



900 Chapel Street, Suite 1400
New Haven, CT 06510
tel: 203 865-2191
fax: 203 624-0484

July 12, 2013

Mr. Stan Koniz
Director of Finance
E-470 Public Highway Authority
22470 East 6th Parkway
Aurora, CO 80018

Subject: E-470 Public Highway Authority, 2013 Traffic and Toll Revenue “Bring-Down” Letter

Dear Mr. Koniz:

As part of the upcoming refinancing, CDM Smith (CDMS) was requested by the E-470 Public Highway Authority (Authority) to perform a review of the traffic and toll revenue forecasts contained in our July 26, 2011 letter report entitled, E-470 Public Highway Authority, Traffic and Toll Revenue “Bring-Down” Letter, and to update the forecasts contained therein, if necessary. To accomplish this, we reviewed the latest monthly traffic and revenue trend data by toll plaza through May 2013 and compared these against the aforementioned July 2011 bring-down letter forecasts, reviewed the divergence between the estimated and actual distributions of EXpressToll and License Plate Toll (LPT) transactions, reviewed the status of projects on the latest highway improvement program versus what was contained in the prior studies, and reviewed the latest socioeconomic and demographic forecasts as compared with those used in the 2008 comprehensive traffic and revenue study and subsequent letter report updates.

Prior Study and Letter Report Updates

CDM Smith Inc., formerly Wilbur Smith Associates, was retained by the Authority in 2008 to prepare a comprehensive traffic and revenue study providing estimates of future traffic and toll revenue through year 2038 based on the conversion of E-470 from a closed, cash barrier/open road tolling system which included cash toll payments, to an all-electronic toll collection system. Subsequent to the 2008 study, the Authority had CDMS prepare two letter reports providing updated forecasts of traffic and toll revenue based on the latest actual traffic and revenue experience on E-470 and due diligence assessments pertaining to key variables which could influence future use of the toll road. These variables include the ExpressToll/License Plate Toll market shares; the toll rates and/or toll rate structure; the regional highway improvement program, particularly changes to projects proximate to E-470; and, the regional socioeconomic and demographic forecasts, also paying particular attention to changes within the E-470 corridor. These updates, including forecasts of traffic and toll revenue were completed and presented in



Mr. Stan Koniz
July 12, 2013
Page 2

letter reports dated September 23, 2010 and July 26, 2011. Brief descriptions of the 2008 comprehensive study and the two updates are provided below.

2008 Comprehensive Traffic and Revenue Study

The objective of the 2008 study was to prepare long-term forecasts of annual transactions and toll revenue recognizing the conversion of E-470 from a closed, cash barrier/open road tolling system with cash and electronic (EXpressToll) methods of toll payment, to an All-Electronic Tolling (AET) system with EXpressToll and License Plate Toll (LPT) methods of toll payment. The study, finalized in December 2008, provided forecasts of toll transactions and revenue through 2038 for both a Base Case, which assumed the continuation of the then-existing EXpressToll and cash methods of toll payment, and an AET system of toll collection employing only EXpressToll and LPT methods of toll payment. These forecasts were prepared based on a study work program which included:

- An origin-destination survey of E-470 customers;
- A stated-preference survey of existing E-470 cash customers;
- An independent review of economic growth forecasts in the E-470 corridor to assess the reasonableness of regional growth assumptions used in the regional travel demand model;
- Development of a traffic model;
- A toll rate sensitivity analysis to provide a measure of revenue potential under higher toll rates; and
- A level of service analysis to identify when future capital improvements to the E-470 mainline may be required.

Based on the study findings, it was determined that the planned \$0.25 toll rate increases every three years from 2009 through 2021, assumed in the Base Case, would be carried into the AET system. Table 1 presents the toll rate assumptions used at that time for the AET analysis.

On January 1, 2009, LPT became an optional method for toll payment in addition to EXpressToll and paying cash. On July 4, 2009, the cash toll booths were removed and paying cash was no longer an option. Tolls in 2009, the first year of AET operations increased for EXpressToll customers from \$1.75 at Plaza A to \$2.00 and from \$2.00 at Plazas B through E to \$2.25. LPT customers who chose not to open an EXpressToll account but continue to use E-470 would be charged an additional \$0.25 at each mainline plaza. An invoice for the toll charges incurred by LPT customers would be sent on a monthly basis, including the additional \$0.25 per transaction. Tolls at all ramp plazas in 2009 increased from \$0.75 for all customers to \$0.90 for EXpressToll and \$1.00 for LPT customers. Based on the rates shown in Table 1, the tolls of EXpressToll customers were 10 percent less than those for LPT customers in all years of the 2009-2038 forecasts.



