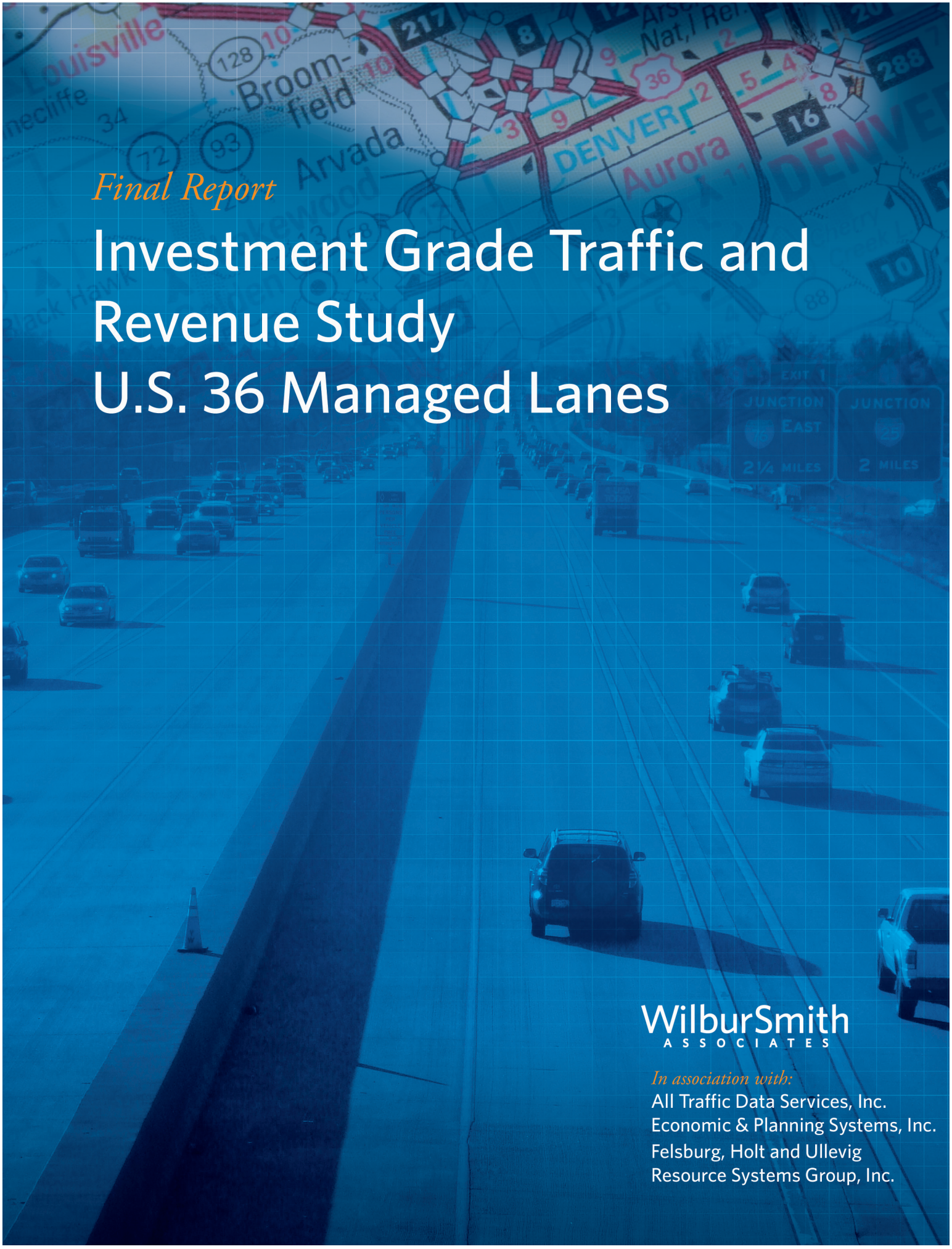

Final Report

Investment Grade Traffic and Revenue Study U.S. 36 Managed Lanes

WilburSmith
ASSOCIATES

In association with:
All Traffic Data Services, Inc.
Economic & Planning Systems, Inc.
Felsburg, Holt and Ullevig
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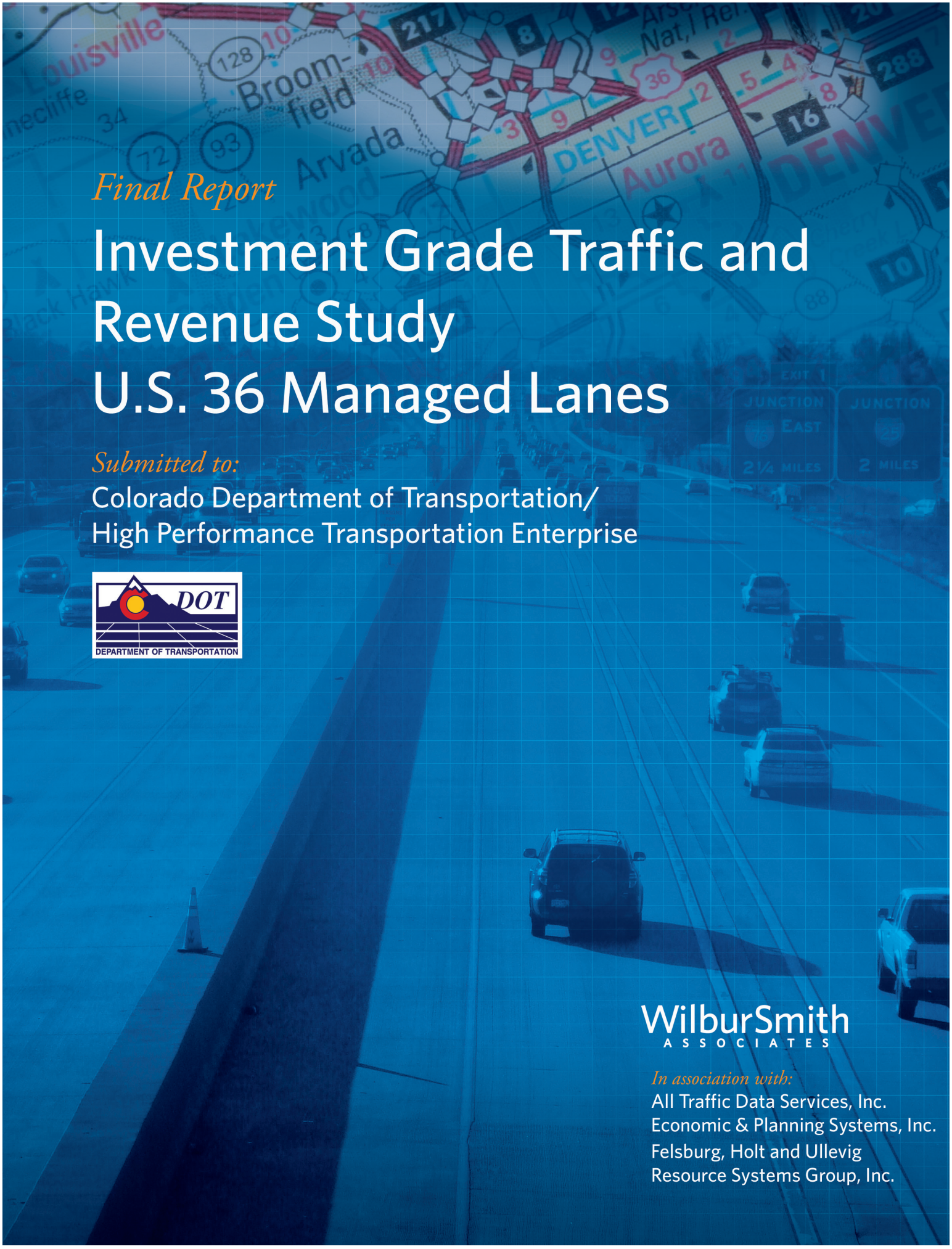

Final Report

Investment Grade Traffic and Revenue Study U.S. 36 Managed Lanes

Submitted to:

Colorado Department of Transportation/
High Performance Transportation Enterprise

DOT
DEPARTMENT OF TRANSPORTATION

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CHAPTER 1
INTRODUCTION

The US 36 Corridor considered in this investment grade traffic and revenue study and depicted in Figure 1-1, is an existing highway alignment between I-25 in Adams County and Foothills Parkway/Table Mesa Drive in Boulder, a distance of approximately 18 miles. This four-lane highway between Denver and Boulder opened as a toll road in 1951. The original bonds used to finance construction were paid off early, and since 1968 US 36 has operated as a toll-free facility. As originally constructed, US 36 had one interchange located in Broomfield. In response to rapid population and job growth, 10 additional interchanges were added between I-25 and Boulder including Broadway Boulevard, Pecos Street, Federal Boulevard, Sheridan Boulevard/92nd Avenue, Church Ranch Boulevard/104th Avenue, Wadsworth Parkway, East Flatiron Circle, 96th Street/Interlocken Loop, West Flatiron Circle, McCaslin Boulevard, and Foothills Parkway/Table Mesa Drive.

Average daily traffic volumes along the west end of US 36 near McCaslin Boulevard have grown from approximately 50,000 vehicles in 1989 to approximately 75,000 vehicles in 2009. Along the east end of the corridor between Pecos Street and Broadway Boulevard the average daily volumes have grown from approximately 90,000 vehicles in 1989 to 120,000 by 2009. However, while the daily volumes have grown by 25,000 to 30,000 throughout the corridor over the past 20 years, the number of mainline lanes has remained at four.

BACKGROUND AND OBJECTIVES

In an effort to address the increased traffic demand and congestion along US 36, numerous studies have been undertaken to analyze improvements to portions of the Corridor since the late 1960s. The more recent studies began in 1998 with the US 36 Major Investment Study (MIS), which concluded in 2001 with approval of a locally preferred alternative by the

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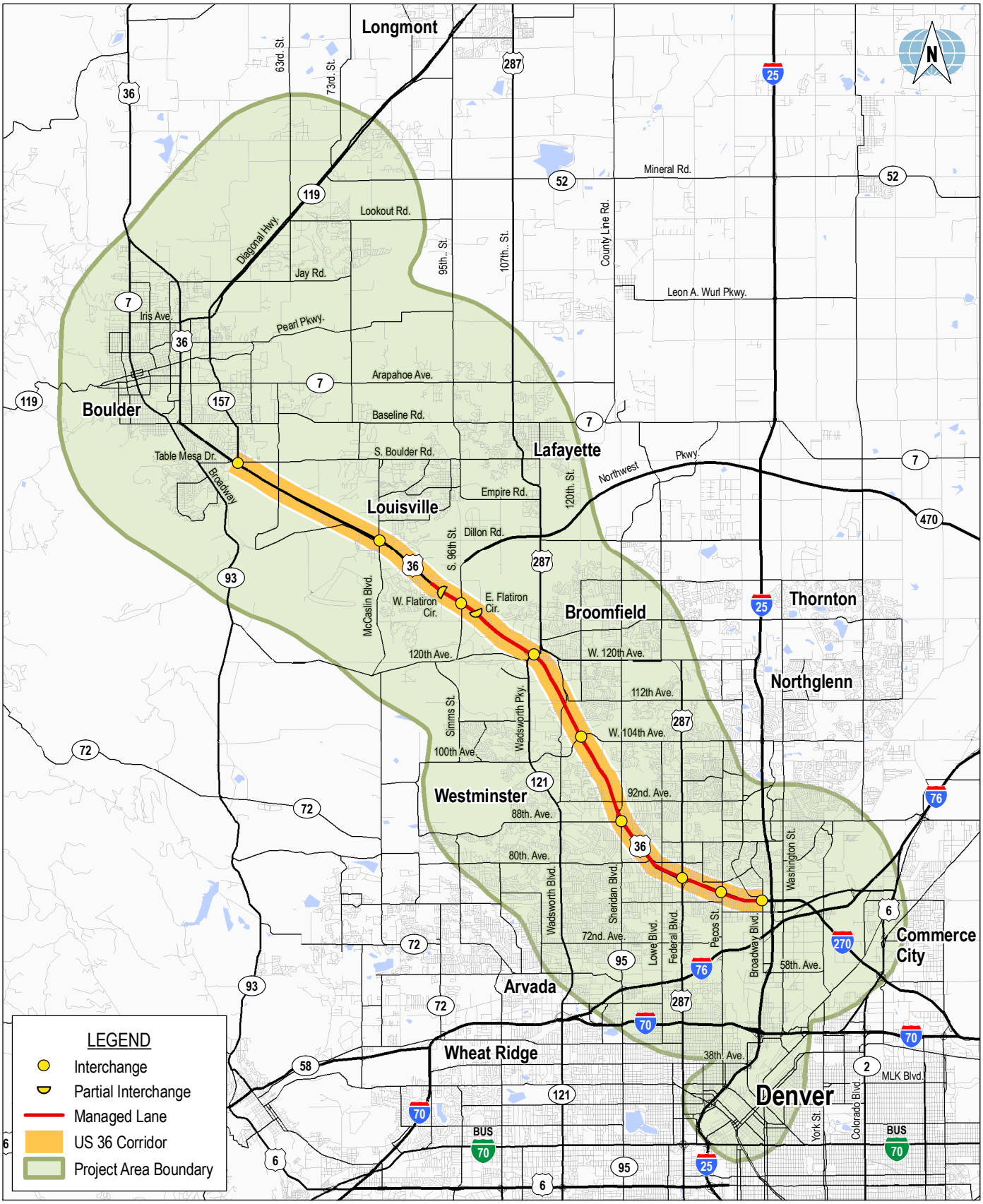

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US 36 LOCATION MAP

FIGURE 1-1

corridor cities and counties. The locally preferred alternative was a multi-modal package of improvements including highway widening, high-occupancy vehicle (HOV) lanes, bus rapid transit (BRT), commuter rail service, and alternate transportation improvements, such as bicycle facilities. The final analysis, the US 36 Final Environmental Impact Statement (FEIS), evaluated alternatives that were part of the 2001 MIS and other reasonable alternatives proposed during the FEIS scoping period. The US 36 FEIS identified a $1.3 billion preferred alternative featuring the following solutions:

- A new buffer-separated managed lane in each direction providing transit, high occupancy vehicles (HOVs) and paying single occupant vehicles (SOVs);
- Repair and replacement of 14 bridges, five of which are considered poor, and 12-miles of poor roadway surface;
- Implementation of a BRT system connecting to the regional transit and intercity rail system through Denver Union Station, the metropolitan transit hub;
- Installation of Intelligent Transportation Systems (ITS) for tolling, transit information and incident management;
- Auxiliary lanes between interchanges to improve intra-corridor mobility;
- An 18-mile commuter bikeway adjacent to the highway; and
- Transportation Demand Management (TDM) strategies to affect commuter behavior.

Working with a diverse political coalition, the Colorado Department of Transportation (CDOT), in partnership with the Regional Transportation District (RTD), the US 36 Mayors & Commissioners Coalition, Adams County, Jefferson County, City & County of Denver, City of Arvada, and 36 Commuting Solutions, identified a first phase of improvements including implementation of the managed lanes (Managed Lanes), BRT service and commuter bikeway for the full length of the corridor at an estimated cost of $550 million. This first phase of the Preferred Alternative was included in the 2009 Record of Decision for the US 36 Managed Lane/BRT Project. While the region's long-range transportation plan identified more than $700 million in funding to build these improvements, the vast majority of funds are not expected to be available until 2030 at the earliest.

The United States Department of Transportation (U.S. DOT), Transportation Investment Generating Economic Recovery (TIGER) Discretionary Grant program presented an opportunity for accelerated implementation of the first phase of US 36 improvements, delivering project benefits 20 years earlier than anticipated. CDOT, in conjunction with its regional partners submitted a

segmented implementation plan for TIGER funding consideration. Each of the segments incorporates BRT implementation, portions of the commuter bikeway and replacement of aging infrastructure as well as a new Managed Lane from:

- Segment 1: Pecos Street to Wadsworth Boulevard.
- Segment 2: Wadsworth Boulevard to Interlocken Loop.
- Segment 3: Interlocken Loop to Table Mesa/Foothills Parkway.

In February 2010, U.S. DOT awarded Colorado $10 million through the TIGER grant program as a Transportation Infrastructure Finance and Innovation Act (TIFIA) Challenge Grant, providing a TIFIA Loan opportunity for the Project.

The TIFIA supported Project analyzed as part of this investment grade traffic and revenue study consists of a 10.1 mile segment of US 36 from Pecos Street to Interlocken Loop (Segments 1 and 2). Upon completion, this portion of US 36 will consist of six lanes (three in each direction), two of which will be Managed Lanes. The Project also includes implementation of a BRT system, which will become part of RTD's FasTracks system and the construction of a commuter bikeway will connect to the regional Denver trail system. The project will also include the replacement of aging infrastructure, some of which has not been upgraded since the opening of US 36 in the early 1950s.

The new Managed Lanes will connect to the northern terminus of the existing, reversible I-25 EXpress Toll Lanes (a seven-mile section of I-25 between downtown Denver and Pecos Street on US 36). The I-25 EXpress Toll Lanes, which opened in 2006, allow carpools, buses, hybrid vehicles with permits, and motorcycles to use the lanes toll-free while SOVs pay a toll. The addition of the Project will provide another link in the Denver metro toll system, resulting in a 17-mile continuous managed lane from eastern end of Boulder County to downtown Denver as shown in Figure 1-2. Given the connectivity between US 36 and the I-25 EXpress Toll Lanes, the CDOT High Performance Transportation Enterprise (HPTE) intends to treat both facilities as a single system. Based on this, and for purposes of this study, CDOT requested that Wilbur Smith Associates (WSA) perform an investment grade study including traffic and revenue forecasts for both the US 36 and I-25 Managed Lanes.

The US 36 Project will also include the following elements:

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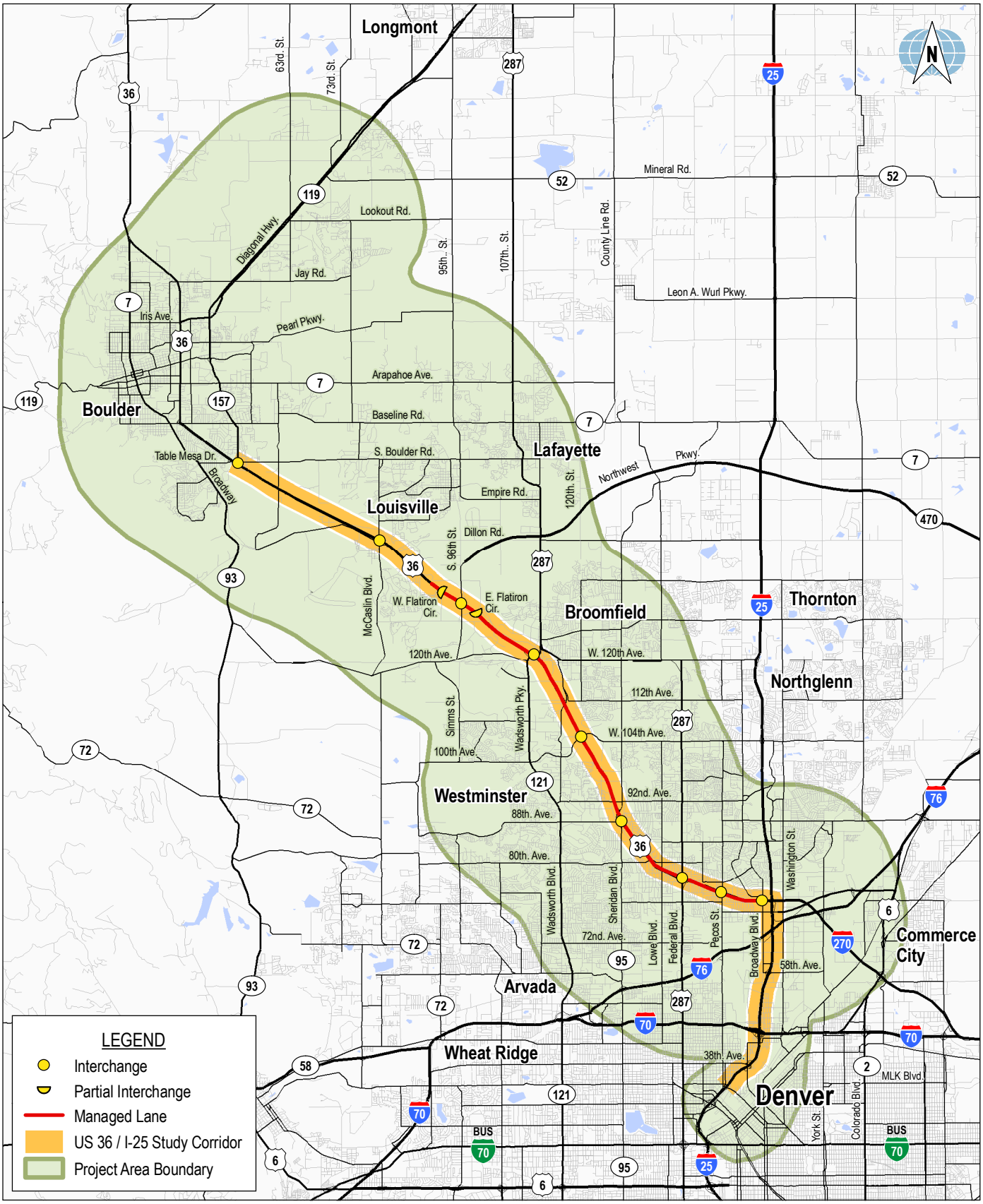

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US 36 / I-25 STUDY CORRIDOR

FIGURE 1-2

MANAGED LANE

- One managed lane in each direction along the US 36 median, separated from the general purpose lanes by a four-foot striped buffer and a four-foot center barrier with a 12-foot inside shoulder.
- Access to the Managed Lanes will be allowed between all interchanges.
- Buses and carpoolers will be able to use the Managed Lanes free of charge while SOVs will pay a toll.

BRT

- A new BRT service plan operated by RTD to reduce trip time and maximize predictability for transit rides.
- BRT service will connect to Denver Union Station on the east, distributing riders to multimodal services, and to Boulder's HOP, SKIP and JUMP family of transit services on the west.
- Transit signal priority and queue bypass lanes at on/off ramps will provide priority for the transit system.
- Enhancements to existing BRT stations, such as modifying BRT ramps and the east side BRT loading platform at the 120th Avenue Station in Broomfield.

GENERAL PURPOSE LANES/AGING PAVEMENT

- Existing general purpose and auxiliary lanes will be improved through widening to the outside and the addition of a 12-foot outside shoulder in most areas.
- Existing pavement will be reconstructed and widened to accommodate the widened cross-section.

BRIDGES

- US 36 over Lowell Boulevard bridge will be replaced.
- Wadsworth Parkway and Wadsworth Boulevard bridges over US 36 will be replaced.

INTERCHANGES

- Gore points (areas where ramps exit or join the main highway) at interchange ramps will be modified to tie to widened US 36. Existing BRT facilities on the ramps will be maintained.

WALLS

- Sound and retaining walls will be constructed as needed in selected areas.

BIKEWAY

- Portions of a bikeway will be constructed in the ultimate location where feasible.

INTELLIGENT TRANSPORTATION SYSTEMS (ITS)

- Dynamic message signs will be added along the corridor to alert drivers to roadway conditions, real-time traffic and travel time conditions, toll status and rates, and carpool information.
- Driver information technologies will leverage transponders and microwave side-fire radars.
- Upgraded, non-invasive ramp metering detection.
- Closed circuit television – providing visual verification of congestion, incidents and safety and security measures.
- All ITS technology will be fully integrated with the CDOT Transportation Management Center existing operations and software.

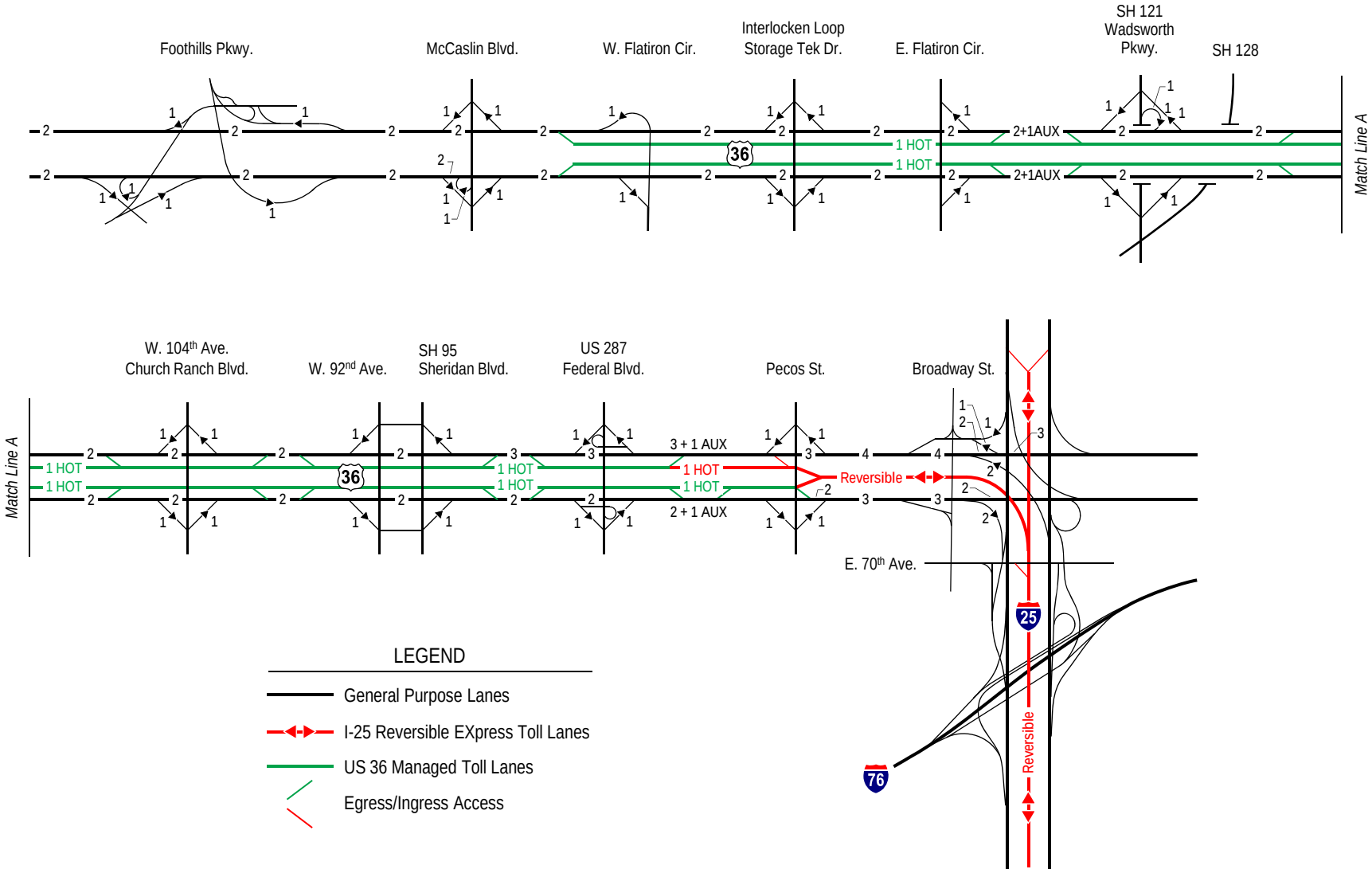
These improvements will help reduce congestion, increase access, and provide diverse travel choices for commuters.

US 36 PROPOSED GENERAL PURPOSE AND MANAGED LANE CONFIGURATION/ACCESS

The proposed general purpose lanes (GP) and managed lanes (ML) configurations and access locations are presented in Figure 1-3. The GP lanes are shown in black, the US 36 Managed Lanes in green, and the I-25 Reversible EXpress Toll Lanes in red.

The initial ingress to the US 36 ML in the eastbound direction is located immediately west of W. Flatiron Circle. The next pair of egress/ingress locations are found between the E. Flatiron Circle and Wadsworth Parkway interchanges. Additional eastbound egress/ingress locations out of and in to the ML have been located between every interchange; the last pair located between Federal Boulevard and Pecos Street. A final eastbound egress point just east of Pecos Street allows ML customers to exit to the GP lanes in the PM when the I-25 reversible lanes are closed in the southbound direction. It also allows them to exit in the AM if they do not wish to continue on the EXpress Toll Lanes when they are open in the AM.

The initial ingress to the US 36 ML in the westbound direction is located between Pecos Street and Federal Boulevard for those customers in the US 36 westbound GP lanes. Customers already in the I-25 EXpress Toll Lanes who do not wish to continue on the US 36 ML can exit to the US 36 GP lanes immediately west of the Pecos Street overpass. The next pair of egress/ingress locations are found between the Federal Boulevard and Sheridan Boulevard interchanges. Additional westbound egress/ingress locations have been situated between every interchange; the last pair between


Foothills Pkwy.
McCaslin Blvd.
W. Flatiron Cir.
Interlocken Loop
Storage Tek Dr.
E. Flatiron Cir.
SH 121
Wadsworth
Pkwy.
SH 128
Match Line A
1 HOT
1 HOT
2+1AUX
2+1AUX
36
W. 104th Ave.
Church Ranch Blvd.
W. 92nd Ave.
SH 95
Sheridan Blvd.
US 287
Federal Blvd.
Pecos St.
Broadway St.
Match Line A
1 HOT
1 HOT
1 HOT
1 HOT
3 + 1 AUX
2 + 1 AUX
Reversible
E. 70th Ave.
25
76
Reversible
LEGEND
General Purpose Lanes
I-25 Reversible EXpress Toll Lanes
US 36 Managed Toll Lanes
Egress/Ingress Access

Wadsworth Parkway and E. Flatiron Circle. The MLs merge with the GP lanes immediately west of W. Flatiron Circle.

Figure 1-3 also indicates the assumed number of US 36 general purpose, auxiliary, and managed lanes. Also shown is the number of I-25 reversible EXpress Toll Lanes.

STUDY APPROACH

This study of the traffic and revenue potential of the US 36 Managed Lanes, including the I-25 EXpress Toll Lanes, under an HOV 2+ scenario was performed at a level of detail considered suitable for use in support of project financing, having incorporated the results from significant data collection efforts and traffic model refinements. The following is a summary of the major work elements of the study.

COLLECTION AND ANALYSIS OF US 36 AND I-25 TRAFFIC AND OPERATIONS DATA

At the outset of the work, WSA launched a data collection effort in the US 36/I-25 corridor. This included the conduct of **traffic counts** in 15 minute increments at all entry and exit ramps and key mainline locations along US 36 during internal weekdays. This allowed WSA to develop a baseline 2010 average weekday traffic profile reflecting the impacts of the recent economic recession. An average weekday profile was developed to allow for finer calibration of US 36 and I-25 with the Denver Region Council of Governments (DRCOG) travel demand model. Historical traffic count information was also assembled from permanent count stations provided by the Colorado Department of Transportation to review monthly and daily variation patterns. In addition, v**ehicle occupancy counts** for passenger cars only were conducted at two locations on US 36. These were conducted for the a.m. and p.m. peak periods on a typical weekday to determine the share of traffic in the single-, two-, and three-or-more occupancy categories. This data was also used to calibrate the traffic models to base year conditions. Finally, t**ravel time/delay runs** using the floating car technique were conducted to identify travel times, average speeds, and locations of bottlenecks. These runs provided information also used for traffic model calibration purposes.

ECONOMIC GROWTH ANALYSES

An economic growth analysis for the Denver region, in general, and the US 36 corridor, specifically, was performed. Based on that analysis, significant downward adjustments were applied to the DRCOG 2010 baseline and all future year projections along the US 36 corridor and for the Denver Metropolitan Area. Downward adjustments were applied to DRCOG's

population forecast along the US 36 corridor and range from a 2.6 percent reduction in 2010 to an 8.5 percent reduction by 2035. Downward adjustments were also applied to DRCOG's employment forecast along the US 36 corridor and range from a 2.8 percent reduction in 2010 to a 13.7 percent reduction by 2035. Similar downward adjustments were applied to population and employment forecasts throughout the Denver region. These adjusted economic forecasts were used as input to the US 36 Managed Lanes travel demand models to generate revised estimates of travel demand for the greater Denver region in general, and the US 36 Corridor, specifically.

The analysis was conducted by local economic subconsultant, Economic & Planning Systems to provide an independent evaluation of economic conditions and to establish growth projections that account for the recent economic contraction and its effect on long-term growth potentials for the Denver region. Because economic conditions have fluctuated significantly in the recent past, an independent assessment of previously issued DRCOG forecasts was warranted. An independent assessment of the socioeconomic forecasts contained in the regional model is typical in preparing investment grade traffic and revenue forecasts. The resulting adjusted forecasts account for a full range of factors and grounds the traffic and revenue study with a comprehensive analysis of market and economic data.

STATED PREFERENCE TRAVEL SURVEYS

Stated Preference Surveys were conducted by subconsultant Resource Systems Group to develop reliable estimates of the willingness-to-pay of automobile travelers who use US 36 between I-25 in the east and State Highway 157 in the west. The surveys included an analysis of the toll sensitivities to support route diversion modeling by trip type. Estimates of toll price sensitivity and propensity to use the proposed US 36 Managed Lanes was incorporated into the travel demand model to support the estimates of traffic and revenue.

TRAFFIC MODEL REFINEMENTS

WSA utilized the latest version of the DRCOG travel demand model and traffic count data in calibration of US 36, I-25 and other roadways in the study area. A subarea extraction of the larger DRCOG model was performed to create our market share demand model for the US 36 and I-25 project corridor. This market share model included multiple morning, midday, and afternoon time slices to reflect the variability in peaking patterns and travel volumes during the day, and matched those time slices currently in use for tolling by time of day on the I-25 Express Toll Lanes. A detailed calibration effort of this subarea model by time period and direction of travel was performed using the 2010 traffic count profile, occupancy surveys, and travel

time surveys on US 36 and I-25 during this investment grade traffic and revenue study effort.

The assumed Project configuration for the study is shown in Figure 1-3. The configuration used in this analysis extends from the proposed managed lanes ingress and egress ramps west of West Flatiron Circle to the southern terminus of the existing I-25 Express Toll Lanes. The assumed infrastructure was incorporated into the market-share demand model and travel demand matrices were developed for the subarea model and included classifications by truck, single-occupant vehicle, HOV2+ vehicles, and HOV3+ vehicles at an assumed 2015 opening year and future years 2020, 2025, 2030 and 2035.

Traffic and Revenue Analysis

A traffic and revenue analysis was conducted for the US 36 Managed Lanes Project, including the I-25 EXpress Toll Lanes, under an HOV2+ scenario. WSA determined optimum tolls for SOVs at various times of day for each travel direction in years 2015, 2020, 2025, 2030 and 2035. Annual revenue forecasts were then developed over a 20-year projection period for each facility (US 36 and I-25).

ORDER OF PRESENTATION

A detailed traffic and operations profile of US 36 is presented in Chapter 2. This includes an existing 2010 traffic count profile along US 36 on an average weekday basis as well as under am and pm peak travel conditions. In addition, information regarding monthly and hourly traffic variations and the results of detailed route reconnaissance investigations are provided.

A detailed corridor growth analysis is presented in Chapter 3, focusing on revisions to population, housing and employment estimates through 2035.

Chapter 4 provides a summary of the results of the stated preference surveys conducted in the project corridor.

Chapter 5 provides a general description of the Managed Lane operating concept, including tolling method and access considerations. Also incorporated is the traffic and revenue analysis, including a toll sensitivity analysis and annual revenue forecasts under toll rates designed to maximize revenue while maintaining Level-of-Service C conditions in the US 36 Managed Lanes. The RTD agreement requires that the I-25 EXpress Toll Lanes be maintained at Level-of Service B conditions.

An Appendix is also included which provides the full, comprehensive reports of both the economic growth and stated preference survey results.

CHAPTER 2

TRAFFIC AND OPERATIONS PROFILE

The evaluation of traffic and revenue potential for managed toll lanes such as those proposed for US 36 requires the development of a traffic and operations profile. Motorists' willingness to pay a toll to use express toll lanes is dependent on levels of congestion in the adjacent toll-free general purpose lanes. Hence, it is important to consider not only daily traffic levels but also hourly and directional traffic distributions.

This chapter presents a summary of the traffic and operations profile developed for US 36 for use in this study. Traffic volumes and operations on I-25 are also considered. An analysis of data on historical traffic trends along with hourly, daily and monthly traffic variations in the study area are included.

EXISTING TRAFFIC VOLUMES AND TRENDS

Traffic volume data for US 36, I-25 and major Denver roadways was collected from a variety of sources, including the Colorado Department of Transportation (CDOT), the Denver Region Council of Governments (DRCOG), and various local county and municipal agencies.

Based on the available count data and observed historical growth trends, estimates of 2010 average daily traffic volumes were developed for key locations throughout the Denver region. A map of estimated 2010 average annual daily traffic volumes in the study area is provided in Figure 2-1. Routes carrying high traffic volumes into, around and out of the study area include US 36, I-25, I-76, I-70, US 287, E-470, the Northwest Parkway and Wadsworth Parkway. The highest traffic volumes in the study area are located on I-25 between US 36 and Park Avenue (south of I-70), ranging from an average of 204,000 to 253,000 vehicles per day.

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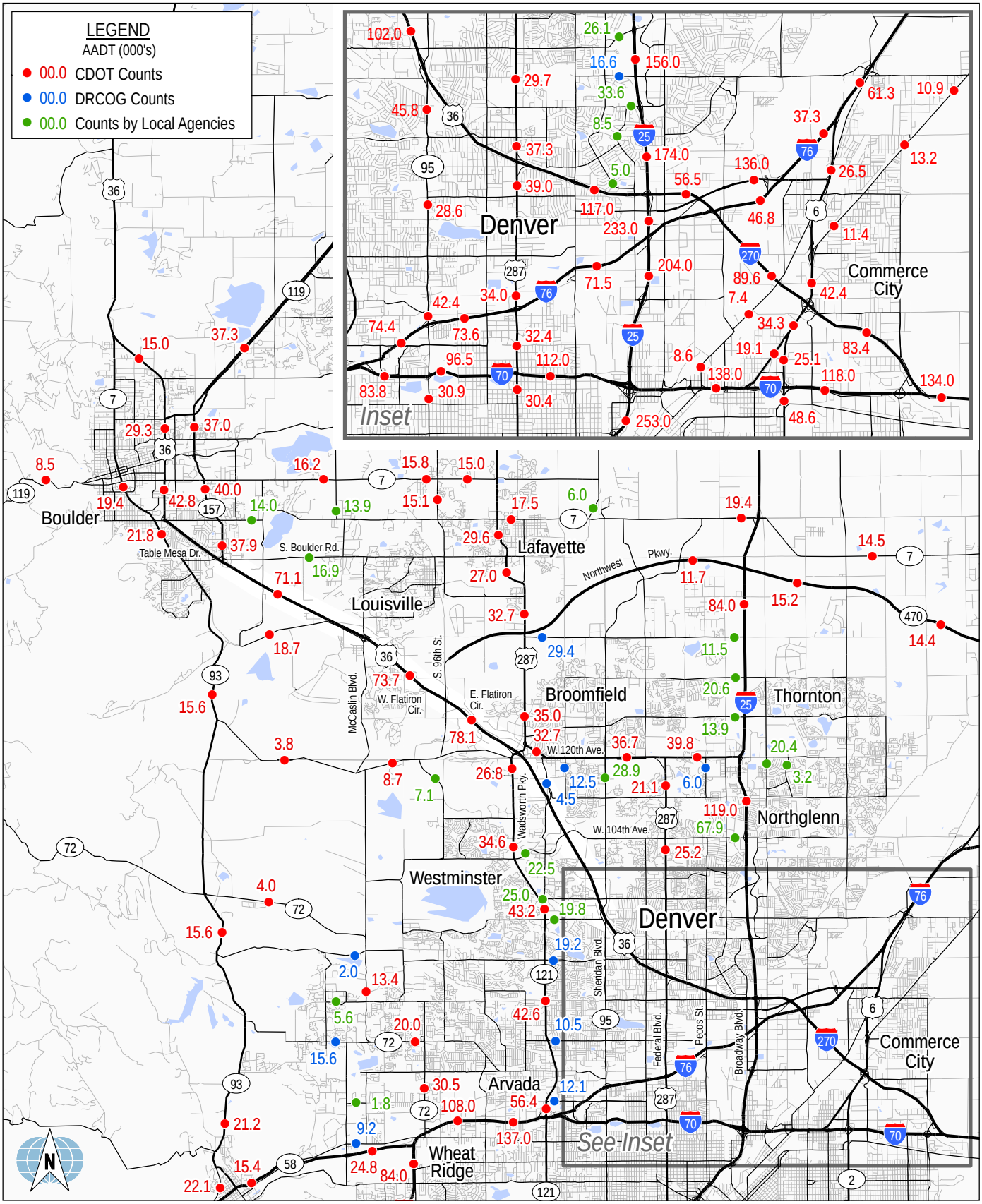


2010 AVERAGE ANNUAL DAILY TRAFFIC VOLUMES

FIGURE 2-1

WilburSmith ASSOCIATES

ANNUAL TRAFFIC AND REVENUE TRENDS

Historical traffic trends for the US 36 and I-25 general purpose lanes, based on continuous traffic count station data, are shown in Table 2-1.

Table 2-1
Trends Average Annual Daily Traffic Volumes

Year	US 36 Southeast of S. McCaslin Blvd. AADT	Percent Change	US 36 Southeast of Wadsworth Pkwy. AADT [1]	Percent Change	I-25 South of US 6 AADT	Percent Change
2000	71,473	-	77,852	-	216,741	-
2001	75,077 [2]	5.0	80,021 [2]	2.8	215,457	(0.6)
2002	75,154	0.1	80,860	1.0	210,609	(2.2)
2003	78,039	3.8	80,622 [2]	(0.3)	208,522	(1.0)
2004	76,715	(1.7)	79,515 [2]	(1.4)	208,916	0.2
2005	78,232	2.0	76,541 [2]	(3.7)	208,914 [2]	(0.0)
2006	77,544	(0.9)	79,806	4.3	207,800	(0.5)
2007	75,999	(2.0)	78,824	(1.2)	213,070 [2]	2.5
2008	74,210 [2]	(2.4)	76,187 [2]	(3.3)	218,787	2.7
2009	75,240 [2]	1.4	76,236 [2]	0.1	222,028	1.5
2010	76,270 [2]	1.4	79,226 [2]	3.9	225,803 [2]	1.7
Average Annual Percent Change						
2000 - 2005		1.8		(0.3)		(0.7)
2005 - 2010		(0.5)		0.7		1.6
2000 - 2010		0.7		0.2		0.4

Source: Colorado Department of Transportation, Continuous Count Station Data.
[1] Average Annual Daily Traffic
[2] Months missing data estimated using available traffic volumes.

Overall, traffic volumes between 2000 and 2010 on US 36 and I-25 increased at an average rate of between 0.2 and 0.7 percent per year. However, within that period there were year-to-year declines noted. Average traffic growth between 2000 and 2005 on I-25 and US 36 southeast of Wadsworth Parkway was negative. This is due in part to the construction of ramps at the I-25 / I-270 / US 36 interchange and the resurfacing of US 36 from Lowell Boulevard to Wadsworth Parkway, Wadsworth Parkway from 104th Avenue to 120th Avenue, and US 287 from I-70 to 74th Avenue. In 2006, traffic volumes on US 36 and I-25 decreased slightly, coinciding with the gasoline price fluctuations experienced that year. Following the end of construction projects in 2006 on US 36 Southeast of Wadsworth Parkway, traffic volumes increased on

US 36 by 4.3 percent. In 2007 and 2008, traffic volumes on US 36 decreased as a result of the housing market decline and associated recession. In contrast, traffic volumes on I-25 grew in 2007 and 2008 by an average of 2.6 percent per year. In 2009 and 2010, traffic volumes on US 36 recovered slightly, with growth rates of roughly 1.5 percent per year, with higher growth of 3.9 percent in 2010 south of Wadsworth Parkway. In general, US 36 traffic volumes in 2010 at these two locations are roughly at levels experienced during 2006. This observation is not uncommon when compared to other parts of country where four to five years of traffic growth was lost due to high fuel prices and the severe and long lasting recession that soon followed. Nationwide vehicle miles travelled decreased for the first time ever during this period. It is expected that traffic levels will continue to recover followed by a return to normal long term growth. Positive growth along US 36 in both 2009 and 2010 point to the beginning of the recovery in the levels of traffic growth. The US 36 corridor also experiences capacity constraints during peak periods. The addition of the Managed Lanes will contribute to the inducement of traffic in the corridor as the capacity constraint will be softened.

I-25 EXPRESS TOLL LANES, TOLL RATES, TRANSACTIONS AND REVENUE

The I-25 EXpress Toll Lanes opened up in 2006 under a fixed time of day pricing policy. Single occupant vehicles (SOV's) are allowed access into the lanes and are charged a toll, while HOV2+ vehicles are toll free. Table 2-2 displays the historical toll rates by time period and direction for the I-25 EXpress Toll Lanes. Peak toll rates were increased in January 2009, followed by another increase in January 2011. Initially, SOV's needed a

Table 2-2
Historic I-25 EXpress Toll Lanes Toll Rates
2006 through 2011

	Time Period	2006	2007	2008	2009	2010	2011
Southbound	5:00 a.m. - 6:00 a.m.	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50
	6:00 a.m. - 6:45 a.m.	1.75	1.75	1.75	1.75	1.75	1.75
	6:45 a.m. - 7:15 a.m.	2.75	2.75	2.75	2.75	2.75	2.75
	7:15 a.m. - 8:15 a.m.	3.25	3.25	3.25	3.50	3.50	4.00
	8:15 a.m. - 8:45 a.m.	2.75	2.75	2.75	2.75	2.75	2.75
	8:45 a.m. - 10:00 a.m.	1.25	1.25	1.25	1.25	1.25	1.25
Northbound	12:00 p.m. - 3:00 p.m.	0.50	0.50	0.50	0.50	0.50	0.50
	3:00 p.m. - 3:30 p.m.	1.50	1.50	1.50	1.50	1.50	1.50
	3:30 p.m. - 4:30 p.m.	2.00	2.00	2.00	2.00	2.00	2.00
	4:30 p.m. - 6:00 p.m.	3.25	3.25	3.25	3.50	3.50	4.00
	6:00 p.m. - 7:00 p.m.	1.50	1.50	1.50	1.50	1.50	1.50
	7:00 p.m. - 3:00 a.m.	0.50	0.50	0.50	0.50	0.50	0.50

transponder to utilize the EXpress lanes. On January 1, 2009, License Plate Toll was introduced as another option to pay a toll. For License Plate Toll customers, cameras will photograph the front and rear license plates and a bill is sent one month later to the registered owner of the vehicle, for all the tolls incurred during that period. No advance registration is required.

Table 2-3 shows the historical trend in total transactions by month on the I-25 EXpress Toll Lanes since opening in the summer of 2006. A period of robust growth in toll transactions occurred during an initial ramp-up period lasting approximately 22 months. Fuel prices surged in the spring and summer of 2008 reaching $4.00 by July and reducing overall VMT nationwide for the first time. Significant reductions in toll free and tolled traffic occurred on the I-25 EXpress lanes as overall trip making was reduced. Express toll lane facilities are highly elastic to small changes in demand, and therefore experience larger negative impacts when traffic levels decrease in the general purpose lanes. In addition, the significant downturn in the housing market and severe recession also contributed to the negative growth in transaction between 2008 and 2009. Peak period toll increases and the implementation of License Plate Toll (LPT) would have also influenced growth, with the toll increase dampening toll traffic and LPT being a positive impact as the eligible market for toll users increased.

During 2010, toll traffic showed recovery with nearly a 5 percent increase over 2009 levels. 2010 toll transactions on the I-25 EXpress Lanes reached their highest levels since opening. 2010 toll free transactions fell by 3.4 percent as compared to 2009. For future revenue growth, the lack of growth in toll free transactions is a positive attribute, as a significant amount of capacity remains in the lanes for substantial growth in SOV traffic.

Table 2-4 shows the historic trend in toll revenue and average toll paid on the I-25 EXpress Toll Lanes facility. In general, revenue trends were similar to the trends in tolled transactions. Revenue in 2009 fell by 2.5 percent when compared to 2008. This is compared to a reduction of 3.5 percent in transaction. The smaller impact on toll revenue is due to the peak period toll increase implemented on January 1, 2009. 2010 toll revenue on the I-25 EXpress Lanes showed significant recovery, reaching its highest level of $2.3 million in gross toll revenue. This is a 6.2 percent increase over 2009 levels.

Table 2-3
Historic I-25 EXpress Toll Lanes Transactions by Month

Toll Free Transactions (HOV)

Month	2006	2007	Percent Change 2006-2007	2008	Percent Change 2007-2008	2009	Percent Change 2008-2009	2010	Percent Change 2009-2010
January	-	193,411	-	206,389	6.7	187,671	(9.1)	176,279	(6.1)
February	-	191,279	-	189,747	(0.8)	177,844	(6.3)	162,737	(8.5)
March	-	220,763	-	222,809	0.9	194,074	(12.9)	179,647	(7.4)
April	-	207,035	-	224,085	8.2	199,370	(11.0)	198,321	(0.5)
May	-	235,651	-	227,486	(3.5)	201,513	(11.4)	197,692	(1.9)
June	-	239,049	-	230,851	(3.4)	215,813	(6.5)	200,784	(7.0)
July	221,918	219,875	(0.9)	252,904	15.0	227,868	(9.9)	215,127	(5.6)
August	234,972	247,138	5.2	230,476	(6.7)	220,656	(4.3)	210,194	(4.7)
September	211,875	229,987	8.5	204,682	(11.0)	199,378	(2.6)	202,129	1.4
October	197,092	241,726	22.6	184,217	(23.8)	194,533	5.6	203,223	4.5
November	207,270	214,216	3.4	178,694	(16.6)	186,263	4.2	180,490	(3.1)
December	181,582	199,136	9.7	197,620	(0.8)	183,535	(7.1)	179,926	(2.0)
Total	**1,254,709**	**2,639,266**	**7.8** [1]	**2,549,960**	**(3.4)**	**2,388,518**	**(6.3)**	**2,306,549**	**(3.4)**

Tolled Transactions (ETC, License Plate, and Violations)

Month	2006	2007	Percent Change 2006-2007	2008	Percent Change 2007-2008	2009	Percent Change 2008-2009	2010	Percent Change 2009-2010
January	-	74,650	-	103,257	38.3	90,510	(12.3)	88,892	(1.8)
February	-	74,545	-	103,646	39.0	84,361	(18.6)	87,658	3.9
March	-	81,149	-	98,689	21.6	88,114	(10.7)	91,423	3.8
April	-	83,162	-	105,165	26.5	95,962	(8.8)	100,271	4.5
May	-	90,567	-	97,596	7.8	88,666	(9.1)	92,819	4.7
June	-	86,434	-	93,394	8.1	96,237	3.0	98,831	2.7
July	40,670	78,564	93.2	96,229	22.5	94,883	(1.4)	96,141	1.3
August	52,825	101,037	91.3	89,249	(11.7)	95,697	7.2	105,733	10.5
September	56,339	95,091	68.8	90,679	(4.6)	96,523	6.4	104,355	8.1
October	63,519	113,582	78.8	98,350	(13.4)	96,364	(2.0)	106,080	10.1
November	63,575	95,497	50.2	80,656	(15.5)	90,068	11.7	96,804	7.5
December	52,477	83,022	58.2	84,996	2.4	84,166	(1.0)	87,019	3.4
Total	**329,405**	**1,057,300**	**72.1** [1]	**1,141,906**	**8.0**	**1,101,551**	**(3.5)**	**1,156,026**	**4.9**

Total Transactions

Month	2006	2007	Percent Change 2006-2007	2008	Percent Change 2007-2008	2009	Percent Change 2008-2009	2010	Percent Change 2009-2010
January	-	268,061	-	309,646	15.5	278,181	(10.2)	265,171	(4.7)
February	-	265,824	-	293,393	10.4	262,205	(10.6)	250,395	(4.5)
March	-	301,912	-	321,498	6.5	282,188	(12.2)	271,070	(3.9)
April	-	290,197	-	329,250	13.5	295,332	(10.3)	298,592	1.1
May	-	326,218	-	325,082	(0.3)	290,179	(10.7)	290,511	0.1
June	-	325,483	-	324,245	(0.4)	312,050	(3.8)	299,615	(4.0)
July	262,588	298,439	13.7	349,133	17.0	322,751	(7.6)	311,268	(3.6)
August	287,797	348,175	21.0	319,725	(8.2)	316,353	(1.1)	315,927	(0.1)
September	268,214	325,078	21.2	295,361	(9.1)	295,901	0.2	306,484	3.6
October	260,611	355,308	36.3	282,567	(20.5)	290,897	2.9	309,303	6.3
November	270,845	309,713	14.4	259,350	(16.3)	276,331	6.5	277,294	0.3
December	234,059	282,158	20.5	282,616	0.2	267,701	(5.3)	266,945	(0.3)
Total	**1,584,114**	**3,696,566**	**21.1** [1]	**3,691,866**	**(0.1)**	**3,490,069**	**(5.5)**	**3,462,575**	**(0.8)**

[1] Annual growth rate between 2006 and 2007 includes only the months of July through December.

