Traffic Characteristics and Safety Technical Report

State Highway 82 / Entrance to Aspen
Environmental Reevaluation

February 20, 2007

Colorado Department of Transportation, Region 3

and

Federal Highway Administration, Colorado Division

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1.0 Introduction

This report provides a detailed reevaluation of the traffic characteristics and safety information presented in the 1997 State Highway 82 Entrance to Aspen Final Environmental Impact Statement (FEIS) (CDOT 1997). Relevant FEIS sections include Section I.D., Traffic Characteristics and Section I.E., Safety.

Traffic topics covered include existing traffic operations, traffic flow variation by location, seasonal traffic flow variations, traffic flow variation by time and direction, future traffic volumes, future traffic operations and future land use as they relate to the Preferred Alternative selected in the 1998 Record of Decision (ROD) (CDOT 1998). Topics regarding safety include traffic safety characteristics, emergency access, and roadway deficiencies as they relate to safety performance of the State Highway 82 project corridor.

Traffic analysis for the 1997 FEIS was developed using a 1993 base year, representing existing conditions, and a 2015 future planning horizon. In this Technical Report, the FEIS traffic analysis for existing and future conditions is updated to 2005 and 2030, respectively. The 2030 future planning horizon provides the required 20-year design period, and is consistent with the planning horizon for the Intermountain Transportation Planning Region's current, adopted Regional Transportation Plan (RTP).

Transportation system management issues, closely related to traffic and safety, are addressed in a separate report, *System Management Technical Report, State Highway 82/Entrance to Aspen Environmental Reevaluation* (February, 2007). The reader should consider both this report and the System Management report together to fully understand the transportation issues associated with the Entrance to Aspen project.

1.1 Methodology

This technical report includes information assembled from many sources, which are listed in the reference section. Traffic count data for 2004 and 2005 was obtained from the City of Aspen and CDOT. References used include current plans, policy documents, and data from CDOT and local traffic databases. Other data was obtained from CDOT and local government sponsored studies. Accident records were obtained from law enforcement data bases.

Traffic forecasts were prepared for the FEIS using a summer/winter peak hour travel model developed for the EIS. The FEIS travel model did not include the Aspen Transportation Management (TM) Program, and used a 2015 future planning horizon. Because future year analysis must provide a 20-year planning horizon, alternatives to the FEIS model for travel forecast update were explored.

A new travel model being developed by the Roaring Fork Transportation Authority (RFTA) was considered. The RFTA model uses a 2025 future planning horizon. While a 2025 planning horizon would provide a 20-year span from the new 2005 base, a 2025 planning horizon is not consistent with the 2030 planning horizon for the current adopted RTP for the Intermountain Transportation Planning Region (TPR, 2004). Other issues with using the RFTA model include that the RFTA model has not yet been

completed for the 2005 base year, and that the RFTA model was developed to evaluate an interim bus transit alternative for the State Highway 82 corridor versus the ultimate light rail transit (LRT) system included in the Preferred Alternative selected in the 1998 ROD.

Absent a viable travel model with which to forecast 2030 traffic volumes, the methodology used for CDOT statewide planning was adopted for this analysis, and 2030 traffic forecasts for the State Highway 82 corridor were prepared using the CDOT traffic database (CDOT, 2006c). The CDOT database incorporates a traffic forecast calculator that uses growth factors developed from trend analysis of current and historic traffic counts included in the data base, including periodic traffic counts, as well as continuous count station data for all state highway system facilities. Growth factors derived from CDOT continuous count station data for State Highway 82 capture the constraining effects of the City of Aspen's TM Program on traffic growth since its implementation in 1995.

Data in the FEIS were analyzed as they relate to the Preferred Alternative selected in the 1998 ROD. More recent and/or current data on the same topics, as noted above, were assembled and compared to the FEIS data. Differences in the data and new trends were identified and reported.

Existing traffic conditions were evaluated with respect to highway traffic congestion expressed in terms of Level of Service (LOS) as defined by the *Highway Capacity Manual 2000* (HCM) (Transportation Research Board, 2000). LOS is assigned a letter code ranging from an A for excellent, free flow conditions to an F for failing, interrupted flow conditions. Conditions associated with individual levels of service as defined by the HCM are summarized in Table 1-1.

Table 1-1
Descriptions of Level of Service

Level of Service	Description
A	Represents the best operating conditions and is considered free flow. Individual users are virtually unaffected by the presence of others in the traffic stream.
B	Represents reasonably free-flowing conditions but with some influence by others.
C	Represents a constrained constant flow below speed limits, with additional attention required by drivers to maintain safe operations. Comfort and convenience levels of the driver decline noticeably. LOS C is the Colorado Department of Transportation's design service level (design capacity) for rural highways.
D	Represents traffic operations approaching unstable flow with high passing demand and passing capacity near zero, characterized by drivers being severely restricted in maneuverability. LOS D is the Colorado Department of Transportation's design service level for urban highways.
E	Represents unstable flow near capacity. LOS E often changes to LOS F very quickly because of disturbances (road conditions, accidents, etc.) in traffic flow.
F	Represents the worst conditions with heavily congested flow and traffic demand exceeding capacity, characterized by stop-and-go waves, poor travel time, low comfort and convenience, and increased accident exposure.

1.2 Regulatory Overview

The subjects covered in this technical report are those necessary to meet the requirements of federal regulations pertaining to federally funded (in whole or in part) transportation projects that minimize and mitigate adverse impacts. Table A-1 in Appendix A shows the federal regulations, executive orders, and state regulations upon which the 1997 FEIS was developed in regard to the traffic environment, and how the regulations have changed (if they have), as well as any new regulations that bear on traffic issues.

The only new regulation related to the traffic safety topic since FEIS publication is the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), signed on August 10, 2005, by President Bush. It authorizes the federal surface transportation programs for highways, highway safety, and transit for the 5-year period from 2005 to 2009. This legislation addresses the challenges of the proposed project: improving safety, reducing traffic congestion, improving efficiency in freight movement, increasing intermodal connectivity, and protecting the environment.

2.0 Traffic Characteristics

Existing traffic congestion is the primary issue associated with the need for improvement of the State Highway 82 transportation corridor. Traffic on State Highway 82 has increased consistently, growing at an average annual rate of 4.4 percent between 1980 and 1993, and then leveling off due to the combined effects of limited corridor capacity and implementation of the City of Aspen's Incremental Transportation Management Program. Given the high level of existing traffic congestion on State Highway 82, it is also important to know how land use changes within and beyond the study corridor will impact future travel demand and traffic conditions and volumes on this transportation corridor. Traffic characteristics, the extent of traffic congestion and the characteristics of traffic congestion are discussed in the FEIS for a 1993 base year and a 2015 future planning horizon. For this reevaluation, the FEIS traffic analysis for existing and future conditions is updated to 2005 and 2030, respectively, and is described below. Much of the State Highway 82 corridor was at capacity in 1993. Under already saturated conditions, it is not possible to pass more traffic through the corridor during the peak hour in 2005; rather increases in 2005 traffic volumes have resulted in extended peak hour queues and a longer duration of congestion.

2.1 Existing Traffic

The FEIS states that, in 1994[1] during the peak summer and winter seasons, the entire section of State Highway 82 within the study corridor operated at LOS E or F for much of the day. Based on the LOS, the FEIS states that traffic operations on State Highway 82 dictate the need for transportation

[1] The existing conditions analysis for the 1997 Entrance to Aspen FEIS used 1993 traffic count volumes and a traffic model with a 1993 base year. The FEIS states that the difference between 1993 and 1994 traffic volumes is minimal.

improvements in the corridor. As shown in Table 2-1, this condition remains constant in extent and severity in 2005.

2.1.1 Traffic Operations

The FEIS states that, in 1994 during the peak summer and winter seasons, the entire section of State Highway 82 within the study corridor operated at a LOS E or F for much of the day. For 2005, this condition remains relatively unchanged from 1994. Increases in traffic volumes are small due to implementation of an effective incremental transportation management program. However, a small increase in 2005 traffic during the peak hour is enough to drop the level of service in one segment, between Maroon Creek Road and Cemetery Lane (milepost 39.8 to milepost 40.1) from a low LOS E to LOS F.

