramid illustrates an example of a prioritization of these policy goals, with the bottom of the pyramid representing the most important goal to tackle first. In this pyramid, mobility is the least important at present. This is due to the need for WSDOT funds to address debt control, court-ordered actions, preservation of existing assets, and safety. This prioritization is bolstered by the fact that there is unused capacity on the highway system outside the peak periods.

2. Shift WSDOT Culture by Redefining Its Customer Base

Current WSDOT analysis methods implicitly define the customer as a motorist who primarily chooses to travel in a single-occupant vehicle during the most congested times of day on the most congested highways. A redefinition of the customer affords WSDOT the opportunity to better embrace the state transportation policy goal of mobility. Mobility, by state law, is the predictable movement of goods and people through the state of Washington. Additionally, a major theme is multimodal travel. With a redefinition of WSDOT's customer base, the development of a multimodal transportation system can begin to receive more planning and financial investment. The definition should focus upon the traveler and not the motorist. As a result, the emphasis of WSDOT efforts should shift away from delay reduction and toward reliability improvement (emphasis on non-recurring congestion) and the provision of programs and services that provide competitive travel choices to travelers.

3. Adopt an Explicit Statewide TDM Policy

With the prioritization of state transportation policy goals and a redefinition of WSDOT's customer, this sets the stage for the articulation of a statewide TDM policy that jump starts the implementation of TDM programs with a concurrent program of data collection and documentation of impacts that builds a knowledge base of the impacts of TDM. The statewide TDM policy should address the following.

- A recognition that traffic congestion is an attribute of vibrant urban areas.
- A recognition that prematurely building strategic capacity rewards travelers' decisions to travel by single occupant vehicle during the peak periods on the most congested highways.
- A recognition that despite a myriad of transportation performance indicators, WSDOT infrastructure investment decision making has historically been directed by a very small set of related performance indicators. These include v/c ratio and maximum motor vehicle throughput.
- A recognition that physical highway infrastructure expansion is expensive to design, build, maintain, and preserve. Other costs include environmental damage, greenhouse gas emissions, and social equity consequences that are difficult to fully quantify.
- A recognition that WSDOT's role is changing from highway builder to multimodal mobility manager, serving functions of policy maker, funder of competitive multimodal options, facilitator and partner, provider of technical support and provider of services.
- A recognition that the Moving Washington approach is understood to mean the concurrent application of all three: TDM, TSM, and strategic capacity improvements, and not the selection

of just one that best improves v/c ratio. In keeping with least cost planning, Moving Washington is a staged approach, where TDM programs, services, and incentives, and TSM traffic flow optimization strategies are implemented and exhausted first, before turning to strategic capacity improvements.

Various actions would follow from the adoption of a statewide TDM policy, such as a reevaluation of the most important performance indicator upon which decisions are based, a reevaluation of level of service standards, and the funding of improved analysis and data collection programs that lead to better transportation system predictability and competitive multimodal travel choices.

4. Integrate the Isolated Commute Trip Reduction Program

A 20-year long range transportation demand management plan should be developed as a component of the current state-required CTR Plan, with the purpose of accomplishing the statewide goals of the WTP, including the Statewide TDM Policy. The long range TDM Plan should be updated every 2 years and timed to be ready to submit a request to Programming for funding in the Biennial Budget Request.

The long range TDM plan would include a base program of local CTR plans and the regional plans, CTR intermodal linkages as part of each statewide modal plan, and a TDM component to each corridor plan, and a TDM mitigation component to each traffic management plan for construction work zones.

5. Revise the Contents of the State Highway System Plan

With the implementation of the above recommendations, the SHSP will change. Based upon prioritized state transportation policies, investments in Program I (Improvements) Environmental Subprogram, Program P (preservation), Program I Safety Subprogram, Program M (maintenance), and Program Q (traffic operations) will maintain an emphasis. The Program I Mobility subprogram includes high occupancy vehicle (HOV) projects and bicycle infrastructure, which could receive greater emphasis. However, the SHSP is not just a long range capital improvement program. With an emphasis upon implementing and exhausting TDM strategies before considering strategic highway expansion projects, there are several areas where TDM can be incorporated into the SHSP. For example, within the Capital and Operational Improvement Element of the SHSP, include TDM as a sub-element, alongside safety, operations (ITS), and capacity. The TDM sub-element could include the CTR Plan that is expanded to a 20-year time horizon. Add passenger throughput, or peak period passenger trips (PPPT), as a measure of capacity so that TDM strategies that increase Average Vehicle Occupancy (AVO) would follow. As there is a shift to reliability as the important element of Mobility, consider relaxing LOS standards. Adopt an approach in which all currently planned TSM and strategic capacity improvement projects are paired with a funded TRPP or other program of TDM strategies. Likewise, projects programmed in the Capital Improvement and Preservation Program (CIPP) could be paired with TDM support strategies that would be listed in the HSP and programmed in the Biennial Budget Request.

6. Clarify Terminology

With a redefinition of the WSDOT customer, there will need to be a review and explicit redefinition of key terms to be used by all WSDOT staff. For example, the terms “needs”, “deficiencies”, and “performance gaps” are interchangeable and mean highway segments that do not meet the minimum 70 percent of posted speed limit standard. With a redefinition of the WSDOT customer, the meaning of these terms should change. WSDOT planning activities should clarify what is considered to be TDM. The State Public Transportation Division should consider renaming itself, such as the State Transportation

Demand Management Division, or Public Transit and Demand Management Division, etc. Alternatively, if it is important that the divisions within Community and Economic Development are delineated by mode, then consider reorganizing TDM planning and implementation activities as a separate division under Engineering and Regional Operations, or as an office within Traffic Operations. Are the terms, "trip reduction" and "transportation demand management" misunderstood? For those outside the transportation profession, such as the state legislature and the voting public, reducing trips might be interpreted as counter to economic development. It is recommended to explore other ways to describe the goals of transportation demand management. The Corridor Sketch Pilot Advisory Group Feedback Table is a good start to the discussion about terminology.

7. Integrate TDM into Corridor Sketch Planning

WSDOT regional planning programs address current and forecasted deficiencies of State highways through the conduct of corridor studies. Guidance for the conduct of corridor planning studies was developed as the product of a comprehensive evaluation of how to incorporate the consideration of Transportation Demand Management strategies into several business areas of the Washington State Department of Transportation (WSDOT). Corridor studies are an integral part of the transportation planning process, which support the State Highway System goals and objectives at the state and regional levels, as well as the vision for the corridor by the communities that the corridor serves. The Moving Washington approach recognizes the importance of using all the tools in the toolbox to cost effectively achieve the state transportation policy goals. This includes the mobility goal of maintaining the predictable movement of goods and people throughout the state of Washington. A recommended approach to TDM strategies as part of least-cost planning for improving mobility asserts that all three methods: (1) managing travel demand, (2) optimizing traffic flow, and (3) accommodating travel demand by increasing capacity, should be used concurrently. This approach will advance the integration of TDM into the selected solutions aimed at reducing traffic congestion, providing mobility choices, enhancing transportation affordability, and meeting the State of Washington's goals for reducing air pollution and greenhouse gas (GHG) emissions and improving community livability. Recommendations were developed for the use of a systematic process for identifying mobility needs, assessing existing TDM programs and resources, and evaluating potential TDM solutions against chosen performance metrics.

8. Establish Long Range TDM Program Funding for Corridor Planning

Corridor study recommendations inform the highway system plan and legislative decision making. It lays out expected growth within a 20-year time horizon, based upon local comprehensive plans. Regardless of whether the proposed improvement will require federal funds, the proposed solutions must find their way into the SHSP. Corridor studies are often initiated by a legislative proviso or because some local governments contributed funds to do a study that they think is needed. Under these circumstances it is common for there to be a particular mobility solution in mind that the local governments want, such as capacity expansion. Because of an historic lack of permanency for TDM programming, there may follow the assumption that long range TDM strategies cannot be undertaken. Capital facilities have a certain permanency to them. Once they exist, an obligation develops to maintain and preserve the facility. This does not appear to be the case with TDM programs and services. A sense of permanency is needed for funding for TDM so that it is understood that the effects of TDM strategies can be counted upon to continue to deliver results. Permanent, reliable and adequate levels of funding should be allocated to transportation demand management strategies that have been delivered through the following WSDOT programs.

- Commute Trip Reduction (CTR) program
- CTR employer tax incentives
- CTR Education and Marketing
- Regional Mobility Grant Program (RMGP)
- Trip Reduction Performance Program (TRPP)
- Growth and Transportation Efficiency Centers
- Vanpool Grant Program

A sense of program permanency will help bring TDM strategies into the discussion for proposed corridor improvements. For each corridor plan, it is recommended to develop a TDM Corridor Component that is incorporated into a recommended 20-year long range demand management plan. The TDM Corridor Component would also be coordinated and consistent with a recommended Multimodal Integration Plan. Each TDM Corridor Component should include a data collection and analysis program. Each Corridor Plan should include an implementation plan that assigns responsibility to certain offices for delivering various elements of the plan, with associated funding sources.

9. Incorporate Greater Transparency in the Priority Programming Process

A review of the 2015-2017 Biennial Budget Request did not find sufficient information about the process undertaken in developing the proposed allocation of funds, including the rationale behind the proposed targeted reductions. Proposed targeted reductions included decreasing funds for Regional Mobility Grant Program. Examples of Regional Mobility grants include funding new transit services that connect urban centers, park and ride lots and expansions, new buses, and rush hour transit service along congested corridors. Proposed targeted reductions in the 2015-2017 Biennial Budget Request also included decreasing funds for ferry service, and decreasing funds for the Highway Maintenance and Operations Program (but delayed snow and ice removal might cause accidents and increase nonrecurring congestion). It is recommended to devise a process for the Biennial Budget preparation that allows a review of the proposed budget request by those departments requesting funds. Different frames of reference among the various WSDOT business areas may yield different problem characterization and solution.

The priority programming analysis must use demand modeling tools to "…evaluate investments based on the best mode or improvement, or mix of modes and improvements, to meet current and future long-term demand within a corridor or system for the lowest cost." (RCW 47.05.035) However, travel demand modeling methodology also has its limitations, including a lack of data, which requires reliance on assumptions.

The Highway Segment Analysis Program (HSAP) is a tool used by Capital Program Development and Management (CPD&M) staff to analyze mobility data and provide consistent evaluation of the through traffic movement on the statewide highway system. This software is used to identify highway segments that operate below 70% of posted speed limits in year 2030. A Mobility Gap Analysis Tool was developed to be used in conjunction with the HSAP to calculate the number of motor vehicles required to be removed from the state highway to restore travel speeds to 70 percent of posted speed limit.

There is a Mobility Priority Programming Process, last updated May 2000, and cited in the October 2014 *WSDOT's Handbook for Corridor Capacity Evaluation*, which applies a benefit to cost analysis to candidate projects for the 2-year biennial request. The benefit to cost analysis is conducted as part of

the cost-efficiency criterion. In addition to the benefit to cost analysis conducted to determine cost-efficiency, other criteria for mobility evaluation are identified along with scoring procedures and weights assigned to those criteria. These were determined with input from state transportation officials and WSDOT personnel. The cost-efficiency criterion was weighted higher than all the others combined. The evaluation criteria and assigned weights should be reviewed by a stakeholder group that includes WSDOT staff from multiple departments, including the Public Transportation Division, and citizen input.

For the benefit to cost analysis of the cost-efficiency criterion, the benefits are defined from a user perspective. These include travel time savings for passenger and freight movement, user operating savings, and accident reduction. The costs are defined from a highway system perspective. These include the costs of construction, environmental retrofit, preliminary engineering, and annual operating and maintenance.

Presently, the cost-efficiency category is the only category that uses a benefit to cost ratio. For the cost-efficiency category, which is weighted at 65 percent, it is recommended to review what is included in benefits and in costs. For example, at the system level, societal benefits might be considered as part of the benefits while greenhouse gas emissions also could be considered a cost.

As another example, because cost of wetland mitigation is already included in the construction cost estimate of the proposed project, the wetlands assessment of intrusion upon classified wetlands is a measure of public resistance to wetlands impacts and not the cost of wetland intrusion itself. This approach incorporates the assumption that wetlands mitigation is completely successful in replacement of wetlands lost. These assumptions should be reviewed as part of the most current Best Available Practice.

WSDOT's Handbook for Corridor Capacity Evaluation, October 2014, identifies numerous other performance indicators for congestion measurement, which might be considered in evaluating the benefits and the costs. While the benefits in the current benefit/cost (b/c) equation are from the user perspective, key congestion performance indicators from the *Handbook* include many other categories. They include transit trip analysis metrics but these metrics are from a system perspective and not from a user perspective. The system perspective metrics include transit ridership (average maximum load), transit passenger miles traveled, transit utilization (percent of available seats), and park-and-ride lot capacity and use.

To support WSDOTs commitment to create a multimodal system, it is recommended that public transit metrics be considered from the user perspective, similarly to the way the benefits to motorists are evaluated, and that WSDOT more widely define its customer base as the traveling public rather than drivers.

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Introduction

The Washington State Highway System Plan (HSP) 2007-2026 Glossary contains two definitions for transportation demand management. It defines Demand Management as "Changing or reducing demand for car use by encouraging the behavioral change of household choices of travel. Transportation demand management is used increasingly by urban planners to affect the rate at which new development attracts cars and increases the need for new or expanded roadways."

Also, Transportation Demand Management is defined in the HSP 2007-2026 as "Measures designed to reduce the number of single occupant vehicle trips during the peak traffic period. Measures include person trip reduction strategies, which eliminate trips completely, vehicle trip reduction strategies that accommodate person trips in fewer vehicles, and peak period modification strategies that move trips out of the most congested periods."

The recommendations for incorporating transportation demand management (TDM) into the Washington State Department of Transportation's (WSDOT) planning processes were developed based upon a review of the literature, as well as studies, plans and guidance materials from WSDOT and the Departments of Ecology and Commerce. The study process also included following current simultaneous state, regional and local planning processes based upon published agendas, minutes and background materials, as well as a series of interviews with over 40 WSDOT staff and interagency partners and several phone conferences. It is hoped that these recommendations can be adapted for use by WSDOT divisions in the conduct of studies, planning and process updates.

While WSDOT is not satisfied with their current level of integration of TDM in WSDOT's planning processes, WSDOT is a leader of state DOTs in recognizing the potential of TDM, and judging from its many ongoing Work Groups organized to tackle difficult problems, it will remain so. This report starts with the Washington Transportation Plan and ends with WSDOT's engagement in local processes. The content of this report is organized thus:

1. Engage the Washington State Transportation Commission
2. Develop a Statewide TDM Policy
3. Statewide Multimodal Transportation Planning
4. Integrate the Commute Trip Reduction Program
5. Regulate Use of the Interstate
6. Highway System Plan
7. State Public Transportation Plan
8. Corridor Studies
9. Programming
10. Funding
11. Construction Mitigation
12. Growth Management Act
13. State Environmental Policy Act

1. Engage the Washington State Transportation Commission

Why Delay Strategic Capacity Improvements?

- By the time debt is paid on Nickel Package and Transportation Partnership package, those 428+ projects will need repair and replacement.
- Right now, there are no funds to expand physical highway system—there are not enough funds to repair and preserve existing highways.
- Recognize that congestion relief through strategic highway capacity expansion should not be #1—there is still unused capacity, such as within vehicles and at different times of day.
- Maintaining capacity of the existing system (as directed by WTP 2030) is not the same as expanding capacity.
- With autonomous vehicles on the horizon, it may be prudent to delay strategic capacity improvements.

WTP Should Prioritize State Policy Goals

The statewide transportation system policy goals established in RCW 47.04.280 are economic vitality, mobility, preservation, safety, stewardship, and environment. The law makes no statement with regard to their relative importance; however, decisions about how transportation funds are used implies their relative importance.

RECOMMENDATION WSTC-1: WSDOT's policy goals should be prioritized by the Washington State citizens, as represented by the Washington State Transportation Commission and reflected in the Washington Transportation Plan.

The State of Washington is under severe budget constraints and it is believed that this will continue to be the case for many years to come. Based on this reality, it is recommended that the allocation of budget in the modal plans that comprise the Statewide Multimodal Transportation Plan reflect explicit direction about how the state transportation policy goals are to be prioritized. This decision process could be conducted on two levels, reflecting statewide priorities, as well as priorities by each WSDOT region.

RECOMMENDATION WSTC-2: The WSTC should exercise leadership to assert in its WTP that WSDOT should "do first things first". This means prioritizing the state policy goals.

For example, in order of priority, the policy goals might list managing debt first, followed by implementation of court-ordered environmental improvements, asset preservation, maintenance and safety, and then providing for reliable mobility using least cost planning.

The pyramid in Figure 1 illustrates an example of prioritized state policy goals, with the most important to do first at the bottom of the pyramid. Mobility, also talked about as congestion relief, has been prioritized and cast as a severe constraint upon economic vitality, with regard to person hours of delay, justifying continued new investment. However, in statute, Mobility is "…the predictable movement of goods and people…" meaning reliability. Travelers can and already do plan for travel based on the amount of time it predictably takes to reach the destination. Motorists have choices to avoid congestion (i.e., travel outside the peak). As a result, nonrecurring congestion should take priority over recurring (predictable) congestion. This includes incident management (Safety). Economic vitality, not

shown in the pyramid, is inherent in all the other pyramid layers, including debt control, environmental protection, asset management, and accident reduction.

RECOMMENDATION WSTC-3: WSDOT should finish projects that have already started and where commitments have been made, but identify those projects that may be in the planning stages that can wait, and set them aside for later.

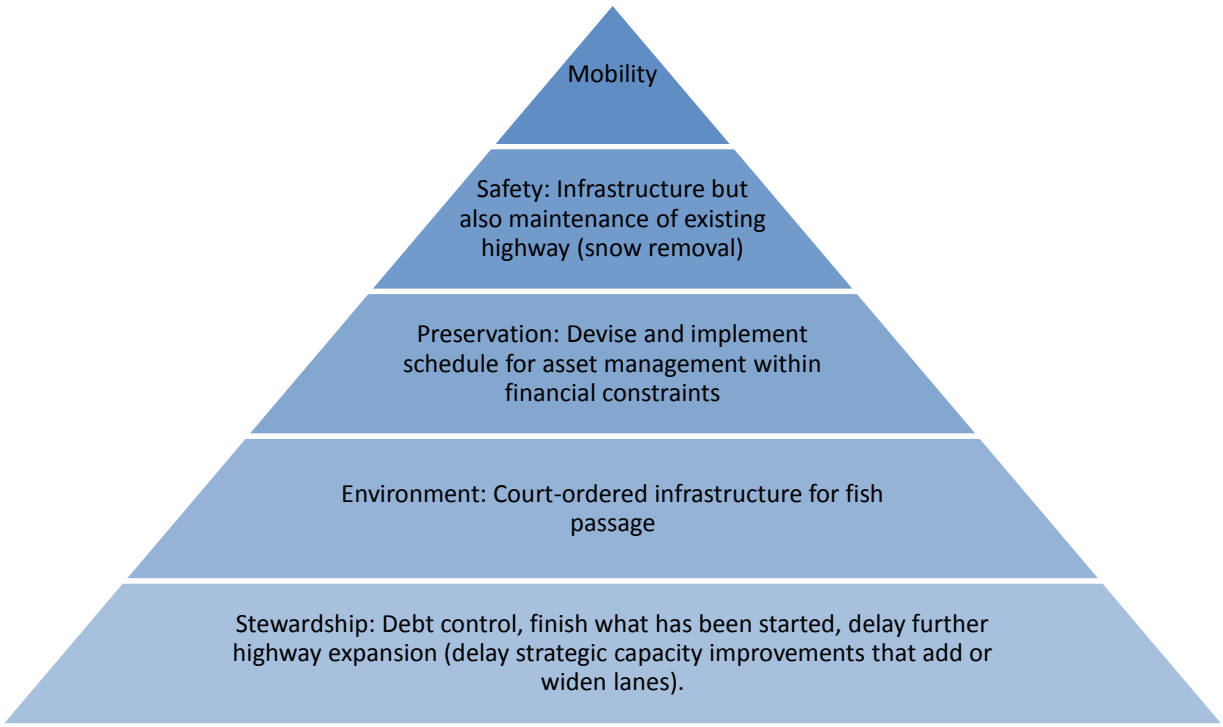

Figure 1 - Recommended Prioritization of State Policy Goals

In the 2015-2017 Biennial Budget Request, September 2014, the budget was composed of requested funds by operating program and capital program. For example, there are 16 operating programs representing operations needs for tolls (Program B), information technology (Program C), aviation (Program F), highway maintenance and operations (Program M), traffic operations (Program Q), ferries (Program X), public transportation (Program V) and others for a total of $1.7 billion requested, including non-appropriated funds. Under the capital budget, there are seven programs, including those for facilities, highway improvements (Program I), highway preservation (Program P), traffic operations capital (Program Q), ferries capital, rail capital and local programs capital (Program Z). The new requested capital budget proposed over 25 percent in expenditure decreases. Even with the decrease, the total budget for capital requested was $5.1 billion, including nonappropriated funds. Highway capital improvements would be decreased by over 36 percent but still would receive over $2.2 billion in the proposal.

In this proposed budget, approximately 83 percent of the $1.95 billion the legislature assumed for highway construction for that next biennium is already committed. Over 75 percent of the committed budget, $1.24 billion, is for mobility improvements.

No clearly stated relationship between budget expenditures and the relative importance of the state transportation policy goals was found. Implicit in previous budgetary allocations is that mobility, in the form of capacity improvements, is the number one priority state transportation policy goal.

