METRO 2040
Modal Targets Project

Evaluation of Potential Measures for Achieving Modal Targets

Final Appendix

METRO
PEOPLE PLACES
OPEN SPACES

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The contents of this document do not necessarily reflect views or policies of the State of Oregon.

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Appendix A. Detailed Report of Jurisdictional Compliance

This appendix includes relevant TDM text from the sample jurisdictions' TSPs. It also summarizes comments from the phone interviews conducted by Alta Planning + Design. Alta interviewed transportation planners from each of the six selected jurisdictions to determine whether the measures identified in the TSP are being implemented and to gauge the level of success in meeting non-SOV targets. The interview questions focused on whether each of the identified measures were being implemented and if (and how) they were being evaluated. The interviews also addressed what the City or County was doing for its own employees as part of ECO requirements.

City of Portland

The City of Portland is currently implementing the following actions through code requirements or through direct programs.

- Parking Management and Requirements
- Support of TMAs
- Roadway Connectivity Requirements
- Transit Pass Program in Regional Centers
- Other Transit Strategies
- Neighborhood-based Travel Management (Travel-Smart Program)
- Development Incentives
- Implementing Bicycle/Pedestrian Facilities
- Carpool/ Match

Text from the City of Portland's TSP is followed by a summary of interviews with transportation staff.

TSP Notes on TDM & Non SOV Actions

CHAPTER 5 TRANSPORTATION DEMAND MANAGEMENT AND PARKING PLAN

"The City's approach to TDM and parking management has focused on working with employers to create TDM programs for their employees. The City is now expanding its focus to also develop strategies and policies that encourage transportation options such as walking, biking, ridesharing, transit, telecommuting, and smart use of the automobile. In the coming years, the approach will include education, outreach, promotion, removing physical and perceptual barriers, providing incentives to target audiences, and creating and supporting partnerships and initiatives that promote transportation options. This approach is reflected in the following objectives:

- Work with employers to create programs for their employees to reduce SOV trips and increase use of carpooling, transit, and non-motor vehicle modes." p. 5-141

CHAPTER 2 TRANSPORTATION ELEMENT OF THE COMPREHENSIVE PLAN

Policy 6.25 Parking Management

Objective A

"Implement measures to achieve Portland's share of the mandated 10 percent reduction in parking spaces per capita within the metropolitan area over the next 20 years." p. 2-31

Policy 6.27 Off-Street Parking

Objective A

"Consider eliminating requirements for off-street parking in areas of the city where there is existing or planned high-quality transit service and good pedestrian and bicycle access." p. 2-32

Objective B

"Encourage the redevelopment of surface parking lots into transit-supportive uses or development or to include facilities for alternatives to the automobile… making parking lots more efficient by including carpool and motorcycle parking, redeveloping parking as transit facilities such as bus waiting areas, removing parking for more development, or placing parking in structures rather than surface lots" p. 2-33

Policy 6.28 Travel Management

Objective A

"Develop neighborhood-based programs to promote and support multimodal strategies and trip reduction strategies and programs." p. 2-33

Objective C

"Support and encourage the growth of car sharing among City residents and businesses through actions that expand the supply of car sharing vehicles at convenient locations and actions that increase the demand for car sharing services." p. 2-33

Objective E

"Require institutions to mitigate excessive parking impacts on residential areas." p. 2-33

POLICY EXPLANATION

"Transportation demand management measures are key to ensuring the compatibility of institutions with the neighborhoods in which they are located. The policy and objectives are implemented, in part, through conditional use and impact mitigation plan approval criteria language in Title 33: Planning and Zoning." p. 2-33

IMPLEMENTATION MEASURES

"Through conditional use and conditional use master plan reviews (Chapters 33.815 and 33.820 of the zoning code), conditions of approval are often placed on large institutions, such as churches and colleges, to require a transportation demand management plan. The TDM plans are tailored to each institution to ensure that transportation impacts can be mitigated over time as the institution grows. Impact mitigation plans (similar to a conditional use master plan) specifically require TDM plans….

PROPOSED CODE CHANGES

Chapter 6, Implementation Strategies and Regulations, contains the new Title 33, Planning and Zoning, language that specifically requires TDM plans as part of conditional land use reviews. This language makes it clear that TDM plans are an important part of the transportation strategy to support large institutions and other uses. To comply with the UGMFP Title 2 requirement that parking lots over three acres in size have 'street-like features', new regulations are being added to

Title 33. In addition to the 'street -like features', these large parking lots must have their 'streets' or driveways spaced to meet the connectivity requirements (every 530 feet) contained in the 2000 RTP. To encourage carsharing, incentives are being considered to encourage developers to provide parking for carsharing vehicles. A pilot project to allow carsharing vehicles to have designated on-street parking may be expanded to apply more widely. p. 5-152, 5-153

"Carpool, vanpool, and rideshare efforts should continue and expand in the following ways:

- Continue to explore opportunities to provide preferential carpool spaces on-street and in private parking facilities and public garages.
- Explore the possibility of a "School-Pool Program," using the web-based rideshare system, for parents who drive their children to public and private schools. The School-Pool program would reduce the vehicle trips generated by parents whose children cannot walk or bicycle to school.
- Explore opportunities for turning small plot s of temporarily unused land (such as ramps near highway projects, vacant lots, and land slated for new facilities) into vanpool parking lots. The spaces would ideally be available for about one year, with each parking lot eventually reverting to its owner for other uses.
- Explore opportunities to create vanpool loading zones in appropriate areas throughout the City." p.5-155
- Parking Meter Districts
- Smart Park Garage System
- Carpool/Vanpool programs
- Area Parking Permit Program
- Expanded Fareless Square
- Neighborhood Rideshare
- Walking, Bicycling, Transit Promotion Events
- Northwest/River District Transportation Option Plan

p.5-156

CITY OF PORTLAND EMPLOYEE PROGRAMS

- Trip Reduction Incentive Program (TRIP)
- Alternative Work Hours and Telework

CLEAN AIR ACTION DAYS

EDUCATION

- Public Schools
- BTA Middle School Bike Safety Curriculum
- PSU Transportation Class
- Police Activities League
- After Schools Programs
- Outreach (Newsletter brochures, web site, and special events on transportation options available to residents and visitors.)

PARTNERS FOR SMART COMMUTING

A consortium of approximately 30 public agencies in Oregon and Washington: transit agencies, cities, counties, state agencies and TMAs. The goal is to raise awareness about the effects of deriving alone to work

CONNECTIONS

Program that identifies problem areas, makes physical improvements (such as crosswalks, bus pads or shelter, improved signage, signal timing changes, audible signals, and tactile strips for the visually impaired), and completes missing segments of the existing citywide bikeway network. The program informs the most affected residents about the improvements and encourages their use by offering an incentive or promoting the improved access.

FUTURE PROJECTS:

Transportation Center – Mobile Unit, Web Site, and Downtown Site

- A physical storefront, preferably downtown near light rail and streetcar
- An e-mobility center that uses the internet/web and kiosks at key locations to offer an easy information resource
- A mobile traveling display with the same look and feel as the physical site, offering targeted information and services to specific audiences while promoting the web and downtown center

TravelSmart™

- A pilot project testing an individualized marketing approach toward demand management.

POTENTIAL STRATEGIES:

- Distance-Based Insurance
- VMT or Emission Fee
- Parking Pricing and Taxation
- Gas Taxes
- Parking Cash-out
- Location-Efficient Mortgage Program
- Green Vehicles (neighborhood electric vehicles)

p. 5-157-161

Policy 6.33 Congestion Pricing

"Advocate for a regional, market-based system to price or charge for auto trips during peak hours.

Objectives:

A. Support pricing strategies that are based on the environmental and social costs of motor vehicles.
B. In cooperation with Metro and other jurisdictions, choose corridors to implement market-based pricing where high-quality transportation alternatives to driving exist.
C. Support experiments in equitable and efficient pricing of new motor vehicle transportation facilities." p. 2-35

COMPREHENSIVE PLAN GOAL 2 URBAN DEVELOPMENT

Policy 2.15 Living Closer to Work

"Locate greater residential densities near major employment centers, including Metro-designated regional and town centers, to reduce vehicle miles traveled per capita and maintain air quality. Locate affordable housing close to employment centers. Encourage home-based work where the nature of the work is not disruptive to the neighborhood."

COMPREHENSIVE PLAN GOAL 7 ENERGY

Policy 7.6 Energy Efficient Transportation

Objective D

"Promote shared recreational use of school facilities and city parks, close-in recreation opportunities, and improved scheduling of events to reduce recreation-related transportation needs.

Objective I

Work with the private and public sector s to increase the number of preferentially located parking spots available for carpools. Work with TriMet to promote their availability.

Objective J

Match carpool riders and provide transit information to city employees. Promote public/private partnerships to increase employee ride-share, transit use, and flextime." p.5-146

CHAPTER 15 TSP PERFORMANCE MONITORING

The TSP uses a two-tiered approach to monitor transportation system performance. The following first -tier indicators are required by the TPR and RTP to show progress toward meeting State and regional policy goals.

- Vehicle miles traveled per capita
- Non-single-occupancy vehicle (SOV) mode split
- Auto occupancy per capita

Baseline data for the first -tier indicators are derived from Metro's regional travel forecast model (regional model), created using EMME/2 transportation modeling software. As mandated by the TPR and RTP, five-year interval benchmarks are identified for the first –tier indicators. The ten second-tier indicators are deemed essential to monitor in order to meet policy goals for Portland's transportation system over the course of the TSP.

- Bikeway network
- Pedestrian network
- Street connectivity
- TDM

These second-tier indicators do not include interim benchmarks.

SUMMARY OF PHONE INTERVIEWS WITH JEANNE HARRISON AND LAVINIA GORDON

Performance measures for transportation evaluation are documented in Chapter 15 of the TSP. Different VMT targets are established in different areas of the city. The City also has proposed to use auto-occupancy as a measure of non-SOV use, but Metro staff did not think it was worthwhile. The TPR says that jurisdictions need to inventory parking but the City found it to be extremely difficult to accurately gauge the supply of parking (attempted to use aerials), so is not doing so. The City expects to complete an update of its TSP in 2008.

The City has used EMME2 modeling for baseline information. This is an issue because it probably won't be used for future evaluations.

The City evaluates a number of "second-tier" indicators such as bikeway network.

The *TravelSmart™ Program* is a primary TDM focus for the Transportation Options (TO) group at the City of Portland. It includes a detailed analysis of effectiveness through use of surveys. This is a neighborhood-focused program. The City has conducted a pilot program in the Multnomah-Hillsdale neighborhood and is now wrapping up a study in the Interstate MAX Corridor. Each study consists of baseline surveys (before), then a targeted information campaign for interested households in the area. The City provides customized information based on the stated needs of participants. The City then follows up with "after" surveys and travel diaries to determine the effectiveness of the campaign. A control-group was established in an area without MAX service to understand the degree of change attributed to introduction of the MAX line. The *TravelSmart™ Program* is patterned after a study in Australia that found that up to 30% of SOV mode-choice decisions are based on erroneous information/misunderstanding of non-SOV modes.

The TO group also is conducting outreach programs, rides, walks, classes, bike, and pedestrian improvements. The City performs bike counts at certain locations such as bridges and looks at before and after counts after bicycle construction or improvement of bicycle facilities. City staff members are members of the boards of the TMAs, and provide technical assistance and support. The City also sponsors NW Ride Match, based on a grant from the Climate Trust.

City of Beaverton

The City of Beaverton is currently implementing the following actions through code requirements or through direct programs.

- Parking Management and Requirements
- Support of TMAs
- Roadway Connectivity Requirements
- Transit Pass Program in Regional Centers
- Other Transit Strategies
- Development Incentives
- Implementing Bicycle/Pedestrian Facilities

Text from the City of Beaverton's TSP is followed by a summary of an interview with transportation staff.

TSP Notes on TDM & Non SOV Actions

CHAPTER 1 SUMMARY

Section 1-4 TSM/TDM

"Measures which are appropriate for site planning such as close-in parking for carpools, bicycle parking, shower facilities, and convenient transit stops should be considered in design review process" p.1-6

"Support continued efforts by WA County, ODOT, DEQ, TriMet, and the Westside Transportation Alliance to develop productive TDM measures that reduce VMT and peak hour trips, including investigating transit pass programs with city employers and implementing a fareless area in the downtown regional center (there are currently 46 employers in Beaverton with transit pass programs, two of which are in the regional center. This may require City funding of TDM management to get maximum benefits of results (possibly $25,000 to $75,000 per year.)"p.1-7

"Continued implementation of motor vehicle and bicycle minimum and maximum parking ratios for new development (per Development Code 60.20) p.1-7 (See Section 4-59 Parking)

"Implementation of downtown connectivity plan as well as local street connectivity improvements identified in Appendix E."

"Implementation of bicycle, pedestrian, motor vehicle and transit system action plan."

CHAPTER 2 GOALS AND POLICIES

Goal 6.2.4

"An efficient transportation system that reduces the percentage of trips by SOVs reduces the number and length of trips, limits congestion, and improves air quality."

