Findings and Recommendations for MPO Safety Planning

Grayson County MPO

Texas Department of Transportation

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Chapter 1. How to Use This Document

1.1 Introduction

Safety planning is the process of identifying overall safety issues including predominant serious crash types, behaviors that contribute to crashes, and locations where an excess number of crashes occur or where crashes are likely to occur; identifying projects or programs to address them; and incorporating the identified projects or programs into a funding and implementation plan.

The Metropolitan Planning Organization (MPO) Safety Planning Project — made possible through the involvement of the Texas Department of Transportation (TxDOT) and the participation of 18 Texas MPOs — leveraged MPO planning funds to develop robust information and tools to assist with current and future transportation safety planning efforts.

This report provides methods for accomplishing these planning tasks, MPO-specific analysis results that identify priority issues and locations, resources for addressing the identified issues and locations, and tools to assist in MPO safety planning efforts. These tools, techniques and resources can be used to:

- Establish or update a Comprehensive Safety Action Plan that will become part of an MPO's Metropolitan Transportation Plan (MTP).
- Identify projects that can be funded through sources such as Safe Streets and Roads for All or the Federal Highway Administration's (FHWA's) Highway Safety Improvement Program.
- Incorporate safety improvements into other planned projects.

1.2 Report Organization

Following this introductory information, the remainder of this report includes three chapters that address existing conditions, improvement opportunities, and outcomes and recommendations.

Terms and Definitions (Chapter 2)

Chapter 2 provides a list of terms and definitions that will be used in this report's crash analyses.

Crash Trends and Contributing Factors (Chapter 3)

Participating MPOs were divided into three categories (Big 6, transportation management association [TMA] and small, as described in Chapter 2) to allow for comparative data analysis when establishing this project's recommendations. Chapter 3 summarizes MPO-specific trends in crash types and contributing factors in the context of all statewide metropolitan areas and compared to other similarly sized MPOs. This comparative information can be helpful to identify crash types and contributing factors that may be of particular concern for communities within an MPO's jurisdiction.

Existing Conditions (Chapter 4)

Chapter 4 summarizes existing safety planning documents, excess crash locations, and potential locations for pedestrian safety improvements within an MPO's jurisdiction. This information can be used to identify local priorities for safety funding and projects. Chapter sections include the following:

- **Current Safety Policies and Programs**: This section includes a list of MPO-specific planning documents that the project team reviewed to gain an understanding of current safety policies and programs and links to the current versions of these documents on the MPO's website.
- **Locations with Excess Crashes**: This section includes the top 10 roadway segments and intersections within an MPO's jurisdiction that experienced excess crashes compared to other similar roadway segments and intersections with comparable traffic levels. Locations are both listed and displayed on a map.
- **Potential Locations for Pedestrian Safety Enhancements**: This section includes roadway segments and intersections within an MPO's jurisdiction with characteristics that are associated with a higher risk of pedestrian crashes.

Improvement Opportunities (Chapter 5)

Chapter 5 summarizes some of the tools and resources that can be used to address local safety priorities identified in Chapters 3 and 4. Chapter sections include the following:

- **MPO Focus Areas**: This section includes a summary of any gaps in current policies and project implementation based on existing data and conditions.
- **Proven Safety Countermeasures**: This section includes a list of proven traffic safety strategies identified by the National Highway Traffic Safety Administration (NHTSA), FHWA and the Texas Strategic Highway Safety Plan for addressing crash types and crash risk factors. Appendix B provides more detailed action plans for each of these strategies, as well as links to online resources for more information and guidance.
- **Behavioral Safety Resources**: This section includes descriptions of and links to behavioral safety resources including media campaigns, downloadable materials and Texas-based traffic safety coalitions.
- **Procedures to Integrate Safety Assessments into MPO Policies**: This section includes recommendations for safety plan development.

Outcomes and Recommendations (Chapter 6)

Chapter 6 provides information on policies and project scoring tools to include in MPO safety plans. Chapter sections include the following:

- **Things to Keep Doing**: This section includes a list of recommended safety policies and a framework for safety-weighted project scoring.
- **Use of Safety Assessment Tools**: This section includes a brief primer on the use of the Safer by Design Tool for evaluating potential safety projects.

- **Corridor Analysis Results**: This section includes a summary of the recommended safety projects for two corridors selected by the MPOs and the Texas A&M Transportation Institute (TTI) team.

Chapter 2. Terms and Definitions

The following terms and definitions will be used in the crash analyses and results described in this document.

2.1 MPO Categories

Big 6 refers to MPOs representing the six largest urban areas:

- Dallas-Fort Worth (North Central Texas Council of Governments).
- Houston-Galveston (Houston-Galveston Area Council).
- San Antonio (Alamo Area Metropolitan Planning Organization).
- Austin (Central Area Metropolitan Planning Organization).
- Rio Grande Valley (Rio Grande Valley Metropolitan Planning Organization).
- El Paso (El Paso Metropolitan Planning Organization).

TMA refers to an urban area more than 200,000 in population but less than the Big 6:

- Amarillo.
- Bryan-College Station.
- Laredo.
- Lubbock.
- Hardin, Jasper, Jefferson and Orange Counties (South East Texas Regional Planning Commission [SETRPC]).
- Tyler.

Small refers to urban areas less than 200,000 in population:

- Abilene.
- Eagle Pass.
- Grayson County.
- Longview.
- San Angelo.
- Texarkana.
- Victoria.
- Wichita Falls.

2.2 Crash Definitions

Angle — crash with a first harmful event collision data field assigned a value of:

- Angle — both going straight.
- Angle — one straight — one backing.
- Angle — one straight one stopped.
- Angle — one right turn — one stopped.

Bicyclist involved — crash involving a pedalcyclist(bicyclist) or a crash involving a unit identified as a pedalcyclist.

Casualty crash — crash in either the fatal (K) or suspected serious injury (A) categories as defined in TxDOT's Crash Records Information System (CRIS).

Fatal crash — any injury crash that results in one or more fatal injuries (abbreviated as "K" in CRIS).

Head-on — crash with a first harmful event collision data field assigned a value of "opposite direction — both going straight."

Impaired — crash involving a driver of with a reported blood alcohol concentration (BAC) greater than zero, a positive substance test, or driving a unit(motor vehicle) assigned one of the following contributing factors:

- Had been drinking.
- Intoxicated — alcohol.
- Taking medication (explain in narrative).
- Intoxicated — drug.

Intersection — crash with a value of "Intersection" or "Intersection Related" in the intersection-related data field.

Left-turn crash — crash with a first harmful event collision data field assigned a value of:

- Opposite direction — one right turn — one left turn.
- Opposite direction both left turns.
- Opposite direction — one left — one stopped.
- Other — one left turn — one entering of leaving a parking space.
- Angle — both left turn.
- Angle — one straight — one left turn.
- Angle — one right turn — one left turn.
- Angle — one left turn — one stopped.
- Same direction — one straight — one left turn.
- Same direction — one right turn — one left turn.
- Same direction — both left turn.
- Same direction — one left turn — one stopped.
- Opposite direction — one straight — one left turn.

Limited visibility — crash with a light condition data field assigned a value of:

- Dark, not lighted.
- Dark, lighted.
- Dark, unknown lighting.
- Dawn.
- Dusk.

Motorcycle — crash involving a unit identified as a motorcycle.

Multi-vehicle — crash with a first harmful event collision data field assigned a value other than:

- One motor vehicle — going straight.
- One motor vehicle — turning right.
- One motor vehicle — turning left.
- One motor vehicle — backing.
- One motor vehicle — other.

Not wearing seatbelts — crash involving a person assigned a restraint used value of "None."

Older driver — crash involving a driver aged 65 years or older.

Pedestrian — crash involving a unit identified as a pedestrian.

Rear-end crash — crash with a first harmful event collision data field assigned a value of:

- Same direction — both going straight — rear end.
- Same direction — one straight — one stopped.
- Same direction — one straight — one right turn.

Right turn — crash with a first harmful event collision data field assigned a value of:

- Angle — both right turn.
- Same direction — both right turn.
- Same direction — one right turn — one stopped.
- Opposite direction — one straight — one right turn.
- Opposite direction — one right turn — one stopped.

Run off the road — single-vehicle crash with the crash occurring off the roadway, on the shoulder or in the median.

Sideswipe — crash with a first harmful event collision data field assigned a value of "same direction — both going straight — sideswipe."

Single vehicle — crash with a first harmful event collision data field assigned a value of:

- One motor vehicle — going straight.
- One motor vehicle — turning right.
- One motor vehicle — turning left.
- One motor vehicle — backing.
- One motor vehicle — other.

Speed related — crash with a contributing factor of:

- Failed to control speed.

- Unsafe speed.
- Speeding — (over limit).

Suspected serious injury crash — crash in which the most severe injury sustained was an incapacitating injury (abbreviated as "A" in CRIS).

Truck tractor — crash involving a unit with a vehicle body style of "Truck Tractor."

Young driver — crash involving a driver aged 15 to 20 years.

Chapter 3. Crash Trends and Contributing Factors

3.1 Crash Trends Across All MPOs

Seventeen of the 24 Texas MPOs, shown in Figure 1 in the dark labels, are participating in the Statewide Assistance for Metropolitan Planning Organization (MPO) Safety project. However, the analyses in this section are aggregated across all MPOs in Texas. All crash data used in this report is from TxDOT's Crash Records Information System (CRIS).

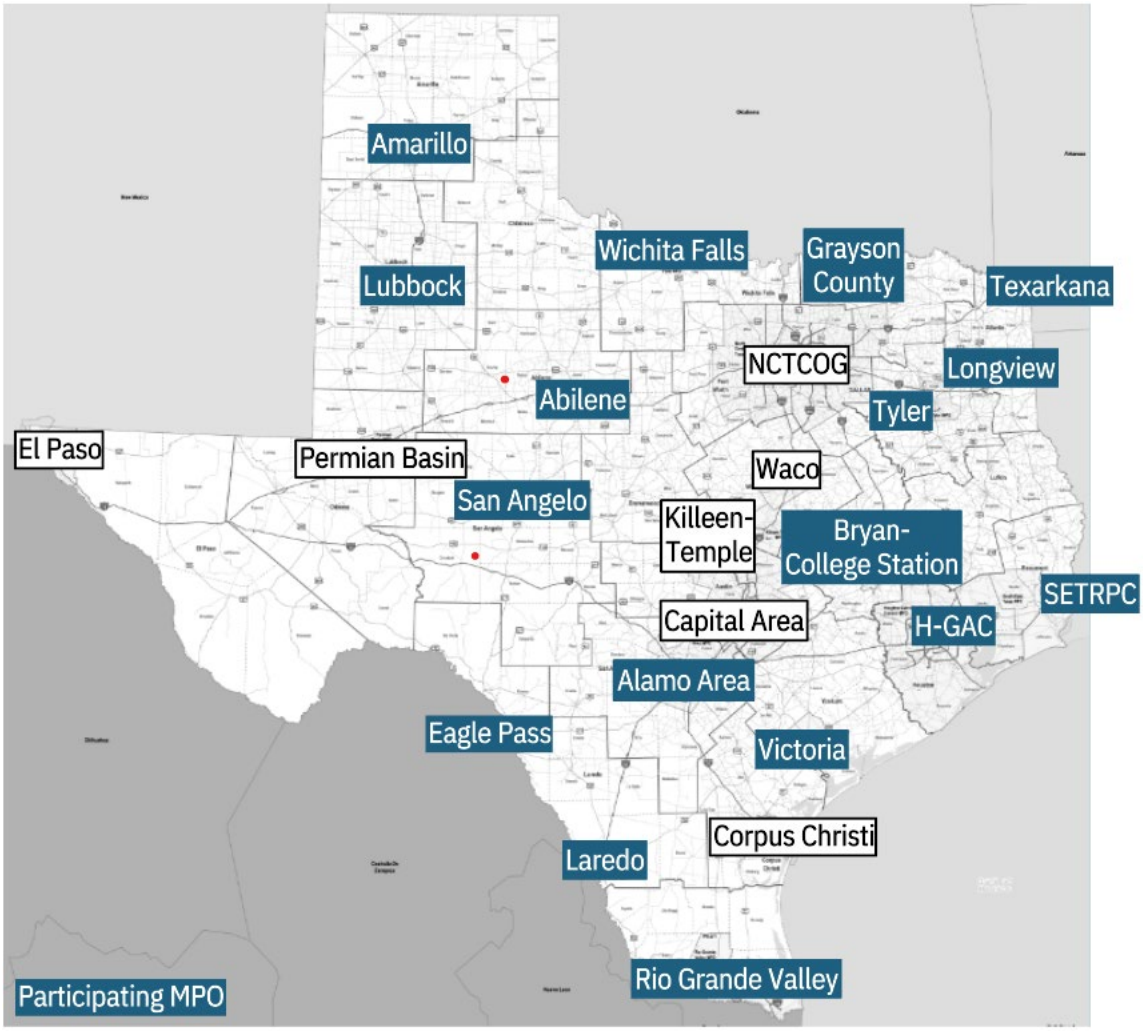


Figure 1. MPOs participating in the Metropolitan Planning Organization Safety Planning Project.

Casualty Crashes by Year

Figure 2 compares the total crashes in Texas metropolitan areas from 2018 to 2023. Not surprisingly, the largest metropolitan areas in the state experience the greatest total numbers of vehicle crashes, including casualty crashes. Suspected serious injury (SSI) crashes occur at rates of approximately 3.5 to 4.3 times that of fatal crashes.

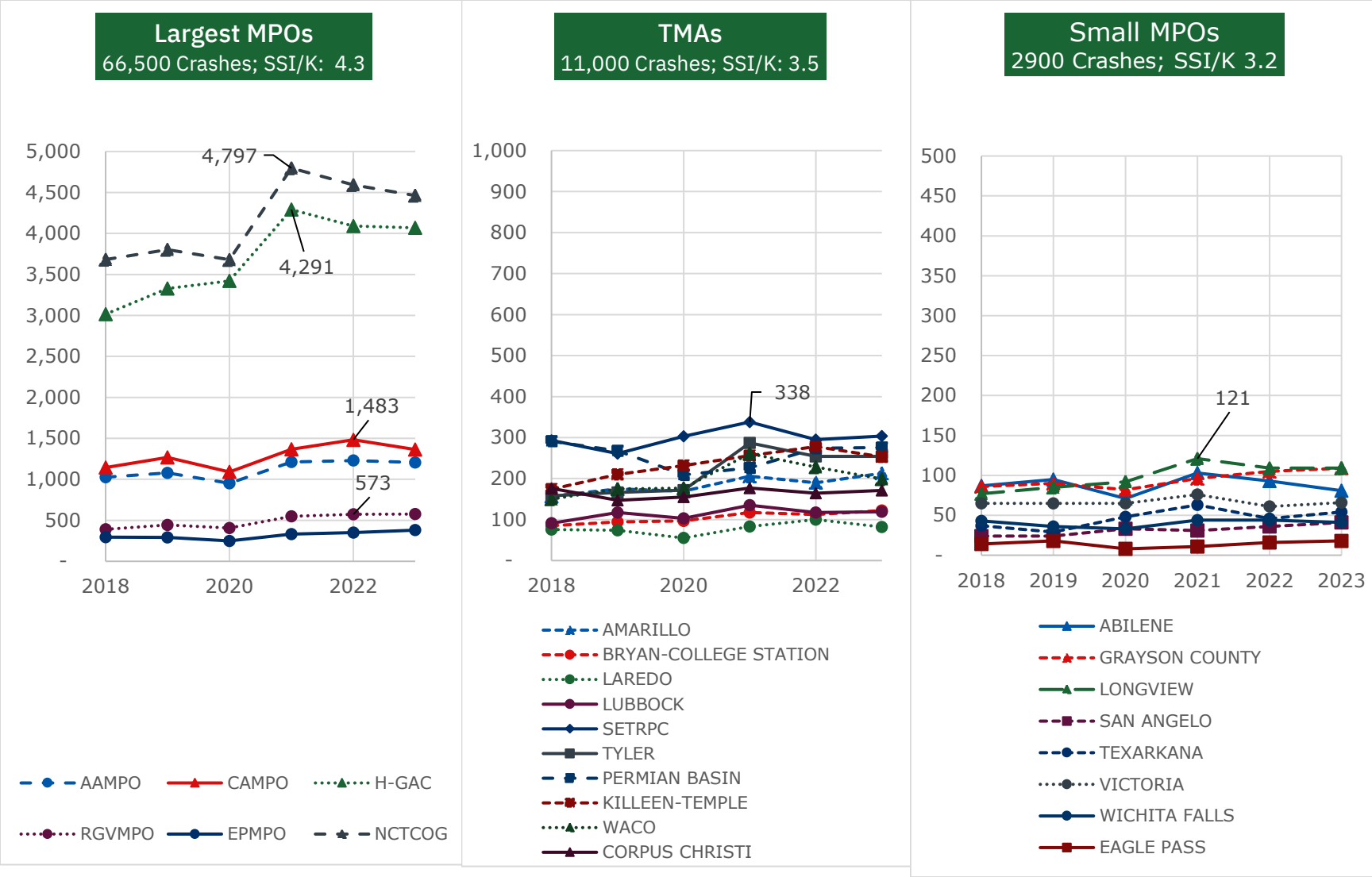


Figure 2. Total crashes in Texas MPO areas in 2018–2023.

Casualty Crashes per 1000 Total Crashes

Figure 3 compares the numbers of casualty crashes per 1000 total crashes within each MPO. This metric indicates how severe any given crash is. The higher the value, the more likely any given crash results in serious injury or death. The following are crash statistics for the three area types:

- Across the Big 6 MPOs, 28.03 out of 1000 crashes result in a casualty (i.e., a fatality or suspected serious injury). Exceeding this average are:
    - CAMPO (40.45 casualty crashes out of 1000 total crashes).
    - NCTCOG (33.97 casualty crashes out of 1000 total crashes).
- The average casualty rate per 1000 crashes across the TMAs is 28.27. TMAs with a higher-than-average casualty rate per 1000 crashes compared to their peers include:
    - Amarillo (32.74).
    - Bryan/College Station (Bryan/CS) (30.51).
    - SETRPC (33.27).
    - Tyler (38.08).
    - Permian Basin (30.77).
    - Killeen-Temple (35.44).
    - Waco (34.22).
- Among the small MPOs, the average casualty rate per 1000 crashes is 31.39. Small MPOs exceeding this average include:
    - Grayson County (59.58).
    - Longview (33.70).
    - Victoria (60.05).

Casualty Crashes per 100 Million Miles Traveled

Figure 4 compares the numbers of casualty crashes per 100 million miles traveled by MPO. This metric indicates how likely a death or serious injury is based on the amount of travel in the MPO area. A vehicle mile is one vehicle traveling 1 mile.

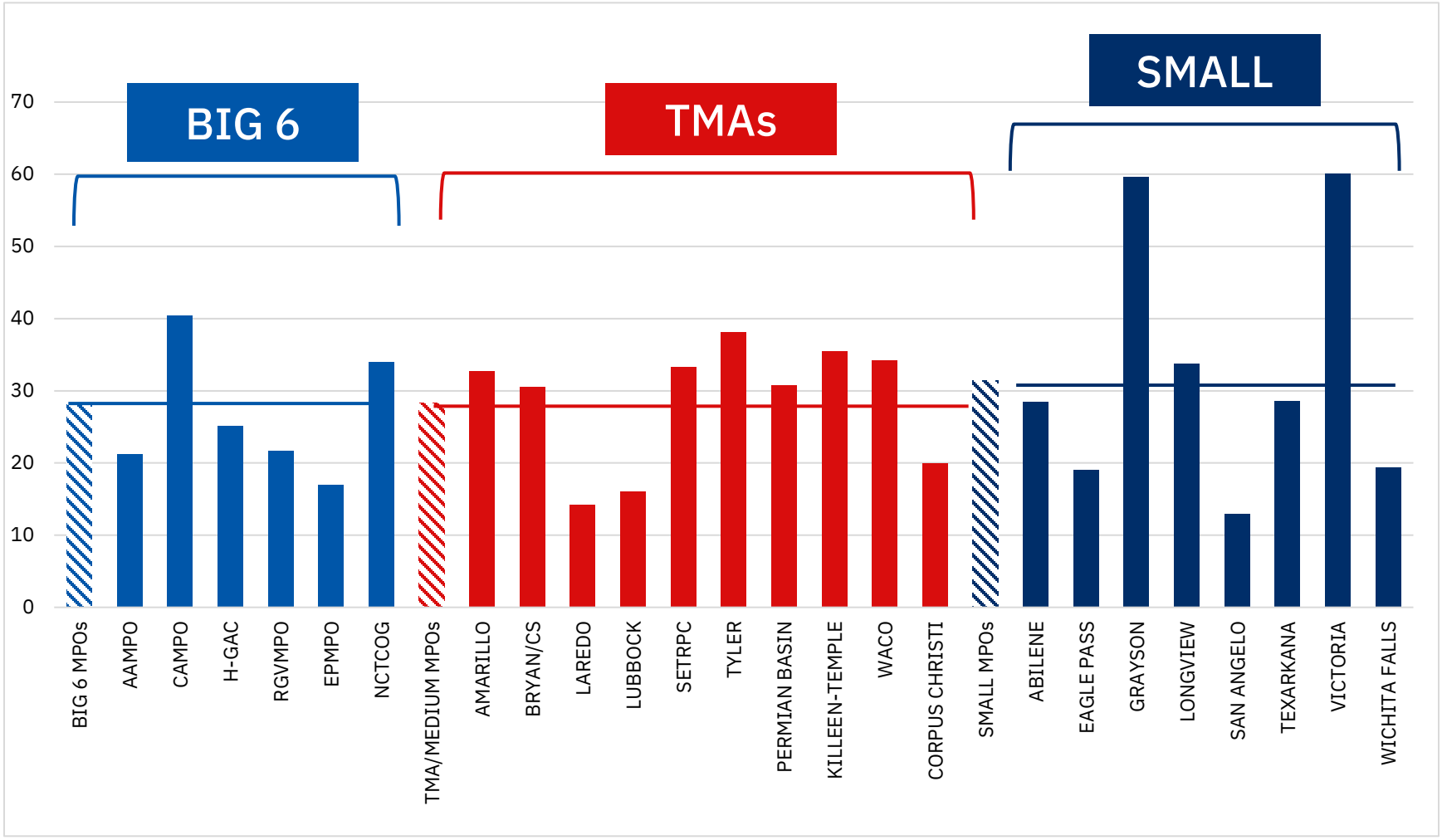


Figure 3. Casualty crashes per 1000 total crashes, by MPO.

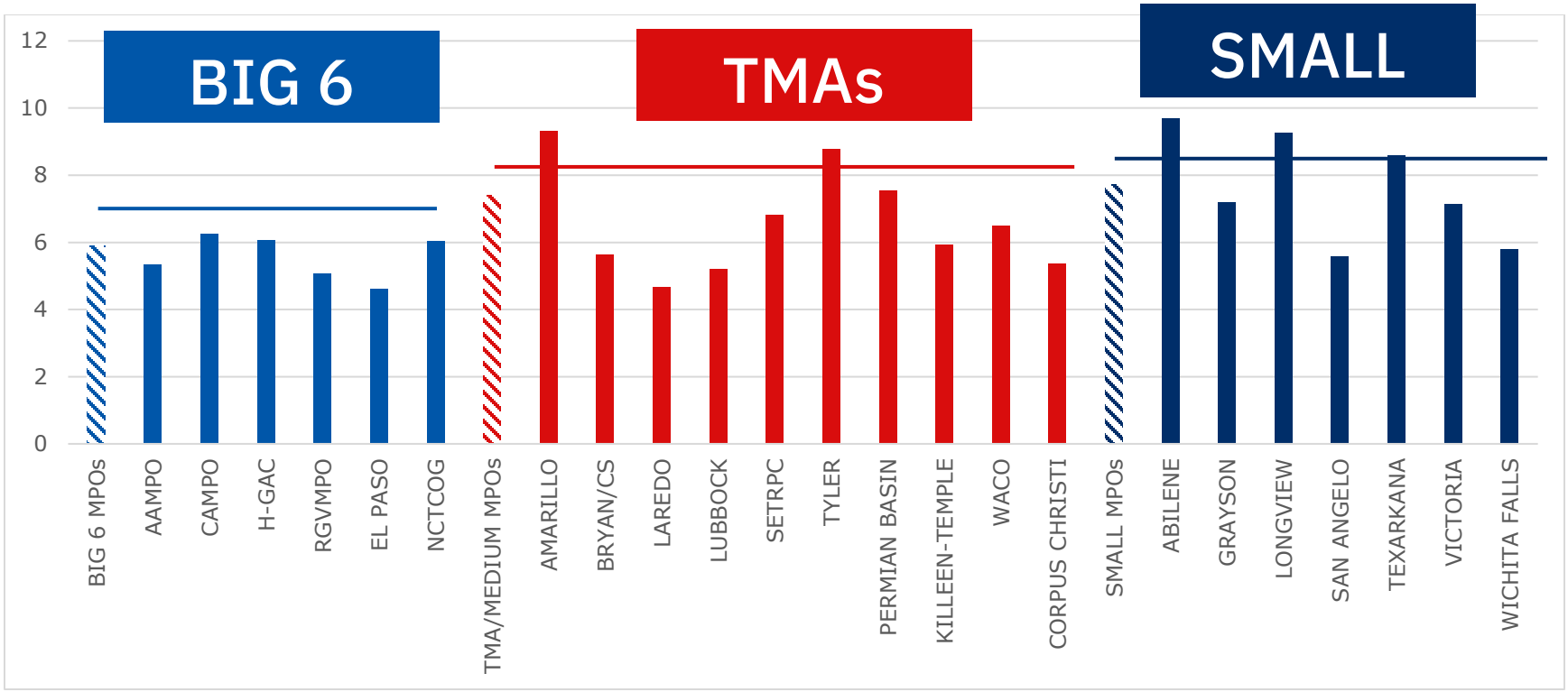


Figure 4. Casualty crashes per 100 million miles traveled, by MPO. This information is not yet available for Eagle Pass MPO.

Single-Vehicle Versus Multi-vehicle Crashes

Multi-vehicle crashes comprise some 70% of all crashes but are less severe than single-vehicle crashes. For this reason, the overall number of casualty crashes is split nearly 50-50 between single and multi-vehicle crashes statewide (see Figure 5).

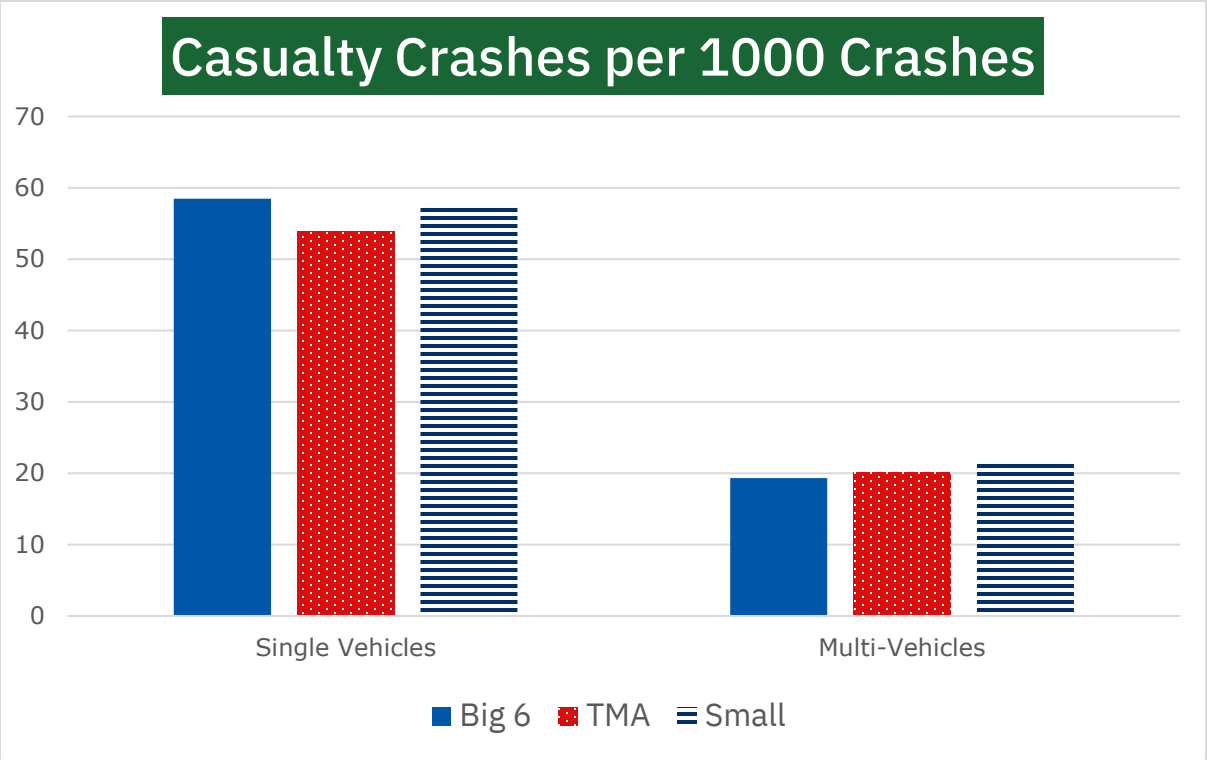


Figure 5. Single-vehicle versus multi-vehicle crashes across the Big 6, TMAs and small MPOs.

Single-Vehicle Run-off-the-Road Casualty Crashes

Single-vehicle run-off-the-road casualty crashes have increased in all MPOs since 2018. The percentage increase of this crash type in the Big 6 and TMAs is over double that in the small MPOs (see Figure 6).

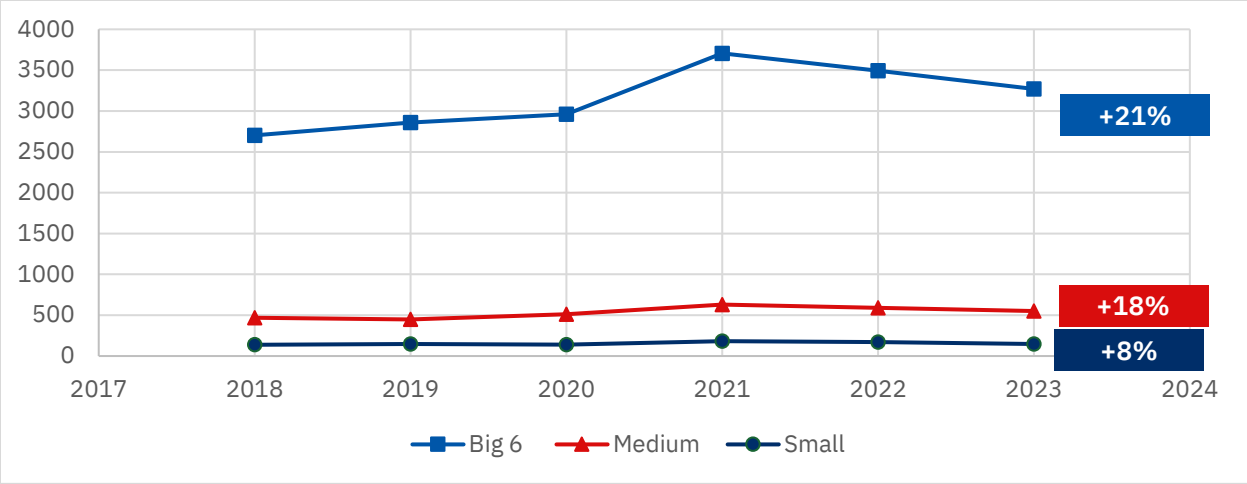


Figure 6. Single-vehicle run-off-the-road casualty crashes in the Big 6, TMAs and small MPOs.

Intersection-Related Casualty Crashes

Intersection-related casualty crashes have increased significantly in all MPOs since 2018. The percentage increase of this crash type in the Big 6 and TMAs is over double that in the small MPOs (see Figure 7).

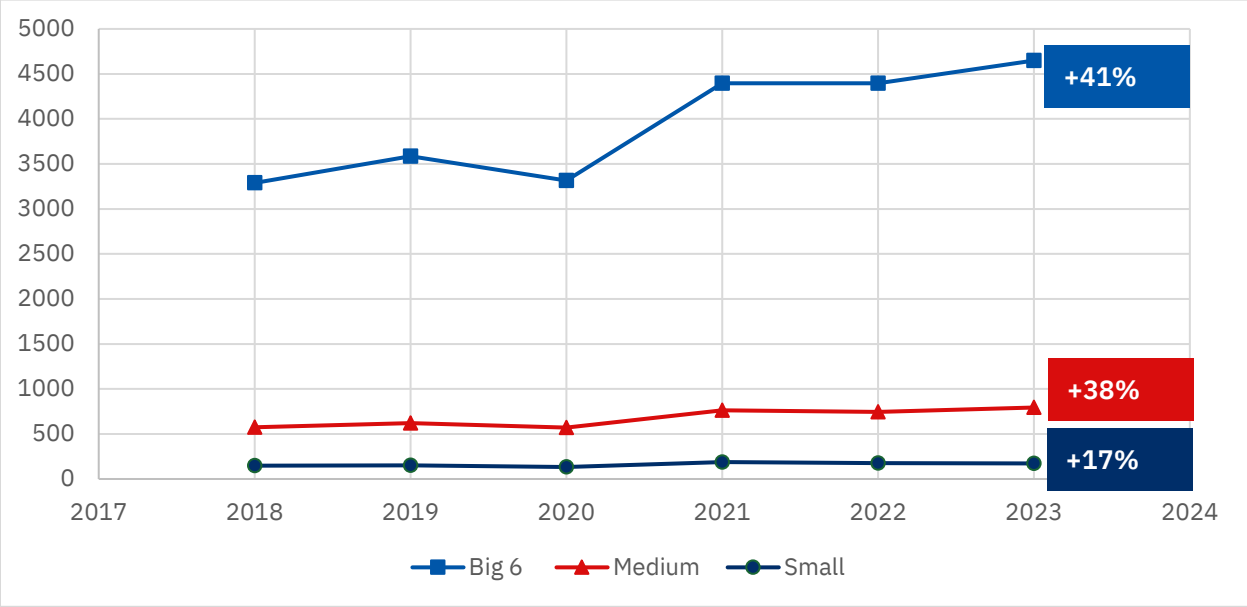


Figure 7. Intersection-related casualty crashes in the Big 6, TMAs and small MPOs.

Pedestrian Crashes

Pedestrian crashes are very severe, accounting for 88% of crash-related casualties in MPOs. As Figure 8 shows, pedestrian-involved crashes make up less than 5% of all single-vehicle crashes in metropolitan areas but between 20% and 27% of all single-vehicle casualty crashes.

