Appendix D2 I-205 Toll Project Truck Toll Multiplier Sensitivity Analysis – Air Quality Effects

I-205 Toll Project Truck Toll Multiplier Sensitivity Analysis – Air Quality Effects Memorandum

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Subject	Truck Toll Multiplier Sensitivity Analysis – Air Quality Effects

1 Introduction

As part of the *I-205 Toll Project Air Quality Technical Report*, analysts estimated vehicle emissions of mobile source air toxics for the No Build Alternative and Build Alternative. In addition, the *I-205 Toll Project Air Pollutant Emissions Memorandum* addressed the estimated emissions of criteria pollutants.[1] The estimates in each of these quantitative analyses were based on traffic modeling performed with toll rate schedule assumptions developed for the I-205 Toll Project Build Alternative.

Unlike these earlier analyses, this memorandum outlines the findings of a sensitivity analysis based on traffic modeling that applies a truck toll multiplier that assumes higher toll rates for medium and heavy trucks. The new toll rate schedule assumptions, referred to in this memorandum as the Truck Toll Multiplier Assumptions, allows analysts to consider potential effects of different toll rates based on vehicle class.

The traffic model results with the Truck Toll Multiplier Assumptions show similar reductions, relative to the No Build Alternative, of vehicle miles traveled (VMT) within the Area of Potential Impact (API) as the Build Alternative. [2] However traffic model results with the Truck Toll Multiplier Assumptions have slightly different vehicle volumes and vehicle mix as compared to the Build Alternative.

Using methodology consistent with that presented in the *I-205 Toll Project Air Quality Technical Report* and *I-205 Toll Project Air Pollutant Emissions Memorandum*, emissions for all pollutants were estimated for the Build Alternative with Truck Toll Multiplier Assumptions (Build TTM). The results are presented in Table 1 through Table 4 below. Previous results from the No Build and Build Alternatives are included for context, but they have not changed as part of this sensitivity analysis.

[1] Criteria pollutant emissions evaluated for the I-205 Toll Project include carbon monoxide, sulfur dioxide, nitrogen oxides, volatile organic compounds, and particulate matter.

[2] See the *I-205 Toll Project Truck Toll Multiplier Sensitivity Analysis – Transportation Effects Memorandum.*

2 Findings

For all pollutants and analysis years, applying the assumptions of the Build TTM results in less estimated emissions than the No Build Alternative. These reductions are the same or more than the emissions reductions estimated for the Build Alternative. The *I-205 Toll Project Air Quality Technical Report* presents more detailed evaluations of specific pollutants by vehicle type and road type. Those evaluations were not performed for the Build TTM because the overall emissions were lower than the Build Alternative. The effects presented in this Truck Toll Multiplier Sensitivity Analysis do not change any of the impact conclusions in the *I-205 Toll Project Air Quality Technical Report.*

Table 1. Mobile Source Air Toxics Emissions (tons per year)

Pollutant	2027					2045				
	No Build	Build	Build TTM	Build % Change from No Build	Build TTM % Change from No Build	No Build	Build	Build TTM	Build % Change from No Build	Build TTM % Change from No Build
Annual VMT	1,051,694,624	965,576,193	960,409,068	-8%	-9%	1,222,083,927	1,162,440,219	1,151,422,862	-5%	-6%
1,3-Butadiene	0.033	0.030	0.030	-8%	-10%	0.000	0.000	0.000	0%	0%
Acetaldehyde	0.379	0.357	0.336	-6%	-11%	0.328	0.298	0.270	-9%	-18%
Acrolein	0.038	0.036	0.033	-5%	-11%	0.022	0.020	0.018	-8%	-15%
Benzene	0.985	0.899	0.896	-9%	-9%	0.707	0.647	0.644	-8%	-9%
Diesel Particulate Matter	2.084	2.029	1.791	-3%	-14%	1.246	1.156	0.963	-7%	-23%
Ethylbenzene	0.710	0.647	0.642	-9%	-9%	0.602	0.543	0.536	-10%	-11%
Formaldehyde	0.616	0.577	0.548	-6%	-11%	0.410	0.373	0.349	-9%	-15%
Naphthalene	0.062	0.058	0.056	-7%	-10%	0.027	0.025	0.024	-8%	-9%
Polycyclic Organic Matter	0.027	0.025	0.024	-7%	-10%	0.011	0.010	0.010	-7%	-9%

Note: Update of Table 6-2 from the *I-205 Toll Project Air Quality Technical Report*

TTM = Truck Toll Multiplier Assumption; VMT = vehicle miles traveled

Table 2. Criteria Pollutant Emissions Comparison (pounds per summer day)