"a) Support and implement trip reduction strategies developed regionally, including employment, tourist, and recreational trip reduction programs."

Actions: Encourage implementation of travel demand management programs. Work to shift traffic to off-peak travel hours. Coordinate trip reduction strategies with Washington County, Metro, Westside Transportation Alliance, Oregon Department of Transportation, TriMet, neighboring cities, and the Oregon Department of Environmental Quality. Seek to raise p.m. peak average vehicle occupancy (AVO) to 1.3 AVO or more in the evening peak and/or move 50 percent or more of the standard evening peak trip generation outside the peak hour. Educate business groups, employees, and residents about trip reduction strategies. Work with business groups, residents, and employees to develop and implement travel demand management programs. Support and implement strategies that achieve progress toward attaining Metro's 2040 Regional Non- Single Occupant Vehicle Modal Targets. 2040 Non-SOV Modal Targets are as follows:

- Beaverton Regional Center: 45-55%;
- Murray/Scholls Town Center: 45-55%;
- Beaverton Main Streets, Station Communities, and Corridors: 45-55%;
- Beaverton Industrial Areas, Intermodal Facilities, Employment Areas, Inner and Outer Neighborhoods: 40-45%

(Targets apply to trips to, within, and out of each 2040 Design Type. The targets reflect conditions appropriate for the year 2040 and are needed to comply with Oregon Transportation Planning Rule objectives to reduce reliance on single-occupancy vehicles.)

Continue to implement the following action plan to work toward achieving these targets:

i) Encourage development that effectively mixes land uses to reduce vehicle trip generation.
ii) Develop consistent conditions for land use approval that require future employment related land use developments to agree to reduce peak hour trip making through TDM strategies.
iii) Support efforts by Washington County, ODOT, DEQ, TriMet, and the Westside Transportation Alliance to develop productive demand management measures that reduce vehicle miles traveled and peak hour trips.
iv) Coordinate with ODOT and TriMet on development of park-and-rides at transit stations or freeway interchange locations. Interchange reconstruction projects should be required to identify potential park-and-ride sites.
v) Build on existing Regional Center average transit pass discount percentage to achieve a 25 percent discount by 2020.
vi) Work with Washington County, Westside Transportation Alliance, and TriMet to develop and implement a downtown fareless transit area, a regional center transportation management agency, and reduced transit fare programs based on increased demand and funding availability.
vii) Implement the bicycle, transit, pedestrian, and motor vehicle master improvement plans to implement a convenient multimodal transportation system that encourages increased bicycle, pedestrian, and transit use.

b) Limit the provision of parking to meet regional and State standards. Actions: Work to reduce parking per capita per Metro and State requirements, while minimizing impacts to neighborhoods. Implement the motor vehicle and bicycle parking ratios in new development. Develop and implement a Regional Center parking plan and a residential parking permit program as demand increases. Continue to implement shared parking and

timed parking through new development and existing programs. Work toward implementing other parking-based TDM strategies such as metered and structured parking to help achieve Metro's 2040 Non-SOV mode split targets."

f) Support mixed-use development where zoning allows.

g) Work with TriMet to encourage the development of transit improvements, improve access and frequency of service, and increase ridership potential and service area. Encourage development of regional high capacity transit, including light rail transit and commuter rail. Action: Support commuter rail and its associated supportive transit services.

Several TDM strategies were developed in the 2015 TSP that are aimed at achieving the Metro 2040 non-SOV targets. The ranking of the strategies follows from most important to least important:

_ Encourage linkage of housing, retail, and employment centers
_ Provide incentives to take transit and use other modes (i.e., free transit pass)
_ Flexible working hours
_ Schedule deliveries outside of peak hours
_ Coordinate shift changes/staggered work hours
_ Telecommuting
_ Participate in Westside Transportation Alliance
_ Provide information regarding commute options to larger employers
_ Work with property owners to install bicycle racks and bicycle amenities

p. 2-5, 2-6, 2-7 (repeated on p.4-24, 4-25, 4-26, 4-27)

SECTION 4-11

4-59 Parking

"The City of Beaverton Development Code has been updated since the adoption of the 2015 TSP to include parking requirements (City of Beaverton Development Code, 60.30). This code includes both motor vehicle and bicycle maximum and required parking ratios for new development. In addition, the City of Beaverton has conducted a regional center parking study (Beaverton Regional Center Parking and Street Design Study), as recommended in the 2015 TSP. The strategies, ranked from most important to least important, are as follows:

- Shared Parking
- Parking Pricing
- Lower parking ratios for land uses within ¼ mile of LRT stations
- Parking needs should be reviewed by individual developments at the site plan review stage Parking ratios should be compared to demand, as identified by ITE or DEQ
- Maximum Parking Ratios

City of Beaverton Development Code

SECTION 60.30.10 NUMBER OF REQUIRED PARKING SPACES

Except as otherwise provided under Section 60.30.10.10., off-street vehicle, bicycle, or both parking spaces shall be provided as follows:

TDM Strategies: "Table 4-6 provides a list of several strategies outlined in the ECO program that could be applicable to the Beaverton area." p. 4.16

SECTION 60.55.35. STREET CONNECTIVITY STANDARDS

1. The Comprehensive Plan Functional Classification plan and Local Connectivity maps in the Transportation System Plan shall be used to identify potential street and accessway connections. The City may require additional connections to adjacent areas identified through the development review processes. Development shall include street plans, consistent with the requirements of this code, that provide for the following:

   A. In new residential, commercial and mixed- use development, local street connections shall be spaced at intervals of no more than 530 feet as measured from the near side right-of-way line, except where impractical due to physical or topographic constraints such as the spacing of existing adjoining streets, freeways, railroads, slopes in excess of City standards for maximum slopes, wetlands or other bodies of water. Local street connections at intervals of no more than 330 feet shall be considered in areas planned for the highest density mixed-use development.

   B. Accessways shall be provided as required by this code for pedestrians, bicycles and/or emergency vehicles on public easements or rights-of-way where full street connections are not possible, with spacing between full street or accessway connections of no more than 330 feet, except where impractical due to physical or topographic constraints such as freeways, railroads, slopes in excess of City standards for maximum slopes, wetlands or other bodies of water.

2. For redevelopment of existing land uses, streets and accessways shall be provided as identified in the Comprehensive Plan and as required by this Code through the development review process. [ORD 4224; August 2002]

SECTION 60.55.60

Transit Facilities

Compliant with RTP Section 6.4.10 Transit Service Planning (retail/office/institutional buildings within 20 ft of transit stop, direct ped. Connections, landing pad for disabled, lighting at stop)

Summary of Phone Interview with Margaret Middleton

The City has good codes that are being enforced and implemented, including parking and street connectivity measures. The City is not evaluating city-wide performance of these measures. The City only measures in-house commuting (by City employees). City staff question whether a city-wide evaluation is Metro's responsibility. The City is working with the Westside TMA to implement ECO rules and encouragement ride-sharing efforts in Beaverton. Based on informal observations, different measures have been effective for different employers/groups of commuters. For some, transit incentives are effective; for others, bicycle facilities have resulted in improvements. The City is using development incentives for developers/ companies that implement TDM measures. The City also has plans for residential permit parking around the downtown area, but the demand does not yet warrant it.

City of Gresham

The City of Gresham is currently implementing the following actions through code requirements or through direct programs.

- Parking Management and Requirements
- Support of TMAs
- Roadway Connectivity Requirements
- Other Transit Strategies
- Development Incentives
- Implementing Bicycle/Pedestrian Facilities

Text from the City of Gresham's TSP is followed by a summary of interview with transportation staff.

TSP Notes on TDM & Non SOV Actions

CH. 4 POLICIES AND STRATEGIES – STREET SYSTEM

Policy 1

Provide a street system that accommodates a variety of travel options.

1. Revise and update the functional classification system and street design standards to serve all modes of transportation and support regional and local land use plans more effectively.

CH.3 SYSTEM INVENTORY & ASSESSMENT

Travel Demand Management

"Traffic Impact Fees can also be reduced for developments implementing a Travel Demand Management Plan that reduces peak hour vehicle trips."

CH.4 POLICIES & STRATEGIES

Travel Demand Management

"Support pubic/private partnerships with transit service providers including the establishment of Transportation Management Associations."

"Adopt appropriate minimum and maximum parking ratios and investigate other measures that reduce parking demand."

"Adopt transit supportive design standards for developments in districts near transit station areas and along designated transit corridors."

"Provide reduced traffic impact fees for new development in the Gresham Regional Center, Rockwood Town Center, and along designated transit corridors."

"Work with local employers to promote telecommuting, flexible work hours and compressed work weeks, the regional carpool matching database, and other demand management strategies. "

"Employ market-based strategies such as parking pricing, parking meters, and congestion pricing to promote more compact land use development, increase alternative mode share, reduce vehicle miles traveled (VMT), and encourage more efficient use of resources."

Parking Management

"Periodically review the Off-Street Parking and Loading Requirements of the Community Development Standards document to:

- Review minimum and maximum parking ratios for all land uses;
- Develop incentives for new development to provide less than the minimum number of parking spaces required by code and for existing development to convert existing parking to other uses;
- Develop standards for structured parking including those related to ground-floor non-parking use, layout, landscaping, and other design, structural, and functional issues;
- Undertake other revisions as necessary to simplify interpretation and administration of parking standards."

"Encourage construction of structured parking in Transit Districts, Civic Neighborhood, Downtown, and Central Rockwood areas to support transit use and encourage high-density development. If feasible, provide incentives in other districts of the city to encourage developers to provide decked or underground parking to reduce land devoted to parking lots."

"Develop and implement a master plan for public parking facilities in the Downtown and Rockwood areas to provide consolidated central parking for existing and future residences and businesses and facilitate more intensive development of these areas."

"Encourage the development of joint-use parking agreements where one or more users share the same pool of parking. Identify existing sites with excess parking that could be shared with new users as an alternative to building new parking spaces. Ensure that Community Development Code regulations are sufficiently flexible to allow joint-use parking agreements."

"Establish a cooperative transportation management association within the Downtown and Rockwood areas with business organizations, community associations, and employers to consider:

- Parking and transit validation programs;
- One-stop shopping;
- Alternative transportation modes for customers and employees;
- Public parking marketing programs;
- Intra- and inter-district shuttle service; and
- Shared-parking agreements."

"Consider other parking strategies and programs in the Transportation System Plan that further City goals including:

- Timed parking zones and parking meters to encourage parking turnover in high-demand areas;
- Preferential on-street parking programs for residents and businesses adjacent to areas with high on-street parking demand."

"Provide encouragement and, where appropriate, technical support to large employers who will be required to reduce single-occupant vehicle (SOV) commute trips as part of the DEQ Employee Commute Option (ECO) Rule."

CH.6 SYSTEM PLANS

Travel Demand Management

"The strategies including the TSP to manage and reduce travel demand over time include:

- Prioritizing pedestrian and bicycle amenities as well as improved connections to transit to increase non-auto trips."
- "Improving end-of-trip facilities that support alternative transportation modes."

¨"The City will continue to encourage all large employers to join the City in participating in the state's Employee Commute Options (ECO) program by compiling travel information in a survey every two years."

Summary of Phone Interview with Ron Papsdorf

Gresham has codified many of the TDM strategies. The City also offers development incentives for new/expanding businesses that complete a TDM plan. If a business completes a plan, it can reduce its transportation impact fees by 27%. Only a few companies have taken advantage of this. The City helped establish the Downtown Gresham TMA. The City is working with the Downtown Development Association to have them manage and fund the TMA into the future. The Rockwood TMA has not been established but is the next TMA to be created in the city. The City is working on bike and pedestrian improvements and coordinating transit improvements with TriMet. No structured parking has been built in the area due to a lack of demand. The City has encouraged shared-use parking lots by allowing developers to count shared parking spaces towards required parking minimums. Also, no market-based strategies such as parking meters have been implemented due to lack of demand pressure for parking. The City just completed a periodic review of parking ratios.

City of Oregon City

The City of Oregon City's TSP has no official section on TDM. However, it does establish non-SOV modal targets based on Metro RTP. It states that, "Each modal element of the TSP has been specifically developed to achieving these non-SOV modal targets for designated areas. The City is committed to work with regional agencies…towards achieving the non-SOV modal targets established."

Text from the City of Oregon City's TSP is followed by a summary of interview(s) with transportation staff.

TSP Notes on TDM & Non SOV Actions

GOAL 1 – MULTIMODAL TRAVEL OPTIONS

Objectives

1. Provide an interconnected and accessible street system that minimizes VMT and cut-through traffic.
2. Provide an interconnected pedestrian system that links residential areas, employment centers, and the arterial and collector roadway network.
3. Provide a well-defined and accessible bicycle network that links residential areas, major bicycle generators, employment centers, and the arterial and collector roadway network with each other.
4. Ensure the adequacy of pedestrian and bicycle connectors to regional trails.
5. Provide a public transit system that ensures efficient accessibility, mobility, and interconnectivity between travel modes.