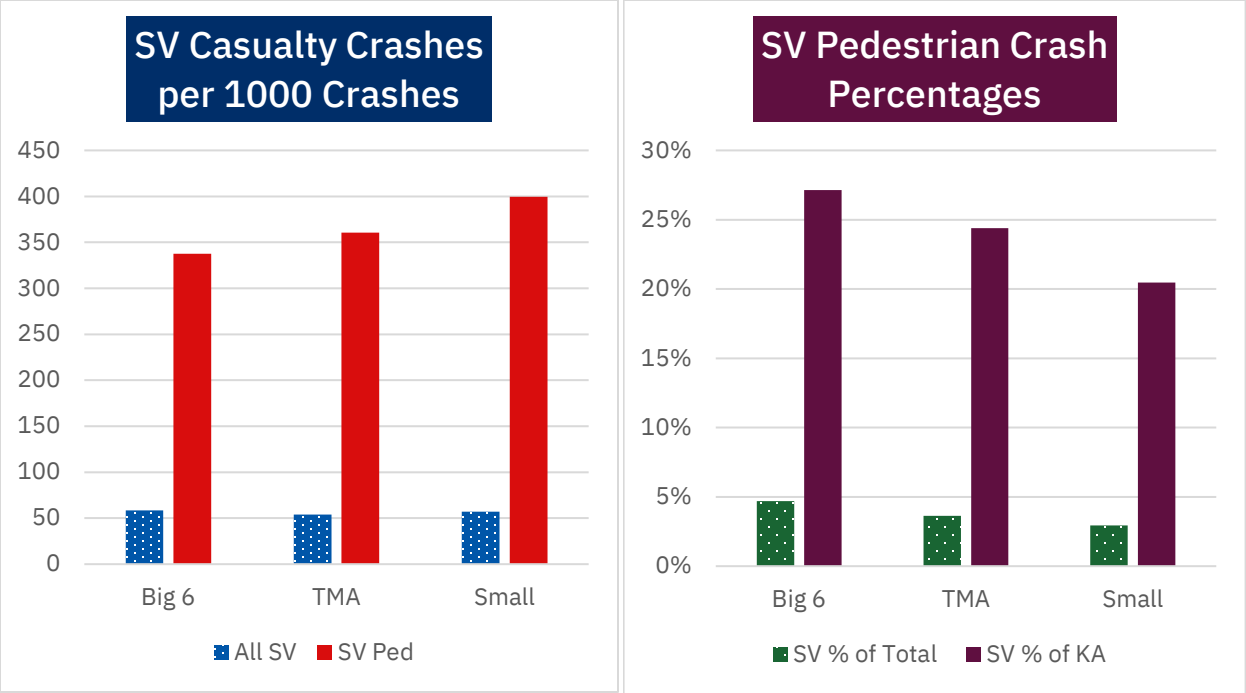


Figure 8. Single-vehicle (SV) casualty crashes per 1000 crashes and the percentage of casualty single-vehicle crashes involving pedestrians.

Pedestrian casualty crashes have increased on average in the Big 6 and TMAs since 2018 while decreasing somewhat on average in the small MPOs (see Figure 9).

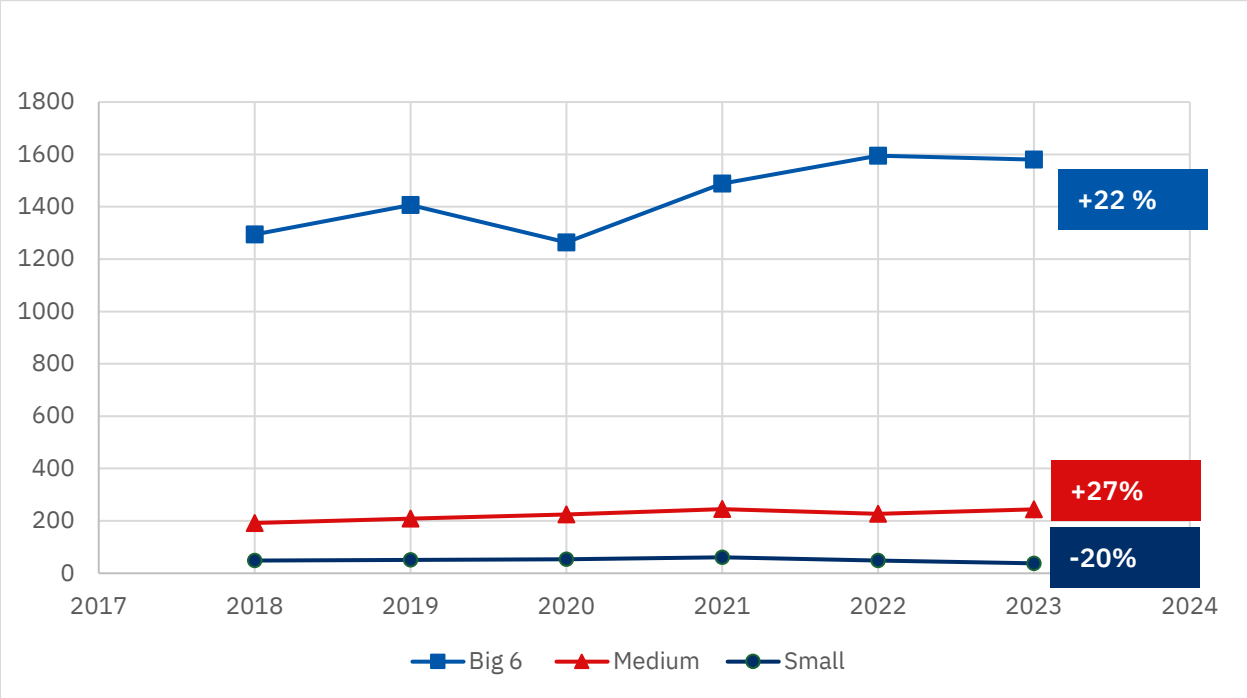


Figure 9. Pedestrian casualty trends in the Big 6, TMAs and small MPOs in 2018–2023.

3.2 Prevalent Casualty Crash Types and Characteristics: Small MPOs

Because the Grayson County Metropolitan Planning Organization is a small MPO, the following analyses and data summaries are provided under the small MPO category, allowing statistical crash information to be compared between the Grayson County MPO and its peer agencies in Texas. These comparisons can help identify issues of specific concern within the MPO.

On-System Versus Off-System Crashes

Total crashes are split nearly evenly between on-system (TxDOT) and off-system (local) roads. **Fatal crashes** are more prevalent on on-system roads (see Figure 10). These percentages are related both to the proportion of travel on on-system roads and the typically higher speeds on them.

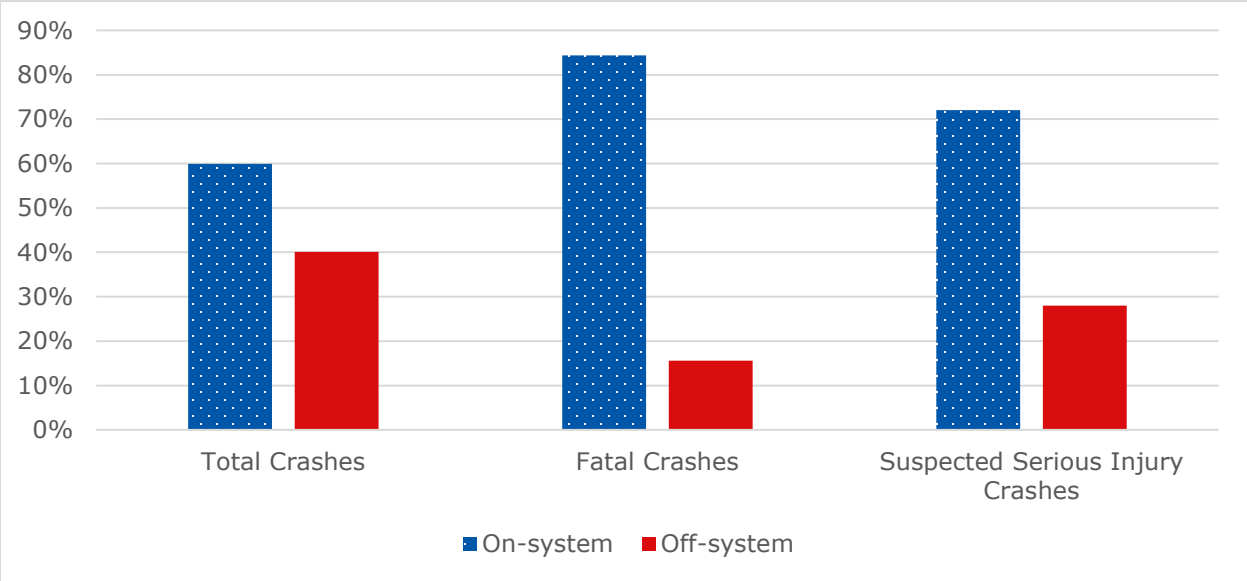


Figure 10. On-system versus off-system crashes across the small MPOs.

Pedestrian Fatal and SSI Crashes

Pedestrian crashes, while they comprise around 1% of all crashes, account for between 10% and 32% of fatal crashes in the participating small MPOs (see Figure 11). In Grayson County, pedestrian crashes comprise nearly 25% of all fatal crashes.

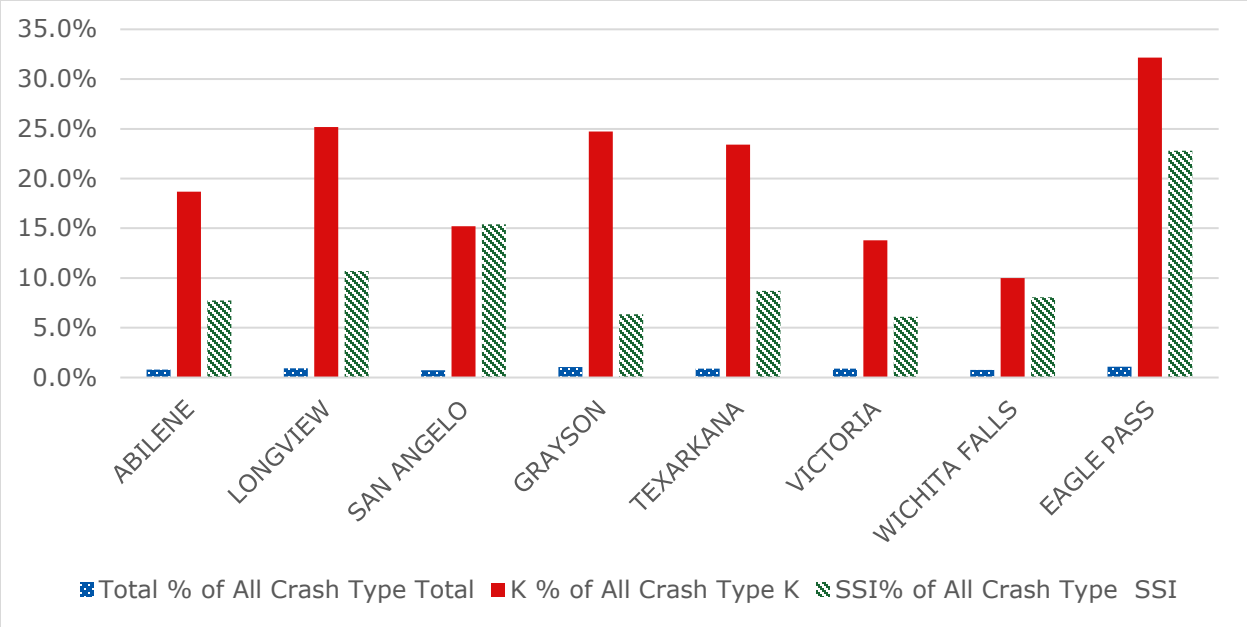


Figure 11. Pedestrian fatal and SSI crashes in the participating small MPOs.

About half of all pedestrian crashes and over 87% of pedestrian fatalities occur during times of limited visibility, as shown in Figure 12.

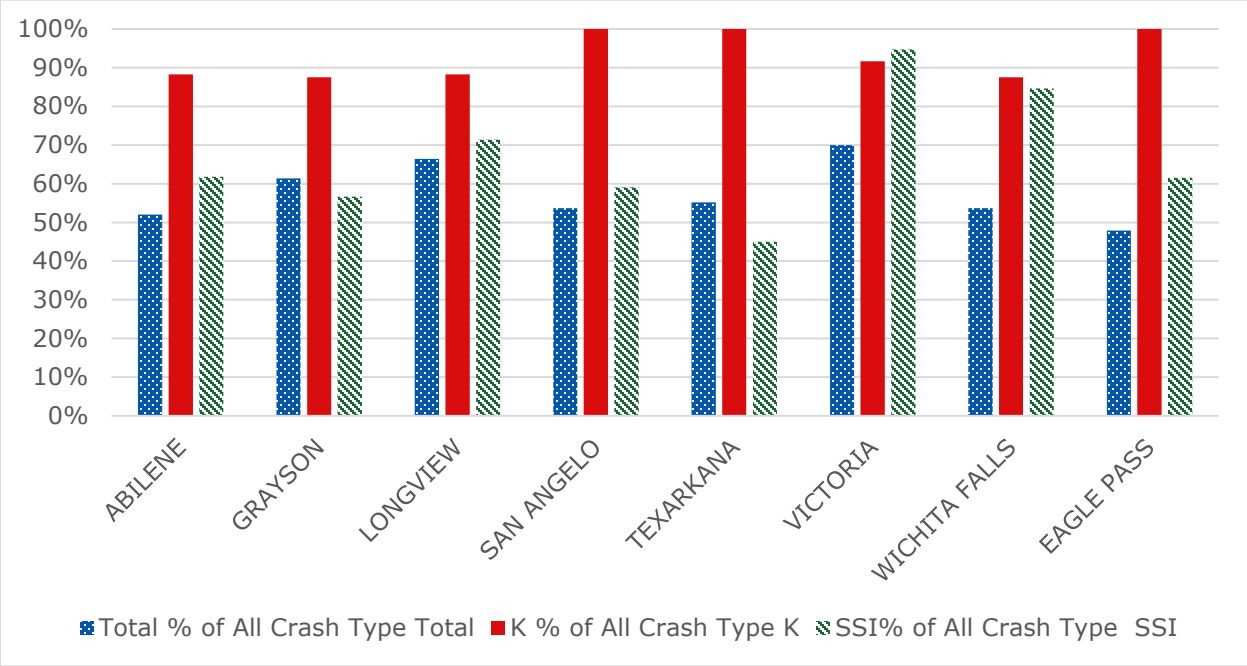


Figure 12. Pedestrian crashes in limited visibility conditions, in the participating small MPOs.

The percentage of on-system fatalities varies between MPOs, with a range of about 57 to 100 percent (see Figure 13). The percentage is related both to the proportion of on-system roads and the typically

higher speeds on them. When serious injury crashes are included, the proportion of crashes on local roads increases (see Figure 14).

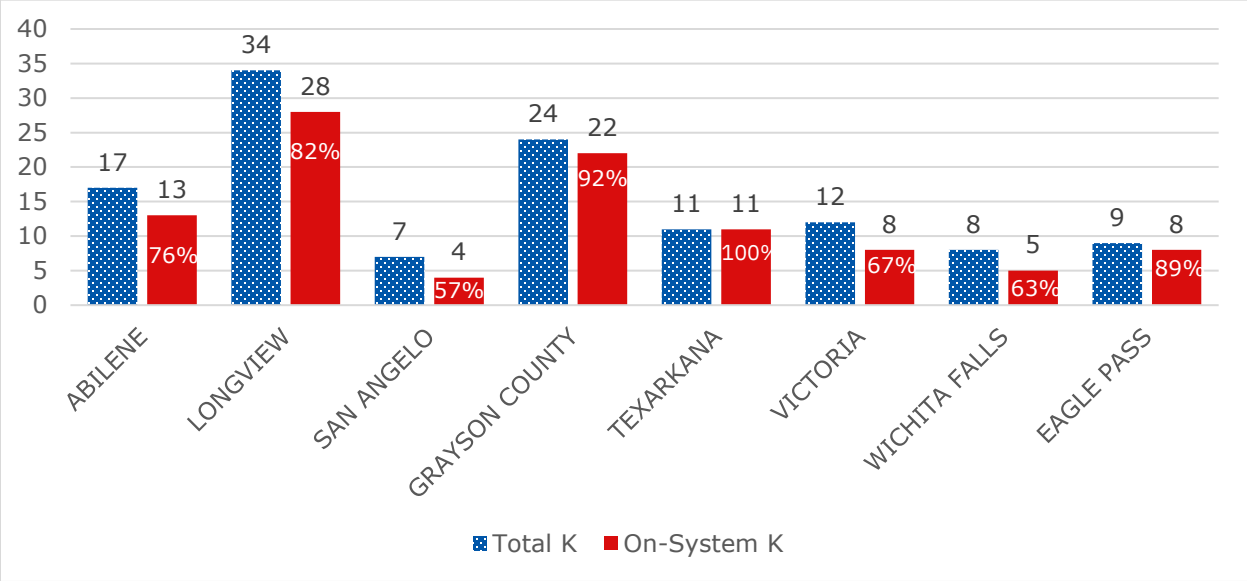


Figure 13. Fatal pedestrian crashes (2018-2023), total versus on-system, in the participating small MPOs.

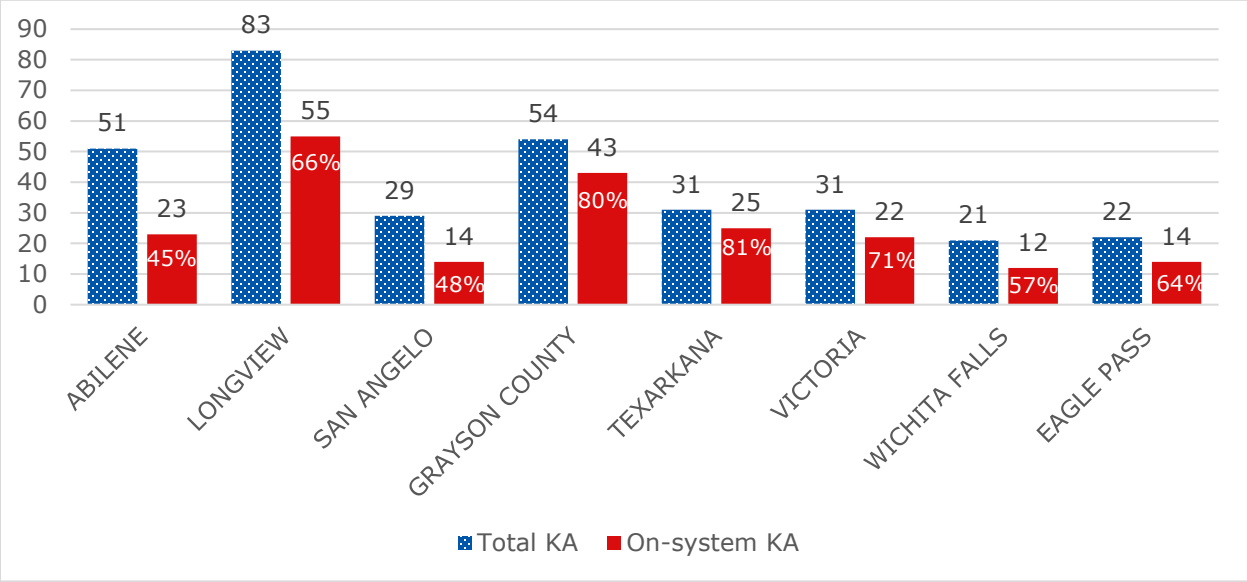


Figure 14. Pedestrian casualty crashes (2018-2023), total versus on-system, in the participating small MPOs.

Intersection-Related Fatal and Serious Injury Crashes

Intersection-related crashes account for 40% to over 50% of crashes within the eight small MPOs, and a slightly smaller percentage of injuries. Intersections also represent between 20% and 40% of fatal crashes in the small MPOs, with the exception of Eagle Pass (see Figure 15).

In six of the eight small MPOs, at least 80% of fatal intersection-related crashes (see Figure 16) and at least 70% of casualty intersection-related crashes (see Figure 17) occurred on-system. This percentage is related both to the proportion of on-system roads in these MPOs and to the typically higher speeds on them.

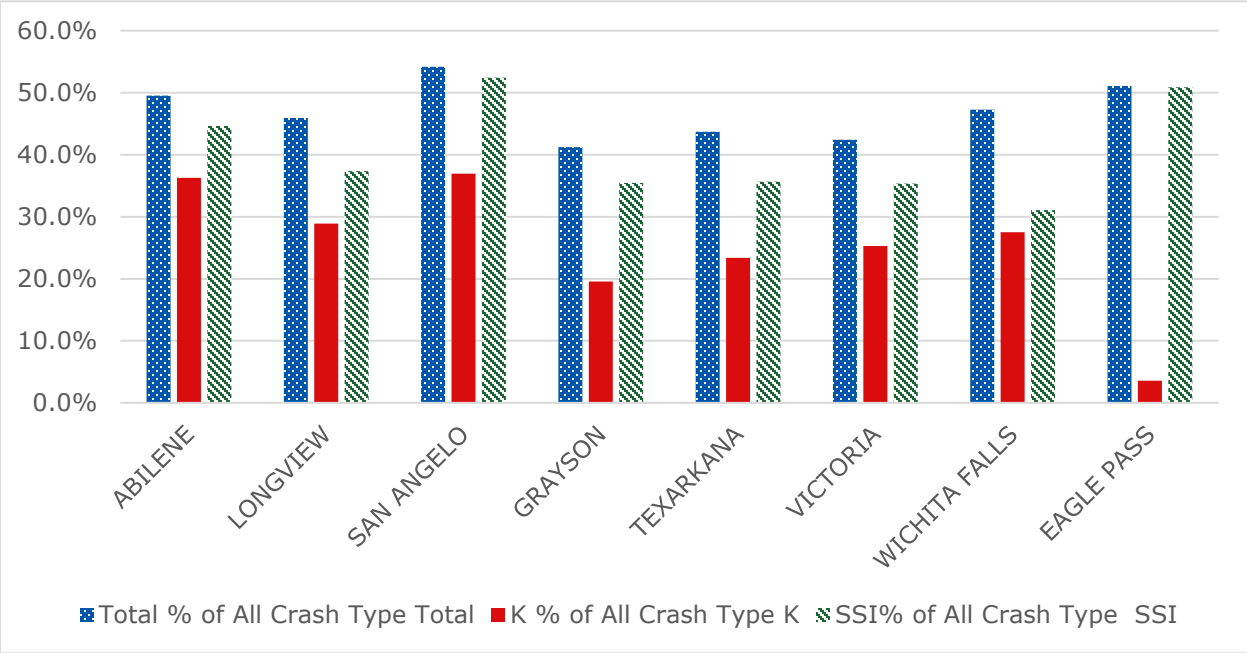


Figure 15. Percentages of intersection-related total crashes, suspected serious injury crashes, and fatal crashes in the participating small MPOs.

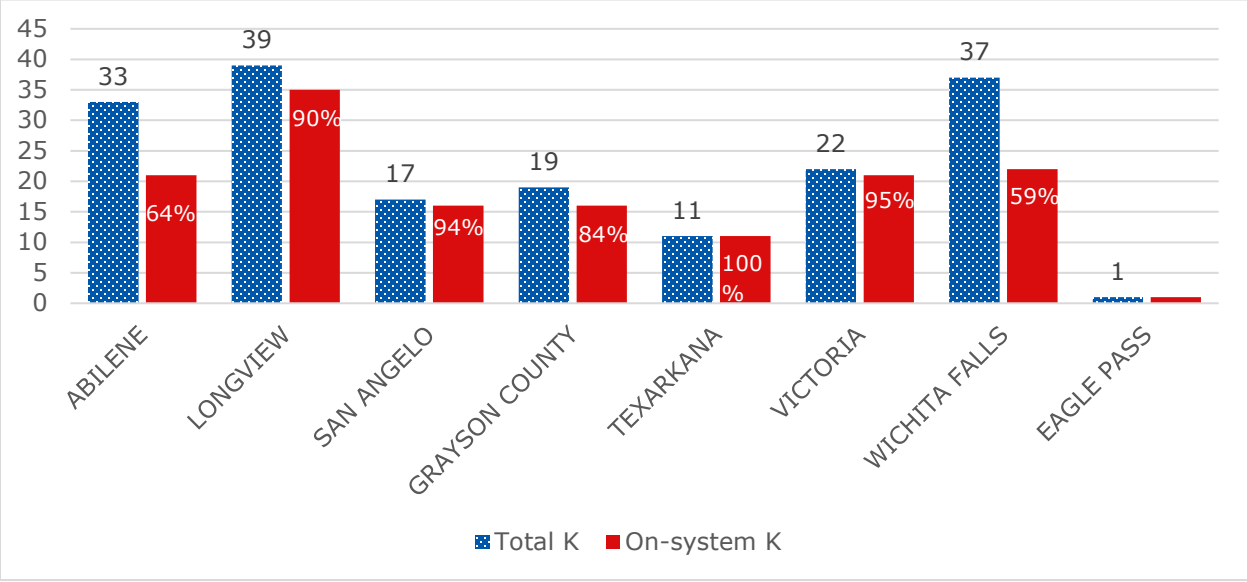


Figure 16. Fatal intersection crashes in small MPOs, total versus on-system, in the participating small MPOs.

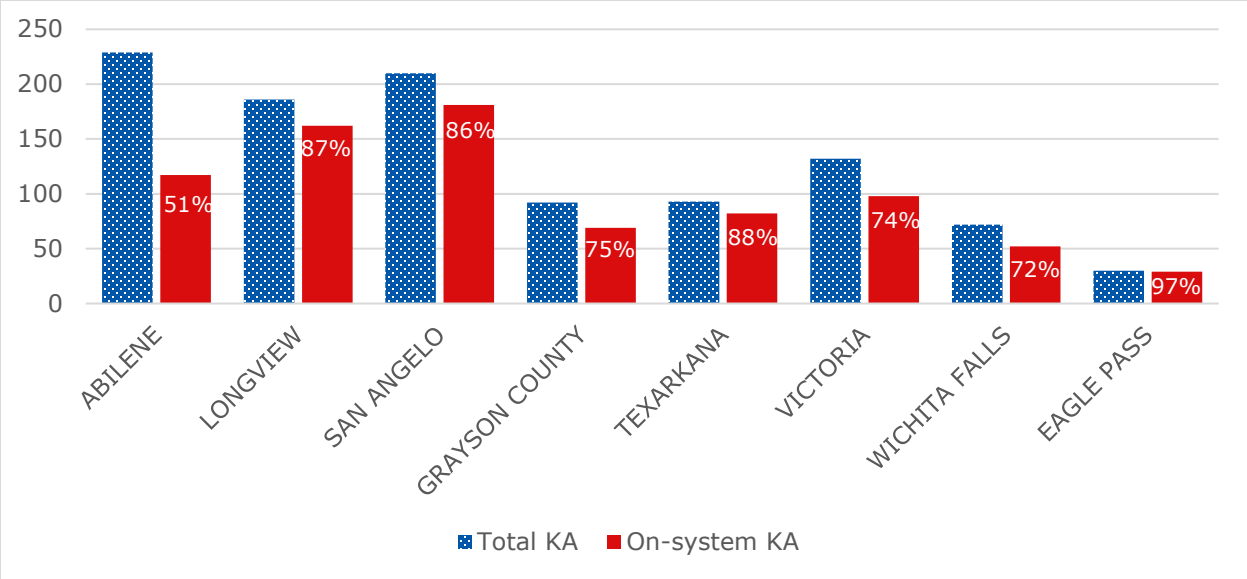


Figure 17. Intersection casualty crashes in small MPOs, total versus on-system, in the participating small MPOs.

Single-Vehicle Casualty Crashes

Single-vehicle crashes are severe; while they comprise 20% to 40% of all crashes within the eight small MPOs, they represent 47% to 60% of all casualty crashes (see Figure 18). Single-vehicle crashes comprise 50% of the casualty crashes in the Grayson County MPO.

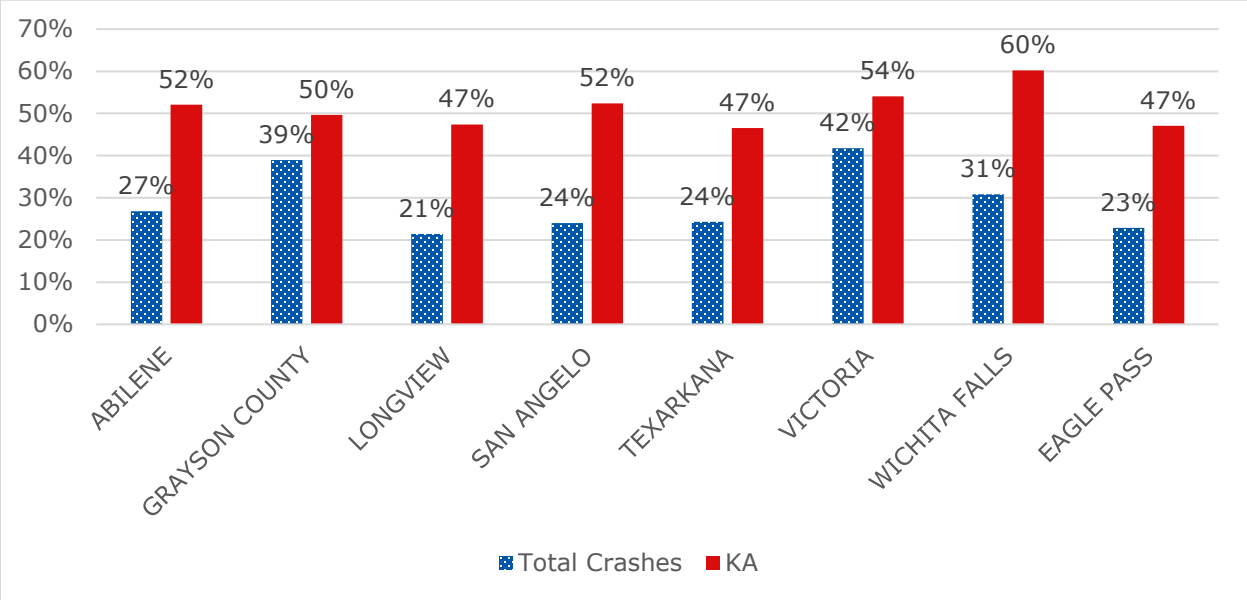


Figure 18. Single-vehicle crashes — percent of total crashes and percent of casualty crashes in the participating small MPOs.

Run-off-road and pedestrian crashes are the most prevalent types of single-vehicle casualty crashes among the eight small MPOs. Together, they account for approximately 80% of all single-vehicle fatal and suspected serious injury crashes.

Run-off-the-Road Crashes

Single-vehicle run-off-road crashes comprise 41% to 79% of all single-vehicle crashes within the small MPOs, and are a significant contributor to casualty crashes (see Figure 19). In the Grayson County MPO, run-off-road crashes represent 75% of the total single-vehicle crashes and 53% of the fatal single-vehicle crashes.

Among run-off-road fatal crashes in the small MPOs, between 73% and 90% occurred on TxDOT roadways (on-system), as shown in Figure 20. Similarly, over 70% of run-off-road casualty crashes occur on-system (see Figure 21).

Run-off-the-road crashes are particularly challenging to address in urban areas.

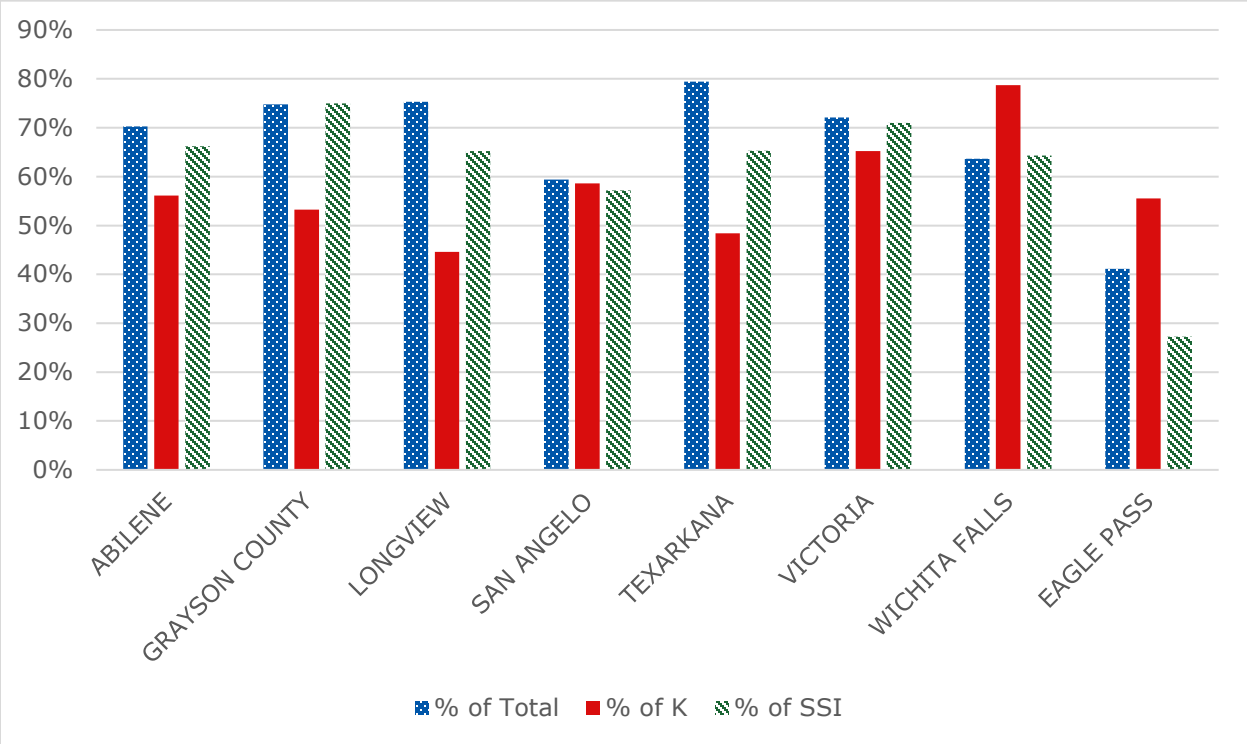


Figure 19. Percent of single-vehicle crashes classified as run-off-road crashes in the participating small MPOs.

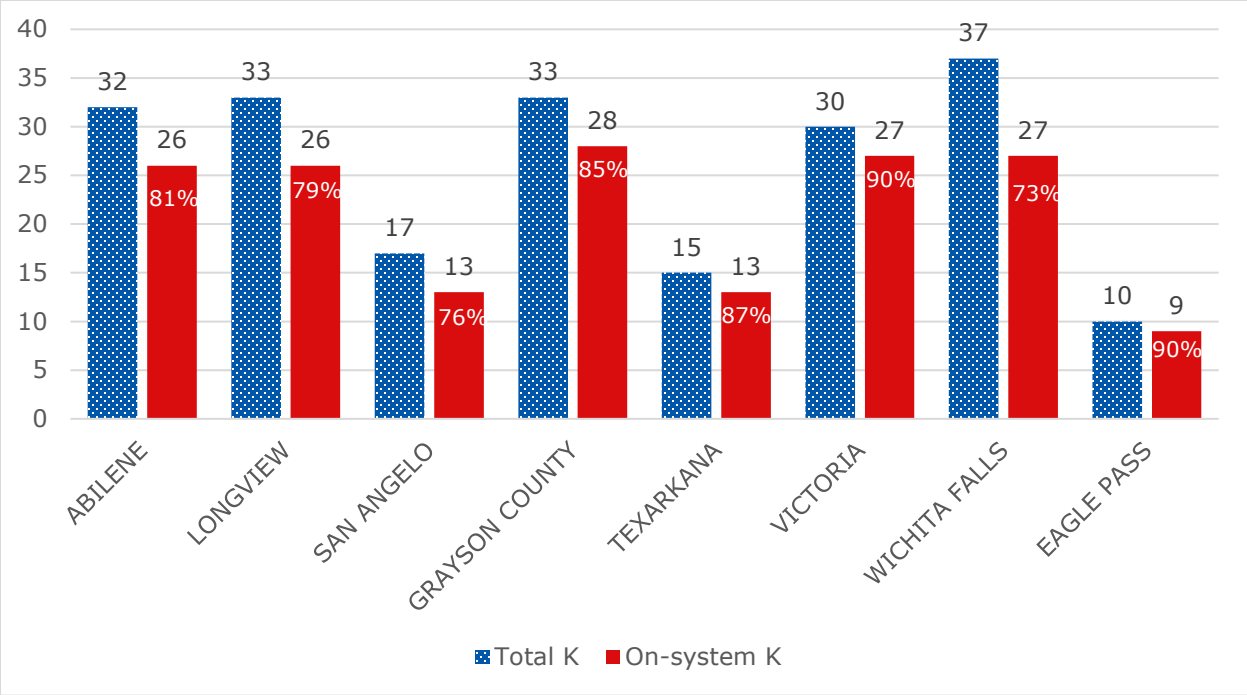


Figure 20. Number of fatal single-vehicle run-off-road crashes on-system versus off-system in the participating small MPOs.

