





### 3.0 Need for the Proposed Action

This section summarizes the transportation needs for the SH 66 corridor and then provides a more detailed description of each need in the corridor. In summary, transportation improvements are needed to address:

- ▶ **Safety:** The corridor has experienced higher than expected safety concerns.
  - Vehicular – Several intersection and mainline locations along the SH 66 corridor have a high number of crashes and fatalities; which is not in line with Colorado Moving Towards Zero Deaths on highways.
  - Bicycle – Areas along the corridor have experienced bicycle safety concerns, from recorded incidents, physical characteristics, and cross-street connections.
  - Pedestrian – A number of pedestrian destinations in the corridor do not have sidewalks connecting them, potentially causing unsafe pedestrian movements.
- ▶ **Mobility:** The movement of people, goods, and services along the corridor has resulted in mobility challenges that can impede people commuting, recreating, and conducting business along SH 66.
  - Vehicular – Traffic congestion, inadequate intersections that fail to accommodate users' needs, highway design, and unreliable travel times substantially impact the ability of people to move across and along the corridor. Because the corridor provides varied commercial opportunities throughout, efficient connections to I-25 are important. These conditions are expected to worsen in the future as the region grows due to local and regional population and employment growth.
  - Bicycle – Much of the SH 66 corridor, but primarily the western half, is heavily used by bicycles (recreational, commuter, and events). Many areas have insufficient shoulders to accommodate bicycles, and the high speed of SH 66 contributes to a high level of traffic stress for cyclists. Future bicycle destinations in the corridor do not have adequate connections.
  - Pedestrian – Many of the pedestrian destinations in the corridor do not have sidewalks between the destinations. While there are some sidewalks and pedestrian intersection crossings along the corridor, there are inadequate connections between these locations and other pedestrian destinations. Currently, there are no grade-separated pedestrian crossings across SH 66.
  - Transit – Existing and planned transit service along the corridor is primarily focused on north-south connections. There are several challenges related to serving the SH 66 corridor: lack of pedestrian infrastructure to provide safe stopping locations; safety concerns related to stopping on a high-speed road; and the Regional Transit District's (RTD) current service boundaries, which bisect the western half of the corridor and do not include Weld County. As development occurs, transit demands along the corridor are anticipated to increase, but infrastructure, current service boundaries, and traffic congestion are likely to continue to make providing transit challenging in this area.
- ▶ **Access:** The current number, locations, and design of public roadway accesses have contributed to traffic operational and safety deficiencies along the corridor. The access need is expected to worsen in the future when more vehicles are using the corridor. Individual private driveways, business accesses directly onto SH 66, and inconsistent access spacing negatively impact safe, reliable, and efficient mobility.



### 3.1 Safety

A review of all reported crashes between January 1, 2011, and December 31, 2015, was completed and the results are summarized in Table 3.1.

**Table 3.1 Number of Crashes by Mode, Location, and Severity (2011-2015)**

Category	Crash Types	Overall	Section					Overall Percent
			1	2	3	4	5	
Mode of Travel	Single or Multiple Vehicles	894	124	442	108	111	109	99.0%
	Pedestrians	1	0	1	0	0	0	0.1%
	Bicycle	8	3	5	0	0	0	0.9%
Location	Intersection	535	56	306	49	82	42	59.2%
	Driveway	48	19	10	4	3	12	5.3%
	Non-Intersection	320	52	132	55	26	55	35.5%
Severity	Property Damage Only (PDO)	566	76	282	66	70	72	62.7%
	Injury	328	51	161	41	41	34	36.3%
	Fatal	9	0	5	1	0	3	1.0%
Totals	For Each Category	903	127	448	108	111	109	100%

#### 3.1.1 Vehicular

During the five-year period of analyzed data, more than 900 reported crashes occurred within the study limits with:

- ▶ 894 crashes (or 99 percent) involving only motorized vehicles
- ▶ 8 crashes (less than 1 percent) involving a bicycle
- ▶ Only 1 crash (0.1 percent) involving a pedestrian

Further review of the data indicates about 65 percent of all crashes occur at locations where there are intersections or driveways and 35 percent are non-intersection-related events.

About 37 percent of the crashes resulted in injuries or fatalities, while the remaining 63 percent were property damage only. There were 9 total fatalities between 2011 and 2015, which accounts for about 1 percent of the total number of reported crashes. To provide context, this is more than twice the state average of the number of fatalities compared to total accidents (0.4 percent).

