



Economic Analysis for Express Lanes on C-470

July 2005

Submitted To: 
CDOT Region 6
2000 S. Holly
Denver, CO 80222

Submitted By:  **PBSJ**
Wilson & Company
999 18th Street, Suite 2600
Denver, CO 80202

Table of Contents

1.0 INTRODUCTION 1

2.0 METHODOLOGY 2

3.0 ECONOMICS AND DEMOGRAPHICS 5

4.0 ANALYSIS OF ECONOMIC AND DEMOGRAPHIC FORECAST..... 12

5.0 C-470 USER SURVEY: SELECTED FINDINGS 16

6.0 CONCLUSION..... 17

7.0 REFERENCES 21

1.0 INTRODUCTION

Several possible configurations have been explored regarding the capacity expansion of the C-470 highway in order to insure that the future service demand is met. These possible configurations include addition of four General Purpose Lanes (GPL) or four tolled Express Lanes (EL). Engineering analysis indicates that the additional lanes are required to prevent considerable future congestion that would occur concomitant with planned population growth and development in the C-470 area.

As part of the *C-470 Corridor Environmental Assessment*, an economic analysis was completed to evaluate the impacts of both the GPL and EL alternatives. This technical report addresses questions regarding the introduction of toll lanes to a section of road not previously tolled. The general questions referred for examination were:

1. Do tolls cause businesses and residents to choose to locate or relocate/expand in other areas, due to the additional cost of doing business or living in the area adjacent to the toll facility?
2. Do businesses in areas accessed via toll facilities lose retail dollars as patrons choose to shop in other areas, in order to avoid paying tolls?

Both of these questions center on the monetary cost of tolls to use Express Lanes. As the GPL configuration does not employ tolls, there is no direct usage charge or monetary cost, so the questions of possible detrimental effects of tolls are not relevant with the GPL configuration.

In the economics of highway use on C-470, traffic congestion imposes a cost that must be borne by the user. The cost of congestion is currently paid in terms of increased travel time (a physical cost). With the addition of tolled Express Lanes, an alternative to the physical cost of congestion is possible. The alternative would be the price of access to the Express Lanes (the toll), which, in other words, is the monetary cost of congestion avoidance.

The monetary cost is the user-elected cost of congestion avoidance. In opting for payment of the monetary cost by using the Express Lanes, a C-470 user shows preference for the monetary cost instead of the physical cost: in his/her calculation, the monetary cost is less than the physical cost of congestion.

If on the other hand, if all lanes (Express and other) were subject to a toll, the C-470 user preference would not matter, as the user would not be able to choose between the monetary cost and the physical cost. In this case some portion of the C-470 users (those preferring the physical cost), would see the cost of using C-470 increase beyond what they are willing to pay.

2.0 METHODOLOGY

Questions regarding the monetary cost of congestion relief realized by using the Express Lanes of C-470 as they relate to the additional costs of doing business or living in an area and in the patterns of retail spending in one area vis a vis another area require us to examine certain questions:

1. Would a disparity in income levels in one area versus another make imposition of a toll in the optional Express Lanes a critical factor in the decision to locate, reside or shop in the area of lower income?
2. Is the population and population growth in the C-470 Corridor (the “study area”) consistent across that area, or are there disproportional levels of present and future congestion that would make the monetary cost of the toll higher in one area than in another which could influence location or retail purchasing decisions?
3. Is the monetary cost of congestion avoidance different in various regions of the C-470 user area so that location or retail purchasing decisions would be affected by toll differentials?
4. Is the introduction of Express Lanes economically neutral with regard to location and retail purchasing decisions?
 - a. Is Express Lane use optional at the discretion of the user?
 - b. In Express Lane management of traffic patterns, do the Express Lanes affect entrance and egress choices favoring/disfavoring one area over another?
 - c. Is the monetary cost comparable to other user charges, monetary and/or time, in the C-470 extended area?

The “C-470 extended area” refers to the entire Denver Metropolitan Statistical Area. The focus of this economic study is on the “C-470 study area,” which as defined by the C-470 Corridor Environmental Assessment are the counties immediately surrounding C-470: Douglas, Jefferson and Arapahoe. As explained in section 1.3, Denver County is also included in the comparisons provided in this study.

To examine these questions, several factors were considered:

1. **Income Levels:** Are per-capita incomes across the C-470 study area within the same range? If homogeneity of incomes exists across the study area it would indicate that the toll option would not disproportionately favor one group (high per-capita income areas) over another (low per-capita income areas). This is one factor in a generalized test of whether the toll will affect decisions on relocation or patterns of commercial activity. If per-capita incomes are

- heterogeneous (vary significantly between areas), other factors would have to be considered as well. If there is a pronounced variance in per-capita earnings, age distribution, and relative travel propensities would have to be weighted into the equation.
2. **Population Growth:** In general terms, *future* congestion is proportional to both the growth in population and the intensification of the use of transportation by the current population. If population growth rates in one area are shown to significantly exceed that of other areas, that high growth area would be expected to benefit more, in the long term, from efforts to mitigate congestion. This examination of probable future congestion must be balanced with the *present* congestion in areas that already have relatively larger populations and whose future population growth rates may be less than that in other areas. With increased population, future congestion will also increase. As congestion increases, the demand for congestion avoidance and the *value* of a monetary payment versus a physical one would increase.
 3. **Price Aversion:** Price aversion is the general unwillingness to pay tolls as measured at different levels of congestion (travel delay times). Survey information from the *C-470 Express Lanes User Survey*, completed in March, 2004 by the ETC Institute, identified the proportional level of C-470 users who are unwilling to pay a toll at each level of household income. The survey did not identify price aversion by residential or business location within the C-470 geographic area. If we are able to establish homogeneity of per capita incomes (step 1) across the C-470 study area, we may conclude that *price aversion* based on monetary cost (price) alone is equivalent across the survey area and that the survey results apply equally across the C-470 study area. There are certainly other factors than price which could influence toll decisions in one area versus another, but data is not sufficient for that analysis. The question here is: Is the relative price of the toll in any one area sufficient to impact home and business location/relocation and retail sales?
 4. **Optionality of the Express Lane Alternative:** Another factor in analyzing the effect of the introduction of a toll is whether that toll is optional (paid as an actual user fee) or whether it extracts a cost(s) on non-users as well. If the toll is optional, its effects on existing traffic patterns and the end result on location and retail purchasing decisions would be minimal; C-470 users would determine how they would absorb the costs of congestion by paying either the monetary cost of the toll or the physical cost in increased travel time, but would not alter their location and retail purchasing decisions simply to avoid the toll. The question central to this issue is whether use of the

Express Lanes (i.e. the toll) is really optional? The engineering design of the C-470 Corridor shows separate Express Lanes (tolled) coexisting with non-toll lanes. The current design is for the addition of Express Lanes equal in number to the current non-toll lanes without a reduction in the current number of non-toll lanes. In this method, the capacity of the C-470 non-toll system remains static (fixed), while the number of users would increase. Relief of current and future congestion levels on the C-470 Corridor are through the addition of Express Lanes. An examination of the traffic study, with its simulation models of usage, will indicate the general level of congestion increase without new lanes and the overall increase as well as the effect that the construction of the Express Lane alternative would have on mitigating the level of congestion.