Table 1
Non-Stop Tolling Toll Rate Assumptions
Passenger Car-Based Rates
2009 - 2021

Year	Method of Payment	Mainline Plazas		Ramp Plazas
		A	B, C, D, E	
2009	EXpressToll	\$ 2.00	\$ 2.25	\$ 0.90
	License Plate Toll	2.25	2.50	1.00
2012	EXpressToll	2.25	2.50	1.00
	License Plate Toll	2.53	2.78	1.12
2015	EXpressToll	2.50	2.75	1.11
	License Plate Toll	2.81	3.06	1.23
2018	EXpressToll	2.75	3.00	1.21
	License Plate Toll	3.09	3.34	1.35
2021	EXpressToll	3.00	3.25	1.32
	License Plate Toll	3.37	3.62	1.46

September 23, 2010 Traffic and Revenue Update Letter

In connection with the planned bond transaction in 2010, the Authority requested that CDMS review the traffic and toll revenue forecasts presented in the 2008 Comprehensive Traffic and Toll Revenue Study based on then-recent actual traffic utilization of E-470 and the resultant toll revenues for all of 2009 and eight months of 2010. As part of the 2010 update, not only was actual total traffic and revenue performance reviewed against the earlier forecasts, but reviews by methods of toll payment were also performed since variances in the estimated versus actual market shares of ExpressToll/LPT customers would impact toll revenue. Also assessed were proposed highway improvements within the immediate E-470 corridor, including principal competing and feeder roadways, and changes to the regional socioeconomic and demographic forecasts possibly impacting traffic potential to E-470.



Mr. Stan Koniz
July 12, 2013
Page 4

July 26, 2011 Traffic and Revenue Update Letter

In November 2010, the Authority requested that CDMS perform an assessment of five alternative toll pricing strategies. In a letter report dated November 24, 2010 entitled, "Alternative Pricing Strategies Traffic and Revenue", CDMS summarized its assessment of each strategy which also included forecasts of traffic and revenue for each. Effective January 1, 2011, the Authority implemented the pricing strategy identified as Alternative E in the November 2010 letter report. A brief description of each pricing strategy including Alternative E is presented below.

In connection with the planned bond transaction in 2011, the Authority requested that CDMS review and update the traffic and toll revenue forecasts for Alternative E contained in the November 2010 Alternative Pricing Strategies Traffic and Revenue letter report. That report tasked CDMS with performing a preliminary assessment of several alternative pricing strategies. These strategies included:

- Alternative A: Incremental Annual Toll Increases;
- Alternative B: Axle-Based Ramp Tolls;
- Alternative C: Increased EXpressToll / License Plate Toll Differentials;
- Alternative D: Three-Tier Tolling Concept; and
- Alternative E: Increased EXpressToll / License Plate Toll Differentials combined with Incremental Annual Toll Increases.

Alternative E was adopted by the Authority's Board of Directors as the preferred alternative primarily because it retained the planned toll increases of \$0.25 every three years for EXpressToll and increased the toll differential between EXpressToll and LPT. It was believed the latter would influence the conversion of LPT customers to EXpressToll customers because of its lower toll rates.

In this alternative, it was assumed that beginning on January 1, 2011, the EXpressToll/LPT toll differential would be increased and that toll rates would also be increased incrementally each year. This was to be done while maintaining the current toll increase schedule of \$0.25 every three years for EXpressToll rates. All commercial vehicle toll rates were assumed to increase proportionally.

Following a review and endorsement of the toll rate and traffic and revenue estimates associated with Alternative E by the Authority, a \$0.15 increase in the passenger car EXpressToll rate at the mainline plazas was implemented on January 1, 2011. The analysis assumed an additional \$0.10 increase at the mainline plazas beginning on January 1, 2012. It was also assumed that the passenger car EXpressToll rate would be increased at the mainline plazas by \$0.10 in both 2013 and 2014 and by \$0.05 in 2015 in order to maintain the triennial \$0.25 toll increase schedule with LPT tolls adjusted to maintain a 25.0 percent toll differential. The same pattern of increase was



assumed to be repeated through 2021. EXpressToll rates at the ramps were assumed to increase by \$0.05 annually beginning in 2011 with LPT tolls adjusted to maintain the assumed 25.0 percent toll differential.

As part of the CDMS review contained in the July 26, 2011 letter, the latest monthly traffic and revenue trend data by toll plaza through May 2011 was examined and compared against the Alternative E forecasts, the estimated and actual distributions of EXpressToll and LPT customer transactions were reviewed, additionally, a general assessment of the status of projects in the highway improvement program versus what was contained in the September 23, 2010 Traffic and Revenue Update Letter was performed, and finally, a general assessment of the latest socioeconomic and demographic forecasts as compared with those in the 2010 update was performed. The toll rate assumptions and resulting transaction and toll revenue forecasts for Alternative E prepared as part of the July 26, 2011 update are presented in Tables 2 and 3, respectively. The toll rate assumptions presented in Table 2 have not changed and remain appropriate for use in the 2013 traffic and revenue update.

Table 2
Actual and Assumed Non-Stop Tolling Toll Rates
Passenger Car-Based Rates

Year	EXpressToll			License Plate Toll		
	Mainline Plazas		Ramp	Mainline Plazas		Ramp
	A	B, C, D, E	Plazas	A	B, C, D, E	Plazas
2010 ⁽¹⁾	\$ 2.00	\$ 2.25	\$ 0.90	\$ 2.25	\$ 2.50	\$ 1.00
2011	2.15	2.40	0.95	2.70	3.00	1.20
2012	2.25	2.50	1.00	2.80	3.15	1.25
2013	2.35	2.60	1.05	2.95	3.25	1.30
2014	2.45	2.70	1.10	3.05	3.40	1.40
2015	2.50	2.75	1.15	3.15	3.45	1.45
2016	2.60	2.85	1.20	3.25	3.55	1.50
2017	2.70	2.95	1.25	3.40	3.70	1.55
2018	2.75	3.00	1.30	3.45	3.75	1.65
2019	2.85	3.10	1.35	3.55	3.90	1.70
2020	2.95	3.20	1.40	3.70	4.00	1.75
2021	3.00	3.25	1.45	3.75	4.05	1.80

⁽¹⁾ Actual.



