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December 15, 2021

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

Subject: 2021 Transaction and Revenue Forecast Update Letter Assuming Toll Rates
Approved November 2021, E-470 Public Highway Authority

Dear Mr. Myers:

On November 4, 2021, the Board of Directors of the E-470 Public Highway Authority (Authority) approved a schedule of reduced toll rates. The toll rate plan presented includes three consecutive years of toll rate decreases with the first to be implemented on January 1, 2022. Additional reductions for January 1, 2023, and January 1, 2024, are planned pending future review and approval from the Board. To understand the impacts of these toll rate changes to the long-range traffic and revenue forecasts contained in the **April 15, 2021 Traffic and Revenue Update Letter** (referred to in this letter as the *2021 Update Study*), CDM Smith (CDMS) was requested to update the forecast to reflect the change in scheduled toll rates. This letter report summarizes the forecast update methodology and provides the revised traffic and revenue forecasts for 2022 through 2050.

2021 Traffic and Revenue Update Study

In Spring 2021, CDM Smith was requested by the Authority to review the prior traffic and toll revenue forecasts developed in May 2020 and to update the forecasts contained therein. To accomplish this, we examined the latest monthly traffic and revenue trend data for each mainline and ramp toll gantry through February 2021, compared actual versus prior estimates of the impact of COVID-19, reviewed toll revenue leakage assumptions, evaluated the impacts of E-470 improvement project assumptions and the latest Denver Regional Council of Governments (DRCOG) highway improvement program, and considered the latest socioeconomic and demographic forecasts.

The *2021 Update Study*, dated April 15, 2021, served as the foundation for the current study forecasts, in that all the forecast assumptions were maintained besides the assumed toll rates on E-470. This section provides a summary of the assumptions from the *2021 Update Study* forecasts, which were ultimately carried forward into the current study transaction and toll revenue estimates.



Socioeconomic Assumptions

For the current study effort, it was assumed that the long-term employment, population, and household projections previously provided by Economic & Planning Systems (EPS) and utilized in the *2021 Update Study* still reflect underlying regional conditions. Thus, no changes to the underlying traffic growth forecasts were made under the current study effort. Any changes in long-term traffic growth rates between the *2021 Update Study* and current study effort are therefore only the result of the impacts of the planned 2022-2024 toll rate adjustments.

COVID-19 Adjustments

In March 2020, traffic impacts related to COVID-19 began as many states and localities began implementing stay-at-home orders, public space closures, social distancing orders and other restrictions in an effort to reduce the spread of the virus based on guidelines from the Center for Disease Control (CDC) and the Federal Government. These restrictions considerably impacted regional traffic patterns. Since more than 20 percent of E-470 traffic originates from or is destined for Denver International Airport (DEN), reductions in air travel and tourism related to the COVID-19 outbreak have impacted E-470 to a greater extent than other facilities in the region. Moreover, since congestion on alternative roadways, such as I-25, I-70 and even local arterials, was significantly reduced E-470 offered lower travel time savings to motorists than it did prior to the COVID-19 outbreak. As a result, E-470 was harder hit than other facilities.

For the *2021 Update Study* CDM Smith reviewed the impacts of the COVID-19 pandemic on E-470 transactions. Following this review, both short-term and long-term COVID-19 impacts were developed by method of payment, by vehicle class, and by toll location. This evaluation also considered the impacts of COVID-19 on trips to and from DEN based on flight data through February 2021. As a result of this evaluation, some short-term adjustments were applied through July 2021, primarily affecting the 2021 forecasts. A transaction impact of 8.1 percent (versus a theoretical forecast without the impacts of COVID-19) was then assumed through the remainder of the forecast period (2022 through 2050). This was done to account for the longer-term effects of the COVID-19, including potential recessionary impacts, increases in telecommuting, and reductions in tourism and other recreational trips. This long-term impact (transaction reduction of 8.1 percent) was carried forward into the current forecasts of transactions and toll revenue.

Highway Improvements

As part of the *2021 Update Study*, a review of the planned regional highway improvements was conducted by CDM Smith. In general, the results of this review found that the changes to the underlying DRCOG highway improvement assumptions would not present a significant impact to the E-470 System. Additionally, an evaluation of the Authority's proposed capital program was conducted. **Table 1** presents a summary of the assumed E-470 highway improvements through 2050. The programmed DRCOG and E-470 highway improvements included in the *2021 Update Study* were carried forward unchanged to the current study effort.