5. **Engineering Design:** To be economically neutral with regard to location and retail purchase decisions, the proposal to add Express Lanes must meet a further condition: the engineering design cannot be such that traffic patterns are diverted either to or from individual areas. Since this project involves construction of Express Lanes parallel to existing non-toll lanes with entrance and egress access to all three counties in the study area that is not disproportionately different than the non-toll lanes, this condition is assumed to be satisfied.

6. **Comparable Costs:** Another point of economic neutrality of the proposal to add Express Lanes with regard to location and retail purchase decisions is that any toll costs imposed must be approximately equal to alternative tolls for the same area. If tolls are approximately equal, C-470 users would not be inclined to change shopping or location choices based on the relative price of tolls.

In reviewing the local socio-economic conditions, this study found that while people are generally resistant to paying new tolls, the economic benefits gained from accessing convenient and/or important shopping and employment centers, and by driving in either reduced or predictable congestion exceed the costs of the tolls. This is further exemplified through the feedback received from the local business community, including the Southeast Business Partnership, South Metro Chamber of Commerce, and the Jefferson Economic Council. Correspondence letters from these entities can be found in the appendix.

The cost of using C-470 can be paid either as a price of congestion by accepting the physical time delays associated with using non-toll lanes, or by paying a monetary charge to use the Express Lanes and avoid congestion. The choice will be at the

discretion of the C-470 user. Express lanes, where tolls are charged, also give C-470 users an option to occasionally use Express Lanes at those times when congestion in non-toll lanes is peaking or in the event of a disruption in normal traffic flows. This enables the C-470 user to gain significant economic value in terms of insuring consistency and predictability in travel times. By maintaining non-toll lanes operating with tolled Express Lanes, the C-470 user can determine whether the monetary price of the toll is warranted at any single point in time and can choose to use an Express Lane or a non-toll lane according to individual preference.

The EL Alternative assumes a user paid toll rate per mile driven on the facility, whereas the GPL Alternative does not. Therefore, the GPL Alternative does not present the possibility of distortion of economic decisions stemming from the imposition of a toll. The GPL Alternative would also relieve congestion, while its costs would be imposed in a form other than direct user fees (tolls). This analysis does not examine the relative merits or costs of EL versus GPL configurations; it only examines the effects of tolls on location/relocation and expansion decisions and on affecting preferences in retail sales.

Within the C-470 extended area, the cost of congestion avoidance would be different than that in the study area, depending on the level of congestion and the availability of other routes between trip origins and destinations. How this cost affects retail purchasing decisions is largely dependent on the time sensitivity of the shopping trip. E-470 and Northwest Parkway are the only other two toll corridors that currently exist in the Denver metropolitan area. The toll charges on these corridors are comparable in cost to those proposed on C-470, indicating that retail purchasing decisions would be economically neutral, as compared to these other toll corridors. However, on other non-tolled highway corridors, where highway congestion is severe (LOS F), without the benefit of capacity improvements (tolled or non-tolled), travelers must choose between the cost of sitting in congestion or taking alternate routes on arterial streets, which may or may not be more time efficient, and thus cost effective.

3.0 ECONOMICS AND DEMOGRAPHICS

The first step to understanding economic changes that may result from implementing a toll facility is to review historical conditions, as well as current forecasts. This section addressed the questions detailed in steps 1 and 2 regarding homogeneity of income levels and populations growth. Like the C-470 Corridor Environmental Assessment, this section looks at the demographics for the affected counties for the proposed C-470 Express Lanes: Douglas, Jefferson, and Arapahoe Counties. In addition, this section also considers the demographics for Denver County, as it is the next closest county to the study area, and a significant economic force within the area.

The historical demographic and economic information presented here is provided by Woods & Poole Economics. Woods & Poole is an independent, non-partisan research firm that uses U.S. Census data as a basis for its analyses. Woods & Poole also obtains data from sources such as the U.S. Department of Labor and Commerce, in addition to conducting independent data collection. Woods & Poole formulates forecasts using its own proprietary demographic and economic models. As such the data in this section may differ from that presented in Chapter 3 of the EA.

The demographic forecasts in Chapter 3 of the EA were formulated by the Colorado Department of Local Affairs (DOLA). The decision to use Woods & Poole data in this analysis rather than that of the DOLA was based on the requirement of an integrated data set of population and income information expressed in constant dollars. Use of the Woods & Poole data also offered the opportunity to examine the relevant questions regarding any distortion in economic behavior caused from tolls with data from a disinterested party.

Table 1 shows the historical population for the selected counties between 1980 and 2004. As noted in Chapter 3 of the EA, Jefferson and Arapahoe Counties have experienced healthy growth over the last 25 years. Douglas County has seen a tremendous average annual growth rate- approximately four times that of its suburban neighbors Jefferson and Arapahoe Counties. This is in part reflective of the small population base in the county at the beginning of the study period. The more developed Denver County experienced little long term growth in population over the study period.

Table 2 shows total earnings for each county during this time period. The earnings category is the compensation paid to workers and is not a measure of company earnings or profits. This category includes wages, salaries and other income, and proprietors' income. This category also includes personal contributions for social insurance (social security, unemployment). Earnings data is recorded by place of work, so that earnings of an employee who works in one county, but resides in another are recorded in the county where the job is located.

All four counties experienced greater and faster growth in earnings than in population, indicating that either jobs were created at higher salaries, larger salary increases for existing jobs occurred, or a significant portion of the local population recently joined the workforce.

Due to the disparity in population between the counties, their total earnings vary widely. As the smallest county, Douglas County had the smallest total earnings in 2004 at \$3.1 million, compared to \$11.8 million for Jefferson County, \$20.3 million for Arapahoe County and \$30.2 million for Denver County. In addition to reflecting the difference in population base, these numbers may also indicate that increasing numbers

of people lived in one county, such as Douglas, and commuted to another, such as Denver or Arapahoe for their jobs.

Total earnings growth in the suburban counties, Jefferson, Arapahoe, and Douglas have been significantly higher than in Denver County paralleling the growth in population and establishment of new commercial establishments in each county. Earnings growth in Douglas County exceeds that of its suburban neighbors by a factor of two to three.

