Portland Metro Area Value Pricing Feasibility Analysis

Final

Round 2 Concept Evaluation

Technical Memorandum 4

May 7, 2018

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Table of Contents

List of Figures

List of Appendices

EXECUTIVE SUMMARY

Project summary

Technical Memorandum 4 presents findings from the round 2 evaluation of five pricing concepts for I-5 and I-205 from the Oregon/ Washington state line south to the I-5/I-205 interchange near Tualatin, Oregon. The purpose of this evaluation is to examine the benefits and impacts of different pricing concepts to inform a recommendation by the study's Policy Advisory Committee (PAC) to the Oregon Transportation Commission (OTC), based on application of a series of performance measures to the five concepts.

Background

In 2017, the Oregon Legislature authorized substantial funding to improve highways, transit, biking and walking facilities, and use technology to make the state's transportation system work better. The Legislature also directed the OTC to seek federal approval to implement value pricing on I-5 and I-205 in the Portland metro area to address congestion.

The Oregon Department of Transportation (ODOT) initiated the Portland Metro Area Value Pricing Feasibility Analysis to explore the options available and determine how and where congestion pricing could help improve congestion on I-5 or I-205 during peak travel times.

The feasibility analysis included two rounds of evaluation. The first round of evaluation assessed the opportunities and issues associated with the primary types of highway congestion pricing applications. Following the round 1 evaluation, a total of five round 2 concepts, referred to as Concepts A through E, were developed based on technical evaluation results, input from the PAC and the public on the initial concepts, and project team experience with congestion pricing systems throughout the U.S. These refined concepts allowed for a more detailed assessment of potential impacts and benefits for defined pricing strategies and locations.

- Concept A – Northern I-5 Priced Lanes
- Concept B – I-5 Priced Lanes: Toll all lanes between Going Street/Alberta Street and Multnomah Boulevard
- Concept C – I-5 and I-205 Priced Roadway: Toll all lanes
- Concept D – I-205 Priced Lane – OR99E to Stafford Road
- Concept E – Abernethy Bridge Priced Roadway

Equity and diversion mitigation strategies

The Oregon Transportation Commission has established that considerations of equity and diversion to surrounding communities are priorities in evaluating potential congestion pricing concepts. The PAC Charter includes both equity impacts and diversion of traffic as factors to be considered in the evaluation of congestion pricing options. The Charter also requests that the PAC identify potential mitigation strategies with a potential to reduce the impact on Title VI and/or Environmental Justice communities and adjacent communities.

Some mitigation strategies that were identified by the project team, the PAC and solicited from the public during outreach events include the following:

- Many diversion impacts can be addressed through design of the system and rate structure. Appropriate rate setting through dynamic pricing could maximize flow on the priced portion of the facility and reduce the incidence of diversion; it should be noted that for Concept E, this could reduce revenue substantially.
- A strategy that combines pricing concepts on I-5 and I-205 could improve overall flow and help to manage diversion between the two freeways.
- Transit, bicycle, and pedestrian improvements or introduction of transit service as well as traffic calming strategies could address local diversion concerns.
- Where diversion increases traffic on surface streets, improvements to walking and bicycling facilities may be needed to mitigate potential safety impacts.
- Discounting programs, such as free, reduced or pre-paid toll tags for Title VI and Environmental Justice communities may be considered. Such programs may also be considered for area residents who do not have viable, toll free alternatives. For example, the residents of Hayden Island must use I-5 to get off the island and may therefore require such mitigation programs if I-5 is to be tolled in the future.
- Lane pricing, as opposed to roadway pricing may result in relatively higher tolls for use of the priced lanes. As such, additional consideration of toll discounting policies for low income users may be needed for approaches where only certain lanes are to be priced.
- Freight vehicles are restricted by Oregon statute from using the left inside lane of highways. In general, when a lane pricing (as opposed to roadway pricing) approach is adopted, it is the inside left lane(s) that is priced. If such an approach were used in Portland, freight vehicles would therefore be restricted from using the facility and thus would not benefit from pricing. As such, revisiting and refining Oregon statutes in relation to tolling on the use of the inside left lane by freight vehicles might be considered as a freight-oriented mitigation measure if lane pricing is implemented.
- A monitoring program with key performance measures could be established to evaluate effectiveness at addressing regional goals.

Round 2 evaluation measures

The round 2 pricing concepts were evaluated using performance measures to demonstrate the range of positive and negative impacts of pricing. This evaluation will inform a project team recommendation for the PAC so it can in turn develop a recommendation for the OTC. Performance metrics were organized based on the following policy considerations, which are identified in the PAC Charter:

- Traffic operations improvement on I-5 and I-205
- Diversion of traffic
- Transit service and active transportation
- Equity benefits and impacts
- Benefits and impacts for the community, economy and environment
- Revenue and costs
- Implementation
  - Consistency with state and regional law and policy
  - Federal feasibility
  - Project delivery schedule

Concepts were assessed as to how they generally performed against each performance metric, with concepts that provide positive impacts or reduce negative impacts performing "well" and concepts that reduce positive benefits or increase negative impacts performing "poorly."

Round 2 evaluation results

Table 1.1-1 is the performance evaluation summary of Concepts A through D, which were developed with the primary intent to minimize congestion. Results are explained in greater detail in the next section. Concept E results are included separately in the next section because the intent of the Concept E analysis was to evaluate its revenue generation potential as opposed to minimizing congestion.

Table 1.1-1. Concepts A through D: performance evaluation summary

Policy consideration	Metric	Concept			
		A	B	C	D
Traffic operations improvement	Vehicle and person throughput on I-5 and I-205	◑	◑	◑	◑
	Freight truck throughput on I-5 and I-205	○	◑	◑	◑
	Passenger vehicle travel time on I-5 and I-205	◑	●	●	◑
	Passenger vehicle travel time on managed lanes	●	N/A	N/A	●
	Freight truck travel time on I-5 and I-205	◑	●	●	◑
	Assessment of change in duration of peak vehicle traffic conditions	●	◑	●	●
	Delay on priced facility	●	●	●	●
	Safety impacts	●	◑	◑	●
	Trip length distribution	◑	◑	◑	◑
Diversion of traffic	Diversion impacts on non-tolled facilities	●	◑	○	◑
	Safety impacts to all modes of transportation (including bicyclists and pedestrians) on routes with diversion	◑	◑	○	●

Policy consideration	Metric	Concept			
		A	B	C	D
Transit service and active transportation	Adequacy of transit service	◑	●	◑	○
	Bus transit travel time	●	◑	●	○
	Mode share shift (high-occupancy vehicle [HOV], single occupancy vehicle [SOV], transit, walk, bike)	◑	◑	●	◑
	Availability of bicycle travel on alternative routes	◑	●	◑	○
	Completeness of pedestrian network	◑	●	◑	○
Equity	Value or travel time savings for Title VI and/or Environmental Justice communities (regional)	◑	◑	●	◑
	Changes in travel time based on geographic zones	◑	●	●	◑
	Access to jobs	◑	◑	●	◑
Community, economy and the environment	Physical impacts to existing residences and businesses	●	●	●	●
	Regional travel time savings	◑	◑	●	◑
	Regional vehicle miles traveled (VMT) (including non-freeway)	◑	◑	●	◑
	Change in air pollution	◑	◑	◑	◑
	Value of travel time savings	◑	◑	●	◑
Cost and revenue	Capital expenditure on facility	●	●	●	●
	Estimated gross toll revenue potential from tolled facility	○	◑	●	○
Implementation	State law & policy	●	●	●	●
	Regional law & policy	●	●	●	●
	Federal feasibility	◑	◑	◑	●
	Project delivery schedule	●	●	◑	◑

Legend: ● Performs well; ◑ Performs moderately; ○ Performs poorly

Concept A: Northern I-5 Priced Lanes

In Concept A, a single lane in each direction would be converted to a tolled managed lane. The concept would convert an existing general purpose lane in the southbound direction, and the existing HOV lane in the northbound direction.

Concept A has limited congestion relief benefits, which are generally restricted to the tolled lanes during peak hour. Conditions on the unpriced lanes are mostly unchanged, and diversion would be limited. Both revenue and capital costs would be relatively low. This concept would likely cover its own tolling infrastructure operating costs but would not offset all roadway rehabilitation and reconstruction costs. Tolling authority for the southbound segment could come under FHWA's Value Pricing Pilot Program and the northbound segment would qualify under FHWA's HOV/High-Occupancy Toll (HOT) Lane Program.

Concept B: I-5 Toll All Lanes between Going St./Alberta St. and Multnomah Blvd.

Concept B converts all lanes between NE Going Street/Alberta Street and SW Multnomah Boulevard to a priced roadway. Concept B has strong potential to reduce congestion along I-5 with modest diversion to I-205 and adjacent facilities. This concept also has a much denser network of transit and multi-modal facilities that can serve as a toll-free travel alternative to minimize impacts. This concept generates more revenue than single-lane concepts and would cover all toll collection and operating costs, as well as routine and periodic roadway operations and maintenance. The beginning and end points of the corridor segments where this concept would be implemented would need to be examined as part of the future environmental analysis process. Tolling authority for this concept could come under FHWA's Value Pricing Pilot Program.

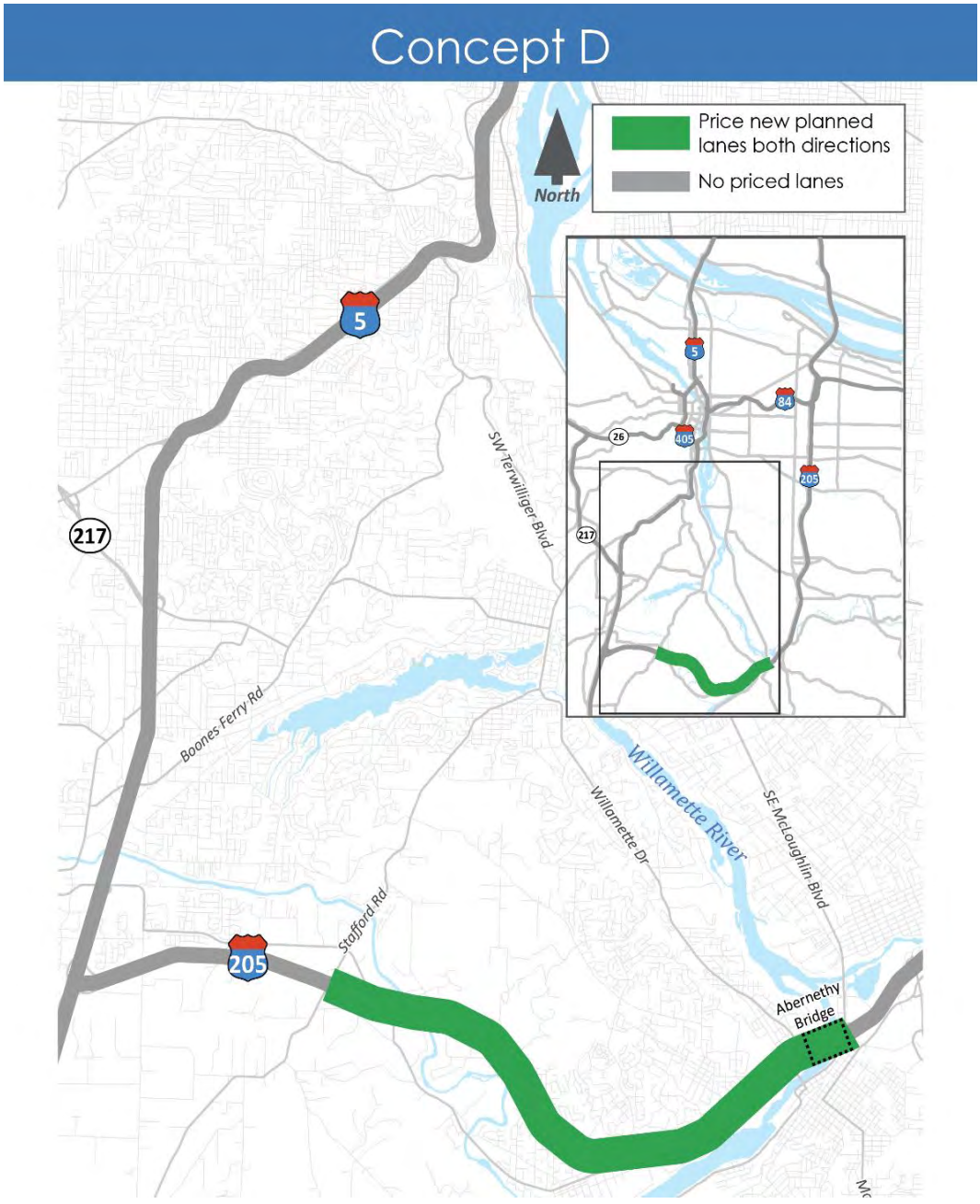
Concept C: Priced Roadway – Toll All Lanes

Concept C would implement pricing on all lanes of I-5 and I-205 from the Washington/ Oregon state line to the I-5/I205 interchange near Tualatin. Concept C has the greatest potential for reducing congestion and generating travel time savings for the widest possible range of users. Because of the scale of this concept, it could be considered as part of a broader regional pricing application in the future, pending success of a pilot pricing program. While diversion can be expected, it could be minimized through dynamic tolling. This concept would by far generate the largest amount of revenue compared to the other concepts. Tolling authority for this concept could come under FHWA's Value Pricing Pilot Program.

Concept D: I-205 Priced Lane – OR99E to Stafford Rd.

Concept D would price the third lane in each direction, currently planned on I-205 from OR99E to Stafford Road, including widening of the Abernethy Bridge. Existing general purpose lanes in each direction would remain unpriced. The future planned project was considered part of the 2027 baseline for all concepts in the evaluation.

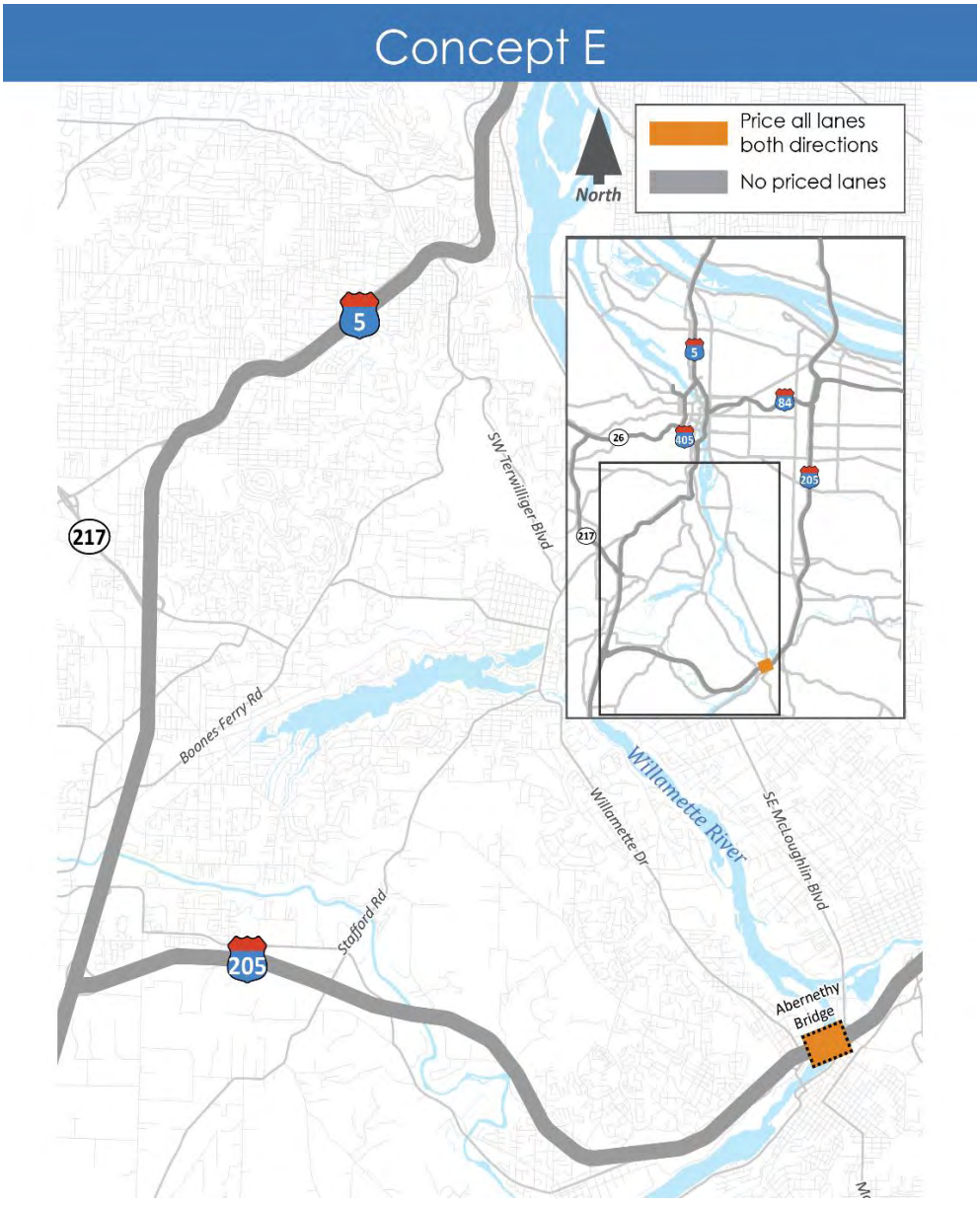
Concept D shows some congestion relief benefit with minimal traffic diversion and provides some benefit to I-205. The pricing concept is not expected to generate significant revenue to contribute toward the construction of the planned lanes and bridge widening project. Concept D would qualify for implementation under Section 129 of U.S. Title 23 if the planned additional lanes were constructed as priced lanes.



Concept E: Abernethy Bridge Priced Roadway

Concept E applies pricing on all existing lanes of the Abernethy Bridge as well as additional lanes to be constructed as part of the planned bridge widening. While this Concept assumes a variable rate structure, with highest rates during peak hours, it was evaluated to determine its potential to help fund the planned addition of a lane on I-205 from OR99E to Stafford Road and reconstruction of the Abernethy Bridge.

Concept E shows promise to raise revenue and reduce congestion on I-205. This concept, or a variant, could pair with a pilot program to balance the travel choice between the I-5 and I-205 corridors. Mitigation strategies would likely be needed to address potential diversion to OR99E and the Arch Bridge. The beginning and end points of the corridor segments where this concept would be implemented would need to be examined as part of the future environmental analysis process.



Key findings

The evaluation of the five round 2 concepts has shown that congestion pricing on I-5 and I-205 has potential benefits to people living and traveling through the Portland metro area and would be effective in addressing traffic congestion on these facilities. Key findings to help support the recommendation are provided on the following pages. Additionally, general findings and considerations include:

- Any concepts considered further should be paired with policies or programs that address potential impact on lower-income and adjacent communities.
- The analysis indicates that all five concepts would likely generate sufficient revenue to pay for tolling operations. However, there is less certainty regarding whether revenue from Concepts A and D (both single-lane concepts) would also cover capital costs of tolling implementation.
- Concepts B, C and E all indicate they would provide revenue to support mitigation and/or planned transportation projects in the Portland metro area.
- A phased approach—implementing a smaller-scale application as a pilot program and following up with monitoring and scheduled reporting—may ensure that the pricing application meets state and regional goals, and may also lay the foundation for a more comprehensive pricing approach for the Portland metro area.
- Key performance measures could be established to gauge success during future monitoring.

Consultant team recommendation

Based on the key findings from the evaluation, the consultant team recommends a phased approach to implementation of congestion pricing on I-5 and I-205:

- Initial implementation of Concept B as a pilot pricing program, coupled with a sunset or trigger to evaluate success.
  - *Rationale:* Strong potential at congestion reduction along I-5 with minimal diversion to I-205 and adjacent facilities; has a much denser network of transit and multi-modal facilities that can serve as a toll free alternative; significant improvements in facility efficiency and vehicular throughput, meaning that more vehicles can be moved and diversion to free facilities can be managed.
- Consider implementation of Concept E concurrent with implementation of Concept B.
  - *Rationale:* Provides the benefits of Concept B while generating funding to advance the addition of new lanes on I-205 where only two lanes in each direction currently exist as well as retrofitting and adding a lane in each direction to the Abernethy Bridge.
- After assessment of the performance of the initial pricing project, and assuming successful evaluation, implementation of Concept C in phases with more comprehensive system analysis.
  - *Rationale:* Greatest potential for reducing congestion and generating travel time savings for the widest possible range of users; significant improvements in

facility efficiency and vehicular throughput, meaning that more vehicles can be moved and diversion to free facilities can be managed.

- Do not implement Concept A or D.
  - *Rationale:* Little congestion relief benefit; would not provide a reasonable test for the potential for pricing to provide congestion relief.

Next steps

At the fifth PAC meeting on May 14, 2018, the PAC will review and consider the evaluation presented in this technical memorandum as well as the public comment received over the past six months. In May and June 2018, the PAC will develop a recommendation(s) to advise the OTC. The OTC will submit a report to FHWA by December 2018. After coordination with FHWA, the OTC will provide direction about next steps such as an environmental analysis, which would include additional public involvement, Title VI and Environmental Justice analysis, traffic analysis, and other analysis of potential benefits and impacts.

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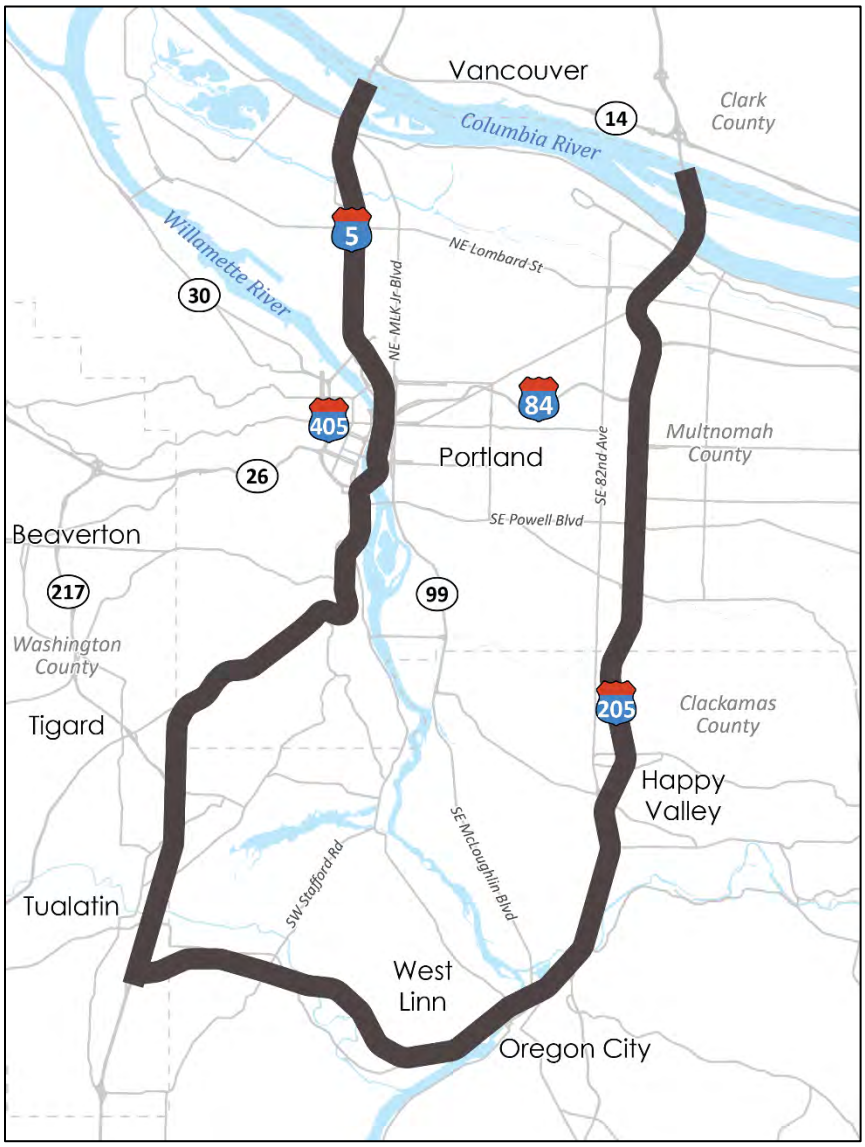
1 INTRODUCTION

1.1 Project context and purpose of this report

In 2017, the Oregon Legislature authorized substantial funding to improve highways, transit, biking and walking facilities, and use technology to make the state's transportation system work better. The Legislature also directed the Oregon Transportation Commission (OTC) to seek federal approval to implement value pricing on I-5 and I-205 in the Portland metro area to address congestion.

The Oregon Department of Transportation (ODOT) initiated the Portland Metro Area Value Pricing Feasibility Analysis to explore the options available and determine how and where congestion pricing could help improve congestion on I-5 or I-205 during peak travel times. The feasibility analysis corridors are depicted on Figure 1-1.

Figure 1-1. Study Corridors: I-5 and I-205



Value pricing, also known as congestion pricing, has been successfully implemented in the U.S. and around the world, resulting in faster, more reliable and predictable trips. It does this using variable rate toll pricing to manage traffic flow during peak travel times, which is typically during the morning and evening peak commuting periods. This creates an incentive for some drivers to reduce the number of trips made, shift travel to less congested periods of the day or use alternate modes such as transit. Some drivers will choose to take alternate routes. Those choosing to pay the toll have higher travel speeds and improved travel time reliability. Pricing may also benefit users of nearby and adjacent non-tolled facilities and lanes by improving traffic flow on the priced lanes and thus reducing the potential for drivers to divert off the freeway to avoid congestion. Pricing can also benefit the users of other modes, and in particular transit, as tolling systems are often implemented with transit improvements such as express bus service and dedicated lanes or access points to the tolled facility. Enhanced transit service is common with newer pricing applications and help all transportation system users benefit from the improved traffic operations provided by pricing.

This memorandum presents findings from the round 2 evaluation of five pricing concepts for I-5 and I-205 from the Oregon/Washington state line south to the I-5/I-205 interchange near Tualatin, Oregon. The purpose of this evaluation is to examine the benefits and impacts of different pricing concepts to inform a recommendation by the study's Policy Advisory Committee (PAC) to the OTC, based on application of a series of performance measures to the five concepts. The PAC recommendation will also be informed by public outreach and input, experience from other pricing projects around the country, and PAC policy discussion to date. The Congestion Pricing Mitigation and Related Policy Considerations memorandum, dated May 2018, reports on PAC discussion and public input about mitigation and should be reviewed concurrent with this memorandum.

The OTC will consider PAC recommendation(s), public input, and technical findings, and develop a report to the Federal Highway Administration (FHWA) to be submitted by the end of 2018. Upon discussion or approval from FHWA (depending on the type of pricing application), ODOT would then conduct further study, which is likely to include environmental analysis, including additional traffic analysis and public involvement.

This memorandum includes the following:

- Section 1 – Introduction
- Section 2 – Round 2 evaluation approach
- Section 3 – Round 2 evaluation summary by concept
- Section 4 – Project team recommendation and next steps

1.2 Technical approach

The feasibility analysis included two rounds of evaluation. The first round of evaluation assessed the opportunities and issues associated with the primary types of highway congestion pricing applications. The analysis identified a broad range of impacts that could be experienced by implementation of value pricing on the study corridors. These

findings are summarized in *Technical Memorandum 3 – Round 1 Concept Evaluation and Recommendations*.[1] Overall, the following conclusions were drawn from round 1:

- An assessment of current and baseline conditions through 2027 found that portions of I-5 and I-205 are currently experiencing "hyper-congestion," a traffic condition characterized by exceptionally high traffic volumes and travel speeds below 40 miles per hour, often causing stop-and-go conditions. Round 1 modeling showed that these conditions are likely to worsen through 2027.
- In general, concepts that priced the entire roadway, as opposed to single-lane pricing concepts, would be the most effective at managing congestion. Pricing all lanes could result in more traffic diversion. Priced roadways are also more likely to generate net revenues that could fund mitigation strategies.
- Concepts involving the conversion of a general purpose lane to pricing had the advantage of maintaining some unpriced lane options but were found to be less effective at addressing the goal of reducing congestion. Priced lane concepts on facilities with only two lanes in each direction, as is the case on locations along I-5, are not operationally feasible without a major interchange reconstruction because at least two general purpose through lanes must be maintained for facility operations.
- Concepts involving the construction of a new priced lane performed well in terms of improved traffic operations due to added capacity but, in addition to being the costliest to implement, the benefits are somewhat limited by downstream bottlenecks. This was particularly true on I-5 approaching the Columbia River Bridge, and on I-205 as well as I-5 at the southern end approaching the Boone Bridge. Constructing new lanes would be the most expensive option and also would likely have the most significant environmental and community impacts. Furthermore, there is evidence that Portland area drivers are already avoiding I-5 and I-205 due to congestion. Additional detail on the results of the round 1 evaluation is provided in *Technical Memorandum 3 – Round 1 Concept Evaluation and Recommendations*.[2] Following the round 1 evaluation, a total of five round 2 concepts were developed based on evaluation results, public input on the initial concepts, and project team experience with congestion pricing systems throughout the U.S. These refined concepts define the pricing strategy and the location where it is to be applied, allowing for a more detailed assessment of potential impacts and benefits. The next section describes the round 2 concepts.

1.3 Round 2 concepts

For the round 2 evaluation, five concepts were studied. The primary goal of each concept is to mitigate congestion on I-5 and I-205, except for Concept E, which was evaluated as a potential strategy to help fund a congestion-relief project that adds a lane in each direction on I-205 from OR99E to Stafford Road and on the Abernethy

[1] Technical Memorandum 3 is available on ODOT's Value (Congestion) Pricing website: http://www.oregon.gov/ODOT/Pages/VP-Feasibility-Analysis.aspx
[2] Technical Memorandum 3 is available on ODOT's Value (Congestion) Pricing website: http://www.oregon.gov/ODOT/Pages/VP-Feasibility-Analysis.aspx

Bridge. These concepts are described in more detail in Technical Memorandum 3 and are as follows:

- Concept A – Northern I-5 Priced Lanes
- Concept B – I-5 Priced Lanes: Toll all lanes between Going Street/Alberta Street and Multnomah Boulevard
- Concept C – I-5 and I-205 Priced Roadway: Toll all lanes
- Concept D – I-205 Priced Lane – OR99E to Stafford Road
- Concept E – Abernethy Bridge Priced Roadway

These five concepts represent a range of potential congestion pricing applications. The concepts include: conversion of an existing high-occupancy vehicle (HOV) lane in Concept A (northbound); conversion of general lanes in Concept A (southbound), Concept B and Concept C as allowed under the FHWA Value Pricing Pilot Program (VPPP); added freeway capacity with the third lane assumed under Concepts D and E; and a tolled bridge as a funding strategy in Concept E).

These concepts were identified to respond to public comment received during the PAC meetings and the winter outreach as well as the technical evaluation of the round 1 concepts. Key themes heard during the winter outreach and how they informed the concepts is provided in Table 1.3-1.

Table 1.3-1. Developing the round 2 concepts

Issue	Concept development
Round 1 public involvement: what we heard (key themes)	
Congestion is a problem	Congestion pricing concepts were identified to address locations along I-5 and I-205 that experience the worst traffic congestion.
How and where revenue will be spent	Concept E – toll all lanes of the Abernethy Bridge was identified as a potential funding strategy for the planned third lane and bridge reconstruction.
Fairness of value pricing	A variety of congestion pricing concept types were identified for round 2 consideration and evaluation, including different geographic locations and a combination of concepts that toll all lanes and concepts that toll one lane.
Transit accessibility and potential transit investments	All round 2 concepts are evaluated within this technical memo for their ability to provide mobility options for all users.
Highway capacity	A variety of congestion pricing concept types were identified for round 2 consideration and evaluation, including those that did and did not provide new capacity.
Round 1 technical evaluation	
Addresses most substantial hyper-congestion	All concepts (A through E) were selected such that each covers a segment or segments of I-5 and/or I-205 that is currently experiencing hyper-congested conditions.
Multimodal transportation options	Concepts A and B were selected in part because there are transit and multi-modal facilities that can serve as an alternative to freeway travel.

Issue	Concept development
Round 1 public involvement: what we heard (key themes)	
Comprehensive approach to congestion management on I-5 and I-205	Concept C was selected and evaluated as an approach to addressing congestion on the entirety of the I-5 and I-205 corridors within the Portland metro area.
Federal feasibility	The concepts selected and evaluated in round 2 would each have unique implementation issues from a federal perspective and would be authorized under different federal tolling authorization programs (HOV to high-occupancy toll [HOT] conversion for Concept A, mainstream tolling for Concept D and Value Pricing Pilot Program for concepts A, B, C and E)
Revenue generation	Concept E was selected and evaluated to examine its ability to generate revenue for further congestion relief strategies.

1.4 Equity and diversion mitigation strategies

The Oregon Transportation Commission has established that considerations of equity and diversion to surrounding communities are priorities in evaluating potential congestion pricing concepts. The PAC Charter includes both *equity impacts* and *diversion of traffic* as factors to be considered in the evaluation of congestion pricing options. The Charter also requests that the PAC identify potential mitigation strategies with a potential to reduce the impact on Title VI and/or Environmental Justice communities and adjacent communities.

In evaluating potential impacts of congestion pricing to Title VI and Environmental Justice communities, a recommendation should consider ways to share benefits as well as strategies to offset negative impacts. Reflecting this objective, many strategies should be considered as trade-offs. For example, pricing all lanes of a roadway is more effective at managing congestion than pricing a single lane. With this increased effectiveness, the amount of the toll can be set at a lower rate when compared to single-lane pricing concepts; also, it is possible to operate more hours with very low or no tolls. The opportunity to maintain lower toll amounts makes the benefits of congestion pricing available to more people at a lower cost.

However, a trade-off with priced roadways, from a low-income impact perspective, is that they do not provide general purpose (unpriced) lanes; drivers who choose to use the freeway during tolled periods would have to pay a toll. For this reason, it is especially important that strategies are considered -- such as increased transit service, low-income toll discounts, or incentives to use transit or carpools -- that can help offset negative impacts and distribute benefits more broadly.

Development of mitigation strategies will depend to a large degree on the type and location of any pricing concept(s) that moves forward. The PAC recommendation will be informed in part by information presented and committee deliberations from the April PAC meeting (PAC meeting #4), which was largely dedicated to a workshop on mitigation strategies. Final identification and development of mitigation strategies will be required as part of the National Environmental Protection Act (NEPA) process, which is required for all federal projects.