Table 2-4
Trends in Monthly I-25 EXpress Toll Lanes Revenue

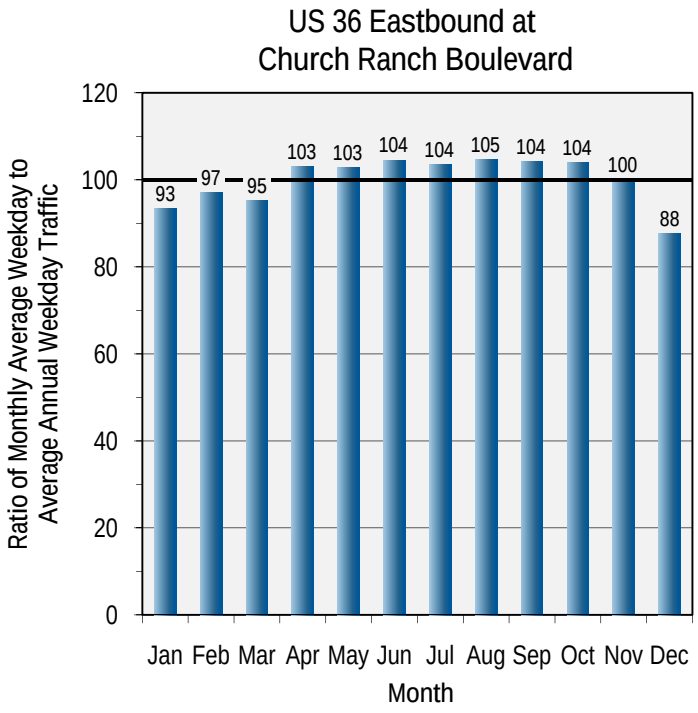
	Revenue								
Month	2006	2007	Percent Change 2006-2007	2008	Percent Change 2007-2008	2009	Percent Change 2008-2009	2010	Percent Change 2009-2010
January	-	$ 144,216	-	$ 215,232	49.2	$ 193,359	(10.2)	$ 175,108	(9.4)
February	-	145,439	-	190,945	31.3	167,743	(12.2)	180,321	7.5
March	-	166,242	-	202,335	21.7	164,007	(18.9)	187,012	14.0
April	-	166,721	-	222,566	33.5	201,713	(9.4)	191,533	(5.0)
May	-	181,927	-	201,142	10.6	187,739	(6.7)	187,739	0.0
June	-	170,514	-	186,178	9.2	188,678	1.3	201,403	6.7
July	$ 63,000	151,555	140.6	186,332	22.9	175,779	(5.7)	195,391	11.2
August	95,696	176,413	84.3	158,515	(10.1)	195,228	23.2	218,374	11.9
September	103,840	188,983	82.0	176,174	(6.8)	200,498	13.8	210,151	4.8
October	121,330	229,213	88.9	211,173	(7.9)	192,984	(8.6)	217,655	12.8
November	118,889	197,137	65.8	165,489	(16.1)	170,073	2.8	207,038	21.7
December	96,907	158,138	63.2	149,309	(5.6)	171,802	15.1	174,399	1.5
Total	**$ 599,662**	**$ 2,076,497**	**83.7** [1]	**$ 2,265,388**	**9.1**	**$ 2,209,602**	**(2.5)**	**$ 2,346,123**	**6.2**

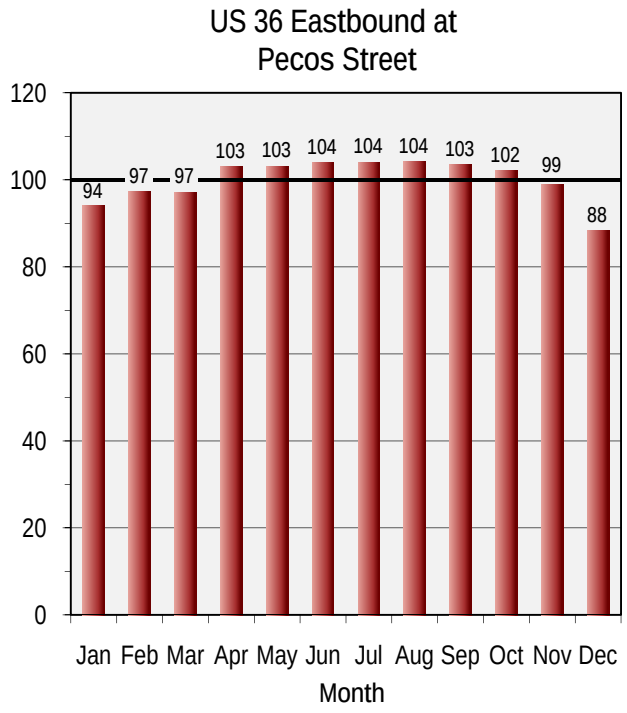
	Average Toll Paid				
Month	2006	2007	2008	2009	2010
January	-	$ 1.93	$ 2.08	$ 2.14	$ 1.97
February	-	1.95	1.84	1.99	2.06
March	-	2.05	2.05	1.86	2.05
April	-	2.00	2.12	2.10	1.91
May	-	2.01	2.06	2.12	2.02
June	-	1.97	1.99	1.96	2.04
July	$ 1.55	1.93	1.94	1.85	2.03
August	1.81	1.75	1.78	2.04	2.07
September	1.84	1.99	1.94	2.08	2.01
October	1.91	2.02	2.15	2.00	2.05
November	1.87	2.06	2.05	1.89	2.14
December	1.85	1.90	1.76	2.04	-
Total	**$ 1.82**	**$ 1.96**	**$ 1.98**	**$ 2.01**	**$ 2.19**

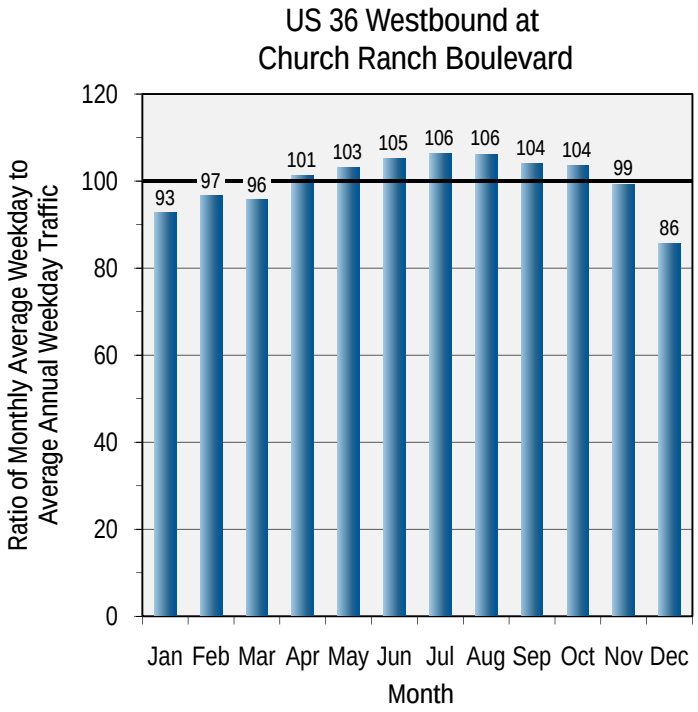
[1] Annual growth rate between 2006 and 2007 includes only the months of July through December.

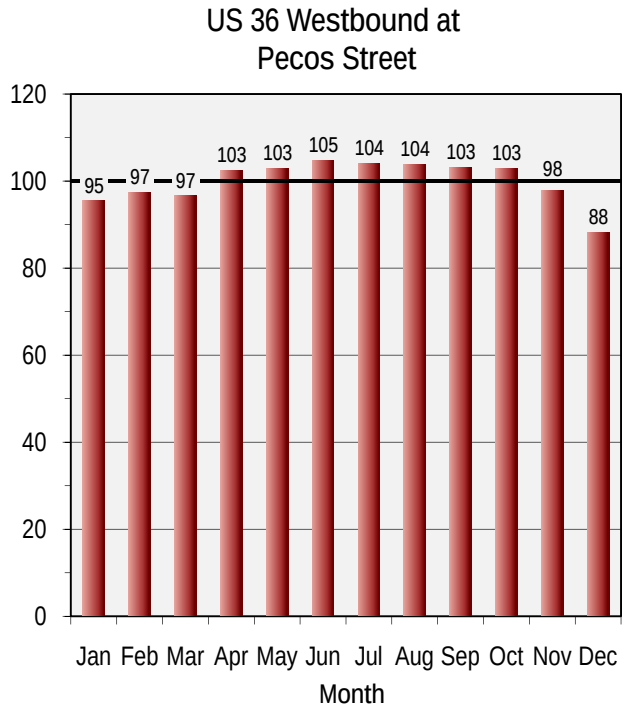
MONTHLY TRAFFIC VARIATIONS

Figure 2-2 shows the monthly variations in average weekday traffic at two count locations on US 36 from January through December 2010. The first location is on US 36 at the overpass of Church Ranch Boulevard, between the exit and entrance ramps. The second count location is on US 36 at the Pecos Street underpass, between the entrance and exit ramps. At both locations, volumes were collected by direction. Figure 2-2 shows each month's average weekday volume as a percentage of average annual weekday traffic. In general, the pattern of monthly variation was similar at both locations and in both directions. December was the lowest volume month, averaging between 11.7 and 14.2 percent below the average annual


US 36 Eastbound at
Church Ranch Boulevard
Ratio of Monthly Average Weekday to Average Annual Weekday Traffic
120
100
80
60
40
20
0
93
97
95
103
103
104
104
105
104
104
100
88
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Month


US 36 Eastbound at
Pecos Street
120
100
80
60
40
20
0
94
97
97
103
103
104
104
104
103
102
99
88
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Month


US 36 Westbound at
Church Ranch Boulevard
Ratio of Monthly Average Weekday to Average Annual Weekday Traffic
120
100
80
60
40
20
0
93
97
96
101
103
105
106
106
104
104
99
86
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Month


US 36 Westbound at
Pecos Street
120
100
80
60
40
20
0
95
97
97
103
103
105
104
104
103
103
98
88
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Month

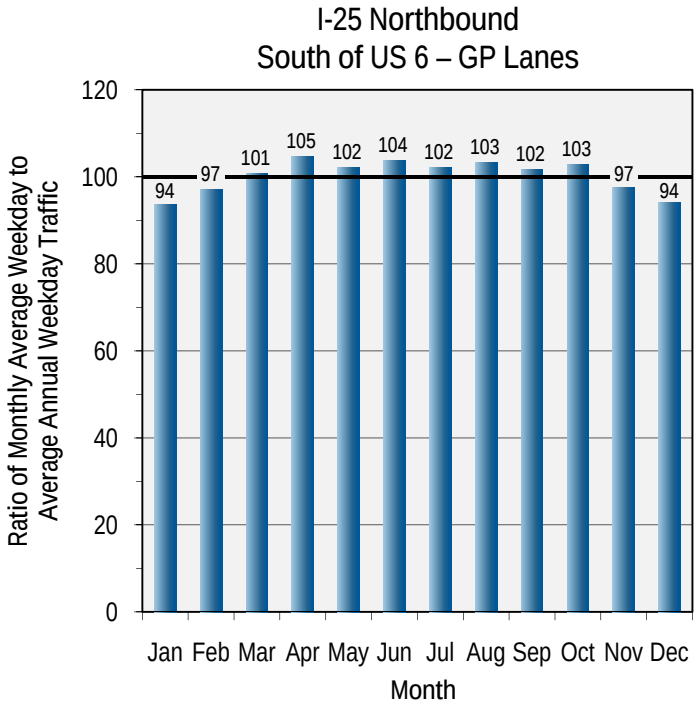
weekday traffic at each location. At each count location, the maximum volume was experienced during a summer month (June, July, or August), with the maximum volumes falling in the range of 4.1 to 6.4 percent above the average annual weekday. April and November were the most "average" months, with April averaging 2.5 percent above average (four counts combined), and November averaging 1.2 percent below average.

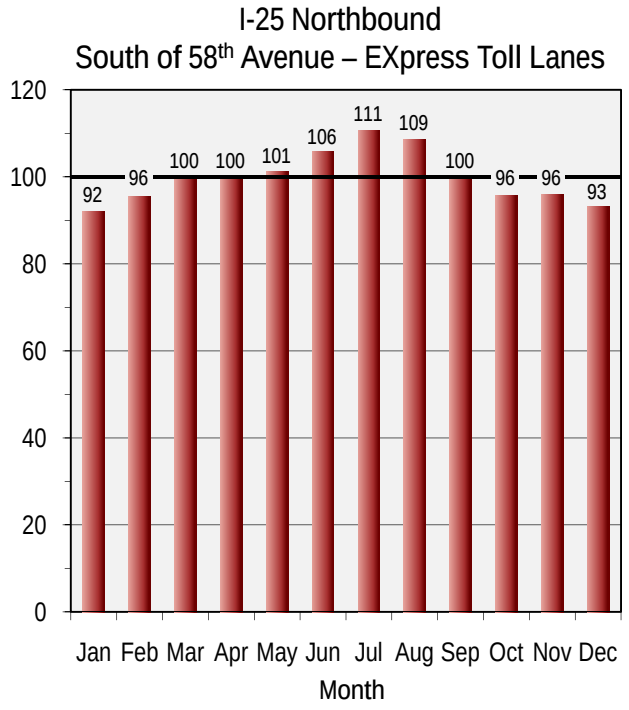
Monthly variations in average weekday traffic on I-25 are provided in Figure 2-3. Traffic data for the general purpose lanes was provided by CDOT at I-25 south of US 6, approximately 3.5 miles south of the EXpress Toll Lanes start. Traffic data from the I-25 EXpress Toll Lanes was provided by CDOT at I-25 south of 58th Avenue. In general, the pattern of monthly variations in the I-25 general purpose lanes is similar in both directions. Average April traffic volumes are the greatest of the year, at 4.8 percent and 5.3 percent greater than the annual average in the northbound and southbound directions, respectively. In the northbound direction, January has the lowest average traffic volumes, at 6.4 percent less than the annual average. In the southbound direction, December is the lowest average traffic volumes, at 6.6 percent less than the annual average. Average March traffic volumes are those that best approximate the annual average.

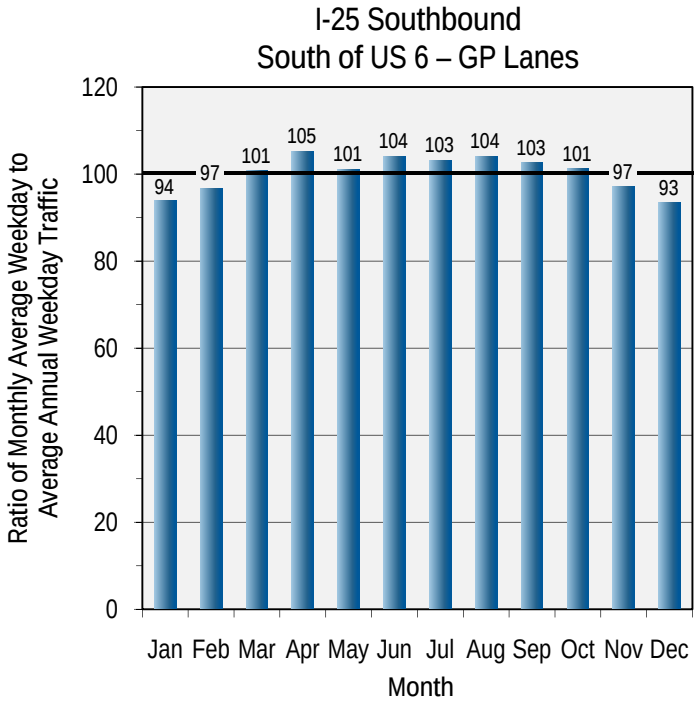
The patterns of monthly variations in the I-25 EXpress Toll Lanes differ by direction. In the northbound direction, the peak months are June, July and August, with July traffic reaching average volumes 10.7 percent greater than the annual average. In the southbound direction, the peak months are September and October, with October traffic reaching average volumes 12.2 percent greater than the annual average. Similar to the general purpose lanes, average traffic volumes are lowest in January for the northbound direction, and December for the southbound direction.

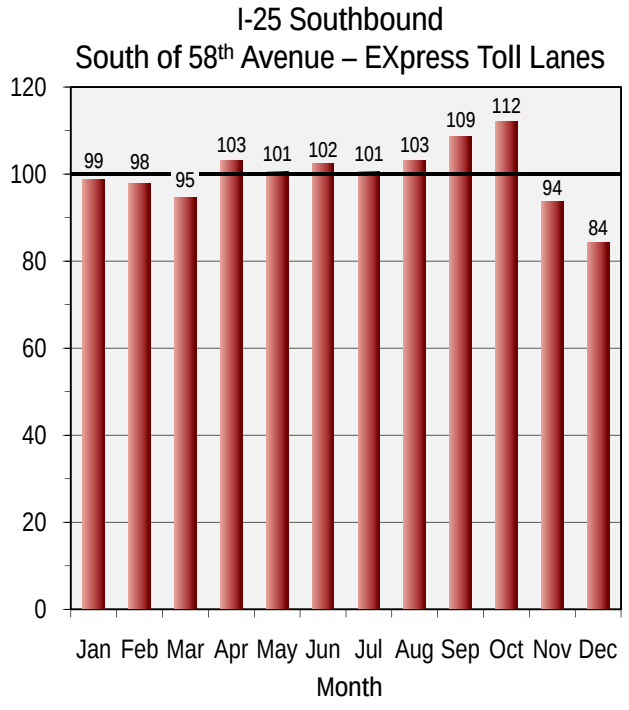
HOURLY TRAFFIC VARIATIONS

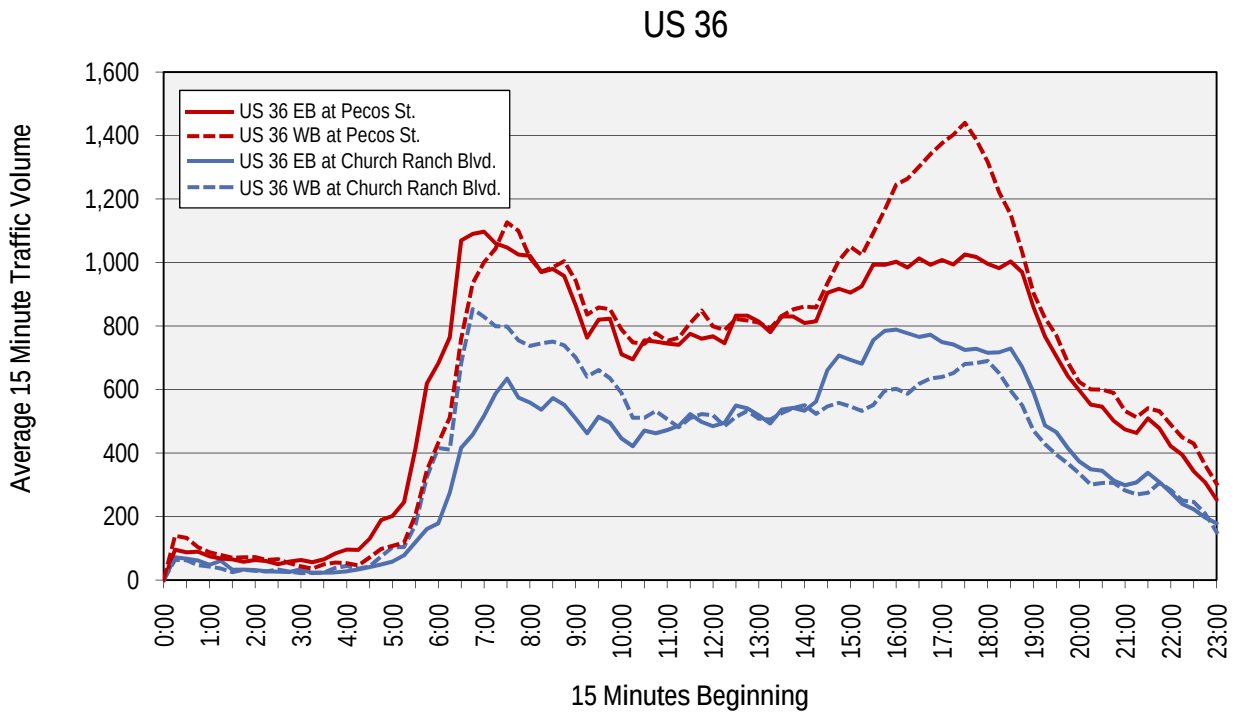
Figure 2-4 illustrates weekday traffic variations on US 36 and I-25. Weekday traffic variations by direction for US 36 are provided in 15-minute increments at the Pecos Street underpass and Church Ranch Boulevard overpass. The volumes illustrated in Figure 2-4 are from the month of September 2010 and do not include traffic from the HOT lane itself. Eastbound volumes are shown with solid lines, while westbound volumes are shown with dashed lines. The volumes at Church Ranch Boulevard are shown in blue, while volumes at Pecos Street are shown in red.

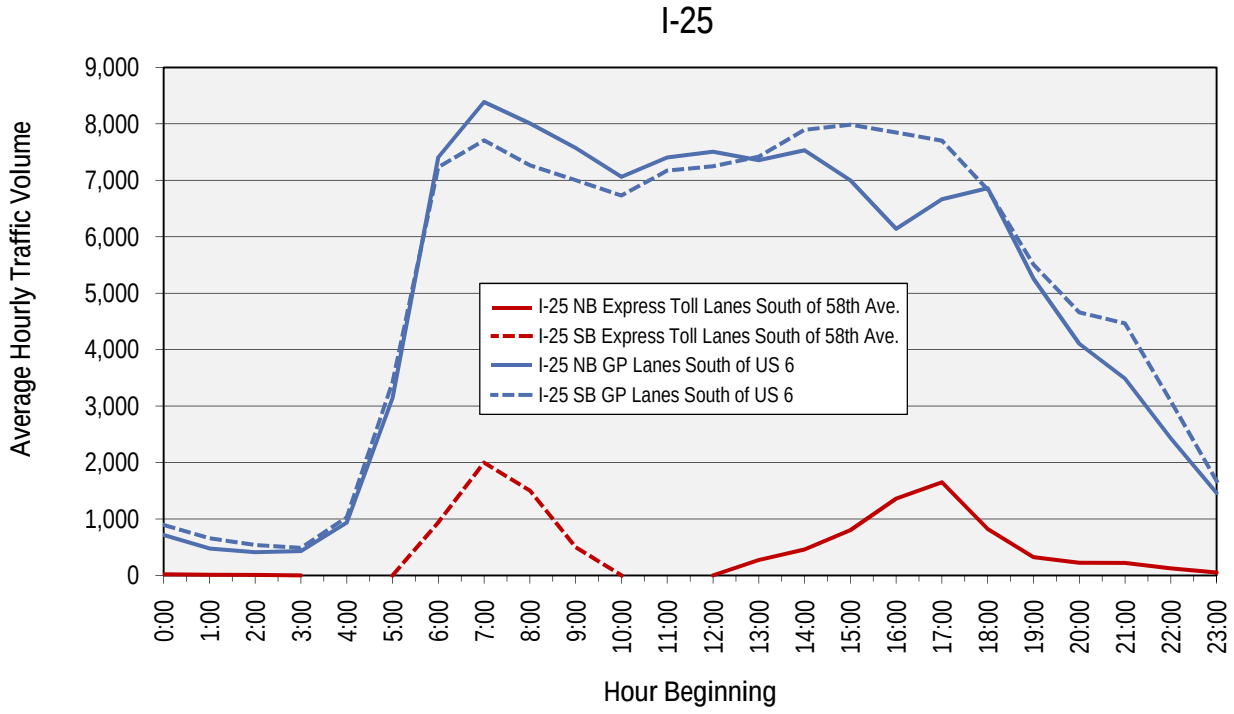

I-25 Northbound
South of US 6 – GP Lanes
Ratio of Monthly Average Weekday to Average Annual Weekday Traffic
120
100
80
60
40
20
0
94 97 101 105 102 104 102 103 102 103 97 94
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Month


I-25 Northbound
South of 58th Avenue – EXpress Toll Lanes
120
100
80
60
40
20
0
92 96 100 100 101 106 111 109 100 96 96 93
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Month


I-25 Southbound
South of US 6 – GP Lanes
Ratio of Monthly Average Weekday to Average Annual Weekday Traffic
120
100
80
60
40
20
0
94 97 101 105 101 104 103 104 103 101 97 93
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Month


I-25 Southbound
South of 58th Avenue – EXpress Toll Lanes
120
100
80
60
40
20
0
99 98 95 103 101 102 101 103 109 112 94 84
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Month


US 36
Average 15 Minute Traffic Volume
1,600
1,400
1,200
1,000
800
600
400
200
0
US 36 EB at Pecos St.
US 36 WB at Pecos St.
US 36 EB at Church Ranch Blvd.
US 36 WB at Church Ranch Blvd.
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
15 Minutes Beginning


I-25
Average Hourly Traffic Volume
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
I-25 NB Express Toll Lanes South of 58th Ave.
I-25 SB Express Toll Lanes South of 58th Ave.
I-25 NB GP Lanes South of US 6
I-25 SB GP Lanes South of US 6
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Hour Beginning

At Pecos Street, the complex nature of commuting patterns on US 36 is clearly evident. Between 6:00 and 10:00 AM, peak volumes in the eastbound and westbound directions are almost identical. This is due to the presence of commuters to both Denver and Boulder. Peak demand during the AM period occurs at about 7:00 AM in both directions. However, during the afternoon between 3:00 and 7:00 PM, peak demand in the westbound direction is far greater than eastbound, which is indicative of a constraint in eastbound capacity during this period. The westbound direction offers an additional lane of general purpose capacity as compared with eastbound.

At the Church Ranch Boulevard overpass, a somewhat more typical directional peaking pattern can be observed. Increased demand occurs in both directions in both the morning and afternoon peak periods. However, there is greater overall demand in morning in the westbound direction, while eastbound traffic is highest during the afternoon peak. This directional pattern reflects commuting to jobs in the Interlocken, Louisville and Boulder areas to the northwest. Unlike the Pecos Street location, the morning and afternoon peaks at the Church Ranch Boulevard overpass do not occur simultaneously in both directions. Instead, the westbound peak occurs approximately one hour prior to the eastbound peak in the morning, whereas the eastbound peak occurs nearly two hours before the westbound peak in the afternoon.

Hourly variations in average weekday traffic on I-25 are also provided in Figure 2-4. Data from the I-25 general purpose lanes was collected at a point south of US 6, while the I-25 EXpress Toll Lane data was collected south of 58th Avenue. Data shows that peaking of I-25 traffic is much less pronounced than US 36, with traffic levels remaining high from 6:00 AM to 6:00 PM. Traffic volumes in the I-25 general purpose lanes are generally higher in the AM northbound with steadily increasing volumes from 5:00 – 7:00 AM, which decline but are still higher than southbound volumes until the early afternoon hours. Southbound demand increases through 3:00 PM, gradually declining until it matches the northbound demand around 6:00 PM.

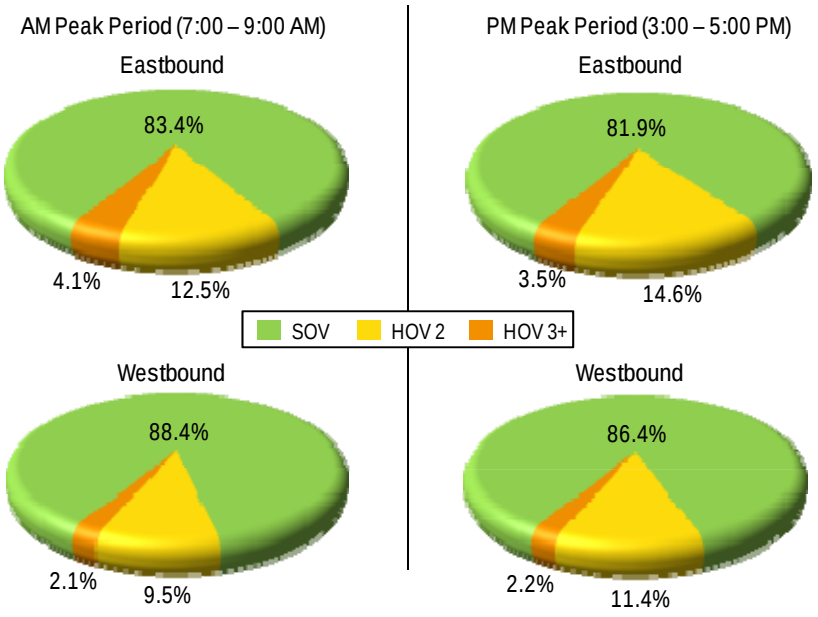
The I-25 EXpress Toll Lanes are open in the southbound direction from 5:00 to 10:00 AM. During this time period, traffic volumes peak at 2,000 vehicles per hour between 7:00 and 8:00 AM, coinciding with the morning peak of the general purpose lanes. Between noon and 3:00 AM, the I-25 EXpress Toll Lanes are open in the northbound direction. During this time period, traffic volumes peak at 1,650 vehicles per hour between 5:00

and 6:00 PM, which is roughly two hours later than the corresponding peak in the general purpose lanes.

VEHICLE OCCUPANCY

Figure 2-5 presents an estimate of the distribution of traffic by vehicle occupancy rate, for both directions of US 36 during the morning and evening peak periods. The estimates are based on a visual survey of traffic conducted by WSA subconsultant All Traffic Data Services on US 36 between Federal Boulevard and Sheridan Boulevard on an internal weekday in early December 2010 as well as Stated Preference Survey results and data in the travel demand model. As shown, HOV usage tended to range between 11.6 and 18.1 percent. HOV usage tended to be higher during the PM peak period than in the morning by approximately two percentage points.

Figure 2-5
Vehicle Occupancy Distribution
US 36 Between Federal Boulevard and Sheridan Boulevard



US 36 AVERAGE WEEKDAY TRAFFIC PROFILES

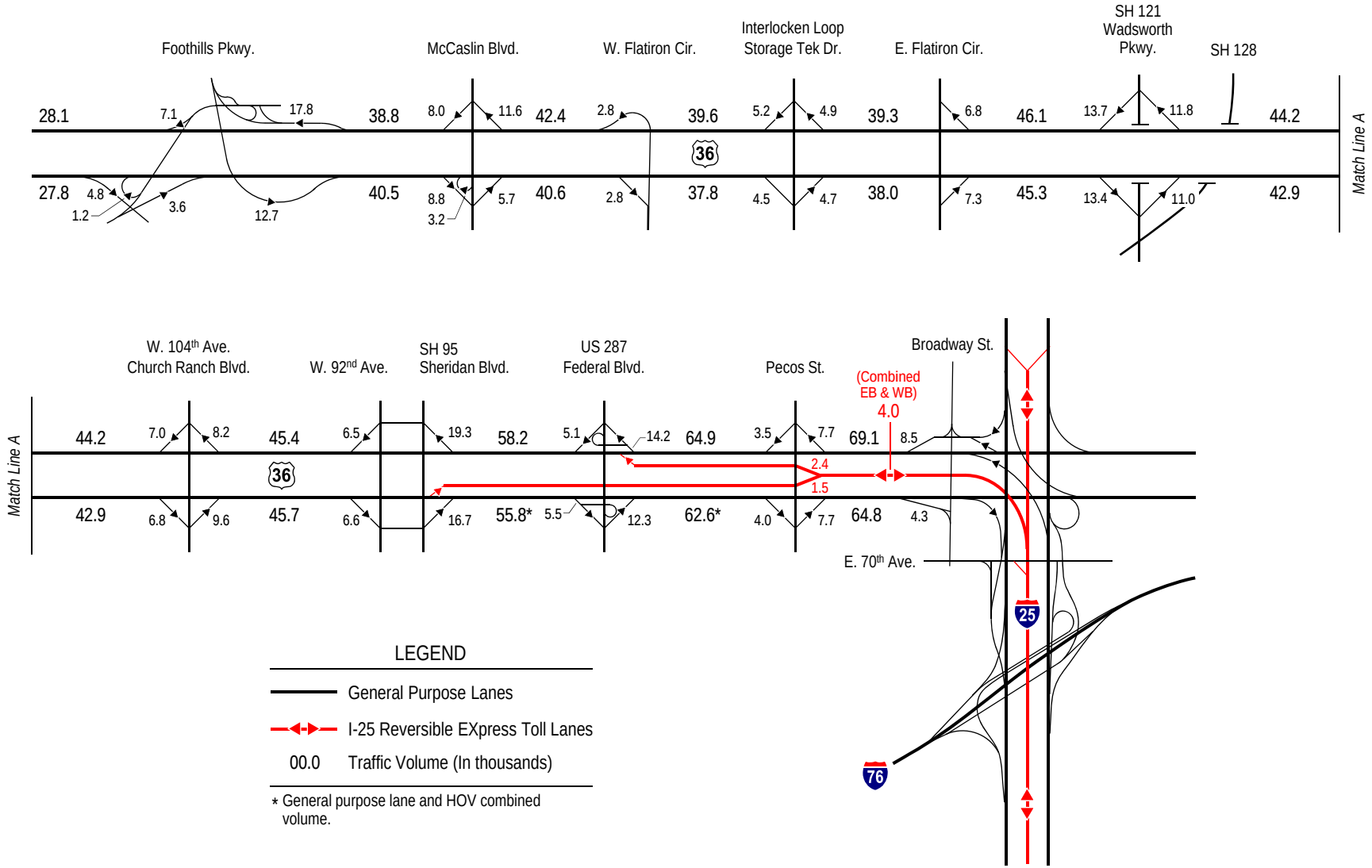
Based on the available traffic data, traffic profiles were developed for US 36 reflecting 2010 average weekday traffic volumes in 15 minute intervals. These profiles were used as part of the modeling process, in order to calibrate and refine the regional travel demand model.

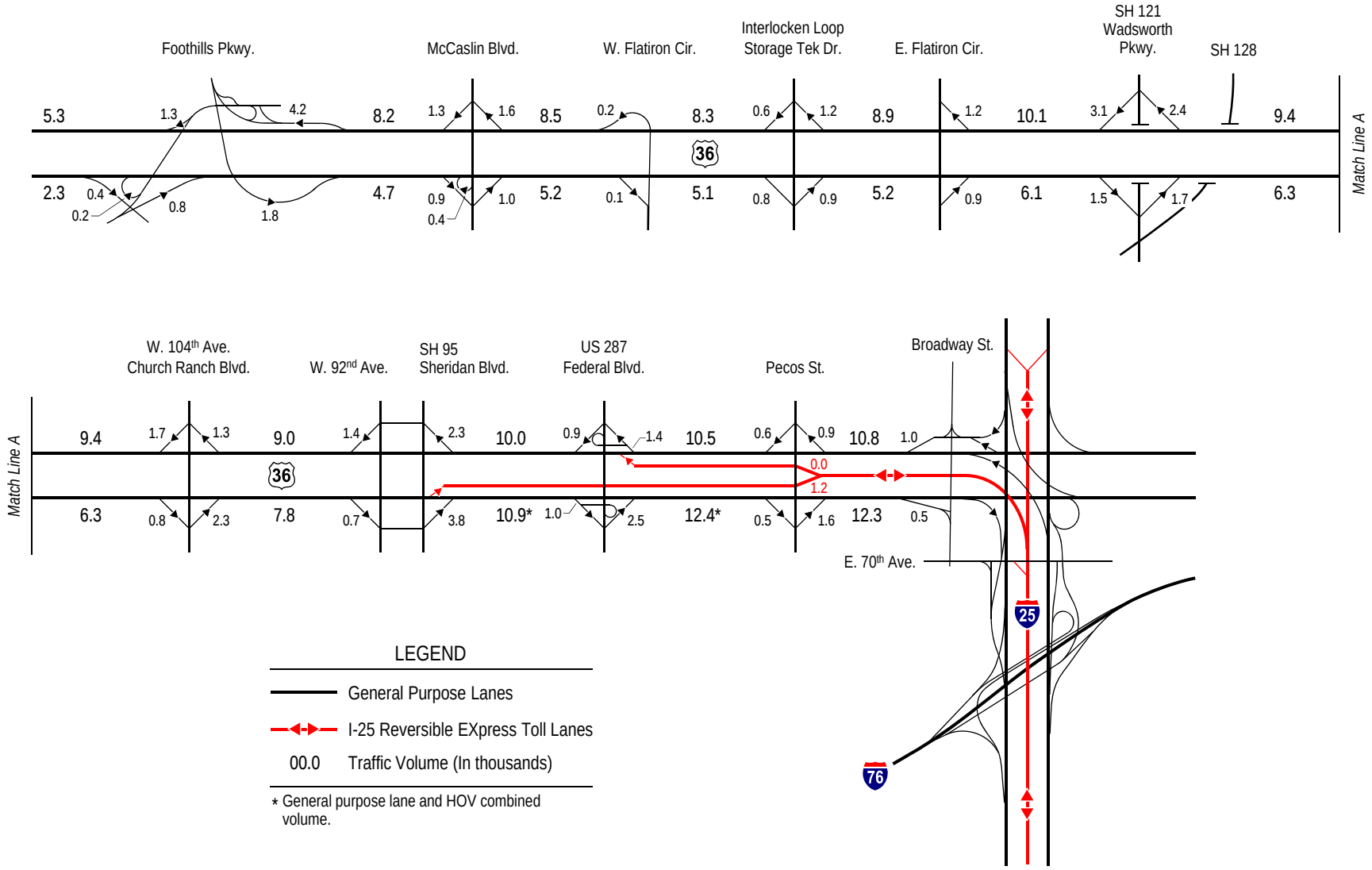
Figure 2-6 presents average daily traffic volumes on US 36 from Foothills Parkway to I-25. In the westbound direction, the highest traffic volumes occur between Sheridan Boulevard and I-25, ranging from 58,200 to 69,100 vehicles, supported by major movements to and from the east at Sheridan Boulevard and US 287. Wadsworth Parkway also shows significant ramp volumes, with 27,100 vehicles going to and from the west during an average weekday and 22,800 going to and from the east. The reversible EXpress Toll Lanes show a combined daily traffic volume of 3,900 vehicles, with 2,400 vehicles traveling westbound and 1,500 vehicles traveling eastbound.

Figure 2-7 presents AM peak period (6:00 – 8:45 AM) traffic volumes on US 36 from Foothills Parkway to I-25. The figure clearly illustrates the point at which the peak direction changes during the AM peak period, which is at Sheridan Boulevard. West of Sheridan Boulevard, roughly 62.0 percent of total traffic travels westbound towards Boulder. East of Sheridan Boulevard, the peak direction is eastbound towards Denver. The directional split is less east of Sheridan Boulevard as well, with roughly 53.0 percent of total traffic traveling eastbound. The reversible EXpress Toll Lanes, which are eastbound during the AM peak period, show a traffic volume of 1,200 vehicles.

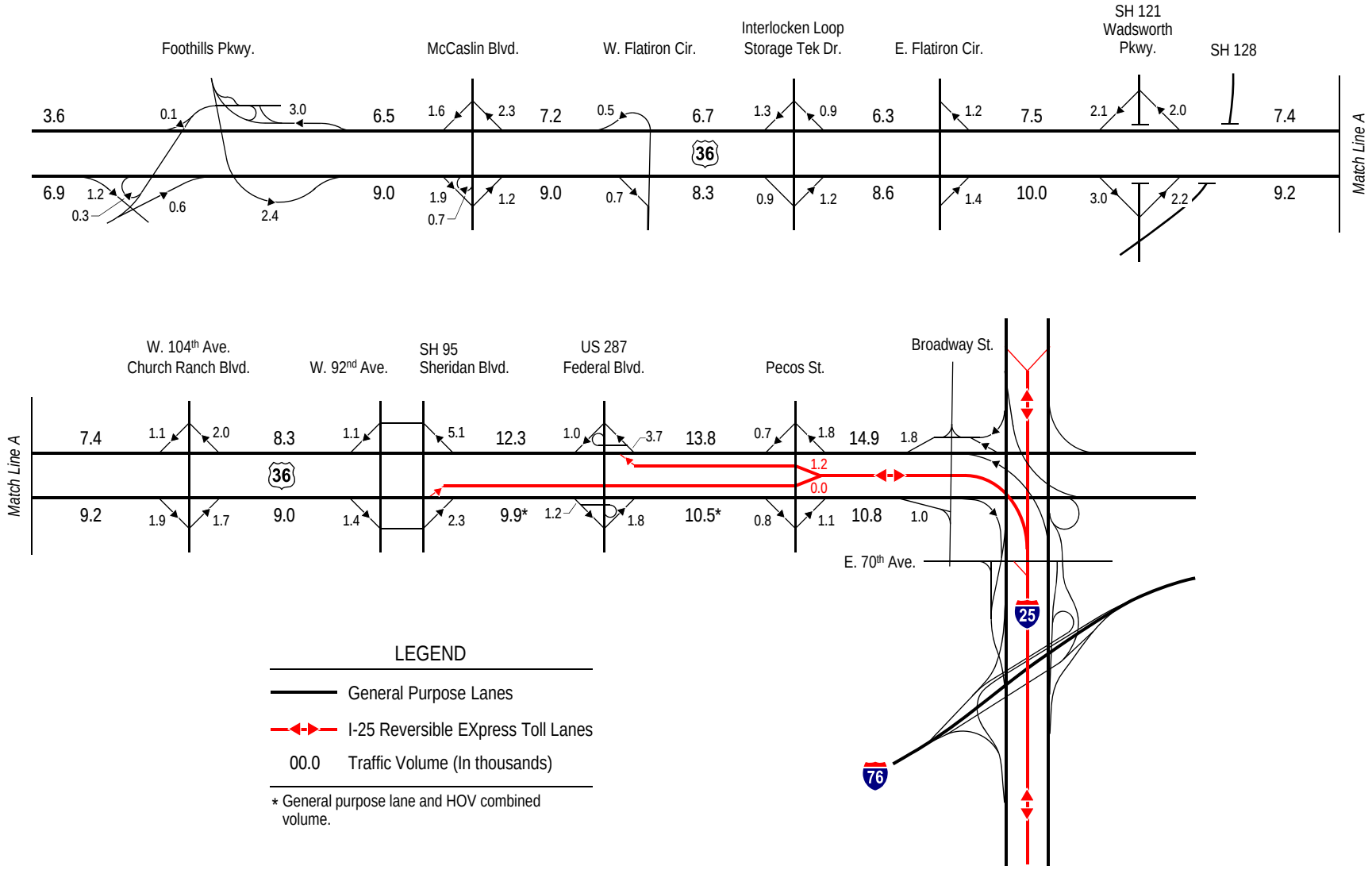
Figure 2-8 presents PM peak period (3:30 – 6:00 PM) traffic volumes on US 36 from Foothills Parkway to I-25. As with the AM peak period, the point at which the peak direction changes is Sheridan Boulevard. West of Sheridan Boulevard, the peak direction is eastbound from Boulder. East of Sheridan Boulevard, the peak direction is westbound Denver. Unlike the AM peak period, the directional split is similar for both sections, with between 55.0 and 58.0 percent of total traffic traveling in the peak direction. The reversible EXpress Toll Lanes, which are westbound during the PM peak period, show a traffic volume of 1,200 vehicles. This volume is the same as that of the AM peak period.

An overview of the average hourly traffic volumes by time period and mainline segment is provided graphically in Figure 2-9. It is clear that Sheridan Boulevard is a key location within the US 36 corridor. On US

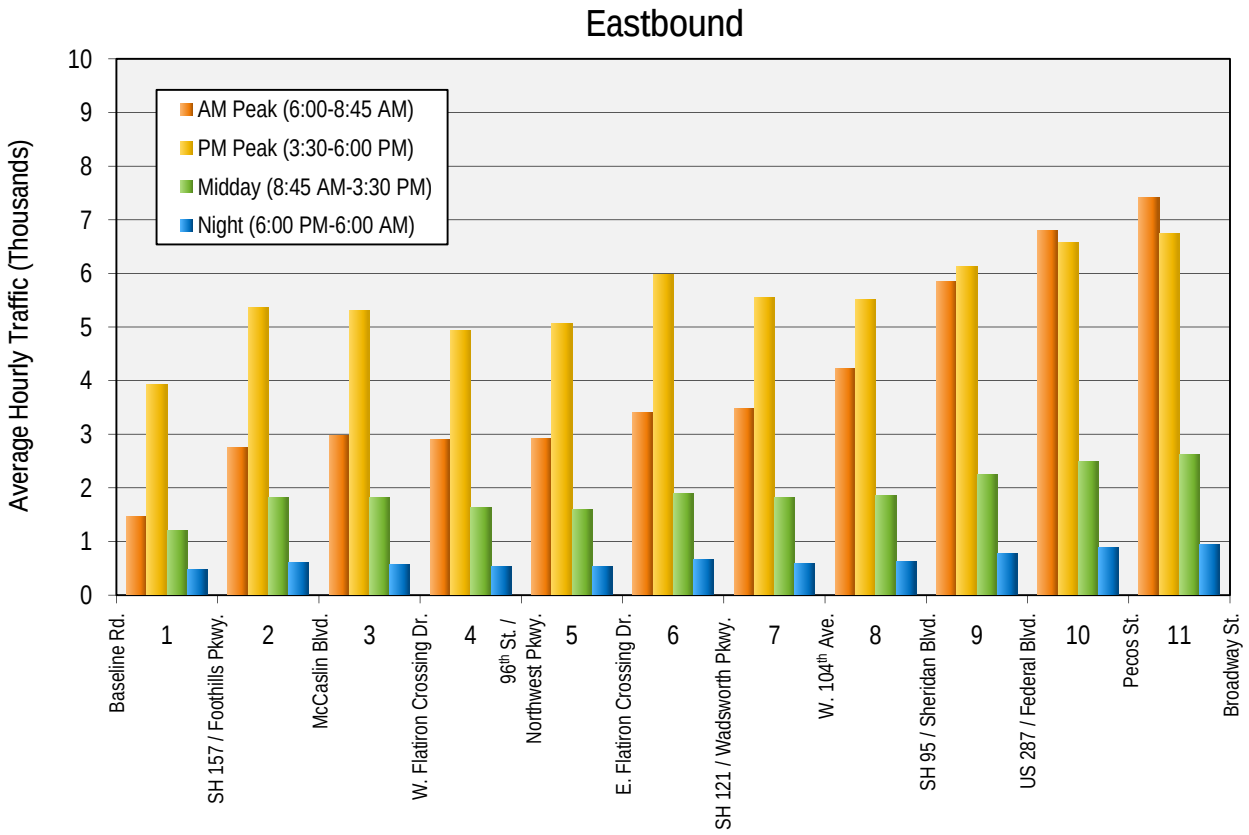

Foothills Pkwy.
McCaslin Blvd.
W. Flatiron Cir.
Interlocken Loop
Storage Tek Dr.
E. Flatiron Cir.
SH 121
Wadsworth
Pkwy.
SH 128
28.1
7.1
17.8
38.8
8.0
11.6
42.4
2.8
39.6
5.2
4.9
39.3
6.8
46.1
13.7
11.8
44.2
27.8
4.8
1.2
3.6
12.7
40.5
8.8
3.2
5.7
40.6
2.8
37.8
4.5
4.7
38.0
7.3
45.3
13.4
11.0
42.9
36
Match Line A
W. 104th Ave.
Church Ranch Blvd.
W. 92nd Ave.
SH 95
Sheridan Blvd.
US 287
Federal Blvd.
Pecos St.
Broadway St.
(Combined
EB & WB)
4.0
44.2
7.0
8.2
45.4
6.5
19.3
58.2
5.1
14.2
64.9
3.5
7.7
69.1
8.5
2.4
1.5
42.9
6.8
9.6
45.7
6.6
16.7
55.8*
5.5
12.3
62.6*
4.0
7.7
64.8
4.3
E. 70th Ave.
25
76
LEGEND
General Purpose Lanes
I-25 Reversible EXpress Toll Lanes
00.0 Traffic Volume (In thousands)
* General purpose lane and HOV combined volume.

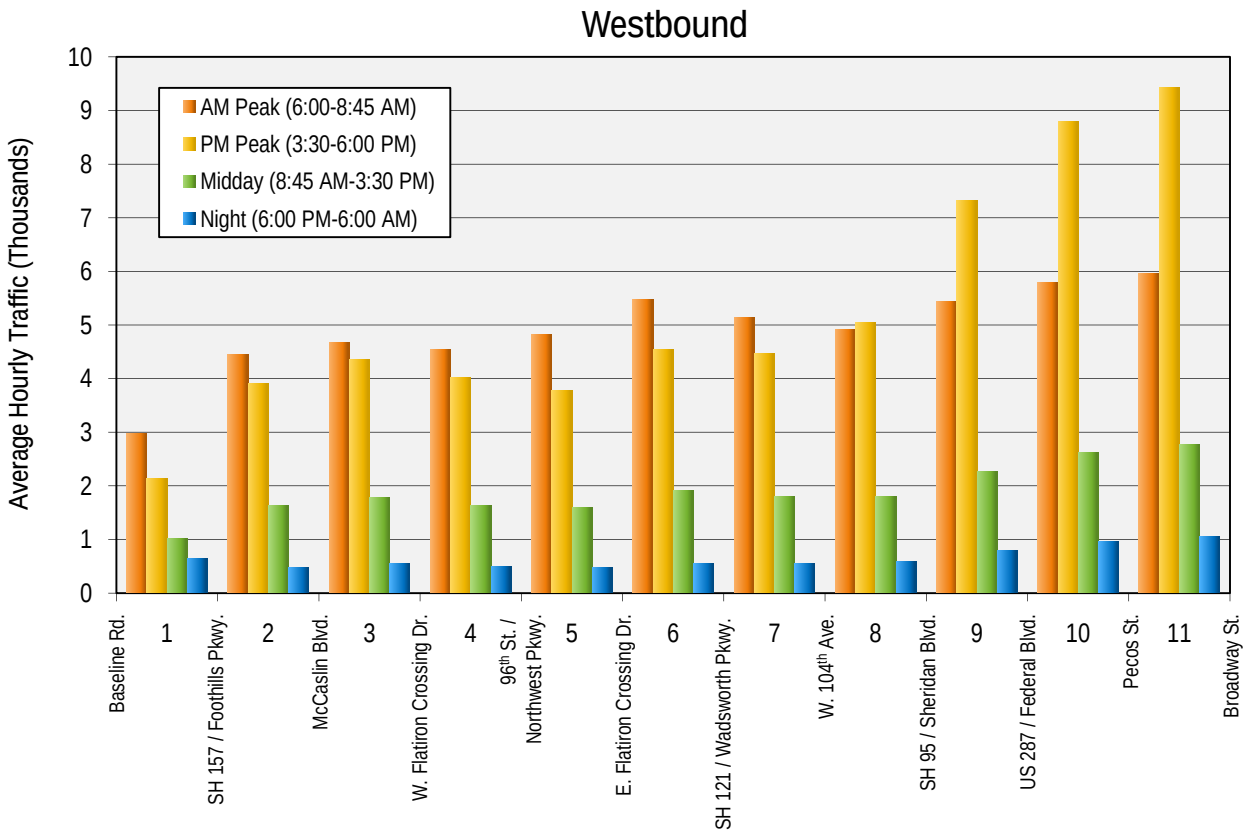


2010 AVERAGE WEEKDAY TRAFFIC VOLUME
AM PEAK PERIOD (6:00-8:45 AM)



2010 AVERAGE WEEKDAY TRAFFIC VOLUME
PM PEAK PERIOD (3:30-6:00 PM)





US 36 MAINLINE SEGMENTS
2010 AVERAGE HOURLY TRAFFIC BY PERIOD

WilburSmith ASSOCIATES

FIGURE 2-9

36 eastbound, traffic volumes west of Sheridan Boulevard are on average 5,200 vehicles per hour during the PM peak period (3:30 – 6:00 PM). Traffic volumes on these segments are significantly lower during the AM peak period (6:00 – 8:45 AM), with an average of 3,000 vehicles per hour. However, east of Sheridan Boulevard, overall traffic volumes are greater, with a significant increase in hourly traffic volumes during the AM peak period. On average, traffic volumes east of Sheridan Boulevard are 6,700 vehicles per hour during the AM peak period and 6,500 vehicles per hour during the PM peak period. Hourly traffic volumes during the Midday (8:45 – 3:30 PM) and Night (6:00 – 6:00 AM) periods are generally the same across all segments, with slightly greater volumes east of Sheridan Boulevard.

On US 36 westbound, the peaking pattern is reversed. Traffic volumes west of Sheridan Boulevard are generally 4,600 vehicles per hour during the AM peak period, with lower traffic volumes of 4,000 vehicles per hour on these segments during the PM peak period. The difference between AM and PM peak period hourly volumes is not as great as in the eastbound direction. East of Sheridan Boulevard, the greatest hourly volumes occur during the PM peak period, with volumes as great as 9,400 vehicles per hour. On average, traffic volumes east of Sheridan Boulevard are 5,700 vehicles per hour during the AM peak period and 8,500 vehicles per hour during the PM peak period. Similar to the eastbound direction, hourly westbound traffic volumes during the Midday and Night periods are generally the same across all segments, with slightly greater volumes east of Sheridan Boulevard.

OBSERVED SPEEDS AND TRAVEL TIMES

Two sets of weekday travel time runs were conducted in the study corridor on US 36 and I-25 on Wednesday, November 30, 2010 and Thursday, December 15, 2010.

GPS devices were used to record highway travel speed and travel delay data while driving in the normal traffic stream. To ensure that the data collected most accurately reflected existing travel conditions, data collection vehicles kept pace with the overall traffic flow, considering any delays encountered at ramps and interchanges. Average speeds and travel times were observed and recorded in both directions during from 6:00 – 10:00 AM and from 3:00 – 7:00 PM.

The observed speeds and travel times travel time-distance information collected during the studies serve as a critical input into the calibration of the travel demand model of US 36. It also provides an overview of current traffic operating conditions.

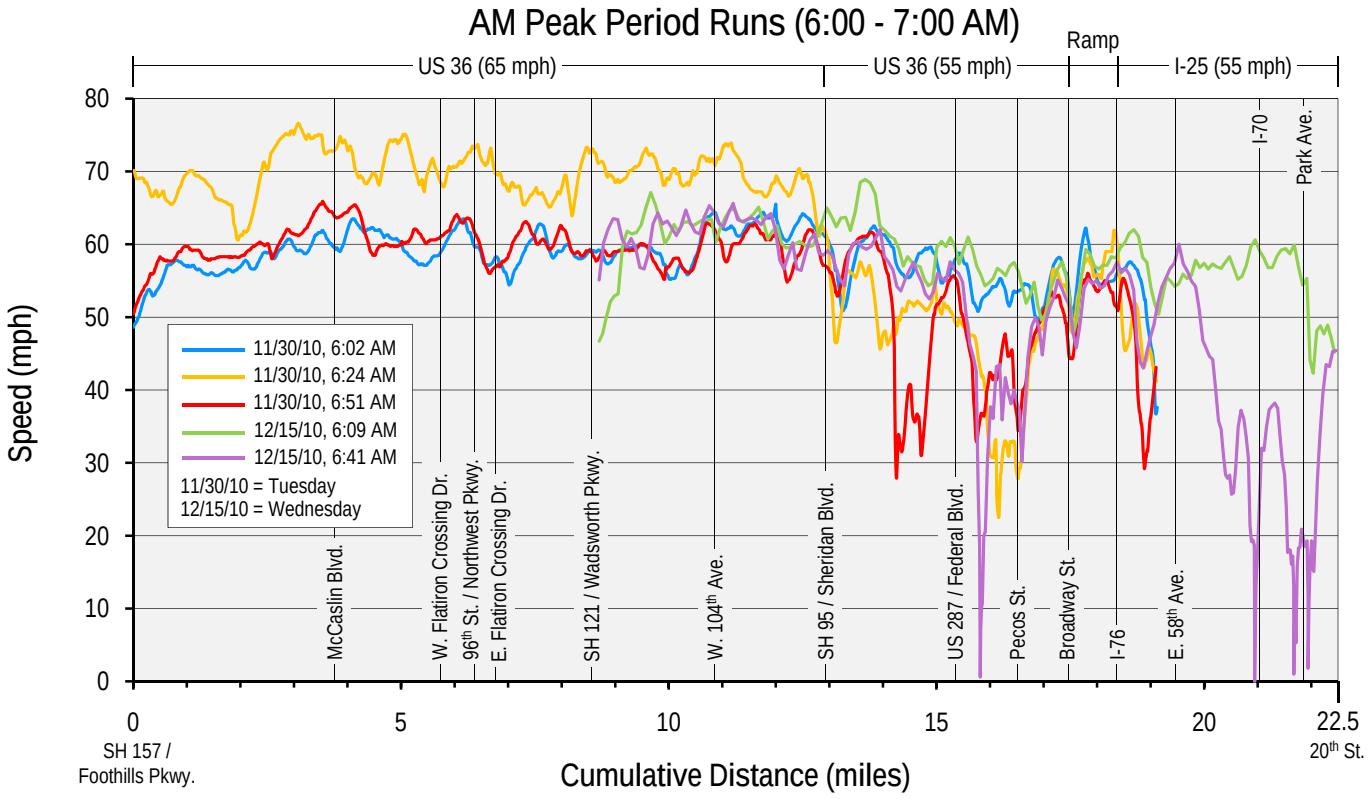
US 36 EASTBOUND AM TRAVEL RUNS

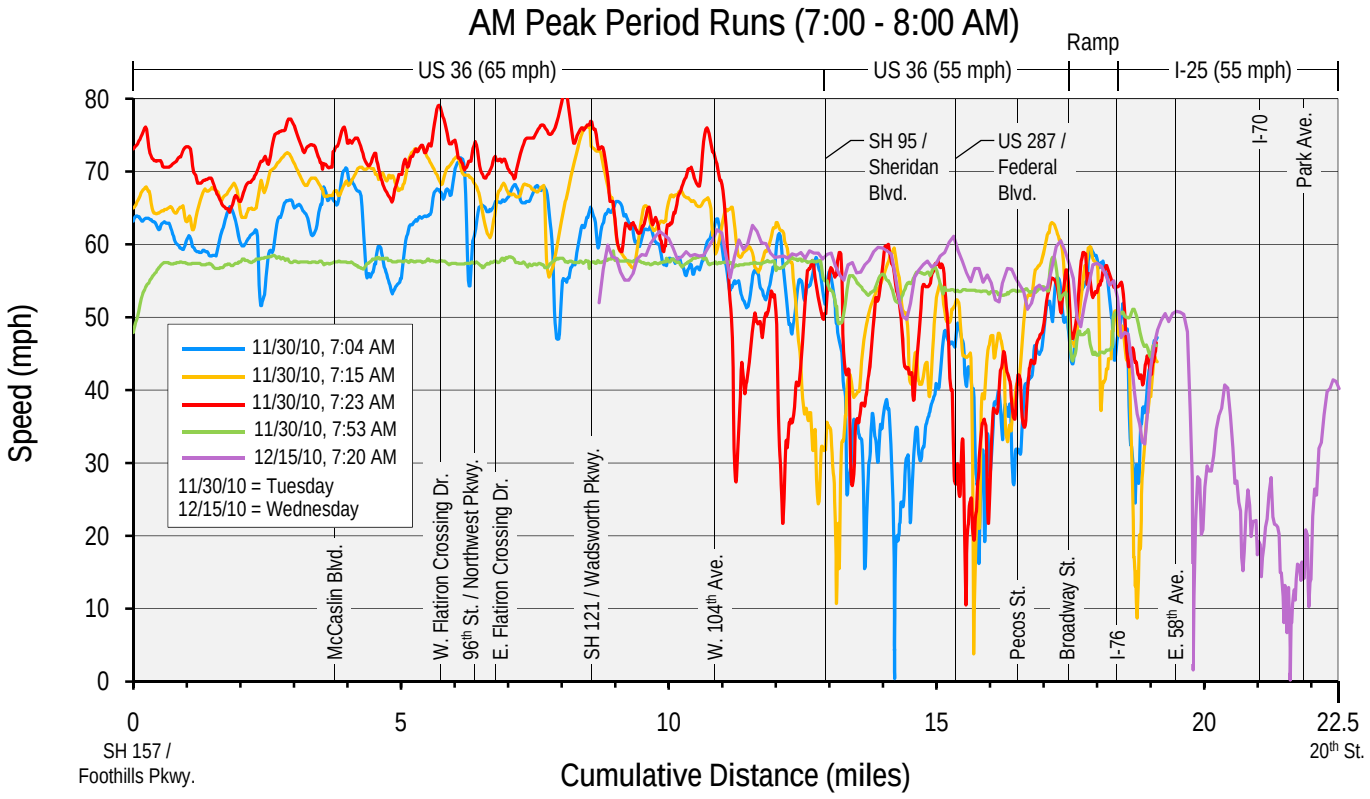
Table 2-5 summarizes the results of the eastbound US 36 and southbound I-25 travel runs. The average free flow travel time, following posted speed limits, from US 36 at Foothills Parkway to I-25 at Park Avenue is 21.9 minutes. During the AM Peak Period (6:00 – 10:00 AM), delays were observed on US 36 and I-25 primarily between 6:00 – 8:00 AM. Travel times between 7:00 – 8:00 AM were observed as being an average of 7.5 minutes greater than free flow conditions. The majority of this difference was caused by travel delays on I-25, as shown in the table. The observed average travel time from US 36 at Foothills Parkway to I-25 at Park Avenue for the entire AM Peak Period was 24.5 minutes, or 2.6 minutes greater than free flow conditions, with an average travel speed of 54.1 MPH.

