NNE Quadrant and I-5 Broadway/Weidler Plans Project
Transportation System Management (TSM)/Transportation Demand Management (TDM) Alternative
Draft October 6, 2011

The concept of a TSM/TDM Alternative was put forth to answer the question about whether TDM measures by themselves could address the safety and operational issues on I-5 and the Broadway/Weidler interchange. TSM/TDM includes minor capital improvements and policy/operational strategies that could be implemented in lieu of major capital improvements. The TSM/TDM Alternative can provide a comparison to show how much improvement on I-5 and in the interchange area could be gained without major capital improvements. This description of TSM/TDM measures relates only to the I-5 freeway and Broadway/Weidler interchange and not to traffic and access to and from the overall NNE Quadrant.

What is Transportation System Management (TSM)

TSM improvements are measures and actions used to increase the efficiency of the transportation system. This includes measures that improve traffic flow, transit operations, bicycle and pedestrian movements using improvements to signals, signage, wayfinding and other low cost methods. TSM measures increasingly utilize sophisticated computer software and hardware to enable traveler information to react to conditions on the ground.

Examples: Variable message signs along freeways, freeway ramp meters, traveler information websites, loop detectors at traffic signals, bicycle-only signals.

What is Transportation Demand Management (TDM)

TSM is an action or set of actions intended to influence the amount, timing and distribution of trip-making on the transportation system. TDM typically seeks to reduce single-occupant vehicle trip-making, spread trips to non-peak times, reduce the need to travel and shift traffic to less congested routes.

Examples: Carpool matching programs, transit fare subsidy programs, bicycle support programs, parking management.

TSM in the NNE Quadrant

The Portland region makes wide use of TSM measures to help reduce and manage traffic. Both the City of Portland and ODOT operate Traffic Operations Centers (TOCs) where cameras are monitored and adjustments can be made to traffic signals and message signs to help maintain traffic flow. On I-5 in the NNE Quadrant, ODOT uses freeway ramp meters to manage the traffic flow onto the freeway and a permanent variable message sign is located on I-84 immediately east of the Grand Avenue overcrossing to inform travelers about conditions and issues on the freeway system ahead of them.

TDM in the NNE Quadrant

TDM programs include city-wide and regional information programs such as the City's SmartTrips Portland and Metro's Drive Less Save More. In addition Metro operates a regional vanpool program and carpool matching is available through Carpoolmatch.org.

While these programs are city-wide or regional in scope, the NNE Quadrant includes one of the most active Transportation Management Associations (TMA) in the region. TMA's have been established in various business and neighborhood areas to assist commuters and promote the use of alternative modes. The Lloyd TMA was established in 1995 to enhance and expand commute options for workers and visitors to the Lloyd District.

The Lloyd TMA currently provides a range of services that directly support commuters and employers in the district. Commuter services include transit and biking maps and information, personalized commuting plans, incentive programs and a transportation store that sells transit tickets, bike gear and a variety of other useful tools for commuters. Employer programs include assistance with the Universal Pass an annual transit pass available through TriMet, a transportation coordinators handbook and a guaranteed ride home program.

The Lloyd TMA programs have proven to be highly effective. The TMA conducts regular Lloyd District commuter surveys which have found that commuters from TMA member employers have a 40% transit mode share for commute trips, while the Lloyd District as a whole has a 27% transit mode share.

TDM in the Regional Model

Metro develops and maintains the regional travel demand model for the Portland region. Metro provides current year and future year forecasts of trip making patterns in the region that take into account an increasing emphasis on TDM measures. This increasing TDM emphasis results in an increased use of alternative modes in the future year forecasts compared to current year models. The increased TDM is accounted for in the future year models in three ways.

- Transit Fares – The regional model uses a proportional reduction in the full transit fares to reflect the presence of a strong TMA and substantial use of transit fare subsidy programs.
- Parking Costs – The model contains a cost for parking in all areas where there is currently a parking charge and it assumes that in the future there will be parking costs in certain locations such as Regional Centers where there is no cost today.
- Pedestrian Environment – The model includes a rating for the pedestrian-friendliness of different areas of the region. This rating is based on the street pattern and the number of street connections per mile. Areas with dense grid system of local streets will rank higher in this measure than areas with limited access and frequent cul-de-sacs.

For regional modeling purposes the Lloyd District is classified as Central City 2 which reflects the high planned employment, good roadway and transit access and a mix of uses. The transit fares are assumed to be at 60% of full fare which is the same as the downtown core. Parking costs in the Lloyd District are assumed to be one-half of the downtown core for the current year and are forecast to grow to two-thirds of downtown in the 2035 future year forecast. The pedestrian environment rating for the Lloyd District is the same as downtown, the highest rating available.

The City of Portland uses the travel demand from the regional model and assigns traffic to a detailed city street network. This more detailed city model is being used to analyze traffic operations and impacts for the NNE Quadrant and I-5 Broadway/Weidler Plan Project. The city model traffic assignments reflect the transit fares, parking costs and pedestrian environment described above for the regional model.