Several mitigation strategies and related policy considerations were identified by the project team, the PAC and solicited from the public during outreach events. A monitoring program with key performance measures could be established to evaluate effectiveness at addressing these strategies. Mitigation strategies identified include the following:

- Many diversion impacts can be addressed through design of the system and rate structure. Appropriate rate setting through dynamic pricing could maximize flow on the priced portion of the facility and reduce the incidence of diversion; it should be noted that for Concept E, this could reduce revenue substantially.
- A strategy that combines pricing concepts on I-5 and I-205 could improve overall flow and help to manage diversion between the two freeways.
- Transit, bicycle, and pedestrian improvements or introduction of transit service as well as traffic calming strategies could address local diversion concerns. Improvements in multimodal options also can provide alternatives for drivers who want to avoid paying a toll.
- Where diversion increases traffic on surface streets, improvements to walking and bicycling facilities may be needed to mitigate potential safety impacts.
- Discounting programs, such as free, reduced or pre-paid toll tags for Title VI and Environmental Justice communities may be considered. Such programs may also be considered for area residents who do not have viable, toll free alternatives. For example, the residents of Hayden Island must use I-5 to get off the island and may therefore require such mitigation programs if the northern section of I-5 is to be tolled.
- Lane pricing, as opposed to roadway pricing, may result in relatively higher tolls for use of the priced lanes. As such, additional consideration of toll discounting policies for low-income users may be needed for approaches where only certain lanes are to be priced.
- Freight vehicles are restricted by Oregon statute from using the left inside lane of highways. In general, when a lane pricing (as opposed to roadway pricing) approach is adopted, it is the inside left lane(s) that is priced. If such an approach were used in Portland, freight vehicles would therefore be restricted from using the facility and thus would not benefit from pricing. As such, revisiting and refining Oregon statutes in relation to tolling on the use of the inside left lane by freight vehicles might be considered as a freight-oriented mitigation measure if lane pricing is implemented.

1.5 Revenue generation considerations

As value pricing involves the use of tolling, revenue will be generated from the users of the priced facilities. Understanding how the revenue will be accounted for is vital towards understanding its contribution to funding improvements over time. For the calculation of revenue, the U.S. Department of Transportation (USDOT) developed a hierarchy of accounting and payments that yields a flow of funds. In general, toll revenues first account for uncollectable toll transactions (called "leakage"), followed by operations and maintenance expenditures, senior debt, rehabilitation and reconstruction funds, investment obligations, and finally equity (excess net revenues).

However, most agencies also account for hedging costs (for managing debt and income over time), reserve funds, and periodic roadway capital maintenance.

In short, the flow of funds puts operating uses as first priority and capital uses last. In terms of forecasting revenues, operations and maintenance costs are regular, recurring, and predictable; whereas, rehabilitation and reconstruction costs are periodic, they do not occur within the first few years of operations, but they need to be annualized in some manner in order to be accounted for within one forecast year revenue estimate.[3]

This memo provides a cursory examination of revenue generation potential for each of the five concepts. For the purposes of this analysis, the project team used a 3-stage assessment:

Stage One – gross toll revenues, minus:

- Leakage, which may include uncollectable transactions
- Routine annual toll collection operations and maintenance expenditures
- Routine annual roadway operations and maintenance expenditures

Stage Two – net toll revenues (remaining revenue after Stage One deductions), minus:

- Debt service on potentially borrowed funds for capital investment
- Contributions to rehabilitation and reconstruction for toll collection systems
- Contributions to rehabilitation and reconstruction for periodic roadway capital, if appropriate

Stage Three – excess net revenues (remaining revenue after deductions from both State One and Stage Two) which may be used for other uses, including incentives and policy-based mitigations.

All five concepts have positive net revenues at Stage 2. Stage 3 uses of revenue will depend on policy and project decisions made during a later phase.

For the following concept evaluation, with the exception of Concept E, the project team poses two primary questions regarding net revenues:

1. Is there sufficient toll revenue generated to cover toll and roadway operations and maintenance costs?
2. If yes, meaning positive net revenues, then what is the range/order of magnitude of annual net revenue remaining that could contribute toward capital investments, which may include capital funding, rehabilitation and reconstruction expenditures.

[3] A detailed description of revenue estimation and funding analysis for toll facilities can be found at USDOT's Center for Innovative Finance Support website: https://www.fhwa.dot.gov/ipd/

2 ROUND 2 EVALUATION APPROACH

2.1 Round 2 performance measures

Concepts were evaluated according to the following performance measures identified with the PAC and documented in *Technical Memorandum 1 – Objectives and Performance Measures*.[4] The list of measures below also includes the description of the key considerations as contained in the PAC charter. Some performance measures apply to more than one consideration. For example, "adequacy of transit service" is both a transit service and equity measure. In addition, there will be a need to look at multiple performance measures in later stages of concept project planning. Some measures will be better captured at later stages. Many factors can be addressed through design and ongoing performance management. If a measure shows poor performance in the feasibility analysis, it can be identified as an objective to incorporate in design.

Consideration: traffic operations improvement on I-5 and I-205

Charter description: To what extent the option will improve the traffic operations of the priced facility, including but not limited to increasing reliability and mitigating congestion.

- Vehicle and person throughput on I-5 and I-205
- Freight truck throughput on I-5 and I-205
- Passenger vehicle travel time on I-5 and I-205
- Passenger vehicle travel time on managed lanes
- Freight truck travel time on I-5 and I-205
- Assessment of change in duration of peak vehicle traffic conditions
- Delay on priced facility
- Safety impacts
- Trip length distribution

Consideration: diversion of traffic

Charter description: To what extent the option will cause diversion to other routes and modes that will impact the performance and operations of other transportation facilities, including both roads and transit service.

- Diversion impacts on non-tolled facilities
- Safety impacts to all modes of transportation (including bicyclists and pedestrians) on routes with diversion

Consideration: transit service and active transportation

Charter description: To what extent public transportation service is available to serve as an alternative, non-tolled mode of travel.

- Adequacy of transit service
- Transit travel time

[4] Technical Memorandum 1 is available on ODOT's Value (Congestion) Pricing website: http://www.oregon.gov/ODOT/Pages/VP-Feasibility-Analysis.aspx

- Mode share shift (HOV, single-occupancy vehicle [SOV], transit, walk, bike)
- Availability of bicycle travel on alternative routes
- Completeness of pedestrian network

Consideration: equity benefits and impacts

Charter description: Whether the option will disproportionately impact environmental justice households or communities and to what extent mitigation strategies could reduce the impact.

- Value or travel time savings for Title VI and/or Environmental Justice communities (regional)
- Changes in travel time based on geographic zones
- Access to jobs

Consideration: benefits and impacts for the community, economy and environment

Charter description: Whether and how the option will impact the surrounding community, economy, and/or environment and the economy of the state in general.

- Physical impacts to existing residences and businesses
- Regional travel time savings
- Regional VMT (vehicle miles traveled) (including non-freeway)
- Change in air pollution
- Value of travel time savings

Consideration: revenue and cost

Charter description: To what extent the option will raise sufficient revenue to cover the cost of implementing value pricing as well as the ongoing operational expenses, including the costs of maintenance and repairs of the facility.[5]

- Capital expenditure on facility
- Estimated gross toll revenue potential from tolled facility

Consideration: implementation

Charter description: Whether the option will comply with existing Oregon Transportation Commission policies, state laws, and regional planning regulations.

- Consistency with state law and policy
- Consistency with regional law and policy

Charter description: Whether the option is allowable under federal tolling laws or will require a waiver under the Value Pricing Pilot Program or some other authority.

- Feasibility under federal law

Charter description: Whether a value pricing option has the potential to alter the expected delivery schedule for a project on the corridor.

- Project delivery schedule

[5] Note, as described in Section 1.5 above, gross revenue will first be allocated to ongoing operations and maintenance expenditures for the value pricing program, followed by debt service or state repayment of capital costs for implementing the system.

2.2 Round 2 performance measure evaluation approach

As with the round 1 evaluation, performance of each concept was evaluated against a 2027 baseline. Baseline conditions included all projects in the constrained 2027 Regional Transportation Plan and assumed no pricing. More information on the baseline conditions is provided in *Technical Memorandum 3*.

To evaluate each concept, the performance metrics were assigned a score based on professional assessment and, in some cases, analysis of modeling data. The team then converted the score to ranking symbols based on the extent to which the concept generated additional benefits or reduced negative impacts. More information on the evaluation methods and assumptions used is provided in Appendix A. Concepts providing positive impacts or reducing negative impacts were scored as "performs well," while those that reduce positive benefits or increase negative impacts were scored as "performs poorly."

The ranking is displayed throughout as follows:

Concept performs well: ●

Concept performs moderately: ◑

Concept performs poorly: ○

3 ROUND 2 EVALUATION SUMMARY BY CONCEPT

This section provides a summary of the round 2 evaluation for the performance measures listed in section 2.1.[6] Concepts A through D were evaluated based on how well they performed for each performance metric. Concept E was evaluated against a smaller subset of performance measures, since the purpose of Concept E was to test revenue generation. While each concept is composed of numerous individual roadway segments, each concept was evaluated as a whole. As such, individual segments may perform relatively better or relatively worse than other segments composing the concept, but the overall evaluation is reflective of the concept in its entirety. Detailed scoring of performance metrics and associated data for each performance metric is provided in an evaluation metric matrix attached as Appendix B. A summary of regional data and associated findings generated through the round 2 evaluation is provided in Appendix C.

3.1 Concept A: Northern I-5 Priced Lanes

In Concept A, a single lane in each direction would be converted to a tolled managed lane. The concept would convert an existing general purpose lane in the southbound direction, and the existing HOV lane in the northbound direction. The following are key findings from the assessment of Concept A:

- Concept A has limited congestion relief benefits, which are generally restricted to tolled lanes during the peak hour.
- Conditions on the unpriced lanes are mostly unchanged, and diversion would be limited.
- Both revenue and capital costs would be relatively low. Revenue will cover toll system operations and maintenance costs, but may not be enough to offset all roadway rehabilitation and reconstruction costs that would be incurred regardless of whether the lanes are priced. It is not likely to substantially support other capital improvements.
- Mitigation strategies particularly may be needed for Hayden Island, which is only accessible via this section of I-5. Impacts to Title VI and/or Environmental Justice communities are likely to be minimal.
- Regarding user costs, this concept maintains two unpriced lanes in each direction; at the same time, the toll amount per user would be higher, which is consistent among single-lane pricing concepts.
- The northbound segment would qualify under FHWA's HOV/HOT Lane Program. The southbound segment may qualify under the FHWA Value Pricing Pilot Program.

[6] As with the round 1 evaluation, data for quantifying the evaluation metrics and conducting the assessment were supplied by Metro's regional travel demand model. Much of the travel demand model data were processed through ECONorthwest's Toll Optimization Model (TOM), which supplies a refined assessment of changes in traveler behavior, traffic volumes and other metrics associated with the implementation of pricing concepts (see Appendix D for assumptions used in the TOM model). Metro's Multi-criteria Evaluation (MCE) tool, also based on the regional travel demand model results, was used to assess regional and community impacts for measures not traditionally produced directly from regional demand modeling.

Figure 3-1. Round 2 Concept A: Northern I-5 Priced Lanes

3.1.1 Traffic operations improvement on I-5 and I-205

Concept A would improve travel for users of the priced lanes but would not generate much travel time savings for users of the general purpose lanes or the remainder of the area network. Overall, the probability of encountering congestion is slightly reduced and minimal diversion would occur with this concept. Additional detail on this group of performance metrics is included in the evaluation methods and assumptions matrix in Appendix A.

Table 3.1-1. Concept A evaluation: traffic operations improvement

Performance measure	Concept A evaluation	Findings
Vehicle and person throughput on I-5 and I-205	◑	Both an increase and decrease in vehicle and person throughput. Little net impact.
Freight truck throughput on I-5 and I-2050	○	Change in freight truck throughput is relatively minor, but there is an overall trend on I-5 of reduced throughput as well as evidence of diversion to I-205. Trucks are also assumed to be prohibited from accessing the managed lane based on current state law and practice around the country.
Passenger vehicle travel time on I-5 and I-205	◑	Improved travel time on the managed lanes themselves, and no evidence of negative impacts to the general purpose lanes.
Passenger vehicle travel time on managed lanes	●	Improved travel time on the managed lanes.
Freight truck travel time on I-5 and I-205	◑	No significant improvement or detriment to freight truck travel times.
Assessment of change in duration of peak vehicle traffic conditions	●	Decrease in the potential for encountering hyper-congested conditions in the vicinity of the managed lanes. This impact extends to some extent away from the managed lanes, and there are no detrimental impacts in other areas on either I-5 or I-205.
Delay on priced facility	●	Reduced delay on the priced managed lanes with no detrimental effects elsewhere.
Safety impacts	●	Some limited potential to decrease the frequency and severity of crashes in the region.
Trip length distribution	◑	No significant changes to freeway trip lengths are expected.
Legend:	Performs well ●	Performs moderately ◑ / Performs poorly ○

Source: Metro Regional Travel Demand Model, Metro Multi-Criteria Evaluation Tool

Vehicle and person throughput on I-5 and I-205

Concept A would result in daily vehicle throughput comparable to the baseline with daily vehicle volumes remaining essentially unchanged. Slight increases in vehicle throughput were seen on I-5 in the southbound direction during the AM and PM peak hours.

Daily person throughput was also comparable to the baseline, with slight increases on I-5 in the southbound direction and slight decreases on I-5 in the northbound direction.

Freight truck throughput on I-5 and I-205

This concept shows modest shifts in daily truck volumes from I-5, with its priced managed lane, to the unpriced I-205 corridor. This shift occurs because trucks over 10,000 pounds cannot access the managed lane under current Oregon law,[7] and general purpose capacity is limited to two lanes rather than three general purpose lanes in the baseline.

Passenger vehicle travel time on I-5 and I-205

Passenger vehicle travel times, relative to the baseline, change modestly in the general purpose lanes.

Passenger vehicle travel time on managed lanes

The tolled lanes on the northern portion of I-5 in Concept A provide moderate travel time savings to the users of those lanes. These savings occur primarily during the peak hours and are concentrated in those areas where the lanes exist. Travel time savings do not extend much beyond the priced lane, but there is also no observable reduction in travel times in the general purpose lanes.

Freight truck travel time on I-5 and I-205

Freight vehicles over 10,000 pounds are barred by state law from accessing the (leftmost) priced lanes in Concept A. As such, the travel time for freight vehicles in the general purpose lanes for this concept are the same for passenger vehicles in the general purpose lanes, which are generally not affected by the implementation of pricing.

Assessment of change in duration of congested traffic conditions

Concept A results in slight reductions in congested conditions on I-5 where the priced managed lane option is offered. During the 7 AM peak hour, the chance of hyper-congestion on I-5 is reduced from the baseline condition (from 36 to 38 percent in both directions). During the 5 PM peak hour, the chance of encountering hyper-congestion on I-5 is reduced only in the southbound direction, from 34 percent in the baseline to 33 percent for Concept A.

Delay on priced facilities

Concept A reduces delay in the parts of the corridor where pricing is applied (the priced lanes). These results are more pronounced during the AM and PM peak hours than off-peak times of travel.

[7] Oregon Revised Statute 2017 Edition. Chapter 811.325: Failure to keep camper, trailer or truck in right lane. Applies to any vehicle with a trailer and any vehicle with a registration weight of 10,000 pounds or more; this includes transit vehicles except in the HOV lane. https://www.oregonlegislature.gov/bills_laws/ors/ors811.html. Accessed February 9, 2018.

Safety

Concept A provides limited potential for reducing roadway crashes in the region. Reduction in crashes on the priced lanes may be offset in part by increased crashes on the general purpose lanes. According to researchers, "HOV-to-[priced lane] conversion does not significantly affect the safety performance of the roadway segments as a whole."[8]

Trip length distribution

No significant changes to trip length distribution are expected to result from Concept A.

3.1.2 Diversion of traffic

Diversion in Concept A is anticipated to be minimal, but some changes to traffic circulation patterns could occur. While these changes are anticipated to be small, potential locations where increases in roadway volumes could occur include the following:

- Martin Luther King Boulevard (OR 99E) [Lombard Street to Marine Drive]
- Interstate Avenue (OR 99W) [Alberta Street to Columbia Boulevard]
- Columbia Boulevard [I-5 to Martin Luther King Boulevard (OR 99E)]
- I-205

As such, the impact to road users, including vehicular traffic as well as bicyclists and pedestrians, is expected to be minimal. Additional detail on the diversion performance metric is provided in the evaluation methods and assumptions matrix in Appendix A.

Table 3.1-2. Concept A evaluation: diversion of traffic

Performance measure	Concept A evaluation	Findings
Diversion impacts on non-tolled facilities	●	No substantial traffic diversion impacts.
Safety impacts to all modes of transportation (including bicyclists and pedestrians) on routes with diversion	◑	No substantial increase in the frequency or severity of crashes is expected.

Legend: ● Performs well; ◑ Performs moderately; ○ Performs poorly

Source: Metro Regional Travel Demand Model, Metro Multi-Criteria Evaluation Tool

3.1.3 Transit service and active transportation

Concept A scores moderately well in this category of performance metrics. There is viable transit service in the area with numerous routes parallel to I-5. However, there is a lack of supporting infrastructure, in particular park-and-ride lots. Furthermore, there are

[8] Abuzwidah, M. and M. Abdel-Aty. "Effects of Using High Occupancy Vehicle Lanes on Safety Performance of Freeways". Presented at the 96th Annual Meeting of the Transportation Research Board, Paper No. 17-06894, Washington, D.C., (2017).

relatively few frequent service lines. Additional detail on this group of performance metrics is provided in the evaluation methods and assumptions matrix in Appendix A.

Table 3.1-3. Concept A evaluation: transit service and active transportation

Performance measure	Concept A evaluation	Findings
Adequacy of transit service	◑	Eight total transit lines, two TriMet, both frequent service, and six C-Tran. Two park and ride lots and one transit center.
Bus transit travel time	●	Time savings for AM peak and PM peak (northbound/southbound). Six C-Tran express bus routes would benefit.
Mode share shift (HOV, SOV, transit, walk, bike)	◑	Minimal impacts on regional mode share. Slight potential to shift some trips from SOV to HOV.
Availability of bicycle travel on alternative routes	◑	About 50 miles of bike lanes within a 1-mile buffer of the corridor. Five roadways with bike lanes run mostly parallel to the freeway and another two are somewhat parallel. Gaps are noticeable in the network, however.
Completeness of pedestrian network	◑	66 total street miles of sidewalks. 16.5 miles of sidewalk/mile of corridor length within a half mile buffer.
Legend:	Performs well ● Performs moderately ◑ Performs poorly ○	

Source: Metro Regional Travel Demand Model, WSP

Adequacy of transit service

Concept A performed well in terms of parallel transit lines running near the corridor as well as lines that run a significant length of the corridor. Altogether C-Tran has six lines that run from Vancouver to downtown Portland (the Lloyd Center, and/or the Delta Park MAX Station), facilitating inter-state travel via transit. TriMet service offers two lines that run the length of this concept's corridor, and both are high frequency. The MAX Yellow line runs near the I-5 Corridor and allows for transfers to C-Tran at the Delta Park MAX Station.

Bus transit travel time

Concept A provides a modest amount of potential travel time savings along I-5. Six C-Tran routes currently use this section of the freeway for their express bus service between downtown Portland and Lloyd Center to Vancouver. TriMet currently operates no bus service along this section of the freeway, and the modest travel time savings potential along with the presence of the MAX Yellow line may not be enough to result in new TriMet service being added.

Mode share shift

The regional model results indicate that there would likely be minimal shifts in mode share, with some limited potential shift from SOV to HOV. No significant change was identified for transit or bicycle/pedestrian mode share.

Availability of bicycle travel

Five routes run parallel to Concept A, providing options for people riding bikes. A path extends across the Columbia River providing access to those traveling to and from Vancouver. However, there are noticeable gaps in the bicycle network, particularly in northern areas where there are fewer bike facilities overall. Some bike lanes also start and end abruptly, limiting connectivity to destinations within the area.

Completeness of pedestrian network

In the southern half of the concept corridor there is a tight, complete pedestrian network. However, north of Columbia Boulevard, the pedestrian network is severely limited with few, if any, sidewalks. Furthermore, pedestrians desiring to walk to Delta Park, the Columbia River or any of the recreational areas in that northern area face obstacles in terms of available infrastructure. Overall, 66 miles of sidewalks are present with 16.5 miles per mile of corridor length.

3.1.4 Equity benefits and impacts

Concept A does not result in any significant travel time benefits for Title VI or Environmental Justice communities (low-income, people of color, and low English proficiency communities), but it also does not result in any substantive negative impacts. Performance measures in other categories also relate to equity, although they are not specifically categorized as such. Additional detail on this and other performance metrics is provided in the evaluation methods and assumptions matrix in Appendix A.

Regarding user costs, this concept maintains two unpriced lanes in each direction, so area drivers would have toll free alternatives to travelling in the tolled lane. However, those using the tolled lane would be subject to a higher toll rate relative to other concepts that price all lanes. This is consistent with other experience with single-lane pricing projects.

Table 3.1-4. Concept A evaluation: equity benefits and impacts

Performance measure	Concept A evaluation	Findings
Value or travel time savings for Title VI and/or Environmental Justice communities (regional)	◑	Small travel time benefit for Title VI and Environmental Justice communities.
Changes in travel time based on geographic zones	◑	Small travel time benefit for the region.
Access to jobs	◑	No significant impact on job access for Title VI or Environmental Justice communities.

Legend: ● Performs well ◑ Performs moderately ○ Performs poorly

Source: Metro Regional Travel Demand Model, Metro Multi-Criteria Evaluation Tool

Value of travel time savings for Title VI and/or Environmental Justice communities

A small benefit in terms of overall travel time can be expected with this concept for Title VI and Environmental Justice communities in the region. However, the scale of those travel time benefits is small—less than any of the other value pricing concepts.

Travel time savings by geographic area

Concept A would result in a small improvement in vehicle travel time for Title VI and Environmental Justice communities, but the scale of the improvement is the smallest of any value pricing concept. Furthermore, benefits to the region are limited. Trips to and from central Portland, north Portland and in areas between Columbia Boulevard and the Columbia River (between I-5 and I-205) would benefit most.

Access to jobs

Concept A does not result in any significant change in access to jobs within a 30-minute drive for Title VI and Environmental Justice communities.

3.1.5 Benefits and impacts for the community, economy and environment

The positive and negative impacts to the community, economy and environment are mixed for Concept A. The concept shows the potential to increase overall system efficiency by slightly reducing total motor vehicle hours traveled (VHT), VMT, and regional vehicle emissions. Additional detail on this group of performance metrics is provided in the evaluation methods and assumptions matrix in Appendix A.

Table 3.1-5. Concept A evaluation: benefits and impacts for the community, economy and environment

Performance measure	Concept A evaluation	Findings
Physical impacts to existing residences and businesses	●	No physical impacts expected.
Regional travel time savings	◑	Minimal impact on overall Regional VHT. Potential for reduction to regional VHT is highest during the AM peak hour.
Regional VMT (including non-freeway)	◑	No significant change on Regional VMT.
Change in air pollution	◑	No significant change expected. Some potential to slightly reduce regional vehicle emissions.
Value of travel time savings	◑	Potential to provide a small regional travel time benefit for motor vehicles. Has the smallest benefit of all concepts evaluated.

Legend: ● Performs well; ◑ Performs moderately; ○ Performs poorly

Source: Metro Regional Travel Demand Model, Metro Multi-Criteria Evaluation Tool

Overall, the regional transportation system shows some potential to operate more efficiently under Concept A, as system-wide impacts show the potential to slightly reduce total motor VHT, VMT and vehicle emissions.

This concept does not include construction of new lanes along tolled segments and, therefore, would not have significant physical impacts to residents or businesses adjacent to the corridor.

3.1.6 Revenue and costs

As a single priced lane in each direction of travel with adjacent, toll-free general-purpose lanes, Concept A is not anticipated to generate significant revenue. Revenues would cover toll collection and operating costs, but may not cover all roadway rehabilitation and reconstruction costs of the facility; however, these costs would be incurred regardless of the lanes being priced. Significant revenue for other capital programs is unlikely. Additional detail on this group of performance metrics is provided in the evaluation methods and assumptions matrix in Appendix A.

Table 3.1-6. Concept A evaluation: revenue and cost

Performance measure	Concept A evaluation	Findings
Capital expenditure on facility	●	Low capital costs as tolling is only anticipated for a relatively short distance in a single lane (each direction).
Estimated toll revenue potential from tolled facility	○	Low total annual revenue but moderate daily revenue per centerline mile. Sufficient revenue for capital investments would likely not be available.
Legend:	Performs well ● Performs moderately ◑ Performs poorly ○	

Source: WSP, Metro Regional Travel Demand Model, Metro Multi-Criteria Evaluation Tool

Capital expenditure on facility

Concept A would convert an existing northbound HOV lane and would require the conversion of another general purpose lane in the southbound direction. It would likely have low capital costs as tolling is only anticipated for a relatively short distance in these lanes. Capital costs for Concept A are much less than if additional lanes were added, and are less than many major highway capital project costs.

Gross toll revenue potential

The potential annual gross toll revenue estimate for Concept A is $20 million (in 2017 dollars), one of the two lowest of the five concepts. The revenue estimates were calculated based on toll rates that vary for each segment and time of day based on traffic conditions. The modeling analysis adjusted the toll rates for each hour of the day to the level that maintains free flow traffic conditions on the tolled lanes throughout the day and during peak periods. The toll rates range between $0.34 per mile during non-peak hours to a high of $1.45 per mile during the peak. Estimated revenue would be sufficient to cover routine costs associated with toll collection and operations, roadway operations and maintenance, and periodic costs associated with rehabilitation and reconstruction of toll equipment. However, estimated revenues may not be sufficient to cover all periodic roadway rehabilitation and reconstruction costs that would be incurred whether or not the lanes are priced. Excess revenue would likely not be available for significant contributions to capital improvements particularly for underwriting revenue bonds. Appendix E includes additional information about revenue and cost assumptions.

3.1.7 Implementation

Concept A complies with state and regional policy. The conversion of the northbound HOV lane would qualify under FHWA's Section 166 HOV/HOT Lane Program; the southbound conversion could qualify under FHWA's Value Pricing Pilot Program. Concept A could be deployed within a relatively quick timeframe with no impact to

other regional project schedules. Additional detail on all performance metrics are provided in the evaluation methods and assumptions matrix in Appendix A.

Table 3.1-7. Concept A evaluation: implementation

Performance measure	Concept A evaluation	Findings
Consistency with state law and policy	●	Consistent with state law and policy. Any tolling proposal would need to meet additional legal requirements.
Consistency with regional law and policy	●	Complies with regional law and policy; tolling proposals would need coordination with Metro.
Feasibility under federal law	◑	Operationally similar in the northbound direction to many other congestion pricing projects in the U.S. Southbound conversion of a general purpose lane would have some federal requirements.
Project delivery schedule	●	No negative impacts to the delivery schedules of other projects.
Legend: Performs well ● Performs moderately ◑ Performs poorly ○		Please see summaries below for additional assessment detail.

Source: WSP

Consistency with state and regional law and policy

Concept A generally conforms to guidance and requirements found in state and regional laws and policies. Descriptions of state and regional laws and policies are provided in Appendix F.

Feasibility under federal law

The northbound conversion of the existing HOV lane would be operationally feasible from a federal perspective and would qualify under FHWA's Section 166 HOV/HOT Lane Program. Under Section 166 the implementing agency is required to consult with the local metropolitan planning organization (MPO) regarding the placement and amount of tolls on the converted lanes. The implementing agency is also required to demonstrate that the conversion has not and does not (upon implementation) degrade service for HOV vehicles. Annual reporting is required. The conversion of the southbound general purpose lane may qualify under FHWA's Value Pricing Pilot Program.

Project delivery schedule

Concept A can be developed and implemented relatively quickly. There are no negative impacts to other projects.

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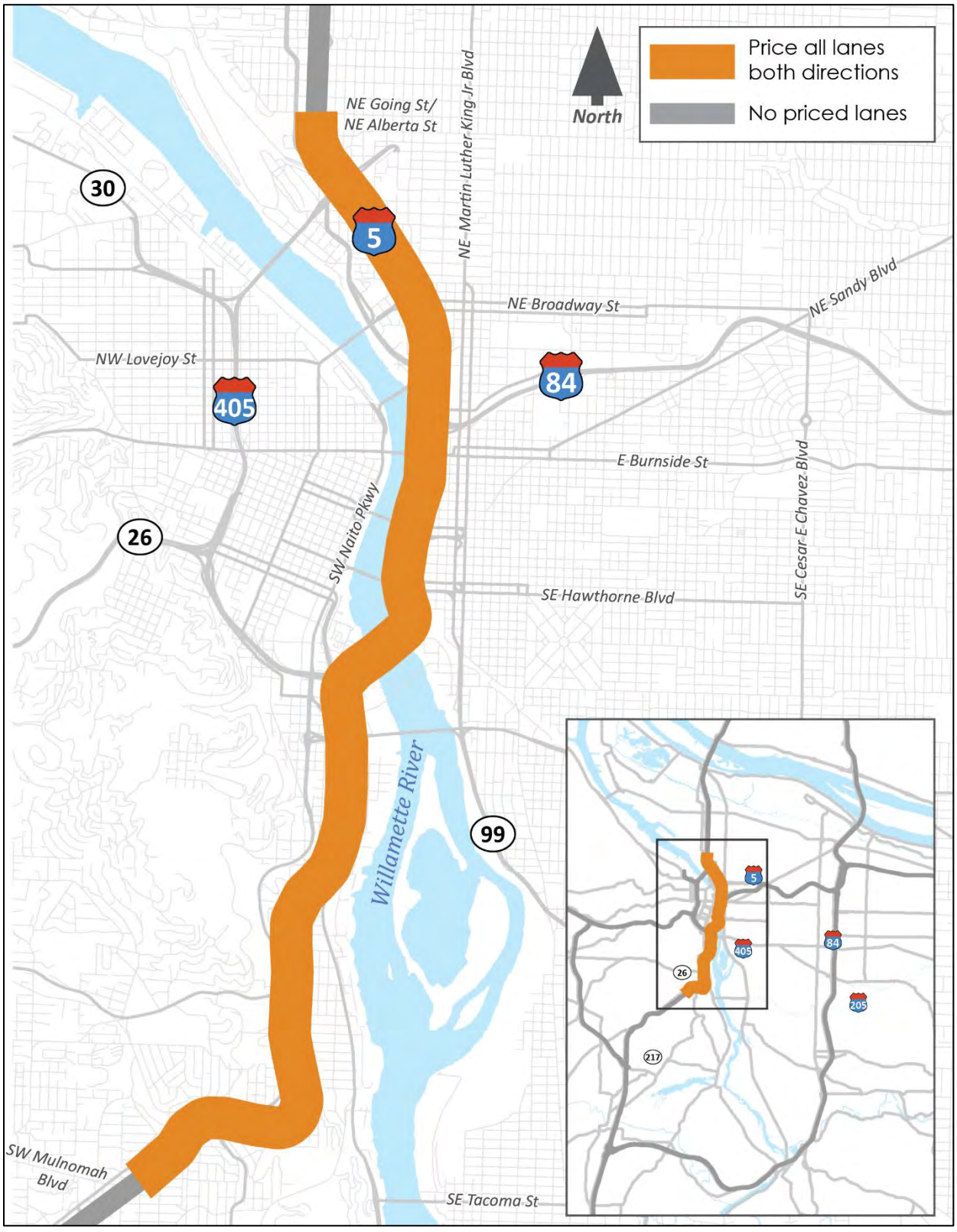
3.2 Concept B: I-5 Priced Lanes: Toll All Lanes between Going Street/Alberta Street and Multnomah Boulevard

Concept B converts all lanes between NE Going Street/Alberta Street and SW Multnomah Boulevard to a priced roadway. The following are key findings from the assessment of Concept B.

- There are noticeable congestion reduction and time savings for users of the facility, particularly during peak periods.
- Concept B provides travel time savings to area Title VI and Environmental Justice communities.
- The concept moves vehicles more efficiently in terms of vehicles per lane per hour relative to the baseline and, as a result, diversion from the tolled facility to I-205 and nearby roads is modest.
- The concept's context features a dense network of transit and multi-modal facilities.
- Because it does not maintain any general purpose (unpriced) freeway lanes, there may be a need to provide mitigations such as increased transit service, low income toll rates, or other strategies.
- Tolling authority for this concept would come under FHWA's Value Pricing Pilot Program.

Figure 3-2. Round 2 Concept B: I-5 Toll All Lanes between Going Street/Alberta Street and Multnomah Boulevard



3.2.1 Traffic operations improvement on I-5 and I-205

Concept B would improve travel for users, with benefits in travel time and delay reductions. Other metrics generally show moderate benefits or limited impacts. It is important to note that traffic operations results should be examined holistically instead of examination of just one or two performance measures to understand the full breadth of implications. Additional detail on this group of performance metrics is included in the evaluation methods and assumptions matrix in Appendix A.

Table 3.2-1. Concept B evaluation: traffic operations improvement

Performance measure	Concept B evaluation	Findings
Vehicle and person throughput on I-5 and I-205	◑	Some evidence of increased vehicle throughput during the peak hours. It is not, however, consistent for all segments. There does not appear to be substantial overall diversion to I-205.
Freight truck throughput on I-5 and I-205	◑	Diversion of truck traffic from I-5 to I-205, which results in less freight truck throughput on I-5. However, freight throughput can be managed with pricing policies post implementation to reduce diversion and maintain throughput.
Passenger vehicle travel time on I-5 and I-205	●	Improved travel times on I-5 with no significant negative impacts on I-205.
Passenger vehicle travel time on managed lanes	N/A	Not applicable.
Freight truck travel time on I-5 and I-205	●	Freight trucks travel at the same speeds as passenger vehicles.
Assessment of change in duration of peak vehicle traffic conditions	◑	Conditions moderately improve on I-5, but this is offset to some extent by moderate deterioration on I-205.
Delay on priced facility	●	Reduced delay on the priced portions of I-5.
Safety impacts	◑	Some limited potential to decrease the frequency and severity of crashes in the region.
Trip length distribution	◑	Trip length distribution is not impacted by this concept.
Legend:	Performs well ●	Performs moderately ◑ / Performs poorly ○

Source: Metro Regional Travel Demand Model, Metro Multi-Criteria Evaluation Tool

Vehicle and person throughput on I-5 and I-205

Overall, Concept B does not result in significant changes in daily vehicle and person throughput relative to the baseline (no tolls), but there are potential increases in throughput during the peak hours on some segments. While the modeling results indicate that pricing could lower vehicle volumes during off-peak periods, dynamic pricing of all lanes in this concept allows for toll rates to be adjusted and volumes managed in response to travel conditions.

Freight truck throughput on I-5 and I-205

Concept B results in a shift in daily truck volumes from I-5 (the tolled facility) to I-205 (where no pricing is present). This shift occurs during the peak hours as well as over the course of the day. However, the magnitude of the shift is greater during the peak periods. The model shows that overall throughput on both corridors combined is slightly less than baseline conditions. Freight throughput can be managed post implementation through changes to the tolling schedule if needed to minimize diversion and maintain throughput.

