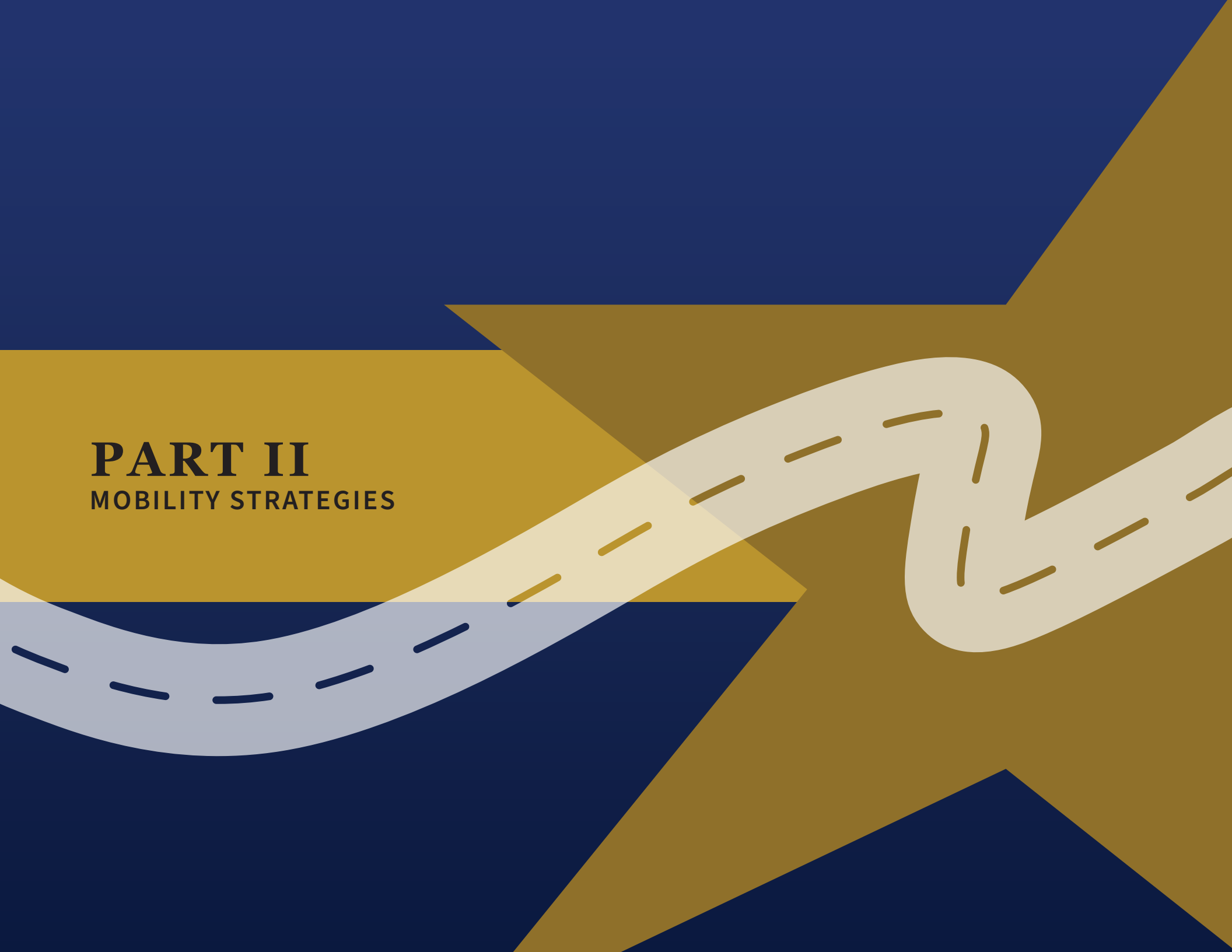




The background is composed of large, overlapping geometric shapes in dark blue, mustard yellow, and light blue. A stylized road with dashed lines runs diagonally across the image, starting from the bottom left and curving towards the top right. The road is divided into two sections: a light blue section in the lower left and a light yellow section in the upper right, with a white dashed line running through the center of both.

PART II

MOBILITY STRATEGIES



The Safe System Approach provides the foundation and framework by which the Mansfield Active Transportation and Safety Plan can be implemented.

CHAPTER 5: SAFETY ACTION PLAN

This chapter provides insight into the purpose of the Safe System and Vision Zero Approach along with highlighting the overarching framework for increasing safety and reducing fatalities. A key component of this plan is the development of the High Injury Network (HIN), which identifies areas within Mansfield that have experienced high rates of fatalities and injuries from crashes. This section details the HIN, including its significance, methodology, and results. Based on the final results of the HIN and stakeholder input, priority corridor segments and intersections were selected to receive targeted recommendations.

Safe System Approach

The Safe System Approach was pioneered by Claes Tingvall, a Swedish road safety expert in the 1990's. The Safe System Approach provides the foundation and framework by which the Mansfield Active Transportation and Safety Plan can be implemented. This approach not only addresses human mistakes but aims to accommodate them through strategic roadway design. The six principles that can be used to implement the Safe System Approach are as follows:



DEATH OR SERIOUS INJURY IS UNACCEPTABLE: *Prioritizing the elimination of severe crashes and preventing fatal and major injuries from occurring, in effort to protect all users on Mansfield's roads.*



HUMANS MAKE MISTAKES: *Human error is inevitable and can lead to collisions; however, well-planned roadways that accommodate human mistakes can reduce the severity of those crashes.*



HUMANS ARE VULNERABLE: *Human ability has a limit for crash tolerance before it results in injury or fatality. This limit is measurable (kinetic energy transfer) and should be taken into consideration when designing transportation systems that accommodate human vulnerabilities.*



RESPONSIBILITY IS SHARED: *Crash prevention and road safety require the collaboration of all people. This includes road users, designers, law enforcement, policymakers, and more. No single party is responsible.*



SAFETY IS PROACTIVE: *To reduce crashes, prevention is necessary. It is vital that proactive countermeasures are in place before crashes occur to mitigate potential risks in a transportation network.*



REDUNDANCY IS CRUCIAL: *Effective change requires strengthening all elements of the transportation network. Protection of people is a priority, and redundancy increases the resilience of the transportation system and prevents systemwide failure.*

The Safe System Approach provides a broad approach to various initiatives that are intended to eliminate serious and fatal injuries. This approach to safety integrates the reality of human error and aims to minimize consequences through the emphasis of multi-layer countermeasures. Crash impacts can be mitigated, and safety overall can be enhanced through strategic roadway design such as reducing speeds, protected lanes, and technological advancements. **Figure 30** visualizes five complementary strategies outlined by U.S. Department of Transportation (USDOT) that support the Safe System Approach.

- 1 **Safe Road Users** are responsible for safe driving and behavior while on the road to ensure they are abiding by federal roadway and state regulations.
- 2 **Safe Vehicles** mitigate the harmful effects of a crash or can prevent a crash from occurring. With advanced safety technology, vehicles can assist drivers and improve driver attention. Features include collision warning, lane departure technology, and emergency braking.
- 3 **Safe Speeds** tremendously influence the roadway environment. Reducing speeds on transportation networks reduces crash impacts, protects everyone, and allows more time for driver response.
- 4 **Safe Roads** involve tactical planning to ensure the road design, structure, operation, and countermeasures work collaboratively to provide a secure environment and improve safety.
- 5 **Post-Crash Care**, such as first responders and emergency services, account for those that respond to a crash.

FIGURE 30. SAFE SYSTEM APPROACH



Source: U.S Department of Transportation



Six E's of Safety

Similar to the Safe Systems Approach, the Six E's of safety are components of an integrated and comprehensive framework. These six components provide diverse perspectives that enhance user experience and improve safety.

Engineering

Engineering projects and interventions can be designed to reduce the frequency and severity of crashes through the built environment. It can be implemented through physical improvements that enhance traffic safety for all users. Examples of engineering enhancements include safety barriers and traffic calming measures that reduce speeds and provide separation among various forms of mobility.



Education

Education can improve safety by raising awareness on transportation choices and provide insight on multi-modal transportation and safety countermeasures. Education can positively benefit road users by demonstrating the proper way of utilizing the system.



Evaluation

Evaluation can support both proactive and responsive measures. Thorough analysis provides a better understanding of the effectiveness of safety measures. By evaluating crash data trends and common points of interest, potential challenges can be addressed for the future safety of the community.



Engagement

Engagement efforts must be made to ensure that underserved, disadvantaged, and diverse populations receive access to roadway infrastructure and safety improvements. Historically, vulnerable and disadvantaged populations lack access to transportation resources and deserve the same opportunities as other areas in the City.



Enforcement

Enforcement can ensure that traffic regulations are in place and being followed by road users. In addition, visibility enforcement can deter behaviors like speeding and other dangerous behaviors.



Encouraging

Encouraging the community to further their knowledge and understanding of safety principles is beneficial in promoting defensive driving and increasing road safety.





Vision Zero

According to the National Highway Traffic Safety Administration, 40,901 people lost their lives in a motor vehicle on U.S roadways in 2023 due to human error. As seen in **Figure 31**, Vision Zero is a road safety initiative that aims to eliminate all fatalities and severe injuries by prioritizing a network that protects road users, serves the community, and adheres to the principles of safe road design. In the 1990s, Sweden was the first country to implement this concept of safety. This multidisciplinary approach emphasizes the importance of addressing human errors in design by implementing crash prevention measures to minimize its impact.

FIGURE 31. VISION ZERO APPROACH

Traditional Approach	Vision Zero	
Prevent crashes	→ Prevent deaths and serious injuries	<i>Whereas traditional road safety strives to modify human behaviors and prevent all crashes, the Safe System Approach also focuses transportation system design and operation on anticipating human mistakes and lessening impact forces to reduce crash severity and save lives.</i>
Improve human behavior	→ Design for human mistakes/limitation	
Control speeding	→ Reduce system kinetic energy	
Individuals are responsible	→ Share responsibility	
React based on crash history	→ Proactively identify and address risks	

Source: Vision Zero Network



Mansfield's State of Safety

This section examines the crash history and societal cost of crashes for the City of Mansfield from 2020–2024. Understanding the state of safety serves as a foundation by building an understanding of crash trends to guide the plan's recommendations and create actions to reduce future crashes. Assessing Mansfield's unique safety needs is a crucial part of developing a plan that addresses the City's specific roadway safety challenges.