This is reinforced by the use of the performance indicator of travel speed. WSDOT performance indicators should reflect state and community priorities. The allocation of the WSDOT budget should reflect the prioritization of the state transportation policy goals. WSDOT staff has been engaged in discussion urging the consideration of other performance indicators linked to other important transportation goals besides mobility as measured by travel speed. The application of a different performance indicator or some combination of performance indicators will require some way to weight the indicators according to importance. Prioritizing the state transportation policy goals would provide policy direction to guide this weighting. For example, using the suggested order of priority above, this also would result in focusing the use of gas tax revenues on completing the court-required physical improvements to remove fish migration barriers, preservation, maintenance and safety, then capacity expansion, in that order. This also would suggest use of gas tax revenue not just on physical safety infrastructure, but also significant funds toward safety programming, such as social marketing for behavioral change. What proportion of crashes was due to poor highway design and what proportion was due to driver fault? Highway design is sophisticated, as it incorporates human factors, so the proportion of crashes due to driver fault might not be insignificant. For example, for areas with high incidence of crashes, an awareness campaign, lowering the posted speed limit and better enforcement might be just as or more effective than design changes.

A prioritization of the state transportation policy goals begins to move the process away from the identification of locational spot deficiencies. At first blush, the identification of spot deficiencies to provide incremental improvements would seem to make sense, considering funding constraints. However, strategic capacity improvements tend to be reactive rather than strategic.

RECOMMENDATION WSTC-4: The HSP should be guided by other statewide targets, such as reducing annual per capita vehicle miles traveled (VMT) by 18 percent by 2020, increasing use of transportation alternatives for commute trips to 40 percent by 2019, reducing greenhouse gas emissions in the state to 1990 levels by 2020, and local government Commute Trip Reduction (CTR) performance goals and targets.

A strong public transit system provides an essential transportation choice. The SR 520 corridor study recognized the need for local partnerships to carry out transit service provision, land use planning, and other activities, while allowing WSDOT to focus upon what the agency ***can*** do, within its constitutional limitations.

RECOMMENDATION WSTC-5: WSDOT should explore all avenues to operate the state highway system in a way that makes alternative transportation choices competitive, giving greater time advantage to transit and other high occupancy vehicles (HOV).

These actions also should be considered in corridor planning. For example, WSDOT utilization data show many park and ride lots are operating at capacity. WSDOT can expand existing park and ride lots, develop new park and ride facilities in strategic locations, and provide incentives to vanpoolers to meet at park and ride locations that still have plenty of remaining capacity.

Address WSDOT's Limited Scope of Activity

WSDOT is limited by the Washington State constitutional Amendment 18 prohibiting the use of gas tax revenue for anything other than a highway purpose. A later state Supreme Court interpretation of the amendment excluded use of the gas tax revenue for public transit service. According to a recent report from Transportation for America, Washington is one of 23 states that prohibit use of gas tax revenue for transit. Some states are reconsidering that prohibition based on public request for more transit, bicycle and pedestrian improvements. http://t4america.org/wp-content/uploads/2016/01/12-State-Policies-for-2016.pdf

RECOMMENDATION WSTC-6: WSDOT should ask the Governor to revisit the limited use of gas tax revenue, as some other states are now doing.

Public Transportation Division Should Increase Engagement with the Washington State Transportation Commission

- Provide more presentations that explain the concepts of transportation demand management (TDM). Have a presence at every WSTC regularly scheduled meeting.
- Explain how the Interstate still has unused capacity and how TDM strategies direct travelers to use existing capacity of the existing system without having to fund costly expansions.
- Revise Transportation 101 to include a user-based perspective: how travelers experience the system. Communicate the personal stories of how TDM has helped travelers.
- Start a Vanpool Riders Opinion Group (VROG).
- Participate in the update of VOWS survey.
- Provide recommendations to the Governor's Office of well-informed citizens to serve on the WSTC.

RECOMMENDATION WSTC-7: WSDOT should provide more regular presentations to the WSTC that explain the concepts of TDM.

The Public Transportation Division should provide regular presentations about TDM to the WSTC so that the WSTC has a more in-depth understanding of the role of TDM and its potential. The "Transportation 101" presentation should be updated to include more about TDM. The current Transportation 101 provides a macro-level view of transportation, such as total freight tonnage transported. A presentation update also would tell the transportation story from a travel demand perspective and from a traveler's perspective. It would expand the definition of highway system capacity toward a TDM perspective to include passenger capacity and capacity by time of day. Since the top priority of the current WTP 2030 is to maintain capacity of the existing system, and not expand capacity of the system, discuss this from a TDM perspective, e.g., maintain HOV capacity or person throughput. Inform the public that they can apply to serve on the WSTC.

There is a Ferry Riders Opinion Group (FROG). There should also be a Vanpool Riders Opinion Group (VROG) to increase awareness by the WSTC and put the value of vanpooling front and center to the WSTC.

The statewide *Voice of Washington Survey (*VOWS*)* gauges public opinion about transportation issues. The previous one concentrated on questions pertaining to willingness to pay for transportation improvements from various sources. What questions are asked and the way the questions are worded affects what feedback is received. For example, Q6 asks participants how they would rate the relative

importance of five transportation objectives, including expanding travel options, improving safety, maintaining the system, increasing capacity and protecting the environment. Increasing capacity is defined as "Improving the movement of goods and people through capacity upgrades like widening existing roads and building new roads and bridges to accommodate our growing population and connect remote communities." There is no option for participants to rate improving capacity through greater efficiencies, such as increasing passenger capacity and moving some trips outside the peak periods. WSDOT should ask if VOWS is asking the right questions from a TDM perspective. The Public Transportation Division staff should review the questions in the VOWS of citizens statewide.

The Public Transportation Division and the CTR Board should encourage people who are well-informed in TDM, to serve on the WSTC. The Public Transportation Division and the CTR Board should provide applicant recommendations to the Governor's office.

Standards for Peak Hour of Motor Vehicle Travel Demand may be Too High

The Draft WSPTP, October 2015, identifies the issue of routine traffic congestion. Traffic congestion is at the heart of WSDOT discussion regarding mobility and whether to increase capacity. On state roadway segments where the level of service is measured by the volume to capacity (v/c) ratio and the standard is higher than LOS E, there is the expectation of higher travel speeds during the peak hour than is necessary to maintain maximum passenger throughput. In the delivery of the predictable movement of goods and people, as required by the state transportation policy goal, traffic congestion caused by higher volumes of commuters is routine, easy to anticipate and, in a word, reliable. Travelers can plan accordingly. Certainly non-routine traffic congestion, such as that caused by traffic collisions or special events, should be addressed with incident reduction strategies and special event planning. Building capacity to satisfy level of service (LOS) higher than LOS E creates even more unused capacity during non-peak hours of the day and may be inconsistent with least cost planning.

RECOMMENDATION WSTC-8: WSDOT should continue discussion on the development of WSDOT policy that revisits level of service (LOS) standards to determine if such standards, based upon volume to capacity, are reasonable, given WSDOT's budgetary and revenue-generating constraints. This review should reflect the results of a prioritization of state transportation policy goals.

RECOMMENDATION WSTC-9: Where maximum passenger throughput is currently not achieved, use traffic congestion as a tool to disincentivize single occupant vehicle (SOV) travel. Combined with policies, incentives, programs and services that make alternative travel modes competitive with SOV travel, this deliberate harnessing of traffic congestion can move corridor performance toward maximum passenger throughput.

RECOMMENDATION WSTC-10: WSDOT should consider the establishment of LOS standards for other performance indicators, as WSDOT begins to select and adopt other performance indicators for community access and other transportation service attributes.

RECOMMENDATION WSRC-11: WSDOT should develop designated limited access truck routes with the performance metric of travel speed and an associated maximum vehicle throughput standard, for communities where movement of freight is highest priority.

2. Develop a Statewide TDM Policy

- Moving Washington should be embraced as more than an approach but as support for a Statewide TDM Policy that directs the use of TDM strategies in long range and short term plans and programs.
- Policy would recognize the temporary nature of traffic congestion and that congestion is characteristic of vibrant urban areas.
- At a time of financial austerity, shift the transportation planning focus from motorists to travelers, and from delay reduction to reliability improvement.
- Shift the primary activity of WSDOT in the most densely populated areas from builder of the system to managing the system and managing mobility.

Reverse the Burden of Proof

Standard problem-solving methodologies (i.e., Highway Capacity Manual) also are embedded with notions of the nature of a problem. As a result, the continued use of a particular methodology might limit the framing of the problem differently and so prevent the development of a new and effective solution. For example, the current decision making process for correcting deficiencies under least cost planning, based largely on vehicle speeds, not person throughput, jumps directly to the solution to build strategic capacity improvements, with the justification that TDM cannot prove its ability to restore segment-by-segment motor vehicle LOS. However, can the particular strategic physical capacity improvement demonstrate the system wide accomplishment of other goals (e.g., see statewide performance goals and targets below) such as decreasing SOV mode shift, decreasing greenhouse gas emissions, decreasing VMT, or moving vehicle trips out of the peak period of traffic congestion? Can it demonstrate this accomplishment at a lower cost than a TDM strategy?

Statewide performance goals and targets

Goal: Increase the use of transportation alternatives for commute trips among residents to 33 percent by 2015 (Governor's Results Washington). Correlate this goal if and when the Governor's office issues an update after 2015.

CTR Program Target: 40 percent use of transportation alternatives for commutes by 2019. 6 percentage point increase in jurisdiction's CTR program over their baseline.

Goal: Reduce the state's annual per capita vehicle miles traveled by 18 percent by 2020 (RCW 47.01.440 – state VMT goals).

CTR Program Target: 18 percent reduction of VMT for employees in jurisdiction's CTR program.

Goal: Reduce the state's greenhouse gas (GHG) emissions to 1990 levels by 2020 (RCW 70.235.020 – state GHG goals).

CTR Program Target: 18 percent daily GHG emissions reduction per employee (based on CTR VMT target).

Recommendation Regarding Goal Setting

The Corridor Capacity Report (CCR) October 2015 reports that WSDOT manages some Results Washington performance measures related to sustainable and efficient infrastructure, which fall within

the "prosperous economy" goal area. The Results Washington transportation performance measures related to system performance include alternative commute modes. One of WSDOT's goals is to increase the percentage of Washington's use of alternative commute methods to 29 percent by 2020, from 27.6 percent in 2014 of Washington workers age 16 years and older (carpool, vanpool, public transportation, walk, bike, taxi, motorcycle, telecommute).

RECOMMENDATION POL-1: WSDOT should identify and adopt some alternative transportation performance goals that are clearly meaningful to the general public from the individual traveler perspective.

What difference does it make in the life of a Washington citizen if use of alternative commute modes rises from 27.6 percent to 29 percent by 2020? A more meaningful goal for alternative commute modes is to deliver competitive transportation service by way of alternative commute modes. For example, in the WSDOT 2015 Corridor Capacity Report Appendix, comparative travel times for SOV, HOV and transit are illustrated by bar graphs for the major commute origin/destination pairs. Both the Home-to-Work and Work-To-Home commutes show travel times at posted speed, travel time at maximum throughput (approx. 51 mph), average travel time during peak conditions, and travel time required to ensure on-time arrival 95 percent of the time.

For example, a more meaningful alternative commute mode goal to Washington commuters would be that peak period transit reliable travel time will be consistently less than for SOV, for both Home-To-Work and for Work-To-Home.

Such a goal will also accomplish increasing alternative mode share. But the reframed goal makes clear the benefit to the user and it makes clear the task for WSDOT—to alter policy for use of lane capacity to favor transit and other HOV users.

Accomplishing this will first require some changes to the method of analysis and increased data collection, toward better understanding travel time for the entire trip. The notes under the bar graphs in the CCR indicate that "Transit travel times include off-highway travel such as exiting to stop at a transit center and may not be directly comparable to private auto times which only include highway travel." (CCR 2015 Appendix, p. 27)

RECOMMENDATION POL-2: WSDOT should prioritize modifications to the analysis to improve comparability between transit travel time and private auto travel times, and to collect data on HOV trip endpoints (see Corridor Capacity Handbook, p. 30), to improve comparability between SOV travel and HOV travel.

TDM Statewide Policy

With the prioritization of state transportation policy goals and an explicit definition of all travel markets served by WSDOT, this sets the stage for the articulation of a Statewide TDM Policy that jump starts the implementation of TDM programs with a concurrent program of data collection and documentation of impacts that builds a knowledge base of the impacts of TDM.

RECOMMENDATION POL-3: Establish a Statewide TDM Policy that states a recognition of the following existing conditions. These may be like "whereas" statements in a preamble.

1. Some degree of traffic congestion is an attribute of vibrant urban areas, which can be used as a tool to disincentivize SOV travel.
2. With potential future effect of autonomous vehicles and the diversification of ride hailing firms or transportation network companies into actual rideshare providers, such transformational changes increase the uncertainty in long term planning, and make quick TDM service implementation more desirable.
3. Predictability is the defining characteristic of mobility, per WA state law.
4. WSDOT infrastructure investment decision making has historically been directed by a small set of related transportation performance indicators. These include v/c ratio and maximum motor vehicle throughput.
5. Use of one screening performance metric for mobility runs the risk of overlooking other attributes of the transportation system where there may be other kinds of deficiencies.
6. Physical highway infrastructure expansion is expensive to design, build, maintain, and preserve. Other costs include environmental damage, greenhouse gas emissions, and social equity consequences that are difficult to fully quantify.
7. WSDOT's role is changing from highway builder to multimodal mobility manager, serving functions of policy maker, funder of competitive multimodal options, facilitator and partner, provider of technical support and provider of services.
8. The Moving Washington approach is understood to mean the concurrent application and staging of all three strategies: TDM, TSM, and strategic capacity improvements, and not the selection of just one that best improves v/c ratio on a highway segment.
9. In keeping with least cost planning, TDM programs, services, and incentives, and TSM traffic flow optimization strategies are implemented and exhausted first, before turning to strategic capacity improvements.
10. Current limitations of data and analysis methodology prevent fully measuring the impacts of TDM, especially by highway segment. However, lack of perfect data and methodology should not curtail implementation of TDM.
11. The motor vehicle trip reduction effects of TDM strategies improve level of service of all segments of a journey.
12. Provision of full support to incorporating TDM into WSDOT planning processes requires a commitment to transitioning WSDOT toward less reliance on gas tax revenues and more reliance on other funding sources.

RECOMMENDATION POL-4: Consider, in the development of a Statewide TDM Policy, the following policy issues relating to TDM, given the above existing conditions.

1. As some other states are now doing, consider asking the Governor to review the relevance of the 18th amendment to the state constitution, originally passed in 1944 and interpreted to exclude public transit in 1969.
2. Explore all avenues to operate the State Highway System in a way that makes transportation choices other than the single occupant vehicle (SOV) competitive, giving greater time advantage to transit and other HOVs.

3. Adopt a definition of TDM that recognizes use of packages of complementary TDM strategies, and to promote a common understanding among WSDOT departments about which strategies TDM includes.
4. Consider reviewing the definition of the 291 corridors in the State Highway System. Each corridor may function as a system of parallel streets.
5. Consider adopting the baseline screening performance metric and target of maximum passenger throughput for limited access facilities, and other level of service performance metrics, such as the transit/auto accessibility ratio, with their associated performance standards, to reflect the reality of a growing urban population, a prioritization of the state transportation policy goals, WSDOT resource constraints, and the application of least cost planning.
6. Consider alternative ways to screen for performance gaps, not only from a system perspective, but also from a user perspective, according to the entire traveler journey, by travel market, and by mode.
7. Develop designated limited access truck routes with the performance metric of travel speed and an associated maximum vehicle throughput standard, for communities where movement of freight is highest priority.
8. Select transportation system investments for inclusion in the Highway System Plan, based on their strong contribution to achieving three established statewide goals and targets: 1) reducing annual per capita VMT by 18 percent by 2020; 2) increasing use of transportation alternatives for commute trips to 40 percent by 2019; and 3) reducing greenhouse gas emissions in the state to 1990 levels by 2020; and to helping local governments achieve their CTR performance goals and targets.
9. Articulate other transportation goals that are meaningful from a traveler perspective, such as the goal that peak period transit reliable travel time will be consistently less than for SOV, for both Home-To-Work and for Work-To-Home commutes. Such a goal also will accomplish increasing alternative mode share. The reframed goal makes clear the benefit to the user and the task for WSDOT—to maintain policy for use of lane capacity to favor transit and other HOV users.
10. Develop a process for a local government to use to articulate the essential elements of a community corridor vision.
11. Provide statements that correct common misconceptions about TDM, such as the effect of latent demand, in WSDOT planning documents.
12. Focus highway tolling policy with the primary goal of shifting travel behavior (by time of day and mode), and with a goal of revenue generation to be secondary.
13. Provide ongoing stable permanent funding for CTR program implementation and related programs of the Public Transportation Division (PTD) to allow longer term TDM planning. All TDM implementation should include sufficient funding for programs of ongoing data collection, monitoring and evaluation, especially for the implementation of corridor master plans.
14. Adjust use of benefit/cost ratios to reflect least cost planning. Under least cost planning, it is the "good enough" benefit for the least cost.
15. Provide visualizations of the effects of TDM strategies in plans to illustrate existing services and programs, as well as the impact of TDM services, programs and incentives.
16. Develop, apply and report on economic performance indicators measuring the result of better travel time experienced by transit and other HOVs, to include commuter travel cost savings, increased sales tax revenues, and the direct and indirect job creation impacts from increased transit and TDM services.
17. Increase regular reporting of progress on the success of public transit and TDM to several audiences, including transportation policy makers, the Legislature, the Washington State

Transportation Commission, the media, those involved in implementing work site CTR programs, and the general public. Success reported would be from both a system perspective and a user perspective.

Various actions would follow from the adoption of a Statewide TDM Policy, such as a reevaluation of the most important performance indicators upon which transportation investment decisions are based, and the funding of improved analysis and data collection programs that lead to better transportation system predictability and competitive multimodal travel choices.

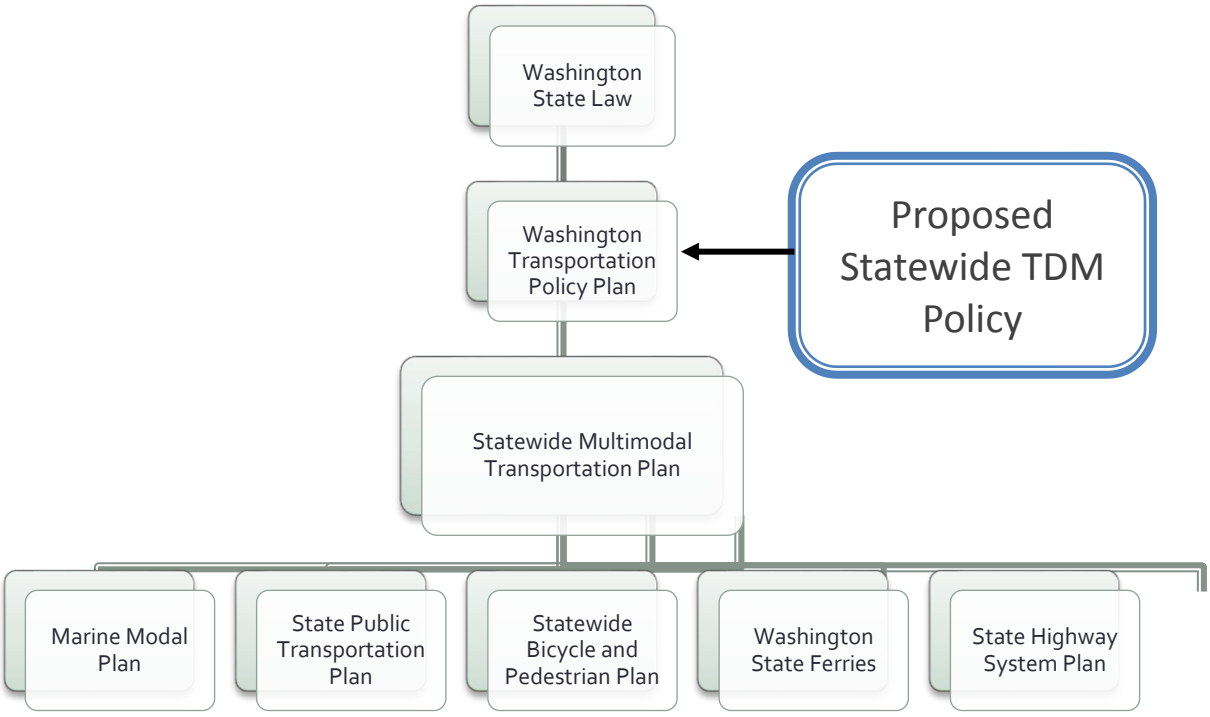

Figure 2 - A Proposed Statewide TDM Policy Should be part of the WTP

3. Statewide Multi-Modal Transportation Planning

Development of a Multi-Modal Statewide Model

Per Executive Order 14-04, "The Department of Transportation will develop, adopt, and implement the multimodal, federally-compliant, long-range statewide transportation plan with a renewed focus on transportation strategies to increase efficiency and reduce both costs and greenhouse gas emissions. The plan must explore alternative revenue sources to fund our transportation system, including vehicle-miles-traveled fees, system-wide tolling, demand-management and trip-reduction strategies, and other reforms such as least-cost planning, transit-oriented land use, freight-corridor development, prioritized-project selection, and similar innovative tools. This new focus will be developed based on scenario analyses of how investments in the transportation system move our state in the direction of a multimodal, coordinated, cost-effective, safe, and low-carbon transportation system. In developing the plan, the Department shall utilize a multi-modal statewide model that allows for analysis of economic benefits, vehicle miles traveled, health, greenhouse gas emissions, and a least-cost planning methodology in order to develop outcomes to be achieved at five, ten, and twenty years from the plan's adoption date. The Department shall develop the transportation model to reflect the current local, state, and national trend showing a decrease in driving, and to evaluate how actions will contribute to achieving the state's enacted limits for greenhouse gas emission reductions."