Pollutant	2027					2045				
	No Build	Build	Build TTM	Build % Change from No Build	Build TTM % Change from No Build	No Build	Build	Build TTM	Build % Change from No Build	Build TTM % Change from No Build
CO	53,433	52,594	52,504	-2%	-2%	31,491	31,055	30,849	-1%	-2%
NOx	5,230	5,179	5,114	-1%	-2%	4,287	4,146	4,063	-3%	-5%
SO_2	22	20	20	-5%	-6%	21	21	20	-4%	-6%
VOC	12,973	12,939	12,934	-0.3%	-0.3%	8,257	8,227	8,220	-0.4%	-0.4%
Total PM_{10}*	462	427	428	-7%	-7%	505	442	440	-12%	-13%
Total $PM_{2.5}$**	216	210	209	-2%	-3%	177	168	167	-5%	-6%

Note: Update of Table 3 from the *I-205 Toll Report Air Pollutant Emissions Memorandum*

* Total PM_{10} emissions are the sum of PM_{10} exhaust, PM_{10} brakewear, and PM_{10} tirewear.

** Total $PM_{2.5}$ emissions are the sum of $PM_{2.5}$ exhaust, $PM_{2.5}$ brakewear, and $PM_{2.5}$ tirewear.

CO = carbon monoxide; NOx = nitrogen oxides; PM_{10} = particulate matter less than 10 microns in diameter; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; SO_2 = sulfur dioxide; TTM = Truck Toll Multiplier Assumption; VOC = volatile organic compound

Table 3. Criteria Pollutant Emissions Comparison (pounds per winter day)

	2027					2045				
Pollutant	No Build	Build	Build TTM	Build % Change from No Build	Build TTM % Change from No Build	No Build	Build	Build TTM	Build % Change from No Build	Build TTM % Change from No Build
CO	74,556	73,862	73,768	-1%	-1%	50,891	50,538	50,326	-1%	-1%
NOx	5,773	5,720	5,650	-1%	-2%	5,033	4,882	4,793	-3%	-5%
SO_2	24	23	23	-4%	-5%	24	23	22	-3%	-5%
VOC	12,941	12,909	12,904	-0.3%	-0.3%	9,998	9,969	9,962	-0.3%	-0.4%
Total PM_{10}*	598	564	565	-6%	-6%	592	530	528	-11%	-11%
Total $PM_{2.5}$**	337	331	330	-2%	-2%	254	246	245	-3%	-4%

Note: Update of Table 4 from the *I-205 Toll Report Air Pollutant Emissions Memorandum*

* Total PM_{10} emissions are the sum of PM_{10} exhaust, PM_{10} brakewear, and PM_{10} tirewear.

** Total $PM_{2.5}$ emissions are the sum of $PM_{2.5}$ exhaust, $PM_{2.5}$ brakewear, and $PM_{2.5}$ tirewear.

CO = carbon monoxide; NOx = nitrogen oxides; PM_{10} = particulate matter less than 10 microns in diameter; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; SO_2 = sulfur dioxide; TTM = Truck Toll Multiplier Assumption; VOC = volatile organic compound

Table 4. Annual Emissions Comparison (tons per year)

Pollutant	2027					2045				
	No Build	Build	Build TTM	Build % Change from No Build	Build TTM % Change from No Build	No Build	Build	Build TTM	Build % Change from No Build	Build TTM % Change from No Build
CO	11,120	10,988	10,971	-1%	-1%	7,150	7,082	7,044	-1%	-1%
NOx	966	956	944	-1%	-2%	813	786	770	-3%	-5%
SO_2	4	4	4	-5%	-6%	4	4	4	-4%	-5%
VOC	2,243	2,237	2,236	-0.3%	-0.3%	1,594	1,589	1,587	-0.3%	-0.4%
Total PM_{10}[a]*	94	88	88	-7%	-7%	98	86	86	-12%	-12%
Total $PM_{2.5}$**	48	47	47	-2%	-2%	37	36	36	-4%	-5%

Note: Update of Table 5 from I-205 Toll Project Air Pollutant Emissions Memorandum

* Total PM_{10} emissions are the sum of PM_{10} exhaust, PM_{10} brakewear, and PM_{10} tirewear.

** Total $PM_{2.5}$ emissions are the sum of $PM_{2.5}$ exhaust, $PM_{2.5}$ brakewear, and $PM_{2.5}$ tirewear.

CO = carbon monoxide; NOx = nitrogen oxides; PM_{10} = particulate matter less than 10 microns in diameter; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; SO_2 = sulfur dioxide; TTM = Truck Toll Multiplier Assumption; VOC = volatile organic compound