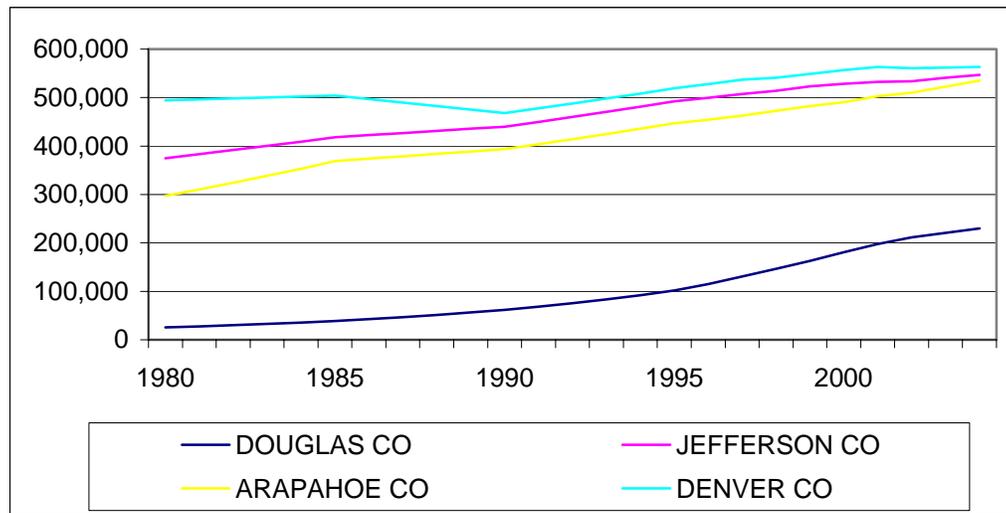
Note the monetary figures shown for both earnings and per capita income are expressed in constant 2000 dollars. By showing the values in constant dollars, inflation is removed and the rise in earnings and per capita income is shown in terms of a rise in real purchasing power making it possible to make more accurate comparisons between the years presented.

To understand the purchasing power of the population, we need to look at per capita income (PCI), which is shown on **Table 3**. Personal income is the sum of wages and salaries, other labor income (pension contributions, healthcare contributions, etc), proprietors' income, rental income of persons, dividend income, personal interest income, and transfer payments (Social Security and Medicare, etc. income to individuals) less personal contributions for social insurance (Social Security and Medicare, etc. payments from individuals). Personal income divided by population equals per Capita income.

In 2004 Arapahoe County had the highest PCI at \$47,980 (expressed in 2000 dollars). Denver County had the next highest PCI at \$42,341, then Jefferson County at \$39,337, and Douglas County had \$34,170. In terms of general income levels, this spread of PCI figures is relatively small; all counties fall within the same national economic quintile (the national incomes of the United States divided into five groups by frequency of occurrence). In general, per-capita income within the study area is homogenous, and no one area would be considered economically disadvantaged as compared to the others vis a vis the relative influence of a toll on purchasing or location decisions.

It is noteworthy that the average annual growth rate in PCI in Douglas County during the study period was half that of the other counties. **Table 4** shows that Douglas County had a higher percentage of its population in the 0 to 19 years age group and a smaller percentage of its population in the workforce age 20 to 64 years. The resulting lower median age in Douglas County represents a higher dependent population and thus a lower PCI. The evidence of the higher dependent proportion of the population in Douglas County is further evidence that the homogeneity of average household or family income is a valid assumption.

Table 1
C-470 Express Lanes Affected Counties
Historical Demographics - Population



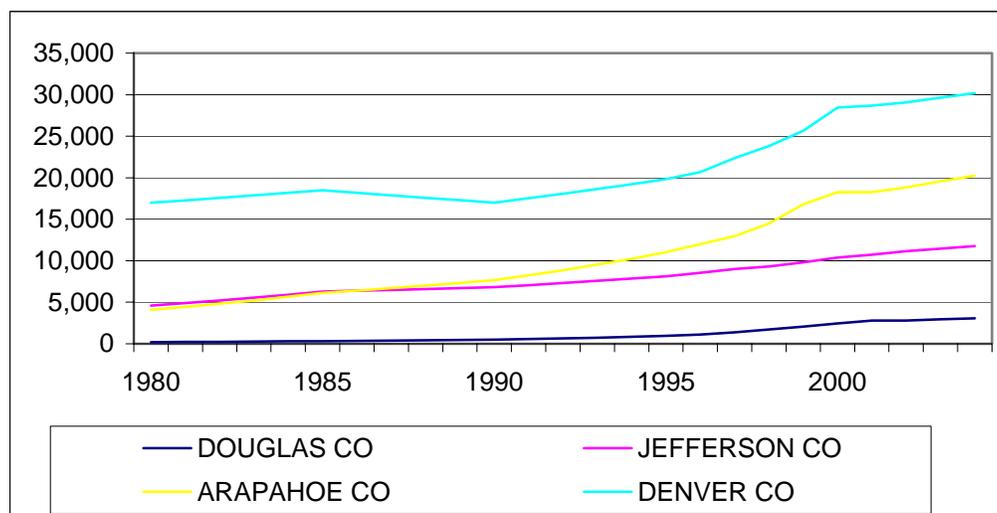
	<u>DOUGLAS CO</u>	<u>JEFFERSON CO</u>	<u>ARAPAHOE CO</u>	<u>DENVER CO</u>
1980	25,630	374,680	297,370	494,140
1985	38,850	418,410	369,030	504,430
1990	61,670	440,010	393,900	468,140
1995	101,940	492,150	446,820	518,960
1996	114,690	499,820	454,210	527,640
1997	130,510	507,370	462,680	536,680
1998	146,160	513,710	472,540	540,890
1999	162,870	523,330	482,260	548,850
2000	180,390	528,520	490,690	556,580
2001	197,610	532,530	502,540	563,240
2002	211,090	533,810	510,140	560,420
2003	220,580	540,710	522,770	561,930
2004	229,860	547,080	534,850	562,920

Average Annual Growth Rates

1980-1985	8.67%	2.23%	4.41%	0.41%
1985-1990	9.68%	1.01%	1.31%	-1.48%
1990-1995	10.57%	2.26%	2.55%	2.08%
1995-2000	12.09%	1.44%	1.89%	1.41%
2000-2004	6.25%	0.87%	2.13%	0.32%
1980-2004	9.57%	1.59%	2.48%	0.54%

Source: Woods & Poole Economics

Table 2
C-470 Express Lanes Affected Counties
Historical Demographics - Total Earnings (000) \$2000