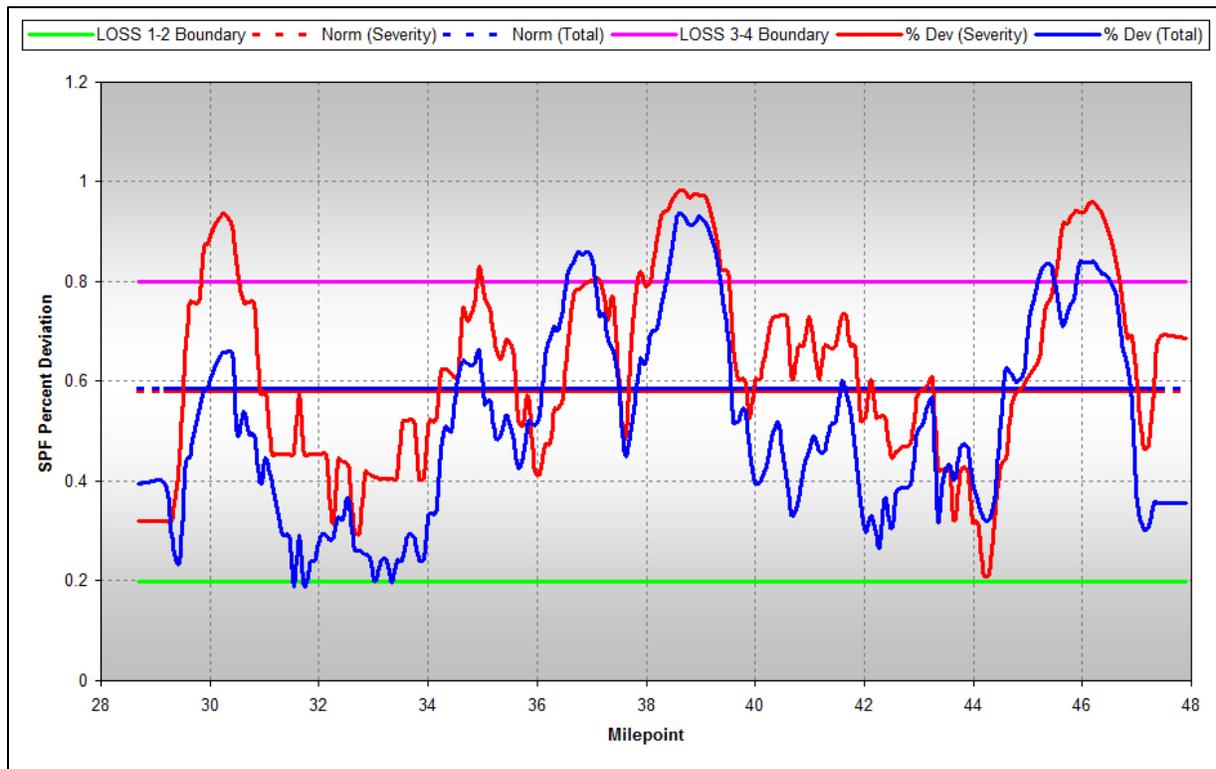
Approximately 50 percent of all crashes occurred in Section 2 of the study area, which is primarily urbanized, with a higher density of development, intersections, and access points, and has higher volumes compared to other study area sections.

Non-intersection crashes account for 35 percent of all crashes (319 of 903) observed in the study area. Rear-end and fixed object crashes were the most common crash types, accounting for 45 percent and 24 percent of all non-intersection collisions, respectively. Figure 3.1 presents non-intersection crash data. When evaluating all crashes, most of the corridor falls within Level of Service of Safety (LOSS) II, while the following sections fall into the LOSS III category, indicating moderate to high potential for improvement:

- ▶ Between Gay Street to Pace Street in Longmont
- ▶ Between ¼ mile west of WCR 13 to WCR 17



**Figure 3.1 Rural 2-Lane Undivided SPF Analysis – Non-Intersection Crashes**



When looking at severity of crashes, the following sections fall into the LOSS IV category indicating a high potential for improvement:

- ▶ Between Boulder County Road 47 to 61<sup>st</sup> Street
- ▶ From approximately Pace Street to Elmore Road
- ▶ From approximately ½ mile east of WCR 13 to WCR 17

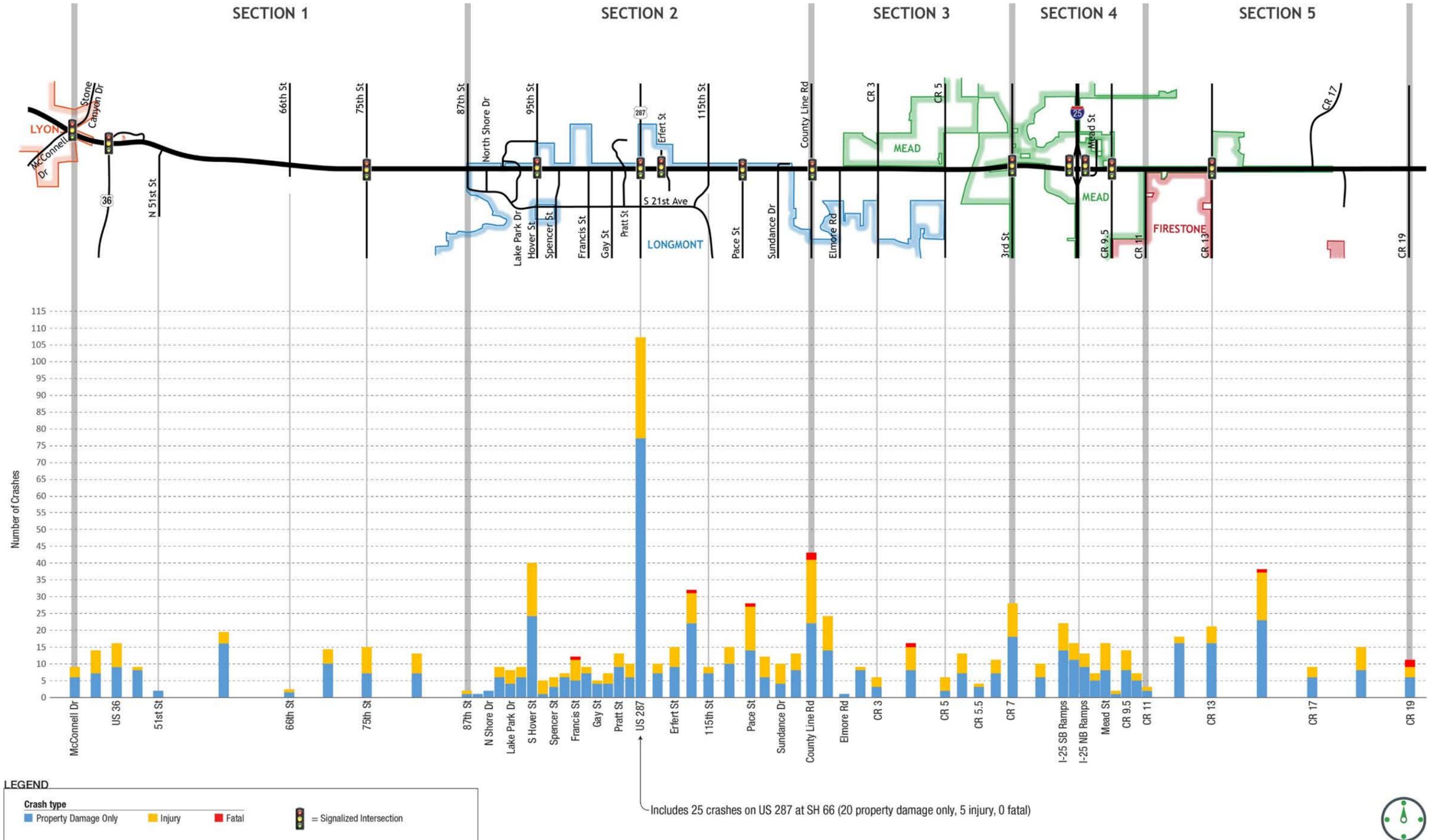
The data also indicate that rear-end crashes accounted for nearly 45 percent (403 crashes) and crashes involving a turning vehicle accounted for another 21 percent (191 turning related crashes) of all crash events within the study area. Typical factors that contribute to these types of crashes include congestion at signalized intersections where drivers may experience unexpected stop-and-go conditions or long delays waiting to turn. In addition, drivers experiencing long delays (poor operations) at stop controlled intersections often take greater risks by accepting shorter gaps in the traffic stream to turn onto or move across SH 66.

