

## 2 Purpose and Need

### 2.1 BACKGROUND INFORMATION

US 50 serves national, regional, and local transportation needs. As a coast-to-coast element of the NHS, US 50 is an important route for the movement of people and distribution of goods and services through and beyond the Lower Arkansas Valley. Within Colorado, US 50 links two key north-south transportation routes: US 287 and I-25. US 287 is a designated interstate trade route called the Ports-to-Plains Corridor, which connects Laredo, Texas, and Denver, Colorado. I-25 extends through Colorado to the north and south, from Interstate 10 (I-10) in New Mexico to Interstate 90 (I-90) in Wyoming. US 50 provides access to I-25, which connects Denver with Colorado's other large metropolitan areas.

US 50 in southeastern Colorado generally parallels the Arkansas River, passing through four counties and 10 cities and towns, as previously shown in Figure 1-1. In most of the small communities, US 50 also serves as Main Street. Four communities along the US 50 corridor (Pueblo, La Junta, Las Animas, and Lamar) are county seats, as well as important regional service centers.

The largest community along this corridor is the city of Pueblo, with a population of just over 105,000 (2010 Census). The other rural communities range in population from approximately 400 (Manzanola) to almost 7,800 (Lamar) (2010 Census). Growth in southeastern Colorado has lagged behind most other areas of the state. From 2000 to 2010, the combined population of the four counties increased approximately 8 percent, which is half of the growth rate experienced by the entire state during the same time period (approximately 17 percent). The combined population of the 10 communities east of Pueblo decreased overall by 10 percent from 28,350 people in 2000 to 25,474 people in 2010.

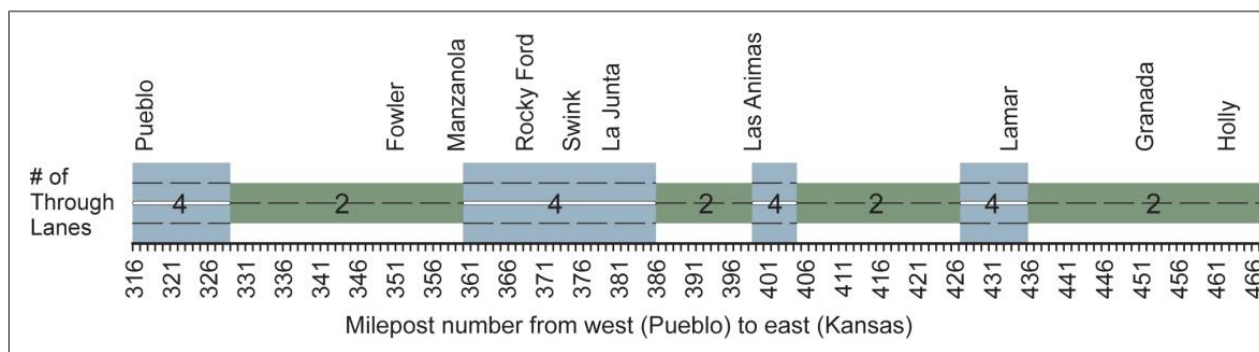
The Lower Arkansas Valley is largely rural and heavily dependent on an agricultural economy. Currently, large ranches and farmland use approximately 3.5 million acres, or 80 percent, of the land that comprises the four counties of Pueblo, Otero, Bent, and Prowers (Agricultural Census 2007b). Public lands managed by several different state and federal agencies account for an additional 858,000 acres, or 20 percent, of the area of these counties (CDOT 2004b, CDOW 2003a). Towns and schools make up less than 1 percent of the land, accounting for 4,601 acres and 378 acres, respectively (CDOT 2004b). Most businesses in the four counties directly or indirectly support agriculture. With the exception of Pueblo County, there are few industrial employers in the area. Because most communities in the Lower Arkansas Valley are small, vital services are available only in the larger regional centers, such as Pueblo, La Junta, Las Animas, and



Lamar. Additional information about the socioeconomic characteristics of the project corridor is provided in Chapter 4, Section 4.3.5, Social and Economic Considerations.

