LEBANON

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Prepared By:

TEC ENGINEERING, INC.

Lebanon Safe Streets Initiative

LSSI

April 2025

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Key Terms

VISION ZERO – A planning initiative aiming to eliminate severe crashes through consideration of human factors and limitations.

ACTION PLAN – A set of strategies, policies and analytical methods to use to attain the goals of Vision Zero.

COMPLETE STREETS – A policy that aims to create streets capable of supporting all modes of transportation – primarily passenger cars, public transit, bicycles, and pedestrians.

CRASH SEVERITY – A classification of the destruction caused by a crash. A breakdown and explanation of the crash severity levels can be found in Appendix C.

CRASH TYPE – The manner in which a collision occurred, usually specified by the relative direction of travel between both units prior to the crash. A full list of crash types can be found in Appendix C.

DISADVANTAGED AREAS – Census Tracts found to be disadvantaged through the EPA's former EJScreen tool. Communities could be disadvantaged through Climate & Disaster Risk Burden, Environmental Burden, Health Vulnerability, Social Vulnerability, and Transportation Insecurity.

TASK FORCE – A group of individuals affiliated with the City of Lebanon who are tasked with implementing strategies to achieve the Vision Zero initiative.

Common Abbreviations

SS4A – Safe Streets for All

ODOT – Ohio Department of Transportation

LPI – Leading Pedestrian Interval, a type of signal phasing which permits pedestrians to begin walking before corresponding vehicular signal heads turn green

ADA – Americans with Disabilities Act, a civil rights law that governs design of curb ramps

VRU – Vulnerable Road Users, roadway users who are more susceptible to injury in the event of a crash. Definitions vary, but for the purposes of this Plan includes pedestrians, bicyclists, motorcyclists, users of other micromobility devices, and generally those without the protective features of a motor vehicle.

RRFB – Rectangular Rapid Flashing Beacon, a traffic control device

MPO – Metropolitan Planning Organization

OKI – An MPO servicing Ohio, Kentucky, and Indiana

WCTID – Warren County Transportation Improvement District

Commitment Statement

The City of Lebanon is steadfast in its commitment to ensuring the safety and accessibility of our streets for all residents and visitors, whether they walk, bike, drive, or use public transit. Recognizing that traffic-related fatalities and serious injuries are preventable, we embrace the principles of the Safe Streets for All (SS4A) initiative and the Vision Zero strategy to eliminate such incidents within our community.

Understanding Our Challenges

Recent data underscores the urgency of the City's commitment. Between 1998 and 2022, Lebanon experienced multiple traffic accidents, with notable incidents occurring on major thoroughfares such as I-71, US-42, and SR-48. These statistics highlight the need for targeted interventions to enhance road safety across our city.

Ongoing Initiatives and Community Engagement

In 2024, Lebanon partnered with TEC Engineering, Inc. to develop a Comprehensive Safety Action Plan. The Lebanon Safe Streets Initiative seeks to identify and implement strategies that address the specific safety concerns of our community.

Our Commitment

To advance our vision of zero traffic-related deaths and serious injuries, Lebanon pledges to:

- **Implement Data-Driven Solutions**: Utilize crash data and community feedback to identify high-risk areas and prioritize safety improvements.
- **Enhance Infrastructure**: Invest in pedestrian and bicycle infrastructure to provide safe and accessible routes for non-motorized users.
- **Promote Equity**: Ensure that safety enhancements benefit all neighborhoods.
- **Engage the Community**: Foster ongoing dialogue with residents, businesses, schools, and other stakeholders to align safety goals and encourage community participation.
- **Secure Funding**: Pursue federal and state funding opportunities, including SS4A grants, to support the implementation of the Lebanon Safe Streets Initiative.

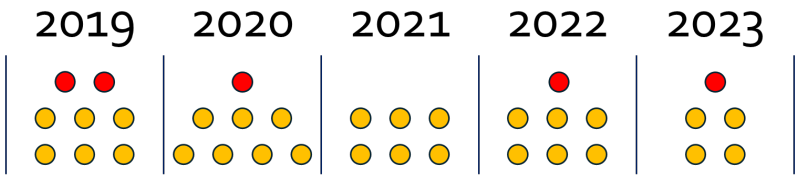
Looking Ahead

By integrating the Vision Zero approach into our transportation planning and policy-making, Lebanon aims to create a safer, more equitable, and more livable community for everyone.

Acknowledgements

Throughout the process of this Plan's creation, residents, local officials, and City officials have demonstrated their interest and commitment to the Vision Zero goal of eliminating deaths and serious injuries on Lebanon's street network. Residents provided valuable input through public surveys and public meetings, and the City's SS4A Task Force advised the consultant team throughout to ensure the Plan addresses the City's needs in a concise and effective manner.

The City acknowledges all residents for their input in the survey – several locations for safety improvements were identified through this input. The City also acknowledges members of the Task Force, council members, and the consultant team for their efforts towards the creation and adoption of this Plan. The City also acknowledges the 5 people who lost their lives and the 29 people who were seriously injured on Lebanon's roads from 2019 to 2023 – the City acknowledges and respects their losses, and hopes to prevent any such future incident.



SS4A TASK FORCE

Mark Messer – City of Lebanon, Mayor
Scott Norris – City of Lebanon, Vice Mayor
Scott Brunka – City of Lebanon, City Manager
Jeff Mitchell – City of Lebanon, Chief of Police
Jason Millard – City of Lebanon, Community Development Director
Ben Stucke – City of Lebanon, City Engineer
Isaac Seevers – Lebanon City Schools, Superintendent
Kurt Weber – Warren County Engineer's Office, County Engineer

CITY OF LEBANON COUNCIL

Mayor Mark Messer
Vice Mayor Scott Norris
Mike Cope
Kristen Eggers
Brad Lamoreaux
Matt Sellers
Jen Harper

CONSULTANT TEAM

TEC Engineering, Inc.

Introduction

The City of Lebanon has committed to the Vision Zero transportation planning initiative, with a goal of zero roadway deaths. This Action Plan details a data-driven, iterative approach to analyzing the City's current safety patterns and steps for improvement, and presents results of the first analysis using this approach. This Action Plan will present short-term, medium-term, and long-term recommendations based on current data. The Plan's analysis will be redone with new crash data on a 3-5 year basis, and new recommendations will be drafted for the planning horizon.

What is Vision Zero?

Vision Zero is a transportation planning initiative originating in Sweden in 1997, which focuses on eliminating fatalities and reducing injuries through acknowledgement of human error. Vision Zero applies primarily to city environments with variations in transportation modes, such as pedestrians, bicyclists, motorcyclists, public transit, and drivers. Special consideration is given to vulnerable road users who are more susceptible to injury in the event of a crash.

Vision Zero also differs from traditional planning in implementation of a systems approach instead of abdication of responsibility to individual drivers. The Safe Systems Approach improves safety through the use of proven safe systems, such as leading pedestrian intervals (LPIs) or roundabouts.

Figure 1: Likelihood of pedestrian deaths if hit at various speeds.

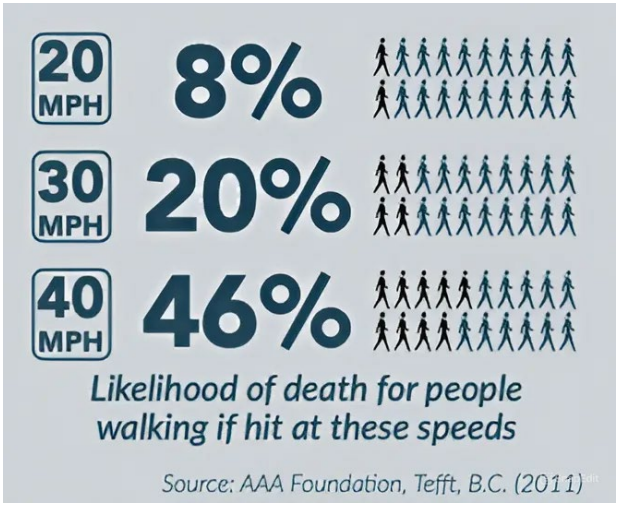
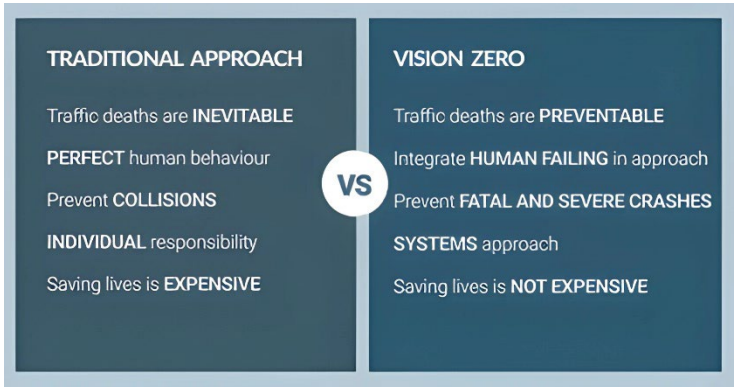


Figure 2: Comparison of Traditional Approach and Vision Zero, courtesy of Vision Zero Network



Past Planning

Past planning efforts are useful in determining which areas are already scoped for improvement by the City. This knowledge can be paired with crash analysis results to determine a more targeted, relevant set of recommendations.

Chapter 6 in the Envision Lebanon Comprehensive Plan details increasing mobility options in the City. Goals outlined are:

- Expand and improve transit opportunities
- Introduce and utilize complete street design guidelines
- Increase pedestrian bicycle safety

One of Lebanon's transportation challenges is servicing the large commuter traffic in and out of the City. There is significant disparity between residents living in the City and those who work in the City. Most residents leave the City for work, and those who come to the City for work commute an average of 24 minutes, placing stress on the surrounding roadway network.

Freight travel in the region is dependent on the roadway network, with most trucks accessing/traveling through the region by State Route 63. Data from 2023 showed that over 900 trucks per day traversed the SR-63 corridor in downtown Lebanon.

The City's transportation network is heavily reliant on vehicles. Alternative transportation options such as the Lebanon Loop bus service. This service began in 2014 and runs from 8a-5p Monday through Friday. Limited bike paths are available, which reflects the low number of bicycle accidents in the City.

The Downtown Lebanon area's walkability is good, and is increasing with recent changes to Broadway and an increased effort towards pedestrian safety along the corridor. Walk Score, a company that measures the walkability of towns and cities, rated Downtown Lebanon with a walk score of 62 (100 being completely walkable, and 0 being completely unwalkable). However, walkability decreases significantly further from downtown – exterior neighborhoods average a walk score of 24.