In addition, a high density of accesses results in drivers slowing to enter the access locations and having to slow as other vehicles exit the access locations. Another key factor that contributes to crashes is the high number of access locations that do not have turn lanes (left and/or right), resulting in vehicles slowing in the main travel lanes of SH 66 to enter these access locations. In many locations on SH 66, there are only two travel lanes (one in each direction), which, coupled with high travel speeds (higher than 50 miles per hour), exacerbates the situation. A vehicle that wants to turn left into an access location must stop and wait for a gap in oncoming traffic to complete its turn, creating safety issues as vehicles approach at high speeds from behind this stopped vehicle.

Figure 3.2 summarizes the crashes along the SH 66 corridor by location.



Figure 3.2 Summary of Crash Data by Location (January 1, 2011, to December 31, 2015)





### 3.1.2 Bicycle and Pedestrian

All reported crashes involving pedestrians or bicycles occurred in Sections 1 and 2 of the study area, which have the highest level of pedestrian and bicycling activities.

Many factors can contribute to crashes involving non-motorized users of the highway. For example, SH 66 has sections that lack continuous facilities (sidewalks or pathways), narrow or non-existent shoulders, a high number of unsignalized intersection crossings, and signalized intersections with no pedestrian phasing to assist with protected crossings (see Figure 3.3). Each condition results in pedestrians and bicyclists being exposed to potential conflicts with motorized traffic on and around SH 66. In addition, transit riders experience the same exposures while walking or riding to and from stops, while the transit vehicles themselves are exposed to the same potential issues as the other motorized vehicles using the highway as previously discussed. An increase in crash exposure potential for pedestrians, bicyclists, and transit riders/vehicles is anticipated as development, motorized and unmotorized traffic volumes, and the number of accesses increase along the corridor.

The photos below show areas in the corridor with non-continuous sidewalks and limited pedestrian connections.



*Lack of sidewalks on SH 66: Hover St/SH 66 and Pace St/SH 66 - Sidewalk connections provided south of SH 66, but not extended along SH 66*