Table 2-1
State Highway 82 Existing Level of Service - Summer Average Peak Hour Comparing FEIS (1993) Data with Currently Available (2005) Data

Section (Mileposts)	1993 Average PM Peak Hour Volume[a]	2005 Average PM Peak Hour Volume[b]	Percent No Passing Zones	Percent Trucks	Maximum Capacity (Total of both Lanes)[c]	Level of Service (1993/2005)[d]
Buttermilk Ski Area to Maroon Creek Bridge (38.5 to 39.2)	1,950	2,370	65%	8%	2,420	E/E
Maroon Creek Bridge to Maroon Creek Road (39.2 to 39.8)	2,030	2,380	80%	8%	2,420	E/E
Maroon Creek Road to Cemetery Lane (39.8 to 40.1)	2,280	2,400	100%	8%	2,420	E/F
Cemetery Lane to 7th Street and Main Street (40.1 to 40.5)	2,430	2,440	100%	8%	2,260	F/F

[a] The existing conditions analysis for the 1997 Entrance to Aspen EIS used 1993 traffic count volumes and a traffic model with a 1993 base year. The FEIS states that the difference between 1993 and 1994 traffic volumes is minimal.

[b] 2005 PM Peak Hour/Design Hour volumes were estimated based on peak/design hour percent of daily traffic (8.5%) and daily volumes data tabulated by month for the years 1993 through 2005.

[c] Maximum capacity is hourly flow under ideal conditions at LOS E. The definition of capacity assumes that good weather and pavement conditions exist. At capacity, no more vehicles can reasonably be expected to traverse a section of roadway during the given time period under prevailing roadway, traffic and control conditions. The capacity for the Cemetery Lane to 7th Street and Main Street is less due to lower speeds through the S-curves

[d] Level of Service in Table 1-2 is shown for 1993 Average PM Peak Hour Volumes, followed by 2005 Average PM Peak Hour Volumes

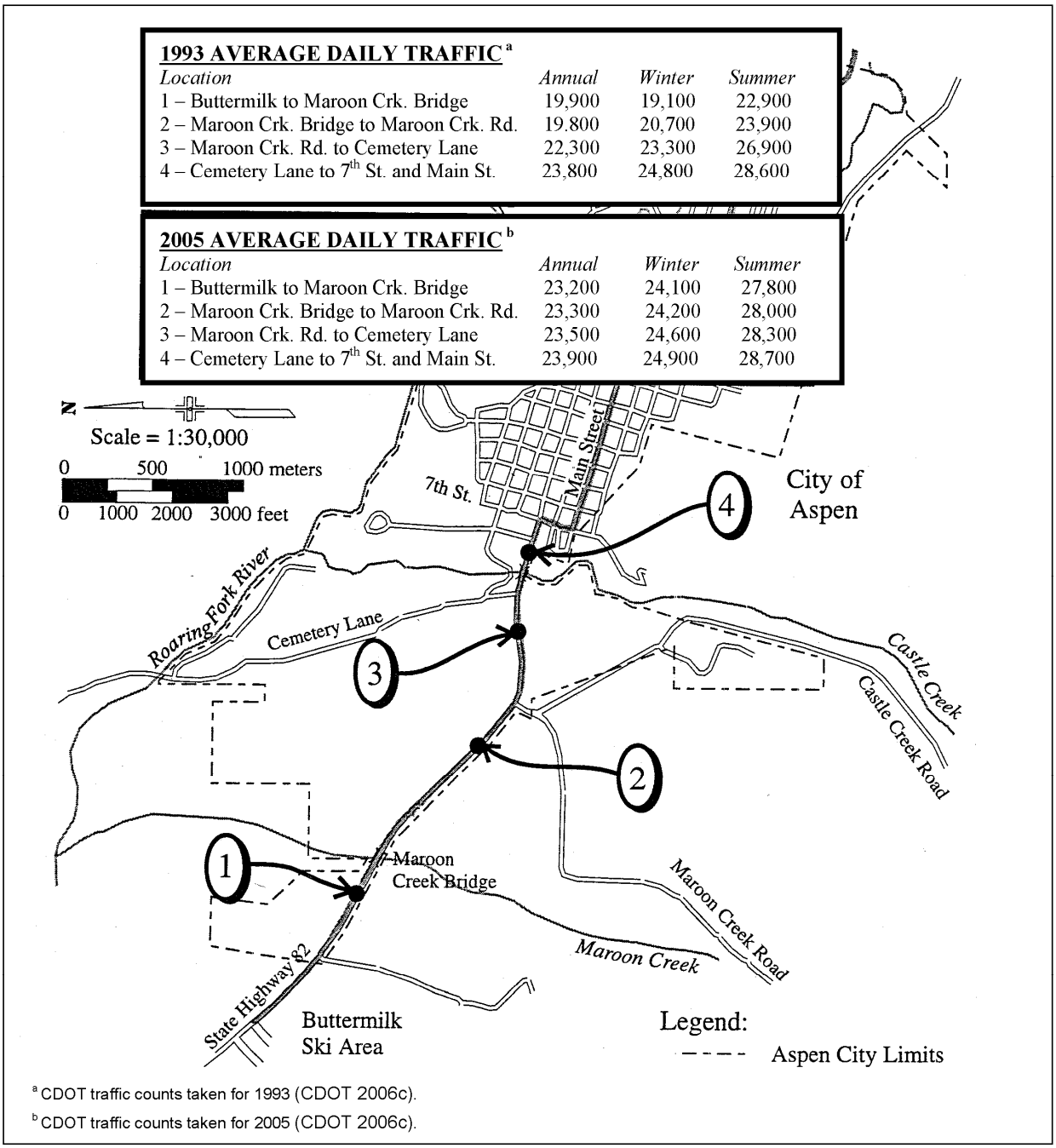
Sources: CDOT, 1997; CDOT, 2006c.

2.1.2 Variations by Location

The FEIS states that in 1993, the traffic volumes on State Highway 82 near the Entrance to Aspen varied considerably by location, with traffic volumes increasing between the Buttermilk Ski Area and the Castle Creek Bridge into Aspen, and the highest volume within the project corridor occurring at Castle Creek

Bridge. Twelve years later, in 2005, the highest volumes were still observed crossing the Castle Creek Bridge; however the Castle Creek Bridge crossing volumes remained constant at 1993 levels, with volumes along the remainder of the corridor increasing to nearly the same level. Average daily and peak hour traffic volumes for both 1993 and 2005 are summarized for four corridor locations in Figures 2-1 and 2-2.