Figures 2-10 and 2-11 illustrate instantaneous travel speeds for AM travel time runs (6:00 – 10:00 AM) conducted on US 36 eastbound and I-25 southbound. As shown in Figure 2-10, significant travel delays were observed on US 36 from the US 287 off-ramps to Pecos Street and on I-25 south of 58th Avenue as early as 6:30 AM. Observed delays continued to worsen on US 36, extending as far west as 104th Avenue until 7:30 AM, when average travel speeds on US 36 eastbound began to return to posted speed limits. At the same time, significant travel delays continued to be observed on I-25 southbound, specifically near the 58th Avenue on ramps and Park Avenue off-ramps. Speeds on US 36 eastbound between 8:00 and 10:00 AM were observed at roughly the posted speed limit, as shown in Figure 2-11, with some slowdowns near Sheridan Boulevard and between Pecos Street and Broadway Street remaining until 9:00 AM. On I-25 southbound, travel speeds were observed to have mostly returned to the posted speed limit of 55 MPH after 8:00 AM, with some additional travel delays at Park Avenue continuing until about 8:30 AM.

US 36 EASTBOUND PM TRAVEL RUNS

As shown in Table 2-5, travel delays were observed on US 36 and I-25 during the entire PM Peak Period (3:00 – 7:00 PM), but primarily between 4:00 – 6:00 PM. As a result of travel delays on I-25 and on US 36 between Wadsworth Parkway and Pecos Street, observed travel times were as much as 14.0 minutes greater than free flow conditions.

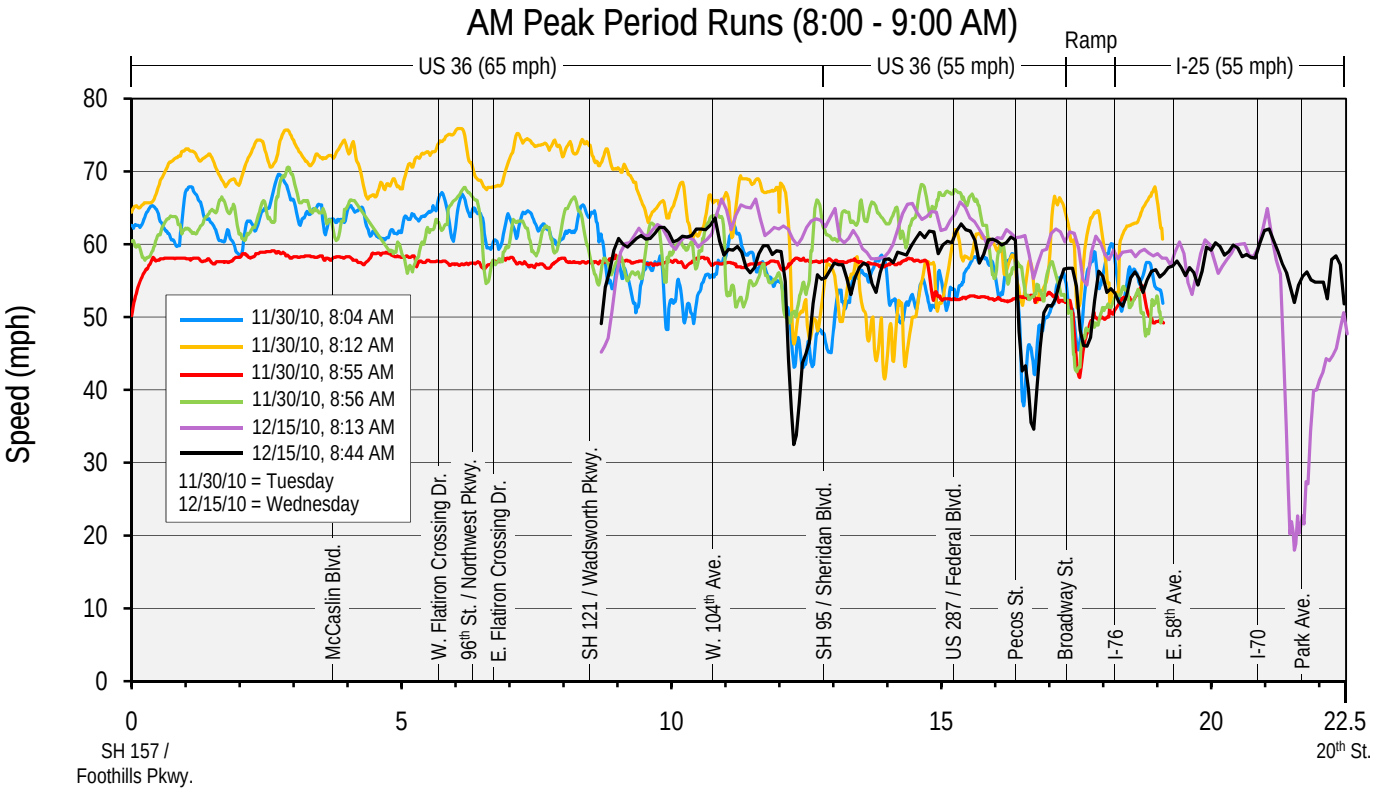


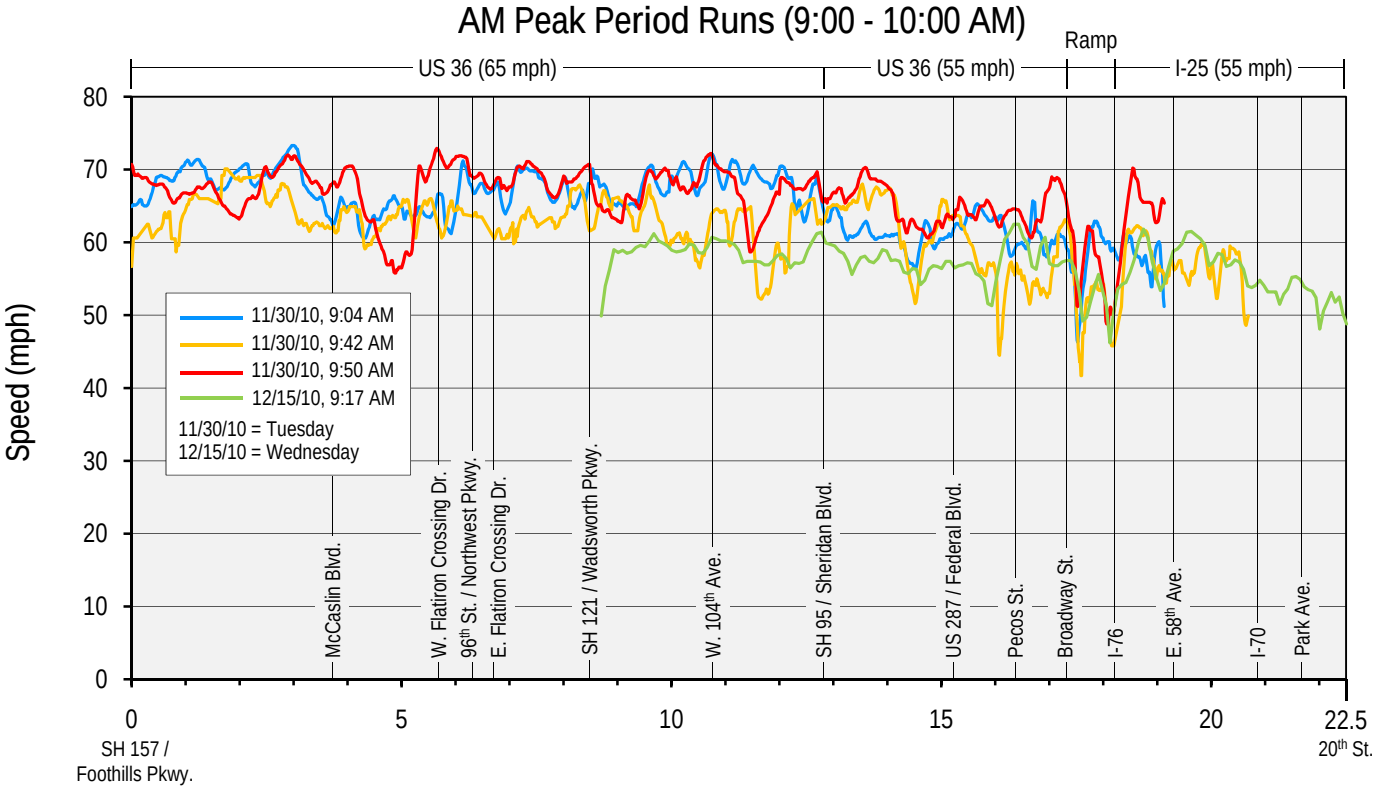


SPEED AND DELAY, 6:00 - 8:00 AM
US 36 EASTBOUND THROUGH I-25 SOUTHBOUND

WilburSmith ASSOCIATES

FIGURE 2-10





SPEED AND DELAY, 8:00 - 10:00 AM
US 36 EASTBOUND THROUGH I-25 SOUTHBOUND

WilburSmith ASSOCIATES

FIGURE 2-11

Table 2-5
Travel Times and Speeds
US 36 Eastbound / I-25 Southbound

AM Peak Period (6:00 - 10:00 AM)

Roadway	US 36 Eastbound				US 36 / I-25		I-25 Southbound		Total					
Segment Start	Foothills Pkwy.		Wadsworth Pkwy.		US 36 at Pecos St.		E. 58th Ave.		Free Flow		Observed		Difference	
Segment End	Wadsworth Pkwy.		Pecos St.		I-25 at E. 58th Ave.		Park Ave.							
Hour	Travel Time (min)	Average Speed (MPH)	Travel Time (min)	Average Speed (MPH)	Travel Time (min)	Average Speed (MPH)	Travel Time (min)	Average Speed (MPH)	Travel Time (min)	Average Speed (MPH)	Travel Time (min)	Average Speed (MPH)	Travel Time (min)	Average Speed (MPH)
6:00 - 7:00 AM	8.3	62.4	8.1	56.6	3.3	50.4	5.0	37.0	21.9	60.6	24.7	53.7	2.8	-6.8
7:00 - 8:00 AM	8.0	64.4	9.2	49.8	3.6	46.5	8.6	21.6	21.9	60.6	29.4	45.1	7.5	-15.4
8:00 - 9:00 AM	8.2	63.3	7.9	57.8	3.1	54.2	3.6	51.1	21.9	60.6	22.8	58.2	0.9	-2.4
9:00 - 10:00 AM	7.7	67.2	7.3	62.8	2.9	58.8	3.3	55.5	21.9	60.6	21.1	62.7	-0.7	2.1
AM Period Average	**8.0**	**64.3**	**8.1**	**56.4**	**3.2**	**52.1**	**5.1**	**36.0**	**21.9**	**60.6**	**24.5**	**54.1**	**2.6**	**-6.4**

PM Peak Period (3:00 - 7:00 PM)

Roadway	US 36 Eastbound				US 36 / I-25		I-25 Southbound		Total					
Segment Start	Foothills Pkwy.		Wadsworth Pkwy.		US 36 at Pecos St.		E. 58th Ave.		Free Flow		Observed		Difference	
Segment End	Wadsworth Pkwy.		Pecos Street		I-25 at E. 58th Ave.		Park Ave.							
Hour	Travel Time (min)	Average Speed (MPH)	Travel Time (min)	Average Speed (MPH)	Travel Time (min)	Average Speed (MPH)	Travel Time (min)	Average Speed (MPH)	Travel Time (min)	Average Speed (MPH)	Travel Time (min)	Average Speed (MPH)	Travel Time (min)	Average Speed (MPH)
3:00 - 4:00 PM	8.7	59.6	8.7	52.6	3.1	55.0	5.0	36.7	21.9	60.6	25.4	52.1	3.6	-8.5
4:00 - 5:00 PM	9.0	57.3	10.2	44.5	3.3	51.7	13.4	13.8	21.9	60.6	35.9	36.9	14.0	-23.7
5:00 - 6:00 PM	11.0	47.1	12.4	36.9	3.3	50.7	7.7	24.1	21.9	60.6	34.3	38.6	12.4	-21.9
6:00 - 7:00 PM	8.8	58.9	8.7	52.3	3.1	53.6	3.4	54.2	21.9	60.6	24.0	55.2	2.2	-5.4
PM Period Average	**9.3**	**55.2**	**10.0**	**45.6**	**3.2**	**52.7**	**7.4**	**25.1**	**21.9**	**60.6**	**29.9**	**44.3**	**8.0**	**-16.3**

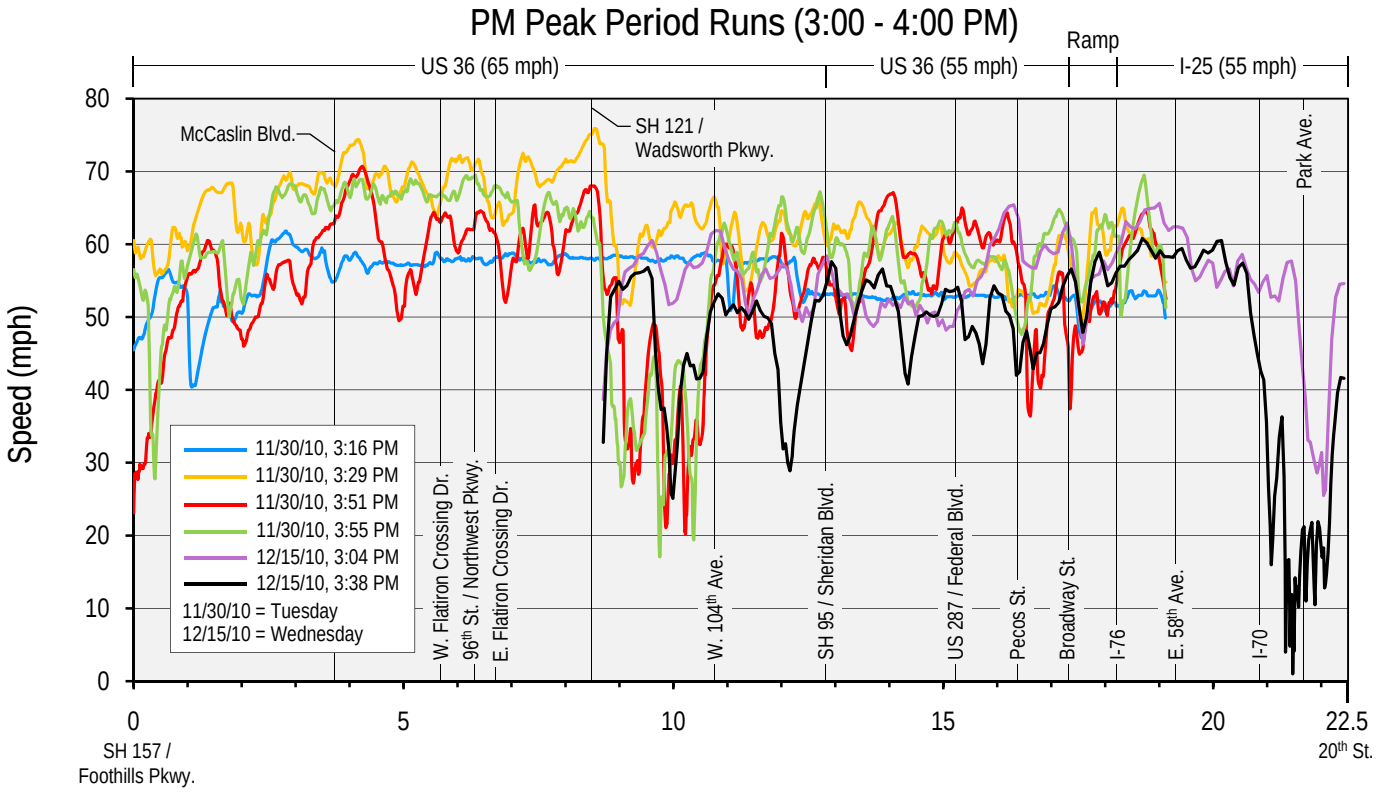
The observed average travel time from US 36 at Foothills Parkway to I-25 at Park Avenue for the entire PM Peak Period was 29.9 minutes, or 8.0 minutes greater than free flow conditions, with an average travel speed of 44.3 MPH.

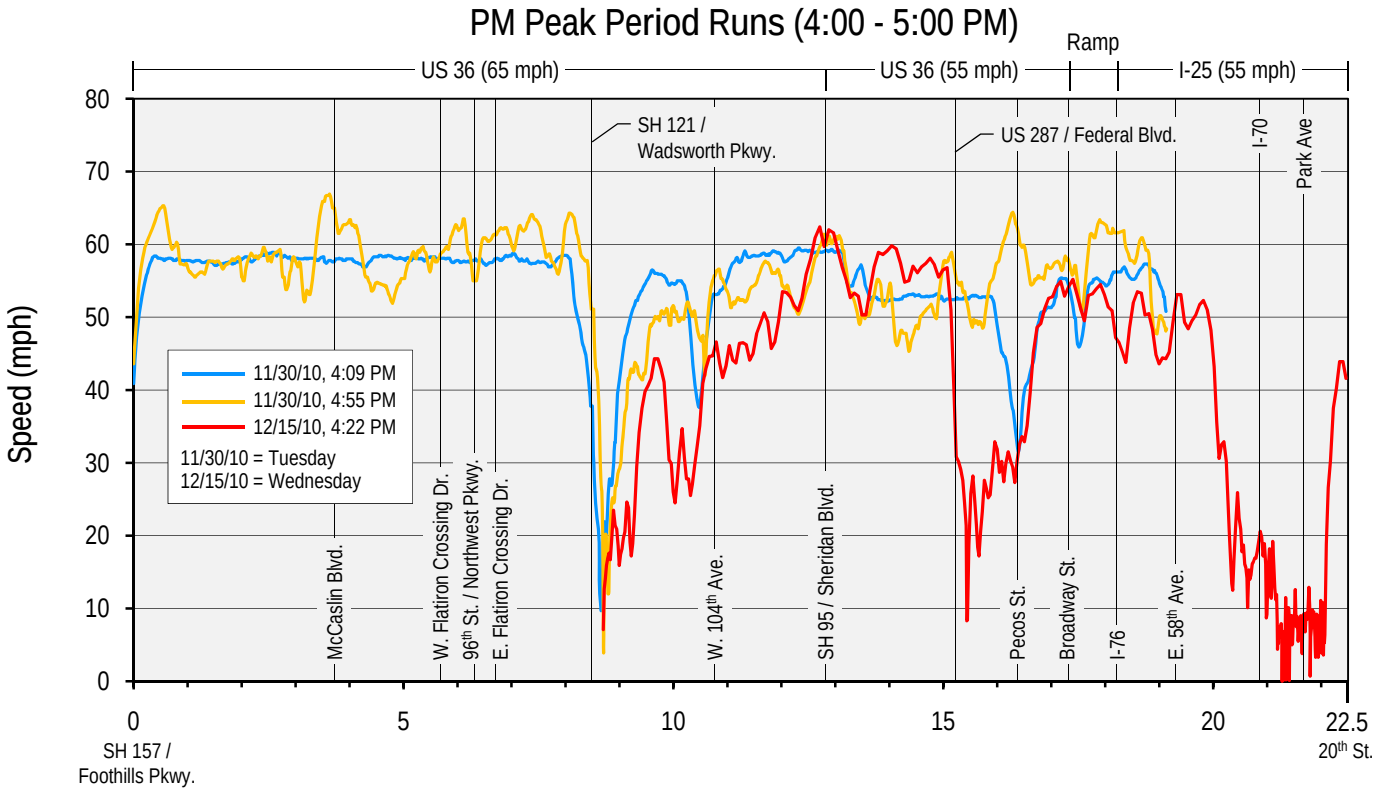
Figures 2-12 and 2-13 illustrate instantaneous travel speeds for PM travel time runs (3:00 – 7:00 PM) conducted on US 36 eastbound and I-25 southbound. Starting at 3:00 PM, travel speeds on US 36 eastbound were observed at about 60 MPH, with higher speeds observed west of Wadsworth Parkway, as shown in Figure 2-12. After 3:30 PM, observed travel delays between Wadsworth Parkway and 104th Avenue began to develop, reaching speeds as low as 10 MPH between 4:00 and 6:00 PM. An additional area where reduced travel speeds were observed was between Pecos Street and Broadway Street. At 3:30 PM, travel speeds of 40 MPH were observed on this segment, with some areas reaching as low as 10 MPH. By 5:00 PM, observed travel speeds in this segment had mostly returned to 60 MPH. Figure 2-13 illustrates the spread of travel delays from Wadsworth Parkway to as far east as the on-ramps from Sheridan Boulevard. Reduced travel speeds were also observed between Foothills Parkway and McCaslin Boulevard at around 5:15 PM. In general, travel delays on US 36 eastbound were observed until about 6:30 PM, when speeds returned to 60 MPH.

On I-25 southbound, observed travel delays began to develop between the I-70 interchange and Park Avenue as early as 3:00 PM. Observed travel speeds on I-25 southbound continued to deteriorate to 10 MPH or less until returning to the posted speed limit of 55 MPH after 6:00 PM.

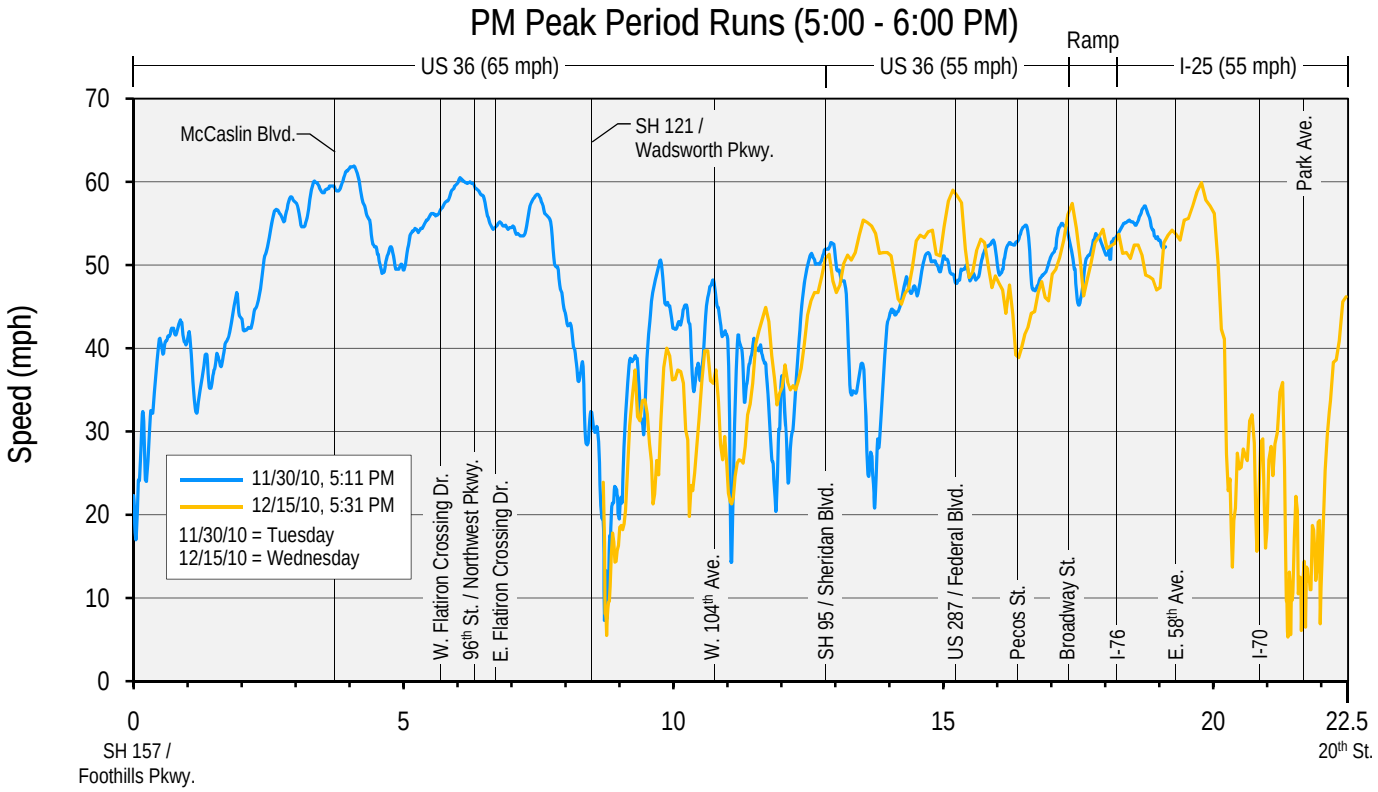
US 36 Westbound AM Travel Runs

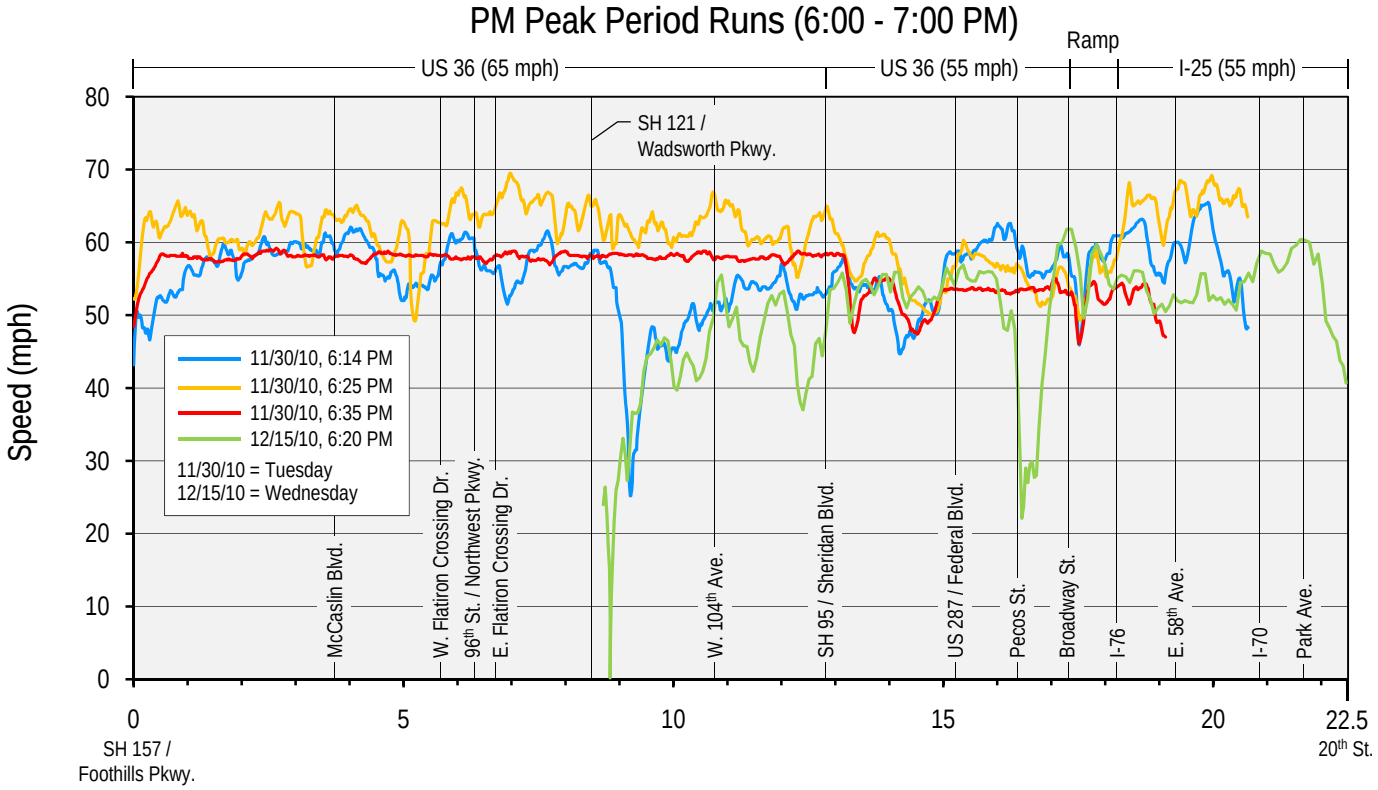
Table 2-6 summarizes the results of the westbound US 36 and northbound I-25 travel runs. The average free flow travel time, following posted speed limits, from I-25 at Park Avenue to US 36 at Foothills Parkway is 20.8 minutes. During the AM Peak Period (6:00 – 10:00 AM), delays were observed on US 36 and I-25 primarily between 7:00 – 9:00 AM. Travel times between 7:00 – 8:00 AM were observed as being an average of 8.0 minutes greater than free flow conditions. The majority of this difference was caused by travel delays on US 36 west of Pecos Street, as shown in the table. The observed average travel time from I-25 at Park Avenue to US 36 at Foothills Parkway for the entire AM Peak Period was 24.0 minutes, or 3.2 minutes greater than free flow conditions, with an average travel speed of 52.2 MPH.





SPEED AND DELAY, 3:00 - 5:00 PM
US 36 EASTBOUND THROUGH I-25 SOUTHBOUND





SPEED AND DELAY, 5:00 - 7:00 PM
US 36 EASTBOUND THROUGH I-25 SOUTHBOUND

Table 2-6
Travel Times and Speeds
US 36 Westbound / I -25 Northbound

AM Peak Period (6:00 - 10:00 AM)

Roadway	US 36 Westbound				US 36 / I-25		I-25 Northbound		Total					
Segment Start	Wadsworth Pkwy.		Pecos St.		I-25 at E. 58th Ave.		Park Ave.		Free Flow		Observed		Difference	
Segment End	Foothills Pkwy.		Wadsworth Pkwy.		US 36 at Pecos St.		E. 58th Ave.							
Hour	Travel Time (min)	Average Speed (MPH)	Travel Time (min)	Average Speed (MPH)	Travel Time (min)	Average Speed (MPH)	Travel Time (min)	Average Speed (MPH)	Travel Time (min)	Average Speed (MPH)	Travel Time (min)	Average Speed (MPH)	Travel Time (min)	Average Speed (MPH)
6:00 - 7:00 AM	7.8	61.2	8.3	55.6	2.8	56.2	2.7	58.5	20.8	60.4	21.6	58.1	0.8	-2.3
7:00 - 8:00 AM	11.8	40.6	11.3	41.0	2.9	53.8	2.8	55.9	20.8	60.4	28.7	43.6	8.0	-16.8
8:00 - 9:00 AM	9.7	49.7	9.3	49.9	2.8	55.9	2.8	56.7	20.8	60.4	24.4	51.3	3.7	-9.1
9:00 - 10:00 AM	7.0	68.1	8.5	54.5	2.9	53.6	2.8	55.9	20.8	60.4	21.2	59.1	0.4	-1.3
AM Period Average	**9.1**	**52.8**	**9.3**	**49.6**	**2.8**	**54.9**	**2.7**	**56.7**	**20.8**	**60.4**	**24.0**	**52.2**	**3.2**	**-8.1**

PM Peak Period (3:00 - 7:00 PM)

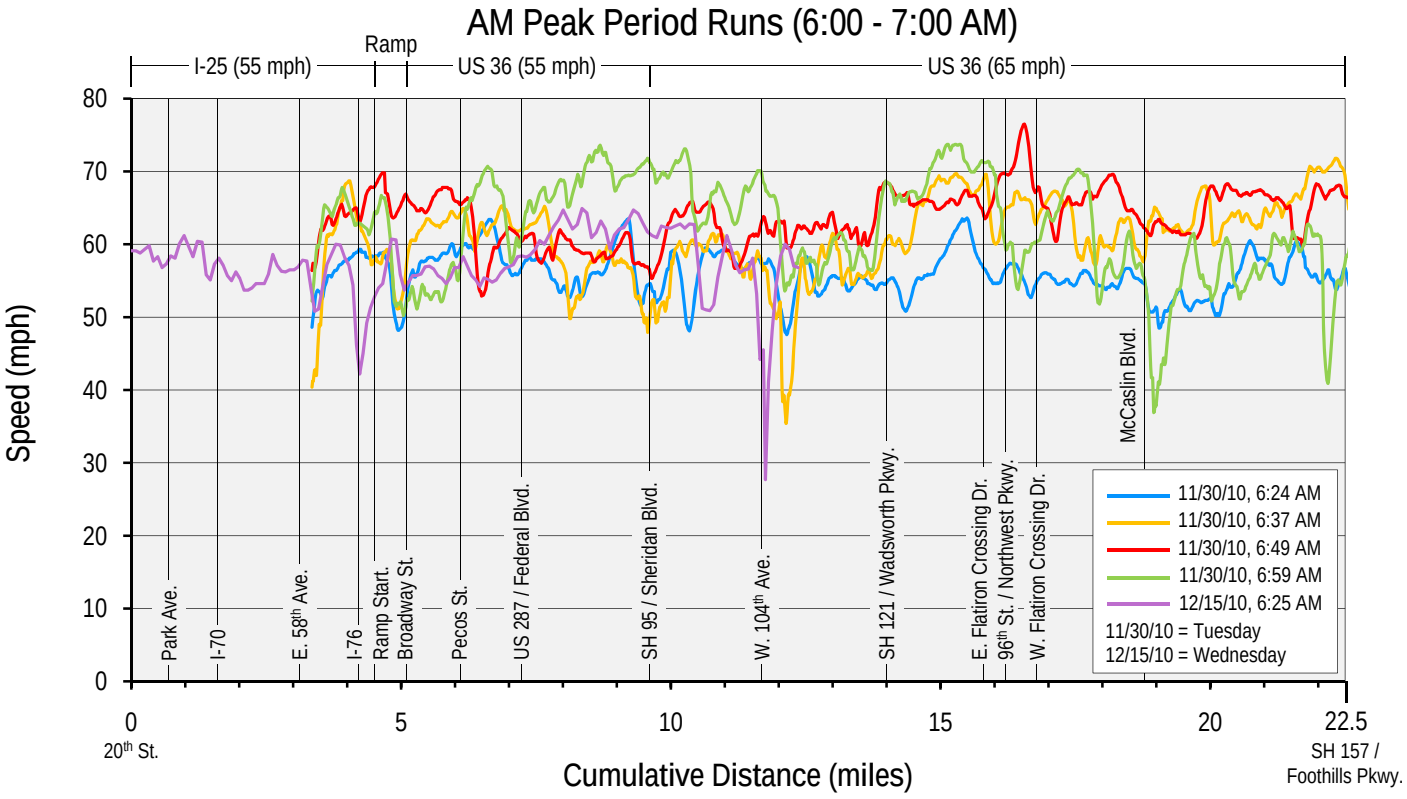
Roadway	US 36				US 36 / I-25		I-25		Total					
Segment Start	Wadsworth Pkwy.		Pecos St.		I-25 at E. 58th Ave.		Park Ave.		Free Flow		Observed		Difference	
Segment End	Foothills Pkwy.		Wadsworth Pkwy.		US 36 at Pecos St.		E. 58th Ave.							
Hour	Travel Time (min)	Average Speed (MPH)	Travel Time (min)	Average Speed (MPH)	Travel Time (min)	Average Speed (MPH)	Travel Time (min)	Average Speed (MPH)	Travel Time (min)	Average Speed (MPH)	Travel Time (min)	Average Speed (MPH)	Travel Time (min)	Average Speed (MPH)
3:00 - 4:00 PM	8.2	58.7	9.1	50.9	3.1	49.5	3.1	50.6	20.8	60.4	23.5	53.4	2.7	-6.9
4:00 - 5:00 PM	9.7	49.5	9.6	47.9	3.7	42.0	19.6	7.9	20.8	60.4	42.7	29.4	21.9	-31.0
5:00 - 6:00 PM	-	-	10.2	45.1	5.9	26.4	5.0	31.2	13.4	57.8	21.1	36.6	7.7	-21.2
PM Period Average	**8.9**	**53.7**	**9.7**	**47.8**	**4.2**	**36.7**	**9.2**	**16.9**	**20.8**	**60.4**	**32.1**	**39.1**	**11.3**	**-21.3**

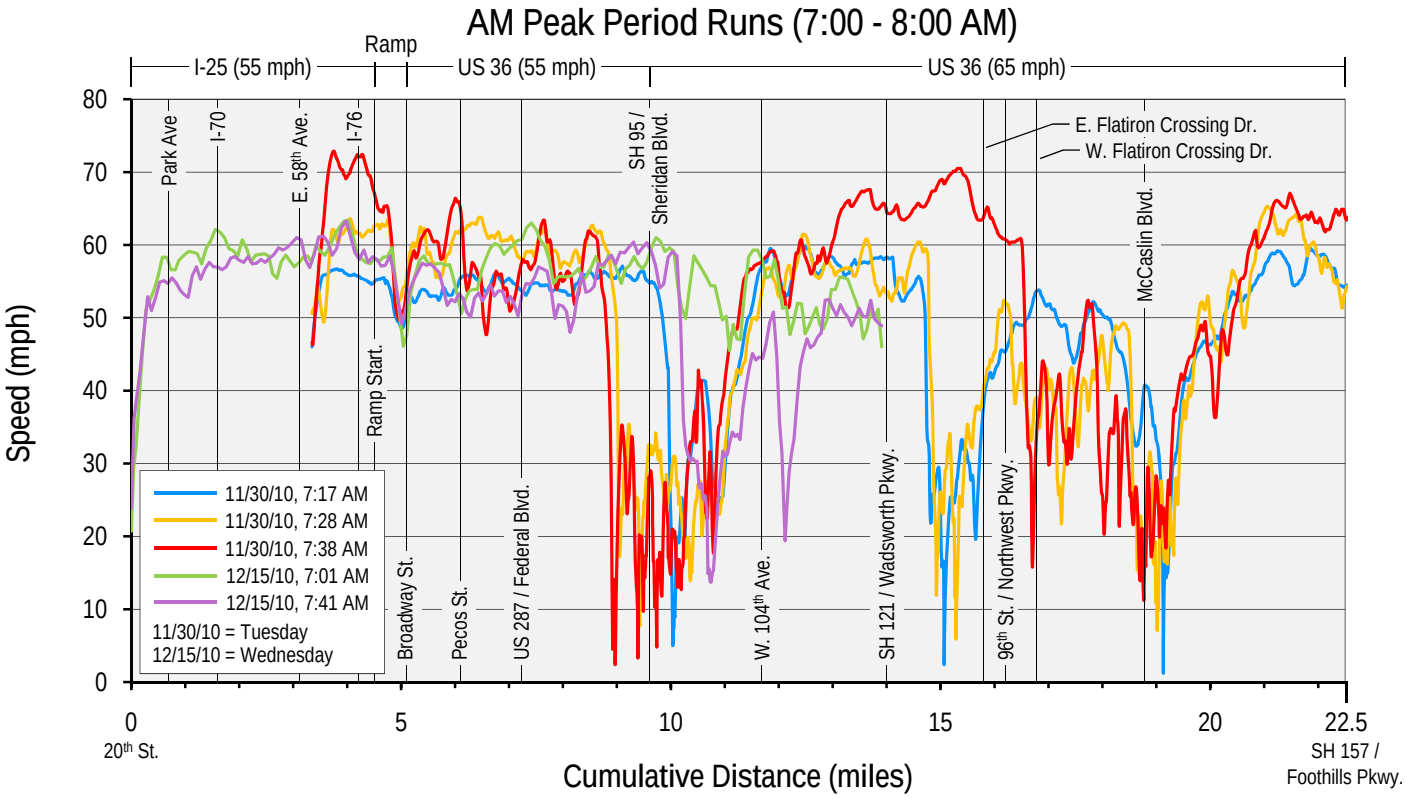
Figures 2-14 and 2-15 illustrate instantaneous travel speeds for AM travel time runs (6:00 – 10:00 AM) conducted on I-25 northbound and US 36 westbound. Between 6:00 and 7:00 AM, traffic on and US 36 westbound was observed to generally be traveling at the posted speed limits, with some minor delays beginning to develop at 104th Avenue and at McCaslin Boulevard. By 7:15 AM, speeds of 20 MPH and less were observed between the Sheridan Boulevard off-ramps and 104th Avenue. By 8:00 AM, some of these observed delays still remained at US 287 and at Sheridan Boulevard. Significant reductions in travel speed were also observed west of Wadsworth Parkway between 7:15 AM and 9:00 AM, with observed travel speeds of 15 MPH or less. By 8:30 AM, reduced travel speeds were observed primarily near McCaslin Boulevard. By 9:00 AM, observed travel speed west of Wadsworth Parkway had generally returned to posted speed limits. Throughout the PM period, travel speeds on I-25 northbound were observed at the posted speed limit of 55 MPH.

US 36 Westbound PM Travel Runs

As shown in Table 2-6, travel delays were observed on US 36 and I-25 during the entire PM Peak Period (3:00 – 7:00 PM), but primarily between 4:00 – 5:00 PM. As a result of travel delays on I-25, with average speeds south of 58th Avenue below 10 MPH, observed travel times were as much as 21.9 minutes greater than free flow conditions. The observed average travel time from I-25 at Park Avenue to US 36 at Foothills Parkway for the entire PM Peak Period was 32.1 minutes, or 11.3 minutes greater than free flow conditions, with an average travel speed of 39.1 MPH.

Figures 2-16 and 2-17 illustrate instantaneous travel speeds for PM travel time runs (3:00 – 6:00 PM) conducted on I-25 northbound and US 36 westbound. As shown in Figure 2-16, travel speeds on both roadways were generally observed at the posted speed limits before 3:45 PM, with some minor speed reductions west of McCaslin Boulevard. Travel speeds of 25 MPH were observed on US 36 westbound during one travel run between Broadway Street and Pecos Street at around 4:00 PM. As shown in Figure 2-17, travel speeds on I-25 northbound after 5:00 PM were observed at about 30 MPH, while travel speeds on US 36 westbound were generally observed at 50 MPH or less.

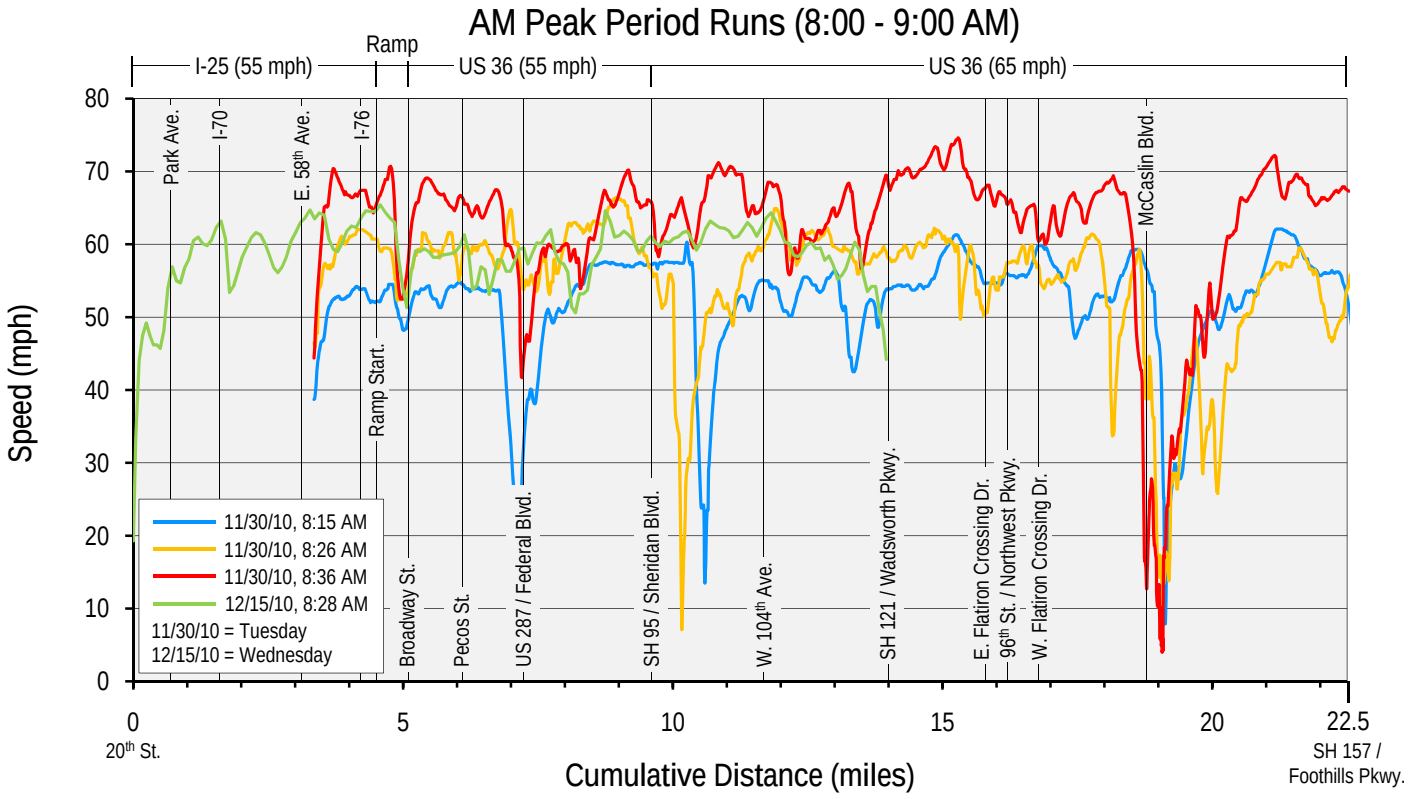


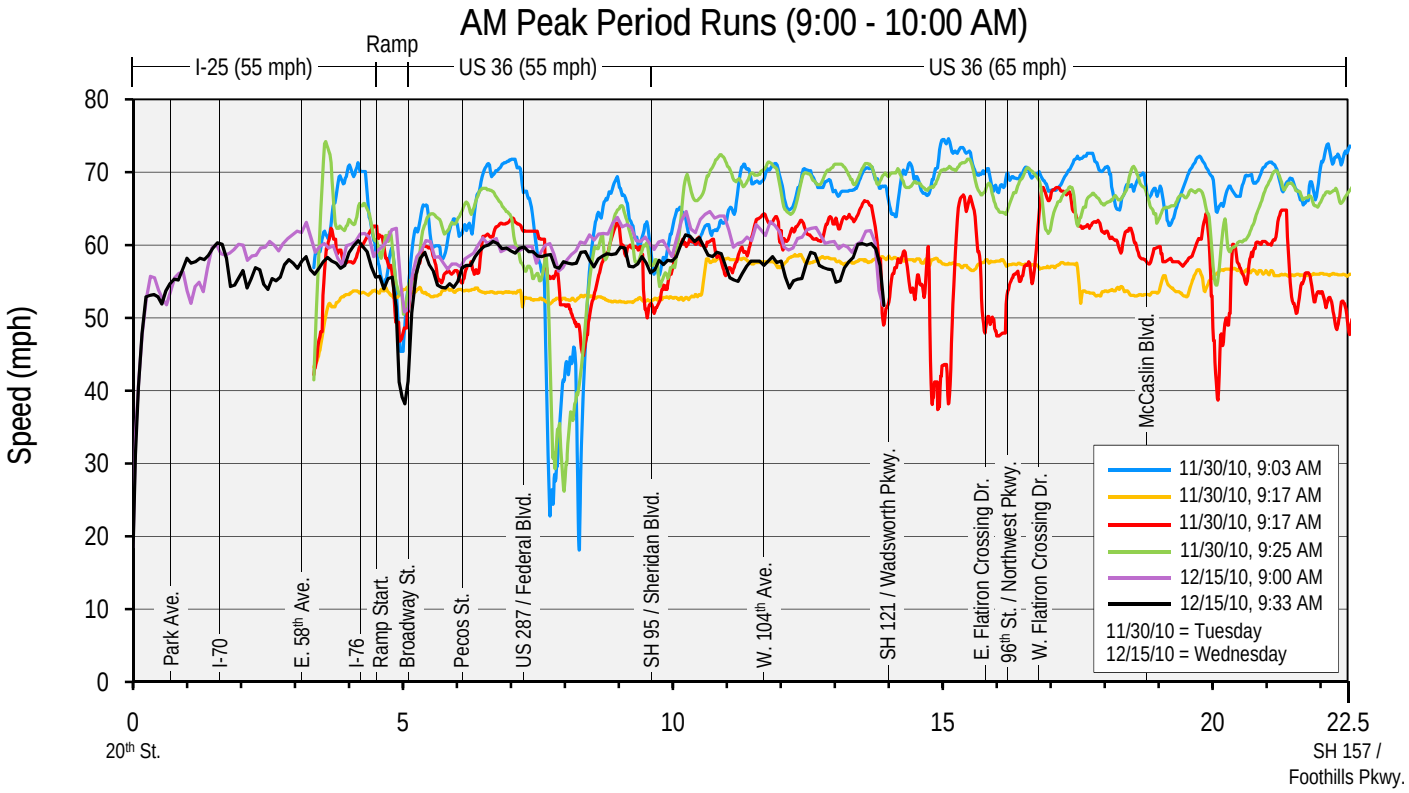


SPEED AND DELAY, 6:00 - 8:00 AM
I-25 NORTHBOUND THROUGH US 36 WESTBOUND

WilburSmith ASSOCIATES

FIGURE 2-14

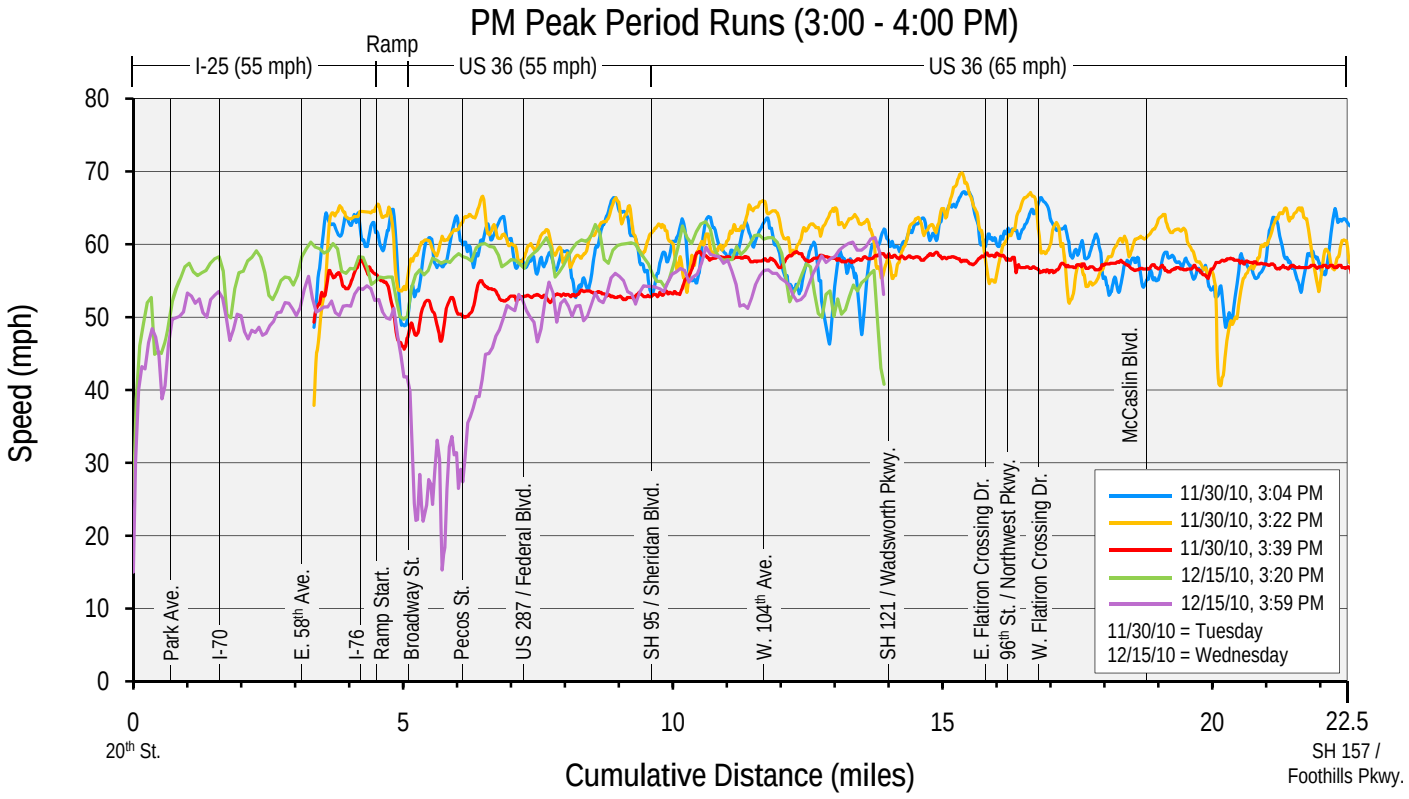


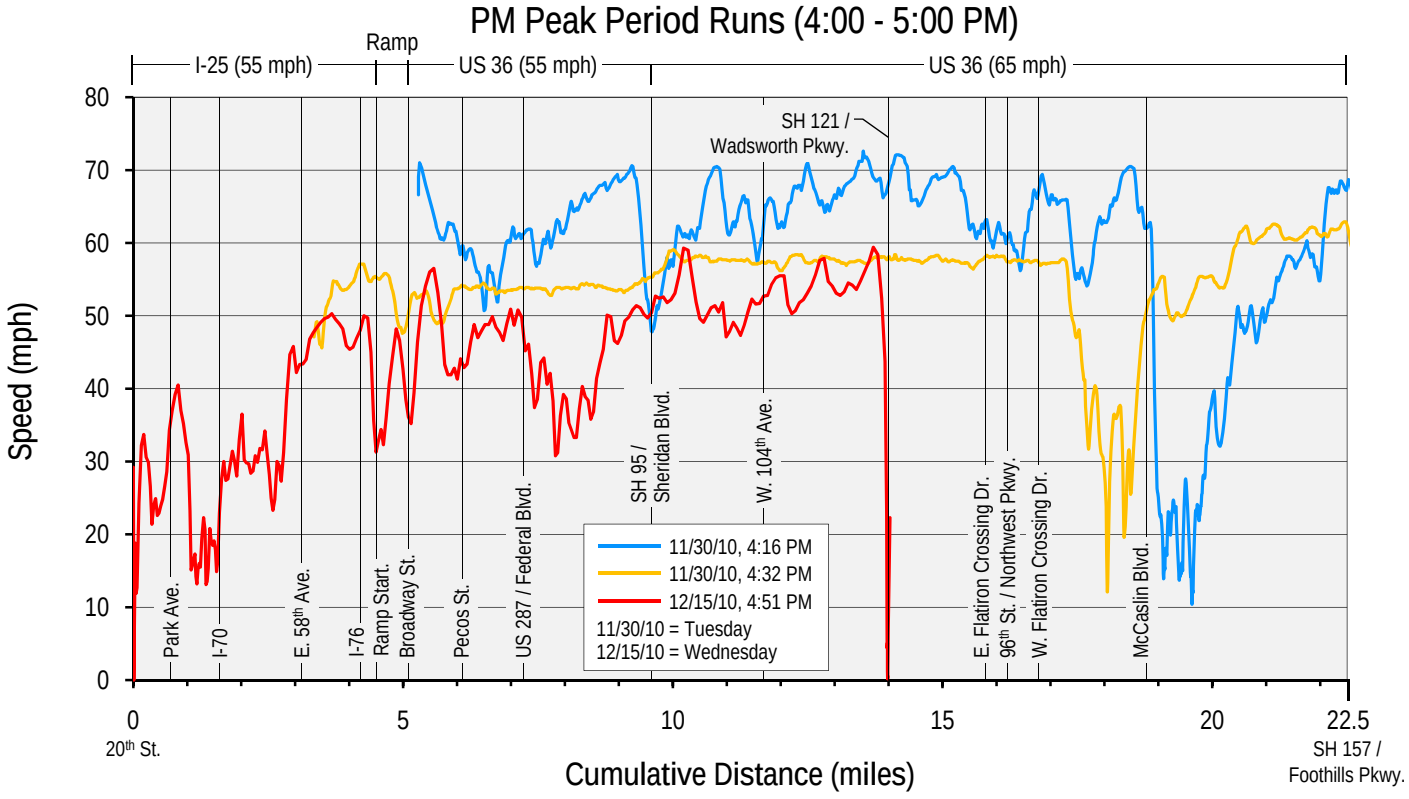


SPEED AND DELAY, 8:00 - 10:00 AM
I-25 NORTHBOUND THROUGH US 36 WESTBOUND

WilburSmith ASSOCIATES

FIGURE 2-15

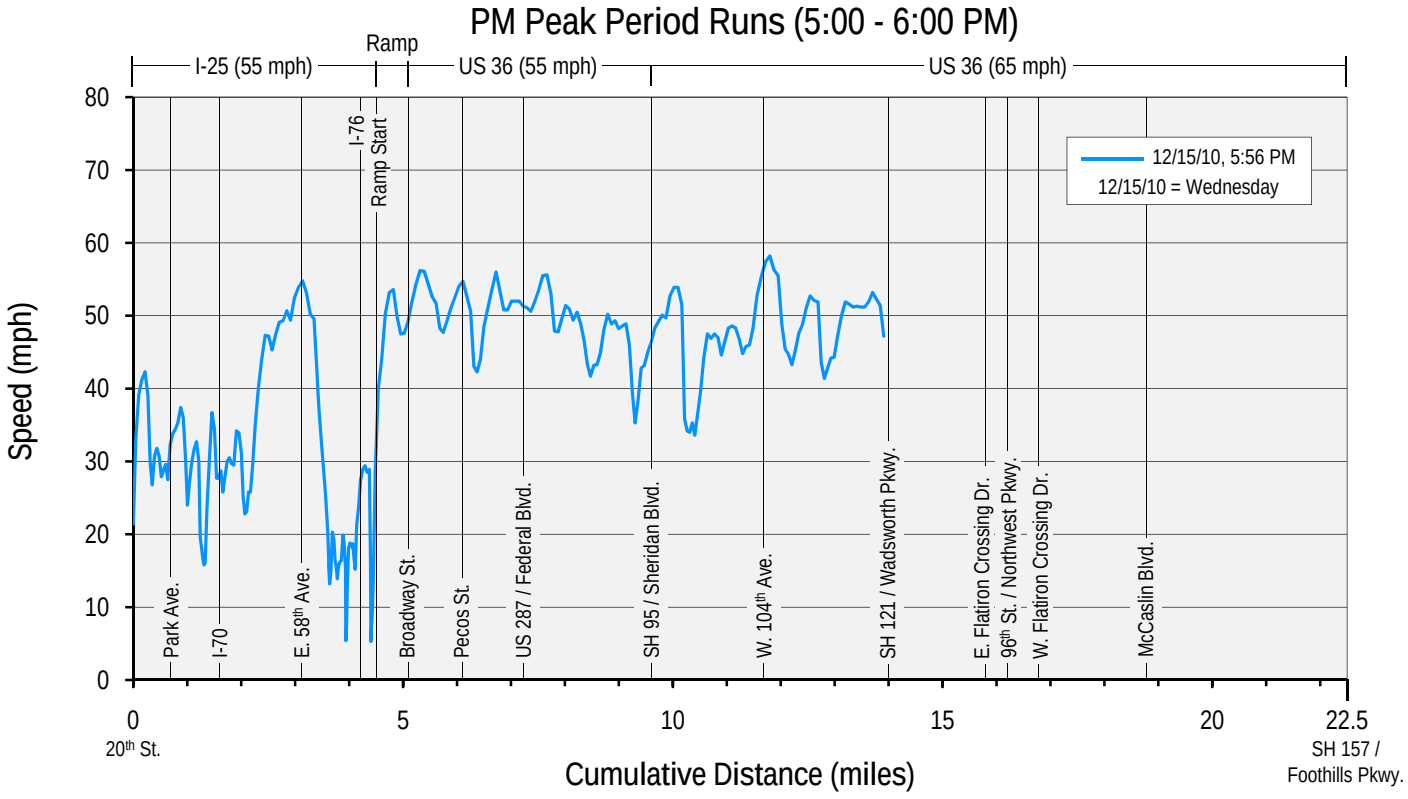




SPEED AND DELAY, 3:00 - 5:00 PM
I-25 NORTHBOUND THROUGH US 36 WESTBOUND

WilburSmith ASSOCIATES

FIGURE 2-16



SPEED AND DELAY, 5:00 - 6:00 PM
I-25 NORTHBOUND THROUGH US 36 WESTBOUND

WilburSmith ASSOCIATES

FIGURE 2-17

CHAPTER 3

STATED PREFERENCE SURVEY

The US 36 Stated Preference Survey was conducted in November 2010 by Resource Systems Group (RSG) for Wilbur Smith Associates and the Colorado Department of Transportation (CDOT) High Performance Transportation Enterprise (HPTE). The objective of the survey was to estimate values of toll sensitivity, or value of time (VOT) of travelers in the Denver-Boulder area who use or could reasonably use US 36 between Boulder and Denver. The survey was designed to provide sufficient detail to allow analyses of traveler responses to different toll rates and toll structures; and to allow analysis of toll sensitivities by trip type sufficient to support route diversion modeling. This chapter summarizes the results of the stated preference survey report; the full text of which is included in the appendix of this document.