RECOMMENDATION SMTP-1: Along these same lines, the multi-modal statewide model also should reflect the achievement of the CTR State Program Performance Goals and Targets.

Because WSDOT is serious about incorporating TDM into statewide planning, then future conditions to be modeled should assume achievement of performance goals and targets. This achievement is the result of consistent and sufficient investment in alternative transportation infrastructure, services and incentives during the planning period, to achieve the shift. Alternatively, assuming that TDM will only ever remove two- to five-percent of trips then requires the response that TSM and physical capacity improvements to serve the remaining motor vehicle trips must be justified. However, building physical capacity removes funding from being invested in alternative transportation services, programs and incentives, and eliminates the reason for travelers to be motivated to seek transportation alternatives.

The current key LOS indicators and standards do not reflect or support the development of a "…multimodal, coordinated, cost-effective, safe, and low-carbon transportation system."

RECOMMENDATION SMTP-2: Transportation level of service indicators should be redefined as features describing transportation service provided to HOV passengers, pedestrians, bicyclists, and "tele-travelers".

Integrated Multi-Modal Plan

An Integrated Multi-Modal Plan should prioritize improvements that:

- **Aim to "equalize" quality of service among modes, so that all modes operate well by themselves and no one mode is greatly more developed than the other modes.**
- **Identify and prioritize connections (programs, services, physical improvements) between modes that improve the level of service of both modes for the completion of a trip.**

Because different modes have different funding sources, analyses for determining priority investments must overcome temptation to build an improvement simply because the funding opportunity is available. Funding allocation across modes should follow a process that incentivizes and rewards progress toward goals common to all modes and toward modal integration for overall transportation system development.

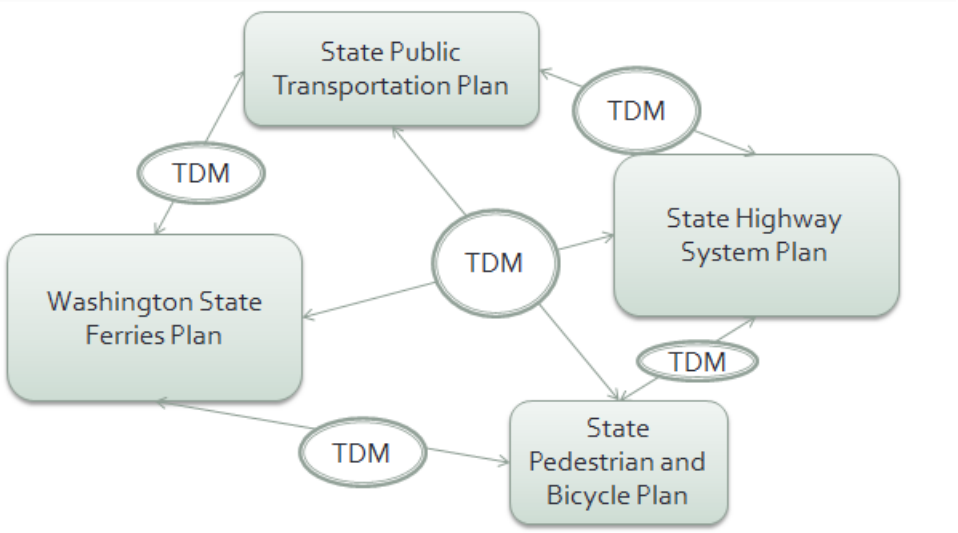

Figure 3 - TDM Services and Incentives Could Provide Linkages among Statewide Modal Plans

The Statewide Multi-Modal Transportation Plan needs Inter-Modal Linkages

- Consider developing guidance for connecting modes of the Statewide Multi-Modal Transportation Plan that identifies common transportation objectives among and between modes.
- Guidance would describe how the modes currently connect, and describe how connectivity will be improved through TDM services, incentives and infrastructure provided through to the planning horizon.
- This Guidance would be incorporated into each long range modal plan, including the HSP.
- Guidance would describe how ferry service and unused highway capacity will be more efficiently used through TDM strategies.
- Guidance would contain a 20-year Statewide TDM Program Funding Strategy for the proposals above. The funding proposal also would restore and enhance GTEC funding, Regional Mobility Grant Program funding, and the Trip Reduction Performance Program that is updated to target identified trips of concern.

Ferries and highways are state-owned facilities and both suffer uneven demand on capacity. TDM strategies provide the connection for ferry service and highways with facilities of state interest that are alternative modes (public transit, walking/bicycling) and that could potentially alleviate peak period demand.

The current 2009 Washington State Ferries Modal Plan does this to some degree, with programs described that integrate carpools/vanpools with preferential loading and unloading.

The state CTR Plan 2015-2019 articulates statewide strategies to leverage the goals set by Results WSDOT for modal integration (better interconnectivity of all transportation modes) and environmental stewardship (improving the energy efficiency of transportation systems). The State CTR Plan 2015-2019 states that the CTR program directly supports agency and statewide goals.

Institutional Silos May Thwart Multi-Modal Planning

The Statewide Multi-Modal Transportation Plan is compartmentalized into two components, state-owned and state-interest. The term "owned" implies physical property, or capital infrastructure. The State-owned component includes the Ferry Long Range Strategic Plan and the Highway System Plan.

The division between state-owned and state-interest is reinforced by administrative separation (Community & Economic Development and Financial Administration), and the institutional division between constructing physical capital improvements and implementing programs and services might discourage multimodal and intermodal network planning.

According to input received during an extensive interview process, there is a sense among WSDOT staff that WSDOT operates in "silos". The WSDOT organization chart (07/01/14) is also drawn along modal lines that might thwart multimodal integration. The six departments representing state-owned facilities are those that oversee financial administration, toll roads, ferries, megaprojects, highway construction, maintenance, operations and environmental planning, and the regional offices. The financial administration department contains the CPDM Office that develops the HSP.

All programs of "state-interest" are under the Assistant Secretary for Community & Economic Development. This includes such diverse modes as aviation, freight systems, public transportation, state rail and marine ports, and local programs that administer grants to facilities owned by local governments. Various TDM functions, such as the CTR Program and the Vanpool Program, are located within the Public Transportation Division.

RECOMMENDATION SMTP-3: Develop the HSP and the biennial proposed budget as a collaborative process with those WSDOT departments that can provide guidance to the TDM programs and services portion of the HSP.

RECOMMENDATION SMTP-4: Create working groups composed of individuals from different modal departments that work together to anticipate and plan for the needs of particular travel user groups.

For example, a major focus of the WTP 2030 was the needs of an aging population. Recent Washington demographics show a growing older population in addition to changing travel behavior (reduced VMT) by Millennials. These groups might set the stage for a refinement of WSDOT organizational units that are less divided by mode.

4. Integrate the Commute Trip Reduction Program

The current CTR Program appears to be minimally connected to other elements of statewide planning, corridor planning, or construction traffic mitigation.

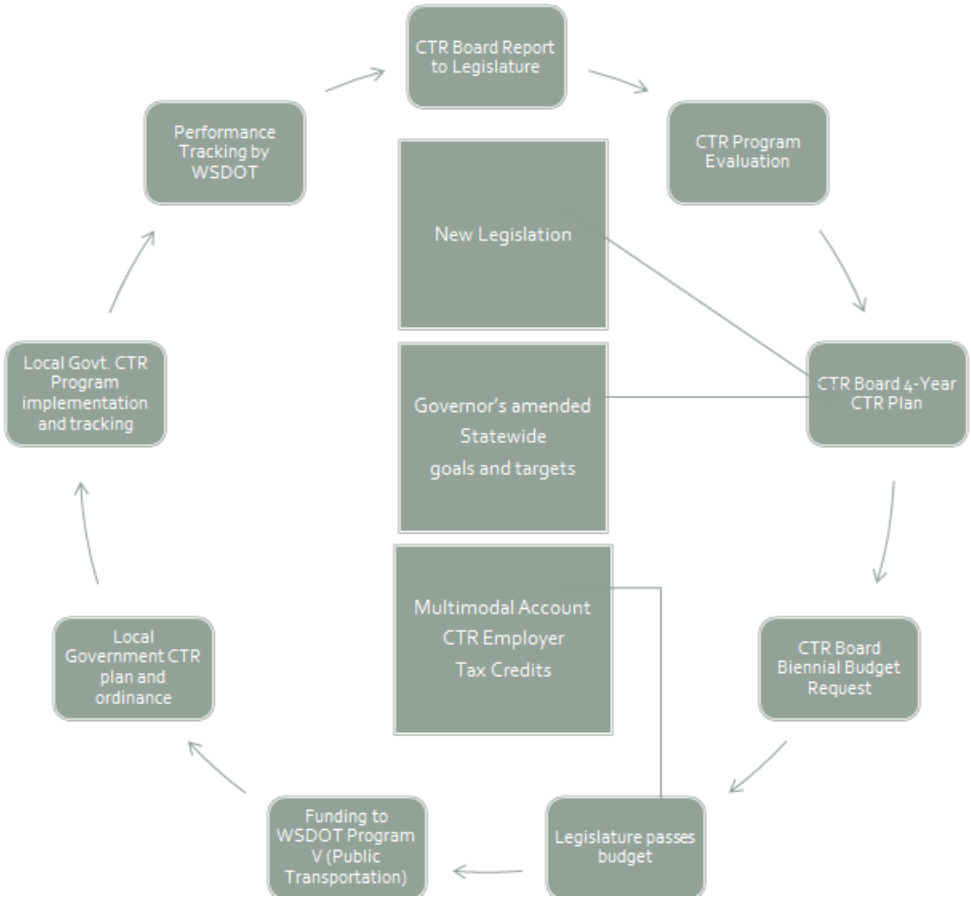

Figure 4 - The Current Commute Trip Reduction Program Planning Process

Position TDM within the Same Planning Time Frames as Other Planning Activities

RECOMMENDATION CTR-1: Develop a 20-year long range transportation demand management plan as a component of the current state-required CTR Plan, with the purpose of accomplishing the statewide goals of the WTP, including the Statewide TDM Policy.

The long range TDM Plan should be updated every two years and timed to be ready to submit a request to Programming for funding in the Biennial Budget Request. Plan contents would include the following.

- The existing base program would be developed from local CTR plans and regional plans, with the opportunity for long range visioning.
- All CTR intermodal linkages would be incorporated as part of other statewide modal plans (HSP, WSF, SPTP, Bike/Ped).

- A TDM component would be included in all corridor plans.
- Construction traffic work zone TDM Mitigation Plans would be included as a component of the Transportation Management Plan (TMP) for all work zones.
- Activities would be included to integrate the long range TDM Plan with statewide sustainability planning activities.
- A data collection and analysis program would be devised to fill in the gaps for calculating TDM impacts on the multiple scales of analysis listed above.

Base Program of Local CTR Plans and Regional Plan

The contents of this part of the plan are described within the State CTR Plan 2015-2019, as adopted by the State CTR Board in September 2014. This part of the plan includes program objectives, statewide and local jurisdiction performance goals and targets, statewide strategies, performance measures, and funding.

CTR Intermodal Linkages as Part of Statewide Modal Plans

The proposed 20-year long range TDM plan would describe opportunities for the development of TDM programs, services, and incentives to facilitate multimodal use, intermodal use, and integrated modal planning.

RECOMMENDATION CTR-2: The TDM long range plan would accomplish the following:

- **Align the CTR Program with the 20-year statewide modal plans, including SPTP, HSP, WSF, and Statewide Bicycle/Pedestrian Plan.**
- **Establish CTR Program investments and strategies to help accomplish long term mobility goals of modal plans.**
- **Communicate permanence, state commitment, and longevity of the CTR programs, services and incentives.**
- **Compile all integration components describing how the CTR Program supports each modal plan, into one document, to identify where there can be efficiencies and economies of scale.**

TDM Component to the Corridor Plan

A Corridor Plan is developed to propose long term mobility improvements to a state highway. A TDM Component would be developed and included in each Corridor Plan. These TDM Components would also be included and described in the 20-year CTR Plan for the purpose of compiling statewide TDM planning needs and to see where proposed TDM programs and services can be used for more than one corridor plan, as well as how those programs and services will relate to the Base Program, the CTR Intermodal Linkages, and TDM Mitigation plans for the same affected area.

Construction Traffic Work Zone TDM Mitigation Plan

Updates to the long range TDM plan should include the new or updated TDM Mitigation Plan that is incorporated into each Transportation Management Plan (TMP) for each highway construction project identified in the HSP. Specifically, these are elements of each TDM Mitigation Plan that can include campaigns specifically targeted for a particular work zone and also include engagement with those CTR employers that will be affected by the construction, to augment existing activities of those employers. For example, an employer could agree to offer special incentives to employees for agreeing to carpool, vanpool, ride the bus, walk, or bicycle temporarily during the construction project. Some of these

employees who use the alternative transportation option temporarily may also decide to use these commute options on a permanent basis. Campaigns could be targeted to encourage that desired commitment. Campaigns could be scheduled to coincide with the final phases of construction completion. If the CTR Program changes to include targeting all trip purposes, then key stakeholders beyond the original participating CTR employers (schools, subdivisions) can also be identified and included in the TDM Mitigation Plan.

Develop Visualization Aids to Describe TDM and Its Impacts

Visualization of transportation improvements in plans and maps is important to communicate internally, as well as with agency partners, elected officials and the public. Maps usually depict where capital improvements are to be made but TDM risks being forgotten because it relies less upon visible capital infrastructure.

RECOMMENDATION CTR-3: Include visual representations of TDM strategies in plans to illustrate existing services and programs, as well as the impact of services, programs and incentives.

For example, the CTR Program should have a map highlighting the location of participating CTR employers within corridors, with associated tables showing current aggregated corridor-wide CTR performance as well as performance targets and the anticipated impacts of those targets. The associated plan should describe how the performance targets will be achieved, such as objectives for some number of new vanpools and carpools, and some percentage increase in telecommuting and application of alternative work hours. The objectives should be described with a timeline and budget annually to continue CTR program support to achieve these changes within the plan horizon.

Background of CTR Program

The purpose of the CTR Program is to improve air quality, reduce traffic congestion, reduce petroleum consumption, and strengthen the economy. The CTR law, RCW 70.94.537, defines those areas that must participate in the CTR program as those cities and counties with urban growth areas containing a state highway segment exceeding 100 person hours of delay, as well as those counties and cities located in contiguous urban growth areas. However, WSDOT no longer produces the 100 person hours of delay analysis so the CTR Board uses the affected urban growth areas as identified in WAC 468.63.020(1)(a)(viii)(B) as those jurisdictions containing a population over 70,000 and having adopted a CTR ordinance before year 2000, and any contiguous urban growth areas.

CTR Program Focus

The CTR Board is charged by the Legislature to decide whether to change, continue, or terminate the CTR program. State law specifies the focus on employee commute trips. The CTR Board thinks that the CTR Program has been effective despite funding constraints and its very narrow focus upon large employers in urban areas along congested corridors (4% of household trips taken).

Planning Process

The CTR Board must create a State CTR Program Plan, to be updated every four years (RCW 70.94.537(3) and (5)). This State CTR Plan is based on local and regional plans. The CTR Board reports to the state Legislature every 2 years and submits funding requests for inclusion in the biennial budget. The CTR Board is a board of citizens appointed by the Governor. Any citizen can submit an application to serve on the CTR Board. CTR Board meetings are held each month at different locations throughout the state

and are open to the public. The CTR Board gets feedback from a Technical Advisory Group (TAG) and asks for comments from the public and from stakeholders.

Objectives

The CTR Board's objectives for the CTR program as listed on all CTR Board meeting agendas of the past year:

- **Support the principles of Moving Washington**
- **Strengthen and grow public-private partnerships**
- **Help meet state and local economic, environmental and community objectives**
- **Focus resources where they have the most impact**
- **Cultivate and reward local innovation and accountability**
- **Incentivize integration of transportation and land use policies, plans and decisions**
- **Keep existing successful TDM infrastructure relatively intact**
- **Maintain consistent, efficient measurement as much as possible**
- **Simplify requirements**
- **Learn from new approaches**

Performance Measures

The CTR Board has a Legislative Committee and a Performance Measurement Committee. Performance measurement is to determine whether investments are accomplishing the program purpose and how to improve the program and lower the cost. The choice of performance indicators and targets is provided in the WAC and not in statute. However, the law does specify that the performance indicators must address both cost effectiveness and benefits to the transportation system. The performance measures have been unchanged since the beginning of the program in 1991. These are the drive alone rate and vehicle miles of travel (VMT).

History

The original CTR law was passed in 1991. The CTR Program is a collaborative partnership between WSDOT, local governments, transit agencies, RTPOs and employers to provide transportation solutions and reduce SOV travel and VMT. Statewide, over 1,000 work sites participate in the CTR Program. Due to the 2006 CTR Efficiency Act, local governments must create CTR plans that establish goals for designated urban growth areas to reduce SOV and VMT from CTR work sites. Regional transportation planning organizations review and coordinate the CTR plans of local governments in their region.

CTR Efficiency Act

The CTR Efficiency Act established a planning framework to integrate CTR with local, regional, and state transportation and land use planning and investments. Due to the Efficiency Act, WSDOT established administrative rules, planning guidelines, and a model CTR plan. Regional transportation planning organizations review and coordinate local government CTR plans in each region. The Trip Reduction Performance Program (TRPP), begun in 2003, and later the GTECs were new ways to achieve trip reduction more efficiently as well as through engaging partnerships. The PTD reported that by 2009, CTR worksites had reduced statewide weekday morning trips by 30,000, cutting delay by eight percent in the Central Puget Sound Region.

Growth and Transportation Efficiency Centers (GTEC)

The Efficiency Act in 2006 also enabled cities and counties to establish Growth and Transportation Efficiency Centers (GTEC) in areas of greatest employment intensity and residential density. The purpose of the GTEC concept is to more efficiently focus CTR program resources where they are most needed to gain the best results. A GTEC is a defined boundary of dense mixed development of major employers, residential areas, and businesses within an established urban growth area. The goal of the GTEC is to provide greater access to employment and residential areas while at the same time reducing the drive alone rate on the state highway system during peak periods. GTECs are intended to more closely integrate local government land use and transportation planning and work more closely with local transit agencies. GTECs are intended to encourage land use changes, develop a new level of engagement through partnerships and align the partners.

The 2007-2009 State budget allowed for $2.4 million in technical assistance and financial incentives for GTECs to improve transportation efficiency performance. Fourteen cities statewide were given $10,000 by WSDOT to develop GTEC plans in 2007. Of these 14, seven were selected for further funding. WSDOT entered into agreements with the seven cities to develop their GTECs and provided technical support for the measurement of baseline conditions and progress.

The GTECs extended their partnerships to include smaller employers, residents and students. GTECs extended internal partnerships to planning and public works departments within the host jurisdiction. GTECs connected transportation goals to job growth and economic development.

Pilot Projects

In 2012, the CTR Board decided to develop a pilot program of Alternate Plans that will operate through 2017. The purpose of piloting Alternate Plans is to step away from the traditional regulation-oriented CTR approach and allow local government and business initiatives to develop effective programs to reduce trips. The results of the pilot Alternate Plans will help inform decisions regarding recommendations to changes to the CTR Program. The program has allowed consortia of businesses to apply to develop their own Alternate Plan to more effectively achieve CTR goals. The CTR Board funded six pilot Alternate Plans from Seattle, Redmond, Tukwila, Tacoma, Snohomish County and Yakima County. These localities were selected because their applications addressed one of three criteria: 1) greater reduction in drive alone rate (DAR) and VMT than the traditional CTR Plan format, 2) greater efficiency in CTR Plan administration while not reducing performance, and 3) greater local adaptation to local conditions. These Alternate Plans are to test different purposes (reduce all trips), different performance measurement methods (technology-based), and different structures (community-based, corridor based, industry-based). Other identified program structures include the original CTR base program, GTEC (defined compact mixed use urban centers), and TRPP (trips any time of day). In May 2014, the CTR Board received first-year reports of program progress of the Alternate Plans implementation from four host cities and one county. The Alternate Plans differ in various ways. The Redmond Alternate Plan is described in detail below. In June 2014, the CTR Board voted to approve the continuation of all of the pilot Alternate Plans.

Example of a Pilot Alternate Plan: City of Redmond

The City of Redmond's CTR Alternate Plan emphasized business to business engagement instead of regulator to business interaction in achieving CTR goals. It is to promote the City's two urban centers and encourage efficient use of existing and planned infrastructure. The City of Redmond used the state CTR grant funds to pay for a trip cardreader system and incentives. The Greater Redmond

Transportation Management Association (GRTMA) would administer the program and report to the City. The City of Redmond Alternate Plan officially started June 30, 2014.

Members of the Greater Redmond TMA said that they think the CTR biannual survey does not accurately reflect the level of effort of their members to reduce SOV travel. They propose using a "low tech" data collection method, called the RideTrack cardreader, that requires a phone line and a power outlet (although many companies now have VoIP, an analog phone line is required for the reader). A swipe card tracks daily trips on a cardreader located at the entrances and exits to work site buildings. Redmond Alternate Plan implementers describe this method as simple, accurate, secure, and inexpensive. They anticipate that collecting more accurate information would help them know where to place their outreach efforts.