PARKING SECTION

The City has established parking maximums at ratios no greater than those listed in the *Urban Growth Management Functional Plan.* In some instances, the City of Oregon City parking standards require less parking than Metro standards, but under no land use code do they permit more parking. (p.5-64)

Summary of Phone Interview with Nancy Kraushaar

The City has no comprehensive TDM program due to size and the character of the city. No TMAs have been established. The City has been working to improve bicycle and pedestrian facilities through project implementation and also working improving trail connections. It has integrated bike/pedestrian/transit on project plans (Molalla Ave, Hwy 213 interchange, 7th Street Corridor Plan, Holcomb Blvd., McLoughlin Blvd.). It is working with TriMet to improve transit and operates a trolley during summer to reduce driving trips in the downtown area. The City's development code supports and requires pedestrian friendly developments.

City of Wilsonville

The City of Wilsonville is currently implementing the following actions through code requirements or through direct programs through its transit provider, SMART (South Metro Area Rapid Transit).

- Parking Management and Requirements
- Non-SOV Encouragement Programs
- Other Transit Strategies
- Development Requirements and Incentives
- Implementing Bicycle/Pedestrian Facilities

Text from the City of Wilsonville's TSP is followed by a summary of an interview with transportation staff from SMART.

TSP Notes on TDM & Non SOV Actions

CHAPTER 8 TRANSPORTATION DEMAND MANAGEMENT

8.5 Policies

Policy 8.1.1 – Promote land use patterns and development standards that support alternatives to the single-occupant vehicle and reduce reliance on the automobile

Policy 8.1.2 – Improve pedestrian and bicycle connectivity and amenities to ensure they are viable commuting options.

Policy 8.1.3 – Participate in local and regional trip reduction strategies.

8.6 Implementation Measures

Implementation Measure 8.1.1.a – Encourage developments that effectively mix land uses to reduce vehicle trip generation, especially the number and length of home-to-work trips.

Implementation Measure 8.1.1.b – Encourage design and location of complementary activities that support public transit, ride-share programs, and use of other alternative modes of transportation.

Implementation Measure 8.1.1.c – Promote the expansion of establishments of commercial goods and services within the city to reduce the need for out-of-town trips.

Implementation Measure 8.1.1.d – Amend the City's Development Code to require new large developments and high employment and/or traffic generators to submit TDM programs to the city indicating how they will reduce transportation impacts, the activities they intend to undertake, and how they will implement these activities. The city shall coordinate all employer-based TDM efforts with Oregon DEQ to prevent duplicative requirements.

Implementation Measure 8.1.1.e – Revise the Development Code's parking standards to be in compliance with the most recently adopted RTP and the Urban Growth Management Functional Plan including the continued imposition of maximum parking limits for large development and high employment and/or traffic generators.

Implementation Measure 8.1.1.f – Allow for a reduction from minimum parking standards for developers who implement a TDM Plan approved by SMART. Those parking spaces devoted to the TDM Plan should be excluded from the required parking maximum calculations in subsequent changes of use of the property, subject to approval by the Development Review Board.

Implementation Measure 8.1.1.g – Accommodate the expected growth in population and employment and the resulting transportation needs in the city by improving arterial and collector street networks and the pedestrian and bikeway system.

Implementation Measure 8.1.1.h – Study the traffic generation implication of reducing the traffic trip-generation of all new "mixed-use, pedestrian-friendly center, or neighborhood" developments by 10% of that identified by the ITE Manual. Should those types of developments prove to generate 10% fewer trips, revise Section 4.140(.09)(J) of the Development Code to require a 10% credit in the number of calculated traffic trips per OAR 660-012-0060(5)(a)-(d).

Implementation Measure 8.1.2.a – Encourage employers to improve on-site provisions for bicyclists such as weather-protected parking facilities, showers, and lockers at point of destination.

Implementation Measure 8.1.2.b – Make accommodation for bicyclists and walkers at park-and-ride lots and transportation transfer locations, including bicycle lockers or racks, sidewalks, pedestrian refuges, and marked crossings as appropriate.

Implementation Measure 8.1.2.c – Encourage large employers (50 or more employees) to include preferential parking for carpools and vanpools.

Implementation Measure 8.1.3.a – Work to reduce the number of vehicle miles traveled in the city by monitoring transportation demand management programs of area businesses.

Implementation Measure 8.1.3.b – Establish a TDM program to work with area businesses and market travel demand management and commuting alternatives. Provide incentives that encourage employees to reduce SOV commute trips. Identify a lead individual within the City to be responsible for program coordination.

Implementation Measure 8.1.3.c – Establish and market a rideshare program. Take part in regional and state efforts to reduce the number of vehicle miles traveled.

Implementation Measure 8.1.3.d – Establish a coordinated system of public and private buses and shuttles connecting neighborhoods and major Wilsonville retail and employment areas to enable the growing number of residents and employees to make work and shopping trips without using an SOV vehicle. Facilitate the formation of vanpools as appropriate.

Implementation Measure 8.1.3.e – Develop and distribute materials which educate and enable children to more readily use transit and other non-motorized modes of travel.

Implementation Measure 8.1.3.f – Coordinate with ODOT, Metro, TriMet, and the Counties of Washington and Clackamas on the development of park-and-ride areas and transfer stations at

freeway interchanges, and the planned commuter rail station in Wilsonville to ensure that service is coordinated and allows for inter-modal connectivity.

Implementation Measure 8.1.3.g – Develop and adopt City policies which encourage reduced reliance on the automobile by City employees and allow the City to act as a role model for other Wilsonville employers. These policies shall include provisions for flex- and compressed workweek schedules, telecommuting, preferred parking, and other policies that encourage the use of alternative transportation modes.

Implementation Measure 8.1.3.h – Assist in the provision of alternative transportation options that provide a link between employment sites, retail services, and transportation transfer points for both mid-day and commuting trips. These transportation options could take the form of shuttles or vanpools between park-and-ride lots or commuter rail stations and employment sites. Other options could include small alternative-fuel vehicles, scooters, or bicycles.

Summary of Phone Interview with Christine Heycke (SMART)

TDM policies have been codified by the City. The City requires new development to provide a TDM plan and conduct annual updates. This has been implemented within the past year, so updates have not been received yet. Currently, the City lacks staff to implement other TDM programs, but has a half-time intern working on this. The City does not evaluate the effectiveness of specific improvements. Issues related to validity and quality of evaluation data make it difficult to justify spending time on such an evaluation. The cost of collecting reliable data is prohibitive. The local transit agency (SMART) conducts outreach programs to the public and local employers, and has promoted business energy tax credits- Xerox has installed 60 bike lockers. SMART conducts transportation fairs and other events to promote non-SOV use. SMART also coordinates rideshare program with the City of Portland – Carpool Match NW. The City and local employers are not doing shuttles or vanpools due to the difficulty of operating them. The City is considering coordination with other jurisdictions on a regional program. The City is helping implement the WalkSmart program, which works with adults and children to promote walking by providing information and distributing pedometers. The program encourages people to keep track of steps walked and especially walking that replaces car trips. 700 have people signed up to date. There are competitions between businesses in the program. SMART has implement a kids program - SMART Art on the Bus contest – where students create art related to non-SOV modes. Winners' art is put on SMART buses. The City is planning to implement an ECO-rule equivalent to require City of Wilsonville employers to reduce SOV driving trips. This would be a requirement for all employers with more than 50 employees (DEQ is considering raising their employee threshold to 100).

Clackamas County

Clackamas County is currently implementing the following actions through code requirements or through direct programs.

- Parking Management and Requirements
- Roadway Connectivity Requirements
- Support of TMAs
- Other Transit Strategies
- Implementing Bicycle/Pedestrian Facilities

Text from Clackamas County's TSP is followed by excerpts from their Comprehensive Plan and Zoning Code 1007.07, and a summary of the interview with transportation staff.

TSP Notes on TDM & Non SOV Actions

CHAPTER V TRANSPORTATION DEMAND MANAGEMENT

Goals

- Reduce single occupant vehicle trip on the roadway network during peak travel demand periods.
- Reduce vehicle miles traveled per capita by 10% by year 2020 (using 2000 as a base year)
- Work with businesses in Clackamas County to support their efforts in reducing single occupant vehicle commuting, which in turn will reduce Vehicle Miles Traveled per capita.

Policies

1.0 Work with Metro and the State to explore Congestion Pricing on appropriate transportation facilities to encourage reductions in VMT.

2.0 Encourage employers in Clackamas County to implement a range of TDM policies to help their employees reduce VMT. Examples are: subsidized bus passes, company owned vanpools, preferred parking for carpools and vanpools, bicycle racks, and flexible work schedules.

3.0 Coordinate with DEQ and TriMet to implement TDM programs and the ECO rule.

4.0 Provide adequate bicycle and pedestrian facilities to employment areas of Clackamas County to encourage use of alternative modes for the commute to work.

5.0 Work with Clackamas County employers located in concentrated employment areas to develop TMAs to coordinate and support private sector TDM efforts.

The Clackamas Comprehensive Plan's Transportation Chapter contains policies for TDM and Connectivity. Policies 18 and 19 under the section "Improvements to Serve Development" address connectivity:

18.0 Developers of new developments and land divisions that will require construction of new streets shall provide the County with a conceptual street plan map and street cross sections responding to the other requirements of this section, and full street connections at intervals of no more than 530 feet. Exceptions may be made when a full street connection is

prevented by barriers such as topography, railroads, freeways, pre-existing development or environmental constraints such as streams and wetlands.

19.0 Before an exception is granted to the above requirement, it shall be determined if, at a minimum, an accessway for pedestrians, bicyclists or emergency vehicles may be constructed at intervals of 330 feet. Those accessways shall be constructed unless prevented by barriers or environmental constraints.

Clackamas County adopted Metro parking requirements for urban areas in Zoning Ordinance 1007.07. Table 2 (not included here) provides maximums which comply with Metro's requirements Zoning Ordinance 1007.07 also encourages the use of shared parking, park-and-ride lots, and dedicated spaces for vanpools.

1007.07 OFF-STREET PARKING REGULATIONS

A. General Provisions

"Shared parking" may be defined, for purposes of subsection 1007.07B2c, as parking spaces used jointly by two or more uses within the same development, or separate developments, which either have peak hours of operation which do not overlap, or typically provide services to many of the same patrons (i.e. hotel providing lodging for convention participants within the same development), provided satisfactory legal evidence is presented in the form of deeds, leases, or contracts securing full access to such parking spaces for all parties jointly using them. (9-11-85)

Off-street parking requirements for types of uses and structures not specifically listed in this Ordinance shall be determined by the Planning Director.

Uses located on transit service lines which have days and hours of operation not in conflict with weekday use, such as churches, fraternal organizations, or nighttime amusements, may be encouraged, or required under subsection 1007.06, to allow a portion of their parking area to be used for a park-and-ride lot.

New industrial and office developments shall provide carpool/vanpool spaces for employees. A minimum of five percent, but not less than one, of the required parking spaces shall be marked and signed for use as carpool/vanpool spaces. These spaces shall be the closest employee motor vehicle parking spaces to the building entrances normally used by employees, except for any handicapped spaces provided. (9-8-94)

On-site parking spaces constructed in excess of those required may be redeveloped for transit oriented uses or any other uses permitted in the applicable zone. (9-8-94)

PARKING MAXIMUMS: (11-5-98)

Within the Urban Growth Boundary, the Parking Maximums listed in Table 2, Zone A, apply when an area has 20 minute peak hour transit service within one-quarter (1/4) mile walking distance for bus transit or one-half (1/2) mile walking distance for light rail transit. (3/14/02)

Within the Urban Growth Boundary, areas not meeting the requirement of 1007.07C2a, are subject to the maximums listed in Table 2, Zone B. (3/14/02)

Summary of Phone Interview with Mohammed Fattahi

The County has worked with Metro on congestion pricing strategies, but region-wide meetings are no longer being conducted in Clackamas County. County staff members are only evaluating modal shift actions for County employees, not for all employers in the county. Clackamas County helped establish the Clackamas Regional Center TMA in 2002 and has provided it with technical assistance. The TMA is working with local employers to reduce SOV trips. The County currently is constructing bike and pedestrian improvements and estimates that between 2%-10% of total transportation spending is for bike/ped improvements. The County is involved with the Carpool Match program and is working with TriMet to determine route changes and improvements to improve transit use. Staff notes that within the County, some measures such as transit incentives are not working and SOV mode share has actually increased.

Parking and street connectivity standards in compliance with Metro requirements have been adopted in the Clackamas Ordinance 1007.07 and the Comprehensive Plan.

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Appendix C. Pedestrian and Bicycle Count Methodology

This pedestrian and bicycle count methodology has been developed to attain a consistent regional pedestrian and bicycle count and analysis procedure so that trends in usage can be documented. The counting strategy outlined is designed to provide an easy and inexpensive method of conducting pedestrian and bicycle counts on a regular basis. The level of detail to be extracted during routine counts is kept at a minimum to reduce ambiguity while still proving to be a worthwhile task. This is not unlike the typical traffic count that reveals little more than the type of vehicle, speed, time of day, and direction of travel. Motorist data regarding age, trip purpose, length of trip, etc. are relatively rare.