Citywide Crash Trends

Crash data from 2020–2024 was collected from the TxDOT Crash Records Information System (CRIS) and analyzed to determine which roadways have experienced the most crashes in Mansfield. Over the five-year period, there were a total of 5,023 crashes in Mansfield with 970 (19.3%) resulting in a fatality (K), serious injury (A), or minor injury (B). In 2024, the highest number of crashes occurred with 1,090 reported, and in 2021, the highest number of fatal crashes occurred with six reported (**Table 13**). Although the total fatalities have decreased since 2021, there are still fatalities occurring and the total crashes have steadily increased according to the data.

Exhibit 16 on page 77 displays a heat map showing density of where these crashes occurred within the City of Mansfield from 2020–2024. Furthermore, **Exhibit 17** on page 78 shows the locations where fatal, serious injury, and minor injury crashes in the City occurred during the study period.

TABLE 13. MANSFIELD CRASHES PER YEAR BY SEVERITY (2020–2024)

YEAR	TOTAL CRASHES	FATALITIES (% OF TOTAL)	SERIOUS INJURY (% OF TOTAL)	MINOR INJURY (% OF TOTAL)	NON-INJURY CRASHES (% OF TOTAL)
2020	819	2 (0.2%)	22 (2.7%)	123 (15.0%)	672 (82.1%)
2021	982	6 (0.6%)	28 (2.9%)	159 (16.2%)	789 (80.3%)
2022	1,048	3 (0.3%)	34 (3.2%)	157 (15.0%)	854 (81.5%)
2023	1,084	2 (0.2%)	37 (3.4%)	166 (15.3%)	879 (81.1%)
2024	1,090	1 (0.1%)	24 (2.2%)	206 (18.9%)	859 (78.8%)
TOTAL	5,023	14 (0.28%)	145 (2.9%)	811 (16.1 %)	4,053 (80.7%)

Top Contributing Factors

Crashes may occur due to several different factors such as distracted driving, speeding, or being impaired. Understanding the factors that contributed to a crash is pivotal to safety planning as they show the specific issues that led to a crash occurring. For example, if an area has many severe crashes attributed to ‘Disregard Stop Sign or Light’, this means safety efforts should prioritize ending red light and stop sign running. Contributing factors in crash analysis refers to the behaviors or actions that end up resulting in an incident. Police officers reporting crashes may identify multiple contributing factors for a single crash.

The most common contributing factors of crashes in City of Mansfield are shown in **Table 14**. ‘Speeding’ was the highest contributing factor in the City, with 1,144 total crashes (22.8%) and 224 fatal and injury-related crashes (19.6% of KABs). The other most prevalent contributing factors are: ‘Driver Inattention’ (861), ‘Failed to Yield Right of Way – Turning Left’ (657), ‘Followed Too Close’ (320), and ‘Changed Lane When Unsafe’ (313).

TABLE 14. TOP CONTRIBUTING FACTORS (2020–2024)

CONTRIBUTING FACTORS	CRASH COUNT	PERCENT OF CRASHES
Speeding	1,144	22.8%
Driver Inattention	861	17.1%
Failed to Yield Right of Way – Turning Left	657	13.1%
Followed Too Closely	320	6.4%
Changed Lane When Unsafe	313	6.2%

Top Manners of Collision

While contributing factors give an insight into why a crash may have occurred, manners of collision describe how the crash occurred. The top manner of collision in Mansfield was ‘One Motor Vehicle – Going Straight’ crashes with 896 crashes. Additionally, ‘Same Direction – One Straight-One Stopped’ crashes (826 total crashes) were prevalent during this time. **Table 15** shows the top manners of collision for Mansfield crashes from 2020–2024.

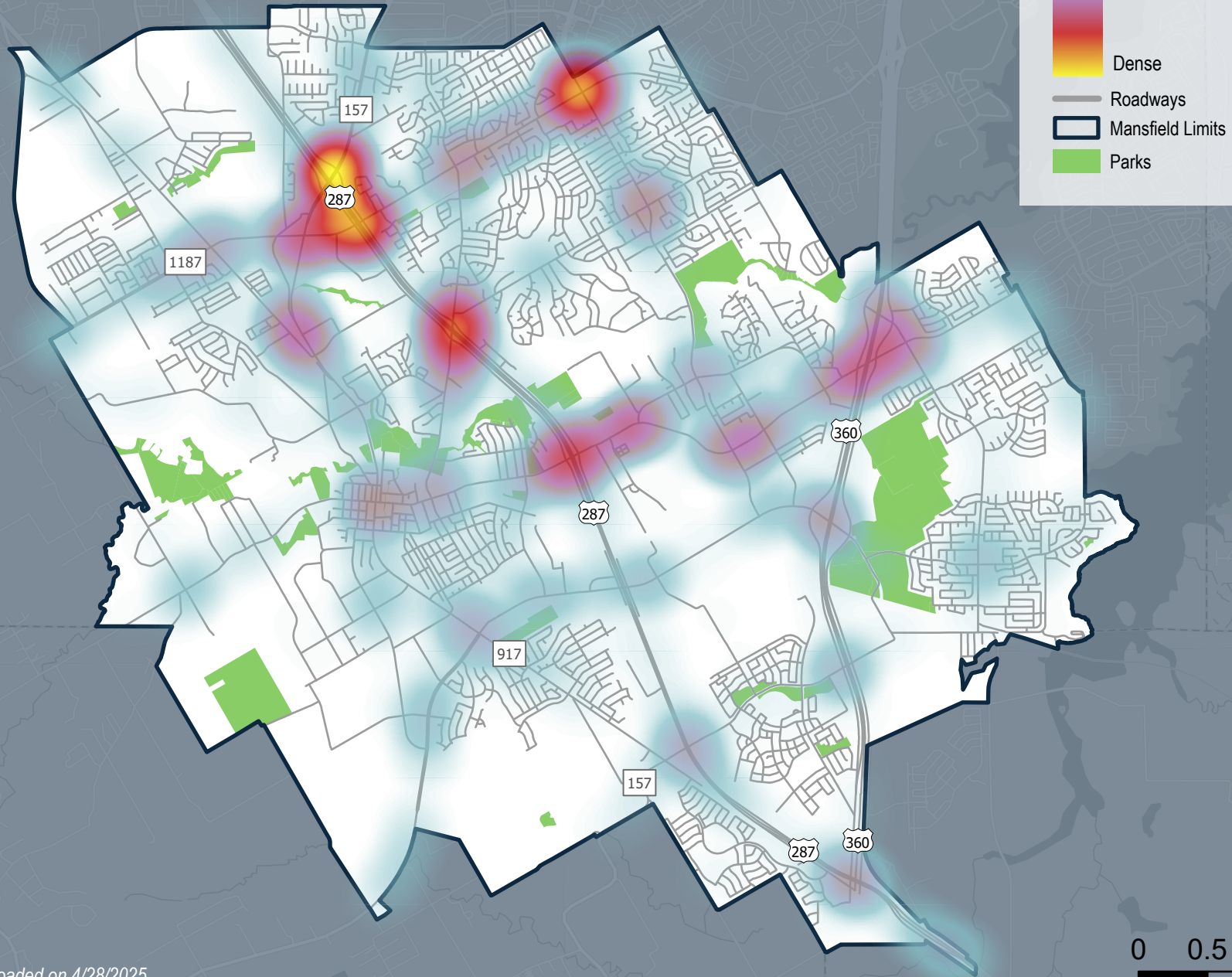
TABLE 15. TOP MANNERS OF COLLISION (2020–2024)

MANNERS OF COLLISION	CRASH COUNT	PERCENT OF CRASHES
One Motor Vehicle – Going Straight	896	17.8%
Same Direction – One Straight-One Stopped	826	16.4%
Angle – Both Going Straight	734	14.6%
Opposite Direction – One Straight-One Left Turn	655	13.0%
Same Direction – Both Going Straight-Rear End	408	8.1%