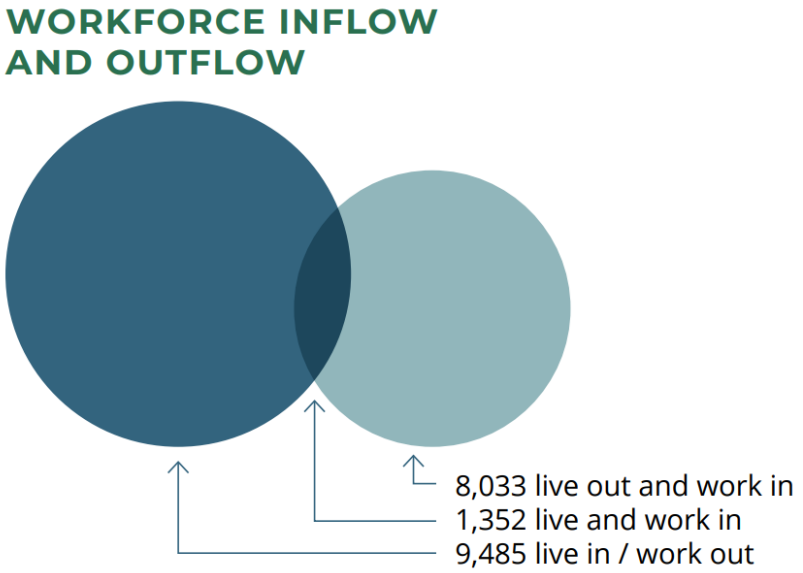


Figure 3: Workforce disparity in Lebanon. (Source: Envision Lebanon 2021)

Goals in Comprehensive Plan

The City of Lebanon plans to extend the City's multi-use path network by implementing the Lebanon-Turtlecreek Trail Initiative. This plan expands the City's existing bike network, connecting it to the nearby Little Miami Scenic Trail. Accessibility to the Little Miami Scenic Trail has the potential to attract new residents and increase property value.

Adopting a complete streets policy will help guide future decisions to prioritize space for safe cycling and walking, improve crossing facilities to better accommodate bicyclists and pedestrians. Many similar decisions have been incorporated into previous projects, adding a concrete policy will ensure consideration on all future projects. The complete streets policy will be integrated into the Engineer's Design & Construction Standards Manual.

Complete streets meet the needs of people in all forms of transportation: walking, cycling, driving, and taking transit. Complete streets aim to create safer interactions for all users, despite age or abilities. In some situations where road traffic is dominated by fast traveling vehicles, traffic calming measures can help to make an area more pedestrian friendly. Examples may include, curb bulbs, landscaped medians, on-street parking or narrowed travel lanes. Complete streets may look different in a rural context versus an urban one, assuming the design follows the same core principle.

Include bicycle and pedestrian facilities in new roadway or improvement projects. Routine repaving projects, major road reconstructions, and new roadways will include a pedestrian and bicycle component. Future roadways will place an emphasis on safety, be smooth enough for cycling, include accessibility details per ADA guidelines, and consider additions of signage and protected bicycle lanes where appropriate. Protected or separated lanes offer the highest degree of safety and comfort for riders of all skill levels, but are more expensive and use additional right-of-way.

Figure 4: Bicycle facility improvements, taken from the Envision Lebanon Comprehensive Plan

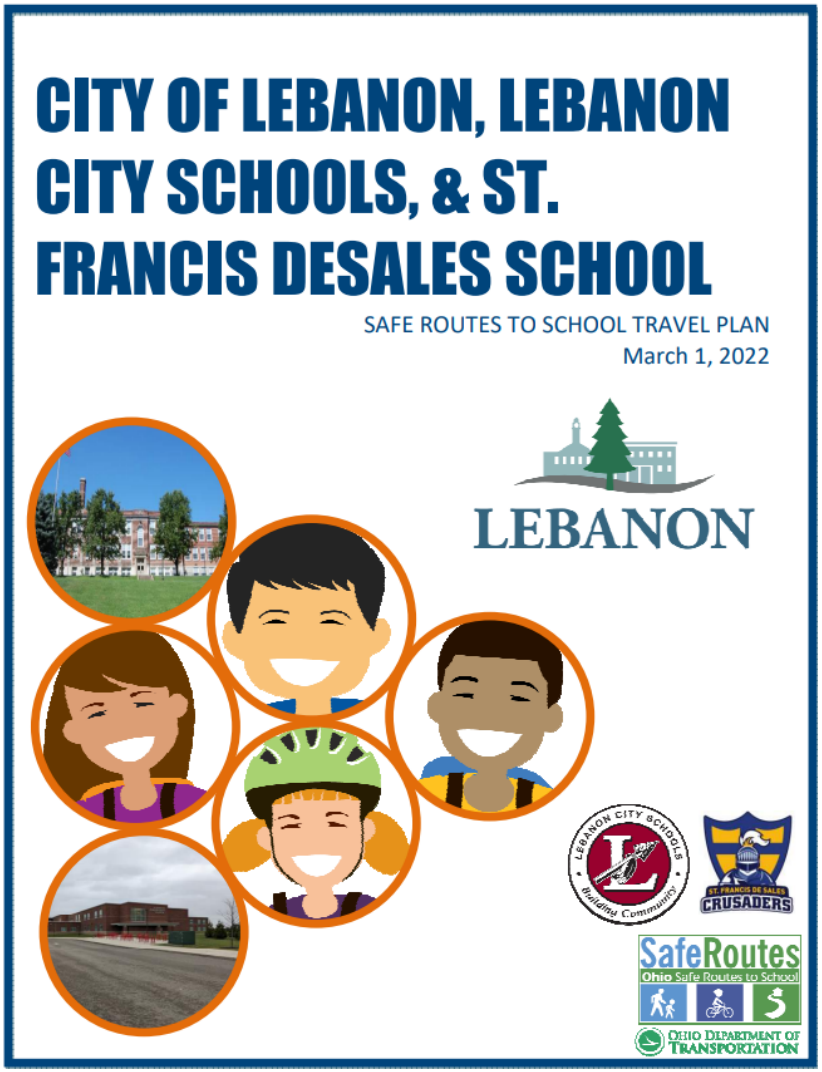
Safe Routes to School Plan (SRTSP)

The City of Lebanon has created a travel plan incorporating four major schools in the City – Donovan Elementary, Berry Intermediate, Lebanon Junior High, and St. Francis de Sales schools. The first three schools (collectively) contain grades 3-8, while St. Francis de Sales contains grades K-8.

The goal of the SRSTP is to envision and implement safe, navigable trails and paths for children to use to get to school. The plan encourages children to use active transportation modes instead of bus transit and parents' vehicles to get to school.

The plan's creation involved multiple public surveys, in which parents expressed their main concerns about their child walking/biking to school.

The Plan contains a set of recommendations developed for the four schools to improve pedestrian and bicycle facilities – because many of these recommendations are separated from the street network (or run adjacent to the street network), recommendations are generally separate from the recommendations presented in the LSSI. The SRTSP can be found on the City of Lebanon's website.



Study Area: The City of Lebanon

The City of Lebanon is approximately 12.97 square miles and had a population of 20,841 in the 2020 Decennial Census. The Lebanon Streets Division maintains more than 225 miles of roadway within city limits.

Lebanon is considered a bedroom community – in 2021, 85% of those who live in Lebanon commute to areas outside the City. Due to general growth of the Warren County region, Lebanon's population has doubled from 1990 to today. The City's growth has slowed in recent years, but the City plans for growth to increase in coming years.

Much of downtown Lebanon is historic – 17 properties and four districts are on the National Registry of Historic Places.

Lebanon is immediately north of I-71, and is roughly 7 miles east of I-75. State Route 63, dubbed "Main St" in Lebanon, is often used as a shortcut between I-75 and I-71, leading to high truck volumes in downtown Lebanon. The City also contains portions of US 42, SR 48, and SR 123.

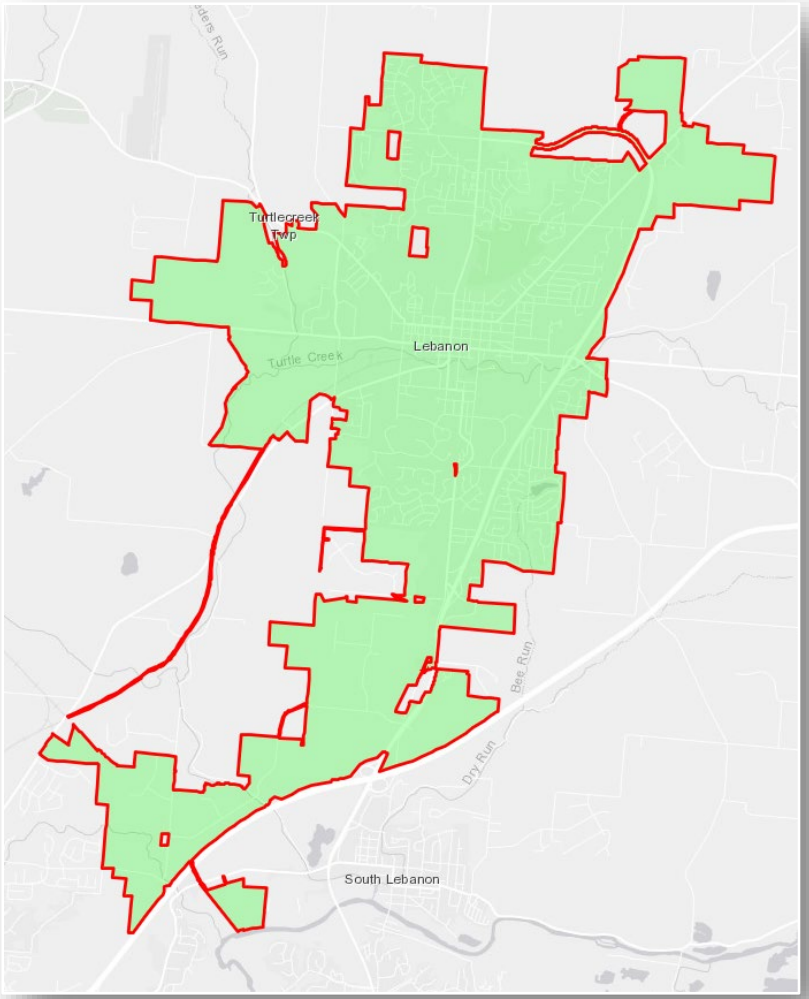


Figure 5: City of Lebanon - Study Area

Equity and Engagement

In consideration of the equity component of SS4A, crashes in disadvantaged areas of Lebanon were analyzed separately to determine any crash patterns unique to the disadvantaged area.