Table 3
Estimated Annual Toll Transactions and Revenue (in Thousands)
Alternative E

Year	July 26, 2011 Update			
	Transactions (000)	Toll Revenue (000)		
		Gross ⁽¹⁾	Uncollectable ⁽²⁾	Net ⁽³⁾
2010	51,298	105,718	10,043	95,675
2011 ⁽⁴⁾	52,822	120,300	11,429	108,871
2012	54,938	130,711	12,418	118,293
2013	58,290	143,257	13,609	129,648
2014	61,896	157,331	14,946	142,385
2015 ⁽⁵⁾	63,699	163,952	15,575	148,377
2016	66,822	177,556	16,868	160,688
2017	69,992	192,804	18,316	174,488
2018	70,842	198,252	18,834	179,418
2019	74,478	214,383	20,366	194,017
2020	78,655	231,846	22,025	209,821
2021 ⁽⁶⁾	81,226	239,128	22,717	216,411
2022	84,051	253,272	24,061	229,211
2023	86,974	268,254	25,484	242,770
2024	89,999	284,121	26,992	257,129
2025	93,129	300,927	28,588	272,339
2026	96,368	318,728	30,279	288,449
2027	99,719	337,581	32,070	305,511
2028	103,188	357,549	33,967	323,582
2029	106,776	378,699	35,976	342,723
2030	110,490	401,099	38,104	362,995
2031	114,333	424,825	40,358	384,467
2032	118,309	449,954	42,746	407,208
2033	122,424	476,569	45,274	431,295
2034	126,682	504,759	47,952	456,807
2035	131,088	534,616	50,788	483,828
2036	135,647	566,239	53,793	512,446
2037	140,365	599,733	56,975	542,758
2038	145,247	635,208	60,345	574,863
2039	150,298	672,781	63,914	608,867
2040	155,526	712,577	67,695	644,882
2041	160,935	754,727	71,699	683,028

⁽¹⁾ Calculated based on estimated vehicle transactions and the associated toll rates.

⁽²⁾ Uncollectable revenue is assumed to be 9.5 percent of total gross toll revenue.

⁽³⁾ Net Revenue is referenced in Table 2 of the 2011 Bond Offering Statement.

⁽⁴⁾ Beginning in 2011, tolls are assumed to increase each year.

⁽⁵⁾ Interchange at Potomac Street planned to open January 1, 2015.

⁽⁶⁾ Interchanges at Quebec Street, 112th Avenue, 88th Avenue, 48th Avenue planned to open January 1, 2021.



Trends in Monthly Toll Transactions

Table 4 presents a comparison of monthly transaction trends from January 2008 through May 2013, the last month for which actual transaction data was available. Transactions declined consistently beginning in May 2008 through the end of 2009, a result of the national and regional economic recession. While not shown in Table 4, transactions declined by 3.8 percent in all of 2008 compared with 2007 and declined again in 2009 by 7.9 percent. However, the 2009 declines were heavily influenced by the January 1, 2009 toll increase of \$0.25 for passenger car EXpressToll customers and \$0.50 for passenger car cash and LPT customers as E-470 converted to an all-electronic tolling (AET) system. Depending on the toll gantry location, this represented toll increases of 12.5 to 14.3 percent for EXpressToll customers and 25.0 to 28.6 percent for LPT customers. Furthermore, it is believed that the impact of the toll increase was felt primarily from January through May 2009 when double-digit declines were experienced. Otherwise, similar double-digit decreases would have been expected for most, if not the entire year. Following the initial negative reaction to the toll increase, customers began returning to E-470, possibly reconsidering its time-savings advantages over toll-free alternative routes. The single-digit declines from June through October were more in line with those in 2008, suggesting that they were more economy related.

Transactions returned to consistent positive growth in 2010. Transactions increased by 6.9 percent compared with 2009, even though weather events in January and February of 2010 tempered the final annual growth. Other than January and February, all 2010 months experienced positive growth between 4.7 and 12.2 percent. Continued increases occurred throughout 2011, although the 1.5 percent annual increase over 2010 was tempered by more modest increases ranging between 0.5 to -0.9 percent during the final quarter of 2011. However, the 52.1 million transactions in 2011 did begin to approach the 2007 pre-recession high of 54.1 million transactions even with the toll increases that took effect on January 1, 2011. Transactions continued to grow in 2012, increasing by 3.6 percent to 54.0 million. Transactions have grown at a robust rate of 5.9 percent during the first five months of 2013 compared with the same time period in 2012. Accounting for the additional day in 2012 due to leap year, the growth through May would have been closer to 6.5 percent.