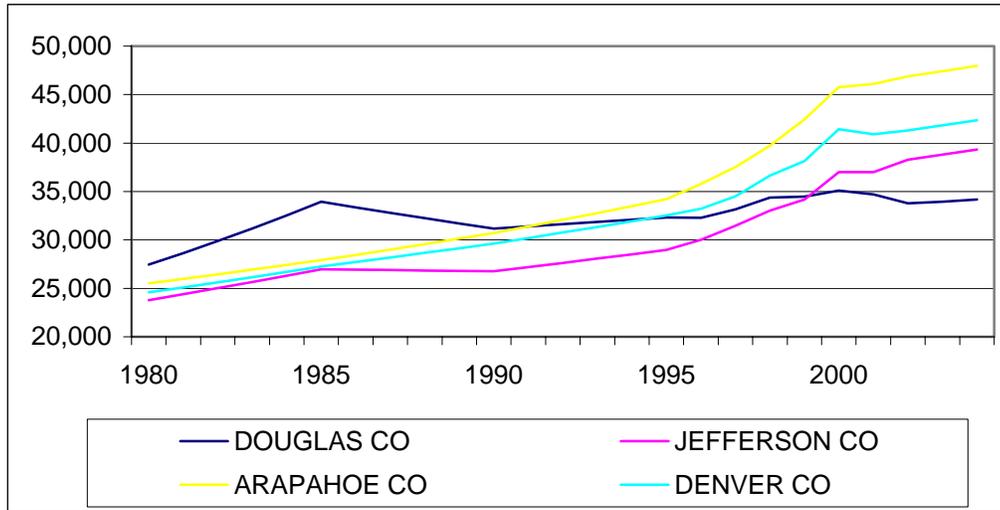
	<u>DOUGLAS CO</u>	<u>JEFFERSON CO</u>	<u>ARAPAHOE CO</u>	<u>DENVER CO</u>
1980	\$201.34	\$4,583.72	\$4,104.61	\$16,994.33
1985	\$316.85	\$6,287.16	\$6,134.20	\$18,489.58
1990	\$510.34	\$6,807.93	\$7,656.31	\$17,011.11
1995	\$960.73	\$8,114.39	\$11,010.74	\$19,830.30
1996	\$1,121.02	\$8,521.09	\$12,004.16	\$20,660.22
1997	\$1,381.80	\$8,995.06	\$12,949.44	\$22,367.69
1998	\$1,713.16	\$9,286.79	\$14,493.00	\$23,824.02
1999	\$2,079.92	\$9,804.79	\$16,802.71	\$25,647.03
2000	\$2,458.29	\$10,368.80	\$18,269.06	\$28,465.54
2001	\$2,787.03	\$10,735.81	\$18,253.59	\$28,674.96
2002	\$2,793.88	\$11,127.08	\$18,843.35	\$29,048.48
2003	\$2,936.42	\$11,452.68	\$19,550.36	\$29,619.84
2004	\$3,082.59	\$11,773.52	\$20,263.89	\$30,164.79

Average Annual Growth Rates

1980-1985	9.49%	6.52%	8.37%	1.70%
1985-1990	10.00%	1.60%	4.53%	-1.65%
1990-1995	13.49%	3.57%	7.54%	3.11%
1995-2000	20.67%	5.03%	10.66%	7.50%
2000-2004	5.82%	3.23%	2.29%	1.33%
1980-2004	12.04%	4.01%	6.88%	2.42%

Source: Woods & Poole Economics

Table 3
C-470 Express Lanes Affected Counties
Historical Demographics - Per Capita Income \$2000



	<u>DOUGLAS CO</u>	<u>JEFFERSON CO</u>	<u>ARAPAHOE CO</u>	<u>DENVER CO</u>
1980	\$27,438	\$23,787	\$25,513	\$24,584
1985	\$33,946	\$26,954	\$27,906	\$27,254
1990	\$31,157	\$26,769	\$30,712	\$29,623
1995	\$32,295	\$28,963	\$34,215	\$32,528
1996	\$32,268	\$30,023	\$35,774	\$33,226
1997	\$33,150	\$31,446	\$37,519	\$34,494
1998	\$34,371	\$33,022	\$39,742	\$36,637
1999	\$34,459	\$34,191	\$42,435	\$38,159
2000	\$35,090	\$37,008	\$45,768	\$41,421
2001	\$34,690	\$37,004	\$46,099	\$40,896
2002	\$33,786	\$38,279	\$46,869	\$41,315
2003	\$33,953	\$38,802	\$47,405	\$41,825
2004	\$34,170	\$39,337	\$47,980	\$42,341

Average Annual Growth Rates

	<u>DOUGLAS CO</u>	<u>JEFFERSON CO</u>	<u>ARAPAHOE CO</u>	<u>DENVER CO</u>
1980-1985	4.35%	2.53%	1.81%	2.08%
1985-1990	-1.70%	-0.14%	1.93%	1.68%
1990-1995	0.72%	1.59%	2.18%	1.89%
1995-2000	1.67%	5.02%	5.99%	4.95%
2000-2004	-0.66%	1.54%	1.18%	0.32%
1980-2004	0.92%	2.12%	2.67%	2.29%

Source: Woods & Poole Economics

Table 4
C-470 Express Lanes Affected Counties
Age Distribution

	1980	1990	2000	2004
Douglas County				
Median Age	30.38	32.13	33.49	34.05
Percentage of Population Aged 0-19	37.2%	33.5%	33.8%	32.5%
Percentage of Population Aged 20-64	58.2%	62.3%	62.1%	63.1%
Arapahoe County				
Median Age	29.25	32.24	34.29	35.23
Percentage of Population Aged 0-19	33.2%	30.1%	29.7%	28.8%
Percentage of Population Aged 20-64	61.6%	62.3%	61.7%	62.1%
Jefferson County				
Median Age	29.33	33.22	36.72	37.8
Percentage of Population Aged 0-19	33.4%	29.5%	28.2%	26.9%
Percentage of Population Aged 20-64	60.6%	62.3%	62.1%	62.6%

Source: Woods & Poole Economics

Understanding the historical demographics for the study area provides us with the context to understand the forecasted demographics. **Tables 5 through 7** show the Woods & Poole forecasts for population, earnings, and per capita income, respectively. As explained previously, Woods & Poole uses the U.S. Census as a starting point for their forecasts but then adjusts their forecasts based on additional research. This is the reason behind the higher population forecasts shown here, particularly for Arapahoe County. Note that the Woods & Poole forecasts shows that Jefferson, Arapahoe, and Denver counties are all expected to have approximately the same population through 2010, after which time (2010 through 2025) Arapahoe and Jefferson are expected to grow at a faster rate than Denver County. Douglas County is expected to grow at a 2.98 percent growth rate between 2005-2025 and to have approximately 430,800 residents in 2025. At that time Jefferson County is expected to have approximately 693,800, while 802,200 residents are estimated for Arapahoe County in 2025 and 596,300 residents for Denver.