### 2.1.1 Existing Roadway Conditions

The segment of US 50 between Pueblo, Colorado, at I-25 and the Colorado-Kansas state line is characterized by its surrounding rural and agricultural landscape and the diverse communities it traverses. Along this segment, the roadway is primarily a two-lane highway, interspersed with four sections that have four travel lanes, as shown in Figure 2-1. CDOT’s existing right of way through towns generally varies from 60 feet to 80 feet, and typically is not wide enough to provide a roadway that meets current AASHTO safety standards. The posted speed limit within established cities and towns ranges from 25 mph to 45 mph, while the majority of rural segments are posted at 65 mph.



Source: CDOT 2003a

Figure 2-1. Two-Lane Versus Four-Lane Travel on US 50

### 2.1.2 Types of Users on the US 50 Corridor

The amount of existing and future traffic on a roadway usually is the driving force behind the need for improvements. For the US 50 corridor, however, traffic volume is not the concern. The issue is the conflict between the different types of users and vehicles. US 50 serves long-distance, regional, and local transportation needs and accommodates a number of diverse users with different—and sometimes conflicting—travel needs. The conflicts created by the different types of users and their different needs hinder mobility and create safety issues along US 50. The travel needs of these different users are described below.

#### Long-Distance Travelers

These users pass through the Lower Arkansas Valley to reach destinations outside the 150-mile corridor. These trips neither originate nor end in the Lower Arkansas Valley. Long-distance motorists may stop in a US 50 community for fuel, food, or lodging. For long-distance travelers, the desire is to get through the



Lower Arkansas Valley as quickly as possible. High speeds are desired for these users; stoplights, speed reduction zones, intersecting roads, and driveways present unwanted delays and hazards to these motorists.

An example of these users would be interstate truck drivers. US 50 is part of the National Network, which was authorized by the Surface Transportation Assistance Act (STAA) of 1982 (P.L. 97-424) and specified in the U.S. Code of Federal Regulations (23 CFR 658) to require states to allow freight trucks on the Interstate System and portions of the Federal-Aid Primary System. Under Colorado state law, STAA-dimensioned commercial vehicles may operate legally on all highways that were designated as a Federal-Aid Primary Highway prior to June 1, 1991.

### Regional (Intercity) Travelers

These users take trips that start or end within the US 50 corridor and pass through more than one city or town. These trips include visiting Pueblo or beyond for goods and services not available in local communities, farm-to-market travel, other trips between towns, travel to locations of employment, trips to access educational institutions and social events, and recreational trips. For example, many rural residents use the US 50 corridor to access goods and services in Pueblo or in other more-urban areas along I-25. Many residents drive to Pueblo, La Junta, or Lamar for employment, major medical care, shopping, and higher education. Regional (intercity) motorists tend to travel at moderate to high speeds and travel delays are anticipated. Access to major cross streets is needed to get these travelers to their destinations. Regional trips typically range from 15 miles to 100 miles in length.

### Local Travelers

These users make trips into, out of, or through one town, or in a rural area between towns. These travelers use US 50 as if it were a local street or county road because alternative routes may not be available or may not be as convenient. These travelers include pedestrians and bicyclists, as well as those who drive cars, school buses, trucks, and farm equipment. For local travelers, low speeds are typical and appropriate. These travelers use US 50 to get to and from county roads, private driveways, farm fields, and local businesses. Speed-reduction zones and stoplights provide the safety needed to make these trips on or across the highway. Local trips typically are less than 15 miles in length.

A subset of local travel consists of very short trips along or across US 50 within a town. In many towns, US 50 is the predominant location of businesses and services. Short internal trips are made by trucks, motor vehicles, pedestrians, or bicyclists.



Figure 2-2 shows US 50 user types based on their needs for access and desired travel speed.