Redmond's Commute Management System is called R-TRIP (Redmond Trip Resource & Incentive Program www.gortrip.com). Participant commuters who use alternative transportation can earn a first-time rider free 3-month One Regional Card for All (ORCA) bus pass for riding transit. In 2009, seven regional transportation agencies partnered to develop the ORCA that uses smart card technology to allow commuters to pay for their transit fare using E-Purse or a monthly pass. The ORCA allows users to track different fares and transfers automatically.

Participant commuters who use alternative transportation also can earn an R-TRIP $50 Commute Incentive after logging 50 alternative commute trips, and participate in monthly drawings for prizes. Vanpoolers can earn $50/month for six months vanpool subsidy, a new driver bonus of $100, and a $35 referral bonus by recruiting a new vanpooler. Walkers can earn a $50 incentive. R-TRIP commuters set up their personal on-line commute account with Trip Tracker to record their commutes on their personal Commute Calendar. The online Trip Tracker aggregates results of all recorded alternative commutes and calculates GHG emissions reduced, fuel saved, trips eliminated, and money saved.

Employers can apply for grants from the City of Redmond to start a new program and receive tax credits for Business and Occupational Tax (B&O) and Public Utility Tax (PUT). Employers can apply for a Redmond Transportation Innovation Grant or a Paid Parking Demonstration Grant.

In addition to their CTR law in the Redmond Municipal Code, the City also has a Transportation Management Program (TMP) that is part of the zoning code and which applies a condition to new commercial development. Property owners must assign a transportation coordinator, market and promote the program, provide preferential parking for carpoolers and vanpoolers, provide Transportation Information Centers, be a member of the TMA, and provide at least one financial incentive. The TMP contains a performance goal, survey and reporting requirements.

2013 Report to the Legislature, WA State CTR Board

The 2013 Report to the Legislature from the WA State CTR Board, issued in early 2014, provided concise statistics about the efficiency performance of high occupancy vehicles, HOV lanes, the numbers of bicyclist and pedestrian commuters counted in the state, and VMT eliminated through telecommuting. The Report pointed out that 84 percent of an individual's trips are not commute trips and that the CTR Program, by virtue of its target of employment sites with 100 or more employees, addresses just four percent of all trips. The CTR Board's 2013 Report also presented a proposal for the CTR Program going forward. It proposed that the CTR program expand its focus to include all trip purposes. This proposal raised the funding request from $6.2 million of the existing biennium, to $20 million for the next biennium.

The Report proposed that the CTR program provide a new grant program for local governments to devise and implement Community Trip Reduction Plans. These would be locally designed and customized to address the sources of congestion specific to each community, not just large employment sites but also potentially corridors, residential areas, and urban centers. This approach is anticipated to expand public private partnerships.

Under this proposal, the role of the CTR Board would be to develop standards, criteria and processes in coordination with community stakeholders. The CTR Board would formalize the new plan in the WAC. The new CTR Program would update program data methodology, and extend and amend the CTR Tax Credit. With the proposed $20 million, the CTR Program staff would not only administer the current basic large employment-site based CTR program, but also administer the new grant program to local governments to develop innovative Community Trip Reduction Plans, conduct a statewide outreach campaign on energy-efficient and active transportation choices, and provide a new employer telework information and assistance program.

The CTR Board also proposed, for its current CTR Program, to update the methodology, as required by state law, for determining which jurisdictions are affected by the CTR law. Presently, applicability depends upon exceeding a threshold of 100 person-hours of delay. The CTR Board has proposed a broader set of criteria, including congestion, air quality, employment density, and population density. The CTR Board also proposed a four-year extension on the employer tax credit program. Employers who participate in this program provide financial incentives to their employees to rideshare, use public transportation, use car sharing services, or commute by walking and bicycling. These participating employers are then eligible for a CTR tax credit against business and occupation or public utility taxes. This program also engages employers who are not required to participate in the CTR program. The proposal would raise the limit of the credit from $100,000/year to $200,000/year per employer but eliminate the ability of employers to defer use of the tax credit to future years.

For the 2013 legislative session, the CTR Board recommended changes to CTR law to expand trip reduction to all trips, update the program methodology and extend and amend the CTR tax credit. The tax credit was extended for one year.

Review and Proposed Changes to the Program by the CTR Board

The CTR Board introduced new legislation in the 2014 Supplementary Session to redefine affected jurisdictions as those that meet three out of four criteria of air quality, congestion, employment density and population density. This did not pass but the CTR Board wants to continue to advocate for this change. The CTR tax credit for employers who provide alternative transportation incentives to their employees, created by RCW 82.70, was renewed until June 30, 2015 by the state legislature (Engrossed Substitute Senate Bill (ESSB) 6001. Although the statewide cap was reduced to $1.5 million for applications filed in January 2014 and 2015.

During 2014, the CTR Board revisited the purpose and structure of the CTR Program to propose changes to the CTR program and determine its request for funding. There is a desire to move the CTR program from one that is centralized and run by the State, to one that is decentralized and highlights local innovation for a customized local government approach that addresses the unique issues of each community. The CTR Board wants to make the program more flexible and responsive to changing conditions. The CTR Board has determined that the role of the State should be to determine at the county level, with local and regional input, where to implement the program based on congestion, set general parameters, and set guidelines and standards.

The CTR Board considered developing a competitive grant program, featuring innovation, and performance measurement tied to local objectives and goals. The CTR reviewed the 6 a.m. to 9 a.m. definition of peak period, and considered using goals to further reduce DAR 5 percent and VMT 7.5 percent for the 2015-2019 plan period, based upon the trend set from the last three survey cycles. The CTR Board's consideration of the recommended goals for 2015-2019 recognized that they do not factor in employment growth. The Board also considered whether to propose removing reporting requirements and whether to allow local governments to use a GTEC in place of a CTR plan.

The CTR Board discussed program options and associated costs as the basis for funding requests. They reviewed assessments of the CTR program that they collected from 17 local governments and regions. The CTR Board reviewed the criteria for determining the CTR program participation threshold, such as the 100 person hours of delay threshold, and whether other factors should be considered, such as energy and air quality. They discussed how to give local CTR program implementers the ability and support to build upon the existing programs using corridors, urban centers, employers with 50+ employees, and other travelers, such as students and residents.

The CTR Board discussed performance measurement and data issues. They discussed how to better and more simply measure program results with less money (i.e., survey changes? Reporting changes?). They developed a matrix of the many customer groups served by the CTR program to identify for what purpose they are using the data and what they are trying to accomplish and what data sets they need. They identified 13 distinct customer groups. The CTR Board also had results of a survey of Employee Transportation Coordinators (ETC) regarding the CTR survey. Two-thirds of the ETCs thought that the CTR survey should be kept, but changed. For example, the ETCs believe the 70 percent response rate requirement is too high. The ETCs identified other types of data and ways to collect data that might be useful.

State CTR Plan 2015-2019

In September 2014, the CTR Board adopted the State Commute Trip Reduction Plan for the period 2015-2019, with objectives to make the program more flexible and engaging the community to expand the focus to not just commute trips but all trip types. This would result in community-designed and determined trip reduction plans. As a result, performance measures would be changed to match the all-trips focus. Objectives also include integrating planning to support multimodal transportation choices, and leveraging the Governor's and WSDOT's policy direction. The Plan includes support for extending and increasing the CTR employer tax credit program, developing and implementing a new community all-trips program through competitive grants, and continuing the Board's ongoing pilot of alternative local government CTR plans that are customized by the community, by plan types, goals and strategies.

The CTR Board voted to provide local governments with the option to use one of the three local performance goals and targets options, listed below, provided that the local performance makes a meaningful contribution to all three state goals to reduce emissions, fuel consumption and traffic congestion.

1. State goals, state targets
2. State goals, locally tailored targets
3. Locally defined goals and targets

Credibility of CTR Survey Data

Based upon a series of interviews conducted for this study, the Strategic Assessment Office (SAO) and Capital Program Development and Management (CPDM) expressed caution about the reliability of CTR survey data for various reasons.

- Lack of trust in self-reported data in general.
- For before/after commute surveys with a time lag of two years in between them, it is not possible to know whether they are measuring travel behavior of the same group of people.
- Causality can be difficult to prove. Measured changes could be due to the TDM program or some other condition (e.g., price of gas, unemployment).
- One cannot pinpoint the effect of some portion of the CTR program upon the performance of a particular roadway segment because commuters' travel routes are not known.
- The biggest gains in SOV reduction are the first few years, and then the rate of reduction falls off. Level of effort of maintaining accomplishments needs to be considered.

RECOMMENDATION CTR-4: Conduct vehicle and person trip counts at a sample of CTR sites to establish "ground truth" of vehicle trips generated to compare to CTR survey results.

RECOMMENDATION CTR-5: Adopt a regional public transportation GIS architecture and data model to automatically retrieve and update General Transit Feed Specification (GTFS)-based data sets to have a single location for data from multiple transit agencies, which includes performance data (boardings/alightings per bus stop).

RECOMMENDATION CTR-6: Augment the CTR data collection program, by establishing self-generated-codes as part of the CTR survey process to track changes in behavior at the individual level while preserving anonymity.

The use of multiple self-generated codes allow commute behavior data to be matched over successive CTR survey cycles by using attributes that are unlikely to change (e.g., sex, month of birth, middle initial, first three letters of mascot of last attended high school, etc.) to create a unique code for each respondent.

These data should help determine correlation of strategies to behavior changes. Items could include questions about first and second choice commute routes, to identify associations between TDM program efforts and its impact upon a particular highway segment. Other tracking options should be developed and tested (e.g., opt-in tracking of mobile devices) to replicate paths and document changes in behaviors outside of the commute trip (e.g., a U-Pass may encourage transit use for non-work purposes as well as for work.)

RECOMMENDATION CTR-7: Make sure the performance metrics are understood by those whose efforts implement policies to support mode shift.

For example, at a work site, increasing average vehicle ridership (AVR) by 10 percent from 1.10 to 1.21 does not translate well into what sort of action needs to be taken at the work site. However, vehicles driven to the work site per 100 employees is easier to understand. For example, the inverse of AVR (multiplied by 100) is the number of motor vehicles driven to the work site per 100 employees. Increasing AVR from 1.10 to 1.21 is the same thing as measuring about 91 motor vehicles used per 100 employees and decreasing that to about 83 motor vehicles used per 100 employees. The work site

employee transportation coordinator will more easily understand that the goal is to remove eight motor vehicles per 100 employees. Goals expressed in terms of reducing this number are more easily understood than goals to change in AVR by 10 percent.

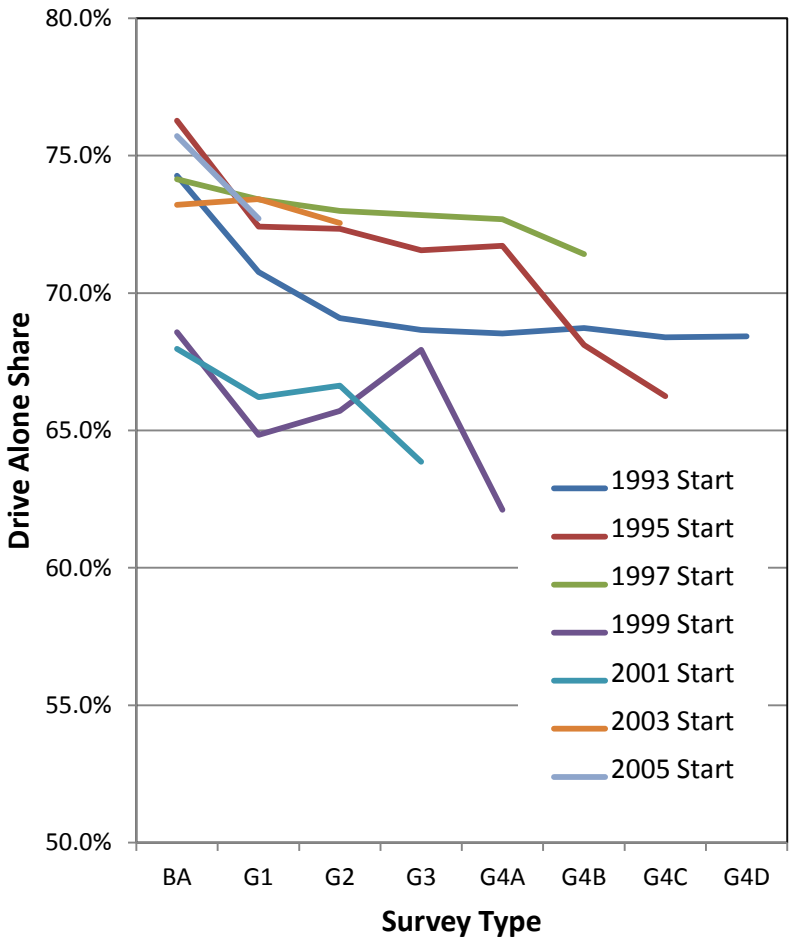

Figure 5 - Drive Alone Mode Share Change by Program Start Year

National Center for Transit Research. 2010. "Developing a Technique that Predicts the Impacts of TDM on a Transportation System." FDOT BDK85 WO 977-05. p. 21.

TDM Cost and Benefit Data are Limited

Limited cost data for TDM strategies of the CTR Program are in the form of the total biennial funding amounts for TDM programs compared with measured results. Results are usually given in terms of travel behavior changes as measured across the region and not at the level of a highway corridor.

RECOMMENDATION CTR-8: As WSDOT begins to accumulate more experience including multimodal solutions and TDM as part of corridor planning, such as implementing recommendations of the SR 520 Multi-modal Corridor Planning Study, the implementation should include funding for the

development of a program of data collection and analysis to measure TDM program results along the corridor.

Data and Analysis for Problem Definition and Need Statement

The CTR Program should play a role in corridor planning, as described above under TDM Component to the Corridor Plan. As part of the problem definition, a Contributing Factors Analysis (CFA) is conducted. In the CFA process, each potential contributing factor is evaluated based upon data analysis and direct observation. At this stage, it is essential for the PTD staff to have available data and observations that describe any potential contributing factors that relate to traveler mobility from a public transit and TDM perspective. Otherwise the potential contributing factor might be dropped from the list as the CFA process proceeds. Initially, PTD staff may not have the data.

RECOMMENDATION CTR-9: Participation in the problem definition process will help PTD staff formulate a list of data needs and analysis needs related to issues they may know anecdotally, and which should be undertaken on a broader scale, going forward.

The CTR Program already has a rich dataset representing the participation and effects of CTR strategies undertaken for commute trips at large work sites in designated urban areas. This is a good start, and can be expanded from there, if the PTD wants to address other trip purposes for TDM programs targeting neighborhoods, downtown areas, or other subsets of communities.

Threshold performance metrics are triggers for evaluation. They are used in the WSDOT network screening process during priority programming. These are used to identify performance gaps for further investigation. When a threshold performance metric is triggered, then a planning phase or scoping phase is begun to evaluate the location. This location evaluation information is provided to project development staff in the form of a planning document or scoping instructions.

RECOMMENDATION CTR-10: TDM staff should consider application of an alternative screening metric that takes TDM into account.

For example, instead of travel speed at 70 percent posted speed limit, consider travel time on HOV lanes compared to SOV lanes. For optimizing success of transit and demand management, travel time for HOV lanes and transit should be less than for the SOV lane, especially for reliability at 95th percentile.

RECOMMENDATION CTR-11: Include the results of the CTR program in the CCR.

This is for the purpose of highlighting the CTR contribution to congestion reduction, keeping TDM visible as part of the planning process, and as a reminder to consider TDM strategies.

Presently, an entire quarterly report is devoted to reporting upon highway capacity. This reinforces capacity as the most important attribute of transportation. As other performance indicators are developed, it is important to report upon progress to the legislature and the general public, in the achievement of other types of transportation system performance, especially from the traveler perspective.

RECOMMENDATION CTR-12: Expand focus beyond Drive Alone Rate in CTR program results by reporting on changes in the increase in frequency of use of alternative transportation, time of the trip,

and the success in transitioning travelers from one HOV mode to another mode of even higher occupancy (e.g., carpool to vanpool).

Shifting trips to alternate routes or alternate times of the day can affect traffic flow without the need to change modes. It also may be easier for three two-person carpools to join together into one vanpool than to convince two SOV travelers to share the ride.

5. Regulate Use of the Interstate

Most discussion and concern regarding mobility seemed to focus upon the functioning of the Interstate System. The Interstate is strongly associated with economic growth and development, primarily serving regional trips. However, some local trips are made on the Interstate system, affecting function especially during the peak periods. Some portions of the Interstate presently have HOV or HOT lanes.

RECOMMENDATION INT-1: Introduce regulation to disincentivize local trip making on the Interstate, through the introduction of tolls and time preference/penalty to give priority to regional trips, HOV trips, and freight.

Table 1 - WSDOT could regulate use of the Interstate to give priority to selected travel markets

Travel choices:	Description	Remarks	Toll rate increase or decrease
Route Selection: Traveler chooses to drive on Interstate or other selected toll roads or congested highways of concern to WSDOT	Traveler both enters and exits Interstate within a defined urbanized area (intracity trip or shorter)	The shorter the trip the higher the toll, to penalize trips that could have been taken on local streets	↑
	Traveler passes through particular highway segment(s) with LOS deficiencies		↑
	Traveler passes through particular highway segment(s) undergoing construction		↑
	Where traveler's trip entrance, exit, or both entrance and exit is outside the defined urbanized area	Because Interstate is meant for interregional trips and this would define an interregional trip	Exempt from toll
	Vanpools and buses		Exempt
Time of day/day of week	Traveler chooses to travel during the peak period.	The closer to or within the peak period the traveler chooses to travel, the higher the toll. This could also target certain days, during special events. Span of peak period could also vary	↑
Mode	SOV	One person uses up the space of four travelers	↑
	2 or 3 more occupants in vehicle		↓
	Vanpools and buses		Exempt
Vehicle type	Low gas mileage		↑
	Economy cars and electric vehicles		↓
	Vanpools and buses		Exempt

The Interstate regulation concept could be focused on Interstate segments of concern and could be introduced with the implementation of a Washington State road usage charge, as reported to the Washington Senate and House Transportation Committees in January 2014. WSDOT could use its vast ITS infrastructure investment to implement a variable pricing program that influences demand and

builds on past successes in Washington with variable pricing. The concept might include continually recalculating the price of a trip on the Interstate based upon a combination of factors and roadway conditions. The toll could expand upon the existing HOV lane concept to also include time of day and vehicle type to capture cost of emissions. This concept could apply to both commuters and travelers with other trip purposes.

While the worksite focus of the CTR Program is an effective delivery method for transportation services and programs, this pricing approach could also support local plans such as the Puget Sound Regional Council (PSRC) TDM Action Plan objective to provide TDM services that also target non-commuter trips as well. As more travelers respond to price signals, demand for TDM programs, services and incentives will increase. The price signal could be amplified if travelers receive credit or additional services provided to travel in the preferred way, with funds generated from tolls paid by travelers who travel through congested areas during peak period by SOV.

This approach would eliminate the difficulty of trying to prove the impact of a CTR program on highway segment LOS, for purposes of project selection and funding. The CTR program could use surveys for collecting preference and perception data to improve services and incentives. This might reorient the CTR program as a service provider rather than a regulation implementer. This approach depends heavily on technology innovation, which is supported in the draft WTP 2035. TSM has historically been justified and funded heavily. The concept puts ITS investments to more rigorous use in managing demand.

6. Highway System Plan

Recommendations for the New 2013-2032 State Highway System Plan

- Mobility Policy Goal emphasis should be on system reliability.
- Contain a description of travel attributes of the customers that the highway serves, including passengers of cars, vans, buses.
- TDM strategies that are proposed by WSDOT Region planning offices and by the Public Transportation Division should have statements that describe how the TDM strategies address state priorities in investments, legislative policy goals and performance expectations, and the new WTP 2035.
- For each economic high priority corridor segment, the Public Transportation Planning Division should participate in the articulation of WSDOT's vision for the corridor's role and purpose.
- For each Corridor Summary Report, there should be statements about how specific TDM strategies can support corridor function.
- Within the Capital and Operational Improvement Element of the HSP, it is recommended to include TDM as a sub-element, alongside safety, operations (ITS), and capacity.
- The TDM sub-element could include the CTR Plan that is expanded to a 20-year time horizon.
- Add passenger throughput, or peak period passenger trips (PPPT), as a measure of capacity so that TDM strategies that increase Average Vehicle Occupancy would follow.
- Adopt an approach in which all currently planned TSM and strategic capacity improvement projects are paired with a funded TRPP or other program of TDM strategies. Projects programmed in the Capital Improvement and Preservation Program (CIPP) could be paired with TDM support strategies that would be listed in the HSP and programmed in the Biennial Budget Request.

The Highway System Plan is described thus: "The State Highway System Plan is the highway component of the WTP. The HSP defines service objectives, action strategies, and costs to plan for, maintain, operate, preserve, and improve the state highway system for the duration of 20 years. The HSP is updated every two years, in coordination with local plan updates, to reflect completed work and changing transportation needs, policies and revenues." (WSDOT Design Manual M 22-01.05, June 2009, p. 120-6.)

The HSP is developed and updated by the Capital Program Development and Management (CPDM) Office. In addition to developing and updating the HSP, the CPDM Office also coordinates planning activities and provides technical assistance to the WSDOT Regional Offices and collects and processes data, develops travel forecasts, and conducts studies.

The HSP contains a listing of proposed capital improvements categorized into elements. These elements include the following.