Passenger vehicle travel time on I-5 and I-205

Concept B results in passenger travel time savings on I-5 with some modest increase in travel time on I-205. This is expected given potential for traffic shifts from I-5 to I-205. However, the average increase in travel times on I-205 across all the hours of the day is about 1 percent, or less than a minute, over the 27-mile corridor.

Freight truck travel time on I-5 and I-205

Freight vehicles receive the same travel time improvement benefits on I-5 as passenger vehicles. Furthermore, freight vehicles would see a similar increase in travel times on I-205 (approximately 1 percent) as passenger vehicles.

Assessment of change in duration of congested traffic conditions

Concept B reduces congested conditions on I-5 while only very modestly increasing the incidence of these conditions on I-205. During the 7 AM peak hour, the chance of hyper-congestion on I-5 is reduced from the baseline condition (38 percent in the northbound and southbound directions) to 30 percent in the northbound and 32 percent in the southbound. Further, during the 5 PM peak hour, the chance of hyper-congestion on I-5 is reduced relative to the baseline condition (35 percent in the northbound and 34 percent in the southbound) to 28 percent in the northbound and 30 percent in the southbound.

Delay on priced facilities

The pattern in changes in vehicular volume leads to a similar pattern in delay, as Concept B reduces hours of delay on I-5 and slightly increases delay on I-205.

Safety

No significant change in the overall frequency and severity of crashes is expected to result from this concept, although it may result in a small reduction in the overall frequency and severity of crashes based on Portland Metro's MCE tool that analyzes safety impacts on the overall regional transportation system.

Trip length distribution

No significant changes to trip length distribution are expected to result from this concept.

3.2.2 Diversion of traffic

As all lanes are priced in Concept B, there is a chance of diversion that could negatively impact safety on adjacent and regional toll-free facilities. Additional detail

on this group of performance metrics is provided in the evaluation methods and assumptions matrix in Appendix A.

Table 3.2-2. Concept B evaluation: diversion of traffic

Performance measure	Concept B evaluation	Findings
Diversion impacts on non-tolled facilities	◑	No substantial diversion impacts are expected when freeway throughput is increased during peak hours. Diversion to non-tolled facilities may occur in off-peak periods.
Safety impacts to all modes of transportation (including bicyclists and pedestrians) on routes with diversion	◑	The diversion of trips in off-peak periods from a priced facility to adjacent arterials and other roadways could increase need for safety mitigation on those facilities.
Legend:	Performs well ●	Performs moderately ◑ Performs poorly ○

Source: Metro Regional Travel Demand Model, Metro Multi-Criteria Evaluation Tool

Diversion impacts during peak conditions are expected to be minimal, as I-5 may be able to move more traffic. The application of tolls during off-peak conditions could divert vehicles off the freeway during those times, but tolling through dynamic pricing could minimize this effect.

While the scale of diversion is expected to be small overall, potential locations where increases in roadway volumes could occur include the following:

- I-205
- I-405
- Lewis and Clark Highway (SR-14) [I-5 to I-205]
- Martin Luther King Boulevard (OR 99E) [Broadway Street to Marine Drive]
- Interstate Avenue (OR 99W) [Broadway Avenue to Going Street]
- Greeley Avenue [Going Street to Interstate Avenue]
- McAdam Avenue/Riverside Drive (OR 43) [I-5 to A Avenue]
- Boones Ferry Road [Kruse Way to Terwilliger Boulevard]
- Taylors Ferry Road [McAdam Avenue (OR 43) to I-5]
- Terwilliger Boulevard [Boones Ferry Road to I-5]
- Barbur Boulevard (OR 99W) [I-405 to I-5]
- Minnesota Avenue/Missouri Avenue [Alberta Street I-5 Ramps to Going Street I-5 Ramps] – this potential use of ramps to bypass a short tolled segment is dependent on how tolling is structured

Diversion from freeways in off-peak periods may increase the likelihood of motor vehicle crashes on the potentially impacted roadways and at intersections. Additionally, non-vehicular travel (e.g., bicyclists and pedestrians) on diversion routes could experience increased conflicts with motor vehicles during off-peak periods, which could increase crash frequency.

It should be noted that surface streets (non-freeway roadways) with higher levels of congestion generally exhibit lower serious crash rates per mile than uncongested surface streets.[9]

3.2.3 Transit service and active transportation

Concept B scores well overall in this category of performance as it features good bicycle and pedestrian access and sufficient transit service - including all current and future MAX light rail lines - running in and parallel to the corridor. However, there are no park-and-ride lots and only one transit center adjacent to the corridor. Additional detail on this group of performance metrics is provided in the evaluation methods and assumptions matrix in Appendix A.

Table 3.2-3. Concept B evaluation: transit service and active transportation

Performance measure	Concept B evaluation	Findings
Adequacy of transit service	●	26 total transit line options. 19 transit lines by TriMet, five transit lines by C-Tran. No park and ride lots and one transit center.
Bus transit travel time	◑	Time savings for the AM peak and PM peak (northbound/southbound). Five C-Tran express bus routes and one TriMet route would benefit.
Mode share shift (HOV, SOV, transit, walk, bike)	◑	Minimal impact on regional mode share. Some potential to discourage SOV trips, with shifts to HOV, transit, and active modes.
Availability of bicycle travel on alternative routes	●	Nearly 110 miles of bike lanes within a 1 mile buffer, 17 of which run parallel to the corridor and another 4 that run in a near-parallel fashion. Some gaps are found in the southern area, but options still exist.
Completeness of pedestrian network	●	138 total street miles of sidewalks. 20 miles of sidewalk/mile of corridor length within a half-mile buffer.
Legend:	Performs well ●	Performs moderately ◑ Performs poorly ○

Source: Metro Regional Travel Demand Model, WSP

Adequacy of transit service

Concept B performed very well with a total of 21 bus routes, three current and future MAX lines, and two streetcar lines offering parallel service along its route, 19 of which are run by TriMet with 9 of those being frequent service. This provides numerous transit options into and out of the downtown Portland area. C-Tran also has five lines running the length of the I-5 corridor into either downtown Portland or the Lloyd District. However, none of these lines provide frequent service, and they do not run the length

[9] Metro State of Safety Report, April 2012.

of the corridor. A lack of transit centers and park-and-ride facilities creates further issues for those who want to drive for at least a portion of their trip.

Bus transit travel time

Concept B provides a modest amount of potential travel time savings along I-5. Five C-Tran bus routes currently use this section of the freeway for express bus service between downtown Portland and Lloyd Center to Vancouver. TriMet currently operates one bus route along this section heading into and out of downtown Portland. There is the potential for a new express bus service serving the corridor; however, with the current Yellow Line MAX train and the planned SW Corridor high-capacity transit line, this would need examination.

Mode share shift

Concept B is anticipated to have a minimal impact on regional mode share. However, some potential to discourage SOV trips in favor of HOV, transit, and active modes such as bicycling and pedestrian would be expected due to the application of tolling costs.

Availability of bicycle travel

Concept B has numerous bike facilities running parallel to the corridor giving cyclists multiple options. This concept also benefits from being near downtown Portland, which has multiple planned routes, including the upcoming Green Loop. While some gaps do exist in the southern area of the concept, overall the corridor provides options regardless of where a cyclist travels.

Completeness of pedestrian network

A complete and consistent pedestrian network exists within the concept corridor. Few gaps exist that do not have some type of natural barrier (river, steep hills). This corridor segment also has the highest number of sidewalks per mile of corridor. Overall, aside from the very southern tip of the corridor, the pedestrian network is complete and provides good options for pedestrians.

3.2.4 Equity benefits and impacts

Concept B offers some limited travel time benefits for Title VI and/or Environmental Justice communities in the region. Performance measures in other categories also relate to equity, although they are not specifically categorized as such. Additional detail on this and other performance metrics is provided in the evaluation methods and assumptions matrix in Appendix A.

Because this concept does not maintain any general purpose (unpriced) freeway lanes, there may be a need to provide mitigations such as increased transit service, low income toll rates, or other strategies.

Table 3.2-4. Concept B evaluation: equity benefits and impacts

Performance measure	Concept B evaluation	Findings
Value or travel time savings for Title VI and/or Environmental Justice communities (regional)	◑	Potential travel time benefit for Title VI and Environmental Justice communities.
Changes in travel time based on geographic zones	●	Potential for vehicle travel time reduction for the region, particularly along the I-5 corridor.
Access to jobs	◑	Potential for some improved access to jobs for Title VI and Environmental Justice communities. Low wage job access shows slightly higher improvements than the overall average.

Legend: ● Performs well; ◑ Performs moderately; ○ Performs poorly

Source: Metro Regional Travel Demand Model, Metro Multi-Criteria Evaluation Tool

Value of travel time savings for Title VI and/or Environmental Justice communities

An improvement in overall travel time can be expected with this concept for Title VI and Environmental Justice communities in the region (low-income, people of color, and low English proficiency communities). The scale of travel time benefit is smaller than for Concept C but more than would be expected with Concepts A, D or E.

Travel time savings by geographic area

A reduction in vehicle travel time can be expected with this concept and the benefits would be experienced throughout the region. Trips to and from areas along the I-5 corridor (between the I-5 junction with I-205 and the Columbia River) would benefit most, including parts of Tigard, Tualatin, Lake Oswego, and central, north and northeast Portland.

Access to jobs

Concept B offers some potential improvement to the percent of regional jobs accessible within a 30-minute drive for Title VI and/or Environmental Justice communities. On average, approximately 1 percent more (from 32 percent to 33 percent) of all regional jobs would be accessible within a 30-minute drive during the morning peak hour. Access to low wage jobs would be expected to have slightly higher improvements than access to all jobs.

3.2.5 Benefits and impacts for the community, economy and environment

By pricing all lanes, Concept B would improve overall system efficiency, which yields moderate benefits in terms of time savings, reduction in regional vehicle miles traveled and reduction in air pollution. Additional detail on this group of performance metrics is provided in the evaluation methods and assumptions matrix in Appendix A.

Table 3.2-5. Concept B evaluation: benefits and impacts for the community, economy and environment

Performance measure	Concept B evaluation	Findings
Physical impacts to existing residences and businesses	●	No physical impacts expected.
Regional travel time savings	◑	Potential for minor reduction in regional VHT. Benefit consistent throughout the day and highest in the AM peak hour.
Regional vehicle miles traveled (VMT) (including non-freeway)	◑	Greater potential for reducing VMT than Concepts A or D or E, minor impacts anticipated.
Change in air pollution	◑	No significant change expected. Some potential to slightly reduce regional vehicle emissions.
Value of travel time savings	◑	Potential to provide travel time savings for the region as a whole. Has the second-highest benefit of all concepts evaluated.
Legend:	Performs well ●	Performs moderately ◑ Performs poorly ○

Source: Metro Regional Travel Demand Model, Metro Multi-Criteria Evaluation Tool

Overall, the regional transportation system is expected to operate more efficiently as system-wide impacts show the potential to reduce total motor VHT, VMT and vehicle emissions.

This concept does not include building new lanes and, therefore, would not have any physical impacts to residents or businesses that run adjacent to the corridor.

3.2.6 Revenue and costs

Concept B would generate more revenue than single-lane concepts and would cover all toll collection and operating costs, as well as routine and periodic roadway operations and maintenance that would be incurred regardless of whether the lanes were priced. At this level of analysis, there are too many unknowns to determine how much funding for other capital projects would be generated, and whether it is significant enough to contribute to long-term rehabilitation and reconstruction of the corridor's infrastructure. This concept is relatively inexpensive to deploy. Additional detail on this group of performance metrics is provided in the evaluation methods and assumptions matrix in Appendix A.

Table 3.2-6. Concept B evaluation: revenue and cost

Performance measure	Concept B evaluation	Findings
Capital expenditure on facility	●	Higher than costs associated with concepts that only toll a single lane; not as costly as many highway capital projects.
Estimated gross toll revenue potential from tolled facility	◑	Low-to-moderate total annual revenue and revenue per centerline mile. Likely provides excess revenue to designate to other capital projects, but at an unknown level of contribution.
Legend:	● Performs well; ◑ Performs moderately; ○ Performs poorly	

Source: WSP, Metro Regional Travel Demand Model, Metro Multi-Criteria Evaluation Tool

Capital expenditure on facility

Capital costs for converting general purpose lanes on I-5 for Concept B are higher than the costs associated with concepts that only toll a single lane, but not as costly as many major highway capital projects.

Gross toll revenue potential

The potential annual gross toll revenue estimate for Concept B is $50 million (in 2017 dollars). The revenue estimates are calculated based on toll rates that vary for each segment and time of day based on traffic conditions. The modeling analysis adjusted the toll rates for each hour of the day to the level that maintains free flow traffic conditions on the tolled lanes throughout the day and during peak periods. The toll rates range between $0.10 per mile during non-peak hours of the day and up to $0.26 per mile during the peak. Estimated revenue would be sufficient to cover routine costs associated with toll collection and operations, roadway operations and maintenance, and periodic costs associated with rehabilitation and reconstruction of toll equipment. Estimated revenues hold the potential for excess revenue to be available to support capital investments and/or mitigation solutions. Appendix E includes additional information about revenue and cost assumptions.

3.2.7 Implementation

Concept B complies with applicable state and regional law and policy. The concept may qualify under the FHWA Value Pricing Project Program (VPPP) but would not qualify under the FHWA's Mainstream Tolling or HOV/HOT Lane Program. The concept could be deployed relatively quickly with minimal impact to other regional projects. Additional detail on all performance metrics are provided in the evaluation methods and assumptions matrix in Appendix A.

Table 3.2-7. Concept B evaluation: implementation

Performance measure	Concept B evaluation	Findings
Consistency with state law and policy	●	Consistent with state law and policy. Any tolling proposal would need to meet additional legal requirements.
Consistency with regional law and policy	●	Consistent with regional law and policy; likely coordination with Metro.
Feasibility under federal law	◑	May qualify under FHWA VPPP program.
Project delivery schedule	●	No negative impacts to the delivery schedules of other projects.
Legend: Performs well ● Performs moderately ◑ Performs poorly ○		Please see summaries below for additional assessment detail.

Source: WSP

Consistency with state and regional law and policy

Concept B is consistent with guidance and requirements found in state and regional laws and policies. Information on state and regional laws and policies is provided in Appendix F.

Feasibility under federal law

Concept B may qualify for FHWA's Value Pricing Pilot Program (Oregon has a slot), which may allow tolling of all existing general purpose lanes in the absence of reconstruction activities.

Project delivery schedule

Concept B can be developed relatively quickly without significant impact to other projects in the area. Discussion on state and local laws and policies is provided in Appendix F.

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3.3 Concept C: I-5 and I-205 Priced Roadway – Toll All Lanes

Concept C would implement pricing on all lanes of I-5 and I-205 from the Washington/Oregon state line to the I-5/I205 interchange near Tualatin. The following are key findings from the assessment of Concept C:

- Concept C generates the greatest overall benefit in terms of regional congestion reduction and travel time savings.
- Route diversion can be expected, which could be minimized through dynamic tolling.
- The concept would provide travel time savings and enhanced access to jobs for Title VI and Environmental Justice communities.
- Transit and multi-modal facilities can serve as travel alternatives though accessibility of these options varies over the I-5 and I-205 corridors.
- Because it does not maintain any general purpose (unpriced) freeway lanes, there may be a need to provide mitigations such as increased transit service, low income toll rates, or other strategies.
- Concept C would generate the largest amount of revenue compared to other concepts.

Figure 3-3. Round 2 Concept C: Priced Roadway – Toll All Lanes

3.3.1 Traffic operations improvement on I-5 and I-205

Concept C would result in the largest overall benefits for the region in terms of congestion reduction and improvement in travel times. However, diversion to the regional arterial network and other non-priced freeways is likely without mitigation. It is important to note that traffic operations results should be examined holistically instead of examination of just one or two performance measures to understand the full breadth of implications. Additional detail on this group of performance metrics is provided in the evaluation methods and assumptions matrix in Appendix A.

Table 3.3-1. Concept C evaluation: traffic operations improvement

Performance measure	Concept C evaluation	Findings
Vehicle and person throughput on I-5 and I-205	◑	Modeling results indicate that there would be a reduction in vehicle and person throughput on I-5 and I-205, particularly during off-peak periods. It may be possible to minimize or eliminate this in practice through toll adjustments.
Freight truck throughput on I-5 and I-205	◑	Modeling results indicate that freight truck throughput would be reduced. However, freight throughput can be managed with pricing policies post implementation to minimize diversion and maintain throughput.
Passenger vehicle travel time on I-5 and I-205	●	Major improvements in travel times on all segments of I-5 and I-205.
Passenger vehicle travel time on managed lanes	N/A	Not applicable.
Freight truck travel time on I-5 and I-205	●	Freight travel times mirror passenger vehicle travel times in this concept.
Assessment of change in duration of peak vehicle traffic conditions	●	All segments of I-5 and I-205 indicate reductions in the possibility of encountering hyper-congested conditions, indicating a reduction in the duration of congested travel. This is confirmed by the reduction in peak hour VHT for the region as a whole.
Delay on priced facility	●	Reduced delay on all segments of both I-5 and I-205.
Safety impacts	◑	Some limited potential to decrease the frequency and severity of overall crashes in the region.
Trip length distribution	◑	No significant changes are expected. Some limited potential to reduce overall freeway trip lengths as users seek to limit payments under assumed distance-based toll.
Legend:	Performs well ●	Performs moderately ◑ Performs poorly ○

Source: Metro Regional Travel Demand Model, Metro Multi-Criteria Evaluation Tool

Vehicle and person throughput on I-5 and I-205

The modeling results show that Concept C could reduce vehicle volumes, particularly during off-peak periods. The use of dynamic pricing would allow volumes to be

managed in response to traffic conditions. This would allow for more efficient traffic flow overall. Overall regional VMT and VHT are reduced with Concept C, an indication the network is performing more efficiently overall.

As noted, Concept C could reduce daily vehicle and person throughput on both facilities when compared to the baseline. However, the reduction is smaller during the peak periods, and may explain why the overall network performance shows increased efficiency. Some segments of I-5 and I-205 have higher throughput than the baseline during the peak hour, but the trend overall is moderately lower.

The model used in this analysis applied off-peak toll rates that may have been higher than required and resulted in more vehicle diversion than would be desired in these off-peak travel hours. It is also possible that the toll rates modeled during the peak travel hours had the same effect. Toll rates could be managed to balance freeway performance and vehicle diversion.

Freight truck throughput on I-5 and I-205

Concept C results in lower daily truck throughput on both facilities relative to the baseline. The magnitude of this reduction is greater during the peak hours. Freight throughput can be managed post implementation through changes to the tolling schedule if needed to minimize diversion and maintain throughput.

Passenger vehicle travel time on I-5 and I-205

Concept C results in the largest travel time savings of all the tolling concepts. Travel time savings during the peak hours range from 5 to 9 minutes depending on the corridor and direction of travel. In some cases, this represents a more than a 20 percent reduction in travel time. During off-peak hours, the travel time savings are more modest.

Passenger vehicle travel time on managed lanes.

Concept C has no priced managed lanes in operation.

Freight truck travel time on I-5 and I-205.

Freight vehicles travel in the general purpose lane of I-5 and I-205. As such, the travel time for freight vehicles shows the same improvement as passenger cars.

Assessment of change in duration of congested traffic conditions

Concept C does the most to reduce the probability of experiencing congested conditions compared to other concepts analyzed. During the 7 AM peak hour, the probability of hyper-congestion is reduced by 25 to 50 percent. During the 5 PM peak hour, it is reduced by between 33 to 66 percent.

Delay on priced facilities

Concept C significantly reduces hours of delay during peak periods on both I-5 and I-205 by between 25 to 50 percent depending on the location and time.

Safety

Hyper-congested freeways can create high variances in motor vehicle speeds, especially when approaching a queue, which can result in crashes. Removing hyper-

congestion reduces speed differentials and can therefore reduce the opportunity for crashes on freeways. The freeway performance improvements described above for Concept C, paired with overall region-wide reductions in VMT, would be expected to improve overall safety in the region.

Trip length distribution

No substantial changes to trip length distribution are expected to result from this concept. There is some limited potential to reduce overall freeway trip lengths as users seek to limit payments under an assumed distance-based toll.

3.3.2 Diversion of traffic

The application of pricing to all lanes of I-5 and I-205 within the overall study area is anticipated to result in diversion to arterials and surface streets under Concept C. This could negatively impact safety for bicyclists and pedestrians, as well as drivers on these roads without mitigation. Additional detail on this group of performance metrics is provided in the evaluation methods and assumptions matrix in Appendix A.

Table 3.3-2. Concept C evaluation: diversion of traffic

Performance measure	Concept C evaluation	Findings
Safety impacts to all modes of transportation (including bicyclists and pedestrians) on routes with diversion	○	The diversion of trips from a priced facility to adjacent arterials and other roadways could increase the need for safety mitigation on those facilities.
Diversion impacts on non-tolled facilities	○	Potential for diversion impacts is higher than other concepts. Potential impacts have a wide geographic spread between I-5 and I-205.

Legend: ● Performs well ◐ Performs moderately ○ Performs poorly

Source: Metro Regional Travel Demand Model, Metro Multi-Criteria Evaluation Tool

Concept C analysis showed high potential for diversion impacts without mitigation. The analysis produced mixed results for changes in freeway volumes, with some freeway segments showing increased throughput during peak demand periods (when hyper-congestion could be relieved) and others showing decreased volume. The impacts vary by time of day, direction and highway. Overall daily impacts show an average decrease of 150 to 250 vehicles per hour on I-5 (each direction) and 250 to 350 fewer vehicles per hour on I-205 (each direction).

The impact of diversion away from freeways is expected to be distributed over many major roadways in the region, particularly north–south routes that are alternatives to I-5 and I-205. Model results indicate most diversion would occur in off-peak periods.

Where diversion from freeways could increase demand on other roadways, the likelihood of motor vehicle crashes could increase. Additionally, non-vehicular travel mode road users (e.g., bicyclists and pedestrians) on diversion routes could experience

increased conflicts with motor vehicles during off-peak periods, which could increase crash frequency.

Safety impacts could occur along segments and at intersections on the diversion routes, as increased motor vehicle volume is an indicator of increased crash potential. It should be noted that surface streets (non-freeway roadways) with higher levels of congestion generally exhibit lower serious crash rates per mile than uncongested surface streets.[10]

3.3.3 Transit service and active transportation

Concept C performs well in some aspects of transit service and active transportation but not as well in other areas. This is primarily due to the size of the concept relative to the others. The primary benefits to transit occur around downtown Portland and the inner core of I-205 near the Gateway Transit Center and at the intersection of I-84 and I-205. However, the southern areas of the concept lack transit service and, in particular, frequent service lines (e.g. in Clackamas County). Furthermore, bicycle and pedestrian infrastructure is almost non-existent in the southern areas of the concept. Additional detail on this group of performance metrics is provided in the evaluation methods and assumptions matrix in Appendix A.

Table 3.3-3. Concept C evaluation: transit service and active transportation

Performance measure	Concept C evaluation	Findings
Adequacy of transit service	◑	36 total transit lines running. 26 lines from TriMet, eight from C-Tran, and 1 from SMART. A total of 11 frequent service lines, four of which are MAX trains. 12 park-and-ride and seven transit centers exist directly along this concept corridor.
Bus transit travel time	●	Time savings for AM peak and PM Peak (northbound/southbound). Eight C-Tran express bus routes and two TriMet routes would benefit.
Mode share shift (HOV, SOV, transit, walk, bike)	●	Could produce changes in regional mode share. Potential to discourage SOV trips, with shifts to HOV, transit, and active modes. Overall shift away from SOV travel would be less than 1% of regional trips.
Availability of bicycle travel on alternative routes	◑	335 total miles of bike lanes within a 1-mile buffer. Dozens of parallel paths depending on the location. Gaps exist, especially in the southern and eastern parts of the concept corridor.
Completeness of pedestrian network	◑	416 total street miles of sidewalks. 9 miles of sidewalk per mile of corridor length within a half-mile buffer.
Legend:	Performs well ●	Performs moderately ◑ Performs poorly ○

Source: Metro Regional Travel Demand Model, WSP

[10] Metro State of Safety Report, April 2012

Adequacy of transit service

Concept C features the most transit options with 28 bus routes, five current and future MAX lines, two streetcar lines, and the WES commuter rail line, but it is also the largest concept in terms of geographic area. This limits its effectiveness in terms of transit service evaluation. Through downtown Portland and inner east Portland areas, transit options are plentiful and provide frequent service. There are also large numbers of park-and-ride lots (12) and seven transit centers. However, the southern areas of both corridors lack service as few lines run parallel to either I-5 or especially I-205. The few lines that do run parallel to these corridors either do not run a sufficient length and/or do not offer frequent service.

Bus transit travel time

Concept C provides the highest amount of potential travel time savings along I-5 and I-205. Eight C-Tran routes currently use the concept corridor for express bus service between downtown Portland, Lloyd Center, and Delta Park MAX station to Vancouver. TriMet currently operates two bus routes along this concept corridor. SMART has one route that travels from Wilsonville to the Barbur Transit Station on I-5. Given the potential savings, there is also the possibility to add express bus service along either I-5 or I-205. I-205 along the southern corridor and near the Abernethy Bridge may benefit the most from a new service as it is currently the only section of highway that does not have a current or planned MAX/high-capacity transit line.

Mode share shift

By pricing all lanes of I-5 and I-205 within the study corridor, Concept C has the largest potential mode shift. The pricing of the entire corridor for both facilities would create an incentive to form carpools to reduce the individual burden of tolls or to use transit, bikes or walking to avoid tolls altogether. However, when analyzed over the entire region, the cumulative shift away from SOV travel is anticipated to be less than 1 percent of all regional trips.

Availability of bicycle travel

Concept C has the most bicycle infrastructure with 335 total miles, but this is unequally distributed among the 45 centerline miles of the corridors. As such, some segments of the concept's corridors perform very well. Portland central city and the I-205 east Portland sections have adequate bicycle travel options with multiple parallel bike lanes and paths. I-205 is also home to the I-205 trail, which runs directly parallel to the corridor concept from Abernethy Bridge to Vancouver. However, gaps persist in the overall network. The southern end of the corridor has very few bike facilities, and entire sections of the corridor often have no parallel bike paths. This provides cyclists with few, if any, options to travel the entire length of I-5 or I-205.

Completeness of pedestrian network

Concept C covers the most geographic area and, therefore, is the most challenging to assess in terms of pedestrian network completeness. This is primarily because of the large gaps in the far north segment of I-5 north of Columbia Boulevard, the far south segments of I-5 and I-205, and the general spottiness of the pedestrian network in the

eastern side of the corridor. Pedestrians are likely to encounter at least some gaps unless they are in inner Portland.

3.3.4 Equity benefits and impacts

Concept C offers travel time benefits for Title VI and Environmental Justice communities in the region. Performance measures in other categories also relate to equity, although they are not specifically categorized as such. Additional detail on this and other performance metrics is provided in the evaluation methods and assumptions matrix in Appendix A.

Because this concept does not maintain any general purpose (unpriced) freeway lanes, there may be a need to provide mitigations such as increased transit service, low income toll rates, or other strategies.

Table 3.3-4. Concept C evaluation: equity benefits and impacts

Performance measure	Concept C evaluation	Findings
Value or travel time savings for Title VI and/or Environmental Justice communities (regional)	●	Highest potential travel time benefit for Title VI and Environmental Justice communities.
Changes in travel time based on geographic zones	●	Highest potential vehicle travel time reductions for the region. Benefits would be experienced region-wide.
Access to jobs	●	Greatest potential to improve access to jobs for Title VI and Environmental Justice communities. Low wage jobs have slightly higher improvements than the overall average.

Legend: ● Performs well; ◐ Performs moderately; ○ Performs poorly

Source: Metro Regional Travel Demand Model, Metro Multi-Criteria Evaluation Tool

Value of travel time savings for Title VI and/or Environmental Justice communities

A benefit in overall travel time can be expected with this concept for Title VI and Environmental Justice communities in the region (low-income, people of color, and low English proficiency communities). The scale of travel time benefit is larger than for any other concept.

Travel time savings by geographic area

A reduction in vehicle travel time can be expected with this concept, and the benefits would be experienced throughout the region and into southern Washington. Trips to and from areas along the I-5 and I-205 corridors would benefit most, including parts of Wilsonville, Tualatin, Tigard, Beaverton, Lake Oswego, Portland, West Linn, and Oregon City.

Access to jobs

Concept C offers potential improvement to the percent of regional jobs accessible within a 30-minute drive for Title VI and/or Environmental Justice communities. On average, approximately 3 percent more (from 32 percent to 35 percent) of all regional jobs would be accessible within a 30-minute drive during the morning peak hour. The benefits are more evident for low-wage jobs, as approximately 5 percent more of regional low-wage jobs would be accessible in the morning peak hour. The off-peak period also shows potential for improving the share of regional jobs that can be accessed within a 30-minute drive by approximately 2 percent.

3.3.5 Benefits and impacts for the community, economy and environment

Concept C is anticipated to generate the largest travel time savings for the region and could decrease regional vehicle miles traveled. The benefits of travel time savings are likely to be distributed across the entire regional network. Additional detail on this group of performance metrics is provided in the evaluation methods and assumptions matrix in Appendix A.

Table 3.3-5. Concept C evaluation: benefits and impacts for the community, economy and environment

Performance measure	Concept C evaluation	Findings
Physical impacts to existing residences and businesses	●	No physical impacts expected.
Regional travel time savings	●	Highest potential to decrease regional VHT, with a daily decrease of up to 5%.
Regional vehicle miles traveled (VMT) (including non-freeway)	●	Could decrease regional VMT, up to 2% across all time periods.
Change in air pollution	◑	Some potential to reduce regional vehicle emissions.
Value of travel time savings	●	Highest potential to provide regional travel time benefit for motor vehicles.

Legend: ● Performs well; ◑ Performs moderately; ○ Performs poorly

Source: Metro Regional Travel Demand Model, Metro Multi-Criteria Evaluation Tool

Overall, the regional transportation system is expected to operate more efficiently as system-wide impacts show the potential to reduce total motor VHT and VMT.

Air pollution impacts (vehicle emissions) of Concept C are challenging to estimate at the regional level because of the scale of potential changes and the dynamics that influence vehicle emissions. While model results indicate a potential exists to reduce regional vehicle emissions if Concept C were implemented, the ultimate outcome is not definitive.

This concept does not include construction of any additional new lanes (beyond the baseline 2027 assumptions) and, therefore, would not have any physical impacts to residents or businesses that run adjacent to the corridor.

3.3.6 Revenue and costs

Concept C generates the greatest amount of revenue of the concepts analyzed, which may cover all routine and periodic roadway facility operation and maintenance costs. The concept would require the largest capital expenditure in terms of tolling equipment. Additional detail on this group of performance metrics is provided in the evaluation methods and assumptions matrix in Appendix A.

Table 3.3-6. Concept C evaluation: revenue and cost

Performance measure	Concept C evaluation	Findings
Capital expenditure on facility	●	Requires the largest capital expenditure for toll equipment but not as costly as many highway capital projects.
Estimated gross toll revenue potential from tolled facility	●	Highest total annual revenue, moderate-to-high daily revenue per centerline mile. Results in excess revenue to designate to other capital projects, but at an unknown level of contribution.

Legend: ● Performs well; ◑ Performs moderately; ○ Performs poorly

Source: WSP, Metro Regional Travel Demand Model, Metro Multi-Criteria Evaluation Tool

Capital expenditure on facility

Concept C requires the largest capital expenditure for toll equipment as the concept covers the entirety of I-5 and I-205 within the study area. Capital costs would be less than many major highway capital projects.

Gross toll revenue potential

The potential annual gross toll revenue estimate for Concept C is approximately $300 million (in 2017 dollars), the highest of all five concepts. About 55 percent of this revenue will be generated by I-5 and 45 percent generated by I-205. The revenue estimates were calculated based on toll rates that vary for each segment and time of day based on traffic conditions. The modeling analysis adjusted the toll rates for each hour of the day to the level that maintains free flow traffic conditions on I-5 and I-205 throughout the day and during peak periods. The toll rates range from $0.17 per mile during off-peak hours to $0.38 per mile during peak hours. In addition to covering routine toll collection and operations as well as roadway operations and maintenance costs, Concept C revenues would likely be sufficient to cover periodic toll system rehabilitation and reconstruction costs, roadway rehabilitation and reconstruction costs, and support capital investments and/or mitigation solutions. Appendix E includes additional information about revenue and cost assumptions.

3.3.7 Implementation

Concept C is consistent with state and regional laws and policies. The concept could qualify under the FHWA Value Pricing Pilot Program but would not qualify under FHWA's Mainstream Tolling or HOV/HOT Lane Program. The system would be deployed slower than concepts A and B, given its geographic size, but construction costs and construction timing would be far shorter than that required to add lanes to a facility. Development and implementation would not negatively impact regional project schedules. Additional detail on all performance metrics are provided in the evaluation methods and assumptions matrix in Appendix A.

Table 3.3-7. Concept C evaluation: implementation

Performance measure	Concept C evaluation	Findings
Consistency with state law and policy	●	Consistent with state law and policy. Any tolling proposal would need to meet additional legal requirements.
Consistency with regional law and policy	●	Consistent with regional law and policy; likely coordination with Metro.
Feasibility under federal law	◑	May qualify for VPPP (Oregon has a slot).
Project delivery schedule	◑	No negative impacts to the delivery schedules of other projects.
Legend:	Performs well ● Performs moderately ◑ Performs poorly ○	Please see summaries below for additional assessment detail.

Source: WSP

Consistency with state and regional law and policy

Concept C is consistent with state and regional laws and policies. Information on state and regional laws and policies is provided in Appendix F.

Feasibility under federal law

Concept C may qualify for FHWA's Value Pricing Pilot Program (Oregon has a slot), which allows for the tolling of pre-existing general purpose that are not being reconstructed using toll revenues.

Project delivery schedule

Concept C would not require construction of new roadway lanes; however, because it is being implemented over the entirety of the I-5 and I-205 corridors, it would take longer to develop than the smaller-scale concepts. It is not expected to impact regional project delivery schedules.