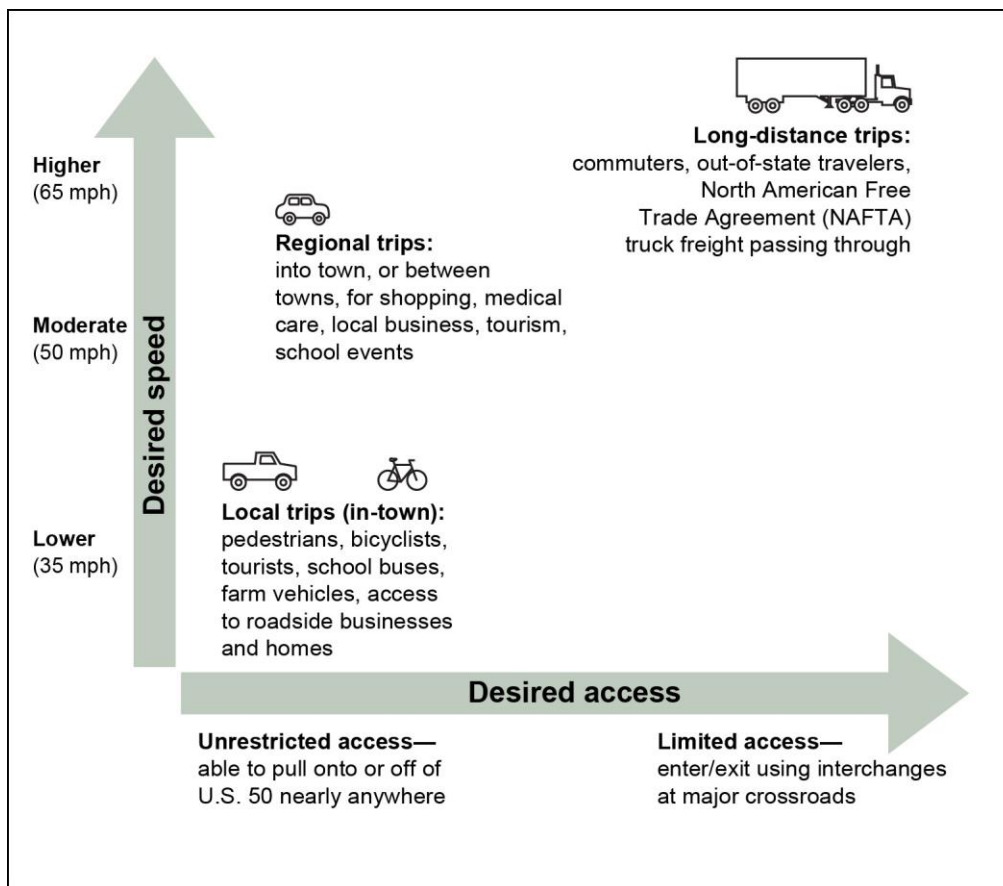


Figure 2-2. General Travel Needs of Various US 50 Users

## 2.2 PROJECT PURPOSE

The purpose for undertaking transportation improvements in the US 50 corridor from Pueblo, Colorado, to the vicinity of the Colorado-Kansas state line is to improve *safety* and *mobility* for local, regional, and long-distance users of US 50 for present and future travel demand.