- System preservation: bridges, road surfaces
- Highway maintenance of LOS: cost estimates for the 20-year planning time frame
- Capacity and operational improvements
    - Safety: physical improvements to facility design
    - Operations: ITS camera, conduit, fiber, control centers, signal systems, toll facilities

    - Capacity: Highway segments, highway interchanges, intersections, sidewalks, pedestrian bridges, park and ride lots, culverts, erosion control
- Scenic highways
- Trail and paths

The Moving Washington approach calls for the consideration of TSM, TDM and strategic capacity improvements in order to maintain the system within financial constraints. TSM falls within capital facilities under the Capacity and Operational Improvements Element. TDM can include capital facilities, such as pedestrian bridges and park and ride lots, but TDM also includes programs and services that are not capital improvements. Appendix O of the 2007-2026 HSP contains CTR under Mobility Improvements, including line items for TRPP (now unfunded), park and ride, CTR tax credits, CTR education and marketing, and the vanpool grant program.

The HSP 2007-2026 lists TDM as a type of Tier I strategy (p. 78) and this HSP was written during the time that Moving Washington had been introduced, although the Tier I, Tier II, and Tier III categories suggest a level of expenditure rather than corresponding to the categories of TSM, TDM and strategic capacity improvements.

The HSP 2007-2026 Glossary contains two definitions. It defines Demand Management as "Changing or reducing demand for car use by encouraging the behavioral change of household choices of travel. Transportation demand management is used increasingly by urban planners to affect the rate at which new development attracts cars and increases the need for new or expanded roadways."

Also, Transportation Demand Management is defined in the HSP 2007-2026 as "Measures designed to reduce the number of single occupant vehicle trips during the peak traffic period. Measures include person trip reduction strategies, which eliminate trips completely, vehicle trip reduction strategies that accommodate person trips in fewer vehicles, and peak period modification strategies that move trips out of the most congested periods."

A definition of TDM in the new 2015-2017 CIPP includes a discussion of the Moving Washington approach (p.II-10) that describes "Manag[ing] Demand: Provide citizens with options such as HOV lanes and Traveler Information." Traveler information has been described as a Tier I investment (low-cost, high return). Capital improvement examples are given, such as variable message signs and traffic cameras. Tier II (moderate cost) and Tier III (high cost) solutions include HOV ramps and HOV lanes respectively.

RECOMMENDATION HSP-1: Identify and fund corresponding TDM strategies to support TSM and other capital improvements as part of a HSP project. For example, the regional ridematching program can help citizens take advantage of the HOV lanes that could be promoted on the 5-1-1 information system.

Emphasis on Long Term Time Horizon Challenges Least Cost Planning

State law requires estimates of future travel demand using 10-year and 20-year time horizons. Looking far into the future is necessary for planning large capital projects but the uncertainty of long term forecasting risks overdesign. For example, autonomous vehicles are on the horizon, which could decrease the need for lane capacity. The diversification of ride hailing firms into actual rideshare providers are new opportunities to change SOV mode user behavior. These short term and mid-term changes and their potential positive effects may be overlooked. TDM can be implemented in the short

term, targeting TDM service improvements that also are least cost, with impacts on future travel demand that may affect those estimates 10 and 20 years into the future.

RECOMMENDATION HSP-2: Initiate TDM strategies in the near term, with performance measured against the level of investment in the strategies. Changes in operation of the transportation facility as a result of TDM in the near term could be considered and incorporated into the estimation of future conditions.

Screening (Threshold) Performance Metrics Direct the Problem Definition

Highway segments with performance gaps are first identified in initial network screening using the Highway Segment Analysis Program (HSAP) to locate those segments operating under 70 percent posted speed limit. The WSDOT methodology has used this one performance indicator of travel speed, applying a consistent methodology to it measurement, across all regions of the state, to develop a prioritized list of state highway segments that are anticipated to perform below this minimum. This also provides a fair and equitable means to allocate state transportation funds across regions. These are the highway segments that get identified in each region for corridor studies.

This definition of transportation service, as determined by the performance indicator, bears the risk of directing the solution of the problem—restoration of travel speed. Any initial screening of this nature may hide segments in the highway network with other types of mobility needs. While traffic congestion and crashes are easily observable problems, other mobility problems may be invisible, such as a lack of transportation choices along the corridor. The WSDOT effort to conduct Corridor Sketches of all 291 segments in the State Highway System, instead of only evaluating segments with choke points, may avoid this issue of overlooking other types of mobility needs.

As long as restoring travel speed to 70 percent of posted speed limit remains the primary service indicator for the identification of deficiencies, the purpose and need for a corridor planning study will lean toward capacity enhancements to restore motor vehicle travel speed. Vehicle throughput and travel speed may be appropriate indicators for freight movement on limited access facilities, but less so for other state roads of a different functional classification.

RECOMMENDATION HSP-3: Identify alternative ways to screen for performance gaps from a TDM perspective, according to the entire traveler journey, by travel market, and by mode.

The Highway Segment as the Unit of Study Introduces Practical and Methodological Challenges

Highway segment analysis points to improving travel time on a segment with performance gaps. Capital improvements may return free flow to the segment but motorists may still sit in traffic on another segment of their trip. Expanding capacity on one segment to remedy a bottleneck has the effect of moving the location of the bottleneck to another segment of slightly lesser capacity. With a growing statewide population, WSDOT recognizes that simply accommodating traveler demand for SOV travel and satisfying motorist expectation to travel at posted speed limit is a goal that will continue to be out of reach in both a practical sense and a budgetary sense.

The goal of corridor planning has been to determine the best combination of strategies to restore the travel speed of a highway segment to its level of service standard. Travel speed can be measured on a segment by segment basis. While data do exist, such as HOV usage, average vehicle occupancy (AVO) and passenger counts aboard transit vehicles, there currently is no method to link and measure the

impact of particular TDM programmatic efforts upon a particular highway segment of interest. CTR data presently do not contain the travel routes of individual employees, nor do the data enable tracking changes of commute characteristics to individuals. For example, changes in performance from a particular work site could be due to employee turnover.

Given the level of resources currently allocated to the CTR program that is targeted to large employers in designated urban growth areas, such data, if it were available, might indicate that the effects of the CTR program are quickly dispersed geographically, with only minor effects on any one highway segment. This might be interpreted that the CTR program is not effective in addressing the bottleneck. The impacts of TDM strategies are not measured by the highway segment unit of analysis. This is not a shortcoming of the TDM strategy but a limitation of the segment analysis methodology.

RECOMMENDATION HSP-4: Allocate additional targeted resources for TDM to address highway segments of interest, particularly those on limited access facilities.

Additionally, evaluating the CTR program effects of a particular highway segment fails to capture the motor vehicle trip reduction effects upon all other highway segments in a single journey.

RECOMMENDATION HSP-5: Recognize the motor vehicle trip reduction effects of TDM strategies upon the entire journey, composed of a series of highway segments. This helps to maintain the LOS standard for those other highways segments as well.

Incorporate Reliability as the Defining Characteristic of the State Transportation Policy Goal of Mobility

Washington State law is explicit about defining the state transportation policy goal of mobility to include reliability: "To improve the predictable movement of goods and people throughout Washington State." WSDOT has historically focused upon mobility for motorists on the highway system. Within this context of mobility, reliability is the ability to deliver on a motorist's expectation of travel time. If the Washington State Highway System experiences congestion that is routine, then there already is some degree of reliability for the motorist to predict when and where the congestion will occur. The ability to predict enables motorists to have some degree of choice over avoiding congestion. As a result of this control, motorists with choices (commuters who can afford to travel by SOV) bear some responsibility to do what is needed for them to avoid traffic congestion.

RECOMMENDATION HSP-6: Refocus tolling policy with the primary goal of shifting travel behavior (by time of day and mode), and with a secondary goal of revenue generation.

Include TDM Programs, Services, and Incentives as a Permanent, Continuing Dimension of Long Range Transportation Planning, Mid-Range Programming, and Short-Term Budgeting

The HSP (and its corresponding partner agency plans, the MPO LRTP and the TIP, and the Transportation Element of the Local Comprehensive Plan) should include a stronger complement of ongoing programs, services and incentives targeted to CTR program participants as well as other potential employers, other travel markets and the general public. Within the planning documents, organizing the descriptions of all the transportation improvements together by corridor and geographic planning subarea may provide clarity about how TDM, TSM&O and capacity improvements are a cohesive package of strategies that work in tandem to improve mobility in the corridor. Listing and organizing improvements by corridor

should include a chronology of implementation that would describe TDM programs, TDM services, TDM incentives, TSM&O strategies, their associated data collection and performance measurement programs, and the funding sources for all these TDM and TSM&O elements, prior to the listing of considered capacity improvements.

RECOMMENDATION HSP-7: Develop a 20-year long range transportation demand management plan as a component of the current state-required CTR Plan, with the purpose of accomplishing the statewide goals of the WTP, including the Statewide TDM Policy. The long range TDM Plan should be updated every 2 years and timed to be ready to submit a request to Programming for funding in the Biennial Budget Request.

RECOMMENDATION HSP-8: Include TDM as a sub-element, alongside safety, operations (ITS), and capacity, in the Capital and Operational Improvement Element of the HSP. The TDM sub-element could include the CTR Plan that is expanded to a 20-year time horizon.

RECOMMENDATION HSP-9: Add passenger throughput, or peak period passenger trips (PPPT), as a measure of capacity so that TDM strategies that increase Average Vehicle Occupancy would follow. As there is a shift to reliability as the important element of Mobility, consider relaxing LOS standards.

RECOMMENDATION HSP-10: Adopt an approach in which all currently planned TSM and strategic capacity improvement projects are paired with a funded TRPP or other program of TDM strategies.

RECOMMENDATION HSP-11: Pair projects programmed in the Capital Improvement and Preservation Program (CIPP) with TDM support strategies that would be listed in the HSP and programmed in the Biennial Budget Request.

RECOMMENDATION HSP-12: TDM strategies should be supported by ongoing stable permanent funding for CTR program implementation, emergency ride home, information services, promotional campaigns, ride matching services, school pool, subsidies, incentives, and technical support for telecommuting and alternative work arrangements (flextime, compressed work week, satellite offices, proximate commute). All TDM implementation should include sufficient funding for programs of ongoing data collection, monitoring and evaluation.

Discuss and Correct Common Misconceptions about TDM in the Update of WSDOT Planning Documents

Statements that correct common misconceptions within the transportation profession should be repeated throughout planning documents. Latent demand is an example. The concept of latent demand is sometimes used to explain why transportation demand management is ineffective. For example, using TDM, if some number of vehicle trips are removed from a highway segment during the peak period, other travelers will move their trips into that freed capacity so that no apparent change in travel time will be experienced by travelers. However, if the road is widened, more vehicles also will fill the new space.

> *The effects of latent demand also apply to capacity increases and transportation systems management strategies.*

RECOMMENDATION HSP-13: Develop statements correcting common misconceptions about TDM within the transportation profession and incorporate throughout WSDOT planning documents.

At the time of this report, the HSP 2013-2032 was not yet available. However, there was a statement on the WSDOT website about the development of the new HSP. The new HSP 2013-2032 that is currently under development "…will more clearly define state priorities in investments in the highway system…" (CPDM Office WSDOT Highway System Plan description, August 2013).

RECOMMENDATION HSP-14: TDM strategies that are proposed by WSDOT Region planning offices and by the Public Transportation Division should have statements that describe how the TDM strategies developed from Corridor Studies and from the CTR Plan address state priorities in investments, legislative policy goals and performance expectations, the new WTP 2035.

Corridor Summary Reports (CSR) will be a new feature in the new HSP (according to the August 2013 summary). CSRs will be an essential element of the WSDOT highway system planning process. Each economic high priority corridor segment will have an articulated WSDOT vision for the corridor's purpose and role. The CSR is intended to help guide investment decisions, based on corridor function and performance characteristics.

RECOMMENDATION HSP-15: For each CSR, develop statements about how specific TDM strategies can support corridor function.

According to the CPDM Office WSDOT Highway System Plan description, August 2013, the new HSP will incorporate new ideas emphasized in the Moving Washington Framework, including the following in Table 2. Recommendations for incorporating TDM are included below.

Table 2 - TDM could assist in the implementation of Moving Washington in the HSP

Moving Washington Emphasis:	To incorporate TDM:
"Strategic and staged investments to achieve corridor performance"	Corresponding TDM strategies should be paired with these investments.
"Closer alignment with maintenance, operational, and modal investments"	TDM strategies should be identified as part of operational and modal investments.
"Improved consideration of sustainable investments"	The value of TDM strategies should be estimated in achieving sustainability goals.
"Focusing on economic, or high priority, corridors"	TDM strategies should be devised for corridor-specific advantages.
"Recognizing transportation system improvement proposals in approved regional transportation plans"	Proposed WSDOT TDM strategies should demonstrate support for the objectives in the regional TDM action plan of the RTPO/MPO.

7. State Public Transportation Plan

Clear terminology that is universally shared may improve funding opportunities

- WSDOT planning activities should clarify what is considered to be TDM.
- The State Public Transportation Division should consider renaming itself, such as the State Transportation Demand Management Division, or Public Transit and Demand Management Division, etc.
- Alternatively, if it is important that the divisions within Community & Economic Development are delineated by mode, then consider reorganizing TDM planning and implementation activities as a separate division under Engineering and Regional Operations, or as an office within Traffic Operations.
- Are the terms, "trip reduction" and "transportation demand management" misunderstood? For those outside the transportation profession, reducing trips might be interpreted as counter to economic development. Explore other ways to describe the goals of transportation demand management.

Institutionalizing TDM

It might be easy to overlook that the Public Transportation Division does much more than provide support for public transit. The Public Transportation Division should consider having its Division renamed, Transportation Demand Management Division, or something other than "Public Transportation Division." If TDM is conducted by the PTD, then that can justify interpretation of TDM as a form of public transportation. The Moving Washington approach embraces system efficiencies through considering TDM as a means to preserve highway capacity while at the same time providing alternative transportation services. While there might not be positive name recognition in the Legislature regarding the Moving Washington approach and TDM by extension, public transportation may be in a worse position as merely a mode of "state interest" rather than "state-owned", a mode that does not qualify for support from highway gas tax revenues because the law has interpreted public transportation as something other than a highway purpose. As a result, when it comes to the difficult decisions that must be made regarding where to cut funding, it might seem to make sense to the Legislature to approve funding cuts to a service that WSDOT does not own. If WSDOT does not own public transit, how can WSDOT be considered a responsible steward of scarce transportation funds if it increases its grants to public transit? The Legislature might see the highway system as WSDOT's first priority.

How TDM strategies are categorized, what it encompasses, and within what department it is considered to be a subset, might influence whether and how TDM gets funded.

Transportation Demand Management Needs a Consistent Definition

The *Washington State Public Transportation Plan* (WSPTP), Draft, October 2015 includes demand management under the umbrella of public transportation that is broadly defined to include any form of transportation that is accessible and available to the public, which does not involve a single person in a motorized vehicle. "Public" refers to access to the service, not to the ownership of the system providing the service (p.15).

The WSPTP working group carefully considered the definition of public transportation and what it encompasses. The definition of public transportation has ramifications for how various activities are eligible for various funding sources and within which WSDOT division support activities are administered.

The WSPTP lists examples of public transportation services and programs to include TDM. Within demand management, examples include congestion pricing (parking fees, express toll lanes, and variable tolls), commute trip reduction, employer commute benefits, telecommuting, intelligent transportation systems, and flextime, remote programs, and staggered work shifts. (p.16)

The 2015-2017 CIPP (p.II-10) that is developed from the HSP, describes managing demand using capital improvement examples, including HOV lanes, variable message signs and traffic cameras. It would stand to reason that TDM should be eligible for gas tax funds and be part of the Capital and Operational Improvement Element of the HSP, as a separate sub-element, alongside safety, operations (ITS), and capacity.

It might be argued that congestion pricing and ITS are part of the realm of transportation systems management and operations. Among these examples, perhaps a distinction can be attempted to differentiate TDM from transportation systems management and operations (TSM&O). The distinction is not sharply drawn but TDM tends to emphasize and target deliberate travel decisions planned by individuals in advance of the trip. TDM focuses more upon providing alternative travel options that might be applied to both infrequent trips as well as habitual trips. The time frame of a TSM&O strategy is more instantaneous as motorists react to traffic controls and conditions. TSM&O concentrates upon improving traffic flow with devices that include signal coordination, ramp metering, dynamic lane assignment, truck climbing lanes, roadway geometric alterations and traveler information systems. TSM&O is associated with its own highway hardware and capital facilities, while TDM programming is primarily characterized by services, incentives, public awareness campaigns, and also may include capital investments, such as vans and park and ride lots. The emphasis of TDM implementation is upon the people who travel while the emphasis of TSM&O is upon traffic flow. Even with this distinction, there is overlap between TDM and TSM&O, such as dynamic congestion pricing, which can be anticipated in advance by the motorist who might change travel by mode or time of day as a result.

RECOMMENDATION SPTP-1: Adopt a definition of TDM to promote a common understanding among WSDOT departments, about what strategies TDM includes.

Different institutions define TDM differently, resulting in the tendency for overlap of TDM, Active Transportation Demand Management (ATDM), managed lanes and TSM&O. The risk of this vagueness about what constitutes TDM is that if, for example, hard-running shoulders for transit are supplied to a state highway, there may be the tendency to think that TDM has already been addressed and no more needs to be done involving TDM. The Demand Management Solutions section of the *Practical Design Procedures* also lists toll lanes and managed lanes as TDM. The tendency also is to prefer capital facility solutions. WSDOT knows how to build physical infrastructure. Hard running shoulders, managed lanes and toll lanes are important infrastructure to promote travel behavior change; however, TDM works best as a package of programs, services, incentives, disincentives, and policies used in tandem with the physical multimodal capital facilities to promote use of transit, vanpools, bicycling and walking.

While active parking management involves making the best use of parking supply using dynamic pricing by time of day, a TDM strategy might include making preferential parking available to high occupancy vehicles (HOV). A TDM policy with regard to parking might include capping parking supply. To maximize

use of existing capacity, a TDM policy might include adopting passenger throughput as a performance metric with some threshold defining the average vehicle occupancy (AVO) that must be achieved during the peak period before consideration is given to adding capacity.

Background on Definitions and the Relationship between Public Transportation and TDM

Some definitions for TDM were reproduced from the HSP and presented in the previous chapter. Neither of these definitions indicate that TDM is a form of public transportation. Below is a compilation of additional definitions of TDM. As the SPTP Advisory Committee recognized, definitions matter and the Committee considered the definition of public transportation early on in its planning process.

RECOMMENDATION SPTP-2: Review definitions for their impact on use of funding sources for public transportation and TDM, and for their impact on establishing roles for state agencies that are both helpful or thwart flexibility and service development.

The Revised Code of Washington was reviewed to determine the relationship of TDM and public transportation in statute, if any. TDM is not mentioned in the definition of urban public transportation systems.

RCW 47.04.082 Urban public transportation systems—defined.

As used in chapter 108, Laws of 1967, "urban public transportation system" means a system for the public transportation of persons or property by buses, streetcars, trains, electric trolley coaches, other public transit vehicles, or any combination thereof operating in or through predominantly urban areas and owned and operated by the state, any public agency, any city or county or any municipal corporation of the state, including all structures, facilities, vehicles and other property rights and interest forming a part of such a system.

RCW 47.01.330 Office of transit mobility.

RCW 47.01.330 established the Office of Transit Mobility in 2005. The law states that the duties of this Office include:

> "Strengthening policies for inclusion of transit and transportation demand management strategies in route development, corridor plan standards, and budget proposals." (RCW 47.01.330 (2)(e))
>
> And
>
> "Recommending best practices to integrate transit and demand management strategies with regional and local land use plans in order to reduce traffic and improve mobility and access." (RCW 47.01.330 (2)(f))

Because transit and TDM are included together and addressed by the Office of Transit Mobility, it might be interpreted to mean that TDM is considered part of public transportation. But this is unclear. Might this association make TDM ineligible for funding from gas tax revenue?

The Public Transportation Office describes TDM as a tool box of strategies that also include those not relating to public transit. PTO oversees TDM programs, the CTR program, and vanpool program. It oversees park and ride lot program but park and ride lots are, in fact, funded in the HSP.

TDM is neither defined within law for Regional Transit Authorities (Chapter 81.112 RCW), nor is TDM explicitly defined in the CTR law (RCW 70.95.521 through 555). TDM is not defined by Rule that implements the CTR law.

Federal Highway Administration

FHWA categorizes as types of demand management strategies, telecommuting, transit service improvements and park-and-ride promotion. FHWA also includes ramp metering and toll/congestion pricing and HOV lanes as types of demand management.

Puget Sound Regional Council

"Transportation demand management (TDM) refers to activities that help people use the transportation system more efficiently. TDM activities help get the most out of transportation infrastructure and services by making lower cost, higher efficiency transportation options easier to use and more readily available. These activities produce wide-ranging benefits to individuals and the transportation system as a whole, reducing traffic congestion, vehicle emissions, and fuel consumption while supporting physical activity and enhanced safety. TDM makes existing transportation investments perform better, extends the life of existing infrastructure, and can improve outcomes for new transportation investments." http://www.psrc.org/assets/9910/TDM_Action_Plan_july_2013.pdf

Washington State Transportation Center

"TDM is a broad range of strategies that reduce or shift use of the roadway, thereby increasing the efficiency and life of the overall transportation system. TDM programs influence travel behavior by using strategies that accommodate more person-trips in fewer vehicles, shift the location or time of day at which trips are made, or reduce the need for vehicle trips." (Daniel Carlson, Washington State Transportation Center, "WSDOT's Role in Transportation Demand Management: Strategic Interest, Structure, and Responsibilities," WSDOT, 2005. p. 3. Accessed April 29, 2014 at http://www.wsdot.wa.gov/research/reports/fullreports/616.1.pdf

Municipal Research and Services Center (MRSC)

"Congested streets and roadways result when too many people want to drive on the same routes at the same time, particularly during peak commute hours or special events. The term "demand" refers to the amount of street/road use during a given time period. Transportation Demand Management (TDM) programs focus on changing or reducing travel demand, particularly at peak commute hours, instead of increasing roadway supply. Thus, TDM makes more efficient use of the current roadway system. With the right incentives (or disincentives) travelers may be influenced to use transportation systems in a way that contributes less to congestion. In fact, research around the country indicates that well-designed TDM programs can reduce vehicle trips by as much as 30 or 40 percent."