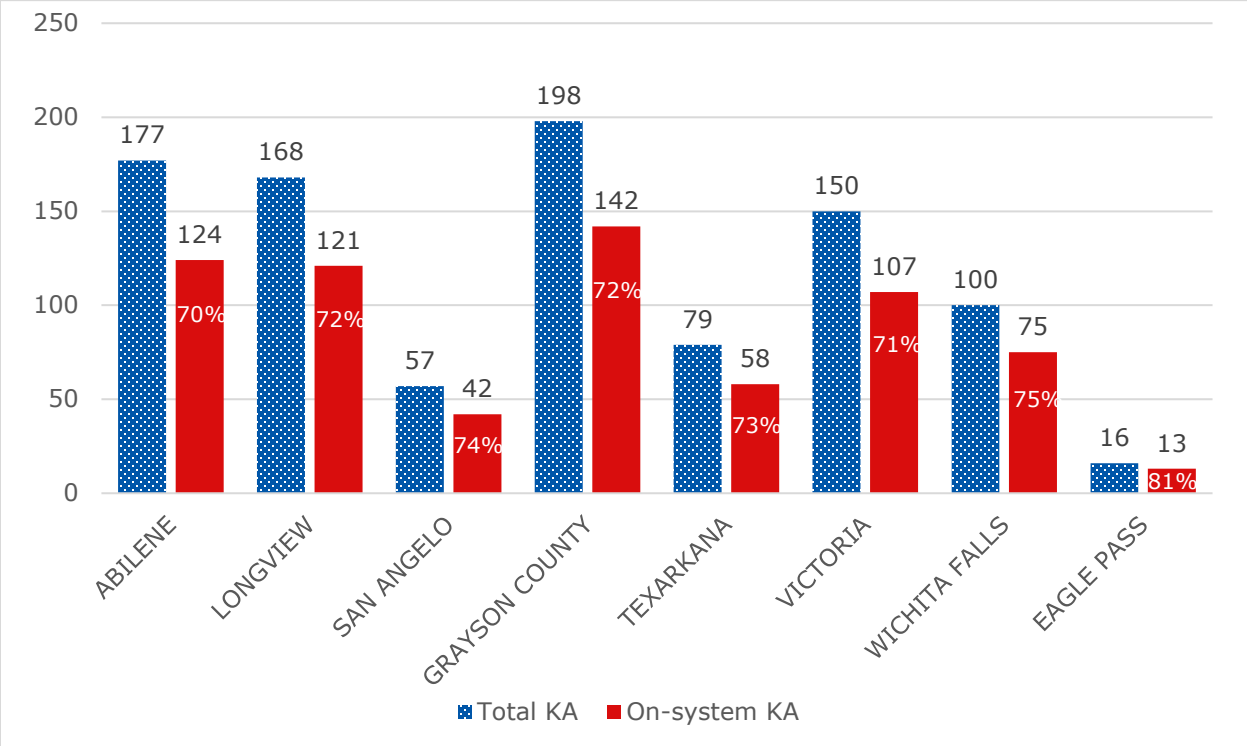


Figure 21. Number of casualty single-vehicle run-off-road crashes on-system versus off-system in the participating small MPOs.

Run off the Road — Overturning

Among run-off-the-road crashes, overturning crashes are the most severe. While they represent less than 15% of all run-off-the-road crashes, they constitute larger proportions of fatal and SSI crashes (see Figure 22). In the Grayson County MPO, 36% of fatal run-off-road crashes involve a vehicle overturning.

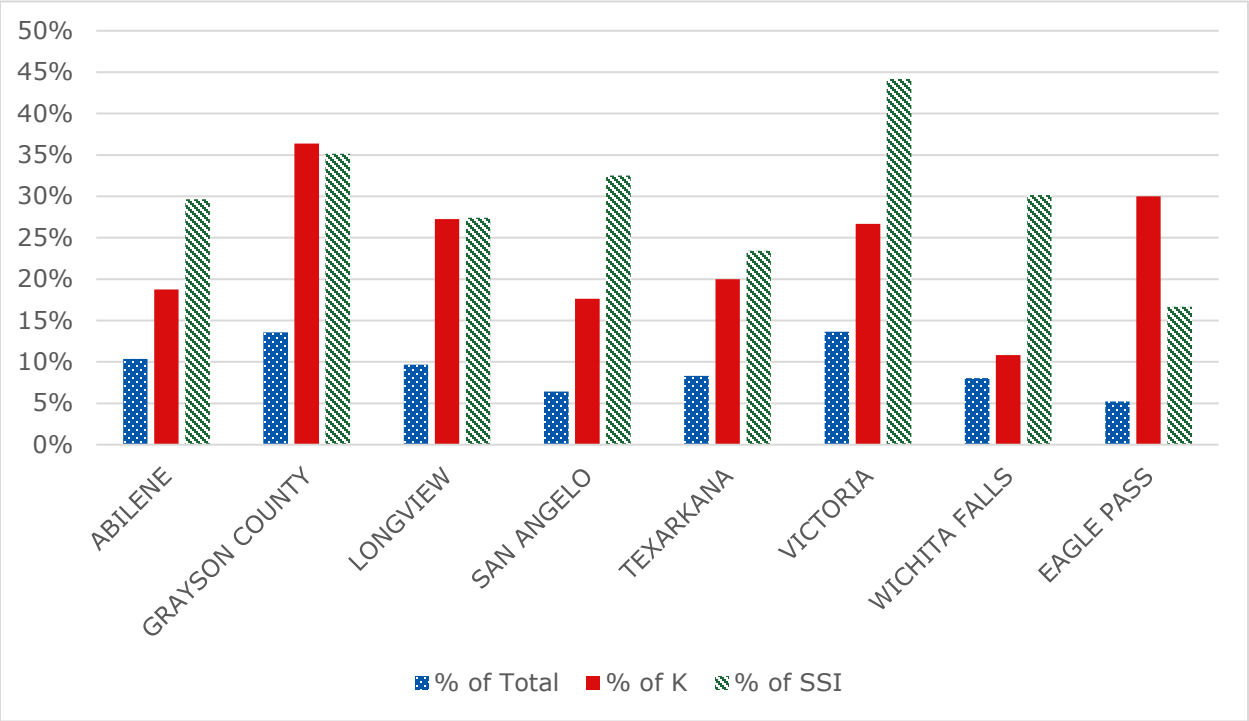


Figure 22. Overturning crashes as a percentage of run-off-the-road (ROR) crashes in the participating small MPOs.

Run off the Road — Other Categories

Other run-off-the-road crash categories include hitting a utility or luminaire pole (see Figure 23); hitting a fence (see Figure 24); hitting a tree, shrub, or landscaping (see Figure 25); and hitting a guardrail or post (see Figure 26).

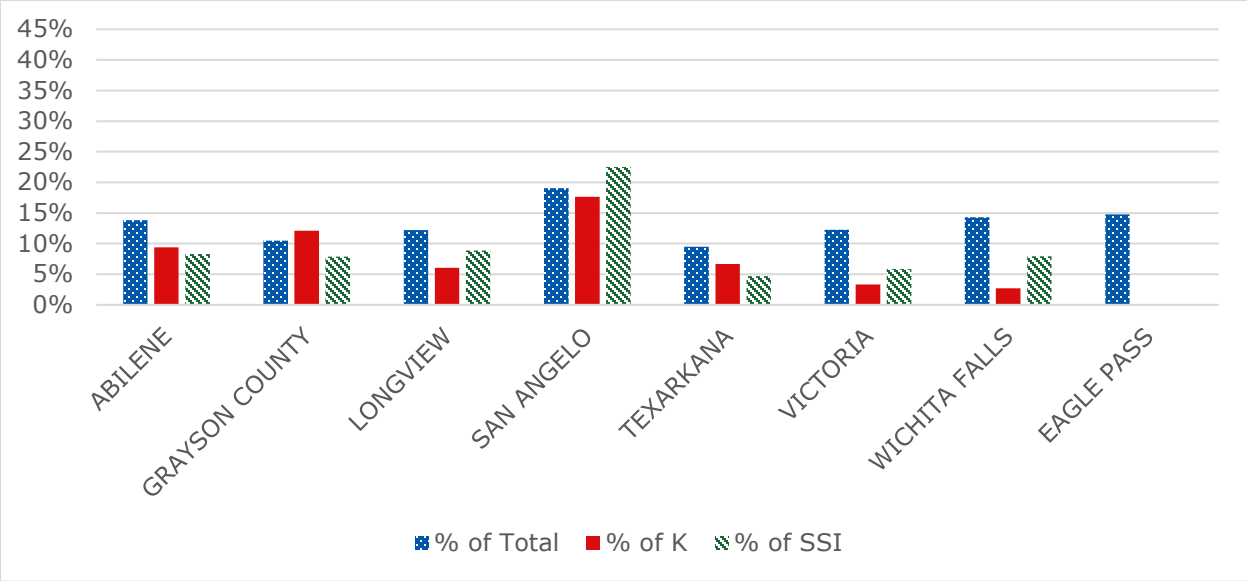


Figure 23. ROR — hit utility or luminaire pole in the participating small MPOs.

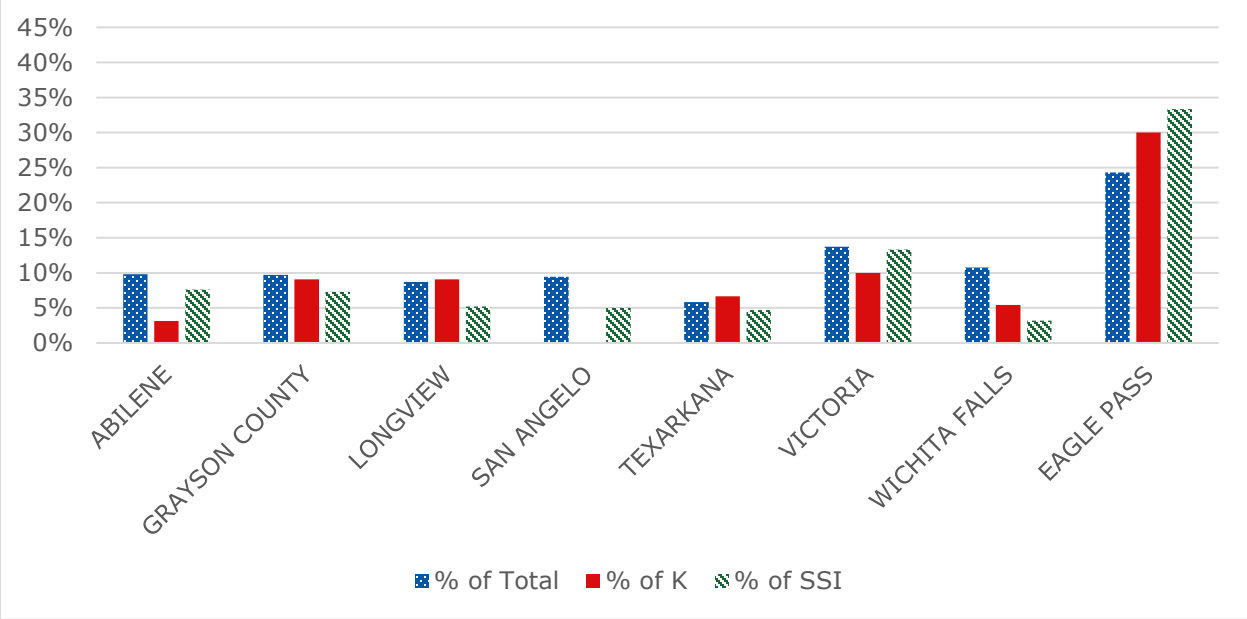


Figure 24. ROR — hit fence in the participating small MPOs.

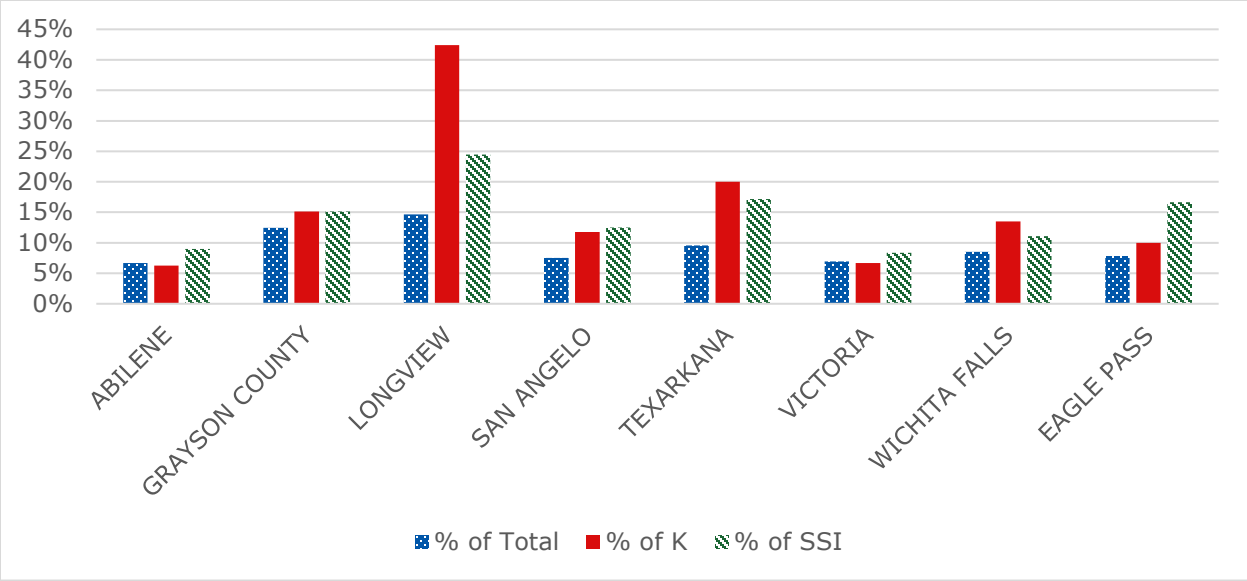


Figure 25. ROR — hit tree, shrub or landscaping in the participating small MPOs.

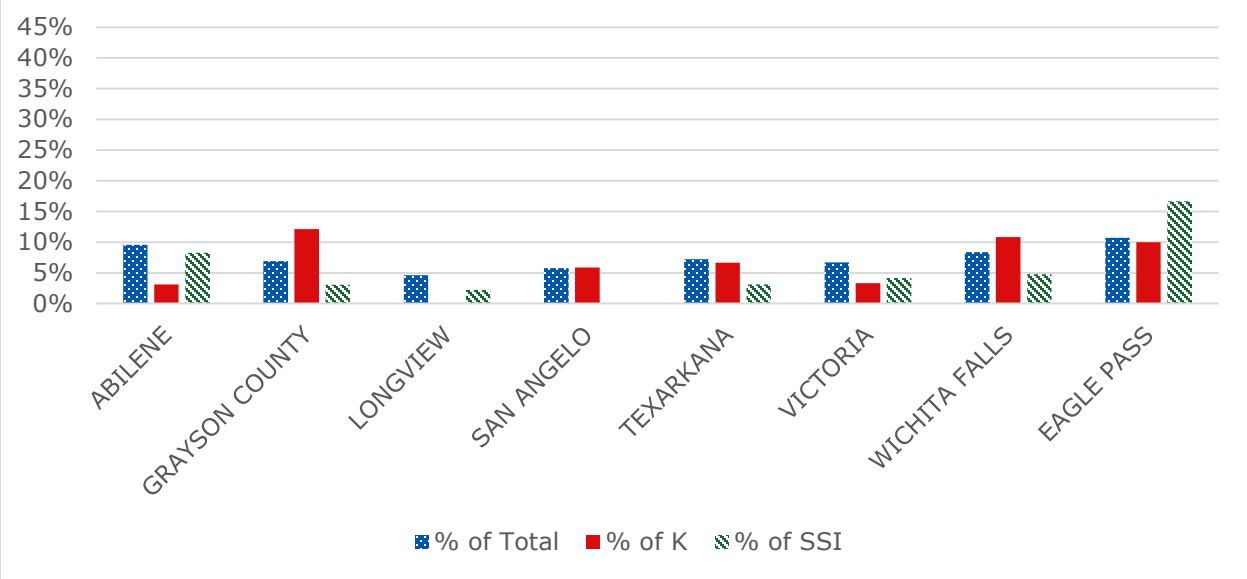


Figure 26. ROR — hit guardrail or guard post in the participating small MPOs.

Multi-vehicle Fatal and Serious Injury Crash Types

Less than 4% of all crashes in the small MPOs involve more than one vehicle. Multi-vehicle crashes are not as severe as single-vehicle crashes but are still a significant contributor to casualty crashes.

Multi-vehicle Head-On Crashes

Head-on crashes represent a small portion of all multi-vehicle crashes, but are a significant contributor to fatal crashes. Head-on crashes may be challenging to address in urban areas. Multi-vehicle head-on

crashes comprise between 4% and 14% of suspected serious injury crashes and between 12% and 60% of fatal crashes in the participating small MPOs (see Figure 27). In Grayson County, 31% of fatal multi-vehicle crashes are head-on crashes.

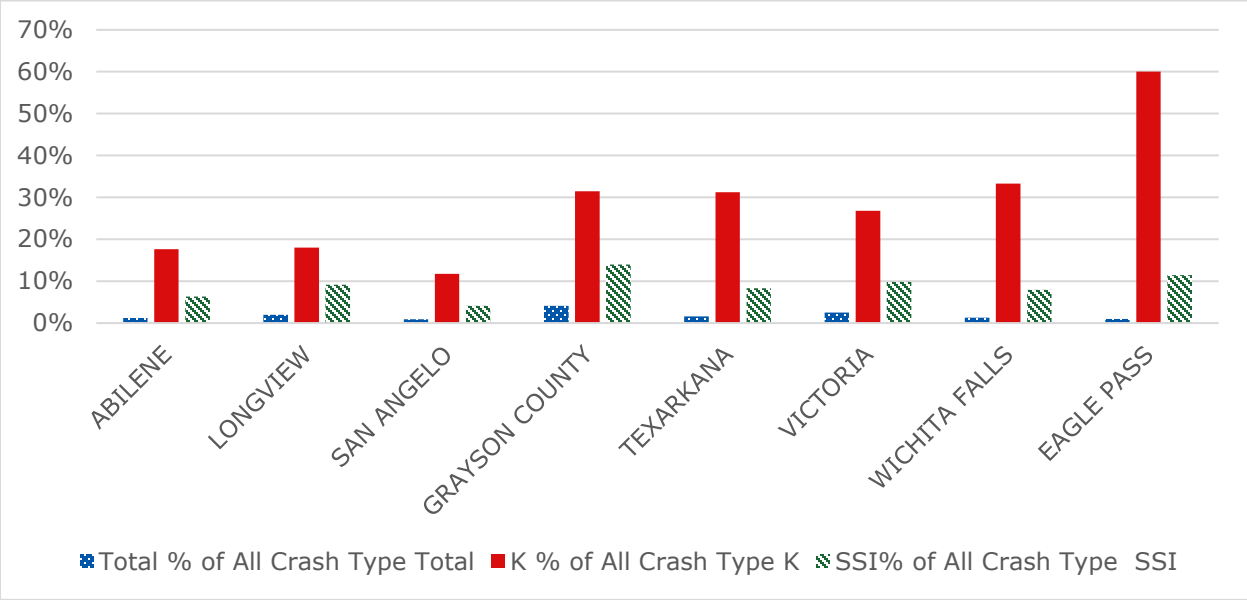


Figure 27. Percent of multi-vehicle head-on crashes in the participating small MPOs.

Multi-vehicle Angle Crashes

Angle crashes represent between 21% and 31% of all multi-vehicle crashes in the small MPOs (see Figure 28).

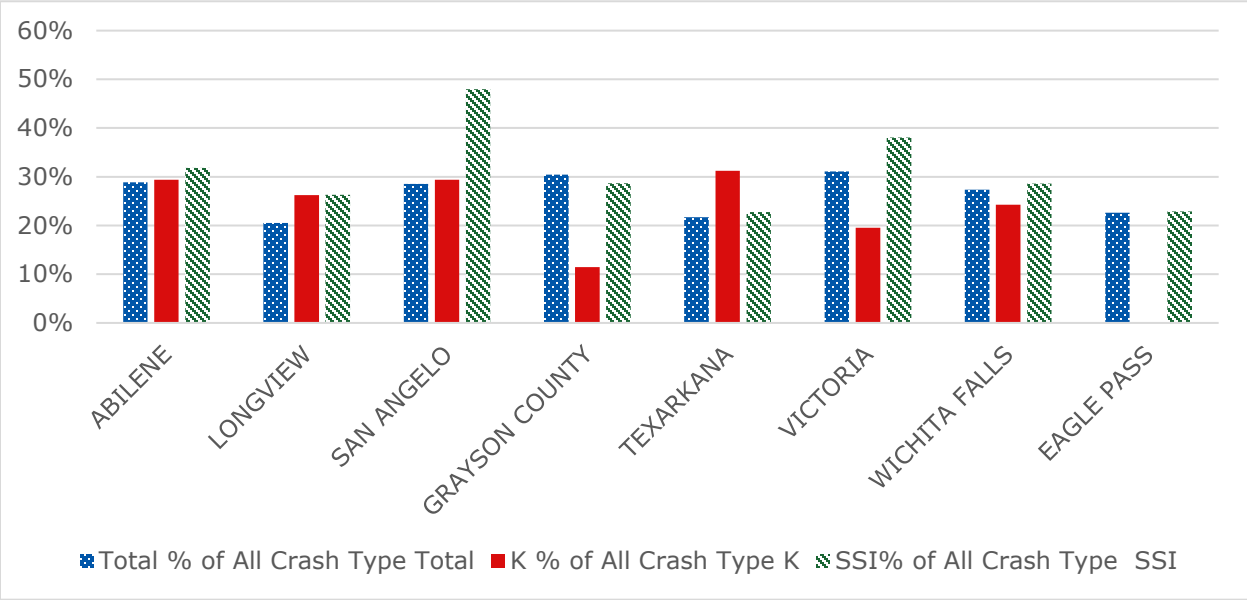


Figure 28. Multi-vehicle angle crashes in the participating small MPOs.

Multi-vehicle Left-Turn Crashes

Left-turn crashes account for 22% to 30% of multi-vehicle crashes (22% in Grayson County), and between 21% and 41% of fatal multi-vehicle crashes (23% in Grayson County) (see Figure 29).

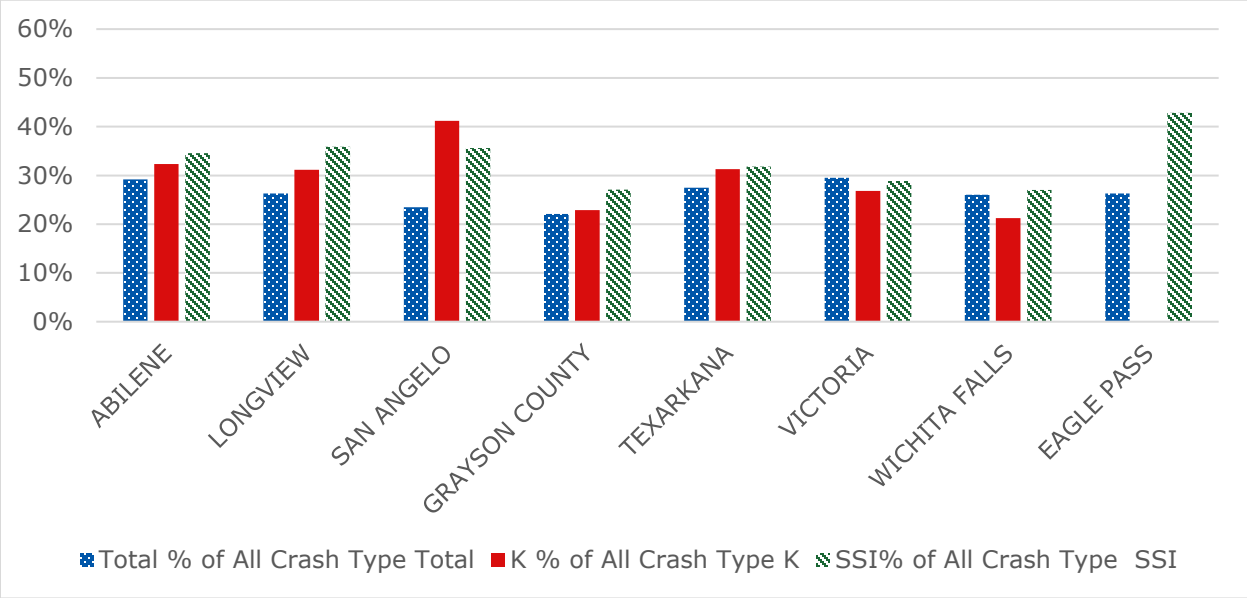


Figure 29. Multi-vehicle left-turn crashes in the participating small MPOs.

Multi-vehicle Rear-End Crashes

Rear-end crashes account for between 28% and 38% of all multi-vehicle crashes in the small MPOs (see Figure 30). Rear-end crashes comprise 31% of fatal multi-vehicle crashes in Grayson County.

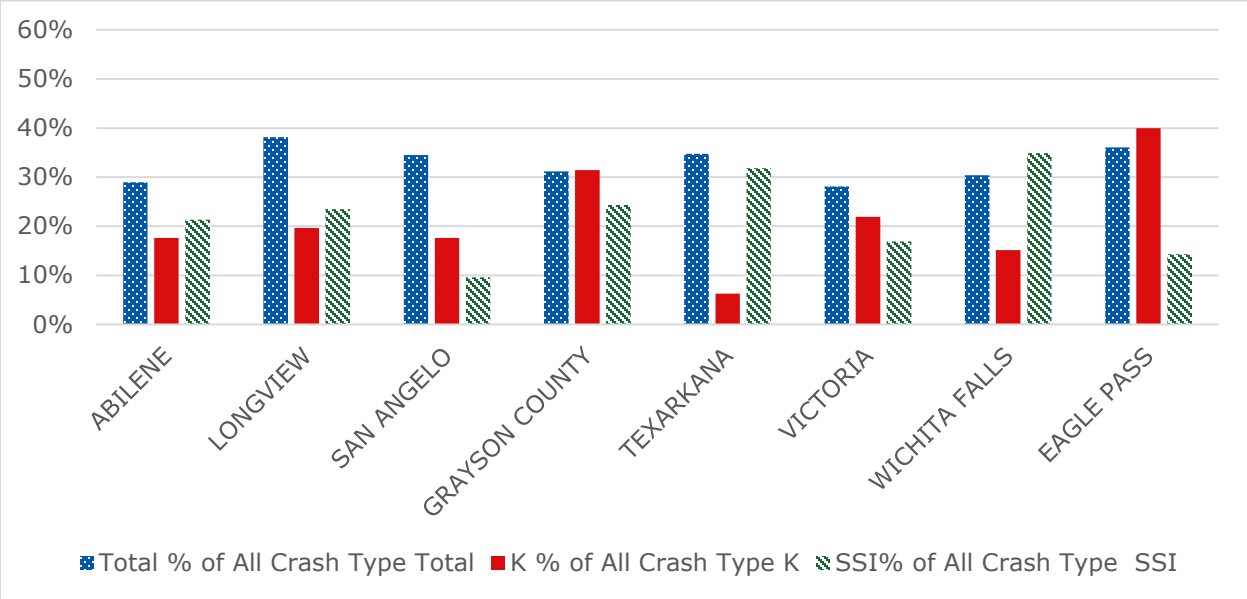


Figure 30. Multi-vehicle rear-end crashes in the participating small MPOs.

Bicycles, Motorcycles and Tractor Trailer Trucks in Casualty Crashes

Bicyclist fatal crashes, while not as prevalent as pedestrian crashes, exceed 5% of all fatal crashes in two small MPOs (Texarkana and San Angelo) (see Figure 31).

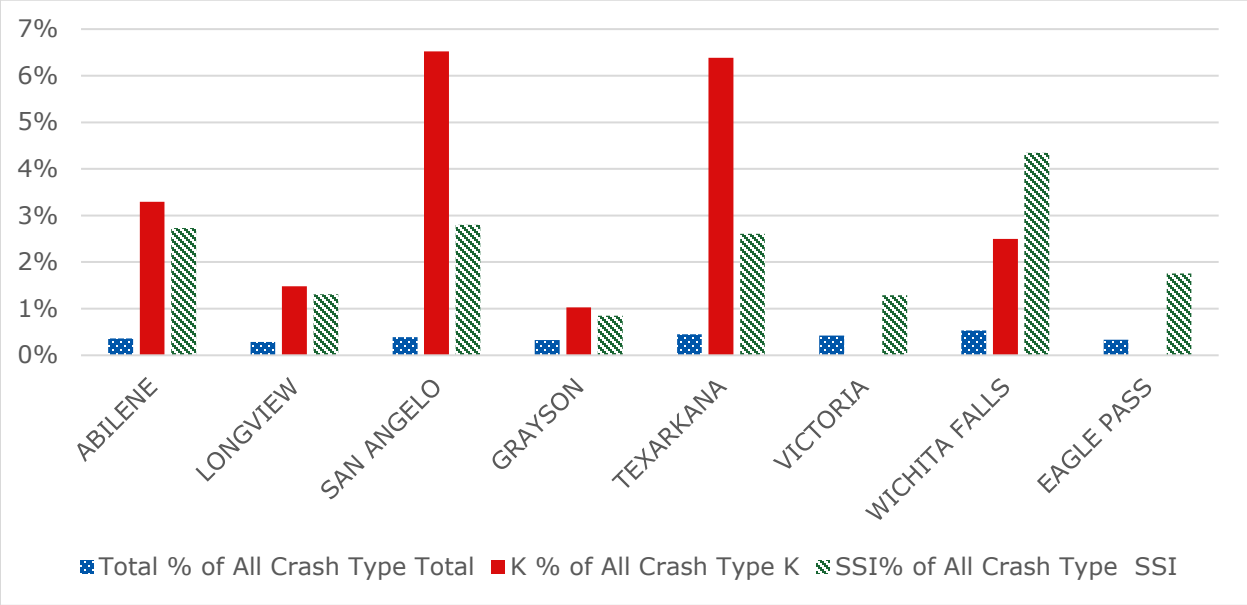


Figure 31. Crashes involving bicycles in the participating small MPOs.

Motorcycle crashes are a small proportion of all crashes in the small MPOs, but the crashes that do happen tend to be severe. Crashes involving motorcyclists comprise between 11% and 26% of all fatal crashes in the small MPOs (see Figure 32).

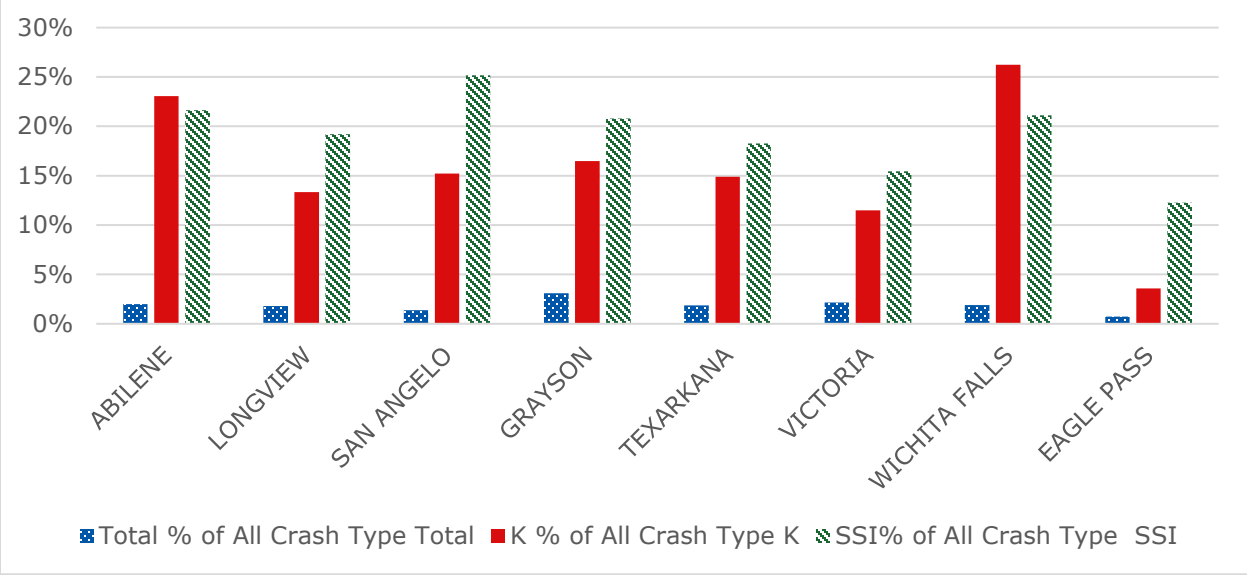


Figure 32. Crashes involving motorcycles in the participating small MPOs.

Crashes involving truck tractors are a small percentage of total crashes (between 2% and 6% of all crashes within the small MPOs), but those crashes are disproportionately fatal and exceed 10% of all fatalities in the Eagle Pass, Longview, Texarkana, and Victoria MPOs (see Figure 33).

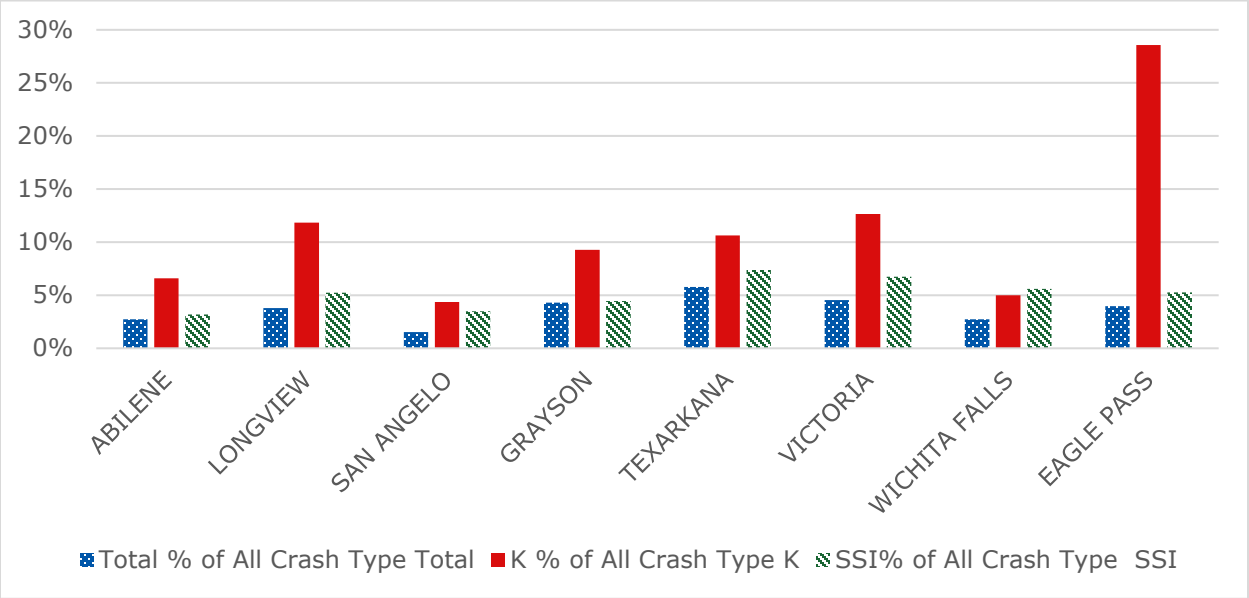


Figure 33. Crashes involving truck tractors in the participating small MPOs.

Behaviors Contributing to Casualty Crashes

Impairment

Driver impairment from alcohol, drugs, or both is a factor in a significant proportion of fatal crashes in the small MPOs (see Figure 34). It is also likely an underreported factor in non-fatal crashes. In Grayson County, 40% of fatal crashes involved an impaired driver.