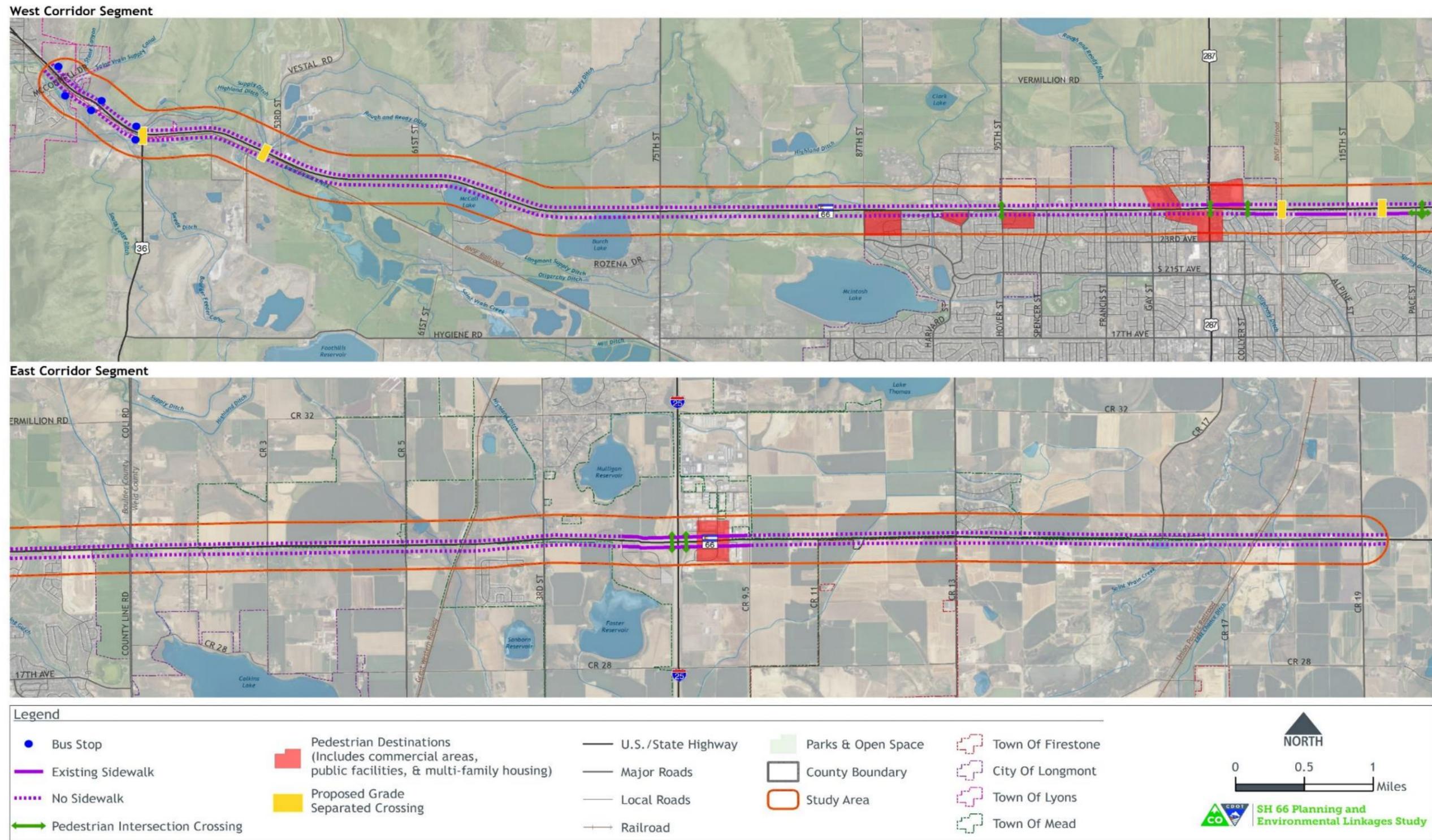


*Pedestrian crossings at SH 66/Erfert St and SH 66/I-25*





Figure 3.3 Pedestrian Environment





### 3.1.3 Effect on Other Needs

Finally, crashes on SH 66 cause unpredictable traffic congestion, in addition to the congestion during normal conditions. This non-recurring congestion can further degrade safe, reliable, and efficient mobility along the corridor. As traffic volumes increase in the future, it is likely that the number of crashes will also increase. Improvements to address the factors that contribute to crashes will improve mobility and increase safety.

## 3.2 Mobility

SH 66 serves many users including daily commuters, circulation for local traffic, trucking delivery routes, visitors to the region, and those pursuing recreational activities.

### 3.2.1 Vehicular

The existing traffic volumes already exceed capacity at some intersections, resulting in congestion and delays. Table 3.2 shows the existing and projected future daily traffic volumes at some select locations within the study area. Traffic volumes range from about 12,000 vehicles per day at either end of the study area to a high of 27,000 vehicles per day within Section 2 (the more urbanized section of the study area). The projected future daily traffic volumes on SH 66 are expected to increase between 25 and 50 percent between now and the year 2040.

**Table 3.2 Existing and 2040 No Action Daily Traffic Volumes at Select Locations**

Section	Location	2017 Existing	2040 No Action	Change
1	Between 51 <sup>st</sup> Street and 66 <sup>th</sup> Street	12,000	15,100	3,100 (26%)
	Between 75 <sup>th</sup> Street and 87 <sup>th</sup> Street	14,000	18,900	4,900 (35%)
2	Between 87 <sup>th</sup> Street and 95 <sup>th</sup> /Hover Street	14,500	21,700	7,200 (50%)
	Between Spencer Street and Francis Street	27,000	36,400	9,400 (35%)
	Between Erfert Street and 115 <sup>th</sup> Street	21,300	28,300	7,000 (33%)
	Between Pace Street and County Line Road	23,350	28,900	5,550 (24%)
3	Between WCR 5 and WCR 7/3 <sup>rd</sup> Street	24,100	31,300	7,200 (30%)
4	Between 3 <sup>rd</sup> Street and I-25	23,600	32,100	8,500 (36%)
	Between I-25 and WCR 9.5	14,100	21,250	7,150 (51%)
5	Between WCR 17 and WCR 19	11,900	15,000	3,100 (26%)

The future increase in traffic volumes will result in more congestion and more delay. Table 3.3 shows the existing and projected future 2040 No Action level of service (LOS) at the signalized intersections within the study area. Under existing traffic volumes, three signalized intersections (95<sup>th</sup>/Hover Street, US 287, and WCR 7/3<sup>rd</sup> Street in Mead) operate at LOS E or F, considered poor operations. However, the 2040 No Action scenario projects eight signalized intersections (nearly triple compared to existing conditions) operating at LOS E or F during the peak hours. Still other intersections will experience degradation in operations by 2040. This degradation in operations across most of the corridor will result in drivers experiencing long delays, slower travel speeds, and much longer travel times along SH 66. This could result in undesirable neighborhood cut-through traffic. In addition to the degradation of operations at signalized intersections, the number of stop-controlled intersections operating at LOS E



or F is projected to increase from 21 locations in 2017 to 25 in 2040. As volumes increase along the corridor, the number of acceptable gaps in SH 66 traffic for vehicles to safely turn onto or across SH 66 is anticipated to further decrease. Delay and congestion and possible safety issues are likely to increase. As is the case currently, vehicles that do turn onto SH 66 will at many locations enter the only available lane of travel and will do so at slow speeds. This situation may result in vehicles on SH 66 having to slow, producing additional delay and congestion and potential safety issues.

**Table 3.3 Existing and 2040 No Action Level of Services for Signalized Intersections**

Intersection	Existing		2040 No Action	
	AM	PM	AM	PM
McConnell Drive	B	A	B	A
US 36	B	B	B	C
75 <sup>th</sup> Street	B	C	D	F
95 <sup>th</sup> /Hover Street	D	F	F	F
US 287	C	F	F	F
Erfert Street	A	A	A	C
Pace Street	C	C	D	F
County Line Road	D	C	F	F
WCR 7/3 <sup>rd</sup> Street	E	D	F	F
Southbound I-25 Ramps	B	B	B	B
Northbound I-25 Ramps	C	C	C	C
WCR 9.5	C	C	D	F
WCR 13	C	C	E	F

Note: Blue highlighted cells represent a degradation in level of service between Existing and 2040 No Action scenarios, and red font shows intersections with LOS E or F.

