

## Memorandum

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SUBJECT: **Congestion Pricing Proposals Analysis** P/A P09042-008-003  
**Technical Memorandum 1A: Project Criteria** No.  
**and Measures of Effectiveness**

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### Introduction

The Congestion Pricing Proposals Analysis (CPPA) Study was undertaken by ODOT in response to state legislation<sup>1</sup> that directed the agency to implement a congestion pricing pilot project in the Portland Metro area by 2012. This memorandum describes how the proposed projects will be evaluated, and it highlights areas where further study is required to better understand the risks and potential impacts associated with these concepts.

### Background

Oregon House Bill 2001 stipulates that ODOT must develop and implement one or more congestion pricing pilot projects within the Portland Metro area, according to the following criteria:

- It must study the effect congestion pricing has on reducing traffic congestion
- It does not apply to motor vehicles with a gross weight rating over 10,000 pounds
- It is built and operational by October 2012
- Any excess revenues collected by this program are expended for highway construction, improvement and maintenance.

Local agency stakeholders were assembled into a Technical Advisory Committee that were charged with developing candidate congestion pricing proposals to be reviewed for this study. A range of locations and strategies were considered, and three packages of pricing proposals were advanced for evaluation. The current proposals include:

- Point pricing on Cornelius Pass Road in Multnomah County
- Freeway ramp pricing at selected interchanges in the Highway 217 corridor
- Parking pricing strategies in Central Portland

The project evaluation process involves two phases that help to understand some of the benefits, costs and potential impacts of the proposed pricing project. For each phase, there are measures used to quantify each aspect of the project, which is referred to, in general, as

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<sup>1</sup> Oregon House Bill 2001, Section 3 (enacted October 2009) Excerpt: “The Department of Transportation ... shall develop one or more pilot programs and implement congestion pricing in the Portland metropolitan area and study the effect congestion pricing may have on reducing traffic congestion.”

measures of effectiveness (MOE). The core set of MOEs that will be required for this evaluation are reported in two documents published by EDR Group. The *Benefit-Cost Assessment Guidance for Evaluating Proposed Highway Tolling and Pricing Options for Oregon* (2010) and the *Economic Assessment of Tolling Schemes for Congestion Reduction* (2010) provide a description of the applicable MOEs for each study phase, which are introduced below along with a description of the evaluation phases. Refer to the source documents noted above for a more complete description. In addition, specific projects MOEs are identified to evaluate how well the policy objectives of a proposed pilot projects are met. These are discussed in the final section of the memo.

## **Phase 1: Initial Screening Assessment**

Travel forecasts estimate the expected usage levels for priced facilities, and the potential traffic diversions to non-priced alternative routes. The forecast years to be considered in this evaluation include the following:

- 2012, Pilot Project Opens
- 2017, End of Initial Pilot Project Testing
- 2026, Mid-range forecast
- 2035, Long-range forecast, consistent with Regional Transportation Plan horizon

System performance is reviewed, with and without pricing alternative in place. A preliminary review is made of the potential for NEPA or Environmental Justice issues.

**Table 1: Phase 1 | Transportation Assessment MOEs**

Categories	Comments
Forecast Time Period	AM, PM, Mid-day, Daily
Traffic volume	Tolled facility and non-tolled facilities
Traffic speed	Tolled facility and non-tolled facilities
Traffic delay	Tolled facility and non-tolled facilities
Traffic congestion (demand / capacity ratio)	Tolled facility and non-tolled facilities
Trip totals by mode share	Study Area / Region
Trips eliminated during time period	Study Area / Region

## **Phase 2: Regional Impact Analysis**

This next phase of analysis considers the regional effects of potential economic issues associated with traffic diversions, changes in travel costs and tax revenues, and the relative benefits compared to the cost to construct and operate the facility. Potential effects of vehicle emissions (e.g., Green House Gas) are also evaluated. This phase requires a preliminary understanding of the capital costs involved with constructing and operating the tolled facilities (Table 2) and applies value to the changes in travel costs by vehicle and trip purposes (Table 3). The general elements represented in Table 2 may not apply to all

proposed project locations (e.g., there may be no impacts to bridges). The intent is a general list of cost elements to be considered when preparing the estimates for each proposed toll project.