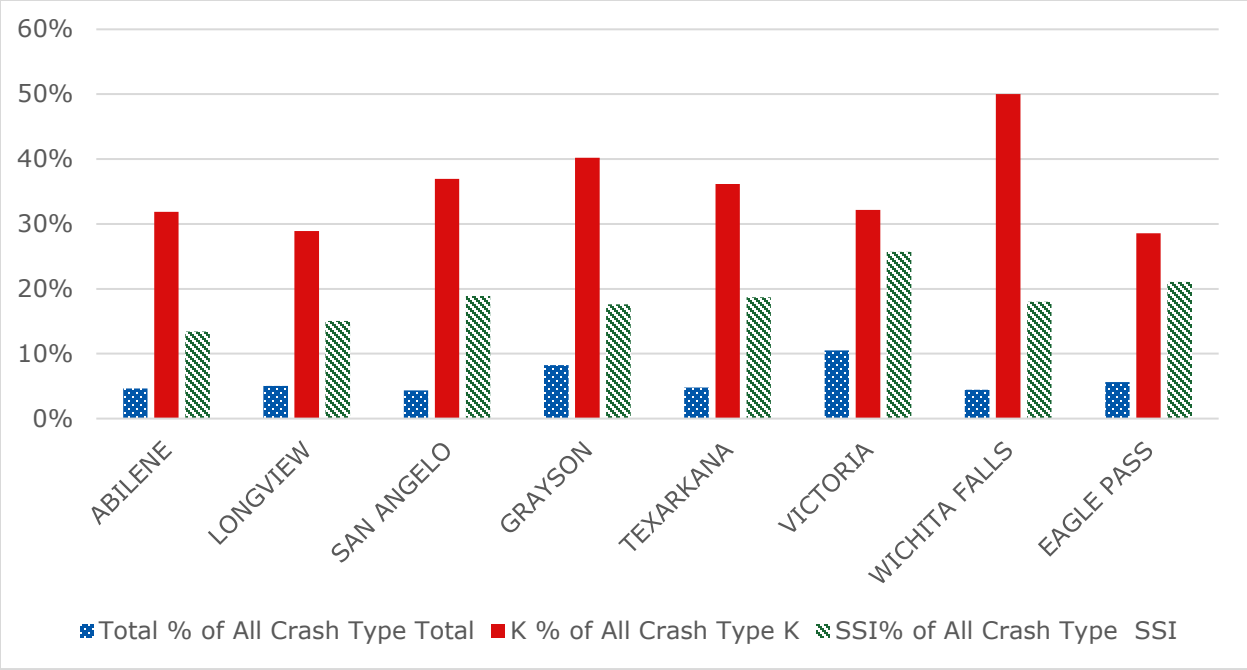


Figure 34. Percent of crashes with impairment as a contributing factor in the participating small MPOs.

Not Wearing Seatbelts

Between 21% and 38% of fatal crashes in the small MPOs involved a driver or vehicle occupant who was unbelted at the time of the crash (see Figure 35). Overall seat belt use in a region does not necessarily correlate with fatalities; some areas with high percentages of seat belt use also have a high percentage of fatalities in which one or more vehicle occupants were unbelted.

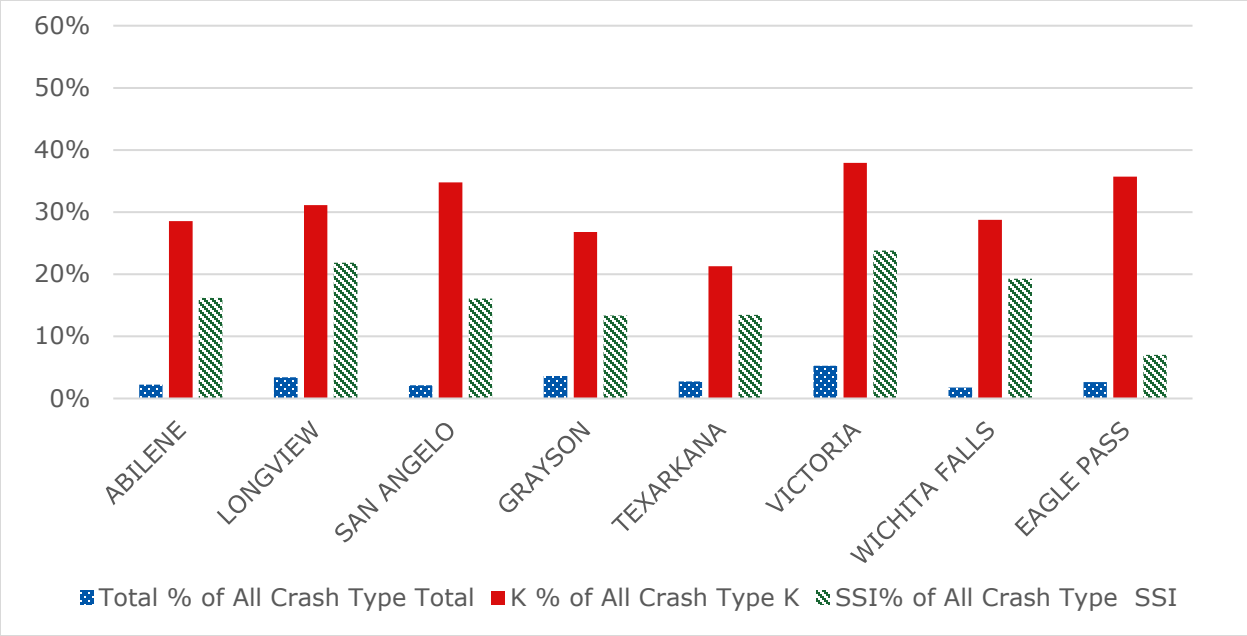


Figure 35. Percent of crashes in which one or more vehicle occupants was not wearing a seatbelt in the participating small MPOs.

Speed Related

Crashes with a contributing factor of "failed to control speed," "unsafe speed," and/or "speeding over limit" can be difficult to compare across jurisdictions, and may reflect differing emphasis on this factor by law enforcement officers in crash reporting. "Failure to control speed" may indicate a loss of vehicle control, rather than excessive speed. Speed-related factors were cited in 21% to 52% of fatal crashes in the small MPOs (see Figure 36).

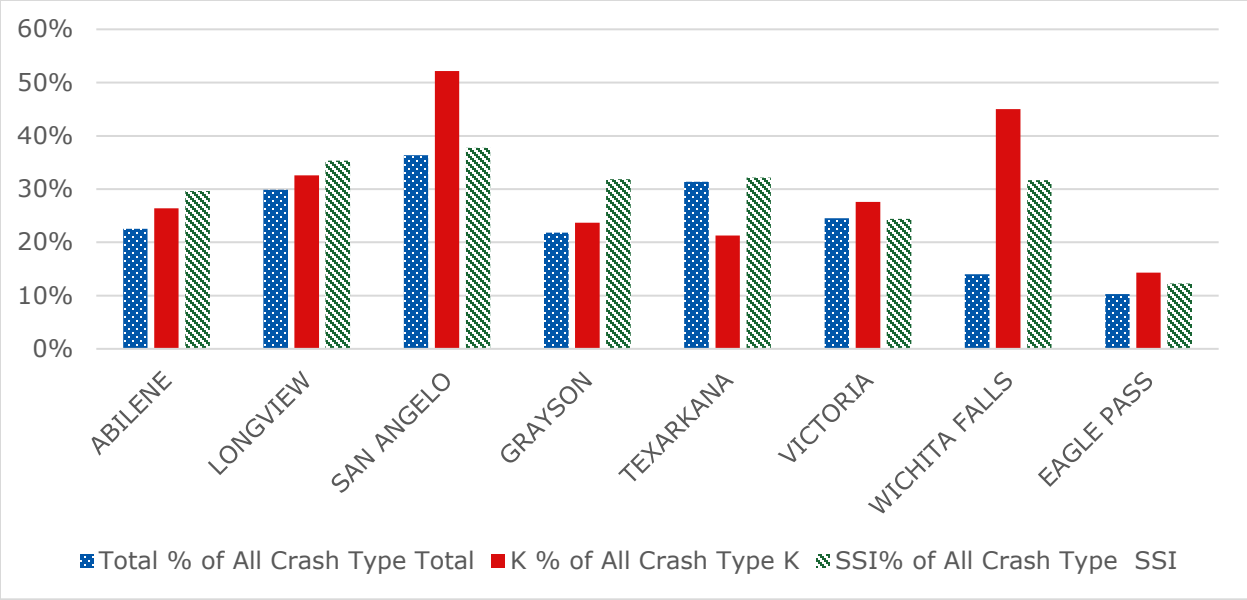


Figure 36. Percent of crashes in which speed was cited as a contributing factor in the participating small MPOs.

Distraction

The role of driver distraction in crashes is difficult to ascertain with confidence, and reporting of distraction as a contributing factor may reflect differing emphasis on this factor by law enforcement officers in crash reporting. Driver distraction was cited in 2% to 18% of fatal crashes in the small MPOs (see Figure 37).

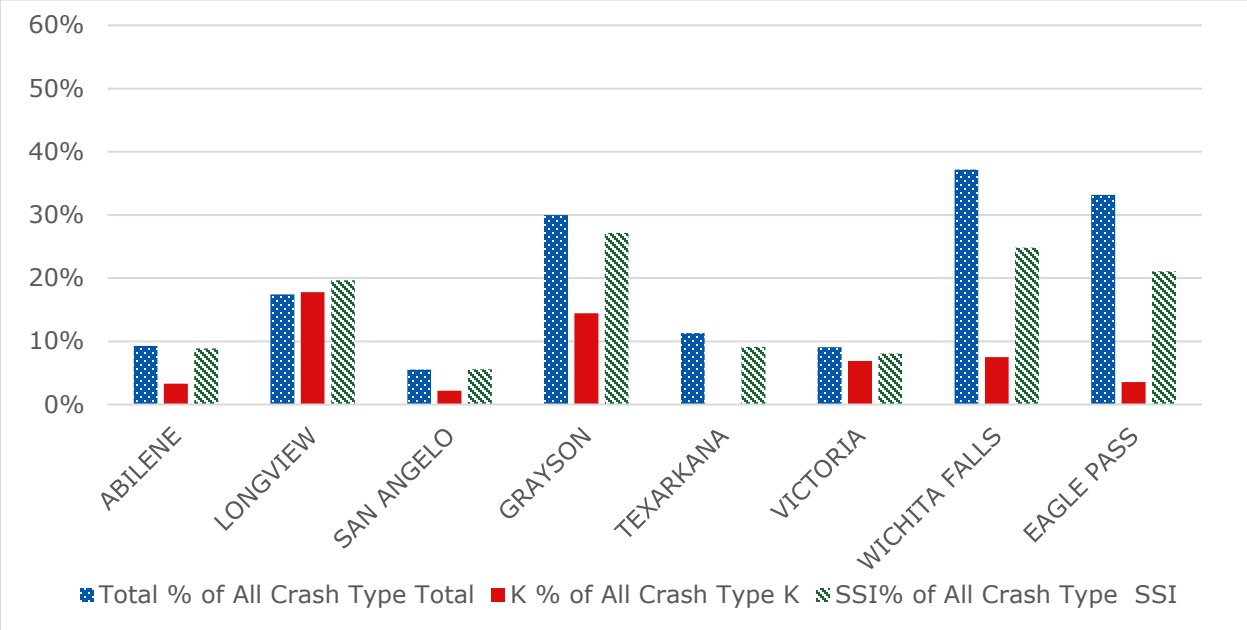


Figure 37. Percent of crashes in which distraction was cited as a contributing factor in the participating small MPOs.

Older Drivers

Older drivers' involvement in severe crashes is generally proportional to their overall crash involvement. The percentage of casualty crashes among drivers aged 65 and older depends in large part on their driving frequency and on the proportion of older adults in the population. Older persons may be more likely to be killed or injured in a crash, but a crash that is recorded as involving an older driver does not necessarily indicate that the older driver was at fault, or that the older driver was among those injured. Within the participating small MPOs, between 15% and 26% of fatal crashes involved an older driver (see Figure 38). Older drivers were involved in 26% of fatal crashes in the Grayson County MPO.

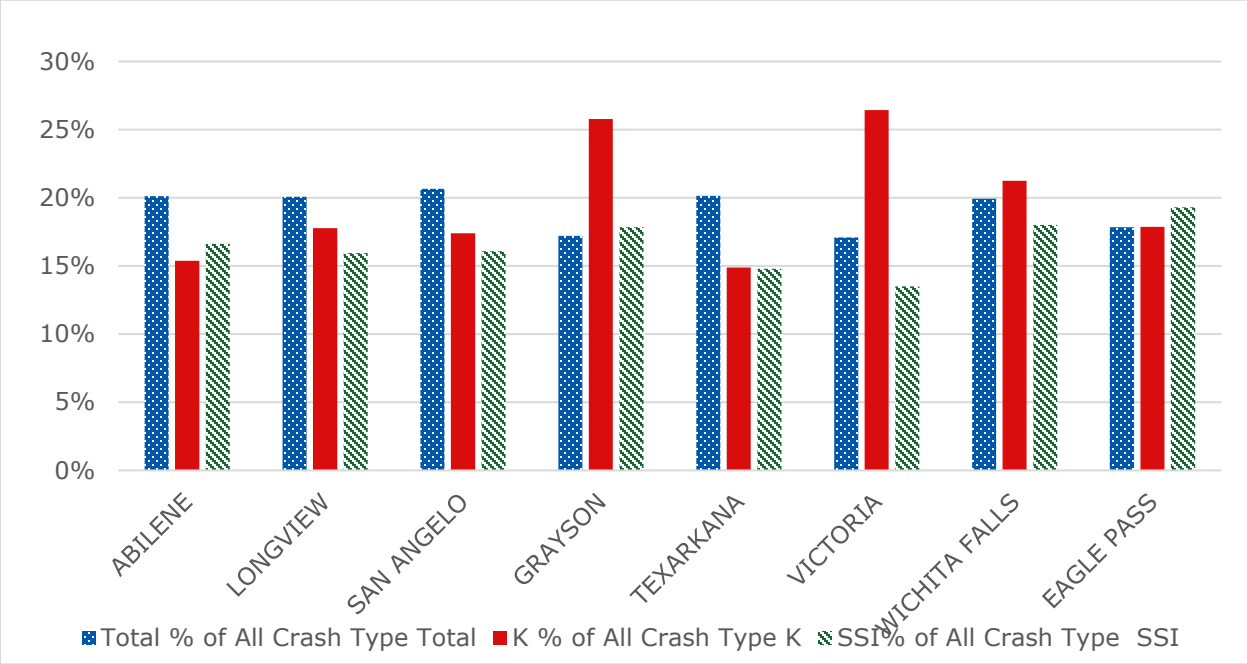


Figure 38. Percent of crashes involving drivers aged 65 or older in the participating small MPOs.

Young Drivers

Young drivers are defined as being between 15 and 20 years old. Young drivers' involvement in severe crashes is generally less than their overall crash involvement. The percentage of casualty crashes among young drivers depends in large part on their driving frequency and on the proportion of young adults in the population. A crash that is recorded as involving a young driver does not necessarily indicate that the young driver was at fault, or that the young driver was among those injured. Within the participating small MPOs, between 7% and 22% of fatal crashes involved a young driver (see Figure 39). Young drivers were involved in 22% of fatal crashes in the Grayson County MPO.

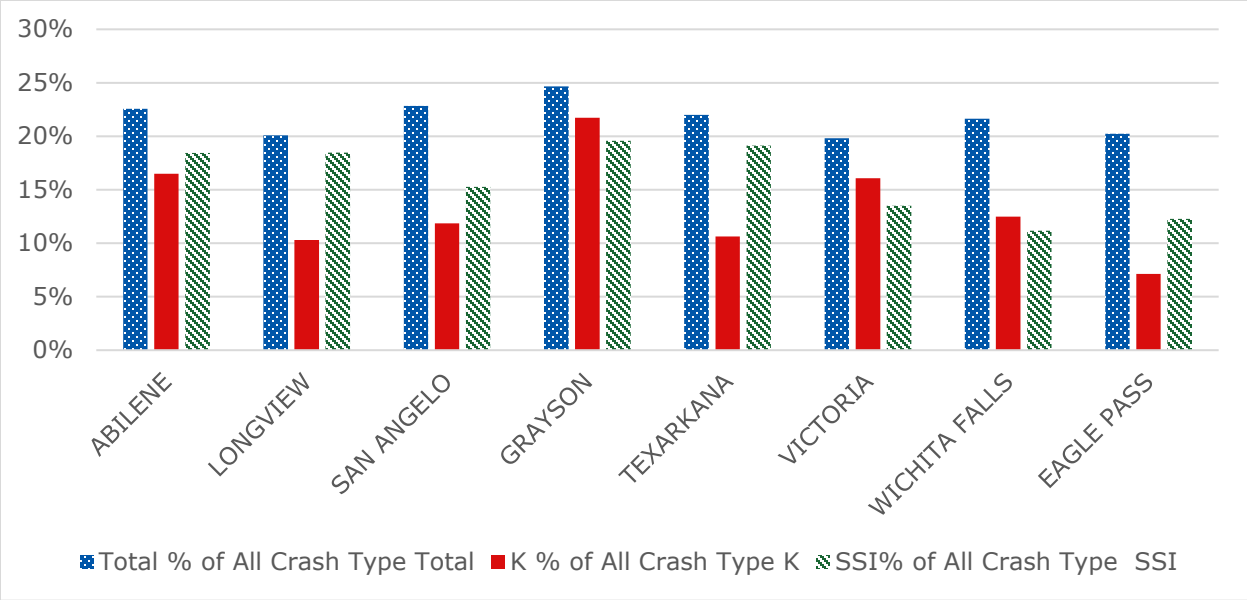


Figure 39. Percent of crashes involving drivers aged 15 to 20 years in the participating small MPOs.

Work Zone Crashes

Crashes in roadway work zones will vary in frequency depending on the amount of road work that is underway at a given time. Work zone crashes vary widely among the participating small MPOs, comprising between 1% and 9% of fatal crashes (see Figure 40).

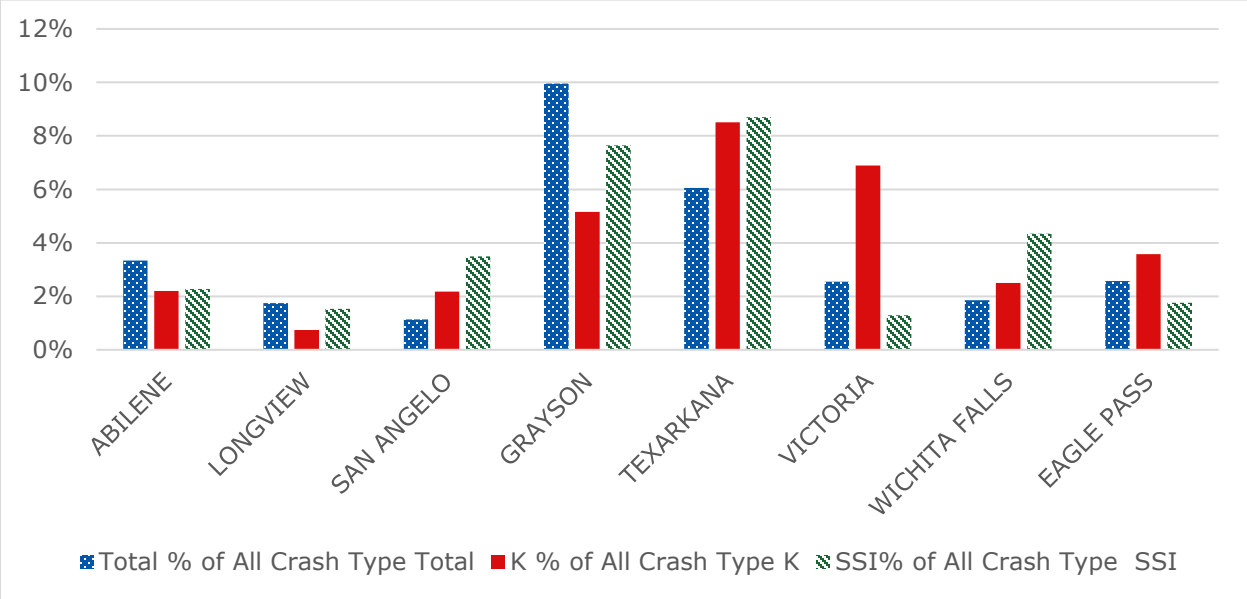


Figure 40. Percent of crashes occurring in work zones in the participating small MPOs.

Wet-Weather Crashes

Crashes with wet weather as a contributing factor vary in prevalence depending on area rainfall. Wet-weather crashes represent 6% to 17% of all crashes in the four participating large MPOs, and 2% to 19% of fatal crashes (see Figure 41).

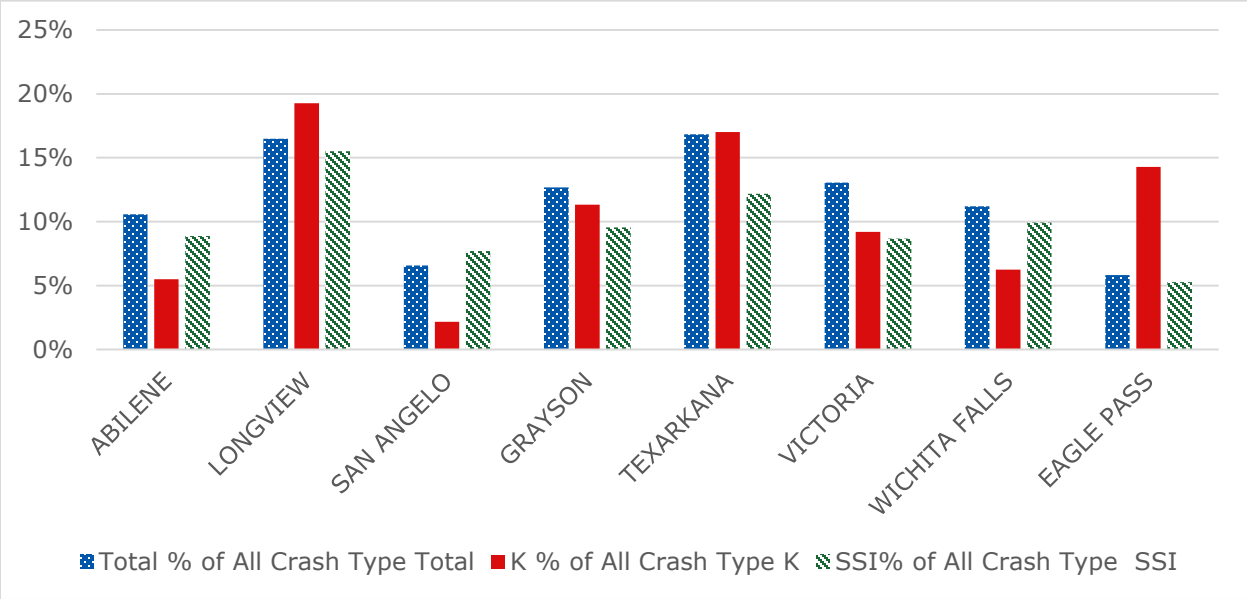


Figure 41. Percent of crashes in which wet weather was cited as a contributing factor in the participating small MPOs.

Chapter 4. Existing Conditions

4.1 Current Safety Policies and Programs

The project team reviewed planning documents provided by the Grayson County MPO to gain a baseline understanding of the MPO's current safety policies, priorities and programming and to inform the project efforts. These documents included the following:

- TAPS Public Transit- Long Range Transit Plan 2021 (https://www.gcmpo.org/page/Transit_Planning).
- Coordinated Human Services Transportation Plan 2022-2026.
- Public Transportation Agency Safety Plan.
- MTP 2045 (https://www.gcmpo.org/page/transport_study_area).
- Transportation Improvement Program (TIP) 2023-2026.
- Thoroughfare Plan 2024.
- Safety and Operations Strategic Plan 2022 (https://www.gcmpo.org/page/Other_Planning_Documents).
- Freight Mobility Plan 2018.
- Texas Demographic Center 2022-2023.
- MPO Safety Planning Report 2023.

The Grayson County MPO's current planning documents can be found on their website, https://www.gcmpo.org/.

4.2 Locations with Excess Crashes

Table 1 lists the top 10 roadway segments that experienced *excess crashes* in the Bryan-College Station MPO's jurisdiction in 2021–2023, including the associated annual average daily traffic (AADT). Excess crashes are defined as the difference between the expected and the average number of crashes for that type of intersection or segment within each MPO grouping (including only the participating MPOs).

Similarly, Table 2 lists the top 10 intersections experiencing excess crashes, as compared to other similar intersections. Figure 42 maps these segments and intersections.

Excess Crash Mapping Tool

The project team developed a web-based tool that displays different levels of intersections and segments with excess crashes within each of the participating MPO's jurisdictions using a geographic information system roadway map. The Excess Crash Mapping Tool can be accessed at https://ttishiny.shinyapps.io/bcs_mpo_demo/.

The tool allows an analyst to select an MPO and then select a level of excess crashes based on a percentage of the total crashes. The analyst can select their desired percentage of intersections or

segments to view (e.g., top 5%, 15%, … 100 %). The segments are color coded on the map based on the top 5% (red), next 10% (orange), next 35% (yellow) and remaining 50% (purple). The tool provides the number of intersections or segments included in the selected percentage.

Hovering over any identified intersection or segment will provide information such as traffic volumes, total crashes, fatal and serious injury crashes and excess crashes, allowing the analyst to get a sense of the severity of crashes as well as the total and excess crashes.

The tool also generates a list of the intersections and segments identified based on the percentages selected, providing the data in tabular form. Because the TxDOT inventory does not include names for local streets, they are only identified by a segment number developed for this project. However, TxDOT on-system roads are identified by route type (U.S., SH, FM, etc.) and number. These tables can be downloaded as Excel files.

Table 1. Grayson County MPO's top 10 excess crash intersections.

Rank	Major TxDOT RouteID	Major Highway	Major AADT	Minor TxDOT RouteID	Minor Highway	Minor AADT	Total Crash (Three-Year)	KA Crash (Three-Year)	Excess Crash (Three-Year)
1	SH0289-KG	SH0289	7769	FM0902-KG	FM0902	1746	21	3	12.2
2	US0069-KG	US0069	6668	1068467	NA	907	16	0	11.24
3	FM0131-KG	FM0131	6061	1230849	NA	88	11	1	7.19
4	FM0691-KG	FM0691	7903	092AA3025	NA	172	14	1	6.63
5	FM0120-KG	FM0120	8709	1068489	NA	889	10	1	5.54
6	250087	NA	11493	1230658	NA	172	10	0	5.54
7	SH0005-KG	SH0005	9972	1245899	NA	882	14	0	4.99
8	1230580	NA	3243	1230431	NA	2997	9	0	4.89
9	US0377-KG	US0377	9606	FM0902-KG	FM0902	3179	9	0	4.4
10	SH0091-KG	SH0091	7178	1068489	NA	889	11	0	3.87

Table 2. Grayson County MPO's top 10 excess crash roadway segments.

Rank	TxDOT RouteID	Highway	AADT	Length (Mile)	Total Crash (Three-Year)	KA Crash (Three-Year)	Excess Crash (Three-Year)
1	FM0120-KG	FM0120	18580	0.124	36	1	27.52
2	US0075-KG	US0075	51480	0.878	59	4	22.22
3	US0075-KG	US0075	55498	0.548	37	3	15.65
4	US0082-KG	US0082	19131	1.463	29	3	13.33
5	US0377-KG	US0377	9977	0.311	27	1	11.24
6	US0082-KG	US0082	19244	1.114	24	1	10.73
7	US0082-KG	US0082	17053	0.195	17	1	10.62
8	US0075-KG	US0075	51480	0.217	20	1	8.69
9	US0082-KG	US0082	19244	0.584	18	1	8.41
10	FM1417-KG	FM1417	12620	1.048	14	4	7.24

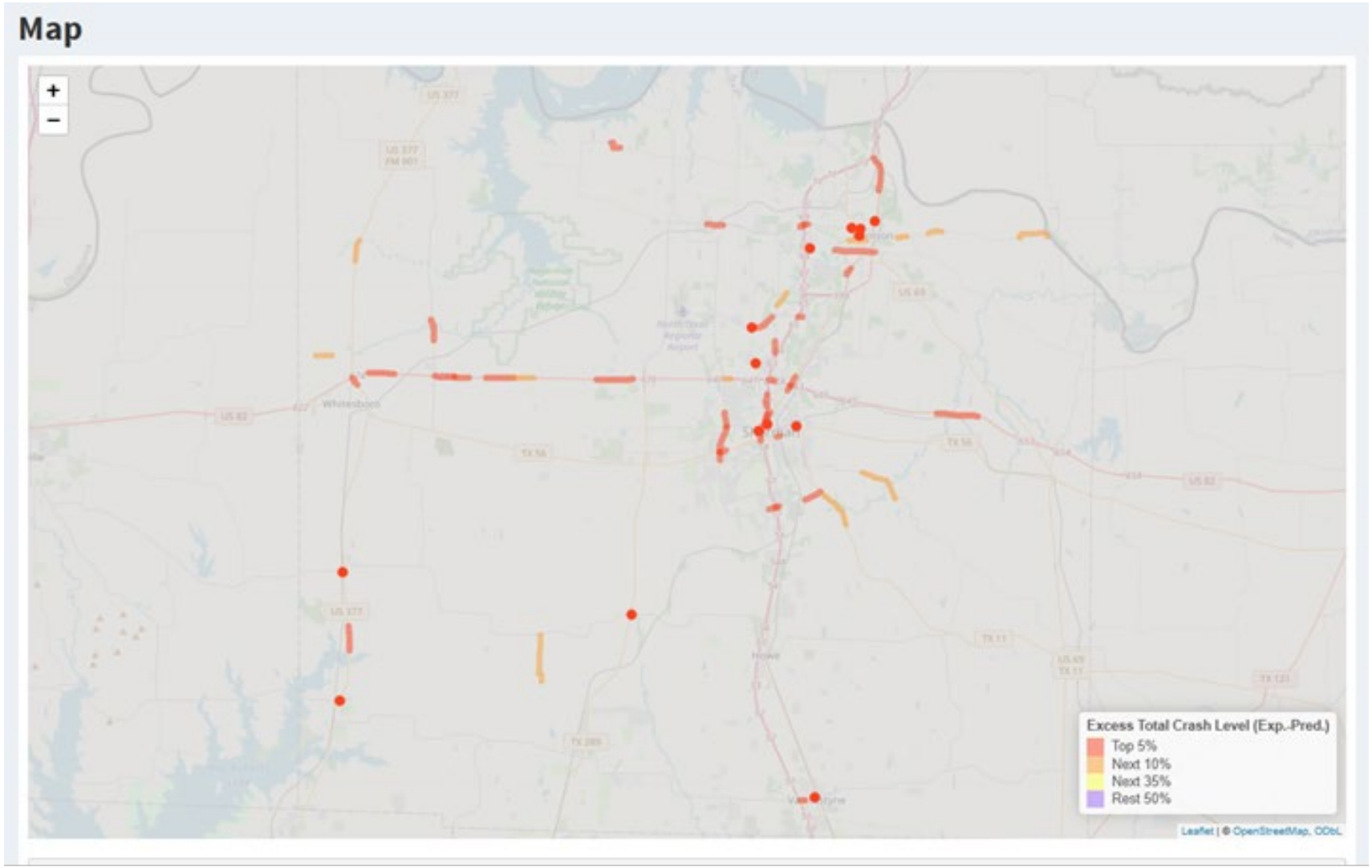


Figure 42. Map of top 10 segments and top 10 intersections with excess crashes in Grayson County MPO's jurisdiction.

Excess Crash Methodology

The project team used procedures from the American Association of State Highway and Transportation Officials' (AASHTO's) *Highway Safety Manual* to calculate safety performance (number of crashes) and identify intersections and segments with excess crashes. Again, excess crashes are defined as the difference between the expected and the average number of crashes for that type of intersection or segment within each MPO grouping (including only the participating MPOs). First, the project team developed an intersection and segment database using OpenStreetMap. Next, the intersections and segments were grouped into categories based on their characteristics.

Intersection Analysis

The intersection groups were formed using combinations of urban/rural, three-legged/four-legged and signalized/not signalized features, resulting in eight categories of intersections within each MPO grouping (Big 6, TMAs and small). Intersections were only compared within the same MPO grouping (i.e., the safety performance of an intersection in the Big 6 was only compared to the safety performance of other intersections in the Big 6). A negative binominal model was developed to relate the number of crashes per year (based on data from 2021, 2022 and 2023 in TxDOT's CRIS) to the volume of traffic on the major and minor streets of the intersection. This model basically estimates the average number of crashes expected for an intersection in a particular group with any given level of major and minor street traffic. Figure 43 shows an example of the modeled relationship, where the predicted number of crashes for a location with an average daily traffic (ADT) of 8,000 is 2.2. Ideally, the model would predict casualty crashes (fatal and serious injury); however, too few fatal and serious injury crashes occurred at enough intersections to create a statistically valid model. Instead, the total number of crashes was used for this model.

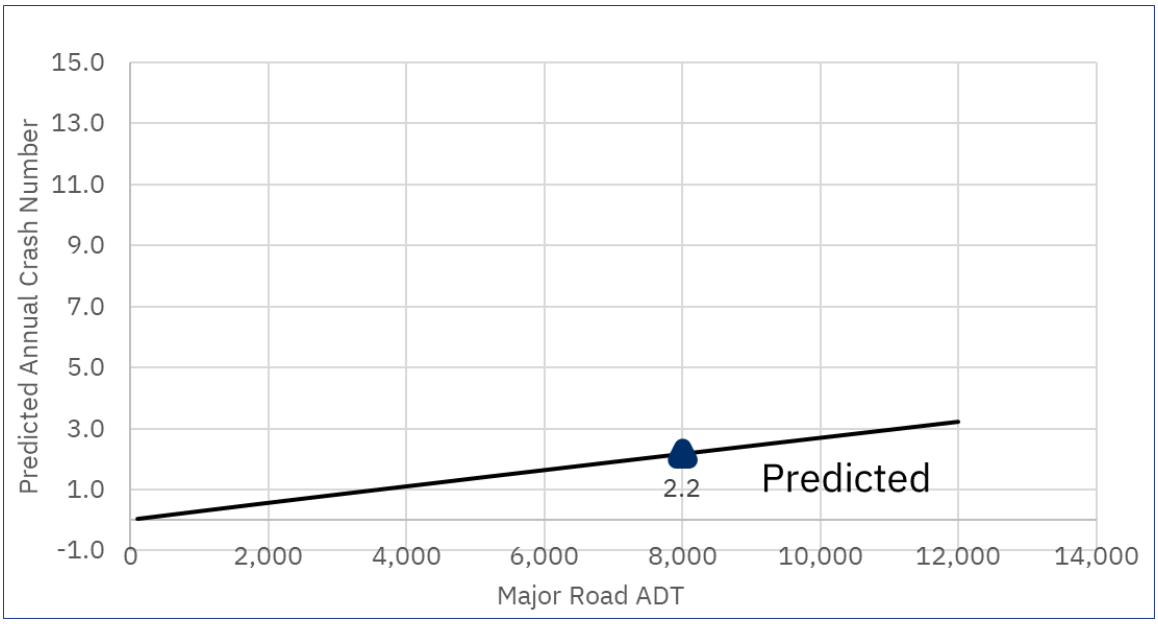


Figure 43. Example relationship between traffic volume and crashes.

For each intersection, the project team calculated the predicted number of crashes using the model and recorded the number of observed crashes from the CRIS database. Because some degree of random variation exists in crash data at any given location, the team employed a statistical technique called the Empirical Bayes method to develop an expected number of crashes over the long term. This method is used to compensate for the natural variation in the data. The expected number of crashes always falls somewhere between the predicted and observed values. If the model has a very good fit for the data, the expected number will fall closer to the predicted value. If a great deal of variation exists in the data, the expected number will fall closer to the observed value. This expected number is the number of crashes expected at that location averaged over many years. This method is recommended in AASHTO's *Highway Safety Manual*. Figure 44 graphically illustrates this method. In this case, the number of excess crashes is equal to 4.0 (6.2 expected crashes minus 2.2 predicted crashes). This example suggests a higher level of confidence in the model than the observed crashes (i.e., the 6.2 value for expected crashes is closer to the 2.2 value for predicated crashes than the 14 value for observed crashes).