MRSC continues: "Travelers base their travel choices on a number of important motivators including the desire to save time and money, to reduce stress or to improve convenience. At least some of these motivations must be addressed to encourage a change in habits. Some of the most promising TDM programs emphasize coordination with local employers on measures such as car or vanpooling programs, bus pass subsidies, alternative work schedules, telecommuting options and parking management. Studies also indicate that congestion pricing is an especially effective approach, which should gain favor as congestion worsens and new variations on the concept are developed." (http://www.mrsc.org/subjects/transpo/tdm.aspx)

Current Roles of PTD

The PTD manages both federal and state public transportation grants through the Consolidated Grant Program, the Regional Mobility Grant Program, and the Vanpool Investment Program, including project selection and funding distribution, and provides technical support for grant writing, budget preparation, contracting, financial tracking, performance and compliance monitoring and reporting. The PTD also conducts the following.

- Assists with vehicle purchases and asset management.
- Provides training.
- Develops the WA State Human Services Transportation Plan.
- Houses the staff that provide technical support to the CTR Program.

Vanpool Investment Program

The Vanpool Investment Program was funded biennially since 2003 by the State Legislature. It is a program that is a partnership with public transit agencies. The PTD's role has been the following.

- Report progress to the State Legislature.
- Seek continued funding to expand the program.
- Administer capital grants to public transportation agencies that operate the vanpool programs.
- Conduct statewide marketing campaign. Provide marketing materials and joint media purchases for public transit agencies. Promote Rideshareonline.com.
- Provide technical support to local agencies to start and improve their vanpool programs.
- Gather electronic data for monitoring and reporting.
- Develop vanpool program growth scenarios and investment levels to support the scenarios.
- Forecast statewide vanpool needs.

Rideshareonline.com

Rideshareonline.com was first created by King County Metro and has grown statewide, and has partners in Idaho and Oregon. WSDOT has been involved in the software update to increase functionality consistent with the Travel Options program concept, the WSDOT Construction Traffic Mitigation Program and WSDOT's Traveler Information System. The update would enhance dynamic ridematching capability, provide for better tracking and bookkeeping, and enable employee transportation coordinators statewide to find ridesharing matches for their employees.

Construction Traffic Mitigation

The PTD also conducts construction traffic mitigation to maintain transportation system efficiency during construction and provide flexibility in how and when construction occurs to save time and money. Recent examples are I-405 and I-5. Construction mitigation activities on I-405 have included increasing transit services, public outreach to provide information about transportation alternatives, incentives to vanpools and carpools to use lesser-used park-and-ride lots to provide additional space for transit riders, providing bike racks and lockers. Construction mitigation activities for I-5 included retiming traffic signals on alternative routes, adding capacity to Sounder commuter rail trains, and providing incentives to vanpool riders.

Regional Mobility Grant Program

The Regional Mobility Grant Program (RMGP) supports local efforts to improve transit mobility and reduce congestion on the most heavily traveled roadways. Funded projects have included new transit services that connect urban centers, park and ride lots and expansions, new buses, and rush-hour transit service along congested corridors. Such a program supports WSDOT's role as a partner in creating a multimodal system. The RMGP also supports congestion relief on the most heavily traveled highways as well as provide enhanced mobility.

Trip Reduction Performance Program (TRPP)

The Trip Reduction Performance Program (TRPP) was created in 2003 by the State Legislature to provide compensation to organizations that successfully remove vehicle trips and vehicle miles traveled off the road through innovative incentives programs. The TRPP provided grants to applicants with plans to reduce vehicle trips. King County Metro was a grant recipient. King County Metro used the grant to create 56 new vanpools and keep existing vanpools at full ridership during the 2005-2007 biennium.

The state legislature provided $1.5 million for the 2005-2007 biennium. WSDOT administered the program. Applicants were received and 17 were selected from state, county, city, RTPO, transit and employer representatives. Fifteen of the projects were actually implemented. WSDOT awarded $1,339,132 to the 15 projects. Four projects out of the 15 projects exceeded their goals. Two projects were very successful. The program was structured so that WSDOT paid 50 percent to the applicants up front to start their programs, and the remaining was paid based upon performance, so that there was risk sharing. Average price per reduced trip was $233. Overall, the program performance exceeded estimated trips reduced by 27%. The program was funded for two funding cycles then not renewed by the state legislature.

The Development of the State Public Transportation Plan (SPTP)

- Currently underway with identified goals, strategic action, and state role.
- SPTP should identify what public transit needs that TDM and the CTR Program can deliver to accomplish statewide goals of the WTP and SPTP.
- Identify TDM programs, services, and incentives that promote public transit use, intermodal use with HSP, WSF, Bicycle/Pedestrian, and integrated modal planning with PTD.
- Identify the role of public transit in TDM Components of Corridor Plans and TDM Mitigation Plans of TMPs.
- Address how existing programs can be strengthened.

The Public Transportation Division views the transportation system as integrated, multimodal and sustainable and began looking for ways to integrate public transportation and TDM in day to day activities. They are attempting to define the state interest and the state role in public transportation. The PTD gave a presentation to the WSTC about the development of the WSPTP. One objective of the State Public Transportation Plan will be to identify recommendations tied to state goals, important to efficiency and effectiveness of the transportation system and that can be addressed by public transportation and TDM. Presentation contains a definition of public transportation adopted by the Transportation Commission in 1992, which includes TDM and ridesharing under the public transportation umbrella. The working group is evaluating that definition. The SPTP aims to "Provid[e] leadership on sustainability, climate change and public health as they relate to public transportation and transportation demand management in particular." (from PowerPoint presentation given to WSTC,

"Washington's Statewide Public Transportation Plan, March 19, 2014, presented by Cathy Silins, Public Transportation Division, Deputy Director, slide 22).

Accessibility as an Alternative Performance Measure

WSDOT is developing additional transportation performance metrics that reflect what is important to the community. One of these is accessibility. The *WSDOT's Handbook for Corridor Capacity Evaluation*, October 2014, chapter on Accessibility Evaluation Methodology, presents a discussion about measuring accessibility, or the ease of reaching valued destinations. "WSDOT uses a cumulative opportunities measure of accessibility for peak period commute to jobs. Essentially, it is a count of jobs reachable from each census tract or Traffic Analysis Zone in a study area, during the morning commuter rush and within a certain travel time." This is the average commute time in the Seattle-Tacoma metropolitan statistical area, which is 28.5 minutes. The method uses speed data for each roadway length, including arterial and local streets, from several sources, including speed data from GPS and Bluetooth pings gathered by private vendors. It also uses data from in-pavement loop detectors on highways. Jobs data and the regional transportation network model is supplied by the regional planning council. Transit travel time is calculated using transit service data from transit agencies, taking transit stop locations and average walking speed into consideration. The method does not include calculations for driving to a park and ride lot location to take transit. The transit/auto accessibility ratio is then calculated, with a value of 1.0 meaning that just as many jobs are accessible by transit as by personal automobile, within the same average commute time.

Because WSDOT's mission is to provide transportation service to all of Washington's citizens, the greater than 30 percent of Washington's citizenry with special needs, as identified in the Draft WSPTP, who may not drive a private auto, require particular attention. These are individuals who may be part of the growing elderly population, youths, persons with disabilities, including veterans, and low-income persons. These individuals need better access to jobs, education, retail, and community services. Tipping the balance of the transit/auto accessibility ratio toward 1.0 or higher will not only move SOV travelers to transit, thereby improving highway travel speed and reducing delay, but also will directly benefit the greater than 30 percent of Washington's population that do not drive.

RECOMMENDATION SPTP-3: Use the transit/auto accessibility ratio as a screening or threshold performance metric for some corridors.

RECOMMENDATION SPTP-4: Develop a method for calculating accessibility that includes calculations for driving to a park and ride lot location to access transit or other HOV transportation.

Economic Indicators as Alternative Performance Measures

The WSDOT CTR data provide some evidence that people prefer to commute by SOV because of its greater convenience. Time savings is a measure of convenience and the WSDOT 2015 CCR October 2015 Appendix information provides a comparison of peak hour commute travel time by SOV, HOV and transit for major corridors. The data indicate that, in several cases, travel time for SOV is less than for transit.

RECOMMENDATION SPTP-5: Allocate sufficient WSDOT resources for more transit service with supporting TDM programs, services, and incentives directed toward making travel time by transit comparable to or faster than SOV.

As a result, more people would ride transit, not only for its personal cost savings but also for its comparable convenience. More SOV travelers would switch to public transit. As SOV travel decreased, more capacity along the corridor would be freed, moving toward restoring maximum vehicle throughput. This approach also would save both transit and SOV travelers on the congestion cost for the daily commuter.

RECOMMENDATION SPTP-6: Calculate commuter cost savings for those who switch to public transit from SOV travel, as an economic indicator of an increase in disposable income and subsequent increase in sales tax revenues.

Some of the economic indicator measures used by WSDOT include metrics for job impacts of highway projects. These are direct job impacts, indirect job impacts, and induced job impacts. The Washington State Office of Financial Management (OFM) maintains a model for estimating the number of jobs created or saved due to highway construction projects. (*WSDOT's Handbook for Corridor Capacity Evaluation*. October 2014. p. 19-20)

RECOMMENDATION SPTP-7: OFM should develop a model for estimating the number of jobs created or saved, directly and indirectly, due to investments in transit services and TDM services.

The results of these estimates can inform the development of corridor scenario alternatives containing various investment levels in transit and TDM, for better comparisons with build-only corridor improvement alternatives.

It is important to note that a shift in SOV travel to HOV and transit will reduce gas tax revenues that WSDOT depends upon. For WSDOT to provide full support toward using TDM in corridor improvement alternatives, it is critical that WSDOT find alternative funding sources.

Include a Transportation Demand Management Performance Dashboard in the WSPTP

Reporting on the success of public transit and TDM is important for transportation policy makers, the Legislature, the media, the Washington Transportation Commission, those implementing work site CTR programs, and the general public to know. The Draft WSPTP, October 2015, discusses a transportation performance dashboard for existing data, which includes the following.

Transportation Performance Dashboard

- Transit ridership
- Commute trip reduction work site mode split
- Transportation-related carbon emissions
- Transportation cost per household
- Transportation as a percent of household spending
- Vehicle occupancy

One of the WSPTP's recommendations is to develop a cross-organizational decision making process on system operation and investments. The WSPTP recognizes this would call for the inclusion of real-time performance measures. It also calls for supplementary performance measures for a public transportation connectivity dashboard that summarizes progress using measures such as the following.

Public Transportation Connectivity Dashboard

- Increased first mile/last mile access
- Percent completion of sidewalk networks
- Other measures that make use of mode split data
- Person throughput
- Multimodal cost per person trip

RECOMMENDATION SPTP-8: Consider the following additional performance measures, to enhance public transportation connectivity.

- Percentage ADA compliance of sidewalk facilities within ½ mile of bus stop
- Number of residents or households within ¼ mile of a transit stop (or use isochrone time measure)
  For neighborhoods or planning subareas where there is a higher percentage of elderly, the distance from a transit stop might be less than ¼ mile, for example, within 1 or 2 blocks. Where there is location-specific data that has determined the average walking distance of transit customers to a bus stop, use that as the yardstick of measure
- Number of residents or households within ¼ mile of a location where at least two bus routes cross (or use isochrone time measure)
- Percent completion of sidewalks and on-road bicycle facilities within 1/x mile of bus stops within planning subarea
- Availability of bicycle parking at bus stops
- Availability of space for bicycle on bus racks on front of bus
- Availability of space for bicycles within bus
- Incidence of bicyclist having to wait for next bus
- Availability of mobile app indicating bike storage availability of next bus
- Transit/auto accessibility ratio

RECOMMENDATION SPTP-9: Include the following information in a Transportation Demand Management Dashboard, to enhance transportation demand management performance measures in the WSPTP.

Transportation Demand Management Dashboard

- Motor vehicle trips reduced per 100 employees
- Percentage CTR work site employees that begin their work day outside the peak time period
- Percentage shift in peak period travel by time of day for other trip types
- Shift in peak period travel by route
- Decrease in total travel time by transit and other HOVs
- Progress toward achieving local government CTR performance goals and objectives
- Percentage of employers that avail themselves of qualified transportation fringe benefits
- Percentage of employers that subsidize employee vanpooling, transit up to $255 per month and reimburse bicycling up to $20 per month, to deduct cost of benefit from their taxes, to offer benefit as a pre-tax deduction from employee's salary, or as a combination of the two
- Increase in frequency (number days per week) with which commuters use alternative transportation modes
- Improvement toward switching from a 2-person carpool to a 3+-person carpool)

- Improvement toward switching from a carpool to a vanpool containing 5+ occupants
- Improvement toward switching from a vanpool to riding public transportation
- Reduction in annual per capita VMT
- Increase in use of transportation alternatives for commute trips
- Reduction in greenhouse gas emissions
- Commuter travel cost savings and associated increased sales tax revenues due to increased disposable income
- Direct and indirect job creation impacts

8. Corridor Studies

Recommendations for the conduct of corridor studies can be found in the separate document, “Transportation Demand Management Guidance for Corridor Planning Studies”, February 2016, also prepared under this study.

9. Programming

- Current priority programming compares TDM against TSM and strategic capacity improvements as alternative options, and selections are made.
- However, RCW 47.05.010 requires the incorporation of a broad range of solutions, including TDM.
- Use all three components of Moving Washington concurrently: TDM, TSM and strategic capacity improvements.
- Prioritize the best TDM solution over other TDM alternatives, the best TSM solution over other TSM solutions and the best strategic capacity improvement over other strategic capacity improvements. This enables "apples to apples" comparisons.
- Stage the use of all three strategies: fund and implement TDM first to optimize traveler use of the existing system, fund TSM second, and strategic capacity improvements third.
- Devise a process for the Biennial Budget preparation that allows a review of the proposed budget request by those departments requesting funds.
- Do not be held back by lack of "perfect" data.
- Review and update the Mobility Priority Programming Process.

State law describes, as part of priority programming for highway development, that:

> "The priority programming system for improvements must incorporate a broad range of solutions that are identified in the statewide transportation plan as appropriate to address state highway system deficiencies, including but not limited to highway expansion, efficiency improvements, nonmotorized transportation facilities, high occupancy vehicle facilities, transit facilities and services, rail facilities and services, and transportation demand management programs." and it "…must incorporate a broad range of solutions, identified in the WTP, including… TDM." (RCW 47.05.010)

A staged approach accomplishes that state requirement and eliminates the problem that CTR results that are measured either at the employment site level or at an aggregated system wide level do not translate to number of vehicles reduced from an Interstate lane segment. TDM strategies have been dismissed because the current segment analysis methodology does not account for CTR results. Consideration of TDM strategies should not be eliminated due to measurement methodology limitations.

State law describes the requirements for Priority Programming for Highway Development, which is the 2-year update of the HSP. This describes the work of the Capital Program Development and Management Office.

> "It is the intent of the legislature that investment of state transportation funds to address deficiencies on the state highway system be based on a policy of priority programming having as its basis, the rational selection of projects and services according to factual need and an evaluation of life cycle costs and benefits that are systematically scheduled to carry out defined objectives within available revenue. The state must develop analytic tools to use a common methodology to measure benefits and costs for all modes." RCW 47.05.010

Consider the components of RCW 47.05.010

"…rational selection of projects and services…"

Moving Washington equips the planning process with a rationale for the selection of projects. Additionally, the law explicitly includes services. Moving Washington calls for consideration of TDM, TDM and strategic capacity improvements. The current HSP contains strategic capacity improvements, TSM, and some capital improvements that are supportive of TDM such as pedestrian bridges, sidewalks and park and ride lots. However, the 2007-2026 HSP does not contain TDM programming and services.

"…according to factual need…"

Factual need is evident in the recognition of violations of LOS standards on state highway segments, coupled with continuing severe funding constraints that would make cost prohibitive an approach that is solely reliant on capacity improvements. Moving Washington recognizes the factual need for TDM. According to the "Transportation 101: Moving People and Goods, Spring 2014, slide 15, presented to the WSTC, the WTP 2030 stated that "The top priority must be to maintain the capacity of the existing transportation system." TDM accomplishes this purpose, by shifting commuters from SOV to HOV modes, Existing capacity is maintained and more efficiently used and accomplished at lower cost. However, adding strategic capacity improvements only expands existing capacity, which is different.

"…and an evaluation of life cycle costs and benefits…"

The WSDOT Public Transportation Division has published aggregate benefits of the TDM program. The amount of the biennial investment in TDM by the Legislature is also known. There are gaps in calculating benefits but this can be improved.

"…that are systematically scheduled to carry out defined objectives within available revenue…"

Within the 2007-2026 HSP, the systematic scheduling of projects and services has included strategic capacity improvements and TSM, and some capital facilities that support walking and HOV travel; however, it has lacked the systematic scheduling of TDM services that could be selected to pair with and support both strategic capacity and TSM improvements.

"…The state must develop analytic tools to use a common methodology to measure benefits and costs for all modes…"

This statement in the law could be interpreted in more than one way. One interpretation could be that the same methodology must be applied to all modes, but the Highway Capacity Manual does not measure reduction in Drive Alone Rate (DAR) or VMT. For example, use of the same methodology should not be necessary for the purpose of a comparison of benefits and costs, nor would it seem advisable, as performance measures differ for different modes. There does not appear to be a suitable common methodology to measure benefit/costs for all modes. Benefits could be described in terms of the achievement of objectives that accomplishment the state's transportation policy goals (RCW 47.04.280) established under General Provisions (RCW 47.04) for Title 47 Public Highways and

Transportation. This law authorizes the Office of Financial Management (OFM) to establish objectives and performance measures. OFM's report provides a set of different objectives and performance measures for different modes for the state transportation policy goal of mobility, listed in the Table 3 below.

However, a different performance measure, volume/capacity, is used with LOS standards established by WSDOT for State Highways of Statewide Significance. The law authorizes WSDOT to set LOS standards (RCW 47.06.140) under Statewide Transportation Planning, RCW 47.06. Proposed TDM strategies appear to be evaluated for their potential to achieve Objectives 3.1 and 3.2, in Table 3 below, using the same methodology as used for evaluating strategic capacity improvements. This is a segment analysis based upon methodology of the Highway Capacity Manual. Presently, the data are not available to measure the effect of a specifically funded TDM strategy upon the volume/capacity of a particular state highway segment. It is possible that TDM strategies are not selected for inclusion in the priority program and proposed biennial budget due to this lack of information.

Table 3 - OFM Mobility (congestion relief) objectives and associated performance measures

Goal 3, Mobility: To improve the predictable movement of goods and people throughout the state.	
Objective	**Performance Measure**
3.1 Reduce congestion on urban highways and arterials in Seattle	**3.1 Annual Hours of Delay per Traveler**: Annual hours of delay per traveler on major corridors in greater Seattle and Spokane areas
3.1 Reduce congestion on urban highways and arterials in Spokane	
3.2 Reduce congestion by making system more efficient	**3.2 Avoided Annual Hours of Delay per Traveler**: Annual hours of delay avoided through operational or public transportation enhancements
3.3 Improve traffic flow through HOT lanes	**3.3 High Occupancy Toll (HOT) Lanes**: Usage of HOT lanes on SR 167
3.4 Improve performance of HOV lanes	**3.4 High Occupancy Vehicle (HOV) Lanes**: Usage of Seattle-area network of HOV lanes by person miles traveled (PMT)
3.5 Reduce percentage of commuters who drive alone to work	**3.5 Drive-Alone Rate**: Percentage of commute trips taken while driving alone
3.6 Increase ridership (ferries)	**3.6 Ferries**: Ridership and percentage trips on time for Washington State Ferries
3.6 Increase percentage of on-time trips (ferries)	
3.7 Increase ridership (passenger rail)	**3.7 Passenger Rail**: Ridership and percent of trips on time for Washington and Amtrak-sponsored Cascades train service
3.7 Increase percentage of on-time trips	
3.8 Increase ridership in Puget Sound area	**3.8 Transit**: Transit ridership inside and outside of the Puget Sound area
3.8 Increase ridership in areas outside of the Puget Sound area	
3.9 Promote walking and biking to improve public health	**3.9 Walking or Biking**: Percent of Washington workers (age 16 or older) commuting via biking or walking

Source: Office of Financial Management, State of Washington. "Washington's Transportation System: Goals, Objectives and Performance Measures." 2012 Biennial Transportation Attainment Report. October 2012, pp. 6-7, and 25-42.

A review of the 2015-2017 Biennial Budget Request proposed targeted reductions for Regional Mobility Grant Program, decreasing funds for ferry service, and decreasing funds for the Highway Maintenance and Operations Program (snow and ice removal). It did not appear to provide information about the process undertaken in developing the proposed allocation of funds, including the rationale behind the proposed targeted reductions.

