Accident Analysis Update
Addendum to Traffic Report Technical Memorandum

PREPARED FOR: New Pueblo Freeway Project File

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DATE: July 12, 2011

Introduction

The initial accident analysis for the New Pueblo Freeway Environmental Impact Statement project was conducted in 2004 and documented in the *Traffic Technical Memorandum New Pueblo Freeway* dated February 2005. The content of this technical memorandum was incorporated into the Draft Environmental Impact Statement (DEIS) document. The analysis used accident data provided by the Colorado Department of Transportation (CDOT) for the years 2000 through 2002. Comments received on the DEIS necessitated updating the accident analysis to focus on the years 2003 through 2008. The purpose of this technical memorandum is to document the process followed to update the accident analysis and present the results.

Methodology

During the 2003 through 2008 timeframe, CDOT safety analyses evolved from accident rate comparisons to Safety Performance Function (SPF) comparisons. Both methodologies assess the level of safety for a roadway based on accidents and traffic volumes. However, the SPF methodology provides a more accurate comparison of a roadway's safety performance to similar facilities because it incorporates the cross section whereas the average accident rate is calculated from statistics for facilities across the state with varying cross sections (such as number of lanes, access control, and presence of a median). The SPF methodology is now the industry standard.

In recognition of this methodology change that occurred around 2006, two different methodologies were used to cover the 2003 through 2008 time frame. The accident analysis for the 2003 through 2005 time period was conducted by comparing the accident rates for each segment in the study area to the 2005 statewide average urban interstate rates. A segment with an accident rate less than 80 percent of the statewide average was rated "good". A segment with an accident rate greater than 120 percent of the statewide average was rated "poor". Accident rates between these two thresholds were rated "fair". This is the same methodology followed in the initial accident analysis.

The accident analysis for the 2006 through 2008 time period was conducted by comparing the I-25 accident statistics to the expected safety performance of an urban interstate based on CDOT's "Urban 4-Lane Freeways" SPF graph. The study area is considered as one segment for this analysis because the SPF graph is only valid for segments greater than 0.9 miles in length. The point that represents the intersection of the Average Daily Traffic and the average accidents per mile per year is compared to the lines that represent the expected

safety performance and plus / minus 1.5 standard deviations from the expected performance. A point above the expected line indicates a segment experienced more accidents than expected for this type of facility and there is a high potential to reduce accidents if appropriate improvements are implemented (*Level of Service of Safety*, Transportation Research Record 1840 Paper Number 03-2112, authored by Jake Kononov and Bryan Allery).

Data

The CDOT safety office provided the accident data for the years 2003 through 2008. The study limits remain as milepost 100.68 (29th Street overpass) at the north end and milepost 94.77 (Pueblo Boulevard interchange) at the south of the study area.

The Average Daily Traffic volume data is from the CDOT website. The initial assumption that the daily traffic is distributed equally in the northbound and southbound directions over the course of one day was held constant for the update effort. For the 2003 through 2005 analysis, volumes for each segment were used to calculate vehicle miles of travel for each segment for the accident rate comparison. For the 2006 through 2008 analysis, the average of the Average Daily Traffic volumes for all nine segments was used to calculate the vehicle miles of travel for the SPF comparison.

The statewide average urban interstate accident rates for 2005 were obtained from the CDOT website (2005 Statewide Accidents and Rate Book 2005). The Safety Performance Function graph for four lane urban interstates was also obtained from the CDOT website.

Accident Rates and Assignment of Ratings for the 2003 through 2005 Time Period

For the 2003 through 2005 analysis, the 7-mile length of I-25 through Pueblo was divided into nine different study segments (same segments as the initial analysis). There were 702 total accidents during the 2003 to 2005 time period. Of these total accidents, 1 resulted in a fatality, 80 resulted in injuries, and 621 resulted in property damage only. The fatality occurred on a curve when the driver was attempting a lane-change maneuver. Comparative data from 2003 through 2005 indicate that I-25 through Pueblo has a 43 percent higher overall rate of accidents than other urban interstates statewide. I-25 through Pueblo has a 68 percent higher property-damage-only accident rate for the same period.