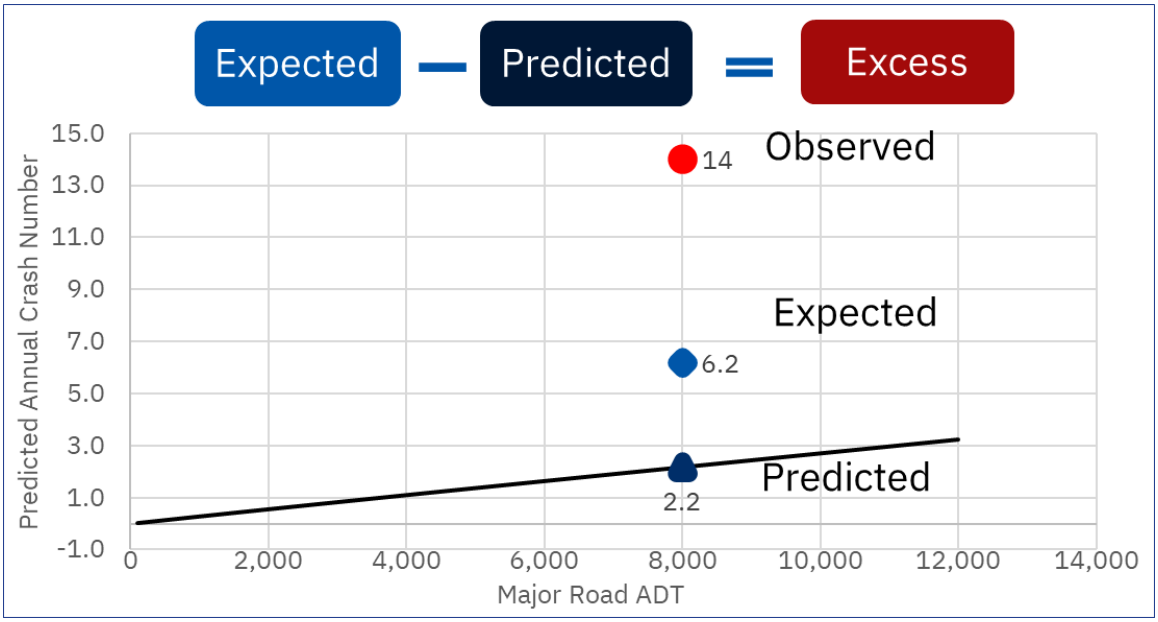


Figure 44. Example calculation of excess crashes based on predicted and observed crashes.

Next, the project team compared the expected number of crashes for each location to the value predicted by the model. If the number of expected crashes exceeds the predicted crashes, the intersection is deemed to have excess crashes. The intersections were then ranked within each MPO's jurisdiction based on the number of excess crashes. These locations present the greatest opportunity to improve safety because they have more crashes than comparable intersections in this category. The model accounts for the amount of traffic as well, so it does not necessarily identify the intersections with the *most* crashes (usually those with the most traffic) but rather the intersections with the most crashes exceeding the average.

Segment Analysis

Segments were grouped by ownership (TxDOT, city, county or other) and by known characteristics such as freeway/surface street and cross section (divided/undivided). Although it would be desirable to apply the cross-section classification for every segment, the only comprehensive database is the TxDOT inventory, which only has this information for on-system roads. Moving forward, it would be desirable to incorporate inventory data maintained by the MPOs for their transportation models. Such an effort exceeded the resources available in this project, but this expansion should be a goal of future safety planning efforts. A great deal of valuable information in the models could aid in understanding crash issues on non-TxDOT roads.

Fortunately, the TxDOT inventory does include an estimated traffic volume for every road — on-system and off-system — in the inventory. A separate model was developed for each category of segment within each MPO grouping. These models relate the number of crashes per mile on a segment (based on data from 2021, 2002 and 2023 in TxDOT's CRIS) to the traffic volume on that segment. Ideally, the model would predict the casualty crashes (fatal and serious injury); however, too few fatal and serious injury crashes occurred on enough segments to create a statistically valid model. Instead, the total number of crashes was used for this model. Segments were limited to a maximum of 2 miles in length.

The project team then compared the number of observed crashes over the three-year period to the predicted values and ranked the segments based on the total number of crashes for each segment. These segments present the greatest opportunity to improve safety because they have more crashes than comparable segments in this category. The model accounts for the amount of traffic as well, so it does not necessarily identify the segments with the *most* crashes (usually those with the most traffic) but rather the segments with the most crashes exceeding the average.

4.3 Potential Locations for Pedestrian Safety Enhancements Using the Systemic Approach

Certain types of crashes — notably pedestrian and rural curve crashes — are often not concentrated at a particular location or on a particular segment, making it difficult to prioritize improvements based on crash history alone. Therefore, a systemic approach was developed to determine the association between certain roadway characteristics and crashes. Because pedestrian crashes are a growing problem and are concentrated in MPO areas, this project used the systemic approach to identify locations with high levels of characteristics or *risk factors* associated with pedestrian crashes.

To identify risk factors, the proportion of pedestrian crashes for a specific range or value of a variable are compared to the proportion of existing vehicle miles traveled (VMT) (calculated as a product of segment length and the ADT) for segments or total entering volumes for intersections within the respective range or value. Separate analyses were conducted for intersections and segments.

Roadway Segment Methodology

For roadway segments, the research team used the systemic methodology for pedestrian safety previously developed by Wu et al. in 2017.[1] In that study, the authors considered variables such as median type, number of lanes, pavement width, vehicular volume level and truck percentage. In the risk assessment, sites were prioritized using risk factor weights. Risk factor weights were calculated using the crash total and the crash overrepresentation or underrepresentation of each element. Appendix A provides a detailed explanation of this methodology.

Because data on the variables used in this method were only available for TxDOT on-system roadways, prioritization only included on-system roads. In this case, characteristic data used for transportation modeling could prove beneficial in prioritizing more roadway segments.

Intersection Methodology

Because the specific roadway information data used in previous studies was not available for off-system roadways, the project team developed a new risk factor evaluation for this study. The team considered four types of intersections: three-legged stop-controlled, four-legged stop-controlled, three-legged signalized and four-legged signalized. The number of characteristics available for all intersections was limited. The available risk factors evaluated included the following:

- **Area Population Range**: Area population ranges included rural (population <5,000), small urban (population 5,000–49,999), urbanized (population 50,000–199,999) and large urbanized (population ≥200,000). The majority of pedestrian crashes occurred in large, urbanized areas.
- **Number of Lanes**: The number of lanes on both the major and minor streets were evaluated. Intersections with two lanes on the minor street experienced most of the pedestrian crashes.
- **Truck Percentage**: Intersections with <10% trucks were overrepresented in truck crashes. This percentage may be a function of truck restrictions or limited travel in areas where pedestrians are present.

Risk factor weights were calculated using the crash total and the crash overrepresentation or underrepresentation of each element. Appendix A provides a detailed explanation of the intersection methodology.

Systemic Pedestrian Mapping Tool

The project team then used the system approach to prioritize on-system segments and all intersections within each participating MPO's jurisdiction and created an online tool that will allow each MPO to view an interactive map and list of priority intersections and on-system segments. This

[1] Wu, L., Ko, M., Lord, D., & Geedipally, S. 2017. *A Systemic Approach to Pedestrian Safety Improvement* [Technical Memorandum]. Traffic Operations Division, Texas Department of Transportation.

Systemic Pedestrian Mapping Tool can be accessed at https://ttishiny.shinyapps.io/mpo_ped_systemic/.

This resource can be used to identify locations where an MPO or participating partner may wish to implement pedestrian safety measures or enhance the walking environment. Appendix B includes a list of pedestrian safety measures. This resource can also be used where projects are programmed or contemplated so that pedestrian safety measures can be incorporated into the project. The results of this process do not imply that pedestrian safety measures are not needed or appropriate on other corridors; this resource simply allows for the visualization of locations that have higher risk potential for pedestrian crashes.

A map of the top 10 segments and top 10 intersections for potential pedestrian safety enhancements for this MPO is shown in Figure 45. The segments are listed in Table 3 and the intersections are listed in Table 4.

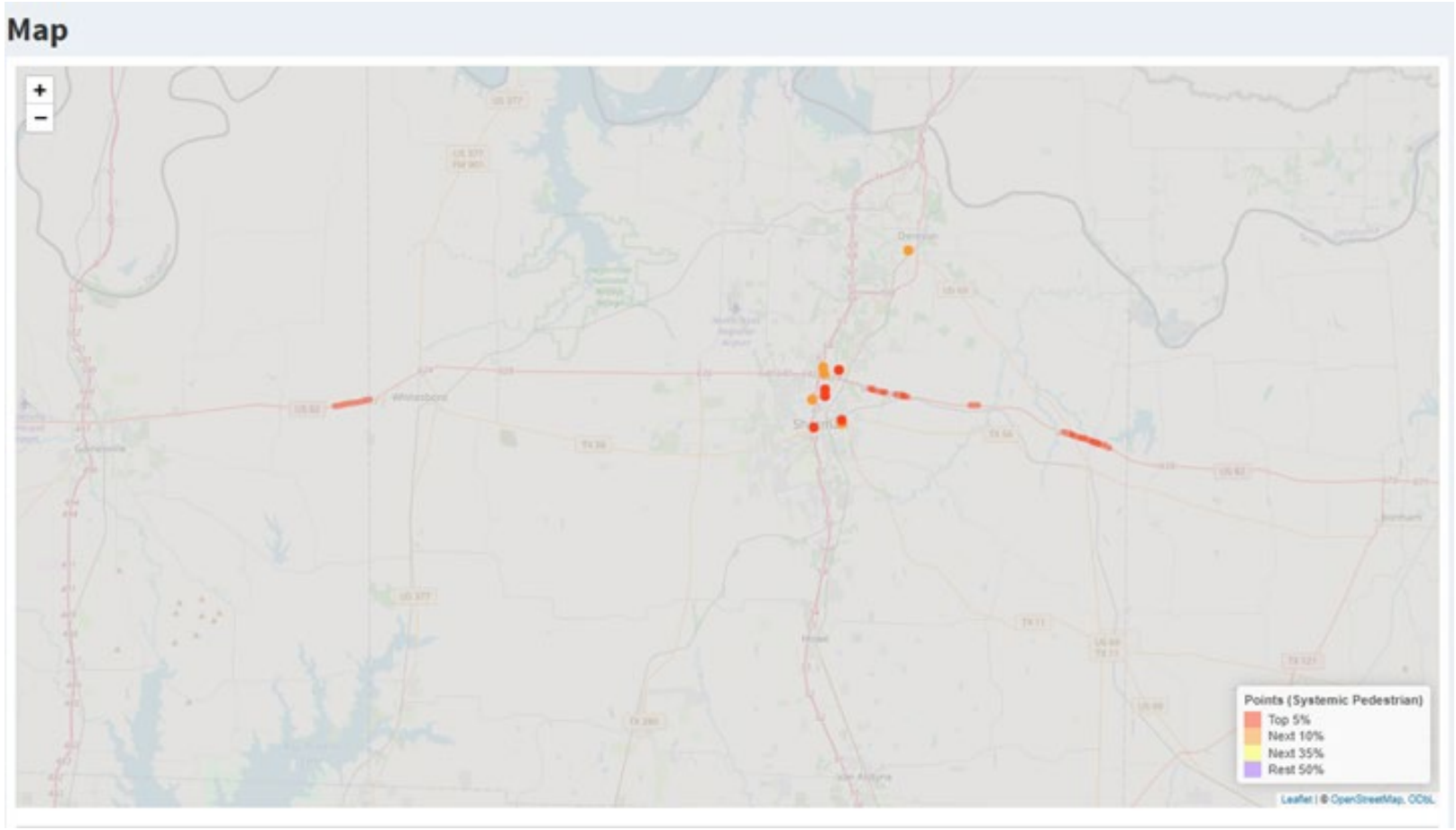


Figure 45. Map of top 10 segments and intersections for potential pedestrian safety enhancements, Grayson County MPO.

Table 3. Top 10 segments for potential pedestrian safety enhancements, Grayson County MPO.

Rank	TxDOT RouteID	From DFO	To DFO	Number of Lanes	AADT	Truck Percentage	Points
1	US0082-KG	414.692	415.024	4	14700	15.7	115
2	US0082-KG	387.04	388.505	4	18302	17.5	115
3	US0082-KG	410.454	410.948	4	14568	15.7	115
4	US0082-KG	420.54	421.015	4	9492	20.6	115
5	US0082-KG	420.205	420.389	4	9492	20.6	115
6	US0082-KG	411.786	411.847	4	14700	15.7	115
7	US0082-KG	411.449	411.746	4	14700	15.7	115
8	US0082-KG	410.31	410.454	4	14568	15.7	115
9	US0082-KG	410.948	411.007	4	14568	15.7	115
10	US0082-KG	418.967	419.328	4	14700	15.7	115

Table 4. Top 10 intersections for potential pedestrian safety enhancements, Grayson County MPO.

Rank	Latitude	Longitude	Major TxDOT RouteID	Major Highway	Major AADT	Minor TxDOT RouteID	Minor Highway	Minor AADT	Points
1	33.64192	-96.5933	250060	NA	7760	1230441	NA	973	111
2	33.65707	-96.6056	250082	NA	10744	250072	NA	5594	111
3	33.66089	-96.6058	250072	NA	8588	1230442	NA	812	110
4	33.63771	-96.6137	1230620	NA	1530	1230854	NA	895	110
5	33.67264	-96.5954	250058	NA	3999	1230518	NA	172	110
6	33.65491	-96.615	250082	NA	8996	250082	NA	5743	110
7	33.74639	-96.5435	1068599	NA	1571	1068689	NA	1500	110
8	33.63952	-96.593	SH0056-KG	SH0056	11469	250060	NA	7760	104
9	33.67037	-96.6063	1230502	NA	11617	250072	NA	10127	102
10	33.67488	-96.6066	250072	NA	9427	1230654	NA	172	102

Chapter 5. Improvement Opportunities

5.1 Proven Safety Roadway Countermeasures to Address Regional High-Priority Safety Issues

The following sections summarize proven countermeasures recommended by NHTSA and/or FHWA for particular crash types or crash contributing factors. Appendix B provides more specific action plans within each of these strategies, as well as links to further information and resources. Where applicable, MPOs may advise their member agencies to consider some of these strategies, based on regional safety priorities.

Roadway and Lane Departures

Objective: Reduce the frequency of fatal and serious injury crashes associated with roadway and lane departures through infrastructure improvements and driver behavior.

Strategies: Strategies to reduce the frequency and severity of roadway and lane departure crashes include the following:

- Keep vehicles from encroaching on the roadside or opposite lane.
- Minimize the consequences of vehicles leaving the road.
- Minimize the likelihood of crashing in adverse conditions.

Appendix B provides action plans and links to resources associated with these strategies.

Speed-Related Crashes

Objective: Reduce the occurrence of fatal and serious injury crashes by establishing travel speeds that suit the function and level of safety of road segments as well as improve drivers' compliance with speed limits and safe driving based on conditions.

Strategies: Strategies to reduce the frequency and severity of speed-related crashes include the following:

- Establish target speed limits and road characteristics to reduce speeding on state, county and local roadways.
- Improve the quality of crash data contributing factors related specifically to speed.
- Leverage data to improve engineering, education and enforcement.

Appendix B provides action plans and resources associated with these strategies.

Intersection Crashes

Objective: Reduce the frequency of fatal and serious injury crashes associated with intersections through infrastructure improvements and driver behavior modification.

Strategies: Strategies to reduce the frequency and severity of speed-related crashes include the following:

- Expand intersection safety practices through planning, design and implementation.
- Reduce intersection violations.

Appendix B provides action plans and resources associated with these strategies.

Occupant Protection

Objective: Utilize a data-driven approach to identify and target audiences for enforcement and education efforts designed to increase correctly installed and applied safety belts and child car seats.

Strategies: Strategies to reduce the number of injuries associated with unrestrained or improperly restrained vehicle occupants include the following:

- Increase occupant restraint use through short-term, high-visibility enforcement.
- Improve education and outreach efforts.
- Prioritize efforts geographically and demographically based on lower use rates.

Appendix B provides action plans and resources associated with these strategies. Additional behavioral safety resources are provided in Section 3.2 of this chapter.

Impaired Driving

Objective: Reduce the occurrence of fatal and serious injury crashes attributed to impaired driving (alcohol and/or other drugs).

Strategies: Strategies to reduce the number of crashes and injuries associated with impaired driving include the following:

- Increase education for all road users on the impact of impaired driving and its prevention.
- Increase officer contacts with impaired drivers through regular traffic enforcement.
- Increase data, training and resources for law enforcement officers, prosecutors, toxicologists, judges and community supervision personnel in alcohol and/or other drug use while driving.

Appendix B provides action plans and resources associated with these strategies. Additional behavioral safety resources are provided in Section 3.2 of this chapter.

Distracted Driving

Objective: Reduce fatalities and serious injuries by identifying, implementing and evaluating awareness strategies to reduce distracted driving.

Strategies: Strategies to reduce the number of crashes and injuries associated with distracted driving include the following:

- Utilize data and information to communicate the dangers of distracted driving to teens, their parents, employers, public officials and others.
- Improve and increase enforcement capabilities for addressing distracted driving.
- Increase installation of engineering countermeasures known to reduce distracted driving.
- Use technology to reduce distracted-driving crashes, serious injuries and fatalities.

Appendix B provides action plans and resources associated with these strategies. Additional behavioral safety resources are provided in Section 3.2 of this chapter.

Vulnerable Road Users

Objective: Utilize a data-driven approach to decrease the number of fatal and serious injuries sustained by vulnerable road users by identifying and targeting audiences for education efforts designed to increase occupant protect usage including correctly installed and applied safety belts and child car seats.

Strategies: Strategies to reduce the number of crashes and injuries of fatal and serious injuries sustained by vulnerable road users include the following:

- Improve driver and vulnerable-road-user safety awareness and behavior.
- Reduce vulnerable-road-user crashes on urban arterials and local roadways.
- Improve vulnerable-road-user networks.
- Develop strategic pedestrian safety plans tailored to local conditions.

Appendix B provides action plans and resources associated with these strategies. Additional behavioral safety resources are provided in Section 3.2 of this chapter.

Post-Crash Care

Objective: Enhance the survivability of crashes through expedient access to emergency medical care, while creating a safe working environment for vital first responders and preventing secondary crashes through robust traffic incident management (TIM) practices.

Strategies: Strategies to improve crash outcomes through post-crash care include the following:

- Improve data collection and analysis techniques.
- Increase and improve emergency responder training.
- Facilitate current and future state and metropolitan TIM teams meetings.
- Utilize technology, policy and available personnel to investigate and report crashes more efficiently to enable rapid crash scene clearance.
- Identify and implement engineering solutions where possible to reduce response times.

Appendix B provides action plans and resources associated with these strategies.

5.2 Behavioral Safety Resources

Texas communities have access to a wide range of behavioral traffic safety resources developed by TxDOT, TxDOT's subgrantee organizations and others. Public education and outreach campaigns offer free downloadable graphics and print materials as well as sharable public service announcements (PSAs). Several campaigns listed here also facilitate statewide or regional stakeholder coalitions and/or may be able to provide a presentation or support an event in an area.

Pedestrian/Bicycle Safety

Campaigns and programs that have been developed in Texas to address pedestrian and bicycle safety include the following:

- **Texas Pedestrian Safety Coalition**: This statewide coalition of pedestrian safety stakeholders meets online three to four times per year and hosts the annual Pedestrian Safety Forum. Materials available on the coalition's website include numerous resources for pedestrian safety-focused engineering, education and policy.
- **Walk.Bike.Safe**: This outreach campaign provides safety messaging and best practices for pedestrians, bicyclists and drivers, as well as educational materials for law enforcement, crash data analyses and action plans for urban and rural communities. Materials, including sharable videos, are available on the campaign website.
- **TxDOT's Pedestrian Safety Media Campaigns**: These media campaigns offer sharable videos and downloadable materials.
- **Walk Smart — Pedestrian Safety near Bus Stops**: Animated videos provide safety messages to pedestrians and drivers about right-of-way laws at and near bus stops.
- **Pedestrian and Bicycle Safety with Harley and Hobbit**: This program provides pedestrian and bicycle safety messaging and curricula designed specifically for children aged 4 to 11.
- **Pedestrian Safety Checklist**: This printable poster — designed by Dallas County Health and Human Services — contains straightforward pedestrian safety tips for children and adults.

Table 5 provides links to pedestrian safety program websites.

Table 5. Pedestrian safety outreach resources.

Campaign or Program	Website
Texas Pedestrian Safety Coalition	https://www.texaspedsafety.org/
Walk.Bike.Safe	https://www.walkbikesafetexas.org/
Pedestrian Safety media campaigns (TxDOT)	https://www.txdot.gov/safety/traffic-safety-campaigns/pedestrian-safety.html
Walk Smart — Pedestrian Safety Near Bus Stops	https://www.walkbikesafetexas.org/walksmart/
Pedestrian and Bicycle Safety with Harley and Hobbit	https://harleyandhobbitroadsafety.com/
Pedestrian Safety Checklist	https://www.dallascounty.org/Assets/uploads/docs/hhs/public-health/trauma-injury/motor-vehicle/Pedestrian-Safety-Back-to-School-Safety-Posters.pdf

Motorcycle Safety

Campaigns and programs that have been developed in Texas to address motorcycle safety include the following:

- **Look.Learn.Live**: This website contains multiple motorcycle safety resources including downloadable outreach materials, data analyses and strategic action plans. The website also tracks events and meetings for the Texas Motorcycle Safety Coalition, including the annual Texas Motorcycle Safety Forum.
- **Texas Motorcycle Safety Coalition**: A statewide volunteer organization facilitated by TTI that includes riders, club representatives, law enforcement and first responders, state and local agency officials, motorcycle safety instructors and training schools, and motorcycle dealerships. The coalition meets three to four times per year and maintains an email mailing list. New members can sign up for the mailing list on LookLearnLive.org.
- **Texas Rider Education**: This website is a one-stop shop for information pertaining to obtaining a motorcyclist's license in Texas.

Table 6 provides links to motorcycle safety program websites.

Table 6. Motorcycle safety outreach resources.

Campaign or Program	Website
Look.Learn.Live	https://www.looklearnlive.org/
Texas Motorcycle Safety Coalition	https://www.looklearnlive.org/coalition/
Texas Rider Education	https://texasridereducation.org/

Young and Older Drivers

Campaigns and programs that have been developed in Texas to address traffic safety among young drivers (15–20 years of age) and older drivers (over 55 years of age) include the following:

- **Teens in the Driver Seat**: This peer-to-peer outreach program was designed to educate teen drivers and pre-drivers about the risks that young drivers face on the road. This program provides educational materials and support for school-based programs and sponsors an annual Youth Transportation Safety Summit.
- **U in the Driver Seat**: As an expansion of the original Teens in the Drivers Seat program, this program focuses on peer-to-peer traffic safety outreach to college and university students.
- **Silver Drivers, Safe Texans**: This program provides CarFit events and traffic safety education programs to drivers over 55 years of age.

Table 7 provides links to young driver and older driver safety resources.

Table 7. Young and older driver resources.

Campaign or Program	Website
Teens in the Driver Seat	https://www.t-driver.com/
U in the Driver Seat	https://www.u-driver.com/
Silver Drivers, Safe Texans (Older Drivers)	https://brazosvalleyinjuryprevention.tamu.edu/home/silverdriverssafetexans/

Occupant Protection

Campaigns and programs that have been developed in Texas to address safety belt and child safety seat use include the following:

- **Safe Kids Houston**: This program provides child safety seat information and safety seat inspection events in the greater Houston area.
- **Department of State Health Services Safe Riders**: This program provides child safety seat information, safety seat inspection events, and car seat distribution services in the state of Texas.
- **Click It or Ticket** and **Teen Click It or Ticket**: These safety belt campaigns provide a variety of ready-made video PSAs on the importance of safety belt use.

Table 8 provides links to occupant protection education and outreach resources.

Table 8. Occupant protection resources.

Campaign or Program	Website
Safe Kids Houston	https://www.safekidsgreaterhouston.org/child-passenger-safety
Department of State Health Services Safe Riders (Child Passenger Safety Seat)	https://www.dshs.texas.gov/injury-prevention/safe-riders
Click It or Ticket (TxDOT Media Campaign)	https://www.txdot.gov/safety/traffic-safety-campaigns/click-it-or-ticket.html
Teen Click It or Ticket (TxDOT Media Campaign)	https://www.txdot.gov/safety/traffic-safety-campaigns/teen-click-it-or-ticket.html

Impaired Driving

Campaigns and programs that have been developed in Texas to address impaired driving include the following:

- **Texas Impaired Driving Task Force**: This website provides links to fact sheets, books, interactive tools, research reports, strategic plans and more to support programs that help to reduce impaired driving due to alcohol, drugs or fatigue/drowsiness. The task force hosts an annual Impaired Driving Forum as well as several meetings per year.
- **TTI's Center for Alcohol and Drug Education Studies**: This center offers a growing list of research reports, fact sheets, tip cards and training videos; many of these resources are specifically developed to provide up-to-date information and best practices to law enforcement

and the judiciary on topics such as ignition interlocks, treatment and referral services, and impaired-driving prevention.

- **Drive Sober, No Regrets** and **College and Young Adult Impaired Driving Campaign**: Media campaigns sponsored by TxDOT.
- **El Paso District Attorney's Office Get a Ride Home**: One example of a program that provides vouchers for a safe ride home during designated holidays; the program is sponsored via a TxDOT Traffic Safety Grant.
- **Watch UR BAC**: This campaign from Texas Agrilife provides useful information to youth and adults about the effects and risks of alcohol, as well as information about ignition interlocks, social hosting laws and other related topics. The program's driving-while-intoxicated prevention simulator and motorcycle simulator can be used to demonstrate the effects of alcohol on driving skills.
- **Motorcycle Stakeholder Tool Kit for Preventing Impaired Riding**: Available on the LookLearnLive.org website, this toolkit and associated PSAs address the risks of riding a motorcycle while impaired and offers suggestions for reducing the number of alcohol and drug-related motorcyclist injuries and fatalities.

Table 9 provides links to campaigns and resources for reducing impaired driving.

Table 9. Impaired-driving resources.

Campaign or Program	Website
Texas Impaired Driving Task Force	https://www.texasimpaireddrivingtaskforce.org/
Center for Alcohol and Drug Education Studies — Resources	https://cades.tti.tamu.edu/resources/
Drive Sober, No Regrets (TxDOT Media Campaign)	https://www.txdot.gov/safety/traffic-safety-campaigns/faces-of-drunk-driving.html
College and Young Adult Impaired Driving Campaign	https://www.txdot.gov/safety/traffic-safety-campaigns/college-young-adult-impaired.html
El Paso District Attorney's Office Get a Ride Home	https://www.epcounty.com/freeride/
Watch UR BAC — Texas Agrilife	https://watchurbac.tamu.edu/
Preventing Impaired Riding	https://www.looklearnlive.org/safety/preventing-impaired-riding/

Distracted Driving

Campaigns and programs that have been developed in Texas and elsewhere to address distracted driving include the following:

- **Talk.Text.Crash**: TxDOT's media campaign addresses the dangers of driving while distracted.
- **Governor's Highway Safety Association's Distracted Driving**: This website provides an overview of distracted-driving research, strategic plans and best practices for reducing distracted driving.
- **Do Not Disturb While Driving**: A video PSA from Cambridge Mobile Telematics shows how to set the *do not disturb* feature of a smartphone to avoid call or text distractions on the road.

Table 10 provides links to resources for reducing distracted driving.

Table 10. Distracted-driving resources.

Campaign or Program	Website
Talk.Text.Crash (TxDOT Media Campaign)	https://www.txdot.gov/safety/traffic-safety-campaigns/distracted-driving.html
Governors Highway Safety Association — Distracted Driving	https://www.ghsa.org/state-laws-issues/distracted-driving
Do Not Disturb While Driving	https://vimeo.com/1040047990?_hsenc=p2ANqtz-_s8nnjeAm2q7uw_VsIj94FJTbyS8XZOqqmCSAG_23wrnkVoVNJRqKfnyd2FOJyV5hL-IxST5hRlV6YUXsxfEQ_f5bdPA&_hsmi=358812887

Speeding

Campaigns and programs that have been developed in Texas and elsewhere to address speed-related crashes include the following:

- **Be Safe. Drive Smart — Drive a Safe Speed:** TxDOT's media campaign addresses the dangers of speeding.
- **Speeding Catches up with You:** This PSA and supporting information is provided by NHTSA.

Table 11 provides links to resources for reducing crashes due to speeding.

Table 11. Speeding reduction resources.

Campaign or Program	Website
Be Safe. Drive Smart — Drive a Safe Speed (TxDOT)	https://www.txdot.gov/safety/traffic-safety-campaigns/be-safe-drive-smart/safe-speed.html
Speeding Catches Up with You (NHTSA)	https://www.nhtsa.gov/campaign/speeding-catches-up-with-you

Commercial Vehicles and Employee/Fleet Drivers

Campaigns and programs that have been developed in Texas and elsewhere to address commercial vehicle and fleet/employer driver safety include the following:

- **Improving Commercial Motor Vehicle Safety on Rural Roadways**: This program provides data-driven tools for large truck drivers/fleet operators and law enforcement officers to address large truck crashes on rural roadways in Texas.
- **Employer-Based Driver Safety Web Resource**: This interactive web-based resource provides information for planning, implementing and evaluating employer-based driver safety programs.
- **Employee Driver Safety Innovation**: This program works with employers and organizations to develop curricula, conduct employer and driver training, and provide technical assistance and resources for integrating safety into daily driving operations.

- **Our Driving Concern — Texas**: This National Safety Council program provides online courses and webinars, printable materials, interactive games and other resources aimed at raising awareness about driver safety in the workplace.

Table 12 provides links to behavioral traffic safety resources for commercial vehicles and employee/fleet drivers.

Table 12. Behavioral safety resources for commercial vehicles and employee/fleet drivers.

Campaign or Program	Website
Improving Commercial Motor Vehicle Safety on Rural Roadways	https://cts.tti.tamu.edu/improving-cmv-safety-on-rural-roads-in-texas/
Employer-Based Driver Safety Web Resource	https://crp.trb.org/btscrpwebresource1/
Employee Driver Safety Innovation	https://cts.tti.tamu.edu/edsi/
Our Driving Concern — Texas (National Safety Council)	https://tx.ourdrivingconcern.org/

5.3 Integrating Safety into Metropolitan Transportation Planning and Programming

Creating a Regional Traffic Safety Plan involves outlining goals, strategies and action steps to reduce traffic-related injuries and fatalities across a specific geographic area. The following structured outline and sample Regional Traffic Safety Plan can be customized based on the region's needs:

1. **Executive Summary:**

    - **Purpose**: Enhance roadway safety, reduce traffic fatalities, and improve mobility for all users.
    - **Region Covered**: Define region-specific geographic boundaries, rural/urban areas, population, roads and modes.
    - **Time Frame**: Define time frame (e.g., 2025–2030).

    Vision: A transportation system with zero deaths and serious injuries.

    Goals:

    - Reduce traffic fatalities by X% by 2030.
    - Improve pedestrian and cyclist safety.
    - Decrease impaired and distracted-driving incidents.
    - Promote safe infrastructure and smart mobility solutions.

    Potential Challenges:

    - Growing population.
    - Immigrants and changing demographics.
    - Egos and selfishness.

2. **Data and Safety Analysis:**

   - **Crash Data Review**: Identify trends in fatalities, serious injuries and high-crash corridors.
   - **Behavior versus Infrastructure**: Consider crash type. Crashes can be divided into two categories, and the means to address them are different. Behavior-related crashes stemming from driver actions are only marginally influenced by infrastructure. These types of crashes are instead mitigated with awareness, education and enforcement.
   - **High-Risk Users**: Identify high-risk users (e.g., pedestrians, bicyclists, motorcyclists, seniors and youth).
   - **Hotspots**: Define geographic areas with recurring safety issues.

   (Include visuals such as heat maps, charts of crash types, etc.)

3. **Strategies and Action Areas:**

   A. Safer Road Users (often slow to change):

   - Implement public education campaigns for safety belt use, distracted driving, etc.
   - Establish law enforcement partnerships that target high-risk behaviors.
   - Implement school-based safety programs for youth.
   - Initiate awareness campaigns for all behavioral risks.

   B. Safer Roads:

   - Ensure good maintenance practices.
   - Improve pavement scores, signs, signals and markings.
   - Improve crosswalks, bike lanes and lighting.
   - Upgrade intersections with roundabouts or signal timing changes.
   - Implement Complete Streets designs.

   C. Safer Vehicles:

   - Promote the use of vehicles with advanced safety technologies.
   - Encourage fleet modernization (for public buses, taxis, etc.).
   - Ensure good maintenance practices.

   D. Safer Speeds:

   - Review and adjust speed limits based on road context.
   - Expand enforcement and automated speed enforcement.
   - Use road design (e.g., narrow lanes, speed humps) to calm traffic.

   E. Post-Crash Care:

   - Improve emergency response times.
   - Strengthen trauma center capabilities.

- Integrate real-time crash reporting systems.
- Exploit advances in vehicle technology and infrastructure crash detection.

4. **Equity and Community Engagement:**

   - Involve underserved and high-risk communities in planning.
   - Ensure safety improvements are distributed equitably.
   - Translate materials into multiple languages.

5. **Implementation Plan:**

   - **Lead Agencies**: Define lead agencies (e.g., TxDOT, local municipalities, police departments).
   - **Funding Sources**: Identify funding sources (e.g., federal/state grants, local funds, private partnerships, etc.). Potentially identify funds for enforcement and education also.
   - **Timeline and Milestones**: Define quarterly/yearly benchmarks for reducing crashes and implementing various components of the plan.
   - **Monitoring and Evaluation**: Conduct annual safety audits and provide progress reports that include:

     - Education and enforcement activities.
     - Infrastructure changes.
     - Safety statistics.

6. **Appendices**: Provide supplemental information that includes:

   - Crash data tables.
   - Maps and diagrams.
   - Stakeholder engagement summary.
   - Policy references.

Chapter 6. Outcomes and Recommendations

6.1 Things to Keep Doing

MPOs have a critical role in advancing transportation safety through the development of their MTP and TIP. By institutionalizing safety as a core project selection factor, MPOs can align with federal performance goals, support state Strategic Highway Safety Plans (SHSPs), and meaningfully reduce fatalities and serious injuries.

This section outlines recommended safety-focused policies, a scoring framework for evaluating projects and implementation guidance for MPOs seeking to integrate safety more explicitly in regional planning.

Policy Recommendations for Safety-Focused Planning

MPOs are encouraged to consider the following practices when integrating safety into project prioritization:

- **Performance-Based Safety Requirement**: All MTP and TIP project applications should demonstrate alignment with PM1 safety performance measures (fatalities, serious injuries and nonmotorized user crashes, both total and per 100 million VMT).
- **Vision Zero or Toward Zero Deaths Commitment**: Adopt regional safety goals to eliminate traffic deaths and prioritize projects located on high-crash corridors, especially those incorporating FHWA's Proven Safety Countermeasures.
- **Systemic Risk Analysis**: Move beyond crash history to proactively address roadway risk factors (e.g., wide arterials, skewed intersections, uncontrolled crossings, etc.).
- **Safe System Approach Evaluation**: Prioritize projects that contribute to safer roads, speeds, vehicles, users and post-crash care. Consider how infrastructure can reduce the likelihood and severity of crashes.
- **Title VI and American Disabilities Act (ADA) Compliance**: Ensure all projects meet federal accessibility and nondiscrimination requirements, including the Public Right-of-Way Accessibility Guidelines (https://www.access-board.gov/prowag/). Encourage ADA-compliant designs and engagement of individuals with disabilities.
- **Complete Streets Integration**: Require project sponsors to include multimodal design elements unless granted a documented exception.
- **Safety Incentives**: Consider reducing or waiving local match requirements for projects that address high-crash areas or implement low-cost, high-impact safety solutions.
- **Work Zone Safety and Phasing**: Require early implementation of safety-critical components in phased projects. All projects should include a Work Zone Safety Plan that ensures safe temporary conditions.
- **Access Management**: Use access management strategies to reduce conflict points between motor vehicles, bicyclists and pedestrians.