APPROACH

The stated preference survey instrument was programmed using customized software developed by RSG for online administration through RSG's RSGSurvey.com website. Respondents for the survey were recruited from several sources, including travelers who had used their EXpressToll transponder within the month prior to the survey, businesses and organizations located in the Denver-Boulder study area, and the online market research panel, Research Now. RSG worked with the E-470 Public Highway Authority to survey motorists who recently used the Northwest Parkway and the northern section of E-470. Organizations and businesses in the project corridor contacted for participation included the coalition group "36 Commuting Solutions," the Denver Metro Chamber of Commerce, the National Oceanic and Atmospheric Administration, the Boulder Medical Center, the Geological Society of America, and the Southwest Research Institute, among others. Research Now panel members were recruited by county of residence. EXpressToll customers were sent an email invitation to the survey that contained a link to the survey website. Each business and organization contacted was provided

with a unique survey link and example email invitation text, which was distributed to employees and/or coalition member organizations. Research Now qualifying members were also sent email invitations to the survey that contained a link with unique identifier.

The customized computer-based survey software adapts to the trip characteristics of each respondent, making the survey realistic for them. By performing calculations behind the scenes, it allowed for the presentation of complex ideas in a simple manner. Electronic validation of each question eliminated item non-response and prevented the entry of invalid inputs. Responses were stored directly into a database after every question, reducing data entry costs and eliminating transcription error.

SURVEY QUESTIONNAIRE

The survey questionnaire was designed to collect information about a recent trip that the respondent made in the greater Denver-Boulder area and to find out how they might make that same trip if Managed Lanes were constructed on US 36 between Boulder and Denver. The survey questions were grouped into four main sections, including (1) screening and trip characteristics, (2) stated preference, (3) debrief and opinions, and (4) demographics.

The complete text of the questionnaire and example survey screens is included in the appendices to the full survey report found in the Appendix of this document.

SCREENING AND TRIP CHARACTERISTICS

After being presented with basic instructions about how to navigate the computer-based instrument and a brief introduction to the purpose of the study, respondents answered a set of screening questions. To qualify for the survey, respondents must have entered a home ZIP code from the state of Colorado, and they must have made a recent automobile trip that met the following conditions:

- Used or could have reasonably used US 36 between Boulder and Denver;
- Made within the past month;
- Made in a personal vehicle;
- Made on a weekday; and
- Took at least 15 minutes.

Respondents who indicated that they had not made a trip that met all of these criteria were terminated from the survey.

Qualifying respondents were asked to focus on their most recent trip that met all of the screening criteria as they continued through the survey. This **"reference trip"**, formed the basis for the rest of the survey. Respondents were asked to think of the one-way portion of their trip, rather than their entire round trip, and were asked a series of questions regarding the specific details of their reference trip, including:

- Day of week;
- Purpose;
- Beginning and ending locations;
- US 36 entrance and exit ramps;
- Use of alternate routes to avoid congestion;
- Trip start time;
- Travel time;
- Travel delays;
- Vehicle occupants;
- Tolls paid;
- Ownership of electronic toll collection (ETC) transponder;
- Trip frequency;
- Use of I-25 Express Lanes; and
- Frequency of transit use.

The specifics of these questions are described in the full stated preference report found in the appendix.

STATED PREFERENCE

The stated preference questions were designed to construct quantitative experiments to estimate respondents' travel preferences and behavioral response under hypothetical future conditions. The details of each respondent's **"reference trip"** were used to build a set of eight stated preference scenarios that included two or three travel alternatives for making their trip in the future. These included using:

1. Current route (US 36 general purpose lanes or alternative route to US 36);
2. US 36 proposed Managed Lane; or
3. US 36 proposed Managed Lane with additional passengers.

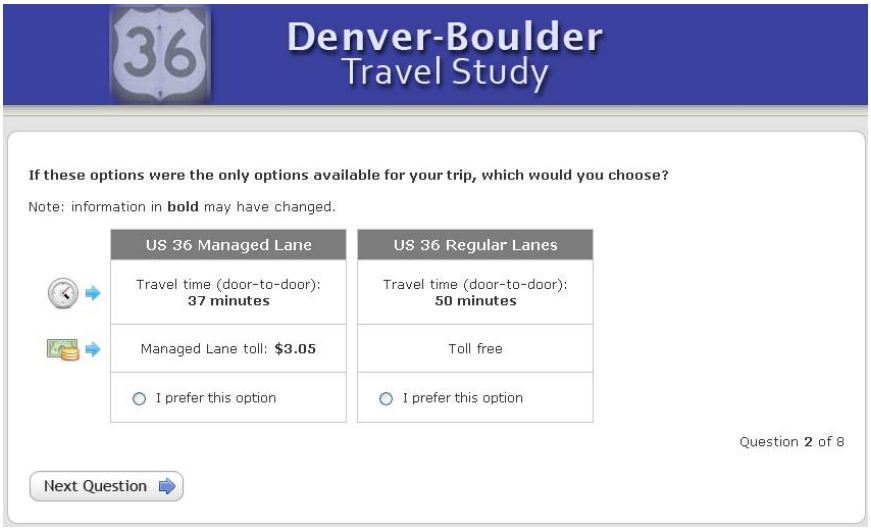
Respondents who reported a trip with two or fewer total occupants (SOV or HOV2) were presented with all three alternatives. Respondents with

three or more vehicle occupants (HOV3+) were only presented with the first two alternatives.

Each alternative was described by at least two attributes: travel time and toll cost. A third attribute, the number of additional passengers, was presented for those who were shown the third alternative. The values of the attributes varied across the eight questions, and respondents were asked to select the alternative they preferred the most under the conditions that were presented. Figure 3-1 shows an example of a question with three alternatives, while Figure 3-2 shows an example of a stated preference question with two alternatives. In order to avoid potential bias associated with the layout of the alternatives, the order of these alternatives was randomized for each respondent.

Figure 3-1
Sample Survey Screen: Stated Preference Question with Three Alternatives

Figure 3-2
Sample Survey Screen: Stated Preference Question with Two Alternatives



The attribute values presented in each question varied around a set of base values. To ensure that the scenarios were realistic, the trip characteristics of each respondent's **"reference trip"** were used to calculate the base values for travel time and toll cost. The base values for the attributes were varied by multiplying or adding one of several factors to give the level required by the experimental design for that particular scenario. By varying the travel time, toll cost, and number of passengers shown in each experiment, the respondent was faced with different time savings for different costs, allowing them to demonstrate their travel preferences across a range of values of time.

DEBRIEFING

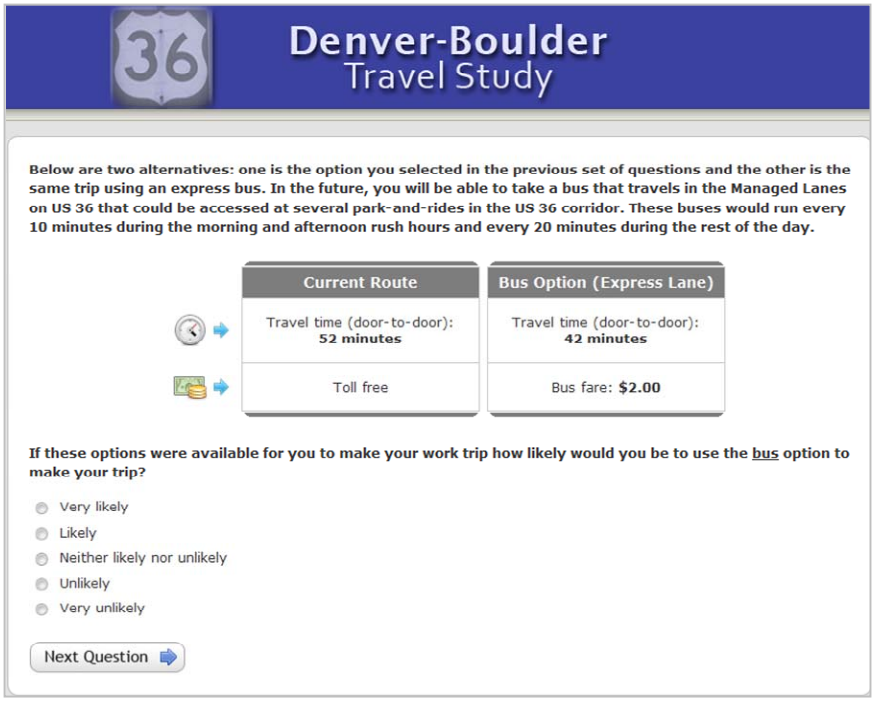
After completing the eight stated preference scenarios, respondents answered a series of questions to assess underlying rationales for their choices and to identify any potential strategic bias in their responses.

Respondents who never selected a Managed Lane alternative or the carpooling alternative were asked to select the primary reason for these choices. Additionally, respondents who selected at least one Managed Lane alternative in the SP section and reported a trip with two or more occupants who were coworkers or other prearranged carpoolers were asked to indicate whether or not they would consider breaking up their

carpool and paying the full toll amount to drive alone in the Managed Lanes.

In order to assess the likelihood that travelers would use a proposed bus option that would use the Managed Lanes, respondents were presented with a two-alternative scenario: the alternative the respondent selected in the final stated preference experiment, and a bus option with an associated travel time and fare, Figure 3-3. The travel time and fare amounts for the bus alternative were pivoted off of the levels from the selected alternative in the respondent's eighth experiment. Given the two scenarios, respondents indicated how likely they would be to choose the bus option.

Figure 3-3
Sample Survey Screen: Likelihood of Using Managed Lane Bus Option



Respondents who stated that they do not own a transponder for electronic toll collection and selected at least one tolled alternative in the stated preference questions were asked how likely they would be to get a transponder to pay the toll. The transponder toll was compared with a more expensive license plate tolling option. The amount of the license plate tolling surcharge varied from respondent to respondent. This

question was asked for informational purposes in the event that surcharges were levied for license plate tolling customers. Those who were not likely to pay with a transponder were asked to select the reason(s) for their preference.

Respondents were also asked for their overall opinion of the proposed US 36 Managed Lane project based on a five point scale from strongly favor to strongly oppose. Those with a non-neutral opinion were asked a follow-up question to identify why they were in favor or opposed to the project. Respondents were then asked the degree to which they agreed or disagree with a series of attitudinal statements regarding tolls, carbon emissions, and changing travel behavior.

DEMOGRAPHICS

Demographic questions were asked in order to classify respondents, identify differences in responses among traveler segments, and confirm that the sample contained a diverse cross section of the traveling population served by US 36. Demographic questions relating to the following topics included gender, age, employment status, household size, vehicle ownership, and annual household income.

Before finishing the survey, respondents were given the opportunity to leave comments about the survey and/or the proposed US 36 Managed Lanes. These open-ended comments are provided in the appendix of the stated preference study report.

SURVEY ADMINISTRATION

An administration plan was designed to produce a generally representative sample of US 36 corridor travelers in an efficient, timely, and cost-effective way. The sampling plan was designed to include a sufficient range of travelers and trip types to support the statistical estimation of coefficients of a choice model. By collecting data from a range of traveler and trip types, it is possible to identify the ways in which different characteristics affect mode and route choice behavior. These differences can then be reflected in the structure and coefficients of the resulting choice model. The survey sample that supports choice model estimation does not need to be perfectly population proportional as long as:

- Any behavioral differences are properly represented in the model; and
- The model is applied for forecasting using appropriate population proportions and/or sample weights.

The survey instrument was administered entirely online through RSG's rsgsurvey.com website from November 15, 2010 through December 3, 2010. A total of 5,819 surveys were completed. The administration methods and number of complete surveys are presented in Table 3-1.

Table 3-1
Survey Administration Methods

Data Source	Completed Surveys	
	Number	Percent
EXpressToll Users	3,696	63.5
Businesses and Organizations	1,515	26.0
Online Research Panel	608	10.4
Total	5,819	100.0

SURVEY RESULTS

A total of 5,819 respondents completed the survey. The number of records was reduced to 5,340 after completing data checks and outlier analysis, described in more detail in the full survey report found in the Appendix of this document.

The descriptive analysis of the data presented below is provided in four sections including (1) trip characteristics, (2) stated preference, (3) debrief, and (4) demographics.

For the purposes of statistical modeling, respondents trips were grouped into four segments, including (1) peak work trips, (2) peak non-work trips, (3) off-peak work trips, and (4) off-peak non-work trips.

Many of the tabulations presented in the full report and its appendices are segmented by these categories. Work trips include all commute trips to or from work as well as business-related trips, while all other trip purposes are categorized as non-work trips. Both work and non-work trips were

segmented into peak and off-peak trips, where the peak period segments include trips made from 6:00 AM to 8:59 AM or 3:00 PM to 6:59 PM.

TRIP CHARACTERISTICS

At the beginning of the trip characteristic section, respondents were asked about their most recent trip in the US 36 corridor. Of the 5,340 total respondents, 5,068 (95 percent) reported a recent trip that used US 36, while the remaining 272 (5 percent) reported a trip that did not use but could have reasonably used US 36.

Forty percent of respondents reported a trip to/from work, 20 percent reported a business-related trip, and 17 percent reported a social/recreational trip. A significant majority (72 percent) of trips began at home. The most commonly reported trip originated at home and ended at a location other than home or work. This particular trip type categorized 38 percent of respondents.

The specific locations of the trip origins and destinations are displayed by zip code in Figures 3-4 and 3-5. These maps show similar distributions which are heavily clustered around the US 36 corridor and Boulder.

Figure 3-4
Map of Respondents Trip Origin

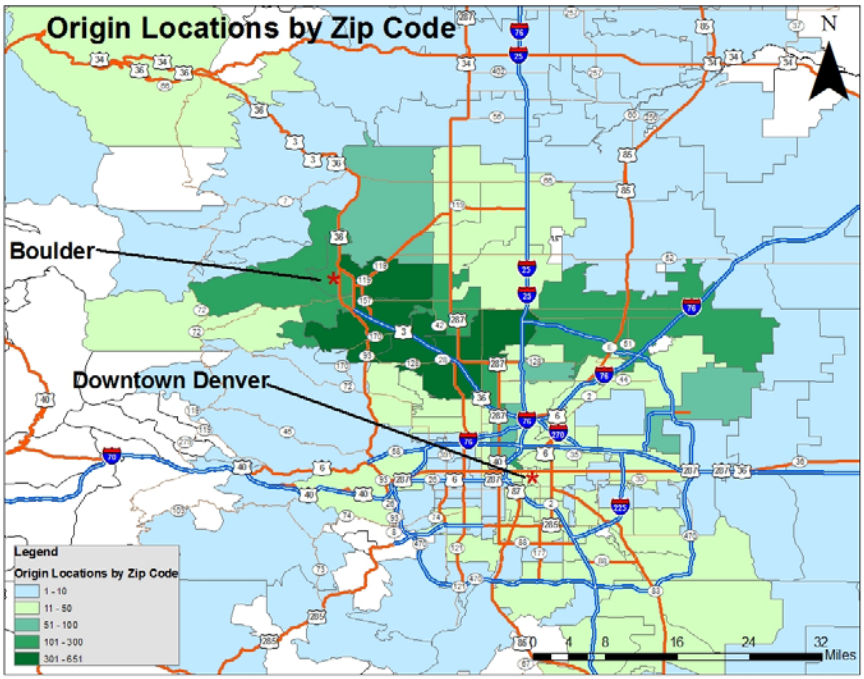
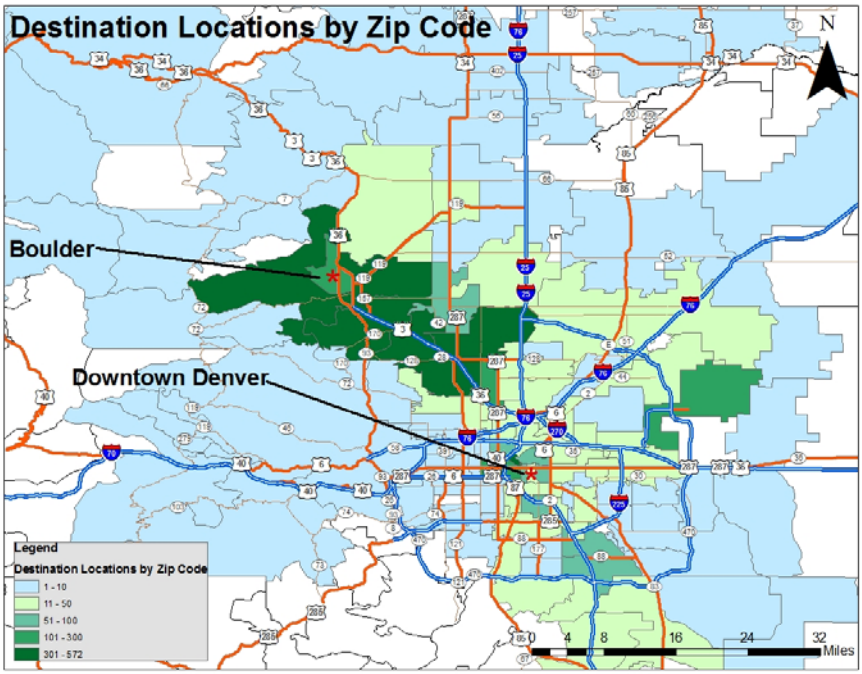


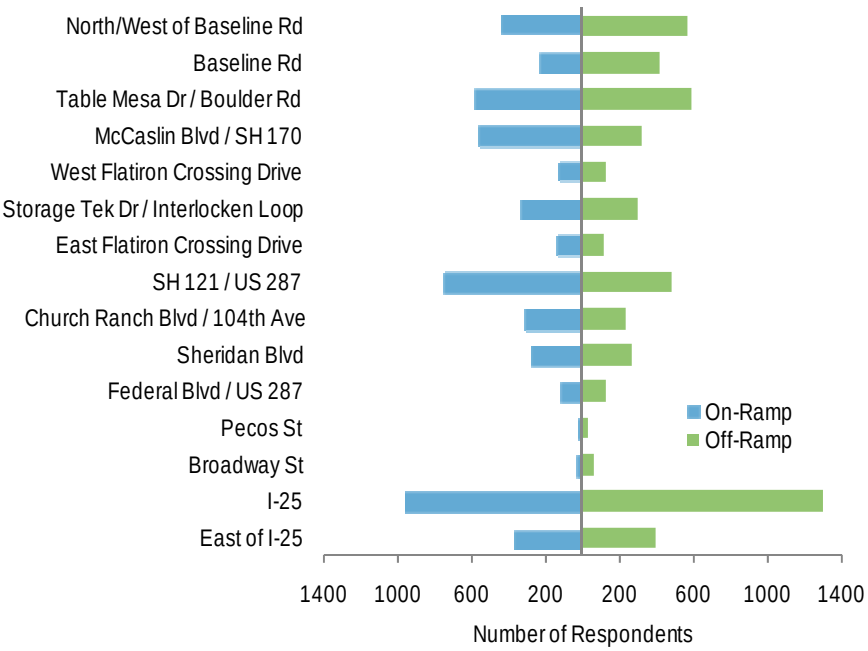
Figure 3-5
Map of Respondents Trip Destination



The latitude and longitude coordinates for each origin-destination pair were used to calculate the trip distance using a Google Maps™ travel direction algorithm. The median trip distance was 22 miles.

Respondents selected the US 36 entrance and exit ramps they used, or could have used. Figure 3-6 presents an overview of the ramps used by the survey sample. It should be noted that the I-25 entrance and exit ramps were identified the most, suggesting the through trip nature of many users.

Figure 3-6
US 36 Entrance and Exit Ramps



Reported travel times ranged from ten minutes to three hours, with a mean travel time of 45 minutes and a median travel time of 40 minutes for the entire sample. Travel times varied somewhat by segment, with trips made in the peak period slightly longer in duration than trips made in the off-peak period.

Table 3-2 shows the mean and median travel time, trip distance, and distance on US 36 for each segment.

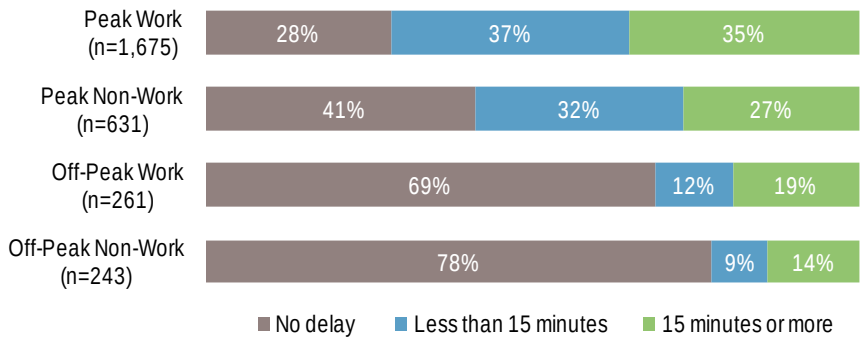
Table 3-2
Travel Time, Trip Distance and US 36 Distance By Travel Time Segment

Travel Time Segment	Total Trip Travel Time		Total Trip Distance		US 36 Distance [1]	
	Mean (minutes)	Median (minutes)	Mean (miles)	Median (miles)	Mean (miles)	Median (miles)
Peak Work	46.0	45.0	24.1	21.8	10.4	9.1
Peak Non-Work	48.0	45.0	26.3	22.4	10.6	9.1
Off-Peak Work	41.0	40.0	25.8	24.6	11.4	11.0
Off-Peak Non-Work	42.0	40.0	26.3	22.3	10.4	9.1
All	45.0	40.0	25.3	22.4	10.6	9.1

[1] Distance on the study portion of US 36 only (between Table Mesa Dr and I-25)

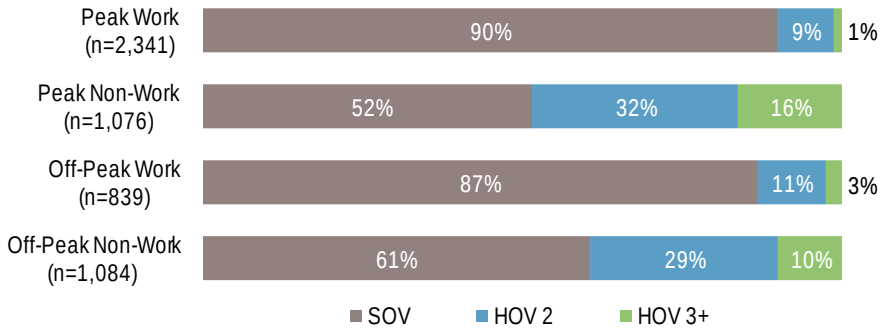
Overall, 53 percent of respondents reported delays due to traffic congestion on US 36, with significant variation by time of day. Seventy-two percent of peak work trips and 59 percent of peak non-work trips experienced delay, while only 31 percent of off-peak work and 22 percent of off-peak non-work trips experienced delay due to traffic congestion. In addition to experiencing delays more frequently, respondents who traveled during peak hours also reported longer delays as shown in Figure 3-7.

Figure 3-7
Delay Due to Traffic Congestion



Work trips had lower occupancy than non-work trips. Peak and off-peak work trips had a mean occupancy of 1.12 and 1.17, respectively, while peak non-work and off-peak non work trips had a mean occupancy of 1.74 and 1.54, respectively. Figure 3-8 presents the distribution of SOV, HOV2, and HOV3+ respondents.

Figure 3-8
Vehicle Occupancy



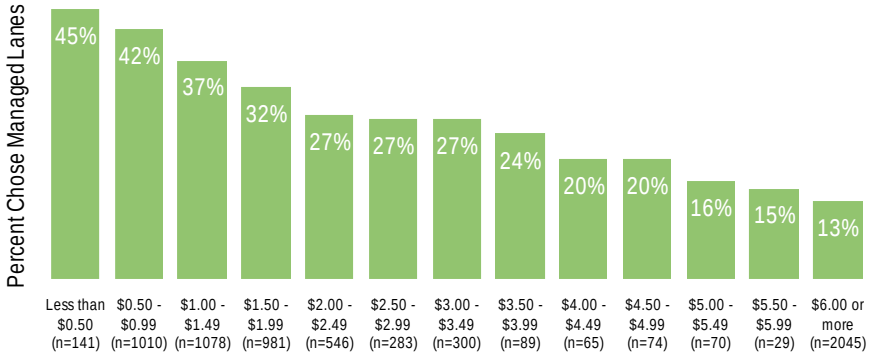
Seventy-four percent of the aggregate sample reported owning an electronic toll transponder and no segment of the sample featured greater than 77 percent or less than 70 percent ownership.

STATED PREFERENCE QUESTIONS

Respondents chose the current route alternative in approximately 64 percent of stated preference scenarios, and the Managed Lane alternative in 28 percent of scenarios. The Managed Lane alternative with additional passengers was selected in 8 percent of the scenarios.

Respondents were less likely to choose the Managed Lane alternative as the toll cost increased. Figure 3-9 presents the percent of times the Managed Lanes alternative (Alternative 2) was chosen at different toll rates. Because each respondent was presented with eight questions, the total number of choice observations is 42,720.

Figure 3-9
Percent of Time Non-HOV Managed Lane Selected by Toll Cost



DEBRIEF QUESTIONS

Upon completing the stated preference experiments, respondents were asked to answer a series of debrief questions to understand the underlying reasons for their choices in the eight stated preference questions.

If a respondent never chose a Managed Lane alternative in the stated preference scenarios, they were asked to select the primary reason they did not. The option that was cited most frequently (46 percent) was that the time savings presented in the experiments was not high enough to justify the cost (Table 3-3).

Table 3-3
Main Reason For Not Choosing Managed Lane Alternative By Travel Time Segment

	Peak Work		Peak Non-Work		Off-Peak Work		Off-Peak Non-Work	
Reason	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Time Savings Not Worth The Toll Cost	176	47.0	89	44.0	95	47.0	131	43.0
Opposed To Paying Tolls	115	31.0	62	31.0	67	33.0	98	32.0
Not Enough Time Savings	38	10.0	22	11.0	24	12.0	47	16.0
Other	37	10.0	22	11.0	15	7.0	21	7.0
Current Route Is More Convenient	1	0.0	3	1.0	2	1.0	4	1.0
Do Not Want To Pay Tolls Electronically	5	1.0	3	1.0	1	0.0	1	0.0
Total	190	51.0	106	53.0	106	52.0	166	55.0

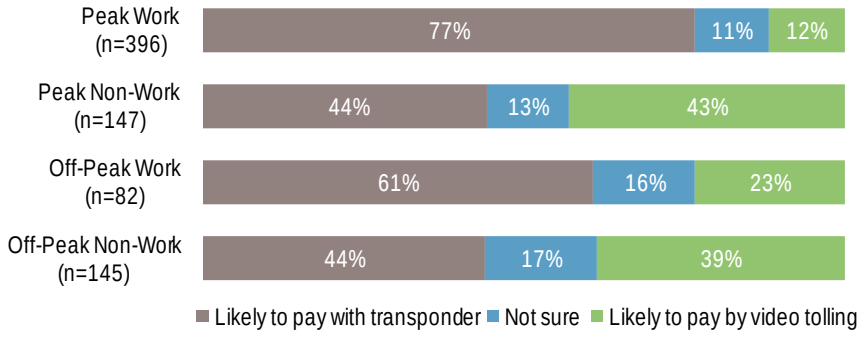
Those respondents who were presented with the carpool alternative in the stated preference experiments and never selected this option were asked why they chose not to carpool. Forty percent of respondents stated that their primary reason for choosing to travel alone is that they like the flexibility of independent travel. The results of this question are broken down by segment in Table 3-4.

Table 3-4
Main Reason For Not Choosing Carpool Alternative By Travel Time Segment

Reason	Peak Work		Peak Non-Work		Off-Peak Work		Off-Peak Non-Work	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Like flexibility of traveling alone	694	43.0	159	33.0	217	36.0	260	41.0
Other	388	24.0	123	25.0	209	34.0	184	29.0
Don't know others to carpool with	314	19.0	121	25.0	105	17.0	108	17.0
Too much time required to coordinate with others	160	10.0	46	10.0	57	9.0	53	8.0
Like privacy of traveling alone	58	4.0	34	7.0	18	3.0	30	5.0
Total	1,614	100.0	483	100.0	606	100.0	635	100.0

Respondents who reported not owning an EXpressToll transponder, but selected at least one of the tolled alternatives were asked how likely they would be to pay a toll using a transponder given a toll discount. Figure 3-10 shows that motorist making work trips were substantially more likely to obtain a transponder.

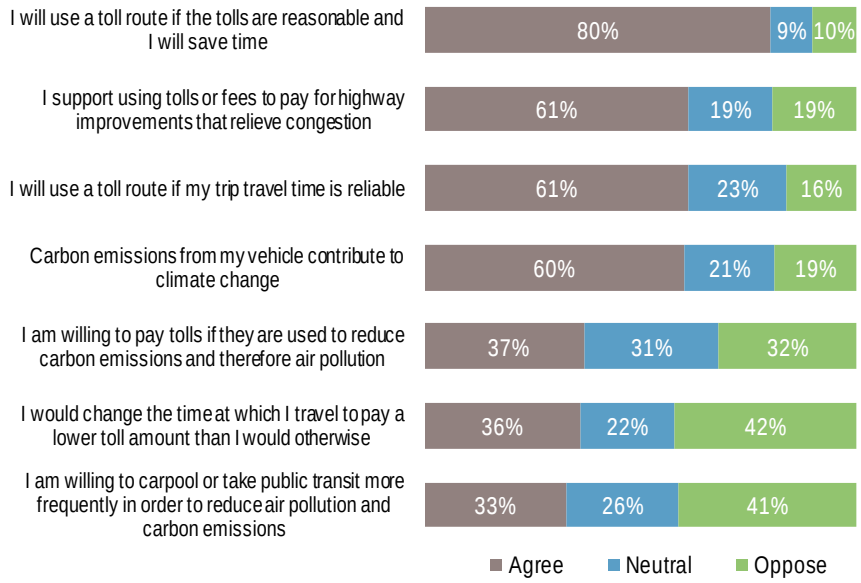
Figure 3-10
Toll Payment Options by Segment



The overall opinion of the proposed project varied only slightly by sample segment. Approximately 62 percent of the aggregate sample favors the project, whereas only 18 percent of respondents oppose the project.

As shown in Figure 3-11, respondents were most likely to use a toll route if the tolls are reasonable and they will save time. Conversely, they were unlikely to pay higher tolls in order to reduce air pollution and emissions.

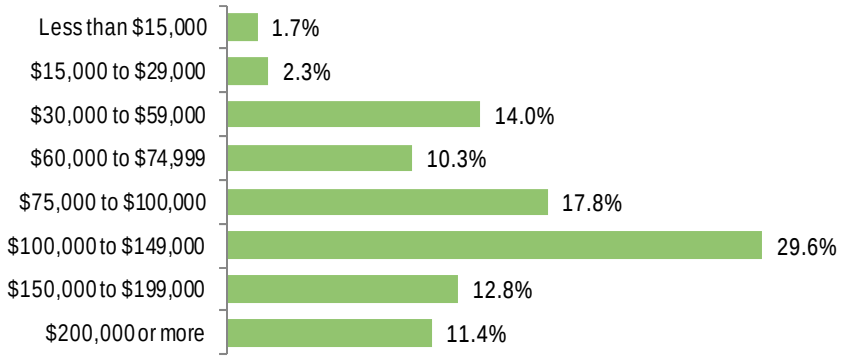
Figure 3-11
Attitude Statements



DEMOGRAPHIC QUESTIONS

Of the 5,340 respondents, slightly over half were male (54 percent). The median age of the sample fell in the 45-54 year old category. Forty-two percent of respondents live in a two-person household and 47 percent have two household vehicles. Seventy-two percent of respondents are employed full-time, while 10 percent were self-employed, and only 2% are not currently employed. The median household income of respondents was in the $100,000-$134,999 category, with a distribution as shown below in Figure 3-12.

Figure 3-12
Annual Household Income



As shown in Table 3-5, the peak work segment had the highest annual household income, while the off-peak non-work segment had the lowest.

Table 3-5
Mean and Median Annual Household Income

Travel Time Segment	Annual Household Income	
	Mean	Median (midpoint)
Peak Work	$ 118,658	$ 117,500
Peak Non-Work	108,780	117,500
Off-Peak Work	114,902	117,500
Off-Peak Non-Work	106,621	82,500
Total	113,634	117,500

MODEL ESTIMATION

Data from the stated preference alternatives were expanded into a dataset that contained eight observations for each of the 5,340 usable surveys, yielding a total of 42,720 observations that were used to complete model estimation. The statistical estimation and specification testing was completed using a conventional maximum likelihood procedure that estimated a single set of coefficients for a multinomial logit (MNL) model. These coefficients were used to estimate the value of travel time savings for travelers in the proposed US 36 Denver-Boulder study area. The value-of-time estimates were input into the travel demand model to estimate traffic and revenue for the proposed US 36 Managed Lane project.

VALUES OF TIME

One way to evaluate the sensitivities that are estimated in the MNL models is to calculate the values of time for the different model segments. The marginal rate of substitution of the travel time and toll cost coefficients provides the implied value that travelers place on their time in terms of their willingness to pay a toll for travel time savings offered on the US 36 Managed Lanes. The values of time evaluated at the mean income and distance for each segment are shown below in Table 3-6.

Table 3-6
Value of Time

Travel Time Segment	Mean Income	Mean Distance (miles)	Value of Time ($/hr)
Peak Work	$ 118,658	24.1	$ 14.83
Peak Non-work	108,780	26.3	13.13
Off-peak Work	114,902	25.8	13.56
Off-peak Non-work	106,621	26.3	12.77
Aggregate	113,634	25.3	14.31

Because the sensitivity to cost varied by annual household income and trip distance in the model segments, the resulting values of time also vary with household income and trip distance. Figures 3-13 through 3-16 show the relationship between annual household income, trip distance, and value of time for each segment.

Figure 3-13
Peak Work Values of Time by Income and Distance

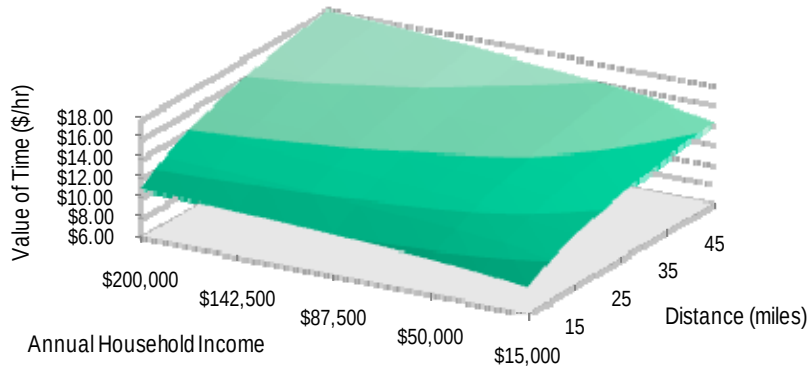


Figure 3-14
Peak Non-Work Values of Time by Income and Distance

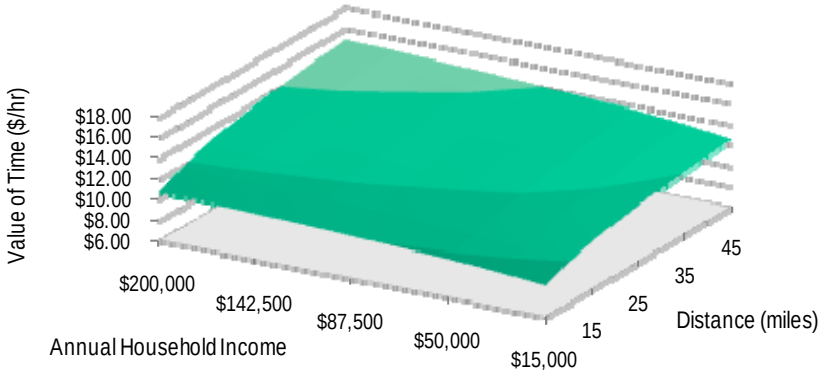


Figure 3-15
Off-Peak Work Values of Time by Income and Distance

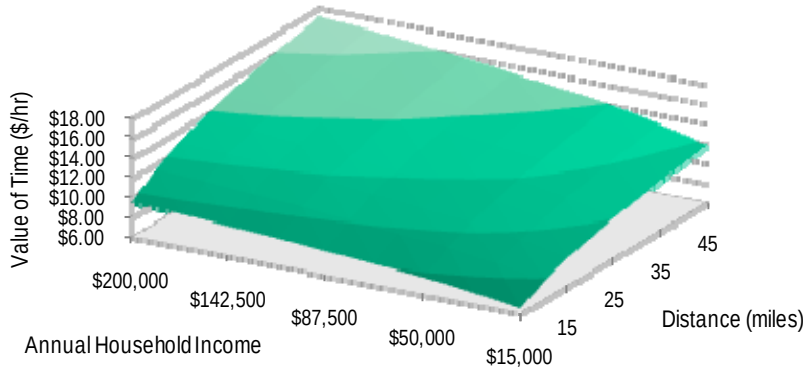
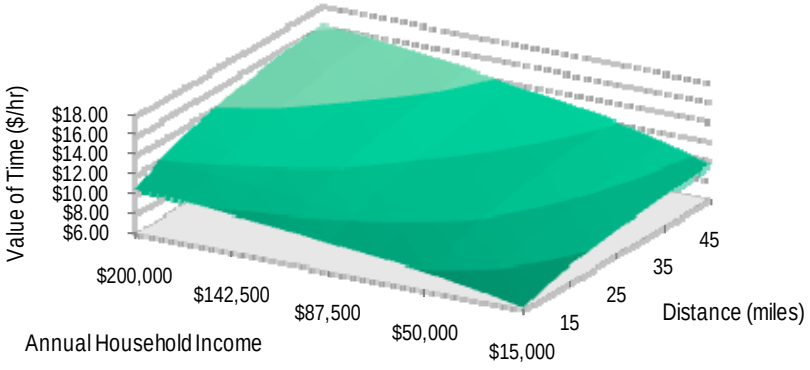


Figure 3-16
Off-Peak Non-Work Values of Time by Income and Distance



APPLICATION TO MODEL FOR TRAFFIC AND REVENUE FORECAST

A weighted average value-of-time was calculated for each trip origin-destination/traffic analysis zone pair within the travel demand model used for the traffic and revenue analysis for this project. The estimated value-of-time for each origin-destination zone pair was weighted for each trip purpose based on the household income for each zone, and the average

length of trips between the zones that would potentially use US 36. This matrix was used as input to the traffic assignments.

OVERVIEW

A stated preference survey questionnaire that gathered information from 5,340 automobile travelers in the Denver-Boulder region was developed and implemented. The questionnaire collected data on current travel behaviors, presented respondents with information about the proposed Managed Lanes, and engaged the travelers in a series of stated preference scenarios.

Choice models were developed to produce estimates of value of time (VOT) of travelers for four market segments, including (1)peak work, (2) peak non-work, (3) off-peak work, and (4) off-peak non-work. The values of time that were estimated were within the ranges found in other major metropolitan areas across the country. The values of time varied by trip purpose, time of day, income, and distance, and generally fell within a range of $6.00/hr to $18.00 per hour. The off-peak non-work segment had the lowest values of time, while the peak work segment had the highest values of time.

CHAPTER 4

ECONOMIC GROWTH ANALYSIS

The purpose of this chapter is to provide an overview of the economic analyses completed in making adjustments to the Denver Regional Council of Governments (DRCOG) 2035 projections for the Denver Metropolitan Area. The findings from this analysis have been used as input to the travel demand model for use in generating estimates of travel demand for the greater Denver region in general, and the US 36 Corridor, specifically.

The analysis was conducted by Economic & Planning Systems (EPS) to provide an independent evaluation of economic conditions and to establish growth projections that account for the recent economic contraction and its effect on long-term growth potentials for the Denver region. Because economic conditions have fluctuated significantly in the recent past, an independent assessment of previously issued DRCOG forecasts is warranted. The resulting adjusted forecast accounts for a full range of factors and grounds the larger study with a comprehensive analysis of market and economic data.

This chapter presents the analysis of economic, demographic, residential, and commercial market trends and conditions that form the basis to adjustments made by EPS. Also presented is a summary of each major planned or approved development plan in the vicinity of the US 36 Corridor. The concluding section of the chapter summarizes how the analyses of these conditions have resulted in the adjustment to the 2010 base, as well as the 2015 to 2035 projections.

METHODOLOGY

A variety of adjustments were made to the DRCOG projections. Because the projections are complex, EPS broke the types of adjustments into three components: adjustments to the base forecast year, 2010; county level adjustments to address macro trends; and traffic analysis zone (TAZ) level

adjustments to address specific trends in the US 36 Corridor. Each component of adjustment used research and analysis of primary and secondary data.

BASE YEAR ADJUSTMENTS

The current DRCOG forecast was released before the recession began. The adjustments made to the 2010 forecasts have been based on analyses of independent regional data sources for employment and demographics, as described below.

COUNTY ADJUSTMENTS

A variety of secondary independent data sources are used in the adjustment of these DRCOG growth forecasts, including historic growth trends and independent forecasts of population and households.

TAZ ADJUSTMENTS

It is generally understood that an analysis of projections at a subarea, or TAZ level, produces results with a generally high degree of specificity. As such, the approach taken here was to make adjustments to subareas or TAZ projections only when market information and research provides a clear basis. The following factors concerning market information and research were used to make these decisions with a clear basis.

- Development Plans
- Entitlement Process
- TAZ Attributes
- Market Studies
- Market Pressure
- Proximity to Transportation
- Capital Improvements
- Ownership Patterns

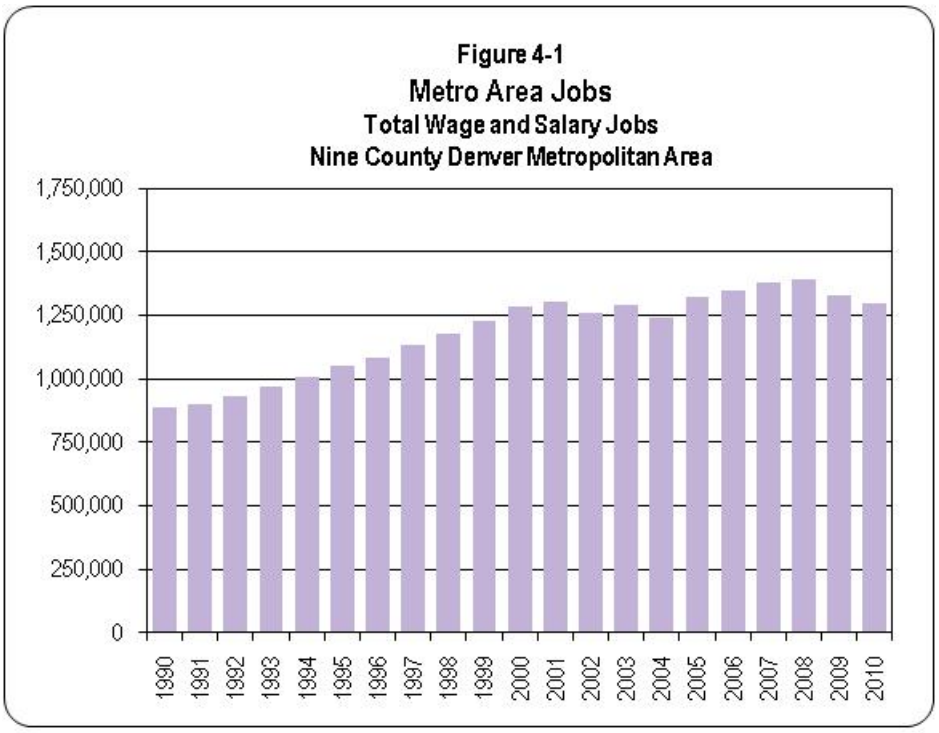
HISTORIC TRENDS

The following section presents a summary of historical economic and demographic trends for the metro area. These trends were analyzed at multiple geographical levels in the course of making adjustments to the DRCOG projections. These represent the major three trends assessed—employment, population, and households (residential building activity).

EMPLOYMENT

Information on the number of wage and salary positions for each of the counties of the DRCOG planning area comes from the BLS. By many

accounts, the past decade has been called the "lost decade" as gains in the early and mid-part of the decade, which were substantial, were generally eliminated during the 2007 to 2009 recession, as shown in Figure 4-1.



From 1990 to 2000, the metro area experienced a high rate of growth. Total employment grew at 3.7 percent annually, adding nearly 40,000 jobs per year. Between 2000 and 2010, however, the level of employment remained nearly the same notwithstanding significant growth or contraction on an annual basis. Averaged over 20 years, the nine counties grew at 1.8 percent per year, or an average increase of approximately 20,000 jobs per year. From a base of approximately 890,000 jobs in 1990 to a base of approximately 1.3 million jobs in 2010, the nine-county metro area added more than 404,000 jobs.

POPULATION

From 1990 to 2000, the nine counties grew at 2.5 percent annually, adding more than 20,000 persons per year. Douglas County added the largest number of persons during this time. From a base of approximately 21,000 persons in 1990, more than 40,000 moved to the County by 2000, reflecting a growth rate of 11.3 percent. Jefferson and Arapahoe counties also added large numbers to their populations. Jefferson County added nearly 40,000, and Arapahoe County added more than 36,000.

From 2000 to 2009, the population in the nine-county metro area grew by an average of 1.8 percent annually. The fastest growing counties in the region were Douglas County, followed by Broomfield and Adams. Accounting for more than 25 percent of population growth, Douglas County added the most persons of all to the metro area. More than 115,000 people moved to the County during the decade. Adams, Arapahoe, and Denver counties added a combined 227,000, accounting for more than half of all the metro area's population growth.

Over the 20-year period, the nine counties grew at 2.1 percent per year, or an average of approximately 19,000 persons. From a base of approximately 740,000 in 1990 to a base of approximately 1.1 million in 2009, the area population grew by nearly 364,000 persons.

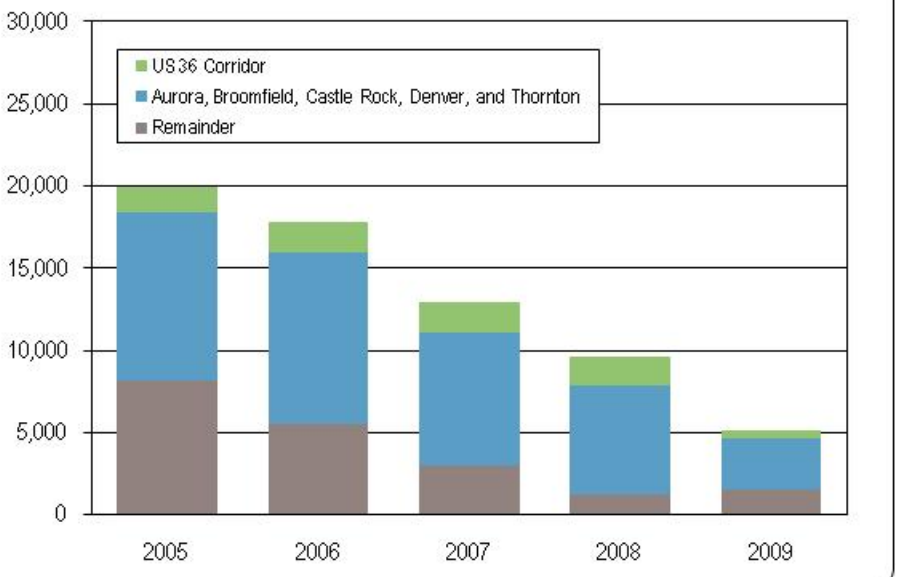
HOUSEHOLDS AND HOUSING UNITS

Trends in residential building permits are used to gauge recent and historical residential construction activity. The trends are also a critical element to estimating the increase in total households for the nine counties of the metro area.

Overall, there were more than 65,000 permits issued in the metro area from 2005 to 2009, as indicated in Figure 4-2. On average, this reflects approximately 13,000 housing units per year. By municipality, however, the annual production rates vary significantly. Activity in 2005 and 2006 was substantially higher than the activity after the contraction that began in 2006. Aurora, Broomfield, Castle Rock, Denver, and Thornton issued the highest number of permits during this time, representing nearly 60 percent of the total metro area's activity.

Among the jurisdictions that represent the US 36 Corridor (Boulder, Broomfield, Lafayette, Louisville, and Westminster), approximately 7,500 units were permitted. At an average of 1,500 units per year, this represented more than 10 percent of the average annual building activity for the metro area.

Figure 4-2
Metro Area Permits



CURRENT ECONOMIC BACKGROUND

The forecasts analyzed and adjusted were released by DRCOG in 2007. Although DRCOG did account for the housing contraction that began in the fourth quarter of 2006, it did not project the effects of a major recession. The purpose of analyzing DRCOG's 2035 forecasts is to apply current information and market knowledge to make adjustments at the county or city and TAZ levels.

APPROACH

The task of adjusting DRCOG's forecasts was approached from the following perspectives. Each perspective sheds light on the different parameters used to inform the adjustments.