Congestion occurs when traffic volumes increase and operations degrade. The degree of congestion can be measured as a ratio of a vehicle’s actual travel speed (which accounts for delay, queues, and other capacity reducing impacts) versus the posted speed limit (also known as free-flow speed). The vehicle that experiences very little delay will travel at speeds close to free flow and will encounter low or minor levels of congestion. However, a vehicle that experiences higher levels of delay will travel at much lower speeds and experience a heavy or significant degree of congestion. In existing conditions, the highway users across most of the SH 66 study area (68 percent eastbound to 91 percent westbound) experience low levels of congestion, while the highway users experience heavy to significant congestion on a small amount of the study area (4 percent westbound to 16 percent eastbound). In the 2040 No Action scenario, the highway users are expected to experience low to minor levels of congestion on a smaller portion of the study area (54 percent eastbound and 71 percent westbound) and the users are expected to experience heavy or significant congestion on a higher portion of the study area (25 percent westbound and 32 percent eastbound). The expected increase in congestion in 2040 is consistent with the projected growth in traffic volumes and degradation in operations at most intersections, which may result in increased delays, longer queues, and motorists taking longer than expected, or anticipated, while using SH 66 to commute to work, conduct business, or travel to



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recreation activities and destinations. **Figure 3.4** shows the degree of congestion on SH 66 for existing traffic conditions, and **Figure 3.5** shows the expected congestion in the 2040 No Action scenario.

In addition, congestion and LOS affect travel time. The study area is approximately 20 miles in length. Based on speed limits, a vehicle could travel from end-to-end of the study area in approximately 20 minutes, assuming it does not encounter any delay or congestion (free flow conditions). A comparison between the actual travel time to the free flow conditions results in a value called a travel time index. A low travel time index indicates trips with little delay and near free-flow speeds, while a high travel time index is consistent with higher and delay reduced speeds.

The existing travel time index for the entire SH 66 study area ranges from 1.3 to 3.1 depending on the time of day (AM or PM) and direction of travel (eastbound or westbound). Higher values are experienced for eastbound traffic in both time periods. These values are consistent with moderate to high levels of delay caused by congestion along the corridor. Individual sections have travel time indices as high as 4.5 (Section 2, eastbound during the PM) consistent with high delays and congestion through the more urbanized portion of the corridor where there are higher volumes, more access locations, and a greater number of traffic signals. By 2040, the end-to-end travel time indices are expected to increase by as much as 158 percent and by more than 400 percent on some individual sections. Clearly, the projected increase in traffic volumes will result in longer delays and trips for all motorists using all or part of SH 66, indicating the need for improvements to help reduce delay and provide more efficient and reliable mobility.