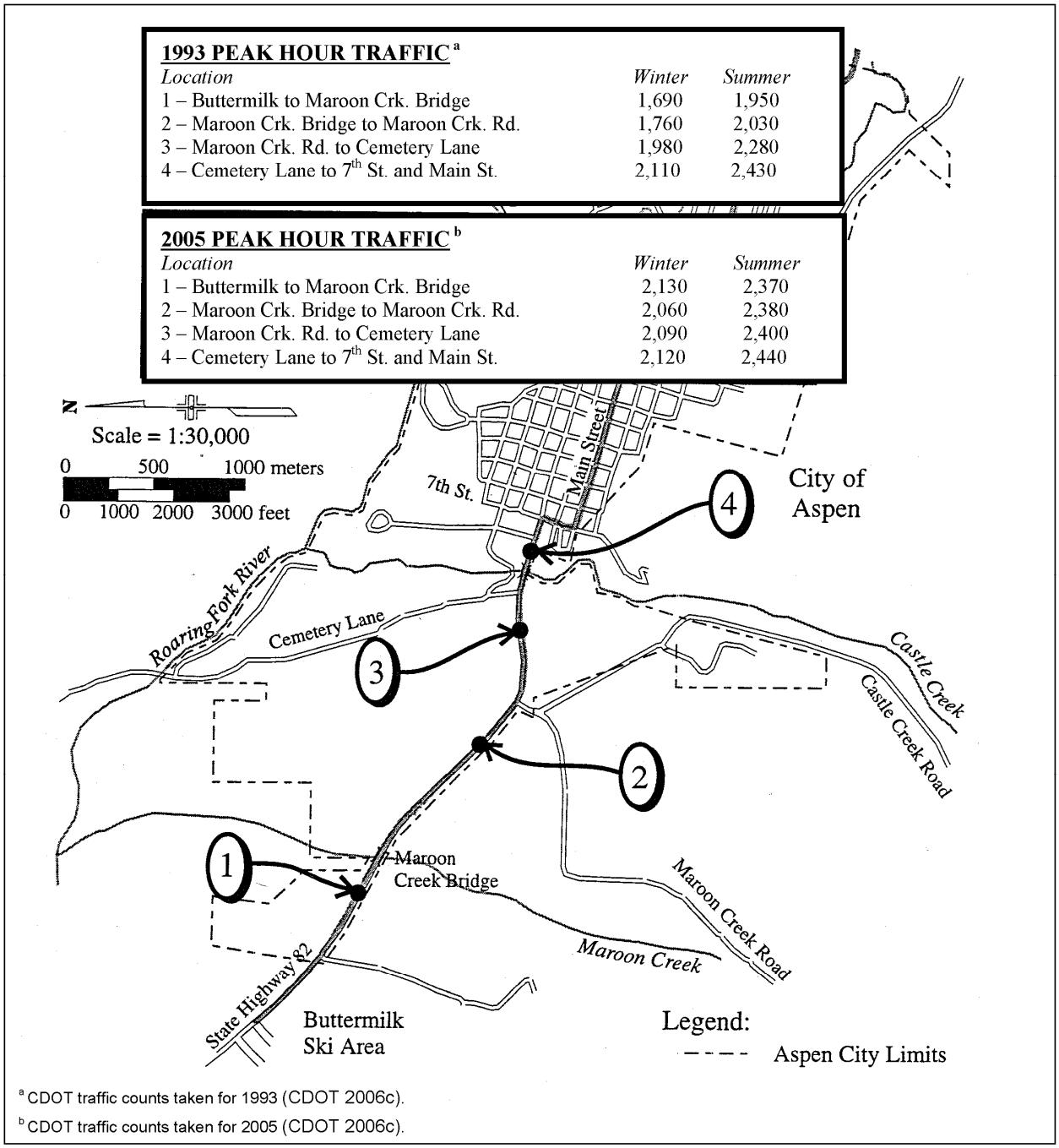
Figure 2-1
Average Daily Traffic Volumes State Highway 82 Entrance to Aspen Study Corridor
Comparing FEIS (1993) Data with Currently Available (2005) Data



[a] CDOT traffic counts taken for 1993 (CDOT 2006c).

[b] CDOT traffic counts taken for 2005 (CDOT 2006c).

Figure 2-2
Peak Hour Traffic Volumes State Highway 82 Entrance to Aspen Study Corridor
Comparing FEIS (1993) Data with Currently Available (2005) Data

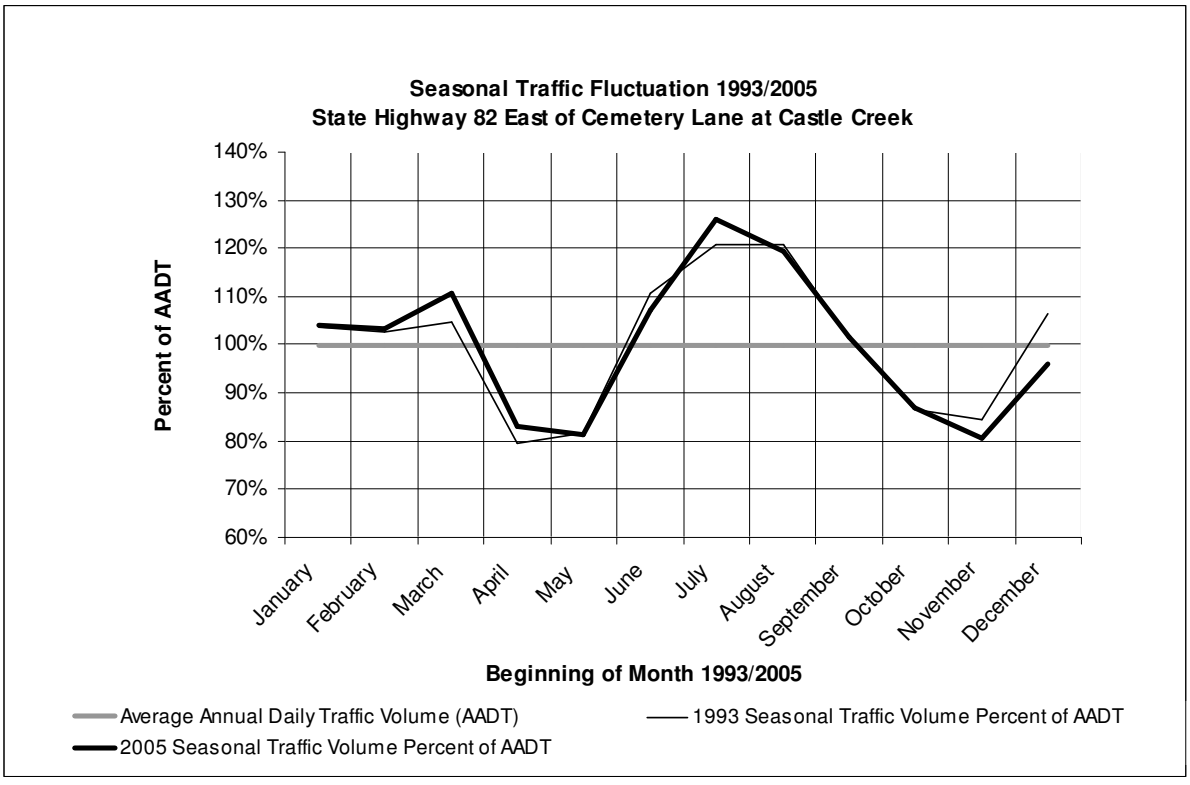


2.1.3 Seasonal Variation

The recreational opportunities in the Roaring Fork Valley attract large numbers of visitors to the area, primarily in the winter and summer months. Actual CDOT traffic counts for 1993 (CDOT, 2006c), by week, were graphed in the FEIS as percent of average annual daily traffic (AADT). The data showed that during the winter and summer months the traffic volume on State Highway 82 had very distinct peaks corresponding to the winter holiday period from late December through late March, and the summer tourist season between June and August. Figure 2-3 summarizes the FEIS 1993 traffic count data, together with new actual CDOT traffic counts for 2005 (CDOT, 2006c). The data shows that the seasonal pattern that has been documented in the past continued in 2005. This pattern is characterized by winter and summer traffic volume peaks that exceed the AADT by 4 percent and 20 percent, respectively. This pattern is expected to continue into the future.

The FEIS concluded that the existence of these two distinct and separate high-volume seasons rendered the use of annual averages for evaluating daily volumes invalid. Rather, it is necessary to use summer average daily volumes (SADT), the highest daily volumes, to evaluate peak congestion, and to use winter average daily volumes to evaluate PM_{10} air quality impacts, because this is an air quality problem most prevalent during the winter months.

Figure 2-3
Seasonal Traffic Volume Variation Comparing FEIS (1993) Data with Currently Available (2005) Data



2.1.4 Variations by Time and Direction

The FEIS examined hourly traffic distribution of daily traffic, as well as traffic distribution by direction by time of day, for both average winter and average summer days. Actual CDOT traffic counts for 1993 were used for the analysis (CDOT, 2006c). The traffic count data for 1993 showed distinctly different distributions of total traffic by time of day for winter versus summer days. The winter distribution is dependent on the opening and closing of local ski areas, with an early peak between 6 a.m. and 8 a.m. due to commuter/recreational traffic arriving from down valley to attend work/school or to ski in Aspen, and an additional rise in traffic volume between 8 a.m. and 9 a.m. coinciding with the opening of the ski areas and end of the morning commute. Winter traffic then drops slightly until mid-day, rising after noon until an evening peak between 3 p.m. and 5 p.m. that coincides with employee and skier departures from the Aspen area. The summer distribution is similar to the winter distribution from midnight until 8 a.m.; however, the summer morning peak rises more rapidly and does not increase after 8 a.m. Rather, traffic volumes remain fairly constant through 5 p.m., with less pronounced volumes occurring at noon and between 3 p.m. and 5 p.m. Summer volume is spread throughout the day, with high congestion continuous from morning until evening.