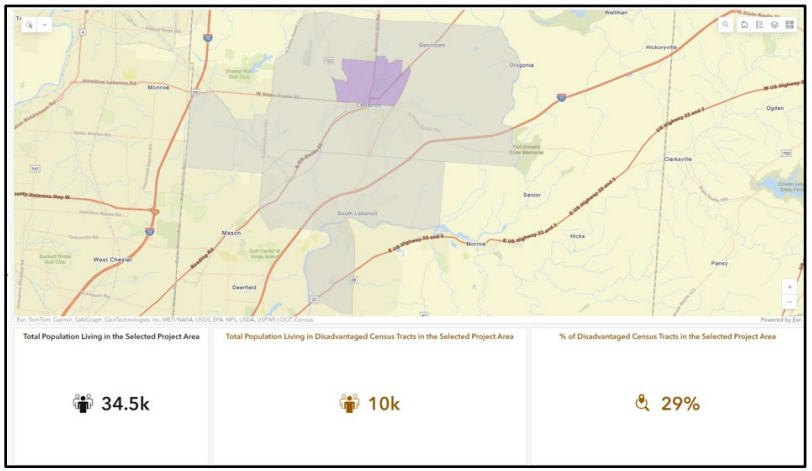


Figure 6: Disadvantaged areas of Lebanon, shaded in purple, courtesy of USDOT ETC Explorer.

Census Tract 39165031500 is disadvantaged environmentally due to anticipated changes in extreme weather (98.9th percentile). In contrast, Census Tract 39165031400, located immediately east of the previous tract, has an anticipated change in extreme weather rating in the 34th percentile. Instead of extreme weather, this tract has a high social vulnerability percentile (77.7th percentile) which is attributed to a 79.9th percentile rating of residents being below twice the poverty line, 65.7th percentile unemployment, 81.6th percentile house tenure, 72.8th percentile housing cost burden, 68.8th percentile uninsured, 87.1st percentile for disability, and 93.2nd percentile limited English proficiency. The surrounding areas of Lebanon are considered disadvantaged by the USDOT ETC Explorer by means of transportation insecurity, but the tracts are not formally recognized as disadvantaged.

Approximately 24% of Lebanon is classified as low-income, and 15% of residents have disabilities. Lebanon is in the 80th percentile for Particulate Matter, 87th percentile for Ozone, and 90th percentile for Toxic Releases to Air.

Crashes in Disadvantaged Areas

About 24% of all fatal and serious crashes occur in this area, and roughly 38% of all crashes within city limits occur in this area. The City of Lebanon encompasses roughly 13 square miles, and the disadvantaged tracts are 4.29 square miles combined. This means that the disadvantaged tracts make up 33% of Lebanon. If all areas of Lebanon were (theoretically) equally as developed, this would mean that the disadvantaged tracts would contain 33% of total crashes. Realistically, it may contain more crashes due to development and business/institution presence on the tracts. Much of downtown Lebanon is in these tracts, which has low speed limits, but high volumes. This typically results in higher rates of fender benders and low-severity crashes. These tracts have a lower rate of serious injury and fatal crashes than 33%, likely due to low speed limits.

The most common crash category was rear-end crashes, which is to be expected for the heavily-signalized downtown environment.

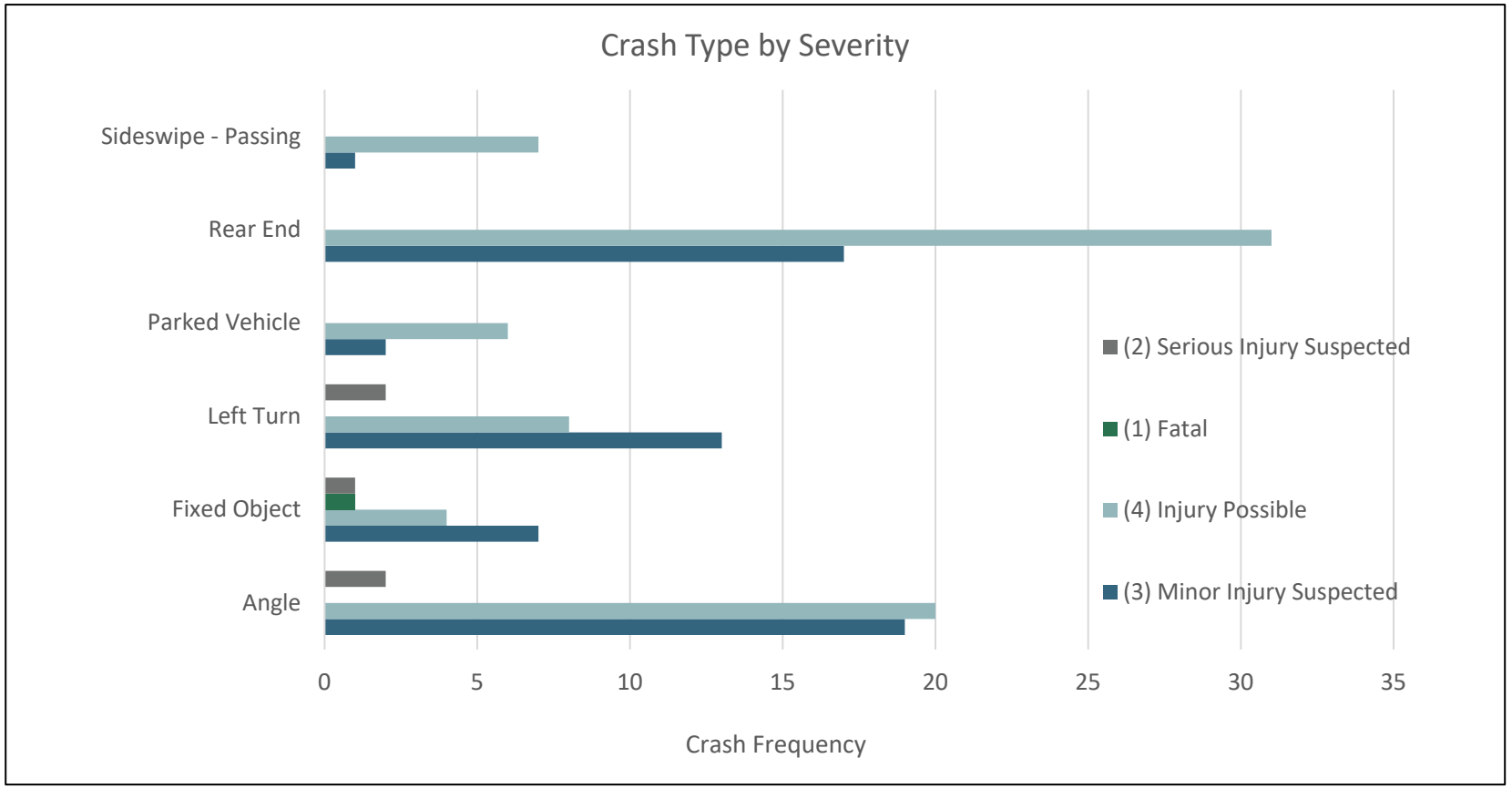


Figure 7: Common crash types for disadvantaged area.

Public Input: Community Survey

An online community survey was released from October 16th, 2024, to December 12th, 2024, to gather input about problem areas throughout the City of Lebanon. A total of 200 responses and 231 problem areas were collected as part of the survey. Analysis sheets from the survey can be found in Appendix B.

Respondents were asked several demographic questions prior to entering problem areas. Most respondents lived in Lebanon and worked outside Lebanon. Respondents had a generally moderate rating of the city's street, pedestrian, and bike facilities. Most residents learned of the survey through social media.

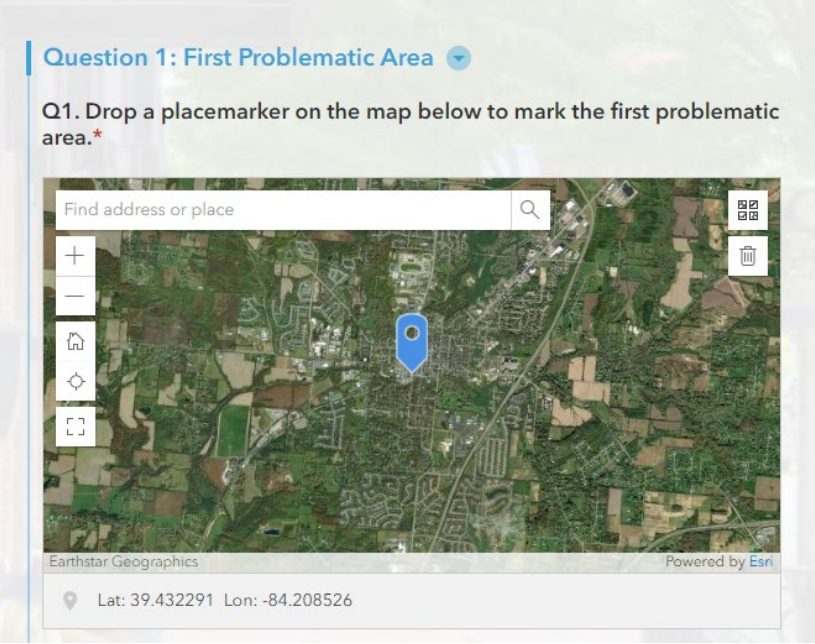


Figure 8: Problematic Area Interactive Map

Question	Yes	No	% Yes	% No
Live in Lebanon?	183	76	91.5%	38.0%
Work in Lebanon?	15	117	7.5%	58.5%

Table 1: Number of survey respondents who work/live in Lebanon.

Network	Average Rating (1-5, Bad to Good)
Street Network	3.51
Pedestrian Facilities	3.30
Bike Facilities	3.05

Table 2: Average survey rating of Lebanon maintained facilities.

How did you hear about this survey?	Number of Responses
Social Media	135
City Newsletter	22
Word of Mouth	19
City of Lebanon Website	12
other	6
Social Media, City of Lebanon Website	2
Social Media, City Newsletter	2
City of Lebanon Website, City Newsletter	1
Social Media, Word of Mouth	1
Grand Total	**200**

Table 3: Outreach methods and number of respondents reached.

Participants had the opportunity to select 1-3 problem areas, select from a pre-selected list of problems, and write in their own description of the problem. Several participants had similar thoughts – the most common comments are tabulated in Table 4.

Area	# of Comments	Common Comments
Intersection of Main St & Broadway St	15	Complaints of pedestrian facilities, excessive truck traffic, excessive speed, and red light running
BP 48 SB Ramps & Main St	19	Left-turning movement from offramp extremely difficult and unsafe during rush hour
Downtown Grid of Intersections	12	Downtown intersections between Broadway St, Warren St, Main St and High St alternate between 2-way stop and 4-way stop, leading some drivers to assume that 2-way stops are 4-way stops
BP 48 Sidewalks	20	Residents east of SR/BP 48 have no pedestrian access to downtown
Columbus Ave & BP 48	11	Complaints of red light running, especially after left-turn arrow turns yellow. Painted island on south corner should be landscaped island. Not enough warning that NB right-turn from BP 48 to US 42 will end in a right turn lane. No safe pedestrian crossings
Main St & Mechanic St RRFB	12	Vehicles rarely yield to pedestrians with lights flashing, very unsafe
Cook Rd & SR 48	12	No pedestrian crossing to reach downtown Lebanon, visibility from E Cook Rd to W Cook Rd is poor

Table 4: Most common survey comment areas.