## 2.3 NEED FOR THE ACTION

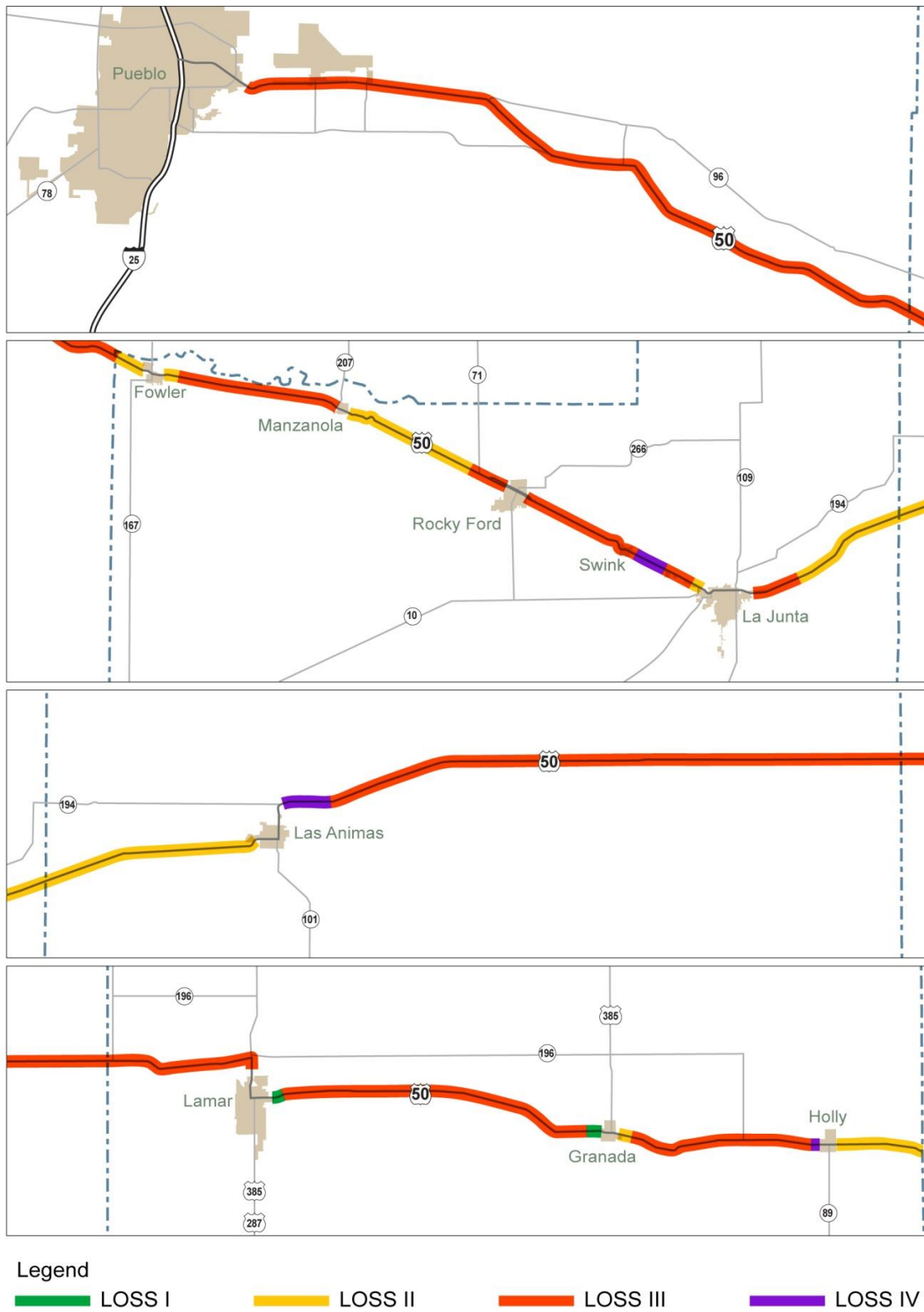
The need for improvements on US 50 results from the combined effects of multiple safety and mobility issues. These issues are both directly and indirectly influenced by the differing needs of the road users, highway deficiencies, roadway geometrics, access (the ability to enter, exit, or cross US 50), numerous speed reduction zones, and lack of passing opportunities. Safety and mobility issues along US 50 are discussed in the following sections.

### 2.3.1 Safety Issues

CDOT uses Level of Service of Safety (LOSS) to quantify the magnitude of safety issues for rural and nonurban areas. LOSS is a qualitative measure used to characterize the safety of a roadway segment in reference to its expected performance. LOSS reflects how the roadway segment is performing in regard to its expected crash frequency and severity at a specific level of annual average daily traffic (AADT). There are four LOSS categories:

- LOSS I: Indicates low potential for crash reduction since there is a low frequency of crashes
- LOSS II: Indicates low to moderate potential for crash reduction since there is a better-than-expected (not as many crashes as might be expected) frequency of crashes
- LOSS III: Indicates moderate to high potential for crash reduction since there is a worse-than-expected (more crashes than might be expected) frequency of crashes
- LOSS IV: Indicates high potential for crash reduction since there is a high frequency of crashes

Figure 2-3 depicts the LOSS throughout the corridor. As shown in Figure 2-3, a majority of the corridor is LOSS III, which indicates a relatively high magnitude of safety issues along the corridor. Around Swink, Las Animas, and Holly, safety is considerably worse than similar facilities (LOSS IV). A total of 80 percent of the rural areas on US 50 are classified as LOSS III and IV, which identifies a need for safety improvements. It is important to note that due to the spacing of major intersections and access points, LOSS is not calculated for towns.