Crash Heat Map

Sources: City of Mansfield, TxDOT CRIS Database (2020-2024)*

EXHIBIT 16. CRASH HEAT MAP

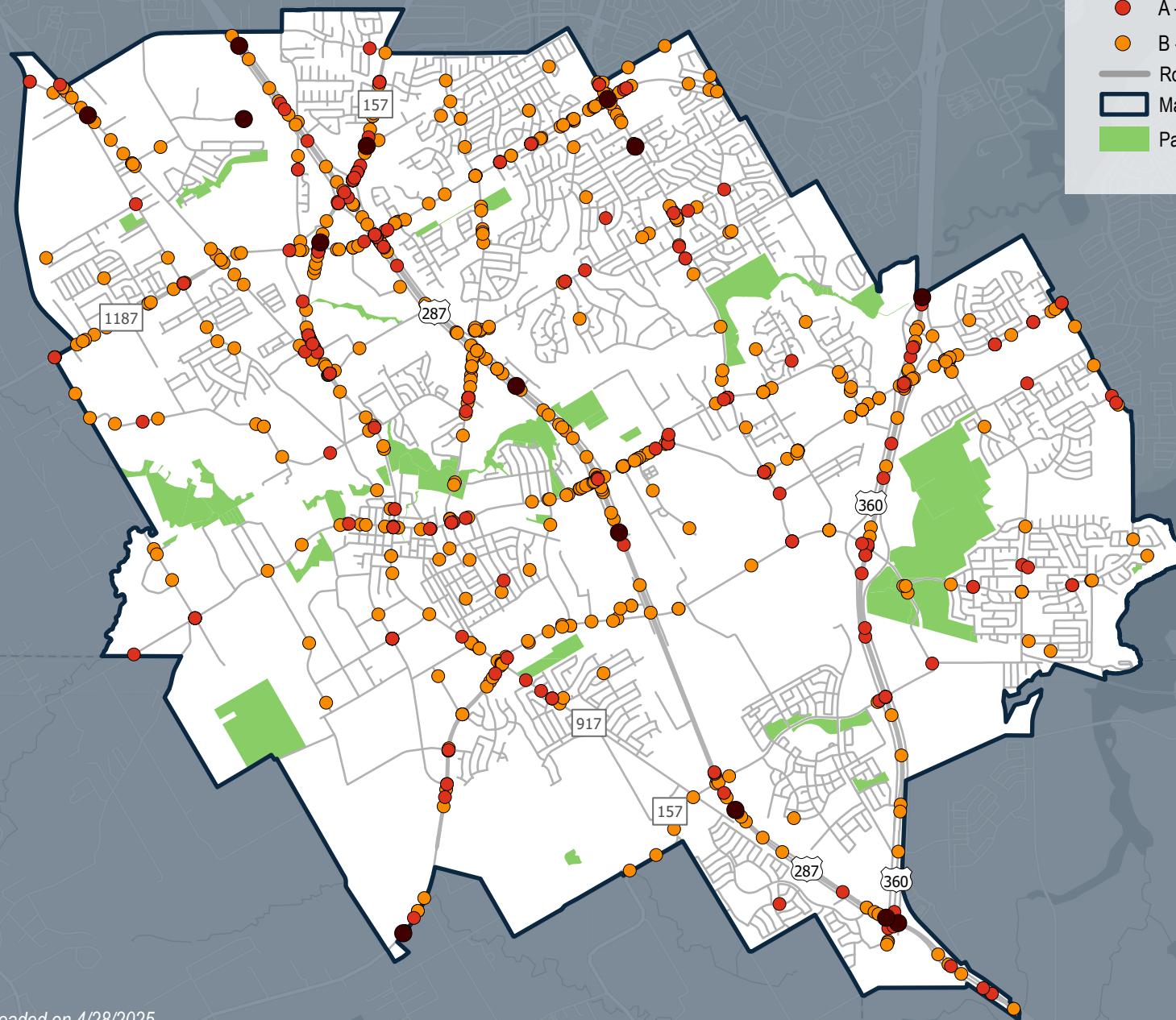


*Data downloaded on 4/28/2025

Fatal & Severe Crashes

Sources: City of Mansfield, TxDOT CRIS Database (2020-2024)*

EXHIBIT 17. FATAL & SEVERE CRASHES (2020-2024)



LEGEND

Crash Severity

- K - Fatal Injury (14) [0.3%]
- A - Suspected Serious Injury (145) [3%]
- B - Suspected Minor Injury (811) [16%]

- Roadways
- ▭ Mansfield Limits
- Parks





Texas Strategic Highway Safety Plan Emphasis Areas

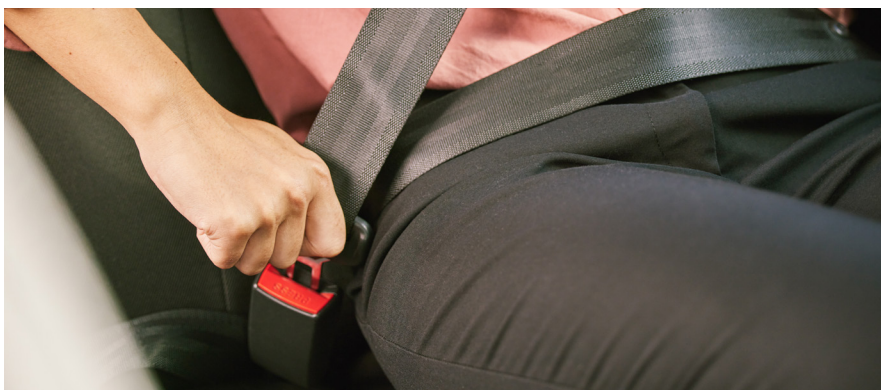
In 2022, the Traffic Safety Division of TxDOT and Department of Public Safety (DPS) updated the Texas Strategic Highway Safety Plan (SHSP) to coordinate the statewide efforts in reducing fatalities and injuries on state and local roadways. This update introduced a Safe System that attributes severe crashes to system flaws instead of just human error. The SHSP analyzed Texas crash data to identify the plan's emphasis areas, which address the crash types, user behaviors, and vehicle types that produce the most frequent and severe crashes. The data gathered in this section of the plan regarding these emphasis areas comes from TxDOT SHSP (2022). Crash data for Mansfield has allowed for crashes concerning the following emphasis areas to be mapped:



ROADWAY AND LANE DEPARTURE: crashes occurring when a vehicle departs from the dedicated lane for its direction of travel



INTERSECTION SAFETY: occurs within an intersection or is related to the movement through an intersection



UNRESTRAINED PERSON: an occupant of a vehicle was not using a restraint



SPEED-RELATED: a vehicle was above the speed limit, under the speed limit but faster than safe conditions, or speed was not properly controlled



IMPAIRED DRIVING: a driver involved in the crash was under the influence of drugs or alcohol, had been drinking, or had been taking medicine



DISTRACTED DRIVING: the driver was distracted from their primary tasks of navigating the vehicle



VULNERABLE ROAD USERS: crashes involve pedestrians or bicyclists



POST-CRASH CARE: services after a crash to reduce the potential severity of the crash and other crashes in the future. There are no crashes to be mapped for the Post-Crash Care emphasis area as it is concerned with what occurs following a crash event.

Roadway and Lane Departures

A roadway or lane departure crash occurs when a vehicle moves outside its designated right of way, entering the median, shoulder, off-road areas, or traveling into oncoming lanes (**Figure 32**). Lane departure crashes also often involve vehicles and stationary objects. Collisions with stationary structures result in a rapid transfer of force to the vehicle, which can lead to serious injury or fatality. Such crashes are more prevalent during low-light conditions due to reduced visibility.

Roadway and lane departure contributed greatly to the presence of crashes in the City. These crashes most occurred on US-287, 360 Tollway, Broad St, and Debbie Ln. From 2020–2024, Mansfield experienced 893 roadway departures, 197 of which resulted in injuries or fatalities (**Table 16**).

Exhibit 18 on page 82 shows the location of roadway and lane departure crashes in Mansfield.

FIGURE 32. ROADWAY & LANE DEPARTURES



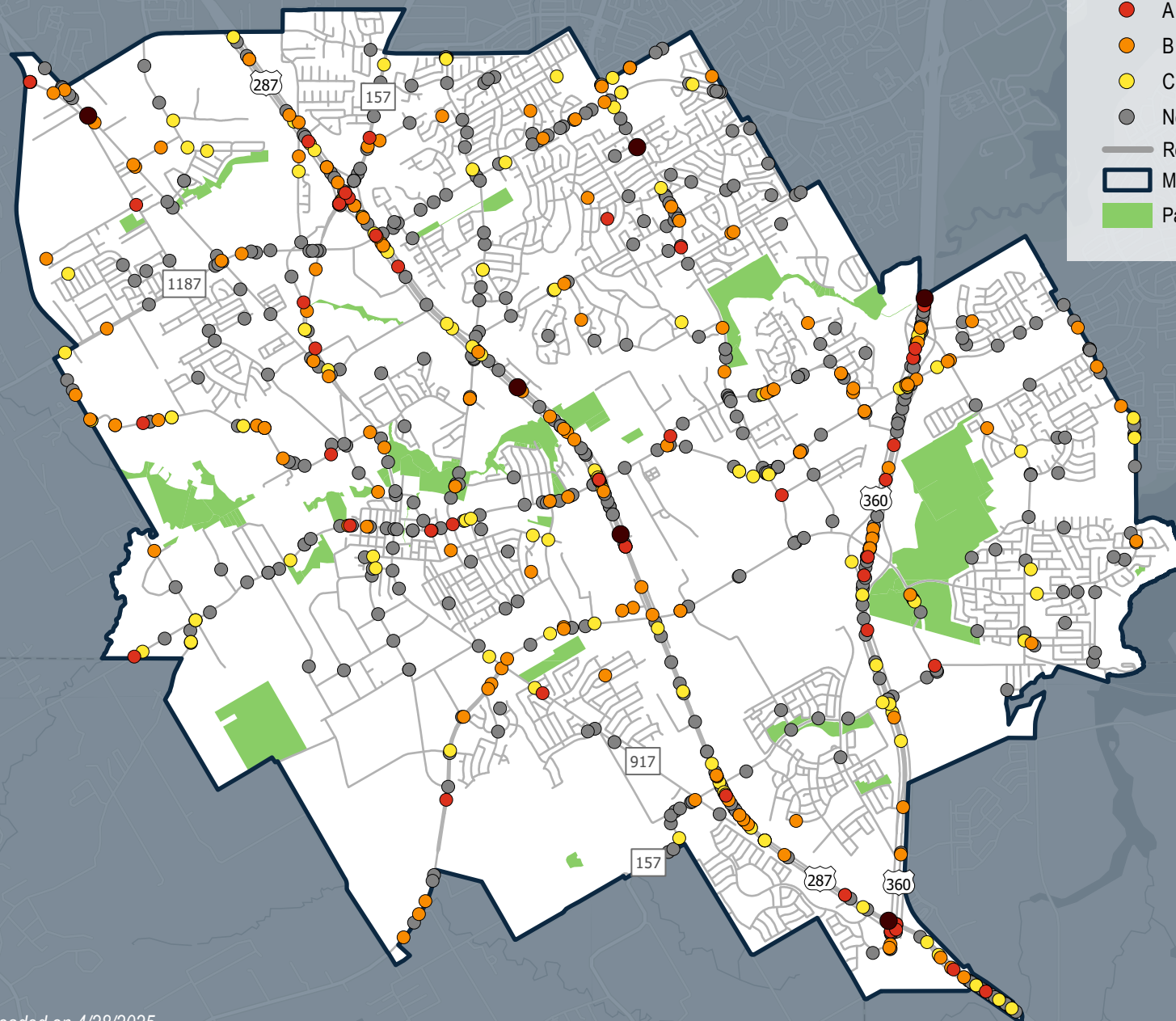
TABLE 16. ROADWAY & LANE DEPARTURE CRASHES (2020–2024)

CRASH TYPE	ALL CRASHES	ROADWAY AND LANE DEPARTURE CRASHES
Total Crashes	5,023	893
% Total	100%	17.8%
High Injury Crashes (KABs)	970	197
% KABs	19.0%	22.1%

Roadway & Lane Departure Crashes

Sources: City of Mansfield, TxDOT CRIS Database (2020-2024)*

EXHIBIT 18. ROADWAY & LANE DEPARTURE CRASHES



LEGEND

Crash Severity

- K - Fatal Injury (6) [0.7%]
- A - Suspected Serious Injury (42) [5%]
- B - Suspected Minor Injury (149) [17%]
- C - Possible Injury (114) [13%]
- No Injury & Unknown Severity (582) [65%]

- Roadways
- ▭ Mansfield Limits
- Parks



Intersection Safety

Intersection-related crashes happen within or near intersections (**Figure 33**), where vehicles travel in multiple directions and collisions are more likely. According to the SHSP, 35% of these crashes in Texas involve angles and 28% involve left turns. Common causes include failure to yield, speeding, and ignoring signals.