Trends in EXpressToll and License Plate Toll Transactions

Table 5 presents trends in monthly toll transactions by method of toll payment. While transaction data is presented from January 2011 through May 2013, the last month for which data was provided, we have assessed the trends from January 2009, the beginning of AET on E-470. EXpressToll transactions increased from 68.7 percent in 2008, when toll payment by cash was permitted, to 72.4 percent in 2009. It was estimated that had the existing methods of toll collection remained, the percent of EXpressToll transactions in 2009 would have increased to an estimated



Table 4
Trends in Monthly Toll Transactions
E-470

Month	2008		2009		Percent Change		2010		Percent Change		2011		Percent Change		2012		Percent Change		2013		
	Total	Percent Change	Total	Percent Change	Total	Percent Change	Total	Percent Change	Total	Percent Change	Total	Percent Change	Total	Percent Change	Total	Percent Change	Total	Percent Change	Total	Percent Change	
January	4,075,816	(12.6)	3,562,664	2.2	3,641,051	5.1	3,825,889	1.1	3,868,862	7.1	4,144,884	7.1	4,144,884	7.1	3,868,862	7.1	4,144,884	7.1	4,144,884	7.1	4,144,884
February	4,025,929	(17.5)	3,321,616	2.6	3,408,374	4.0	3,545,212	3.9	3,683,550	3.7	3,818,348	3.7	3,818,348	3.7	3,683,550	3.7	3,818,348	3.7	3,818,348	3.7	3,818,348
March	4,350,591	(12.1)	3,823,542	5.5	4,033,562	4.4	4,209,612	2.0	4,295,232	3.9	4,464,028	2.0	4,464,028	3.9	4,295,232	3.9	4,464,028	3.9	4,464,028	3.9	4,464,028
April	4,316,486	(13.0)	3,755,311	7.4	4,031,699	1.6	4,097,759	3.4	4,238,073	6.1	4,494,953	3.4	4,494,953	6.1	4,238,073	6.1	4,494,953	6.1	4,494,953	6.1	4,494,953
May	4,661,339	(10.7)	4,160,698	6.7	4,437,748	2.0	4,525,204	6.7	4,828,130	8.1	5,219,608	6.7	5,219,608	8.1	4,828,130	8.1	5,219,608	8.1	5,219,608	8.1	5,219,608
June	4,558,834	(5.7)	4,300,701	7.7	4,629,859	0.4	4,648,748	5.6	4,911,112	---	---	5.6	---	---	4,911,112	---	---	---	---	---	---
July	4,714,680	(3.6)	4,544,427	5.7	4,802,044	0.8	4,842,067	2.3	4,951,799	---	---	2.3	---	---	4,951,799	---	---	---	---	---	---
August	4,698,795	(5.9)	4,423,443	8.5	4,800,413	2.0	4,897,862	5.1	5,146,202	---	---	5.1	---	---	5,146,202	---	---	---	---	---	---
September	4,269,575	(3.5)	4,121,413	9.0	4,491,207	0.7	4,523,215	0.6	4,551,822	---	---	0.6	---	---	4,551,822	---	---	---	---	---	---
October	4,393,842	(7.9)	4,047,184	12.2	4,541,323	(0.9)	4,500,452	5.3	4,737,218	---	---	5.3	---	---	4,737,218	---	---	---	---	---	---
November	3,876,777	(0.7)	3,849,674	9.8	4,226,940	(0.9)	4,188,321	5.4	4,416,214	---	---	5.4	---	---	4,416,214	---	---	---	---	---	---
December	4,137,797	(1.8)	4,062,040	4.7	4,253,721	0.5	4,276,045	1.4	4,337,602	---	---	1.4	---	---	4,337,602	---	---	---	---	---	---
January to May	21,430,161	(13.1)	18,623,831	5.0	19,552,434	3.3	20,203,676	3.5	20,913,847	5.9	22,141,821	3.5	22,141,821	5.9	20,913,847	5.9	22,141,821	5.9	22,141,821	5.9	22,141,821
Total Year	52,080,461	(7.9)	47,972,713	6.9	51,297,941	1.5	52,080,386	3.6	53,965,816	---	---	3.6	---	---	53,965,816	---	---	---	---	---	---

Source: E-470 Authority



Mr. Stan Koniz
 July 12, 2013
 Page 9

Table 5
Trends in Monthly Toll Transactions by Method of Payment
E-470

Month	2011					
	ExpressToll		LPT ⁽¹⁾		Total	
	Transactions	Percent	Transactions	Percent	Transactions	Percent
January	2,838,739	74.2	987,150	25.8	3,825,889	100.0
February	2,663,287	75.1	881,925	24.9	3,545,212	100.0
March	3,140,828	74.6	1,068,784	25.4	4,209,612	100.0
April	3,063,832	74.8	1,033,927	25.2	4,097,759	100.0
May	3,287,996	72.7	1,237,208	27.3	4,525,204	100.0
June	3,330,132	71.6	1,318,616	28.4	4,648,748	100.0
July	3,343,605	69.1	1,498,462	30.9	4,842,067	100.0
August	3,473,214	70.9	1,424,648	29.1	4,897,862	100.0
September	3,262,743	72.1	1,260,472	27.9	4,523,215	100.0
October	3,270,661	72.7	1,229,791	27.3	4,500,452	100.0
November	3,049,910	72.8	1,138,411	27.2	4,188,321	100.0
December	3,034,868	71.0	1,241,177	29.0	4,276,045	100.0
January to May	11,706,686	74.7	3,971,786	25.3	15,678,472	100.0
Total Year	37,759,815	72.5	14,320,571	27.5	52,080,386	100.0