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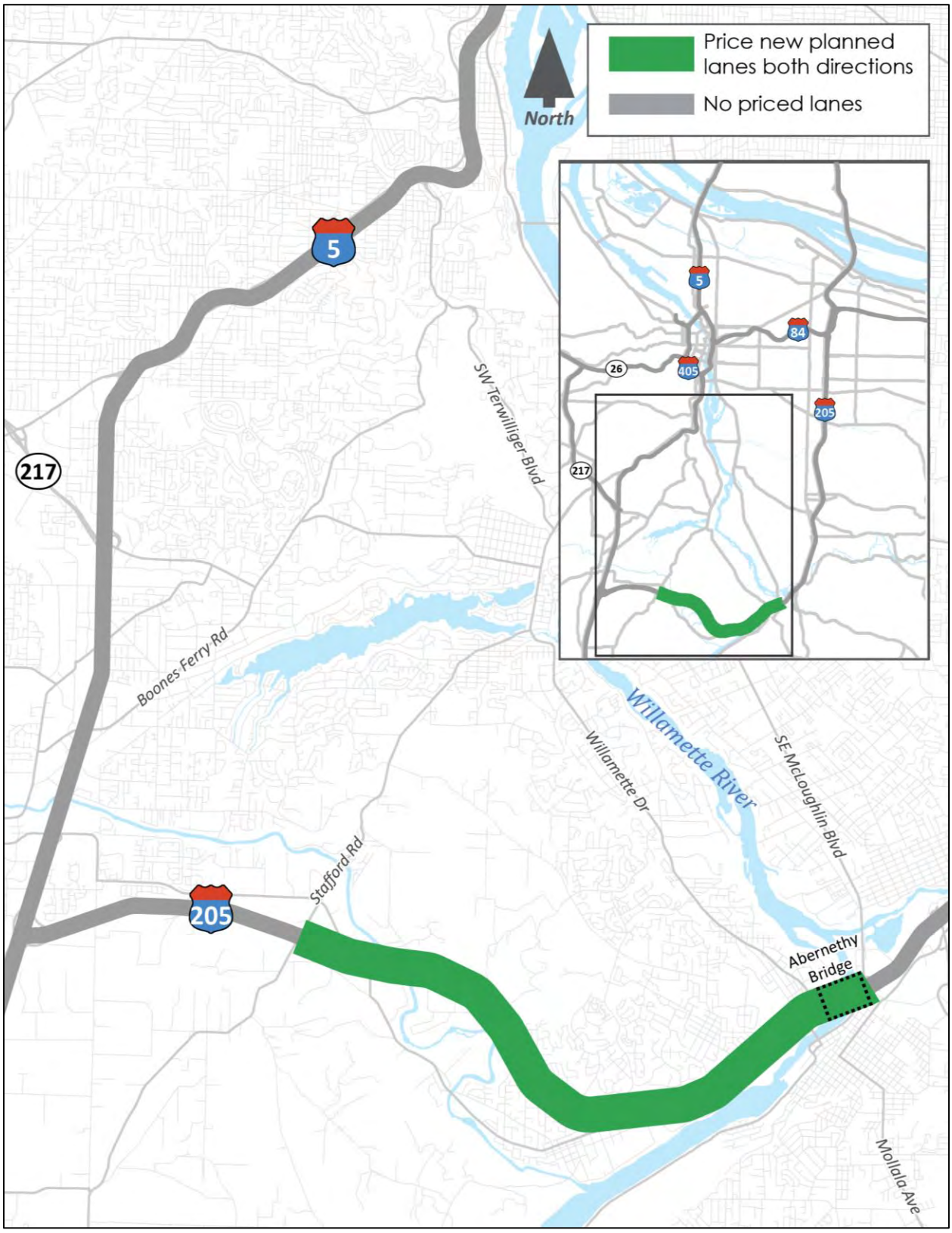
3.4 Concept D: I-205 Priced Lane – OR99E to Stafford Road

Concept D would price future additional third lanes in each direction currently planned but not funded for construction on I-205 from OR99E to Stafford Road, including widening of the Abernethy Bridge. Existing general purpose lanes in each direction would remain unpriced. The future planned project was considered part of the 2027 baseline for all concepts in the evaluation. Key findings from the assessment of Concept D are as follows:

- Congestion reduction is minimal, though the concept slightly reduces congestion along the priced portion of I-205.
- Diversion may occur but it is likely to be minimal.
- The concept area provides very few travel alternatives such as transit and active modes.
- Regarding user costs, this concept maintains two unpriced lanes in each direction; at the same time, the toll amount per user would be higher than all-tolled corridor options, which is consistent among single-lane pricing concepts.
- Concept D may be the quickest to implement from a federal perspective.

Figure 3-4. Round 2 Concept D: I-205 Priced Lane – OR99E to Stafford Road



3.4.1 Traffic operations improvement on I-5 and I-205

Concept D results in travel time improvements for users of the priced lanes. Diversion is minimal. Additional detail on this group of performance metrics can be found in the evaluation methods and assumptions matrix in Appendix E.

Table 3.4-1. Concept D evaluation: traffic operations improvement

Performance measure	Concept D evaluation	Findings
Vehicle and person throughput on I-5 and I-205	◑	Moderate increases in person throughput during the peak hour on I-205. This is likely because this is a managed lane scenario and higher occupancy vehicles have a preference. Vehicle throughput is changed to a far lesser degree.
Freight truck throughput on I-5 and I-205	◑	Moderate increases in truck throughput on I-5, but these are offset by decreases on I-205. Trucks are also assumed to not be able to access the managed lane based on current state law and practice around the country. Freight vehicles will receive some benefit from minor decreases in travel time in the general purpose lanes on I-205 in the vicinity of the improvement.
Passenger vehicle travel time on I-5 and I-205	◑	No significant impacts to travel time on I-5 or I-205. There are improvements in travel time on the managed lanes themselves.
Passenger vehicle travel time on managed lanes	●	For vehicles using the managed lanes, there are improvements in travel time.
Freight truck travel time on I-5 and I-205	◑	No differences in travel time compared with the baseline for trucks on I-5 or I-205.
Assessment of change in duration of peak vehicle traffic conditions	●	Moderate improvement on I-205 for the duration of congested travel. This does not translate to I-5.
Delay on priced facility	●	Moderate improvements in delay on the priced facility.
Safety impacts	●	Potential to decrease the frequency and severity of crashes in the priced section of corridor.
Trip length distribution	◑	No significant changes to freeway trip lengths are expected overall. Some longer-distance trips may switch from I-5 to I-205 to take advantage of performance improvements on the tolled segment.
Legend:	Performs well ●	Performs moderately ◑ / Performs poorly ○

Source: Metro Regional Travel Demand Model, Metro Multi-Criteria Evaluation Tool

Vehicle and person throughput on I-5 and I-205

Concept D results in little change in daily vehicle throughput relative to the baseline. All-day vehicle volumes are essentially unchanged but, during the peak hours and in the peak direction, vehicle volumes could increase slightly on I-205 relative to the baseline condition.

All-day person throughput is relatively unchanged compared to the baseline with peak hour, peak direction person throughput on I-205 increasing slightly (about 5 percent in the northbound direction in the 5 PM hour and 7 percent in the southbound direction during the 7 AM peak hour).

Freight truck throughput on I-5 and I-205

Concept D results in modest shifts in daily truck volumes from I-205 (with the priced lane) to I-5 (the facility without the priced lane) with shifts during the peak periods being higher. In Concept D, a single lane in each direction is converted from a general purpose lane to a toll managed lane. Since trucks cannot access the managed lanes, and since general purpose capacity is lower when compared with the baseline, this change in truck routing from I-205 to I-5 is expected. However, freight vehicles should receive some benefit from minor decreases in travel time in the general purpose lanes on I-205 in the vicinity of the improvement.

Passenger vehicle travel time on I-5 and I-205

Concept D results in only modest changes in travel times in the general purpose lanes when compared with the baseline. During peak hours, travel times in the general purpose lanes increase slightly on the segments of I-205 where the priced managed lane is implemented, but total corridor travel times increase very modestly.

Passenger vehicle travel time on managed lanes

Concept D provides a toll managed lane alternative to the general purpose lanes on the southern portion of I-205. As such, users experience travel time savings for the entire corridor of between 7 and 9 percent during peak hours. For the specific segment where the priced managed lanes are operating, the time savings are greater on a percent basis (between 13 and 34 percent).

Freight truck travel time on I-5 and I-205

Freight vehicles travel in the general purpose lanes of I-5 and I-205 in this concept, not the priced lanes. As such, the travel time for freight vehicles is the same as corresponding travel times for passenger vehicles in the general purpose lanes.

Assessment of change in duration of congested traffic conditions

Concept D results in modest reductions in congested conditions on I-205 where the priced managed lane is offered. During the 7 AM peak hour, the chance of encountering hyper-congestion on I-205 is reduced from the baseline condition (28 percent in the northbound and 36 percent in the southbound) to 24 percent for the northbound direction and 31 percent for the southbound. Furthermore, during the 5 PM hour, the chance of hyper-congestion on I-205 is reduced from the baseline condition (30 percent for the northbound and 21 percent for the southbound) to 25 percent in the northbound direction and 19 percent in the southbound.

Delay on priced facilities

Concept D reduces delay in the parts of the corridors where managed lanes are operational. This reduction is more pronounced (up to 10 percent) during peak hours.

Safety

Concept D could potentially reduce crashes within the priced lanes by improving traffic flows. However, there is the potential for these benefits to be offset in part by increased crashes in the general purpose lanes.

Trip length distribution

No significant changes to trip length distribution are expected to result from this concept.

3.4.2 Diversion of traffic

Concept D is not anticipated to generate levels of diversion that may negatively impact safety. Additional detail on this group of performance metrics is provided in the evaluation methods and assumptions matrix in Appendix A.

Table 3.4-2. Concept D evaluation: diversion of traffic

Performance measure	Concept D evaluation	Findings
Safety impacts to all modes of transportation (including bicyclists and pedestrians) on routes with diversion	◑	No substantial diversion impacts are expected.
Diversion impacts on non-tolled facilities	●	No substantial traffic diversion impacts.
Legend: Performs well ● Performs moderately ◑ Performs poorly ○		

Source: Metro Regional Travel Demand Model, Metro Multi-Criteria Evaluation Tool

Overall, diversion is expected to be minimal. However, some changes to traffic circulation patterns may occur. While the scale of diversion is expected to be small, potential locations where increases in roadway volumes could occur include the following:

- Borland Road/Willamette Falls Drive [Stafford Road to Willamette Drive]
- McLoughlin Boulevard [I-205 to Roethe Road]
- Pacific Highway (OR 99E) [I-205 to south of Metro area]
- Trails End Highway (OR 213) [I-205 to south of Metro area]

This concept would likely not result in significant diversion of vehicular traffic from the freeway to arterials or other roads. Therefore, effects to road users (vehicular, bicyclists or pedestrians) are expected to be minimal.

3.4.3 Transit service and active transportation

Concept D performs the worst of any of the concepts in terms of transit service and active transportation. There are no parallel running transit lines, very few bicycle facilities and the pedestrian network is almost non-existent. What pedestrian infrastructure there is has little to no connectivity. Additional detail on this group of

performance metrics is provided in the evaluation methods and assumptions matrix in Appendix A.

Table 3.4-3. Concept D evaluation: transit service and active transportation

Performance measure	Concept D evaluation	Findings
Adequacy of transit service	○	A total of three transit lines, all run by TriMet. Only a single frequent service line, and only a single transit center. No park-and-rides exist in the area.
Bus transit travel time	○	Minimal time savings for AM peak and PM peak (northbound/southbound). One TriMet route would marginally benefit.
Mode share shift (HOV, SOV, transit, walk, bike)	◑	Minimal impacts on regional mode share. Slight potential to shift SOV to HOV.
Availability of bicycle travel on alternative routes	○	Just over 28 miles of bike lanes within a 1-mile buffer. Zero parallel paths that run the distance of the concept corridor. Gaps exist along every part of the corridor.
Completeness of pedestrian network	○	37 total street miles of sidewalks. 6 miles of sidewalk/mile of corridor length within a half-mile buffer.
Legend:	Performs well ● Performs moderately ◑ Performs poorly ○	

Source: Metro Regional Travel Demand Model, WSP

Adequacy of transit service

Concept D performs poorly from a transit perspective. Only three bus routes intersect the Concept D corridor. Only a single bus route runs parallel to the concept corridor for any meaningful length and it does not provide frequent service. For much of the day, bus headways are one hour. The other two bus routes run only slightly parallel to the corridor length but not enough to make them reasonable alternatives. A single transit center exists along the concept corridor and no park-and-rides exist in the area.

Bus transit travel time

Concept D provides only a modest amount of potential travel time savings along I-205. TriMet currently operates one bus route along this section of the freeway, but only over the Abernethy Bridge. Furthermore, there is unlikely to be any incentive for adding a new TriMet express freeway service.

Mode share shift

Concept D is anticipated to have minimal to no impact on regional mode share. What little mode shift may occur would likely be from SOV to HOV modes.

Availability of bicycle travel

Concept D performed poorly for bicycle travel options. While some bike lanes exist near the corridor, only few sections are parallel, and those run for only a small segment to the east. No paths run parallel to the full length of this concept corridor. Cyclists have no alternative options to ride for the length of the concept corridor. Finally, this concept area has severe gaps in the existing bicycle network. What bicycle lanes do exist only run for a few hundred feet before ending.

Completeness of pedestrian network

Concept D performed poorly for pedestrian network completeness. The pedestrian networks that exist are fragmented and end in many cul-de-sacs. A very small, tight sidewalk network is located near the Abernethy Bridge, but it is much too small to be of use to those who live in the western areas of the network.

3.4.4 Equity benefits and impacts

Concept D offers some minimal travel time benefits to the region, but it does not provide much travel time benefits for Title VI and Environmental Justice communities. Performance measures in other categories also relate to equity, although they are not specifically categorized as such. Additional detail on this and other performance metrics is provided in the evaluation methods and assumptions matrix in Appendix A.

Regarding user costs, this concept maintains two unpriced lanes in each direction. At the same time, the toll amount per user would be higher, which is consistent among single-lane pricing concepts.

Table 3.4-4. Concept D evaluation: equity benefits and impacts

Performance measure	Concept D evaluation	Findings
Value or travel time savings for Title VI and/or Environmental Justice communities (regional)	◑	Small travel time benefit for Title VI and Environmental Justice communities.
Changes in travel time based on geographic zones	◑	Small travel time benefit for the region.
Access to jobs	◑	No significant impact on job access for Title VI and/or Environmental Justice communities.

Legend: ● Performs well; ◑ Performs moderately; ○ Performs poorly

Source: Metro Regional Travel Demand Model, Metro Multi-Criteria Evaluation Tool

Value of travel time savings for Title VI and/or Environmental Justice communities

A small benefit in overall travel time can be expected with this concept for Title VI and Environmental Justice communities in the region (low-income, people of color, and low English proficiency communities). The scale of the travel time benefit is relatively small, but greater than in Concept A.

Travel time savings by geographic area

A small improvement in vehicle travel time can be expected with this concept. Benefits to the region are focused on the south side of the Portland Metro area. Trips to and from West Linn, Oregon City, Tualatin, Tigard, Wilsonville, and parts of Portland would benefit most.

Access to jobs

Concept D offers no significant change to the percent of regional jobs accessible within a 30-minute drive for Title VI or Environmental Justice communities.

3.4.5 Benefits and impacts for the community, economy and environment

Concept D analysis shows minimal impact on travel time savings or regional vehicle miles traveled. The construction of new capacity could impact nearby residences and businesses. However, the new lanes are already planned for the corridor (and considered part of the baseline for all concepts analyzed). Construction will have impacts regardless of whether they are constructed as general purpose lanes or as priced lanes. Additional detail on this group of performance metrics is provided in the evaluation methods and assumptions matrix in Appendix A.

Table 3.4-5. Concept D evaluation: benefits and impacts for the community, economy and environment

Performance measure	Concept D evaluation	Findings
Physical impacts to existing residences and businesses	●	Limited physical impacts might be expected (the additional lane and bridge widening are considered part of the baseline for all concepts).
Regional travel time savings	◑	Minimal impact on overall regional VHT. Potential for reduction of regional VHT is highest during the AM peak period.
Regional vehicle miles traveled (VMT) (including non-freeway)	◑	No significant change in regional VMT.
Change in air pollution	◑	No significant change expected. Some potential to slightly reduce regional vehicle emissions.
Value of travel time savings	◑	Potential to provide a small regional travel time benefit for motor vehicles. Has the second-smallest benefit of all concepts evaluated.

Legend: ● Performs well; ◑ Performs moderately; ○ Performs poorly

Source: Metro Regional Travel Demand Model, Metro Multi-Criteria Evaluation Tool

Overall, the regional transportation system shows some potential to operate more efficiently as system-wide impacts show the potential to slightly reduce total motor VHT. There is potential for a small increase (less than 0.1%) in overall VMT due to out-of-

direction travel to the southern portion of I-205, which would benefit from improved performance during peak hours.

Though this concept is anticipated to toll new lanes, the new lanes are planned and included in the baseline for this study. It should be noted that the planned project could have limited physical impacts to adjacent residences and businesses (with or without pricing in place).

3.4.6 Revenue and costs

Concept D generates relatively little revenue, though shows low capital costs as tolling is anticipated for a relatively short distance in a single lane each direction. Additional detail on this group of performance metrics is provided in the evaluation methods and assumptions matrix in Appendix A.

Table 3.4-6. Concept D evaluation: revenue and cost

Performance measure	Concept D evaluation	Findings
Capital expenditure on facility	●	Low capital costs as tolling is only anticipated for a relatively short distance in a single lane (each direction). [a]
Estimated gross toll revenue potential from tolled facility	○	Lowest total annual revenue and daily revenue per centerline mile. Sufficient revenue for capital investments would likely not be available.

Legend: ● Performs well; ◑ Performs moderately; ○ Performs poorly

Note: All concepts assume construction of a third lane on I-205 between Stafford Road and OR99E will be operational by 2027. However, if construction of the third lane were to be funded through toll revenues, this assessment would be poor.
Source: WSP, Metro Regional Travel Demand Model, Metro Multi-Criteria Evaluation Tool

Capital expenditures on facility

For this feasibility analysis, the roadway improvement project to add a lane to I-205 along this concept's corridor (including Abernethy Bridge widening) was assumed to be independent of tolling the new lane. As a result, Concept D would likely have low capital costs as tolling is only anticipated for a relatively short distance in these lanes. If tolling revenue is identified as a funding source for the project, the capital cost of constructing the new planned lanes would not be fully covered by the anticipated revenues from this concept.

Gross toll revenue potential

The potential annual gross toll revenue estimate for Concept D is $20 million (in 2017 dollars), one of the two lowest of the five concepts. The revenue estimates were calculated based on toll rates that vary for each segment and time of day based on traffic conditions. The modeling analysis adjusted the toll rates for each hour of the day to the level that maintains free flow traffic conditions on the tolled lanes throughout the

day and during peak periods. The toll rates range between $0.16 per mile during non-peak hours to a high of $1.05 per mile during the peak. Estimated revenue would be sufficient to cover routine costs associated with toll collection and operations, roadway operations and maintenance, and periodic costs associated with rehabilitation and reconstruction of toll equipment. However, estimated revenues may not be sufficient to cover roadway rehabilitation and reconstruction costs that would be required regardless of the lane being tolled. Excess revenue would likely not be available for significant contributions to capital improvements. Appendix E includes additional information about revenue and cost assumptions.

3.4.7 Implementation

Concept D is consistent with state and regional law and policy. The concept qualifies under FHWA's Mainstream Tolling program if the planned new lanes on I-205 are constructed as priced facilities. However, if new lanes were to be constructed and then converted to priced lanes, the authority would be granted under the Value Pricing Pilot Program. The implementation of this concept would not impact other projects, but could require additional design time for the planned project due to the need to address tolling facility design considerations. Developing the new lanes as priced lanes could accelerate their construction. Additional detail on this group of performance metrics is provided in the evaluation matrix in Appendix A.

Table 3.4-7. Concept D evaluation: implementation

Performance measure	Concept D evaluation	Findings
Consistency with state law and policy	●	Consistent with state law and policy. Any tolling proposal would need to meet additional legal requirements.
Consistency with regional law and policy	●	Consistent with regional law and policy; likely coordination with Metro.
Feasibility under federal law	●	Qualifies under Section 129 of U.S. Title 23 for tolling if implemented at time of construction. Otherwise VPPP.
Project delivery schedule	◑	Potential for construction acceleration; may need additional design time to reflect tolling.
Legend:	Performs well ● Performs moderately ◑ Performs poorly ○	Please see summaries below for additional assessment detail.

Source: WSP

Consistency with state and regional law and policy

Concept D is consistent with guidance and requirements found in state and regional laws and policies. Discussion on state and regional laws and policies is provided in Appendix F.

Feasibility under federal law

Concept D would qualify for implementation under Section 129 of U.S. Title 23 if the planned additional lanes were constructed as priced lanes. However, if the new lanes were to be constructed as general purpose lanes and then converted to priced lanes, then the Value Pricing Pilot Program applies.

Project delivery schedule

It is possible, but not likely, that revenues from Concept D could accelerate construction of the planned additional lane between Stafford Road and OR 99E. There is risk of a need to modify existing design work to reflect tolling design considerations (e.g. buffer between managed lane and general purpose lane).

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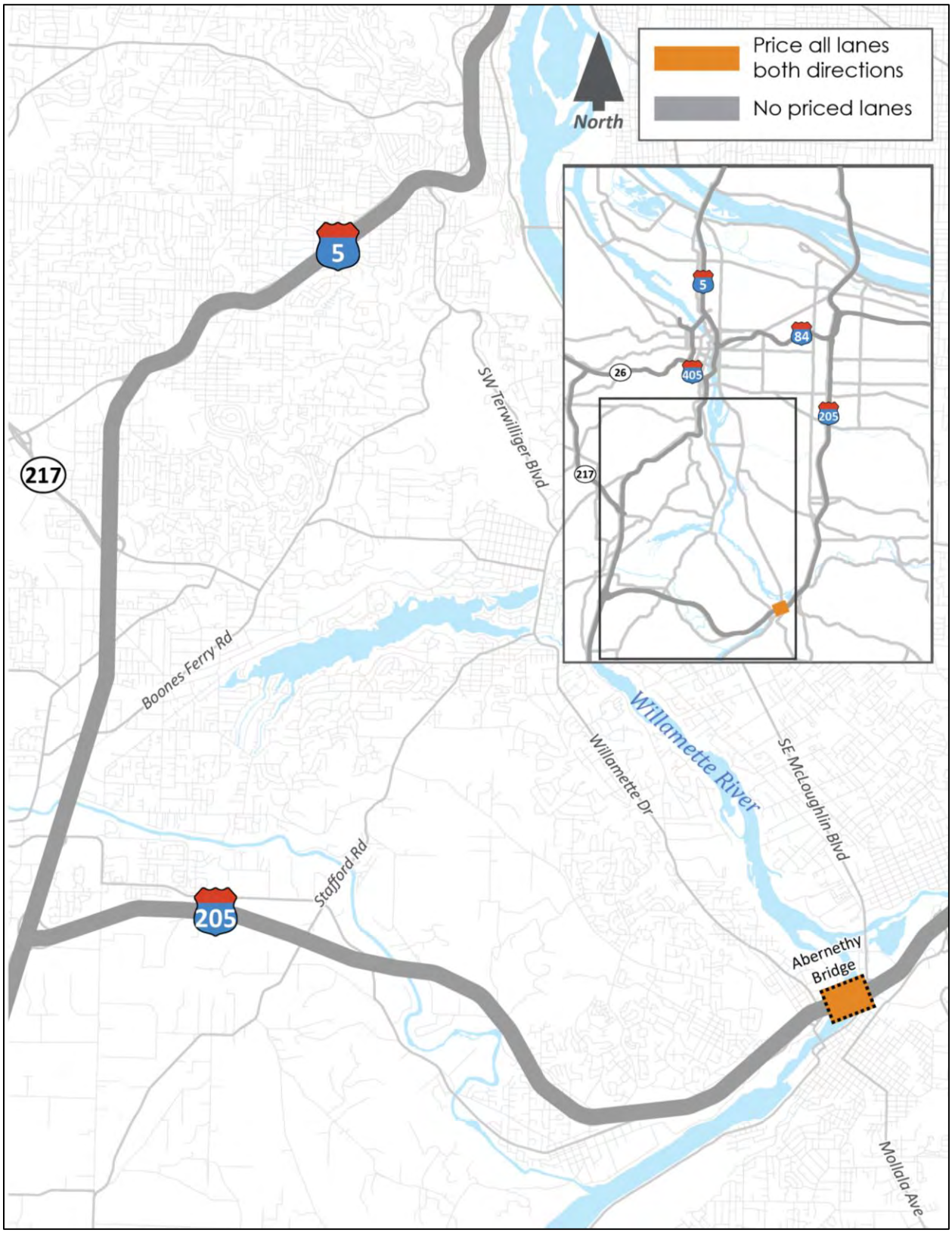
3.5 Concept E: Abernethy Bridge Priced Roadway

Concept E (Figure 12) applies pricing on all existing lanes of the Abernethy Bridge as well as additional lanes to be constructed as part of the planned bridge widening. This Concept has a different primary objective than Concepts A through D. Rather than pricing to relieve congestion, Concept E was evaluated as a strategy to help reduce congestion by funding a bottleneck relief project that would add a third lane in each direction on I-205 from OR99E to Stafford Road and widening of the Abernethy Bridge. Therefore, revenue generation was the primary objective of this Concept.

The following are key findings from the assessment of Concept E.

- Congestion reduction and travel time savings would occur for drivers on I-205; particularly near the Abernethy Bridge.
- Some traffic, particularly freight traffic, would be diverted to I-5, with longer distance trips attracted to I-5, slightly increasing I-5 travel times.
- There is a high probability of diversion to other facilities as some vehicles seek to avoid the toll (although some trips may also be diverted to different modes or times of day). Strategies to minimize traffic diversion onto the local street network would need to be examined as part of the future NEPA process if this concept is pursued further.
- Because it does not maintain any general purpose (unpriced) freeway lanes, there may be a need to provide mitigations such as increased transit service, low income toll rates, or other strategies.
- Pricing all lanes on the Abernethy Bridge would likely generate sufficient revenue over time to fund bridge expansion, as well as all or a portion of the additional lane in both directions on I-205 from the bridge to Stafford Road (as well as covering tolling operations and freeway operation and maintenance costs).

Figure 3-5. Round 2 Concept E: Abernethy Bridge Priced Roadway



While the primary objective of Concept E is revenue generation in support of constructing congestion relief projects, the use of variable toll rates that are highest during peak conditions on the bridge would also provide congestion relief on I-205. The sections that follow detail findings from key performance measures to help understand the effect of this concept: traffic operations, diversion, revenue and cost, and implementation. Not all the performance measures used for Concepts A through D are relevant to evaluation of Concept E, or in some cases, the results from Concept D are the same.

3.5.1 Traffic operations improvement on I-5 and I-205

Concept E shows reductions in delay on I-205. Concept E would result in some diversion of vehicles away from I-205. Some freight vehicles would be impacted as many long-distance trips would likely shift from I-205 to I-5. As a result of this increased demand on I-5, travel times would likely be slightly increased on I-5. The volume reductions on I-205 would result in travel time improvements, most notably near the Abernethy Bridge. It is important to note that traffic operations results should be examined holistically instead of examination of just one or two performance measures to understand the full breadth of implications. As discussed earlier in this memorandum, reductions in throughput can indicate benefits for other performance measures such as reduced delay or travel time.

Table 3.5-1. Concept E evaluation: traffic operations improvement

Performance measure	Concept E evaluation	Findings
Vehicle and person throughput on I-5 and I-205	○	Decreased throughput on I-205 with slightly increased throughput on I-5.
Freight truck throughput on I-5 and I-205	○	Decreased throughput on I-205 with slightly increased throughput on I-5. Freight throughput can be managed post implementation. This ability will be contingent to some extent on potential bonding requirements.
Passenger vehicle travel time on I-5 and I-205	◑	Reduced travel times on I-205 and modestly increased travel times on I-5.
Passenger vehicle travel time on managed lanes	NA	Not applicable.
Freight truck travel time on I-5 and I-205	◑	Reduced travel times on I-205 and increased travel times on I-5.
Assessment of change in duration of peak vehicle traffic conditions	◑	Reduction in duration of peak vehicle traffic conditions on I-205 and a slight increase on I-5.
Delay on priced facility	●	Substantial delay reductions on I-205, particularly in the area near the Abernethy Bridge.
Legend:	Performs well ● Performs moderately ◑ Performs poorly ○	

Source: Metro Regional Travel Demand Model, Metro Multi-Criteria Evaluation Tool

Vehicle and person throughput on I-5 and I-205

Concept E results in relatively large reductions in daily passenger vehicle throughput , and therefore likely diversion to other facilities, travel modes, of time of travel on I-205 relative to the Baseline in 2027; approximately 1,000 fewer vehicles per hour (up to 25% during the peak hours) would cross the Abernethy Bridge in each direction. Concept E would likely lower vehicle volumes during the peak periods on both I-5 and I-205. This amount of diversion is significant, and the project team recognizes that mitigation measures and other efforts to minimize impacts on local facilities would need to be identified in future planning phases. The concept would result in slight increases in passenger vehicle throughput on I-205 in the southbound direction in some segments during the AM peak hour as speeds increase and the volume of trucks decline to avoid the peak tolls at the Abernethy Bridge. Daily person throughput follows a similar pattern relative to the baseline as passenger vehicle volumes.

Freight truck throughput on I-5 and I-205

Concept E results in sizable shifts in daily truck volumes from I-205 to I-5. This shift is even more pronounced during peak hours. This shift would occur because trucks are making longer trips than passenger vehicles and have an increased opportunity to avoid the Abernethy Bridge toll by taking I-5 through the Portland metro area. This finding is dependent on the assumption that trucks would pay a multiple of the passenger vehicle toll based on the number of axles, but could be offset to some extent based on the actual toll charged freight vehicles.

Passenger vehicle travel time on I-5 and I-205

Passenger vehicle travel times increase modestly on I-5 (relative to the baseline) due to the diversion of traffic (especially longer distance trips made by trucks) from I-205. However, travel times on I-205 improve as a result of the lower volume of vehicles. Travel times during peak hours decrease by about 10 percent, while off-peak travel time decreases are more modest.

Passenger vehicle travel time on managed lanes

The tolls on the Abernethy Bridge would apply to all lanes, not just a managed lanes subset, so managed lanes travel times are not applicable for this tolling concept.

Freight truck travel time on I-5 and I-205

Because Concept E prices all lanes of travel on the Abernethy Bridge, the travel time for freight vehicles would be the same as for passenger vehicles. Travel time would be reduced on I-205, with modest increases on I-5. However, since a sizable share of freight vehicles divert from I-205 to I-5, a large number of freight vehicles would experience longer travel times on I-5 while a smaller share of freight vehicles would benefit from the reduced travel times on I-205.

Assessment of change in duration of congested traffic conditions

Congested conditions on I-205 would be virtually eliminated at the Abernethy Bridge, with congestion reduction improvements gradually diminishing with distance away from the bridge as a result of the Concept E tolling. However, modest increases in congested

conditions would be expected on I-5 due to longer trip, through traffic diverted from tolling on I-205. During the morning peak hour the chance of hyper-congestion in the I-205 corridor would be reduced from the Baseline condition; from 28 to 14 percent in the northbound direction and from 36 to 23 percent in the southbound direction. During the evening peak the chance of encountering hyper-congestion in the I-205 corridor would also be reduced; from 30 to 12 percent in the northbound direction and from 21 to 9 percent in the southbound direction.

Delay on priced facilities

Concept E would reduce delay in the I-205 corridor, especially near the Abernethy Bridge. This improvement would be more pronounced during the peak hours. Daily hours of delay in the I-205 corridor would be reduced by 38 percent in the northbound direction of travel and by 37 percent in the southbound direction.

3.5.2 Diversion of traffic

All lanes would be priced in Concept E with the primary intention of raising revenue (rather than the primary intention of relieving congestion). As such, there is a high probability of diversion to other facilities as some vehicles seek to avoid the toll (although some trips may also be diverted to different modes or times of day). This diversion could negatively impact safety on adjacent and regional toll-free facilities without mitigation. Additional detail on this group of performance metrics can be found in the evaluation methods and assumptions matrix in Appendix A.

Table 3.5-2. Concept E evaluation: diversion of traffic

Performance measure	Concept E evaluation	Findings
Diversion impacts on non-tolled facilities	○	Potential for diversion impacts on non-tolled facilities is high.
Safety impacts to all modes of transportation (including bicyclists and pedestrians) on routes with diversion	○	The diversion of trips from the priced bridge facility to adjacent arterials and other roadways could increase the need for safety mitigation on those facilities.

Legend: ● Performs well ◑ Performs moderately ○ Performs poorly

Source: Metro Regional Travel Demand Model, Metro Multi-Criteria Evaluation Tool

Overall diversion is expected to be substantial based on the expected change in vehicle throughput on the tolled segments of I-205. Diversion from the Abernethy Bridge is expected to average approximately 1,000 vehicles per hour (about 25% during peak hours) in each direction. Diversion can occur to different modes, to travel times with lower tolls, or to other roadways. The diversion to other roadways may potentially impact locations including:

- I-5
- OR 224 [OR 99E to OR 212]

- Sellwood Bridge/Tacoma Street [Macadam Avenue (OR 43) to McLoughlin Boulevard (OR 99E)]
- McLoughlin Boulevard (OR 99E) [Tacoma Street to OR 224]
- OR 43 [Taylors Ferry Road to A Avenue]
- Stafford Road/McVey Ave [OR 43 to Borland Road]
- Willamette Falls Drive
- Downtown Oregon City
- Pacific Highway (OR 99E) [I-205 to south of Metro area]

Because this concept does not maintain any general purpose (unpriced) freeway lanes, there may be a need to provide mitigations such as increased transit service, low income toll rates, or other strategies.

3.5.3 Revenue and costs and implementation

Concept E has potential to generate more revenue than all other concepts except for Concept C. Net revenue projections over a 30-year period appears to support $350 to $550 million in up-front capital investments through toll-backed financing. Revenue could be available to support the planned additional lane on I-205 (Stafford to OR99E) including the Abernethy Bridge, while funding the tolling and maintenance and operations of the facility.

Table 3.5-3. Concept E evaluation: revenue and cost and implementation

Performance measure	Concept E evaluation	Findings
Capital expenditure on facility	●	Revenue would be sufficient to cover funding the estimated $250 million required for the bridge lane expansion, and may be sufficient to cover part, and possibly all, the cost of additional lanes on I-205 between OR99E and Stafford Road.
Estimated gross toll revenue potential from tolled facility	◑	Moderate total annual revenue; highest daily revenue per centerline mile due to a single point toll at the Abernethy Bridge.
Estimated revenue leakage	◑	Primarily leakage attributed to vehicles without an account / pass diverting to alternative facilities or using the facility as a violator, which may be partially mitigated by allowing for image based toll collection and by roadside cameras and visual enforcement.
Estimated toll collection operation and maintenance and periodic rehabilitation and reconstruction costs including toll vendor(s) procurement costs	●	Relatively low toll transaction volumes will result in higher fixed costs per transaction, or higher costs attributed to contracting with an existing back office system operated by another agency/vendor(s). However, these are offset by high revenue per transaction. Lane-side equipment costs would still be directly incurred along with agency staff and transactional costs. Revenues after leakage adjustments are anticipated to be sufficient to cover toll operating and maintenance costs and contribute toward facility operation and maintenance costs, rehabilitation and reconstruction costs, and / or debt service costs if capital financing is assumed.