The earnings forecast shown in **Table 6** projects healthy growth rates for all four counties earnings over the next 20 years. Similarly the per capita income forecast

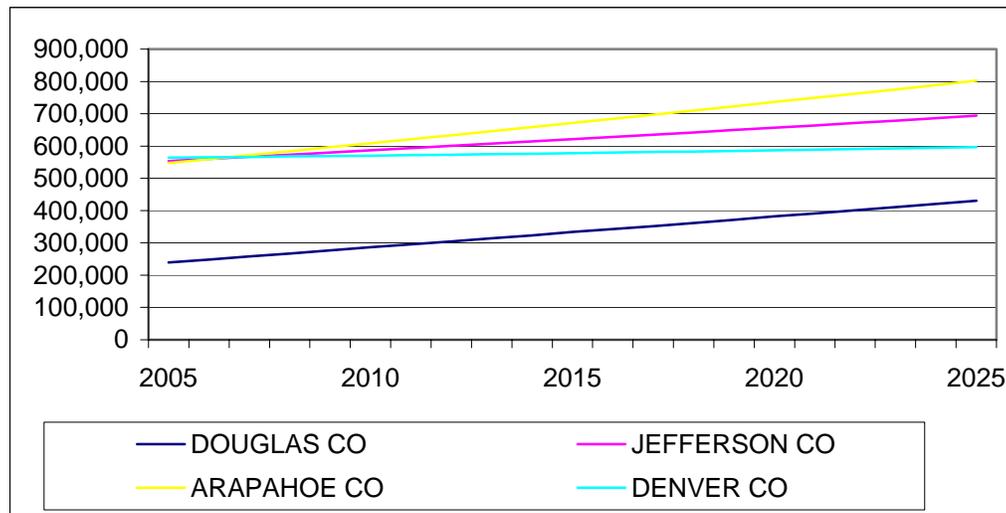
shown on **Table 7** reflects expected steady income growth in the four counties. All are expected to grow at annual growth rate between approximately 1.2 percent and 1.3 percent between 2005 and 2025.

4.0 ANALYSIS OF ECONOMIC AND DEMOGRAPHIC FORECAST

The projected population growth rate that is shown in **Table 5** for Douglas County is approximately twice that of the other study area counties. As future transportation congestion tends to increase with population growth, future congestion in and around Douglas County would increase faster than its neighboring counties. In terms of value received by methods that would provide alleviation to congestion, C-470 users in Douglas County would capture more value than their counterparts in Jefferson or Arapahoe Counties. There would likely be differences for individual users depending on their individual access requirements, but in aggregate Douglas County would generally gain more in utility.

This observation is borne out in examining the Woods & Poole forecast of PCI (see **Table 7**). Growth rates for PCI are slightly higher for Douglas County than in its suburban counterparts in each of the five-year increments from 2010 forward. While PCI is still lower in future projections, this is reflective of the age distribution (a higher proportion of dependent population) in Douglas County as compared to Jefferson and Arapahoe Counties.

**Table 5
C-470 Express Lanes Affected Counties
Forecasted Demographics - Population**



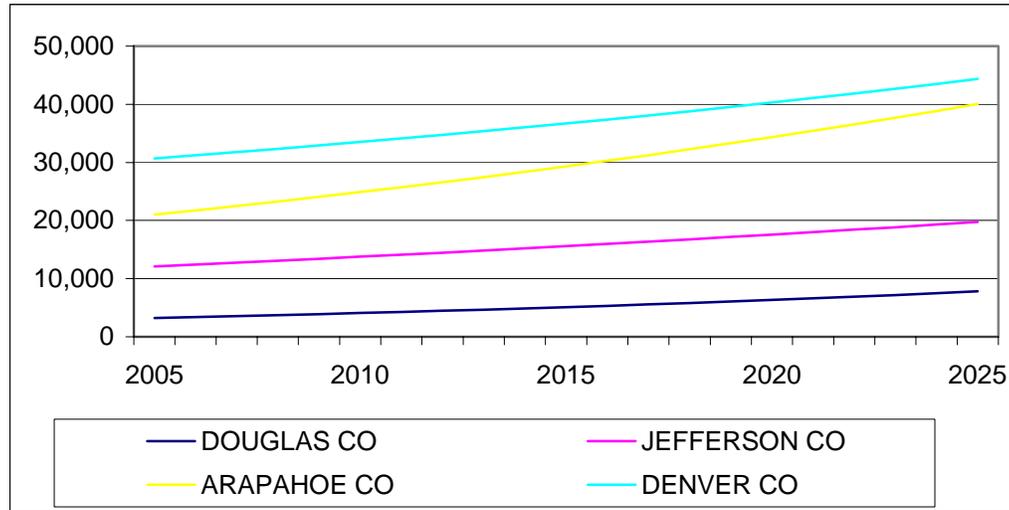
	<u>DOUGLAS CO</u>	<u>JEFFERSON CO</u>	<u>ARAPAHOE CO</u>	<u>DENVER CO</u>
2005	239,260	553,750	547,270	564,200
2006	248,520	560,140	559,390	565,250
2007	257,930	566,840	571,810	566,560
2008	267,320	573,540	584,220	567,900
2009	276,670	580,130	596,540	569,130
2010	286,080	586,750	608,860	570,380
2015	333,530	621,200	671,890	578,040
2020	381,630	656,770	736,170	586,620
2025	430,790	693,800	802,220	596,320

Average Annual Growth Rates

2005-2010	3.64%	1.16%	2.16%	0.22%
2010-2015	3.12%	1.15%	1.99%	0.27%
2015-2020	2.73%	1.12%	1.84%	0.30%
2020-2025	2.45%	1.10%	1.73%	0.33%
2005-2025	2.98%	1.13%	1.93%	0.28%

Source: Woods & Poole Economics

Table 6
C-470 Express Lanes Affected Counties
Forecasted Demographics - Total Earnings (000) \$2000



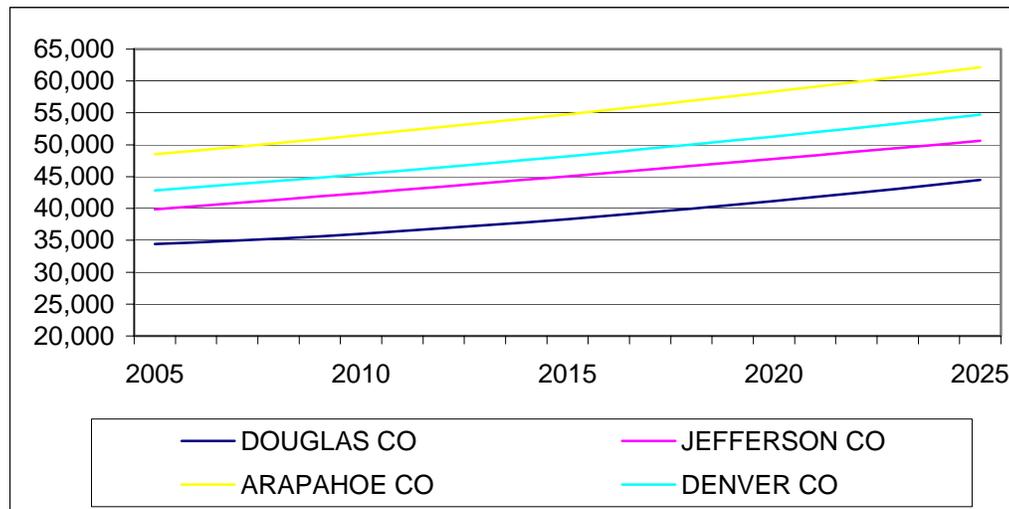
	<u>DOUGLAS CO</u>	<u>JEFFERSON CO</u>	<u>ARAPAHOE CO</u>	<u>DENVER CO</u>
2005	\$3,233.43	\$12,094.71	\$20,991.82	\$30,705.63
2006	\$3,389.23	\$12,416.95	\$21,730.46	\$31,239.63
2007	\$3,551.33	\$12,744.77	\$22,490.66	\$31,786.11
2008	\$3,719.90	\$13,078.39	\$23,271.93	\$32,346.16
2009	\$3,895.14	\$13,417.94	\$24,074.20	\$32,920.44
2010	\$4,077.26	\$13,763.58	\$24,897.70	\$33,509.46
2015	\$5,099.17	\$15,586.59	\$29,345.12	\$36,689.22
2020	\$6,330.49	\$17,575.77	\$34,376.01	\$40,290.18
2025	\$7,809.41	\$19,740.40	\$40,033.92	\$44,353.60

