TSM/TDM (Transit and Roadway Efficiency) Concept - Analysis and Results

TO: Task Force and Oversight Team

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This memo summarizes the analysis methods and preliminary results of the scenarios developed to evaluate the TSM/TDM Concept (also known as the Transit and Roadway Efficiency Concept) developed and described in the June 20, 2007 memorandum titled "Transit and Roadway Efficiency Concept Definition." The intent of the concept is to meet the project Purpose and Need without adding "general purpose" system capacity.

The concept proposed four elements:

1. New high capacity transit service,
2. A lane of capacity across the river dedicated to transit, with supportive improvements to the roadway, pedestrian, and cycling system,
3. A set of demand management policies, and
4. A set of changes to comprehensive plan designations in west Salem.

A description of each concept element and the associated analysis results are presented below. The elements are presented in the order in which they were modeled: land use first, then demand management, and then transit and roadway elements.

The analysis described below is preliminary and is intended only to represent conceptual recommendations as to which TSM/TDM elements appear to have the most influence on travel behavior. Further study and refinement of the concepts would be needed prior to detailed implementation of any given concept.

Land Use Element

Concept Description

Changes would be adopted into the City's Comprehensive Plan that accommodate more employment in west Salem. These land uses could provide employment for residents of west Salem and Polk County that support the project Purpose and Need by shortening trip lengths, reducing the number of river crossings, and minimize further congestion in the vicinity of Wallace Road. For the land use element to be effective, it would likely need to include several thousand office jobs (not service commercial jobs) in areas of west Salem (such as in the vicinity of Orchard Heights or Doaks Ferry Road) that are not already congested.

Modeling Assumptions

The land use scenario assumptions developed by City of Salem and Mid-Willamette Valley Council of Government (MWVCOG) staff for this analysis, involved adding 2,000 additional jobs in west Salem above the current Regional Transportation Plan (RTP) base forecast of 4,485 jobs. Many of these jobs were added in the area of Orchard Heights and Doaks Ferry Road. This represents a 45% increase in jobs over what is currently forecasted in west Salem for the year 2031.

Modeling Results

The model forecast results show only a small reduction (164 trips) in westbound PM peak hour bridge crossings compared to the RTP base scenario. The RTP base scenario forecasts 7,917 westbound vehicle trips and the west Salem Land Use Scenario forecast is 7,753 vehicle trips.

This small change in trips across the bridge during the peak hour is due to several factors. First, even with this increase in jobs, future west Salem employment would represent only 5% of the total regional employment, which is forecast to be 129,000 jobs in 2031. Thus, the influence of even a significant increase in employment in west Salem with respect to employment in the region is small. Second, 2,000 additional new jobs in west Salem does not correlate to a reduction in 2,000 trips across the bridge in the peak hour because only a portion of work trips occur during the peak hour and because some of the new jobs in west Salem would be filled by people who live east of the river.

Demand Management Element

Concept Description

A set of travel demand management strategies and policies would complement the roadway and transit elements of the TSM/TDM concept. The principal strategy tested for the purposes of this analysis was the application of user charges for motorists working in Salem, including but not limited to the Capitol Mall area. Charges would vary by time of day, with the goal of spreading morning and evening demand over a longer period and thus improving mobility. Transit, carpool and vanpool travel would be free of user charges. For the demand management element to be effective we estimate that the user fees (which could take a variety of forms) would need to be the equivalent of several dollars ($1-$3) per day more than today. This analysis assumes any decision as to whether or not user fees should be implemented is a separate policy discussion.

Modeling Assumptions

For modeling purposes, parking fees in downtown Salem were used as a one possible example of user fees that could be adjusted to influence travel demand. The demand management concepts were evaluated with the model by adjusting the short and long term parking costs used in the mode-choice model. In the model, when faced with higher costs for driving, users have the option to switch destinations and/or change modes to car pooling, transit, walking, or bicycling. The demand management concepts are applied in addition to (or on top of) the land use concept assumptions.

Three scenarios were tested. The first scenario assumed a doubling of parking charges to downtown zones that currently have parking charges. The second applied the doubling of charges to an expanded downtown parking area. The third scenario looked at a tripling of the parking charges in the expanded downtown parking area.

Modeling Results

Table 1 shows the modeled *daily* change in mode choice percentage for each scenario.