Performance measure	Concept E evaluation	Findings
Project delivery schedule	●	Potential for construction acceleration; may need additional design time to reflect tolling.

Legend: ● Performs well; ◑ Performs moderately; ○ Performs poorly

Source: WSP, Metro Regional Travel Demand Model, Metro Multi-Criteria Evaluation Tool

Capital expenditure on facility

Preliminary costs for identified improvements are estimated at approximately $250 million for the bridge widening and seismic retrofit project, as well as another $250 million for adding a lane in each direction from OR99E to SW Stafford Road. Revenue is anticipated to be sufficient to cover bonding for the estimated $250 million required for the bridge lane expansion, and may be sufficient to cover part, and possibly all of the cost of additional lanes on I-205 between OR99E and Stafford Road.

Gross toll revenue potential

The potential annual gross toll revenue estimate for Concept E is around $53 million (in 2017 dollars). Concept E differs from the other concepts in that a single point (the Abernethy Bridge) is tolled for an emphasis on revenue generation. Toll rates vary with the level of traffic congestion; the modeling analysis estimated the highest tolls during the peak periods ($3.50) and no toll between 11 pm and 5 am. Weekend tolls were not modeled but were assumed to have a midday peak toll, with weekend tolls generally lower value than weekdays. In addition to covering routine toll collection and operations, roadway operations and maintenance costs, Concept E revenues would likely be sufficient to cover periodic toll system rehabilitation and reconstruction costs, roadway rehabilitation and reconstruction costs, and support capital investments and/or mitigation solutions. Appendix E includes additional information about revenue and cost assumptions.

Revenue leakage often refers to potential revenue that is not collected from users and may be associated with policy decisions such as available toll payment methods and enforcement strategies. In Concept E, it is assumed that all users must have a tag/transponder in their vehicle that is linked to a pre-established customer account to use the tolled lanes. This analysis did not account for tag/transponder penetration rates or the percentage of through-trips and out of state/country trips that likely would not have a registered transponder account in the state of Oregon. As such, the leakage or revenue loss factors provided assume that a certain number of vehicles would divert to alternative routes to avoid fines and fees associated to being a violator.

In Concept E, HOV and carpool vehicles are assumed to pay tolls; therefore, no leakage associated with false carpool declaration is assumed. Revenue leakage is assumed to occur in the following ways:

- *No Account:* drivers without a valid account who choose an alternate route is estimated between 10 to 20 percent. This could be mitigated if an alternative payment method was offered for infrequent users.

- *Violations:* drivers using the lanes without a transponder are expected to be in the range of 5-10 percent. This, too, could be mitigated with the implementation of an alternative payment method for infrequent users. Depending on that method, there will still likely be some leakage arising from delayed violations due to unpaid toll bills.
- *Equipment error:* equipment read errors of transponders is assumed to be less than 0.5 percent.
- *Account status:* transponder accounts linked to expired credit and debit cards and accounts with insufficient balances are assumed to be 4 percent, some of which may ultimately be recovered depending on business rules implemented.

Routine annual toll collection operations and maintenance costs, as well as periodic rehabilitation and reconstruction costs for Concept E are based on toll agency experience for other comparable toll facilities in the U.S. Concept E includes routine annual costs for credit card banking fees, state/agency management and oversight, back office customer service center vendor systems and operations contract(s), lane-side equipment and vendor operations, and enforcement costs for state highway patrol. Periodic rehabilitation and reconstruction costs include lane-side toll equipment and the procurement of back office and lane-side toll vendor multi-year contracts.

Concept E revenues are based on toll rates that emphasize revenue-generation while still alleviating congestion, and are expected to produce gross toll revenues in the range of $66 million in year of collection dollars for 2027. This level of revenue, after factoring in leakage, should be sufficient to cover routine toll collection costs, routine facility maintenance costs, and banking fees, with the remaining net revenues available to support the financing of capital investments and contribute to periodic toll collection and roadway facility rehabilitation and capital reconstruction costs.

Under very preliminary, conceptual net revenue and financing assumptions, the Concept E net revenue projections over a 30-year period would appear to support $350 to 550 million in up-front capital investments through toll bond financing.

The revenues available from pricing could potentially allow the expansion to be accelerated. There is risk of a need to modify existing design work to reflect tolling design considerations.

4 RECOMMENDATION AND NEXT STEPS

The technical analysis identified the following key findings from the evaluation of congestion pricing on I-5 and I-205:

- Concept A in north Portland exhibits little congestion relief benefit and the potential for minimal benefits may harm successful implementation of congestion pricing in the area.
- Concept B near the Portland city center has strong potential to reduce congestion along I-5 with minimal diversion to I-205 and adjacent roadways. This concept also has a dense network of transit and multi-modal facilities in the downtown/Rose Quarter/Swan Island area that can serve as a toll free travel alternative to minimize impacts. Concept termini would need to be examined as part of the future NEPA process.
- Concept B would generate revenue to cover operations and associated costs with excess revenue being available for capital investment and/or mitigation.
- Concept C has the greatest potential for reducing congestion on both I-5 and I-205 and generating travel time savings for the widest possible range of users, and could be considered as part of a future broader regional pricing application pending success of a pilot pricing program.
- Concept C has the greatest revenue potential and would cover toll collection costs, toll system replacement and rehabilitation costs, and provide revenue for capital investment and/or mitigation.
- Concept D in the southern end of I-205 shows little congestion relief benefit with minimal traffic diversion and provides some benefit to I-205.
- Concepts A and D would likely generate sufficient funding to cover toll operations but not replacement and rehabilitation costs, roadway maintenance and would not support capital investments and/or mitigation.
- Concept E centered at the Abernethy Bridge shows promise to raise revenue and reduce congestion on I-205. This concept, or a variant, could pair with a pilot program to balance the travel choice between the I-5 and I-205 corridors. Concept termini would need to be examined as part of the future NEPA process.

4.1 Implications for congestion pricing implementation

Congestion pricing on I-5 and I-205 shows benefits to people living and traveling in the Portland metro area. Pricing would be effective in addressing traffic congestion on these corridors, based on the technical analysis and evaluation. Consideration should be given to the following if any pricing concept is implemented.

- Any concepts considered further should be paired with policy or programs that address potential impacts on lower-income and adjacent communities as part of an equitable strategy to ensure benefits are shared broadly.
- A phased approach – implementing a smaller-scale application as a pilot program and following up with monitoring and scheduled reporting – may ensure that the pricing application meets state and regional goals. Such a program would also lay the foundation for a more comprehensive pricing approach for the metro area by illustrating to the public how pricing has

positively impacted congestion where implemented. A smaller-scale application as a pilot program followed up with monitoring and scheduled reporting based on key performance measures could be established to gauge success. A sunset or benchmark paired with the pilot program could provide a predictable schedule for re-assessment of pricing as a tool for congestion minimization.

4.2 Consultant team recommendation

Based on the key findings from the evaluation, the consultant team recommends a phased approach to implementation of congestion pricing on I-5 and I-205:

- Initial implementation of Concept B as a pilot pricing program, coupled with a sunset or trigger to evaluate success.
  - *Rationale:* Strong potential at congestion reduction along I-5 with minimal diversion to I-205 and adjacent facilities; has a much denser network of transit and multi-modal facilities that can serve as a toll free alternative; significant improvements in facility efficiency and vehicular throughput, meaning that more vehicles can be moved and diversion to free facilities can be managed.
- Consider implementation of Concept E concurrent with implementation of Concept B.
  - *Rationale:* Provides the benefits of Concept B while generating funding to advance the addition of new lanes on I-205 where only two lanes in each direction currently exist as well as retrofitting and adding a lane in each direction to the Abernethy Bridge.
- After assessment of the performance of the initial pricing project, and assuming successful evaluation, implementation of Concept C in phases with more comprehensive system analysis.
  - *Rationale:* Greatest potential for reducing congestion and generating travel time savings for the widest possible range of users; significant improvements in facility efficiency and vehicular throughput, meaning that more vehicles can be moved and diversion to free facilities can be managed.
- Do not implement Concept A or D.
  - *Rationale:* Little congestion relief benefit; would not provide a reasonable test for the potential for pricing to provide congestion relief.

4.3 Next Steps

At the fifth PAC meeting on May 14, 2018, the PAC will review and consider the evaluation presented in this technical memorandum as well as the public comment received over the past six months. In May and June 2018, the PAC will develop a recommendation(s) to advise the OTC. The OTC will submit a report to FHWA by December 2018. After coordination with FHWA, the OTC will provide direction about next steps such as an environmental analysis, which would include additional public involvement, Title VI and Environmental Justice analysis, traffic analysis, and other analysis of potential benefits and impacts.

Appendix A Evaluation methods and assumptions

ROUND 2 METHODOLOGY AND SCREENING DATA DEVELOPMENT

***NOTE:** Scoring is generally 0, 2.5, 5 for qualitative measures, and 0, 1, 3, 5 for quantitative measures. They are different scales to indicate the finer level of detail for the quantitative analysis.

Performance Measure	Evaluation Type	Tool	Description	Scoring*
Traffic operations improvement on I-5 and I-205				
▪ Vehicle and person throughput on I-5 and I-205	Quantitative *(vehicles and persons)*	TOM	This metric describes the number of vehicles and the number of people moved in those vehicles along the I-5 and I-205 corridors. Concepts that increase the number of vehicles and people moving along I-5 and I-205 during the AM (7am – 8am) and PM (5pm – 6pm) peak hours as well as on a daily basis will score higher. *Likely will be based on assessment of average volume per lane mile within the concept, but first the team needs to see the data.*	0 – Does not improve (or reduces) vehicular or person throughput. 1- Results in marginal improvements in throughput (0 to 5 percent improvement over the baseline). 3 – Results in noticeable improvements to throughout (between 5 to 10 percent improvement over the baseline). 5 – Results in significant improvements to throughput (over 10 percent improvement over the baseline).
▪ Freight truck throughput on I-5 and I-205	Quantitative	TOM	This metric describes the number of commercial and other heavy freight vehicles that move along the I-5 and I-205 corridors. Concepts that increase the amount of freight moving along I-5 and I-205 during the AM (7am – 8am) and PM (5pm – 6pm) peak hours as well as on a daily basis will score higher. *Likely will be based on assessment of average volume per lane mile within the concept, but first the team needs to see the data.*	0 – Does not improve (or reduces) freight throughput. 1- Results in marginal improvements in throughput (0 to 5 percent improvement over the baseline). 3 – Results in noticeable improvements to throughout (between 5 to 10 percent improvement over the baseline). 5 – Results in significant improvements to throughput (over 10 percent improvement over the baseline).

Performance Measure	Evaluation Type	Tool	Description	Scoring*
▪ Passenger vehicle travel time on I-5 and I-205	Quantitative *(for all concepts)*	TOM	Pricing frees available freeway capacity and provides tools to better manage that capacity. As such, pricing should reduce the amount of time it takes to travel along I-5 or I-205. This metric describes the time it takes a passenger vehicle to travel along I-5 and I-205 during the AM (7am – 8am) and PM (5pm – 6pm) peak hours as well as on a daily basis. Concepts that reduce travel time will receive a higher score than pricing concepts that do not improve travel time or increase travel times. For priced lanes concepts (Concepts A and D), this metric reflects both travel time in the priced lane and the general-purpose lanes. A different performance measure captures travel time for priced lanes only. A different performance measure captures travel time for freight vehicles.	0 – Does not reduce travel times or results in increased travel times. 1 – Results in marginal improvements to travel time (0 to 5 percent reduction relative to the baseline). 3 – Results in noticeable improvements to travel time (between 5 to 10 percent decrease relative to the baseline). 5 – Results in significant improvements to travel times (over 10 percent reduction relative to the baseline).
▪ Passenger vehicle travel time on managed lanes	Quantitative *(for priced lanes concepts only – Concepts A and D)*	TOM	Managing congestion on a designated lane on a freeway maintains its free-flow travel conditions and should result in a reduced travel time compared with the general-purpose lanes. For priced lanes concepts only (Concepts A and D), this metric describes the time it takes a passenger vehicle to travel along I-5 and I-205 during the AM (7am – 8am) and PM (5pm – 6pm) peak hours on as well as on a daily basis *on the priced lanes only*. This is to disaggregate results that combine the travel time for priced lanes and general-purpose lanes. Concepts that reduce travel time as compared to baseline will receive a higher score than pricing concepts that do not improve travel time or increase travel times.	0 – Does not reduce travel times or results in increased travel times. 1 – Results in marginal improvements to travel time (0 to 10 percent reduction relative to the baseline). 3 – Results in noticeable improvements to travel time (between 10 to 25 percent decrease relative to the baseline). 5 – Results in significant improvements to travel times (over 25 percent reduction relative to the baseline).

Performance Measure	Evaluation Type	Tool	Description	Scoring*
▪ Freight truck travel time on I-5 and I-205	Quantitative	TOM	This metric describes the time it takes a commercial or heavy freight vehicle to travel along I-5 and I-205 during the AM (7am – 8am) and PM (5pm – 6pm) peak hours as well as on a daily basis. Pricing concepts that reduce travel time for freight vehicles, regardless of whether they travel in priced lanes or general-purpose lanes, will receive a higher score than pricing concepts that do not improve travel time or increase travel times. Travel in general purpose lanes may or may not improve in concepts with both priced and general-purpose lanes. In concepts with all lanes priced, all vehicles, including freight vehicles, travel in priced lanes. In concepts with both priced and general-purpose lanes, freight vehicles were assumed to travel only in the general-purpose lanes due to the state restriction on heavy vehicles in the left lane (single priced lanes are designed to be in the left lane so that they are safer and more efficient by avoiding ingress and egress conflicts).	0 – Does not reduce travel times or results in increased travel times. 1 – Results in marginal improvements to travel time (0 to 5 percent reduction relative to the baseline). 3 – Results in noticeable improvements to travel time (between 5 to 10 percent decrease relative to the baseline). 5 – Results in significant improvements to travel times (over 10 percent reduction relative to the baseline).

Performance Measure	Evaluation Type	Tool	Description	Scoring*
▪ Assessment of change in duration of peak vehicle traffic conditions	Qualitative	TOM	Both the severity of congestion and the length of time congestion exists describes the overall impacts of congestion on a facility. Because travel conditions vary substantially from day to day, this metric will look at the probability of encountering congested conditions during any given hour of peak demand. Congestion is generally defined on a freeway as when travel speeds drop below 40 mph, though this can vary based on number of lanes, geometric configuration, and posted speed. Observing the decreasing probability of congestion as the time measured moves farther from the peak hour allows for a determination of the likely length of congested conditions. This is a relative measure for the assessed concepts that will show the probability that congestion is encountered.	0 – Longer congested periods likely. 2.5 – Congestion periods somewhat reduced. 5 – Significant congestion reduction.
▪ Delay on priced facility	Qualitative	TOM	This metric describes the continued impact to travel time from congestion after implementation of pricing. This will be developed for both priced and unpriced lanes when appropriate for the concept. It is generated by subtracting the free flow travel time on the segment from the travel time on the segment with the concept in place.	0 – Longer travel time impacts likely. 2.5 – Travel time impacts somewhat reduced. 5 – Significant reduction in travel time impacts.

Performance Measure	Evaluation Type	Tool	Description	Scoring*
▪ Safety impacts	Qualitative	Informed by MCE	This measure assesses the potential to improve regional safety by reducing number of total crashes and/or crash severity. Concepts that increase freeway throughput and reduce probability of congested conditions will score well as freeways are generally safer on a per vehicle mile basis than arterial roadways, particularly when operating at consistent speeds. This measure is informed by regional outputs from Metro Multi-criteria Evaluation Tool that consider overall system impacts on both freeways and non-freeways.	0 – Expected to have no significant impact on number or severity of crashes in the region. 2.5 – Some limited potential to decrease number or severity of crashes in the region. 5 – Significant potential to decrease number or severity of crashes in the region.
▪ Trip length distribution	Qualitative	Informed by SWIM & KATE	Pricing may serve to discourage drivers from making short distance trips on the freeway or may provide an incentive to use alternative, toll free routes or other modes for short trips. This could result in more freeway capacity available for drivers making longer distance trips. This metric describes the likely change in the distribution of trip lengths along segments of I-5 and I-205. Concepts will be scored higher if they result in trip distributions on the freeway with a higher mean trip length; indicating that fewer drivers are making short distance trips on the facility.	0 – Does not result in any significant change to trip length distribution or reduces the mean trip length along segments of I-5 or I-205. 2.5 – Results in noticeable increases in mean trip length (between 10 and 25 percent increase relative to the baseline). 5 – Results in significant increases in mean trip length (over 25 percent increase relative to the baseline).

Performance Measure	Evaluation Type	Tool	Description	Scoring*
Diversion of traffic				
▪ Diversion impacts on non-tolled facilities	Qualitative	Informed by KATE	Pricing provides incentives for drivers to change the time they travel, the mode they use or the routes they take. Regarding route choice, there is a chance that pricing will shift travel to non-tolled routes, potentially increasing congestion and increasing travel times on those routes. This metric will assess the potential of pricing to adjacent, non-tolled facilities. Concepts that may result in significant diversion to adjacent toll-free facilities and increase congestion on those facilities will be rated lower.	0 – Significant potential to cause diversion away from freeways to the arterial system. Scale is extensive in volume and/or in geographic impact. 2.5 – Moderate potential to cause diversion away from freeways to the arterial system. Scale is relatively minor in volume and/or geographic impact. 5 – Limited potential to cause significant diversion away from freeways to the arterial system. The scale is expected to be negligible or limited to parallel routes in the immediate vicinity.
▪ Safety impacts to all modes of transportation (including bicyclists and pedestrians) on routes with diversion	Qualitative	Based on the level of trip diversion and the location of bicycle and pedestrian facilities (bike/ped maps); Informed by MCE	The diversion of trips from a priced facility to adjacent arterials and other roadways may degrade those facilities and could increase safety risks. This metric qualitatively assesses the potential of pricing concepts to increase safety risks on adjacent facilities due to diversion. Concepts that do not result in high levels of diversion to adjacent facilities will therefore be scored higher.	0 – High diversion: Pricing concept is expected to result in increased safety risks on adjacent facilities due to diversion of trips 2.5 – Medium diversion: Pricing concept is expected to result in diversion to adjacent facilities but safety risks on those facilities will be minimal 5 – Low diversion: Pricing concept is expected to have minimal diversion and will not result in any new safety risks for adjacent facilities

Performance Measure	Evaluation Type	Tool	Description	Scoring*
Transit service and active transportation				
▪ Adequacy of transit service	Qualitative	Transit System Maps (TriMet, CTRAN, SMART), Aerial Review	This performance measure assesses the availability of existing or planned transit service along I-5 and I-205 or parallel routes in the vicinity of the concept. Drivers with little to no access to viable transit services will not be able to use transit as an alternative to travel in a personal vehicle. Concepts with existing or planned frequent transit service running along a direct route with short headways (15-minute arrivals or better) and concepts with many transit stations and/or park-and-ride facilities in the area near the concept will be scored higher.	0 – Concepts with no or minimum existing and planned transit service, or only one route with long headways near the concept. 2.5 – Concepts with one transit route with relatively short headways, or multiple routes with longer headways in the concept area; and one park-and-ride lot or major transit station within a one-mile buffer. **OR** concepts with low or non-existent existing services with planned service. 5 – Concepts with multiple routes with short headways in the area and served by more than one park-and-ride lot or major transit station (within a one-mile buffer). **OR** concepts with moderate transit services with planned service.
▪ Transit travel time	Qualitative	Transit System Maps (TriMet, CTRAN, SMART), and informed by travel speed information from TOM and/or KATE	This performance measure assesses potential improvements in transit travel time on I-5 and/or I-205. Concepts with more freeway transit service, or that can reasonably encourage additional rubber tired transit options would score higher. Transit routes will be cross-referenced with freeway travel times.	0 – Transit routes with little to no freeway interaction and no opportunity for beneficial freeway interaction – this includes almost all local service. 2.5 – 1-2 existing or planned transit routes with modest freeway mileage **OR** The concept can encourage development of express service in an area without rail alternatives. 5 – Two+ existing or planned transit routes with freeway mileage and the concept will benefit transit travel time **OR** The concept has some existing or planned routes and the concept can encourage development of express service in an area without rail alternatives.

Performance Measure	Evaluation Type	Tool	Description	Scoring*
▪ Mode share shift (HOV, SOV, transit, walk, bike)	Qualitative	KATE	This metric considers potential changes in the share of daily person trips by mode. It is based on results from the regional travel demand model with a focus on the ability of a concept to encourage shifts away from SOV travel. This allows consideration of potential changes to transit service on managed facilities beyond that assumed in baseline modeling.	0 – Expected to increase share of regional SOV trips while reducing share from HOV, transit, or active modes. 2.5 – Some limited potential to decrease share of regional SOV trips while increasing share for HOV, transit, or active modes. 5 – Significant potential to decrease share of regional SOV trips while increasing share for HOV, transit, or active modes.
▪ Availability of bicycle travel on alternative routes	Qualitative	RTP Existing Regional Bicycle Network maps	This metric assesses the availability of bicycle infrastructure that might serve as a non-vehicular option to travel in a personal vehicle along alternative and parallel routes. Concepts with available bicycle options within approximately 1-mile buffer of the concept will be scored higher. The analysis was conducted based on the amount of bike lanes per mile of concept length to standardize the assessment across the concepts.	0 – Non-existent bicycle options. 2.5 – Concepts with minimal bicycle options. 5 – Concepts with multiple bicycle options.
▪ Completeness of pedestrian network	Qualitative	RTP Existing Regional Pedestrian Network maps	This metric assesses the consistency of the pedestrian network in a concept area that might serve as a non-vehicular option to travel in a personal vehicle or provide access to transit. Concepts with connected pedestrian networks within approximately 0.5-mile buffer of the concept will be scored higher. The analysis was conducted based on the amount of pedestrian facilities per mile of concept length to standardize the assessment across the concepts.	0 – Non-existent to minimal pedestrian connections (lots of pedestrian system gaps). 2.5 – Concepts with average pedestrian network (minimal gaps). 5 – Concepts with highly connected pedestrian network (few to no gaps).

Performance Measure	Evaluation Type	Tool	Description	Scoring*
Equity impacts				
▪ Value of travel time savings for Title VI and/or Environmental Justice communities (regional)	Quantitative	MCE	Pricing may disproportionately impact Portland metro region drivers based on where they live and travel with regard to I-5 and I-205. This metric assesses travel time benefit by Title VI and/or Environmental Justice communities. Title VI/Environmental Justice communities include low income, low English proficiency (LEP), or communities of color in the region. This measure reflects a regional annualized benefit of travel time savings from the Metro Multi-criteria Evaluation Tool that considers overall system impacts on both freeways and non-freeways. Pricing concepts that decrease travel times and/or do not result in significant increases in travel time for Title VI and/or Environmental Justice communities will receive higher scores.	0 – Concept will increase travel times for Title VI and/or Environmental Justice communities. 1 – Concept will improve travel times but will impose significant travel costs Title VI and/or Environmental Justice communities. 3 – Concept will significantly improve travel times but with additional travel costs. 5 – Concept will significantly improve travel times and with marginal to no increases in overall travel costs.
▪ Changes in travel times based on geographic area	Qualitative *(map)*	MCE	This criterion reflects the relative change in total vehicle travel time by geographic area (based on Transportation Analysis Zones). It will show the locations where the most vehicle travel time benefit is expected to be experienced by drivers). The measure does not include changes in travel time for trucks. Pricing concepts that decrease total vehicle travel time and offer benefits across the region will receive higher scores.	0 – Significantly increases vehicle travel times across the region. 2.5 – Has relatively little effect on vehicle travel time across the region. 5 – Significantly reduces vehicle travel time across the region. *NOTE – will be displayed in "heat" map format to inform about areas of greatest benefit

Performance Measure	Evaluation Type	Tool	Description	Scoring*
▪ Access to Jobs	Qualitative	KATE	This measure describes the share of regional jobs accessible by mode within a 30-minute drive for Title VI and/or Environmental Justice communities (aggregate changes for TAZs that have these communities, and based on census data). Concepts that increase access will be scored higher.	0 – Significantly increases travel time to employment for areas with significant concentrations of Title VI and/or Environmental Justice communities. 2.5 – Has relatively little effect on travel time to employment for areas with significant concentrations of Title VI and/or Environmental Justice communities. 5 – Significantly reduces travel times to employment for areas with significant concentrations of Title VI and/or Environmental Justice communities.
Impacts on the community, economy, and environment				
▪ Physical impacts to existing residences and businesses	Qualitative	Based on review of aerials (with an understanding of the location of concentrations of Title VI and/or Environmental Justice communities)	This metric assesses each concept's potential to require significant construction or changes to the current roadway footprint. Concepts that do not require new construction or would not require significant changes to the operation of nearby roadways will receive higher scores.	0 – High: Concept will require new construction or significant changes to current roadway footprint such that nearby residences and businesses can be expected to see significant impacts. Significant impacts to concentrations of Title VI and/or Environmental Justice communities. 2.5 – Medium: Concept will require new construction, reconstruction, or changes to existing roadway footprints that will likely impact some nearby residences and businesses. Concentrations of Title VI and/or Environmental Justice communities are impacted. 5 – Low to Non-existent: Concept will not require new construction or changes to existing roadway footprints.

Performance Measure	Evaluation Type	Tool	Description	Scoring*
▪ Regional travel time savings	Quantitative	KATE	This metric examines total vehicle hours of travel (VHT) on the Metro area roadway network, based on the regional travel demand model. The model considers the number of vehicle trips being made, the routing of vehicle trips through the network, and the vehicle travel time required from origin to destination. While most changes are expected to occur near the concept location, changes are often felt throughout the system. This metric compares the total regional travel time between the baseline and the concept.	0 – Pricing concept will increase VHT. 1 – Pricing concept will have only a small effect on VHT 3 – Pricing concept will somewhat reduce VHT. 5 – Pricing concept will significantly reduce VHT.
▪ Regional vehicle miles traveled (VMT) (including non-freeway)	Quantitative	KATE	This metric assesses the change in total vehicle miles of travel on the Portland Metro area roadway network due to pricing, based on the regional travel demand model. The model considers the number of vehicle trips being made and the routing of trips through the network from origin to destination. While most changes are expected to occur near the project location, changes are often felt throughout the system. This metric compares total region VMT between the baseline and the concept. Lower VMT is usually associated with a more efficient system and will be scored higher.	0 – Significant increase in Regional VMT. 2.5 – No significant change in Regional VMT. 5 – Significant reduction in Regional VMT.
▪ Change in air pollution	Qualitative	MCE	This measure examines the potential change in vehicle emissions in the region. The measure is informed by MOVES emissions model application to the regional travel demand modeling results.	0 – Expected to potentially increase regional vehicle emissions. 2.5 – No significant change expected. Some potential to slightly reduce regional vehicle emissions. 5 – Expected to potentially reduce regional vehicle emissions.

Performance Measure	Evaluation Type	Tool	Description	Scoring*
▪ Value of travel time savings	Quantitative	MCE	Travelers tend to use priced lanes because there is value associated with their time and they will often pay to reduce their travel time. This measure monetizes travel time savings generated by the pricing concepts across all modes of travel. It will be determined by the regional travel demand model and multi-criteria evaluation tool (MCE) using an average value of time appropriate to the Portland metro area.	0 – Travel time savings value is negative. 1 – Travel time savings is less than $20M annual benefit (2010 dollars). 3 – Travel time savings is between $20M and $50M annual benefit (2010 dollars). 5 – Travel time savings is greater than$50M annual benefit (2010 dollars).
Revenue and Costs				
▪ Capital expenditure on facility	Quantitative based on Order of Magnitude Costs	Based on estimates supplied by ODOT, or order of magnitude estimates from similar deployments in other areas.	This metric provides an assessment of potential capital expenditures based on the requirements of the concept itself and the presence of limiting factors (such as a lack of ROW) along key corridor segments. Concepts that will require minimal capital expenditures will be scored higher.	0 – The concept can be accommodated within the segment but major capital expenditures for construction and/or right of way procurement will be required. 2.5 – The concept can be accommodated within the segment with moderate capital expenditure. 5 – The concept can be accommodated within the existing ROW of the segment with minimal capital expenditure.

Performance Measure	Evaluation Type	Tool	Description	Scoring*
▪ Estimated gross toll revenue potential from tolled facility	Quantitative	Modeling Outputs and Traffic and Revenue Annualization Model	This metric relates to forecasted annual gross toll revenue potential. It will be generated by modeled daily toll trips, toll rates, and existing day of week traffic data. There will be consideration of policy and operational assumptions on tolling periods, payment options available to customers and potential differences in rates by payment method. Revenue is provided prior to adjustments for potential revenue leakage due to occupancy violations, unidentified trips or non-payment of toll bills.	1 – Likely does not result in excess revenue. 2.5 – Likely results in some excess revenue. 5 – Results in substantial excess revenue.
Implementation				
▪ Consistency with state and regional law and policy	Quantitative	Review of applicable laws and policies	This metric identifies and confirms compliance with existing OTC policies, state laws, and regional planning regulations.	0 – No. 5 – Yes.
▪ Feasibility under federal law	Quantitative	Seek input from FHWA for specific alternatives being considered	This metric verifies that an option is allowable under federal tolling laws. In some cases options may require Federal concurrence under the Value Pricing Pilot Program or some other authority.	0 – Option is not allowable under current Federal Law. 2.5 – Option is potentially allowable if Federal concurrence is obtained. 5 – Option is allowable under Federal law without additional concurrence.
▪ Project delivery schedules	Quantitative	Comparison of concepts with planned projects	Concepts can potentially affect the schedule of other projects planned in the Portland metro area. Concepts that can accelerate project delivery are rated higher than those that might slow project delivery.	0 – Project could slow the delivery of other projects. 2.5 – Project is not likely to affect the delivery of other projects. 5 – Project may speed up delivery of other projects.

Appendix B Performance measure evaluation scoring

The following ratings summarize the scores for Concepts A-D for all performance metrics, and are intended for this analysis only. Traffic operations scores vary by segment within a concept because traffic impacts change depending on context or interaction with the regional transportation system. Non-traffic operations scores, however, are more localized (such as active transportation) or apply to the concept overall (such as federal feasibility). The project team used professional judgment and technical analysis, and converted these scores to symbols for ease of reporting. Supporting documentation is available upon request.