Understanding the DRCOG Model - EPS met with DRCOG's Regional Modeling Manager and economist who oversee the forecasting process. A meeting was conducted to enable EPS to make reasonable adjustments to the forecasts after more thoroughly understanding the underlying assumptions and possible limitations of the 2035 projections. DRCOG is not planning a recalibration of the planning area economic forecast until it is scheduled to produce 2040 forecasts. It does, however, acknowledge

that the effects of the recession may result in a change to near-term projections, if not the 2035 control totals.

Geographic Scope – The EPS analysis included the extent of DRCOG's nine-county planning area, with the exception of the portions of Weld and Elbert counties located on its periphery. Some aspects of the analysis focused on trends at the county level, and some aspects of the analysis focused on trends at the municipal or sub-municipal level. Other aspects of the analysis focused on trends and conditions at a TAZ (site-specific or development project) level. For the TAZ level analyses, the refined focus primarily targeted the geography surrounding the US 36 Corridor.

Economic and Demographic Trend Research - The analysis and adjustments of county, municipal, or sub-municipal level trends and forecasts were based on the analysis of secondary data sources, such as those outlined earlier in this summary. These regional and sub-regional trends were used to benchmark the DRCOG forecasts with historic capture of economic and demographic growth.

Market Research - EPS conducted research of major transit and conventional development within the US 36 Corridor. The scale of these developments, their land uses, and timing of developments were identified. In addition, information was gathered about residential building activity, as well as office, industrial, and retail market conditions and trends to inform adjustments.

Capital Investment - Additionally, one of the major assumptions used in the EPS analysis related to the timing of RTD's FasTracks system. EPS assumes that metro area voters are likely to approve a 0.2 percent sales tax extension to fund the project shortfall. RTD estimates that under this level of sales tax increase the entire system would be completed by 2027. Under this assumption, the Northwest Rail Corridor would be constructed by approximately 2020. All these assumptions are critical to the timing adjustments of development, particularly TOD along the US 36 Corridor.

Adjustments - EPS recognized that DRCOG uses a robust travel demand model based on a variety of factors, which are calibrated to an independent economic forecast for the entire metro area. While DRCOG uses information at the TAZ level to calibrate its projections, it is generally understood that analysis of smaller areas within the region produces results with variable degrees of accuracy. As such, EPS took the approach of making adjustments to the DRCOG forecast estimates only when market information and research provided a clear basis.

SHORT-TERM ECONOMIC OUTLOOK

This section provides a summary of the short-term (one- to two-year) economic outlooks for the Denver Metro Area. These short-term outlooks form the basis for the adjustment of projections for the near-term (between 2010 and 2015).

Center for Business and Economic Forecasting (CBEF) - CBEF is a private research firm that prepares long-term and short-term regional economic and demographic forecasts. According to a presentation at the 2011 Colorado Business Economic Outlook, the CBEF anticipates job growth to increase at a slow, steady pace, adding approximately10,100 jobs in 2011.

Metro Denver Economic Development Corporation (Metro Denver EDC) - The Metro Denver EDC is an affiliate of the Denver Metro Chamber of Commerce and represents the interests of its 70 cities, counties, and economic development organizations in the seven-county Metro Denver and two-county Northern Colorado region. The Metro Denver EDC's outlook for 2010 projected a 1.1 percent job loss for the metro area, higher than its projected loss of 0.4 percent for 2009.

Colorado Legislative Council - Colorado Legislative Council staff serves as the nonpartisan research arm of the Colorado General Assembly. According to staff, the State and the metro area in particular, is currently experiencing a gradual recovery, but that tight credit, high unemployment and debt levels, and a generally weak housing market will hinder recovery. The job market in the Denver metro area has stabilized, but growth is slower than initially projected. Similarly, single and multi-family construction permits have increased, pointing to an improvement in the housing market.

National Association of Realtors (NAR) - The NAR tracks measures of market performance regularly and provides updates and short-term outlooks on the conditions relevant to the real estate industry. In 2010, the NAR Chief economist stated that the Denver market is stronger than most areas of the nation, and it is likely to rebound faster. Contrary to conditions in other national housing markets, the Denver Metro Area did not overbuild during the real estate bubble to the extent that some cities did, such as Phoenix and Las Vegas.

DRCOG ORIGINAL FORECAST

This section contains an overview and analysis of the current DRCOG 2035 forecast. As mentioned previously, EPS met with staff from DRCOG to more thoroughly understand the assumptions, parameters, and possible limitations of the current forecast numbers.

EMPLOYMENT

DRCOG forecasts that employment through 2035 will grow at an average of 2.0 percent per year. Total jobs are projected to grow from a base of 1.3 million in 2005 to nearly 2.2 million by 2035. Between 2010 and 2020, this represents an increase of more than 29,000 jobs per year, and from 2020 to 2035, an increase of more than 37,000 jobs per year. While these trends indicate a consistent growth rate, they assume an increasing number of jobs added per year.

HOUSEHOLDS

The 2035 household forecast indicates that growth will occur at an average rate of 1.7 percent per year. In total, the area is projected to add more than 600,000 households at a rate of more than 24,000 per year. From 2010 to 2020, this represents an increase of approximately 20,000 households per year, yet from 2020 to 2035 the forecast indicates an increase of nearly 27,000 households per year. Similar to DRCOG's employment projections, these indicate a relatively consistent rate of growth that do not reflect a tapering growth rate over time.

POPULATION

The 2035 population forecast indicates that growth will occur at an average rate of 1.6 percent per year. In total, the area is projected to add more than 1,360,000 persons at a rate of more than 54,000 per year. From 2010 to 2020 this represents an increase of approximately 50,000 per year, and from 2020 to 2035 the forecast indicates an increase of nearly 57,000 persons per year.

In the EPS analysis, population projections are related to the household projections by the average household size factor. Over time, DRCOG projects the regional average household size to diminish from approximately 2.47 persons per household in 2010 to approximately 2.40 persons per household by 2035. EPS has applied this assumption to the adjusted household forecast estimates for each TAZ to determine the adjusted population forecasts.

ADJUSTMENTS TO DRCOG FORECAST

This section outlines adjustments to the DRCOG forecasts made by EPS. Adjustments were made to the base forecast year 2010, as well as the subsequent forecast years. Two types of adjustments were made to the forecast years 2015 and beyond. The first type of adjustment applied to county and municipal levels, and the second was made at the TAZ (site-specific) level.

BASE YEAR REGIONAL ADJUSTMENTS

The current DRCOG forecasts were released before the recession began. The adjustments made to the 2010 forecasts are based on analyses of independent regional data sources for employment and demographics, as described below.

Households - DRCOG's 2010 household forecast were adjusted using records of residential building activity, as reported previously. DRCOG projected households to increase by approximately 90,000 between 2005 and 2010, or at a rate of nearly 1.7 percent per year. However, residential building activity trends indicated that approximately 65,300 units were built during this time. Adjusted for vacancy (5 percent through 2007 and 10 percent through 2009), this indicates an increase of an estimated 61,300 households. While this still represents an increase in households, it is approximately 30 percent lower than the DRCOG forecast. EPS applied various methodologies to apportion this change to the 2010 household forecast. In most cases, sufficient information was available to apply the adjusted household count by municipality. In other cases, EPS selected sub-geographies within a few municipalities (or counties) to distribute the growth. Overall, many adjustments assumed that a predominant portion of growth occurred within urban areas. At an annualized rate, this adjustment represents a reduction in the growth rate between 2005 and 2010 to 1.2 percent per year from 1.7 percent per year.

Employment - The 2010 DRCOG employment forecasts were adjusted using records of wage and salary jobs from the BLS. Job growth, like household growth, occurred at a slower rate than projected, given the recession and associated job losses. In the nine counties of the DRCOG planning area, EPS made adjustments to reflect total employment levels by county. Adjustments were made to reflect the number of jobs gained and lost during that period.

BLS records indicated that the nine-county area lost approximately 20,000 jobs during this period. DRCOG had projected employment to increase by more than 15,000 jobs from 2005 to 2010. EPS made adjustments to

reflect the net job loss over this five-year period with the largest changes occurring in Denver, Jefferson, and Arapahoe counties. At an annualized rate, this adjustment represents a reduction in the growth rate between 2005 and 2010 to negative 0.3 percent per year from 0.2 percent per year.

Population - As described previously, adjusted population forecasts have been estimated by applying DRCOG's average household size factors by TAZ level to the adjusted household projection. DRCOG had projected population to increase by more than 177,000 persons between 2005 and 2010, reaching nearly 2.8 million persons. After adjustments to the household forecast, the adjusted 2010 population base is approximately 2.7 million, a reduction of 2.8 percent to the original DRCOG forecast. At an annualized rate, this adjustment represents a reduction in the growth rate between 2005 and 2010 to 0.8 percent per year from 1.3 percent per year.

COUNTY ADJUSTMENTS

Adjustments to the household forecasts incorporated information from the Department of Local Affairs' (DOLA) forecast of population growth for the metro area and other counties. Adjustments to the employment forecasts incorporated information from two independent sources: the Bureau of Labor Statistics (BLS) records on wage and salary jobs, and the Center for Business and Economic Forecasting (CBEF) forecast of employment growth for the metro area and other counties.

The original DRCOG forecast projected employment to grow between 2010 and 2035 at an annual average rate of 1.7 percent. The rate of growth projected by five-year periods indicated that an average of approximately 20,000 households would enter the metro area between 2010 and 2020, and increase to nearly 27,000 per year between 2020 and 2035. The original DRCOG forecast projected employment to grow between 2010 and 2035 at an annual average rate of 2.0 percent.

For both employment and households, EPS applied a similar methodology using independent data sources as benchmarks. EPS recognized that a tapering of growth rates over time reflects a more natural relationship between the number of households added per year and the size of the base. EPS made two sets of adjustments to the household projections. The overall growth rate was adjusted for each five-year increment growth rate for the DRCOG dataset, and growth rates at the county level were adjusted to account for historical rates of capture. As a result, each five-year period tapers in the rate of growth, while keeping the average number of households and employment added per year relatively constant.

TAZ ADJUSTMENTS

Major transit and non-transit projects were evaluated to make adjustments at the TAZ level. The area evaluated around the US 36 Corridor from north to south includes the entire Corridor from Foothills Parkway south of Boulder to east of Downtown Denver. On the east edge, the area generally bisects the area between Interstate 25 North and US 36. On the west edge, the area generally bisects US 36 and Interstate 70 West.

The major development projects EPS evaluated were selected because of their close proximity to the US 36 Corridor or inclusion within the boundaries of the influence area, and include:

- ARISTA
- Clear Creek
- Mid Town at Clear Creek
- Original Broomfield
- Highway 42 Revitalization Area
- Boulder Transit Village
- Westminster Center Reinvestment Area
- Superior Town Center
- ConocoPhillips Campus
- Candelas
- Northwest Business Park
- Business Park at Mandalay
- North Wadsworth Business Center
- Hyland Village
- Adams County Housing Authority
- Great Western Park
- Interlocken
- Broomfield Business Center
- Vantage Point Residential

EPS made 11 upward adjustments to households and five reductions and no change to two development plans. EPS made four increases to employment, eight reductions, and did not change four of the employment levels.

SUMMARY OF DIFFERENCES

The following section identifies the differences between DRCOG's original forecasts and EPS' adjusted forecasts. A summary of the various adjustments is provided, along with illustrative comparisons of the original DRCOG forecasts, the independent forecasts of CBEF and DOLA, and the

adjusted forecasts of EPS. Maps showing the adjustments geographically are also presented in this section.

HOUSEHOLDS AND POPULATION

The original DRCOG forecast projected total households to reach 1,734,596 by 2035. After adjustments, the projected number of total households in 2035 is 1,584,231, as shown in Table 4-1. In total, this is a reduction of 8.7 percent to the 2035 household total. In the US 36 Influence Area, the overall reduction was 8.5 percent, and in the remaining portion of the nine-county DRCOG planning area the reduction was 8.7 percent.

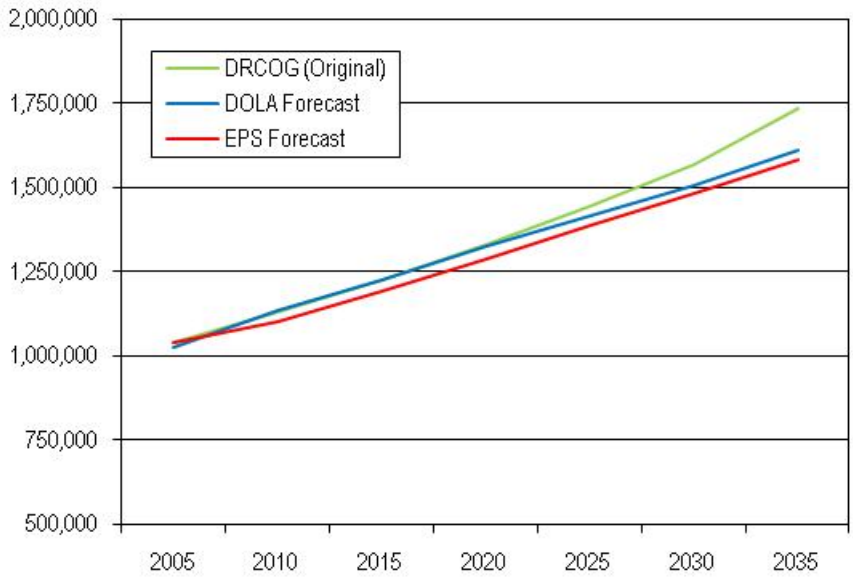
Table 4-1
Summary of Household Forecast Differences

	2005	2010	2015	2020	2025	2030	2035	2010 - 2035 Difference	2010 - 2035 AAPC (1)	2010 - 2020 Difference	2010 - 2020 AAPC (1)	2020 - 2035 Difference	2020 - 2035 AAPC (1)
Original DRCOG Forecast													
US 36 Corridor	196,048	210,703	224,017	239,286	255,796	273,074	296,801	86,098	1.4	28,583	1.3	57,515	1.4
Remainder	844,532	919,662	999,801	1,091,622	1,190,914	1,294,973	1,437,795	518,133	1.8	171,960	1.7	346,173	1.9
Total	**1,040,580**	**1,130,365**	**1,223,818**	**1,330,908**	**1,446,710**	**1,568,047**	**1,734,596**	**604,231**	**1.7**	**200,543**	**1.6**	**403,688**	**1.8**
Adjustments to Total													
Adj. 1: 2010 & Later	0	-28,428	-28,428	-28,428	-28,428	-28,428	-28,428						
Adj. 2: County Level	0	0	-1,866	-11,794	-28,317	-55,573	-119,704						
Adj. 3: TAZ Level	0	0	-3,138	-4,521	-3,836	-1,987	-2,233						
Total	**0**	**-28,428**	**-33,432**	**-44,743**	**-60,581**	**-85,988**	**-150,365**						
Percent Difference													
Adj. 1: 2010 & Later	0.0%	-2.5%	-2.3%	-2.1%	-2.0%	-1.8%	-1.6%						
Adj. 2: County Level	0.0%	0.0%	-0.2%	-0.9%	-2.0%	-3.5%	-6.9%						
Adj. 3: TAZ Level	0.0%	0.0%	-0.3%	-0.3%	-0.3%	-0.1%	-0.1%						
Total	**0.0%**	**-2.5%**	**-2.7%**	**-3.4%**	**-4.2%**	**-5.5%**	**-8.7%**						
EPS Adjusted Forecast													
US 36 Corridor	196,048	205,230	215,036	227,441	242,081	257,329	271,507	66,277	1.1	22,211	1.0	44,066	1.2
Remainder	844,532	896,707	975,350	1,058,724	1,144,048	1,224,730	1,312,724	416,017	1.5	162,017	1.7	254,000	1.4
Total	**1,040,580**	**1,101,937**	**1,190,386**	**1,286,165**	**1,386,129**	**1,482,059**	**1,584,231**	**482,294**	**1.5**	**184,228**	**1.6**	**298,066**	**1.4**
Difference													
US 36 Corridor	0	-5,473	-8,981	-11,845	-13,715	-15,745	-25,294						
Remainder	0	-22,955	-24,451	-32,898	-46,866	-70,243	-125,071						
Total	**0**	**-28,428**	**-33,432**	**-44,743**	**-60,581**	**-85,988**	**-150,365**						
Percent Difference													
US 36 Corridor	0.0%	-2.6%	-4.0%	-5.0%	-5.4%	-5.8%	-8.5%						
Remainder	0.0%	-2.5%	-2.4%	-3.0%	-3.9%	-5.4%	-8.7%						
Total	**0.0%**	**-2.5%**	**-2.7%**	**-3.4%**	**-4.2%**	**-5.5%**	**-8.7%**						

Source: DRCOG; Economic & Planning Systems
(1) Average Annual Percent Change

The first adjustment EPS made relates to the 2010 base forecast year and subsequent years. As shown in Table 4-1, this adjustment accounts for 1.6 percent of the total 8.7 percent reduction to the 2035 forecast. This adjustment can also been seen in Figure 4-3. As described previously, this adjustment was made to reflect the number of building permits issued from 2005 to 2009. Subsequent years were also adjusted by the same number to reflect an adjusted base.

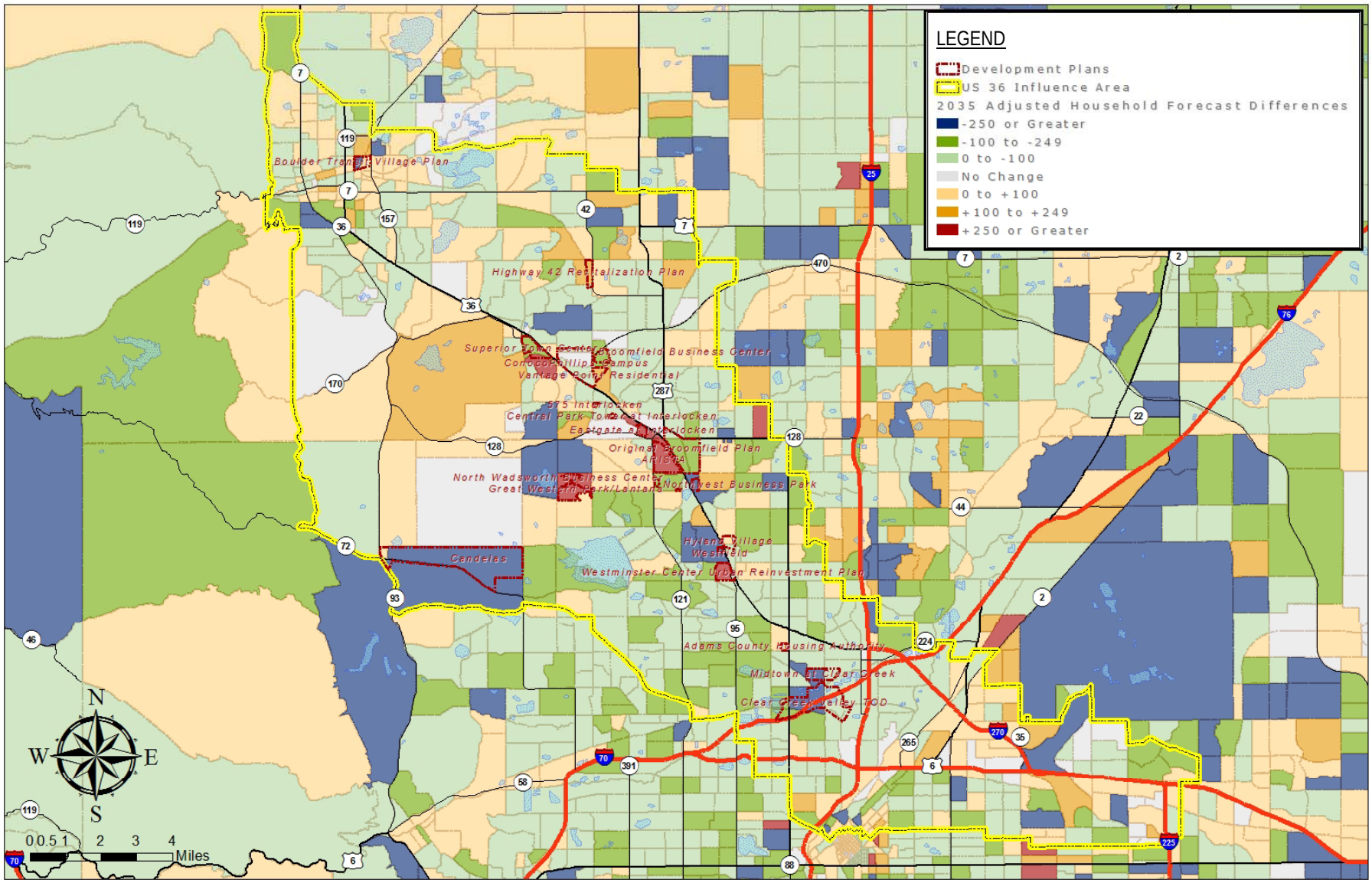
Figure 4-3
Household Forecast Comparison



The largest portion of the adjustments came from the second adjustment. EPS calibrated growth rates to reflect the tapering of growth over time that occurs with an increasing base. These adjustments were made at the county level and by time period. Overall, this accounts for 6.9 percent of the total 8.7 percent reduction in total households in 2035.

The third adjustment accounts for 0.1 percent of the total 8.7 percent reduction. While small, these adjustments were made in the US 36 Influence Area and play an important role in the generation of travel demand. As shown in Figures 4-3 and 4-4, adjustments were both positive and negative. Applying the factors described previously, many positive adjustments to total households were concentrated in areas surrounding transportation corridors. Negative adjustments, on the other hand, often occurred in more remote locations farther from transportation corridors.

Also, as mentioned previously, changes in the population forecasts are related to the adjustments in households by the average household size factor. The adjusted 2035 population forecast is 8.8 percent lower than the original DRCOG forecast. Population is projected to grow at an average rate of 1.3 percent per year to 2035, down from the original DRCOG forecast of 1.6 percent per year.



2035 ADJUSTED HOUSEHOLD FORECAST DIFFERENCES NORTHERN PORTION

EMPLOYMENT

The original DRCOG forecast projected total employment to reach 2,183,066 by 2035. After EPS' adjustments, the projected total employment in 2035 is 1,844,703 as shown in Table 4-2. In total, this is a reduction of 15.5 percent to the 2035 control total. In the US 36 Influence Area, the overall reduction was 13.7 percent, and in the remaining portion of the nine-county DRCOG planning area the reduction was 16.0 percent.

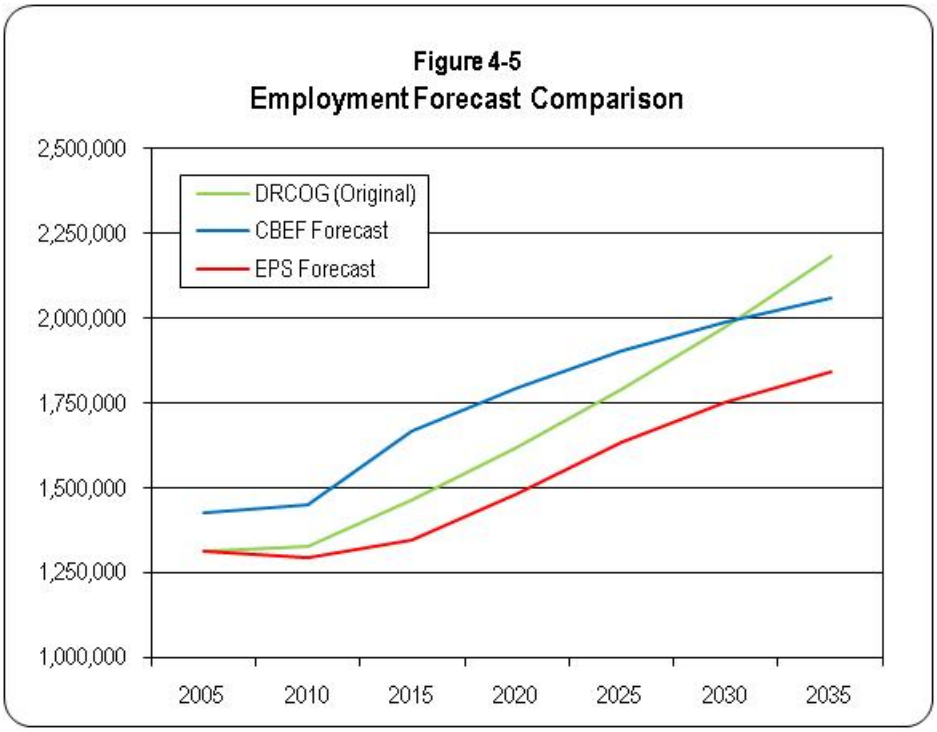
Table 4-2
Summary of Employment Forecast Differences

	2005	2010	2015	2020	2025	2030	2035	2010 - 2035 Difference	2010 - 2035 AAPC [1]	2010 - 2020 Difference	2010 - 2020 AAPC [1]	2020 - 2035 Difference	2020 - 2035 AAPC [1]
Original DRCOG Forecast													
US 36 Corridor	303,845	301,124	332,952	368,274	407,308	450,485	498,150	197,026	2.0	67,150	2.0	129,876	2.0
Remainder	1,009,174	1,027,122	1,133,263	1,251,259	1,381,616	1,525,722	1,684,916	657,794	2.0	224,137	2.0	433,657	2.0
Total	**1,313,019**	**1,328,246**	**1,466,215**	**1,619,533**	**1,788,924**	**1,976,207**	**2,183,066**	**854,820**	**2.0**	**291,287**	**2.0**	**563,533**	**2.0**
Adjustments to Total													
Adj. 1: 2010 & Later	0	-34,709	-34,709	-34,709	-34,709	-34,709	-34,709						
Adj. 2: County Level	0	0	-80,020	-100,206	-116,716	-184,491	-296,677						
Adj. 3: TAZ Level	0	0	-3,282	-2,722	-2,649	-4,190	-6,977						
Total	**0**	**-34,709**	**-118,011**	**-137,637**	**-154,074**	**-223,390**	**-338,363**						
Percent Difference													
Adj. 1: 2010 & Later	0.0%	-2.6%	-2.4%	-2.1%	-1.9%	-1.8%	-1.6%						
Adj. 2: County Level	0.0%	0.0%	-5.5%	-6.2%	-6.5%	-9.3%	-13.6%						
Adj. 3: TAZ Level	0.0%	0.0%	-0.2%	-0.2%	-0.1%	-0.2%	-0.3%						
Total	**0.0%**	**-2.6%**	**-8.0%**	**-8.5%**	**-8.6%**	**-11.3%**	**-15.5%**						
EPS Adjusted Forecast													
US 36 Corridor	303,845	292,716	307,504	338,689	375,099	404,478	429,983	137,267	1.6	45,973	1.5	91,294	1.6
Remainder	1,009,174	1,000,821	1,040,700	1,143,207	1,259,751	1,348,339	1,414,720	413,899	1.4	142,386	1.3	271,513	1.4
Total	**1,313,019**	**1,293,537**	**1,348,204**	**1,481,896**	**1,634,850**	**1,752,817**	**1,844,703**	**551,166**	**1.4**	**188,359**	**1.4**	**362,807**	**1.5**
Difference													
US 36 Corridor	0	-8,408	-25,448	-29,585	-32,209	-46,007	-68,167						
Remainder	0	-26,301	-92,563	-108,052	-121,865	-177,383	-270,196						
Total	**0**	**-34,709**	**-118,011**	**-137,637**	**-154,074**	**-223,390**	**-338,363**						
Percent Difference													
US 36 Corridor	0.0%	-2.8%	-7.6%	-8.0%	-7.9%	-10.2%	-13.7%						
Remainder	0.0%	-2.6%	-8.2%	-8.6%	-8.8%	-11.6%	-16.0%						
Total	**0.0%**	**-2.6%**	**-8.0%**	**-8.5%**	**-8.6%**	**-11.3%**	**-15.5%**						

Source: DRCOG; Economic & Planning Systems
[1] Average Annual Percent Change

The first adjustment EPS made related to the 2010 base forecast year and subsequent years. As shown in Table 4-2, this adjustment accounts for 1.6 percent of the total 15.5 reduction to employment in 2035. These adjustments are also illustrated by Figure 4-5. As described previously, this adjustment was made to reflect the change in wage and salary jobs reported from 2005 to 2010. Subsequent years were also adjusted by the same number to reflect an adjusted base.

The largest portion of the adjustments came from the second adjustment. EPS calibrated growth rates to reflect the tapering of growth over time that occurs with an increasing base. Similar to the second household adjustment, these adjustments were made by county and by time period. Overall, these adjustments accounted for 13.6 percent of the total 15.5 percent reduction in 2035 employment.

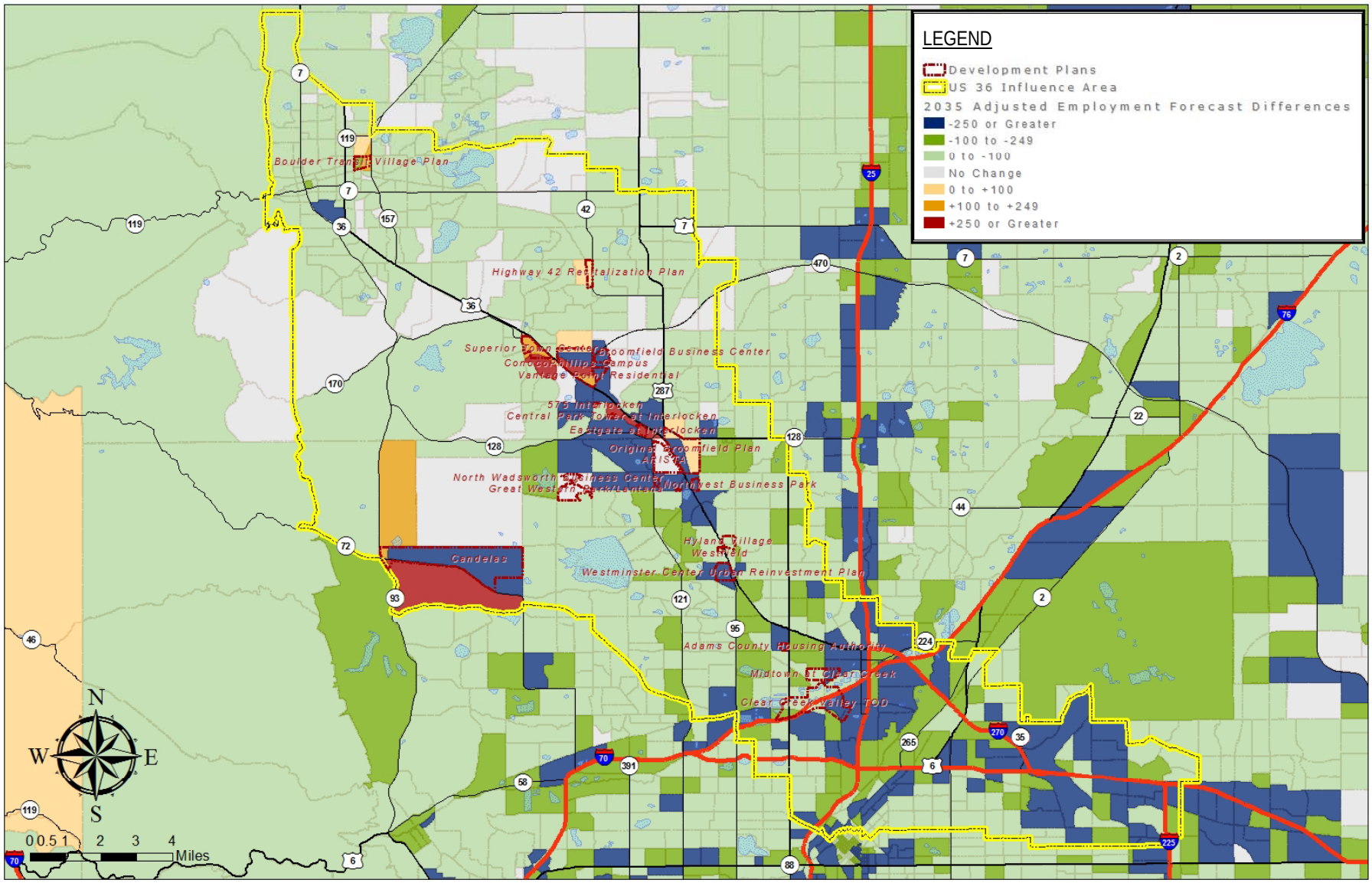


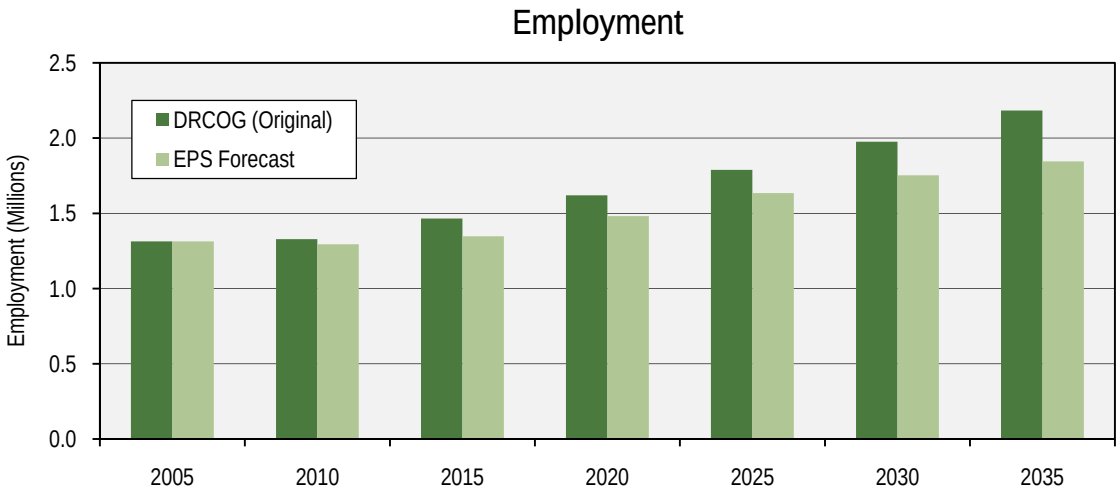
The third adjustment made at TAZ levels accounted for 0.3 percent of the total 15.5 percent reduction. Adjustments to TAZs in the Influence Area were positive and negative. As mentioned previously, consideration was given to the timing of development and the impacts of the recession. This factor was among the major contributing factors to reductions in employment projections, as shown in Figures 4-5 and 4-6. A majority of the reductions in employment projections at the TAZ level for 2035 relate to development being pushed back, not necessarily eliminated.

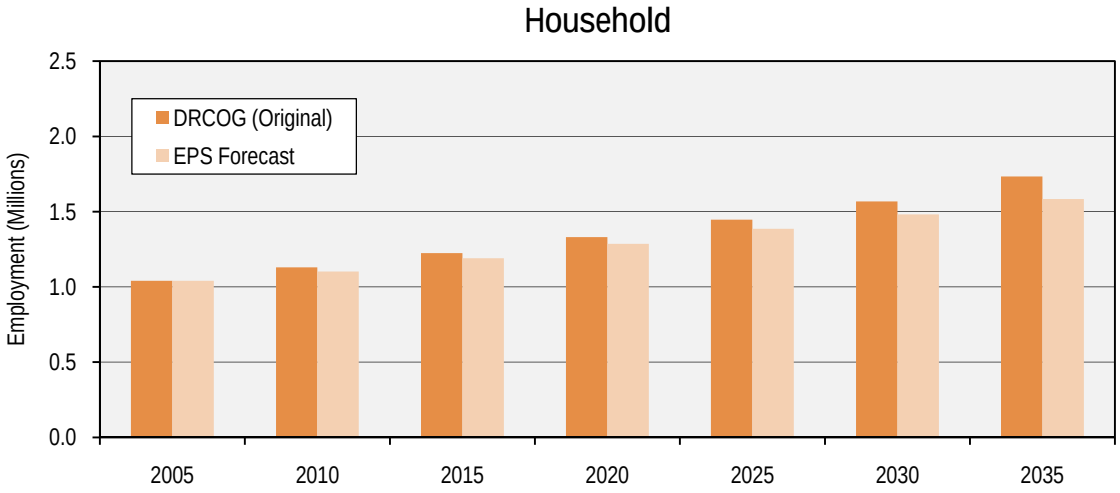
SUMMARY

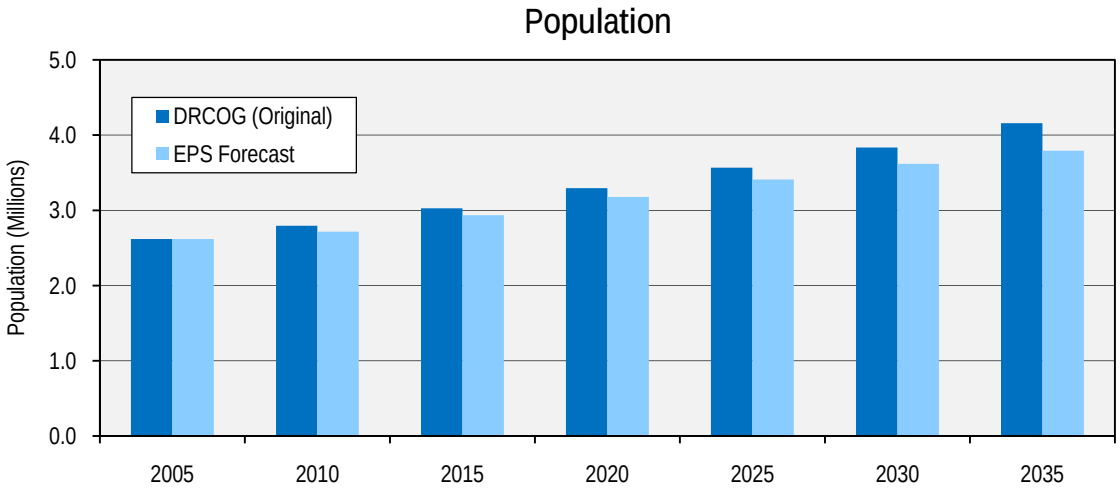
The original DRCOG forecasts and adjusted forecasts by EPS are illustrated in Figure 4-7. The adjusted projections of employment, households, and population are shown in contrast to the original DRCOG forecasts to illustrate the order of magnitude differences for each. The adjustments, as described in this chapter, reflect extensive data and market analysis, research, and understanding of the original DRCOG model and forecasts.

As shown, the forecasts vary by increasing degrees from 2010 to 2035. In 2010, the adjusted employment forecast is reduced by 2.6 percent and by 8.0 percent in 2015. Between 2015 and 2025, the forecast reductions range between 8.0 and 8.6 percent. In 2030, the forecast is reduced by


LEGEND
Development Plans
US 36 Influence Area
2035 Adjusted Employment Forecast Differences
-250 or Greater
-100 to -249
0 to -100
No Change
0 to +100
+100 to +249
+250 or Greater
Boulder Transit Village Plan
Highway 42 Revitalization Plan
Superior Town Center
Broomfield Business Center
ConocoPhillips Campus
Vantage Point Residential
575 Interlocken
Central Park Tower at Interlocken
Eastgate at Interlocken
Original Broomfield Plan
ARISTA
North Wadsworth Business Center
Great Western Park Lantern
Northwest Business Park
Hyland Village
Westfield
Candelas
Westminster Center Urban Reinvestment Plan
Adams County Housing Authority
Midtown at Clear Creek
Clear Creek Valley TOD
N
W
E
S
0 0.5 1 2 3 4
Miles


Employment
Employment (Millions)
DRCOG (Original)
EPS Forecast
2.5
2.0
1.5
1.0
0.5
0.0
2005
2010
2015
2020
2025
2030
2035


Household
Employment (Millions)
DRCOG (Original)
EPS Forecast
2.5
2.0
1.5
1.0
0.5
0.0
2005
2010
2015
2020
2025
2030
2035


Population
Population (Millions)
DRCOG (Original)
EPS Forecast
5.0
4.0
3.0
2.0
1.0
0.0
2005
2010
2015
2020
2025
2030
2035

11.3 percent, and in 2035 is reduced by 15.5 percent. The increased reductions in 2030 and 2035 are indicative of an adjusted (tapered) growth rate.

The adjusted household forecast in 2010 is 2.5 percent lower than the original forecast. In 2015, the adjusted forecast is 2.7 percent lower. By 2020, the adjusted forecast is 3.4 percent lower and 4.2 percent lower in 2025. In 2030, the adjusted forecast is 5.5 percent lower, and in 2035, the adjusted forecast is 8.7 percent lower. As with the employment forecast reductions, the increased magnitude of the adjustments for 2030 and 2035 reflect a tapered growth rate.

CHAPTER 5

TRAFFIC AND REVENUE ESTIMATES

The results of the assessment of traffic and toll revenue characteristics of the proposed US 36 Managed Lanes are presented in this chapter. As discussed in Chapter 1, this study analysis focuses on a proposed 10.1 mile Managed Lanes Project on US 36 extending from immediately west of West Flatiron Circle to Pecos Street under an HOV2+ toll-free scenario. These new managed lanes will connect to the northern terminus of the existing, reversible I-25 EXpress Toll Lanes (a seven-mile section of I-25 between Pecos Street and downtown Denver), creating a 17-mile continuous managed lane from the eastern end of Boulder County to downtown Denver. Because the High Performance Transportation Enterprise intends to treat these connected facilities as a system, traffic and revenue estimates are reported for both facilities later in this Chapter.

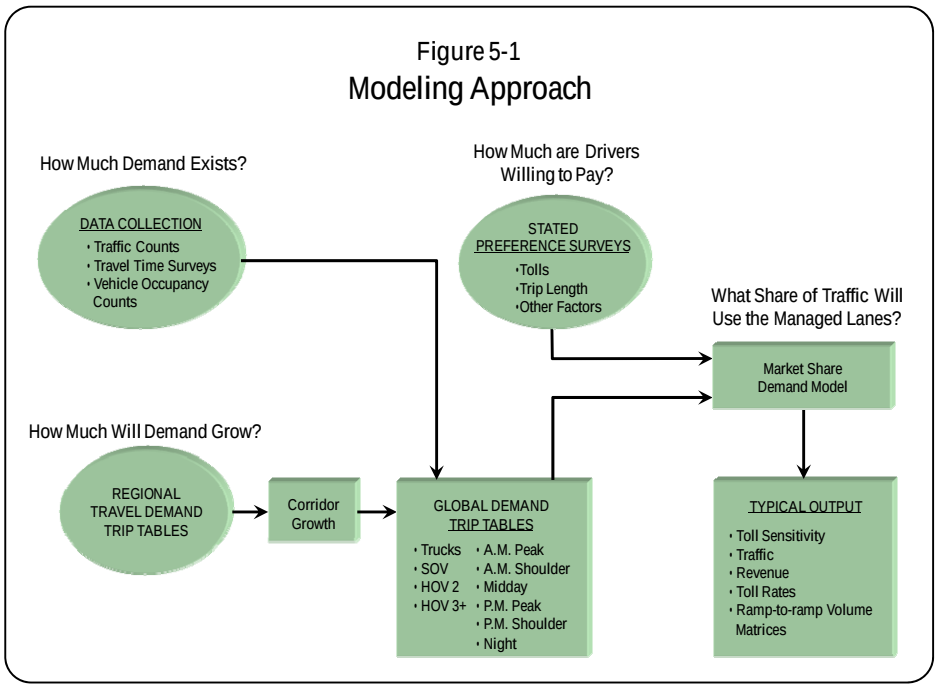
Future year traffic assignments were run at 2015, 2020, 2025, 2030 and 2035 levels. Annual transactions and toll revenue were estimated from opening-year 2015 through future-year 2035.

MODELING APPROACH

Figure 5-1 presents an overview of the methodology used to develop estimates of traffic and revenue. As shown in Figure 5-1, the traffic and revenue study attempts to answer four overall questions:

- How much demand exists in the corridor today;
- How much will the demand grow in the future;
- What share of traffic can be expected to use the Managed Lanes; and
- How much are drivers willing to pay?

Figure 5-1
Modeling Approach



A profile of existing demand was created as part of the study and was summarized previously in Chapter 2. The existing demand profile included monthly and daily traffic variation information, average weekday and peak period traffic profiles by travel direction and travel time surveys. This became the basic foundation of the travel demand models used in the analysis.

The overall modeling approach used in the study required the use and development of two independent models. These included:

- **Regional model for global demand estimates** – The global demand is an estimate of the total amount of traffic that would be expected to use the US 36 corridor, under both the existing or improved conditions. These estimates were based on the assignment results of the Denver Region Council of Governments (DRCOG) Compass 4.0 (Cycle 2, 2009) regional model. The Compass 4.0 (Cycle 2, 2009) regional model was provided to WSA by our traffic modeling subconsultant, Felsburg Holt & Ullevig (FHU), in November 2010 and included the latest underlying socioeconomic forecasts of DRCOG available at that time.

Using the latest underlying DRCOG socioeconomic forecasts, an economic growth analysis for the Denver region and the US 36 corridor was performed as described in detail in Chapter 4. Significant downward adjustments were made to the 2010 baseline DRCOG socioeconomic data and all future year projections through 2035 for the Denver Metropolitan Area and the US 36 corridor based on these analyses. As was previously shown in Tables 4-1 and 4-2, downward adjustments were applied to DRCOG's population forecast along the US 36 corridor and range from a 2.6 percent reduction in 2010 to an 8.5 percent reduction by 2035. Downward adjustments were also applied to DRCOG's employment forecast along the US 36 corridor and range from a 2.8 percent reduction in 2010 to a 13.7 percent reduction by 2035. Similar downward adjustments were applied to population and employment forecasts throughout the Denver region. These adjusted economic forecasts were used as input to the global travel demand models to generate revised estimates of travel demand for the greater Denver region in general, and the US 36 Corridor, specifically.

The analysis was conducted by local economic subconsultant, Economic & Planning Systems, to provide an independent evaluation of economic conditions and to establish growth projections that accounted for the recent economic contraction and its effect on long-term growth potentials for the Denver region. Because economic conditions have fluctuated significantly in the recent past, an independent assessment of previously issued DRCOG forecasts was warranted. An independent assessment of the socioeconomic forecasts contained in the regional model is typical in preparing investment grade traffic and revenue forecasts. The resulting adjusted forecast accounts for a full range of factors and grounds this study with a comprehensive analysis of market and economic data.

- **The market share micro-model** – This model is a subarea of the regional demand model and was used to estimate the share of total traffic on US 36 that would choose the managed lanes versus the toll-free general purpose lanes under varying operating conditions and toll rates. Trip tables for 2010 traffic levels were calibrated directly to observed control volumes on the US 36 mainline and ramp locations. Future growth forecasted from the regional model was then applied to the 2010 calibrated trip tables to develop future year subarea trip tables. The estimated share of corridor traffic in the managed lanes was based on several factors, including the location of access and egress points, demand levels, the time savings offered by the managed lanes and, of course, the toll rates being charged.

GLOBAL DEMAND ESTIMATES

The corridor global traffic demand is defined as the total traffic traveling in the US 36 Managed Lane corridor. Global demand estimates were prepared using trip tables developed using the DRCOG Compass 4.0 (Cycle 2, 2009) regional model package. The regional travel demand model was used in two ways. First, it was used to provide the base travel patterns for the micro-model subarea and second, to develop growth characteristics for the micro-model subarea.

The calibration process for the regional model used for this study included the following steps:

- Develop trip tables at 2010, 2015, 2020, 2025, 2030 and 2035 levels reflecting the new socioeconomic data from economic subconsultant Economic & Planning Systems;
- Adjust assignment parameters including link speeds and capacities, and speed/flow relationships; and
- Extract micro-model subarea travel demand information from base and future year traffic models.

The DRCOG traffic networks included the latest Transportation Improvement Program (TIP) covered by the model. Specific modifications to this plan related only to assumptions regarding the general purpose and managed lane project configuration for US 36.

MARKET SHARE MICRO-MODEL

The extracted micro-model subarea used for this study was generally oriented in a northwest to southeast direction, following the US 36/I-25 corridor from Boulder to downtown Denver. In general, the subarea model extends as far north as Arapahoe Road in Boulder County, as far east as the I-76/I-270 interchange and as far south as Colfax Avenue in downtown Denver, and includes all major arterial and freeway links within this coverage area as represented in the DRCOG networks.

The subarea trip tables used in the micro-model were initially extracted from region-wide traffic assignments at a base-year (2010) level. These trip tables were used as "seed matrices" in a calibration process that adjusted the trip tables to reflect actual traffic volumes for US 36 ramps and mainlines for the analysis intervals used in the micro-model, which were smaller than those used in the regional model. The trip tables reflected average internal weekday (Tuesday, Wednesday and Thursday) travel conditions only.

The analysis periods used in the market share micro-model have been defined below and also represent the current time periods used for charging tolls on the I-25 EXpress Toll Lanes:

- AM1 - AM Peak Pre-Shoulder Period (5:00 - 6:00 AM)
- AM2 - AM Peak Shoulder Period (6:00 - 6:45 AM)
- AM3 - AM Peak Shoulder Period (6:45 - 7:15 AM)
- AM4 - AM Peak Period (7:15 - 8:15 AM)
- AM5 - AM Peak Shoulder Period (8:15 - 8:45 AM)
- AM6 - AM Peak Post-Shoulder Period (8:45 - 10:00 AM)
- MD1 - Midday Period (10:00 AM - 12:00 PM)
- MD2 - Midday Period (12:00 - 3:00 PM)
- PM1 – PM Peak Shoulder (3:00 - 3:30 PM)
- PM2 – PM Peak Shoulder (3:30 - 4:30 PM)
- PM3 – PM Peak Period (4:30-6:00 PM)
- PM4 – PM Peak Shoulder (6:00-7:00 PM)

The overnight period from 7:00 PM to 5:00 AM for weekdays was not analyzed explicitly. The annual traffic and toll revenue forecasts presented later in this report assume a certain percentage of traffic and revenue will occur during the overnight hours, as well as on weekends. This was reflected through the use of an annualization factor, which takes the estimated average weekday transactions and revenue for the model periods and converts them to annual estimates. An annualization factor of 267 equivalent weekdays per year for tolled transactions and revenue was used for both US 36 and I-25 estimates. This recognizes the fact that weekend day traffic and revenue on the managed lanes is considerably lower as compared to an average weekday. An annualization factor of 393 equivalent weekdays per year was used for toll-free (HOV2+) transactions. These annualization factors were developed from a review of the I-25 EXpress Toll Lanes actual daily traffic volumes for year 2010.

Trip tables representing future year demand for the micro-model subarea were extracted and compared to those developed for the base year to estimate zonal growth rates, which were then applied to the calibrated base-year 2010 subarea matrices.

In the micro-model, travel time between a path using the tolled managed lanes was compared with the travel time on a path using the next best free route(s) (most likely the US 36 general purpose lanes). For each travel movement, the proportion of motorists expected to use the managed lanes was a function of the computed time savings and the cost to use the lanes (cost-per-minute saved) versus the value placed on time savings by the motorist (value of time).

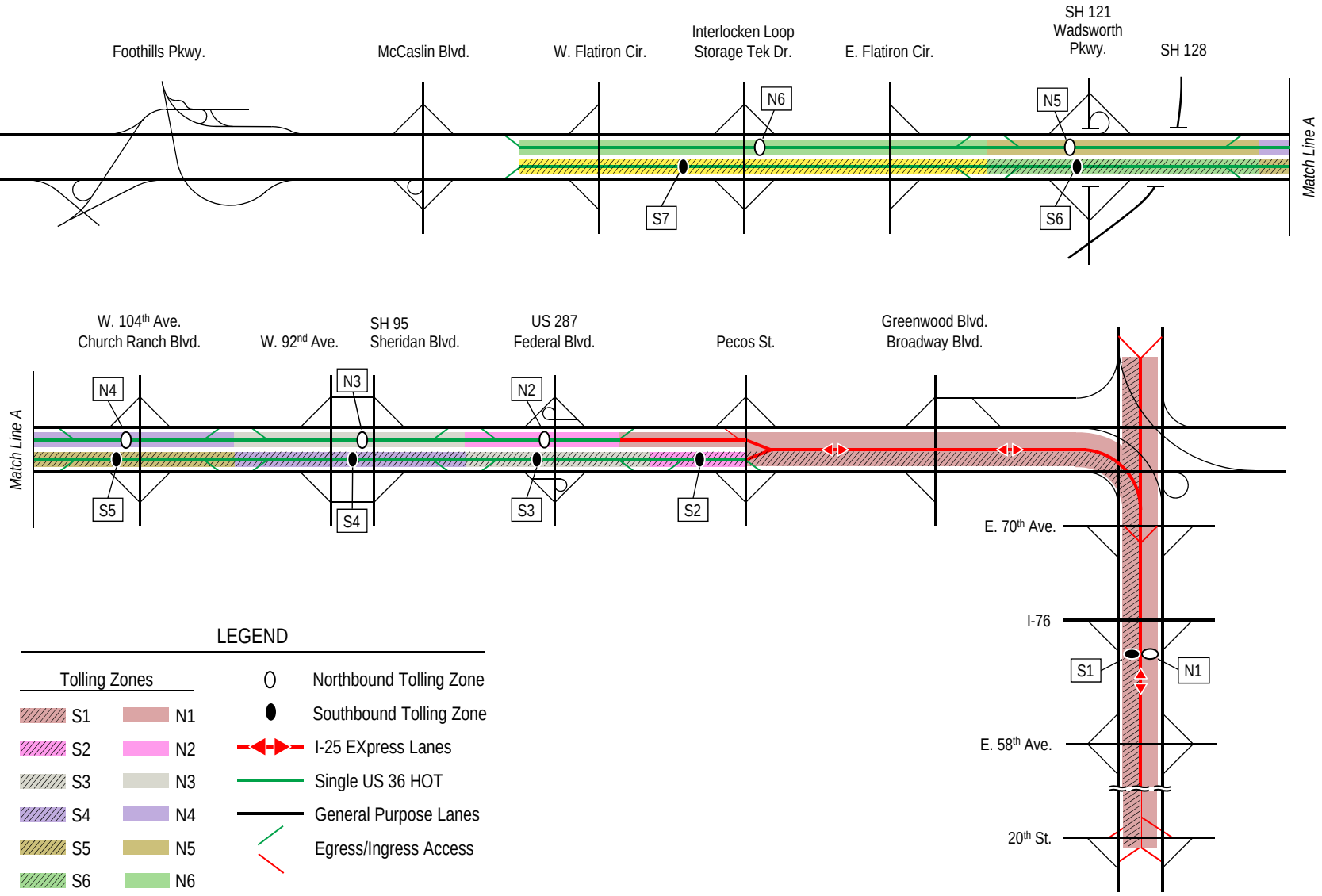
The share of each traffic movement captured by the managed lanes was based on an estimate of the assumed distribution of the VOT. It was assumed that motorists with a VOT greater than the cost per minute saved would tend to choose the managed lanes, while those with a lower VOT would tend not to choose the toll lanes.

The micro-model relies on developing an equilibrium condition between the toll cost and the estimated time savings. If more traffic uses the managed lanes there is less congestion in the free lanes and lower time savings. Less time savings would result in less traffic choosing the managed lanes. For each toll rate level, there exists an equilibrium point between the level of traffic congestion in the free lanes (time savings) and the amount of traffic willing to pay a toll to save that same amount of time. At low toll levels, there is a higher propensity to use the managed lanes, and there is a lower congestion level in the free lanes. At higher toll levels, there is less traffic in the managed lanes and also more congestion in the free lanes.

At each forecast year, a full range of toll rates were tested on US 36 ranging from $0.05 to $2.00 per mile for each time period, tolling zone and travel direction with a minimum toll charge of $0.25 in 2015, increasing to $0.45 by 2035. The tolling zone configuration used in this analysis is shown in Figure 5-2. On I-25, time period toll rates were based on current rates inflated to future year levels. For purposes of this analysis, it was assumed that the US 36 Managed Lanes would have one lane open per direction throughout the entire day. On I-25, the EXpress Toll Lanes were assumed to remain reversible and operating as they do currently. That is, the two reversible I-25 EXpress Toll Lanes would be open southbound during the AM time periods and northbound during the PM time periods. The I-25 Express Toll Laness were assumed to be closed during the midday time period (10:00 AM - 12:00 PM) to facilitate reversing EXpress Toll Lane operations. The toll rates chosen for the US 36 Managed Lanes for use in the traffic and revenue analysis reflect those that maximize revenue for each individual tolling zone and time period, while at the same time keeping demand below 1,500 vehicles per lane per hour in the managed lanes.