Source: Swenka 2014

Figure 2-3: Level of Service of Safety of US 50, 2008-2012

While 18.3 miles (12 percent) of the corridor are classified as developed areas in towns, 39 percent of crashes occurred in these towns, resulting in a higher ratio of crashes per mile in developed areas (towns) than rural areas. This is to be expected due to the increase in conflict points and traffic volumes, confirmed by the fact that 68 percent of crashes occurring in the larger communities of Pueblo, Rocky Ford, La Junta, Las Animas, and Lamar occurred at intersections (broadside and rear-end crashes). Additionally, within towns, there is an increase in the potential for conflicts between cyclists, pedestrians, and vehicles because there is a larger likelihood of people walking and biking in town.

According to CDOT data for the years 2008–2012, there were more than 1,600 crashes reported along US 50 from Pueblo to Kansas (approximately 330 crashes annually), which is an average of two crashes per mile each year (Swenka 2014). Over the five years examined, there were a total of 19 fatalities—an average of about four per year—and nearly one-eighth of all crashes involved injuries. As seen in the LOSS analysis in Figure 2-3, this is relatively high compared to state averages of similar corridors. Additional crash data analysis is provided in Chapter 4, Section 4.4.1, Transportation.

There are several factors that contribute to safety issues along the US 50 corridor, including inadequate clear zones, frequent changes in road design characteristics, and limited passing opportunities. These are discussed in the following sections.

### Inadequate Clear Zones

By today's design standards, each side of a highway should provide an area that is clear of hazards (i.e., obstructions) so that motorists who run off the road have the space to recover and safely re-enter the highway. In rural areas, shoulders range from eight feet to 10 feet, with narrower shoulders located in urban portions of the corridor. For a roadway like US 50, typical design standards require 10-foot shoulders and a 30-foot clear zone.

US 50 has inadequate clear zones, meaning there are obstructions or fixed objects and hazards along the side of the road that could be hit by vehicles that veer off the road. Inadequate clear zones add to the potential severity for run-off-the-road crashes reported each year (CDOT 2004a). The problem of inadequate clear zones and shoulders is of concern to all types of users on US 50. Examples of inadequate clear zones along US 50 are shown in Figure 2-4.



**Figure 2-4. Examples of Inadequate Clear Zones on US 50**

The most common type of crash along the US 50 corridor involves hitting a fixed object. Common fixed-object hazards along US 50 include utility poles, irrigation structures, and deep ditches. Between 2008 and 2012, there were a total of 360 reported crashes with fixed objects along US 50 through the Lower Arkansas Valley, which accounts for approximately 22 percent of all crashes on this corridor. Three of these accidents, or less than one percent, resulted in a fatality (Swenka 2014). The existence of numerous roadside hazards and lack of adequate clear zones on US 50 present a high level of risk for fatalities in run-off-the-road crashes.

### Frequent Changes in Road Design Characteristics

Over time, national roadway design standards have evolved to make roads safer and more efficient. Each time changes were made to US 50, design standards current at that time were used. Over many decades, this has resulted in a mixture of different roadway characteristics. Today, as a result, there are more than 170 roadway changes within the 150-mile US 50 corridor (CDOT 2003b). These changes include the following:

- Posted speed limits change by 10 mph or more in 28 instances
- Road width changes 60 times due to variations in shoulder width, median width, and number of lanes
  - The number of through-lanes changes seven times
  - The width of the outside shoulder changes 33 times
  - The width of the median changes 42 times

These frequent changes in the roadway's design reduce safety on US 50. Drivers expect the design of a roadway to be relatively consistent over a reasonable distance (driver expectancy). National safety studies



have shown that roads with frequent design changes, or a lack of driver expectancy, increase the risk of crashes (McGee et al. 1986, Ogden 1990).

Repeated changes in roadway design are of greatest concern to long-distance users who pass through infrequently and are likely to be unfamiliar with the road. Regional and intercity users, who make frequent, moderate-length trips on the corridor, also may be affected. For these users, the problem is not their own driver expectancy but their greater chance of being in harm's way when long-distance users encounter the roadway design changes.