Summary Sheet – Concepts A through D

		Concept			
		A	B	C	D
Traffic operations improvement	Vehicle and person throughput on I-5 and I-205	◑	◑	◑	◑
	Freight truck throughput on I-5 and I-205	○	◑	◑	◑
	Passenger vehicle travel time on I-5 and I-205	◑	●	●	◑
	Passenger vehicle travel time on managed lanes	●	N/A	N/A	●
	Freight truck travel time on I-5 and I-205	◑	●	●	◑
	Assessment of change in duration of peak vehicle traffic conditions	●	◑	●	●
	Delay on priced facility	●	●	●	●
	Safety impacts	●	◑	◑	●
	Trip length distribution	◑	◑	◑	◑
Diversion of traffic	Diversion impacts on non-tolled facilities	●	◑	○	◑
	Safety impacts to all modes of transportation (including bicyclists and pedestrians) on routes with diversion	◑	◑	○	●
Transit service and active transportation	Adequacy of transit service	◑	●	◑	○
	Bus transit travel time	●	◑	●	○
	Mode share shift (HOV, SOV, transit, walk, bike)	◑	◑	●	◑
	Availability of bicycle travel on alternative routes	◑	●	◑	○
	Completeness of pedestrian network	◑	●	◑	○
Equity	Value or travel time savings for Title VI and/or Environmental Justice communities (regional)	◑	◑	●	◑
	Changes in travel time based on geographic zones	◑	●	●	◑
	Access to jobs	◑	◑	●	◑

		Concept			
		A	B	C	D
Community, economy and the environment	Physical impacts to existing residences and businesses	●	●	●	●
	Regional travel time savings	◑	◑	●	◑
	Regional VMT (including non-freeway)	◑	◑	●	◑
	Change in air pollution	◑	◑	◑	◑
	Value of travel time savings	◑	◑	●	◑
Cost and revenue	Capital expenditure on facility	●	●	●	●
	Estimated gross toll revenue potential from tolled facility	○	◑	●	○
Implementation	State law & policy	●	●	●	●
	Regional law & policy	●	●	●	●
	Federal feasibility	◑	◑	◑	●
	Project delivery schedule	●	●	◑	◑
Legend:	Performs well ●	Performs moderately ◑	Performs poorly ○		

Non-Traffic Scores

5 = Most Favorable ← → 1 = Least Favorable

Impacts to the Community, Economy, and Environment		Impacts to the Community, Economy, and Environment					
		Physical Impacts Score	Regional Travel Time Savings Score	Diversion Impact Scores	Regional VMT Score	Change in Air Quality Score	Value of Travel Time Savings Score
Concept A	*HOV/GP to Priced Lane (I-5)*	5.0	1.0	5.0	2.5	2.5	1.0
Concept B	*Price All Lanes (I-5: Downtown)*	5.0	3.0	2.5	2.5	2.5	3.0
Concept C	*Price All Lanes (I-5 & I-205)*	5.0	5.0	0.0	5.0	2.5	5.0
Concept D	*Price New Planned Lane (I-205)*	5.0	1.0	5.0	2.5	2.5	1.0

Equity Impacts		Equity Impacts					
		Safety Impact Score (Routes w/ Diversion)	Access to Jobs Score	Geo Zone Travel Time Change Score	Value of Travel Time Savings Score (Regional)		
Concept A	*HOV/GP to Priced Lane (I-5)*	5.0	2.5	2.5	1.0		
Concept B	*Price All Lanes (I-5: Downtown)*	2.5	2.5	5.0	3.0		
Concept C	*Price All Lanes (I-5 & I-205)*	0.0	5.0	5.0	5.0		
Concept D	*Price New Planned Lane (I-205)*	5.0	2.5	2.5	1.0		

Transit Service & Active Transportation		Transit Service & Active Transportation					
		Adequacy of Transit Service Score	Transit Travel Time Score	SOV Mode Shift Score	Bicycle & Ped Option Score	Ped Network Consistency Score	
Concept A	*HOV/GP to Priced Lane (I-5)*	2.5	2.5	2.5	2.5	2.5	
Concept B	*Price All Lanes (I-5: Downtown)*	5.0	5.0	2.5	5.0	5.0	
Concept C	*Price All Lanes (I-5 & I-205)*	2.5	5.0	5.0	2.5	2.5	
Concept D	*Price New Planned Lane (I-205)*	0.0	0.0	2.5	0.0	0.0	

Cost & Revenue		Cost & Revenue					
		Capital Cost (High-Level) Score	Estimated Revenue Score				
Concept A	*HOV/GP to Priced Lane (I-5)*	5.0	1.0				
Concept B	*Price All Lanes (I-5: Downtown)*	5.0	2.5				
Concept C	*Price All Lanes (I-5 & I-205)*	5.0	5.0				
Concept D	*Price New Planned Lane (I-205)*	5.0	1.0				

Law & Policy		Law & Policy					
		State Law & Policy Score	Regional Law & Policy Score	Federal Feasibility Score	Project Delivery Schedule Score		
Concept A	*HOV/GP to Priced Lane (I-5)*	2.5	5.0	2.5	5.0		
Concept B	*Price All Lanes (I-5: Downtown)*	2.5	5.0	2.5	5.0		
Concept C	*Price All Lanes (I-5 & I-205)*	5.0	5.0	2.5	2.5		
Concept D	*Price New Planned Lane (I-205)*	5.0	5.0	5.0	2.5		

Baseline Traffic Performance

Corridor	Segment ID	Direction	From	To	Length (Miles)	Peak Hour	*Traffic Operations on I-5 & I-205*							
							Peak-Hour Vehicle Throughput	Peak-Hour Person Throughput	Peak-Hour Freight Truck Throughput	Peak- Hour GP Travel Time	Peak- Hour ML Travel Time	Peak-Hour Freight Truck Travel Time	Chance of Hyper-Congestion	Hours of Delay on Priced Facility
I-5	2	NB	I-205	OR-217	3.6	AM	3,891	4,447	356	7.52	0.00	7.52	0.44	253.7
						PM	4,998	5,899	198	6.81	0.00	6.81	0.44	255.2
I-5	3	NB	OR-217	Capitol Hwy	2.7	AM	3,440	3,917	430	4.11	0.00	4.11	0.20	78.1
						PM	4,075	4,773	192	4.00	0.00	4.00	0.10	77.8
I-5	4	NB	Capitol Hwy	Ross Island Bridge	4.9	AM	3,418	3,920	308	10.16	0.00	10.16	0.48	310.6
						PM	4,092	4,884	167	9.03	0.00	9.03	0.38	275.7
I-5	5	NB	Ross Island Bridge	I-84	1.9	AM	2,503	2,873	260	4.67	0.00	4.67	0.48	109.0
						PM	3,078	3,752	111	4.76	0.00	4.76	0.49	130.9
I-5	6	NB	I-84	N Skidmore St.	2.2	AM	3,255	3,714	348	3.98	0.00	3.98	0.38	103.8
						PM	3,803	4,911	151	3.54	0.00	3.54	0.26	85.6
I-5	7	NB	N Skidmore St.	Interstate Bridge	3.6	AM	3,305	4,781	408	8.29	7.23	8.29	0.31	172.8
						PM	4,256	5,357	134	13.34	7.86	13.34	0.41	510.1
I-5	8	SB	Interstate Bridge	N Skidmore St.	3.6	AM	3,398	3,845	208	11.67	0.00	11.67	0.53	370.3
						PM	3,750	4,486	301	8.02	0.00	8.02	0.27	190.3
I-5	9	SB	N Skidmore St.	I-84	2.2	AM	3,337	3,888	315	3.67	0.00	3.67	0.35	87.1
						PM	3,860	4,626	277	3.69	0.00	3.69	0.33	102.6
I-5	10	SB	I-84	Ross Island Bridge	1.9	AM	2,620	3,006	212	5.05	0.00	5.05	0.36	128.3
						PM	2,877	3,448	204	5.07	0.00	5.07	0.35	140.4
I-5	11	SB	Ross Island Bridge	Capitol Hwy	4.5	AM	3,531	4,002	302	8.93	0.00	8.93	0.39	248.5
						PM	4,088	4,873	282	9.31	0.00	9.31	0.40	313.7
I-5	12	SB	Capitol Hwy	OR-217	3.0	AM	3,621	4,062	312	4.32	0.00	4.32	0.27	94.8
						PM	3,832	4,550	289	4.27	0.00	4.27	0.25	95.9
I-5	13	SB	OR-217	I-205	3.7	AM	4,200	4,746	337	6.18	0.00	6.18	0.35	174.3
						PM	4,681	5,529	273	7.22	0.00	7.22	0.46	276.3
I-205	15	NB	I-5	Stafford Rd	2.0	AM	3,713	4,216	216	2.09	0.00	2.09	0.19	16.1
						PM	4,292	5,060	262	2.38	0.00	2.38	0.26	40.4
I-205	16	NB	Stafford Rd	10th St	3.3	AM	3,908	4,450	210	4.34	0.00	4.34	0.22	52.1
						PM	4,387	5,187	253	4.97	0.00	4.97	0.31	106.9
I-205	17	NB	10th St	Sunset Ave	1.9	AM	3,918	4,452	193	4.09	0.00	4.09	0.32	102.4
						PM	4,416	5,238	251	4.39	0.00	4.39	0.38	139.6
I-205	18	NB	Sunset Ave	Main St	1.2	AM	4,337	4,946	195	1.26	0.00	1.26	0.34	34.4
						PM	4,790	5,736	264	1.26	0.00	1.26	0.27	38.0
I-205	19	NB	Main St	SR-224	4.1	AM	3,887	4,512	164	7.92	0.00	7.92	0.44	246.3
						PM	4,440	5,408	263	6.78	0.00	6.78	0.30	199.4
I-205	20	NB	SR-224	NE Glisan St	7.7	AM	4,055	4,744	226	14.35	0.00	14.35	0.31	371.5
						PM	4,355	5,321	302	13.59	0.00	13.59	0.25	350.6
I-205	21	NB	NE Glisan St	Jackson Bridge	3.6	AM	3,726	4,386	234	6.90	0.00	6.90	0.15	61.0
						PM	5,092	5,844	284	9.14	0.00	9.14	0.33	287.2
I-205	22	SB	Jackson Bridge	NE Glisan St	3.9	AM	4,463	5,031	257	10.59	0.00	10.59	0.40	375.2
						PM	4,240	5,183	173	6.63	0.00	6.63	0.09	55.7
I-205	23	SB	NE Glisan St	SR-224	7.4	AM	3,805	4,401	310	14.04	0.00	14.04	0.30	336.1
						PM	4,453	5,488	165	13.81	0.00	13.81	0.29	363.3
I-205	24	SB	SR-224	Main St	4.0	AM	3,413	3,922	241	7.14	0.00	7.14	0.38	171.9
						PM	4,536	5,548	132	7.70	0.00	7.70	0.38	264.1
I-205	25	SB	Main St	Sunset Ave	1.3	AM	3,974	4,515	262	1.27	0.00	1.27	0.36	33.3
						PM	4,699	5,680	154	1.14	0.00	1.14	0.23	27.9
I-205	26	SB	Sunset Ave	10th St	1.9	AM	3,840	4,353	250	4.52	0.00	4.52	0.39	130.0
						PM	4,609	5,559	157	3.87	0.00	3.87	0.19	100.3
I-205	27	SB	10th St	Stafford Rd	3.3	AM	3,843	4,358	247	5.35	0.00	5.35	0.37	117.7
						PM	4,342	5,221	161	4.09	0.00	4.09	0.17	36.1
I-205	28	SB	Stafford Rd	I-5	2.3	AM	3,797	4,299	266	2.77	0.00	2.77	0.37	49.8
						PM	3,881	4,637	160	2.24	0.00	2.24	0.14	13.7

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Round 2 Concept A: **HOV/GP to Priced Lane (I-5)**

5 4 3 2 1
Most Favorable ← → *Least Favorable*

Corridor	Segment ID	Direction	From	To	Length (Miles)	Peak Hour	*Traffic Operations on I-5 & I-205*																			
							Peak-Hour Vehicle Throughput	Peak-Hour Vehicle Throughput Score	Peak-Hour Person Throughput	Peak-Hour Person Throughput Score	Peak-Hour Freight Truck Throughput	Peak-Hour Freight Truck Throughput Score	Peak- Hour GP Travel Time	Peak-Hour GP Travel Time Score	Peak- Hour ML Travel Time	Peak-Hour ML Travel Time Score	Peak-Hour Freight Truck Travel Time	Peak-Hour Freight Truck Travel Time Score	Chance of Hyper-Congestion	Chance of Hyper-Congestion Score	Hours of Delay on Priced Facility	Hours of Delay on Priced Facility Score	Safety Impacts	Safety Impact Score	Trip Length Distribution	Trip Length Distribution Score
I-5	2	NB	I-205	OR-217	3.6	AM	2	1.0	6	1.0	0	0.0	-0.01	1.0	0.00		-0.01	1.0	0.00	2.5	-0.77	2.5	Moderate	2.5	Moderate	2.5
						PM	-2	0.0	-2	0.0	2	1.0	0.01	0.0	0.00		0.01	0.0	0.00	0.0	0.48	0.0	Moderate	2.5	Moderate	2.5
I-5	3	NB	OR-217	Capitol Hwy	2.7	AM	1	1.0	6	1.0	-1	0.0	0.00	1.0	0.00		0.00	1.0	0.00	0.0	-0.28	2.5	Moderate	2.5	Moderate	2.5
						PM	-4	0.0	-3	0.0	2	1.0	0.00	1.0	0.00		0.00	1.0	0.00	0.0	-0.19	2.5	Moderate	2.5	Moderate	2.5
I-5	4	NB	Capitol Hwy	Ross Island Bridge	4.9	AM	2	1.0	4	1.0	-1	0.0	0.00	1.0	0.00		0.00	1.0	0.00	2.5	-0.14	2.5	Moderate	2.5	Moderate	2.5
						PM	-2	0.0	0	0.0	2	1.0	0.02	0.0	0.00		0.02	0.0	0.00	0.0	0.97	0.0	Moderate	2.5	Moderate	2.5
I-5	5	NB	Ross Island Bridge	I-84	1.9	AM	17	1.0	47	1.0	-10	0.0	-0.02	1.0	0.00		-0.02	1.0	0.00	2.5	-0.69	2.5	Moderate	2.5	Moderate	2.5
						PM	-2	0.0	3	1.0	2	1.0	-0.01	1.0	0.00		-0.01	1.0	0.00	2.5	-0.27	2.5	Moderate	2.5	Moderate	2.5
I-5	6	NB	I-84	N Skidmore St.	2.2	AM	2	1.0	179	1.0	-3	0.0	-0.24	3.0	0.00		-0.24	3.0	-0.05	5.0	-14.05	2.5	Moderate	2.5	Moderate	2.5
						PM	-3	0.0	5	1.0	2	1.0	0.00	0.0	0.00		0.00	0.0	0.00	0.0	0.14	0.0	Moderate	2.5	Moderate	2.5
I-5	7	NB	N Skidmore St.	Interstate Bridge	3.6	AM	-111	0.0	-909	0.0	-1	0.0	-0.44	3.0	-1.34	3.0	-0.44	3.0	-0.09	5.0	-31.99	2.5	Moderate	2.5	Moderate	2.5
						PM	-3	0.0	9	1.0	2	1.0	-1.80	5.0	-3.20	5.0	-1.80	5.0	0.00	0.0	-116.45	2.5	Moderate	2.5	Moderate	2.5
I-5	8	SB	Interstate Bridge	N Skidmore St.	3.6	AM	155	1.0	558	5.0	-45	0.0	0.05	0.0	-3.05	5.0	0.05	0.0	-0.07	5.0	-48.30	2.5	Moderate	2.5	Moderate	2.5
						PM	-47	0.0	124	1.0	-4	0.0	0.16	0.0	-1.47	3.0	0.16	0.0	-0.04	5.0	-20.51	2.5	Moderate	2.5	Moderate	2.5
I-5	9	SB	N Skidmore St.	I-84	2.2	AM	92	1.0	392	5.0	-56	0.0	-0.06	1.0	0.00		-0.06	1.0	-0.02	2.5	-2.54	2.5	Moderate	2.5	Moderate	2.5
						PM	6	1.0	135	1.0	-5	0.0	-0.03	1.0	0.00		-0.03	1.0	-0.01	2.5	-2.10	2.5	Moderate	2.5	Moderate	2.5
I-5	10	SB	I-84	Ross Island Bridge	1.9	AM	61	1.0	93	1.0	-36	0.0	-0.03	1.0	0.00		-0.03	1.0	-0.01	2.5	-0.06	2.5	Moderate	2.5	Moderate	2.5
						PM	2	1.0	13	1.0	-2	0.0	-0.01	1.0	0.00		-0.01	1.0	0.00	2.5	-0.37	2.5	Moderate	2.5	Moderate	2.5
I-5	11	SB	Ross Island Bridge	Capitol Hwy	4.5	AM	68	1.0	86	1.0	-39	0.0	-0.04	1.0	0.00		-0.04	1.0	0.00	2.5	-0.74	2.5	Moderate	2.5	Moderate	2.5
						PM	0	1.0	3	1.0	0	0.0	0.00	1.0	0.00		0.00	1.0	0.00	0.0	-0.24	2.5	Moderate	2.5	Moderate	2.5
I-5	12	SB	Capitol Hwy	OR-217	3.0	AM	70	1.0	89	1.0	-44	0.0	-0.02	1.0	0.00		-0.02	1.0	0.00	0.0	-0.77	2.5	Moderate	2.5	Moderate	2.5
						PM	0	1.0	5	1.0	0	0.0	0.00	1.0	0.00		0.00	1.0	0.00	0.0	-0.13	2.5	Moderate	2.5	Moderate	2.5
I-5	13	SB	OR-217	I-205	3.7	AM	68	1.0	87	1.0	-43	0.0	-0.04	1.0	0.00		-0.04	1.0	-0.01	2.5	-2.29	2.5	Moderate	2.5	Moderate	2.5
						PM	-1	0.0	4	1.0	0	0.0	-0.01	1.0	0.00		-0.01	1.0	0.00	2.5	-1.10	2.5	Moderate	2.5	Moderate	2.5
I-205	15	NB	I-5	Stafford Rd	2.0	AM	3	1.0	1	1.0	2	1.0	0.01	0.0	0.00		0.01	0.0	0.01	0.0	0.50	0.0	Moderate	2.5	Moderate	2.5
						PM	4	1.0	4	1.0	-2	0.0	0.00	0.0	0.00		0.00	0.0	0.00	0.0	0.11	0.0	Moderate	2.5	Moderate	2.5
I-205	16	NB	Stafford Rd	10th St	3.3	AM	0	1.0	-3	0.0	2	1.0	0.02	0.0	0.00		0.02	0.0	0.00	0.0	1.08	0.0	Moderate	2.5	Moderate	2.5
						PM	2	1.0	3	1.0	-1	0.0	0.00	0.0	0.00		0.00	0.0	0.00	0.0	0.13	0.0	Moderate	2.5	Moderate	2.5
I-205	17	NB	10th St	Sunset Ave	1.9	AM	-3	0.0	-9	0.0	2	1.0	0.01	0.0	0.00		0.01	0.0	0.00	0.0	0.55	0.0	Moderate	2.5	Moderate	2.5
						PM	2	1.0	3	1.0	-1	0.0	0.00	1.0	0.00		0.00	1.0	0.00	0.0	-0.17	2.5	Moderate	2.5	Moderate	2.5
I-205	18	NB	Sunset Ave	Main St	1.2	AM	-3	0.0	-9	0.0	2	1.0	0.00	0.0	0.00		0.00	0.0	0.00	0.0	0.17	0.0	Moderate	2.5	Moderate	2.5
						PM	2	1.0	3	1.0	-1	0.0	0.00	1.0	0.00		0.00	1.0	0.00	0.0	-0.03	2.5	Moderate	2.5	Moderate	2.5
I-205	19	NB	Main St	SR-224	4.1	AM	-2	0.0	-10	0.0	1	1.0	0.01	0.0	0.00		0.01	0.0	0.00	0.0	0.34	0.0	Moderate	2.5	Moderate	2.5
						PM	2	1.0	3	1.0	-1	0.0	0.00	1.0	0.00		0.00	1.0	0.00	0.0	-0.25	2.5	Moderate	2.5	Moderate	2.5
I-205	20	NB	SR-224	NE Glisan St	7.7	AM	-1	0.0	-12	0.0	1	1.0	0.00	0.0	0.00		0.00	0.0	0.00	0.0	0.08	0.0	Moderate	2.5	Moderate	2.5
						PM	3	1.0	4	1.0	-2	0.0	0.00	1.0	0.00		0.00	1.0	0.00	0.0	-0.22	2.5	Moderate	2.5	Moderate	2.5
I-205	21	NB	NE Glisan St	Jackson Bridge	3.6	AM	74	1.0	40	1.0	5	1.0	0.07	0.0	0.00		0.07	0.0	0.02	0.0	3.93	0.0	Moderate	2.5	Moderate	2.5
						PM	1	1.0	4	1.0	-1	0.0	-0.03	1.0	0.00		-0.03	1.0	0.00	2.5	-2.47	2.5	Moderate	2.5	Moderate	2.5
I-205	22	SB	Jackson Bridge	NE Glisan St	3.9	AM	-81	0.0	-243	0.0	37	5.0	0.17	0.0	0.00		0.17	0.0	0.01	0.0	9.87	0.0	Moderate	2.5	Moderate	2.5
						PM	26	1.0	-14	0.0	2	1.0	0.03	0.0	0.00		0.03	0.0	-0.01	5.0	2.36	0.0	Moderate	2.5	Moderate	2.5
I-205	23	SB	NE Glisan St	SR-224	7.4	AM	-75	0.0	-110	0.0	46	5.0	0.04	0.0	0.00		0.04	0.0	0.00	0.0	0.14	0.0	Moderate	2.5	Moderate	2.5
						PM	0	1.0	-9	0.0	1	1.0	0.02	0.0	0.00		0.02	0.0	0.00	0.0	1.18	0.0	Moderate	2.5	Moderate	2.5
I-205	24	SB	SR-224	Main St	4.0	AM	-65	0.0	-86	0.0	37	5.0	0.03	0.0	0.00		0.03	0.0	0.00	0.0	0.30	0.0	Moderate	2.5	Moderate	2.5
						PM	-1	0.0	-6	0.0	0	1.0	0.01	0.0	0.00		0.01	0.0	0.00	0.0	0.42	0.0	Moderate	2.5	Moderate	2.5
I-205	25	SB	Main St	Sunset Ave	1.3	AM	-74	0.0	-95	0.0	43	5.0	0.00	0.0	0.00		0.00	0.0	0.00	0.0	-0.13	2.5	Moderate	2.5	Moderate	2.5
						PM	0	1.0	-4	0.0	1	1.0	0.00	0.0	0.00		0.00	0.0	0.00	0.0	0.08	0.0	Moderate	2.5	Moderate	2.5
I-205	26	SB	Sunset Ave	10th St	1.9	AM	-72	0.0	-91	0.0	40	5.0	0.02	0.0	0.00		0.02	0.0	0.00	0.0	0.41	0.0	Moderate	2.5	Moderate	2.5
						PM	1	1.0	-2	0.0	1	1.0	0.01	0.0	0.00		0.01	0.0	0.00	0.0	0.57	0.0	Moderate	2.5	Moderate	2.5
I-205	27	SB	10th St	Stafford Rd	3.3	AM	-72	0.0	-91	0.0	40	5.0	0.03	0.0	0.00		0.03	0.0	0.00	0.0	1.36	0.0	Moderate	2.5	Moderate	2.5
						PM	2	1.0	-1	0.0	1	1.0	0.00	0.0	0.00		0.00	0.0	0.00	0.0	0.35	0.0	Moderate	2.5	Moderate	2.5
I-205	28	SB	Stafford Rd	I-5	2.3	AM	-76	0.0	-93	0.0	44	5.0	0.03	0.0	0.00		0.03	0.0	0.00	0.0	1.38	0.0	Moderate	2.5	Moderate	2.5
						PM	2	1.0	0	0.0	0	1.0	0.00	0.0	0.00		0.00	0.0	0.02	0.0	0.20	0.0	Moderate	2.5	Moderate	2.5

Round 2 Concept B: **Price All Lanes (I-5: Downtown)**

5 4 3 2 1
Most Favorable ← → *Least Favorable*

Corridor	Segment ID	Direction	From	To	Length (Miles)	Peak Hour	*Traffic Operations on I-5 & I-205*																			
							Peak-Hour Vehicle Throughput	Peak-Hour Vehicle Throughput Score	Peak-Hour Person Throughput	Peak-Hour Person Throughput Score	Peak-Hour Freight Truck Throughput	Peak-Hour Freight Truck Throughput Score	Peak- Hour GP Travel Time	Peak-Hour GP Travel Time Score	Peak- Hour ML Travel Time	Peak-Hour ML Travel Time Score	Peak-Hour Freight Truck Travel Time	Peak-Hour Freight Truck Travel Time Score	Chance of Hyper-Congestion	Chance of Hyper-Congestion Score	Hours of Delay on Priced Facility	Hours of Delay on Priced Facility Score	Safety Impacts	Safety Impact Score	Trip Length Distribution	Trip Length Distribution Score
I-5	2	NB	I-205	OR-217	3.6	AM	130	1.0	153	1.0	-85	0.0	-0.22	1.0			-0.22	1.0	0.47	0.0	-10.76	2.5	Moderate	2.5	Moderate	2.5
						PM	-13	0.0	-5	0.0	-10	0.0	-0.10	1.0			-0.10	1.0	0.43	2.5	-8.66	2.5	Moderate	2.5	Moderate	2.5
I-5	3	NB	OR-217	Capitol Hwy	2.7	AM	229	3.0	273	3.0	-329	0.0	-0.57	5.0			-0.57	5.0	0.11	2.5	-36.23	5.0	Moderate	2.5	Moderate	2.5
						PM	-129	0.0	-141	0.0	-122	0.0	-0.46	5.0			-0.46	5.0	0.08	2.5	-33.51	5.0	Moderate	2.5	Moderate	2.5
I-5	4	NB	Capitol Hwy	Ross Island Bridge	4.9	AM	650	5.0	772	5.0	-308	0.0	-1.70	5.0			-1.70	5.0	0.34	5.0	-86.41	5.0	Moderate	2.5	Moderate	2.5
						PM	187	1.0	238	1.0	-144	0.0	-1.32	5.0			-1.32	5.0	0.24	5.0	-92.11	5.0	Moderate	2.5	Moderate	2.5
I-5	5	NB	Ross Island Bridge	I-84	1.9	AM	424	5.0	506	5.0	-244	0.0	-0.53	5.0			-0.53	5.0	0.41	2.5	-16.44	2.5	Moderate	2.5	Moderate	2.5
						PM	129	1.0	163	1.0	-76	0.0	-0.75	5.0			-0.75	5.0	0.37	5.0	-33.63	5.0	Moderate	2.5	Moderate	2.5
I-5	6	NB	I-84	N Skidmore St.	2.2	AM	302	3.0	358	3.0	-231	0.0	-0.58	5.0			-0.58	5.0	0.25	5.0	-31.88	5.0	Moderate	2.5	Moderate	2.5
						PM	-123	0.0	-172	0.0	-64	0.0	-0.39	5.0			-0.39	5.0	0.17	2.5	-27.49	5.0	Moderate	2.5	Moderate	2.5
I-5	7	NB	N Skidmore St.	Interstate Bridge	3.6	AM	135	1.0	145	1.0	-106	0.0	-0.64	3.0			-0.64	3.0	0.24	2.5	-25.32	2.5	Moderate	2.5	Moderate	2.5
						PM	22	1.0	11	1.0	-11	0.0	-0.49	1.0			-0.49	1.0	0.39	2.5	-25.54	2.5	Moderate	2.5	Moderate	2.5
I-5	8	SB	Interstate Bridge	N Skidmore St.	3.6	AM	181	3.0	207	3.0	-80	0.0	-0.55	1.0			-0.55	1.0	0.49	2.5	-26.78	2.5	Moderate	2.5	Moderate	2.5
						PM	21	1.0	30	1.0	-30	0.0	-0.29	1.0			-0.29	1.0	0.24	2.5	-19.59	2.5	Moderate	2.5	Moderate	2.5
I-5	9	SB	N Skidmore St.	I-84	2.2	AM	60	1.0	71	1.0	-120	0.0	-0.41	5.0			-0.41	5.0	0.25	2.5	-25.31	5.0	Moderate	2.5	Moderate	2.5
						PM	77	1.0	99	1.0	-130	0.0	-0.34	3.0			-0.34	3.0	0.29	2.5	-23.60	2.5	Moderate	2.5	Moderate	2.5
I-5	10	SB	I-84	Ross Island Bridge	1.9	AM	253	3.0	308	5.0	-139	0.0	-0.54	5.0			-0.54	5.0	0.39	0.0	-17.72	2.5	Moderate	2.5	Moderate	2.5
						PM	255	3.0	321	3.0	-138	0.0	-0.51	5.0			-0.51	5.0	0.38	0.0	-18.72	2.5	Moderate	2.5	Moderate	2.5
I-5	11	SB	Ross Island Bridge	Capitol Hwy	4.5	AM	315	3.0	381	3.0	-169	0.0	-1.10	5.0			-1.10	5.0	0.29	5.0	-63.22	5.0	Moderate	2.5	Moderate	2.5
						PM	165	1.0	210	1.0	-105	0.0	-1.08	5.0			-1.08	5.0	0.30	5.0	-75.05	2.5	Moderate	2.5	Moderate	2.5
I-5	12	SB	Capitol Hwy	OR-217	3.0	AM	131	1.0	160	1.0	-138	0.0	-0.51	5.0			-0.51	5.0	0.18	2.5	-32.19	5.0	Moderate	2.5	Moderate	2.5
						PM	-11	0.0	-19	0.0	-73	0.0	-0.44	5.0			-0.44	5.0	0.16	2.5	-30.64	5.0	Moderate	2.5	Moderate	2.5
I-5	13	SB	OR-217	I-205	3.7	AM	119	1.0	142	1.0	-88	0.0	-0.19	1.0			-0.19	1.0	0.32	2.5	-12.66	2.5	Moderate	2.5	Moderate	2.5
						PM	40	1.0	46	1.0	-33	0.0	-0.12	1.0			-0.12	1.0	0.44	2.5	-8.30	2.5	Moderate	2.5	Moderate	2.5
I-205	15	NB	I-5	Stafford Rd	2.0	AM	-130	0.0	-149	0.0	105	5.0	0.06	0.0			0.06	0.0	0.21	0.0	3.64	0.0	Moderate	2.5	Moderate	2.5
						PM	11	1.0	6	1.0	4	1.0	0.03	0.0			0.03	0.0	0.27	0.0	2.77	0.0	Moderate	2.5	Moderate	2.5
I-205	16	NB	Stafford Rd	10th St	3.3	AM	-143	0.0	-165	0.0	99	5.0	0.11	0.0			0.11	0.0	0.23	0.0	6.96	0.0	Moderate	2.5	Moderate	2.5
						PM	-2	0.0	-9	0.0	3	1.0	0.07	0.0			0.07	0.0	0.32	0.0	5.28	0.0	Moderate	2.5	Moderate	2.5
I-205	17	NB	10th St	Sunset Ave	1.9	AM	-157	0.0	-178	0.0	89	5.0	0.13	0.0			0.13	0.0	0.36	0.0	6.91	0.0	Moderate	2.5	Moderate	2.5
						PM	-7	0.0	-14	0.0	3	1.0	0.06	0.0			0.06	0.0	0.38	0.0	4.86	0.0	Moderate	2.5	Moderate	2.5
I-205	18	NB	Sunset Ave	Main St	1.2	AM	-160	0.0	-181	0.0	91	5.0	0.04	0.0			0.04	0.0	0.37	0.0	2.40	0.0	Moderate	2.5	Moderate	2.5
						PM	12	1.0	7	1.0	4	1.0	0.02	0.0			0.02	0.0	0.30	0.0	2.17	0.0	Moderate	2.5	Moderate	2.5
I-205	19	NB	Main St	SR-224	4.1	AM	-144	0.0	-166	0.0	75	5.0	0.14	0.0			0.14	0.0	0.45	0.0	5.21	0.0	Moderate	2.5	Moderate	2.5
						PM	4	1.0	-3	0.0	3	1.0	0.10	0.0			0.10	0.0	0.31	0.0	8.25	0.0	Moderate	2.5	Moderate	2.5
I-205	20	NB	SR-224	NE Glisan St	7.7	AM	-147	0.0	-171	0.0	91	5.0	0.19	0.0			0.19	0.0	0.32	0.0	8.05	0.0	Moderate	2.5	Moderate	2.5
						PM	9	1.0	3	1.0	3	1.0	0.10	0.0			0.10	0.0	0.26	0.0	8.31	0.0	Moderate	2.5	Moderate	2.5
I-205	21	NB	NE Glisan St	Jackson Bridge	3.6	AM	-92	0.0	-105	0.0	117	5.0	0.12	0.0			0.12	0.0	0.15	2.5	6.64	0.0	Moderate	2.5	Moderate	2.5
						PM	2	1.0	4	1.0	4	1.0	0.04	0.0			0.04	0.0	0.34	0.0	3.68	0.0	Moderate	2.5	Moderate	2.5
I-205	22	SB	Jackson Bridge	NE Glisan St	3.9	AM	-124	0.0	-141	0.0	72	5.0	0.08	0.0			0.08	0.0	0.40	0.0	1.90	0.0	Moderate	2.5	Moderate	2.5
						PM	-9	0.0	-10	0.0	35	5.0	0.05	0.0			0.05	0.0	0.09	2.5	4.39	0.0	Moderate	2.5	Moderate	2.5
I-205	23	SB	NE Glisan St	SR-224	7.4	AM	-141	0.0	-163	0.0	87	5.0	0.16	0.0			0.16	0.0	0.31	0.0	6.20	0.0	Moderate	2.5	Moderate	2.5
						PM	-42	0.0	-54	0.0	31	5.0	0.09	0.0			0.09	0.0	0.30	0.0	5.41	0.0	Moderate	2.5	Moderate	2.5
I-205	24	SB	SR-224	Main St	4.0	AM	-127	0.0	-146	0.0	69	5.0	0.10	0.0			0.10	0.0	0.38	0.0	3.59	0.0	Moderate	2.5	Moderate	2.5
						PM	-47	0.0	-58	0.0	27	5.0	0.07	0.0			0.07	0.0	0.39	0.0	4.24	0.0	Moderate	2.5	Moderate	2.5
I-205	25	SB	Main St	Sunset Ave	1.3	AM	-143	0.0	-163	0.0	79	5.0	0.02	0.0			0.02	0.0	0.38	0.0	1.17	0.0	Moderate	2.5	Moderate	2.5
						PM	-34	0.0	-40	0.0	32	5.0	0.01	0.0			0.01	0.0	0.25	0.0	1.10	0.0	Moderate	2.5	Moderate	2.5
I-205	26	SB	Sunset Ave	10th St	1.9	AM	-144	0.0	-164	0.0	75	5.0	0.08	0.0			0.08	0.0	0.39	0.0	3.14	0.0	Moderate	2.5	Moderate	2.5
						PM	-35	0.0	-41	0.0	32	5.0	0.05	0.0			0.05	0.0	0.20	0.0	4.06	0.0	Moderate	2.5	Moderate	2.5
I-205	27	SB	10th St	Stafford Rd	3.3	AM	-143	0.0	-165	0.0	75	5.0	0.09	0.0			0.09	0.0	0.37	0.0	4.21	0.0	Moderate	2.5	Moderate	2.5
						PM	-25	0.0	-29	0.0	34	5.0	0.05	0.0			0.05	0.0	0.10	2.5	3.64	0.0	Moderate	2.5	Moderate	2.5
I-205	28	SB	Stafford Rd	I-5	2.3	AM	-143	0.0	-165	0.0	81	5.0	0.08	0.0			0.08	0.0	0.38	0.0	4.51	0.0	Moderate	2.5	Moderate	2.5
						PM	-28	0.0	-32	0.0	32	5.0	0.02	0.0			0.02	0.0	0.18	0.0	1.61	0.0	Moderate	2.5	Moderate	2.5

