Appendix 2.0

RTP System Planning

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Appendix 2.1
Bicycle Travel Demand Model Enhancement

Bicycle use is an important component of the region's strategy to provide a multi-modal, balanced transportation system. Metro's 2000 Regional Transportation Plan (RTP) includes policy language calling for bicycle mobility and accessibility to and within the central city, regional centers, light rail station communities and other mixed-use activity centers. The RTP includes a regional system map of bikeways planned for the next twenty years.

The existing regional transportation demand model probably underestimates bicycle and pedestrian trips, and does not predict bicycle travel according to the transportation network. Instead, the current model predicts bicycle and pedestrian trips as part of the "mode choice" step of the modeling process, but does not assign these trips to a network to predict how they might be distributed. While pedestrian trips are generally short enough to make a network assignment impractical, bicycle trips are of sufficient length to be assigned to a network and evaluated at this level.

Developing a travel demand model for bicycles is an important step in developing a quantitative evaluation method to allocate funding for bicycle project and improve the region's ability to plan for bicycle travel. As part of a future update to the RTP or the Regional Bicycle Plan, Metro will develop a bicycle travel demand model that can help determine what factors influence the decision to use a bicycle for trips and how bicyclists choose their route of travel. The additional data will allow Metro to improve its modeling capability to include travel demand forecasting for bicycles. The modeling results will assist planners in identifying needs and predicting future use of bikeway facilities, testing planned networks, and evaluating specific projects.

Main Features

Developing a bicycle travel demand forecasting model requires an extensive analysis of the dynamics involved in selecting the bicycle as a travel mode. Since passage of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and most recently the Transportation Equity Act for the 21st Century (TEA-21) by the U.S. Congress, there has been increased theoretical discussion of the factors that influence bicycle travel. Work by Landis (1996) on a latent demand score model, Ridgeway (1994) on applying travel demand modeling techniques to bicycles, and Goldsmith (1994) on estimating the effect of bicycle facilities on VMT and emissions has added to the base of knowledge. However, there are relatively few comprehensive analyses of the bicycle mode choice process. As a result, estimating the number of current bicyclists and projecting future bicycle ridership continues to be a challenge. Building on the limited analysis to date, Metro identified five main components to be used to develop a bicycle travel demand model:

1. A focus group of current bicyclists to determine their perception of needs as experienced users, and to determine how they make decisions in route selection.
2. A stated preference survey applied to a stratified random set of potential bicyclists to determine their responses to a set of hypothetical improvements and incentives.

3. The development of calibrated forecasting models based on a combination of the stated preference results and the 1994 household travel behavior survey. Calibration confirms that the model is providing an accurate representation of current trip making. This is essential to assure that the model will provide a reasonably accurate forecast of future bicycle trip activity.
4. The development of bicycle accessibility measures and travel speed estimation. Travel speeds are an important element of the travel demand forecasting model because of speed's relationship to accessibility. Bicycle travel times can be estimated for each non-freeway link in the transportation network by importing the elevation at each node from a geographic information system. The resulting link elevation changes can then be related to a speed/grade relationship equation developed by Navin (ITE Journal, March 1994). With improved bicycle speed data it is possible that a statistically valid travel time measure can be developed for bicycle trip links.
5. The utilization of Metro's geographic information systems (GIS) software to quantify and illustrate factors that affect route selection and travel speed, including land use, topography and presence of bikeway facilities.

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Appendix 2.2
2040 Modal Targets

2040 Modal Targets

The 2040 Growth Concept serves as the integrated land use and transportation plan for the Portland metropolitan region, pursuant to Section 660-12-0035(5)(c) of the Oregon Transportation Planning Rule (TPR). A basic construct of the 2040 Growth Concept is to reduce the region's reliance on the automobile by focusing growth in centers and along major transportation corridors where transportation infrastructure is concentrated. This concept was fundamental to the development of the Regional Transportation Plan (RTP).