Month	2012					
	ExpressToll		LPT ⁽¹⁾		Total	
	Transactions	Percent	Transactions	Percent	Transactions	Percent
January	2,831,966	73.2	1,036,896	26.8	3,868,862	100.0
February	2,727,838	74.1	955,712	25.9	3,683,550	100.0
March	3,134,415	73.0	1,160,817	27.0	4,295,232	100.0
April	3,109,350	73.4	1,128,723	26.6	4,238,073	100.0
May	3,471,439	71.9	1,356,691	28.1	4,828,130	100.0
June	3,436,760	70.0	1,474,352	30.0	4,911,112	100.0
July	3,403,907	68.7	1,547,892	31.3	4,951,799	100.0
August	3,611,152	70.2	1,535,050	29.8	5,146,202	100.0
September	3,241,374	71.2	1,310,448	28.8	4,551,822	100.0
October	3,439,164	72.6	1,298,054	27.4	4,737,218	100.0
November	3,194,320	72.3	1,221,894	27.7	4,416,214	100.0
December	3,093,092	71.3	1,244,510	28.7	4,337,602	100.0
January to May	11,803,569	73.4	4,282,148	26.6	16,085,717	100.0
Total Year	38,694,777	71.7	15,271,039	28.3	53,965,816	100.0

Month	2013					
	ExpressToll		LPT ⁽¹⁾		Total	
	Transactions	Percent	Transactions	Percent	Transactions	Percent
January	3,050,663	73.6	1,094,221	26.4	4,144,884	100.0
February	2,813,850	73.7	1,004,498	26.3	3,818,348	100.0
March	3,220,182	72.1	1,243,846	27.9	4,464,028	100.0
April	3,280,331	73.0	1,214,622	27.0	4,494,953	100.0
May	3,722,624	71.3	1,496,984	28.7	5,219,608	100.0
June	-	-	-	-	-	-
July	-	-	-	-	-	-
August	-	-	-	-	-	-
September	-	-	-	-	-	-
October	-	-	-	-	-	-
November	-	-	-	-	-	-
December	-	-	-	-	-	-
January to May	16,087,650	72.7	6,054,171	27.3	22,141,821	100.0
Total Year	16,087,650	72.7	6,054,171	27.3	22,141,821	100.0

Source: E-470 Authority

⁽¹⁾ LicensePlateToll transactions include all violations.



Mr. Stan Koniz
 July 12, 2013
 Page 10

69.6 percent. This suggests that eliminating the cash option resulted in an increase in EXpressToll participation by about 2.8 percent.

This assessment seems to suggest that about 15 percent of cash customers converted to EXpressToll, with the remainder opting for the LPT alternative. And, since 2009 as shown in Table 5, the ExpressToll share of transactions has remained in the range of 72 to 73 percent. Through May 2013, the market share is 72.7 percent.

Table 6 presents EXpressToll/LPT distributions used to develop the transactions and revenue estimates in the 2011 bring-down letter and those used in this update. The revised distributions are based on actual 2009 and through May 2013 percentages, and the assumption that the existing surcharge percent is retained throughout the forecast period.

Year	Prior "Bring-Down" Asumptions		Revised Asumptions ⁽¹⁾	
	EXpressToll	License Plate	EXpressToll	License Plate
2009	72	28	72	28
2010	73	27	73	27
2011	74	26	73	27
2012	75	25	73	27
2015	77	23	74	26
2018	80	20	76	24
2021	80	20	77	23
2035 and Beyond	80	20	79	21

⁽¹⁾ Based on actual transaction data through May 2013.



Review of the Highway Improvement Program

As part of the comprehensive traffic and toll revenue study performed in 2008, a detailed review was conducted of the proposed highway improvements for the immediate E-470 corridor and along principal competing and complementary freeways. A review of those plans was conducted by subconsultant, Felsburg Holt & Ullevig (FHU) as part of this update. At the same time, CDMS also reviewed the proposed capital program of E-470 itself to verify improvement assumptions from the 2008 study.

Several assumed projects have already been completed since the 2008 study, including:

- I-25 FasTracks road widening project in South Denver;
- I-70/E-470 intersection grade-separation;
- I-25 widening in Douglas County;
- Ridgeway Parkway and its associated I-25 interchange in Lone Tree;
- Tower Road widening south of Pena Boulevard; and
- E-470 northbound to I-70 westbound flyover ramp.

None of these projects were assumed to have significant near-term impacts on E-470 traffic. And, any impacts that they may have generated are now included in the current actual E-470 traffic and revenue trends that the current study is based on.

Two major corridor projects that had the potential to negatively impact E-470 have been removed from the Metro Vision Regional Transportation Plan. These development/developer driven projects include:

- Aurora Parkway between Parker Road and Gartrell Road; and
- Cottonwood Drive between Chambers Road and Parker Road.

Finally, projects whose planning horizon has been altered and which could have a slight negative impact on the E-470 corridor include the following improvements. However, these projects are not currently programmed until 2024.

- I-25 widening in Douglas County;
- Tower Road widening between 56th Avenue and Pena Boulevard; and
- Lincoln Avenue widening between Keystone Boulevard and Parker Road.