Round 2 Concept C: **Price All Lanes (I-5 & I-205)**

5 4 3 2 1
Most Favorable ← → *Least Favorable*

Corridor	Segment ID	Direction	From	To	Length (Miles)	Peak Hour	*Traffic Operations on I-5 & I-205*																			
							Peak-Hour Vehicle Throughput	Peak-Hour Vehicle Throughput Score	Peak-Hour Person Throughput	Peak-Hour Person Throughput Score	Peak-Hour Freight Truck Throughput	Peak-Hour Freight Truck Throughput Score	Peak- Hour GP Travel Time	Peak-Hour GP Travel Time Score	Peak- Hour ML Travel Time	Peak-Hour ML Travel Time Score	Peak-Hour Freight Truck Travel Time	Peak-Hour Freight Truck Travel Time Score	Chance of Hyper-Congestion	Chance of Hyper-Congestion Score	Hours of Delay on Priced Facility	Hours of Delay on Priced Facility Score	Safety Impacts	Safety Impact Score	Trip Length Distribution	Trip Length Distribution Score
I-5	2	NB	I-205	OR-217	3.6	AM	0	1.0	32	1.0	66	5.0	-1.18	5.0	0.00		-1.18	5.0	0.33	5.0	-77.37	5.0	Moderate	2.5	Moderate	2.5
						PM	-319	0.0	-383	0.0	-63	0.0	-1.68	5.0	0.00		-1.68	5.0	0.13	5.0	-154.51	5.0	Moderate	2.5	Moderate	2.5
I-5	3	NB	OR-217	Capitol Hwy	2.7	AM	-193	0.0	-197	0.0	54	5.0	-0.26	3.0	0.00		-0.26	3.0	0.14	2.5	-18.53	2.5	Moderate	2.5	Moderate	2.5
						PM	-385	0.0	-437	0.0	-115	0.0	-0.61	5.0	0.00		-0.61	5.0	0.17	0.0	-45.09	5.0	Moderate	2.5	Moderate	2.5
I-5	4	NB	Capitol Hwy	Ross Island Bridge	4.9	AM	26	1.0	59	1.0	56	5.0	-1.27	5.0	0.00		-1.27	5.0	0.39	2.5	-73.59	2.5	Moderate	2.5	Moderate	2.5
						PM	46	1.0	80	1.0	-166	0.0	-2.05	5.0	0.00		-2.05	5.0	0.15	5.0	-149.20	5.0	Moderate	2.5	Moderate	2.5
I-5	5	NB	Ross Island Bridge	I-84	1.9	AM	-31	0.0	-12	0.0	31	5.0	-0.33	3.0	0.00		-0.33	3.0	0.45	2.5	-13.97	2.5	Moderate	2.5	Moderate	2.5
						PM	119	1.0	131	1.0	-80	0.0	-1.03	5.0	0.00		-1.03	5.0	0.33	5.0	-47.20	5.0	Moderate	2.5	Moderate	2.5
I-5	6	NB	I-84	N Skidmore St.	2.2	AM	-91	0.0	-83	0.0	43	5.0	-0.30	3.0	0.00		-0.30	3.0	0.31	2.5	-18.79	2.5	Moderate	2.5	Moderate	2.5
						PM	-140	0.0	-479	0.0	-59	0.0	-0.38	5.0	0.00		-0.38	5.0	0.21	2.5	-26.74	5.0	Moderate	2.5	Moderate	2.5
I-5	7	NB	N Skidmore St.	Interstate Bridge	3.6	AM	-237	0.0	-1,227	0.0	54	5.0	-1.09	5.0	-7.23		-1.09	5.0	0.20	5.0	-45.86	5.0	Moderate	2.5	Moderate	2.5
						PM	-75	0.0	-429	0.0	18	5.0	-4.00	5.0	-7.86		-4.00	5.0	0.34	2.5	-201.27	5.0	Moderate	2.5	Moderate	2.5
I-5	8	SB	Interstate Bridge	N Skidmore St.	3.6	AM	411	5.0	533	5.0	-164	0.0	-2.45	5.0	0.00		-2.45	5.0	0.35	5.0	-128.37	5.0	Moderate	2.5	Moderate	2.5
						PM	-278	0.0	-308	0.0	-54	0.0	-1.25	5.0	0.00		-1.25	5.0	0.15	5.0	-91.26	5.0	Moderate	2.5	Moderate	2.5
I-5	9	SB	N Skidmore St.	I-84	2.2	AM	50	1.0	110	1.0	-192	0.0	-0.59	5.0	0.00		-0.59	5.0	0.19	5.0	-36.21	5.0	Moderate	2.5	Moderate	2.5
						PM	-11	0.0	15	1.0	-168	0.0	-0.52	5.0	0.00		-0.52	5.0	0.24	2.5	-38.04	5.0	Moderate	2.5	Moderate	2.5
I-5	10	SB	I-84	Ross Island Bridge	1.9	AM	381	5.0	482	5.0	-195	0.0	-1.24	5.0	0.00		-1.24	5.0	0.23	5.0	-47.99	5.0	Moderate	2.5	Moderate	2.5
						PM	340	5.0	433	5.0	-182	0.0	-1.03	5.0	0.00		-1.03	5.0	0.48	0.0	-42.72	5.0	Moderate	2.5	Moderate	2.5
I-5	11	SB	Ross Island Bridge	Capitol Hwy	4.5	AM	337	3.0	436	5.0	-302	0.0	-2.19	5.0	0.00		-2.19	5.0	0.14	5.0	-138.27	5.0	Moderate	2.5	Moderate	2.5
						PM	241	3.0	310	3.0	-282	0.0	-2.34	5.0	0.00		-2.34	5.0	0.13	5.0	-172.19	5.0	Moderate	2.5	Moderate	2.5
I-5	12	SB	Capitol Hwy	OR-217	3.0	AM	-52	0.0	-23	0.0	-205	0.0	-0.85	5.0	0.00		-0.85	5.0	0.08	5.0	-56.44	5.0	Moderate	2.5	Moderate	2.5
						PM	-159	0.0	-181	0.0	-174	0.0	-0.79	5.0	0.00		-0.79	5.0	0.07	5.0	-56.31	5.0	Moderate	2.5	Moderate	2.5
I-5	13	SB	OR-217	I-205	3.7	AM	-212	0.0	-210	0.0	-111	0.0	-1.28	5.0	0.00		-1.28	5.0	0.14	5.0	-100.60	5.0	Moderate	2.5	Moderate	2.5
						PM	14	1.0	26	1.0	-133	0.0	-1.83	5.0	0.00		-1.83	5.0	0.23	5.0	-151.04	5.0	Moderate	2.5	Moderate	2.5
I-205	15	NB	I-5	Stafford Rd	2.0	AM	-606	0.0	-666	0.0	-82	0.0	-0.34	5.0	0.00		-0.34	5.0	0.00	5.0	-16.10	5.0	Moderate	2.5	Moderate	2.5
						PM	-418	0.0	-478	0.0	-106	0.0	-0.47	5.0	0.00		-0.47	5.0	0.02	5.0	-36.37	5.0	Moderate	2.5	Moderate	2.5
I-205	16	NB	Stafford Rd	10th St	3.3	AM	-430	0.0	-461	0.0	-64	0.0	-0.76	5.0	0.00		-0.76	5.0	0.04	5.0	-48.81	5.0	Moderate	2.5	Moderate	2.5
						PM	-204	0.0	-211	0.0	-100	0.0	-1.03	5.0	0.00		-1.03	5.0	0.13	5.0	-80.46	5.0	Moderate	2.5	Moderate	2.5
I-205	17	NB	10th St	Sunset Ave	1.9	AM	-164	0.0	-154	0.0	-56	0.0	-0.78	5.0	0.00		-0.78	5.0	0.12	5.0	-55.95	5.0	Moderate	2.5	Moderate	2.5
						PM	-142	0.0	-128	0.0	-116	0.0	-0.99	5.0	0.00		-0.99	5.0	0.11	5.0	-80.04	5.0	Moderate	2.5	Moderate	2.5
I-205	18	NB	Sunset Ave	Main St	1.2	AM	-177	0.0	-163	0.0	-56	0.0	-0.22	5.0	0.00		-0.22	5.0	0.17	5.0	-17.01	5.0	Moderate	2.5	Moderate	2.5
						PM	-274	0.0	-276	0.0	-99	0.0	-0.21	5.0	0.00		-0.21	5.0	0.18	2.5	-19.28	5.0	Moderate	2.5	Moderate	2.5
I-205	19	NB	Main St	SR-224	4.1	AM	270	3.0	372	3.0	-113	0.0	-1.85	5.0	0.00		-1.85	5.0	0.24	5.0	-117.80	5.0	Moderate	2.5	Moderate	2.5
						PM	-214	0.0	-203	0.0	-84	0.0	-1.29	5.0	0.00		-1.29	5.0	0.12	5.0	-107.04	5.0	Moderate	2.5	Moderate	2.5
I-205	20	NB	SR-224	NE Glisan St	7.7	AM	-71	0.0	-29	0.0	-47	0.0	-1.83	5.0	0.00		-1.83	5.0	0.22	2.5	-129.85	5.0	Moderate	2.5	Moderate	2.5
						PM	-189	0.0	-147	0.0	-85	0.0	-1.80	5.0	0.00		-1.80	5.0	0.16	2.5	-146.72	5.0	Moderate	2.5	Moderate	2.5
I-205	21	NB	NE Glisan St	Jackson Bridge	3.6	AM	-483	0.0	-512	0.0	-56	0.0	-0.64	3.0	0.00		-0.64	3.0	0.03	5.0	-36.96	5.0	Moderate	2.5	Moderate	2.5
						PM	-563	0.0	-409	0.0	-80	0.0	-2.17	5.0	0.00		-2.17	5.0	0.10	5.0	-203.45	5.0	Moderate	2.5	Moderate	2.5
I-205	22	SB	Jackson Bridge	NE Glisan St	3.9	AM	-34	0.0	84	1.0	21	3.0	-2.01	5.0	0.00		-2.01	5.0	0.20	5.0	-150.92	5.0	Moderate	2.5	Moderate	2.5
						PM	-552	0.0	-606	0.0	55	5.0	-0.43	3.0	0.00		-0.43	3.0	0.01	2.5	-34.63	5.0	Moderate	2.5	Moderate	2.5
I-205	23	SB	NE Glisan St	SR-224	7.4	AM	-131	0.0	-75	0.0	26	3.0	-1.30	3.0	0.00		-1.30	3.0	0.21	2.5	-91.82	5.0	Moderate	2.5	Moderate	2.5
						PM	-304	0.0	-328	0.0	29	5.0	-1.75	5.0	0.00		-1.75	5.0	0.17	5.0	-144.36	5.0	Moderate	2.5	Moderate	2.5
I-205	24	SB	SR-224	Main St	4.0	AM	-1	0.0	50	1.0	24	5.0	-0.86	5.0	0.00		-0.86	5.0	0.28	2.5	-50.75	5.0	Moderate	2.5	Moderate	2.5
						PM	-59	0.0	-35	0.0	-39	0.0	-1.71	5.0	0.00		-1.71	5.0	0.22	5.0	-132.62	5.0	Moderate	2.5	Moderate	2.5
I-205	25	SB	Main St	Sunset Ave	1.3	AM	-21	0.0	27	1.0	-30	0.0	-0.17	5.0	0.00		-0.17	5.0	0.25	5.0	-12.00	5.0	Moderate	2.5	Moderate	2.5
						PM	-503	0.0	-578	0.0	22	5.0	-0.15	5.0	0.00		-0.15	5.0	0.13	2.5	-13.82	5.0	Moderate	2.5	Moderate	2.5
I-205	26	SB	Sunset Ave	10th St	1.9	AM	41	1.0	89	1.0	-15	0.0	-0.75	5.0	0.00		-0.75	5.0	0.25	5.0	-50.43	5.0	Moderate	2.5	Moderate	2.5
						PM	-575	0.0	-679	0.0	19	5.0	-0.66	5.0	0.00		-0.66	5.0	0.06	5.0	-58.15	5.0	Moderate	2.5	Moderate	2.5
I-205	27	SB	10th St	Stafford Rd	3.3	AM	39	1.0	90	1.0	-5	0.0	-0.78	5.0	0.00		-0.78	5.0	0.25	5.0	-51.98	5.0	Moderate	2.5	Moderate	2.5
						PM	-665	0.0	-787	0.0	14	3.0	-0.54	5.0	0.00		-0.54	5.0	0.01	5.0	-36.09	5.0	Moderate	2.5	Moderate	2.5
I-205	28	SB	Stafford Rd	I-5	2.3	AM	-74	0.0	-46	0.0	-1	0.0	-0.34	5.0	0.00		-0.34	5.0	0.22	5.0	-23.71	5.0	Moderate	2.5	Moderate	2.5
						PM	-607	0.0	-725	0.0	27	5.0	-0.27	5.0	0.00		-0.27	5.0	0.00	5.0	-13.75	5.0	Moderate	2.5	Moderate	2.5

Round 2 Concept D: **Price New Planned Lane (I-205)**

5 4 3 2 1
Most Favorable ← → *Least Favorable*

Corridor	Segment ID	Direction	From	To	Length (Miles)	Peak Hour	*Traffic Operations on I-5 & I-205*																					
							Peak-Hour Vehicle Throughput	Peak-Hour Vehicle Throughput Score	Peak-Hour Person Throughput	Peak-Hour Person Throughput Score	Peak-Hour Freight Truck Throughput	Peak-Hour Freight Truck Throughput Score	Peak- Hour GP Travel Time	Peak-Hour GP Travel Time Score	Peak- Hour ML Travel Time	Peak-Hour ML Travel Time Score	Peak-Hour Freight Truck Travel Time	Peak-Hour Freight Truck Travel Time Score	Chance of Hyper-Congestion	Chance of Hyper-Congestion Score	Hours of Delay on Priced Facility	Hours of Delay on Priced Facility Score	Safety Impacts	Safety Impact Score	Trip Length Distribution	Trip Length Distribution Score
I-5	2	NB	I-205	OR-217	3.6	AM	4	1.0	123	1.0	1	1.0	-0.01	1.0			-0.01	1.0	0.44	0.0	-0.36	2.5	Moderate	2.5	Moderate	2.5
						PM	-74	0.0	-45	0.0	50	5.0	0.08	0.0			0.08	0.0	0.45	0.0	5.21	0.0	Moderate	2.5	Moderate	2.5
I-5	3	NB	OR-217	Capitol Hwy	2.7	AM	11	1.0	6	1.0	1	1.0	0.05	0.0			0.05	0.0	0.21	0.0	3.22	0.0	Moderate	2.5	Moderate	2.5
						PM	-58	0.0	-116	0.0	55	5.0	0.05	0.0			0.05	0.0	0.11	0.0	2.99	0.0	Moderate	2.5	Moderate	2.5
I-5	4	NB	Capitol Hwy	Ross Island Bridge	4.9	AM	-6	0.0	-22	0.0	-2	0.0	0.08	0.0			0.08	0.0	0.49	0.0	4.42	0.0	Moderate	2.5	Moderate	2.5
						PM	-81	0.0	-144	0.0	47	5.0	0.08	0.0			0.08	0.0	0.38	0.0	3.58	0.0	Moderate	2.5	Moderate	2.5
I-5	5	NB	Ross Island Bridge	I-84	1.9	AM	-6	0.0	-19	0.0	3	1.0	0.01	0.0			0.01	0.0	0.48	0.0	0.43	0.0	Moderate	2.5	Moderate	2.5
						PM	-77	0.0	-119	0.0	44	5.0	0.04	0.0			0.04	0.0	0.50	0.0	0.70	0.0	Moderate	2.5	Moderate	2.5
I-5	6	NB	I-84	N Skidmore St.	2.2	AM	-6	0.0	-13	0.0	3	1.0	0.01	0.0			0.01	0.0	0.38	0.0	0.26	0.0	Moderate	2.5	Moderate	2.5
						PM	-89	0.0	-120	0.0	56	5.0	0.01	0.0			0.01	0.0	0.26	0.0	0.17	0.0	Moderate	2.5	Moderate	2.5
I-5	7	NB	N Skidmore St.	Interstate Bridge	3.6	AM	1	1.0	-1	0.0	0	1.0	0.03	0.0			0.03	0.0	0.31	0.0	1.40	0.0	Moderate	2.5	Moderate	2.5
						PM	-86	0.0	-97	0.0	49	5.0	0.09	0.0			0.09	0.0	0.41	0.0	1.46	0.0	Moderate	2.5	Moderate	2.5
I-5	8	SB	Interstate Bridge	N Skidmore St.	3.6	AM	-94	0.0	-114	0.0	52	5.0	0.05	0.0			0.05	0.0	0.54	0.0	-1.21	2.5	Moderate	2.5	Moderate	2.5
						PM	-1	0.0	-5	0.0	1	1.0	0.01	0.0			0.01	0.0	0.27	0.0	0.49	0.0	Moderate	2.5	Moderate	2.5
I-5	9	SB	N Skidmore St.	I-84	2.2	AM	-118	0.0	-147	0.0	71	5.0	0.01	0.0			0.01	0.0	0.35	0.0	-0.38	2.5	Moderate	2.5	Moderate	2.5
						PM	-1	0.0	-6	0.0	1	1.0	0.00	0.0			0.00	0.0	0.33	0.0	0.26	0.0	Moderate	2.5	Moderate	2.5
I-5	10	SB	I-84	Ross Island Bridge	1.9	AM	-97	0.0	-138	0.0	54	5.0	0.05	0.0			0.05	0.0	0.38	0.0	0.09	0.0	Moderate	2.5	Moderate	2.5
						PM	-4	0.0	-18	0.0	2	1.0	0.01	0.0			0.01	0.0	0.35	0.0	0.49	0.0	Moderate	2.5	Moderate	2.5
I-5	11	SB	Ross Island Bridge	Capitol Hwy	4.5	AM	-112	0.0	-183	0.0	59	5.0	0.15	0.0			0.15	0.0	0.40	0.0	5.85	0.0	Moderate	2.5	Moderate	2.5
						PM	-4	0.0	-21	0.0	2	1.0	0.02	0.0			0.02	0.0	0.40	0.0	1.57	0.0	Moderate	2.5	Moderate	2.5
I-5	12	SB	Capitol Hwy	OR-217	3.0	AM	-103	0.0	-165	0.0	68	5.0	0.09	0.0			0.09	0.0	0.30	0.0	4.63	0.0	Moderate	2.5	Moderate	2.5
						PM	0	0.0	0	0.0	2	1.0	0.01	0.0			0.01	0.0	0.25	0.0	0.91	0.0	Moderate	2.5	Moderate	2.5
I-5	13	SB	OR-217	I-205	3.7	AM	-110	0.0	-78	0.0	69	5.0	0.04	0.0			0.04	0.0	0.35	0.0	1.24	0.0	Moderate	2.5	Moderate	2.5
						PM	1	1.0	113	1.0	1	1.0	0.00	1.0			0.00	1.0	0.46	0.0	-0.22	2.5	Moderate	2.5	Moderate	2.5
I-205	15	NB	I-5	Stafford Rd	2.0	AM	-159	0.0	29	1.0	-8	0.0	-0.13	3.0			-0.13	3.0	0.11	2.5	-9.04	5.0	Moderate	2.5	Moderate	2.5
						PM	7	1.0	393	3.0	-59	0.0	-0.14	3.0			-0.14	3.0	0.19	2.5	-11.25	5.0	Moderate	2.5	Moderate	2.5
I-205	16	NB	Stafford Rd	10th St	3.3	AM	-112	0.0	107	1.0	-5	0.0	-0.08	1.0	-0.75	3.0	-0.08	1.0	0.14	2.5	-20.27	5.0	Moderate	2.5	Moderate	2.5
						PM	36	1.0	471	3.0	-52	0.0	0.09	0.0	-1.33	5.0	0.09	0.0	0.24	2.5	-24.33	2.5	Moderate	2.5	Moderate	2.5
I-205	17	NB	10th St	Sunset Ave	1.9	AM	-26	0.0	205	1.0	-1	0.0	0.08	0.0	-1.25	5.0	0.08	0.0	0.26	2.5	-19.92	2.5	Moderate	2.5	Moderate	2.5
						PM	35	1.0	459	3.0	-47	0.0	0.16	0.0	-1.56	5.0	0.16	0.0	0.28	5.0	-21.75	2.5	Moderate	2.5	Moderate	2.5
I-205	18	NB	Sunset Ave	Main St	1.2	AM	-33	0.0	210	1.0	-5	0.0	0.04	0.0	-0.39	5.0	0.04	0.0	0.27	2.5	-5.20	2.5	Moderate	2.5	Moderate	2.5
						PM	16	1.0	379	3.0	-55	0.0	0.06	0.0	-0.39	5.0	0.06	0.0	0.22	2.5	-3.68	2.5	Moderate	2.5	Moderate	2.5
I-205	19	NB	Main St	SR-224	4.1	AM	22	1.0	125	1.0	-2	0.0	-0.15	1.0	-0.14	1.0	-0.15	1.0	0.42	2.5	-11.36	2.5	Moderate	2.5	Moderate	2.5
						PM	68	1.0	248	1.0	-53	0.0	-0.13	1.0	-0.11	1.0	-0.13	1.0	0.28	2.5	-12.02	2.5	Moderate	2.5	Moderate	2.5
I-205	20	NB	SR-224	NE Glisan St	7.7	AM	-1	0.0	33	1.0	-2	0.0	-0.08	1.0			-0.08	1.0	0.31	2.5	-5.65	2.5	Moderate	2.5	Moderate	2.5
						PM	69	1.0	143	1.0	-55	0.0	-0.15	1.0			-0.15	1.0	0.24	2.5	-9.66	2.5	Moderate	2.5	Moderate	2.5
I-205	21	NB	NE Glisan St	Jackson Bridge	3.6	AM	-10	0.0	0	0.0	-3	0.0	-0.02	1.0			-0.02	1.0	0.18	0.0	-0.97	2.5	Moderate	2.5	Moderate	2.5
						PM	75	1.0	98	1.0	-55	0.0	-0.05	1.0			-0.05	1.0	0.33	2.5	-2.69	2.5	Moderate	2.5	Moderate	2.5
I-205	22	SB	Jackson Bridge	NE Glisan St	3.9	AM	104	1.0	132	1.0	-60	0.0	-0.05	1.0			-0.05	1.0	0.39	2.5	-0.61	2.5	Moderate	2.5	Moderate	2.5
						PM	-4	0.0	2	1.0	-2	0.0	-0.01	1.0			-0.01	1.0	0.12	0.0	-0.75	2.5	Moderate	2.5	Moderate	2.5
I-205	23	SB	NE Glisan St	SR-224	7.4	AM	108	1.0	191	1.0	-71	0.0	-0.21	1.0			-0.21	1.0	0.28	2.5	-11.08	2.5	Moderate	2.5	Moderate	2.5
						PM	1	1.0	30	1.0	-3	0.0	-0.03	1.0			-0.03	1.0	0.29	2.5	-2.44	2.5	Moderate	2.5	Moderate	2.5
I-205	24	SB	SR-224	Main St	4.0	AM	115	1.0	282	3.0	-59	0.0	-0.18	1.0	-0.14	1.0	-0.18	1.0	0.35	2.5	-11.03	2.5	Moderate	2.5	Moderate	2.5
						PM	1	1.0	80	1.0	-2	0.0	-0.04	1.0	-0.10	1.0	-0.04	1.0	0.37	2.5	-5.30	2.5	Moderate	2.5	Moderate	2.5
I-205	25	SB	Main St	Sunset Ave	1.3	AM	93	1.0	422	3.0	-67	0.0	0.00	1.0	-0.37	5.0	0.00	1.0	0.29	2.5	-7.07	2.5	Moderate	2.5	Moderate	2.5
						PM	-57	0.0	156	1.0	-6	0.0	0.07	0.0	-0.30	5.0	0.07	0.0	0.19	2.5	-1.33	2.5	Moderate	2.5	Moderate	2.5
I-205	26	SB	Sunset Ave	10th St	1.9	AM	140	1.0	588	5.0	-59	0.0	0.01	0.0	-1.57	5.0	0.01	0.0	0.29	5.0	-28.43	2.5	Moderate	2.5	Moderate	2.5
						PM	-87	0.0	126	1.0	-5	0.0	0.21	0.0	-1.09	5.0	0.21	0.0	0.14	2.5	-9.24	2.5	Moderate	2.5	Moderate	2.5
I-205	27	SB	10th St	Stafford Rd	3.3	AM	145	1.0	621	5.0	-60	0.0	-0.07	1.0	-1.56	5.0	-0.07	1.0	0.27	2.5	-36.38	5.0	Moderate	2.5	Moderate	2.5
						PM	-93	0.0	105	1.0	-7	0.0	0.10	0.0	-0.64	3.0	0.10	0.0	0.13	2.5	-5.85	2.5	Moderate	2.5	Moderate	2.5
I-205	28	SB	Stafford Rd	I-5	2.3	AM	104	1.0	520	5.0	-71	0.0	-0.18	3.0			-0.18	3.0	0.31	2.5	-11.58	2.5	Moderate	2.5	Moderate	2.5
						PM	-86	0.0	65	1.0	-6	0.0	-0.06	1.0			-0.06	1.0	0.09	2.5	-4.50	5.0	Moderate	2.5	Moderate	2.5

Appendix C Regional transportation demand model findings

Metro's regional travel demand model plays a key role in concept evaluations. One of the benefits of a regional model is its ability to show regional impacts on the overall transportation system, including freeways and surface streets. These include the following:

- Vehicle hours of travel (VHT), which totals the travel time of all vehicle trips made within the model area. VHT can be a good indicator of network efficiency and the impact of a particular alternative.
- Vehicle miles of travel (VMT), which is the total of all vehicle miles driven in the model area. VMT is also a measure of network efficiency. A reduction in VMT when the number of trips is held constant, as it is in the regional model, can indicate a more efficient network.
- Mode share, which is the breakdown of daily person trips by mode (single-occupant vehicle [SOV], high-occupancy vehicle [HOV], public transportation, bicycle, pedestrian) and how the share of any particular mode choice changes under each concept. Reported percentage changes may not appear to be high but can still represent a large number of total trips changed.

These regional impacts had a significant bearing on the evaluation and implications for the recommendations contained within this technical memorandum. Key data points are summarized in subsequent sections.

VHT summary

Observations and conclusions:

- All tolling concepts indicate a net reduction in regional VHT.
- Concepts A and D have minimal impact on regional VHT. The most significant impact is seen in the AM peak hour.
- Concept B has a small impact on regional VHT. The benefit is relatively consistent throughout the day, though also highest in the AM peak hour.
- Concept C would produce the most significant decreases in regional VHT, a daily decrease of ~5.0 percent.

Table B1. Vehicle Hours Traveled (VHT) by time period by concept – difference from baseline

Reporting Period	Concept A	Concept B	Concept C	Concept D
AM Peak Hour	(1,600)	(3,200)	(16,100)	(2,100)
PM Peak Hour	(100)	(1,500)	(8,600)	(700)
Morning	(2,600)	(6,400)	(34,200)	(3,600)
Midday	(600)	(3,700)	(17,200)	(700)
Afternoon	(400)	(4,600)	(23,500)	(1,900)
24 hour Total	(3,600)	(15,500)	(79.000)	(6,400)

Source: Metro regional travel demand model

Table B2. Vehicle Hours Traveled (VHT) by time period by concept – percent difference

Reporting Period	Concept A	Concept B	Concept C	Concept D
AM Peak Hour	-1.2%	-2.3%	-11.4%	-1.5%
PM Peak Hour	-0.1%	-1.2%	-6.9%	-0.6%
Morning	-0.6%	-1.6%	-8.5%	-0.9%
Midday	-0.1%	-0.8%	-3.5%	-0.2%
Afternoon	-0.1%	-1.0%	-5.3%	-0.4%
24 hour Total	-0.2%	-1.0%	-5.0%	-0.4%

Source: Metro regional travel demand model

VHT sensitivity testing

Model sensitivity testing with less perceived benefit of improved freeway travel time indicated lower overall benefits in daily VHT savings. These results indicate smaller reductions in daily VHT for Concept A (0.0%), Concept B (-0.6%), and Concept C (-3.1%), and a small increase in VHT for Concept D (+0.1%)

Observations and conclusions:

- Concepts A and D would have minimal impact on regional VHT. There is some potential for a small increase or decrease, depending on model sensitivity assumptions.
- Concept B also has a small impact on regional VHT but shows consistent savings throughout the day. Reduction in VHT is between 0.5 and 1 percent depending on model capacity assumptions/methods.
- Concept C would produce most significant decreases to regional VHT, between 3 and 5 percent depending on model sensitivity assumptions.
- The greatest VHT benefits are generally experienced in the AM peak period.

VMT summary

Observations and conclusions:

- Overall, concepts A and D have minimal impact on regional VMT. Concept A model results indicate small decreases in VMT, while Concept D results indicate small increases in VMT. Neither concept would be expected to produce a significant change in total VMT.
- The potential increases in Concept D are likely due to the out-of-direction travel necessary to use the southern section of I-205.
- Concept B has a greater impact on VMT than Concept A or D but the reduction is also a small percentage of total VMT.
- Concept C could produce significant decreases to regional VMT, a daily decrease of 2 percent.
- Changes to VMT are generally consistent for all time periods.

Table B3. Vehicle Miles Traveled by time period by concept – difference from baseline

Reporting Period	Concept A	Concept B	Concept C	Concept D
AM Peak Hour	(1,000)	(9,200)	(79,400)	3,100
PM Peak Hour	(600)	(8,300)	(77,200)	2,300
Morning	(2,200)	(28,300)	(249,300)	5,600
Midday	(5,700)	(21,100)	(385,800)	1,200
Afternoon	(2,800)	(30,300)	(286,000)	5,300
24 hour Total	(14,800)	(98,400)	(1,091,100)	10,100

Source: Metro regional travel demand model

Table B4. Vehicle Miles Traveled by time period by concept – percent difference

Reporting Period	Concept A	Concept B	Concept C	Concept D
AM Peak Hour	0.0%	-0.3%	-2.2%	0.1%
PM Peak Hour	0.0%	-0.2%	-2.1%	0.1%
Morning	0.0%	-0.2%	-2.1%	0.0%
Midday	0.0%	-0.1%	-2.2%	0.0%
Afternoon	0.0%	-0.2%	-2.1%	0.0%
24 hour Total	0.0%	-0.2%	-2.1%	0.0%

Source: Metro regional travel demand model

VMT sensitivity testing

Model sensitivity testing with less perceived benefit of improved freeway travel time indicated similar overall benefits in daily VMT changes. These results indicate potential reductions in daily VMT, as follows: Concept A (0.0%), Concept B (-0.2%), Concept C (-2.2%), and Concept D (-0.1%)

Observations and conclusions:

- Concept A shows small daily VMT reduction with a similar overall daily impact, regardless of model sensitivity assumptions.
- Concept D shows a potential to slightly increase or decrease VMT, depending on model sensitivity assumptions. This is most likely due the out-of-direction travel associated with using the southern segment of I-205 and how attractive the freeway is to travelers. In either approach, the overall change to VMT is small.
- Concept B shows similar VMT savings, regardless of model sensitivity assumptions.
- Concept C would produce the most significant decreases to regional VMT. The daily decrease in VMT is very similar regardless of model sensitivity assumptions.

Mode share summary

Observations and conclusions:

- Concepts A and D have minimal impact on regional mode share. There is some potential to shift SOV to HOV trips.
- Concept B has minimal impact on regional mode share. There is some potential to discourage some SOV trips, with shifts to HOV primarily but also active transportation modes.
- Concept C could produce significant changes to regional mode share, although the total change still reflects less than half of one percent of regional trips. There is potential to discourage some SOV trips, with shifts to HOV primarily but also active transportation modes.

Table B5. Mode share shift relative to 2027 baseline (Daily Person Trips)

Reporting Period	Concept A	Concept B	Concept C	Concept D
SOV	0.0%	-0.1%	-0.5%	0.0%
HOV	0.0%	0.0%	0.3%	0.0%
Transit /Bus	0.0%	0.0%	0.1%	0.0%
Bike/Walk	0.0%	0.0%	0.0%	0.0%

Source: Metro regional travel demand model

Table B6. Change in daily person trips

Reporting Period	Concept A	Concept B	Concept C	Concept D
SOV	-2,000	-7,000	-50,000	-2,000
HOV	2,000	4,000	31,000	2,000
Transit/Bus	0	2,000	11,000	0
Bike/Walk	0	1,000	8,000	0

Source: Metro regional travel demand model
Note: Values rounded to nearest 1,000.

Note: Mode share changes may be overstated to some degree due to limitations of the analysis approach in fully accounting for potential freeway travel time savings in the model's mode choice estimation.

Appendix D Toll Optimization Model (TOM) inputs and assumptions

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Toll Optimization Modeling

Inputs, Policy Assumptions, and Options

Portland Value Pricing
Feasibility Analysis

Modeling Coordination

March 8, 2018

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Model Background

- ECONorthwest's Toll Optimization Model© (TOM) is a special suite of models designed to determine equilibrium lane volumes, toll levels, revenues, and associated travel times for tolled highway facilities.
- ECONorthwest has been operating traffic and revenue models with benefit-cost features for over two decades.
- These tools allow "pivoting" or "extrapolating" performance of an existing project to a much wider range of conditions and business rules.
- The tools are supplied with demand forecasts to test future performance of toll facilities.
- Tolls, traffic and revenues can be optimized under a variety of tolling objectives. The models also can be used to evaluate non-tolled (HOV) managed lane facilities.
- In complex modeling settings (e.g. dynamic pricing) the models provide over 150 output variables per facility segment or link.

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Policy Requires Modeling Flexibility

- Efficient pricing requires variability in prices at various times and under various circumstances. This is because the costs imposed by a user's vehicle vary with the nature of and conditions on the roadway, and the characteristics of the vehicles using of the roadway.
- Policy makers benefit from having a means that allows them to quickly determine whether or not a project offers the prospect of meaningful net benefits and revenues that support toll operations.
- This exercise is made complex by the number of factors that contribute to a successful managed lanes facility design and operation.
- Many of these factors are explicitly represented in the TOM model as policy assumptions that can be established by the end user.

- **Corridor Volumes**
- Some express lanes have been developed in relatively lightly-used corridors, while others have been developed in corridors that have heavy corridor volumes.
- While not strictly a policy assumption, the demand volumes provided to the TOM model may have some uncertainty associated with them. Test can be performed using variations in volume to determine the influence on project feasibility

- Demographic Conditions

- Express Lanes have generally, but not always, been implemented in settings where incomes and values of time are high. Others are in corridors with a high share of recreational or other on-work traffic.
- Again modeling tests can be made regarding uncertainty associated with demographics and growth.

Value of Time

- Different users of potential managed lanes will have levels of willingness to pay for travel time savings. This is known as a user's value of time (VOT) savings.
- The TOM model typically makes use of any locally available information on VOT, such as mean values from a travel demand model. The TOM model then applies a distribution (log-normal distribution) around those mean values.
- Modeling tests can be made with alternative VOT in order to help determine project financial risk and feasibility.

- Traffic Composition
- Corridors can differ in the share of traffic comprised by SOVs, HOVs, and trucks. This affects the ease of traffic movements between the express and general-purpose lanes, and the value of travel time savings or loses.
- The TOM model typically inherits the composition of traffic from a validated travel demand model.

Model Input/Policy Assumption

Facility Geometry

- Facilities with express lanes vary in the number of express lanes and their share of total cross-sectional capacity. They also differ in the number of ingress and egress points and whether "hard" or "soft" barriers separate express from general purpose lanes.
- The nature of the planned project determines the characterization of lanes and any limits on express lane access. In the case of limited access special procedures are implemented in the TOM model to properly represent the demand for express lane usage.

Policy Assumption

- ## Hours of Operation
- Some express lanes operate only in the AM and/or PM peak periods of workdays while others operate 'round the clock and on weekends.
- The TOM model can represent every five minutes of the day and hours of operation can be set to meet desired operating rules.

- Carpool Policies

- In some express lane implementations policy makers have seen fit to continue allowing 2+ person carpools to travel free in the tolled lanes, while other projects have raised the carpool occupancy requirement. In other settings all vehicles pay for access to the managed lanes.
- The TOM model permits the selection of which vehicle classes pay a toll for express lane use and which are exempt. These assumptions can also be varied by time of day.

Policy Assumption

- Tolling Objectives
- The tolling objective is manifest in the procedures used to vary tolls. In some cases, the toll is varied with the sole purpose of maintaining a **minimum level of service** in the express lane, while in other cases, the objective is to **minimize the costs** to users of the corridor or, alternatively, to **maximize the revenue** generated by the facility.
- In a typical TOM model run both **cost min.** and **rev. max.** are analyzed. These objectives can also be subject to other policy constraints. More below…

Minimum and Maximum Tolls

- Some facility operators will impose constraints on a toll objective such as minimum or maximum toll rates. Minimum tolls may ensure that toll transaction costs are recovered. Maximum tolls may provide users a price guarantee.
- Minimum and maximum constraints can be impose on any other toll objective. Each will have implications for both revenue and facility performance.

- Toll Discounts

- It is sometimes desired to offer toll discounts to certain vehicle classes such as HOV2+ vehicles or electric vehicles.
- The TOM model allows any vehicle class that is modeled to be provided a discount toll rate. Discounts can vary by time of day and can be combined with any other toll objective. Toll discounts will influence both revenue and facility performance.