Figures 2-4 and 2-5 compare 1993 and 2005 daily traffic volume distributions by time of day (vehicles per hour or vph), based on actual CDOT traffic counts, for the winter and summer, respectively. Although 1993 volumes were higher than 2005 volumes for the same hour in some instances, in all cases the recorded overall 2005 daily volumes were higher than comparable 1993 daily volumes (refer to Table 2-1). The data shows that the hourly distribution of traffic throughout the day that was documented in 1993 continued in 2004. This pattern is also expected to continue into the future.

Figure 2-4
Daily Traffic Distribution – Winter, State Highway 82 East of Cemetery Lane at Castle Creek Comparing FEIS (1993) Data with Currently Available (2005) Data

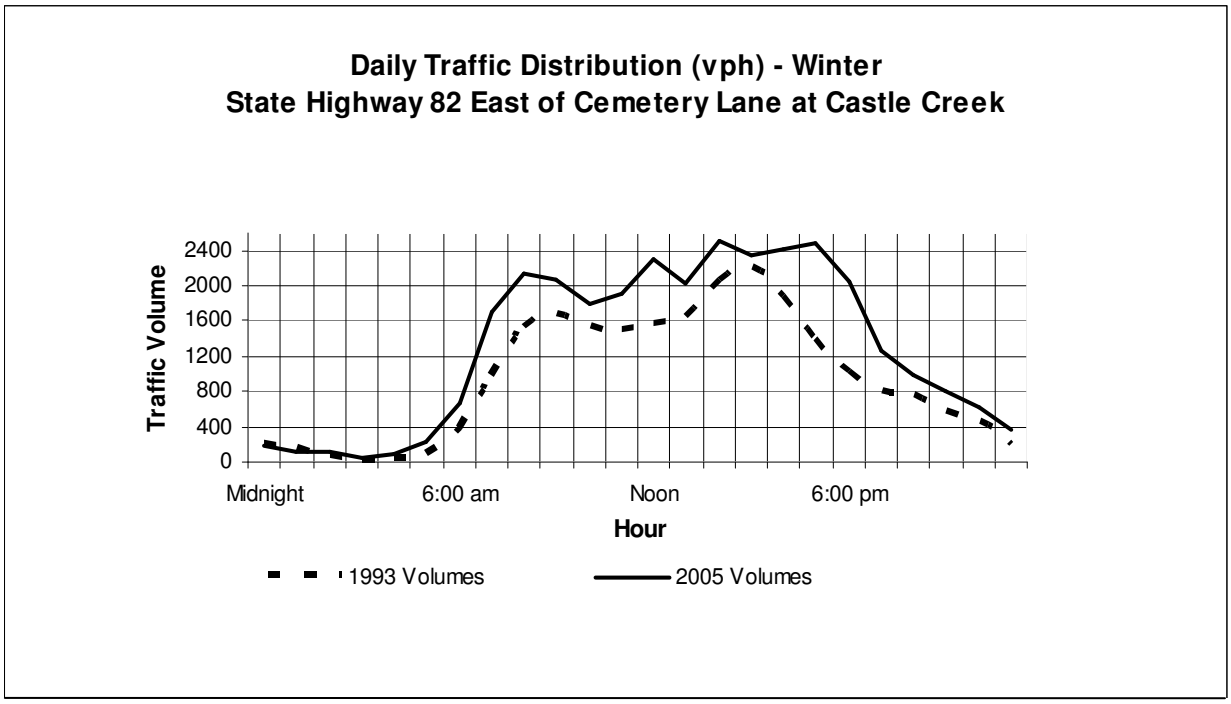
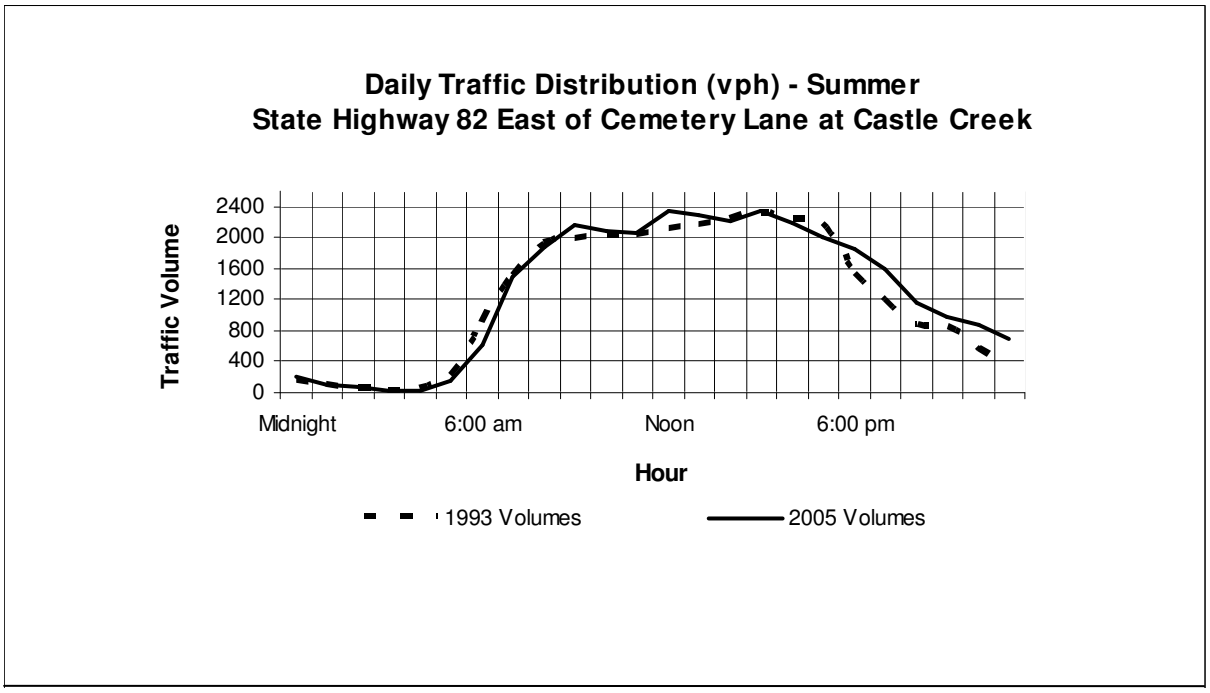
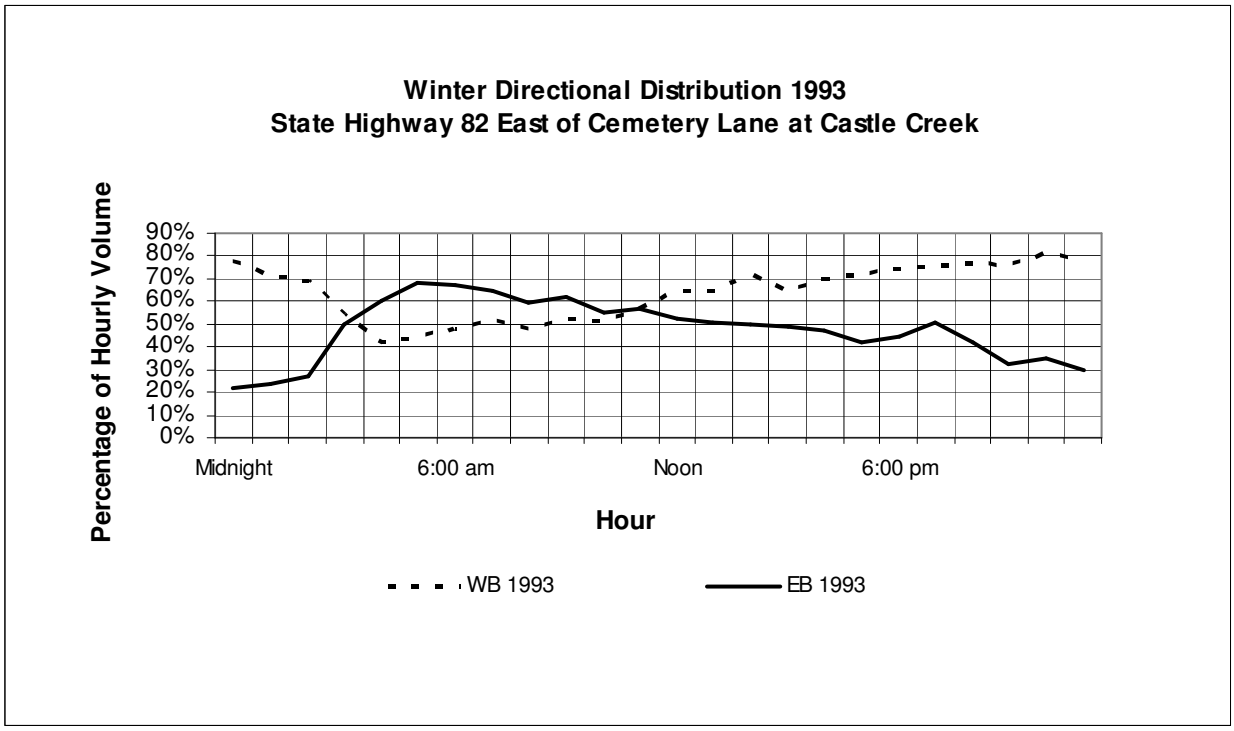