BASIC ASSUMPTIONS

The traffic and projected toll revenue estimates for the US 36 Managed Lanes and the I-25 EXpress Toll Lanes are predicated on the following basic assumptions which are believed to be reasonable for this study.



WilburSmith ASSOCIATES

TOLLING ZONE CONFIGURATION

FIGURE 5-2

1. The US 36 Managed Lanes will open to traffic on July 1, 2015;

2. The configuration of the US 36 Managed Lanes, including the proposed access locations, tolling zones and toll rates will be as described in this report;

3. Passenger cars and light trucks (two-axle commercial vehicles) will be allowed to use the US 36 Managed Lanes. Medium and heavy trucks will be prohibited from using the US 36 Managed Lanes;

4. All HOV passenger cars, buses, van pools and light trucks will be eligible to use the US 36 Managed Lanes for free. For purposes of this analysis, the definition of HOV is any vehicle with two or more passengers. Motorcycles will also be able to use the Managed Lanes for free;

5. Tolls will be collected via the EXpressToll electronic toll collection (ETC) equipment, which will be effectively marketed and widely available to all motorists interested in using the US 36 Managed Lanes. A License Plate Tolling (LPT) option will also be available for toll collection for motorists not choosing the EXpressToll option. Cash will not be accepted.

6. Rigorous managed lane enforcement along with an administrative adjudication process will be implemented to minimize toll violations/evasions. No adjustments have been made to toll revenue estimates included in this report for toll violation/evasion;

7. Estimates of annual toll revenue included in this report have been adjusted to reflect "ramp-up" during the first three years of operation;

8. Transportation improvements as detailed in DRCOG's Compass 4.0 (Cycle 2, 2009) networks will be implemented; no other competing routes or capacity improvements will be implemented within the forecast period and no other general purpose lane capacity other than those assumed in this analysis will be provided along the US 36 Managed Lane project corridor;

9. Toll rates and estimates of toll revenue included in this report are calculated in future dollars;

10. Economic growth in the study corridor will generally follow the underlying socioeconomic projections prepared by the independent economic subconsultant, Economic & Planning Systems, as

documented in a separate report dated January 26, 2011, entitled "Economic Growth Analysis, US 36 Investment Grade Traffic and Revenue Analysis";

11. No major recession or significant economic restructuring will occur which would substantially reduce traffic in the region;

12. No natural disasters will occur that could significantly alter travel patterns throughout the area;

13. Over the long term, motor fuel will remain in adequate supply and future increases in fuel price will not significantly exceed the overall rate of inflation; and

14. No local, regional or national emergency will arise which would abnormally restrict the use of motor vehicles.

Any significant departure from these basic assumptions could materially affect estimated traffic and toll revenue for the proposed 36 Managed Lanes facility.

PROJECT CONFIGURATION

This section of the report describes the detailed traffic and revenue analysis for the Project described in Chapter 1 and presented in Figure 1-3. It will discuss the optimum toll rate analysis, detailed estimates of traffic under average weekday conditions for various future years, as well as estimates of annual transactions and toll revenue.

OPTIMUM RATE ANALYSIS

Managed lane projects similar to US 36 typically make use of variable tolls by time of day. In general, tolls are increased during periods of high congestion while lower tolls are used in off-peak hours.

The determination of optimum toll rates for a managed lane facility is considerably different than that of a typical toll facility. Optimum rates for managed lanes can be dictated by three sometimes conflicting criteria:

- Maximizing toll revenue potential;
- Managing demand in the managed lanes to assure a congestion-free ride; and
- Optimizing the distribution of traffic between the un-tolled general-purpose lanes and the tolled managed lanes.

Most times, the objectives of revenue maximization and demand management generally function in concert, although the demand management objective usually controls in the event of a conflict. That is, in some cases it may be necessary to use rates beyond the revenue maximizing point to effectively manage demand in the managed lanes. This might more likely occur under high congestion conditions, typically later in the forecast period.

However, the objectives of revenue maximization and optimization of demand between free and tolled lanes may well be in conflict. Revenue maximization may occur at one toll rate, but will result in traffic on the tolled managed lanes well below the capacity of those lanes. It may be an objective to increase the amount of traffic served by managed lanes, thereby reducing demand and congestion in the general purpose lanes. This optimum distribution is often attained at toll rates below those which would produce maximum revenue potential. For purposes of this study, traffic and revenue estimates have been based on revenue maximizing toll rates.

A wide range of toll rates were tested for each analysis period in each travel direction. As noted previously, there were 12 analysis periods used in the study, generally extending from 5:00 AM to 7:00 PM under average weekday conditions. Also, as previously shown in Figure 5-2, there were 13 individual tolling zones, two on I-25 and 11 on US 36. Separate traffic assignments were run at per-mile toll rates from $0.05 to $2.00 in $0.05 increments at each of the 11 US 36 tolling zones for each of the analysis periods. Toll sensitivity curves were produced for each tolling zone, for each analysis period, and for each analysis year under an average weekday condition.

At the two I-25 tolling zones, toll sensitivity analyses were not performed. Toll rates similar to those currently in place were used. By the assumed 2015 opening year of the US 36 Managed Lanes, AM peak hour (7:15-8:15 AM) and PM peak period (4:30-6:00 PM) tolls were increased to $4.75 from the current $4.00, consistent with historical toll increases based on an average annual percent change. Adjustments to tolls in other time periods were made on a proportional basis. Tolls for the shoulder period before (6:45-7:15 AM) and after (8:15-8:45 AM) the AM peak hour were increased from the current $2.75 to $4.75. This was done for compliance with the current Intergovernmental Agreement between the HPTE and the RTD which states that peak period rates, 6:45-8:45 AM and 4:30-6:00 PM, shall not be less than RTD Express fares.

For purposes of this study, illustrative examples of toll sensitivity results for Tolling Zones N5 and S6, west of Wadsworth Parkway, and Tolling Zones N2 and S3, east of Federal Boulevard, at 2015, 2025 and 2035 levels for the AM Peak Period, AM4 (7:15 - 8:15 AM) and PM Peak Period, PM3 (4:30-6:00 PM) are provided in Figures 5-3 through 5-8.

Figure 5-3 presents the results of the toll sensitivity analysis at 2015 levels for the tolling zones west of Wadsworth Parkway in the AM peak direction (westbound) and the PM peak direction (eastbound). In addition to the revenue curves, estimated toll transactions in the managed lanes at progressively higher toll rates are shown. The selected toll rate under a revenue maximization condition is indicated by the black dot.

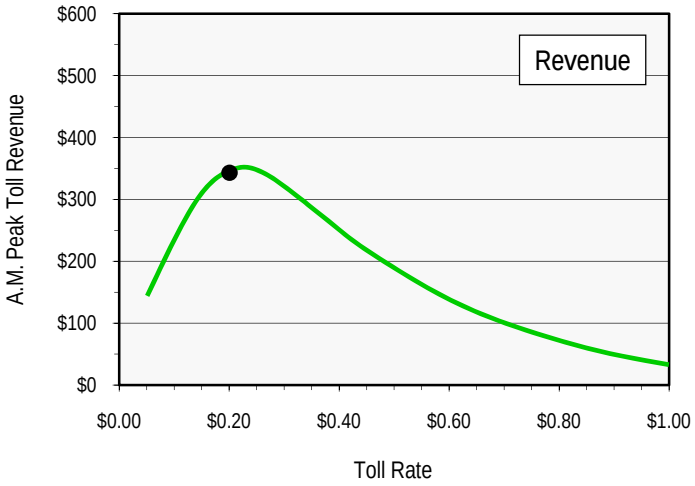
For example, in the AM peak period, westbound direction, the optimum toll for year 2015 for tolling zone N5, west of Wadsworth Parkway, was found to be $0.20 per mile as indicated by the black dot on the green curve. This, however, is not the highest point of the revenue curve. In theory, the absolute optimum toll rate would be that which produces the maximum revenue. However, WSA recommends a rate which is slightly below the maximum point on the curve. This will allow for some latitude in rate adjustments in the future if needed to offset lower traffic growth, for example. Also, the forecasting process itself is based on a range of assumptions such as estimates of value of time. While the technical approach and assumptions are reasonable, there is always some inherent uncertainty about the way the motoring public will behave, since decisions to use toll facilities are based upon individual perceptions and values. The $0.20 per mile optimum rate reflects the rate for travel over this one tolling zone (N5).

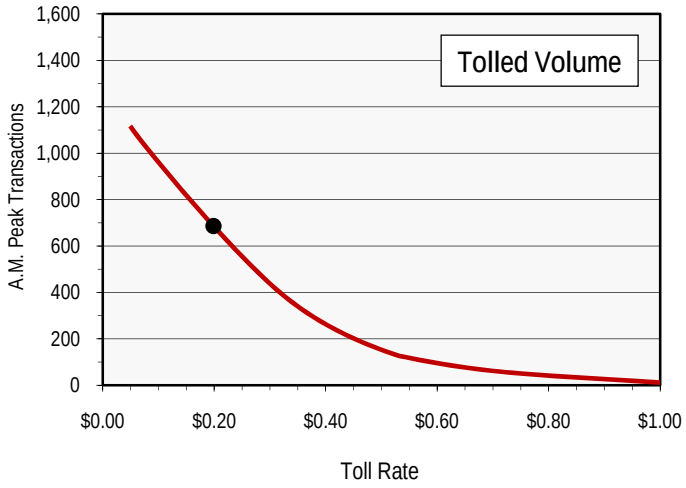
In the PM peak period, eastbound direction, the optimum toll for year 2015 for tolling zone S6, west of Wadsworth Parkway, was also $0.20 per mile. The $0.20 per mile optimum rate reflects the rate for travel over this one tolling zone.

The bottom portion of Figure 5-3 shows what would be expected to happen to tolled transactions in the managed lanes as toll rates are increased. In the AM peak westbound direction, tolled transactions would be reduced from about 700 to about 400 when tolls are increased from $0.20 to $0.30 per mile.

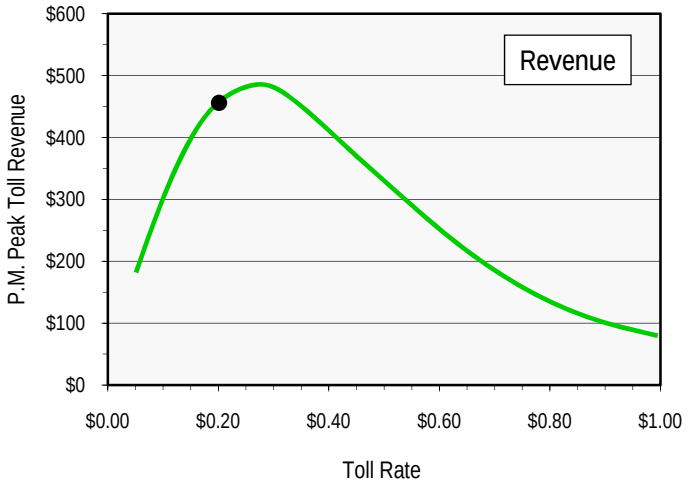
Figure 5-4 presents the results of the 2015 toll sensitivity analysis for the tolling zones east of Federal Boulevard in the AM peak direction (eastbound) and the PM peak direction (westbound). As in Figure 5-3, revenue curves and estimated toll transactions in the managed lanes at

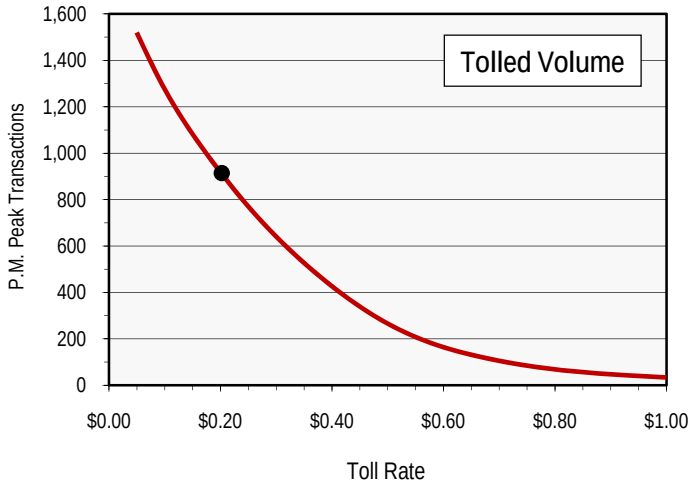
A.M. Peak – Westbound (N5)
7:15 - 8:15 A.M.





P.M. Peak – Eastbound (S6)
4:30 - 6:00 P.M.





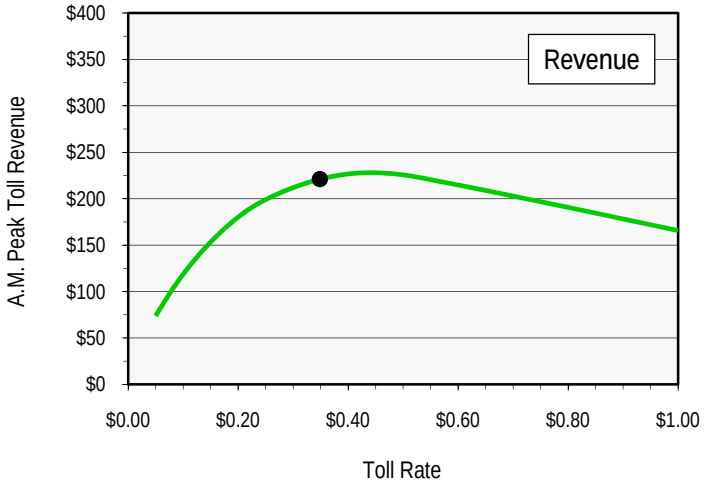
● Revenue Maximization Toll Rate

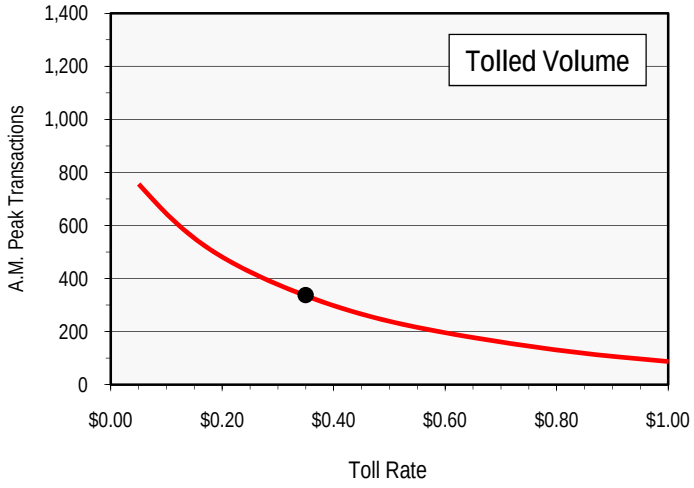
2015 TOLL SENSITIVITY CURVES
West of Wadsworth Parkway - A.M. and P.M. Peak Periods

WilburSmith ASSOCIATES

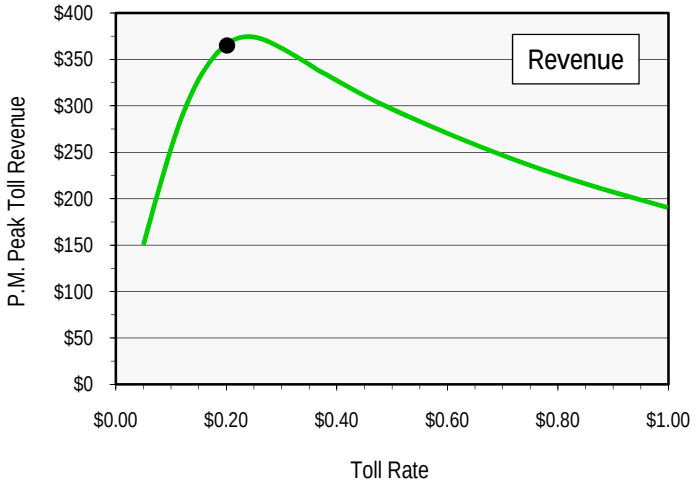
FIGURE 5-3

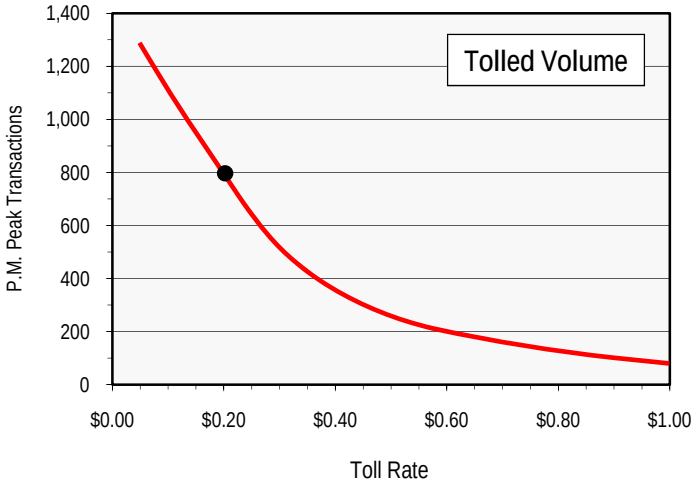
A.M. Peak – Eastbound (S3)
7:15 - 8:15 A.M.





P.M. Peak – Westbound (N2)
4:30 - 6:00 P.M.





● Revenue Maximization Toll Rate

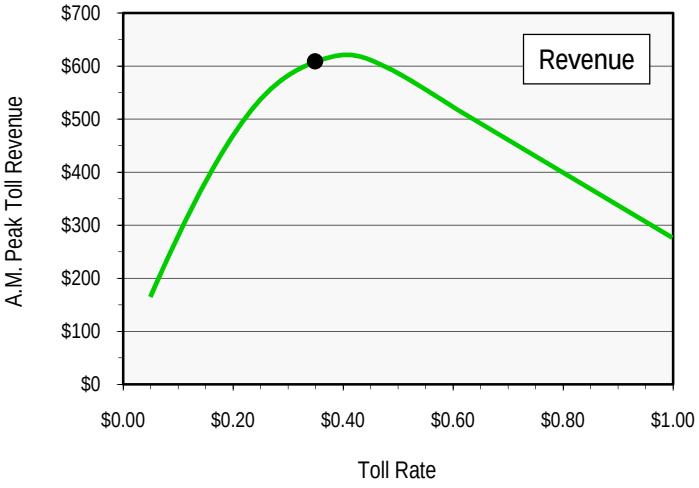
2015 TOLL SENSITIVITY CURVES
East of Federal Boulevard - A.M. and P.M. Peak Periods

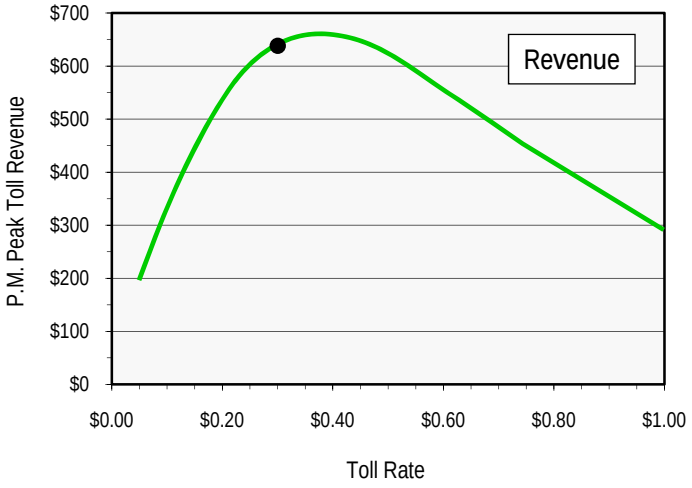
WilburSmith ASSOCIATES

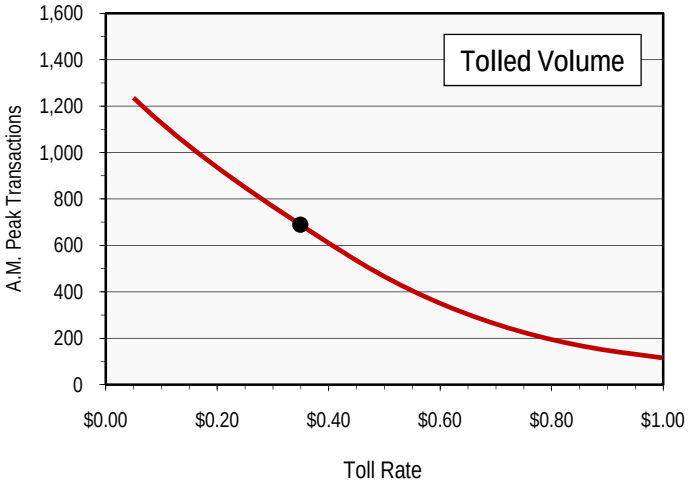
FIGURE 5-4

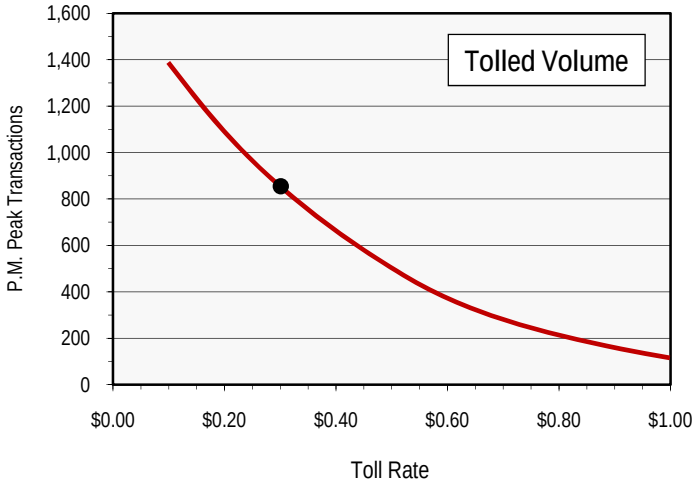
A.M. Peak – Westbound (N5)
7:15 - 8:15 A.M.

P.M. Peak – Eastbound (S6)
4:30 - 6:00 P.M.









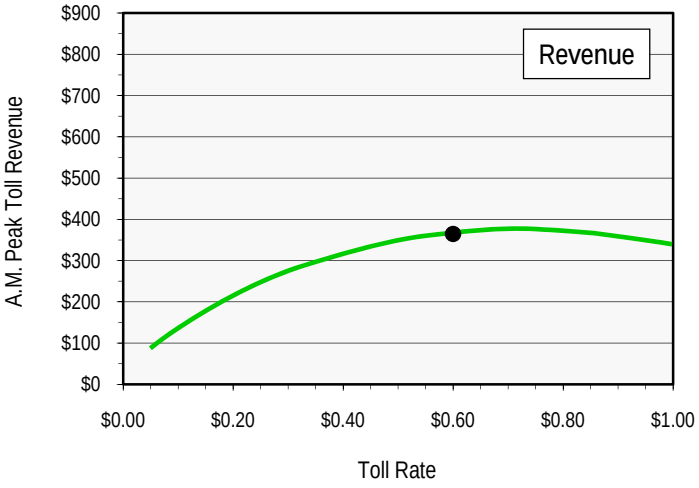
● Revenue Maximization Toll Rate

2025 TOLL SENSITIVITY CURVES
West of Wadsworth Parkway - A.M. and P.M. Peak Periods

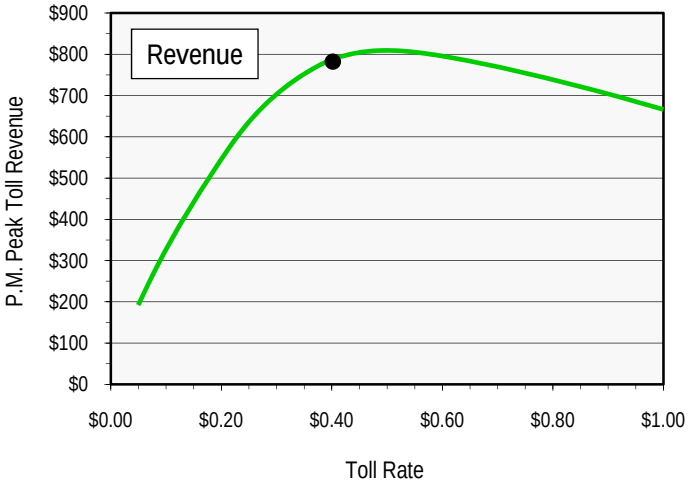
WilburSmith ASSOCIATES

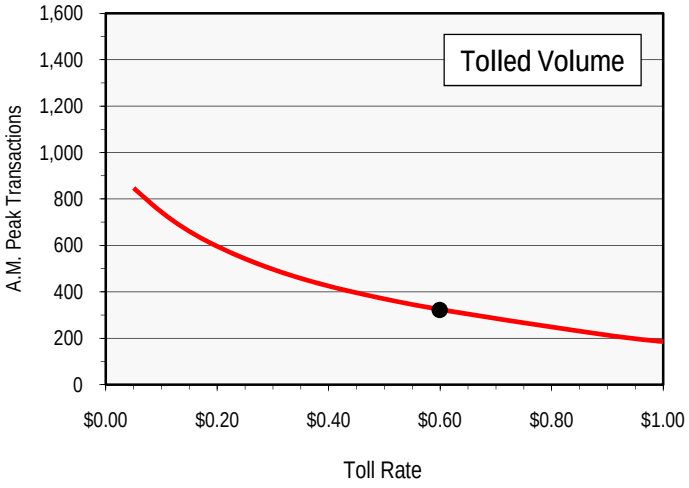
FIGURE 5-5

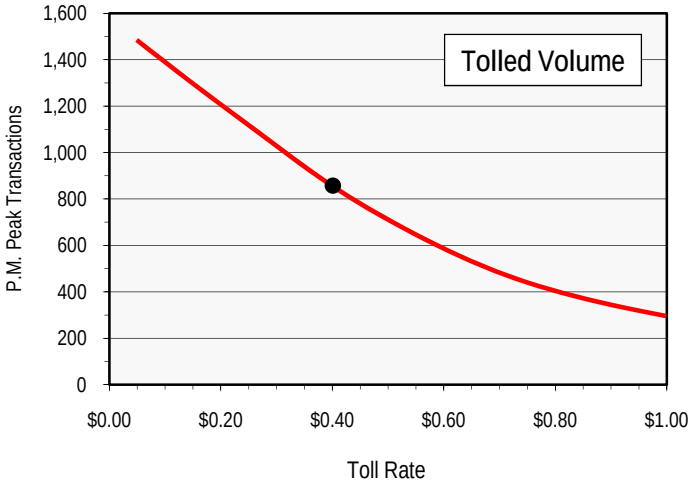
A.M. Peak – Eastbound (S3)
7:15 - 8:15 A.M.



P.M. Peak – Westbound (N2)
4:30 - 6:00 P.M.







● Revenue Maximization Toll Rate

2025 TOLL SENSITIVITY CURVES
East of Federal Boulevard - A.M. and P.M. Peak Periods

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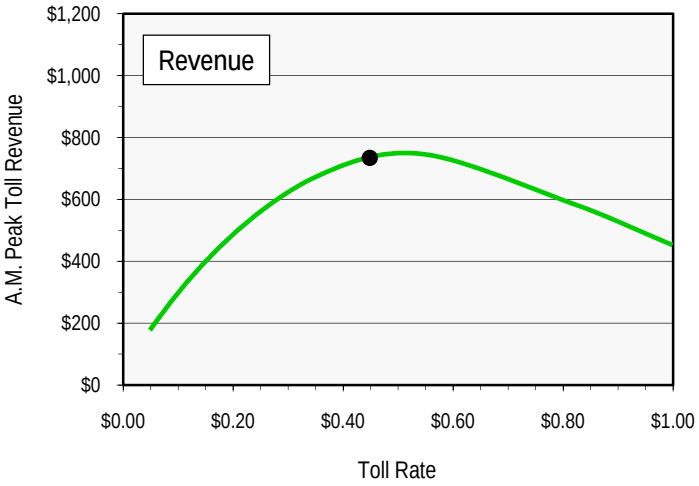
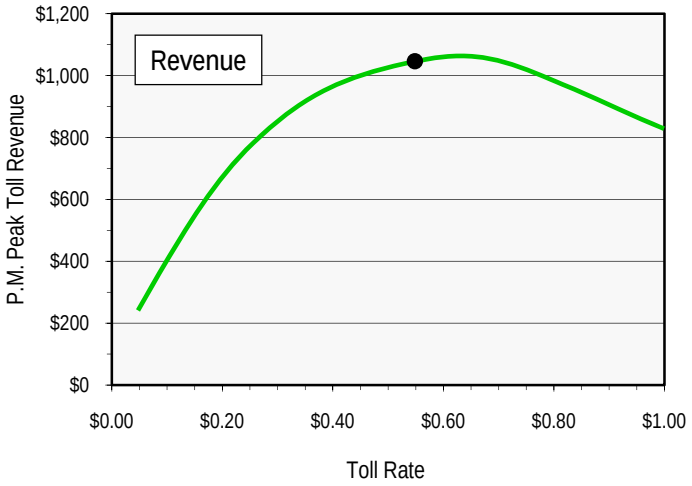
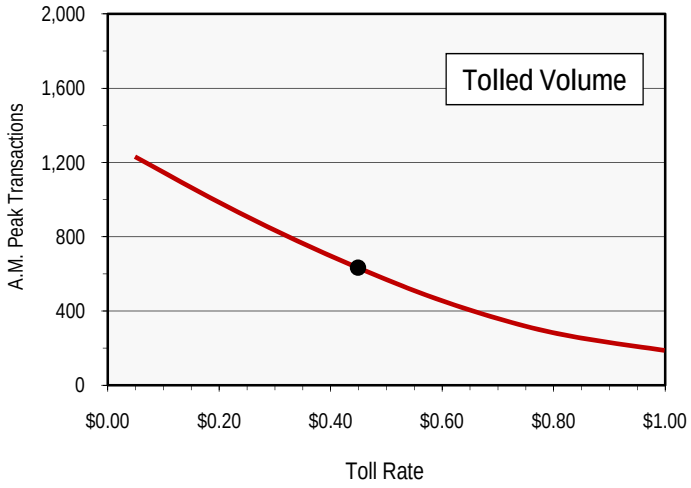
FIGURE 5-6

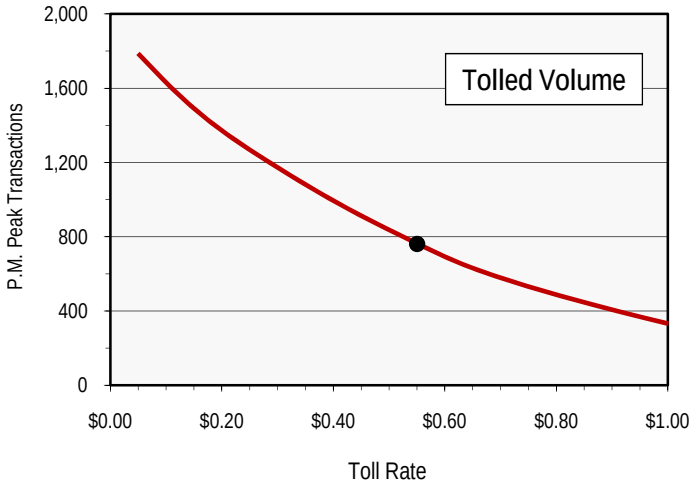
A.M. Peak – Westbound (N5)
7:15 - 8:15 A.M.



P.M. Peak – Eastbound (S6)
4:30 - 6:00 P.M.







● Revenue Maximization Toll Rate

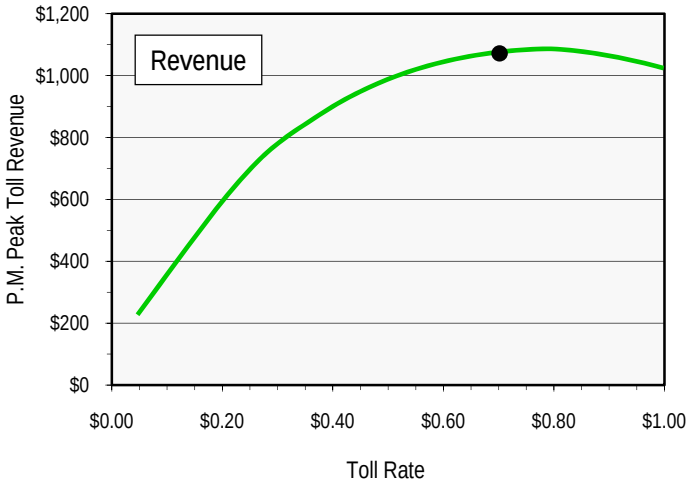
2035 TOLL SENSITIVITY CURVES
West of Wadsworth Parkway - A.M. and P.M. Peak Periods

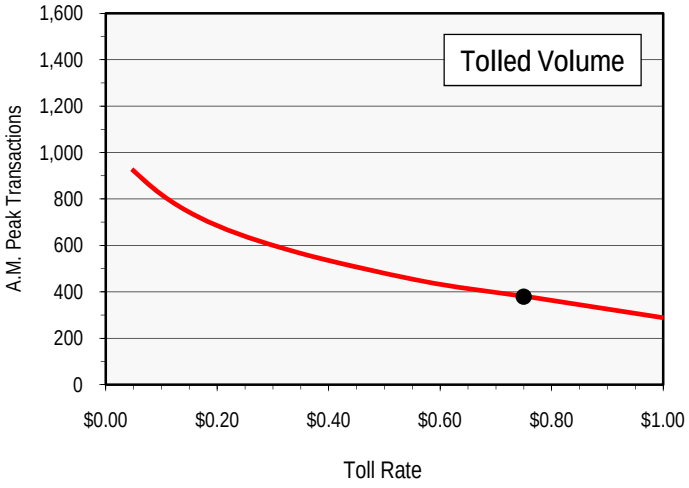
WilburSmith ASSOCIATES

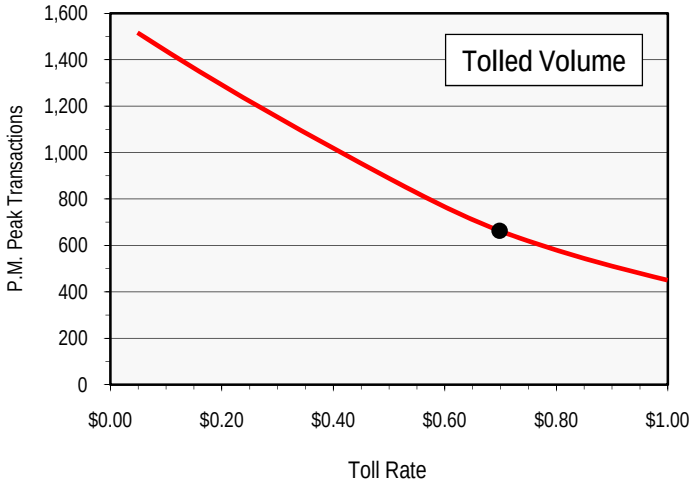
FIGURE 5-7

A.M. Peak – Eastbound (S3)
7:15 - 8:15 A.M.

P.M. Peak – Westbound (N2)
4:30 - 6:00 P.M.







● Revenue Maximization Toll Rate

2035 TOLL SENSITIVITY CURVES
East of Federal Boulevard - A.M. and P.M. Peak Periods

WilburSmith ASSOCIATES

FIGURE 5-8

progressively higher toll rates are shown. The selected toll rate under a revenue maximization condition is indicated by the black dot.

In the AM Peak Period, eastbound direction, the optimum toll for year 2015 for tolling zone S3, east of Federal Boulevard, was found to be $0.35 per mile as indicated by the black dot on the green curve. The $0.35 per mile optimum rate reflects the rate for travel over this one tolling zone (S3). In the PM Peak Period, westbound direction, the optimum toll for year 2015 for tolling zone N2, east of Federal Boulevard, was $0.20 per mile. The $0.20 per mile optimum rate reflects the rate of travel over tolling zone N2, only.

The bottom portion of Figure 5-4 shows what would be expected to happen to tolled transactions in the managed lanes as toll rates are increased. In the AM peak eastbound direction, tolled transactions would be reduced from about 375 to about 200 when tolls are increased from $0.35 to $0.60 per mile.

Figures 5-5 and 5-6 present similar toll sensitivity results for year 2025, while Figures 5-7 and 5-8 present the estimates for year 2035.

Based on the toll sensitivity analyses, Table 5-1 provides a summary of revenue optimizing toll rates for each of the 12 time periods and 11 tolling zones along the proposed US 36 Managed Lanes (N2 through N6 and S2 through S7) for years 2015, 2025 and 2035. Estimated tolls assumed for the full-length, seven mile trip on the I-25 EXpress Toll Lanes for each time period and travel direction (N1 and S1) are also provided in Table 5-1.

In 2015, toll rates in the AM peak period would range from $0.20 to $0.35 per mile depending on the tolling zone to optimize revenue. During the PM peak period rates range from $0.15 to $0.25 per mile to optimize revenue. Generally speaking, toll rates in the shoulder periods surrounding the peak periods are similar but slightly lower than the peaks. Off-peak periods tend to be significantly lower at around $0.05 per mile at all or most tolling zones.

By 2025, optimum toll rates in the AM peak period have increased to manage demand in the managed lanes and range between $0.30 and $0.60 per mile depending on the tolling zone and travel direction. During the PM peak period, rates range from $0.35 to $0.40 per mile to optimize revenue and manage demand.

Table 5-1
Per Mile Toll Rates
I-25 EXpress Toll Lanes and US 36 Managed Lanes From Pecos Street to West of West Flatiron Circle

2015 Westbound - Minimum Toll $0.25
Per Mile Toll Rate ($) By Toll Zone

	Time Period	I-25	US 36				
		N-1	N-2	N-3	N-4	N-5	N-6
AM1	5:00 AM - 6:00 AM	---	$0.05	$0.05	$0.05	$0.05	$0.05
AM2	6:00 AM - 6:45 AM	---	$0.05	$0.05	$0.05	$0.05	$0.05
AM3	6:45 AM - 7:15 AM	---	$0.15	$0.15	$0.15	$0.15	$0.15
AM4	7:15 AM - 8:15 AM	---	$0.20	$0.20	$0.20	$0.20	$0.20
AM5	8:15 AM - 8:45 AM	---	$0.15	$0.15	$0.15	$0.15	$0.15
AM6	8:45 AM - 10:00 AM	---	$0.05	$0.05	$0.05	$0.05	$0.05
MD1	10:00 AM - 12:00 PM	---	$0.05	$0.05	$0.05	$0.05	$0.05
MD2	12:00 PM - 3:00 PM	$0.50	$0.05	$0.05	$0.05	$0.05	$0.05
PM1	3:00 PM - 3:30 PM	$1.75	$0.05	$0.05	$0.05	$0.05	$0.05
PM2	3:30 PM - 4:30 PM	$2.50	$0.15	$0.15	$0.15	$0.15	$0.15
PM3	4:30 PM - 6:00 PM	$4.75	$0.20	$0.20	$0.15	$0.15	$0.15
PM4	6:00 PM - 7:00 PM	$1.75	$0.20	$0.20	$0.15	$0.15	$0.15

2015 Eastbound - Minimum Toll $0.25
Per Mile Toll Rate ($) By Toll Zone

	Time Period	I-25	US 36					
		S-1	S-2	S-3	S-4	S-5	S-6	S-7
AM1	5:00 AM - 6:00 AM	$0.50	$0.05	$0.05	$0.05	$0.05	$0.05	$0.05
AM2	6:00 AM - 6:45 AM	$2.00	$0.10	$0.10	$0.10	$0.10	$0.10	$0.10
AM3	6:45 AM - 7:15 AM	$4.75	$0.20	$0.20	$0.20	$0.20	$0.15	$0.15
AM4	7:15 AM - 8:15 AM	$4.75	$0.35	$0.35	$0.35	$0.25	$0.20	$0.20
AM5	8:15 AM - 8:45 AM	$4.75	$0.20	$0.20	$0.15	$0.15	$0.15	$0.15
AM6	8:45 AM - 10:00 AM	$1.50	$0.10	$0.10	$0.05	$0.05	$0.05	$0.05
MD1	10:00 AM - 12:00 PM	---	$0.05	$0.05	$0.05	$0.05	$0.05	$0.05
MD2	12:00 PM - 3:00 PM	---	$0.10	$0.10	$0.10	$0.10	$0.10	$0.05
PM1	3:00 PM - 3:30 PM	---	$0.20	$0.20	$0.20	$0.20	$0.15	$0.15
PM2	3:30 PM - 4:30 PM	---	$0.25	$0.25	$0.25	$0.25	$0.20	$0.20
PM3	4:30 PM - 6:00 PM	---	$0.25	$0.25	$0.25	$0.25	$0.20	$0.20
PM4	6:00 PM - 7:00 PM	---	$0.25	$0.25	$0.25	$0.25	$0.20	$0.20

2025 Westbound - Minimum Toll $0.35
Per Mile Toll Rate ($) By Toll Zone

	Time Period	I-25	US 36				
		N-1	N-2	N-3	N-4	N-5	N-6
AM1	5:00 AM - 6:00 AM	---	$0.05	$0.05	$0.05	$0.05	$0.05
AM2	6:00 AM - 6:45 AM	---	$0.10	$0.10	$0.10	$0.10	$0.10
AM3	6:45 AM - 7:15 AM	---	$0.30	$0.30	$0.30	$0.30	$0.30
AM4	7:15 AM - 8:15 AM	---	$0.30	$0.35	$0.35	$0.35	$0.35
AM5	8:15 AM - 8:45 AM	---	$0.30	$0.30	$0.30	$0.30	$0.30
AM6	8:45 AM - 10:00 AM	---	$0.10	$0.10	$0.10	$0.10	$0.10
MD1	10:00 AM - 12:00 PM	---	$0.05	$0.05	$0.05	$0.05	$0.05
MD2	12:00 PM - 3:00 PM	$0.75	$0.10	$0.10	$0.10	$0.10	$0.10
PM1	3:00 PM - 3:30 PM	$2.50	$0.20	$0.20	$0.20	$0.15	$0.15
PM2	3:30 PM - 4:30 PM	$3.25	$0.35	$0.35	$0.25	$0.25	$0.25
PM3	4:30 PM - 6:00 PM	$6.50	$0.40	$0.35	$0.35	$0.35	$0.35
PM4	6:00 PM - 7:00 PM	$2.50	$0.25	$0.25	$0.25	$0.25	$0.20

2025 Eastbound - Minimum Toll $0.35
Per Mile Toll Rate ($) By Toll Zone

	Time Period	I-25	US 36					
		S-1	S-2	S-3	S-4	S-5	S-6	S-7
AM1	5:00 AM - 6:00 AM	$0.75	$0.05	$0.05	$0.05	$0.05	$0.05	$0.05
AM2	6:00 AM - 6:45 AM	$2.75	$0.20	$0.20	$0.20	$0.15	$0.15	$0.15
AM3	6:45 AM - 7:15 AM	$6.50	$0.35	$0.35	$0.35	$0.30	$0.30	$0.25
AM4	7:15 AM - 8:15 AM	$6.50	$0.60	$0.60	$0.55	$0.45	$0.35	$0.35
AM5	8:15 AM - 8:45 AM	$6.50	$0.30	$0.30	$0.30	$0.25	$0.25	$0.25
AM6	8:45 AM - 10:00 AM	$2.00	$0.20	$0.15	$0.15	$0.15	$0.15	$0.15
MD1	10:00 AM - 12:00 PM	---	$0.10	$0.10	$0.10	$0.10	$0.10	$0.10
MD2	12:00 PM - 3:00 PM	---	$0.20	$0.20	$0.20	$0.20	$0.20	$0.20
PM1	3:00 PM - 3:30 PM	---	$0.30	$0.35	$0.30	$0.30	$0.30	$0.25
PM2	3:30 PM - 4:30 PM	---	$0.40	$0.40	$0.40	$0.40	$0.35	$0.35
PM3	4:30 PM - 6:00 PM	---	$0.40	$0.40	$0.35	$0.35	$0.30	$0.30
PM4	6:00 PM - 7:00 PM	---	$0.35	$0.35	$0.30	$0.30	$0.30	$0.30

2035 Westbound - Minimum Toll $0.45
Per Mile Toll Rate ($) By Toll Zone

	Time Period	I-25	US 36				
		N-1	N-2	N-3	N-4	N-5	N-6
AM1	5:00 AM - 6:00 AM	---	$0.05	$0.05	$0.05	$0.05	$0.05
AM2	6:00 AM - 6:45 AM	---	$0.15	$0.15	$0.15	$0.15	$0.15
AM3	6:45 AM - 7:15 AM	---	$0.45	$0.40	$0.45	$0.45	$0.45
AM4	7:15 AM - 8:15 AM	---	$0.45	$0.45	$0.45	$0.45	$0.45
AM5	8:15 AM - 8:45 AM	---	$0.40	$0.40	$0.40	$0.40	$0.40
AM6	8:45 AM - 10:00 AM	---	$0.20	$0.20	$0.20	$0.15	$0.20
MD1	10:00 AM - 12:00 PM	---	$0.15	$0.15	$0.15	$0.15	$0.15
MD2	12:00 PM - 3:00 PM	$1.00	$0.25	$0.25	$0.25	$0.25	$0.20
PM1	3:00 PM - 3:30 PM	$3.25	$0.30	$0.30	$0.30	$0.25	$0.25
PM2	3:30 PM - 4:30 PM	$4.50	$0.50	$0.50	$0.50	$0.45	$0.40
PM3	4:30 PM - 6:00 PM	$8.75	$0.70	$0.55	$0.50	$0.45	$0.50
PM4	6:00 PM - 7:00 PM	$3.25	$0.70	$0.55	$0.50	$0.45	$0.50

2035 Eastbound - Minimum Toll $0.45
Per Mile Toll Rate ($) By Toll Zone

	Time Period	I-25	US 36						
		S-1	S-2	S-3	S-4	S-5	S-6	S-7	
AM1	5:00 AM - 6:00 AM	$1.00	$0.05	$0.05	$0.05	$0.05	$0.05	$0.05	#
AM2	6:00 AM - 6:45 AM	$3.75	$0.30	$0.30	$0.30	$0.30	$0.25	$0.25	
AM3	6:45 AM - 7:15 AM	$8.75	$0.60	$0.55	$0.55	$0.55	$0.45	$0.45	
AM4	7:15 AM - 8:15 AM	$8.75	$0.75	$0.75	$0.75	$0.75	$0.45	$0.45	
AM5	8:15 AM - 8:45 AM	$8.75	$0.50	$0.50	$0.50	$0.50	$0.45	$0.45	
AM6	8:45 AM - 10:00 AM	$2.75	$0.35	$0.35	$0.35	$0.35	$0.25	$0.25	
MD1	10:00 AM - 12:00 PM	---	$0.25	$0.25	$0.25	$0.25	$0.25	$0.25	
MD2	12:00 PM - 3:00 PM	---	$0.30	$0.30	$0.30	$0.30	$0.30	$0.30	
PM1	3:00 PM - 3:30 PM	---	$0.50	$0.50	$0.50	$0.50	$0.45	$0.40	
PM2	3:30 PM - 4:30 PM	---	$0.60	$0.60	$0.60	$0.60	$0.45	$0.45	
PM3	4:30 PM - 6:00 PM	---	$0.70	$0.70	$0.70	$0.60	$0.55	$0.50	
PM4	6:00 PM - 7:00 PM	---	$0.70	$0.70	$0.70	$0.60	$0.55	$0.50	

Note: The toll rates shown on I-25 (N-1 and S-1) are actual tolls and not per-mile toll rate.
All Toll Rates are Shown in Future Year Dollars.

By 2035, toll rates selected to maximize revenue during the AM and PM peak periods increase considerably, resulting in per-mile rates between $0.45 and $0.75 during the AM peak period and between $0.45 and $0.70 during the PM peak period, again depending on direction and tolling zone.

Estimated Average Weekday Traffic

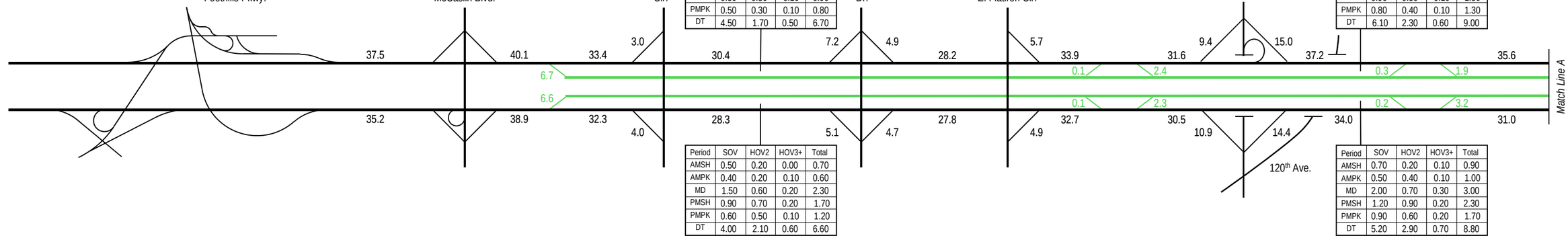
Based on the selected toll rates, estimated average weekday traffic volumes along US 36 and I-25 between Foothills Parkway and I-76 for years 2015, 2025, and 2035 are shown on Figures 5-9, 5-10, and 5-11, respectively. The existing reversible I-25 EXpress Toll Lanes are shown in red and the proposed US 36 Managed Lanes are shown in green, along with proposed ingress and egress locations. General purpose lanes and associated access are shown in black. For the managed lane segments, volumes are broken down by time of day and by vehicle occupancy categories. For example, in the westbound managed lane segment between West Flatiron Circle and Interlocken Loop, SOV traffic in 2015 is estimated to be 4,500 vehicles on an average weekday out of a daily total of 6,700 vehicles, and total PM Peak volume accounts for 800 vehicles out of the daily total of 6,700. Average weekday volumes are also shown for the general purpose lanes, as well as ramps and managed lane ingress and egress locations.

In the eastbound direction, the US 36 Managed Lanes segment with the greatest estimated traffic volumes is in the vicinity of the Federal Boulevard interchange, where the estimated 2015 average weekday volume is 14,200 vehicles increasing to 15,000 vehicles by 2035. The 2015 average weekday volume of 14,200 vehicles is slightly higher than the 13,900 vehicles estimated to use the easternmost segment of the US 36 eastbound managed lane, at Pecos Street. Additionally, 12,000 eastbound vehicles in 2015 are estimated to exit the managed lane before it continues onto the existing I-25 reversible EXpress Toll Lanes. However, 8,900 vehicles out of the 12,000 exiting occurs when the I-25 Express Toll Lanes are not open in the southbound direction. Usage of the US 36 Managed Lanes is estimated to be lower along the most westerly segments of the managed lanes as demand and congestion levels are somewhat lighter than segments that are closer to I-25. In the westbound direction, the US 36 Managed Lanes segment with the greatest estimated traffic volumes is in the vicinity of the Church Ranch Boulevard interchange, where 2015 average weekday traffic is estimated at 10,600 vehicles per day, increasing to 15,200 vehicles by 2035.