From 2020 to 2024, intersections accounted for just over half of all crashes in Mansfield, making them the city's highest crash emphasis area. There were 2,565 intersection-related crash events with 522 resulting in injury or fatality (**Table 17**). **Exhibit 19** on page 84 shows all the location of all intersection-related crashes that occurred in Mansfield.

FIGURE 33. INTERSECTION SAFETY



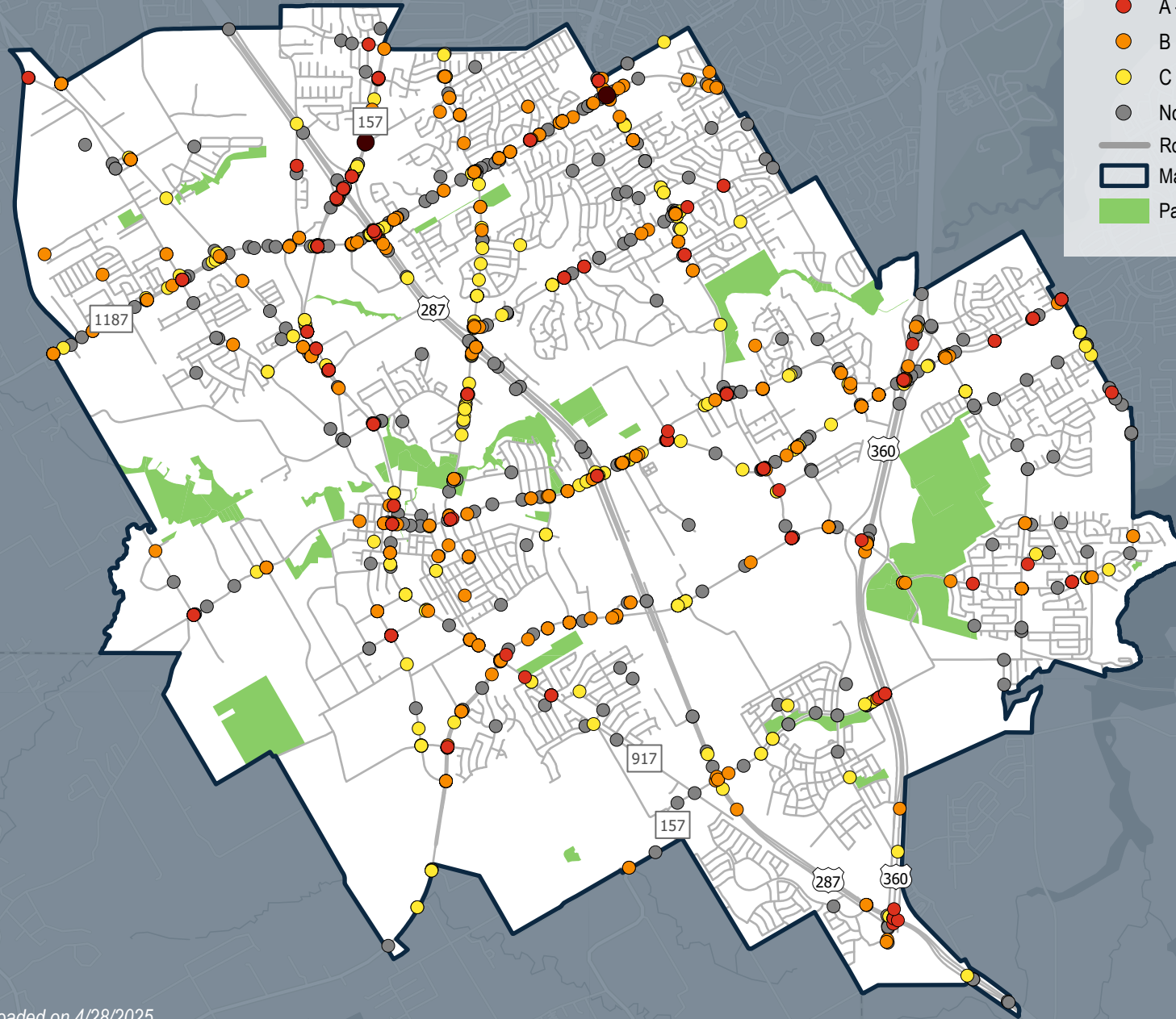
TABLE 17. INTERSECTION CRASHES (2020–2024)

CRASH TYPE	ALL CRASHES	INTERSECTION-RELATED CRASHES
Total Crashes	5,023	2,565
% Total	100%	51.1%
High Injury Crashes (KABs)	970	522
% KABs	19.0%	20.4%

Intersection Related Crashes

Sources: City of Mansfield, TxDOT CRIS Database (2020-2024)*

EXHIBIT 19. INTERSECTION RELATED CRASHES



LEGEND

Crash Severity

- K - Fatal Injury (2) [0.1%]
- A - Suspected Serious Injury (67) [3%]
- B - Suspected Minor Injury (453) [18%]
- C - Possible Injury (549) [21%]
- No Injury & Unknown Severity (1,494) [58%]

- Roadways
- ▭ Mansfield Limits
- ▭ Parks



Unrestrained Person

Collisions involving unrestrained persons occur when there is a person who is not wearing a seatbelt or child restraint. Without wearing restraints, people involved in crashes have nothing to stop or limit the extent to which the force of the crash is transferred to their body, greatly increasing their chance of injury or fatality. In 2021, 27% of the fatalities in Texas crashes involved people who were not wearing seat belts. Wearing a restraint in a vehicle is the most effective way to save a person's life or reduce their chance of injury (**Figure 34**).

In Mansfield, unrestrained persons were involved in only 2.6% of total crashes. Despite this low number, over a third of these crashes resulted in injury or fatality, highlighting the severity of this emphasis area. Crashes involving unrestrained persons were dispersed throughout the City with a slight concentration along FM1187 and US-287. In total, 129 crashes involving unrestrained persons occurred from 2020-2024 in Mansfield, 51 of which resulted in KABs (**Table 18**). **Exhibit 20** on page 86 shows where unrestrained person crashes occurred during the study period.

FIGURE 34. UNRESTRAINED PERSON



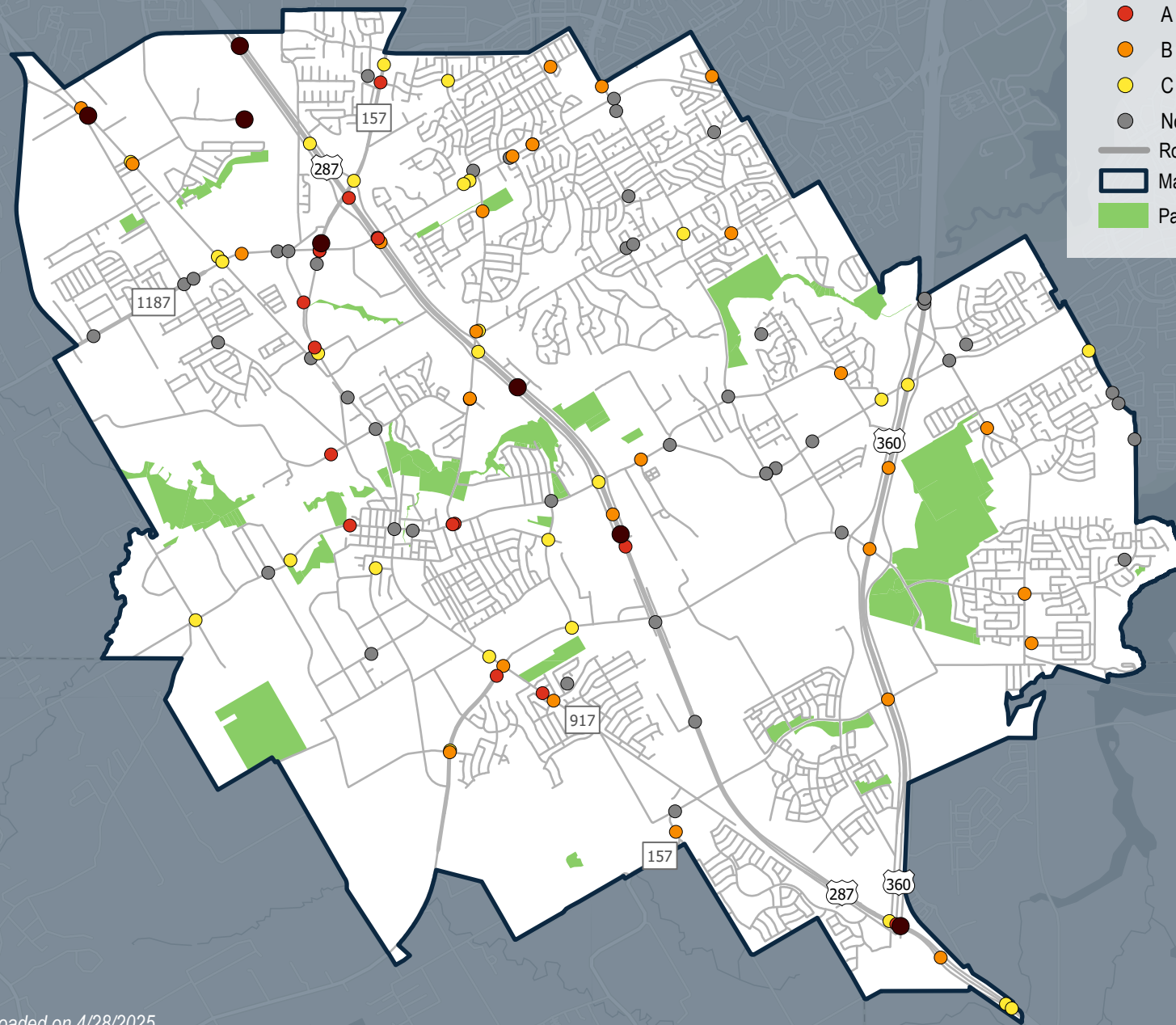
TABLE 18. UNRESTRAINED PERSON CRASHES (2020–2024)