- Level of Service Violations
- Some facilities are required to maintain a minimum level-of-service, often this is a minimum speed (45 m.p.h.) during much of the facilities operation.
- The TOM model permits the establishment of a minimum level-of-service. In this case when the express lane speeds drop below this threshold the lane reverts to HOV operations and no tolls are imposed until speeds recover.

Policy Assumption

- Pricing Frequency
- Some facilities implement variable pricing via a table of fixed rates that varies by day of week and time of day. Others employ so-called dynamic pricing, wherein the toll varies in real time with the facility volume.
- The TOM model can represent either "static" or "dynamic" toll rate setting. Dynamic pricing allows for re-pricing every five minutes and draws from traffic distributions across many days of "operation".

- Feedback to Regional Model

- Express toll lanes are a lane choice for users of a corridor. Typically these facilities will not significantly influence the choice of travel mode. But conversion from HOV operations can have some influence of carpool formation.

- The TOM model is a micro-assignment model and inherits demand from a regional model. To test mode choice implications of toll policy a feedback step must be implemented between TOM and the regional model.

Treatment of Hyper-Congestion

- Many corridors with express lanes experience hyper-congestion during some point during one or both peak periods of operations. These conditions present unique challenges in modeling facility performance and toll implementations.
- The TOM model has special features to properly handle the hyper-congested state. TOM makes use of high frequency and high resolution data on historical corridor performance (when available) to customize the implementation of these procedures.

- Modeling of the Spreading of the Peak
- As demand in a corridor grows the peak period of operations typically expands. Conversely, as capacity is added to a corridor the peaks may shorten.
- The TOM model has an optional feature that models the lengthening/shortening of the peak. This feature makes use of high frequency and high resolution data on current traffic volumes (when available), and changes in future demand and facility capacity.

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Appendix E Discussion on revenue and cost metrics

Estimated revenue leakage

For all of the evaluated concepts, facility users are assumed to be required to have a tag/transponder in their vehicle that is linked to a pre-established account to use the tolled lanes. The use of photo toll equipment for image capture and toll bill processing is not assumed in any of the concepts, although photo enforcement equipment may be installed to deter people from avoiding toll equipment by switching lanes before and after toll gantries or in shoulder lanes, as well as for identification of vehicles traveling in the toll lanes without a valid transponder.

The modeled transaction and revenue values do not account for penetration rates for transponder accounts or the percentage of through trips and out of state/country trips that likely would not be associated to a registered transponder account in the state of Oregon. As adjustments for transponder usage rates were not made in the traffic modeling, the leakage or revenue loss factors provided assume that a certain number of transactions will divert to alternative routes or general purpose lanes, in the case of express toll lanes or HOT lanes, to avoid fines and fees associated with violation.

Additional leakage attributed to equipment read errors of transponders is assumed to be less than 0.5 percent and consistent across concepts. Transponder accounts linked to expired credit and debit cards and accounts with insufficient balances are assumed to be 4 percent and consistent across concepts.

Estimated toll collection operations and maintenance / rehabilitation and reconstruction costs

For all concepts, routine operations and maintenance costs and periodic rehabilitation and reconstruction costs are assumed and estimated using existing toll agency experience on other comparable toll facilities in the U.S. All concepts assume costs associated to credit card fees, state/agency costs, back office customer service center vendor contract(s), lane-side equipment and vendor costs, enforcement costs for state highway patrol, and periodic replacement of lane-side toll equipment and procurement of back office and lane-side toll vendors.

- Credit card fees are anticipated to be comprised of a fixed base cost and percentage cost based on the value of the transaction. The overall percentage rate is assumed to be 2.3 percent consistent with typical credit card fee processing rates, including a factor for account refunds.
- The state or toll agency is assumed to be responsible for general management, vendor oversight, marketing, information technology, accounting and finance, and enforcement/violations. In addition to administrative costs attributed to rent, computer equipment and other general overhead, other agency costs also include items for consultant fees, including personal services contracts and forecasting activities
- The customer service center vendor(s) is (are) responsible for processing toll transactions, collecting toll revenue, maintaining customer accounts, interfacing with customers via telephone and potential retail walk-in centers and providing

software applications to enable these functions. Either a single vendor or multiple vendors will be responsible for providing both the software systems that process electronic toll transactions for payment and the operations to provide customer service. Expenditures for vendor services are incurred on a contract basis that can be based on either a fixed monthly amount, a transactional fee, or combination of the two.

- Roadway toll systems costs include all lane equipment, hardware and software required to identify a toll transaction and transmit data about that transaction to the customer service center for payment processing. Sometimes referred to as "lane systems," this equipment includes transponder readers, cameras, and communications network equipment that need regular maintenance and/or replacement to ensure the system is functioning properly. For all of the concepts, it is assumed the toll systems vendor operate under a 10-year fixed-fee contract that is procured under the same timeline with a full set of equipment replacement at the beginning of each vendor contract cycle. Lane side equipment costs primarily cover transponder readers and cameras used for video enforcement.
- Enforcement costs are assumed to be incurred through interagency agreements with law enforcement, typically state patrol, for both HOV occupancy declaration enforcement and to confirm vehicles are traveling through the facility with a valid and correctly installed transponder. In all concepts, enforcement is budgeted during toll service hours with additional enforcement during peak travel times. Current methods of enforcement are not foolproof and there are still challenges in enforcing the entire length of the facility as well as accurately determining occupancy levels in backseats of passenger vehicles. Typically, enforcement officers will be able to identify carpool declaration through a beacon signal on the gantry when a vehicle declared as a HOV passes through or through the back of a switchable transponder set to carpool declaration mode, which is identified by a red background on the back of the transponder facing the windshield. Similar to vehicle occupancy detection, a gantry beacon may alert enforcement officers to vehicles without valid transponders.

The following assumptions relate to specific concepts:

Concept A

The following cost factors, based on industry best practices and the judgment of the evaluation team, were accounted for in the generation of revenue estimates for Concept A:

- Concepts facility users are assumed to be required to have a tag/transponder in their vehicle that is linked to a pre-established account to use the tolled lanes.
- Carpools (HOV 3+) are assumed to be exempt from paying tolls. These vehicles would self-declare using a switchable transponder that allows them to switch to HOV status, which tend to be more expensive than a sticker tag. False carpool declaration is estimated to be more than 25 percent of declared carpool trips on U.S. express lane toll facilities. However, rates decline with the presence of law enforcement. This evaluation assumed enforcement levels are adequate for coverage during operating hours, with higher levels during peak periods, with revenue loss of 20 percent.
- The use of photo toll equipment for image capture and toll bill processing is not assumed in any of the concepts.
- The modeling assumes that 30 percent potential transactions will divert to the general purpose lanes or alternative routes to avoid fines and fees associated to being a violator.
- Drivers using the lanes without a transponder is expected to be 5 percent, the lowest of the tolling concepts. Lower rates are expected due to the presence of law enforcement to monitor HOV declaration.
- Equipment read errors of transponders were assumed to account for less than 0.5 percent, which was consistent across all concepts.
- Transponder accounts linked to expired credit and debit cards and accounts with insufficient balances are assumed to be 4 percent, and consistent across concepts.
- Credit card fees are anticipated to be comprised of a fixed base cost and percentage cost based on the value of the transaction. The overall percentage rate is assumed to be 2.3 percent consistent with typical credit card fee processing rates including a factor for account refunds. With lower revenue generation in comparison to the other concepts, Concept A is expected to incur low overall costs attributed to credit card fees.
- The state or toll agency is assumed to be responsible for general management, vendor oversight, marketing, information technology, accounting and finance, and enforcement/violations. In addition to administrative costs attributed to rent, computer equipment, and other general overhead, other agency costs also include items for consultant fees, including personal services contracts and forecasting activities.
- The customer service center vendor(s) is (are) responsible for processing toll transactions, collecting toll revenue, maintaining customer accounts, interfacing with customers via telephone and potential retail walk-in centers and providing software applications to enable these functions. For Concept A it was assumed, due to the limited number of transactions and reduced potential for economies of scale in procuring a back-office vendor(s) directly, that back functions would be contracted through another agency at a cost premium to account for

periodic vendor procurement. Periodic costs associated to vendor procurement, implementation, and testing are not assumed in Concept A.

- Roadway toll systems costs include all lane equipment, hardware, and software required to identify a toll transaction and transmit data about that transaction to the customer service center for payment processing. For all of the concepts it is assumed the toll systems vendor operate under a 10-year fixed fee contract that is procured under the same timeline with a full set of equipment replacement at the beginning of each vendor contract cycle. In Concept A multiple single lane toll points are assumed in both the north and south travel directions.
- Enforcement costs are assumed to be incurred through interagency agreements with law enforcement, typically state patrol, for both HOV occupancy declaration enforcement and to confirm vehicles are traveling through the facility with a valid and correctly installed transponder. In all concepts enforcement is budgeted during toll service hours with additional enforcement during peak travel times. Concept A assumes higher levels of enforcement for both occupancy and registered transponder detection.

Concept B

The following cost factors, based on industry best practices and the judgment of the evaluation team, were accounted for in the generation of revenue estimates for Concept B:

- Concepts facility users are assumed to be required to have a tag/transponder in their vehicle that is linked to a pre-established account to use the tolled lanes.
- Carpools (HOV 3+) are assumed to pay tolls. As such, there is no revenue loss associated with false HOV declaration.
- The use of photo toll equipment for image capture and toll bill processing is not assumed in any of the concepts.
- The modeling assumes that 20 percent potential transactions will divert to the general purpose lanes or alternative routes to avoid fines and fees associated to being a violator.
- Drivers using the lanes without a transponder is expected to be 10 percent.
- Equipment read errors of transponders were assumed to account for less than 0.5 percent, which was consistent across all concepts.
- Transponder accounts linked to expired credit and debit cards and accounts with insufficient balances are assumed to be 4 percent, and consistent across concepts.
- Credit card fees are anticipated to be comprised of a fixed base cost and percentage cost based on the value of the transaction. The overall percentage rate is assumed to be 2.3 percent consistent with typical credit card fee processing rates including a factor for account refunds. With lower revenue generation in comparison to the other concepts, Concept B, with the lowest average toll rates is expected to incur lower overall costs attributed to credit card fees.
- The state or toll agency is assumed to be responsible for general management, vendor oversight, marketing, information technology, accounting and finance, and enforcement/violations. In addition to administrative costs attributed to rent, computer equipment, and other general overhead, other agency costs also

include items for consultant fees, including personal services contracts and forecasting activities.

- The customer service center vendor(s) is (are) responsible for processing toll transactions, collecting toll revenue, maintaining customer accounts, interfacing with customers via telephone and potential retail walk-in centers and providing software applications to enable these functions. Concept B it is assumed that customer service center vendor(s) will be procured to process tolls and manage customer accounts and walk-in centers. Periodic costs associated to vendor procurement, implementation, and testing are typically contracted for 6-10 year periods for systems functions and 3-8 years for operations functions (assuming bi-furcated vendor contracts), in Concept B vendors are assumed to be procured on 8 year cycles.
- Roadway toll systems costs include all lane equipment, hardware, and software required to identify a toll transaction and transmit data about that transaction to the customer service center for payment processing. For all of the concepts it is assumed the toll systems vendor operate under a 10-year fixed fee contract that is procured under the same timeline with a full set of equipment replacement at the beginning of each vendor contract cycle. In Concept B a single toll point is assumed in all lanes and shoulders in both the north and south travel directions and entry ramps.
- Enforcement costs are assumed to be incurred through interagency agreements with law enforcement, typically state patrol, to confirm vehicles are traveling through the facility with a valid and correctly installed transponder. In all concepts enforcement is budgeted during toll service hours with additional enforcement during peak travel times. Concept B assumes base levels of enforcement for registered transponder detection.

Concept C

The following cost factors, based on industry best practices and the judgment of the evaluation team, were accounted for in the generation of revenue estimates for Concept C:

- Concepts facility users are assumed to be required to have a tag/transponder in their vehicle that is linked to a pre-established account to use the tolled lanes.
- Carpools (HOV 3+) are assumed to pay tolls. As such, there is no revenue loss associated with false HOV declaration.
- The use of photo toll equipment for image capture and toll bill processing is not assumed in any of the concepts.
- The modeling assumes that 20 percent potential transactions will divert to the general purpose lanes or alternative routes to avoid fines and fees associated to being a violator.
- Drivers using the lanes without a transponder is expected to be 15 percent.
- Equipment read errors of transponders were assumed to account for less than 0.5 percent, which was consistent across all concepts.
- Transponder accounts linked to expired credit and debit cards and accounts with insufficient balances are assumed to be 4 percent, and consistent across concepts.

- Credit card fees are anticipated to be comprised of a fixed base cost and percentage cost based on the value of the transaction. The overall percentage rate is assumed to be 2.3 percent consistent with typical credit card fee processing rates including a factor for account refunds. With lower revenue generation in comparison to the other concepts, Concept B, with the lowest average toll rates is expected to incur lower overall costs attributed to credit card fees.
- The state or toll agency is assumed to be responsible for general management, vendor oversight, marketing, information technology, accounting and finance, and enforcement/violations. In addition to administrative costs attributed to rent, computer equipment, and other general overhead, other agency costs also include items for consultant fees, including personal services contracts and forecasting activities. Concept C would generate enough annual toll trips to assume that Oregon would establish their own toll agency and back office systems and operations with benefits from economies of scale in regards to state administrative costs per toll transactions.
- The customer service center vendor(s) is (are) responsible for processing toll transactions, collecting toll revenue, maintaining customer accounts, interfacing with customers via telephone and potential retail walk-in centers and providing software applications to enable these functions. For Concept C it was assumed that customer service center vendor(s) will be procured to process tolls and manage customer accounts and walk-in centers. Periodic costs associated to vendor procurement, implementation, and testing are typically contracted for 6-10 year periods for systems functions and 3-8 years for operations functions (assuming bi-furcated vendor contracts), in Concept C vendors are assumed to be procured on 8 year cycles.
- Roadway toll systems costs include all lane equipment, hardware, and software required to identify a toll transaction and transmit data about that transaction to the customer service center for payment processing. For all of the concepts it is assumed the toll systems vendor operate under a 10-year fixed fee contract that is procured under the same timeline with a full set of equipment replacement at the beginning of each vendor contract cycle. In Concept C multiple toll points are assumed in all lanes and shoulders in both the north and south travel directions and entry ramps on both I-5 and I-205, providing significant operations and maintenance and rehabilitation and reconstruction costs.
- Enforcement costs are assumed to be incurred through interagency agreements with law enforcement, typically state patrol, to confirm vehicles are traveling through the facility with a valid and correctly installed transponder. In all concepts enforcement is budgeted during toll service hours with additional enforcement during peak travel times. Concept C assumes base levels of enforcement for registered transponder detection.

Concept D

The following cost factors, based on industry best practices and the judgment of the evaluation team, were accounted for in the generation of revenue estimates for Concept D:

- Concepts facility users are assumed to be required to have a tag/transponder in their vehicle that is linked to a pre-established account to use the tolled lanes.
- Carpools (HOV 3+) are assumed to be exempt from paying tolls. These vehicles would self-declare using a switchable transponder that allows them to switch to HOV status, which tend to be more expensive than a sticker tag. False carpool declaration is estimated to be more than 25 percent of declared carpool trips on U.S. express lane toll facilities. However, rates decline with the presence of law enforcement. This evaluation assumed enforcement levels are adequate for coverage during operating hours, with higher levels during peak periods, with revenue loss of 20 percent.
- The use of photo toll equipment for image capture and toll bill processing is not assumed in any of the concepts.
- The modeling assumes that 30 percent potential transactions will divert to the general purpose lanes or alternative routes to avoid fines and fees associated to being a violator.
- Drivers using the lanes without a transponder are expected to be 5 percent.
- Equipment read errors of transponders were assumed to account for less than 0.5 percent, which was consistent across all concepts.
- Transponder accounts linked to expired credit and debit cards and accounts with insufficient balances are assumed to be 4 percent, and consistent across concepts.
- Credit card fees are anticipated to be comprised of a fixed base cost and percentage cost based on the value of the transaction. The overall percentage rate is assumed to be 2.3 percent consistent with typical credit card fee processing rates including a factor for account refunds. With lower revenue generation in comparison to the other concepts, Concept B, with the lowest average toll rates is expected to incur lower overall costs attributed to credit card fees.
- The state or toll agency is assumed to be responsible for general management, vendor oversight, marketing, information technology, accounting and finance, and enforcement/violations. In addition to administrative costs attributed to rent, computer equipment, and other general overhead, other agency costs also include items for consultant fees, including personal services contracts and forecasting activities. For Concept D it is assumed that, due to the limited number of transactions and reduced potential for economies of scale in procuring a back-office vendor(s) directly, back office functions are assumed to be contracted through another agency at a cost premium to account for periodic vendor procurement.
- The customer service center vendor(s) is (are) responsible for processing toll transactions, collecting toll revenue, maintaining customer accounts, interfacing with customers via telephone and potential retail walk-in centers and providing software applications to enable these functions. For Concept D it was assumed, due to the limited number of transactions and reduced potential for economies of scale in procuring a back-office vendor(s) directly, that back functions would be contracted through another agency at a cost premium to account for periodic vendor procurement. Periodic costs associated to vendor procurement, implementation, and testing are not assumed in Concept D.

- Roadway toll systems costs include all lane equipment, hardware, and software required to identify a toll transaction and transmit data about that transaction to the customer service center for payment processing. For all of the concepts it is assumed the toll systems vendor operate under a 10-year fixed fee contract that is procured under the same timeline with a full set of equipment replacement at the beginning of each vendor contract cycle. In Concept D multiple toll points are assumed in both the east and west travel directions.
- Enforcement costs are assumed to be incurred through interagency agreements with law enforcement, typically state patrol, for both HOV occupancy declaration enforcement and to confirm vehicles are traveling through the facility with a valid and correctly installed transponder. In all concepts enforcement is budgeted during toll service hours with additional enforcement during peak travel times. Concept D assumes higher levels of enforcement for both occupancy and registered transponder detection.

Appendix F Discussion on state and regional laws and policies

The analysis presented in this technical memorandum regarding concept consistency with state and regional laws and polices was conducted using the following documents:

- Oregon Highway Plan (OHP)
- Oregon Transportation Plan (OTP)
- Oregon Revised Statutes (ORS)
- Oregon Constitution
- Oregon Administrative Rules (OAR)
- Metro Regional Transportation Plan (RTP)

It is important to note that this analysis was conducted by applying the methodology that if a concept does not specifically violate applicable state or regional law or policy (i.e., if a concept is not specifically illegal), then the concept receives a top score. State and regional laws and policies contain some standards that any proposed future tolling project must meet. For example, OAR 731-040-0050 – Evaluation and Authorization requires that the OTC cannot "consider authorizing a proposed tollway project for construction until the tollway project has been included as a tollway in the local or regional transportation system plan of jurisdictions in which the project would be located."[11] This means that some level of detail on the proposed tollway would likely need to be included in the Metro RTP at some point.

Other regulations require that the tolling proposal meet certain revenue and cost requirements at a level of detail that is not knowable at the feasibility analysis stage. Still other regulations require that proposed tollways meet certain unspecified parameters that dictate policy considerations (such as traffic operations, diversion of traffic and other considerations similar to those included in this feasibility analysis). This analysis assumes that the specific parameters of the Portland Metro Area Value Pricing Feasibility Analysis, and/or parameters included in future analysis that will be conducted before any tolling proposal is actually implemented, will be accepted as parameters.[12]

Also worth noting is that ORS 383.150 – Traffic congestion relief program, which was established by House Bill 2017, stipulates the following:

> (1) The Oregon Transportation Commission shall establish a traffic congestion relief program.
> (2) No later than December 31, 2018, the commission shall seek approval from the Federal Highway Administration, if required by federal law, to implement value pricing as described in this section.

[11] OAR 731-040-0050 (7).
[12] For example, the OHP stipulates that "ODOT will only consider those toll projects ranked 'medium to high' under tolling parameters considered by ODOT" and then refers to a 2009 white paper that provided similar parameters to this feasibility analysis (OHP Action 6.A.2). This feasibility analysis assumes that the specific parameters of this feasibility analysis are acceptable and/or that future analysis of an actual tolling proposal will include acceptable parameters. This analysis assumes that the parameters identified in the 2009 white paper are not the only parameters that may be determined acceptable.

(3) After seeking and receiving approval from the Federal Highway Administration, the commission shall implement value pricing to reduce traffic congestion. Value pricing may include, but is not limited to, variable time-of-day pricing. The commission shall implement value pricing in the following locations:
(a) On Interstate 205, beginning at the Washington state line and ending where it intersects with Interstate 5 in this state.
(b) On Interstate 5, beginning at the Washington state line and ending where it intersects with Interstate 205.

Portland Metro Area Value Pricing – Summary of Relevant Policies

The information below provides a summary of relevant federal, state, and regional plans and policies in support of the Portland Metro Area Value Pricing Feasibility Analysis.

This is not intended to provide a comprehensive history of all tolling or value pricing efforts in Oregon. Further information about these topics can be found at ODOT's website, http://www.oregon.gov/ODOT/Pages/Value-Pricing.aspx. Questions about the content of this document can be directed to valuepricinginfo@odot.state.or.us.

Background

In 2017, the legislature made a significant commitment to Oregon's multimodal transportation system by passing House Bill 2017, also known as Keep Oregon Moving. The legislation committed $5.3 billion for projects aimed at freeway bottlenecks, active transportation needs, and funding for transit operations.

Section 120 of HB 2017 creates the Traffic Congestion Relief Program and directs the Oregon Transportation Commission (OTC) to request approval from the Federal Highway Administration (FHWA) to implement value pricing on Interstate 5 and Interstate 205 in the Portland metropolitan area. The OTC has until December 31, 2018 to seek FHWA's approval. Once Oregon receives that authority, HB 2017 compels the OTC to move forward with value pricing implementation to relieve congestion.

The OTC directed the Oregon Department of Transportation (ODOT) to conduct a feasibility analysis, working with local government officials and stakeholders and seeking public input so that the voice of all those who may be affected can be heard. A Policy Advisory Committee (PAC) was convened to advise the OTC on implementing Section 120, making recommendation(s) regarding:

- Based on the considerations described under Committee Responsibilities, what location(s) on I-5 and/or I-205 are best suited to implement value pricing?
- For the recommended location(s), what type of value pricing should be applied?
- What mitigation strategies should be pursued based on their potential to reduce the impact of value pricing on environmental justice communities or adjacent communities?

The PAC is asked to consider the following factors in evaluating pricing options:

- Revenue and cost

- Traffic operations improvements
- Diversion of traffic
- Adequacy of transit service
- Equity impacts
- Impacts on the community, economy, and environment
- Public input
- Consistency with state and regional law and policy
- Feasibility under federal law
- Project delivery schedules

Oregon plans and policies

HB 2017 and its value pricing directive are not Oregon's first legislative experience with tolling. The Oregon Department of Transportation's (ODOT's) deliberate approach to modern tolling and value pricing policy began in 1995 with the passage of Senate Bill 626. That legislation resulted in much of Oregon Revised Statutes (ORS) Chapter 383 as it exists today, governing tollway project authority, agreements, funding and fee collection. Although lawmakers and ODOT did not move forward any tolling projects at the time, the Traffic Congestion Relief Program provisions of HB 2017 augment this existing statute in ORS Chapter 383.

Oregon Highway Plan Goal 6

Starting in 2006, the OTC adopted policies to support the consideration of tolling in Oregon as a means to improve the capacity and operational efficiency of the state highway system. Following the commission of a series of white papers that investigated many facets of tolling and value pricing, ODOT updated the Oregon Highway Plan (OHP) in 2009 with Goal 6: Tolling and Congestion Pricing. These amendments set the policy for ODOT and the OTC to follow on future value pricing projects. The white papers and resulting policy identified that tolling can accomplish more than just revenue generation. Additional objectives include congestion relief, greenhouse gas/emission reduction, and economic development. OHP Goal 6 also established policies that stipulate tolling project requirements, public engagement and education, and tolling technology and system interoperability (http://www.oregon.gov/ODOT/Planning/Documents/OHP-Tolling-Pricing-Policy-Amendments.pdf).

Statewide tolling policy work continued in 2012, with the adoption of many additions to Oregon Administrative Rule (OAR) Chapter 731, Division 40. These rules implement the provisions of ORS Chapter 383 that direct ODOT and OTC to further clarify statute and set the parameters OTC will use when considering toll project proposals. These rules also create a process for reviewing and approving toll rates, reinforce Oregon's commitment to interoperability, establish civil penalties for failure to pay a toll, and set up processes specific to interstate bridge toll projects.

Oregon policy on uses of revenue

HB 2017 dedicates net revenue from value pricing to a newly created Congestion Relief Fund. As a tax or excise levied on the operation or use of a motor vehicle, revenue from value pricing would be subject to the same limitations as the State Highway Fund. The State Highway Fund is bound by the restrictions of Article IX, Section 3a of the Oregon

Constitution, which specifies that funds "shall be used exclusively for the construction, reconstruction, improvement, repair, maintenance, operation and use of public highways, roads, streets and roadside rest areas in this state."

The Oregon Supreme Court has interpreted this to mean that these funds "must be limited exclusively to expenditures on highways, roads, streets and roadside rest areas themselves and for other projects or purposes within or adjacent to a highway, road, street or roadside rest area right-of-way that primarily and directly facilitate motorized vehicle travel."

The Oregon Department of Justice (DOJ) has not completed a full analysis of what activities that support public transportation or active transportation may be eligible under Article IX, Section 3a. However, DOJ has provided informal and formal opinions on a range of potential eligible uses of State Highway Fund dollars that may help inform the OTC considerations:

- Park-and-ride lots that connect auto users to bus systems: these must be in or adjacent to the right-of-way and must serve bus routes (and could not solely serve light rail, for example, as it is not "motorized vehicle travel").
- Construction of shared-purpose lanes that include light rail—although the cost of light rail-only improvements within the lane (such as the rail itself) would not be eligible to be paid with State Highway Fund dollars.
- Bus malls: former public streets that will be closed to all motor vehicle traffic except buses are eligible.
- Bus pullouts on the highway.
- Bicycle and pedestrian facilities that are within the highway, road or street right-of-way are eligible. Off-system paths and trails are not.

The newly created Congestion Relief Fund is a dedicated account to finance congestion relief efforts on the identified tollways, including value pricing administrative and operating costs, new or expanded facilities and ongoing maintenance of the tollways.

While the Congestion Relief Fund is established in statute as a distinct account from the previously established State Tollway Account, the latter may provide insights into future rules for use for the newly created fund. ORS 383.009(2) provides that State Tollway Account funds may be used to finance preliminary studies, acquire right of way, construct, improve or maintain the tollway, operate and administer applicable toll systems, and finance any bonds or other obligations used for such expenses.

Upon passage of HB 2017, the legislature included a "budget note" directing ODOT to dedicate value pricing revenue for funding congestion relief efforts along I-205, particularly the I-205 Stafford Road to Abernethy Bridge projects. The note attached to ODOT's 2017-2019 budget is in effect through the duration of the budgetary biennium, which ends June 30, 2019. Beyond the period of time covered by the budget note, the Oregon Transportation Commission will set policy for where revenue from value pricing should be directed, subject to further direction from the Legislature. The Policy Advisory Committee may choose to make recommendations to the Commission on this topic.

Federal tolling programs

Federal laws pertaining to the collection of tolls on Interstate highways, and the use of federal funds for tolling projects, largely predate the Interstate system itself. Initially, provisions in Title 23 of United State Code (U.S.C.) prohibited the use of federal money for tolling projects on federal-aid highway fund facilities. In 1991, however, the Intermodal Surface Transportation Efficiency Act (ISTEA) opened the door for federally funded tolling projects. ISTEA required that tolling of any existing roads or bridges may only occur after the facility is reconstructed, expanded or otherwise improved. Subsequent congressional action allowed tolling of high-occupancy vehicle lanes and established a pilot project for jurisdictions to experiment with congestion pricing. The following is an overview of relevant tolling regulations and their applicability to the various concepts under consideration by the Portland Metro Area Value Pricing Policy Advisory Committee (PAC).

23 U.S.C. Section 129 – Mainstream Tolling

Title 23 U.S.C. Section 129 provides authority for tolling Federal-aid highways in conjunction with new construction or other improvements to those highways. Public agencies may impose new tolls on federal-aid highways in the following cases:

- Initial construction of a new highway, bridge, or tunnel
- Initial construction of new lanes on highways, bridges, and tunnels (including Interstates), as long as the number of toll-free lanes is not reduced
- Reconstruction or replacement of a bridge or tunnel
- Reconstruction of a highway (other than an Interstate)
- Reconstruction, restoration, or rehabilitation of an Interstate highway, as long as the number of toll-free lanes is not reduced

Prior to October 1, 2012, public authorities were required to execute a tolling agreement with FHWA to impose tolls on a federal-aid highway, but this requirement is no longer required. Although tolling agreements are no longer required under the mainstream tolling programs, State departments of transportation and other public agencies responsible for toll facilities are strongly encouraged to execute a memorandum of understanding (MOU) with their FHWA Division Offices, particularly considering the new requirements for audits and the potential consequences of noncompliance (including the discontinuation of toll collection).

Of the pricing concepts advanced for Round 2 analysis, Concepts D (adding capacity to the southern section of I-205 and pricing those lanes) and E (replacement of the Abernethy Bridge) fall under the jurisdiction of the Title 23 U.S.C. Section 129 provisions.

23 U.S.C. Section 166 – HOV/HOT Lane Program

Under Section 166 of Title 23, existing HOV lanes may be converted to tolled operation provided that tolls are variably priced and collected electronically in order to manage travel demand. The program includes consultation the local metropolitan planning organization (MPO) regarding the placement and amount of tolls on the converted lanes. To implement tolls on an existing high-occupancy vehicle (HOV) lane, project sponsors must demonstrate that the presence of paying vehicles will not cause conditions on the facility to become degraded. Ongoing annual reporting

documenting conditions on the converted lanes is also required, and if the HOV facility becomes degraded the sponsor must bring the facility into compliance either by increasing HOV occupancy requirements, increasing tolls, increasing capacity, or eliminating access to paying motorists.

The following certification provisions apply whenever an HOV lane is converted to HOT operations under Section 166:

- States must certify annual to FHWA that they meet the operational requirements stipulated in Section 166, including vehicle eligibility; enforcement, and operational performance monitoring, evaluation and reporting. The annual certifications must demonstrate that the presence of paying vehicles in the high-occupancy toll (HOT) lane has not cause traffic service to become degraded.
- States must demonstrate that programs are in place to inform motorists how they may enroll and use the managed lane, either in a non-paying HOV vehicle or a paying HOT vehicle.
- States must indicate that they have or will have an automated electronic toll collection system in place on the managed lanes.

While Oregon has only minimally utilized HOV lanes, one option under consideration in Round 2, Concept A, involves conversion of the existing HOV lane on the northbound portion of I-5. Accordingly, Oregon could avail itself to the provisions of 23 U.S.C. Section 166 should this concept continue to move forward.

Value Pricing Pilot Program

The Value Pricing Pilot Program (VPPP) is designed to assess the potential of different value pricing approaches for reducing congestion. Under this program, tolls may be imposed on existing toll-free highways, bridges, and tunnels, so long as variable pricing is used to manage demand. Congress has authorized up to 15 slots under the VPPP, which are allocated to State or local agencies. Seven of these slots have been permanently allocated to States that have executed agreements for tolling projects under the program.

Oregon currently has a VPPP slot, which was used in the past to evaluate tolling on Highway 217 as well as a project by Portland State University regarding peer-to-peer car sharing in Portland. This VPPP could be used for other congestion pricing projects in Oregon. Once an agency holds a slot in the program, it may be used for multiple value pricing projects.

Round 2 Concepts A (southbound I-5 managed lane), B (pricing all lanes of I-5 from Going St. at the northern end to Multnomah Blvd. at the southern end) and C (pricing all lanes of I-5 and I-205, from the Washington state line to the southern terminus of I-205 at I-5) would likely use the VPPP tolling program.

Regional plans and policies

In 2000, the Metro Council and the Joint Policy Advisory Committee on Transportation (JPACT) adopted a peak period pricing policy and policy direction for future corridor refinement plans and studies, as recommended by the Traffic Relief Options (TRO) study led by ODOT and Metro. This action was reflected in a new RTP policy on peak period pricing and specific provisions for pricing to be considered as part of several upcoming

corridor studies, including the Sunrise Highway, I-5-99W Connector, Sunset Highway, I-5, I-205, Highway 99E/224 and Highway 217.

The Transportation System Management and Operations (TSMO) Strategic Plan, which was adopted as part of the RTP in 2010, also identifies value pricing as a potential strategy for future traffic management and calls for the study and implementation of congestion pricing/high occupancy lanes.

The 2014 RTP also made value pricing an objective within the plan's Goal 4, "Emphasize Effective and Efficient Management of the Transportation System." The RTP advances value pricing as one possible strategy to help the region optimize capacity of existing facilities, improve travel conditions for system users, and address complementary goals such as improving air quality and meeting greenhouse gas emission reduction targets.

Chapter 2 of the 2014 RTP includes the following language:

"Value pricing—sometimes called congestion pricing —involves the application of market pricing (through variable tolls, variable priced lanes, area-wide charges or cordon charges) to the use of roadways at different times of day. While this tool has been successfully applied in other parts of the U.S. and internationally, it has not been applied in the Portland metropolitan region to date. In 2008, the Oregon Department of Transportation (ODOT) researched the potential effects of tolling/pricing to determine if and how tolling could be applied in Oregon. ODOT will research the application of this tool in the Portland metropolitan region and identify a pilot project to further test this strategy in response to House Bill 2001, which was adopted by the 2009 Legislature.

"As applied elsewhere, this strategy manages peak use on limited roadway infrastructure by providing an incentive for drivers to select other modes, routes, destinations or times of day for their travels. Reducing discretionary peak hour travel helps the system operate more efficiently improving mobility and reliability of the transportation system while limiting vehicle miles traveled and congestion-related auto emissions. In addition, those drivers who choose to pay tolls can benefit from significant savings in time. Similar variable charges have been utilized for pricing airline tickets, telephone rates and electricity rates to allocate resources during peak usage. In addition, value pricing may generate revenues to help with needed transportation improvements. More work is needed to gain public support for this tool." (2014 RTP, pages 2-86 and 2-87).

Chapter 6 of the RTP, "Implementation," identifies several corridors and facilities that should consider pricing strategies as part of future rehabilitation or capacity expansion projects. Specifically, Tigard to Wilsonville (Mobility Corridor #3, centered on I-5 South), Clark County to I-5 via Gateway, Oregon City and Tualatin (Mobility Corridors # 7, 8, and 9, centered on I-205) and Portland Central City Loop (Mobility Corridor # 4, centered on I-5 and I-405) are all targets of opportunity for future pricing efforts.