Figure 2-5
Daily Traffic Distribution – Summer, State Highway 82 East of Cemetery Lane at Castle Creek Comparing FEIS (1993) Data with Currently Available (2005) Data



Figures 2-6 and 2-7 present the directional distribution of traffic for 1993 and 2005, expressed as percent of hourly traffic volume, for the winter and summer, respectively. Directional distribution throughout the day is shown in the westbound and eastbound directions for typical summer and winter peak travel days. The data shows that the hourly directional pattern of traffic flow that was documented in 1993 continued in 2005. This pattern is also expected to continue into the future.

Figure 2-6
Directional Distribution – Winter, State Highway 82 East of Cemetery Lane at Castle Creek
1993 and 2005



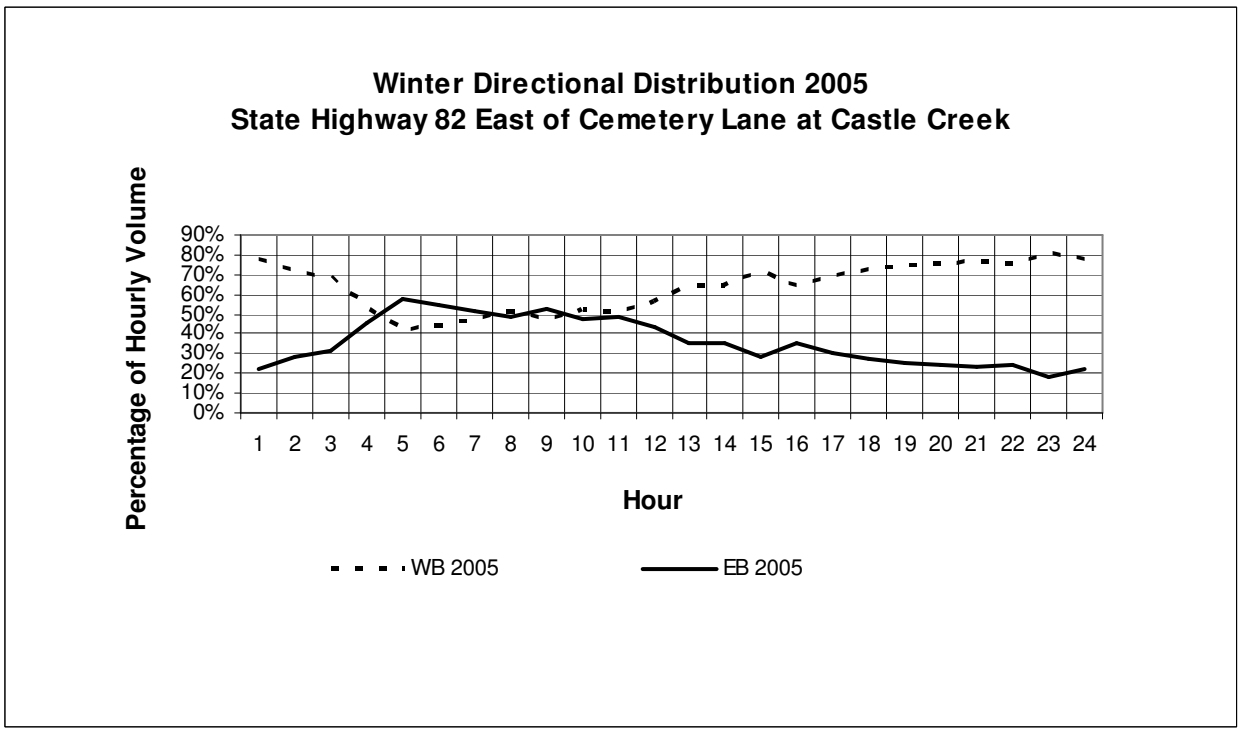
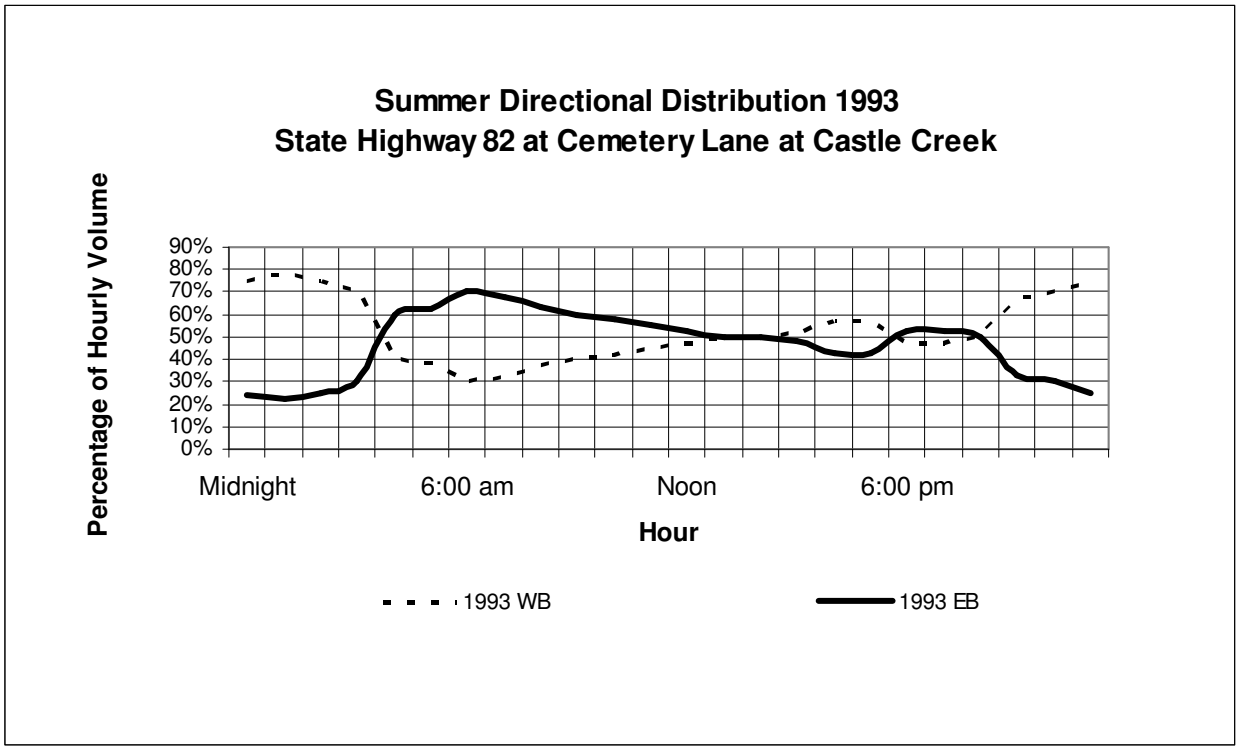
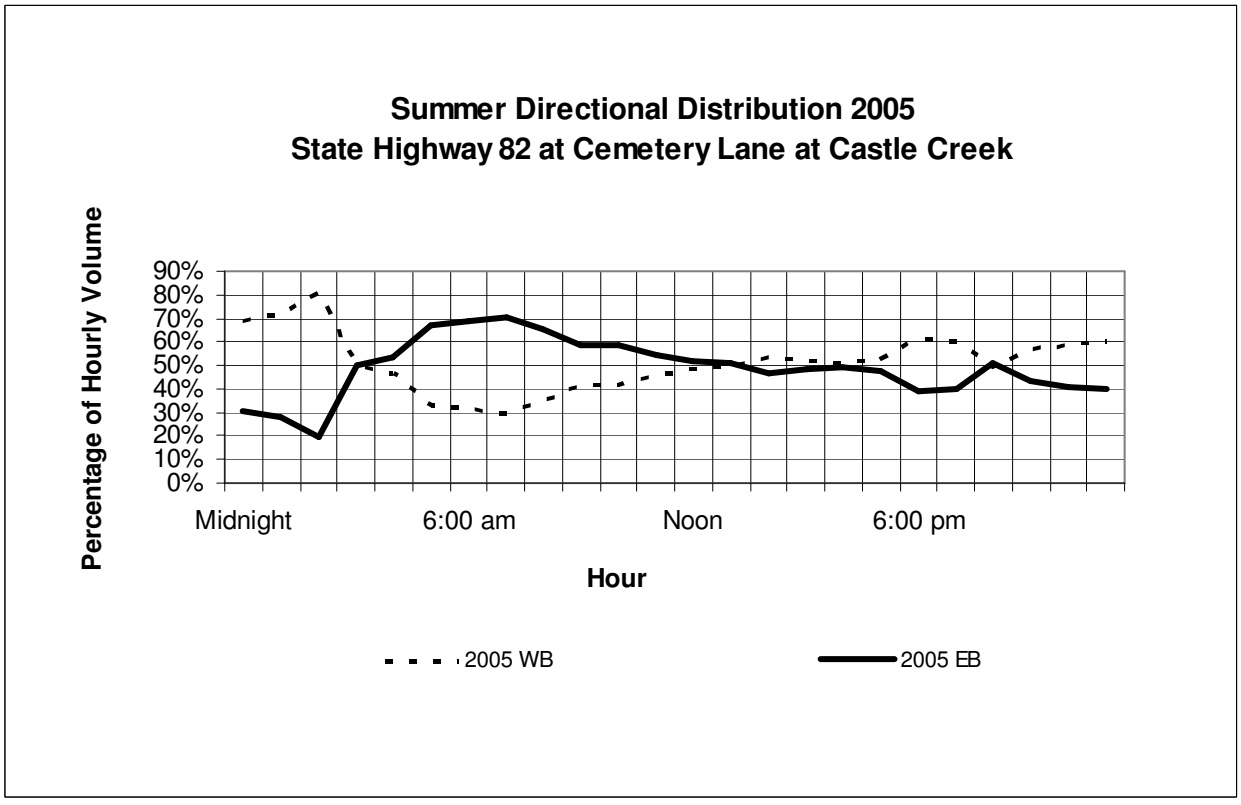