Other areas received fewer comments but still received a moderate amount – these are tabulated in Table 5.

Area	# of Comments	Common Comments
Bike Lanes on Broadway	8	Bike path is unsightly and feels dangerous to ride on. Path complicates turning movements onto and out of west side of Broadway
Lawndale/Broadway/ Monroe Offset Intersection	6	Turns from Lawndale to Monroe (and vice versa) are difficult due to close proximity - storage length for SBL and NBL is too short
Warren St &	5	Left turn from SB Broadway is difficult
Main St & Stubbs Mills Rd	5	Traffic pattern from EB Main St down Stubbs Mills is very confusing - insufficient pedestrian ammenities to reach downtown Lebanon
South St & Broadway St Visibility	4	Vehicles parked in on-street parking just south of WB South St make it difficult to see down Broadway to check for oncoming traffic
Mulberry St & Mechanic St	4	Curb bump-outs and on-street parking reduce visibility onto Mulberry approaches
Cook Rd & Navaho Dr Crosswalk	4	No safe crossing from The Academy to the playground - crosswalk here would also make a shorter route to Donovan Elementary School
S East St & Bike Path Crossing	4	Bike path users reported nearly being hit at the crossing, requested additional warning signs for bike crossing
East St & Orchard Ave 3-Way Stop	3	Vehicles do not stop at stop signs on East St approaches, partially due to stop signs having poor visibility
Drake Rd & Miller Rd	3	No pedestrian facilities for students walking to high school, EBL storage length is too short to accommodate buses

Table 5: Less common comment areas.

SS4A Task Force

The Lebanon SS4A Task Force includes representatives from Lebanon's key governmental organizations, who are listed below:

- Mark Messer – City of Lebanon, Mayor
- Scott Norris – City of Lebanon, Vice Mayor
- Scott Brunka – City of Lebanon, City Manager
- Jeff Mitchell – City of Lebanon, Chief of Police
- Jason Millard – City of Lebanon, Community Development Director
- Ben Stucke – City of Lebanon, City Engineer
- Isaac Seevers – Lebanon City Schools, Superintendent
- Kurt Weber – Warren County Engineer's Office, County Engineer

The Task Force met on the following dates:

- September 24th, 2024
- January 22nd, 2025
- April 4th, 2025

Additional meetings not exclusively between the Task Force were held on the following dates:

- January 9th 2025 – Project Site Update Meeting
- February 26th 2025 – Open House Public Meeting
- April 22nd, 2025 – City Council Meeting

Figure 8: January 22nd Task Force Meeting.

Figure 9: April 4th Task Force Meeting.

Existing Transportation Safety Conditions

Crash data for the City of Lebanon was obtained from the Ohio Department of Public Safety database for the five-year study period from 2019-2023. Five years of data were used to normalize the model and reduce the influence of abnormal traffic patterns. The crash data was used to conduct analyses on several different subdivisions of crashes, sorted by severity, transit type, and location.

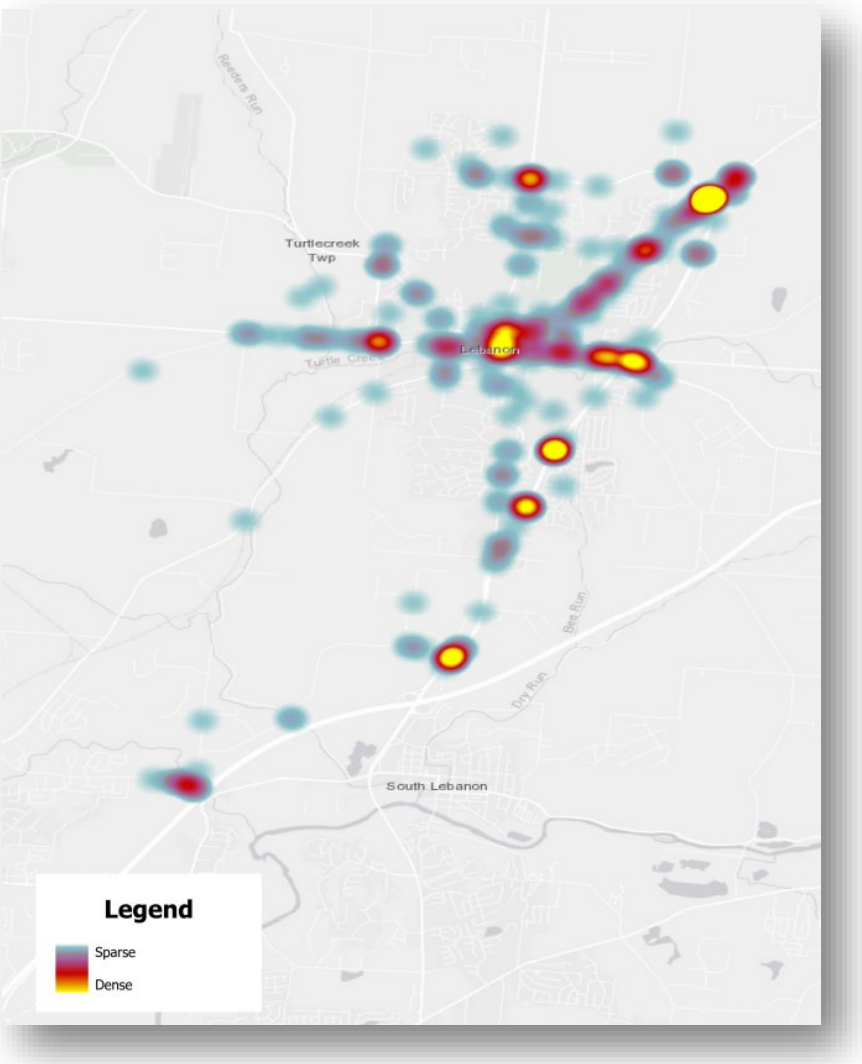


Figure 9: All Injury crashes heat map for the study period 2019-2023.

Critical Crashes

Over the study period, there were a total of 29 serious injury crashes and 5 fatal crashes in the City of Lebanon. An average of 6.8 serious injury and fatal crashes occur in the City every year.

As part of the study process, crash reports for serious injury and fatal crashes in the City of Lebanon were carefully examined to ensure data accuracy, and to discover common crash factors. Eleven crashes were "failure to yield" related, eight of the crashes were motorcycle/dirt bike related, and six crashes were "run-off-road" related.

In terms of crash location, 15 crashes were on SR 48, 10 were on US 42, three were on SR 63, and three were on Mason Morrow Millgrove Road – however, three of these crashes occurred at intersections between these roads. In total, 28 crashes (85% of all serious injury and fatality crashes) occurred between these four roads.

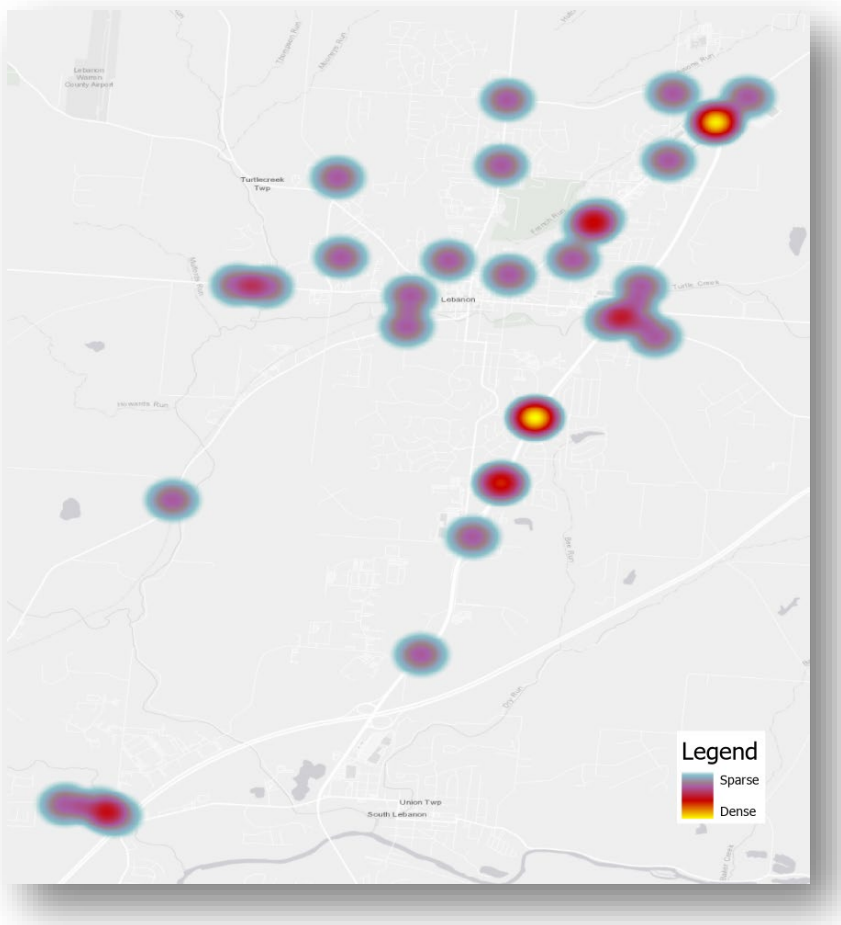


Figure 10: Fatal and Serious crashes heat map for study period 2019-

Who is impacted by High Severity Crashes?

Age demographics are useful in determining who is disproportionately affected by crashes. Crashes for age groups were divided by the number of Lebanon residents in that age group to obtain a "crash per 1000 residents" metric. It should be noted that this model assumes all crashes were involving residents of Lebanon, whereas some crashes may have involved non-residents.

The highest crash frequency was in the 35-39 age group, which can be expected as 35-39 year olds are the largest age group that can legally drive in Lebanon. They have a high fatal & serious crash rate of 3.84 crashes per 1000 residents, but they are beaten by the low-population 20-24 age group. This age group experiences an F&S crash rate of 4.56 crashes per 1000 residents – the highest in Lebanon. Nationally, 20-24 year olds have comprised an average 13.2% of total crashes, whereas in Lebanon they comprise 11.9%. Nationally, 35-39 year olds comprise around 7.6% of total crashes annually, and in Lebanon, they comprise 6.5% total crashes. Despite low total crashes, the 35-39 age group comprises 17.6% of all serious and fatal crashes. Older drivers (65+) were also involved in 17.6% of F&S crashes, and younger drivers (15-25) were involved in 23.5% of crashes.