CRASH TYPE	ALL CRASHES	UNRESTRAINED PERSON CRASHES
Total Crashes	5,023	129
% Total	100%	2.6%
High Injury Crashes (KABs)	970	51
% KABs	19.0%	39.5%

Unrestrained Person Crashes

Sources: City of Mansfield, TxDOT CRIS Database (2020-2024)*

EXHIBIT 20. UNRESTRAINED PERSON CRASHES



LEGEND

Crash Severity

- K - Fatal Injury (7) [5%]
- A - Suspected Serious Injury (14) [11%]
- B - Suspected Minor Injury (30) [23%]
- C - Possible Injury (28) [22%]
- No Injury & Unknown Severity (50) [39%]

— Roadways

▭ Mansfield Limits

▭ Parks

Impaired Driving

Driving while impaired refers to operating a vehicle after consuming alcohol, drugs, or certain medications (**Figure 35**). Impairment can affect a driver's ability to make safe decisions and manage the vehicle effectively. Crashes involving impaired drivers are often severe due to decreased control, which increases risk for all road users. Statewide, serious or fatal crashes involving impaired drivers most frequently occur between 10 PM and 2 AM.

Impaired driving crashes make up 4.8% of the City's total crashes. A total of 240 impaired driver crashes took place in Mansfield from 2020–2024. Of these crashes, 58 resulted in fatality or injury (**Table 19**). **Exhibit 21** on page 88 shows the location of all impaired crashes in the City.

FIGURE 35. IMPAIRED DRIVING



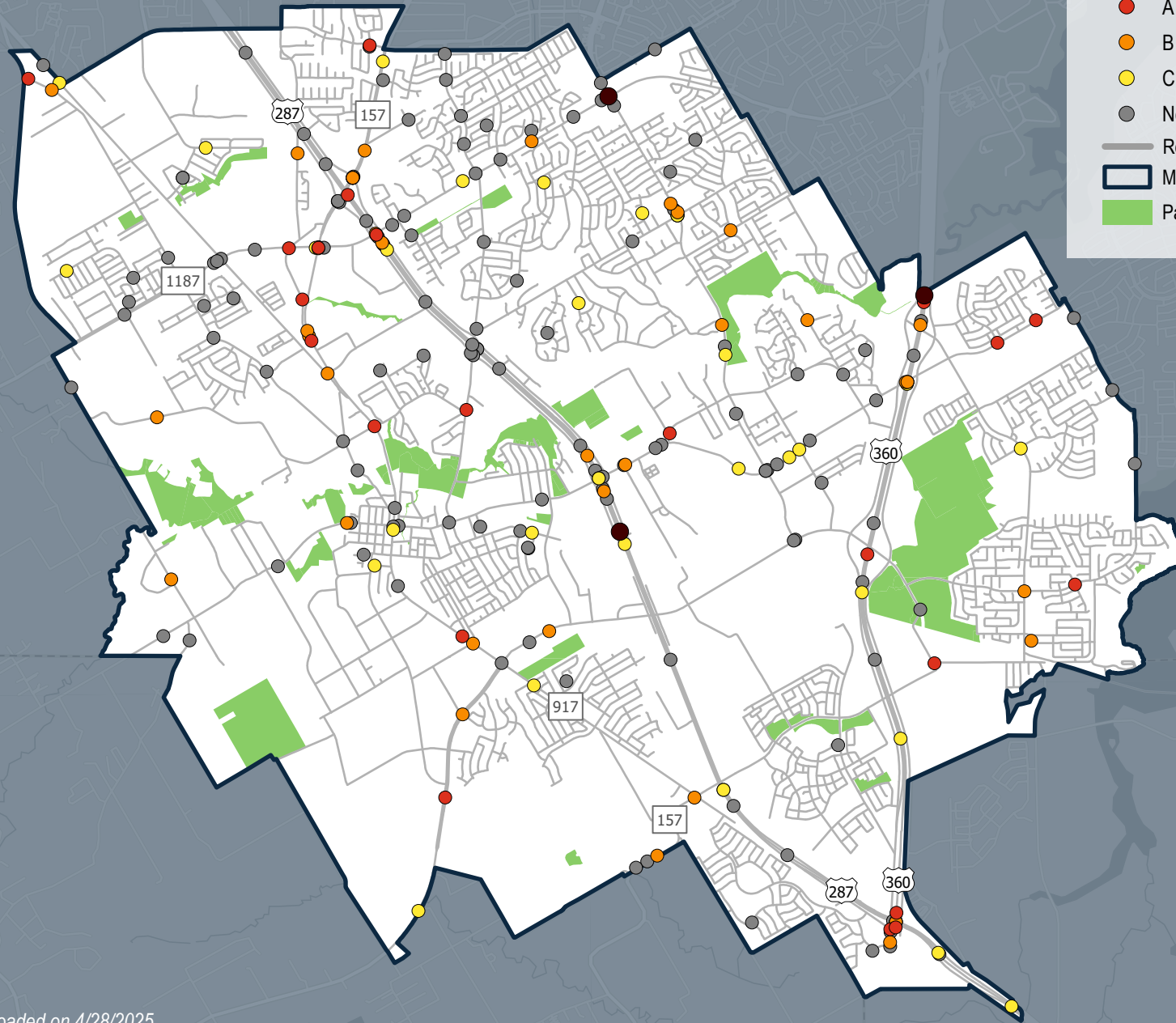
TABLE 19. IMPAIRED DRIVING CRASHES (2020–2024)

CRASH TYPE	ALL CRASHES	IMPAIRED DRIVING CRASHES
Total Crashes	5,023	240
% Total	100%	4.8%
High Injury Crashes (KABs)	970	58
% KABs	19.0%	24.2%

Impaired Driving Crashes

Sources: City of Mansfield, TxDOT CRIS Database (2020-2024)*

EXHIBIT 21. IMPAIRED DRIVING CRASHES



LEGEND

Crash Severity

- K - Fatal Injury (3) [1.3%]
- A - Suspected Serious Injury (22) [9%]
- B - Suspected Minor Injury (33) [14%]
- C - Possible Injury (34) [14%]
- No Injury & Unknown Severity (148) [62%]

- Roadways
- ▭ Mansfield Limits
- Parks

*Data downloaded on 4/28/2025

0 0.5 1 Miles

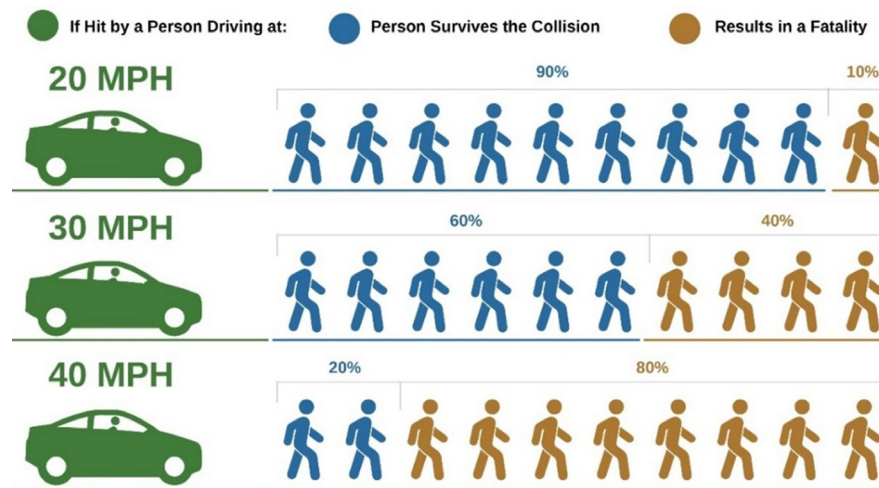


Speed-Related

Speed-related crashes happen when drivers exceed the posted speed limit, drive too fast for current road conditions even if they are below the legal limit, or fail to properly control their vehicle's speed. High-speed collisions have a significantly higher chance of causing serious injuries or fatalities compared to lower-speed incidents. According to the Strategic Highway Safety Plan (SHSP), most speed-related crashes tend to occur on highways and most frequently during daylight hours. The Texas Department of Transportation (TxDOT) emphasizes the importance of identifying specific road segments that would benefit from designated speed zones as a proactive measure to help prevent speed-related crashes and reduce their severity.

Just under a quarter of all crashes in Mansfield have been attributed to being speed-related during the study period. From 2020–2024, 1,144 speed-related crashes occurred in the City; 224 of these (19.6%) resulted in a fatality or injury (Table 20). It's important to note that higher vehicle speeds significantly increase the likelihood of a pedestrian fatality in a crash (Figure 36). Exhibit 22 on page 90 shows the locations of all speed-related crashes occurred in Mansfield.