### Limited Passing Opportunities

US 50 is a two-lane highway for approximately 96 miles through the Lower Arkansas Valley; passing is not permitted on approximately 55 of these miles due to sight distance limitations (topography, access locations, highway curvature, etc.) or other safety constraints. A safety project added passing lanes along a three-mile stretch between mileposts 338 and 341 (between Pueblo and Fowler) in 2008, but there are no other passing lanes in the corridor. The two-lane sections of US 50 range from 15 miles to 30 miles long and are located along four stretches of the highway (see Figure 2-1).

Limited passing opportunities are of concern to:

- Long-distance and regional users, whose ability to maintain consistent, high speeds is hindered by slow-moving vehicles in their way
- Regional low-speed users, who are unable to attain high speeds and lack safe opportunities to get out of the way of traffic queued behind them
- Local users, who need to decelerate for and make turns off the highway (where there are no turning lanes) and have high-speed traffic approaching from behind them
- Users driving agricultural equipment that is unable to meet posted speeds and must travel in the shoulder or right lane

Traveling behind slow-moving vehicles for long distances has been shown to increase unsafe passing maneuvers, which leads to certain types of crashes that have relatively high severity. The *2003 CDOT Safety Assessment Report* states, "The higher frequency of these more severe accidents within the 2-lane sections is evident, particularly in the segments west of Manzanola [milepost 360] and east of Lamar [milepost 436]" (CDOT 2003c). The report also indicates that the potential for head-on collisions is higher in areas where faster vehicles attempt to pass slower trucks (CDOT 2003c). CDOT crash records from 2008 to 2012 indicate that the US 50 corridor experienced eight head-on collisions and



152 sideswipes, which are the types of crashes that tend to occur on two-lane roads without passing lanes (Swenka 2014).

Additionally, due to the current predominantly two-lane configuration and difficulty in passing, the average traffic speeds can be reduced occasionally as extended queues develop behind loaded trucks and slow vehicles such as farm vehicles, Recreational Vehicles (RVs), and slow cars.

### School Traffic

Information obtained from school systems along the corridor show that school buses cross US 50 at least 208 times daily and there are at least 43 bus stops along the highway. School officials report that other traffic rarely stops in either direction when buses pick up and drop off students, even though stopping for a school bus is required by Colorado law. Long-distance and regional users of US 50 do not expect to encounter school buses stopping on the highway. The unexpected need to stop for school buses increases the possibility of crashes, making the roadway less safe for all users.

### **2.3.2 Mobility Issues**

For trips along US 50, mobility means traveling at a speed that is appropriate for the type of trip being made. Mobility needs are different for the different users of US 50. This section includes a discussion of balancing the conflicting needs of long distance, regional, and local users. This section also includes a discussion of speed reduction zones, which constrain travel speeds and limit mobility along sections of the corridor.

Inadequate mobility on US 50 in the Lower Arkansas Valley has been cited as a factor that limits economic development in the area. According to City Manager Rick Klein of La Junta, poor mobility on US 50 limits the area's ability to retain and attract transportation-dependent businesses. In 2006, two major employers along the corridor ceased their operations: the Neoplan bus manufacturing facility in Lamar and the Bay Valley Foods plant in La Junta. Transportation concerns were cited as one of the issues making these operations noncompetitive. Similarly, local efforts to attract a Wal-Mart distribution warehouse reportedly were rebuffed because US 50 is not a four-lane highway. With agriculture in the Lower Arkansas Valley in a continuing decline, all communities along the corridor are seeking to diversify their economies. This will be difficult to accomplish with inadequate mobility on US 50.

### Balancing the Conflicting Needs of Long Distance, Regional, and Local Users

It is difficult to meet the needs of all users on a single road. As a result, the conflicts between the needs of different users result in safety and mobility problems. These problems are especially evident on the in-town and two-lane sections of US 50, where the conflicting needs are most apparent and the ability to separate users is the most constrained.

There is a conflict between long-distance travelers and residents within towns. Long-distance travelers normally desire consistent, relatively high speeds, while local residents need the ability to use and cross the highway safely. On two-lane sections with limited opportunities for passing, long-distance and regional travelers also are unable to maintain consistent high speeds when they encounter slow-moving vehicles. US 50 is used extensively to move farm equipment from field to field and for transport of locally grown agricultural products throughout the year.