Figure 3.4 Existing Congestion on SH 66

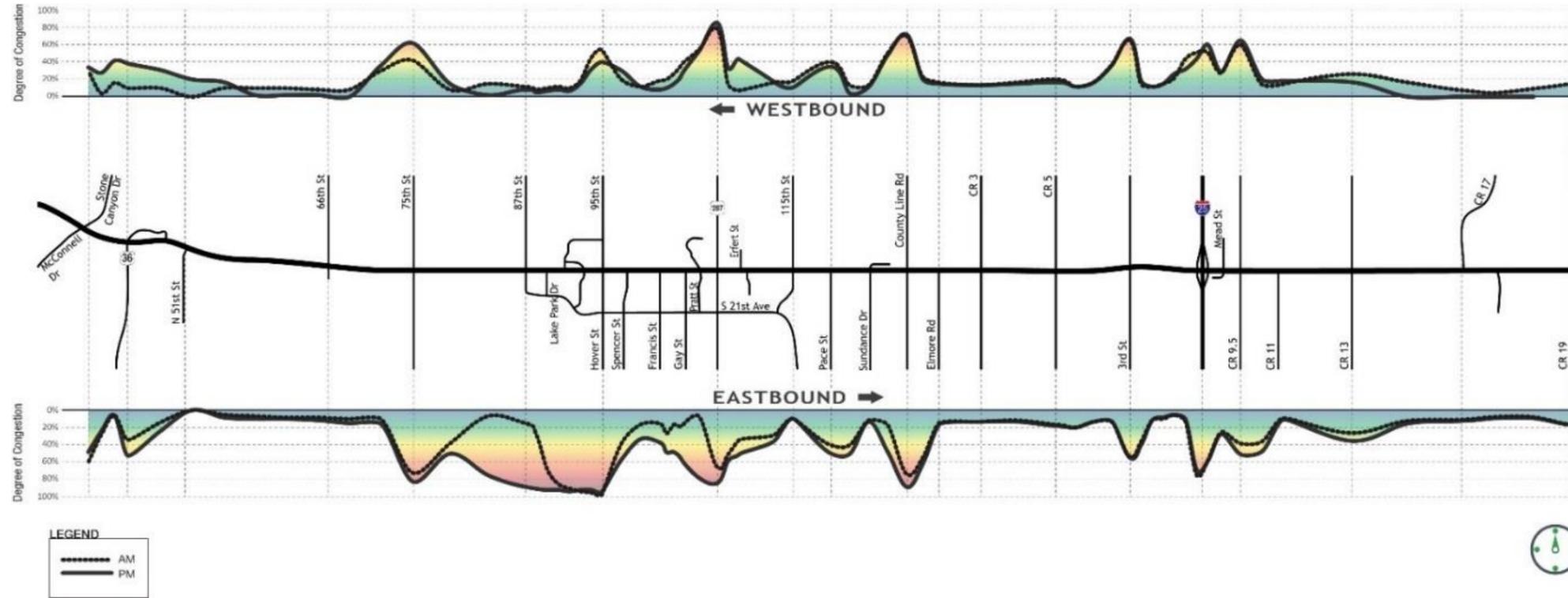
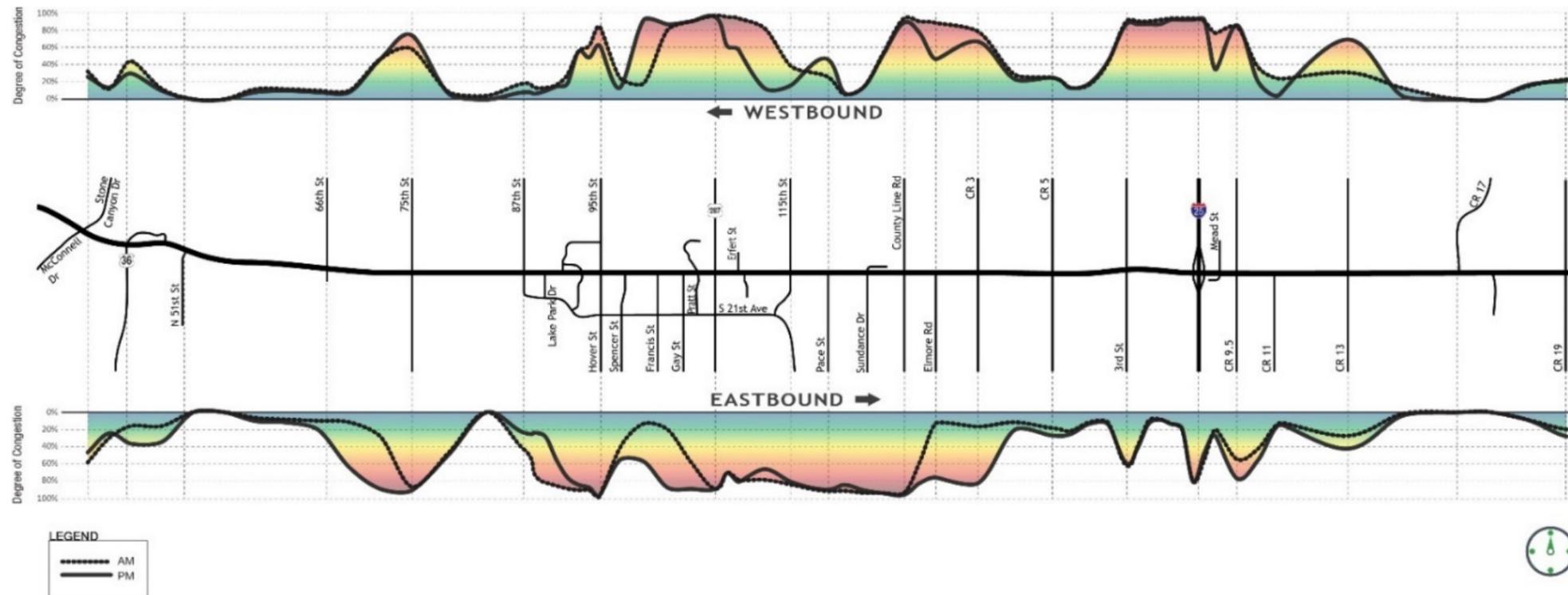


Figure 3.5 2040 No Action Congestion on SH 66





### 3.2.2 Bicycle and Pedestrian

Mobility applies to more than just the vehicular traffic on SH 66. Pedestrians attempting to walk along or cross from one side of SH 66 to the other have the benefit of some sidewalks and pedestrian intersection crossings in the corridor; however, there are gaps (lack of connectivity or continuous sidewalks) or inadequacies (narrow shoulders) in the facilities that create difficulties in making some movements across or along SH 66. Pedestrian demands vary throughout the corridor, as depicted in **Figure 3.3**, and gaps in the pedestrian environment are present between pedestrian destinations within the SH 66 study area as well as in more rural areas, where demands are low. In addition, at-grade crossings at intersections currently accommodate the schools located on one side of SH 66 that have many students who travel by foot from the other side of the highway. Currently, only 13 signalized intersections (about one every 1.5 miles) provide protected movements across SH 66 for pedestrians and bicyclists. At these locations, traffic signals protect non-motorized movements, and these intersections typically have marked crosswalks. However, the clear majority of intersections and access locations along SH 66 are not signalized and do not have marked crosswalks. At these locations, the pedestrians and bicyclists are exposed to vehicular movements and must make their crossings at their own risk.

As traffic volumes and congestion levels increase, it is likely that more traffic signals will be added to the intersections along the highway, providing more locations where more comfortable and potentially safer crossings can be made. However, additional development along the highway will also add more access locations. With higher volumes and more accesses, pedestrians and bicyclists will be exposed to a higher potential for conflicts with vehicles. As the congestion levels increase on SH 66, non-motorized users will also experience more difficulty completing trips along and across the highway, as these users may be forced to make long, out of direction trips to use signalized locations, unable to cross at any other location.