REASONS FOR COUNTING

There are four primary reasons why pedestrian and bicycle counts should be an essential and regular activity:

1. *Conditions and trend analysis* – number of people currently walking and bicycling, how this number is changing over time, characteristics of the cyclists and/or pedestrians
2. *Network planning* – help prioritize improvements and find locations needing attention
3. *Crash analysis* – develop exposure measures
4. *Demand forecasting* – calibrate models

While city engineering and planning staff members have a clear interest in pedestrian and bicycle counts, other groups may also find this data useful. Community health officials are naturally interested in promoting healthy lifestyles. Counts would give them some idea as to how many residents are walking and bicycling on a regular basis. Counts that include age categories may also be helpful to the health professionals, trying to gauge the level of activity achieved by the growing number of senior citizens. The number of school-aged cyclists would be of interest to school officials, primarily for safe routes to school programs and safety education. Police departments would find value in the data for enforcement and safety reasons.

LOCATION

Cities, counties, and even parks districts should identify numerous locations throughout their jurisdiction for regular counts. Ideal candidates would be streets and pathways that are in a pedestrian and bicycle plan and on a project list or near existing or proposed activity centers. Popular cycling routes should also be considered, whether they be arterials with bike lanes, bridges, or popular trails. Keep in mind that counting sites should not be on curves or hills.

SCHEDULE

When to conduct the counting may depend upon the location of the site. If near a school, counts should be done on weekdays during their peak hours. In the morning, forty-five minutes before the first bell to fifteen minutes after the last bell are common. Release peak counting times are fifteen minutes before the first bell to forty-five minutes after the last release. The peak hours of 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. may be the most beneficial for a majority of locations.

Fro non-school locations, travel patterns generally vary over the course of the week. Mondays and Fridays should be avoided because travel patterns are rarely typical as people may not be on the roads due to extended three-day weekends and Fridays often see earlier afternoon peak times and increased evening traffic. Work-commute counts should therefore, be limited to Tuesday through Thursday, and not on a holiday or when schools are not in session. However, if counts will be collected at shopping centers or other non-work destinations, weekend or holiday counts would prove most beneficial.

For all locations, the best times to conduct counts are during the dryer spring, and fall months. Darker and wetter conditions in the winter can deter all but the devoted cyclists and pedestrians. The summer months should be avoided for school counts, because they would not account for school-related trips. Counts should be taken annually at the same time of year to provide for consistent comparisons over time. Counts should also take place on mild, sunny days. The date and weather conditions should be included on the tally sheets.

DATA COLLECTION

According to *Pedestrian and Bicycle and Pedestrian Data: Sources, Needs & Gaps* by the U.S. Department of Transportation's Bureau of Transportation Statistics, the ideal method of collecting data would include the following:

Usage patterns would not only be tracked on individual facilities but also aggregates of data across an area, such as total pedestrian and bicycle-miles of travel in the city. For this reason, roadway characteristics such as number of travel lanes should be recorded.

- Data would be collected systematically to enable a comparison of patterns over time.
- Data would be collected in a similar manner throughout a larger area (even nationwide) to allow comparison and aggregation.
- Certain characteristics of the cyclists would be obtained, such as age, sex, purpose of the trip and its length, type of facility, etc.

Obviously, a high level of detail is nearly impossible to obtain by merely observing passing cyclists. Local entities should consider coupling counts with random survey samplings of passing cyclists, time and resources permitting. Survey questions could include, among other things, trip purpose, trip length, and income level. Trip purpose, especially, would be valuable information to gather as the goal of many improvement projects is to encourage more biking and walking for work and utilitarian purposes.

For routine manual counts, the information to be recorded will be relatively easy to obtain visually. Count sheets should be given to the counters to record information. These count sheets (see an example on the following page) should contain the following:

- Time intervals
- Direction of travel
- Gender
- Approximate age
- Helmet usage (for bicyclists)
- Occurrence of riding on sidewalks (for bicyclists)

The sheets could enable the counter to break up the counting session into 15-minute intervals. This helps the counter stay more alert and shows more detailed peak times of usage.

Age categories should not be too detailed as it will further complicate the tally sheet and probably lead to more inaccurate data. Age categories can be simply divided into these groups: under 18 years, 19 – 64, and 65 years and older. The "under 18" cyclists are likely to be on school commute trips. Cyclists over the age of 65 are likely to be retired and taking trips for leisure or utilitarian purposes. These two groups of people are also less likely to be driving automobiles, whether due to youth or limiting health issues.

Helmet usage is of interest to those concerned about safety. If bicyclists under 16 years of age are not wearing helmets, then the laws are not being enforced.

Riding on the sidewalk is illegal in downtown Portland but a common practice along roadways all throughout the region that experience high traffic volumes or are perceived as dangerous corridors. If sidewalks are used for bikeways, this could signal the need for on-street improvements, lack of enforcement, or a large number of inexperienced cyclists.

This methodology is described in more detail in the Institute of Transportation Engineers Pedestrian & Bicycle Council's *National Bicycle and Pedestrian Documentation Project* (see Appendix B).

WHO COUNTS?

PSU students currently conduct an annual bicycle count at about 20-25 locations in Portland. This could potentially be expanded to other sites in the region. City staff members – most likely interns – are other nominees for conducting counts. But other resources are possible if time and people are scarce. Volunteers could be recruited from the community – pedestrian and bicycle clubs or advocacy groups, or citizens that are interested in helping the city. If the city has money to spare in the budget, there are firms that specialize in counting.

Video cameras can be used to obtain the same information as a manual count. The advantage to this method is the ability to replay the video for greater accuracy and use for longer time periods. However, technical difficulties and theft are among the disadvantages.

The most basic bicycle counts can be conducted with tube counters. While these are usually used to count cars, the software can be programmed to detect bicycles. This technique is good for purely user counts, can be conducted over long time frames, and requires little manpower.

Of course, the rider characteristics will be absent and theft is often associated with counting units. Also, tube counters often under count cyclists when heavier vehicle cross the tubes at the same time or if cyclists purposely avoid the tubes. Loop detectors can be installed along key bicycle and pedestrian routes for continuous counts, as has been done on some in Eugene, Oregon.

Once the data has been collected in the field, the results should be compiled and made readily available to the public. Metro's website is the most logical and accessible location. This data compilation should also be coordinated with Metro's Data Resource Center, to allow for the creation and sharing of GIS-based data files.

SUMMARY

Pedestrian and bicycle counting should become a standard practice throughout the region. Consistency is the key to this program – counts taken at least annually, during the same time of year, and at the same location. This data should be made readily available to the public so other agencies and researchers may utilize the data in numerous ways.

BICYCLE TALLY SHEET

DATE: **WEATHER CONDITIONS:**

LOCATION: **TYPE OF BIKEWAY:**

HOUR			#	SEX		AGE			NOT WEARING HELMET	RIDING ON SIDEWALK
				MALE	FEMALE	<18	19 - 64	65+		
	:00	NB SB EB WB								
		NB SB EB WB								
	:15	NB SB EB WB								
		NB SB EB WB								
	:30	NB SB EB WB								
		NB SB EB WB								
	:45	NB SB EB WB								
		NB SB EB WB								
	:00	NB SB EB WB								
		NB SB EB WB								
	:15	NB SB EB WB								
		NB SB EB WB								
	:30	NB SB EB WB								
		NB SB EB WB								
	:45	NB SB EB WB								
		NB SB EB WB								

OBSERVATIONS:

Appendix D. Transportation Policy Advisory Committee (TPAC) Workshop Summaries

Metro 2040 Modal Targets Project – TPAC Workshop
April 15 Workshop Summary

PARTICIPANTS

Metro Staff: Kim Ellis, Bill Barber, John Mermin.

Consulting Team: Matt Hastie and Steve Faust, Cogan Owens Cogan; Mia Birk and Arif Khan, Alta Planning and Design.

Attendees: Ed Abrahamson, Multnomah County; Lenny Anderson, Swan Island TMA; Andy Back, Washington County; Scott Bricker, Citizen; Danielle Cowan, City of Wilsonville; Marianne Fitzgerald, DEQ; Mark Garrity, WSDOT – Southwest Region; Kathryn Harrington, Citizen, Washington County; Jeanne Harrison, Portland Office of Transportation; Christine Heycke, SMART/City of Wilsonville; Ross Kevlin, ODOT; Nancy Kraushaar, Oregon City; Jen Massa, SMART/City of Wilsonville; Mike McKillip, City of Tualatin; Margaret Middleton, City of Beaverton; Ron Papsdorf, City of Gresham; Phil Selinger, TriMet; Ron Skidmore, Clackamas County; John Wiebke, City of Hillsboro.

BACKGROUND

This was the first of three workshops conducted to receive input on the 2040 Modal Targets project. The purpose of this workshop was to provide an overview of the project and process, and discuss current approaches and potential strategies to increasing use of modes of travel other than single occupancy vehicle use. Workshop participants included members of TPAC, the Regional Travel Options Subcommittee to TPAC and local transportation coordinating committees.

Metro staff and the consulting team provided an overview of the project and process. The purpose of the project is to research current approaches to meeting 2040 modal target requirements in the Regional Transportation Plan (RTP) and evaluate potential actions local governments may take to reduce drive-alone trips. In addition, the project will identify amendments to the current RTP to more clearly define minimum requirements that will constitute a "safe harbor" for meeting the targets and describe how Metro will determine local government compliance with the targets during future transportation system plan updates.

Metro staff reviewed these objectives and the workshop process and schedule. The consultant team then provided an overview of the memo detailing current approaches. The memo includes a description of modal targets, minimum requirements and other possible strategies to reduce single-occupancy vehicle trips, as well as a description of activities that several sample jurisdictions are undertaking to meet modal targets and how, if at all, these strategies are being monitored.

SUMMARY OF DISCUSSION

The following is a summary of comments made by participants at the meeting. The first set of comments is comprised of general responses to the memo and its findings. The second set of comments is in response to specific potential strategies for meeting modal targets.

General comments

- It may be appropriate for jurisdictions to receive credit for what TMAs, ECO employers and transit agencies are doing.
- The results in the memo are representative of the jurisdictions at the table. One exception is Multnomah County. Multnomah County is different from other counties in that it contains few urbanized unincorporated areas. Therefore, its Transportation System Plan (TSP) does not include as many strategies oriented towards urban development
- In regards to the minimum requirements, the decision to implement a fareless area should be based on a variety of factors and may not be appropriate in all regional centers. For example, fareless areas are ineffective without priced parking.
- Effects of various strategies may need to be measured at the regional level even though they are implemented at the local level.
- If the model is the only tool for tracking progress, Metro's travel behavior survey should be updated because it is nearly 10 years old, if possible before the next Regional Transportation Plan update. This would give us a 10-year trend of travel behavior.
- How do we know these measures are being implemented locally?
- One outcome of this project may be to recommend changes to Metro's model to incorporate the effects of some of these strategies.
- The RTO rideshare study is doing research on where people are choosing to live and work. This information could be useful to this project.
- A combination of ECO, Census and travel data can be useful to identify trends for specific areas. Surveys are a way to measure effects of strategies.
- Concern with expectations for how quickly things can happen and change. Bike and pedestrian use needs time to catch up to network development.
- One TMA is looking at location efficient living. They are encouraging Swan Island employees to live in North Portland. They promote home ownership. There is a need for livable and affordable communities close to employment centers.
- There has been a study of location efficient mortgages, but it did not evaluate use of alternative modes as an outcome of that tool.
- TriMet work needs to be incorporated, including connectivity, pedestrian inventory, ridership and safe crossing studies.
- The results of ODOT safe crossings studies and efforts also need to be incorporated.
- The best way to measure the effectiveness of these strategies is to survey people. For example, if there is an increase in transit ridership, these people must be surveyed to determine why they stopped driving and started using transit.
- The effect of many strategies, particularly land use strategies, must be measured over a long period of time. We may not have enough data in this region to evaluate the effectiveness of such strategies for a number of years.
- Use of case studies may be an effective way to evaluate certain strategies. Is there a way to identify a "typical" jurisdiction or area in the region for use as a case study or should a range of jurisdictions be used for case studies? How applicable will results or specific strategies be to all jurisdictions in the region?

- Will this study result in more responsibility for local jurisdictions to monitor and report progress? Doing that at the regional level would seem to make more sense.

Specific comments

Street connectivity and other land use strategies

- There are a number of barriers to implementing street connectivity plans. They seem to be working well in newly developing areas, but are expensive to implement in older areas. In addition, connectivity improvements often receive resistance from established neighborhoods. It is important to keep making connections instead of having streets stubbed out for several years.
- If the streets are not connected to transit or a mix of uses, then the strategy is less effective.
- Land use also can be a barrier. Some jurisdictions have experienced resistance to placing neighborhood commercial uses in residential areas. People are worried about more traffic. Lot sizes are also a factor –if a developer loses a viable lot to a new connection, they are less inclined to provide the connection.
- Land use is the most important factor in reducing SOV trips. Land use policies should be part of regional decision making (e.g. UGB expansion) along with promoting a better housing/jobs balance, etc.
- Data about where people live and work shows that people are making smarter choices and living closer to work.
- Marketing and educational tools are helpful in influencing public opinion to achieve land use strategies.
- Accessways provide a low cost option to support walking and biking to schools.
- City of Wilsonville implements a concurrency policy, which helps achieve connectivity.