Safety-Weighted Project Scoring Framework

A scoring framework that incorporates weighting for safety benefits ensures that limited resources are directed to projects with the greatest potential to save lives and prevent serious injuries. By applying this structured, performance-based approach, MPOs can elevate safety in transportation planning while supporting state and federal goals. This scoring system enables MPOs to evaluate and rank projects based on demonstrated or expected safety benefits. The safety-based scoring framework considers the following seven criteria:

1. **Crash Reduction Effectiveness (0–30 Points):** Based on documented crash data, crash modification factors, and SHSP alignment, recommended scoring is as follows:

    - High (≥40% crash reduction, FHWA's Proven Safety Countermeasures applied): 30 points.
    - Moderate (20–39% crash reduction): 20 points.
    - Low (≤19% crash reduction or minimal evidence): 10 points.
    - No demonstrated crash reduction: 0 points.

2. **High Injury Network/Systemic Risk (0–20 Points)**: For projects located on high injury network or addressing known risk patterns, recommended scoring is as follows:

    - Direct high injury network location: 20 points.
    - Systemic risk treatment: 15 points.
    - Indirect safety benefit: 10 points.
    - Not in safety-priority area: 0 points.

3. **Multimodal Safety Improvements (0–15 Points)**: For projects that enhance safety for pedestrians, bicyclists or transit users, recommended scoring is as follows:

    - Significant improvements (e.g., protected lanes, raised crossings): 15 points.
    - Moderate improvements (e.g., signage, ramps, signals): 10 points.
    - Minor enhancements: 5 points.
    - No improvements: 0 points.

4. **Speed Management/Design Speed Reduction (0–15 Points)**: For projects that incorporate measures to lower vehicle speeds, recommended scoring is as follows:

    - Documented ≥10% reduction or meets Safe System speed targets: 15 points.
    - Partial speed management: 10 points.
    - Minimal effect on speed: 5 points.
    - No speed measures: 0 points.

5. **Title VI/ADA Accessibility Features (0–15 Points)**: For projects that include accessible infrastructure and public input, recommended scoring is as follows:

    - ADA features with demonstrated outreach: 15 points.
    - ADA features only: 10 points.
    - Limited accessibility measures: 5 points.
    - No ADA components: 0 points.

6. **Safety Project Typology (0–15 Points)**: For projects whose primary or secondary purpose is safety, recommended scoring is as follows:

    - Standalone safety project (e.g., Safe Routes, crossings): 15 points.
    - Embedded safety components: 10 points.
    - Minimal or indirect safety link: 5 points.
    - Not safety-related: 0 points.

7. **Cost-Effectiveness and Readiness (0–15 Points)**: Considering implementation readiness and return on investment, recommended scoring is as follows:

    - Low-cost, high-impact and ready-to-implement: 15 points.
    - Moderate cost with clear safety benefits: 10 points.
    - Higher cost or unclear timeline: 5 points.
    - No readiness or return on investment demonstrated: 0 points.

Recommended prioritization based on the total score from these seven criteria is as follows:

- **High Priority (100–125 Points)**: Strong alignment with safety objectives; should be prioritized for funding.
- **Fundable (75–99 Points)**: Worthy of funding with or without minor revisions or conditions.
- **Medium Priority (50–74 Points)**: May be considered for phased funding or with added safety features.
- **Low Priority (<50 Points)**: Not recommended unless substantially revised to improve safety impact.

Implementation Guidance for MPOs

To successfully integrate this framework, MPOs should:

- **Adopt the Scoring Criteria**: Incorporate the full rubric into the TIP/MTP Call for Projects materials and scoring sheets.
- **Provide Data Tools and Technical Support**: Offer crash data, high injury network maps, ADA resources and access to FHWA countermeasure guidance.
- **Ensure Transparency**: Publish scoring results and funding decisions, including justifications for high and low rankings.

- **Allocate Dedicated Safety Funds**: Consider reserving 10–20% of TIP funds for top-scoring safety-related projects.
- **Review Annually**: Update criteria and weightings as SHSP priorities, crash trends and federal guidance evolve.

6.2 Corridor Analysis

The MPO Statewide Safety Planning Assistance Team at TTI conducted two corridor safety assessments in each participating MPO. In most cases, assessments were conducted for one surface street corridor and one freeway corridor.

Corridor Selection and Analysis Process

Candidate sites were selected by examining the map of intersections and segments with excess crashes (described in Chapter 2, Section 2.3). To identify intersections and segments with excess crashes, the TTI team developed safety performance functions that provide benchmarks for the number of predicted crashes at intersections and segments. These benchmarks were used to determine which locations have more crashes than predicted. Fatality and serious injury crashes were also considered in the selection process. The intersections and segments were then ranked and mapped.

Surface Street Corridors

Surface street corridors were identified with a preponderance of intersections with excess crashes, with an emphasis on including intersections in the top 5% within the MPO's jurisdiction and those with fatal and serious injury crashes. Both TxDOT on-system and off-system local roads were considered, but the top candidates often included TxDOT surface roads. To make the assessments feasible within the time and budget constraints of the MPO Safety Planning Project, the project team endeavored to identify corridors that included 15 to 25 intersections.

Freeway Corridors

Freeway corridors were selected on the basis of their segment rankings, with an emphasis placed on those within the top 5% and those with fatal and serious injury crashes. All of the freeway segments were located on the TxDOT system. To make the assessments feasible within the time and budget constraints, the project team endeavored to identify corridors about 3 to 4 miles in length.

Assessment Purpose

These assessments will provide each MPO and their partners with information to identify new safety-oriented projects or to shape currently planned projects, regardless of the primary project purpose. The project team used TxDOT's Safer by Design safety scoring tool to assess the surface streets and a *Highway Safety Manual*-based spreadsheet tool developed for TxDOT by TTI to assess the freeway corridors. The assessments also served as examples of how these tools can be used for future project development purposes. Importantly, the Safer by Design Tool can be used to evaluate any MPO-

funded project, regardless of the primary purpose of the project. The tool can be used to evaluate alternatives or examine potential countermeasures for incorporation into a project to improve safety. The Safer by Design Tool could also be used to score potential projects based their ability to improve safety because the tool's output provides a safety score for the existing and proposed conditions.

This assessment process is not necessarily intended to identify the worst corridors from a safety standpoint. The intent of this assessment is to:

- Identify surface and freeway corridors that have a significant number of intersections or segments with excess crashes.
- Demonstrate how the analysis tools can be used to evaluate the safety effects of changes to the corridors.
- Provide potential actions to improve road safety.

These evaluation tools can be used by an MPO, their partners, or consultants preparing plans for projects funded by the MPO. TxDOT already requires the use of the Safer by Design safety scoring tool in all TxDOT urban and rural surface street projects, regardless of the primary project purpose.

Corridor Analysis Results

Since there are no freeway sections for consideration in the Grayson MPO, two surface street corridors were selected for analysis — FM 120 (Ginger to Rusk) and US 377 (Delaware Bend to Emberson Chapel). An overall review of the crash history revealed that the major intersections at the east end of both corridors drove much of the focus. 24 specific segments were selected for the US 377 corridor along with 28 intersections, and five segments were selected for the FM 120 corridor along with 20 intersections. Improvements considered for the segments (shoulders, raised medians, etc.) were incorporated into the intersection analyses as appropriate. The actions considered below show the impact of these modifications if they are reasonable and appropriate based on a more detailed analysis and further data collection.

FM 120 Segment Analysis

A systemic approach was taken in the corridor. Design 1 was intended to be less costly and easier to implement. Design 2 was intended to be more extensive – considerations that would be normally associated with a reconstruction of the roadway. The 24 segments along FM 120 varied from low density rural to areas in town with higher density and different characteristics. Table 13 summarizes the changes considered:

Table 13. FM 120 Segment analysis.

Segment	Possible Improvement	Design 1	Design 2
Segments 1-2	Street Lighting	n/a	Added
	Lane and Shoulder Width	12’ / 10’	12’ / 10’
Segments 3-5	Access Management	50% less major driveways	50% less major driveways
	Street Lighting	n/a	Added
	Raised Median	n/a	10’ with curbs

FM 120 Intersection Analysis

As with the segments, a systemic approach was taken with the intersections based on the crash history, right-of-way available, and complexity of movements. Design 1 was intended to be less costly and easier to implement. Design 2 was intended to be more extensive – considerations that would seize opportunities from the major segment improvements and having the potential for heightened public concern. Table 14 summarizes the changes considered.

Table 14. FM 120 Intersection analysis.

Possible Improvement	Design 1	Design 2
Street lighting	n/a	Added
Minor street turn lane	n/a	Added
Left turn phasing	Protected/Permissive	Protected only
Reflective Signal Backplates	Added, if missing	Added, if missing
U-turn Restriction	n/a	Added

US 377 Segment Analysis

A systemic approach was taken in the corridor. Design 1 was intended to be less costly and easier to implement. Design 2 was intended to be more extensive – considerations that would be normally associated with a reconstruction of the roadway. Table 15 summarizes the changes considered:

Table 15. FM 377 Segment analysis.

Segment	Possible Improvement	Design 1	Design 2
Segments 1-14, 17-24	Street Lighting	n/a	Added
	Center and Edge Rumble	Added	Added
Segments 15-16	Access Management	25% less major driveways	50% less major driveways
	Street Lighting	Added	Added
	Median	n/a	Buffer

US 377 Intersection Analysis

As with the segments, a systemic approach was taken with the intersections based on the crash history, right-of-way available, and complexity of movements. Design 1 was intended to be less costly and easier to implement. Design 2 was intended to be more extensive – considerations that would seize opportunities from the major segment improvements and having the potential for heightened public concern. Table 16 summarizes the changes considered.

Table 16. US 377 Intersection analysis.

Possible Improvement	Design 1	Design 2
Street lighting	n/a	Added
Minor street turn lane	n/a	Added
Left turn phasing	Protected/Permissive	Protected only
Reflective Signal Backplates	Added, if missing	Added, if missing
U-turn Restriction	n/a	Added

Summary of Results

The Safer by Design Tool provides detailed information (included in the appendix) as well as summary information of safety scores and predicted crash occurrences. Table 17 shows the potential of the changes if implemented after detailed analysis and consideration.

Table 17. Summary of results.

		Scenario		
Corridor	**Parameter**	**Existing**	**Design 1**	**Design 2**
US 377	Score	63.3	66.5	80.1
	Predicted crashes	26.4	25.3	19.7
	% crash reduction (from existing)	n/a	4%	25%
FM 120	Score	38.8	40.8	62.3
	Predicted crashes	33.1	30.8	20.3
	% crash reduction (from existing)	n/a	7%	39%

Appendix A. Systemic Approach to Pedestrian Safety

The traditional hotspot identification approaches are mainly based on crash occurrences. Under this approach, high-risk sites — defined as sites that experience more crashes than expected — are identified through network screening, and investments are then decided based on the observed crash frequencies. However, this traditional approach may not provide adequate results when crashes are more sporadic, as in the case of pedestrian crashes. As a result, transportation agencies such as MPOs would experience difficulties in meeting safety performance goals by only investing in high-crash locations when traditional techniques are employed.

The systemic approach to safety involves the identification and implementation of countermeasures that address high-risk roadway factors through systemwide analysis of specific target crash types (pedestrian crashes in this case). Because systemic improvements focus on high-risk roadway features rather than specific locations, it is possible to use the roadway characteristics that are associated with pedestrian crashes. To identify the risk factors, the proportion of pedestrian crashes for a specific range or value of a variable are then compared to the proportion of existing VMT (calculated as a product of segment length and the ADT) for segments or total entering volumes for intersections within the respective range or value.

A.1 Roadway Segments

For segments, the research team used the systemic methodology for pedestrian safety previously developed by Wu et al. in 2017.[2] In that study, the authors considered variables such as median type, number of lanes, pavement width, vehicular volume level and truck percentage. In the risk assessment, sites were prioritized using risk factor weights. Risk factor weights were calculated using the crash total and the crash overrepresentation or underrepresentation of each element, as shown in Table A-1. The total risk factor weight is the sum of all risk factor weights of a segment for each element evaluated.

Based on the weights provided in Table A-1, the total weights for a particular risk factor were calculated using the following equation:

$$W_t = \begin{cases} 10 + CT + CO, \text{if overrepresentation} \\ 10 + CT - CU, \text{if underrepresentation} \end{cases} \quad (1)$$

where W_t is the total weight, *CT* is the weight based on crash total, *CO* is the weight based on crash overrepresentation and *CU* is the weight based on crash underrepresentation.

[2] Wu, L., Ko, M., Lord, D., & Geedipally, S. 2017. *A Systemic Approach to Pedestrian Safety Improvement* [Technical Memorandum]. Traffic Operations Division, Texas Department of Transportation.

Table A-1. Risk factor weight criteria.

Weight (Points)	Crash Total	Crash Overrepresentation	Crash Underrepresentation
1	≥0% and <10%	0%	0%
2	≥10 and <20%	>0% and <2%	>0% and <2%
3	≥20 and <30%	≥2% and <3%	≥2% and <3%
4	≥30 and <40%	≥3% and <4%	≥3% and <4%
5	≥40 and <50%	≥4% and <5%	≥4% and <5%
6	≥50 and <60%	≥5% and <6%	≥5% and <6%
7	≥60 and <70%	≥6% and <7%	≥6% and <7%
8	≥70 and <80%	≥7% and <8%	≥7% and <8%
9	≥80 and <90%	≥8% and <9%	≥8% and <9%
10	≥90 and <100%	≥9% and <10%	≥9% and <10%

Table A-2 summarizes the risk factor prioritization results related to pedestrian crashes separately for rural and urban roadway segments. For example, 10 points are given to segments having a curbed median in rural areas. An additional 23 points are given if the pavement width of the segment is greater than 50 feet.

Table A-2. Pedestrian crash risk factor prioritization results for segments.[3]

Risk Factor			Weight (Points)	
			Rural	Urban
Median type	No median		7	8
	Unprotected		21	12
	Curbed		10	13
	Barrier		17	19
Name of lanes	1 or 2		6	5
	3 or 4		23	22
	5 or more		11	21
Pavement width (feet)	≤16		9	10
	17–24		2	4
	25–50		23	21
	>50		23	23
Vehicle volume level	Low		2	2
	Moderate		9	5
	High		27	26
Truck percentage (%)	≤10	≤5	4	7
	10–20	5–10	22	19
	20–30	10–20	19	14
	>30	>20	21	10

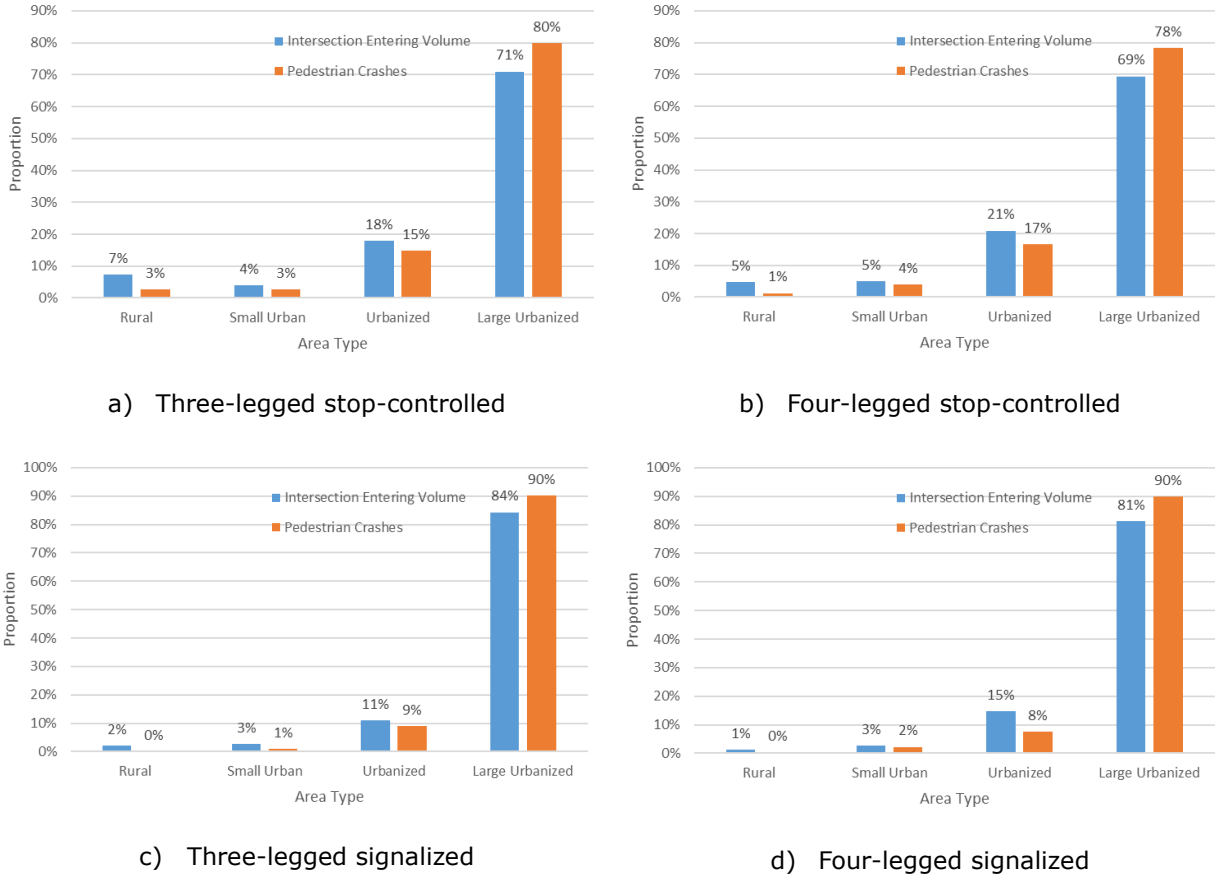
[3] Wu, L., Ko, M., Lord, D., & Geedipally, S. 2017. *A Systemic Approach to Pedestrian Safety Improvement* [Technical Memorandum]. Traffic Operations Division, Texas Department of Transportation.

A.2 Intersections

The research team considered multiple variables when identifying the risk factors for pedestrian safety at intersections. The team considered four types of intersections: three-legged stop-controlled, four-legged stop-controlled, three-legged signalized and four-legged signalized. This section presents the risk factor evaluation for all types of intersections.

Area Type

Figure A-1 shows the proportion of pedestrian crashes as a function of area type. Four area types were considered: rural (population <5,000), small urban (population 5,000–49,999), urbanized (population 50,000–199,999) and large urbanized (population ≥200,000). Not surprisingly, the majority of the crashes occurred at intersections in large, urbanized areas; more pedestrians are present in urban environments.



a) Three-legged stop-controlled

b) Four-legged stop-controlled

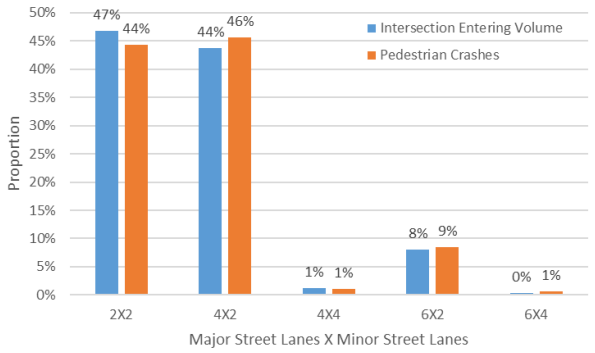
c) Three-legged signalized

d) Four-legged signalized

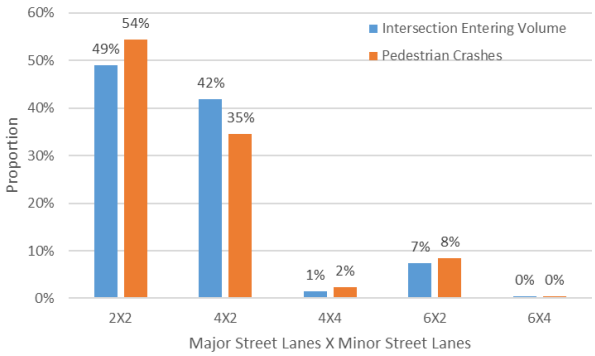
Figure A-1. Proportion of pedestrian crashes by posted speed limit.

Number of Lanes

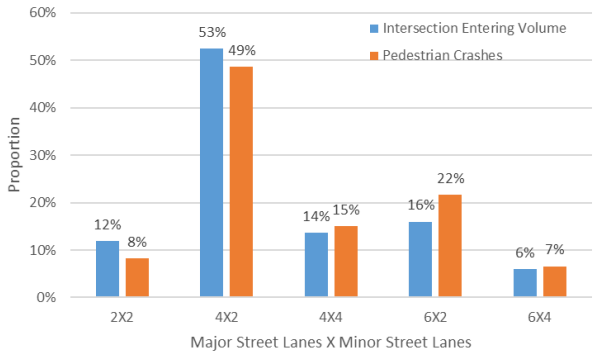
Figure A-2 shows the proportion of pedestrian crashes as a function of the number of lanes on major and minor streets. Intersections with two lanes on the minor street had the most pedestrian crashes.



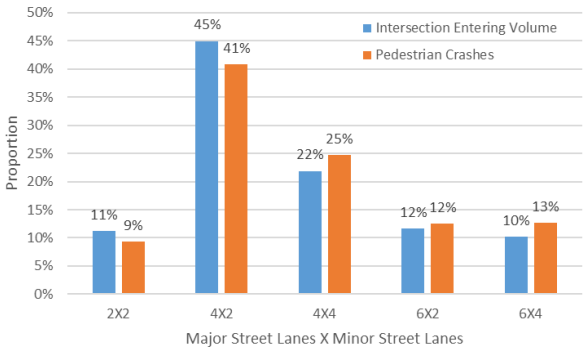
a) Three-legged stop-controlled



b) Four-legged stop-controlled



c) Three-legged signalized

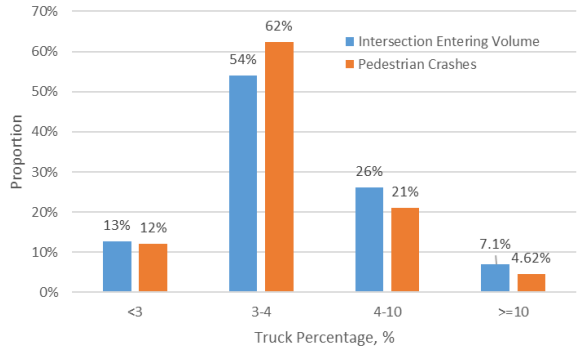


d) Four-legged signalized

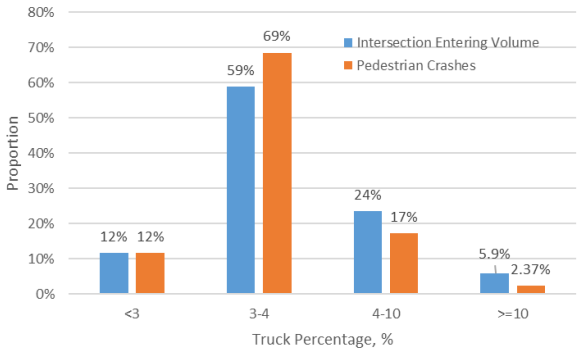
Figure A-2. Proportion of pedestrian crashes by number of lanes.

Truck Percentage

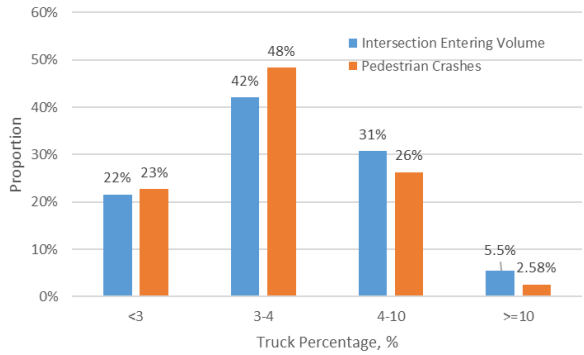
Figure A-3 shows the proportion of pedestrian crashes as a function of truck percentage in the traffic mix. Intersections with <10% trucks were overrepresented in truck crashes. In general, trucks are either restricted or travel less in areas where pedestrians are present.



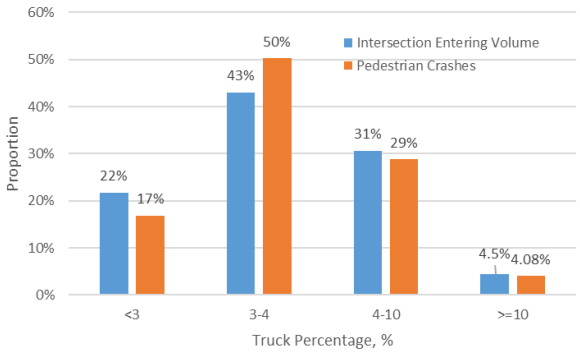
a) Three-legged stop-controlled



b) Four-legged stop-controlled



c) Three-legged signalized



d) Four-legged signalized

Figure A-3. Proportion of pedestrian crashes by truck percentage.

Table A-3 summarizes the risk factor prioritization results for pedestrian crashes at intersections.

Table A-3. Pedestrian crash risk factor prioritization results for intersections.

Risk Factor		Weight (Points)			
		Three-Legged Stop-Controlled	**Four-Legged Stop-Controlled**	**Three-Legged Signalized**	**Four-Legged Signalized**
Area type	Rural	6	7	8	9
	Small urban	9	9	9	9
	Urbanized	8	7	8	3
	Large urbanized	26	25	24	27
Name of lanes (major×minor)	2×2	12	20	7	9
	4×2	15	6	11	10
	4×4	9	11	12	14
	6×2	11	11	17	12
	6×4	11	10	11	13

Risk Factor		Weight (Points)			
		Three-Legged Stop-Controlled	Four-Legged Stop-Controlled	Three-Legged Signalized	Four-Legged Signalized
Truck percentage (%)	<3	10	12	13	7
	3–4	24	25	20	22
	4–10	7	5	8	11
	>10	8	7	10	13

Appendix B. Traffic Safety Countermeasures

B.1 Roadway and Lane Departures

The frequency of fatal and serious injury crashes associated with roadway and lane departures can be reduced through infrastructure improvements and driver behavior. Table B-1 provides action plans and links to resources associated with these strategies.

Table B-1. Traffic safety countermeasures for roadway and lane departure crashes.

Strategy	Action Plan	Link
Keep vehicles from encroaching on the roadside or opposite lane	Employ data-driven tools and advanced methods to identify overrepresentation of run-off-the-road and head-on crashes on segments. Use predictive modeling and improved data system queries and mapping to identify locations with a high probability of roadway/lane departure crashes cross-referenced with road type, geometric characteristics, horizontal curvature, vehicle type and area type.	https://www.texasshsp.com/emphasis-areas/roadway-and-lane-departures/strategy-1/improved-data-systems-action-plan/
	Revise roadway configuration to provide additional paved recovery areas (e.g., convert four-lane roadways to three-lane roadways with design features compatible with surrounding land use context, use of safety edge, etc.).	
	Provide consistent curve treatments and advisory speeds for similar conditions.	https://highways.dot.gov/safety/proven-safety-countermeasures/roadside-design-improvements-curves
	Use enforcement and educational approaches to encourage lower speeds in target areas and/or roadway sections.	
	Provide additional positive guidance (e.g., rumble strips, striped lines, raised pavement markings, chevrons that include light-emitting diodes, curve delineators, speed feedback signs, edge lines/centerlines, wider edge lines, etc.). Conduct public information campaigns that explain why and how to navigate the roadway safely.	https://highways.dot.gov/safety/proven-safety-countermeasures/enhanced-delineation-horizontal-curves
	Establish target speeds. Use engineering techniques to manage speeds in areas experiencing or susceptible to roadway and lane departures. Establish design speeds that more closely approximate the anticipated operating speed for the roadway.	
	Implement raised medians that prevent vehicles from encroaching on opposite-direction lanes.	https://highways.dot.gov/sites/fhwa.dot.gov/files/Corridor%20Access%20Management_508.pdf
Minimize the consequences of vehicles leaving the road	Implement barriers, median treatments, and forgiving roadside objects (e.g., use median barriers, safety treat fixed objects, establish safe-clear policies, improve slopes, etc.) with consideration given to land use context.	https://highways.dot.gov/safety/proven-safety-countermeasures/median-barriers

Strategy	Action Plan	Link
Minimize the likelihood of crashing in adverse conditions	Identify locations that are overrepresented in terms of nighttime crashes. Develop and use screening and systemic crash analysis tools to identify locations. Provide additional roadway delineation and roadway lighting.	
	Identify and address locations subject to wet-weather run-off-the-road crashes.	

B.2 Speed Related

The occurrence of fatal and serious injury crashes can be reduced by establishing travel speeds that suit the function and level of safety of road segments as well as improve drivers' compliance with speed limits and safe driving based on conditions. Table B-2 provides action plans and links to resources associated with these strategies.

Table B-2. Traffic safety countermeasures for speed-related crashes.

Strategy	Action Plan	Link
Establish target speed limits and road characteristics to reduce speeding on state, county and local roadways	Implement target speeds for arterial, collector and local roadways considering design and expected operating speeds. Implement target speeds considering pedestrians, land use and roadway context, including options for target speeds of ≤35 mph on arterials. Evaluate existing speeds for appropriate target speeds.	https://highways.dot.gov/safety/proven-safety-countermeasures/appropriate-speed-limits-all-road-users
	Establish triggers to review segments prior to construction and maintenance projects to address target speed approaches. Consider revising state procedures for setting limits included in TxDOT's *Design Manual*.	
Improve crash data quality regarding contributing factors related to speed	Establish and/or disseminate procedures for establishing speed zones (regulatory and/or advisory). Coordinate between city, county and state networks. Identify current best practices and consider adopting new methodologies as appropriate.	https://nacto.org/publication/city-limits/
	Analyze the roadway network to identify locations with high frequencies of fatal and severe injury crashes. Deploy engineering and/or behavior-related countermeasures that are proactive/predictive to address hot spots including work zone.	https://www.ite.org/technical-resources/topics/speed-management-for-safety/measures-for-managing-speed/
	Review options on the crash reporting (CR-3) form for detailing crash characteristics related to speed. Collaborate with law enforcement to revise the CR-3 form to add more options to detail the elements of speed impacting a crash.	
Leverage data to improve engineering,	Educate law enforcement on the use of crash data to highlight the need for accurate and comprehensive reporting with special emphasis on speed-related characteristics. Review definitions for contributing factors and emphasize differences between failure to control speed, speeding over the limit/unsafe for conditions, etc.	https://www.nhtsa.gov/book/countermeasures-that-work/speeding-and-speed-management

Strategy	Action Plan	Link
education and enforcement	Ensure crash analysts understand the differences among speeding-related contributing factors and their association with statutes when analyzing crash data.	
	Train law enforcement officers and urge agencies to effectively use TxDOT's CRIS and other data sources during planning and patrols to maximize impacts and resources.	https://www.nhtsa.gov/book/countermeasures-that-work/speeding-and-speed-management/countermeasures
	Develop case studies to document and communicate how cities implement safe design speeds in various settings.	
	Establish partnerships between state, county and local agencies to implement safe streets projects including but not limited to Safe Routes to Schools.	
	Using a data informed approach, deploy awareness and educational campaigns that are proven effective in reducing speeding.	

B.3 Intersection Safety

The frequency of fatal and serious injury crashes associated with intersections can be reduced through infrastructure improvements and driver behavior modification. Table B-3 provides action plans and links to resources associated with these strategies.

Table B-3. Traffic safety countermeasures for intersection crashes.

Strategy	Action Plan	Link
Expand intersection safety practices through planning, design and implementation	Evaluate intersection controls. TxDOT and local agencies should use intersection control evaluations and other appropriate evaluation processes in project development. Coordination with MPOs is required for projects within districts and statewide. Identify threshold for requirements.	https://highways.dot.gov/safety/intersection-safety/ice
	Expand state and local systems implementation of low-cost safety improvements at urban and rural intersections.	https://highways.dot.gov/safety/proven-safety-countermeasures/systemic-application-multiple-low-cost-countermeasures-stop
	Identify and develop case studies to illustrate best practices and innovative approaches, including alternative intersection designs.	https://highways.dot.gov/safety/proven-safety-countermeasures/roundabouts
	Provide training to state and local stakeholders including but not limited to external webinars on road safety planning and the use of the Safety Scoring Tool for Urban Intersections and data dashboards for TxDOT Design Division Safety Tools.	https://www.txdot.gov/business/resources/design-tools-training/safer-by-design.html

Strategy	Action Plan	Link
	Address signal timing and assess technology. Interconnect traffic signals, optimize traffic signal timings and/or implement technology to improve traffic flow, encourage safe travel speed and reduce crashes. Identify how mature and exploratory datasets can be better used to inform the targeting of problematic intersections.	https://highways.dot.gov/safety/proven-safety-countermeasures/yellow-change-intervals
	Reduce potential conflict points through intersection and driveway spacing, roundabouts, and other access management strategies.	https://highways.dot.gov/sites/fhwa.dot.gov/files/Corridor%20Access%20Management_508.pdf
Reduce intersection violations	Train law enforcement agencies on effective techniques to use targeted enforcement at high-volume incident locations. Install signal indicator lights to inform law enforcement of red signal onset.	
	Deploy abbreviated FHWA traffic engineering training for law enforcement. Identify best practices for partnerships between traffic engineering and law enforcement to encourage an integrated approach to intersection safety.	
	Develop safety campaigns to educate the public on intersection safety with a focus on vulnerable road users and older/younger drivers. Employ evidenced-based countermeasures focused on those causing the risk.	
	Develop case studies to illustrate methods for utilizing technology to focus on targeted intersections to inform/educate state and local agencies.	
	Improve and expand access to TxDOT's CRIS data through dashboards related to intersection safety.	

B.4 Occupant Protection

A data-driven approach can be used to identify and target audiences for enforcement and education efforts designed to increase correctly installed and applied safety belts and child car seats. Table B-4 provides action plans and links to resources associated with these strategies.

Table B-4. Traffic safety countermeasures for occupant protection.

Strategy	Action Plan	Link
Increase occupant restraint use through short-term, high-visibility enforcement	Deploy high-visibility enforcement activities at state and local levels in conjunction with national Click It or Ticket campaigns.	https://www.trafficsafetymarketing.gov/safety-topics/seat-belt-safety/click-it-or-ticket

Strategy	Action Plan	Link
Improve education and outreach efforts	Deploy targeted media activities at state and local levels in conjunction with national Click It or Ticket campaigns.	https://www.nhtsa.gov/book/countermeasures-that-work/seat-belts-and-child-restraints/key-resources
	Increase intervention efforts by healthcare professionals, teachers and safety advocates.	
	Increase training/retention of child passenger safety technicians and instructors.	
	Develop a consolidated resource tool (website) that advocates (e.g., law enforcement personnel, technicians, healthcare providers, etc.) can use to direct people to fitting stations, car seat resources, etc.	
	Educate younger drivers (under age 25) to use occupant protection for themselves and other people in their vehicle through formal driver education and targeted outreach programs such as Teens in the Driver Seat.	
Prioritize efforts geographically and demographically based on lower use rates	Focus on enforcement, education and encouragement activities in the geographic areas with lower use rates.	
	Focus education and outreach activities on demographic groups based on lower use rates and equity.	
	Identify and evaluate innovative means of reaching target areas and populations.	
	Maintain child passenger safety seat distribution programs for low-income families.	

B.5 Impaired Driving

The occurrence of fatal and serious injury crashes attributed to impaired driving (alcohol and/or other drugs) can be reduced through various strategies. Table B-5 provides action plans and links to resources associated with these strategies.

Table B-5. Traffic safety countermeasures for impaired-driving crashes.