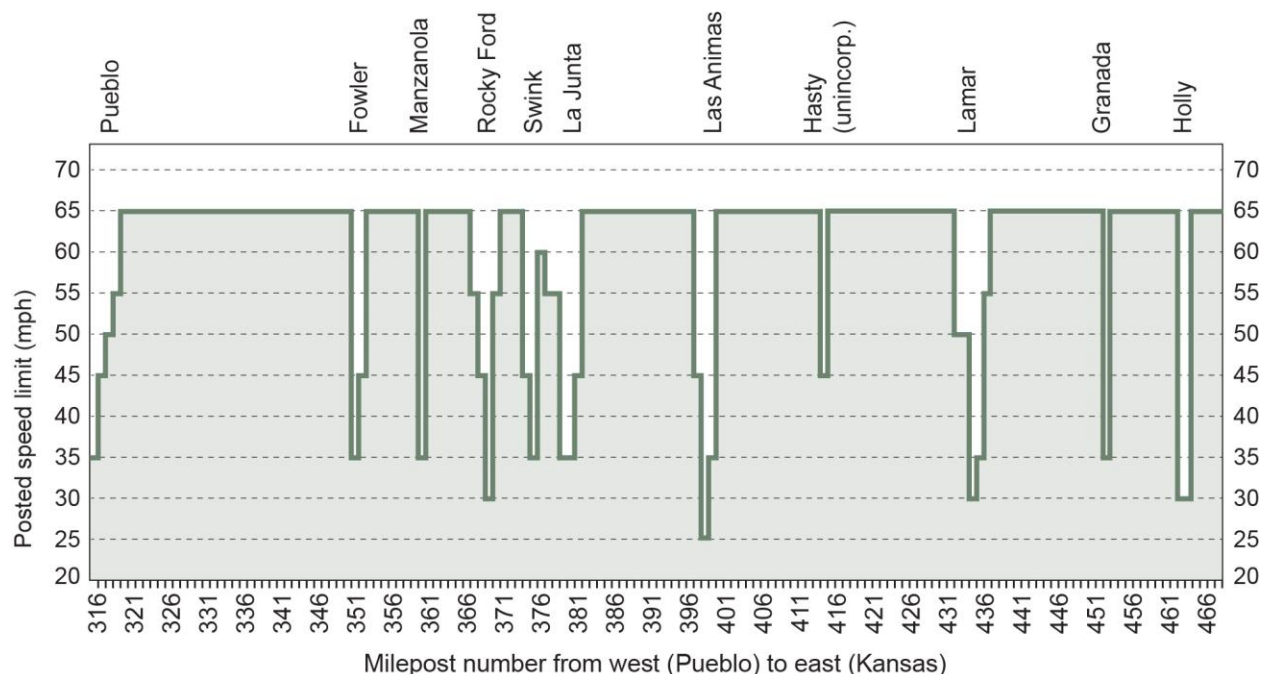
A study conducted near milepost 339 (west of Fowler) in November 2006 found that, on average, one out of every 20 vehicles on the road was traveling at a speed of 15 mph or slower (CDOT 2007b). During the active farming season, the percentage would likely be much higher. US 50 is a two-lane highway in this area, with more miles of no-passing zones than miles where passing is allowed. Figure 2-5 provides two examples of agricultural equipment using more than one full travel lane in downtown Rocky Ford and of one using both the shoulder and the travel lane between communities.



**Figure 2-5. Agricultural Vehicles Driving on US 50 in Downtown Rocky Ford (left) and Mixing with Auto Traffic (right)**

### Speed Reduction Zones

Travel speeds along US 50 are constrained by speed reduction zones where the highway passes through the communities along the corridor (see Figure 2-6). Traffic signals in the communities and an at-grade railroad crossing controlled by a light in Rocky Ford also constrain travel speeds along the corridor.



**Figure 2-6. Posted Speed Limits (Primary) on US 50 for Each Mile from I-25 in Pueblo (milepost 316) to the Kansas State Line (milepost 467.5) (CDOT 2012)**

The speed limits within cities and towns are relatively low for safety reasons. US 50 serves as Main Street within many of the communities it connects, and is an important part of local street systems. Businesses, homes, parks, and important community facilities—such as town halls and post offices—are located along the highway. Therefore, residents must frequently cross US 50, park on US 50, or walk on sidewalks adjacent to US 50 in their daily travels. For example, in Rocky Ford, where the municipal swimming pool is on one side of the highway, and residential areas are located on the other, children cross the highway on foot or bike to reach an important recreational destination.