Most crashes occurred in the afternoon and evening, with 20.6% of F&S crashes occurring in the PM peak. 64.7% of F&S crashes occurred between noon and 6pm.

Road conditions played a part in several crashes – 20.6% of F&S crashes occurred on wet pavement, and 29.4% of F&S crashes occurred when skies were cloudy.

Age	Residents	Fatal & Serious Crashes	Crashes per 1000 Residents
15 to 19 years	1478	4	2.71
20 to 24 years	878	4	4.56
25 to 29 years	1470	3	2.04
30 to 34 years	1106	1	0.90
35 to 39 years	1562	6	3.84
40 to 44 years	1304	3	2.30
45 to 49 years	1197	4	3.34
50 to 54 years	1420	1	0.70
55 to 59 years	1107	1	0.90
60 to 64 years	1477	1	0.68
65 to 69 years	950	2	2.11
80 to 84 years	482	2	4.15
85 years & over	626	2	3.19

Table 6: Crash rates of age groups in Lebanon. 2019-2023

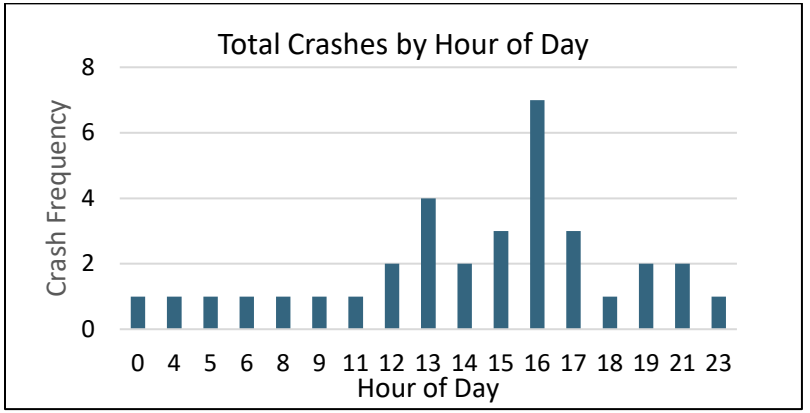


Figure 11: Serious Injury & Fatal Crashes by Hour of Day. 2019-2023

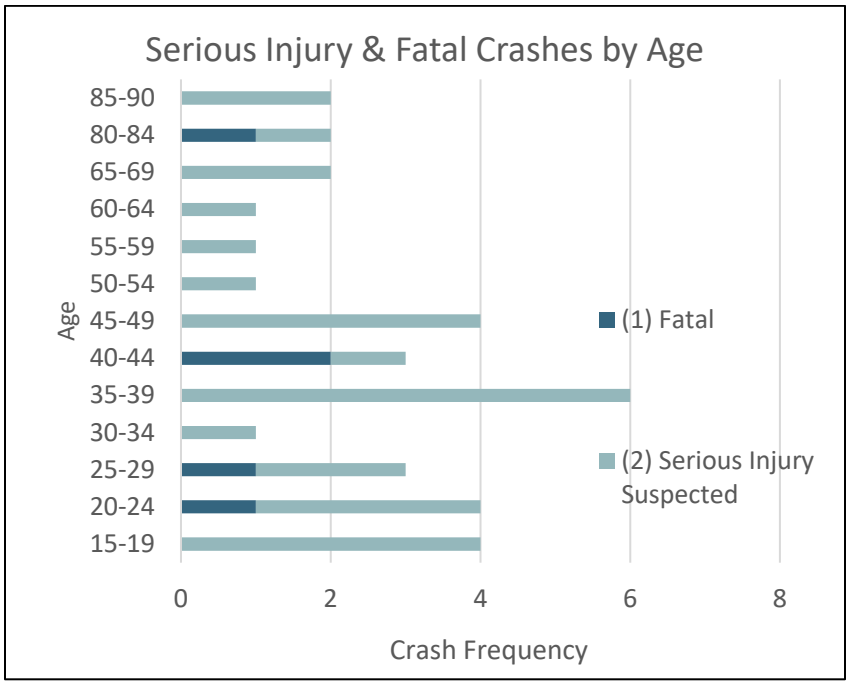


Figure 12: Serious Injury and Fatal Crashes by Age. 2019-2023

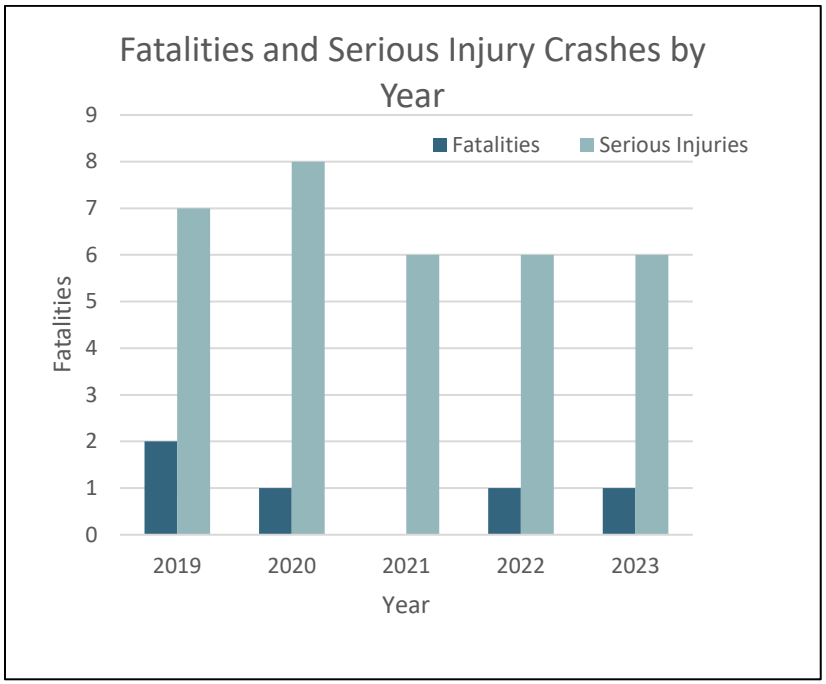


Figure 13: Fatalities and Serious Injury Crashes by Year. 2019-2023

Contributing Crash Factors

Left turn, fixed object, and head-on were the most common crash types for Fatal and Serious crashes. Fixed object crashes were frequently also ran-off-road crashes, which is also one of the highest crash types. Failure to yield was the most common driver contributing factor. 18.5% of F&S crashes were motorcycle related, 17.6% were roadway departure related, 64.7% were intersection related, and 23.5% were speed related.

In Lebanon's Comprehensive Plan, it was noted that more severe crashes occur on the peripheries of the city than downtown. This is because the outer roads have higher speed limits and fewer geometric restrictions or control devices, making speed-related crashes more likely. This is reflected in the crash statistics, as 73.5% of serious crashes occurred on a road with a posted speed limit of 35 or above (note that this statistic is separate from the statistic in Table 8, which pertains to whether or not drivers were exceeding the posted speed limit).

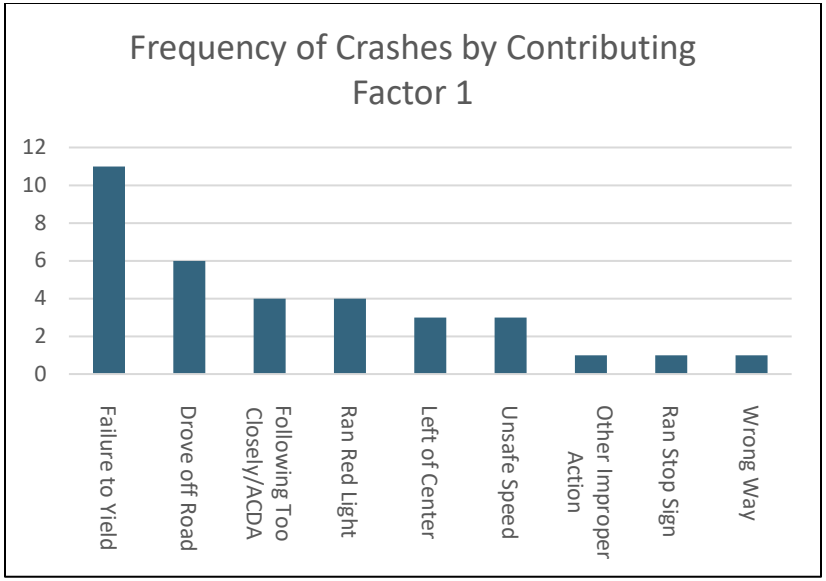


Figure 14: Frequency of crashes by contributing factor. 2019-2023

Crash Type	(1) Fatal	(2) Serious Injury Suspected	Grand Total
Left Turn	0	9	9
Angle	0	6	6
Fixed Object	1	4	5
Overturning	1	4	5
Rear End	0	3	3
Head On	1	2	3
Sideswipe - Meeting	1	0	1
Pedalcycles	0	1	1
Pedestrian	1	0	1
Grand Total	5	29	34

Table 7: Fatal & serious crashes divided by type. 2019-2023

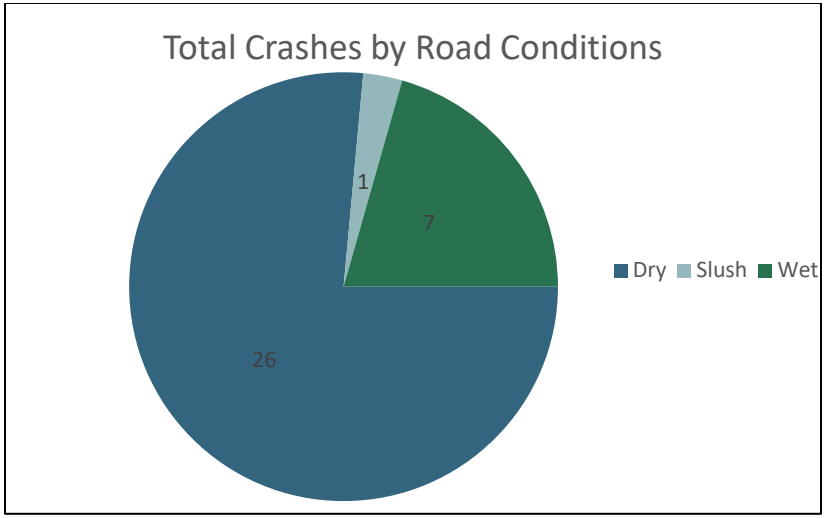


Figure 15: Total crashes by road conditions. 2019-2023

Roadway Departure	Crashes	%
No	22	64.71%
Yes	12	35.29%
Grand Total	34	100.00%

Intersection Related	Crashes	%
Yes	22	64.71%
No	12	35.29%
Grand Total	34	100.00%

Speed Related	Crashes	%
No	26	76.47%
Yes	8	23.53%
Grand Total	34	100.00%

Table 8: Additional statistics related to serious injuries and fatalities. 2019-2023