Exhibit 1 summarizes the accident data for the nine segments on I-25 within the project limit for the 2003 through 2005 time period**.** The rating is based on CDOT criteria for urban interstates, with a good rating being 1.18 or fewer total accidents per million vehicle miles traveled (VMT), a fair rating being between 1.18 and 1.96, and a poor rating being 1.96 or greater. The 2005 average urban interstate accident rate in Colorado, measured in total accidents per million VMT, was 1.57. Five of the nine segments within the study limits had accident rates up to three times higher than the statewide average for urban interstates during this time period.

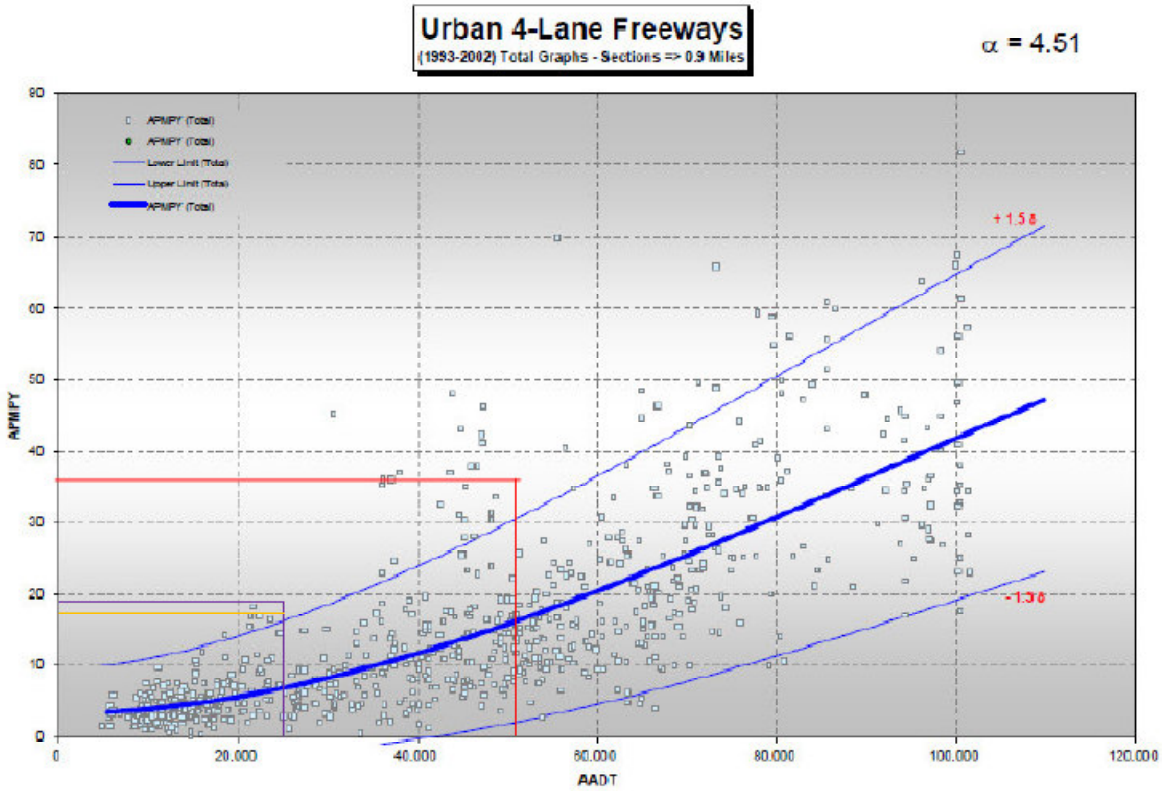
Exhibit 1. Accident Statistics for the 2003 through 2005 Time Period

