

Regional Mobility Pricing Project

Memorandum

Date	July 21, 2022
To	I-5 Rose Quarter Improvement Project Team
From	Regional Mobility Pricing Project Team
Subject	RMPP/RQ Regional Travel Demand Model Sensitivity Test Results Summary

1 Purpose

This memo provides a summary of regional travel demand model (RTDM) results in the vicinity of the I-5 Rose Quarter Improvement Project (RQ Project) for different future model scenarios in 2045. Specifically, this review looked at the impacts that the RQ Project and the Regional Mobility Pricing Project (RMPP) could have on each other. This sensitivity analysis also was prepared to further address issues identified by the RQ Project team in response to stakeholder questions received during the 2019 Environmental Assessment public comment period for the RQ Project.

The Portland Metro RTDM was used to provide high level traffic analysis and comparisons to better understand the relationship between the two projects. The RQ Project would include construction of additional auxiliary lanes and shoulders on I-5 between I-84 and I-405. The RMPP would apply pricing (tolls) on all lanes of I-5 and I-205 to manage traffic congestion.

2 Methodology/Assumptions

Four model scenarios were evaluated in 2045 and compared to assess potential changes in conditions with and without RMPP and with and without the RQ Project improvements. Table 1 shows major projects that were included for each scenario. Scenarios with RQ Project improvements are called No Build while scenarios without RMPP are called No Action.

The RMPP (Action) scenarios include preliminary modeling toll rate assumptions developed for the Initial Congestion Pricing Concept (ICPC). The ICPC scenario was developed to address congestion in 2045 baseline (No Action) conditions. These assume construction of the RQ Project and other (constrained) projects in the Regional Transportation Plan that have been identified as reasonably likely to be funded by 2045. The RMPP toll rate assumptions will be updated/refined as the project is developed further.

The ICPC toll rate assumptions are assumed to be variable by time of day based on an hourly schedule, not dynamically priced as a function of congestion. No adjustments or modifications were made to the toll rate assumptions to account for RQ Project Build/No Build status. The toll rate assumptions were held constant between the two model scenarios that include the RMPP.

Table 1. Scenarios Compared in 2045

	Baseline Scenarios for RMPP		Additional Scenarios for Sensitivity Test	
	RMPP No Action w/ RQ Build	RMPP ICPC w/ RQ Build	RMPP No Action w/ RQ No Build	RMPP ICPC w/ RQ No Build
I-205 Toll Project	✓	✓	✓	✓
I-205 Improvements Project	✓	✓	✓	✓
IBR Program Toll	✓	✓	✓	✓
IBR Program Improvements	✓	✓	✓	✓
Rose Quarter Improvement Project	✓	✓	x	x
RMPP Initial Congestion Pricing Concept	x	✓	x	✓

3 Limitations

Specific results from the RTDM scenarios are expected to differ from the RQ Project technical analysis, as different methodologies, assumptions, and tools are applied in each project. RMPP project results are also expected to change as more detailed and refined analysis will be performed during later project phases.

Regional travel demand models do not supersede or replace the need for more refined traffic operations analysis currently being conducted by the RQ project team. The RTDM forecasts are generally not appropriate for directly predicting future traffic conditions at specific locations. They are best used to support planning decision-making by providing relative comparisons between scenarios and high-level indicators of potential changes in key performance measures.

The RMPP’s ICPC was not designed to eliminate traffic congestion in the Rose Quarter but was designed to manage demand and congestion along the I-5 and I-205 corridors in the Portland metro area, assuming the RQ Project improvements have been constructed on I-5. Either updating the project objectives or the baseline assumptions could change the assumed/applied toll rates of the RMPP.

The analysis presented is limited to consideration of results on the I-5 mainline and does not include evaluation of potential changes in traffic conditions on other nearby roadways in the area around the RQ Project.

4 Results

Tables 2 and 3 show the peak hour model volumes on I-5 between I-405 and I-84 for each of the four scenarios. All model scenarios reflect average weekday conditions in 2045. While the number of trips on I-5 increases under a RQ Project build scenario for all four conditions analyzed (two in the AM and two in

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the PM), the model network changes indicate that most of these trips are rerouting from other roadways that are alternatives to I-5. This reflects the model reacting to changed conditions to increase the efficiency of the network by transferring trips to I-5 and away from a more congested alternatives such as I-405 and/or surface streets near I-5.