For the purpose of TPR compliance, the Regional Transportation Plan (RTP) includes 2040 modal targets as the primary "alternative" standard for evaluating the region's progress in reducing reliance on thhe automobile. Table 1.3 in Chapter 1 summarizes the modal targets and represents an aggressive long-term goal for the Portland metropolitan region to reduce non-single occupancy vehicle (non-SOV) travel in the region. The 2040 modal targets are also based on observed travel behavior collected as part of Metro's 1994-1995 survey of more than 7,500 households in the Portland metropolitan region.

1994 Travel Behavior/Activity Survey

In 1994, Metro also conducted a travel behavior survey within the four-county boundary of Clackamas, Multnomah and Washington Counties in Oregon and Clark County, Washington. As part of this survey, more than 7,500 households kept a diary of activities performed during a two-day period, including identification of how individuals traveled to those activities. The study was designed to focus on the relationship between an activity type and the need for travel and highlighted the importance of all activities, whether "big" or "small." Results from the study are summarized in Table 1.

Table 1. Summary of 1994 Metro Travel Behavior/Activity Survey Results (for all trip purposes)

	Mode Share					Vehicle Miles per Capita	Auto Ownership per Household
Land Use Type	% Auto	% Walk	% Transit	% Bike	% Other		
Areas with Good Transit/ Mixed Use In Multnomah County	58.1%	27.0%	11.5%	1.9%	1.5%	9.80	0.93
Areas With Good Transit Only In Multnomah County	74.4%	15.2%	7.9%	1.4%	1.1%	13.28	1.50
Remainder of Multnomah County	81.5%	9.7%	3.5%	1.6%	3.7%	17.34	1.74
Remainder of Region	87.3%	6.1%	1.2%	0.8%	4.6%	21.79	1.93

Source: Metro Travel Forecasting Department

Areas with good transit service and a good mix of land uses showed the highest percentage of alternative mode use (41.9 percent combined). Conversely, the remainder of the region showed the highest percentage of auto use (87.3 percent). This indicates that individuals are likely to use the automobile when no other choices exist, but may choose other alternatives when they are available. The results of this study support this region's effort to link land use and transportation planning as a means to provide a balanced, multi-modal transportation system.

Relationship of 2040 Modal Targets to RTP Modeling Assumptions

Appendix 1.8 identifies specific modeling assumptions by transportation analysis zone (TAZ) that are intended to mirror the expected improvements proposed in the RTP and their impact on mode choice. The following section summarizes how the modeling assumptions relate to transit, walking, bicycling and shared ride.

Transit

Transit ridership is highly dependent on convenient, affordable, frequent service. For transit, the RTP modeling assumes nearly tripling current transit service levels, fareless squares in all regional centers, as well as the central city, and varying levels of parking cost in most centers. The RTP also assumes reduced fare programs for all trips destined for the central city, regional centers and other areas that are currently targeted for transportation demand management (TDM) programs. Finally, the RTP identifies improvements to enhance bicycle and pedestrian access to transit.

Walking

For pedestrian improvements, the RTP uses a modeling surrogate of intersection density (e.g., street connectivity) that the travel survey has demonstrated to be a reliable predictor of pedestrian travel. Using this surrogate, the RTP modeling has assumed a broad range of pedestrian improvements, including full-street "boulevard" retrofits, and improved street connectivity in the central city, regional and town centers, station communities and main streets.

Bicycling

For bicycle travel, the RTP focuses on providing improved bicycle facilities with the recognition that additional information is needed to better quantify the factors that affect the propensity to choose bicycling as a mode of travel, including accessibility to type of land use, presence of bikeway facilities and topography (see Appendix 2.1 for more information).

Shared ride

The travel behavior survey data suggest that the shared ride alternative to driving alone is less responsive to integrated land use and transportation planning than transit, walking and bicycling. For shared ride travel, this is largely due to the complexity of trip-making and social factors that limit the potential for non-family shared ride arrangements. As a result, modeling assumptions were not developed to specifically to reflect this mode choice.