**Table 2: Phase 2 | Capital Cost Comparison of Base Case and Build Alternative**

Categories	Base Case	Alternative
Property Acquisition		
Engineering and Design		
Grading & Drainage		
Wet Lands Replacement		
Paving/Road Construction		
Transport Structures (bridges)		
Vehicles		
Tolling Electronics and other Equipment		
Operations and Maintenance		
Rehabilitation/Safety Improvement		
<b>Total Cost</b>		

The base case should include expenditures that would be superseded by a build alternative. The marginal cost of a build alternative is: *Alternative – Base Case*.

Further information from the travel model forecasts are developed to describe effects on various sectors of the traveling public to assess the economic impacts throughout the community.

**Table 3: Phase 2 | Assessing Benefits Related to Congestion and Safety**

Categories	Base Case	Alternative
Vehicle Occupancy		
Vehicle types		
Commuting vehicle trips		
Commuting average vehicle trip time		
Commuting average vehicle trip length		
Non-commute vehicle trips		
Non-commute average vehicle trip time		
Non-commute average vehicle trip length		
Congested miles (volume/capacity > 0.90)		
Congested % of VMT		

Categories	Base Case	Alternative
Vehicle Delay		
Distribution by trip purposes		
Vehicle hours traveled		
Vehicle miles traveled		
Average travel time		
95 <sup>th</sup> Percentile travel time		
Buffer Index		

The key values of time and other cost savings were reported in the *Benefit-Cost Assessment Guide* and could be reviewed to ensure the assumptions are current, but generally should be appropriate as they are for this study.

**Table 4: Phase 2 | Value of Time, Operating Costs and Safety for All Cases**

Categories	Unit costs (applies to all cases)
Value of time for truck drivers and crew	
Value of time for auto drivers and passengers by trip purpose (commuting, non-commute)	
Value of time for freight logistics	
Value of reliability for trucks drivers and crew	
Value of reliability for auto drivers and passengers by trip purpose	
Value of reliability for freight logistics	
Vehicle operating costs	
Safety values by crash severity	
Value of emissions reductions per mile	

## Project Objectives and Recommended Criteria

In addition to the MOEs noted above, various performance related measures could be developed for the proposed projects. Given the time constraints posed by the initial legislation, the analytical process must make best use of readily available data and methods for assessing each stage of evaluation. The following discussion highlights the recommended MOEs for each candidate project.

The proposed congestion pricing projects each have stated objectives that give an indication for how success can be defined, at least from the perspective of the Technical Advisory Committee. However, with any congestion pricing project, there are wide ranges of related effects that can occur.

We prepared a summary of the stated objectives and the recommended performance MOEs that address them below (see Table 5). In addition, areas where further study or refinement are needed to adequately evaluate projects are highlighted. These issues are further discussed in the following section.

**Table 5: Performance MOEs Recommended for Proposed Congestion Pricing Projects**

<b>Proposed Project</b>	<b>Stated Objective</b>	<b>Recommended MOEs</b>	<b>Potential Issues or Concerns</b>
Point Tolling Project on Cornelius Pass Road	<ul style="list-style-type: none"> <li>• Generate revenue</li> <li>• Apply net proceeds to safety improvements</li> </ul>	<ul style="list-style-type: none"> <li>• Estimated net revenue collected annually</li> <li>• Estimated cost to construct and maintain (annualized)</li> </ul>	<ul style="list-style-type: none"> <li>• Absence of congestion may dampen results</li> <li>• Low ADT may not generate sufficient revenues to break even</li> <li>• Located at edge of Metro model area; need further network definition and review of how external trips area applied in corridor</li> <li>• Diversions may affect alternative routes</li> </ul>