Table 1
Assumed E-470 Highway Improvements

Years of Construction	Year of Completion	From	To	Improvement	Length	Counties
2019-2020	2021	Quincy Ave.	I-70	Widen from 4 to 6 Lanes	7.0	Arapahoe
2020	2021	38th Ave.		New Interchange (Partial) - In/Out Movement		Adams
2022	2023	Gantry C		Relocate Gantry C to the South		Adams
2022	2023	38th Ave.		New Interchange (Full)		Adams
2022	2023	I-70		Ramp C - EB I-70 to SB E-470		Adams
2022-2024	2025	I-70	Pena Blvd.	Widen from 4 to 6 Lanes	7.4	Adams/Denver
2022-2024	2025	Pena Blvd.	E 104th Ave.	Widen from 4 to 6 lanes	7.6	Adams/Denver
2023-2024	2025	88th Ave.		Add New Interchange		Adams
2023-2024	2025	Sable Blvd.		Add New Interchange		Adams
2026-2027	2028	E 104th Ave.	I-76	Widen from 4 to 6 lanes	7.6	Adams/Denver
2027-2028	2029	I-25 South	Parker Rd.	Widen from 6 to 8 Lanes	5.5	Arapahoe
2025-2029	2030	I-70		Interchange Rebuild Completion / Capacity		Adams
2030	2031	48th Ave.		Add New Interchange		Adams
2029-2030	2031	Parker Rd.	Smoky Hill Rd.	Widen from 6 to 8 lanes	5.4	Arapahoe/Douglas
2031-2032	2033	Smoky Hill Rd.	I-70	Widen from 6 to 8 lanes	9.7	Arapahoe
2030	2031	112th Ave.		Add New Interchange		Adams
2033-2034	2035	I-76		Ramp - NB E-470 to WB I-76		Adams
2033-2034	2035	I-76	US 85	Widen from 4 to 6 lanes	2.8	Adams
N/A	N/A	Potomac St.		Add New Interchange		Adams
2036-2037	2038	US 85	I-25 N	Widen from 4 to 6 lanes	8.2	Adams
2035-2039	2040	I-76		Ramp - WB I-76 to NB E-470		Adams
2038-2039	2040	Pena Blvd.	I-76	Widen from 6 to 8 Lanes	7.6	Adams/Denver

Note: The above table represents the Authority's capital plan as of April 15, 2021. Modifications or changes to the Authority's capital plan after the date of the *2021 Update Study* were not included in this update letter.

Toll Rate Assumptions

CDM Smith utilized the toll rate schedule approved on November 4, 2021, by the Authority's Board of Directors to revise the *2021 Update Study* transaction and toll revenue forecasts for E-470. **Table 2** presents the *2021 Update Study* toll rate assumptions for passenger cars through 2040 (left) followed by the revised toll rate schedule (right). The revised toll rate schedule assumes a \$0.10 toll reduction at Gantry A and a \$0.05 toll reduction at Gantries B, C, D and E for both the ExpressToll and LicensePlateToll toll rates (as compared to the *2021 Update Study* assumptions), starting January 1, 2022. Toll rates will then be reduced by the same amount in 2023, and again in 2024. The previous evaluation within the *2021 Update Study* assumed a 2 percent increase in toll rates every 5 years, beginning in 2025. The current analysis assumes that toll rates will be held constant for all forecast years after 2024 (2025 and thereafter).