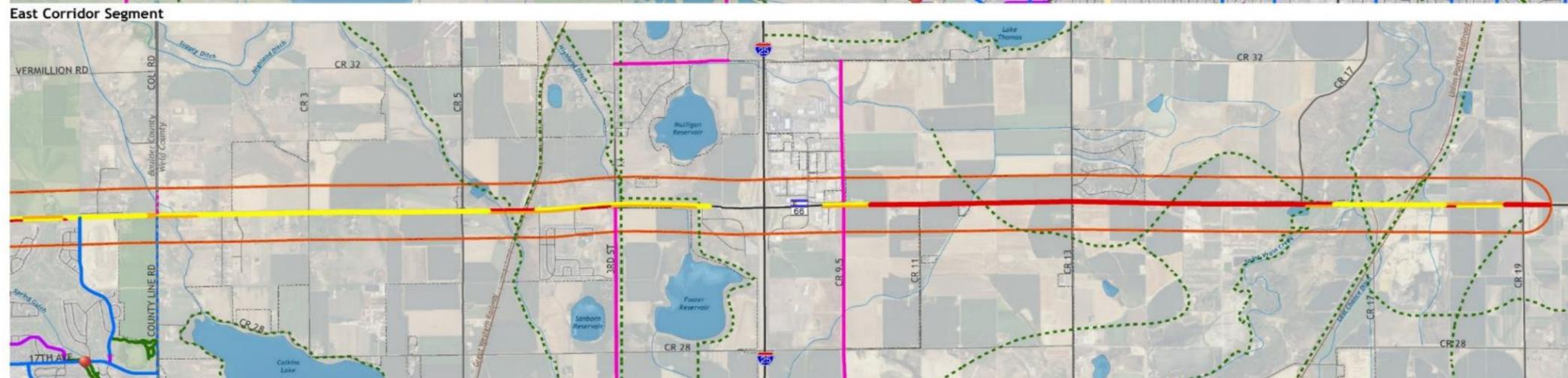
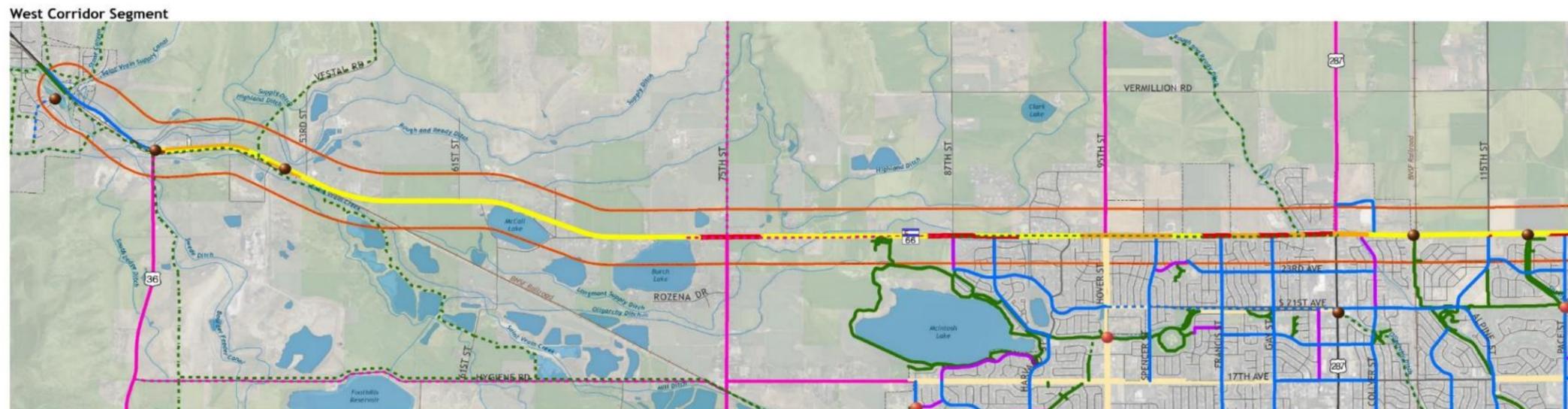
Additionally, the SH 66 corridor provides substantial bicycling opportunities for commuting and recreation. This is especially true along the western end of the corridor, which receives the highest amount of bicycle traffic. This section of roadway has wide shoulders (10-feet); however, because of the high speeds of vehicular traffic on SH 66, the level of traffic stress on the cyclists remains high (see **Figure 3.6**). This results in reduced bicycle comfort, which limits usage in the corridor. Typically, only advanced riders are comfortable using a corridor like SH 66 with such high speeds.

Stakeholder input also reflects this situation. The following summarizes the needs identified for bicycling and walking through stakeholder interviews:

- ▶ Crossing improvements of SH 66 west of I-25
- ▶ Grade-separated crossing of US 36 parallel to SH 66
- ▶ Safety improvements at intersections
- ▶ Separated facility along SH 66 in Longmont
- ▶ Connect Lyons and Longmont with off-street facilities/trails
- ▶ Connections to future Platte River Trail and regional trail connections in Weld County

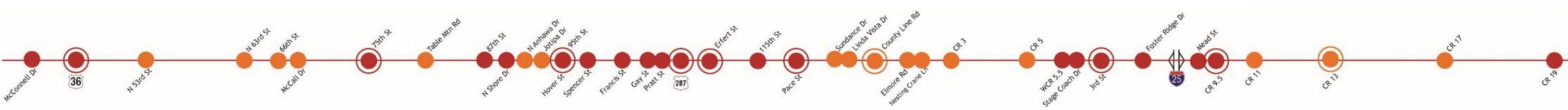


Figure 3.6 Existing and Planning Bicycle Network



**Level of Traffic Stress**

The Mineta Transportation Institute (MTI) developed level of traffic stress (LTS) as an alternative to bicycle level of service grading of the bicycle network. LTS aims to address the variances in tolerance of stress brought on by vehicular traffic for different user groups. LTS provides a score of comfort ranging from 1 to 4, with LTS 1 feeling safe for all levels of users and LTS 4 only for very experienced and skilled bicyclists—a very small portion of the population. Even with wide shoulders and a portion of US 36 having bike lanes, all segments and just over half of the intersections along the corridor have a high level of traffic stress (LTS 4) due to high speeds and high traffic volumes. The remaining intersections scored LTS 3, meaning most experienced adult bicyclists feel comfortable enough to cross, but groups like the elderly, children, and inexperienced bicyclists would not. The figure below illustrates the LTS scores for segments and intersections along the corridor.