Figure 2-7
Directional Distribution – Summer, State Highway 82 East of Cemetery Lane at Castle Creek 1993 and 2005





2.2 Future Traffic

2.2.1 Future Traffic Volumes

The FEIS forecast for the 2015 high growth scenario traffic demand at Cemetery Lane for the No-Action Alternative was 42,000 vehicles per day (vpd) during the summer and 36,400 vpd during the winter. With the afternoon peak accounting for 8.5 percent of daily traffic, the summer traffic demand would be 3,600 vph during the p.m. peak hour. Based on this forecast traffic volume, the FEIS states that capacity of the existing highway would be extremely insufficient and would not be able to handle forecast traffic demand during the p.m. peak hour, and that the existing highway would operate at LOS F for 16 hours a day to process forecast summer average daily demand of 42,000 vehicles. Further, the FEIS concludes that, without mitigation of increasing traffic congestion, the LOS on State Highway 82 can be expected to further deteriorate well below acceptable levels, for longer periods along the entire study corridor.

Since 1995, the City of Aspen has implemented the Incremental Transportation Management (TM) Program, with the goal of maintaining future traffic volumes at or below the 1994[2] levels in the project corridor. The TM Program has been successful in keeping the average daily traffic during peak season at essentially the same level as it was in 1994. (Note that traffic counts for TM program monitoring are collected at the Castle Creek Bridge, and not along the entire State Highway 82 corridor.) Nonetheless, 2030 traffic demand at Cemetery Lane for the No-Action Alternative is 44,800 vpd during the summer and 37,000 vpd during the winter. (Traffic demand was prepared using CDOT growth factors that indirectly account for reduced traffic growth due to implementation of the TM program.) This equates to a 2030 summer traffic demand, with the TM Program, of 3,800 vph. Forecast 2030 demand for the No-Action Alternative will further exceed capacity of the existing highway, above the capacity deficit identified by the FEIS for 2015 (CDOT 1997), and will extend the period of the day during which the highway will operate at LOS F. By 2030, increasing down valley traffic volumes under the No-Action Alternative will also have the effect of extending congestion and failing LOS "down valley" along the entire corridor.

The FEIS found that serving existing and future person-trip demand on the State Highway 82 project corridor will require a combination of general purpose lanes and transit facilities. Provision of high-capacity transit facilities included in the Preferred Alternative (light rail transit (LRT), buses, or other dedicated-vehicle transit modes) will be critical to providing the transportation capacity needed to accommodate forecasted person trips in the years 2015 and 2030, and will support achieving the stated community goal of limiting the number of vehicles in 2015 to levels at or below those in 1994 (CDOT 1997). Transit modes, particularly high-capacity LRT and exclusive bus lanes, provide significantly more

[2] The project objective is stated in the 1998 ROD (page 7) as, "…the stated community goal of limiting the number of vehicles in 2015 to levels at or below those in 1994." Throughout the FEIS, traffic volumes are referred to as levels at or below those in 1993, because the traffic model used for the FEIS was based on 1993 traffic volumes. The FEIS states that difference between 1993 and 1994 traffic volumes is minimal (page I-3, FEIS).

person-trip carrying capacity within less right-of-way width than can be provided by addition of general purpose lanes within the corridor. Supporting multimodal parking facilities, also included in the Preferred Alternative, will encourage transit use, limit travel by personal vehicle within the City of Aspen, and reduce traffic congestion within the core downtown area.

2.2.2 Future Traffic Operations

The FEIS states that traffic (in 1993-1994, at the time of the FEIS traffic studies) is congested on State Highway 82 between the airport and Aspen, and congestion is experienced for increasing periods within the peak seasons. Although 2005 traffic volumes within the segment of the corridor targeted by the City of Aspen TM Program remain essentially unchanged from 1993 levels, traffic volumes between the Buttermilk Ski Area and Cemetery Lane have continued to increase, reaching the 1993 corridor high at the Castle Creek Bridge in 2005. The FEIS states that as traffic volumes increase, traffic operations on State Highway 82 are expected to get even worse. For 1993 the existing highway reached capacity at about 2,300 vehicles per hour (vph) at Cemetery Lane. For 2005, CDOT traffic counts show that the roadway segment between Maroon Creek Road and Cemetery Lane has also reached/exceeded capacity.

2.2.3 Future Land Use

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), like its predecessor, the Intermodal Surface Transportation Efficiency Act (ISTEA), recognizes a strong correlation between land use and travel demand. The FEIS states that, while the City of Aspen and greater Pitkin County are proactive in promoting the location of affordable housing close to jobs and to manage the rate of development within their respective jurisdictions, a large amount of development has continued, and will continue throughout the State Highway 82 corridor. These developments create additional travel demand and result in increased traffic. A cadre of travel demand management measures has helped to manage traffic resulting from the tremendous increase in residential units throughout the valley. However, the FEIS concludes that, because the capacity of existing State Highway 82 is inadequate to handle even current (1993-1994) travel demand, even very aggressive measures to get vehicles off the road will not offset the need to upgrade State Highway 82 corridor to meet current and future travel demand. Development pressure on the State Highway 82 corridor has continued since publication of the FEIS, and the conclusion of the FEIS with respect to future land use remains valid.

3.0 Traffic Impacts and Mitigation Measures

Two potential impacts of the Preferred Alternative related to traffic were identified in the 1997 FEIS: the removal of some parking on Main Street, Monarch Street, and Durant Avenue, and potential congestion at intersections near transit stations and park-and-ride facilities. There have been no changes to the Preferred Alternative selected in the 1998 ROD, and these impacts remain valid. Table 3-1 summarizes

the impacts identified in the FEIS and this reevaluation, and the mitigation identified in the ROD along with current status of mitigation implementation, if applicable.