Finally, on E-470 itself, the planned construction of a full interchange at Quebec Street has been rescheduled. As programmed in the 2008 Comprehensive Traffic and Revenue Study, a partial interchange with ramps to/from the south only was scheduled to open to traffic in 2012, with the ramps to/from the north added in 2021. The current Authority plan is to open this full interchange in 2015. This was estimated to have a significant positive impact on E-470 traffic and revenue and has been accounted for in the updated forecasts. It should be pointed out that the ramps to/from the south will be un-tolled.

All other interchange improvements in the Metro Vision Regional Transportation Plan are programmed to occur in either 2024 (Potomac Street, 48th Avenue) or 2035 (112th Avenue, 88th Avenue). The traffic and revenue impacts of these improvements have been accounted for as part of the "normal growth" estimates.

Review of Regional Socioeconomic/Demographic Forecasts

The United States continues to slowly recover from the most severe recession since the Great Depression, regaining labor force levels not seen in more than five years. As the nation's economy moves toward full recovery of pre-recession employment levels, Colorado, among a few states in the country achieved its 2008 (pre-recession) labor force level in 2013. Among the State's regions, the Denver Metro Area is leading this statewide recovery. The recession had had such a large impact on the economy and growth in the country, and in Colorado, that many of the earlier growth forecasts for the Denver Metro Area not only overestimated the amount and rate of growth in the Metro Area over the next twenty years, but also did not anticipate the volatility and duration of the recession. For this "update" letter, a high-level review of historic conditions and recent regional socioeconomic and demographic forecasts was conducted to assess if any changes had occurred due to the recession that would impact traffic growth in the E-470 corridor.

A similar, yet more detailed, analysis was conducted in 2008 for the 2008 E-470 Comprehensive Traffic and Revenue Study and was based on 2005 forecasts developed by the Denver Regional Council of Governments (DRCOG). Revisions to the DRCOG regional socioeconomic and demographic forecasts were made at both the Denver Metro area and E-470 corridor levels. These were then used to adjust the regional travel demand models. The traffic forecasts in the 2008 study reflected these adjustments. For the current analysis, a further review has been made at a high level, based on the most currently available socioeconomic data and assumptions regarding the strength of recovery and resiliency of the post-recession economy.

DRCOG recently released revisions to its 2035 growth forecasts, in which 2035 population and employment estimates were reduced and interim year estimates were recalibrated. Forecasts to 2040 are also expected to be released within the next year or two. Along with the available DRCOG forecasts, other updated forecasts for population and employment were used to inform further revision to the forecasts prepared for the 2008 study.



Table 7 presents a comparison of the adjusted population and employment forecasts for the Denver Metro Area used in the 2008 E-470 Comprehensive Traffic and Revenue Study and the current revised forecasts. The current 2013 forecasts are what were used to determine if adjustments to the short-term (2013 – 2014) and/or long-term (beyond 2015) traffic growth forecasts found in the 2008 study were warranted in developing updated forecasts of traffic and revenue for this “update” letter. In general, traffic growth rates in 2013 and 2014 were dampened by approximately 1.0 percent per annum to be more in line with the latest actual traffic growth trends and to attempt to account for the lower employment forecasts. Following the opening of the Quebec Street interchange in 2015, the overall growth rate between 2016 and 2026 remained similar in both the prior and current updates. From 2027 through 2041, the annual growth rate was reduced from 3.5 percent per annum in the 2011 update, to 3.4 percent per annum between 2027 and 2031, 3.3 percent per annum between 2032 and 2036, and 3.2 percent per annum between 2037 and 2043 in the current update. These modest reductions adjust for the reductions in 2035 population and employment forecasts.

Table 7
Denver Metro Revised Forecasts

Forecast	2015	2035
Population ⁽¹⁾		
EPS Adjusted - 2008	3,023,205	4,139,768
EPS Adjusted - 2013	3,151,285	4,080,155
Percent Difference	4.2	(1.4)
Employment ⁽¹⁾		
EPS Adjusted - 2008	1,668,106	2,165,161
EPS Adjusted - 2013	1,514,003	1,960,269
	(9.2)	(9.5)

Source: Economic and Planning Systems (EPS).

⁽¹⁾ Data shown are estimates developed by EPS in 2008 as part of the E-470 Traffic and Revenue Study and in 2013 for this update.



Updated Transaction and Toll Revenue Estimates

The updated forecasts developed as part of this analysis are based on a review of the socioeconomic and demographic assumptions and the latest highway improvements incorporated in the latest Metro Vision Regional Transportation Plan discussed above. Furthermore, 24 months of additional traffic and revenue data are now available since the July 2011 traffic and toll revenue bring-down analysis was conducted. Table 8 provides a comparison of actual versus estimated performance of E-470 over the last 17 months (January 2012 through May 2013).