### 3.2.3 Transit

Regarding transit, all the fixed-route transit and accompanying Access-a-Ride services in the study area are in Boulder County. RTD's fixed-route bus services are limited in the study area due to its location on the edge of the RTD service area. Routes focus on serving regional travel needs and/or local trips in Longmont. This includes four local Longmont routes and regional routes connecting to Boulder and the Denver metropolitan area. Regional service also connects Lyons and Boulder via US 36. Health First Colorado via Veyo provides Medicaid transportation services, and Heart and Soul Paratransit provides other social service transportation to eligible individuals in the Weld County section of the corridor.

RTD also has two Park-n-Rides near the study area: one on US 287, just south of the corridor, and one in Lyons. A CDOT-maintained Park-n-Ride is also located at I-25 and SH 66, but it is currently used only for ride-sharing purposes.

Census data can be used to help identify areas of high transit propensity, i.e., areas that are likely to support significant transit ridership. The indicators used for this evaluation of transit propensity include areas with high densities of the following population characteristics:

- ▶ Age 65 plus
- ▶ Individuals with disabilities
- ▶ Households below the poverty line
- ▶ Households with zero vehicles

The data for the study area suggest that the areas with the highest level of transit propensity are near the US 287/SH 66 intersection. This is supported by the fact that the existing transit routes serving the corridor are focused in this area, and, subsequently, the existing transit ridership is the highest here.

The data also show large percentages of households over the age of 65 on both the east and west ends of the corridor, more than 50 percent and between 26 and 50 percent, respectively. Likewise, both ends of the corridor also have mid to high levels of low-income populations, and the east end has high levels of populations with disabilities. Consistent with other areas in Colorado, there is expected to be an increase in residents who have difficulties with their transportation needs, thereby creating new transit demands in the area.

As transit demands increase along the corridor, the inadequate pedestrian infrastructure and RTD's service boundaries are likely to become more problematic in providing user-friendly services. For example, the current service boundary limits RTD's ability to have stops on the north side of SH 66 in some sections, and no stops can be provided in Weld County because it is not part of RTD's service area.

Finally, as traffic volumes continue to grow, the ability for vehicles (including transit vehicles), pedestrians, and bicyclists to efficiently move along or across SH 66 will become more difficult. Significant degradation in operations are expected to result in long delays, high levels of congestion, and longer than expected trip times. These factors and increased population are likely to increase transit demands requiring more transit options to the corridor. Increased service levels may encounter difficulty if the increase in congestion prevents the ability to provide reliable schedules for routes.



### 3.3 Access

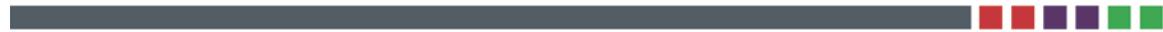
The study area includes a small portion of US 36 and approximately 20 miles of SH 66 between US 36 and WCR 19 east of I-25. A review of the *State Highway Access Code* (SHAC) indicates that all portions of the study area are classified as either Regional Highway (RA) or Non-Rural Regional Highway (NR-A). Per the SHAC, these types of highways are governed by the following characteristics:

- ▶ Medium to high traffic speeds
- ▶ Medium to high levels of traffic volumes
- ▶ Medium to long distance travel (principal highways serving intra and inter-regional trips)
- ▶ Prioritize the through movement of vehicles over providing local access
- ▶ Allow one access per abutting parcel if acceptable access cannot be provided from the local street network
- ▶ Limit traffic signalized intersections to ½ mile spacing when possible
- ▶ Allow other limited access types (right-in-right-out and three-quarter)

Table 3.4 summarizes highway categories within the study area as identified in the SHAC and the number of existing accesses (signalized and unsignalized). Today, the study area includes more than 300 access locations, including 13 signalized intersections. Most unsignalized accesses are driveways providing movement to residential homes and the many businesses that have frontage along the highway. Many access locations are not defined with curb and gutter but with undefined dirt or paved openings that span the full length of the property.

**Table 3.4 Existing Access Conditions within the Study Area**

Highway	Start	End	Access Category	Number of Access Locations		
				Signalized	Unsignalized	Total
US 36	McConnell Drive	SH 66	Regional Highway	1	32	33
SH 66	US 36	CR 23	Regional Highway	2	109	111
	CR 23	SH 287	Non-Rural Regional Highway	1	32	33
	SH 287	CR 1	Non-Rural Regional Highway	3	29	32
	CR 1	WCR 7/3 <sup>rd</sup> Street (390 feet east of)	Regional Highway	2	34	36
	WCR 7/3 <sup>rd</sup> Street (390 feet east of)	I-25	Non-Rural Regional Highway	0	8	8
	I-25	CR 11	Non-Rural Regional Highway	3	5	8
	CR 11	CR 19	Regional Highway	1	49	50
<b>Totals</b>				<b>13</b>	<b>298</b>	<b>311</b>





### 3.3.1 Effect on Other Needs

The current number, locations, and design of accesses contribute to operational and safety deficiencies along the corridor. Many locations do not have turn lanes (right or left), are not delineated by curb and gutter, do not include appropriate accommodations for pedestrians and bicyclists to facilitate movements (including locations where pedestrian and bicycle demands are present), and are spaced at irregular distances along the entire length of the study area.

The number of access locations is expected to increase as additional development occurs along or adjacent to the highway. The increase in traffic and access locations is expected to further degrade the operations and safety for all modes of travel along SH 66. Improvements to the number, location, and design of access locations along SH 66 can help reduce congestion, which, in turn, can help minimize the overall magnitude of improvements needed to provide better operations and safety along the highway. The study area needs improvement in the form of better access control (development of an access control plan) to help reduce the impact of poor access points to operations and safety in the future, along SH 66 and parallel routes.