Table 2
Toll Rate Assumptions, 2022 – 2040

		2021 Update Study Toll Rate Assumptions				Revised Toll Rate Assumptions			
		Toll Gantry A	Toll Gantry C	Toll Gantry B, D, E	Ramp Gantries	Toll Gantry A	Toll Gantry C	Toll Gantry B, D, E	Ramp Gantries
2022	ExpressToll	\$ 2.70	\$ 2.70	\$ 2.95	\$ 1.25	\$ 2.60	\$ 2.65	\$ 2.90	\$ 1.25
	LPT	\$ 4.30	\$ 4.30	\$ 4.65	\$ 2.05	\$ 4.20	\$ 4.25	\$ 4.60	\$ 2.05
2023	ExpressToll	\$ 2.70	\$ 2.70	\$ 2.95	\$ 1.25	\$ 2.50	\$ 2.60	\$ 2.85	\$ 1.25
	LPT	\$ 4.30	\$ 4.30	\$ 4.65	\$ 2.05	\$ 4.10	\$ 4.20	\$ 4.55	\$ 2.05
2024	ExpressToll	\$ 2.70	\$ 2.70	\$ 2.95	\$ 1.25	\$ 2.40	\$ 2.55	\$ 2.80	\$ 1.25
	LPT	\$ 4.30	\$ 4.30	\$ 4.65	\$ 2.05	\$ 4.00	\$ 4.15	\$ 4.50	\$ 2.05
2025	ExpressToll	\$ 2.75	\$ 2.75	\$ 3.00	\$ 1.30	\$ 2.40	\$ 2.55	\$ 2.80	\$ 1.25
	LPT	\$ 4.40	\$ 4.40	\$ 4.80	\$ 2.05	\$ 4.00	\$ 4.15	\$ 4.50	\$ 2.05
2030	ExpressToll	\$ 2.80	\$ 2.80	\$ 3.05	\$ 1.35	\$ 2.40	\$ 2.55	\$ 2.80	\$ 1.25
	LPT	\$ 4.45	\$ 4.45	\$ 4.85	\$ 2.15	\$ 4.00	\$ 4.15	\$ 4.50	\$ 2.05
2035	ExpressToll	\$ 2.85	\$ 2.85	\$ 3.10	\$ 1.40	\$ 2.40	\$ 2.55	\$ 2.80	\$ 1.25
	LPT	\$ 4.55	\$ 4.55	\$ 4.95	\$ 2.25	\$ 4.00	\$ 4.15	\$ 4.50	\$ 2.05
2040	ExpressToll	\$ 2.90	\$ 2.90	\$ 3.15	\$ 1.45	\$ 2.40	\$ 2.55	\$ 2.80	\$ 1.25
	LPT	\$ 4.60	\$ 4.60	\$ 5.00	\$ 2.30	\$ 4.00	\$ 4.15	\$ 4.50	\$ 2.05
2045	ExpressToll	\$ 2.95	\$ 2.95	\$ 3.20	\$ 1.50	\$ 2.40	\$ 2.55	\$ 2.80	\$ 1.25
	LPT	\$ 4.70	\$ 4.70	\$ 5.10	\$ 2.40	\$ 4.00	\$ 4.15	\$ 4.50	\$ 2.05
2050	ExpressToll	\$ 3.00	\$ 3.00	\$ 3.25	\$ 1.55	\$ 2.40	\$ 2.55	\$ 2.80	\$ 1.25
	LPT	\$ 4.80	\$ 4.80	\$ 5.20	\$ 2.50	\$ 4.00	\$ 4.15	\$ 4.50	\$ 2.05

Note: The first year of each toll rate reduction is indicated in red.
The 2021 Update Study assumed an 2 percent toll rate increase every 5 years, as indicated in blue.
Toll rate adjustments are assumed to occur on January 1 of the indicated year.

Forecast Development

As noted previously, the traffic and revenue estimates under the revised toll schedule were based on the same modeling inputs and general assumptions used in the *2021 Update Study*. CDM Smith utilized the DRCOG regional travel demand model, which was modified and calibrated specifically to the E-470 System as a part of prior study efforts. Traffic assignments were run at 2021, 2025, 2030, 2035, and 2040 levels under the new toll rate schedule and the model outputs were

compared versus the “Base Case” assignments from the *2021 Update Study*. The estimated traffic and revenue impacts of the new toll rates were then applied in each of the model years. The year-over-year growth rates developed under the *2021 Update Study* were then applied to the revised model year forecasts with the toll rate impacts to develop annual transactions and revenue streams through 2050. Using information provided by E-470, estimates of unbillable and net toll revenues were incorporated into the *2021 Update Study* revenue forecasts. 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. These assumptions regarding unbillable and unpaid revenue have been carried forward into the current analysis. It should be noted that this process carried forward the model adjustments and post processing established during the *2021 Update Study* and prior studies, maintaining consistency between the prior and current analyses.