TABLE 1
Modeled Daily Mode Choice with User Charges

Scenario	Auto	Transit	Other[1]
RTP Base	86.6%	3.3%	10.1%
Double parking costs in current parking zones	82.0%	4.1%	13.9%
Double parking costs in expanded parking zones	79.7%	4.8%	15.5%
Triple parking costs in expanded parking zones	76.2%	5.4%	18.5%

The results show that increasing the area where parking charges are applied in the downtown area and tripling the average amount charged could reduce auto trips by 10% (from 86.6% of trips to 76.2% of trips).

Table 2 shows the resulting impact on the peak direction (westbound) PM river crossings for the land use and user charge scenarios described above. The results show that the 10% reduction in daily mode split for user fees described in Table 1 corresponds to an approximately 9% reduction in trips across the bridge during the PM peak hour.

This analysis does not recommend that any specific set of user fees (for example, parking charges) be used but rather is intended to demonstrate one possible scenario.

TABLE 2
Modeled Change in PM Peak Hour Westbound Bridge Crossing Volume with User Fees

Scenario	Westbound Bridge Volume	Percent Change
RTP Base	7,917	- 0%
West Salem Land Use	7,753	-2.07%
Double Parking	7,487	-5.43%
Double Parking Expanded	7,409	-6.42%
Triple Parking Expanded	7,195	-9.12%

[1] "Other" includes walking, bicycling, and carpooling.

Transit and Roadway Element

Concept Description

The transit element consists of the operation of two new routes, one on Highway 22 and one on Wallace Road, each serving downtown (and possibly other employment destinations in the city). Each route would offer premium, express service, from a suitably sited park and ride lot. Service would be provided by a set of eight new, articulated buses. Service would operate at six minute headways on each route. These changes would accommodate up to 2,000 riders across the bridge in the morning and evening peak hour. This would be equivalent to 20% of the projected demand at that time.

Transit vehicles would cross the river in a dedicated lane. This new capacity either would be located on the existing bridges or would operate on the existing railroad bridge structure, suitably refurbished to accommodate these vehicles.

Access and egress would be furnished by a combination of new ramps and structures, queue-jumping lanes at intersections, and other techniques, as necessary, to provide express service that affords a meaningful travel time advantage over general purpose vehicular lanes.

Modeling Assumptions

Two new transit lines were added to the transit network as described in the scenario above. To emulate the roadway improvements, these lines where assumed in the model to operate at free flow travel times (i.e., the fastest possible speed) along their route. Stops were also minimized or limited to the park and ride lots provided. On Wallace Road, the park and ride lot was assumed to be located near the Brush College Road intersection. Two stops were located along Highway 22, one at Doaks Ferry Road and the other at Rosemont. Access from zones in west Salem was provided to the most convenient lot for service. This service was then applied to the mode choice part of the model. Figure 2 below shows the transit service, stops, and zone access. These assumptions were applied (added) to the increased parking cost and expanded parking area scenarios described above.