Segment	Segment Length	ADT	# PDO	# INJ	# FAT	#TOT	Rate (PDO)	Eval Rating (PDO)	Rate (INJ)	Eval Rating (INJ)	Rate (FAT)	Eval Rating (FAT)	Rate (TOT)	Eval Rating (TOT)
1 Pueblo Blvd. To Indiana Ave. milepost 94.77 to 95.9	1.13	31,661	15	5	0	20	0.38	Good	0.13	Good	0.00	Good	0.51	Good
2 Indiana Ave. to Central Ave. milepost 95.9 to 96.67	0.77	37,127	44	4	0	48	1.41	Fair	0.13	Good	0.00	Good	1.53	Fair
3 Central Ave. to Abriendo Ave. milepost 96.67 to 97.45	0.78	42,671	102	18	0	120	2.80	Poor	0.49	Poor	0.00	Good	3.29	Poor
4 Abriendo Ave. to Ilex St. milepost 97.45 to 97.91	0.46	51,242	76	10	0	86	2.94	Poor	0.39	Fair	0.00	Good	3.33	Poor
5 Ilex St. to 1st St. milepost 97.91 to 98.55	0.64	52,232	88	11	0	99	2.40	Poor	0.30	Fair	0.00	Good	2.70	Poor
6 1st St. to 6th St. milepost 98.55 to 98.88	0.33	50,037	55	8	0	63	3.04	Poor	0.44	Fair	0.00	Good	3.48	Poor
7 6th St. to 13th St. milepost 98.88 to 99.33	0.45	57,888	45	4	1	50	1.58	Poor	0.14	Good	0.04	Good	1.75	Fair
8 13th St. to SH 50B milepost 99.33 to 99.95	0.62	72,001	83	10	0	93	1.70	Poor	0.20	Good	0.00	Good	1.90	Fair
9 SH 50B to 29th St. milepost 99.95 to 100.68	0.73	60,709	113	10	0	123	2.33	Poor	0.21	Good	0.00	Good	2.53	Poor

Accident Analysis for the 2006 through 2008 Time Period

There were 643 total accidents during the 2006 through 2008 time period. Of these total accidents, 3 resulted in fatalities, 72 resulted in injuries, and 568 resulted in property damage only. Exhibit 2 shows the CDOT Urban 4-Lane Freeways SPF graph. To follow the SPF methodology for the 2006 through 2008 accident analysis, the total number of accidents per mile per year (APMPY) was plotted on the Urban 4-Lane Freeways SPF graph along with the average Annual Daily Traffic volume along the 5.91-mile length of I-25 in the study area. Exhibit 2 shows three plots that represent both directions in the study area (red line), and the northbound (yellow line) and southbound (purple line) directions separately. The vertical purple line represents the Average Daily Traffic for both the northbound and southbound directions because it is assumed that the volume is equally distributed in both directions throughout one day. The plots of the average accidents and volumes all intersect above the line that represents a 1.5 positive standard deviation from the expected safety performance of a 4-lane urban interstate facility with similar daily traffic volumes (top blue line). Based on this location on the graph, this section of I-25 experienced more accidents and exhibited a lower safety performance than expected during the 2006 through 2008 time period. This is consistent with the fair and poor ratings attributed to the 2003 through 2005 accident statistics.

Exhibit 2. Safety Performance Comparison for the 2006 through 2008 Time Period



Conclusion

Both methodologies suggest traffic safety problems exist on I-25 between 20th Street and Pueblo Boulevard. The accident rate and SPF comparisons yield similar conclusions over the 6-year analysis period because the accidents remain fairly consistent from year to year due in part to the geometric deficiencies and recurring congestion along this segment of I-25. The 2003 through 2008 accident analysis yields the same results as the 2000 through 2002 accident analysis – this section of I-25 through Pueblo experiences more accidents than similar facilities across the state.