Updated Transaction and Toll Revenue Estimates

The resulting revised annual transaction, and gross and net toll revenue estimates for E-470 under the new toll rate schedule for 2022 and beyond are provided in **Table 3**.

In the short term, total annual transactions are estimated to be 90.2 million in 2022, increasing to 100.7 million by 2025. This represents an increase of 0.5 and 1.7 percent over the *2021 Update Study* in 2022 and 2025, respectively, with the additional transactions serving to slightly offset the reductions in revenue resulting from the toll rate decrease. Total estimated gross revenues in 2022 are \$278.1 million in the current study forecasts, representing an average toll rate of \$3.08. By 2025, the average toll rate is estimated to decrease to \$2.95, producing annual gross revenues of \$297.3 million. Annual net toll revenues are estimated to decrease, relative to the *2021 Update Study*, to \$237.9 million in 2022, representing a reduction of 1.3 percent. In 2025, net toll revenues are estimated to be \$255.2 million in the current study forecasts, or a reduction of 5.6 percent.

As the difference between the *2021 Update Study* and current study toll rate assumptions increases every five years (as a result of maintaining the current toll rates versus a two percent rate increase every five years), so does the difference in forecasted transactions and toll revenues. By 2050, total transactions are estimated to be 190.9 million, representing a 2.4 percent increase while forecasted net toll revenues are estimated to decline to \$474.3 million, 12.8 percent less than previous forecasts. By 2050, the average toll rate is estimated to decrease to \$2.87, producing annual gross revenues of \$549.6 million.

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

Year	2021 Update Study		Transactions (000s)	Current Update Forecast			Difference		Percent Difference	
	Transactions	Net Revenue		Toll Revenue (\$000s)			Trans.	Net Rev.	Trans.	Net Rev.
	(000s)	(\$000s) ⁽¹⁾		Gross ⁽²⁾	Billable ⁽³⁾	Net ⁽¹⁾	(000s)	(\$000s) ⁽¹⁾	(000s)	(\$000s) ⁽¹⁾
2020 ⁽⁴⁾⁽⁵⁾⁽⁶⁾	58,071	\$ 155,798	58,071	\$ 185,277	\$ 167,970	\$ 155,798	-	\$ -	-	-
2021 ⁽⁴⁾⁽⁶⁾⁽⁹⁾	77,013	205,778	77,013	243,058	223,130	205,778	-	-	-	-
2022 ⁽⁶⁾⁽⁷⁾	89,753	240,929	90,198	278,143	262,052	237,917	445	(3,012)	0.5	(1.3)
2023 ⁽⁵⁾⁽⁷⁾	92,328	247,728	93,143	281,733	265,827	241,245	815	(6,483)	0.9	(2.6)
2024 ⁽⁵⁾⁽⁷⁾	96,427	259,090	97,654	290,381	274,255	248,767	1,227	(10,323)	1.3	(4.0)
2025 ⁽⁸⁾⁽⁹⁾	98,969	270,225	100,686	297,288	281,155	255,215	1,717	(15,010)	1.7	(5.6)
2026	101,170	275,978	102,926	303,690	287,292	260,728	1,756	(15,250)	1.7	(5.5)
2027	103,290	281,890	105,080	310,122	293,581	266,362	1,790	(15,528)	1.7	(5.5)
2028 ⁽⁵⁾⁽⁹⁾	107,473	293,799	109,329	323,352	306,249	277,677	1,856	(16,122)	1.7	(5.5)
2029 ⁽⁹⁾	110,783	302,246	112,702	332,443	314,986	285,587	1,919	(16,659)	1.7	(5.5)
2030 ⁽⁸⁾	113,184	313,840	115,570	339,899	322,359	292,319	2,386	(21,521)	2.1	(6.9)
2031 ⁽⁹⁾	117,894	326,890	120,376	353,998	335,793	304,595	2,482	(22,295)	2.1	(6.8)
2032 ⁽⁵⁾	122,143	338,337	124,715	366,477	347,621	315,309	2,572	(23,028)	2.1	(6.8)
2033 ⁽⁹⁾	127,362	352,160	130,043	381,506	361,892	328,280	2,681	(23,880)	2.1	(6.8)
2034	131,918	364,177	134,696	394,588	374,305	339,542	2,778	(24,635)	2.1	(6.8)
2035 ⁽⁸⁾⁽⁹⁾	139,328	391,760	142,556	416,599	395,275	358,701	3,228	(33,059)	2.3	(8.4)
2036 ⁽⁵⁾	142,935	401,304	146,248	426,798	404,943	367,463	3,313	(33,841)	2.3	(8.4)
2037	145,930	409,469	149,313	435,563	413,243	374,970	3,383	(34,499)	2.3	(8.4)
2038 ⁽⁹⁾	150,285	421,806	153,767	448,771	425,766	386,318	3,482	(35,488)	2.3	(8.4)
2039	153,716	431,115	157,279	458,750	435,218	394,871	3,563	(36,244)	2.3	(8.4)
2040 ⁽⁵⁾⁽⁸⁾⁽⁹⁾	155,201	442,917	158,920	463,206	439,542	398,940	3,719	(43,977)	2.4	(9.9)
2041	158,425	451,702	162,228	472,454	448,312	406,892	3,803	(44,810)	2.4	(9.9)
2042	162,169	461,929	166,065	483,211	458,514	416,144	3,896	(45,785)	2.4	(9.9)
2043	166,019	472,420	170,013	494,248	468,981	425,636	3,994	(46,784)	2.4	(9.9)
2044 ⁽⁵⁾	170,435	484,478	174,541	506,926	481,006	436,540	4,106	(47,938)	2.4	(9.9)
2045 ⁽⁸⁾	172,148	496,832	176,297	510,668	484,756	440,245	4,149	(56,587)	2.4	(11.4)
2046	175,260	505,378	179,489	519,495	493,131	447,845	4,229	(57,533)	2.4	(11.4)
2047	178,443	514,095	182,753	528,497	501,672	455,596	4,310	(58,499)	2.4	(11.4)
2048 ⁽⁵⁾	182,180	524,383	186,586	539,116	511,748	464,740	4,406	(59,643)	2.4	(11.4)
2049	185,025	532,055	189,506	547,046	519,272	471,567	4,481	(60,488)	2.4	(11.4)
2050 ⁽⁸⁾	186,351	544,055	190,864	549,578	521,891	474,272	4,513	(69,783)	2.4	(12.8)