Maximum parking ratios and other parking requirements

- Parking requirements are difficult to implement relative to other strategies because they are dependent upon market conditions.
- Some jurisdictions don't have the densities necessary to justify use of on-street parking management strategies. There has to be a certain demand in order to use metered parking.
- Some jurisdictions are implementing on-street and off-street parking regulations. For example, the City of Portland has eliminated, parking minimums in many parts of the City. Parking regulations are not effective in other jurisdictions because developers and lenders use a formula to determine how much parking to include in a development. As a result, local jurisdictions often have to work hard just to prevent developers from exceeding the maximum parking requirements.
- Some projects are being constructed without any parking.
- A number of parking strategies are being used in Beaverton and Gresham, including pricing, permit parking, timed parking, and shared parking. A resource would be to look at traffic commission documents.
- Need more incentives for shared parking.

Transit

- Barriers include:
    - Lack of sidewalks
    - Location and condition of bus stops
    - Full park-and-ride lots
    - Too many transfers are required to reach destination

    - Security issues
- Transit agencies are responsible for implementing programs needed to meet transit requirements. However, partnerships with local jurisdictions are essential to build public facilities and to help create private development that supports transit use.
- The decision about whether to build more park-and-ride stations near light rail stations is difficult. Land near those stations is valuable and using it for transit oriented development is typically more effective in increasing ridership than using it to expand park-and-ride lots. On the other hand, park-and-ride lots are crucial to supporting transit use.
- There may be opportunities to create more park-and-ride lots in rural areas or on less valuable land near transit lines. There is some use of such areas as informal park-and-rides. ODOT has sanctioned or encouraged such practices in the past.
- 45% of SMART users take transit because it is free.
- Transit subsidies and frequent service help level the playing field for transit – making it more competitive to driving.

<u>TMAs and trip reduction</u>

- TMAs can help with implementation. They are well connected to all involved parties and work under the umbrella of the RTO program.
- TMAs are effective in efforts such as adding bus service.
- The education and communication element is very important. Collaborative marketing efforts are effective – the RTO program is shifting in this direction.
- Carpooling/vanpooling is being studied. Questions under consideration include. Where is the market for these services? Why hasn't it worked in the past?
- Park-and-ride lots need to have spaces for carpoolers.
- TMAs are hard to keep going – need a charismatic leader as well as local government and business support. To be successful, they also need to be focused on solving a specific transportation problem or addressing an opportunity that has emerged.

Metro 2040 Modal Targets Project – TPAC Workshop
May 20 Workshop Summary

PARTICIPANTS

Metro Staff: Kim Ellis, Bill Barber, John Mermin.

Consulting Team: Matt Hastie and Steve Faust, Cogan Owens Cogan; Arif Khan, Alta Planning and Design.

Attendees: Ed Abrahamson, Multnomah County; Lenny Anderson, Swan Island TMA; Blair Crumpacker, Washington County; Danielle Cowan, City of Wilsonville; Marianne Fitzgerald, DEQ; Kathryn Harrington, Citizen, Washington County; Ross Kevlin, ODOT; Mike McKillip, City of Tualatin; Margaret Middleton, City of Beaverton; Jessica Roberts, Bicycle Transportation Alliance; Phil Selinger, TriMet; Ron Skidmore, Clackamas County; John Wiebke, City of Hillsboro.

BACKGROUND

This was the second of three workshops conducted to receive input on the 2040 Modal Targets project. The purpose of this workshop was to discuss the various strategies used to increase use of modes of travel other than single occupancy vehicle use, their effectiveness, best practices for implementing them, and how they can be measured and monitored. Workshop participants included members of TPAC, the Regional Travel Options Subcommittee to TPAC and local transportation coordinating committees.

Metro staff reviewed the project objectives and the workshop process and schedule. The consultant team then provided an overview of the memo detailing the results of research on potential strategies. The memo includes a summary of strategies and effectiveness, a description of strategies currently required by Metro and other, other potential strategies, a summary of best practices and a detailed review of research on potential strategies.

SUMMARY OF DISCUSSION

The following is a summary of comments made by participants at the meeting on the research, requirements and best practices presented in the memo.

Research

- Tri-Met has data on miles traveled by automobile to and from park-and-ride lots; that information could be included, although it has not been analyzed or summarized in a report or study.
- Studies of pedestrian connectivity should be included, if available. Pedestrian improvements should be discussed more broadly to cover pedestrian connectivity and access to transit. A study of pedestrian trips was conducted in the NE Sandy area recently, but it is uncertain what type of data was recorded. The study probably did not include data on change in mode share of pedestrian trips. The study also looks at an area that has always had a good level of pedestrian activity, but where improvements have further increased activity.

- The project team should be commended for a thorough job of researching a wide range of strategies. However, it would be beneficial to take more time and effort to "drill down" the data and describe the impacts of certain strategies in more detail.
- The document does not document the local experience. Local jurisdictions probably could be helpful in providing information about their success or challenges in implementing certain strategies. Unfortunately, few jurisdictions have quantifiable results, only anecdotal information. *The consulting team noted that the Task 2 memo covered this issue to some degree, as did discussion at the first TPAC workshop for the project.*
- Studies should not be ignored just because there is no quantifiable data. *Studies without quantifiable data are not excluded from the memo and some strategies will continue to be recommended even where there is a lack of specific quantitative data directly documenting their effectiveness.*
- The report is very granular. Many of the strategies work best when integrated with other strategies. *It is recognized that many strategies work best in conjunction with others. The objective of this task is to document the effects of each strategy in isolation. The final report will note the importance of implementing a range of strategies in a coordinated manner.*
- Many of the studies seem to have been undertaken in the mid-1990s. Were there any follow-up studies to those? *The most recent studies were used whenever possible. In many cases there did not appear to be any follow-up studies.*
- Many jurisdictions do not keep continuous data on each strategy because it is costly and not a priority.
- The purpose should be for the research to point towards strategies we think will be effective and how to measure and monitor them in the future.
- The Regional Transportations Options (RTO) committee has discussed the need to implement evaluation and monitoring steps into all projects.
- Safe Routes to School has been a very effective program.
- Two studies not cited in the memo may be useful:
    - Analysis of a bike program in the Netherlands
    - Rideshare study from UrbanTrans being conducted for the RTO program. The study documents where people who work in employment centers live. It recommends that jurisdictions should have an independent audit of the effectiveness of their programs every few years.
- Another suggestion is the Washington D.C. State of the Commuter report.

RTP required and non-required strategies

<u>Street connectivity and other land use strategies</u>

- The memo recommends that whether or not to include "Fareless Areas" and "Support of Transportation Management Associations (TMAs)" be discussed in the RTP update.
- In the past, an aggressive approach toward TMAs was taken. Now, Metro wants to focus on existing TMAs and create new TMAs only when well planned and in specific situations and locations. *The recommendation to revisit support for TMAs is not linked to a judgment about their relative effectiveness. Employer-based strategies can be very effective in increasing share of alternative modes and TMAs can be instrumental in implementing or encouraging implementation of these strategies*
- "Other" strategies listed in the memo do not necessarily represent additional specific requirements. This document should help to define minimum requirements more clearly.
- The Transportation-Efficient Development (TED) section could be expanded. Density and transit should be examined more thoroughly.
- TravelSmart™ and Safe Routes to School have been very effective.
- Projects should look at transportation and land use and their relationship to public health.

- Demand responsive service is expensive to implement. It is ranked as "easy" to implement but is not necessarily easy from a cost perspective.
- Location Efficient Mortgages should be evaluated in their ability to fill TED housing that would not be filled otherwise.

Best practices

- Density of employment areas should be considered in determining the potential effectiveness of specific strategies. For example, denser employment areas have more potential to support increased transit service. Types of industry, jobs per acre and work trips should be analyzed. The Portland atlas of industrial areas is a good resource.
- Industrial areas on the urban fringes often lack transit options. Site orientation is very important.
- Did you categorize research by location – urban vs. suburban locations? The effectiveness of strategies in suburban areas should be further evaluated, if possible to determine their relative effectiveness in those areas. *Most of the studies we reviewed were undertaken in more urban areas but some were performed in suburban areas. We can review the list to identify those with a suburban orientation.*
- Best practices must be justified and talked about as being in the best interests of everyone.
- ODOT and Metro received $2 million per year for Transportation Demand Management marketing and public awareness campaigns. Approximately half of that money will be used for programs in the Portland metropolitan area.
- Recommendations for parking should be bold. During the RTP update process, we should consider a new policy calling for paid parking to be implemented throughout the region.
- The total transit experience is important, including bus shelters, cleanliness, reliable and frequent service, a safe environment, etc. The details matter.
- Infrastructure connections are needed such as bike racks on cars, end-of-trip facilities and other improvements that make combining bikes and transit easier.
- Free parking hurts the work of TMAs.
- Parking is a land use issue. Employment land should not be used to store cars. There should be incentive strategies to capture and demonstrate the value of land.

NEXT STEPS

- Metro is updating its travel behavior survey. Metro staff is open to expanding the scope to try and isolate the effects of these strategies as part of that effort.
- The final report will address implementation and monitoring more thoroughly. It will recommend possible amendments to the RTP, such as clarifying and expanding the minimum requirements.
- It should make concrete recommendations to support the efforts of local jurisdictions.
- The review of best practices should cover both incentives and regulations. An over-emphasis on regulations can result in a backlash among the public and ultimately reduce support for the goals and programs we are trying to implement.
- Metro's model is probably the best way to monitor progress. Metro expects to recommend that success in achieving modal targets and implementing strategies be measured at the regional level. However, it also would be useful for local jurisdictions and others to incorporate surveys or other means to monitor success of specific projects or actions, where feasible.
- Tables or maps showing where different strategies have been implemented would be helpful.

Appendix E. Detailed Review of Strategies

The following matrix provides more detailed information about the results of research conducted in preparing this memo, including descriptions of specific literature and case studies reviewed. As noted previously, this matrix describes only those studies that provided quantitative or other evidence of a correlation between implementation of a given strategy and reduction in SOV use or shift to other modes. A complete list of information sources reviewed is included in the bibliography section at the end of this memorandum.

Evaluated Strategies	Agency/ Location	Type of Strategy/Goals	Effect	Evaluation Method and Data	Ease of Implementation	Applicability	Supporting Research
Land Use							
Connectivity	SMARTRAQ Atlanta, GA	Studied the effect of increased regional average interse ction density from 8.3 to 16.6 intersections per square kilometer.	Reduces average vehicle mileage by 1.6%. Indicates that a 10% increase in intersections per square mile reduces VMT by about 0.5%.	Before and after connectivity and traffic counts.	Difficult to implement in established neighborhoods. Easier when carried out through new development.	Region-wide Implemented by local jurisdictions and private developers.	http://transaq.ce.gatech.edu/smartraq/
Connectivity	Metro Portland, OR	Use five case studies to evaluate the impact of street connectivity on local traffic by forecasting low, moderate and high levels of connectivity.	A change from low to moderate connectivity reduced VMT an average of 2%. A change from moderate to high connectivity reduced VMT an average of 1%.	Applied the Metro regional forecasting model to determine average vehicle miles of travel (VMT).	See above	See above	Portland Metro. Street Connectivity: An Evaluation of Case Studies in the Portland Region (2004).
Transportation-Efficient Development (TED)	California	Study of the effect of living in close to transit has on mode share.	Among those surveyed who drove to work when they lived away from transit, 52.3% switched to transit commuting when moving to within a half-mile walking distance of a rail station.	Survey of current and prior modes of commute.	See above	See above	http://gulliver.trb.org/publications/tcrp/tcrp_rpt_102.pdf Cervero, 1993
Transportation-Efficient Development	California (Bay Area)	Surveys were used to determine mode of commute for workers living near BART.	On average, 32% of workers living near BART commuted by rail. The regional average is 5%.	Surveys to determine mode of commute.	See above	See above	http://gulliver.trb.org/publications/tcrp/tcrp_rpt_102.pdf Cervero, 1994
Transportation-Efficient Development	Portland, OR	A study of transit mode share at the Center Commons, a TOD.	Transit mode share increased nearly 50% for work trips and by 60% for non-work trips.		See above	See above	http://gulliver.trb.org/publications/tcrp/tcrp_rpt_102.pdf Switzer, 2002
Transportation-Efficient Development	San Francisco, CA	Study investigates the effects of New Urbanism design principles on both non-work and commuting travel by comparing modal splits between two distinctly different neighborhoods.	Residents of the mixed-use, gridded neighborhood made 15% fewer auto trips and 22% more walking trips than the suburban style neighborhood. In the mixed-use, gridded neighborhood, 29% of those surveyed drove alone to work. In the suburban style neighborhood, 51% drove alone to work.	Surveyed to determine mode of commute.	See above	See above	http://www.uctc.net/papers/281.pdf. Cervero and Radisch, 1995.
Location Efficient Mortgages	No evaluative studies						
Parking							
Employer parking	Aggregate	Analysis of case studies at seven	SOV mode share averaged 25% lower when employees	Before and after	Moderate	Applicable in CBDs	Shoup, 1994a