Strategy	Action Plan	Link
Increase education for all road users on the impact of impaired driving and its prevention	Deploy robust, longitudinal survey activities to measure attitudes related to impaired driving and the impact of educational and/or media campaigns on target audiences. Publish results for stakeholders and program partners.	
Increase officer contacts with impaired drivers	Educate road users on how alcohol and/or other drugs negatively impact driving behavior.	https://www.texasshsp.com/emphasis-areas/impaired-driving/#strategies

Strategy	Action Plan	Link
through regular traffic enforcement	Implement effective countermeasures (education and enforcement) specifically addressing driving under the influence (for drivers under age 21 with any detectable amount of alcohol) with an emphasis on zero tolerance.	
	Demonstrate to all types of road users the consequences associated with violations including the magnitude of the impact of impaired-driving crashes on fatality rates by making comparisons with other causes of death (e.g., murder rate). Emphasize different target audiences based on data/community.	
	Educate police officers, community leaders, the public, and traffic safety partners on the role of regular traffic enforcement stops as a primary tool in detecting impaired drivers and encourage their use to reduce impaired crashes. Focus on agency administration and local government entities to establish local priorities.	https://www.nhtsa.gov/book/countermeasures-that-work/alcohol-impaired-driving/understanding-problem
Increase data, training and resources for law enforcement officers, prosecutors, toxicologists, judges and community supervision personnel in the area of alcohol and/or other drug use while driving	Use a data-driven approach to optimize areas and times for enforcement. Increase the deployment of Data-Driven Approaches to Crime and Traffic Safety training and local implementation.	https://www.nhtsa.gov/book/countermeasures-that-work/alcohol-impaired-driving/data-surveillance
	Educate communities with data through earned media and other means to communicate the impact of impaired driving in local areas.	
	Identify training opportunities for law enforcement at the state and local levels in locations with high probabilities for alcohol and/or other drug use (e.g., events, communities, entertainment districts, etc.) that frequently lead to impaired driving.	
	Train law enforcement in effective driving-while-intoxicated detection using Standardized Field Sobriety Testing, Advanced Roadside Impaired Driving Enforcement, and the Drug Evaluation and Classification Program. Include preparation for testimony.	
	Train prosecutors in the driving-while-intoxicated trial process and presentation of evidence. Implement joint training for law enforcement, prosecutors and laboratory personnel (forensic toxicologists) to assist in presenting scientific evidence of alcohol and/or drug impairment in court.	
	Educate judges on the driving-while-intoxicated trial process with joint training for judges and appropriate court personnel on the impairing effects of alcohol and/or other drugs on driving, the driving-under-the-influence process (for drivers under age 21), the driving-while-intoxicated detection process, and monitoring options (e.g., ignition interlock devices, testing, etc.).	
	Train community supervision personnel on the impairing effects of alcohol and/or other drugs on driving and the use of ignition interlock devices/testing as a condition of probation.	

Strategy	Action Plan	Link
	Provide additional resources for laboratories to address testing capacity for evidence associated with driving-while-intoxicated convictions and their availability to provide expert testimony.	
	Identify methodologies and resources for improving the identification of drugged driving as a contributing factor in impaired-driving crashes.	

B.6 Distracted Driving

Fatalities and serious injuries can be reduced by identifying, implementing, and evaluating awareness strategies to reduce distracted driving. Table B-6 provides action plans and links to resources associated with these strategies.

Table B-6. Traffic safety countermeasures for distracted-driving crashes.

Strategy	Action Plan	Link
Utilize data and information to communicate the dangers of distracted driving to teens, their parents, employers, public officials and others	Use crash data and survey results to develop and document a suite of age-specific countermeasures and messages about the dangers of distracted driving.	https://www.nhtsa.gov/book/countermeasures-that-work/distracted-driving/key-resources
	Educate public officials and employers about the human and economic costs of distracted driving through outreach programs.	
	Educate teens and their parents on the Graduated Driver Licensing law with specific attention to the provisions designed to address distracted driving such as limiting the number of passengers and disallowing cell phone use.	
	Implement effective peer-to-peer programs such as Teens in the Driver Seat (junior high and high school) and U in the Driver Seat (college).	
	Educate the consumers, parents, employers, and the public with age-specific messages about vehicle safety technologies (e.g., mycardoeswhat.org) and tools to encourage distraction-free driving through car dealers, the media and employers.	
	Identify and disseminate model distracted-driving policies to law enforcement agencies for guidance on enhancing officer safety. Use the Texas Department of Public Safety policy as a model that agencies can emulate or revise.	
Improve and increase enforcement capabilities for	Use Selective Traffic Enforcement Program grants and high-visibility enforcement techniques to enforce distracted-driving state laws and local ordinances, especially in locations where the data indicate distraction as a contributing factor in crashes.	

Strategy	Action Plan	Link
addressing distracted driving		
Increase installation of engineering countermeasures known to reduce distracted driving	Use network screening techniques to identify and systemically implement engineering countermeasures known to reduce distracted driving, such as edge line, centerline, and transverse rumble strips; wider and brighter striping; and lighting, especially in areas associated with distracted-driving crashes.	
Use technology to reduce distracted-driving crashes, serious injuries and fatalities	Test and implement apps to encourage distraction-free driving or discourage distracted driving.	
	Implement an incentive-based app specifically addressing teen drivers.	You in the Driver Seat App

B.7 Vulnerable Road Users

A data-driven approach can be used to decrease the number of fatal and serious injuries sustained by vulnerable road users by identifying and targeting audiences for education efforts designed to increase occupant protect usage including correctly installed and applied safety belts and child car seats. Table B-7 provides action plans and links to resources associated with these strategies.

Table B-7. Traffic safety countermeasures for vulnerable-road-user crashes.

Strategy	Action Plan	Link
Improve driver and vulnerable-road-user safety awareness and behavior	Educate motorists on appropriate actions if they become stranded on a freeway or high-speed roadway to reduce crashes with unintended pedestrians on roadways.	
	Provide driver and pedestrian safety messages and education.	
	Educate vulnerable road users through campaigns like Walk.Bike.Safe and encourage alternatives such as transit, taxis and transportation network companies.	
	Improve nighttime visibility of vulnerable road users using educational programs such as Be Safe. Be Seen.	
Reduce vulnerable-road-user crashes on urban arterials and local roadways	Complete a sidewalk inventory and implement pedestrian-oriented design treatments at high-volume and/or high-risk pedestrian/pedalcyclist locations.	https://highways.dot.gov/safety/proven-safety-countermeasures/crosswalk-visibility-enhancements

Strategy	Action Plan	Link
	Implement proven countermeasures such as leading/exclusive pedestrian intervals at signalized intersections (i.e., pedestrian walk signals activate prior to parallel green), high-volume pedestrian-use signaled intersections, and pedestrian pushbuttons.	https://highways.dot.gov/safety/proven-safety-countermeasures/leading-pedestrian-interval
Improve vulnerable-road-user networks	Develop and implement programs such as Vision Zero, Road to Zero, Safe Systems or pedestrian action plans to assist cities, developers and other agencies develop policies and implement projects that address common pedestrian/pedalcyclist crash types.	https://highways.dot.gov/safety/proven-safety-countermeasures/medians-and-pedestrian-refuge-islands-urban-and-suburban-areas
	Disseminate information and training for traffic safety professionals on the effectiveness and appropriateness of pedestrian traffic control measures.	
Develop strategic pedestrian safety plans tailored to local conditions	Provide available protected paths when construction impedes sidewalks, trails, etc.	https://highways.dot.gov/safety/proven-safety-countermeasures/walkways
	Develop policies to analyze vulnerable-road-user levels of service, delay and network connectivity as part of project development. Develop and disseminate a Complete Streets policy support guide with model policy and implementation information for local agencies and MPOs.	https://highways.dot.gov/safety/proven-safety-countermeasures/road-diets-roadway-reconfiguration
	Develop strategic pedestrian safety plans tailored to local conditions.	
	Develop a State Pedestrian Safety Action Plan that includes how equity is to be addressed.	

B.8 Post-Crash Care

The survivability of crashes can be enhanced through expedient access to emergency medical care, while creating a safe working environment for vital first responders and preventing secondary crashes through robust TIM practices. Table B-8 provides action plans and links to resources associated with these strategies.

Table B-8. Traffic safety countermeasures for post-crash care.

Strategy	Action Plan	Link
Improve data collection and analysis techniques	Develop and implement a revised crash report form to increase and improve data collection, especially data on roadway and incident clearance times, response times, secondary crashes and responder injuries.	

Strategy	Action Plan	Link
Increase and improve emergency responder training	Develop crash investigation training materials for delivery to sheriffs' deputies, and work with law enforcement liaisons and district traffic safety specialists to deliver the training, especially in rural areas.	
	Expand TIM basic and refresher training requirements.	https://ops.fhwa.dot.gov/tim/training/
Facilitate current and future state and metropolitan TIM teams meetings	Increase first responder participation in existing TIM teams and TIM meetings by soliciting support from TxDOT district traffic safety specialists.	
	Enlist the assistance of TxDOT district traffic safety specialists in identifying existing TIM teams or starting TIM teams to fill voids, especially in rural areas.	
Utilize technology, policy and available personnel to investigate and report crashes more efficiently to enable rapid crash scene clearance	Increase the use of current and emerging technologies to capture information more efficiently for crash reports and to expedite crash scene clearance, especially in rural areas.	
	Identify and implement effective technologies designed to more efficiently capture crash report information and clear crash scenes.	
Identify and implement engineering solutions where possible to reduce response times	Support an Open Roads Policy statewide that facilitates quick clearance strategies.	
	Identify and catalog engineering techniques that affect timely response to crashes.	
	Provide information to TxDOT district traffic safety specialists, MPOs and others on engineering solutions that decrease response times.	

Appendix C. Corridor Analysis Details

Report

General Information

Name	Value
Analyst	r-saylor@tti.tamu.edu
CSSJ	MPO-SBD
District	Paris
County/City	Grayson
Area Type	Urban
Highway Name	FM0120
Evaluation Date	2025-06-18
Letting Date	2025-06-18
Project Category	3R
Number of Segment	5
Number of Intersections	20
From DFO	5.6
To DFO	12.5

Summary Table

Entity	Id	Alias	Location	Extg	D1	D2	Extg	D1	D2
Segment	1		5.62 - 6.29	69.0	72.0	78.0	1.3	1.3	1.2
Segment	2		8.95 - 9.11	70.0	73.0	79.0	0.4	0.3	0.3
Segment	3		9.55 - 9.78	21.0	30.0	70.0	2.1	1.5	0.8
Segment	4		9.78 - 9.89	18.0	24.0	46.0	2.0	1.5	1.0
Segment	5		10.74 - 11.1	9.0	9.0	16.0	4.5	4.5	2.6
Intersection	1		FM 120 @ Ginger	46.0	46.0	89.0	1.4	1.4	0.7
Intersection	2		FM 120 @ FM 1417	72.0	72.0	80.0	2.7	2.7	2.4
Intersection	3		FM 120 @ Preston	59.0	59.0	87.0	0.9	0.9	0.6
Intersection	4		FM 120 @ FM 131	72.0	72.0	92.0	2.5	2.5	1.9
Intersection	5		FM 120 @ Regency	68.0	68.0	89.0	1.0	1.0	0.7
Intersection	6		FM 120 @ York	29.0	29.0	44.0	0.7	0.7	0.4
Intersection	7		FM 120 @ Trout	36.0	36.0	47.0	1.0	1.0	0.7
Intersection	8		FM 120 @ Vick	23.0	27.0	48.0	1.2	1.0	0.6
Intersection	9		FM 120 @ Juanita	27.0	27.0	44.0	0.5	0.5	0.3
Intersection	10		FM 120 @ Derby	27.0	27.0	42.0	0.3	0.3	0.2
Intersection	11		FM 120 @ Bush	69.0	69.0	91.0	0.6	0.6	0.5
Intersection	12		FM 120 @ Brown	39.0	39.0	73.0	1.1	1.1	0.6
Intersection	13		FM 120 @ Perry	39.0	39.0	73.0	1.1	1.1	0.6
Intersection	14		FM 120 @ Tone	16.0	29.0	35.0	2.0	1.1	0.9
Intersection	15		FM 120 @ Chandler	39.0	39.0	73.0	0.9	0.9	0.5
Intersection	16		FM 120 @ Armstrong	35.0	35.0	73.0	1.5	1.5	0.7
Intersection	17		FM 120 @ Barrett	39.0	39.0	73.0	0.8	0.8	0.4
Intersection	18		FM 120 @ Fannin	39.0	39.0	73.0	0.8	0.8	0.4
Intersection	19		FM 120 @ Burnett	39.0	39.0	73.0	0.8	0.8	0.4
Intersection	20		FM 120 @ Rusk	39.0	39.0	73.0	1.0	1.0	0.5
Weighted Total				38.8	40.8	62.3	33.1	30.8	20.3

Selected Design

Design 2

Elements Increasing Safety

Segment: Bicyclist - Street Lighting, Shoulder Width
Intersection: Num of Approaches with Exclusive Left-Turn Lanes, Retroreflective Sheeting to Backplates, Num of Approaches with Exclusive Right-Turn Lanes, Left-Turn Signal Phasing, Minor Street light on bicycle, Prohibit Left-Turns or U-Turns, Minor Intersection type on bicycle

Key Elements Required to Match Optimal Score

Segment: Roadside object, Pedestrian - Sidewalk, Shoulder Width, Bicyclist - Facility

Intersection: Num of Approaches on Major St. with Right-Turn Channelization, Offset Left-Turn Lanes, Retroreflective Sheeting to Backplates, Actuated Advance Warning, Minor Intersection channelization, RA Number of Legs with Right-Turn Bypass Lane, Number of Approaches for which RTOR is Prohibited, Minor Pedestrian crossing facility type, Num of Approaches with Exclusive Right-Turn Lanes, Minor Bicycle path presence and pedestrian crossing facility type, Minor Bicycle facilities and paved shoulder provision (entering & exiting), Minor Vehicle parking, Right-In Right-Out, Minor Median type, Left-Turn Signal Phasing, Minor Intersection type on bicycle

Primary Constraints

ID	Label	Checked
A	Funding Eligibility / Scope	No
B	Schedule / Delivery Timeframe	No
C	Local ROW / Utilities	No
D	ROW / Utilities	No
E	Environmental Issues	No
F	Railroad Impact	No

Funding

ID	Label	Checked
A	Future Funded Project	No
B	Future Unfunded Project Identified	No

Cost and Time

Name	Estimated Number to Achieve Optimal
Cost	
Month	0

Comments On Primary Constraints

Configuration - segment - 1

Milepost Elements

item	Value
From DFO	5.62
To DFO	6.29

Basic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
ADT	8600	8600	8600	8600	8600
Roadway Type	Two-Way	Two-Way	Two-Way	Two-Way	Two-Way
Number of Through Lanes on All Direction(s)	4	4	4	4	4
Posted Speed Limit (mph)	55	55	55	55	55

Geometric Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Median Configuration	Divided	Divided	Divided	Divided	Divided
Median Width (ft)	30	10	30	30	15
Median Barrier Presence	No	No	No	No	No
Lane Width (ft)	11	12	12	12	12
Shoulder Width (ft)	9	4	10	10	10
Horizontal Curve Presence:	No	No	No	No	No

Traffic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Com./Inst. Driveway Num	9	9	9	9	0
Major Residential Driveway Num	0	0	0	0	0
Minor/Other Driveway Num	0	0	0	0	0
Street Lighting Presence	No	No	No	Yes	Yes

Roadside Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Roadside Parking Presence	No	No	No	No	No
Fixed Object Num within 30ft on Both Sides	0	0	0	0	0

Pedestrian Elements

Item	Existing	Standard	Design 1	Design 2	Optimal

Peak-Hour Pedestrian Flow Level along Left Side	0 to 5	0 to 5	0 to 5	0 to 5	0 to 5
Peak-Hour Pedestrian Flow Level along Right Side	0 to 5	0 to 5	0 to 5	0 to 5	0 to 5
Sidewalk	None	Sidewalk adjacent to traveled way (within 3 ft)	None	None	Sidewalk with > 10 ft separation from traveled way with no barrier present
School Zone	School zone flashing beacons or other active warnings present	School zone flashing beacons or other active warnings present	School zone flashing beacons or other active warnings present	School zone flashing beacons or other active warnings present	School zone flashing beacons or other active warnings present
Fencing (i.e., Pedestrian Barrier)	None	None	None	None	None
Number of Transit Bus Stops	0	0	0	0	0
Peak-Hour Pedestrian Crossing Flow Level at Unmarked Crossing Locations	0 to 5	0 to 5	0 to 5	0 to 5	0 to 5
Number of Marked Crossings	0	0	0	0	2
Peak-Hour Pedestrian Crossing Flow Level for Crossing -1					0 to 5
Refuge Island Presence for Crossing -1					Yes
Crossing Traffic Control Device for Crossing -1					PHB or HAWK
Peak-Hour Pedestrian Crossing Flow Level for Crossing -2					0 to 5
Refuge Island Presence for Crossing -2					Yes
Crossing Traffic Control Device for Crossing -2					PHB or HAWK

Bicyclist Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Peak-Hour Bicycle Flow Level (both sides)	0 to 5	0 to 5	0 to 5	0 to 5	0 to 5
Bicycle Facility	Paved shoulder	Separated bicycle path without barrier	Paved shoulder	Paved shoulder	Separated bicycle path without barrier

Configuration - segment - 2

Milepost Elements

item	Value
From DFO	8.95
To DFO	9.11

Basic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
ADT	9831	9831	9831	9831	9831
Roadway Type	Two-Way	Two-Way	Two-Way	Two-Way	Two-Way
Number of Through Lanes on All Direction(s)	4	4	4	4	4
Posted Speed Limit (mph)	50	50	50	50	50

Geometric Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Median Configuration	Divided	Divided	Divided	Divided	Divided
Median Width (ft)	30	10	30	30	15
Median Barrier Presence	No	No	No	No	No
Lane Width (ft)	12	12	12	12	12
Shoulder Width (ft)	9	4	10	10	10
Horizontal Curve Presence:	No	No	No	No	No

Traffic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Com./Inst. Driveway Num	0	0	0	0	0
Major Residential Driveway Num	3	3	3	3	0
Minor/Other Driveway Num	3	3	3	3	0
Street Lighting Presence	No	No	No	Yes	Yes

Roadside Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Roadside Parking Presence	No	No	No	No	No
Fixed Object Num within 30ft on Both Sides	0	0	0	0	0

Pedestrian Elements

Item	Existing	Standard	Design 1	Design 2	Optimal

Peak-Hour Pedestrian Flow Level along Left Side	0 to 5	0 to 5	0 to 5	0 to 5	0 to 5
Peak-Hour Pedestrian Flow Level along Right Side	0 to 5	0 to 5	0 to 5	0 to 5	0 to 5
Sidewalk	None	Sidewalk adjacent to traveled way (within 3 ft)	None	None	Sidewalk with > 10 ft separation from traveled way with no barrier present
School Zone	No school zone	No school zone	No school zone	No school zone	No school zone
Fencing (i.e., Pedestrian Barrier)	None	None	None	None	None
Number of Transit Bus Stops	0	0	0	0	0
Peak-Hour Pedestrian Crossing Flow Level at Unmarked Crossing Locations	0 to 5	0 to 5	0 to 5	0 to 5	0 to 5
Number of Marked Crossings	0	0	0	0	0

Bicyclist Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Peak-Hour Bicycle Flow Level (both sides)	0 to 5	0 to 5	0 to 5	0 to 5	0 to 5
Bicycle Facility	Paved shoulder	Separated bicycle path without barrier	Paved shoulder	Paved shoulder	Separated bicycle path without barrier

Configuration - segment - 3

Milepost Elements

item	Value
From DFO	9.55
To DFO	9.78

Basic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
ADT	9831	9831	9831	9831	9831
Roadway Type	Two-Way	Two-Way	Two-Way	Two-Way	Two-Way
Number of Through Lanes on All Direction(s)	4	4	4	4	4
Posted Speed Limit (mph)	40	40	40	40	40

Geometric Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Median Configuration	TWLTL	TWLTL	TWLTL	Divided	TWLTL
Median Width (ft)				10	
Median Barrier Presence				Yes	Yes
Lane Width (ft)	12	12	12	12	12
Shoulder Width (ft)	0	4	0	0	10
Horizontal Curve Presence:	No	No	No	No	No

Traffic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Com./Inst. Driveway Num	12	12	6	6	0
Major Residential Driveway Num	0	0	0	0	0
Minor/Other Driveway Num	0	0	0	0	0
Street Lighting Presence	No	No	No	Yes	Yes

Roadside Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Roadside Parking Presence	No	No	No	No	No
Fixed Object Num within 30ft on Both Sides	0	0	0	0	0

Pedestrian Elements

Item	Existing	Standard	Design 1	Design 2	Optimal

Peak-Hour Pedestrian Flow Level along Left Side	0 to 5	0 to 5	0 to 5	0 to 5	0 to 5
Peak-Hour Pedestrian Flow Level along Right Side	0 to 5	0 to 5	0 to 5	0 to 5	0 to 5
Sidewalk	None	Sidewalk adjacent to traveled way (within 3 ft)	None	None	Sidewalk with > 10 ft separation from traveled way with no barrier present
School Zone	No school zone	No school zone	No school zone	No school zone	No school zone
Fencing (i.e., Pedestrian Barrier)	None	None	None	None	None
Number of Transit Bus Stops	0	0	0	0	0
Peak-Hour Pedestrian Crossing Flow Level at Unmarked Crossing Locations	0 to 5	0 to 5	0 to 5	0 to 5	0 to 5
Number of Marked Crossings	0	0	0	0	0

Bicyclist Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Peak-Hour Bicycle Flow Level (both sides)	0 to 5	0 to 5	0 to 5	0 to 5	0 to 5
Bicycle Facility	None	Separated bicycle path without barrier	None	None	Separated bicycle path without barrier

Configuration - segment - 4

Milepost Elements

item	Value
From DFO	9.78
To DFO	9.89

Basic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
ADT	18580	18580	18580	18580	18580
Roadway Type	Two-Way	Two-Way	Two-Way	Two-Way	Two-Way
Number of Through Lanes on All Direction(s)	4	4	4	4	4
Posted Speed Limit (mph)	40	40	40	40	40

Geometric Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Median Configuration	TWLTL	TWLTL	TWLTL	Divided	TWLTL
Median Width (ft)				10	
Median Barrier Presence				Yes	Yes
Lane Width (ft)	12	12	12	12	12
Shoulder Width (ft)	0	4	0	0	10
Horizontal Curve Presence:	No	No	No	No	No

Traffic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Com./Inst. Driveway Num	5	5	3	3	0
Major Residential Driveway Num	0	0	0	0	0
Minor/Other Driveway Num	0	0	0	0	0
Street Lighting Presence	No	No	No	Yes	Yes

Roadside Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Roadside Parking Presence	No	No	No	No	No
Fixed Object Num within 30ft on Both Sides	10	10	10	10	0
Min. Offset Distance (ft)	10	10	10	10	

Pedestrian Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Peak-Hour Pedestrian Flow Level along Left Side	0 to 5	0 to 5	0 to 5	0 to 5	0 to 5
Peak-Hour Pedestrian Flow Level along Right Side	0 to 5	0 to 5	0 to 5	0 to 5	0 to 5
Sidewalk	None	Sidewalk adjacent to traveled way (within 3 ft)	None	None	Sidewalk with > 10 ft separation from traveled way with no barrier present
School Zone	No school zone	No school zone	No school zone	No school zone	No school zone
Fencing (i.e., Pedestrian Barrier)	None	None	None	None	None
Number of Transit Bus Stops	0	0	0	0	0
Peak-Hour Pedestrian Crossing Flow Level at Unmarked Crossing Locations	0 to 5	0 to 5	0 to 5	0 to 5	0 to 5
Number of Marked Crossings	0	0	0	0	0

Bicyclist Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Peak-Hour Bicycle Flow Level (both sides)	0 to 5	0 to 5	0 to 5	0 to 5	0 to 5
Bicycle Facility	None	Separated bicycle path without barrier	None	None	Separated bicycle path without barrier

Configuration - segment - 5

Milepost Elements

item	Value
From DFO	10.74
To DFO	11.1

Basic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
ADT	10758	10758	10758	10758	10758
Roadway Type	Two-Way	Two-Way	Two-Way	Two-Way	Two-Way
Number of Through Lanes on All Direction(s)	2	2	2	2	2
Posted Speed Limit (mph)	40	40	40	40	40

Geometric Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Median Configuration	TWLTL	TWLTL	TWLTL	TWLTL	TWLTL
Lane Width (ft)	12	12	12	12	12
Shoulder Width (ft)	0	4	0	0	10
Horizontal Curve Presence:	No	No	No	No	No

Traffic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Com./Inst. Driveway Num	22	22	22	11	0
Major Residential Driveway Num	8	8	8	8	0
Minor/Other Driveway Num	4	4	4	4	0
Street Lighting Presence	No	No	No	Yes	Yes

Roadside Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Roadside Parking Presence	No	No	No	No	No
Fixed Object Num within 30ft on Both Sides	25	25	25	25	0
Min. Offset Distance (ft)	5	5	5	5	

Pedestrian Elements

Item	Existing	Standard	Design 1	Design 2	Optimal

Peak-Hour Pedestrian Flow Level along Left Side	0 to 5	0 to 5	0 to 5	0 to 5	0 to 5
Peak-Hour Pedestrian Flow Level along Right Side	0 to 5	0 to 5	0 to 5	0 to 5	0 to 5
Sidewalk	None	Sidewalk adjacent to traveled way (within 3 ft)	None	None	Sidewalk with > 10 ft separation from traveled way with no barrier present
School Zone	No school zone	No school zone	No school zone	No school zone	No school zone
Fencing (i.e., Pedestrian Barrier)	None	None	None	None	None
Number of Transit Bus Stops	0	0	0	0	0
Peak-Hour Pedestrian Crossing Flow Level at Unmarked Crossing Locations	0 to 5	0 to 5	0 to 5	0 to 5	0 to 5
Number of Marked Crossings	0	0	0	0	1
Peak-Hour Pedestrian Crossing Flow Level for Crossing -1					0 to 5
Refuge Island Presence for Crossing -1					Yes
Crossing Traffic Control Device for Crossing -1					PHB or HAWK

Bicyclist Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Peak-Hour Bicycle Flow Level (both sides)	0 to 5	0 to 5	0 to 5	0 to 5	0 to 5
Bicycle Facility	None	Separated bicycle path without barrier	None	None	Separated bicycle path without barrier

Configuration - intersection - 1

Basic Elements

item	Value
Intersection Location/DFO	5.62
ICE Evaluation	No
Major Roadway Name	FM 120
Major ADT	8600
Major Roadway Type	Two-Way
Major Roadway Through Lane Number on All Direction(s)	4
Major Roadway Speed Limit	55
Major Roadway Pedestrian Level	0 to 5
Major Roadway Bicyclist Level	0 to 5
Minor Roadway Name	Ginger
Minor ADT	172
Minor Roadway Type	Two-Way
Minor Roadway Through Lane Number on All Direction(s)	2
Minor Roadway Speed Limit	30
Minor Roadway Pedestrian Level	0 to 5
Minor Roadway Bicyclist Level	0 to 5
Leg Num	4
Annual Vehicular Crash Rate	0.67
Annual Pedestrian Crash Rate	0
Annual Bicyclist Crash Rate	0

Control Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Control Type	Minor STOP	Minor STOP	Minor STOP	Minor STOP	Minor STOP

Geometric Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Num of Approaches with Exclusive Left-Turn Lanes	1	2	1	2	2
Offset Left-Turn Lanes	No	No	No	No	No
Num of Approaches with Exclusive Right-Turn Lanes	0	0	0	2	2
Num of Approaches on Major St. with Right-Turn Channelization	0	0	0	0	0
Sight Distance (ft)	1320	1320	1320	1320	1320
Median on Min Approach	No	No	No	No	No

Traffic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Street Lighting	No	No	No	Yes	Yes
Number of Approaches with U-Turn Prohibition	0	0	0	0	0

Pedestrian Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Major School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Major Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Major Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	Marked crossing w/out refuge, unsignalized
Major Vehicle parking	None	None	None	None	None
Major Number of auxiliary lanes	1	1	1	1	1
Minor Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Minor School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Minor Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Minor Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	PHB, marked crosswalk w/out refuge
Minor Vehicle parking	Two sides	None	Two sides	Two sides	None
Minor Number of auxiliary lanes	0	1	0	0	1

Bicyclist Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Bicycle facilities and paved shoulder provision (entering)	Paved shoulder	None	Paved shoulder	Paved shoulder	Dedicated bike lane on road
Major Bicycle facilities and paved shoulder provision (exiting)	Paved shoulder	None	Paved shoulder	Paved shoulder	Dedicated bike lane on road
Major Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Major Intersection channelization	No	No	No	No	Present
Minor Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Minor Intersection channelization	No	No	No	No	Yes

Configuration - intersection - 2

Basic Elements

item	Value
Intersection Location/DFO	6.29
ICE Evaluation	No
Major Roadway Name	FM 120
Major ADT	8932
Major Roadway Type	Two-Way
Major Roadway Through Lane Number on All Direction(s)	4
Major Roadway Speed Limit	55
Major Roadway Pedestrian Level	0 to 5
Major Roadway Bicyclist Level	0 to 5
Minor Roadway Name	FM 1417
Minor ADT	3883
Minor Roadway Type	Two-Way
Minor Roadway Through Lane Number on All Direction(s)	2
Minor Roadway Speed Limit	60
Minor Roadway Pedestrian Level	0 to 5
Minor Roadway Bicyclist Level	0 to 5
Leg Num	4
Annual Vehicular Crash Rate	1.33
Annual Pedestrian Crash Rate	0
Annual Bicyclist Crash Rate	0

Control Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Control Type	Minor STOP	Minor STOP	Minor STOP	Minor STOP	Minor STOP

Geometric Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Num of Approaches with Exclusive Left-Turn Lanes	2	2	2	2	2
Offset Left-Turn Lanes	No	No	No	No	No
Num of Approaches with Exclusive Right-Turn Lanes	1	0	1	1	2
Num of Approaches on Major St. with Right-Turn Channelization	0	0	0	0	0
Sight Distance (ft)	1320	1320	1320	1320	1320
Median on Min Approach	No	No	No	No	No

Traffic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Street Lighting	No	No	No	Yes	Yes
Number of Approaches with U-Turn Prohibition	0	0	0	0	0

Pedestrian Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Major School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Major Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Major Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	Marked crossing w/out refuge, unsignalized
Major Vehicle parking	None	None	None	None	None
Major Number of auxiliary lanes	1	1	1	1	1
Minor Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Minor School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Minor Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Minor Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	PHB, marked crosswalk w/out refuge
Minor Vehicle parking	None	None	None	None	None
Minor Number of auxiliary lanes	1	1	1	1	1

Bicyclist Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Bicycle facilities and paved shoulder provision (entering)	Paved shoulder	None	Paved shoulder	Paved shoulder	Dedicated bike lane on road
Major Bicycle facilities and paved shoulder provision (exiting)	Paved shoulder	None	Paved shoulder	Paved shoulder	Dedicated bike lane on road
Major Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Major Intersection channelization	No	No	No	No	Present
Minor Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Minor Intersection channelization	Yes	No	Yes	Yes	Yes

Configuration - intersection - 3

Basic Elements

item	Value
Intersection Location/DFO	6.87
ICE Evaluation	No
Major Roadway Name	FM 120
Major ADT	8932
Major Roadway Type	Two-Way
Major Roadway Through Lane Number on All Direction(s)	4
Major Roadway Speed Limit	55
Major Roadway Pedestrian Level	0 to 5
Major Roadway Bicyclist Level	0 to 5
Minor Roadway Name	Preston
Minor ADT	88
Minor Roadway Type	Two-Way
Minor Roadway Through Lane Number on All Direction(s)	2
Minor Roadway Speed Limit	30
Minor Roadway Pedestrian Level	0 to 5
Minor Roadway Bicyclist Level	0 to 5
Leg Num	4
Annual Vehicular Crash Rate	1.33
Annual Pedestrian Crash Rate	0
Annual Bicyclist Crash Rate	0

Control Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Control Type	Minor STOP	Minor STOP	Minor STOP	Minor STOP	Minor STOP

Geometric Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Num of Approaches with Exclusive Left-Turn Lanes	2	2	2	2	2
Offset Left-Turn Lanes	No	No	No	No	No
Num of Approaches with Exclusive Right-Turn Lanes	0	0	0	2	2
Num of Approaches on Major St. with Right-Turn Channelization	0	0	0	0	0
Sight Distance (ft)	1320	1320	1320	1320	1320
Median on Min Approach	No	No	No	No	No

Traffic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Street Lighting	No	No	No	Yes	Yes
Number of Approaches with U-Turn Prohibition	0	0	0	0	0

Pedestrian Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Major School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Major Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Major Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	Marked crossing w/out refuge, unsignalized
Major Vehicle parking	None	None	None	None	None
Major Number of auxiliary lanes	1	1	1	1	1
Minor Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Minor School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Minor Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Minor Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	PHB, marked crosswalk w/out refuge
Minor Vehicle parking	None	None	None	None	None
Minor Number of auxiliary lanes	0	1	0	0	1

Bicyclist Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Bicycle facilities and paved shoulder provision (entering)	Paved shoulder	None	Paved shoulder	Paved shoulder	Dedicated bike lane on road
Major Bicycle facilities and paved shoulder provision (exiting)	Paved shoulder	None	Paved shoulder	Paved shoulder	Dedicated bike lane on road
Major Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Major Intersection channelization	No	No	No	No	Present
Minor Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Minor Intersection channelization	No	No	No	No	Yes

Configuration - intersection - 4

Basic Elements

item	Value
Intersection Location/DFO	8.55
ICE Evaluation	No
Major Roadway Name	FM 120
Major ADT	9831
Major Roadway Type	Two-Way
Major Roadway Through Lane Number on All Direction(s)	4
Major Roadway Speed Limit	55
Major Roadway Pedestrian Level	0 to 5
Major Roadway Bicyclist Level	0 to 5
Minor Roadway Name	FM 131
Minor ADT	2734
Minor Roadway Type	Two-Way
Minor Roadway Through Lane Number on All Direction(s)	2
Minor Roadway Speed Limit	55
Minor Roadway Pedestrian Level	0 to 5
Minor Roadway Bicyclist Level	0 to 5
Leg Num	4
Annual Vehicular Crash Rate	2.33
Annual Pedestrian Crash Rate	0
Annual Bicyclist Crash Rate	0

Control Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Control Type	Minor STOP	Minor STOP	Minor STOP	Minor STOP	Minor STOP

Geometric Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Num of Approaches with Exclusive Left-Turn Lanes	2	2	2	2	2
Offset Left-Turn Lanes	No	No	No	No	No
Num of Approaches with Exclusive Right-Turn Lanes	1	0	1	2	2
Num of Approaches on Major St. with Right-Turn Channelization	0	0	0	0	0
Sight Distance (ft)	1320	1320	1320	1320	1320
Median on Min Approach	No	No	No	No	No

Traffic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Street Lighting	No	No	No	Yes	Yes
Number of Approaches with U-Turn Prohibition	0	0	0	0	0

Pedestrian Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Major School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Major Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Major Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	Marked crossing w/out refuge, unsignalized
Major Vehicle parking	None	None	None	None	None
Major Number of auxiliary lanes	1	1	1	1	1
Minor Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Minor School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Minor Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Minor Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	PHB, marked crosswalk w/out refuge
Minor Vehicle parking	None	None	None	None	None
Minor Number of auxiliary lanes	1	1	1	1	1

Bicyclist Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Bicycle facilities and paved shoulder provision (entering)	Paved shoulder	None	Paved shoulder	Paved shoulder	Dedicated bike lane on road
Major Bicycle facilities and paved shoulder provision (exiting)	Paved shoulder	None	Paved shoulder	Paved shoulder	Dedicated bike lane on road
Major Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Major Intersection channelization	No	No	No	No	Present
Minor Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Minor Intersection channelization	Yes	No	Yes	Yes	Yes