Systemwide transactions and revenue are presented for all of 2012 and for January through May 2013. Over that entire period, actual traffic experience slightly under-performed the July 2011 estimates by -1.8 percent or 76.1 million actual transactions versus an estimated 77.5 million. During the same period, total gross toll revenue similarly under-performed estimates by about -0.4 percent, or \$184.7 million actual versus an estimated \$185.4 million. Given the growing, yet still sensitive economic climate, these forecasts have proven reasonably accurate. As such, relatively minor adjustments have been made to the short-term (2013 and 2014) forecasts as part of this update. Based on monthly traffic and revenue data provided by E-470, it was assumed that traffic

Table 8
Estimated Versus Actual Annual Transactions and Toll Revenue ⁽¹⁾
E-470

Year	Transactions (000s)			Revenue (000s)		
	Estimated ⁽¹⁾	Actual	Percent Difference	Estimated ⁽¹⁾ Gross	Actual Gross	Percent Difference
2012	54,938	53,966	-1.8	\$ 130,711	\$ 130,035	-0.5
2013 ⁽²⁾⁽³⁾	22,590	22,142	-2.0	\$ 54,713	\$ 54,624	-0.2
Total Since 2012	77,528	76,108	-1.8	\$ 185,424	\$ 184,659	-0.4

⁽¹⁾ All estimated figures shown in this table are from the July 26, 2011 "Bring-Down" Letter.

⁽²⁾ Transactions and revenue from January 1, 2013 to May 31, 2013.

⁽³⁾ 2013 transactions and revenue forecasts have been adjusted based on 2012 monthly variations.



Mr. Stan Koniz
July 12, 2013
Page 15

and revenue growth would continue to slightly under-perform estimates from the July 2011 bring-down letter by about -2.6 and -1.8 percent, respectively, in 2013 and by -3.3 and -2.4 percent, respectively, in 2014. However, annual growth in traffic has been forecasted at a robust 5.2 percent in 2013 and 5.4 percent in 2014. These forecasted growth rates were adjusted slightly downward from the growth rates forecasted in July 2011 based on historic traffic trends and assumed normal growth. Growth rates for 2015 assumed normal growth of approximately 5.0 percent, plus the impact of the opening of the Quebec Street interchange assumed to open to traffic on January 1, 2015. Growth rates beyond 2015 were adjusted as described above.

The resulting revised annual transaction and gross and net toll revenue estimates for E-470 are provided in Table 9. In the short term, transactions on E-470 are estimated to increase from 54.0 million in 2012 to 59.9 million in 2014. This places the revised transaction estimates for the total E-470 system from 2012 to 2014 between 1.0 million to 2.0 million lower principally due to lower actual growth than that which was forecasted between 2010 and 2012 and lower growth estimates between 2012 and 2014 in the current forecast. Systemwide transactions are estimated to reach 81.3 million by 2021 and 160.2 million by 2041, which in both years is less than 1.0 percent different than the July 2011 forecast. Overall transaction growth during the comparable 2013-2043 forecast period is estimated to be 3.7 percent per annum, including the impacts of the planned toll increases.

Revenues are also estimated to be impacted by the changes to the study assumptions. Between 2012 and 2014, gross toll revenue is estimated to increase from \$130.0 million to \$154.3 million. The primary differences between the July 2011 Alternative E forecasts and the current update forecasts are the result of lower actual and forecasted rates of traffic growth. Based on this, the current revenue estimates are 1.9 percent lower in 2014 compared with the July 2011 Alternative E forecast. Systemwide gross toll revenues are estimated to be \$238.1 million in 2021 and \$831.3 million by 2043. The current 2021 forecasts are less than 0.5 percent lower than those prepared in July 2011 and approximately 1.0 percent lower in the out year. Taken as a whole, the revised systemwide gross toll revenue forecasts are on par with those in the July 2011 Alternative E forecast.

Using information provided by E-470, estimates of uncollectable and net toll revenues have also been provided. Uncollectable revenues consist of "rejected" transactions where the license plate cannot be billed and "LPT unpaid" transactions where the license plate can be read, and the customer has been billed, but the bill is unpaid. Based on data from all of calendar year 2012, rejected transactions represent 7.5 percent of gross toll revenue, while LPT unpaid transactions represent 2.7 percent of gross toll revenue. The total estimated uncollectable rate is 10.2 percent of gross toll revenue. This uncollectable rate will most likely be reduced in future years through improvements to technology and enforcement, CDM Smith has therefore assumed the uncollectable