Evaluated Strategies	Agency/ Location	Type of Strategy/Goals	Effect	Evaluation Method and Data	Ease of Implementation	Applicability	Supporting Research
subsidies		employment locations that examine the effect of employer parking subsidies on SOV commuting.	paid for their own parking.	surveys about mode of commute.	Barriers include: • Readily available parking substitutes • Lack of adequate transit service • Resistance from employers or employees	and other densely developed areas with priced parking and where free alternative parking sources are not readily available. Implemented by employers with assistance from transit agencies and TMAs.	
Employer parking subsidies	Los Angeles and Canada	Analysis of the effect of eliminating employer parking subsidies on SOV commuting.	There is an average 16 percentage point reduction in SOV commuting when employers stop subsidizing employee parking.	Before and after surveys about mode of commute.	See above	See above	Feeney, 1989
Employer parking subsidies	California	Study examines effects of state legislation that requires some employers to offer the option of cash in lieu of any parking subsidy.	Drive-alone mode share decreased by 11.5%.	Before and after surveys about mode of commute.	See above	See above	Shoup, 1997
Employer parking subsidies	Los Angeles, CA	Study estimates CBD commuter response to an increase in cost to employees of the price of parking.	Simple elimination of subsidy was predicted to decrease SOV use from 69% to 48%. The cash-out option reduced SOV travel to 55%.	Los Angeles CBD employee survey data and modeling.	See above	See above	Shoup, 1994
HOV priority parking	Seattle	A case study looked at reduced parking charges implemented for carpools at two facilities downtown (from $25 to $5 at one and $25 to $0 at the other).	Forty percent of carpoolers were former bus riders and 38% already rideshared. Only 22% switched from driving alone.	Before and after surveys to determine mode of commute.	Easy Lanes in existing parking facilities can be dedicated to SOV use.	Applicable in urban fringe areas along transit corridors and public and private parking facilities. Implemented by employers and local jurisdictions.	Olsson and Miller, 1978.
HOV priority parking		Study looked at the effect of fee differentials between HOV (free) and SOV ($57.50) parking on drive-alone commuters.	Carpool share rose from 17% to 58%, while transit declined from 38% to 28%.	Before and after surveys about mode of commute.	See above	See above	Shoup, 1994
Parking pricing (metered parking)	City of Eugene, OR	Studies effects of on street parking fees and time limits on SOV travel.	Ninety-five percent of non-residents continued to drive-alone, but either parked in private facilities or managed their parking time to stay within two hour limits.	Before and after surveys about mode of commute.	Easy	Not effective for purposes of reducing SOV trips. Implemented by local jurisdictions.	Dornan and Keith, 1988
Parking pricing	Aggregate	Studies the effect of parking fees on drive-alone commuters.	About 35% of drive-alone commuters would likely switch modes in response to $20 per month parking fees, even if offset by a transportation voucher.	Survey of commuter preferences.	Easy Strategy must address parking supply	Parking pricing is most common in major commercial and recreational centers and large cities. Implemented by local jurisdictions or private parking	Kuppam, Pendyala and Gollakoti, 1999.

Evaluated Strategies	Agency/ Location	Type of Strategy/Goals	Effect	Evaluation Method and Data	Ease of Implementation	Applicability	Supporting Research
						facility owners.	
Parking pricing		Study of the effect of a parking fee increase from $1.37 to $2.73 on auto commuting.	Reduces auto commuting 12% - 39% and, if matched with transit and rideshare subsidies, reduces total auto trips by 19% - 31%.	Before and after case study. Before and after mode of commute data.	See above	See above	http://www.epa.gov/oms/market/pricing.pdf ICF, 1997
Parking pricing	CH2M Hill	Studies the effect of parking fees ($49 per month; free for carpoolers) and travel allowances ($40 per month) on drive-alone auto commuting.	Solo driving declined from 89% to 64%.	Before and after surveys about mode of commute.	See above	See above	K.T. Analytics, 1995.
Parking pricing	Pacific Northwest Bell	Study examines the effect of parking pricing ($60 per month; discounts for carpools) on drive-alone auto commuting.	Results in 25% of employees driving to work, compared with 80% for other employees in the area.	Before and after surveys about mode of commute.	See above	See above	K.T. Analytics, 1995.
Parking pricing	City of Eugene, OR	Study of the effect of increases in parking rates for surface lots ($6 to $16) and garages ($16 to $30). At the same time, fines for commuters parking in short-term metered spaces were increased.	Parking demand declined 35%, about half changing parking locations and half switching to public transit or alternative modes. Monthly parking permit sales fell from 560 to 360.	Before and after surveys about mode of commute.	See above	See above	K.T. Analytics, 1995; Peat, Marwick and Mitchell, 1985.
Parking supply management	City of Portland, OR	Analysis of the effects of parking supply management on SOV commute trips.	Parking maximums, along with a number of other management strategies, increased transit use from 20% in the 1970s to 48% in the mid-1990s.	Analysis of mode of commute statistics.	Easy May involve adopting new parking policies.	Varies depending on the strategy. Typically implemented by local jurisdictions at activity centers where there is competition for limited parking.	K.T. Analytics, 1995.
Parking supply and management (timed parking)	City of Madison, WI	Peak-period pricing demonstration aimed to discourage SOV commuting, thus freeing up more spaces for mid-day shopping and personal business trips. Free shuttle buses to fringe parking lots were instituted before the fee.	Resulted in a 40% decrease in the number of spaces occupied during peak period. However, only a small number changed their transportation mode. A majority merely changed parking location.	Before and after surveys of parking occupancy mode of commute.	Same as above	Not particularly effective in reducing SOV trips. Typically implemented by local jurisdictions at activity centers where there is competition for limited parking.	Charles River Associates, 1984.
Parking supply and management (timed parking)	City of Chicago, IL	Study looked at rate decreases for short-term parking and increases for long-term parking at city owned facilities and their effect on the number, duration and accumulation of vehicles.	Long-term parking decreased by about 50% and the absolute number of parkers decreased while revenues increased. The study's authors believe that former long-term parkers shifted from parking at city facilities to using transit though there has been no quantitative analysis.	Before and after analysis of parking statistics. Parking occupancy statistics.	Same as above	Same as above	Kunze, Heramb and Martin, 1980.
Shared parking	No evaluative studies					Not effective to reduce SOV trips.	
Fare Free Areas							
Fare free areas	City of Portland, OR and TriMet	Study of the effect of drive-alone trips to Lloyd District since it was incorporated into the downtown fare free area.	Drive-alone trips to the Lloyd District have decreased by 2.4%. Change may be due to other factors (e.g., Passport transit program, new metered parking, carpool matching, etc.).	Analysis of mode of commute data.	Difficult Transit agencies will lose revenue and the public will be subsidizing	Appropriate in regional centers. Implemented by regional governmental	City of Portland. *Extension of Fareless Square to the Lloyd District,* 2004.

Evaluated Strategies	Agency/ Location	Type of Strategy/Goals	Effect	Evaluation Method and Data	Ease of Implementation	Applicability	Supporting Research
					fareless travel.	agencies.	
Transit							
Bus frequency	Portland, OR TriMet	Several studies examine the effect of bus frequency on mode choice.	TriMet customers identify convenience as the number one reason why they buy and continue to use transit.	Interviews with a sample of riders.	Easy It is difficult to determine if frequency increases ridership or vice versa.	Region-wide Implemented by local or regional government agencies.	TriMet Voice of the Customer Research Program, 2001.
Bus rapid transit (BRT)	Multiple jurisdictions	Study of the effects of BRT on ridership and mode choice in seven cities. Additional analysis needed to assess direct impacts on mode share.	• In Houston, 30% of riders were new, and 72% of new riders were diverted from automobiles. • Los Angeles saw an increase ridership of 26% - 33%. • Twenty percent of new riders in Vancouver, B.C. previously used automobiles. • Adelaide saw a 76% gain in ridership. • Brisbane reported a 42% gain in riders. • Leeds had a 50% gain in ridership. • Pittsburgh had a 38% increase in ridership.	Transit counts and surveys. Before and after mode of commute data.	Difficult Involves development of new bus facilities and dedicated BRT lanes.	Appropriate on congested urban corridors. Implemented by local or regional government agencies.	Transit Cooperative Research Program: Report 90: Bus Rapid Transit.
Demand responsive / ADA	Dayton, Ohio	Examines the effect of training wheelchair users to use fixed bus route service.	Resulted in 40% increase in wheelchair boardings.	Analysis of wheelchair boarding data.	Varies	Region-wide Implemented by local and regional governments or transit agencies.	Rosenbloom, 1998
Demand responsive / ADA	Mansfield, OH	Reports the effects of change from a fixed to demand responsive on ridership.	Ridership increased 41%	Travel counts	Easy	Region-wide Implemented by local and regional governments or transit agencies.	Navin, 1974; Pratt and Bevis, 1971.
Light Rail Transit	Aggregate	Analyzes the effect of LRT on VMT per capita.	A 10% increase in a city's rail transit service results in a decrease of 40 annual VMT per capita	Before and after travel diaries.	Moderate – light rail lines can be expensive to implement.	Appropriate along congested urban corridors. Implemented by regional government or transit agencies.	Bento, et al (2003). http://econ.worldbank.org/
Light Rail Transit	Aggregate	Reports mode shift for users of light rail.	More than 50% of LRT riders would travel by automobile if light rail were not available.	Rider surveys.	Same as above.	Same as above.	FTA, 2002. www.fta.dot.gov/transit_data_info/reports_publications/reports/16031_ENG_HTML.htm
Light Rail Transit	Portland, OR	Study compares ridership between a bus route and the light rail line that replaced it.	Portland's Interstate MAX Yellow Line carries 92% more people compared with the former Interstate Avenue bus line.	Ridership counts for bus and light rail.	Same as above	Same as above.	Progressive Railroading, 2005. http://www.progressiverailroading.com/transitnews/
Park-and-ride	Aggregate.	Studies the prior mode of park-and-ride facility users.	Generally, 40% – 60% of park-and-ride lot users previously drove alone.	Surveys of mode of commute prior to carpool. Park-and-ride user	Moderate – park-and-ride facilities require funding, adequate transit	Applicable in urban fringe areas along transit corridors.	Bowler et al. (1986) as presented in Weant and Levinson (1990).

Evaluated Strategies	Agency/ Location	Type of Strategy/Goals	Effect	Evaluation Method and Data	Ease of Implementation	Applicability	Supporting Research
				counts.	service rideshare programs, and suitable incentives.		
Park-and-ride	Miami, FL	Studied prior mode data specific to park and pool activity.	Before opening a large fenced and lighted carpool and transit fringe parking lot in the Miami area, 60% of carpoolers surveyed had driven alone.	Surveys of mode of commute prior to carpool. Park-and-ride user counts.	See above	See above	Wattleworth et al, 1978.
Park-and-ride	Aggregate	Study of prior mode data at 150 park-and-ride lots nationally.	Found that 60% of carpoolers had been single occupant drivers.	Surveys of mode of commute prior to carpool. Park-and-ride user counts.	See above	See above	Flora, Stimpson and Wroble, 1980.
Pricing and fares	King County Metro	Examined effect of employer incentives on SOV travel at seven businesses. Incentives include FlexPass transit, vanpool subsidy, carpool, bike and walking incentives, personalized ride match services, shuttles to/from park-and-ride and guaranteed ride home.	Averaged a 133% increase in transit usage and an 18% SOV reduction in two years.	Before and after surveys about mode of commute.	Moderate Is expensive and sometimes controversial.	Region-wide Implemented by regional governments and transit agencies.	King County Metro, 1998; Koss, 1999.
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Routing and coverage	Boston, MA	City restructured routes to provide more direct service to the Downtown Crossing area.	Initial bus route extensions increased ridership between 26% and 30% (2,200 – 2,400 daily riders). About 40% of the increase can be attributed to new transit trips.	Analysis of ridership survey data.	Moderate It is difficult to determine if coverage increases ridership or vice versa.	Region-wide Implemented by local or regional government agencies.	Weisbrod et al, 1982.
Routing and coverage	Albuquerque, NM	City revised route system to a more gridlike service.	Ridership increased 4%.	Analysis of ridership data.	See above	See above	Rosenbloom, 1998.
Site design and accessibility	Bellvue, WA	Study of the effects of site design at six suburban activity centers.	Sites averaged 73% solo office commute vs. 92% at other similar sites and 9% transit commute vs. 0.5% at other sites.	Study included survey of travel characteristics.	Varies Upgrades to sites can be expensive.	Region-wide Implemented by local or regional governmental agencies.	Hooper, 1989.
Transportation Management and Employer-Based							
Alternate work	Aggregate	Study of the effects of compressed work	Could reduce automobile commutes by 7% to 10%.	Estimation based on	Easy	Region-wide	CUTR, 1998