Implementation of the 2040 Modal Targets

Section 6.4.6 of the RTP requires local governments to demonstrate progress toward the 2040 modal targets and to identify actions that will result in progress toward achieving the targets. The targets are for the year 2040. The "progress toward" language is critical in this regard. Some jurisdictions have already met the targets in the most developed areas of the region, while emerging centers are many years from approaching the targets, and development in these areas will likely occur unevenly. Though the modeling assumptions in Appendix 1.8 are tailored to such differences by establishing varying tiers among land use types based on degree of urbanization, there are still significant differences within tiers. Also, the RTP already places a number of very specific requirements on the local TSPs that are part of the effort to work toward meeting the modal targets.

Metro's primary goal is to ensure that the planning programs be adopted, and that on-the-ground progress be demonstrated over time. However, progress toward the non-SOV modal targets is an output of the regional travel demand model, but cannot be generated by local jurisdictions. Therefore, Metro uses the modeling assumptions described shown in Appendix 1.8 as a "checklist" to ensure that the actions called for in local TSPs are generally consistent with the model assumptions made to reach the modal targets. Progress would be periodically evaluated as part of RTP updates.

At a minimum, local transportation system plans are expected to include the following elements to demonstrate consistency with Section 6.4.7 of the RTP:

1. Adoption of 2040 modal targets in TSP policies

2. Adoption of street connectivity plans and implementing ordinances (consistent with RTP Section 6.4.5) as a surrogate for "intersection density."

3. Adoption of maximum parking ratios to implement the parking requirements of Title 2 of the Urban Growth Management Functional Plan as a surrogate for the "parking factors."

4. Formation/existence of transportation management association (TMA) as a surrogate for "Transit Pass Factor."

5. Adoption of fareless area transit policies in regional centers as a surrogate for the "Fareless Area."

6. Adoption of transit strategies consistent with RTP Section 6.4.10

Other potential actions/strategies that must be considered, and included as appropriate, as local transportation system plans and implementing ordinances are developed include:

1. Land use Strategies
   - Mixed use/concept area and pedestrian district plans and implementing ordinances
   - Transit oriented development district plans and implementing ordinances

2. Shared Ride Strategies
   - Carpooling + matching services
   - Vanpooling
   - HOV Lanes
   - Preferential parking for Carpool/Vanpoolers

3. Non-SOV Mode Strategies
   - Bicycle facilities
   - Pedestrian facilities
   - Bicycle and pedestrian plans and projects
   - Transit:
     - Group/free transit passes
     - Express bus service / frequent bus service
     - Park and ride lots
     - Demand responsive transit service
     - Custom shuttle service (e.g., OHSU shuttle)
     - Bus bypass lanes
     - Projects to improve bike/ped access to transit
   - Carsharing
   - Alternative mode friendly street design

4. Parking Strategies
    - Parking pricing/parking meters
    - Timed parking
    - Subsidized parking structures in mixed use areas
    - Preferential parking for carpools/vanpools/bicycles
    - Shared Parking
    - Parking lot placement / building orientation

5. Employer-based strategies
    - Trip reduction ordinances
    - Compressed or staggered work schedules
    - Flex-time
    - Telecommuting/telework
    - Telecommunications (e.g., internet based strategies like video conferencing)
    - Guaranteed Ride Home program
    - Monetary Incentives (free or reduced transit passes, bike/walk certificates)
    - Participation in TMA
    - Vanpool operation/subsidy
    - Provision of on-site facilities supporting alternative modes, e.g. showers, bike parking
    - Preferential parking for carpools/vanpools/bicycles

6. Pricing Strategies
    - Congestion Pricing
    - Parking Pricing
    - Gas Tax Increase
    - Vehicle Miles Traveled Tax
    - Vehicle Miles Traveled Insurance