Average Annual Growth Rates

	<u>DOUGLAS CO</u>	<u>JEFFERSON CO</u>	<u>ARAPAHOE CO</u>	<u>DENVER CO</u>
2005-2010	4.75%	2.62%	3.47%	1.76%
2010-2015	4.57%	2.52%	3.34%	1.83%
2015-2020	4.42%	2.43%	3.22%	1.89%
2020-2025	4.29%	2.35%	3.09%	1.94%
2005-2025	4.51%	2.48%	3.28%	1.86%

Source: Woods & Poole Economics

Table 7
C-470 Express Lanes Affected Counties
Forecasted Demographics - Per Capita Income \$2000



	<u>DOUGLAS CO</u>	<u>JEFFERSON CO</u>	<u>ARAPAHOE CO</u>	<u>DENVER CO</u>
2005	\$34,394.53	\$39,839.75	\$48,528.66	\$42,828.03
2006	\$34,668.91	\$40,360.20	\$49,108.91	\$43,329.66
2007	\$34,956.85	\$40,863.61	\$49,681.96	\$43,823.81
2008	\$35,280.30	\$41,372.77	\$50,273.45	\$44,328.53
2009	\$35,639.74	\$41,895.90	\$50,889.14	\$44,855.42
2010	\$36,020.98	\$42,423.22	\$51,520.80	\$45,394.76
2015	\$38,290.23	\$45,062.62	\$54,794.79	\$48,195.43
2020	\$41,130.74	\$47,800.97	\$58,355.17	\$51,300.66
2025	\$44,494.53	\$50,625.85	\$62,157.13	\$54,717.67

Average Annual Growth Rates

2005-2010	0.93%	1.26%	1.20%	1.17%
2010-2015	1.23%	1.21%	1.24%	1.20%
2015-2020	1.44%	1.19%	1.27%	1.26%
2020-2025	1.58%	1.15%	1.27%	1.30%
2005-2025	1.30%	1.21%	1.25%	1.23%

Source: Woods & Poole Economics

5.0 C-470 USER SURVEY: SELECTED FINDINGS

The following relevant findings were reported in the *Selected Findings of the C-470 Express Toll Lanes Market Demand Survey* conducted by ETC Institute in May, 2004. The survey was reviewed and found to be of a scientific design (sampling and analysis) that would ensure the statistical validity of its conclusion.

A summary of the findings is presented here:

- 67 percent of the commuters surveyed were very or somewhat supportive of the development of express toll lanes on C-470; 31 percent were not supportive and two percent did not have an opinion.
- 82 percent of the commuters surveyed indicated they had used toll highways in other parts of the Denver metropolitan area, such as E-470.
- 81 percent of the commuters surveyed indicated they would pay 20-30 cents per mile to use express toll lanes on C-470 in an emergency or if they were late for an appointment.
- 56 percent of the commuters surveyed indicated they would pay 20-30 cents per mile to use express toll lanes on C-470 if traffic in the free lanes of C-470 was not moving.
- 43 percent of the commuters surveyed indicated they would pay 20-30 cents per mile to use express toll lanes on C-470 if there was heavy congestion on C-470.
- 21 percent of the commuters surveyed indicated they would pay 20-30 cents per mile to use express toll lanes on C-470 if there was moderate congestion on C-470.
- 10 percent of the commuters surveyed indicated they would pay 20-30 cents per mile to use express toll lanes on C-470 if there was light congestion on C-470.
- Seven percent of the commuters surveyed indicated they would pay 20-30 cents per mile to use express toll lanes every time they drive on C-470.
- 29 percent of the residents who participated in the phone survey indicated that they commuted on C-470 between the hours of 6-9 a.m. or 4-7 p.m. on weekdays.
- Amount Commuters Were Willing to Pay to Use Express Toll Lanes Between I-25 and I-70. If commuters could save 12 minutes by using express toll lanes to travel the full distance of C-470 between I-70 and I-25, Eight percent indicated they would pay at least \$5.20 to use express toll lanes. If commuters could save 24 minutes traveling between I-70 and I-25 on C-470, 15 percent indicated they would pay at least \$5.20 to use express toll lanes. If commuters could save 36 minutes on this trip, 26 percent indicated they would pay at least \$5.20 to use express toll lanes. Three-fourths (75 percent) of the commuters surveyed were willing to pay at least \$1.00 to save 36 minutes on a trip between I-70 and I-25; 24 percent were not willing to pay anything.
- Amount Commuters Were Willing to Pay to Use Express Toll Lanes Between Bowles Avenue and I-70. If commuters could save 7.5 minutes by using express toll lanes to travel on C-470 between Bowles Avenue and I-70, 11 percent

indicated they would pay at least \$1.60 to use express toll lanes. If commuters could save 12.5 minutes traveling on C-470 between Bowles Avenue and I-70, 20 percent indicated they would pay at least \$1.60 to use express toll lanes. If commuters could save 22.5 minutes on this trip, 31 percent indicated they would pay at least \$1.60 to use express toll lanes. Almost three-fourths (74 percent) of the commuters surveyed were willing to pay at least \$0.50 to save 22.5 minutes on a trip between Bowles Avenue and I-70; 25 percent were not willing to pay anything.