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schedule (compressed work week)		weeks on total vehicle travel.		commuter surveys.		Implemented by individual businesses and assisted by TMAs.	http://www.cutr.usf.edu/ .
Alternate work schedule (flextime and telework)	Aggregate	Study estimates the potential effects of flextime and telework programs on peak-hour commute trips.	Estimates that flextime and telework together can reduce peak-hour vehicle trips by 20% - 50%.	Surveys of flextime and telework program participants.	Easy	Region-wide Implemented by individual businesses and assisted by TMAs.	Ewing, 1993.
Telework	Aggregate	Survey of 400 U.S. teleworkers.	Estimates that if 10% of the workforce telecommutes on any given day, total vehicle travel would decline by 4%.	Estimation based on survey of teleworkers.	Easy	Region-wide Implemented by individual businesses and assisted by TMAs.	Mokhtarian, 1997
Carsharing	Aggregate / anecdotal	Studies look at the effect of carsharing on per capita driving.	Typically results in a 40% to 60% reduction of per capita driving.	Estimation based on user counts.	Moderate	Region-wide Usually implemented by a private business.	Steininger, Vogl and Zettl, 1996.
Carsharing	San Francisco	Study looks at the effects of the CarShare program on vehicle ownership and VMT.	Two-thirds of participants avoided purchasing another car, resulting in an average member VMT reduction of 47%.	Survey of CarShare members.	See above	See above	http://repositories.cdlib.org/iurd/wps/WP-2003-05/ Cervero and Tsai, 2003.
Guaranteed Ride Home (GHR)		Study looks at the effect of GHR availability on commuters' decision to use transit.	Fifty nine percent of rideshare and transit patrons consider GRH important in their decision to use alternative modes.	Survey of rideshare and transit patrons.	Easy	Region-wide Implemented by local or regional government agency.	K.T. Analytics, 1992.
HOV lane	Aggregate	Study looks at the effects of HOV lanes on vehicle trips.	HOV lanes can reduce vehicle trips on a particular roadway by 4% - 30%	Analysis of vehicle trip counts.	Moderate Often expensive to construct and controversial.	Appropriate on congested highways where lanes can be added or converted. Implemented by local and regional government agencies.	Cosmis, 1993 (www.bts.gov/ntl/DOCS/474.html) and Pratt, 1999 (www4.nationalacademies.org/trb/crp.nsf/all+projects/tcrp+b-12).
Rideshare	Puget Sound	Study looks at the effect of ridesharing on commute trips.	Vanpooling represents about 2% of total commute trips and 7% of commute trips over 20 miles.	Analysis of rideshare surveys and statistics.	Moderate Difficult to match people for carpooling.	Region-wide Implemented privately or through a matching service.	York and Fabricatore, 2001.
Shuttle service	No evaluative studies						
Transit Marketing and Promotion (Individualized Marketing Programs)	Government of Western Australia, Perth, Aus.	TravelSmart™ is, "a social marketing program that identifies individuals who want to change the way they travel, motivates them to think about their travel options and provides them with information about how to use transit, bike, walk or carpool for some of their trips."	The pilot program achieved a 10% reduction in car travel and a 21% increase in public transit use.	Travel diaries and surveys. Individuals trip patterns.	Easy	Implemented by local or regional government agencies or non-profit organizations.	http://www.dpi.wa.gov.au/travelsmart/pdfs/Report.PDF Socialdata Australia Pty. Ltd. *Potential*

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							Analysis, "Perth," 2000.
Bike and Pedestrian							
Bike boulevard	No evaluative studies						
Bike parking	London, England	Survey of 348 London students about mode choice after the installation of bicycle parking racks.	Sixty-one percent of school cyclists (i.e. those who had cycled to school within the past month) said the new cycle racks have encouraged them to cycle to school more often.	Survey of students and interviews with teachers. Of the 348 students, 171 had cycled to school within the past month. Before-and after-counts.	Easy Parking structures are relatively inexpensive.	Applicable at schools though-out region.	http://www.tfl.gov.uk/streets/downloads/pdf/cycling/school-parking-overview-report.pdf
Bike racks on transit	TriMet	Bike racks are on all transit vehicles. This allows cyclists and transit users to combine modes for more travel options.	Use of racks has increased steadily. Anecdotal increase in bicycle mode share and transit use as a result.	Surveys	Easy	Region-wide Implemented by local or regional governmental agency.	
Bike racks on transit	Seattle Metro Transit	See above	Seattle Metro transit agency's entire bus fleet was equipped with bicycle racks in 1994. More than 40,000 cyclists use these racks each month. Anecdotal support for increase in bicycle ridership.	Bike Counts and surveys. Survey data.	See above	See above	King County Metro, 2002
Bike signing	No evaluative studies						
Bike rentals/ "Smart Bike" programs	Netherlands, France, Germany, et al…	In 1996, the smart bike, or automated bike rental system, was first implemented in the United Kingdom, leading to a growing number of programs throughout Europe and Asia. There are presently no such programs in the United States.	Copenhagen has more than 2,000 bikes. 38% of users are tourists. Anecdotal evidence suggests that the free bikes encourage cycling use by direct users and by others.	Surveys of users to determine alternative mode choice. Alternative mode choice if the bicycles were not available.	Moderate Program is costly.	Applicable at major tourist destinations. Most appropriate implementation by private organizations.	http://www.nctr.usf.edu/jpt/pdf/JPT%207-2%20DeMaio.pdf
Bike safety education	No evaluative studies						
"Bike station" facilities	Bikestation (private company), Seattle, WA, Long Beach, CA, et al…	Bikestation offers secure bicycle parking. Some Bikestation locations offer bicycle repairs, bicycle and commute sales & accessories, rental bikes for local and tourist needs, restroom/changing rooms and access to vehicle-sharing.	According to research conducted by Bikestation, an average of 30% of Bikestation users previously drove alone to their destination and still would if the Bikestation were not available.	Surveys. Survey data.	Market-demand based – private operator.	Appropriate at regional transit centers.	www.**bikestation**.org/ Bikestation Seattle Customer Survey, October 2004, King County Metro.
Bikeway improvements	National study on bike lanes and bike commuting.	Examined bike commuting data and associated independent variables that affect ridership.	Each additional mile of bikeway per 100,000 people correlated with 0.069% increase in bicycle commuting. No causal relationship determined.	Statistical - Regression analysis. User counts: either manual or automated tube counts. Information on bicycle facilities and Census data.	Moderate Bike system improvements can be expensive.	Region-wide Implemented by local or regional governmental agencies.	Nelson, A.C. and D. Allen. If You Build them, Commuters Will Use Them: Association between Bicycle Facilities and Bicycle Commuting. Transportation Research Record 1578, TRB, National Research Council, Washington DC, 1996.
Bikeway improvements	Transportation	Study examined bike commuting data and	No strong relationship between off-street paths and	Statistical -	See above	Applicable region-	http://web.pdx.edu/~jd

Evaluated Strategies	Agency/ Location	Type of Strategy/Goals	Effect	Evaluation Method and Data	Ease of Implementation	Applicability	Supporting Research
	Research Record. National study on bike lanes and bike commuting.	related independent variables in 43 US cities. Attempted to determine statistical relationships between variables and bicycle mode share.	commuting rates. Anecdotal positive relationships have been noted.	Regression analysis. User counts: either manual or automated tube counts. Information on bicycle facilities and Census data.		wide on roadways with greater than 3000 vehicles per day.	ill/Dill%20Carr%20TRR%201828.pdf Dill, Jennifer and T. Carr. If You Build them, Commuters Will Use Them: Association between Bicycle Facilities and Bicycle Commuting. Transportation Research Record 1838, TRB, National Research Council, Washington DC, 2003.
Bikeway improvements	PDOT, Portland	Improvements to bicycle network (includes on-street bikeways, and off-street paths).	Portland's Bikeway Network increased 215% between 1991 and 2004. During that same period, the number of bicycle riders daily crossing the four main bicycle bridges in Portland increased 210%. This increase was especially noticeable on the Broadway, Hawthorne, and Steel Bridges, where combined daily ridership went from 2,115 in 1991 to 7,910 in 2004. During this period, the bikeway network feeding these bridges was greatly improved, as were facilities on the bridges themselves.	Tube counts on 4 bridges over the Willamette River. Counts are extrapolated from peak-period counts during peak season. Evaluation method only demonstrates correlation (not causation). Surveys of use.	Varies Bikeway system improvements can be expensive.	Region-wide Implemented by local jurisdictions.	NA
Bikeway improvements	PDOT, Portland	Improvements to bicycle network (includes on-street bikeways, and off-street paths).	A survey in 2001 showed that fully one-third of 600 responding peak hour cyclists began using their bicycles for work within the past two years.	Surveys administered on one of three Willamette River bridges. Riders' history.	See above	See above	City of Portland Bicyle Master Plan – Five Year Update, 2001.
Bikeway improvements	City of Delft, The Netherlands	Evaluated improved bicycle mode split after implementation of plan (aggregated).	Increases in bicycle travel due to decreases in auto-travel and also transit use. Shifts due to decreased mobility of autos and surface transit. Therefore increase in congestion may be a necessary prerequisite.	Surveys distributed through postal mail.	Moderate Improvements can be expensive.	Region-wide Most appropriate at town-centers or other areas with high level of congestion.	http://www.mobility-consultant.com/brm/indu/minitran/id_min82.htm#conclusions
Driver enforcement	No evaluative studies						
Employer-based encouragement programs	Bicycle Transportation Alliance, state-wide	Bike Commute Challenge – employer competition during month of September. Companies "compete" for the highest bicycle mode share.	Increases bicycle mode share during duration of event. In 2004, 1640 of 4,070 participants were new riders. Anecdotal information supports long–term increases in bike mode share.	Surveys during Bike Commute Challenge Surveys and trip logs of commute trips during and after the month-long event.	Easy BTA coordinates marketing through brochures and website. Offers technical assistance.	Region-wide The temporal nature of this event affects the results and impact on mode shift.	NA
End of trip facilities (showers, changing rooms)	Roads and Traffic Authority, New South Wales, Australia	Action for Bikes sets out a costed, 10-year plan for the creation of a series of arterial bicycle networks and facilities	"Of the workplace facilities, lack of a shower and change room was considered to be the most important barrier to bicycle use – a complete obstacle for nearly a fifth of	Surveys Survey data	Easy May require development	Region-wide Implemented by individual	BikePlan2010 - The state of cycling – a review of current

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		across New South Wales.	commuters.		incentives or voluntary action by private businesses.	employers with support from TMAs and local jurisdictions.	data and research, RTA, 1998 http://www.rta.nsw.gov.au/trafficinformation/bicycles/bikeplan2010.html
End-of-trip facilities (showers, changing rooms, and parking) – BikeCentral	BikeCentral Program, Office of Transportation, City of Portland	The Bike Central program in Portland, Oregon was a network of end-of-trip facilities for bicycle commuters to Portland's central city. Bike Central provided showers, secure bicycle parking, and permanent work clothing storage in four central city health clubs in partnership with the City of Portland's Office of Transportation.	Based on a 1997 survey of 36 BikeCentral users, the BikeCentral facility resulted in a 77% decrease in SOV-driving, a 76% decrease in transit use and a 400% increase in bicycling trips for members.	Surveys of users.	See above	See above	City of Portland. Report on the Bike Central Bicycle Commuter Project in Portland, OR. 1997
End-of-trip facilities	Businesses and TMAs, Portland Region	Employers provide showers and changing rooms as an incentive for employees to walk or bike to work. The City of Portland provides incentives for developers to include these facilities in their buildings.	Surveys by the Bicycle Transportation Alliance (and others) suggest that many employees would commute by bike more often if workplaces provided showers and locker rooms.	Surveys Surveys of use.	Would require development of incentives or voluntary action by private businesses.	See above	BTA Bike Commute Challenge Survey, 2004.
Free Bikes – BikeTown Program	Bicycling Magazine, Portland, ME	Bicycling Magazine distributed 50 free bicycles to interested people in Portland, Maine and then tracked their use. Program to expand to 10 cities in 2005.	Short-term impact of increasing ridership. Anecdotal evidence of "contagious" effect of program.	Follow-up interviews. Survey data.	Moderate The program is costly.	Region-wide Most appropriate implementation by private organizations.	http://www.bicycling.com/article/0,3253,s1-9281,00.html?category_id=363
Individualized marketing programs (TravelSmart™)	City of Portland Transportation Options, Socialdata America Ltd.	TravelSmart™ is, "a social marketing program that identifies individuals who want to change the way they travel, motivates them to think about their travel options and provides them with information about how to use transit, bike, walk or carpool for some of their trips."	The City of Portland's Test Pilot resulted in 9% less car travel and an 8% increase in walking, cycling, and public transit. These figures represent a 12% reduction in vehicle miles traveled, over 600,000 miles per year. Residents' changes in travel behavior have been shown to be sustained one year after the initial marketing efforts.	Travel diaries and surveys. Individuals trip patterns.	Easy Sufficient funds are not always allocated to marketing efforts.	Region-wide Implemented by local or regional governmental agencies or a non-profit organization.	http://www.trans.ci.portland.or.us/Options/TravelSmart.htm
Individualized marketing programs (TravelSmart™)	Government of Western Australia, Perth, Australia	Same as above	Two percent mode shift from driving to cycling. (A total decrease in SOV driving by 6%).	Travel diaries and surveys. Individuals trip patterns.	See above	See above	http://www.dpi.wa.gov.au/travelsmart/pdfs/Report.PDF
Lowering speed limits	UK Commission for Integrated Transport	Study looked at best practices in Europe for traffic calming and increasing bicycle and pedestrian mode share. Calls for limiting urban speeds to 20 MPH.	Anecdotal evidence for increased bicycle ridership on slower-speed streets.	Before- and after-counts.	Difficult Politically challenging.	Region-wide Must be implemented at state level.	http://www.cfit.gov.uk/research/ebp/stage3/03.htm#3.21
Off-street paths	Sustrans, UK	Sustrans' Route User Monitoring Programme measures use of the British National Cycle Network by cyclists, pedestrians and other users.	Nearly one third of trips on the NCN replaced a car trip – meaning as many as 38 million car trips were avoided in 2003.	Data are collected by automatic bicycle counters and manual counts with face-to-face surveys. Interviews and before- and after-counts.	Varies	Region-wide Implemented by local jurisdictions.	http://www.sustrans.org.uk/webfiles/Info%20sheets/RMU2003.pdf
Organized bike rides and events	No evaluative studies						