Sensitivity Test for TDM in the NNE Quadrant and I-5 Broadway/Weidler Plans Project

The project team prepared a sensitivity test utilizing the City of Portland regional travel demand model to evaluate the impact that a significant increase in non-motor vehicle mode share would have on trips using I-5 and the Broadway/Weidler ramps.

The sensitivity test used PM peak period data on mode share from the City's 2035 model. As noted above, this model includes assumptions that the pedestrian environment and transit fare structure for the Lloyd District are the same as for downtown and the parking costs in the district are assumed to grow from one-half of downtown to two-thirds of downtown. The 2035 model forecasts that 67% of PM peak period trips to and from the NNE Quadrant (including the Lloyd District) will travel in motor vehicles.

The sensitivity test posed the question, "If measures were implemented that could reduce the motor vehicle mode share to and from the NNE Quadrant, how would that impact operations on I-5 and the Broadway/Weidler interchange?"

Two sensitivity tests were modeled. The tests assumed a reduction in the motor vehicle mode share for trips to and from the NNE Quadrant. A larger reduction was assumed for trips between the quadrant and other central city locations and a lesser reduction was assumed for trips between the quadrant and locations outside the central city (see Figure 1).

The motor vehicle mode shares used in this sensitivity test are as follows:

RTP-Based 2035 Forecast

Motor vehicle mode share for all PM peak period trips to and from the quadrant – 67%

(Note – this is not an assumption but the model derived average for all trips)

Sensitivity Test #1

Assumed motor vehicle mode share for PM peak period trips between the quadrant and other central city locations: 45%

Assumed motor vehicle mode share for PM peak period trips between the quadrant and locations outside of the central city: 55%

Sensitivity Test #2

Assumed motor vehicle mode share for PM peak period trips between the quadrant and other central city locations: 55%

Assumed motor vehicle mode share for PM peak period trips between the quadrant and locations outside of the central city: 65%