- Amount Commuters Were Willing to Pay to Use Express Toll Lanes Between Wadsworth and Quebec. If commuters could save 9.5 minutes by using express toll lanes to travel on C-470 between Wadsworth and Quebec, 10 percent indicated they would pay at least \$1.75 to use express toll lanes. If commuters could save 18.5 minutes traveling on C-470 between Wadsworth and Quebec, 28 percent indicated they would pay at least \$1.75 to use express toll lanes. If commuters could save 28.5 minutes on this trip, 38 percent indicated they would pay at least \$1.75 to use express toll Lanes. Most (85 percent) of the commuters surveyed were willing to pay at least \$0.50 to save 28.5 minutes on a trip between Wadsworth and Quebec; 13 percent were not willing to pay anything.
- Amount Commuters Were Willing to Pay to Use Express Toll Lanes Between Quebec and I-25. If commuters could save 2 minutes by using express toll lanes to travel on C-470 between Quebec and I-25, 28 percent indicated they would pay at least \$0.50 to use express toll lanes. If commuters could save 4 minutes traveling on C-470 between Quebec and I-25, 33 percent indicated they would pay at least \$0.50 to use express toll lanes. If commuters could save 6 minutes on this trip, 38 percent indicated they would pay at least \$0.50 to use express toll Lanes. More than two-thirds (68 percent) of the commuters surveyed were willing to pay at least \$0.25 to save 6 minutes on a trip between Quebec and I-25; 31 percent were not willing to pay anything.

This analysis of the survey data and conclusions is not meant to confirm or reject the financial feasibility of the project based on projected use nor is it meant to compare the relative merits of the use of tolled Express Lanes relative to other configurations (example: all free lanes, all tolled lanes).

The survey results, which can be applied uniformly across the C-470 study area, indicate a general support for the development of tolled Express Lanes with a willingness to pay based on the level of congestion, the particular trip, and the relative time savings when the Express Lanes would be used.

6.0 CONCLUSION

To review the general conclusions made in this study, the original questions are revisited regarding the monetary cost of congestion relief by using tolled Express Lanes

on C-470 as they relate to the additional costs of doing business or living in an area and in the patterns of retail spending in one area vis a vis another area:

1. Would a disparity in income levels in one area versus another make imposition of a toll in the optional Express Lanes a critical factor in the decision to locate, reside, or shop in the area of lower income?

As previously stated, general PCI is homogeneous across the three suburban counties of Douglas, Jefferson, and Arapahoe particularly when the age distribution of the populations of those counties is considered. This homogeneity combined with the general favorability of a monetary alternative to congestion which appears consistent across income groups (refer to Question 11 in the user survey, the cross-tabulation by total income of amenability to the introduction of tolled Express Lanes) strongly suggests that a toll for optional use of Express Lanes would not significantly alter decisions concerning location/relocation or retail purchasing decisions in one county versus another in the C-470 study area.

2. Is the population and population growth in the C-470 study area consistent across that area or are there disproportional levels of present and future congestion that would make the monetary cost of the toll higher in one area than in another that could influence location or retail purchasing decisions?

Future levels of transportation congestion that would rise with population growth would appear to affect Douglas County more than its two suburban counterparts, Jefferson and Arapahoe Counties, because of the significantly higher projected population growth in Douglas County. Therefore, the economic value of congestion relief would appear to be marginally higher for C-470 users living in Douglas County. The significance of the marginally higher economic value is likely to be small because a myriad of other factors, such as the age and design of transportation infrastructure, public transportation alternatives, etc. that would also play a significant role in determining relative value to potential users.

3. Is the monetary cost of congestion avoidance different in different areas of the C-470 extended area so that location or retail purchasing decisions would be affected by toll differentials?

Other toll corridors, such as E-470 and Northwest Parkway charge approximately the same toll as those proposed for the C-470 Express Lanes, and thus would not affect retail purchasing from an economic perspective. However, in areas where toll facilities do not exist, the effects on retail purchasing decisions would be largely dependent on the time sensitivity of the shopping trip.

4. Is the introduction of Express Lanes economically neutral with regard to location and retail purchasing decisions?

- Is Express Lane use optional at the discretion of the user?
- In the Express Lane management of traffic patterns, would the Express Lanes affect entrance and egress choices favoring/disfavoring one area over another?
- Is the monetary cost comparable to other user charges in the C-470 extended area?

As stated in Step 4, area residents and business owners currently pay a physical cost through the time that is lost to congestion. As the population projections show, the study area's population is expected to continue growing, thus congestion can be expected to continue increasing. A cost would be paid by the users either through time lost or in a monetary form.

As **Table 8** shows, if no highway improvements were made, the average commute time for C-470 within the study area would climb from 16 minutes in the eastbound direction during the peak AM hour to 30 minutes by 2025. The PM peak hour eastbound traffic would climb from the current 30 minutes to 34 minutes in 2025.

	Travel Time in Minutes		
	AM	PM	Time Savings
2005 Existing Conditions (Avg)	16	30	
2025 No Action	30	34	
2025 Express Lane Alternative: Using General Purpose Lanes	24	29	5-6
2025 Using Express Lanes	18	18	12-16

Source: C470 Corridor Traffic Model

In the Express Lane Alternative all travelers would benefit as compared to the No Action Alternative. It would be at the discretion of the user as to which cost would be paid; monetarily for access to the tolled Express Lanes, or through the cost of time. Either of these options is preferable to the No-Action Alternative in which all travelers would have no choice but to pay through time, which is projected to be 14 extra minutes during the peak morning hour.

The placement of entrances and egresses were carefully planned during the design and review phase for both the Express Lanes Feasibility Study and EA. This economic analysis concludes that no one county is significantly advantaged nor disadvantaged by the proposed access ramps to the Express Lanes.

The C-470 User Survey shows that 82 percent of commuters are already accustomed to regularly paying tolls in other parts of the Denver Metropolitan area. For example, to use E-470 to access Denver International Airport costs approximately \$5.00 when starting from northbound I-25. Continuing on E-470 to rejoin northbound I-25 costs another \$2.25. If there were alternative non-tolled roads with low levels of congestion in the Denver area, loss of businesses and retail might be an eminent concern. However, because toll roads are already in use in other areas within the region, the C-470 Express Lanes are not would not be a completed foreign concept to highway users.

Without evaluating all possible options (new non-tolled lanes vs. tolled lanes and the associated financing issues), and given the overall findings of the following parameters: regional population and economic homogeneity, the expected continued population growth and the corresponding expected increase in congestion, and the already existing tolerance for tolls in the extended area, this study does not find any evidence that the local areas will experience significantly negative repercussions in relation to location/relocation or retail sales from the introduction of tolled Express Lanes.

7.0 REFERENCES

National Cooperative Highway Research Program; Transportation Research Board – National Research Council. *NCHRP Report 463 Economic Implications of Congestion*. Washington DC, 2001.

PBS&J. *C-470 Corridor Environmental Assessment, Kipling Parkway to I-25, Internal Draft*. May 2005.

PBS&J. *C-470 Express Lanes Feasibility Study, Final Report*. June 2005.

PBS&J. *C-470 Express Toll Lanes Market Demand Survey Draft Report*. May 2004.

PBS&J. *C-470 Traffic Model: 2025 Projected Eastbound C-470 Express Lane Origin by County AM Peak Hour*.