While speed reduction zones provide a necessary benefit to local users, they are a hindrance to long-distance users who value a relatively high, consistent travel speed, and to regional users, who travel the corridor often and bear the highest accumulated cost of chronic travel delays. As noted above, inadequate mobility also affects the ability of the Lower Arkansas Valley to attract and retain industry and the associated employment opportunities.

### 2.3.3 Access

Current access conditions along US 50 have substantially impacted the safety and mobility of the corridor. The observed total crash rates for US 50 through the larger cities of Rocky Ford, Las Animas, and Lamar were above comparable statewide averages (CDOT 2003c). The majority of the crashes in these locations (68 percent) were attributed to intersection- or driveway-related conflicts.

The number of access points influences safety because the number of conflict points increases with every access point where there is an opportunity to enter, exit, or cross a highway. There are a total of 394 permitted access points along US 50, not including city, county, and state roads (CDOT 2003c). In addition, there are an estimated 1,100 additional non-permitted access points that were allowed prior to development of today's access standards. In total, the more than 1,500 access points over 150 miles average out to 10 accesses per mile along this section of US 50. Within the city of Las Animas alone, there are more than 50 accesses, or approximately one access to US 50 every 267 feet.

Current access configurations include stop-sign controlled cross streets, pull-off access for roadside businesses, residential driveways, signals, and private agricultural field access. In addition, there are 14 stoplight-controlled intersections along the 150-mile corridor. Many adjacent landowners, both in communities and rural areas, use US 50 for local trips because there are no other convenient alternative routes. When motorists pull out onto high-speed US 50 from adjacent properties, they introduce a crash risk and potentially impede the flow of traffic.

Access to and from US 50 is of concern to:

- Bicyclists and pedestrians, who need convenient access to local and major cross streets and adjacent properties
- Long-distance users, who need convenient access to travel-related services such as gas, food, and lodging; beyond these minimal needs, any additional accesses diminish their safety and mobility
- Regional (intercity) users, who need convenient US 50 access to and from major cross streets, because their trips include an origin, destination, or both along the corridor
- Local users, who need the ability to travel between US 50 and adjacent properties, to cross US 50 safely, to move farm implements along US 50, and to make deliveries to addresses along US 50
- Slow-moving agricultural vehicles needing access to and from ranches and farms

### **2.3.4 Flexibility to Accommodate Future Needs**

The safety and mobility issues, along with the user conflicts on US 50 discussed previously, are expected to be compounded by increased traffic volumes in the future. While the overall population of the corridor east of Pueblo has generally decreased since 2000, traffic on this portion of US 50 nevertheless has experienced modest growth (a 2.8-percent increase from 1995 to 2000) (CDOT 2007a). The population of Colorado as a whole has been growing rapidly and is expected to continue to do so. Even with minimal population growth in the Lower Arkansas Valley itself, the expected addition of nearly three million new residents in the state by 2040 will likely increase traffic on the US 50 corridor (CDOT 2015).



Based on projections of increased traffic over the next 25 years, the *2003 CDOT Safety Assessment Report* for US 50 estimated that the total crash frequency for the two- and four-lane segments is expected to increase by 81 percent and 50 percent, respectively, if the highway is not substantially improved (CDOT 2003c). Proposed improvements to US 50 will allow the corridor to accommodate the varied needs of existing and future users.

## 2.4 SUMMARY

In conclusion, there are existing safety and mobility issues on the US 50 corridor, and these issues are expected to be exacerbated by projected traffic increases in the future. The highway is not meeting the needs of its users today and does not offer the flexibility to accommodate future changes in travel demand.

Based on these safety and mobility needs identified in this chapter, proposed improvements to US 50 need to address:

- Limited passing opportunities
- Inadequate clear zones
- Frequent changes in roadway design
- Excessive number of access points
- Numerous speed reduction zones
- Travel delays resulting from time spent following slow-moving vehicles
- Meeting the needs of local, regional, and long-distance travelers

Chapter 3, Alternatives Considered, describes how these needs were considered in the development of alternatives.