While the 18th amendment prohibits use of gas tax for public transit, the Regional Mobility Grant Program is a way for WSDOT to support and fund public transit for strategic improvements that enhance mobility and help alleviate uneven demand for highway capacity during peak periods. Examples of Regional Mobility grants include funding for new transit services that connect urban centers, park and ride lots and expansions, new buses, and rush hour transit service along congested corridors.

The priority programming analysis must use demand modeling tools to "…evaluate investments based on the best mode or improvement, or mix of modes and improvements, to meet current and future long-term demand within a corridor or system for the lowest cost." (RCW 47.05.035) However, applying the travel demand modeling methodology and obtaining good data also have limitations.

Mobility Priority Programming Process (MP3) should be updated

The Mobility Project Prioritization Process (MP3) is used to carry out the state transportation policy goals. It accomplishes this by evaluating mobility projects from the WSDOT regions to choose the group of projects that provides maximum value and to justify program tradeoffs under budget constraints. According to the *WSDOT Mobility Project Prioritization Process, Benefit/Cost Software User's Guide*, May 2000, value "…is meant to encompass all the benefits of transportation improvements, including those that are not typically assigned a dollar value." (p.1)

Applying a benefit to cost analysis for a strategic capacity improvement might rate lower than a TDM strategy with regard to environmental protection and energy conservation.

The focus is upon Interstate segments that operate below the LOS standard. A TDM program, such as CTR, has been measured to remove 28,000 vehicles from the system during rush hours every weekday morning, and saving a cumulative total of 12,900 hours of traffic delay in a previous year. (Public Transportation folio, Fall 2012.) These results do not translate to its particular impact on an Interstate segment of concern. If saved hours of traffic delay were computed, these would have been calculated on particular roadway segments, so there must be some general idea which highway segments in the network are benefitting from CTR. The benefit impact of the entire CTR program is not focused upon a particular highway segment, it is dispersed along the highway network, so too, the cost impact of the entire CTR program would also be dispersed along the highway network. A particular highway segment would not bear the full brunt of the cost of the CTR program, only that cost that represents those trips removed from the highway segment by the CTR program. In addition, the benefit and cost impacts of CTR can be computed for a comparable life cycle time span for a highway strategic capacity improvement.

So while the benefit to any one highway segment may be very small, the cost will also be very small. As a result, it seems that what is more important is the benefit/cost (b/c) ratio for the overall CTR program. The CTR program costs are known. The benefits are not just congestion relief, but also to other transportation policy goals, including highway system maintenance and preservation, safety, environmental protection, and economic vitality. A strategic highway capacity improvement might have the most direct and immediate impact on vehicular delay reduction, but it will also have a very large cost. Using a benefit to cost analysis, the CTR alternative should fare well in comparison.

Any project not in the HSP cannot be further evaluated for inclusion in the 2-year biennial budget request. But once it is in the HSP and once it is demonstrated that the project will not worsen air quality in a non-attainment area, then that project proceeds through further evaluation by undergoing a benefit to cost analysis. (WSDOT Mobility Project Prioritization Process, Benefit/Cost Software User's Guide.

Dowling Associates, Inc. and Kittelson & Associates, May 2000, p.3. This reference is cited in *WSDOT's Handbook for Corridor Capacity Evaluation*, October 2014.)

WSDOT assesses potential mobility-related transportation projects based on the maximum throughput threshold in order to prioritize projects using the benefit to cost prioritization in the MP3. Types of demand management mobility projects that are evaluated by WSDOT using "before and after" type methodologies like MP3, include the following.

- Increase transit service
- Increase park and ride lot access and capacity
- Encourage, incentivize commute trip reduction (use transit, vanpool, carpool, walk or bike, telecommute, compressed work week)
- Enhancing alternate routes (opening new JBLM gates, etc.)

Source: *WSDOT's Handbook for Corridor Capacity Evaluation*, October 2014, "Before and After Project Analysis Methodology", p. 43.

The benefit to cost analysis is conducted as part of the cost-efficiency criterion, shown in Table 4. In addition to the benefit to cost analysis conducted to determine cost-efficiency, other criteria for mobility evaluation are identified along with scoring procedures and weights assigned to those criteria. These were initially determined with input from state transportation officials and WSDOT personnel. The cost-efficiency criterion was weighted higher than all the others combined. It is not known if these criteria and weights are re-determined for each biennium.

Table 4 - Evaluation criteria of the Mobility Project Prioritization Process

Criteria and Weights for the 1995-1997 Biennium (WSDOT Mobility Project Prioritization Process, p.2)	
	Weight assigned
Cost efficiency (benefit/cost)	65%
Community Support	14%
Environment	8%
Wetland Assessment	
Water Quality and Permitting	
Noise	
Land Use	7%
Modal integration	6%
Total	100%

For the benefit to cost analysis of the cost-efficiency criterion, the benefits are defined from a user perspective. The costs are defined from a highway system perspective.

WSDOT's Handbook for Corridor Capacity Evaluation, October 2014, identifies numerous other performance indicators for congestion measurement, which might be considered in evaluating the benefits and the costs. While the benefits in the current b/c equation are from the user perspective, key congestion performance indicators from the *Handbook* include many other categories. They include transit trip analysis metrics but these metrics are from a system perspective and not from a user perspective. Metrics from the perspective of the transit system include transit ridership (average maximum load), transit passenger miles traveled, transit utilization (percent of available seats), and park-and-ride lot capacity and use.

RECOMMENDATION PRO-1: Include public transit metrics for benefits from the user perspective, similarly to the way the benefits to motorists are evaluated, and more widely define its customer base as the traveling public rather than drivers.

RECOMMENDATION PRO-2: Have those evaluation criteria and assigned weights reviewed by a stakeholder group that includes WSDOT staff from multiple departments, including the Public Transportation Division, and citizen input as part of the community engagement process for each corridor study.

The original intention of the MP3 was to enable the community to weight the benefit and cost criteria. Presently, the benefit/cost ratio is weighted at 65 percent of the evaluation, where the benefit side of the ratio includes:

- Annual 24-hour motorist and freight travel time savings for 20 years after implementation of the project
- User operating savings
- Accident reduction (safety)

The community may be seeking other benefits, such as the degree to which the alternative scenario improves accessibility to jobs by public transportation.

The cost side of the ratio consists of the following over a 20-year period.

- Right of way
- Construction
- Environmental retrofit
- Preliminary engineering
- Annual operating and maintenance

It is unclear what is included in the environmental retrofit. Some environmental elements cannot easily be retrofitted, including NAAQS criteria pollutants and greenhouse gas emissions generated by each alternative scenario.

As shown in Table 5, the other 45 percent includes Community Support (14 percent), Environment (8 percent) with the subcategories of Wetlands Assessment, Water Quality and Permitting, and Noise Assessment. The 45 percent also includes Modal Integration (7 percent) and Land Use (6 percent). The Wetland Assessment is actually a category that reflects magnitude of public resistance to wetland impacts, and not the actual impacts to wetlands. The impacts to the wetlands are included in the cost of the environmental retrofit; however, this assumes retrofitting is 100 percent successful.

RECOMMENDATION PRO-3: Update the MP3 method through review of Best Available Practice and replace B/C analysis with the identification of the ”good enough” transportation improvement solutions, in accordance with least cost planning. The public also should be involved with the defining of criteria, (environmental mitigation) and the weighting of those criteria.

10. Funding

Per Executive Order 14-04, April 29, 2014, "The Department of Transportation, in consultation with the Freight Mobility Strategic Investment Board, the Transportation Improvement Board, and the County Road Administration Board, will conduct a review of existing state transportation grant programs in order to identify and implement opportunities to increase statewide investments in multimodal transportation. The review will also identify methods of securing transportation funding for local governments that have adopted plans and performance measures to enhance multimodal transportation systems. The Department of Transportation will identify and recommend both immediate and longer-term reforms to grant making that will increase multimodal investments."

Local Programs Transportation Improvement Board

The nature of funding opportunities and the conditions attached to the use of those funds lead local governments toward those project types. Transportation Improvement Board grant programs focus on transportation needs of small cities and towns, urban arterials and urban corridors, and sidewalks. The TIB Strategic Plan 2013-2015 strategies for Mobility were the following.

Fund projects that strategically add capacity and enhance mobility options.
Encourage projects that fill gaps and complete corridors.
Use criteria that identify projects that improve access to non-motorized mobility options, transit, and freight.

Mobility 10-year outcomes include:

- Congestion reduced on a project-specific basis.
- The leveraging of prior transportation investments.
- A continuous network of mobility options, providing access to non-motorized facilities, transit and freight.

Mobility 10-year performance indicators are:

- Change index (percent improvement) in level of service per project.
- Percent increase in completed corridors.
- Number of miles of corridor extension/improvement by project.
- Miles of bike lanes and sidewalks
- Number of projects accessing freight facilities

"The Transportation Improvement Board (TIB) distributes grants to cities and counties for high priority transportation projects that foster state investment in quality local transportation projects. Its six grant programs provided over $98 million dollars of capital funds in 2006 to communities throughout the state….Specific TIB grant programs focus on transportation needs of small cities and towns, urban arterials and urban corridors, and sidewalks. Its 21-member Board includes six city members, six county members, two WSDOT officials, two transit representatives, a private sector representative, a member representing the ports, a member representing non-motorized transportation, a member representing special needs transportation, and a governor appointee. TIB funding comes from the revenue generated by three cents of the statewide gas tax."

RECOMMENDATION FUND-1: Appoint a TDM specialist from the WSDOT Public Transportation Division to serve as a WSDOT representative on the TIB.

Reliance upon the gas tax puts transportation funding at odds with the state goal to decrease the annual per capita VMT by 50 percent by 2050. While TDM is hailed as a means to decrease VMT, TDM also may be seen by some as causing a decrease in gas tax revenues and an obstacle to economic goals.

The real issue with regard to climate change is miles traveled using combustion-engine motor vehicles, and not, for example, miles traveled using fuel cell vehicles or bicycles.

Increased travel activity is viewed by economists as an indicator of vibrant economic activity. The discussion about TDM should be repositioned as a boost to economic activity. TDM is defined by the regional planning council as a means to enable travelers to use the system more efficiently. Under that lens, there is some means to travel most efficiently for each trip taken, and for economic purposes, there may be some optimal magnitude of travel. More travel may not always be better.

Recommendation FUND-2: Consider the following ideas to fund TDM..

- **The current WSDOT traffic model recognizes that TDM is effective in reducing 2-5 percent of trips. As a result, it is proposed that 2 percent of the WSDOT budget be allocated to trip reduction activities.**
- **Develop a TDM Statewide Program Funding Strategy that incentivizes what WSDOT wants local governments to do.**
- **Provide funding incentives to local governments that implement development-based trip reduction ordinances.**
- **Devise new funding programs for public transportation.**
- **Allocate a portion of toll revenues to fund TDM programs that are designed and targeted to benefit the smooth operation of toll facilities.**
- **Restore funding of the GTEC and TRPP. The original TRPP was for any trips, any time of day. A new TRPP could be more specified to trips of concern, such as traffic in a particular direction during the peak hour. The purpose could be tailored for something particular, such as economic competitiveness.**

Consider the Quick Response Safety Program as a Demand Management Funding Source

In 2013, WSDOT funded 54 projects under the federal Quick Response Safety Program. The goal of the Quick Response Safety Program is to fund the construction phase of safety projects that are quick to initiate and complete. The projects must reduce fatal and injurious crashes on local roads and state highways that serve as city arterials using engineering countermeasures. Engineering countermeasures may include strategies that may also manage demand, such as signal retiming and improving bicycle and pedestrian facilities.

RECOMMENDATION FUND-3: Consider the Quick Response Safety Program as a funding source for Transportation Demand Management strategies that also address safety.

11. Construction Mitigation

Construction Mitigation—Work Zone Safety and Mobility Rule

Highway preservation activities are gaining greater priority as infrastructure approaches the end of its service life. As a result, work zone traffic flow and safety are becoming greater concerns. According to FHWA, work zones account for 24 percent of nonrecurring congestion and 10 percent of total congestion. High traffic volumes make it difficult to safely do reconstruction work in or near travel lanes.

For any highway construction project that receives federal funding, construction mitigation is regulated by the Work Zone Safety and Mobility Rule, September 9, 2004, Federal Register. The Rule requires states to implement a policy on work zone safety and mobility, establish procedures to assess work zone impacts, and establish procedures to manage individual projects. Extensive guidance for the implementation of the Rule, particularly the development of a transportation management plan, is provided by FHWA.

The WSDOT Design Manual M22-01.11 updated July 2014 contains Chapter 1010, Work Zone Safety and Mobility. The discussion in the Design Manual gives recognition for the need for early consideration of construction mitigation during the design process, as mitigation of impacts can account for up to 30 percent of the project cost.

According to the Design Manual, a transportation management plan (TMP) is a set of strategies for managing the corridor-wide work zone impacts of a project. A TMP is required for all projects and is the key element in addressing all work zone safety and mobility impacts. There are three main elements of a TMP, as categorized by FHWA. These include Temporary Traffic Control (TTC) strategies that direct traffic through a work zone, Transportation Operations (TO) strategies that improve traffic flow and safety through the work zone, and Public Information (PI) strategies that raise awareness and communicate travel restrictions. TTC strategies are included in the Plans, Specifications, and Estimates (PS&E) as traffic control plans and contract provisions. Some TO strategies and PI strategies are included in the PS&E, but some can also be managed by WSDOT outside the contract.

The TMP development begins in the scoping phase of a project by assessing impacts known at the time and then selecting mitigating strategies and design solutions to manage those impacts. The Design Manual identifies participants in the development of a comprehensive work zone design, including planners, designers, construction engineers and maintenance personnel.

The Design Manual emphasizes the importance of continuing the development of the TMP throughout the project development process. Actions and issues that need to be addressed in the TMP include minimizing, mitigating, and managing work zone impacts, and integrating work zone impact strategies early, during planning, programming, and design.

Construction Mitigation—Developing the TMP

Included in the process of developing a transportation management plan is the assessment of work zone mitigation resulting from various combinations of mitigation strategies in the TTC, TO and PI categories. This exercise aids in determining which strategies will be most effective. FHWA provides a table that presents considerations for the effectiveness of various TTC, PI and TO strategies (Table B.1 TMP

Strategy Matrix—Mobility/Safety Improvement and Considerations for Implementation, located in Developing and Implementing Transportation Management Plans for Work Zones, Appendix B).

The assessment of construction impacts must be early and ongoing. During the impacts assessment, the components of the TMP, including the strategies contained within the TTC, TO, and PI, are developed to address the identified impacts as needed to effectively manage the project. There are a variety of analysis tools available to estimate the impact of work zone activities on traffic flow. FHWA provides guidance for the selection of traffic analysis tools. The tools help predict extent of delay for planning construction phasing and detour routes and to compare the costs and effectiveness of alternative mitigation strategies. WSDOT may select different analysis tools for different projects. Given limited resources, WSDOT may have to justify its selection of mitigation strategies.

No single analysis tool is ideal for all work zones. Some tools, like QuickZone, Highway Capacity Manual-based tools, and Quewz, can calculate queue length and vehicle hours of delay, and total costs per passenger car delay, associated with alternative traffic delay mitigation strategies, in the work zone and also on adjacent detour routes. Strategies include alternative construction phasing, scheduling construction at different times of day or days of the week, or mode shift to transit. Washington State was an initial partner with FHWA in the process for validating the results of QuickZone analyses. These tools are inexpensive and not data intensive but also are not used for complex projects.

Complex projects may use microsimulation tools such as CORSIM, VISSIM, AIMSUN and Paramics, which require greater amounts of data, time and expertise, to construct a model that can accurately forecast traffic conditions. It is possible that over reliance on modeling tools may put an assessment of TDM strategies at a disadvantage if incorrect assumptions about the effectiveness of TDM (i.e., percentage of vehicles removed due to SOV switching to public transit) are inputs to the model that then calculates an insignificant impact on delay reduction. Another possibility is that insufficient reliable data regarding percentage of vehicles removed due to a targeted TDM strategy for construction mitigation may discourage consideration of TDM for a construction project in the first place.

Traffic conditions also depend upon many unknowns, such as driver behavior. Driver behavior includes car following, lane changing, and speed choice. While FHWA funds research to model individual vehicle movements on a second or subsecond basis to recreate traffic flow under certain conditions, there may be other missed variables that remain unidentified. Each work zone is a unique environment. Are we delving into minutiae to make the model precise but not necessarily accurate? The model still might not have sufficient predictive power to steer analysts to the best set of TTC, TO, and PI strategies. Analysts cannot go back in time and apply a different set of strategies to a work zone to verify earlier decisions made. In the meantime, TDM services have the potential to reduce SOV and also provide transportation choices and relief from the stress of driving for those travelers who choose to try alternatives. TDM-related delay mitigation options can be investigated, such as replacing SOV trips with more passengers in HOVs and moving some peak period trips out of the peak.

Construction Mitigation—What do we mean by TDM?

- Confusion about what TDM includes may cause TDM to be overlooked.
- Categories of construction mitigation strategies overlap.
- TDM safety advantages can be overlooked.
- The goal should be for a comprehensive assessment of various TDM options to select one or more TDM options that synergize and achieve congestion mitigation results.

The information from Table 5 below is selected from the Table B.1 TMP Strategy Matrix, *Mobility/Safety Improvement and Considerations for Implementation, FHWA Work Zone Mobility and Safety Program*. It presents how various construction mitigation strategies are categorized and to illustrate how there can be overlap, which can confuse the conversation about what is meant by TDM.

A construction work zone Transportation Management Plan (TMP) for example, might include ramp metering—considered a Demand Management Strategy by this Matrix—concluding that TDM has been addressed in the TMP when, in fact, the TDM programs and services that help a commuter make alternative transportation choices have not been provided.

The complete FHWA TMP Strategy Matrix indicates for each strategy, whether it improves mobility, motorist safety, and work safety, triggers for consideration, potential pros and cons, and other considerations. It is important to note that every strategy has pros and cons, necessitating consideration of the best set of Temporary Traffic Control (TTC), Transportation Operations (TO) strategies, and Public Information (PI) strategies for each particular work zone. Constructability, safety and mobility are the three considerations for selecting strategies for a TMP. According to the FHWA Matrix, TDM strategies are generally viewed as not providing safety advantages, which may count against TDM if a choice for use of limited funds must be made. A strategy that provides both mobility and safety benefits might be selected instead.

Within FHWA's TMP Strategy Matrix, Public Information (PI) Strategies are divided into Public Awareness and Motorist Information. There also are Transportation Operations (TO) Strategies that are divided into Demand Management and Corridor/Network Management Strategies. However, Demand Management strategies are often used with Public Awareness, such as a park-and-ride promotion might be accomplished through a paid advertisement.

Public transportation services is listed as a type of Demand Management strategy, in addition to ramp metering and congestion pricing. Pedestrian and bicycling facilities are considerations categorized under Temporary Traffic Control.

Public Information strategies identified are often used in TDM campaigns even though construction mitigation guidance categorizes demand management strategies within Transportation Operations.

Similarly, the development of Active Transportation and Demand Management Strategies tends to cross over into areas sometimes categorized as transportation demand management. For example, The FHWA *Guide for Highway Capacity and Operations Analysis of Active Transportation and Demand Management Strategies* includes Active Demand Management strategies like dynamic ridesharing, on-demand transit, dynamic fare reduction and dynamic pricing, predictive traveler information, and dynamic HOV/managed lanes.

Table 5 does not include Temporary Traffic Control (TTC) strategies because there appears to be little overlap between demand management and TTC. However, one exception is that bicycling and walking are commonly discussed within a TDM services context and accommodations for bicyclists and pedestrians are listed under TTC.

RECOMMENDATION CM-1: Conduct a comprehensive assessment of the various TDM options, to select one or more TDM options that work well together to achieve vehicle trip reduction results for the particular circumstances of the work zone.

Table 5 - TDM is categorized under different strategy types

Public Information (PI) Strategies		Transportation Operations Strategies	
Public Awareness Strategies	**Motorist Information Strategies**	**Demand Management Strategies**	**Corridor/Network Management Strategies**
Coordination with media, businesses, schools	Changeable message signs	Transit service improvements	Signal timing improvements
Press releases	Dynamic speed message sign	Transit incentives	Street/intersection improvements
Paid advertisements	Traffic radio	Shuttle services	Bus turnouts
Public Information Center	511 traveler information	Ridesharing/carpooling incentives	Parking restrictions
Project web site		Park-and-ride promotion	Reversible lanes
Public meetings		Parking supply management	Ramp metering
Community task forces		Toll/congestion pricing HOV lanes	Ramp closures
Brochures/mailers		Ramp metering	
Rideshare promotions		Telecommuting	
		Variable work hours	

Source: Table Excerpted from FHWA TMP Strategy Matrix Table B.1

Construction Mitigation-WSDOT Design Manual

The WSDOT Design Manual does incorporate TDM as a required consideration in construction mitigation.

> "Planned closures can accelerate work operations reducing the duration of impacts to road users. These types of traffic control strategies must include demand management and public information plans to notify road users and mitigate and manage the impacts as much as possible." (1010.07)

In fact, the WSDOT Design Manual, July 2014, already lists TDM in the checklist to develop a formal TMP document on significant projects. A "significant project" is one that causes sustained work zone impacts. On the Interstate within the boundaries of a Transportation Management Area, a work zone causing intermittent or continuous lane closures for more than three days is considered a significant project. The format of the TMP guidance in the WSDOT Design Manual is similar to the TMP Potential Components Checklist provided by FHWA. TDM is listed under Item 7. Selected Work Zone Impacts Management Strategies (p. 1010-36). Demand management is a line item under Transportation Operations (TO). Demand Management is further itemized under 1010.06(6)(a) Transportation Operations Strategies with the following list.