FIGURE 36. VEHICLE SPEED COMPARISON TO CHANCE OF PEDESTRIAN FATALITY



Source: USDOT

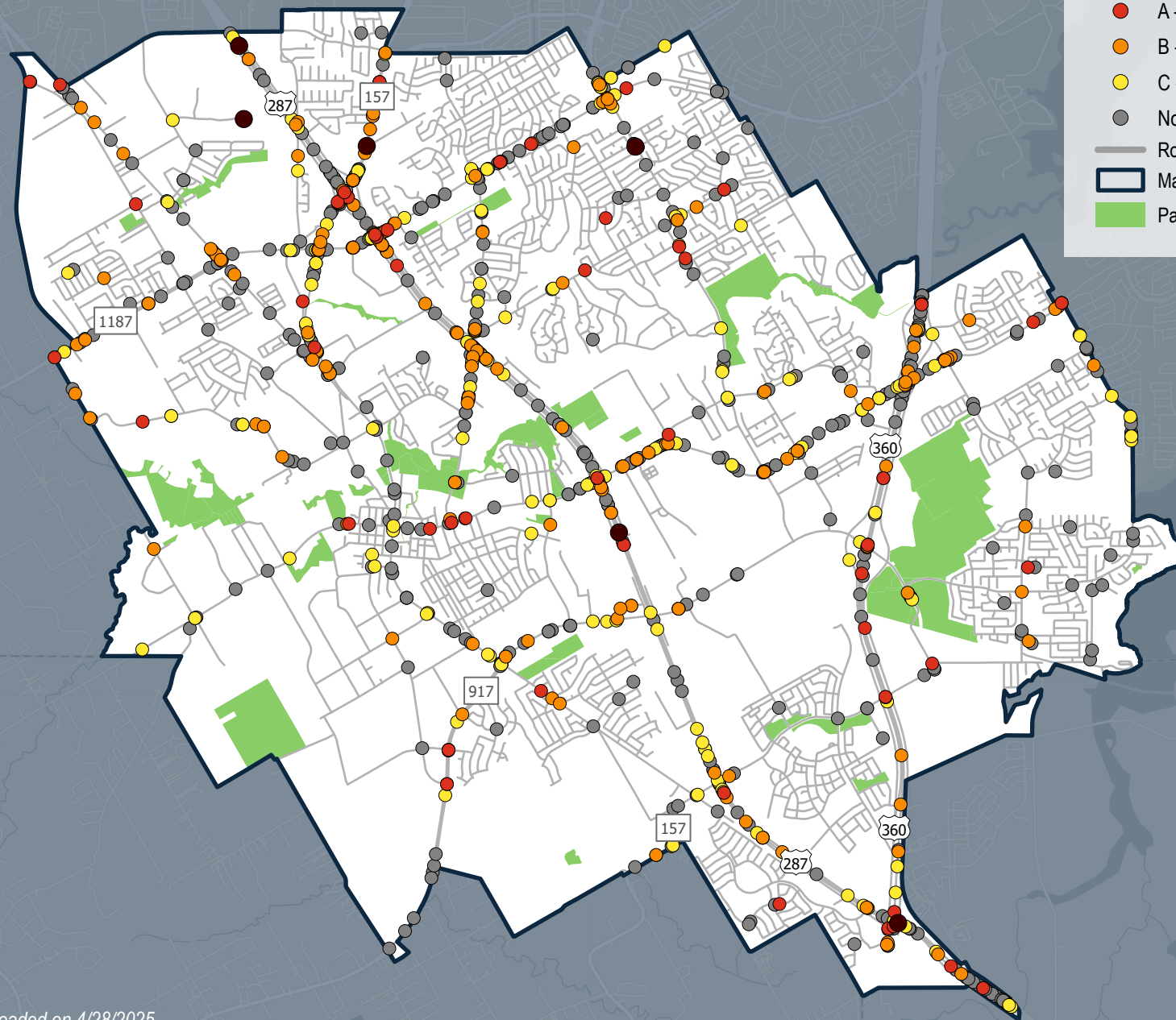
TABLE 20. SPEED-RELATED CRASHES (2020–2024)

CRASH TYPE	ALL CRASHES	SPEED-RELATED CRASHES
Total Crashes	5,023	1,144
% Total	100%	22.8%
High Injury Crashes (KABs)	970	224
% KABs	19.0%	19.6%

Speed-Related Crashes

Sources: City of Mansfield, TxDOT CRIS Database (2020-2024)*

EXHIBIT 22. SPEED-RELATED CRASHES



LEGEND

Crash Severity

- K - Fatal Injury (6) [0.5%]
- A - Suspected Serious Injury (54) [5%]
- B - Suspected Minor Injury (164) [14%]
- C - Possible Injury (227) [20%]
- No Injury & Unknown Severity (693) [61%]

- Roadways
- ▭ Mansfield Limits
- Parks



Distracted Driving

Distracted driving occurs when there is anything that gets the attention of the driver from the primary task of navigating the vehicle (**Figure 37**). Distracted driving reduces the ability for the driver to respond to other vehicles or changing road conditions, creating a dangerous environment for themselves and others. Although research suggests distracted driving is common, it is difficult for it to be noticed and measured. When reporting distracted driving in crashes, any details about the nature of the distraction must be included in the narrative section of the report, which makes it difficult to analyze the trends of distracted driving.

Distracted driving crashes made up 20.4% of crashes in Mansfield during this time frame. Crashes of this type have a great concentration around US-287 and other major arterials throughout the City. There were 1,024 crashes involving distracted drivers; 167 caused a fatality or serious injury (**Table 21**). **Exhibit 23** on page 92 shows where distracted driving crashes occurred in Mansfield during the study period.

FIGURE 37. DISTRACTED DRIVING



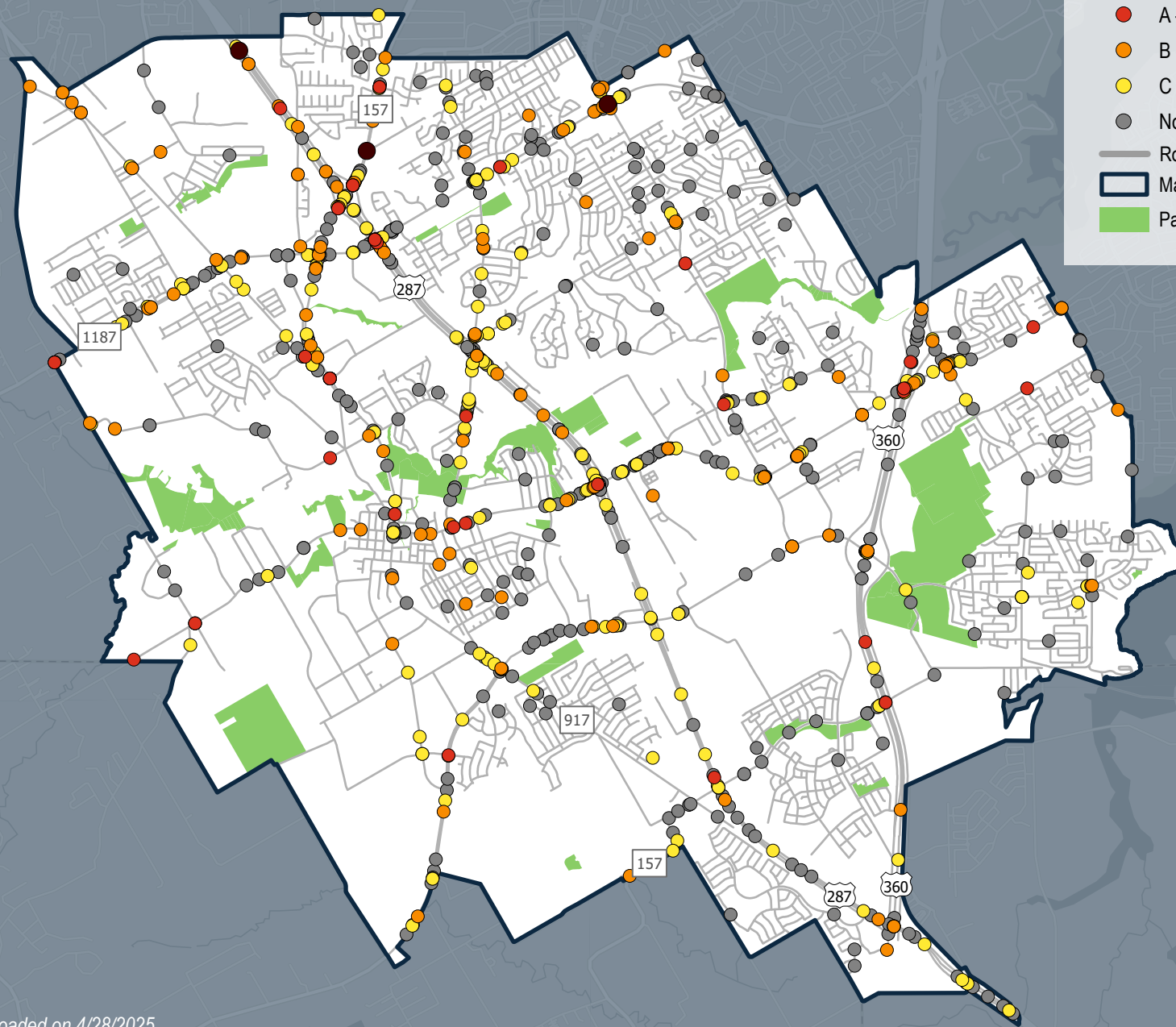
TABLE 21. DISTRACTED DRIVING CRASHES (2020–2024)

CRASH TYPE	ALL CRASHES	DISTRACTED DRIVING CRASHES
Total Crashes	5,023	1,024
% Total	100%	20.4%
High Injury Crashes (KABs)	970	167
% KABs	19.0%	16.3%

Distracted Driving Crashes

Sources: City of Mansfield, TxDOT CRIS Database (2020-2024)*

EXHIBIT 23. DISTRACTED DRIVING CRASHES



LEGEND

Crash Severity

- K - Fatal Injury (3) [0.3%]
- A - Suspected Serious Injury (31) [3%]
- B - Suspected Minor Injury (133) [13%]
- C - Possible Injury (212) [21%]
- No Injury & Unknown Severity (645) [63%]

- Roadways
- ▭ Mansfield Limits
- Parks



Vulnerable Road Users (Bicycle & Pedestrian)

Vulnerable Road Users (VRUs) are defined as pedestrians and bicyclists (**Figure 38**). In the State of Texas, crashes involving VRUS are more likely to end in serious injury or fatality when they occur in dark conditions. These crashes are important to assess for the ATSP as they encompass both the safety and active transportation components. Due to their lack of protection, pedestrians and bicyclists have the highest risk of suffering from fatality or injury from a crash.