Table 3-1
Comparison of Impacts and Mitigation in FEIS/ROD and Reevaluation

Topic	FEIS Impact	Reevaluation Impact	ROD Mitigation
Parking	Removal of 252 parking places on Main Street, Monarch Street, and Durant Avenue to accommodate LRT (alignment on south side of Main Street). Adverse impacts would occur to some businesses along the downtown alignment.	No change. For interim exclusive bus lanes, only Main Street parking would be affected, removing up to 169 spaces during any bus phase.	• Provision of intercept parking lots and park-and-ride facilities in down-valley locations
Traffic Operations	Traffic congestion at intersections near transit stations and/or park-and-ride facilities at Brush Creek Road, Aspen/Pitkin County Airport, and Buttermilk.	Recommended intersection improvements have been implemented to address existing and future congestion at these locations	• Provision of new traffic signals at unsignalized intersections adjacent to proposed station locations • Intersection improvements have been completed since publication of the ROD

4.0 Safety

4.1 Traffic Safety Characteristics

State Highway 82 between Buttermilk Ski Area and Aspen has had worse than average accident rates for more than 20 years. Analysis for the 1997 FEIS was based on accident statistics compiled for three years from April 1, 1991 to March 31, 1994. During that period there were 113 total accidents, including 38 injury accidents. Nearly half of the total accidents occurred in the up valley project segment, between Cemetery Lane and the intersection of 7th Street and Main Street (S-curves). The FEIS concluded that many of the accidents that occurred at the S-curves were caused by a combination of poor weather conditions and substandard roadway design. The total accident rate for the Cemetery Lane intersection of 7th Street and Main Street was 4.48 accidents per million vehicle miles traveled (acc/MVM). This was 386 percent of the average rural Colorado rate (1.16 acc/MVM) and 149 percent of the average urban Colorado rate (3.00 acc/MVM). The accident rate for State Highway 82 within the project corridor has been well above the state accident rate in the past, a trend that the FEIS stated is likely to worsen until appropriate improvements are made. The expectation expressed by the FEIS is borne out by three-year data for the period from April 1, 2000 through March 31, 2003 (City of Aspen 2003), that exhibits increasing accidents rates in the corridor segments between Maroon Creek Road and 7th Street and Main Street (S-curves). As with the earlier three-year period (1991-1994), accidents that occurred between Cemetery Lane and the intersection of 7th Street and Main Street (S-curves) were half of the total of 200 accidents. Data for both three-year periods is summarized in Table 4-1.

A detailed examination of the accident data for the period from April 1, 2000 through March 31, 2003 (City of Aspen 2003) showed that over 50 percent of the accidents occurring on all segments of the corridor were rear-end collisions, symptomatic of traffic congestion. The corridor segment with the greatest share (82 percent) of rear-end accidents was the down valley segment between the Buttermilk Ski Area and Maroon Creek Road, the segment that has also experienced the highest growth in traffic volumes since 1997. The segment with the second highest share of rear-end accidents (58 percent) was the up valley segment between Cemetery Lane and the 7th/Main Street intersection (S-Curves). While traffic volumes have remained virtually unchanged on this segment since 1997, this segment continues to experience the highest peak hour volumes as compared to the down valley corridor segments.

Table 4-1
Aspen Entrance Accident Rates Comparing FEIS (1991-1994) Data with 1992 Statewide Data and Currently Available (2000-2003) Data

Section Location	Section Length km (miles)	Total Accidents	Accident Rate	Injury Accidents	Injury Accident Rate[a]	Property Damage Only	Property Damage Rate[b]
State Highway 82 ACCIDENTS – April 1, 1991 – March 31, 1994							
Buttermilk Ski Area to Maroon Creek Road (MP 38.5 to MP 39.2)	2.08 (1.29)	47	1.71	18	0.65	29	1.05
Maroon Creek Road to Cemetery Lane (MP 39.2 to MP 40.1)	0.48 (0.30)	16	1.9	8	0.95	8	0.95
Cemetery Lane to 7th/Main (S-Curves) (MP 40.1 to MP 40.5)	0.61 (0.38)	50 [c]	4.48	12	1.08	38	3.41
State Highway 82 ACCIDENTS – April 1, 2000 – March 31, 2003							
Buttermilk Ski Area to Maroon Creek Road (MP 38.5 to MP 39.2)	2.08 (1.29)	28	0.85	8	0.24	20	0.61
Maroon Creek Road to Cemetery Lane (MP 39.2 to MP 40.1)	0.48 (0.30)	73	9.30	12	1.53	61	7.64
Cemetery Lane to 7th/Main (S-Curves) (MP 40.1 to MP 40.5)	0.61 (0.38)	99	10.04	19	1.93	80	7.30
Statewide Accidents 1992							
Federal-Aid Primary (Rural)	6,084 (3,781)	4,638	1.16	1,765	0.44	2,874	0.72
Federal Aid Primary (Urban)	827 (514)	12,966	3.00	4,451	1.03	8,515	1.97

[a] This rate is for the number of injury accidents per million vehicle miles traveled, not the number of persons injured. Because there may be multiple injuries in accidents, the injury rate per person is higher.

[b] Total accident, injury accident, and property damage accident rates are per million vehicle miles of travel. Aspen area rates are expressed as an annual average for three years.

[c] Thirty-eight (75 percent) of these accidents occurred between 8th Street and the intersection of 7th Street and Main Street.

Sources:

City of Aspen 2003. SH 82 Accident Statistics, Colorado State Patrol Data Base, 2000-2003 SH 82 Summary Records.

CDOT 2006c. Website, Data & Statistics, Traffic Data.

4.2 Emergency Access

The 1997 FEIS states that emergency response to incidents requiring use of State Highway 82 by emergency vehicles is often delayed by traffic congestion, and that closure of State Highway 82 at the Castle Creek Bridge could jeopardize emergency response, compromising access into or out of Aspen.

This is of particular importance in medical emergencies because the Aspen Valley Hospital is on one side of Castle Creek, while the main fire station and Aspen are on the other side of the creek. The FEIS cites the only other existing access across Castle Creek as the route under State Highway 82, on Power Plant Road via a load-restricted bridge. Load restriction on that bridge would preclude some emergency vehicles from using Power Plant Road as an alternative route. Once the new Castle Creek Bridge is open to traffic, the old bridge will remain in place and will offer a second alternative creek crossing.

As in 1997, the Aspen Ambulance District operates from the Aspen Valley Hospital, while the Aspen Volunteer Fire Department (AVFD) provides responses to hazardous conditions calls involving fuel or chemical spills, downed power lines, and so forth. The AVFD also continues to be the secondary emergency responder in support of Aspen Ambulance. The AVFD is automatically called for CPR support, a second or third backup ambulance, and similar emergencies. A comparison of AVFD's station locations in 1997 and in 2006 is shown in Table 4-2. Construction of the Aspen Airport Business Center (AABC) Fire Station is currently underway.

Table 4-2
Aspen Volunteer Fire Department (AVFD) Station Locations – 1997 and 2006

1997 FEIS	2006 condition [a]
• 420 East Hopkins in Aspen • Aspen/Pitkin County Airport • Entrance to Starwood • Stutsman-Gerbaz, Inc. garage	• Same • New station to open on Sage Way at the Airport Business Center (ABC) development in 2007 • Woody Creek • Aspen Village
[a] Grob, 2006.	

The new AABC Substation will shorten first due emergency response times throughout the continued development to the West of the Castle Creek "divide." Current planning also allows for backup ambulances to be housed (for the first time) both at the AABC fire station and a new Headquarters fire station scheduled for construction in 2009. Regardless, the issues of awkward access and potential delays facing medical transport and other emergency responders remain a concern.

Although some fire station facilities have been replaced since 1997, the locations of emergency responders and access routes relative to the critical State Highway 82 Castle Creek crossing remain unchanged. Because the hospital is on the down valley side of the creek, transport of medical emergencies to the hospital will require crossing of the creek, regardless of the location of the fire station. Locations closer to State Highway 82 will reduce emergency vehicle travel time through congested downtown streets.