Table 2. 2045 Average Weekday Traffic Volumes on I-5 between I-405 and Broadway/Weidler Interchange

8-9 AM	RMPP No Action		RMPP ICPC	
	RQ No Build	RQ Build	RQ No Build	RQ Build
NB	4,948	5,634	3,938	4,179
SB	4,605	5,190	3,356	3,931

5-6 PM	RMPP No Action		RMPP ICPC	
	RQ No Build	RQ Build	RQ No Build	RQ Build
NB	4,487	5,121	3,425	3,327
SB	5,624	5,710	4,370	4,071

Source: Metro Regional Travel Demand Model

Table 3. 2045 Average Weekday Traffic Volumes on I-5 between I-84 and Broadway/Weidler Interchange

8-9 AM	RMPP No Action		RMPP ICPC	
	RQ No Build	RQ Build	RQ No Build	RQ Build
NB	4,711	5,437	4,150	4,519
SB	4,328	4,884	3,531	3,900

5-6 PM	RMPP No Action		RMPP ICPC	
	RQ No Build	RQ Build	RQ No Build	RQ Build
NB	4,839	5,534	4,160	4,129
SB	5,046	5,547	4,297	4,236

Source: Metro Regional Travel Demand Model

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Both the RQ Project build and the RMPP ICPC would be expected to result in changes in traffic volumes, circulation patterns, and traffic operations on I-5 and other roadways near the RQ Project area. RQ Project improvements are expected to increase the driver’s ability to safely navigate the roadway near the junctions of I-5, I-405, and I-84. The RMPP is expected to manage demand to help prevent traffic flow breakdowns with their associated social, economic, and environmental costs. Both of these projects support improved traffic flow and reduced congestion on I-5. While additional analysis would be needed to fully understand the expected changes in traffic operations, looking at relative differences in speeds from the RTDM can provide insights for these projects.

Table 4 and 5 below show the RTDM forecast vehicle speeds during peak hours on I-5 between I-405 and I-84 for each of the four scenarios. All model scenarios reflect average weekday conditions in 2045. It should be noted that small differences in speeds (less than a few miles per hour) are negligible and should not be viewed as a substantive difference between scenarios.

Table 4. 2045 Average Weekday Traffic Speed (in mph) on I-5 between I-405 and Broadway/Weidler Interchange

8-9 AM	RMPP No Action		RMPP ICPC	
	RQ No Build	RQ Build	RQ No Build	RQ Build
NB	22	33	39	44
SB	39	37	45	44

5-6 PM	RMPP No Action		RMPP ICPC	
	RQ No Build	RQ Build	RQ No Build	RQ Build
NB	31	39	43	46
SB	31	35	42	45

Source: Metro Regional Travel Demand Model

Table 5. 2045 Average Weekday Traffic Speed (in mph) on I-5 between I-84 and Broadway/Weidler Interchange

8-9 AM	RMPP No Action		RMPP ICPC	
	RQ No Build	RQ Build	RQ No Build	RQ Build
NB	14	32	27	41
SB	38	39	44	44

5-6 PM	RMPP No Action		RMPP ICPC	
	RQ No Build	RQ Build	RQ No Build	RQ Build
NB	14	33	27	44
SB	33	36	41	44

Source: Metro Regional Travel Demand Model

The RQ Project would not construct any improvements to I-5 southbound between I-405 and Broadway/Weidler interchange; the added auxiliary lane and shoulder in the southbound direction begins south of the southbound Broadway exit. RTDM traffic speed results in this section show limited changes when comparing RQ No-Build and RQ Build in the RMPP ICPC. A more detailed traffic operations analysis is needed to incorporate additional operational factors such as downstream queuing impacts. However, some trends can be identified.

In general, most freeway facilities tend to operate with maximum vehicle flow when average speeds are between 40 mph and 50 mph. Speeds below 40 mph usually indicate a freeway with congestion that negatively impacts its ability to efficiently move vehicles and that can lead to major flow breakdowns. To achieve speeds above 50 mph, the freeway is not likely to be carrying all traffic that it could. The analysis indicates that speeds between 40mph and 50 mph are achieved on all roadway segments only where both the RMPP and the RQ Project improvements are in place.

Table 6 shows the number of hours per day that congestion can be expected to be experienced on I-5 for each of four scenarios and shows the complementary effect with both strategies in place. All model scenarios reflect average weekday conditions in 2045.

Table 6. 2045 Daily Number of Hours with Congestion on I-5 between I-84 and I-405

		RMPP No Action		RMPP ICPC	
		RQ No Build	RQ Build	RQ No Build	RQ Build
Between I-405 and Broadway/Weidler Interchange	NB	13	6	7	0
	SB	6	8	0	0
Between I-84 and Broadway/Weidler Interchange	NB	15	13	12	0
	SB	12	7	0	0

Note: Congestion defined when the ratio of hourly model volume to roadway capacity exceeds 0.8.

Source: Metro Regional Travel Demand Model

5 Summary of Findings

The following observations were made based on comparing the RTDM results for 2045 scenarios:

- Both the RQ Project and RMPP Initial Congestion Pricing Concept (ICPC) were needed to reduce congestion below the congestion threshold (0.80 V/C) for all hours and directions of travel.
- RMPP ICPC could reduce peak hour volumes/demand on I-5 by approximately 1,000 vehicles per hour or more in each direction near the Rose Quarter.
- The RQ Project and RMPP ICPC are each expected to reduce the duration and severity of congestion on I-5 near the Rose Quarter.
- RMPP ICPC is comparatively more effective at improving speeds to above 40 mph.
- RMPP ICPC toll rate assumptions would need to be refined if RQ Project improvements are not constructed. Otherwise, severe congestion would remain on northbound I-5 near I-84.
- For a more refined operational analysis, post-processing of the RTDM results is necessary.