Configuration - intersection - 5

Basic Elements

item	Value
Intersection Location/DFO	9.92
ICE Evaluation	No
Major Roadway Name	FM 120
Major ADT	18580
Major Roadway Type	Two-Way
Major Roadway Through Lane Number on All Direction(s)	4
Major Roadway Speed Limit	40
Major Roadway Pedestrian Level	0 to 5
Major Roadway Bicyclist Level	0 to 5
Minor Roadway Name	Regency
Minor ADT	172
Minor Roadway Type	Two-Way
Minor Roadway Through Lane Number on All Direction(s)	2
Minor Roadway Speed Limit	30
Minor Roadway Pedestrian Level	0 to 5
Minor Roadway Bicyclist Level	0 to 5
Leg Num	4
Annual Vehicular Crash Rate	0.67
Annual Pedestrian Crash Rate	0
Annual Bicyclist Crash Rate	0

Control Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Control Type	Minor STOP	Minor STOP	Minor STOP	Minor STOP	Minor STOP

Geometric Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Num of Approaches with Exclusive Left-Turn Lanes	2	2	2	2	2
Offset Left-Turn Lanes	No	No	No	No	No
Num of Approaches with Exclusive Right-Turn Lanes	0	0	0	2	2
Num of Approaches on Major St. with Right-Turn Channelization	0	0	0	0	0
Sight Distance (ft)	1320	1320	1320	1320	1320
Median on Min Approach	No	No	No	No	No

Traffic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Street Lighting	Yes	No	Yes	Yes	Yes
Number of Approaches with U-Turn Prohibition	0	0	0	0	0

Pedestrian Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Major School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Major Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Major Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	Marked crossing w/out refuge, unsignalized
Major Vehicle parking	None	None	None	None	None
Major Number of auxiliary lanes	1	1	1	1	1
Minor Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Minor School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Minor Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Minor Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	PHB, marked crosswalk w/out refuge
Minor Vehicle parking	None	None	None	None	None
Minor Number of auxiliary lanes	0	1	0	0	1

Bicyclist Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Major Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Major Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Major Intersection channelization	No	No	No	No	Present
Minor Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Minor Intersection channelization	No	No	No	No	Yes

Configuration - intersection - 6

Basic Elements

item	Value
Intersection Location/DFO	10.27
ICE Evaluation	No
Major Roadway Name	FM 120
Major ADT	18580
Major Roadway Type	Two-Way
Major Roadway Through Lane Number on All Direction(s)	2
Major Roadway Speed Limit	40
Major Roadway Pedestrian Level	0 to 5
Major Roadway Bicyclist Level	0 to 5
Minor Roadway Name	York
Minor ADT	172
Minor Roadway Type	Two-Way
Minor Roadway Through Lane Number on All Direction(s)	2
Minor Roadway Speed Limit	30
Minor Roadway Pedestrian Level	0 to 5
Minor Roadway Bicyclist Level	0 to 5
Leg Num	3
Annual Vehicular Crash Rate	1.33
Annual Pedestrian Crash Rate	0
Annual Bicyclist Crash Rate	0

Control Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Control Type	Minor STOP	Signalized	Minor STOP	Minor STOP	Signalized

Geometric Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Num of Approaches with Exclusive Left-Turn Lanes	1	3	1	3	3
Offset Left-Turn Lanes	No	No	No	No	Yes
Num of Approaches with Exclusive Right-Turn Lanes	1	0	1	2	2
Num of Approaches on Major St. with Right-Turn Channelization	1	0	1	1	0
Sight Distance (ft)	1320		1320	1320	
Median on Min Approach	No		No	No	

Traffic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Street Lighting	Yes	Yes	Yes	Yes	Yes
Left-Turn Signal Phasing		Protected-Permis-sive			Protected
Number of Approaches for which RTOR is Prohibited		0			3
Retroreflective Sheeting to Back-plates		Yes			Yes
Actuated Advance Warning		No			
Prohibit Left-Turns		No			No
Number of Approaches with U-Turn Prohibition	0	0	0	0	0
Right-In Right-Out	No		No	No	

Pedestrian Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Major School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Major Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Major Pedestrian crossing facility type	No facility	Signalized w/out refuge	No facility	No facility	Signalized with refuge
Major Vehicle parking	None	None	None	None	None
Major Number of auxiliary lanes	2	1	2	2	1
Minor Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Minor School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Minor Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Minor Pedestrian crossing facility type	No facility	Signalized w/out refuge	No facility	No facility	Signalized with refuge
Minor Vehicle parking	None	None	None	None	None
Minor Number of auxiliary lanes	0	1	0	0	1

Bicyclist Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Major Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Major Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Major Intersection channelization	No	No	No	No	Present
Minor Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Minor Intersection channelization	No	No	No	No	Yes

Configuration - intersection - 7

Basic Elements

item	Value
Intersection Location/DFO	10.35
ICE Evaluation	No
Major Roadway Name	FM 120
Major ADT	18580
Major Roadway Type	Two-Way
Major Roadway Through Lane Number on All Direction(s)	2
Major Roadway Speed Limit	40
Major Roadway Pedestrian Level	0 to 5
Major Roadway Bicyclist Level	0 to 5
Minor Roadway Name	Trout
Minor ADT	172
Minor Roadway Type	Two-Way
Minor Roadway Through Lane Number on All Direction(s)	2
Minor Roadway Speed Limit	30
Minor Roadway Pedestrian Level	0 to 5
Minor Roadway Bicyclist Level	0 to 5
Leg Num	4
Annual Vehicular Crash Rate	1
Annual Pedestrian Crash Rate	0
Annual Bicyclist Crash Rate	0

Control Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Control Type	Minor STOP	Signalized	Minor STOP	Minor STOP	Signalized

Geometric Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Num of Approaches with Exclusive Left-Turn Lanes	2	4	2	3	4
Offset Left-Turn Lanes	No	No	No	No	Yes
Num of Approaches with Exclusive Right-Turn Lanes	0	0	0	2	4
Num of Approaches on Major St. with Right-Turn Channelization	0	0	0	0	0
Sight Distance (ft)	1320		1320	1320	
Median on Min Approach	No		No	No	

Traffic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Street Lighting	Yes	Yes	Yes	Yes	Yes
Left-Turn Signal Phasing		Protected-Permis-sive			Protected
Number of Approaches for which RTOR is Prohibited		0			4
Retroreflective Sheeting to Back-plates		Yes			Yes
Actuated Advance Warning		No			Yes
Prohibit Left-Turns		No			No
Number of Approaches with U-Turn Prohibition	0	0	0	0	0

Pedestrian Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Major School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Major Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Major Pedestrian crossing facility type	No facility	Signalized w/out refuge	No facility	No facility	Signalized with refuge
Major Vehicle parking	None	None	None	None	None
Major Number of auxiliary lanes	1	1	1	1	1
Minor Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Minor School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Minor Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Minor Pedestrian crossing facility type	No facility	Signalized w/out refuge	No facility	No facility	Signalized with refuge
Minor Vehicle parking	Two sides	None	Two sides	Two sides	None
Minor Number of auxiliary lanes	0	1	0	0	1

Bicyclist Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Major Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Major Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Major Intersection channelization	No	No	No	No	Present
Minor Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Minor Intersection channelization	No	No	No	No	Yes

Configuration - intersection - 8

Basic Elements

item	Value
Intersection Location/DFO	10.74
ICE Evaluation	No
Major Roadway Name	FM 120
Major ADT	10758
Major Roadway Type	Two-Way
Major Roadway Through Lane Number on All Direction(s)	2
Major Roadway Speed Limit	40
Major Roadway Pedestrian Level	0 to 5
Major Roadway Bicyclist Level	0 to 5
Minor Roadway Name	Vick
Minor ADT	1058
Minor Roadway Type	Two-Way
Minor Roadway Through Lane Number on All Direction(s)	2
Minor Roadway Speed Limit	30
Minor Roadway Pedestrian Level	0 to 5
Minor Roadway Bicyclist Level	0 to 5
Leg Num	4
Annual Vehicular Crash Rate	2.33
Annual Pedestrian Crash Rate	0
Annual Bicyclist Crash Rate	0

Control Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Control Type	Signalized	Signalized	Signalized	Signalized	Roundabout
Num of Circulating Lane(s)					1

Geometric Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Num of Approaches with Exclusive Left-Turn Lanes	2	4	2	4	
Offset Left-Turn Lanes	No	No	No	No	
Num of Approaches with Exclusive Right-Turn Lanes	0	0	0	4	
Num of Approaches on Major St. with Right-Turn Channelization	0	0	0	0	
RA Number of Outbound-only Leg(s)					0
RA Number of Legs with Right-Turn Bypass Lane					4
Total Number of Driveways/Access Points of the Roundabout					0

Traffic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Street Lighting	Yes	Yes	Yes	Yes	
Left-Turn Signal Phasing	Permissive	Protected-Permis-sive	Protected-Permis-sive	Protected	
Number of Approaches for which RTOR is Prohibited	0	0	0	0	
Retroreflective Sheeting to Back-plates	No	Yes	Yes	Yes	
Actuated Advance Warning	No	No	No	No	
Prohibit Left-Turns	No	No	No	No	
Number of Approaches with U-Turn Prohibition	0	0	0	4	

Pedestrian Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Major School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Major Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Major Pedestrian crossing facility type	Signalized w/out refuge	Signalized w/out refuge	Signalized w/out refuge	Signalized w/out refuge	Marked crossing w/out refuge, unsignalized
Major Vehicle parking	None	None	None	None	None
Major Number of auxiliary lanes	1	1	1	1	1
Minor Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Minor School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Minor Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Minor Pedestrian crossing facility type	Signalized w/out refuge	Signalized w/out refuge	Signalized w/out refuge	Signalized w/out refuge	PHB, marked crosswalk w/out refuge
Minor Vehicle parking	None	None	None	None	None
Minor Number of auxiliary lanes	0	1	0	0	1

Bicyclist Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Major Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Major Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Major Intersection channelization	No	No	No	No	Present
Minor Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Minor Intersection channelization	No	No	No	No	Yes

Configuration - intersection - 9

Basic Elements

item	Value
Intersection Location/DFO	11.04
ICE Evaluation	No
Major Roadway Name	FM 120
Major ADT	10758
Major Roadway Type	Two-Way
Major Roadway Through Lane Number on All Direction(s)	2
Major Roadway Speed Limit	40
Major Roadway Pedestrian Level	0 to 5
Major Roadway Bicyclist Level	0 to 5
Minor Roadway Name	Juanita
Minor ADT	668
Minor Roadway Type	Two-Way
Minor Roadway Through Lane Number on All Direction(s)	2
Minor Roadway Speed Limit	30
Minor Roadway Pedestrian Level	0 to 5
Minor Roadway Bicyclist Level	0 to 5
Leg Num	3
Annual Vehicular Crash Rate	1.33
Annual Pedestrian Crash Rate	0
Annual Bicyclist Crash Rate	0

Control Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Control Type	Minor STOP	Minor STOP	Minor STOP	Minor STOP	Minor STOP

Geometric Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Num of Approaches with Exclusive Left-Turn Lanes	1	1	1	2	2
Offset Left-Turn Lanes	No	No	No	No	No
Num of Approaches with Exclusive Right-Turn Lanes	0	0	0	1	2
Num of Approaches on Major St. with Right-Turn Channelization	0	0	0	0	0
Sight Distance (ft)	1320	1320	1320	1320	1320
Median on Min Approach	No	No	No	No	No

Traffic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Street Lighting	Yes	No	Yes	Yes	Yes
Number of Approaches with U-Turn Prohibition	0	0	0	0	0
Right-In Right-Out	No	No	No	No	Yes

Pedestrian Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Major School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Major Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Major Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	Marked crossing w/out refuge, unsignalized
Major Vehicle parking	None	None	None	None	None
Major Number of auxiliary lanes	1	1	1	1	1
Minor Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Minor School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Minor Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Minor Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	PHB, marked crosswalk w/out refuge
Minor Vehicle parking	One side	None	One side	One side	None
Minor Number of auxiliary lanes	0	1	0	0	1

Bicyclist Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Major Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Major Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Major Intersection channelization	No	No	No	No	Present
Minor Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Minor Intersection channelization	No	No	No	No	Yes

Configuration - intersection - 10

Basic Elements

item	Value
Intersection Location/DFO	11.17
ICE Evaluation	No
Major Roadway Name	FM 120
Major ADT	10758
Major Roadway Type	Two-Way
Major Roadway Through Lane Number on All Direction(s)	2
Major Roadway Speed Limit	40
Major Roadway Pedestrian Level	0 to 5
Major Roadway Bicyclist Level	0 to 5
Minor Roadway Name	Derby
Minor ADT	172
Minor Roadway Type	Two-Way
Minor Roadway Through Lane Number on All Direction(s)	2
Minor Roadway Speed Limit	30
Minor Roadway Pedestrian Level	0 to 5
Minor Roadway Bicyclist Level	0 to 5
Leg Num	3
Annual Vehicular Crash Rate	0.33
Annual Pedestrian Crash Rate	0
Annual Bicyclist Crash Rate	0

Control Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Control Type	Minor STOP	Minor STOP	Minor STOP	Minor STOP	Minor STOP

Geometric Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Num of Approaches with Exclusive Left-Turn Lanes	1	1	1	2	2
Offset Left-Turn Lanes	No	No	No	No	No
Num of Approaches with Exclusive Right-Turn Lanes	0	0	0	1	2
Num of Approaches on Major St. with Right-Turn Channelization	0	0	0	0	0
Sight Distance (ft)	1320	1320	1320	1320	1320
Median on Min Approach	No	No	No	No	No

Traffic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Street Lighting	Yes	No	Yes	Yes	Yes
Number of Approaches with U-Turn Prohibition	0	0	0	0	0
Right-In Right-Out	No	No	No	No	Yes

Pedestrian Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Major School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Major Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Major Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	Marked crossing w/out refuge, unsignalized
Major Vehicle parking	None	None	None	None	None
Major Number of auxiliary lanes	1	1	1	1	1
Minor Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Minor School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Minor Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Minor Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	PHB, marked crosswalk w/out refuge
Minor Vehicle parking	One side	None	One side	One side	None
Minor Number of auxiliary lanes	0	1	0	0	1

Bicyclist Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Major Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Major Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Major Intersection channelization	No	No	No	No	Present
Minor Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Minor Intersection channelization	No	No	No	No	Yes

Configuration - intersection - 11

Basic Elements

item	Value
Intersection Location/DFO	11.26
ICE Evaluation	No
Major Roadway Name	FM 120
Major ADT	10758
Major Roadway Type	Two-Way
Major Roadway Through Lane Number on All Direction(s)	2
Major Roadway Speed Limit	40
Major Roadway Pedestrian Level	0 to 5
Major Roadway Bicyclist Level	0 to 5
Minor Roadway Name	Bush
Minor ADT	172
Minor Roadway Type	Two-Way
Minor Roadway Through Lane Number on All Direction(s)	2
Minor Roadway Speed Limit	30
Minor Roadway Pedestrian Level	0 to 5
Minor Roadway Bicyclist Level	0 to 5
Leg Num	4
Annual Vehicular Crash Rate	0.67
Annual Pedestrian Crash Rate	0
Annual Bicyclist Crash Rate	0

Control Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Control Type	Minor STOP	Minor STOP	Minor STOP	Minor STOP	Minor STOP

Geometric Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Num of Approaches with Exclusive Left-Turn Lanes	2	2	2	4	2
Offset Left-Turn Lanes	No	No	No	No	No
Num of Approaches with Exclusive Right-Turn Lanes	0	0	0	2	2
Num of Approaches on Major St. with Right-Turn Channelization	0	0	0	0	0
Sight Distance (ft)	1320	1320	1320	1320	1320
Median on Min Approach	No	No	No	No	No

Traffic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Street Lighting	Yes	No	Yes	Yes	Yes
Number of Approaches with U-Turn Prohibition	0	0	0	0	0

Pedestrian Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Major School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Major Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Major Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	Marked crossing w/out refuge, unsignalized
Major Vehicle parking	None	None	None	None	None
Major Number of auxiliary lanes	1	1	1	1	1
Minor Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Minor School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Minor Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Minor Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	PHB, marked crosswalk w/out refuge
Minor Vehicle parking	None	None	None	None	None
Minor Number of auxiliary lanes	0	1	0	0	1

Bicyclist Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Major Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Major Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Major Intersection channelization	No	No	No	No	Present
Minor Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Minor Intersection channelization	No	No	No	No	Yes

Configuration - intersection - 12

Basic Elements

item	Value
Intersection Location/DFO	11.53
ICE Evaluation	No
Major Roadway Name	FM 120
Major ADT	10758
Major Roadway Type	Two-Way
Major Roadway Through Lane Number on All Direction(s)	2
Major Roadway Speed Limit	30
Major Roadway Pedestrian Level	0 to 5
Major Roadway Bicyclist Level	0 to 5
Minor Roadway Name	Brown
Minor ADT	172
Minor Roadway Type	Two-Way
Minor Roadway Through Lane Number on All Direction(s)	2
Minor Roadway Speed Limit	30
Minor Roadway Pedestrian Level	0 to 5
Minor Roadway Bicyclist Level	0 to 5
Leg Num	4
Annual Vehicular Crash Rate	0.67
Annual Pedestrian Crash Rate	0
Annual Bicyclist Crash Rate	0

Control Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Control Type	Minor STOP	Minor STOP	Minor STOP	Minor STOP	Minor STOP

Geometric Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Num of Approaches with Exclusive Left-Turn Lanes	0	2	0	4	2
Offset Left-Turn Lanes	No	No	No	No	No
Num of Approaches with Exclusive Right-Turn Lanes	0	0	0	0	2
Num of Approaches on Major St. with Right-Turn Channelization	0	0	0	0	0
Sight Distance (ft)	1320	1320	1320	1320	1320
Median on Min Approach	No	No	No	No	No

Traffic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Street Lighting	Yes	No	Yes	Yes	Yes
Number of Approaches with U-Turn Prohibition	0	0	0	0	0

Pedestrian Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Major School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Major Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Major Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	Marked crossing w/out refuge, unsignalized
Major Vehicle parking	None	None	None	None	None
Major Number of auxiliary lanes	0	1	0	0	1
Minor Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Minor School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Minor Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Minor Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	PHB, marked crosswalk w/out refuge
Minor Vehicle parking	One side	None	One side	One side	None
Minor Number of auxiliary lanes	0	1	0	0	1

Bicyclist Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Major Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Major Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Major Intersection channelization	No	No	No	No	Present
Minor Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Minor Intersection channelization	No	No	No	No	Yes

Configuration - intersection - 13

Basic Elements

item	Value
Intersection Location/DFO	11.7
ICE Evaluation	No
Major Roadway Name	FM 120
Major ADT	10758
Major Roadway Type	Two-Way
Major Roadway Through Lane Number on All Direction(s)	2
Major Roadway Speed Limit	30
Major Roadway Pedestrian Level	0 to 5
Major Roadway Bicyclist Level	0 to 5
Minor Roadway Name	Perry
Minor ADT	172
Minor Roadway Type	Two-Way
Minor Roadway Through Lane Number on All Direction(s)	2
Minor Roadway Speed Limit	30
Minor Roadway Pedestrian Level	0 to 5
Minor Roadway Bicyclist Level	0 to 5
Leg Num	4
Annual Vehicular Crash Rate	2.33
Annual Pedestrian Crash Rate	0
Annual Bicyclist Crash Rate	0

Control Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Control Type	Minor STOP	Minor STOP	Minor STOP	Minor STOP	Minor STOP

Geometric Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Num of Approaches with Exclusive Left-Turn Lanes	0	2	0	4	2
Offset Left-Turn Lanes	No	No	No	No	No
Num of Approaches with Exclusive Right-Turn Lanes	0	0	0	0	2
Num of Approaches on Major St. with Right-Turn Channelization	0	0	0	0	0
Sight Distance (ft)	1320	1320	1320	1320	1320
Median on Min Approach	No	No	No	No	No

Traffic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Street Lighting	Yes	No	Yes	Yes	Yes
Number of Approaches with U-Turn Prohibition	0	0	0	0	0

Pedestrian Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Major School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Major Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Major Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	Marked crossing w/out refuge, unsignalized
Major Vehicle parking	None	None	None	None	None
Major Number of auxiliary lanes	0	1	0	0	1
Minor Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Minor School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Minor Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Minor Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	PHB, marked crosswalk w/out refuge
Minor Vehicle parking	Two sides	None	Two sides	Two sides	None
Minor Number of auxiliary lanes	0	1	0	0	1

Bicyclist Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Major Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Major Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Major Intersection channelization	No	No	No	No	Present
Minor Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Minor Intersection channelization	No	No	No	No	Yes

Configuration - intersection - 14

Basic Elements

item	Value
Intersection Location/DFO	11.79
ICE Evaluation	No
Major Roadway Name	FM 120
Major ADT	10758
Major Roadway Type	Two-Way
Major Roadway Through Lane Number on All Direction(s)	2
Major Roadway Speed Limit	30
Major Roadway Pedestrian Level	0 to 5
Major Roadway Bicyclist Level	0 to 5
Minor Roadway Name	Tone
Minor ADT	3509
Minor Roadway Type	Two-Way
Minor Roadway Through Lane Number on All Direction(s)	2
Minor Roadway Speed Limit	30
Minor Roadway Pedestrian Level	0 to 5
Minor Roadway Bicyclist Level	0 to 5
Leg Num	4
Annual Vehicular Crash Rate	4.33
Annual Pedestrian Crash Rate	0
Annual Bicyclist Crash Rate	0

Control Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Control Type	Signalized	Signalized	Signalized	Signalized	Roundabout
Num of Circulating Lane(s)					1

Geometric Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Num of Approaches with Exclusive Left-Turn Lanes	0	4	4	4	
Offset Left-Turn Lanes	No	No	No	No	
Num of Approaches with Exclusive Right-Turn Lanes	0	0	0	0	
Num of Approaches on Major St. with Right-Turn Channelization	0	0	0	0	
RA Number of Outbound-only Leg(s)					0
RA Number of Legs with Right-Turn Bypass Lane					4
Total Number of Driveways/Access Points of the Roundabout					0

Traffic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Street Lighting	Yes	Yes	Yes	Yes	
Left-Turn Signal Phasing	Permissive	Protected-Permis-sive	Protected-Permis-sive	Protected	
Number of Approaches for which RTOR is Prohibited	0	0	0	0	
Retroreflective Sheeting to Back-plates	No	Yes	Yes	Yes	
Actuated Advance Warning	No	No	No	No	
Prohibit Left-Turns	No	No	No	No	
Number of Approaches with U-Turn Prohibition	0	0	0	4	

Pedestrian Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Major School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Major Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Major Pedestrian crossing facility type	Signalized w/out refuge	Signalized w/out refuge	Signalized w/out refuge	Signalized w/out refuge	Marked crossing w/out refuge, unsignalized
Major Vehicle parking	None	None	None	None	None
Major Number of auxiliary lanes	0	1	0	0	1
Minor Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Minor School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Minor Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Minor Pedestrian crossing facility type	Signalized w/out refuge	Signalized w/out refuge	Signalized w/out refuge	Signalized w/out refuge	PHB, marked crosswalk w/out refuge
Minor Vehicle parking	None	None	None	None	None
Minor Number of auxiliary lanes	0	1	0	0	1

Bicyclist Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Major Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Major Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Major Intersection channelization	No	No	No	No	Present
Minor Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Minor Intersection channelization	No	No	No	No	Yes

Configuration - intersection - 15

Basic Elements

item	Value
Intersection Location/DFO	11.88
ICE Evaluation	No
Major Roadway Name	FM 120
Major ADT	8709
Major Roadway Type	Two-Way
Major Roadway Through Lane Number on All Direction(s)	2
Major Roadway Speed Limit	30
Major Roadway Pedestrian Level	0 to 5
Major Roadway Bicyclist Level	0 to 5
Minor Roadway Name	Chandler
Minor ADT	172
Minor Roadway Type	Two-Way
Minor Roadway Through Lane Number on All Direction(s)	2
Minor Roadway Speed Limit	30
Minor Roadway Pedestrian Level	0 to 5
Minor Roadway Bicyclist Level	0 to 5
Leg Num	4
Annual Vehicular Crash Rate	1
Annual Pedestrian Crash Rate	0
Annual Bicyclist Crash Rate	0

Control Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Control Type	Minor STOP	Minor STOP	Minor STOP	Minor STOP	Minor STOP

Geometric Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Num of Approaches with Exclusive Left-Turn Lanes	0	2	0	4	2
Offset Left-Turn Lanes	No	No	No	No	No
Num of Approaches with Exclusive Right-Turn Lanes	0	0	0	0	2
Num of Approaches on Major St. with Right-Turn Channelization	0	0	0	0	0
Sight Distance (ft)	1320	1320	1320	1320	1320
Median on Min Approach	No	No	No	No	No

Traffic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Street Lighting	Yes	No	Yes	Yes	Yes
Number of Approaches with U-Turn Prohibition	0	0	0	0	0

Pedestrian Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Major School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Major Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Major Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	Marked crossing w/out refuge, unsignalized
Major Vehicle parking	None	None	None	None	None
Major Number of auxiliary lanes	0	1	0	0	1
Minor Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Minor School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Minor Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Minor Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	PHB, marked crosswalk w/out refuge
Minor Vehicle parking	Two sides	None	Two sides	Two sides	None
Minor Number of auxiliary lanes	0	1	0	0	1

Bicyclist Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Major Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Major Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Major Intersection channelization	No	No	No	No	Present
Minor Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Minor Intersection channelization	No	No	No	No	Yes

Configuration - intersection - 16

Basic Elements

item	Value
Intersection Location/DFO	12.06
ICE Evaluation	No
Major Roadway Name	FM 120
Major ADT	8709
Major Roadway Type	Two-Way
Major Roadway Through Lane Number on All Direction(s)	2
Major Roadway Speed Limit	30
Major Roadway Pedestrian Level	0 to 5
Major Roadway Bicyclist Level	0 to 5
Minor Roadway Name	Armstrong
Minor ADT	889
Minor Roadway Type	Two-Way
Minor Roadway Through Lane Number on All Direction(s)	2
Minor Roadway Speed Limit	30
Minor Roadway Pedestrian Level	0 to 5
Minor Roadway Bicyclist Level	0 to 5
Leg Num	4
Annual Vehicular Crash Rate	3.33
Annual Pedestrian Crash Rate	0
Annual Bicyclist Crash Rate	0

Control Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Control Type	Minor STOP	Minor STOP	Minor STOP	Minor STOP	Minor STOP

Geometric Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Num of Approaches with Exclusive Left-Turn Lanes	0	2	0	4	2
Offset Left-Turn Lanes	No	No	No	No	No
Num of Approaches with Exclusive Right-Turn Lanes	0	0	0	0	2
Num of Approaches on Major St. with Right-Turn Channelization	0	0	0	0	0
Sight Distance (ft)	1320	1320	1320	1320	1320
Median on Min Approach	No	No	No	No	No

Traffic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Street Lighting	No	No	No	Yes	Yes
Number of Approaches with U-Turn Prohibition	0	0	0	0	0

Pedestrian Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Major School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Major Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Major Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	Marked crossing w/out refuge, unsignalized
Major Vehicle parking	None	None	None	None	None
Major Number of auxiliary lanes	0	1	0	0	1
Minor Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Minor School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Minor Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Minor Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	PHB, marked crosswalk w/out refuge
Minor Vehicle parking	Two sides	None	Two sides	Two sides	None
Minor Number of auxiliary lanes	0	1	0	0	1

Bicyclist Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Major Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Major Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Major Intersection channelization	No	No	No	No	Present
Minor Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Minor Intersection channelization	No	No	No	No	Yes

Configuration - intersection - 17

Basic Elements

item	Value
Intersection Location/DFO	12.15
ICE Evaluation	No
Major Roadway Name	FM 120
Major ADT	7104
Major Roadway Type	Two-Way
Major Roadway Through Lane Number on All Direction(s)	2
Major Roadway Speed Limit	30
Major Roadway Pedestrian Level	0 to 5
Major Roadway Bicyclist Level	0 to 5
Minor Roadway Name	Barrett
Minor ADT	172
Minor Roadway Type	Two-Way
Minor Roadway Through Lane Number on All Direction(s)	2
Minor Roadway Speed Limit	30
Minor Roadway Pedestrian Level	0 to 5
Minor Roadway Bicyclist Level	0 to 5
Leg Num	4
Annual Vehicular Crash Rate	1
Annual Pedestrian Crash Rate	0
Annual Bicyclist Crash Rate	0

Control Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Control Type	Minor STOP	Minor STOP	Minor STOP	Minor STOP	Minor STOP

Geometric Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Num of Approaches with Exclusive Left-Turn Lanes	0	2	0	4	2
Offset Left-Turn Lanes	No	No	No	No	No
Num of Approaches with Exclusive Right-Turn Lanes	0	0	0	0	2
Num of Approaches on Major St. with Right-Turn Channelization	0	0	0	0	0
Sight Distance (ft)	1320	1320	1320	1320	1320
Median on Min Approach	No	No	No	No	No

Traffic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Street Lighting	Yes	No	Yes	Yes	Yes
Number of Approaches with U-Turn Prohibition	0	0	0	0	0

Pedestrian Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Major School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Major Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Major Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	Marked crossing w/out refuge, unsignalized
Major Vehicle parking	None	None	None	None	None
Major Number of auxiliary lanes	0	1	0	0	1
Minor Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Minor School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Minor Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Minor Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	PHB, marked crosswalk w/out refuge
Minor Vehicle parking	Two sides	None	Two sides	Two sides	None
Minor Number of auxiliary lanes	0	1	0	0	1

Bicyclist Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Major Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Major Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Major Intersection channelization	No	No	No	No	Present
Minor Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Minor Intersection channelization	No	No	No	No	Yes

Configuration - intersection - 18

Basic Elements

item	Value
Intersection Location/DFO	12.32
ICE Evaluation	No
Major Roadway Name	FM 120
Major ADT	7104
Major Roadway Type	Two-Way
Major Roadway Through Lane Number on All Direction(s)	2
Major Roadway Speed Limit	30
Major Roadway Pedestrian Level	0 to 5
Major Roadway Bicyclist Level	0 to 5
Minor Roadway Name	Fannin
Minor ADT	178
Minor Roadway Type	Two-Way
Minor Roadway Through Lane Number on All Direction(s)	2
Minor Roadway Speed Limit	30
Minor Roadway Pedestrian Level	0 to 5
Minor Roadway Bicyclist Level	0 to 5
Leg Num	4
Annual Vehicular Crash Rate	0.67
Annual Pedestrian Crash Rate	0
Annual Bicyclist Crash Rate	0

Control Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Control Type	Minor STOP	Minor STOP	Minor STOP	Minor STOP	Minor STOP

Geometric Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Num of Approaches with Exclusive Left-Turn Lanes	0	2	0	4	2
Offset Left-Turn Lanes	No	No	No	No	No
Num of Approaches with Exclusive Right-Turn Lanes	0	0	0	0	2
Num of Approaches on Major St. with Right-Turn Channelization	0	0	0	0	0
Sight Distance (ft)	1320	1320	1320	1320	1320
Median on Min Approach	No	No	No	No	No

Traffic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Street Lighting	Yes	No	Yes	Yes	Yes
Number of Approaches with U-Turn Prohibition	0	0	0	0	0

Pedestrian Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Major School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Major Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Major Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	Marked crossing w/out refuge, unsignalized
Major Vehicle parking	None	None	None	None	None
Major Number of auxiliary lanes	0	1	0	0	1
Minor Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Minor School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Minor Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Minor Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	PHB, marked crosswalk w/out refuge
Minor Vehicle parking	None	None	None	None	None
Minor Number of auxiliary lanes	0	1	0	0	1

Bicyclist Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Major Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Major Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Major Intersection channelization	No	No	No	No	Present
Minor Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Minor Intersection channelization	No	No	No	No	Yes

Configuration - intersection - 19

Basic Elements

item	Value
Intersection Location/DFO	12.41
ICE Evaluation	No
Major Roadway Name	FM 120
Major ADT	7104
Major Roadway Type	Two-Way
Major Roadway Through Lane Number on All Direction(s)	2
Major Roadway Speed Limit	30
Major Roadway Pedestrian Level	0 to 5
Major Roadway Bicyclist Level	0 to 5
Minor Roadway Name	Burnett
Minor ADT	172
Minor Roadway Type	Two-Way
Minor Roadway Through Lane Number on All Direction(s)	2
Minor Roadway Speed Limit	30
Minor Roadway Pedestrian Level	0 to 5
Minor Roadway Bicyclist Level	0 to 5
Leg Num	4
Annual Vehicular Crash Rate	0.67
Annual Pedestrian Crash Rate	0
Annual Bicyclist Crash Rate	0

Control Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Control Type	Minor STOP	Minor STOP	Minor STOP	Minor STOP	Minor STOP

Geometric Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Num of Approaches with Exclusive Left-Turn Lanes	0	2	0	4	2
Offset Left-Turn Lanes	No	No	No	No	No
Num of Approaches with Exclusive Right-Turn Lanes	0	0	0	0	2
Num of Approaches on Major St. with Right-Turn Channelization	0	0	0	0	0
Sight Distance (ft)	1320	1320	1320	1320	1320
Median on Min Approach	No	No	No	No	No

Traffic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Street Lighting	Yes	No	Yes	Yes	Yes
Number of Approaches with U-Turn Prohibition	0	0	0	0	0

Pedestrian Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Major School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Major Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Major Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	Marked crossing w/out refuge, unsignalized
Major Vehicle parking	None	None	None	None	None
Major Number of auxiliary lanes	0	1	0	0	1
Minor Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Minor School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Minor Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Minor Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	PHB, marked crosswalk w/out refuge
Minor Vehicle parking	Two sides	None	Two sides	Two sides	None
Minor Number of auxiliary lanes	0	1	0	0	1

Bicyclist Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Major Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Major Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Major Intersection channelization	No	No	No	No	Present
Minor Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Minor Intersection channelization	No	No	No	No	Yes

Configuration - intersection - 20

Basic Elements

item	Value
Intersection Location/DFO	12.5
ICE Evaluation	No
Major Roadway Name	FM 120
Major ADT	7104
Major Roadway Type	Two-Way
Major Roadway Through Lane Number on All Direction(s)	2
Major Roadway Speed Limit	30
Major Roadway Pedestrian Level	0 to 5
Major Roadway Bicyclist Level	0 to 5
Minor Roadway Name	Rusk
Minor ADT	431
Minor Roadway Type	Two-Way
Minor Roadway Through Lane Number on All Direction(s)	2
Minor Roadway Speed Limit	30
Minor Roadway Pedestrian Level	0 to 5
Minor Roadway Bicyclist Level	0 to 5
Leg Num	4
Annual Vehicular Crash Rate	1
Annual Pedestrian Crash Rate	0
Annual Bicyclist Crash Rate	0

Control Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Control Type	Minor STOP	Minor STOP	Minor STOP	Minor STOP	Minor STOP

Geometric Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Num of Approaches with Exclusive Left-Turn Lanes	0	2	0	4	2
Offset Left-Turn Lanes	No	No	No	No	No
Num of Approaches with Exclusive Right-Turn Lanes	0	0	0	0	2
Num of Approaches on Major St. with Right-Turn Channelization	0	0	0	0	0
Sight Distance (ft)	1320	1320	1320	1320	1320
Median on Min Approach	No	No	No	No	No

Traffic Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Street Lighting	Yes	No	Yes	Yes	Yes
Number of Approaches with U-Turn Prohibition	0	0	0	0	0

Pedestrian Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Major School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Major Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Major Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	Marked crossing w/out refuge, unsignalized
Major Vehicle parking	None	None	None	None	None
Major Number of auxiliary lanes	0	1	0	0	1
Minor Median Type	None or flush median	None or flush median	None or flush median	None or flush median	Curbed median >= 3ft wide
Minor School zone warning	No school zone	No school zone	No school zone	No school zone	No school zone
Minor Location of pedestrian crossing	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools	Locations other than schools
Minor Pedestrian crossing facility type	No facility	Marked crossing w/out refuge, unsignalized	No facility	No facility	PHB, marked crosswalk w/out refuge
Minor Vehicle parking	Two sides	None	Two sides	Two sides	None
Minor Number of auxiliary lanes	0	1	0	0	1

Bicyclist Elements

Item	Existing	Standard	Design 1	Design 2	Optimal
Major Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Major Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Major Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Major Intersection channelization	No	No	No	No	Present
Minor Bicycle facilities and paved shoulder provision (entering)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle facilities and paved shoulder provision (exiting)	None	None	None	None	Dedicated bike lane on road
Minor Bicycle path presence and pedestrian crossing facility type	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	No bike path or crossing facility	bike path & marked crossing w/ refuge
Minor Intersection channelization	No	No	No	No	Yes