PBS&J. *C-470 Traffic Model: 2025 Peak Hour Travel Times*.

San Diego State University Foundation. *I-15 Congestion Pricing Project Monitoring and Evaluation Services. Task 1.1 Worldwide Experience with Congestion Pricing*. June 1997.

San Diego State University Foundation. *I-15 Congestion Pricing Project Monitoring and Evaluation Services. Task 9 Phase II Year Three Business Impact Study*. May 2001.

Wilbur Smith Associates. *Concept Plan Volume 3 Monitoring and Evaluation Plan I-15 Managed Lanes Value Pricing Project Planning Study*. May 2002.

Woods & Poole Economics. *2004 Complete Economic and Demographic Data Source (CEDDS)*. January 2004.

APPENDIX

Business Community Correspondence



A RESOLUTION IN SUPPORT OF THE EXPANSION OF C-470

WHEREAS, the Southeast Business Partnership is an organization of business and government leaders working together to enhance the economic vitality and quality of life in the South Metro Denver area; and

WHEREAS, more than 300,000 people are employed at more than 20,000 businesses in the South Metro Denver area; and,

WHEREAS, a quality transportation system is vital to the economic vitality of the South Metro Denver area; and

WHEREAS, the C-470 Corridor is one of the Denver Metro area's major economic corridors, providing an important connection to the mountains, the south suburbs and the Southern Front Range; and

WHEREAS, peak hour congestion has increased significantly since the opening of C-470 in the 1980's; and

WHEREAS, projections show that sections of C-470 in Jefferson, Arapahoe and Douglas Counties will increase in volume by 30-40% by 2025; and

WHEREAS, congestion forces traffic to nearby streets which are not designed for high traffic use; and

WHEREAS, congestion inhibits the economic development of a corridor as businesses look to build their industry in an area with easy access.

NOW, THEREFORE, BE IT RESOLVED THAT:

The Southeast Business Partnership supports the expansion of the C-470 highway; and

The Southeast Business Partnership supports C-DOT, Jefferson County, Arapahoe County, Douglas County, the City of Centennial, the City of Littleton, and the City of Lone Tree as they pursue funding sources for the C-470 Project that will allow expansion before the scheduled 2025 date; and

The Southeast Business Partnership supports bringing forth the General Purpose Lane and Toll Lane alternatives in an appropriate public process to carefully examine financial, environmental and social issues.

Dated: July 11, 2005

Signed: _____



July 20, 2005

Mr. Jim Townsend
Wilson & Company
999 18th Street, Suite 2600
Denver, CO 80202

Re: C-470 Environmental Assessment

Dear Mr. Townsend:

The Jefferson Economic Council is fully in support of improvements to C-470 as envisioned in your Environmental Assessment. We realize that many of the improvements are located in Douglas County, however the proposed lane additions begin at Kipling Parkway, in Jefferson County.

One of Jefferson Economic Council's priorities is to build our transportation infrastructure to support the efficient movement of goods, services and people throughout Jefferson County and the Denver metropolitan region. This is why we have supported projects such as the FasTracks plan, as well as the completion of the Northwest Corridor. We actively spoke in favor of FasTracks and I support the completion of the Northwest Corridor as a member of the Corridor Consensus Committee. In the case of the subject project, access to, from, and partially through Jefferson County will be improved. Especially during peak hour travel, we understand that C-470 (Kipling to I-25) currently is a very congested road. In fact, your own research indicates that a no action alternative would mean a future peak hour delay duration of 8 to 10 hours per day. The express lane alternative would have no delay, with a 4 hour delay on general purpose lanes. If general purpose lanes could be funded, there would be no delay. The existing congestion negatively impacts our businesses and residents, and future congestion will be markedly worse without significant improvements.

There is very little funding for additional regional infrastructure throughout the Denver metropolitan region and Colorado as a whole. Even if referendums C and D pass, the revenue derived from their passage for transportation improvements will literally be a "drop in the bucket". This brings up the point that we are of course in favor of general purpose lanes, but the funding just is not available for the construction. Therefore, as a viable alternative, we would support a tolled facility. Such a facility would provide for fast travel with no peak hour delays for those willing to pay the toll, and for those that are unwilling or unable to pay the toll, they will also benefit because traffic will be taken off of the existing general purpose lanes. Beyond tolling, we would also support a vigorous

attempt to find and acquire any and all federal monies that might become available for the facility.

In closing, I also want to express that we were discouraged that the EA did not include the entire length of C-470 from I-25, all the way to I-70. When I attended some of the original public meetings, I noted that future traffic demands between I-70 and Morrison Road are in some cases higher than those projected in the stretch from Kipling Parkway to I-25. Therefore, we would like to see an EA started on that section of C-470 as soon as possible.

Thank you for the opportunity to comment on this important project to Jefferson County businesses.

Sincerely,

A handwritten signature in black ink, appearing to read "Preston E. Gibson", written over a horizontal line. A vertical red line is positioned to the right of the signature.

Preston E. Gibson
President/CEO



South Metro Denver
Chamber of Commerce

Leadership In Motion • www.bestchamber.com

June 22, 2005

To: C470 Implementation Committee

Re: C-470 Financial Analysis/C470 Widening Alternatives

From: John Brackney, President, South Metro Denver Chamber of Commerce

The South Metro Denver Chamber of Commerce (SMDCC) has reviewed the 3 current alternatives regarding C-470 from Kipling to I-25 as well as the potential funding mechanisms for two of the three options. It is our belief that the future growth demands upon this transportation corridor are significant and require an increase in capacity to mitigate future anticipated congestion. It is our position that the "No Action" alternative would lead to an unacceptable level of congestion and severely limit the capacity of the corridor. Our concern is that the constraint of the corridor will cause a domino affect and ultimately undermine economic development and quality of life for the South Metro area.

As to the other possible alternatives; General Purpose Lane (GPL) and the Express Lane (EL). We recognize that these two alternatives have both positive and negative outcomes. The GPL alternative would be most effective from a qualitative assessment by mitigating congestion through greater overall capacity, but would not be financially viable in the near term based on the current and projected availability of transportation funding. The EL alternative would provide an immediate funding mechanism (although under the current analysis, there still exists a short fall) and enhance overall capacity, but the projected improvement in congestion of the general purpose lanes during peak hours would only slightly improve over the No Action Alternative.

While we are not prepared to offer our carte blanche approval of the overall project as there are still many details being sorted through, we do support the implementation of tolling as a funding mechanism in principle. We recognize the ideal outcome would be to have both maximized capacity and no long term cost, but the reality of the current lack of transportation funds, the lack of future funding to maintain the system, and the unquestionable need to increase capacity along the C-470 corridor require us to choose the practical over the ideal. In summary, we are in favor of moving forward with a less than perfect plan if that means moving forward sooner rather than later.