Table 9
Estimated Annual Toll Transactions and Revenue (in Thousands)
E-470

Year	Current Update				July 2011 Bring Down Letter		Difference ⁽¹⁾	
	Transactions	Toll Revenue			Transactions	Gross Toll Revenue	Gross Toll	
		Gross ⁽²⁾	Uncollectable ⁽³⁾	Net ⁽⁴⁾			Transactions	Revenue
2012	53,966	130,035	(13,290)	116,745	54,938	130,711	(972)	(676)
2013	56,791	141,450	(14,325)	127,125	58,290	143,257	(1,499)	(1,807)
2014	59,863	154,311	(15,524)	138,787	61,896	157,331	(2,033)	(3,020)
2015 ⁽⁵⁾	64,052	165,779	(15,927)	149,852	63,699	163,952	353	1,827
2016	67,116	179,572	(16,450)	163,122	66,822	177,556	294	2,016
2017	70,214	194,786	(17,269)	177,517	69,992	192,804	222	1,982
2018	73,259	206,405	(17,483)	188,922	70,842	198,252	2,417	8,153
2019	76,018	219,632	(18,004)	201,628	74,478	214,383	1,540	5,249
2020	78,694	231,958	(18,349)	213,609	78,655	231,846	39	112
2021	81,296	238,182	(17,963)	220,219	81,226	239,128	70	(946)
2022	84,142	252,287	(18,616)	233,671	84,051	253,272	91	(985)
2023	87,087	267,228	(19,283)	247,945	86,974	268,254	113	(1,026)
2024 ⁽⁷⁾	91,924	287,193	(20,223)	266,970	89,999	284,121	1,925	3,072
2025	95,141	304,185	(20,920)	283,265	93,129	300,927	2,012	3,258
2026	98,471	322,182	(21,628)	300,554	96,368	318,728	2,103	3,454
2027	101,818	340,914	(22,325)	318,589	99,719	337,581	2,099	3,333
2028	105,281	360,737	(23,028)	337,710	103,188	357,549	2,093	3,188
2029	108,860	381,707	(23,736)	357,972	106,776	378,699	2,084	3,008
2030	112,561	403,901	(24,447)	379,454	110,490	401,099	2,071	2,802
2031	116,388	427,384	(25,160)	402,224	114,333	424,825	2,055	2,559
2032	120,229	451,800	(25,848)	425,953	118,309	449,954	1,920	1,846
2033	124,197	477,608	(26,529)	451,078	122,424	476,569	1,773	1,039
2034	128,295	504,884	(27,203)	477,681	126,682	504,759	1,613	125
2035 ⁽⁸⁾	132,462	534,923	(27,889)	507,034	131,088	534,616	1,374	307
2036	136,833	565,717	(28,548)	537,169	135,647	566,239	1,186	(522)
2037	141,212	597,705	(29,161)	568,544	140,365	599,733	847	(2,028)
2038	145,731	631,495	(29,750)	601,745	145,247	635,208	484	(3,713)
2039	150,395	667,198	(30,310)	636,888	150,298	672,781	97	(5,583)
2040	155,207	704,906	(30,835)	674,071	155,526	712,577	(319)	(7,671)
2041	160,174	744,751	(31,322)	713,429	160,935	754,727	(761)	(9,976)
2042	165,299	786,839	(31,762)	755,077	-	-	-	-
2043	170,588	831,303	(32,149)	799,154	-	-	-	-

⁽¹⁾ The difference shown is between the current and previous 2011 gross revenue forecasts.

⁽²⁾ Calculated based on estimated vehicle transactions and the associated toll rates.

⁽³⁾ Uncollectable revenue is estimated based on leakage data provided by E-470.

⁽⁴⁾ Net Revenue is referenced in Table 2 of the 2013 Bond Offering Statement.

⁽⁵⁾ Beginning in 2011, tolls are assumed to increase each year.

⁽⁶⁾ Interchange at Quebec Street planned to open January 1, 2015.

⁽⁷⁾ Interchanges at Potomac Street, 48th Avenue planned to open January 1, 2024.

⁽⁸⁾ Interchanges at 112th Avenue, 88th Avenue planned to open January 1, 2035.



Mr. Stan Koniz
July 12, 2013
Page 17

rate will drop from the current rate of approximately 10 percent in 2012 to 4 percent by the end of the forecast period. In 2013 and 2014, total net toll revenue is estimated at \$116.7 million and \$127.1 million, respectively. Net toll revenue is estimated to increase to \$220.2 million by 2021 and to \$799.2 million by 2043.

* * *

Disclaimer

Current accepted professional practices and procedures were used in the development of these traffic and revenue estimates. However, as with any forecast of the future, it should be understood that there may be differences between forecasted and actual results caused by events and circumstances beyond the control of the forecasters. In formulating its estimates, CDM Smith has reasonably relied upon the accuracy and completeness of information provided (both written and oral) by the E-470 Public Highway Authority and other local and state agencies. CDM Smith also has relied upon the reasonable assurances of some independent parties and is not aware of any facts that would make such information misleading.

CDM Smith has made qualitative judgments related to several key variables in the development and analysis of the traffic and revenue estimates that must be considered as a whole; therefore selecting portions of any individual result without consideration of the intent of the whole may create a misleading or incomplete view of the results and the underlying methodologies used to obtain the results. CDM Smith gives no opinion as to the value or merit to partial information extracted from this report.

All forecasts and projections reported herein are based on CDM Smith's experience and judgment and on a review of information obtained from multiple state and local agencies, including the E-470 Public Highway Authority, the Denver Regional Council of Governments, and by independent third parties. These estimates and projections may not be indicative of actual or future values, and are therefore subject to substantial uncertainty. Future developments cannot be predicted with certainty, and may affect the estimates or projections expressed in this report, such that CDM Smith does not specifically guarantee or warrant any estimate or projection contained within this report.

While CDM Smith believes that some of the projections or other forward-looking statements contained within the report are based on reasonable assumptions as of the date in the report, such forward looking statements involve risks and uncertainties that may cause actual results to differ materially from the results predicted. Therefore, following the date of this report, CDM Smith will take no responsibility or assume any obligation to advise of changes that may affect its assumptions



Mr. Stan Koniz
July 12, 2013
Page 18

contained within the report, as they pertain to socioeconomic and demographic forecasts, proposed residential or commercial land use development projects and/or potential improvements to the regional transportation network.

Respectfully submitted,

A handwritten signature in black ink that reads "Paul M. Marcella". The signature is written in a cursive style with a large, sweeping initial "P".

Paul M. Marcella
Project Manager/Principal Planner
CDM Smith Inc.