(1) Net Revenue includes adjustments for unbillable or uncollectable toll revenue.

(2) Gross Revenue does not include adjustments for unbillable or uncollectable toll revenue.

(3) Billable Revenue includes adjustments for uncollectable toll revenue (ie. bad and duplicate images, and plates with invalid DMV addresses).

(4) Includes actual data through February 2021.

(5) Leap Year.

(6) COVID-19 traffic impacts have been included in 2020 due to stay-at-home orders, public space closures and other travel restrictions.

Some recovery is assumed through 2022, with longer-term traffic impacts of 8.1 percent included through the remainder of the forecast period.

(7) Under the Current Study Forecast, toll reductions of \$0.10 (Gantry A) and \$0.05 (Gantries B-E) are assumed for both ExpressToll and LPT customers.

(8) Under the 2021 Update Study, a toll increase of 2 percent is assumed at all toll locations.

(9) Assumed widening of various segments of the E-470 mainline.



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CDM Smith appreciates the important nature of this assignment and the opportunity to work with the Authority. As always, please do not hesitate to contact us with any comments and/or questions.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'David Aron', with a long horizontal flourish extending to the right.

David P. Aron
Project Manager
CDM Smith Inc.

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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, economic conditions 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 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.

The report and its contents are intended solely for use by the E-470 Public Highway Authority and designated parties approved by E-470 Public Highway Authority and CDM Smith. Any use by third-parties, other than as noted above, is expressly prohibited. In addition, any publication of the report for purposes of financing without the express written consent of CDM Smith is prohibited.

CDM Smith is not, and has not been, a municipal advisor as defined in Federal law (the Dodd Frank Bill) to the E-470 Public Highway Authority and does not owe a fiduciary duty pursuant to Section 15B of the Exchange Act to the E-470 Public Highway Authority with respect to the information and material contained in this report. CDM Smith is not recommending and has not recommended any action to the E-470 Public Highway Authority. The E-470 Public Highway Authority should discuss the information and material contained in this report with any and all internal and external advisors that it deems appropriate before acting on this information.