- Provide transit service improvements and possible incentives to help reduce demand.
- For long-term freeway projects, consider ramp metering.
- Provide a shuttle service for pedestrians and bicyclists.
- Provide local road improvements (signal modifications, widening, and so on) to improve capacity for use as alternate routes.
- Provide traffic screens to reduce driver distraction.

The following is documentation of references about TDM found in the WSDOT Design Manual.

- A capacity analysis helps determine whether a work zone strategy is feasible. As part of the traffic capacity analysis process to determine the level of impact, the Design Manual indicates that "Demand management and public information strategies may be required to address delays." and "Planned closures can accelerate work operations reducing the duration of impacts to road users. These types of traffic control strategies must include demand management and public information plans to notify road users and mitigate and manage the impacts as much as possible" (1010.07).
- Temporary Traffic Control Strategies lists the provision of pedestrian and bicycle detour routes and cites potential impacts to bus stops (1010.06(5)(h)).
- Under 1010.05(1)(b) Transportation Operations (TO), four broad categories are listed as options to include in the TMP. The first of these listed is Demand Management Strategies, followed by Corridor/Network Management (traffic operations) Strategies, Work Zone Safety Management Strategies, and Traffic/Incident Management and Enforcement Strategies. Examples of Demand Management Strategies are given as transit service improvements, transit incentives, and park & ride promotion.
- Under Public Information Strategies, the Design Manual instructs to "Include pedestrian and bicycle access information and alternate routes in the public awareness plans. Pedestrian and bicyclist information signing, including alternate route maps specifically for these road users, could be considered" (1010.06(7)(c)).
- Under Work Zone Design Standards, the Design Manual addresses Accommodations for Pedestrians and Bicyclists in 1010.08(7).

Finally, under the discussion of TMP Strategies, the Design Manual instructs: "Do not assume that strategies chosen for past projects will adequately address the impacts for similar current projects. There may be similarities with the type of work, but each project is unique and is to be approached in that manner. Always look for other options or innovative approaches; many projects have unique features that can be turned to an advantage if carefully considered. Even a basic paving project on a rural two-lane highway may have opportunities for detours, shifting traffic, or other strategies" (1010.06(4)).

Construction Mitigation-Recent examples of activities by PTD

According to PTD, through its CTR Program, PTD has conducted construction traffic mitigation to maintain transportation system efficiency during construction and to provide flexibility in how and when construction occurs to save time and money. The CTR Program concentrates its construction mitigation activities on congested corridors and GTECs. Recent examples of PTD involvement in construction mitigation are SR 520, I-405 and I-5. Construction mitigation activities on I-405 have included increasing transit services, public outreach to provide information about transportation alternatives, incentives to vanpools and carpools to use lesser-used park-and-ride lots to provide additional space for transit riders, and providing bike racks and lockers.

Construction mitigation activities for I-5 included retiming traffic signals on alternative routes, adding capacity to Sounder commuter rail trains, and providing incentives to vanpool riders. Various TDM programs through the PTD are already underway and ongoing. Because some of the organizational structure for service provision and the TDM programs themselves are already in operation, the

extension of those existing TDM programs and services to a construction project TMP would not include start-up costs but instead require only the additional cost to extend the existing program.

RECOMMENDATION CM-2: Add more construction mitigation reference materials to provide more examples of TDM and case studies of the successful use of TDM during construction, particularly WSDOT's experience with SR 520, I-5 and I-405. This should be included in the Reference section of the construction mitigation chapter of the WSDOT Design Manual.

Construction Mitigation-Proposed Topics of TDM Mitigation Plan within Transportation Management Plan

RECOMMENDATION CM-3: Create a TDM Mitigation Plan that is a component within the TMP and that lays out a suite of synergizing TDM strategies developed with the specific circumstances of the work zone in mind.

A proposed WSDOT Statewide Transportation Demand Management (TDM) Policy should contain the directive to consult with PTD in the scoping phase of the project to ensure that TDM strategies are planned and initiated before construction begins.

RECOMMENDATION CM-4: Assign a TDM specialist from PTD be part of the work zone safety and mobility design team beginning with scoping and through the construction project to completion.

The assigned PTD staff should develop a TDM Mitigation Plan to meet the particular maintenance of traffic needs of all phases of construction. For each construction project phase, the TDM Mitigation Plan would describe a coordinated set of strategies assigned to improve passenger throughput at identified locations of construction. Each strategy would be described in detail, including timing, trip reduction target, tasks assigned to WSDOT staff, tasks assigned to be contracted out, cost, internal and external stakeholders needed as partners, and how it synergizes with other selected strategies.

RECOMMENDATION CM-5: Require that the TDM Mitigation Plan include a data collection and analysis element to build an information base of before-construction and during-construction traffic counts to monitor program effectiveness.

During construction work zone monitoring, ongoing impact assessment may lead to adjustment in the trip reduction target and the need to update the TDM Mitigation Plan. Although the TDM Mitigation Plan is initiated ahead of the project, ongoing impact assessment should advise the TDM Mitigation Plan to make sure that efforts planned can accomplish trip reduction goals. If at this stage, a more aggressive approach and associated funds are needed to reach these goals, the PTD staff would update the TDM Mitigation Plan in the PS&E.

The content of the TDM Mitigation Plan should include the following.

1. Describe specific circumstances of the work zone.
2. Tailor TDM strategies to each phase of construction.
3. Describe each strategy described in detail and how it complements other strategies.
4. Determine timing.
5. Set SOV trip reduction target.
6. Establish service provision target.
7. Assign tasks to WSDOT staff.
8. Determine tasks to be contracted out and incorporated into PS&E.

9. Outline data collection and analysis method and communicate to and coordinate with work zone construction mitigation contractor.
10. Estimate costs.
11. Identify internal and external stakeholders needed as partners.
12. Confirm stakeholder engagement objectives.
13. Set schedule of stakeholder engagement activities.

RECOMMENDATION CM-6: After updates of the Design Manual are made, provide notice to WSDOT staff about changes to the Design Manual that include TDM in Construction Mitigation.

This could be followed up with an internal WSDOT workshop for all those involved in construction mitigation to be familiarized with the changes, to ask questions, and immediately identify current and proposed construction project plans for which TDM Mitigation Plans should be developed and implemented.

TDM Mitigation plan of each TMP should be incorporated into the following plans and activities.

- Statewide CTR Plan
- Regional Plan
- CTR Plan of local government host of the construction work zone location
- CTR activities of employment sites that will be affected by the work zone construction

The strategies in the TDM Mitigation Plan would also coordinate with and augment existing efforts of the statewide CTR Program and be identified within the State CTR Plan. Including many TDM strategies in a TMP would be extending existing services and programs to a new application, which could be implemented by staff through PTD as a stand-alone project, or be recognized, listed and incorporated into the State CTR Plan, the CTR Plan of the local government within which the construction project is located, and into the individual CTR activities of participating employment sites that will be potentially affected by the construction. Highway construction projects are a golden opportunity for local government CTR plans to use to focus efforts with CTR employers and to organize broader campaigns. For those commuters affected by the construction, success with engaging them to participate in "temporary" use of commute alternatives could be the beginning of a permanent switch. The CTR Plan can anticipate and plan for these opportunities.

12. Growth Management Act

- Consider adopting a performance measure of passenger throughput on state highways affected by land development.
- Consider other performance measures that the development applicant could agree to, such as measures describing transportation service provision.
- Conditions of development approval could include alternative transportation service provision, or payment into a local government TDM fund, or for a programmed WSDOT TDM service, periodic traffic data collection, analysis and reporting.
- If proposed land development is within a designated affected urban area, modify trip generation rates and mode split to reflect the achievement of goals set in the local government CTR Plan.
- Provide technical training in TDM to WSDOT Region staff members who review local government land development proposals.
- Provide technical assistance to local governments to strengthen local ordinances, such as zoning, use of transportation management programs (TMP), subdivision, concurrency, parking, impact fee, and urban design.
- Consider use of trip reduction ordinances aimed at land development proposals.

There are three main areas where WSDOT can influence GMA outcomes. These include the following:

- Influencing the development of a local government's comprehensive plan transportation element.
- Providing technical support and incentives in the development of ordinances that implement the local comprehensive plan transportation element.
- Participation in the land development review process with regard to mitigating potential impacts of proposed new development on the level of service and functioning of the state highway system.

Below is a summary of the law relating to requirements for the development of a local comprehensive transportation element and WSDOT's role in this process. WSDOT currently participates in several ways.

- Monitoring and evaluating performance of state facilities within the local jurisdiction.
- Planning improvements to the state highway system.
- Verifying completeness of inventory of state facilities and LOS standards in the transportation element.
- Providing data, such as traffic counts.
- Coordinating the local six-year plan with the state OFM 10-year capital improvements and preservation investment plan.
- Reviewing the transportation element to verify top down consistency.

It is an iterative process in that "…the State Highway System Plan (HSP) is updated every two years, in coordination with local plan updates, to reflect completed work and changing transportation needs, policies and revenues." (WSDOT Design Manual M 22-01.05, June 2009, p. 120-6.)

WSDOT also contributes by way of updating the State CTR Plan. A new CTR Plan 2015-2019 was adopted by the CTR Board in September 2014. The State CTR Plan sets policy, performance goals and targets in the update of the local CTR plans. Generally, the local CTR Plans fill the statutory requirement for a demand management subelement in the transportation element. The WSDOT CTR Program has been successful in the past in securing state seed funding for local Growth and Transportation Efficiency Centers (GTEC) that are a part of the CTR Plan of some local governments. WSDOT also can influence

GMA outcomes through successful legislative proposals to amend the CTR Program. Currently, the CTR Program is interested in securing several changes to the CTR law, including changing the focus from commute trips to all trips. The CTR Program also seeks funding for a program of technical and financial support to help local governments update their comprehensive plans to produce land use patterns that maximize transportation efficiency. The CTR Program seeks to encourage, through competitive grants, community-tailored CTR Plans that address all trips. The CTR Board wants to incentivize integration of transportation and land use policies, plans and decisions.

Successful incorporation of TDM into GMA requirements that must be fulfilled by local governments may depend on positioning, delivering, and emphasizing TDM as a means of saving money while providing transportation services, in addition to reducing SOV trips. Though required by RCW 70.94.521, reducing Drive Alone Rate (DAR) as a key performance indicator is a weak expression of transportation service provision that risks being undervalued or at worst, misunderstood by local government officials, the public, and even government staff. DAR reduction is expressed in the form of the negative of a trip provided, and is unappealing. If the commuter did not drive alone, what other transportation services did he or she use? How can another performance measure be expressed as a transportation service provided?

If increases in TDM investments are sought, TDM needs to be better understood and appreciated by local elected officials. If increasing partnerships with the private sector is desired, TDM needs to be better expressed in language that lay people understand and that articulates business benefits.

RECOMMENDATION GMA-1: The CTR Board should consider other performance indicators to address goals of reducing traffic congestion, improving air quality, reducing fuel consumption, and strengthening the economy.

In addition to DAR reduction, the performance measures could express transportation service provided, such as number of peak period HOV passenger trips served, rate of increase in HOV passenger trips served outside the peak period, number of employees participating in telecommuting, compressed work week and staggered work hours, wireless coverage on the property, and rate of increase in bicycle traffic and pedestrian traffic.

In the WSDOT Design Manual M 22-01.05, June 2009, Chapter 320 Traffic Analysis, the method for preparing a Traffic Impact Analysis (TIA) includes measuring existing and future conditions in traffic volumes.

RECOMMENDATION GMA-2: Establish an additional performance measure to reflect peak hour passenger trips served, with an associated level of service standard.

RECOMMENDATION GMA-3: Additionally, because the CTR Plans of local governments have vehicle trip reduction targets, these targets should be reflected in a modification of trip generation rates and the mode split used for the traffic assignment.

For example, the State CTR Plan 2015-2019 reflects the Governor's goal to increase use of transportation alternatives to 33 percent by 2015 and to 40 percent by 2019. DAR targets for GTECs are usually more ambitious. Local governments may adopt their own goals and targets, per the State CTR Plan. In addition the TIA is an opportunity to collect before and after data for average vehicle occupancy, pedestrian counts and bicycle counts.

To meet the concurrency requirements under RCW 36.70A.070(6)(b), the law lists demand management strategies, public transportation service, and ride sharing programs among mitigation strategies that can be used to restore traffic conditions to meet the LOS standard.

Land Development Review

Additionally local governments may include multimodal transportation improvements to meet concurrency requirements under RCW 36.70A.108. The Design Manual recommends consultation between the local jurisdiction, WSDOT, and those preparing the Traffic Impact Assessment (TIA), to reach consensus on the mitigation measures. The WSDOT Region staff members who participate in land development review should have some technical background in TDM and should recommend TDM strategies as part of traffic mitigation in the conditions for development approval. A traffic mitigation payment can also be made by the applicant as a contribution to a programmed WSDOT project. As more TDM programs and services are identified in corridor plans, and added to the statewide plans, such as the HSP, the TDM programs and service become eligible to be programmed.

RECOMMENDATION GMA-4: WSDOT Region staff members who participate in land development review should receive professional development training opportunities and financial support to participate in Washington State Ridesharing Organization (WSRO) conferences to become better acquainted with TDM.

WSDOT can provide technical assistance to local governments for strengthening local ordinances that improve land use and transportation efficiencies.

Growth Management Act Local Planning Requirements for Transportation

A county or city that is required or chooses to plan under the Growth Management Act (GMA) (RCW 36.70A.040) is required to develop a transportation element within its local comprehensive plan. The WA Department of Commerce administers the GMA requirements and oversees the local government comprehensive plan update process. The transportation element of the local comprehensive plan responds to the growth estimates and policies from the land use element. Below is a summary of portions of the law that relate to WSDOT's role.

- Wherever possible, the land use element should consider utilizing urban planning approaches that promote physical activity. RCW 36.70A.070(1)
- In the transportation element of the local comprehensive plan, there is a required subelement that provides estimated traffic impacts to state-owned transportation facilities resulting from land use assumptions to assist the department of transportation in monitoring the performance of state facilities, to plan improvements for the facilities, and to assess the impact of land use decisions on state-owned transportation facilities. RCW36.70A.070(6)(a)(ii)
- There must also be a subelement that addresses facilities and services needs. For state-owned transportation facilities, level of service standards for highways, are prescribed in Chapters 47.06 and 47.80 RCW, to gauge the performance of the system. The purposes of reflecting level of service standards for state highways in the local comprehensive plan are to monitor the performance of the system, to evaluate improvement strategies, and to facilitate coordination between the county's or city's six-year street, road, or transit program and the Office of Financial Management's ten-year investment program. RCW 36.70A.070(6)(a)(iii)(C)
- The transportation element requires that after the adoption of the comprehensive plan by jurisdictions required to plan or who choose to plan under RCW36.70A.040, local jurisdictions

must adopt and enforce ordinances which prohibit development approval if the development causes the level of service on a locally owned transportation facility to decline below the standards adopted in the transportation element of the comprehensive plan, unless transportation improvements or strategies to accommodate the impacts of development are made concurrent with the development. These strategies may include increased public transportation service, ride sharing programs, demand management, and other transportation systems management strategies. RCW36.070.(6)(b).

- However, the concurrency requirements do not apply to transportation facilities or services of statewide significance except for counties consisting of islands whose only connection to the mainland are state highways or ferry routes. In these island counties, state highways and ferry route capacity must be a factor in meeting the concurrency requirements. RCW 36.70A.070 (6)(a)(iii)(C)
- The facilities and services needs subelement of the transportation element must include specific actions and requirements for bringing into compliance locally owned transportation facilities or services that are below an established level of service standard. RCW36.70A.070(6) (a)(iii)(D)
- The facilities and services needs subelement must also include an identification of state and local system needs to meet current and future demands. Identified needs on state-owned transportation facilities must be consistent with the statewide multimodal transportation plan required under Chapter 47.06 RCW. RCW36.70A.070(6)(a)(iii)(F)
- The transportation element must include a demand management strategies subelement. RCW36.70A.070(6)(a)(vi)

Local Comprehensive Plans Lack Specificity in Addressing TDM

Local government comprehensive plans do have a number of requirements by state law, including that the transportation element must address demand management strategies. A review of comprehensive plans for local governments found that some do nothing more than provide a list of general TDM strategies, with no discussion of any targeted programming. If counties, cities and transit agencies follow through with providing detail in these areas, then there will be better guidance from the host communities surrounding a corridor, regarding what they set out to accomplish. This can serve as a point of departure for the selection of alternative performance measures for the corridor. These alternative performance measures can be applied as early as the identification of gaps or deficiencies in the corridor sketch planning process. This would provide preliminary direction for the development of a proposal for a corridor planning study.

RECOMMENDATION GMA-5: The Washington State Department of Commerce, in their review of local comprehensive plan updates, should request greater specificity in addressing demand management strategies.

The Requirement for Plan Consistency can make Change Challenging

By state law, external consistency is required in comprehensive planning. An example of external consistency is that the level of service standards for a roadway must be consistent across municipal boundaries. County and city comprehensive plan transportation elements also must reflect regional priorities. Consistency is important; however, if a community wants to make a change, such as redefining level of service and selecting a new standard, it may encounter an inconsistency stumbling block if its neighboring communities continue to use the old level of service indicator and standard.

RECOMMENDATION GMA-6: The regional planning council should be asked to provide facilitation as neighboring local governments entertain the possibility of using different performance indicators.

Lack of Prioritization of Community Objectives

In concept, a corridor's future problems and opportunities to provide transportation service is perceived through the lens of present performance measures used to evaluate the corridor. The primary performance measures have been safety as measured by crash data, travel speed, peak period direction travel time, area-wide VMT, total vehicle hour delay reduction, and the number of congested segments.

WSDOT wants to move toward use of other performance measures. Since the corridor plans should reflect the objectives of the community, it is incumbent upon local governments and the region not only to identify their objectives but also to prioritize them, then select the best performance indicators. The challenge in the development of a transportation service investment program is to assign relative importance to objectives to guide how much effort and resources should be allocated to each, as well as whether some objectives should be accomplished before others.

RECOMMENDATION GMA-7: A process for the development of a community vision for the corridor should be developed to help a local government articulate objectives.

13. State Environmental Policy Act (SEPA)

The success of incorporating TDM into the SEPA review process is reinforced by the integration of transportation and land use in the local jurisdiction that is pursuing an action requiring SEPA review. If the local government comprehensive planning process and implementing regulations successfully support the integration of transportation and land use, the desired effect will be a built environment that supports safe and convenient walking and bicycling for transportation, as well as public transportation. The proposed development location would likely be within a GTEC. The built environment would be transit oriented with a managed parking supply. Adjacent private properties would be committed to development agreements that stipulate the provision of on-site physical facilities that support use of transportation alternatives, in addition to the provision of TDM support programs, services, and incentives. Large work sites will have been implementing CTR activities.

TDM support might include membership in a local transportation management association (TMA), the designation of a transportation coordinator on-site, provision of readily available information on alternative transportation programs, and support for ridematching with others on-site or as participants in the larger regional ridematching service. Subsidies for public transit and vanpool participation would be available to building occupants. Under such a scenario with the physical infrastructure and support programs, services, and incentives in place, the likely traffic impact of the proposed action, whether it is a project action, or non-project action, would be ameliorated with a mode shift away from SOV travel. Any additional traffic impact that must be mitigated could rely more strongly on solutions that take advantage of existing capital improvement programs that support pedestrian, bicycle and public transit infrastructure as well as solutions that can build upon and add to existing TDM programs, services and incentives.

In the meantime, these TDM-supportive characteristics of the project environment may not yet exist or they may be in the early stages of development and not yet generating a sizable shift to alternative transportation modes. WSDOT is then faced with decisions regarding what should be requested to mitigate the proposed action's impacts to state facilities. WSDOT staff must adequately document a proposal's likely adverse impacts, and relate them to any requests by WSDOT for mitigation. The mitigation must be roughly proportional and directly related to the impacts of the development.

Requests for improvements to roadway capacity to maintain established state highway LOS standards also risk perpetuating an environment where land development resources continue to be directed to accommodate SOV travel, resulting in the traffic congestion disincentive to drive alone being removed or reduced.

It is also recognized that the CTR Program is poised to adopt goals and targets to increase the use of transportation alternatives for commute trips among residents to 40 percent by 2019, with a jurisdiction's CTR program achieving an increase in use of transportation alternatives 6 percent over its baseline. The achievement of these goals should be reflected in the assessment of background traffic.

RECOMMENDATION SEPA-1: The Moving Washington approach should be applied to the development of mitigation requests and, similarly to the recommendation for corridor planning, that a program of TDM strategies be devised to maximize its vehicle trip reduction impact to the affected state facilities and be implemented first, before proceeding with TSM and physical capacity improvements.

This mitigation request would include a TDM program of strategies, incentives, and disincentives that limit the generation of SOV trips by the proposed development and directly serve that development.

RECOMMENDATION SEPA-2: The achievement of alternative transportation facilities and TDM programs, services and incentives as envisioned by the end of the 20-year planning horizon should be assumed to be accomplished by that time period, and that the mitigation required of the proposed action be tailored to contribute to and support that long term vision.

This is to avoid requesting types of mitigation that are reacting to traffic circumstances of the immediate future and making an SOV-reliant system a self-fulfilling prophecy. This may involve a suspension of LOS standards for maintaining motor vehicle capacity, or a revision of performance measures and standards that better reflect a multimodal system.

RECOMMENDATION SEPA-3: The WSDOT Region staff member developing the mitigation request must have technical training in TDM.