Once the new Castle Creek Bridge is open to traffic, the old bridge will remain in place and function as a local road, offering a second alternative creek crossing. The Preferred Alternative two-lane parkway configuration also incorporates wide shoulders that would represent an improvement over existing

conditions, allowing emergency vehicles to bypass State Highway 82 general lane closures during incidents.

These features would be included in the Preferred Alternative with either the exclusive bus lanes or LRT transit system.

4.3 Roadway Deficiencies

The FEIS identified roadway deficiencies that affect both the capacity and safety of State Highway 82. Identified geometric deficiencies included narrow shoulders, sharp curves (S-curves), lack of acceleration and deceleration lanes, and the presence of numerous private accesses to the highway. Because accesses represent traffic "conflict" locations, they introduce the potential for accidents, while reducing the capacity of the roadway and impacting traffic operations (CDOT, 1997).

Since 1998, the Colorado Department of Transportation and the City of Aspen have implemented a number of improvements to the State Highway 82 corridor to correct roadway deficiencies, improve traffic flow and add needed capacity.

Between 1996 and 1998, CDOT completed widening of State Highway 82 to four lanes between Aspen Village and Brush Creek Road. Improvements at Shale Bluffs were completed between 1997 and 2000, while widening between Gerbazdale and the Holland Hills project, and between Snowmass Creek East and West, was completed in 1999 and 2000, respectively (CDOT, 2000).

In 2000, CDOT began two projects to complete the widening of State Highway 82 between Basalt and Buttermilk. Widening of the first segment, between Aspen Airport Business Center and Buttermilk was completed in 2001. The Aspen Airport Business Center to Buttermilk segment, within the project corridor, was built as a four-lane segment (including peak-hour HOV lanes) with several upgrades including relocation of Owl Creek Road and West Buttermilk Road to create a new, combined intersection with State Highway 82 near the Buttermilk Ski Area. The roundabout at the Maroon Creek Road intersection was constructed, along with a new pedestrian underpass. The underpass improves safety by connecting the Owl Creek Trail to the Aspen Trail system (CDOT, 2006d). The widening of Snowmass Canyon followed immediately, and was opened to traffic in the fall of 2004. Additionally, the intersection of Truscott Drive and State Highway 82 was completed in 2001.

The City of Aspen also undertook a phased project to improve traffic flow and safety of the high-accident S-curves at the signalized intersection of 7th Street and Main Street. As the first project phase, an off-season demonstration of selected S-curve improvements (City of Aspen, 2005a) was conducted during a two-week period from May 23 through June 3, 2005. The improvements tested included:

- Left-turn restriction from cemetery Lane to SH 82 (7-10 a.m., 3-6 p.m.)
- Eight Street closure, north of SH 82/Hallam Street
- Hallam Street closure, east of SH 82/Seventh Street
- Bleeker Street closure, east of SH 82/Seventh Street

- Bleeker north alley closure, east of SH 82/Seventh Street
- Bleeker south alley closure, east of SH 82/Seventh Street

Off-season testing of the improvements resulted in "…overall improved traffic flow for traffic entering Aspen from the roundabout", as well as "significant reduction in the delay at the signalized Cemetery Lane intersection (12.8 to 25. 9 seconds for the morning and evening peaks, respectively)." (City of Aspen, 2005a.) Other observations/ impacts of the tested improvements included a slight increase in queue lengths at the roundabout, increases in traffic volumes on Power Plant Road and Smuggler Road, modest impacts to the intersections of Seventh and Hallam/State Highway 82 and Sixth and Main as a result of turn restrictions and street closures.

Summer "peak season" demonstration of the improvements was conducted in August 2005. The "peak season testing of the improvements resulted in only modest improvements to traffic flow into Aspen." (City of Aspen, 2005b.) With summer traffic volumes on State Highway 82 at capacity for most of the day, there is little room for improvement; however, "…closures and turn restrictions at Cemetery Lane do keep the flow constrained through the corridor, minimizing turn movements to and from the mainline, improving the flow of traffic" (City of Aspen, 2005b). It was concluded that these improvements will work best as a package, and, if paired with an outbound transit lane as ultimate improvements, significant improvement for bus travel times can be expected. The bus lane on Main Street in Aspen has now been implemented on a permanent basis, and operates daily from 3:00 p.m. to 6:00 p.m. year-round. The final bus-lane striping was done as part of the State Highway 82 Overlay Project. Several accesses to State Highway 82 have also been closed to improve traffic flow. The improvements have resulted in substantially lower transit travel times (anywhere from one minute to 18 minutes between Aspen and Brush Creek when compared to 2005 travel times) between Rubey Park and Brush Creek (City of Aspen, 2006).

The S-Curve analysis demonstrated that only modest capacity and traffic flow improvements can be achieved through traffic control, parking restriction and intersection improvement measures. To provide needed transportation system capacity to accommodate forecast person-trip demand, provisions for high-occupancy transit modes, including dedicated transit lanes, will be critical.

5.0 Agency Contacts and Coordination

Traffic data and counts were obtained from CDOT, Region 3, and the City of Aspen as described in Section 1.1. In addition, RFTA and its travel model consultant were contacted to discuss potential use of the 2025 model currently under development. (Section 1.1 describes the reasons why that model was not used for this reevaluation.)

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7.0 List of Preparers

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Appendix A

Table A-1
Federal and State Regulations Followed in Development of the 1997 FEIS Traffic Characteristics and Safety Section, Changes in the Regulations, and New Regulations

Applicable regulation to traffic characteristics and safety study	Description	Changes if any	Relationship to project
The National Environmental Policy Act of 1969, as amended (NEPA) (Pub. L. 91-190, 42 U.S.C. 4321-4347, January 1, 1970, as amended by Pub. L. 94-52, July 3, 1975, Pub. L. 94-83, August 9, 1975, and Pub. L. 97-258, § 4(b), Sept. 13, 1982)	The purposes of this Act are to prevent or eliminate damage to the environment, protect the health and welfare of people, to enrich the understanding of the ecological systems and natural resources important to the region.		All projects involving the Federal Highway Administration (FHWA) must follow NEPA regulations. Procedures and guidance are set by the Council on Environmental Quality (CEQ).
1991 Intermodal Surface Transportation Efficiency Act (ISTEA)	This landmark provided policy guidance and funding for highway, transit, and safety programs, and authorizes Federal transportation programs in these areas for fiscal years 1992–1997. Through ISTEA, FHWA provided a strategic investment framework, created programs, such as the Surface Transportation Program, that provided flexibility to state and local officials, and helped assure that transportation investments would meet the unique needs of their communities. ISTEA's authority expired in October 1997.	This program was reauthorized as Transportation Equity Act for the 21st Century (TEA-21) (see below).	An important step in coordinating and funding local multimodal projects, and funds for Transportation Enhancement activities, such as landscaping and beautification, rehabilitation—important to this project.
Transportation Equity Act for the 21st Century (TEA-21)	The Transportation Equity Act for the 21st Century was enacted June 9, 1998. TEA-21 authorized the federal surface transportation programs for highways, highway safety, and transit for the period 1998-2003. The TEA-21 Restoration Act, enacted July 22, 1998, provided technical corrections to the original law.	This program continued ISTEA in 1998 and was reauthorized as Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) in 2005 (see below).	Continued ISTEA's innovative policies.

Applicable regulation to traffic characteristics and safety study	Description	Changes if any	Relationship to project
Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)	SAFETEA-LU, signed on August 10, 2005, by President Bush, authorizes the federal surface transportation programs for highways, highway safety, and transit for the 5-year period from 2005 to 2009.	New in 2005	This legislation addresses the challenges of the proposed project: improving safety, reducing traffic congestion, improving efficiency in freight movement, increasing intermodal connectivity, and protecting the environment.
Title 23 - Highways Section 109 – Standards (h)	The purpose of this regulation is to assure that possible adverse economic, social, and environmental effects relating to any proposed project have been fully considered and that the final decisions are made in the best overall public interest.		This covers the important topics of air, noise, water pollution; man-made and natural resources, aesthetic values, community cohesion, public facilities and services; adverse employment effects, and tax and property values losses; displacement of people, businesses and farms; and disruption of desirable community and regional growth.