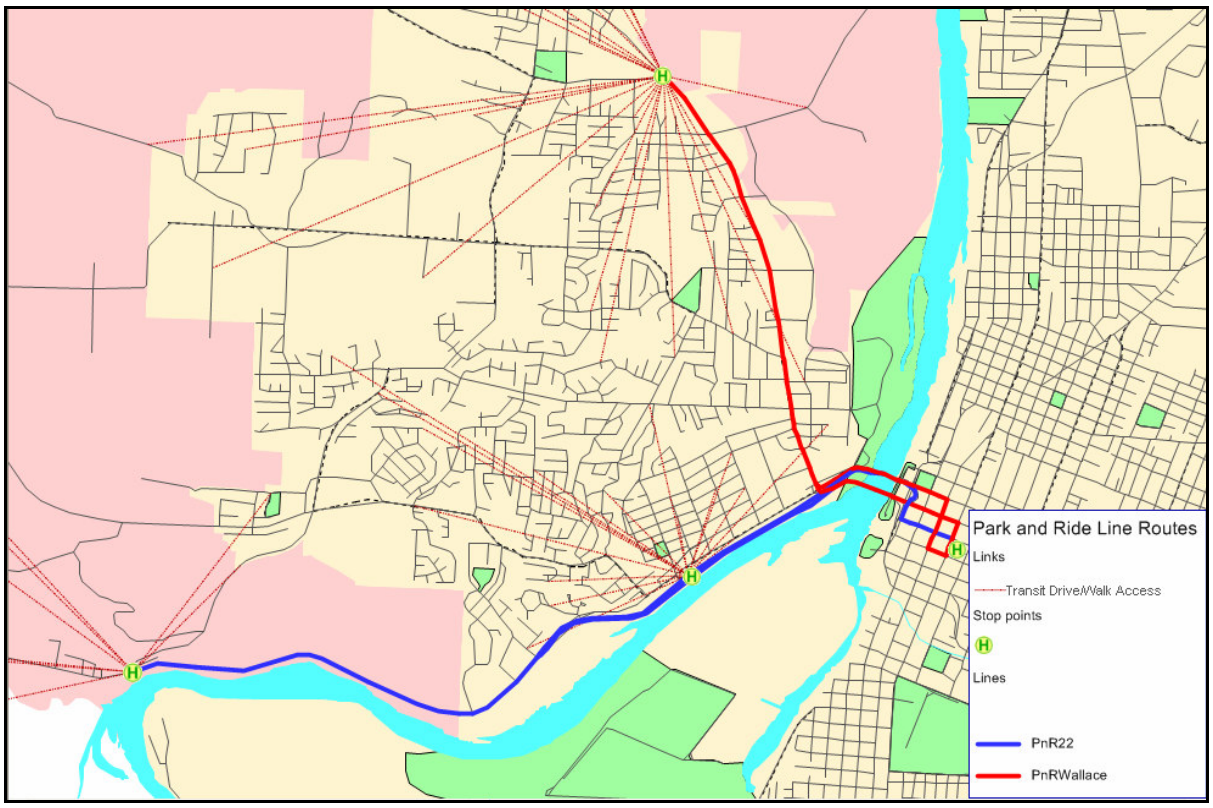

Figure 2: Transit Service Enhancements ("H" = Park and Ride locations)

Modeling Results

Table 3 shows the overall daily changes in mode choice percentage for each scenario when additional transit service is added as described above. Comparing Table 1 and Table 3 suggests that this level of additional transit service would result in only very small daily changes in transit ridership compared to increasing the parking charges.

TABLE 3
Daily Mode Choice with Increased Transit Service

Scenario	Auto	Transit	Other[2]
RTP Base	86.6%	3.3%	10.1%
Double parking costs in expanded parking zones and additional transit	79.5%	5.0%	15.5%
Triple parking costs in expanded parking zones and additional transit	76.1%	5.5%	18.5%

Table 4 below shows the modeled impact of expanded transit service on the peak direction (westbound) PM river crossings[3]. The results are almost identical to the results of the

[2] "Other" includes walking, bicycling, and carpooling.

[3] AM results are similar to PM results.

parking charge only scenarios shown in Table 2. In other words, the model shows that adding the increased transit service does not result in additional reductions in vehicle trips across the existing bridges. Similar results were obtained with or without user charges being assumed.

TABLE 4
PM Peak Hour Westbound Bridge Crossing Volume with Increased Parking Charges and Additional Transit Service

Scenario	Westbound Bridge Volume	Percent Change
RTP Base	7,917	-0%
West Salem Land Use	7,753	-2.07%
Double Parking Expanded + Transit	7,390	-6.66%
Triple Parking Expanded + Transit	7,180	-9.31%

The level of new transit service assumed in the model is a high level of service for the routes and geographies served. However, as shown above, this level of service does not produce a significant shift in total trips across the bridge. The bridge users in the peak hour have trip origins and destinations that extend well beyond the area served by the two new transit lines. In other words, the significant transit improvements modeled get "lost" in the greater universe of trips that cross the bridge. While additional targeted transit investments would be expected to further reduce trips across the bridge, any such reductions would be incremental in extent.

It is interesting to note that when parking charges are increased, the model shows that transit ridership in west Salem increases - even without making improvements to the existing transit service. Improving the transit service to the extent described above would result in only a small increase in trip reduction compared to just increasing parking charges alone. Thus, the relative benefits of expanding various elements of the transit service (for example, a dedicated lane vs. a select few lower cost treatments such as queue jump lanes at heavily congested intersections) and the appropriate size of park and ride lots would need to be studied further to determine the most cost-effective investments.

Conclusions

The analysis described in this memo is preliminary and is intended to represent conceptual recommendations as to which TSM/TDM elements appear to have the most influence on travel behavior, to help inform the decision on range of alternatives for the project. The memo is not intended to make policy recommendations such as whether or not user fees, or what type, should be used. Also, while the travel model itself is a valid tool for planning purposes, the assumptions used in any given scenario are subject to discussion. Further refinement of the scenarios described in the memo will be required prior to detailed implementation of any of the concepts discussed.