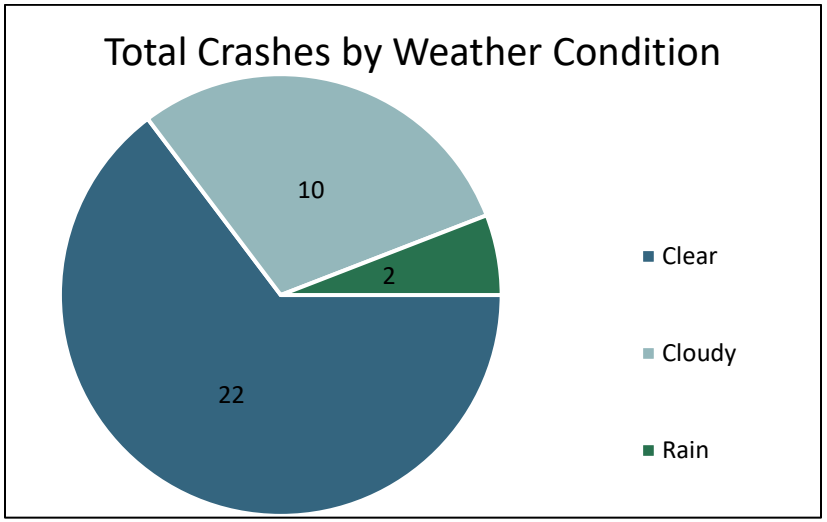


Figure 16: Total crashes by weather condition. 2019-2023

Vulnerable Road Users

Pedestrians and bicyclists are some of the most vulnerable users of public roadways. Crashes involving pedestrians and bicyclists tend to result in more serious injuries due to their lack of surrounding protection. Over the study period of 2019-2023, there were 8 pedestrian-related crashes and 9 bicycle-related crashes in the City of Lebanon.

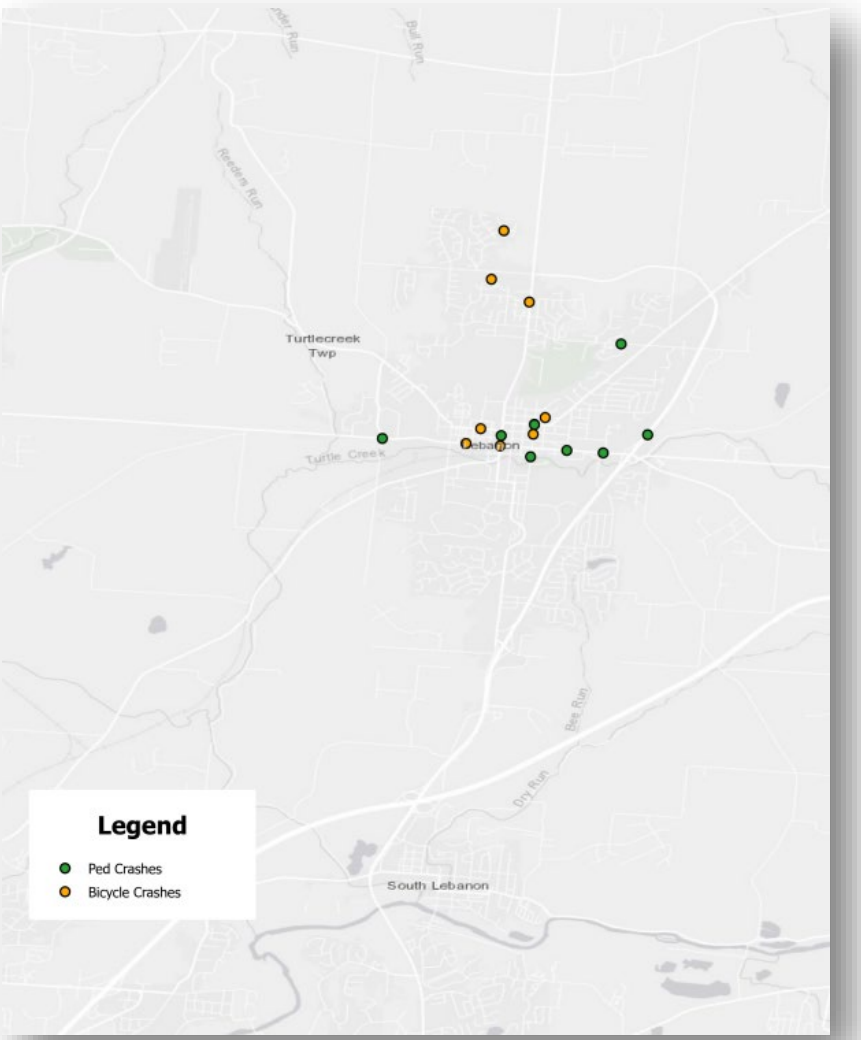


Figure 17: Bicycle and Pedestrian crashes for the study period 2019-2023.

Pedestrian Crashes

Pedestrian crashes have been broken down by severity, time of day, and month below.

Crash Severity	Crashes	%
(1) Fatal	1	12.50%
(3) Minor Injury Suspected	4	50.00%
(4) Injury Possible	3	37.50%
Grand Total	8	100.00%