Proposed Project	Stated Objective	Recommended MOEs	Potential Issues or Concerns
Ramp tolling project on OR 217	<ul style="list-style-type: none"> <li>• Improve safety</li> <li>• Reduce merge conflicts on mainline</li> <li>• Avoid construction of select planned capital projects</li> </ul>	<ul style="list-style-type: none"> <li>• Net change in entering traffic on tolled ramps</li> <li>• Change in mainline weaving conditions</li> <li>• Congestion impacts on diverted routes to non-tolled ramps</li> <li>• Change in corridor travel time reliability</li> </ul>	<ul style="list-style-type: none"> <li>• Short time penalty (VOT at ramp) and many alternate route options may require micro-simulation rather than Metro model</li> <li>• Only available VOT survey from CRC study. Does it still apply?</li> <li>• Localized impacts to nearby businesses not explicitly captured</li> <li>• Develop way to value reliability</li> </ul>
Parking pricing options within Central Portland	<ul style="list-style-type: none"> <li>• Shift auto trips to non-peak hours</li> <li>• Shift auto trips to other modes</li> <li>• Increase parking turnover at on-street spaces (or make more price competitive with parking garages)</li> </ul>	<ul style="list-style-type: none"> <li>• Change in peak period vehicle trips ends by TAZ</li> <li>• Change in peak period trips by mode by TAZ</li> <li>• Change in screen line volumes at gateways to Central Business Area</li> </ul>	<ul style="list-style-type: none"> <li>• Targeted parking areas are a subset of total TAZ parking activity; TAZ findings may not be representative of expected conditions</li> <li>• Understanding local parking price elasticity required to best gauge outcomes; is that available?</li> </ul>

## Areas that Need Further Study

Prior Working Papers written on the suitability of the Metro travel demand model for tolling application have identified areas that are now being pursued by Metro to better develop these capabilities for future studies. These general areas include:

- Temporal shifts of travel demand (e.g., peak spreading)
- Adding tolling costs into Route Choice model
- Enhanced cost sensitivity by income (value-of-time segmentation) by income class
- Value of reliability as it relates to travel time reliability (e.g., buffer time)

Each of these areas will bring better information to future tolling studies, but are not expected to be available within the timeframe of this evaluation. This fact contributes a number of uncertainties to the outcomes of this study, which should be considered as potential risks in misjudging project effectiveness:

- Route choices forecast by the model represent averages for all trip purposes and vehicle types. Differences in value of time by income class, trip purpose, etc. are

not explicitly considered. This generalized forecast overlooks impacts to some sectors of the community.

- Route choices forecast by the model represent average travel times, and do not factor in delays at intersections, merging, weaving or other operational realities. This adds a risk in unrealistic assignments.

Aside from these general approach issues, there are a number of potential issues or concerns that apply to each of the proposed project, as discussed in the following section.

### ***Point tolling project on Cornelius Pass Road***

- Absence of congestion may dampen results – This corridor is generally uncongested, even during peak periods. The perceived value of paying to use a tolled facility at this location may displace a significant volume onto alternate local and regional routes.
- Low ADT may not generate sufficient revenues to break even – Depending on the method used to collect tolls (electronic only vs. some type of manual option) could quickly cause this project to not pay for itself, especially if diversion to other routes is significant.
- Located at edge of Metro model area; need further network definition and review of how external trips area applied in corridor – None of the local parallel street facilities are identified in the model network, since they are very low volume and intended for very limited access. These links should be added to test this project. In addition, the traffic assignment at the edge of the Metro model tends to be dominated by ‘through’ traffic based on assumptions to external stations that represent counties outside the Metro area. This phenomena may create unexpected results.

### ***Ramp tolling project on OR 217***

- Short time penalty (VOT at ramp) and many alternate route options may require micro-simulation rather than Metro model – The limited local street network may need to be augmented to adequately represent choices in the model. However, the length of local trips and abundance of alternate routes may significantly reduce expected use of any tolled ramp facility.
- Only available VOT survey from CRC study. Does it still apply? – Need to consider if the VOT survey is suitable as it is, or if some further work is required.
- Localized impacts to nearby businesses not explicitly captured – The economic analysis provides impacts generalized to sector of activity, and will not identify how individual businesses near affected tolled ramps may be impacted. Need to identify and reach out to businesses near tolled ramps, and those near diverted routes.

## ***Parking pricing options within Central Business District***

- Targeted parking areas are a subset of total TAZ parking activity; TAZ findings may not be representative of expected conditions – This is a basic inadequacy of any parking evaluation where the facilities that are being evaluated are a relatively small subset of the total parking supply provided in a TAZ area.
- Understanding local parking price elasticity required to best gauge outcomes; is that available? – The model process does not provide a true measure of how travel patterns will respond to parking pricing changes. A much better tool would be a study of price elasticity in the central area, that could be used to forecasts changes by time of day, location or duration.