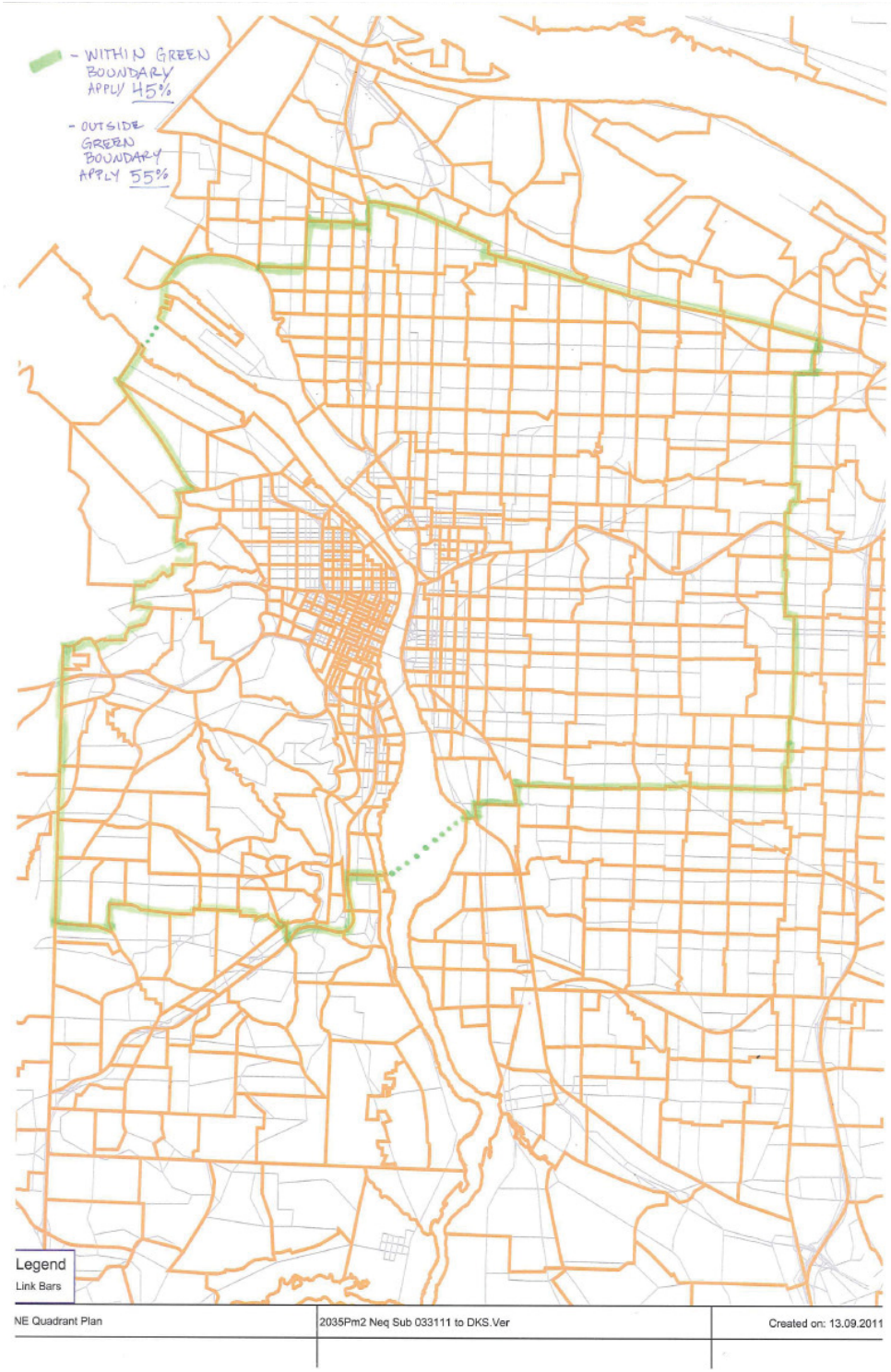

FIGURE 1 – Description of Central City Locations

Sensitivity Test Findings

With Sensitivity Test #1 the total PM peak period motor vehicle trips to and from the quadrant were reduced by 26% from 31,700 to 23,500.

With Sensitivity Test # 2 the total PM peak period motor vehicle trips to and from the quadrant were reduced by 11% from 31,700 to 28,200.

These levels of motor vehicle trip reduction are consistent with the scale of motor vehicle mode share assumed for both test cases and would indicate that the model is reacting appropriately to the trip reduction methodology. The next step was to assign this reduced level of trip making to the roadway system.

City Streets

The traffic assignments with Test #1 indicate a reduction in volumes on the Broadway/Weidler couplet between the Broadway Bridge and NE MLK Jr Blvd of between 60 and 240 vehicles over the two hour PM peak period. Trip reductions are slightly higher on sections of NE Multnomah, NE Lloyd Blvd, NE Grand Ave and NE MLK Jr Blvd. These trip reductions tend to be less than 10% and are an average of about 5% for all streets in the quadrant.

The fact that the reduction in assigned volumes is significantly lower than the percentage reduction in trips to and from the quadrant indicate that the major city streets in the quadrant carry a large portion of trips that are traveling through the quadrant. Through trips are particularly evident on the east/west streets (Broadway, Weidler, Multnomah, etc.) which serve commuter trips to and from downtown.

I-5 Freeway and Broadway/Weidler Interchange

The traffic assignments with Test #1 show a reduction on the mainline I-5 freeway through the quadrant of between 100 and 250 vehicles during the 2-hour PM peak period, a reduction of between 1% and 4% depending on the location. Volumes on the Broadway/Weidler interchange ramps were reduced by approximately 4% compared with the base RTP model run.

Even more so than the city streets, the I-5 freeway through the quadrant includes a large proportion of trips traveling through the quadrant. Any reduction in volumes on the freeway will tend to free up space that will then make it attractive for other trips to fill that void. This notion that space gained on a congested freeway will be filled in with other trips is generally recognized in the transportation modeling and traffic engineering fields.

The above discussion of the sensitivity test findings focused on Sensitivity Test #1. The findings for Sensitivity Test #2 which assumed less of a reduction in motor vehicle trip making created similar results as with Test #1 but with correspondingly lower vehicle volumes and percentage reductions.

Sensitivity Test Conclusions

A fundamental finding for this TDM test is that a significant reduction in motor vehicle trip making to and from the NNE Quadrant would not see a corresponding reduction in traffic volumes on local streets

and the freeway system during the PM peak period. There is a high proportion of through trips on both the city street system and on I-5 through the area.

TSM/TDM Recommendation for the NNE Quadrant and I-5 Broadway/Weidler Plans Project

The sensitivity test used assumptions of motor vehicle trip reduction that could be difficult to achieve. Even assuming this level of significant motor vehicle trip reduction, the impact on I-5 and the interchange was very modest. This seems to indicate that TSM and TDM measures by themselves cannot address the safety and operational issues on I-5 that are associated with the Broadway/Weidler interchange.

However, TDM measures at a city-wide and regional level can provide information and incentives that help to reduce overall motor vehicle trip making and these should continue to be supported and expanded. The Lloyd TMA has demonstrated the continued effectiveness of their programs and continued and expanded public support for their efforts is appropriate. These district-level, city-wide and regional programs and measures should be continued and enhanced as part of all I-5 improvement concepts. The ability of these programs and strategies to reduce dependence on motor vehicle travel in the NNE Quadrant is critically important to achieving the long-term vision for land use and transportation in the quadrant.

If a freeway improvement project advances to more detailed planning and design, consideration should be given to specific, localized TDM measures that could be part of a construction management and mitigation program.