Table 9: Pedestrian crash severity summary. 2019-2023

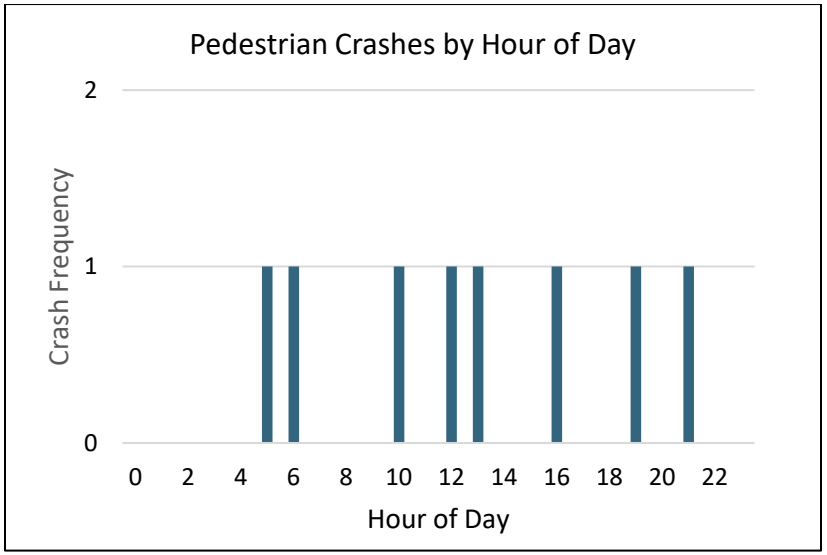


Figure 18: Pedestrian crashes by hour of day. 2019-2023

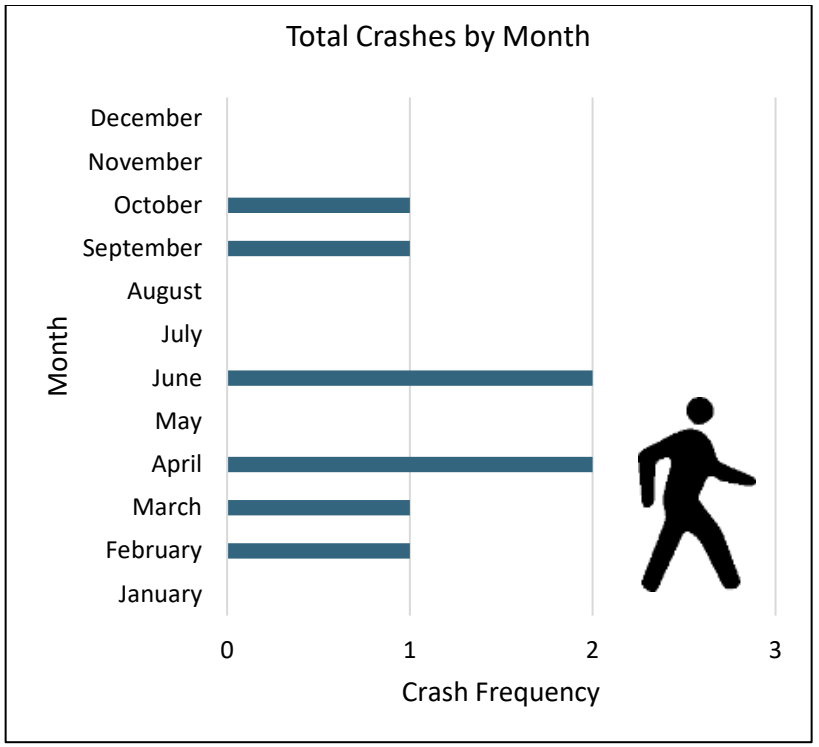


Figure 19: Pedestrian crashes by month. 2019-2023

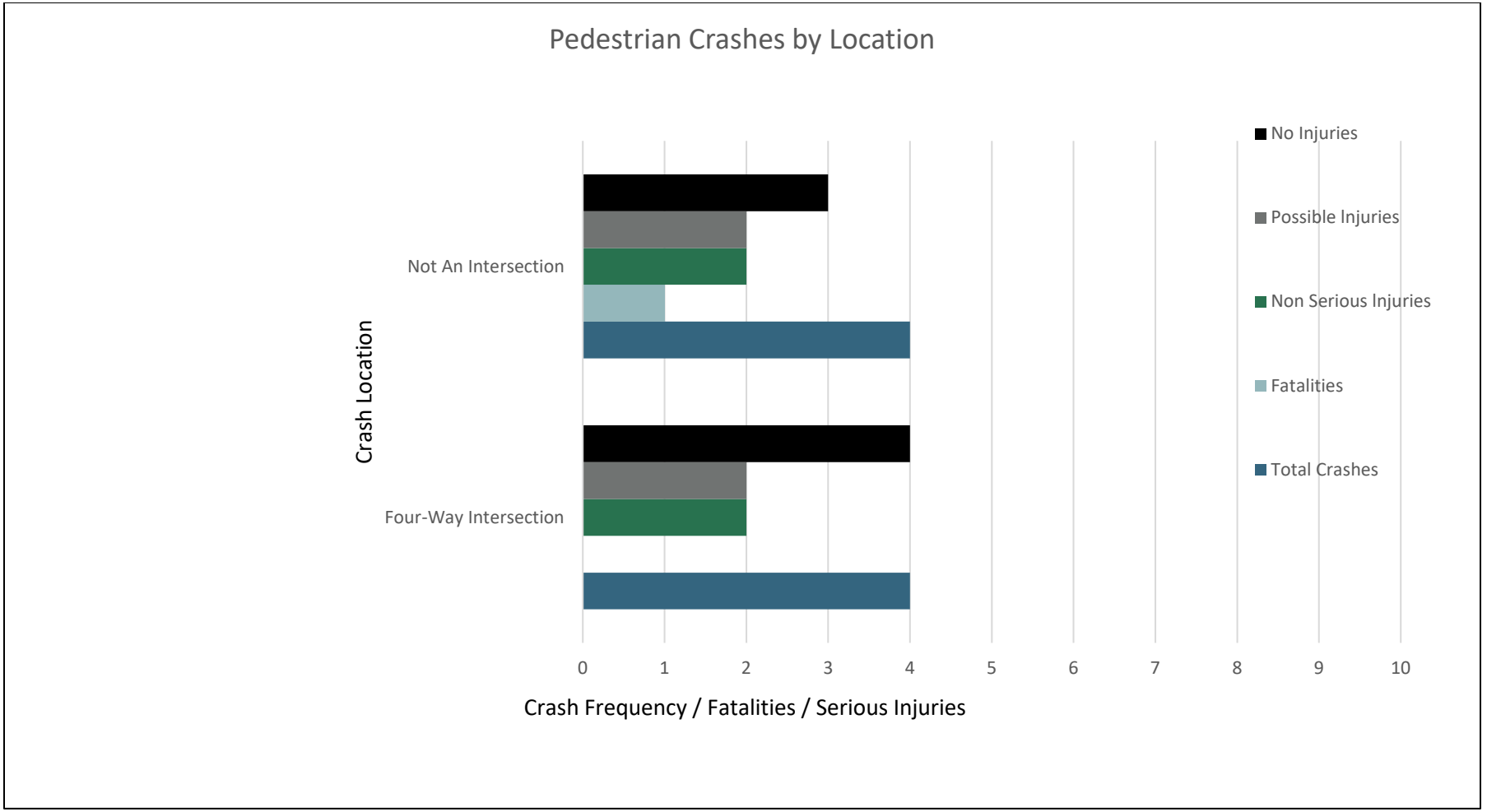


Figure 20: Pedestrian crashes by location. "Total Crashes" measures number of collisions, other categories measure injury per driver/occupant. 2019-2023

Bicycle Crashes

Bicycle crashes have been broken down by severity, time of day, and month below.

Crash Severity	Crashes	%
(2) Serious Injury Suspected	1	10.00%
(3) Minor Injury Suspected	3	30.00%
(4) Injury Possible	3	30.00%
(5) PDO/No Injury	3	30.00%
Grand Total	10	100.00%

Table 10: Bicycle crash severity summary. 2019-2023

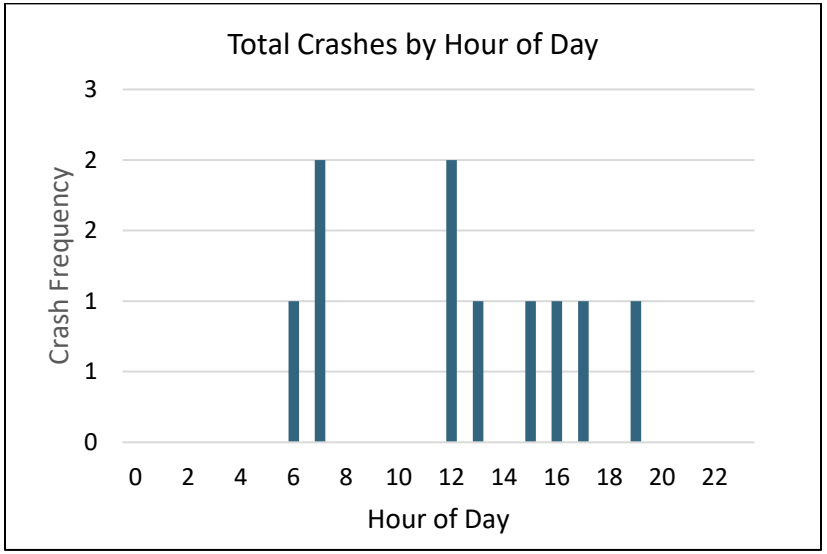


Figure 22: Bicycle crashes by hour of day. 2019-2023

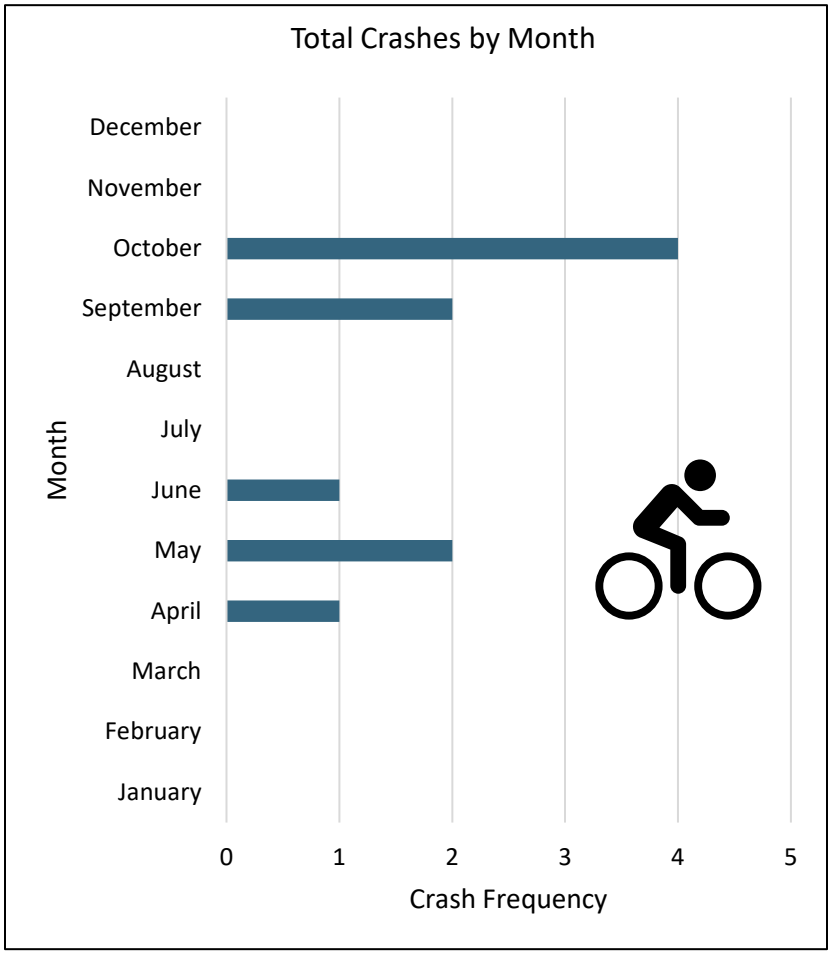


Figure 23: Bicycle crashes by month. 2019-2023

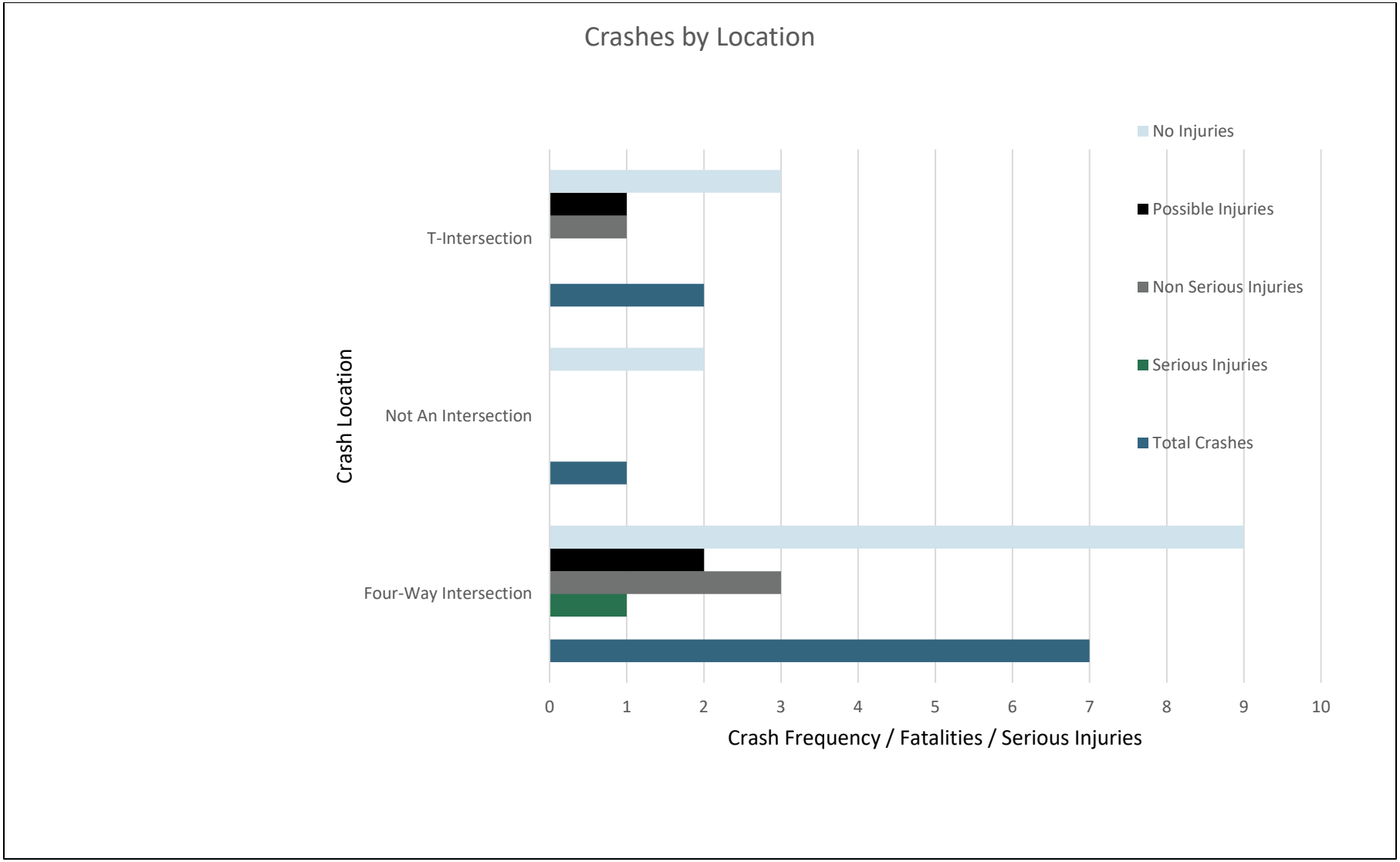


Figure 24: Bicycle crashes by location. "Total Crashes" measures number of collisions, other categories measure injury per driver/occupant. 2019-2023

Motorcycle Crashes

A high number of motorcycle crashes were observed during the analysis. For a complete analysis, these crashes were analyzed and were included in the overall analysis *and* a separate analysis. A total of 17 motorcycle crashes were recorded, with the overwhelming majority being injury crashes. Motorcycle crashes were 3.5% of all injury crashes, 40% of all fatalities, 15% of serious crashes, and 18.5% of all fatalities and serious injuries.