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Pedestrian improvements	No evaluative studies						
Promotional programs -Safe Routes 2 School	Marin County, CA	Program uses a combination of infrastructure improvements, education, enforcement and encouragement to encourage walking and biking to school.	Program recorded a 13% mode shift from single student "chauffeured trips" to the alternative travel modes of walking, bicycling, riding public transit and carpooling. Data also shows that drive-alone trips to pick up or drop off students have decreased from 55% to 42%	Mode of commute surveys.	Easy	Region wide Implemented by governmental agencies and/or non-profit organizations.	
Promotional programs –Ten Toes Express	City of Portland Transportation Options	Ten Toe Express is a city-sponsored initiative designed to encourage walking trips.	According to the program's report, the Ten Toe Express, "successfully helped to increase walking in the Interstate Target Area. More than ½ of the respondents reported taking more than one new trip per week by walking instead of driving. Of new walking trips, 16% were for shopping, 22% for errands, and 13% to a friend's house."	Travel journals and surveys Individuals trip patterns.	Moderate	Region wide Implemented by governmental agencies and/or non-profit organizations.	Ten Toes Express – Final Report, 2004
Restriction/elimination of auto travel (car-free zones)	Various	Elimination of automobiles from certain downtown areas.	Anecdotal reports of short-term bicycle mode share increase. No long-term research available.	Before- and after-studies. Auto and bicyclist counts.	Difficult Politically challenging	Region-wide Implemented by local jurisdictions.	
Shared use paths	Transportation Research Record. National study on bike lanes and bike commuting.	Study examined bike commuting data and related independent variables in 43 US cities. Attempted to determine statistical relationships between variables and bicycle mode share.	No confirmed relationship between off-street paths and commuting rates based on quantitative data. Anecdotal positive relationships have been noted.	Statistical - Regression analysis. User counts: either manual or automated tube counts. Information on bicycle facilities and Census data.	Varies	Region-wide Usually implemented by local jurisdictions.	http://web.pdx.edu/~jdill/Dill%20Carr%20TRR%201828.pdf Dill, Jennifer and T. Carr. If You Build them, Commuters Will Use Them: Association Between Bicycle Facilities and Bicycle Commuting. Transportation Research Record 1838, TRB, National Research Council, Washington DC, 2003.
Single day events – Car-Free Day	Bogota, Columbia, and others	Bogota's first Car-Free Day was in 2000. The whole urban area was restricted to cyclists, pedestrians, rollerbladers and users of public transit. Public pressure, with help from the police, ensured that no cars entered the car-free streets.	Beginning in 2000, Car-free day results in the single-day reduction of over 800,000 cars and 1.5 million people moved by bicycle in city of Bogota.	User counts. User-counts of cyclists.	Moderate (to demonstrate) Politically challenging	Most appropriate in urban centers. Implemented by local and regional governmental agencies.	http://www.un.org/Pubs/chronicle/2003/webArticles/022603_carfreedays.html http://www.ciudadhumana.org/principal.htm (in Spanish)
Single day events – "Clean Air Day"	Translink, BC, Canada	To promote Clean Air Day, agencies across Canada develop campaigns to create greater awareness around air quality issues and to encourage the use of transportation alternatives to the single occupant vehicle (SOV).	Reduction in auto-travel with concurrent increase in bicycling. Seven percent of GVRD residents switched from SOVs to an alternative mode of transportation, and 4% plan to stay with their mode shift for the foreseeable future.	Surveys. User-counts of cyclists, reasons for behaviors.	Easy	Region-wide Implemented by local jurisdictions and/or non-profit organizations.	http://www.translink.bc.ca/files/board_files/meet_agenda_min/2004/07_21_04/4.14cleanair.pdf
Single day events – "Car Free Day"	Fremantle, Australia, and others	The objectives of the car free days include: encouraging reduced car use,	A comparison of the mode share by those surveyed given for the Perth inner metropolitan Region demonstrates a	User counts and surveys.	Easy	Most appropriate in urban centers.	http://www.freonet.net.au/shed-your-

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		creating more space for pedestrians and cyclists, encouraging more people to experience available public transport options, and demonstrating the benefit to business of reduced car traffic.	clear shift away from car use (76% compared to 42%). Of those surveyed 12% indicated that they had changed mode because of the event.	User-counts of cyclists and reasons for travel behaviors.			car/syc_research.pdf
Traffic calming (aggregate)	FHWA Study (1994) of Europe, Japan, and North America	Traffic calming aims to reduce the "dominance and speed of motor vehicles. It employs a variety of techniques to cut vehicle speeds. Normally traffic calming should be applied as an area-wide technique. To apply it only to a particular street is to run the risk of pushing accidents, pollution and "rat-ruing" into neighboring areas."	Cited effects of the traffic calming included a doubling of bicycle use in Buxtehude, Germany in the 4 years following the project. In a suburb of Osaka, Japan, pedestrian traffic in the street increased by 5 percent, bicycle traffic rose by 54% and car traffic entering the street fell by 40%.	Before- and after surveys.	Varies	Region-wide Implemented by local jurisdictions.	http://www.bikewalk.org/assets/pdf/CASE19.PDF
Pricing							
Congestion pricing Area-wide value pricing projects	Singapore, Norway, United Kingdom (London), Germany (Stuttgart)	Case studies of specific projects and impacts. Goal to relieve congestion during peak periods, in part through mode shift.	Primary effect is to reduce traffic during peak periods. secondary effect of shifting mode share from SOVs to transit and rideshare modes, with following effects: • In Singapore, mode shift of up to 30% for buses and 11% for carpools. • In Trondheim, Norway, transit mode share increased by about 7%. • In Stuttgart, Germany, one-year simulation resulted in 5 – 15% mode shift to transit. • In London, transit in peak periods increased by 14%	Changes in mode share measured using combination of data related to: • Vehicle and/or passenger counts taken over time • Survey data • Account information collected electronically and used to administer pricing programs	Difficult Due to significant public and political concerns and barriers, as well as issues related to cost, technology and equity. Portland pilot project recommended not implementing area-wide pricing in this region.	Applicability in this region low (see ease of implementation). Also not very realistic or feasible for implementation at the local level. Could be studied further at the regional level in the future.	Transportation Cooperative Research Program. Report 95. Chapter 14 – Road Value Pricing. John E. Evans IV, Kiran U. Bhatt, and Katherine F. Turnbull. Transportation Research Board. Washington D.C. 2003. (most comprehensive report; other multiple sources – see bibliography)
Congestion pricing Area-wide value pricing modeling studies	Los Angeles, San Francisco, Boston, Portland	Modeling studies of potential effects of implementing area-wide pricing in several US cities. Goal of relieving peak period congestion in part through mode shift.	Predicted mode shifts due to pricing of all or multiple facilities in a given region, with following results: • In Los Angeles, predicted VMT reduction of four to six percent. • In Boston, transit mode share projected to increase by 28% in peak periods • In Portland, one-to three percent mode shift from SOVs to transit and/or carpools	Computer simulations using sophisticated traffic models and incorporating assumptions about behavior under pricing based on survey data	See above	See above	See above and source documents in bibliography.
Congestion pricing Facility-based value pricing projects	Toronto, France (Lille), Korea (Seoul), Florida, New York/ New Jersey	Case studies of implementing pricing on specific facilities in Europe, Asia and US. Goal is to reduce peak period congestion and increase economic efficiency, in part through mode shift.	• In Seoul, Korea, pricing two tunnels resulted in 30% combined mode shift to transit and carpools during peak periods. • In Lille, France, major shift in travel time but no mode shift • No mode shift data for Toronto • Limited data on mode shift effects in New York and New Jersey	See area-wide pricing	Difficult Similar barriers and concerns as for area-wide pricing (equity, public opposition, cost of implementation) but lower level of concern. Portland pilot project did not	See ease of implementation. Has been most effective in areas with limited number of alternatives or options for diversion and where it can be implemented by national or regional	See area-wide pricing.

Evaluated Strategies	Agency/ Location	Type of Strategy/Goals	Effect	Evaluation Method and Data	Ease of Implementation	Applicability	Supporting Research
					recommend full-facility pricing in this region.	government (e.g., Korea and France)	
Congestion pricing Pricing of partial facilities (e.g., High Occupancy Toll lanes)	California (Riverside and San Diego), Texas (Houston)	Case studies of lane-pricing projects in California and Texas. Primary goal is to relieve peak period congestion, make more efficient use of resources and raise revenues for transportation improvements. Mode shift can be secondary result.	Limited impacts on mode share for all facilities. • In San Diego, a share of HOV use increased by approximately three percent but SOV use also increased, resulting in no mode shift. • In Riverside (SR-91), average vehicle occupancy actually decreased; no discernible effect on the share of transit (bus or rail) use. • Limited number of users translates to minimal overall effects in Houston; reported shift of carpools from the general purpose lanes to the express lanes of about 5%.	See area-wide pricing	Fewer barriers than with area-wide or facility pricing. Ability to provide unpriced alternative for drivers reduces concerns about equity, financial impacts and traffic diversion, particularly if implemented only on new facilities. Portland pilot project recommended pricing new capacity on existing or new facilities on case-by-case basis.	May be applicable in this region by Metro or ODOT. Unlikely to be implemented at local jurisdiction level.	
Gas pricing	Bay Area, CA	A survey of 1,520 San Francisco area commuters for the *511 Rideshare* program in June 2004 (after a jump in fuel prices).	Thirty-seven percent of respondents stated that increased gas prices changed how they commute to work. Of those that changed mode of commute, 48% carpool, 25% use public transit, 3% bike, 2% telecommute and 1% walk.	Survey of commuters about mode of commute.	Difficult	Region-wide Local jurisdictions cannot implement this strategy.	http://www.rideshare.511.org/research/ 511 Rideshare, 2004.
Mileage-based taxes	Proposed in the Netherlands, United Kingdom and European Union	Objective is to tie vehicle-related taxes and fees to miles traveled, with the goal of reducing VMT and possibly increasing use of other modes	• No available quantitative data or analysis of existing programs • Simulation models show a potential to decrease VMT by about 2% to 15%, depending on the per mile fee or tax (ranging from 1 cent to 10 cents per mile). • Modeling of a two cents per mile emissions fee showed a reduction of 3.9% to 4.4% in several California communities. • Effects have not been translated into direct effects on mode share.	• Mileage data reported from odometer readings and verified by spot checks. • More sophisticated systems use electronic devices to automatically send mileage data to evaluating entities	Difficult	Likely only feasible to be implemented by state or national entity	VTPI Greig Harvey and Elizabeth Deakin, "The STEP Analysis Package: Description and Application Examples," Appendix B, in Apogee Research, *Guidance on the Use of Market Mechanisms to Reduce Transportation Emissions*, USEPA, April 1997. Todd **Litman**, *Distance-Based Charges; A Practical Strategy for More Optimal Pricing*, VTPI (www.vtpi.org), 1999.
Mileage-based insurance	Private insurance companies in Israel, Holland, South Africa, United Kingdom and	Objective is to lower insurance costs for people who drive fewer miles and increase costs for those who drive more miles, improving equity and providing an	• Study of Progressive Insurance policy holders in Houston, Texas showed 13% reduction in vehicle use. • Modeling indicates a typical participant would reduce VMT by 10% or more.	See mileage-based taxes	Moderate to implement; difficult to measure for	Applied by private insurers; potential need for state authorization (?)	Harvey and Deakin (see above) VTPI and multiple base studies (see

Evaluated Strategies	Agency/ Location	Type of Strategy/Goals	Effect	Evaluation Method and Data	Ease of Implementation	Applicability	Supporting Research
	United States	incentive to reduce VMT.	• No direct effects on single-occupancy vehicle use overall or mode share or shift have been documented.		specific local geographic areas		bibliography)