Accounting for both general purpose and managed lane traffic, the peak traffic load along the US 36 Managed Lanes corridor occurs just east of Federal Boulevard, where 2015 average weekday traffic is estimated at

Investment Grade Traffic and Revenue Study
US 36 Managed Lanes

Not To Scale

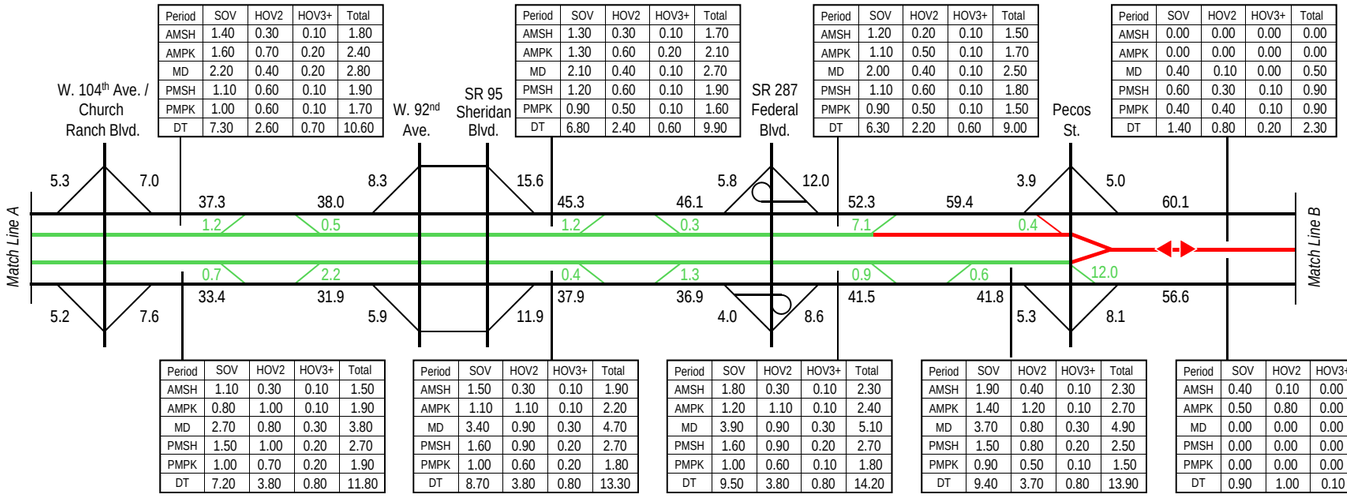


Period	SOV	HOV2	HOV3+	Total
AMSH	1.00	0.20	0.10	1.30
AMPK	1.10	0.50	0.10	1.80
MD	1.40	0.30	0.10	1.80
PMSH	0.50	0.30	0.10	0.90
PMPK	0.50	0.30	0.10	0.80
DT	4.50	1.70	0.50	6.70

Period	SOV	HOV2	HOV3+	Total
AMSH	0.50	0.20	0.00	0.70
AMPK	0.40	0.20	0.10	0.60
MD	1.50	0.60	0.20	2.30
PMSH	0.90	0.70	0.20	1.70
PMPK	0.60	0.50	0.10	1.20
DT	4.00	2.10	0.60	6.60

Period	SOV	HOV2	HOV3+	Total
AMSH	1.20	0.30	0.10	1.60
AMPK	1.40	0.60	0.20	2.20
MD	1.80	0.40	0.10	2.40
PMSH	0.90	0.50	0.10	1.50
PMPK	0.80	0.40	0.10	1.30
DT	6.10	2.30	0.60	9.00

Period	SOV	HOV2	HOV3+	Total
AMSH	0.70	0.20	0.10	0.90
AMPK	0.50	0.40	0.10	1.00
MD	2.00	0.70	0.30	3.00
PMSH	1.20	0.90	0.20	2.30
PMPK	0.90	0.60	0.20	1.70
DT	5.20	2.90	0.70	8.80



Period	SOV	HOV2	HOV3+	Total
AMSH	1.40	0.30	0.10	1.80
AMPK	1.60	0.70	0.20	2.40
MD	2.20	0.40	0.20	2.80
PMSH	1.10	0.60	0.10	1.90
PMPK	1.00	0.60	0.10	1.70
DT	7.30	2.60	0.70	10.60

Period	SOV	HOV2	HOV3+	Total
AMSH	1.30	0.30	0.10	1.70
AMPK	1.30	0.60	0.20	2.10
MD	2.10	0.40	0.10	2.70
PMSH	1.20	0.60	0.10	1.90
PMPK	0.90	0.50	0.10	1.60
DT	6.80	2.40	0.60	9.90

Period	SOV	HOV2	HOV3+	Total
AMSH	1.20	0.20	0.10	1.50
AMPK	1.10	0.50	0.10	1.70
MD	2.00	0.40	0.10	2.50
PMSH	1.10	0.60	0.10	1.80
PMPK	0.90	0.50	0.10	1.50
DT	6.30	2.20	0.60	9.00

Period	SOV	HOV2	HOV3+	Total
AMSH	0.00	0.00	0.00	0.00
AMPK	0.00	0.00	0.00	0.00
MD	0.40	0.10	0.00	0.50
PMSH	0.60	0.30	0.10	0.90
PMPK	0.40	0.40	0.10	0.90
DT	1.40	0.80	0.20	2.30

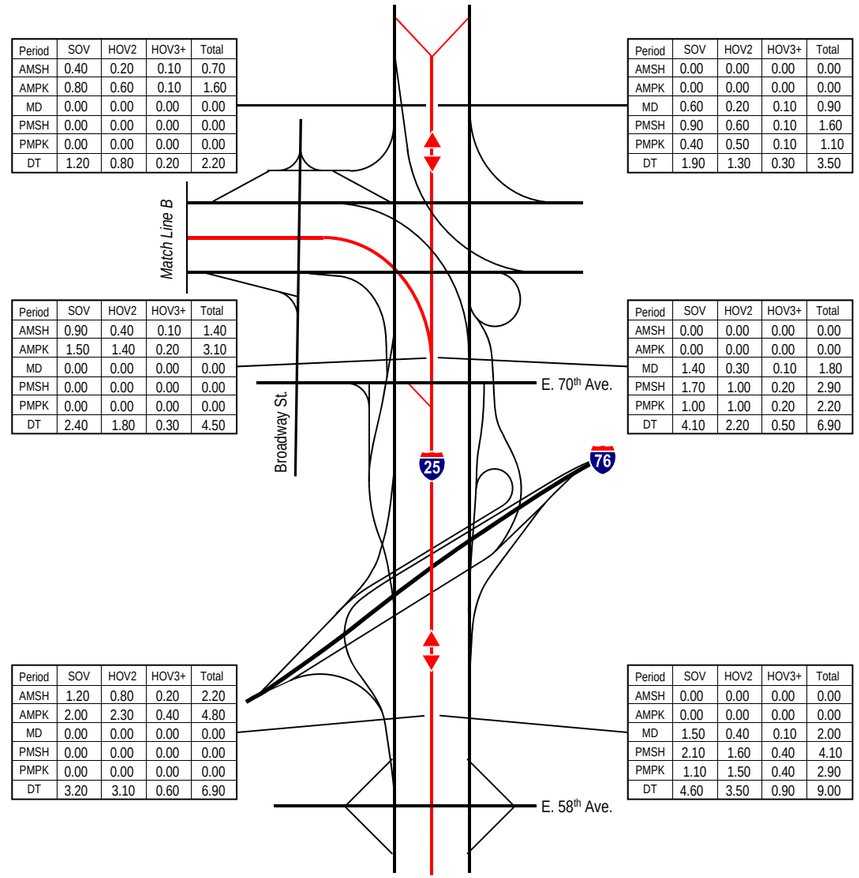
Period	SOV	HOV2	HOV3+	Total
AMSH	1.10	0.30	0.10	1.50
AMPK	0.80	1.00	0.10	1.90
MD	2.70	0.80	0.30	3.80
PMSH	1.50	1.00	0.20	2.70
PMPK	1.00	0.70	0.20	1.90
DT	7.20	3.80	0.80	11.80

Period	SOV	HOV2	HOV3+	Total
AMSH	1.50	0.30	0.10	1.90
AMPK	1.10	1.10	0.10	2.20
MD	3.40	0.90	0.30	4.70
PMSH	1.60	0.90	0.20	2.70
PMPK	1.00	0.60	0.20	1.80
DT	8.70	3.80	0.80	13.30

Period	SOV	HOV2	HOV3+	Total
AMSH	1.80	0.30	0.10	2.30
AMPK	1.20	1.10	0.10	2.40
MD	3.90	0.90	0.30	5.10
PMSH	1.60	0.90	0.20	2.70
PMPK	1.00	0.60	0.10	1.80
DT	9.50	3.80	0.80	14.20

Period	SOV	HOV2	HOV3+	Total
AMSH	1.90	0.40	0.10	2.30
AMPK	1.40	1.20	0.10	2.70
MD	3.70	0.80	0.30	4.90
PMSH	1.50	0.80	0.20	2.50
PMPK	0.90	0.50	0.10	1.50
DT	9.40	3.70	0.80	13.90

Period	SOV	HOV2	HOV3+	Total
AMSH	0.40	0.10	0.00	0.60
AMPK	0.50	0.80	0.00	1.40
MD	0.00	0.00	0.00	0.00
PMSH	0.00	0.00	0.00	0.00
PMPK	0.00	0.00	0.00	0.00
DT	0.90	1.00	0.10	1.90



Period	SOV	HOV2	HOV3+	Total
AMSH	0.40	0.20	0.10	0.70
AMPK	0.80	0.60	0.10	1.60
MD	0.00	0.00	0.00	0.00
PMSH	0.00	0.00	0.00	0.00
PMPK	0.00	0.00	0.00	0.00
DT	1.20	0.80	0.20	2.20

Period	SOV	HOV2	HOV3+	Total
AMSH	0.00	0.00	0.00	0.00
AMPK	0.00	0.00	0.00	0.00
MD	0.60	0.20	0.10	0.90
PMSH	0.90	0.60	0.10	1.60
PMPK	0.40	0.50	0.10	1.10
DT	1.90	1.30	0.30	3.50

Period	SOV	HOV2	HOV3+	Total
AMSH	0.90	0.40	0.10	1.40
AMPK	1.50	1.40	0.20	3.10
MD	0.00	0.00	0.00	0.00
PMSH	0.00	0.00	0.00	0.00
PMPK	0.00	0.00	0.00	0.00
DT	2.40	1.80	0.30	4.50

Period	SOV	HOV2	HOV3+	Total
AMSH	0.00	0.00	0.00	0.00
AMPK	0.00	0.00	0.00	0.00
MD	1.40	0.30	0.10	1.80
PMSH	1.70	1.00	0.20	2.90
PMPK	1.00	1.00	0.20	2.20
DT	4.10	2.20	0.50	6.90

Period	SOV	HOV2	HOV3+	Total
AMSH	1.20	0.80	0.20	2.20
AMPK	2.00	2.30	0.40	4.80
MD	0.00	0.00	0.00	0.00
PMSH	0.00	0.00	0.00	0.00
PMPK	0.00	0.00	0.00	0.00
DT	3.20	3.10	0.60	6.90

Period	SOV	HOV2	HOV3+	Total
AMSH	0.00	0.00	0.00	0.00
AMPK	0.00	0.00	0.00	0.00
MD	1.50	0.40	0.10	2.00
PMSH	2.10	1.60	0.40	4.10
PMPK	1.10	1.50	0.40	2.90
DT	4.60	3.50	0.90	9.00

LEGEND

- I-25 EXpress Toll Lanes (ETL)
- US 36 Managed Lanes (ML)
- General Purpose Lanes
- ETL / ML Ramp
- 0.0 General Purpose Mainline Total Daytime Volumes (does not include night)
- 0.0 Managed Lane Ramp Total Daytime Volumes (does not include night)

AMSH	(AM Shoulder) 5:00-6:45 AM, 8:45-10:00 AM
AMPK	(AM Peak) 6:45-8:45 AM
MD	(Midday) 10:00 AM-3:00 PM
PMSH	(PM Shoulder) 3:00-4:30 PM, 6:00-7:00 PM
PMPK	(PM Peak) 4:30-6:00 PM
DT	(Daytime) 5:00 AM-7:00 PM

Note: All volumes shown represent thousands of vehicles.

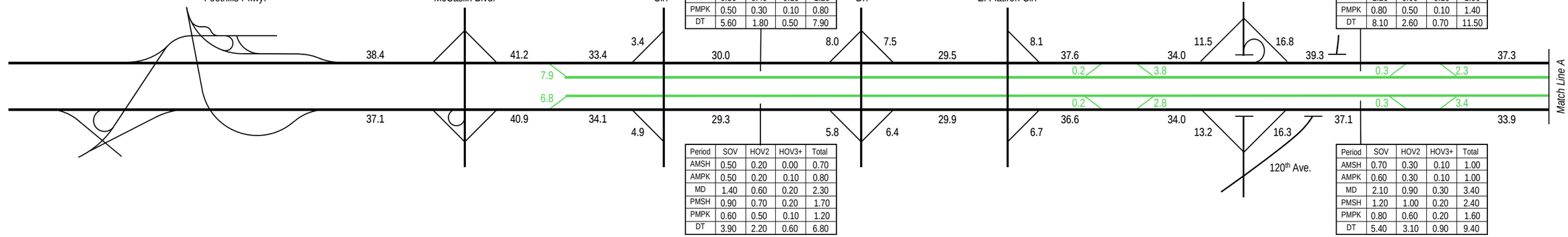
WilburSmith ASSOCIATES

2015 ESTIMATED AVERAGE WEEKDAY TRAFFIC VOLUMES

FIGURE 5-9

Investment Grade Traffic and Revenue Study
US 36 Managed Lanes

Not To Scale

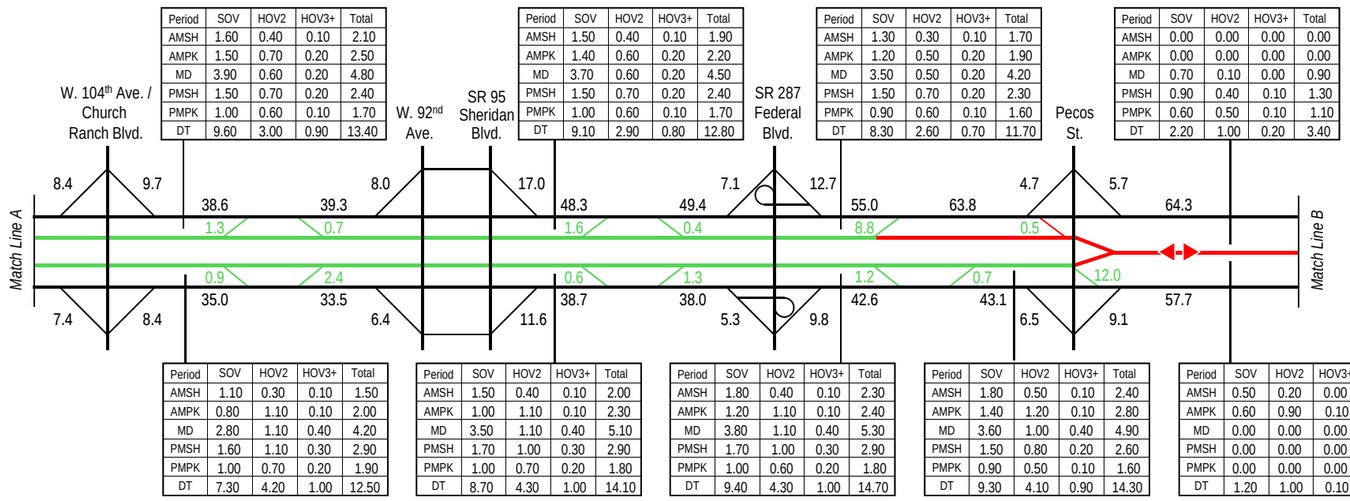


Period	SOV	HOV2	HOV3+	Total
AMSH	1.00	0.30	0.10	1.40
AMPK	1.10	0.50	0.10	1.70
MD	2.30	0.40	0.10	2.80
PMSH	0.80	0.40	0.10	1.20
PMPK	0.50	0.30	0.10	0.80
DT	5.60	1.80	0.50	7.90

Period	SOV	HOV2	HOV3+	Total
AMSH	0.50	0.20	0.00	0.70
AMPK	0.50	0.20	0.10	0.80
MD	1.40	0.60	0.20	2.30
PMSH	0.90	0.70	0.20	1.70
PMPK	0.60	0.50	0.10	1.20
DT	3.90	2.20	0.60	6.80

Period	SOV	HOV2	HOV3+	Total
AMSH	1.40	0.40	0.10	1.80
AMPK	1.40	0.70	0.20	2.20
MD	3.40	0.60	0.20	4.10
PMSH	1.20	0.60	0.10	1.90
PMPK	0.80	0.50	0.10	1.40
DT	8.10	2.60	0.70	11.50

Period	SOV	HOV2	HOV3+	Total
AMSH	0.70	0.30	0.10	1.00
AMPK	0.60	0.30	0.10	1.00
MD	2.10	0.90	0.30	3.40
PMSH	1.20	1.00	0.20	2.40
PMPK	0.80	0.60	0.20	1.60
DT	5.40	3.10	0.90	9.40



Period	SOV	HOV2	HOV3+	Total
AMSH	1.60	0.40	0.10	2.10
AMPK	1.50	0.70	0.20	2.50
MD	3.90	0.60	0.20	4.80
PMSH	1.50	0.70	0.20	2.40
PMPK	1.00	0.60	0.10	1.70
DT	9.60	3.00	0.90	13.40

Period	SOV	HOV2	HOV3+	Total
AMSH	1.50	0.40	0.10	1.90
AMPK	1.40	0.60	0.20	2.20
MD	3.70	0.60	0.20	4.50
PMSH	1.50	0.70	0.20	2.40
PMPK	1.00	0.60	0.10	1.70
DT	9.10	2.90	0.80	12.80

Period	SOV	HOV2	HOV3+	Total
AMSH	1.30	0.30	0.10	1.70
AMPK	1.20	0.50	0.20	1.90
MD	3.50	0.50	0.20	4.20
PMSH	1.50	0.70	0.20	2.30
PMPK	0.90	0.60	0.10	1.60
DT	8.30	2.60	0.70	11.70

Period	SOV	HOV2	HOV3+	Total
AMSH	0.00	0.00	0.00	0.00
AMPK	0.00	0.00	0.00	0.00
MD	0.70	0.10	0.00	0.90
PMSH	0.90	0.40	0.10	1.30
PMPK	0.60	0.50	0.10	1.10
DT	2.20	1.00	0.20	3.40

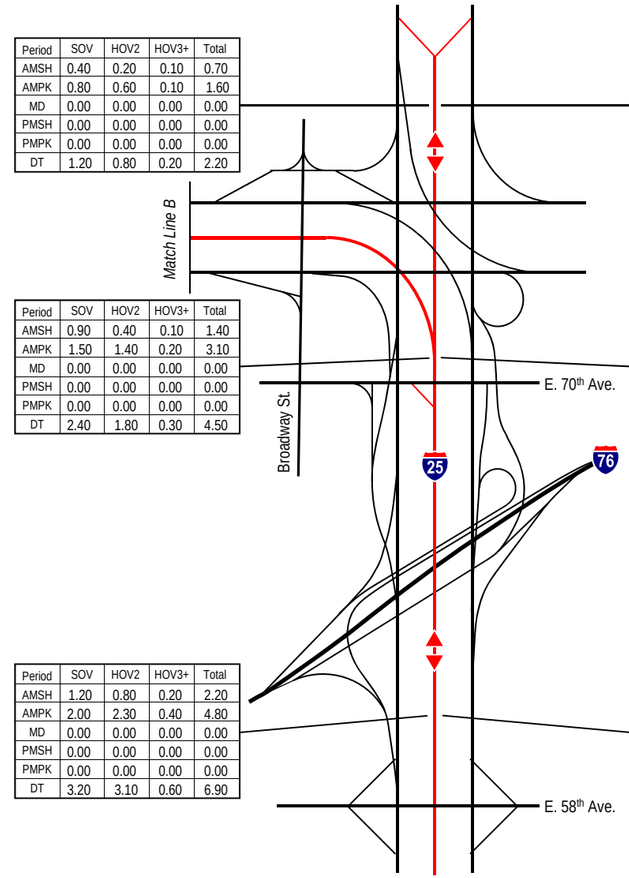
Period	SOV	HOV2	HOV3+	Total
AMSH	1.10	0.30	0.10	1.50
AMPK	0.80	1.10	0.10	2.00
MD	2.80	1.10	0.40	4.20
PMSH	1.60	1.10	0.30	2.90
PMPK	1.00	0.70	0.20	1.90
DT	7.30	4.20	1.00	12.50

Period	SOV	HOV2	HOV3+	Total
AMSH	1.50	0.40	0.10	2.00
AMPK	1.00	1.10	0.10	2.30
MD	3.50	1.10	0.40	5.10
PMSH	1.70	1.00	0.30	2.90
PMPK	1.00	0.70	0.20	1.80
DT	8.70	4.30	1.00	14.10

Period	SOV	HOV2	HOV3+	Total
AMSH	1.80	0.40	0.10	2.30
AMPK	1.20	1.10	0.10	2.40
MD	3.80	1.10	0.40	5.30
PMSH	1.70	1.00	0.30	2.90
PMPK	1.00	0.60	0.20	1.80
DT	9.40	4.30	1.00	14.70

Period	SOV	HOV2	HOV3+	Total
AMSH	1.80	0.50	0.10	2.40
AMPK	1.40	1.20	0.10	2.80
MD	3.60	1.00	0.40	4.90
PMSH	1.50	0.80	0.20	2.60
PMPK	0.90	0.50	0.10	1.60
DT	9.30	4.10	0.90	14.30

Period	SOV	HOV2	HOV3+	Total
AMSH	0.50	0.20	0.00	0.70
AMPK	0.60	0.90	0.10	1.60
MD	0.00	0.00	0.00	0.00
PMSH	0.00	0.00	0.00	0.00
PMPK	0.00	0.00	0.00	0.00
DT	1.20	1.00	0.10	2.30



Period	SOV	HOV2	HOV3+	Total
AMSH	0.40	0.20	0.10	0.70
AMPK	0.80	0.60	0.10	1.60
MD	0.00	0.00	0.00	0.00
PMSH	0.00	0.00	0.00	0.00
PMPK	0.00	0.00	0.00	0.00
DT	1.20	0.80	0.20	2.20

Period	SOV	HOV2	HOV3+	Total
AMSH	0.00	0.00	0.00	0.00
AMPK	0.00	0.00	0.00	0.00
MD	0.60	0.20	0.10	0.90
PMSH	0.90	0.60	0.10	1.60
PMPK	0.60	0.50	0.10	1.10
DT	1.90	1.30	0.30	3.50

Period	SOV	HOV2	HOV3+	Total
AMSH	0.90	0.40	0.10	1.40
AMPK	1.50	1.40	0.20	3.10
MD	0.00	0.00	0.00	0.00
PMSH	0.00	0.00	0.00	0.00
PMPK	0.00	0.00	0.00	0.00
DT	2.40	1.80	0.30	4.50

Period	SOV	HOV2	HOV3+	Total
AMSH	0.00	0.00	0.00	0.00
AMPK	0.00	0.00	0.00	0.00
MD	1.40	0.30	0.10	1.80
PMSH	1.70	1.00	0.20	2.90
PMPK	1.00	1.00	0.20	2.20
DT	4.10	2.20	0.50	6.90

Period	SOV	HOV2	HOV3+	Total
AMSH	1.20	0.80	0.20	2.20
AMPK	2.00	2.30	0.40	4.80
MD	0.00	0.00	0.00	0.00
PMSH	0.00	0.00	0.00	0.00
PMPK	0.00	0.00	0.00	0.00
DT	3.20	3.10	0.60	6.90

Period	SOV	HOV2	HOV3+	Total
AMSH	0.00	0.00	0.00	0.00
AMPK	0.00	0.00	0.00	0.00
MD	1.50	0.40	0.10	2.00
PMSH	2.10	1.60	0.40	4.10
PMPK	1.10	1.50	0.40	2.90
DT	4.60	3.50	0.90	9.00

LEGEND

- I-25 EXpress Toll Lanes (ETL)
- US 36 Managed Lanes (ML)
- General Purpose Lanes
- ETL / ML Ramp
- 0.0 General Purpose Mainline Total Daytime Volumes (does not include night)
- 0.0 Managed Lane Ramp Total Daytime Volumes (does not include night)

AMSH	(AM Shoulder) 5:00-6:45 AM, 8:45-10:00 AM
AMPK	(AM Peak) 6:45-8:45 AM
MD	(Midday) 10:00 AM-3:00 PM
PMSH	(PM Shoulder) 3:00-4:30 PM, 6:00-7:00 PM
PMPK	(PM Peak) 4:30-6:00 PM
DT	(Daytime) 5:00 AM-7:00 PM

Note: All volumes shown represent thousands of vehicles.

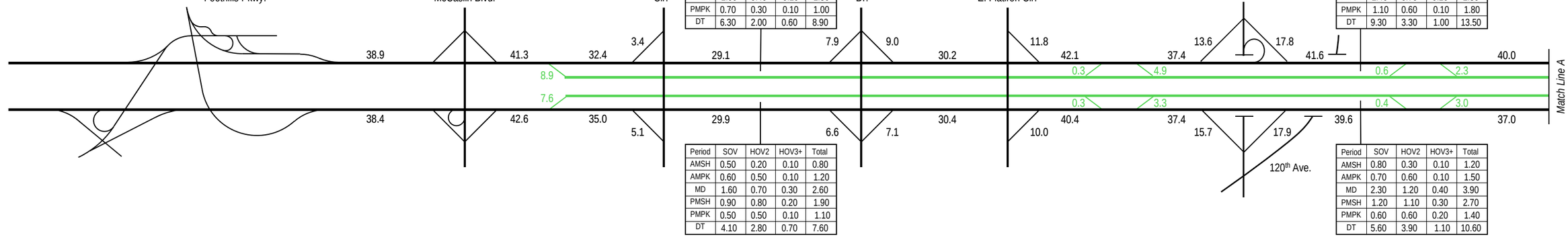
WilburSmith ASSOCIATES

2025 ESTIMATED AVERAGE WEEKDAY TRAFFIC VOLUMES

FIGURE 5-10

Investment Grade Traffic and Revenue Study
US 36 Managed Lanes

Not To Scale

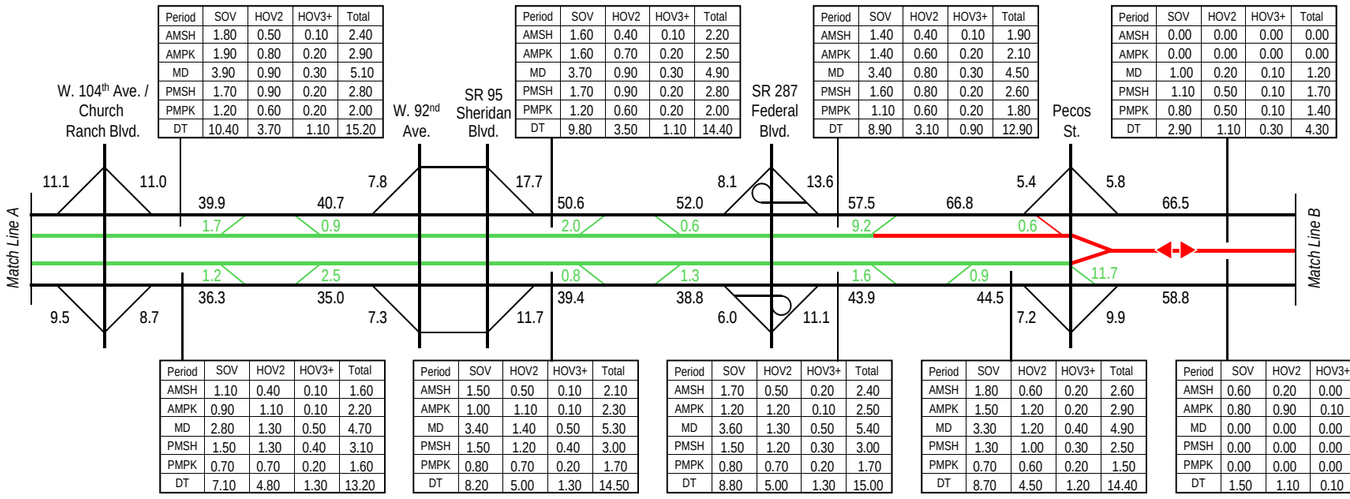


Period	SOV	HOV2	HOV3+	Total
AMSH	1.20	0.30	0.10	1.50
AMPK	1.30	0.50	0.10	1.90
MD	2.30	0.50	0.20	3.00
PMSH	1.00	0.40	0.10	1.50
PMPK	0.70	0.30	0.10	1.00
DT	6.30	2.00	0.60	8.90

Period	SOV	HOV2	HOV3+	Total
AMSH	1.50	0.40	0.10	2.10
AMPK	1.70	0.70	0.20	2.60
MD	3.50	0.80	0.30	4.70
PMSH	1.40	0.70	0.20	2.30
PMPK	1.10	0.60	0.10	1.80
DT	9.30	3.30	1.00	13.50

Period	SOV	HOV2	HOV3+	Total
AMSH	0.50	0.20	0.10	0.80
AMPK	0.60	0.50	0.10	1.20
MD	1.60	0.70	0.30	2.60
PMSH	0.90	0.80	0.20	1.90
PMPK	0.50	0.50	0.10	1.10
DT	4.10	2.80	0.70	7.60

Period	SOV	HOV2	HOV3+	Total
AMSH	0.80	0.30	0.10	1.20
AMPK	0.70	0.60	0.10	1.50
MD	2.30	1.20	0.40	3.90
PMSH	1.20	1.10	0.30	2.70
PMPK	0.60	0.60	0.20	1.40
DT	5.60	3.90	1.10	10.60



Period	SOV	HOV2	HOV3+	Total
AMSH	1.80	0.50	0.10	2.40
AMPK	1.90	0.80	0.20	2.90
MD	3.90	0.90	0.30	5.10
PMSH	1.70	0.90	0.20	2.80
PMPK	1.20	0.60	0.20	2.00
DT	10.40	3.70	1.10	15.20

Period	SOV	HOV2	HOV3+	Total
AMSH	1.10	0.40	0.10	1.60
AMPK	0.90	1.10	0.10	2.20
MD	2.80	1.30	0.50	4.70
PMSH	1.50	1.30	0.40	3.10
PMPK	0.70	0.70	0.20	1.60
DT	7.10	4.80	1.30	13.20

Period	SOV	HOV2	HOV3+	Total
AMSH	1.60	0.40	0.10	2.20
AMPK	1.60	0.70	0.20	2.50
MD	3.70	0.90	0.30	4.90
PMSH	1.70	0.90	0.20	2.80
PMPK	1.20	0.60	0.20	2.00
DT	9.80	3.50	1.10	14.40

Period	SOV	HOV2	HOV3+	Total
AMSH	1.50	0.50	0.10	2.10
AMPK	1.00	1.10	0.10	2.30
MD	3.40	1.40	0.50	5.30
PMSH	1.50	1.20	0.40	3.00
PMPK	0.80	0.70	0.20	1.70
DT	8.20	5.00	1.30	14.50

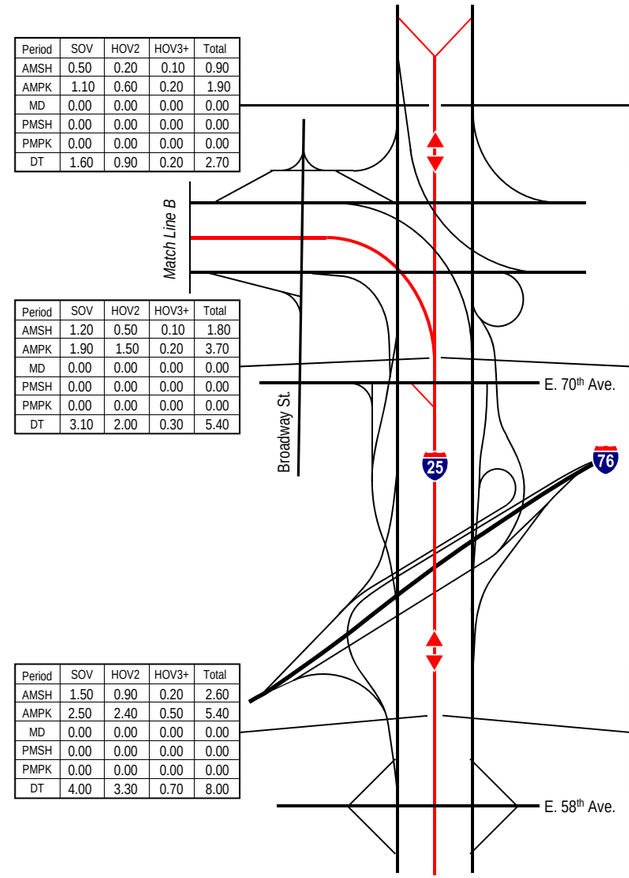
Period	SOV	HOV2	HOV3+	Total
AMSH	1.40	0.40	0.10	1.90
AMPK	1.40	0.60	0.20	2.10
MD	3.40	0.80	0.30	4.50
PMSH	1.60	0.80	0.20	2.60
PMPK	1.10	0.60	0.20	1.80
DT	8.90	3.10	0.90	12.90

Period	SOV	HOV2	HOV3+	Total
AMSH	1.70	0.50	0.20	2.40
AMPK	1.20	1.20	0.10	2.50
MD	3.60	1.30	0.50	5.40
PMSH	1.50	1.20	0.30	3.00
PMPK	0.80	0.70	0.20	1.70
DT	8.80	5.00	1.30	15.00

Period	SOV	HOV2	HOV3+	Total
AMSH	1.80	0.60	0.20	2.60
AMPK	1.50	1.20	0.20	2.90
MD	3.30	1.20	0.40	4.90
PMSH	1.30	1.00	0.30	2.50
PMPK	0.70	0.60	0.20	1.50
DT	8.70	4.50	1.20	14.40

Period	SOV	HOV2	HOV3+	Total
AMSH	0.00	0.00	0.00	0.00
AMPK	0.00	0.00	0.00	0.00
MD	1.00	0.20	0.10	1.20
PMSH	1.10	0.50	0.10	1.70
PMPK	0.80	0.50	0.10	1.40
DT	2.90	1.10	0.30	4.30

Period	SOV	HOV2	HOV3+	Total
AMSH	0.60	0.20	0.00	0.90
AMPK	0.80	0.90	0.10	1.80
MD	0.00	0.00	0.00	0.00
PMSH	0.00	0.00	0.00	0.00
PMPK	0.00	0.00	0.00	0.00
DT	1.50	1.10	0.10	2.70



Period	SOV	HOV2	HOV3+	Total
AMSH	0.50	0.20	0.10	0.90
AMPK	1.10	0.60	0.20	1.90
MD	0.00	0.00	0.00	0.00
PMSH	0.00	0.00	0.00	0.00
PMPK	0.00	0.00	0.00	0.00
DT	1.60	0.90	0.20	2.70

Period	SOV	HOV2	HOV3+	Total
AMSH	0.00	0.00	0.00	0.00
AMPK	0.00	0.00	0.00	0.00
MD	0.90	0.20	0.10	1.10
PMSH	1.30	0.60	0.20	2.10
PMPK	0.60	0.60	0.10	1.40
DT	2.80	1.40	0.40	4.50

Period	SOV	HOV2	HOV3+	Total
AMSH	1.20	0.50	0.10	1.80
AMPK	1.90	1.50	0.20	3.70
MD	0.00	0.00	0.00	0.00
PMSH	0.00	0.00	0.00	0.00
PMPK	0.00	0.00	0.00	0.00
DT	3.10	2.00	0.30	5.40

Period	SOV	HOV2	HOV3+	Total
AMSH	0.00	0.00	0.00	0.00
AMPK	0.00	0.00	0.00	0.00
MD	1.90	0.30	0.10	2.40
PMSH	2.40	1.10	0.30	3.70
PMPK	1.50	1.10	0.30	2.80
DT	5.70	2.50	0.70	8.90

Period	SOV	HOV2	HOV3+	Total
AMSH	1.50	0.90	0.20	2.60
AMPK	2.50	2.40	0.50	5.40
MD	0.00	0.00	0.00	0.00
PMSH	0.00	0.00	0.00	0.00
PMPK	0.00	0.00	0.00	0.00
DT	4.00	3.30	0.70	8.00

Period	SOV	HOV2	HOV3+	Total
AMSH	0.00	0.00	0.00	0.00
AMPK	0.00	0.00	0.00	0.00
MD	2.10	0.40	0.20	2.70
PMSH	2.90	1.80	0.50	5.20
PMPK	1.60	1.60	0.40	3.60
DT	6.60	3.90	1.00	11.50

LEGEND

- I-25 EXpress Toll Lanes (ETL)
- US 36 Managed Lanes (ML)
- General Purpose Lanes
- ETL / ML Ramp
- 0.0 General Purpose Mainline Total Daytime Volumes (does not include night)
- 0.0 Managed Lane Ramp Total Daytime Volumes (does not include night)

AMSH	(AM Shoulder) 5:00-6:45 AM, 8:45-10:00 AM
AMPK	(AM Peak) 6:45-8:45 AM
MD	(Midday) 10:00 AM-3:00 PM
PMSH	(PM Shoulder) 3:00-4:30 PM, 6:00-7:00 PM
PMPK	(PM Peak) 4:30-6:00 PM
DT	(Daytime) 5:00 AM-7:00 PM

Note: All volumes shown represent thousands of vehicles.

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2035 ESTIMATED AVERAGE WEEKDAY TRAFFIC VOLUMES

FIGURE 5-11

117,000 vehicles, increasing to 129,300 vehicles by 2035. In 2015, approximately 23,200 vehicles on an average weekday at this cross-section, or 19.8 percent of total estimated weekday traffic is expected to utilize the US 36 Managed Lanes. This share increases to 21.6 percent, or an estimated 27,900 vehicles, by 2035. At this location, total traffic is estimated to grow at an average annual rate of 0.5 percent per year between 2015 and 2035, while US 36 Managed Lanes traffic grows at 0.9 percent per year. The segment of the corridor with the highest expected growth rate between 2015 and 2035 is the segment between East Flatiron Circle and Wadsworth Parkway, where total traffic is estimated to increase from 79,900 vehicles per day in 2015 to 99,000 vehicles in 2035, for an average annual growth rate of 1.1 percent per year.

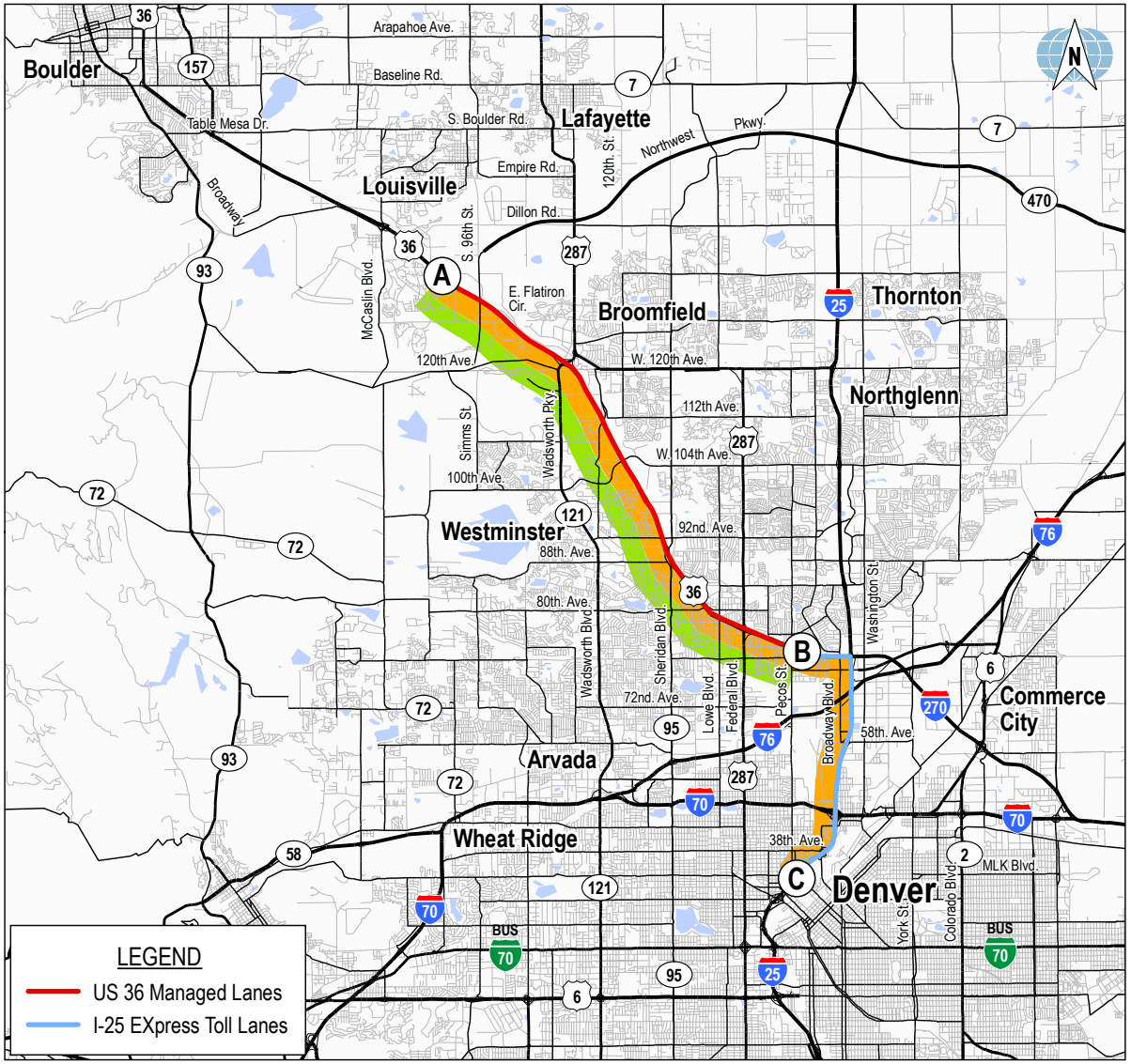
Total average weekday traffic in 2015 on the I-25 EXpress Toll Lanes is estimated at 5,600 and 5,900 vehicles in the southbound and northbound directions, respectively. About 35 percent of those vehicles are directed to and from the US 36 corridor, while the remaining vehicles utilize either the East 70th Avenue connection or are heading to and from I-25 north.

Typical Time Savings Via US 36 and I-25 Managed lanes

Given the toll-free option provided by the US 36 and I-25 general purpose lanes, motorists will choose to pay a toll to use the US 36 Managed Lanes and I-25 EXpress Toll Lanes primarily to save driving time. Hence, time savings for typical movements provide useful insights into the operating conditions and into the rationale of why motorists would pay to use the lanes.

Figures 5-12 through 5-15 present estimated time savings for a couple of typical movements during the AM peak (7:15 – 8:15 AM) and the PM peak (4:30 – 6:00 PM) and are provided at 2015, 2025 and 2035 levels. As shown in the figures, Location A is west of West Flatiron Circle at the western terminus of the proposed US 36 Managed Lanes. Location B is on US 36 at Pecos Street, where the proposed US 36 Managed Lanes will connect with the existing I-25 EXpress Toll Lanes. Location C is on I-25 at 20th Street at the southern terminus of the I-25 EXpress Toll Lanes.

For the AM peak, two movements are presented in Figure 5-12 in the eastbound / southbound direction. During this time period, the peak direction is south on I-25 and east towards Denver on US 36 east of Sheridan Boulevard. West of Sheridan Boulevard on US 36, the peak direction is west towards Boulder. For a movement from A to B, covering a distance of 11.3 miles, use of the US 36 Managed Lanes in 2015 during the AM peak would save an estimated 7.7 minutes. The time savings provided by the proposed US 36 Managed Lanes for this movement are



2015

	AM Peak Eastbound	
	Movement A-B (11.3 Miles)	
	GP Lanes	MLs
Travel Time (Minutes)	18.2	10.5
Time Saved (Minutes)	7.7	

	AM Peak Eastbound	
	Movement A-C (17.4 Miles)	
	GP Lanes	MLs
Travel Time (Minutes)	39.1	16.7
Time Saved (Minutes)	22.4	

2025

	AM Peak Eastbound	
	Movement A-B (11.3 Miles)	
	GP Lanes	MLs
Travel Time (Minutes)	20.4	10.6
Time Saved (Minutes)	9.8	

	AM Peak Eastbound	
	Movement A-C (17.4 Miles)	
	GP Lanes	MLs
Travel Time (Minutes)	46.5	16.9
Time Saved (Minutes)	29.6	

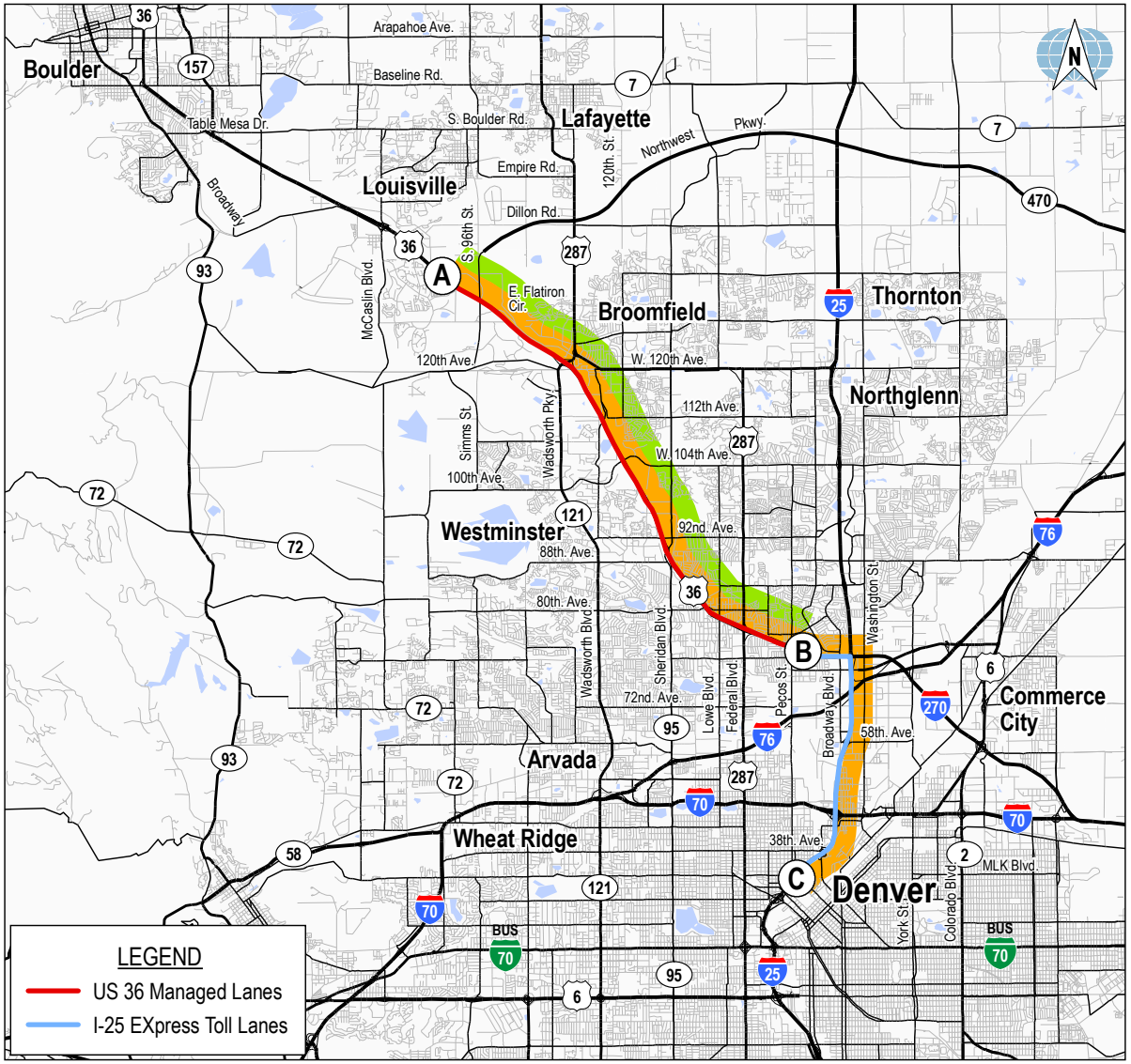
2035

	AM Peak Eastbound	
	Movement A-B (11.3 Miles)	
	GP Lanes	MLs
Travel Time (Minutes)	23.4	10.6
Time Saved (Minutes)	12.8	

	AM Peak Eastbound	
	Movement A-C (17.4 Miles)	
	GP Lanes	MLs
Travel Time (Minutes)	54.2	17.3
Time Saved (Minutes)	36.9	

Note: I-25 EXpress Toll Lanes unavailable Northbound during the AM Peak and Southbound during the PM Peak.

TYPICAL TIME SAVINGS VIA MANAGED LANES
REVENUE MAXIMIZATION - EASTBOUND AM PEAK (7:15-8:15 AM)



2015

	AM Peak Westbound Movement B-A (10.5 Miles)	
	GP Lanes	MLs
Travel Time (Minutes)	17.0	9.8
Time Saved (Minutes)	7.2	

	AM Peak Westbound Movement C-A (17.3 Miles)	
	GP Lanes	MLs
Travel Time (Minutes)	26.2	19.0
Time Saved (Minutes)	7.2	

2025

	AM Peak Westbound Movement B-A (10.5 Miles)	
	GP Lanes	MLs
Travel Time (Minutes)	19.6	9.9
Time Saved (Minutes)	9.7	

	AM Peak Westbound Movement C-A (17.3 Miles)	
	GP Lanes	MLs
Travel Time (Minutes)	29.5	19.8
Time Saved (Minutes)	9.7	

2035

	AM Peak Westbound Movement B-A (10.5 Miles)	
	GP Lanes	MLs
Travel Time (Minutes)	23.9	10.0
Time Saved (Minutes)	13.9	

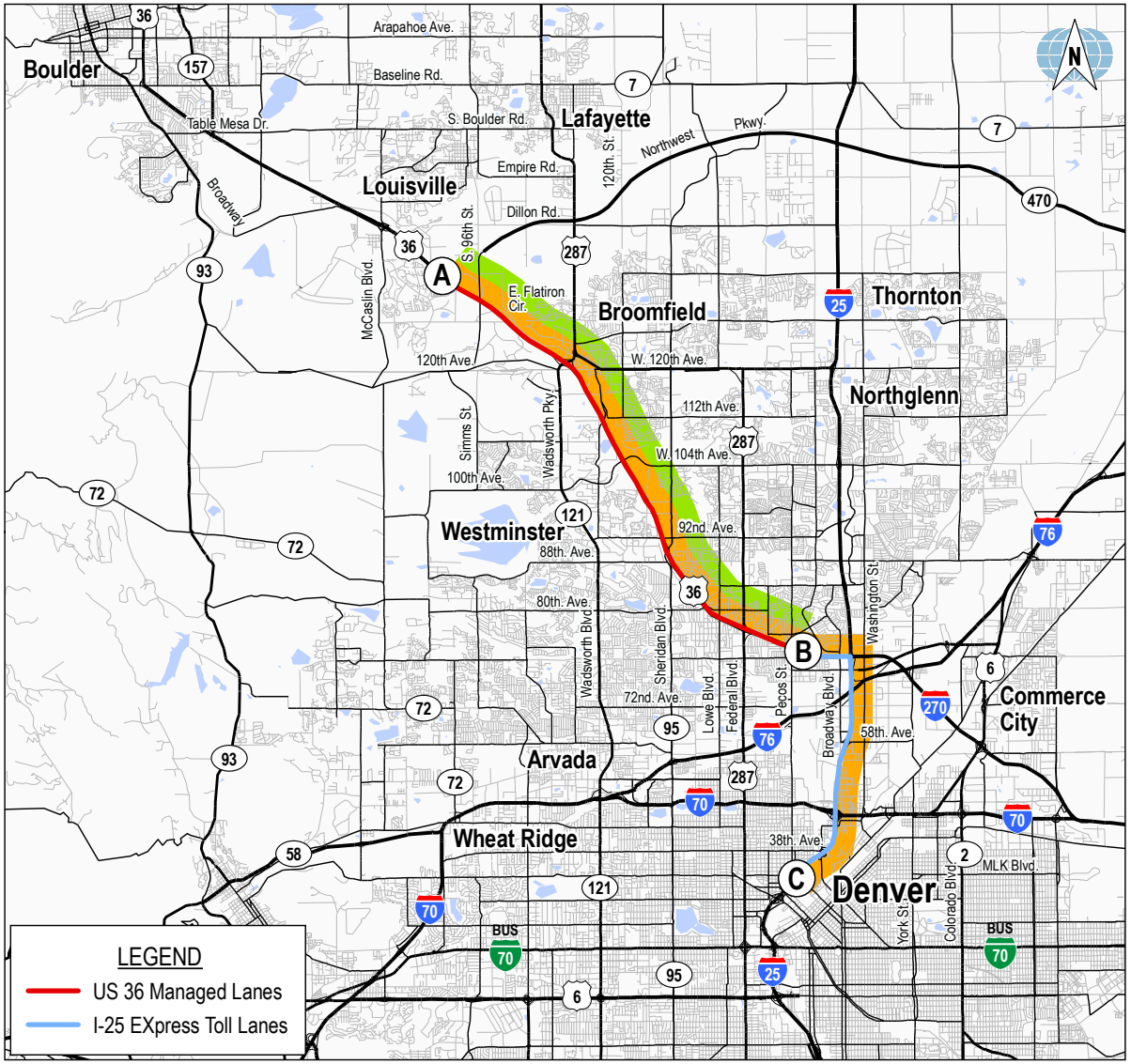
	AM Peak Westbound Movement C-A (17.3 Miles)	
	GP Lanes	MLs
Travel Time (Minutes)	34.6	20.7
Time Saved (Minutes)	13.9	

Note: I-25 EXpress Toll Lanes unavailable Northbound during the AM Peak and Southbound during the PM Peak.

TYPICAL TIME SAVINGS VIA MANAGED LANES
REVENUE MAXIMIZATION - WESTBOUND AM PEAK (7:15-8:15 AM)

WilburSmith ASSOCIATES

FIGURE 5-13



2015

	PM Peak Westbound	
	Movement B-A (10.5 Miles)	
	GP Lanes	MLs
Travel Time (Minutes)	16.6	9.9
Time Saved (Minutes)	6.7	

	PM Peak Westbound	
	Movement C-A (17.3 Miles)	
	GP Lanes	MLs
Travel Time (Minutes)	33.6	16.6
Time Saved (Minutes)	17.0	

2025

	PM Peak Westbound	
	Movement B-A (10.5 Miles)	
	GP Lanes	MLs
Travel Time (Minutes)	19.9	9.9
Time Saved (Minutes)	10.0	

	PM Peak Westbound	
	Movement C-A (17.3 Miles)	
	GP Lanes	MLs
Travel Time (Minutes)	39.9	16.7
Time Saved (Minutes)	23.2	

2035

	PM Peak Westbound	
	Movement B-A (10.5 Miles)	
	GP Lanes	MLs
Travel Time (Minutes)	23.7	9.9
Time Saved (Minutes)	13.8	

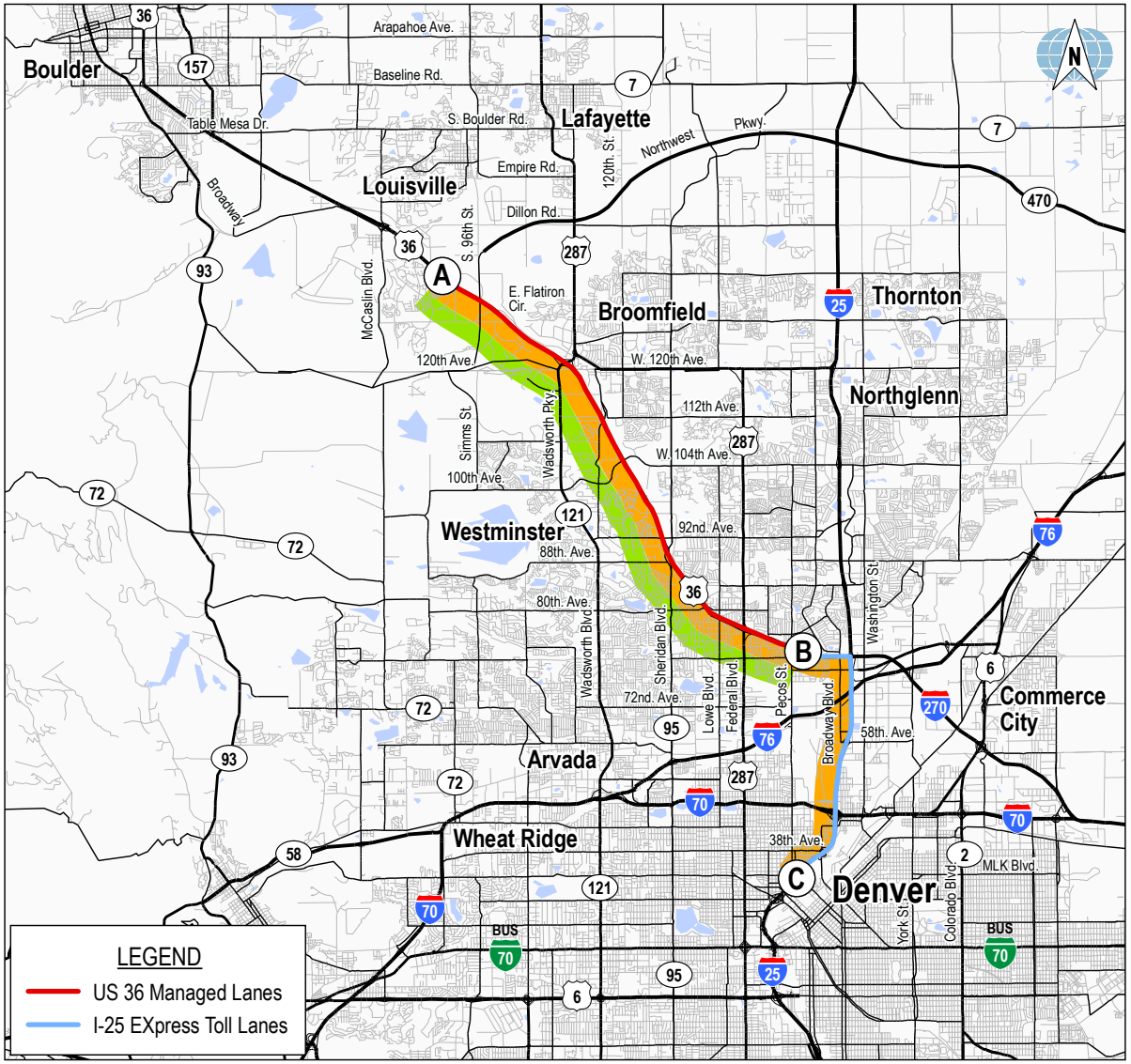
	PM Peak Westbound	
	Movement C-A (17.3 Miles)	
	GP Lanes	MLs
Travel Time (Minutes)	46.7	16.7
Time Saved (Minutes)	30.0	

Note: I-25 EXpress Toll Lanes unavailable Northbound during the AM Peak and Southbound during the PM Peak.

TYPICAL TIME SAVINGS VIA MANAGED LANES
REVENUE MAXIMIZATION - WESTBOUND PM PEAK (4:30-6:00 PM)

WilburSmith ASSOCIATES

FIGURE 5-14



2015

PM Peak Eastbound		
Movement A-B (11.3 Miles)		
	GP Lanes	MLs
Travel Time (Minutes)	20.0	10.5
Time Saved (Minutes)	9.5	

PM Peak Eastbound		
Movement A-C (17.4 Miles)		
	GP Lanes	MLs
Travel Time (Minutes)	34.0	24.5
Time Saved (Minutes)	9.5	

2025

PM Peak Eastbound		
Movement A-B (11.3 Miles)		
	GP Lanes	MLs
Travel Time (Minutes)	21.3	10.5
Time Saved (Minutes)	10.8	

PM Peak Eastbound		
Movement A-C (17.4 Miles)		
	GP Lanes	MLs
Travel Time (Minutes)	36.5	25.7
Time Saved (Minutes)	10.8	

2035

PM Peak Eastbound		
Movement A-B (11.3 Miles)		
	GP Lanes	MLs
Travel Time (Minutes)	22.4	10.5
Time Saved (Minutes)	11.9	

PM Peak Eastbound		
Movement A-C (17.4 Miles)		
	GP Lanes	MLs
Travel Time (Minutes)	36.9	25.0
Time Saved (Minutes)	11.9	

Note: I-25 EXpress Toll Lanes unavailable Northbound during the AM Peak and Southbound during the PM Peak.