Although VRUs accounted for the fewest total crashes, they had the highest proportion of high injury crashes with 76.5% of pedestrian crashes and 76.9% of bicycle crashes resulting in a fatality or injury. Collisions with vulnerable road users were moderately clustered around Debbie Ln, Broad St, and Downtown Mansfield. There were 60 bicycle and pedestrian crashes in 2020–2024 in Mansfield, and 46 were KAB crashes (**Table 22**). **Exhibit 24** on page 94 shows the location of all crashes involving a vulnerable road user in the City.

FIGURE 38. VULNERABLE ROAD USERS



TABLE 22. VULNERABLE ROAD USER CRASHES (2020–2024)

CRASH TYPE	ALL CRASHES	PEDESTRIAN CRASHES	BICYCLE CRASHES
Total Crashes	5,023	34	26
% Total	100%	0.7%	0.5%
High Injury Crashes (KABs)	970	26	20
% KABs	19.0%	76.5%	76.9%

Bicycle Facilities and Crashes

Sources: City of Mansfield, TxDOT

EXHIBIT 24. BICYCLE FACILITIES AND CRASHES

LEGEND

Bicyclist Crashes

- A** - SUSPECTED SERIOUS INJURY
- B** - SUSPECTED MINOR INJURY
- C** - POSSIBLE INJURY
- N** - NOT INJURED

Pedestrian Facilities

- Existing
- In Construction
- Planned (2019)
- Roads
- Parks



0 0.5 1 Miles



Post-Crash Care

Post-crash care focuses on decreasing fatalities and injuries following a crash. The SHSP notes that although they are undesirable, crashes are inevitable. Thus, it is necessary to understand what resources would be needed to mitigate the occurrence of harm to people involved in the crash. Post-crash care covers first responders, trauma and emergency medical services, crash investigation, traffic incident management, and justice (**Figure 39**). The concept encompasses not only immediate medical assistance but also adjustments to road systems aimed at minimizing the severity of future crashes.

FIGURE 39. POST-CRASH CARE



Societal Cost of Crashes

A trend that highlights the impact crashes have on communities is the societal cost of crashes. Every crash, regardless of its severity, ultimately costs money. The costs span across a wide range of areas including medical costs, property damage, decrease in economic productivity, and quality of life. Societal costs are calculated by assigning a monetary value to the impact of crashes by their severity. These costs are a blend of economic costs and the monetized value of impacts. The values used in this analysis are from the Highway Safety Benefit-Cost Analysis Guide from the Federal Highway Administration (FHWA) Safety Program.

The total costs of the crashes that occurred in Mansfield between 2020–2024 are over \$588 million with just 14 fatal crashes making up approximately 27.7% of the total cost. The cost breakdown by severity is shown in **Table 23**.

TABLE 23. SOCIETAL COST OF CRASHES (2020–2024)

CRASH SEVERITY	SOCIETAL CRASH PER CRASH	MANSFIELD CRASHES	SOCIETAL COST OF CRASHES
K – Fatal Injury	\$11,637,947	14	\$162,931,258
A – Suspected Serious Injury	\$674,353	145	\$97,781,185
B – Suspected Minor Injury	\$204,143	811	\$165,559,973
C – Possible Injury	\$129,001	971	\$125,259,971
Non-injury and Unknown	\$12,108	3,082	\$37,316,856
TOTAL SOCIETAL COST OF CRASHES IN MANSFIELD FROM 2020–2024:			\$588,849,243

High Injury Network

The High Injury Network (HIN) is a data-driven analysis conducted in the City of Mansfield to identify corridors and intersections requiring enhanced safety measures based on road segments and intersections that have experienced a higher-than-average rate of crashes resulting in fatal, severe, and minor injuries. The HIN employs the High Safety Manual Critical Crash Rate Method, considering crashes, road classifications, and traffic volumes.

Critical Crash Rate Method

Calculating critical crash rates involves comparing roadway segments with similar functional classes and contexts, normalized by vehicle miles traveled (VMT). If the observed crash rate on a segment exceed the expected crash rate, it is flagged to potentially be added to the HIN. Since the critical crash rate method requires several intermediate calculations to arrive at a final crash rate, an ARCGIS Pro model was created to complete these calculations for each segment on the City's network. The creation of the HIN follows the three critical steps outlined below:

1 Assigning Data to Road Segments

Calculating the critical crash requires four data inputs: roadway functional classification, context, daily traffic volumes, and weighted crash counts. Crashes were assigned weights of 12 for fatal crashes, 3 for severe injury crashes, and 1 for minor injury crashes. This assignment ensured that areas with high injury crashes were prioritized in the development of the HIN. Similarly, traffic volume and functional classifications were also assigned to the roadways during this step.

2 Calculate Variables or Critical Crash Rate

The critical crash rate variables were calculated using equations from the Highway Safety Manual. This rate is determined by comparing the observed crash rate with the expected crash rate. The observed crash rate is based on the actual crashes at each segment per 100 million VMT. The expected average crash rate, also expressed per 100 million VMT, accounts for normalized daily traffic volumes for each functional class. After calculating both values for a segment, the equation identifies segments with a higher crash rate than expected for their classification, traffic volume, and weighted crash counts.

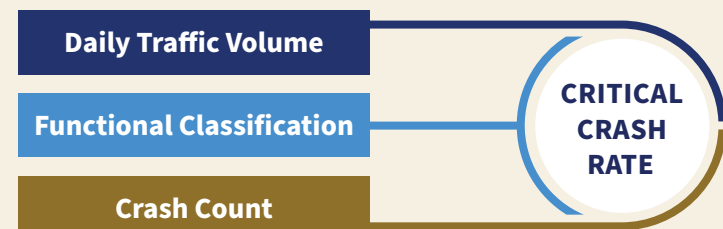
3 Calculate Critical Crash Rate Ratio

After inputting all variables, a ratio is calculated to identify segments with higher-than-average rates of fatal, serious, and minor injury crashes. If this ratio is greater than 1.0, or if the observed crash rate exceeds the critical crash rate, it indicates that the segment's crash history is higher than other road segments of similar functional classification and context.

Segments and intersections with a ratio of 1.0 or higher were considered for inclusion in the High Injury Network (HIN). The critical crash rate is essential for differentiating whether a street should be included in the HIN. By incorporating this rate into our analysis, we can more accurately identify streets with a high frequency of severe crashes, thus prioritizing corridors effectively and maximizing the impact on reducing injuries and fatalities.

Exhibit 25 on page 97 displays the Critical Crash Rate results from the GIS model.