TYPICAL TIME SAVINGS VIA MANAGED LANES
REVENUE MAXIMIZATION - EASTBOUND PM PEAK (4:30-6:00 PM)

WilburSmith ASSOCIATES

FIGURE 5-15

estimated to increase to 9.8 minutes in 2025 and to 12.8 minutes in 2035. This is due to an estimated 5.2 minute increase in travel time in the US 36 general purpose lanes as a result of greater traffic congestion.

For a movement from A to C, which covers a distance of 17.4 miles, the estimated time savings in 2015 from the use of the proposed US 36 Managed Lanes and the existing I-25 EXpress Toll Lanes is 22.4 minutes during the AM peak. Estimated travel times for a trip in the general purpose lanes are expected to increase by 15.1 minutes from 2015 to 2035. This provides an increase in estimated time savings for this movement over the study period, increasing to 29.6 minutes in 2025 and 36.9 minutes in 2035. This indicates the level of traffic congestion expected in future years, primarily on I-25 and the eastern segments of US 36.

In Figure 5-13, the two reciprocal movements are presented for the AM peak in the westbound / northbound direction. For a movement from B to A, covering a distance of 10.5 miles, use of the US 36 Managed Lanes in 2015 during the AM peak would save an estimated 7.2 minutes. This is estimated to increase to 9.7 minutes and 13.9 minutes in 2025 and 2035, respectively. Given that the I-25 EXpress Toll Lanes are not open in this direction during the AM peak, no additional time savings are provided to the 17.3 mile movement from C to A.

For the PM peak, two movements are presented in Figure 5-14 in the westbound / northbound direction. During this time period, the peak direction is north on I-25 and west towards Boulder on US 36 east of Sheridan Boulevard. West of Sheridan Boulevard on US 36, the peak direction is east towards Denver. For the 10.5 mile movement from B to A, use of the US 36 Managed Lanes in 2015 during the PM peak is estimated to save 6.7 minutes. By 2025 and beyond, the estimated travel time in the general purpose lanes is more than twice the estimated travel time using the proposed US 36 Managed Lanes. This provides a movement from B to A with estimated travel time savings of 10.0 minutes in 2025 and 13.8 minutes in 2035.

For a movement from C to A, which covers a distance of 17.3 miles, the estimated time savings using the proposed US 36 Managed Lanes and the existing I-25 EXpress Toll Lanes are 17.0 minutes in 2015 during the PM peak. As with the estimated travel savings provided during the AM peak, significant travel time savings are also estimated during the PM peak. Estimated time savings for this movement are expected to reach 23.2 minutes in 2025 and 30.0 minutes in 2035. In 2025 and 2035, the estimated travel time savings are more than 60 percent of the estimated travel time in the general purpose lanes.

In Figure 5-15, the two reciprocal movements are presented for the PM peak in the eastbound / northbound direction. For a movement from A to B, covering a distance of 11.3 miles, use of the US 36 Managed Lanes in 2015 during the PM peak would save an estimated 9.5 minutes. This is estimated to increase to 10.8 minutes in 2025 and 11.9 minutes in 2035. These estimated time savings are comparable to those in the AM peak in the westbound direction. Given that the I-25 EXpress Toll Lanes are not open in this direction during PM peak, no additional time savings are provided to the 17.4 mile movement from A to C.

CORRIDOR SHARE COMPARISON

The share of tolled traffic in the corridor for the cross section west of Wadsworth Parkway is shown in Table 5-2 and for the cross section east of Federal Boulevard in Table 5-3. Traffic volumes for years 2015, 2025 and 2035 are provided for the GP Lanes, along with tolled and toll-free volumes for the managed lanes for the AM peak period (6:45-8:45 AM), PM peak period (4:30-6:00 PM), and for the Daytime total (5:00 AM-7:00 PM).

The corridor share of tolled volumes varies by time of day and direction of travel for each of the two cross sections shown. What is noteworthy is that the toll paying traffic does not represent a very large and disproportionate share of the total corridor volume. For example, the two-way, total daytime tolled traffic as a percent of two-way, total daytime volume ranges between 13-18 percent throughout the forecast period. During none of the peak periods do tolled volumes represent more than 20 percent of total peak period traffic demand.

ESTIMATED AVERAGE WEEKDAY TRANSACTIONS AND REVENUE

Tables 5-4 and 5-5 provide the estimated average weekday transactions by facility, time period, and direction for the years 2015, 2025, and 2035. Table 5-4 provides tolled transactions, while Table 5-5 provides toll-free transactions. On both tables, the I-25 EXpress Toll Lanes and the US 36 Managed Lanes are shown separately. In 2015, average weekday tolled and toll-free transactions are estimated at 79,600 and 45,600, respectively. Between 2015 and 2035, tolled transactions are expected to grow at an average annual rate of 1.0 percent per year, while toll free transactions are forecasted to grow at 1.5 percent per year. By 2035, over 97,000 tolled transactions are estimated to occur per weekday, with 89.2 percent of those occurring on US 36 due to the fact that there are 11 tolling zones on US 36, while I-25 has just two.

Table 5-2
Corridor Share Analysis - 2015, 2025 and 2035
West of Wadsworth Parkway

Revenue Maximization

Period	2015 Eastbound GP	2015 Eastbound Managed Lane Tolled Traffic	2015 Eastbound Managed Lane Toll Free Traffic	2015 Eastbound Managed Lane Total Traffic	2015 Eastbound Total Volume	2015 Eastbound Percent Tolled Traffic	2015 Westbound GP	2015 Westbound Managed Lane Tolled Traffic	2015 Westbound Managed Lane Toll Free Traffic	2015 Westbound Managed Lane Total Traffic	2015 Westbound Total Volume	2015 Westbound Percent Tolled Traffic
AM Peak Period (6:45 - 8:45 AM)	4.6	0.5	0.5	1.0	5.6	8.9%	6.3	1.4	0.8	2.2	8.5	16.5%
PM Peak Period (4:30 - 6:00 PM)	4.4	0.9	0.8	1.7	6.1	14.8%	3.7	0.8	0.5	1.3	5.0	16.0%
Daytime Total (5:00 AM - 7:00 PM)	30.5	5.2	3.6	8.8	39.3	13.2%	31.6	6.1	2.9	9.0	40.6	15.0%

Period	2025 Eastbound GP	2025 Eastbound Managed Lane Tolled Traffic	2025 Eastbound Managed Lane Toll Free Traffic	2025 Eastbound Managed Lane Total Traffic	2025 Eastbound Total Volume	2025 Eastbound Percent Tolled Traffic	2025 Westbound GP	2025 Westbound Managed Lane Tolled Traffic	2025 Westbound Managed Lane Toll Free Traffic	2025 Westbound Managed Lane Total Traffic	2025 Westbound Total Volume	2025 Westbound Percent Tolled Traffic
AM Peak Period (6:45 - 8:45 AM)	5.5	0.6	0.5	1.1	6.6	9.1%	6.5	1.4	0.8	2.2	8.7	16.1%
PM Peak Period (4:30 - 6:00 PM)	4.4	0.8	0.8	1.6	6.0	13.3%	4.0	0.8	0.6	1.4	5.4	14.8%
Daytime Total (5:00 AM - 7:00 PM)	34.0	5.4	4.0	9.4	43.4	12.4%	34.0	8.1	3.3	11.4	45.4	17.8%

Period	2035 Eastbound GP	2035 Eastbound Managed Lane Tolled Traffic	2035 Eastbound Managed Lane Toll Free Traffic	2035 Eastbound Managed Lane Total Traffic	2035 Eastbound Total Volume	2035 Eastbound Percent Tolled Traffic	2035 Westbound GP	2035 Westbound Managed Lane Tolled Traffic	2035 Westbound Managed Lane Toll Free Traffic	2035 Westbound Managed Lane Total Traffic	2035 Westbound Total Volume	2035 Westbound Percent Tolled Traffic
AM Peak Period (6:45 - 8:45 AM)	6.2	0.7	0.7	1.4	7.6	9.2%	6.7	1.7	0.9	2.6	9.3	18.3%
PM Peak Period (4:30 - 6:00 PM)	4.4	0.6	0.8	1.4	5.8	10.3%	4.0	1.1	0.7	1.8	5.8	19.0%
Daytime Total (5:00 AM - 7:00 PM)	37.4	5.6	5.0	10.6	48.0	11.7%	37.4	9.3	4.3	13.6	51.0	18.2%

Table 5-3
Corridor Share Analysis - 2015, 2025 and 2035
East of Federal Boulevard

Revenue Maximization

Period	2015 Eastbound GP	2015 Eastbound Managed Lane Tolled Traffic	2015 Eastbound Managed Lane Toll Free Traffic	2015 Eastbound Managed Lane Total Traffic	2015 Eastbound Total Volume	2015 Eastbound Percent Tolled Traffic	2015 Westbound GP	2015 Westbound Managed Lane Tolled Traffic	2015 Westbound Managed Lane Toll Free Traffic	2015 Westbound Managed Lane Total Traffic	2015 Westbound Total Volume	2015 Westbound Percent Tolled Traffic
AM Peak Period (6:45 - 8:45 AM)	7.8	1.1	1.2	2.3	10.1	10.9%	7.9	1.1	0.6	1.7	9.6	11.5%
PM Peak Period (4:30 - 6:00 PM)	4.6	1.0	0.8	1.8	6.4	15.6%	8.1	0.9	0.7	1.6	9.7	9.3%
Daytime Total (5:00 AM - 7:00 PM)	41.5	9.5	4.6	14.1	55.6	17.1%	52.3	6.3	2.8	9.1	61.4	10.3%

Period	2025 Eastbound GP	2025 Eastbound Managed Lane Tolled Traffic	2025 Eastbound Managed Lane Toll Free Traffic	2025 Eastbound Managed Lane Total Traffic	2025 Eastbound Total Volume	2025 Eastbound Percent Tolled Traffic	2025 Westbound GP	2025 Westbound Managed Lane Tolled Traffic	2025 Westbound Managed Lane Toll Free Traffic	2025 Westbound Managed Lane Total Traffic	2025 Westbound Total Volume	2025 Westbound Percent Tolled Traffic
AM Peak Period (6:45 - 8:45 AM)	7.9	1.2	1.3	2.5	10.4	11.5%	8.5	1.3	0.7	2.0	10.5	12.4%
PM Peak Period (4:30 - 6:00 PM)	4.7	1.0	0.8	1.8	6.5	15.4%	8.2	1.0	0.7	1.7	9.9	10.1%
Daytime Total (5:00 AM - 7:00 PM)	42.6	9.4	5.3	14.7	57.3	16.4%	55.0	8.3	3.3	11.6	66.6	12.5%

Period	2035 Eastbound GP	2035 Eastbound Managed Lane Tolled Traffic	2035 Eastbound Managed Lane Toll Free Traffic	2035 Eastbound Managed Lane Total Traffic	2035 Eastbound Total Volume	2035 Eastbound Percent Tolled Traffic	2035 Westbound GP	2035 Westbound Managed Lane Tolled Traffic	2035 Westbound Managed Lane Toll Free Traffic	2035 Westbound Managed Lane Total Traffic	2035 Westbound Total Volume	2035 Westbound Percent Tolled Traffic
AM Peak Period (6:45 - 8:45 AM)	8.0	1.3	1.3	2.6	10.6	12.3%	8.6	---	0.7	0.7	9.3	---
PM Peak Period (4:30 - 6:00 PM)	4.8	0.9	1.0	1.9	6.7	13.4%	8.1	1.2	0.7	1.9	10.0	12.0%
Daytime Total (5:00 AM - 7:00 PM)	43.9	8.8	6.3	15.1	59.0	14.9%	57.5	8.9	4.0	12.9	70.4	12.6%

Table 5-4
2015, 2025 and 2035 Estimated Average Weekday Toll Transactions Per Roadway
Revenue Maximization

2015

Period	Period Start	Period End	I-25 EXpress Toll Lanes			US 36 Managed Lanes			Total		
			I-25 NB	I-25 SB	I-25 Total	US 36 WB	US 36 EB	US 36 Total	NB/WB	SB/EB	Total
AM1	5:00 AM	6:00 AM	-	40	40	230	1,070	1,300	230	1,110	1,340
AM2	6:00 AM	6:45 AM	-	310	310	2,330	2,300	4,630	2,330	2,610	4,940
AM3	6:45 AM	7:15 AM	-	310	310	1,750	1,740	3,490	1,750	2,050	3,800
AM4	7:15 AM	8:15 AM	-	860	860	3,110	1,830	4,940	3,110	2,690	5,800
AM5	8:15 AM	8:45 AM	-	270	270	1,670	1,700	3,370	1,670	1,970	3,640
AM6	8:45 AM	10:00 AM	-	430	430	3,520	4,140	7,660	3,520	4,570	8,090
MD1	10:00 AM	12:00 PM	-	-	-	2,870	6,710	9,580	2,870	6,710	9,580
MD2	12:00 PM	3:00 PM	770	-	770	6,600	10,560	17,160	7,370	10,560	17,930
PM1	3:00 PM	3:30 PM	190	-	190	1,450	1,890	3,340	1,640	1,890	3,530
PM2	3:30 PM	4:30 PM	580	-	580	2,250	3,740	5,990	2,830	3,740	6,570
PM3	4:30 PM	6:00 PM	640	-	640	4,050	5,460	9,510	4,690	5,460	10,150
PM4	6:00 PM	7:00 PM	340	-	340	1,150	2,750	3,900	1,490	2,750	4,240
Day Time	**5:00 AM**	**7:00 PM**	**2,520**	**2,220**	**4,740**	**30,980**	**43,890**	**74,870**	**33,500**	**46,110**	**79,610**

2025

Period	Period Start	Period End	I-25 EXpress Toll Lanes			US 36 Managed Lanes			Total		
			I-25 NB	I-25 SB	I-25 Total	US 36 WB	US 36 EB	US 36 Total	NB/WB	SB/EB	Total
AM1	5:00 AM	6:00 AM	-	50	50	430	1,280	1,710	430	1,330	1,760
AM2	6:00 AM	6:45 AM	-	410	410	2,220	2,130	4,350	2,220	2,540	4,760
AM3	6:45 AM	7:15 AM	-	470	470	1,670	1,710	3,380	1,670	2,180	3,850
AM4	7:15 AM	8:15 AM	-	1,160	1,160	3,280	1,960	5,240	3,280	3,120	6,400
AM5	8:15 AM	8:45 AM	-	380	380	1,570	1,810	3,380	1,570	2,190	3,760
AM6	8:45 AM	10:00 AM	-	700	700	4,150	3,960	8,110	4,150	4,660	8,810
MD1	10:00 AM	12:00 PM	-	-	-	6,910	7,130	14,040	6,910	7,130	14,040
MD2	12:00 PM	3:00 PM	1,480	-	1,480	9,850	10,100	19,950	11,330	10,100	21,430
PM1	3:00 PM	3:30 PM	320	-	320	1,200	1,800	3,000	1,520	1,800	3,320
PM2	3:30 PM	4:30 PM	1,060	-	1,060	2,760	3,590	6,350	3,820	3,590	7,410
PM3	4:30 PM	6:00 PM	1,100	-	1,100	4,210	5,350	9,560	5,310	5,350	10,660
PM4	6:00 PM	7:00 PM	670	-	670	2,500	3,190	5,690	3,170	3,190	6,360
Day Time	**5:00 AM**	**7:00 PM**	**4,630**	**3,170**	**7,800**	**40,750**	**44,010**	**84,760**	**45,380**	**47,180**	**92,560**

2035

Period	Period Start	Period End	I-25 EXpressToll Lanes			US 36 Managed Lanes			Total		
			I-25 NB	I-25 SB	I-25 Total	US 36 WB	US 36 EB	US 36 Total	NB/WB	SB/EB	Total
AM1	5:00 AM	6:00 AM	-	60	60	650	1,860	2,510	650	1,920	2,570
AM2	6:00 AM	6:45 AM	-	530	530	2,520	2,060	4,580	2,520	2,590	5,110
AM3	6:45 AM	7:15 AM	-	630	630	1,920	1,710	3,630	1,920	2,340	4,260
AM4	7:15 AM	8:15 AM	-	1,360	1,360	4,130	2,600	6,730	4,130	3,960	8,090
AM5	8:15 AM	8:45 AM	-	520	520	1,840	1,740	3,580	1,840	2,260	4,100
AM6	8:45 AM	10:00 AM	-	890	890	4,320	3,550	7,870	4,320	4,440	8,760
MD1	10:00 AM	12:00 PM	-	-	-	6,320	5,870	12,190	6,320	5,870	12,190
MD2	12:00 PM	3:00 PM	2,110	-	2,110	10,430	11,070	21,500	12,540	11,070	23,610
PM1	3:00 PM	3:30 PM	520	-	520	1,660	1,760	3,420	2,180	1,760	3,940
PM2	3:30 PM	4:30 PM	1,380	-	1,380	3,370	3,810	7,180	4,750	3,810	8,560
PM3	4:30 PM	6:00 PM	1,610	-	1,610	5,260	4,020	9,280	6,870	4,020	10,890
PM4	6:00 PM	7:00 PM	960	-	960	2,280	2,350	4,630	3,240	2,350	5,590
Day Time	**5:00 AM**	**7:00 PM**	**6,580**	**3,990**	**10,570**	**44,700**	**42,400**	**87,100**	**51,280**	**46,390**	**97,670**

Table 5-5
2015, 2025 and 2035 Estimated Average Weekday Toll-Free Transactions Per Roadway
Revenue Maximization

2015

Period	Period Start	Period End	I-25 EXpress Toll Lanes			US 36 Managed Lanes			Total		
			I-25 NB	I-25 SB	I-25 Total	US 36 WB	US 36 EB	US 36 Total	NB/WB	SB/EB	Total
AM1	5:00 AM	6:00 AM	-	10	10	140	130	270	140	140	280
AM2	6:00 AM	6:45 AM	-	430	430	710	630	1,340	710	1,060	1,770
AM3	6:45 AM	7:15 AM	-	490	490	900	640	1,540	900	1,130	2,030
AM4	7:15 AM	8:15 AM	-	1,580	1,580	1,900	4,190	6,090	1,900	5,770	7,670
AM5	8:15 AM	8:45 AM	-	430	430	890	650	1,540	890	1,080	1,970
AM6	8:45 AM	10:00 AM	-	420	420	900	1,300	2,200	900	1,720	2,620
MD1	10:00 AM	12:00 PM	-	-	-	890	1,870	2,760	890	1,870	2,760
MD2	12:00 PM	3:00 PM	340	-	340	1,770	4,590	6,360	2,110	4,590	6,700
PM1	3:00 PM	3:30 PM	250	-	250	420	1,180	1,600	670	1,180	1,850
PM2	3:30 PM	4:30 PM	800	-	800	1,520	2,770	4,290	2,320	2,770	5,090
PM3	4:30 PM	6:00 PM	1,500	-	1,500	2,920	4,410	7,330	4,420	4,410	8,830
PM4	6:00 PM	7:00 PM	490	-	490	1,220	2,350	3,570	1,710	2,350	4,060
Day Time	**5:00 AM**	**7:00 PM**	**3,380**	**3,360**	**6,740**	**14,180**	**24,710**	**38,890**	**17,560**	**28,070**	**45,630**

2025

Period	Period Start	Period End	I-25 EXpress Toll Lanes			US 36 Managed Lanes			Total		
			I-25 NB	I-25 SB	I-25 Total	US 36 WB	US 36 EB	US 36 Total	NB/WB	SB/EB	Total
AM1	5:00 AM	6:00 AM	-	20	20	130	140	270	130	160	290
AM2	6:00 AM	6:45 AM	-	490	490	860	740	1,600	860	1,230	2,090
AM3	6:45 AM	7:15 AM	-	570	570	970	740	1,710	970	1,310	2,280
AM4	7:15 AM	8:15 AM	-	1,690	1,690	1,940	4,190	6,130	1,940	5,880	7,820
AM5	8:15 AM	8:45 AM	-	500	500	960	750	1,710	960	1,250	2,210
AM6	8:45 AM	10:00 AM	-	500	500	1,170	1,750	2,920	1,170	2,250	3,420
MD1	10:00 AM	12:00 PM	-	-	-	1,090	2,440	3,530	1,090	2,440	3,530
MD2	12:00 PM	3:00 PM	490	-	490	2,560	5,450	8,010	3,050	5,450	8,500
PM1	3:00 PM	3:30 PM	340	-	340	600	1,310	1,910	940	1,310	2,250
PM2	3:30 PM	4:30 PM	1,020	-	1,020	1,730	3,060	4,790	2,750	3,060	5,810
PM3	4:30 PM	6:00 PM	1,840	-	1,840	3,030	4,550	7,580	4,870	4,550	9,420
PM4	6:00 PM	7:00 PM	650	-	650	1,490	2,580	4,070	2,140	2,580	4,720
Day Time	**5:00 AM**	**7:00 PM**	**4,340**	**3,770**	**8,110**	**16,530**	**27,700**	**44,230**	**20,870**	**31,470**	**52,340**

2035

Period	Period Start	Period End	I-25 EXpressToll Lanes			US 36 Managed Lanes			Total		
			I-25 NB	I-25 SB	I-25 Total	US 36 WB	US 36 EB	US 36 Total	NB/WB	SB/EB	Total
AM1	5:00 AM	6:00 AM	-	30	30	140	180	320	140	210	350
AM2	6:00 AM	6:45 AM	-	530	530	1,020	830	1,850	1,020	1,360	2,380
AM3	6:45 AM	7:15 AM	-	610	610	1,060	850	1,910	1,060	1,460	2,520
AM4	7:15 AM	8:15 AM	-	1,740	1,740	2,070	4,760	6,830	2,070	6,500	8,570
AM5	8:15 AM	8:45 AM	-	530	530	1,080	880	1,960	1,080	1,410	2,490
AM6	8:45 AM	10:00 AM	-	550	550	1,440	2,250	3,690	1,440	2,800	4,240
MD1	10:00 AM	12:00 PM	-	-	-	1,840	3,380	5,220	1,840	3,380	5,220
MD2	12:00 PM	3:00 PM	590	-	590	3,530	6,380	9,910	4,120	6,380	10,500
PM1	3:00 PM	3:30 PM	410	-	410	740	1,570	2,310	1,150	1,570	2,720
PM2	3:30 PM	4:30 PM	1,130	-	1,130	2,050	3,590	5,640	3,180	3,590	6,770
PM3	4:30 PM	6:00 PM	2,030	-	2,030	3,330	5,010	8,340	5,360	5,010	10,370
PM4	6:00 PM	7:00 PM	780	-	780	1,890	3,210	5,100	2,670	3,210	5,880
Day Time	**5:00 AM**	**7:00 PM**	**4,940**	**3,990**	**8,930**	**20,190**	**32,890**	**53,080**	**25,130**	**36,880**	**62,010**

Table 5-6 provides estimated average weekday revenue by facility, time period, and direction for the years 2015, 2025, and 2035. It should be noted that all revenue are expressed in year-of-expenditure dollar values, and reflect assumptions regarding inflation. Compared with transactions, revenue is far more evenly distributed between the two facilities, with US 36 Managed Lane transactions accounting for 57.0 percent of total combined revenue in 2015, declining to 54.0 percent by 2035. The decline in US 36 revenue share is due to I-25 EXpress Toll Lane revenue growth outpacing US 36 Managed Lane revenue between 2015 and 2025, with an average annual growth rate of 8.0 percent per year on I-25 compared with 6.7 percent per year on US 36. After 2025, revenue growth rates on both facilities are nearly identical, with a projected rate of 6.0 percent per year on I-25, as compared with 5.9 percent per year on US 36. Overall, combined toll revenue is expected to grow from $32,210 on an average weekday in 2015 to $116,280 by 2035, corresponding to an average annual rate of 6.6 percent per year. Toll revenue growth far outpaces toll transaction growth due to the increases in toll rates associated with revenue optimization.

Estimated Annual Transactions and Revenue

Estimated average weekday transactions and revenue were "annualized" by using an annualization factor of 267 equivalent weekdays per year for tolled transactions and revenue. This recognizes the fact that weekend day traffic and revenue on the managed lanes would likely be considerably lower. An annualization factor of 393 equivalent weekdays per year was used for toll-free (HOV2+) transactions. These annualization factors were estimated following a review of the I-25 EXpress Toll Lanes 2010 actual daily traffic volumes.

Estimated annual transactions by roadway are provided in Table 5-7. Annual transactions are shown with and without "ramp-up" during the first three years of operation. Ramp-up is the phenomenon experienced on most start-up toll facilities on which high levels of growth may be experienced over the first three years or so of operation as the motoring public gradually becomes aware of and begins to use the new facility. WSA has done research on existing managed lane facilities and has developed ramp up factors spanning a period of three years, which have been applied to this forecast. Ramp-up has only been applied to US 36 Managed Lane estimates.

As shown in Table 5-7, annual transactions on I-25 are estimated at 3.9 million for year 2015, consisting of 1.3 million tolled and 2.6 million toll-free transactions. US 36 is expected to be open by July 1, and therefore, year 2015 estimates for US 36 reflect six months of operation only.

Table 5-6
2015, 2025 and 2035 Estimated Average Weekday Toll Revenue Per Roadway
Revenue Maximization

2015

Period	Period Start	Period End	I-25 Express Toll Lanes			US 36 Managed Lanes			Total		
			I-25 NB	I-25 SB	I-25 Total	US 36 WB	US 36 EB	US 36 Total	NB/WB	SB/EB	Total
AM1	5:00 AM	6:00 AM	-	$ 20	$ 20	$ 30	$ 100	$ 130	$ 30	$ 120	$ 150
AM2	6:00 AM	6:45 AM	-	630	630	260	390	650	260	1,020	1,280
AM3	6:45 AM	7:15 AM	-	1,450	1,450	590	550	1,140	590	2,000	2,590
AM4	7:15 AM	8:15 AM	-	4,070	4,070	1,390	910	2,300	1,390	4,980	6,370
AM5	8:15 AM	8:45 AM	-	1,260	1,260	560	490	1,050	560	1,750	2,310
AM6	8:45 AM	10:00 AM	-	640	640	400	490	890	400	1,130	1,530
MD1	10:00 AM	12:00 PM	-	-	-	320	620	940	320	620	940
MD2	12:00 PM	3:00 PM	$ 380	-	380	750	1,770	2,520	1,130	1,770	2,900
PM1	3:00 PM	3:30 PM	330	-	330	160	640	800	490	640	1,130
PM2	3:30 PM	4:30 PM	1,440	-	1,440	740	1,640	2,380	2,180	1,640	3,820
PM3	4:30 PM	6:00 PM	3,020	-	3,020	1,530	2,410	3,940	4,550	2,410	6,960
PM4	6:00 PM	7:00 PM	600	-	600	440	1,190	1,630	1,040	1,190	2,230
Day Time	**5:00 AM**	**7:00 PM**	**$ 5,770**	**$ 8,070**	**$ 13,840**	**$ 7,170**	**$ 11,200**	**$ 18,370**	**$ 12,940**	**$ 19,270**	**$ 32,210**

2025

Period	Period Start	Period End	I-25 Express Toll Lanes			US 36 Managed Lanes			Total		
			I-25 NB	I-25 SB	I-25 Total	US 36 WB	US 36 EB	US 36 Total	NB/WB	SB/EB	Total
AM1	5:00 AM	6:00 AM	-	$ 40	$ 40	$ 50	$ 130	$ 180	$ 50	$ 170	$ 220
AM2	6:00 AM	6:45 AM	-	1,130	1,130	490	650	1,140	490	1,780	2,270
AM3	6:45 AM	7:15 AM	-	3,050	3,050	1,120	950	2,070	1,120	4,000	5,120
AM4	7:15 AM	8:15 AM	-	7,510	7,510	2,500	1,630	4,130	2,500	9,140	11,640
AM5	8:15 AM	8:45 AM	-	2,500	2,500	1,050	890	1,940	1,050	3,390	4,440
AM6	8:45 AM	10:00 AM	-	1,400	1,400	930	1,070	2,000	930	2,470	3,400
MD1	10:00 AM	12:00 PM	-	-	-	800	1,290	2,090	800	1,290	2,090
MD2	12:00 PM	3:00 PM	$ 1,110	-	1,110	2,210	3,640	5,850	3,320	3,640	6,960
PM1	3:00 PM	3:30 PM	810	-	810	480	1,010	1,490	1,290	1,010	2,300
PM2	3:30 PM	4:30 PM	3,460	-	3,460	1,800	2,580	4,380	5,260	2,580	7,840
PM3	4:30 PM	6:00 PM	7,130	-	7,130	3,340	3,470	6,810	10,470	3,470	13,940
PM4	6:00 PM	7:00 PM	1,670	-	1,670	1,350	1,840	3,190	3,020	1,840	4,860
Day Time	**5:00 AM**	**7:00 PM**	**$ 14,180**	**$ 15,630**	**$ 29,810**	**$ 16,120**	**$ 19,150**	**$ 35,270**	**$ 30,300**	**$ 34,780**	**$ 65,080**

2035

Period	Period Start	Period End	I-25 ExpressToll Lanes			US 36 Managed Lanes			Total		
			I-25 NB	I-25 SB	I-25 Total	US 36 WB	US 36 EB	US 36 Total	NB/WB	SB/EB	Total
AM1	5:00 AM	6:00 AM	-	$ 60	$ 60	$ 80	$ 210	$ 290	$ 80	$ 270	$ 350
AM2	6:00 AM	6:45 AM	-	1,990	1,990	840	1,010	1,850	840	3,000	3,840
AM3	6:45 AM	7:15 AM	-	5,490	5,490	1,880	1,540	3,420	1,880	7,030	8,910
AM4	7:15 AM	8:15 AM	-	11,910	11,910	4,150	2,930	7,080	4,150	14,840	18,990
AM5	8:15 AM	8:45 AM	-	4,510	4,510	1,650	1,490	3,140	1,650	6,000	7,650
AM6	8:45 AM	10:00 AM	-	2,450	2,450	1,820	2,010	3,830	1,820	4,460	6,280
MD1	10:00 AM	12:00 PM	-	-	-	2,120	2,630	4,750	2,120	2,630	4,750
MD2	12:00 PM	3:00 PM	$ 2,110	-	2,110	5,630	6,130	11,760	7,740	6,130	13,870
PM1	3:00 PM	3:30 PM	1,700	-	1,700	1,040	1,570	2,610	2,740	1,570	4,310
PM2	3:30 PM	4:30 PM	6,190	-	6,190	3,540	3,940	7,480	9,730	3,940	13,670
PM3	4:30 PM	6:00 PM	14,060	-	14,060	6,330	4,670	11,000	20,390	4,670	25,060
PM4	6:00 PM	7:00 PM	3,110	-	3,110	2,770	2,720	5,490	5,880	2,720	8,600
Day Time	**5:00 AM**	**7:00 PM**	**$ 27,170**	**$ 26,410**	**$ 53,580**	**$ 31,850**	**$ 30,850**	**$ 62,700**	**$ 59,020**	**$ 57,260**	**$ 116,280**

Table 5-7
Esrtimated Annual Transactions Per Roadway
Revenue Maximization

Estimated Annual Transactions without Ramp-up

	I-25 EXpress Toll Lanes			US 36 Managed Lanes			Total		
Year	Tolled	Toll-Free	Total	Tolled	Toll-Free	Total	Tolled	Toll-Free	Total
2015 [1]	**1,261,000**	**2,651,000**	**3,912,000**	**10,216,000**	**7,805,000**	**18,021,000**	**11,477,000**	**10,456,000**	**21,933,000**
2016	1,327,000	2,715,000	4,042,000	20,310,000	15,396,000	35,706,000	21,637,000	18,111,000	39,748,000
2017	1,397,000	2,780,000	4,177,000	20,592,000	15,487,000	36,079,000	21,989,000	18,267,000	40,256,000
2018	1,470,000	2,847,000	4,317,000	20,879,000	15,579,000	36,458,000	22,349,000	18,426,000	40,775,000
2019	1,548,000	2,915,000	4,463,000	21,169,000	15,671,000	36,840,000	22,717,000	18,586,000	41,303,000
2020	**1,629,000**	**2,985,000**	**4,614,000**	**21,463,000**	**15,765,000**	**37,228,000**	**23,092,000**	**18,750,000**	**41,842,000**
2021	1,712,000	3,025,000	4,737,000	21,701,000	16,080,000	37,781,000	23,413,000	19,105,000	42,518,000
2022	1,799,000	3,065,000	4,864,000	21,941,000	16,401,000	38,342,000	23,740,000	19,466,000	43,206,000
2023	1,890,000	3,106,000	4,996,000	22,183,000	16,730,000	38,913,000	24,073,000	19,836,000	43,909,000
2024	1,987,000	3,148,000	5,135,000	22,429,000	17,064,000	39,493,000	24,416,000	20,212,000	44,628,000
2025	**2,088,000**	**3,190,000**	**5,278,000**	**22,677,000**	**17,405,000**	**40,082,000**	**24,765,000**	**20,595,000**	**45,360,000**
2026	2,149,000	3,221,000	5,370,000	22,772,000	17,720,000	40,492,000	24,921,000	20,941,000	45,862,000
2027	2,211,000	3,252,000	5,463,000	22,868,000	18,041,000	40,909,000	25,079,000	21,293,000	46,372,000
2028	2,276,000	3,283,000	5,559,000	22,964,000	18,367,000	41,331,000	25,240,000	21,650,000	46,890,000
2029	2,342,000	3,315,000	5,657,000	23,060,000	18,699,000	41,759,000	25,402,000	22,014,000	47,416,000
2030	**2,411,000**	**3,347,000**	**5,758,000**	**23,157,000**	**19,037,000**	**42,194,000**	**25,568,000**	**22,384,000**	**47,952,000**
2031	2,488,000	3,380,000	5,868,000	23,186,000	19,392,000	42,578,000	25,674,000	22,772,000	48,446,000
2032	2,568,000	3,413,000	5,981,000	23,214,000	19,754,000	42,968,000	25,782,000	23,167,000	48,949,000
2033	2,650,000	3,447,000	6,097,000	23,243,000	20,122,000	43,365,000	25,893,000	23,569,000	49,462,000
2034	2,736,000	3,480,000	6,216,000	23,272,000	20,497,000	43,769,000	26,008,000	23,977,000	49,985,000
2035	**2,823,000**	**3,515,000**	**6,338,000**	**23,301,000**	**20,880,000**	**44,181,000**	**26,124,000**	**24,395,000**	**50,519,000**
Cumulative Transactions	**42,762,000**	**66,080,000**	**108,842,000**	**456,597,000**	**361,892,000**	**818,489,000**	**499,359,000**	**427,972,000**	**927,331,000**

Estimated Annual Transactions with Ramp-up

	I-25 EXpress Toll Lanes			US 36 Managed Lanes			Total		
Year	Tolled	Toll-Free	Total	Tolled	Toll-Free	Total	Tolled	Toll-Free	Total
2015 [1][2]	**1,261,000**	**2,651,000**	**3,912,000**	**4,618,000**	**3,528,000**	**8,146,000**	**5,879,000**	**6,179,000**	**12,058,000**
2016 [2]	1,327,000	2,715,000	4,042,000	15,781,000	11,963,000	27,744,000	17,108,000	14,678,000	31,786,000
2017 [2]	1,397,000	2,780,000	4,177,000	19,789,000	14,883,000	34,672,000	21,186,000	17,663,000	38,849,000
2018	1,470,000	2,847,000	4,317,000	20,879,000	15,579,000	36,458,000	22,349,000	18,426,000	40,775,000
2019	1,548,000	2,915,000	4,463,000	21,169,000	15,671,000	36,840,000	22,717,000	18,586,000	41,303,000
2020	**1,629,000**	**2,985,000**	**4,614,000**	**21,463,000**	**15,765,000**	**37,228,000**	**23,092,000**	**18,750,000**	**41,842,000**
2021	1,712,000	3,025,000	4,737,000	21,701,000	16,080,000	37,781,000	23,413,000	19,105,000	42,518,000
2022	1,799,000	3,065,000	4,864,000	21,941,000	16,401,000	38,342,000	23,740,000	19,466,000	43,206,000
2023	1,890,000	3,106,000	4,996,000	22,183,000	16,730,000	38,913,000	24,073,000	19,836,000	43,909,000
2024	1,987,000	3,148,000	5,135,000	22,429,000	17,064,000	39,493,000	24,416,000	20,212,000	44,628,000
2025	**2,088,000**	**3,190,000**	**5,278,000**	**22,677,000**	**17,405,000**	**40,082,000**	**24,765,000**	**20,595,000**	**45,360,000**
2026	2,149,000	3,221,000	5,370,000	22,772,000	17,720,000	40,492,000	24,921,000	20,941,000	45,862,000
2027	2,211,000	3,252,000	5,463,000	22,868,000	18,041,000	40,909,000	25,079,000	21,293,000	46,372,000
2028	2,276,000	3,283,000	5,559,000	22,964,000	18,367,000	41,331,000	25,240,000	21,650,000	46,890,000
2029	2,342,000	3,315,000	5,657,000	23,060,000	18,699,000	41,759,000	25,402,000	22,014,000	47,416,000
2030	**2,411,000**	**3,347,000**	**5,758,000**	**23,157,000**	**19,037,000**	**42,194,000**	**25,568,000**	**22,384,000**	**47,952,000**
2031	2,488,000	3,380,000	5,868,000	23,186,000	19,392,000	42,578,000	25,674,000	22,772,000	48,446,000
2032	2,568,000	3,413,000	5,981,000	23,214,000	19,754,000	42,968,000	25,782,000	23,167,000	48,949,000
2033	2,650,000	3,447,000	6,097,000	23,243,000	20,122,000	43,365,000	25,893,000	23,569,000	49,462,000
2034	2,736,000	3,480,000	6,216,000	23,272,000	20,497,000	43,769,000	26,008,000	23,977,000	49,985,000
2035	**2,823,000**	**3,515,000**	**6,338,000**	**23,301,000**	**20,880,000**	**44,181,000**	**26,124,000**	**24,395,000**	**50,519,000**
Cumulative Transactions	**42,762,000**	**66,080,000**	**108,842,000**	**445,667,000**	**353,578,000**	**799,245,000**	**488,429,000**	**419,658,000**	**908,087,000**

[1] Year 2015 estimates reflect one full year of transactions for I-25 EXpressToll Lanes and July 1 through December 31 transactions for the US 36 Managed Lanes (51 percent of annual traffic and revenue).

[2] Ramp-up adjustment factors are applied to the portion of revenue from US 36 for the first three years of operation. Adjustment factors are as follows: 2015 - 45.2 percent, 2016 - 77.7 percent and 2017 - 96.1 percent.

Annual transactions on the US 36 Managed Lanes are estimated at 18.0 million without ramp-up and 8.1 million with ramp-up. Of those with ramp-up, an estimated 4.6 million transactions are tolled, while 3.5 million are toll-free.

By 2018, the first full year without ramp-up impacts, total annual transactions on the US 36 Managed Lanes are estimated to increase to 36.5 million. This includes an estimated 20.9 million tolled transactions and 15.6 million toll-free transactions. Total annual transactions on the I-25 EXpressToll Lanes are estimated to increase to 4.3 million total transactions in 2018. Total estimated annual transactions in 2018 are 40.8 million.

Both facilities are expected to see continued growth in annual transactions through 2035. Annual transactions in 2035 on the US 36 Managed Lanes are estimated to increase to 44.2 million, an average annual percent increase of 1.1 percent per year between 2018 and 2035. Annual tolled transactions on the US 36 Managed Lanes, estimated at 23.3 million in 2035 are estimated to increase by 0.7 percent per year. On the I-25 EXpress Toll Lanes, estimated total annual transactions are expected to increase to 6.3 million, of which an estimated 2.8 million are tolled transactions. This represents an estimated average annual growth rate of 2.3 percent in total transactions and 3.9 percent in tolled transactions. The greater rate of increase on the I-25 EXpress Toll Lanes is in part due to the increases in traffic congestion forecast in I-25 GP lanes. Toll rate escalation assumptions on each facility also impact growth in toll transactions. Total transactions for both facilities are estimated to reach 50.5 million by 2035.

Estimated annual gross toll revenue by roadway are provided in Table 5-8. Estimates of annual toll revenue are provided for years 2015 through 2035 in future-year dollars, with and without ramp-up on the US 36 Managed Lanes.

As shown in Table 5-8, annual toll revenues for the I-25 EXpress Toll Lanes are estimated at $3.7 million for year 2015. Annual toll revenues for the US 36 Managed Lanes reflecting a July 1 opening are estimated at $2.5 million without ramp-up and $1.1 million with ramp-up. Total toll revenues for both facilities are estimated at $6.2 million without ramp-up and $4.8 million with ramp-up.

Table 5-8
Estimated Annual Gross Toll Revenue Per Roadway
Revenue Maximization

Year	I-25 EXpress Toll Lanes	US 36 Managed Lanes		Total	
	Without Ramp-up	Without Ramp-up	With Ramp-up	Without Ramp-up	With Ramp-up
2015 [1][2]	**$ 3,703,000**	**$ 2,507,000**	**$ 1,133,000**	**$ 6,210,000**	**$ 4,836,000**
2016 [2]	4,012,000	5,255,000	4,083,000	9,267,000	8,095,000
2017 [2]	4,347,000	5,619,000	5,400,000	9,966,000	9,747,000
2018	4,710,000	6,009,000	6,009,000	10,719,000	10,719,000
2019	5,103,000	6,425,000	6,425,000	11,528,000	11,528,000
2020	**5,529,000**	**6,870,000**	**6,870,000**	**12,399,000**	**12,399,000**
2021	5,949,000	7,320,000	7,320,000	13,269,000	13,269,000
2022	6,400,000	7,800,000	7,800,000	14,200,000	14,200,000
2023	6,886,000	8,311,000	8,311,000	15,197,000	15,197,000
2024	7,409,000	8,855,000	8,855,000	16,264,000	16,264,000
2025	**7,971,000**	**9,435,000**	**9,435,000**	**17,406,000**	**17,406,000**
2026	8,454,000	9,983,000	9,983,000	18,437,000	18,437,000
2027	8,965,000	10,564,000	10,564,000	19,529,000	19,529,000
2028	9,507,000	11,178,000	11,178,000	20,685,000	20,685,000
2029	10,082,000	11,828,000	11,828,000	21,910,000	21,910,000
2030	**10,692,000**	**12,515,000**	**12,515,000**	**23,207,000**	**23,207,000**
2031	11,338,000	13,269,000	13,269,000	24,607,000	24,607,000
2032	12,022,000	14,069,000	14,069,000	26,091,000	26,091,000
2033	12,748,000	14,917,000	14,917,000	27,665,000	27,665,000
2034	13,517,000	15,816,000	15,816,000	29,333,000	29,333,000
2035	**14,333,000**	**16,769,000**	**16,769,000**	**31,102,000**	**31,102,000**
Cumulative Revenue	**$ 173,677,000**	**$ 205,314,000**	**$ 202,549,000**	**$ 378,991,000**	**$ 376,226,000**

Note: All toll revenue is calculated in future dollars

[1] Year 2015 estimates reflect one full year of revenue for I-25 EXpressToll Lanes and July 1 through December 31 revenues for the US 36 Managed Lanes (51 percent of annual traffic and revenue).

[2] Ramp-up adjustment factors are applied to the portion of revenue from US 36 for the first three years of operation. Adjustment factors are as follows: 2015 - 45.2 percent, 2016 - 77.7 percent and 2017 - 96.1 percent.

Following 2015, estimated annual toll revenues for the US 36 Managed Lanes are expected to surpass those of the I-25 EXpress Toll Lanes. By 2018, estimated annual toll revenues are expected to increase on the US 36 Managed Lanes and I-25 EXpress Toll Lanes to $6.0 million and $4.7 million respectively. Total estimated annual toll revenues in 2018, are $10.7 million.

Both facilities are expected to experience continued revenue growth with total annual toll revenue estimated to nearly triple by 2035. Annual toll revenues in 2035 for the US 36 Managed Lanes are estimated to increase to $16.8 million, an average annual percent increase of 6.2 percent between 2018 and 2035. On the I-25 EXpress Toll Lanes, estimated annual toll revenues are expected to increase to $14.3 million, representing

an estimated average annual growth rate of 6.8 percent. Total annual toll revenue for both facilities are estimated to reach $31.1 million by 2035, or an estimated $374.4 million in cumulative revenue over the forecast period.

DISCLAIMER

Current accepted professional practices and procedures were used in the development of these traffic and revenue forecasts. 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 forecasts, WSA has reasonably relied upon the accuracy and completeness of information provided (both written and oral) by the Colorado Department of Transportation / High Performance Transportation Enterprise and other local and state agencies. WSA also has relied upon the reasonable assurances of some independent parties and are not aware of any facts that would make such information misleading.

WSA has made qualitative judgments related to several key variables in the development and analysis of the traffic and revenue forecasts 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 underling methodologies used to obtain the results. WSA gives no opinion as to the value or merit to partial information extracted from this report.

All estimates and projections reported herein are based on WSA's experience and judgment and on a review of information obtained from multiple state and local agencies, including the Colorado Department of Transportation / High Performance Transportation Enterprise, and other 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 WSA does not specifically guarantee or warrant any estimate or projections contained within this report.

While WSA 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,

WSA 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.

CHAPTER 6

SENSITIVITY TESTS

The Base Case traffic and revenue forecasts included in the report are based on certain assumptions and forecast of future economic growth and other events which are ultimately subject to some level of uncertainty. As such, it is typical in traffic and revenue studies of this nature to conduct sensitivity tests aimed at identifying the "sensitivity" of revenue forecasts to potential changes in certain basic assumptions or future forecasts of underlying variables. Sensitivity tests typically include hypothetical changes in future socioeconomic growth forecasts, value of time assumptions and so forth. For purposes of this study and to address the needs of TIFIA, traffic assignments for six different sensitivity tests were run for years 2015 and 2035.

For each of the various sensitivity tests, the alternative revenue estimate is shown for each respective year of tests and the percent impact as compared with the Base Case estimates. The discrete sensitivity tests conducted reflected a "downside" change in assumptions in some tests, an "upside" change in assumptions for other tests and combinations of both upside and downside changes. Therefore, the percent impacts shown are negative for some tests and positive for others. It should be noted that toll rates were re-optimized for each sensitivity test to maximize toll revenue while ensuring that demand was managed in the US 36 managed lanes and I-25 express toll lanes.

It is important to recognize that all of the sensitivity tests assessed herein are hypothetical conditions and represent departures from economic forecasts or assumptions used in the Base Case traffic and revenue estimates. These tests are intended to show potential impacts on revenue of these hypothetical changes from basic assumptions, and should not be considered as forecasts themselves. The six sensitivity tests include:

1. Long-Term Reduced Economic Growth (20% Lower Trip Table Growth);

2. Long-Term Increased Economic Growth (10% Higher Trip Table Growth);

3. Increased Value of Time (20% Higher Value of Time);

4. Long-Term Reduced Economic Growth and Increased Value of Time (20% Lower Trip Table Growth and 20% Higher Value of Time);

5. Long-Term Increased Economic Growth and Increased Value of Time (10% Higher Trip Table Growth and 20% Higher Value of Time); and

6. Higher Fuel Prices (25% increase in fuel costs and share increases in HOV2+ vehicles).

The results of the sensitivity tests are summarized in Table 6-1 and Figure 6-1. The top line of Table 6-1 shows the Base Case annual revenue forecast. Note that the Base Case revenue estimate for 2015 shown in this table, and any sensitivity test results for 2015, assume a full year of managed lane operation for both I-25 and US 36, and do not include any adjustments for "ramp-up." The Base Case revenue for 2015 is estimated at $8.6 million. Base Case annual revenue for 2035 is estimated at $31.1 million. Figure 6-1 shows the results of the sensitivity tests relative to the Base Case. Only sensitivity tests 1 and 6 associated with long-term reduced growth and 25 percent higher motor fuel prices, respectively, resulted in lower revenue than the Base Case.

SENSITIVITY TEST 1: LONG-TERM REDUCED ECONOMIC GROWTH

A key underlying parameter of any traffic and revenue forecast is estimated future economic growth in the project corridor. However, this corridor exists today and is not as dependent upon future year growth as a new start-up toll facility might be.

This particular sensitivity test was intended to evaluate the impact of a hypothetical long-term reduced level of overall economic growth throughout the entire corridor. It was simulated by reducing the net growth in trips in the trip tables by 20 percent from the rate of growth assumed in the Base Case.

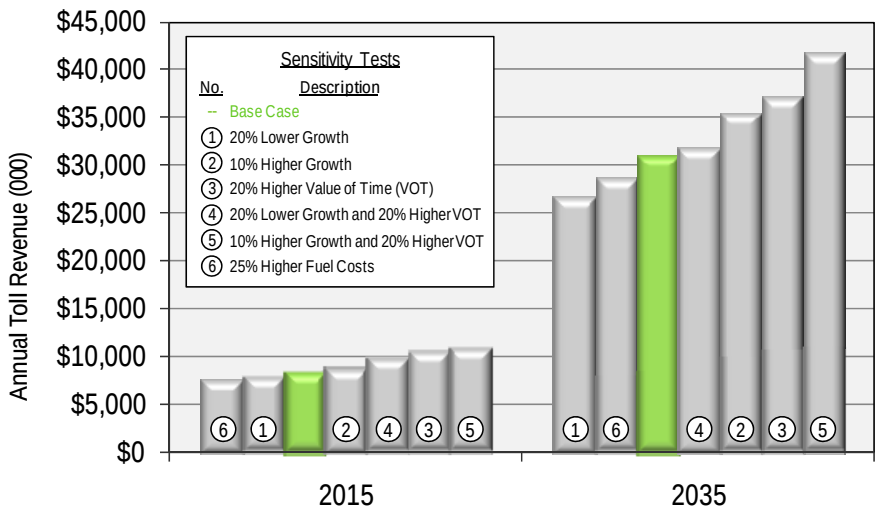
On a systemwide basis, the 20 percent reduction in growth resulted in overall trip table reductions of -1.2 percent in 2015 and -4.9 percent in 2035. The reductions in revenue of this sensitivity test were -7.0 percent in 2015 and -13.8 percent in 2035. We believe these are reasonable and

Table 6-1
Sensitivity Tests
Annual Toll Revenue and Impacts [(1)]

Sensitivity Test Number	Description	2015	2035
-	Base Case	$ 8,618	$ 31,102
1	20% Lower Trip Table Growth	$ 8,016	$ 26,774
	Numerical Difference	(602)	(4,328)
	Percent Difference	-7.0%	-13.9%
2	10% Higher Trip Table Growth	$ 8,943	$ 35,392
	Numerical Difference	325	4,290
	Percent Difference	3.8%	13.8%
3	20% Higher Value of Time	$ 10,554	$ 37,318
	Numerical Difference	1,936	6,216
	Percent Difference	22.5%	20.0%
4	20% Lower Trip Table Growth and 20% Higher Value of Time	$ 9,946	$ 31,935
	Numerical Difference	1,328	833
	Percent Difference	15.4%	2.7%
5	10% Higher Trip Table Growth and 20% Higher Value of Time	$ 10,938	$ 41,826
	Numerical Difference	2,320	10,724
	Percent Difference	26.9%	34.5%
6	25% Higher Fuel Costs	$ 7,693	$ 28,662
	Numerical Difference	(925)	(2,440)
	Percent Difference	-10.7%	-7.8%

Note: Revenue estimates for the 2015 Base Case and sensitivity tests do not account for the effect of ramp-up.

[(1)] Revenue estimates are in thousands.



Comparison of Annual Revenue Estimates
by Sensitivity Test Scenario

Figure 6-1

reflect the highly sensitive nature of demand in the managed express lanes. Impacts of changes in global demand have a relatively high impact on express lane traffic and revenue for two main reasons:

1. Express lanes primarily serve the excess demand that cannot be accommodated in the general purpose lanes. This explains the great difference in demand during peak periods vs. off-peak periods. During off-peak periods, when speeds tend to be almost freeflow and if the global demand can be accommodated by the general purpose lanes, almost no traffic will pay a toll to use the express lanes.

2. The toll-paying volume in express lanes is a small portion of the total corridor demand and is relatively low volume; a small net change in volume can be a high percentage of toll-paying traffic. For example, hypothetically, a 300 vehicle difference in global demand can represent 5 to 10 percent of corridor demand in one hour but can represent 30 to 50 percent of toll-paying traffic in the express lane.

Recent experience on the 91 Express Lanes in Orange County, California appears to bear this out. For example, VMT in Orange County was estimated to be about 2 percent lower in 2009 than in 2007, based on data from the Caltrans Performance Monitoring System (PeMS). This would reflect the impacts of the recession that began in 2008, but after gas prices

stabilized. During this period, revenues on the 91 Express Lanes dropped by 10 percent as compared to 2007.

SENSITIVITY TEST 2: LONG-TERM INCREASED ECONOMIC GROWTH

This particular sensitivity test was intended to evaluate the impact of a hypothetical long-term increase in overall economic growth throughout the entire corridor. It was simulated by increasing the net growth in trips in the trip tables by 10 percent from the rate of growth assumed in the Base Case.

Under this test, opening year revenue was estimated to be +3.8 percent if growth between 2010 and 2015 were increased 10 percent from the current Base Case forecast. The overall impact of a long-term increased growth scenario increases over time. The impact in 2035, the most distant forecast year modeled, was estimated at +13.8 percent. In both years, toll rates were re-optimized to maximize revenue while ensuring demand management. In some cases, higher toll rates as compared to the Base Case were selected which produced additional toll revenue.

SENSITIVITY TEST 3: INCREASED VALUE OF TIME (VOT)

Value of time is an important input parameter in estimating motorists' willingness to pay tolls. On this project, values of time are a function of income and distance traveled in each of the respective traffic analysis zones used in the study. A sensitivity test was requested which evaluates the impact of a hypothetical 20 percent increase in the value of time. This was tested for years 2015 and 2035; with positive revenue impacts of 22.5 percent in 2015 and 20.0 percent in 2035.

SENSITIVITY TEST 4: LONG-TERM REDUCED ECONOMIC GROWTH AND INCREASED VOT

This sensitivity test assessed the combined impact of reducing the net Base Case trip table growth by 20 percent, while at the same time increasing value of time by 20 percent. The tests were carried out for years 2015 and 2035.

Revenue for opening year 2015 is estimated to increase by 15.4 percent. By 2035, the revenue impact is estimated at 2.7 percent higher. This smaller increase than in 2015 accounts for the greater impact of reduced trip table growth over an additional 20 years (2015-2035).

SENSITIVITY TEST 5: LONG-TERM INCREASED ECONOMIC GROWTH AND INCREASED VOT

This sensitivity test assessed the combined impact of increasing the net Base Case trip table growth by 10 percent, while at the same time increasing value of time by 20 percent. The tests were carried out for years 2015 and 2035.

Revenue for opening year 2015 is estimated to increase by 26.9 percent. By 2035, the revenue impact is estimated at 34.5 percent higher. The larger percent increase in 2035 is accounted for by the greater impact of the increased trip table growth over an additional 20 years (2015-2035).

SENSITIVITY TEST 6: HIGHER FUEL PRICES

This sensitivity test was based on the assumption that higher fuel prices would result in fewer vehicles on the region's roads in general, and on the US 36 Managed Lanes, specifically. Therefore, in order to reflect gas price increases of 25 percent, the 2015 and 2035 Base Case trip tables were reduced by a global 2.5 percent. This was derived by assessing traffic counts on US 36 in mid-2007 when fuel prices were relatively low, versus the same period in 2008, when fuel prices were at their peak. The assessment indicated that 2008 weekday traffic was approximately 5.0 percent lower than the same period in 2007. However, it was difficult to gauge the proportion of the decrease attributable to rising fuel prices versus the economic recession. For purposes of this test, it was assumed that the proportion was evenly distributed. Based on this assumption, a 25 percent increase in fuel price resulted in a 2.5 percent decline in traffic, or an elasticity of -0.10.

This test also assumed that 20 percent of the decrease in single-occupant vehicles (SOVs) would shift to two-person, high-occupant vehicles (HOV2), while another 5 percent would shift to three-or-more person, high-occupant vehicles (HOV3+). These changes had the overall effect of reducing the 2015 and 2035 Base Case trip tables by 2.3 percent. The resultant revenue impacts were a 10.7 percent reduction in 2015 and a 7.8 percent reduction in 2035.