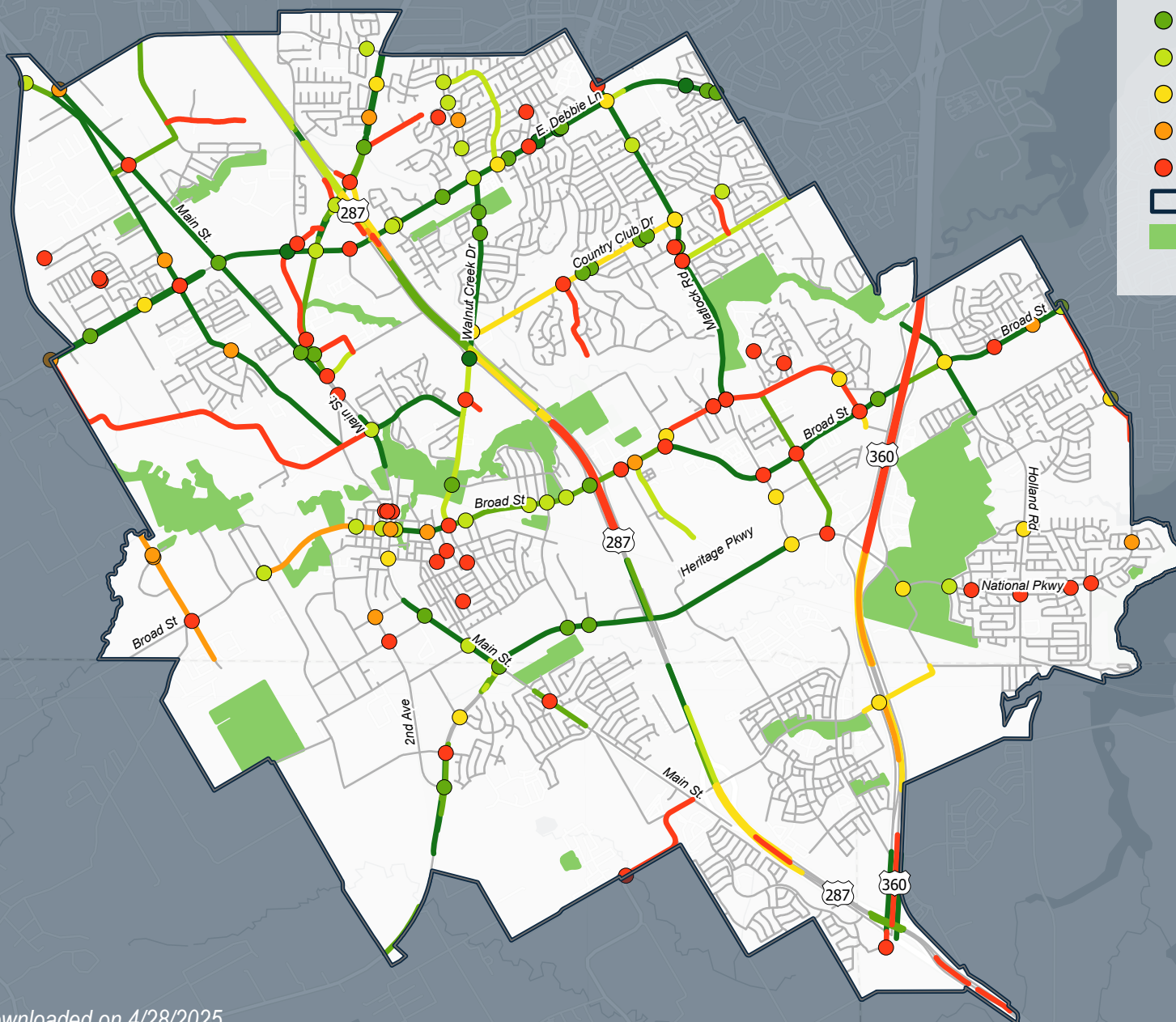
FIGURE 40. HIN DATA INPUTS



Crash Rate Ratios

Sources: City of Mansfield, Replica, TXDOT CRIS Database (2020-2024)*

EXHIBIT 25. CRASH RATE RATIOS



LEGEND

Crash Rate Ratios

- Less than 0.20
- 0.21 - 0.40
- 0.41 - 0.60
- 0.61 - 0.80
- 0.81 - 0.99
- Greater than 1
- Mansfield Limits
- Parks



High Injury Network Results

Creating the High Injury Network (HIN) requires both a qualitative and quantitative approach. While the critical crash rate method identifies locations with higher-than-average crash rates, finalizing the network necessitates further post-processing. This involves a qualitative approach by asking the following questions:

- » What segments and intersections can be identified from the results?
- » What gaps between segments can be closed?
- » How can the amount of road network mileage be minimized?
- » How can the number of fatal, severe injuries, and minor injury crashes be maximized?

This post processing provides a qualitative analysis beyond the data because it is important to look at these corridors from a human perspective that is validated by the data input. Ultimately, the goal of the HIN selection process is to maximize the total fatal, severe, and minor injury crashes on the least mileage of roads on the network. The final HIN for the City of Mansfield comprises 7.4% of the total road network while capturing 85.7% of all fatal crashes, 64.7% of KABs, and 61.5% of bicycle and pedestrian KAB crashes. The map for the Mansfield HIN is displayed in **Exhibit 26** on page 100. **Table 24** below lists each intersection and **Table 25** on page 99 lists each segment and that was included on the HIN.

TABLE 24. HIGH INJURY NETWORK INTERSECTIONS (2020–2024)

HIN INTERSECTIONS	TOTAL CRASH COUNT	CRASH SEVERITY			DAILY VOLUME (AADT)
		K	A	B	
W. Oak St. & N. Main St. (BUS 287)	6	0	1	1	8,900
Vinewood Dr. & S. Main St.	5	0	1	2	2,500
W. Broad St. & Retta Rd.	17	0	1	3	5,600
Hadley Ln. & Barrington Way	3	0	0	2	1,200
Saving Place Dr. & N. Walnut Creek Dr.	21	0	1	6	3,600
Airport Dr. & S. 2nd Ave.	17	0	1	7	1,100
Saint Matthew Dr. & St. Charles Dr.	2	0	0	2	1,100

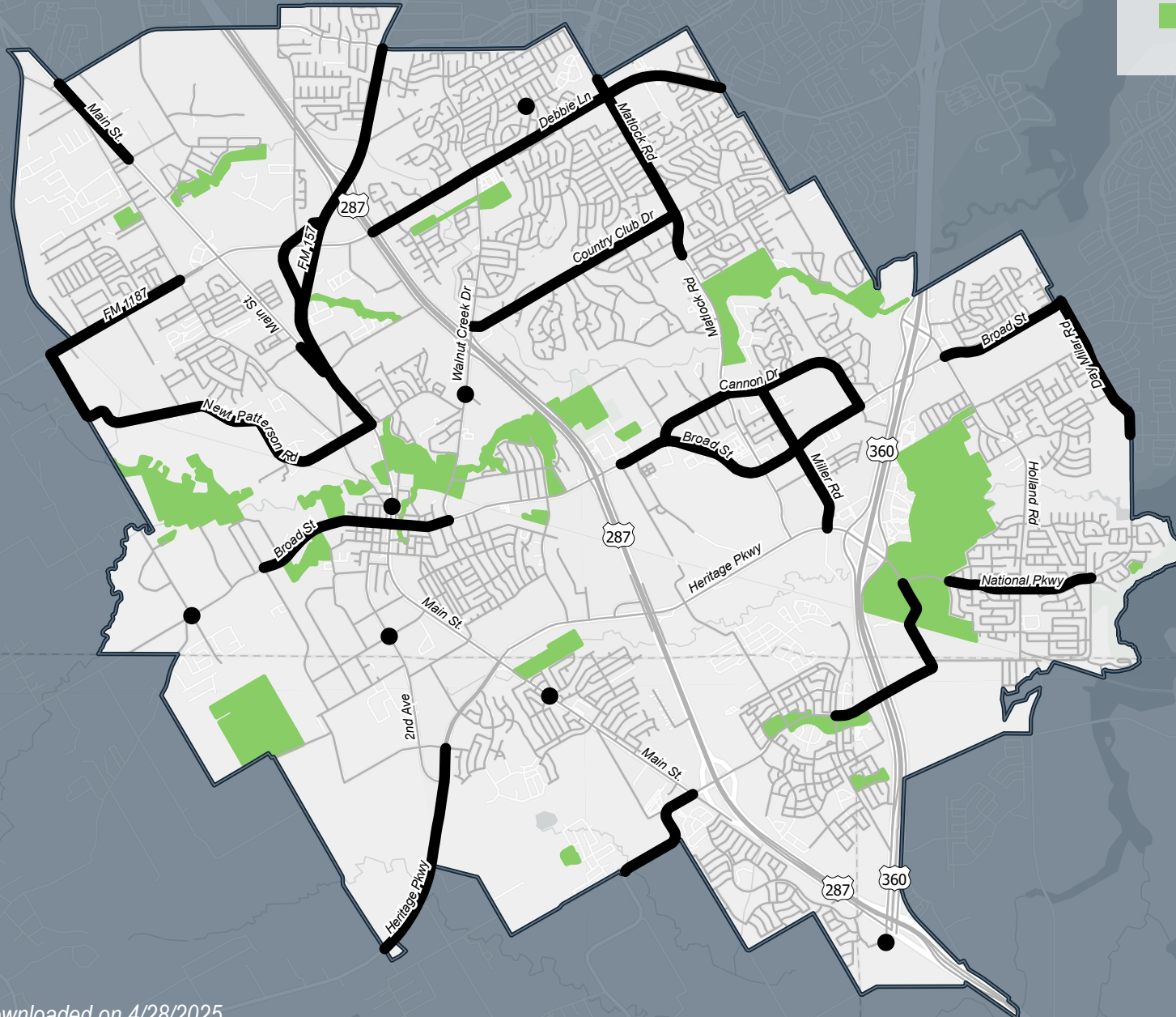
TABLE 25. HIGH INJURY NETWORK SEGMENTS (2020–2024)

ROAD NAME	FROM	TO	TOTAL CRASH COUNT	CRASH SEVERITY			DAILY VOLUME (AADT)
				K	A	B	
Matlock Rd.	Mansfield Webb Rd.	Ragland Rd.	281	2	4	41	26,800
Cannon Dr.	E. Broad St.	E. Broad St.	174	0	5	37	5,200
E. Broad St.	N. Mitchell Rd.	Cannon Dr.	345	0	4	62	21,400
FM 157	Newt Patterson Rd.	Turner Warnell Rd. (Northeast)	588	2	22	102	33,400
Debbie Ln.	US HWY 287	City Boundary (North East)	547	1	9	84	31,400
Lone Star Rd.	S. Matlock Rd.	Britton Rd.	43	0	3	8	5,400
N. Miller Rd.	Cannon Dr.	Heritage Pkwy.	64	0	0	15	2,200
Newt Patterson Rd.	FM 1187	N. Main St.	63	0	4	15	800
Russell Ln.	FM 157	FM 157	52	0	3	9	100
W. Broad St.	Billingslea Dr.	N. Walnut Creek Dr.	107	0	6	25	10,100
Country Club Dr.	N. Walnut Creek Dr.	Matlock Rd.	146	0	2	25	14,500
E. Broad St.	N. Holland Rd.	N. Day Miar Rd.	88	0	2	20	13,800
FM 1187	Newt Patterson Rd.	Cardinal Rd.	80	0	2	19	19,200
N. Day Miar Rd.	E. Broad St.	E. Seeton Rd.	43	0	2	3	15,700
N. Main St.	Legacy Wy.	FM 157/ BUS 287	64	0	3	19	8,200
National Pkwy.	Calloway Dr.	Seeton Rd.	43	0	2	12	4,900
BUS 287/ N. Main St.	Nelson Wyatt Rd.	Turner Warnell Rd. (Northwest)	40	1	0	16	8,200
Heritage Pkwy.	National Pkwy.	Britton Rd.	14	0	1	3	1,200
Lone Star Rd.	City Boundary (South West)	S. Main St.	23	0	0	4	4,300
S. 2nd Ave.	City Boundary (South West)	Klein Tools Blvd.	71	1	4	14	22,200

High Injury Network

Sources: City of Mansfield, Replica, TXDOT CRIS Database (2020-2024)*

EXHIBIT 26. HIGH INJURY NETWORK



LEGEND

- — High Injury Network
- ▭ Mansfield Limits
- ▭ Parks