The National Safety Council released motorcycle injury data in 2024 for the time period of 2007-2022. Nationally, motorcycles make up 14.6% of all fatal crashes, and make up 3.5% injury crashes.

From 2020-2022, there were 45 fatal crashes in Warren County, 5 being motorcycle related. This means that across Warren County, motorcyclists make up 11% of all fatal crashes (lower than the national average).

A disproportionate number of crashes occurred in the summer months, which is indicative of recreational usage.

Crash Severity	Crashes	%
(1) Fatal	2	11.76%
(2) Serious Injury Suspected	5	29.41%
(3) Minor Injury Suspected	6	35.29%
(4) Injury Possible	2	11.76%
(5) PDO/No Injury	2	11.76%
Grand Total	17	100.00%

Table 11: Severity of motorcycle crashes. 2019-2023

Month	Total Crashes
March	1
April	2
May	3
June	3
July	3
August	1
October	2
November	1
December	1
Grand Total	17

Table 12: Motorcycle crashes by month. 2019-2023

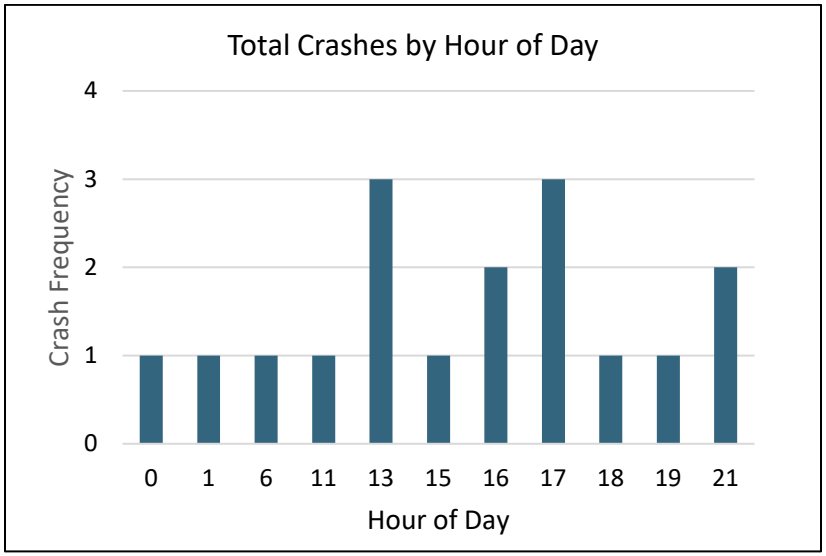


Figure 26: Motorcycle crashes by hour of day. 2019-2023

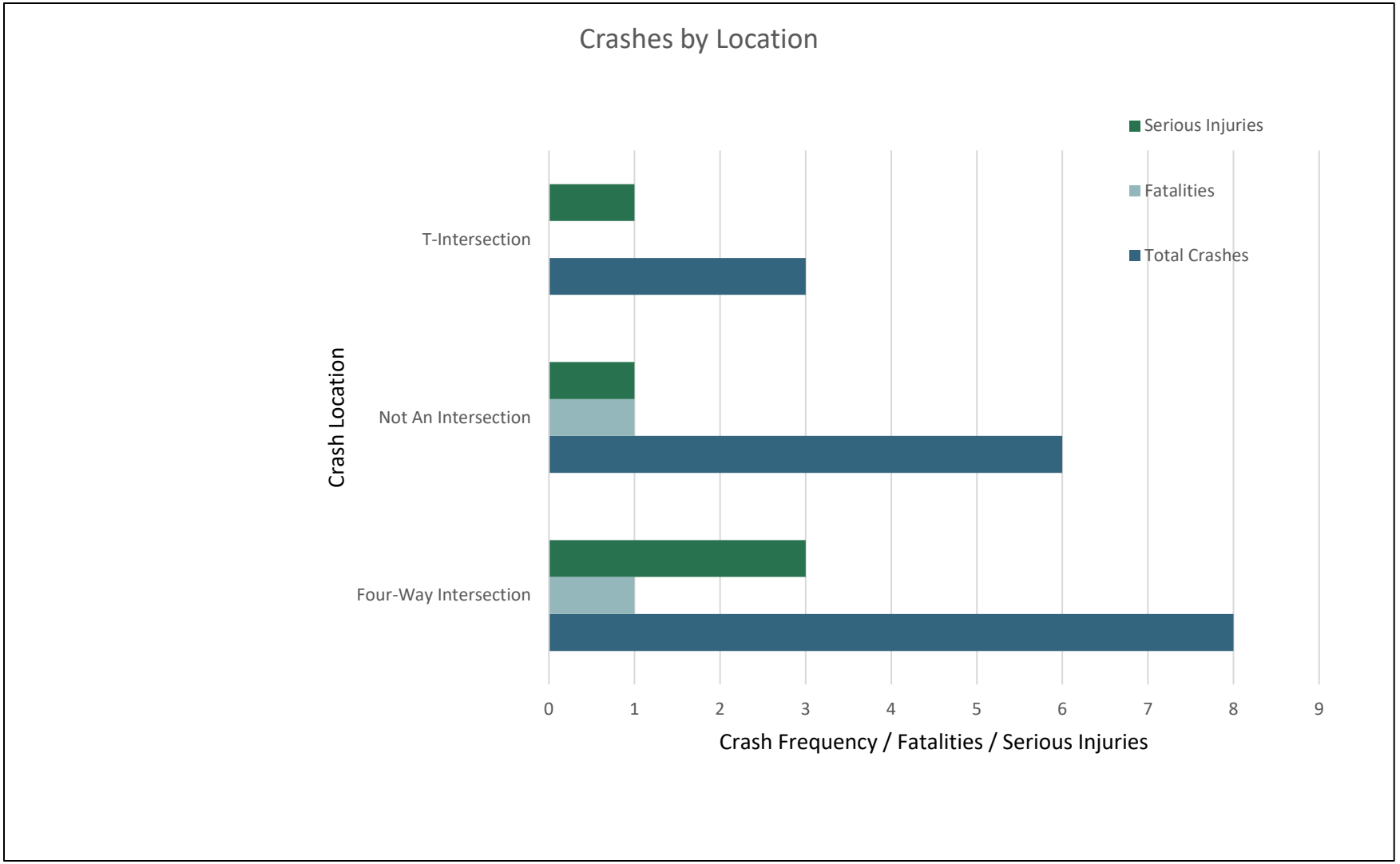


Figure 27: Motorcycle crashes by location, 2019-2023

Active Improvements

Surrounding Areas

According to the Warren County Transportation Improvement District, and Lebanon's 2025 Infrastructure Update, there are several active and planned improvements in and around the City.

Mason-Morrow-Millgrove Rd/Columbia Rd Roundabout

A roundabout is currently planned for the T intersection of Mason Morrow Millgrove Rd and Columbia Rd ***just east*** of I-71. This project does not involve the T-intersection west of I-71.

A temporary modular roundabout has been installed as of this writing and may be upgraded to a permanent roundabout in the future.

I-71 Ramps to State Route 48

This intersection will be modified to a Continuous Green-T (CGT) configuration to allow a separated through lane to be in constant green NB. Construction is expected to occur in 2025/2026.

SR 63 Corridor Improvements Between Union Rd & SR 741

This improvement will occur West of Lebanon, on State Route 63. The road will be widened from two to four lanes, alongside turn lane improvements at major intersections.

2025 Guardrail Replacement Projects

This project is managed by the Warren County Engineer's Office and involves replacement of guardrails in Lebanon and Waynesville. Relevant to Lebanon are the replacements of guardrail along:

- Stubbs Mill Road between Mason-Morrow-Millgrove and Shawhan Road intersections
- Mason-Morrow-Millgrove Road between the South Lebanon City Line and the Stubbs Mill Road intersection.

Mason-Morrow-Millgrove Rd. Realignment Project

This project involves the realignment of Mason-Morrow-Millgrove between the north leg of Columbia Rd and Cox-Smith Rd. The road currently suffers from poor alignment and sight distance issues. This project is planned to begin 6/1/2025 and will continue for one year, until 6/1/2026.

SR 63 Corridor Improvement Between McClure Rd & Neil Armstrong Way

The intersection of Markey Rd and Main St (SR-63) will see an increased volume with the construction of Parkside Landing. The intersection will be converted to a roundabout to reduce delay at the intersection and reduce speeding on Main St. Main St from McClure Rd to Neil Armstrong Way will be widened to three lanes including curb and gutter, storm sewers, and a shared use path on the north side. The bridge just east of Markey Rd will also be replaced as part of the project. Construction is slated to begin in 2027.

Miller Rd Sidewalk

A sidewalk is currently slated for construction along Miller Rd from Broadway St to Drake Rd. No construction date is known as of this writing.

Cincinnati Ave (US-42) & Glosser Rd. Roundabout

A lack of turn lanes on US-42, poor visibility from Glosser Rd, a skewed minor approach, and high speeds on US-42 have made this a historically dangerous intersection. The roundabout will make turning left from the minor approaches significantly easier, will reduce high speeds on US-42, and will add a sidewalk up Glosser Rd.

Kingsview Bridge Replacement

The existing Kingsview bridge is structurally deficient. Because the bridge will be used for future detours, repairs must be made prior to other road closures. Construction began in March 2025, and will continue to November 2025.

N Broadway Bike Path Reconfiguration

The existing bike path along North Broadway will be removed, and the western curb will be brought east to narrow the road. The bike path will be reconstructed west of its original location, providing 5 to 10 feet separation from vehicular traffic on Broadway. This project was a recommended project in the City's SRTSP. The planned construction date is unknown as of this writing.

Figure 29: Cincinnati Ave (US-42) & Glosser Rd. Roundabout

Figure 30: Kingsview Bridge

Analysis Approach

Methodology – Crash Rate

The following process is a list of steps outlining the methodology used to evaluate and organize a list of spots and segments.

Using ODOT's GCAT (GIS Crash Analysis Tool), a crash data search was conducted utilizing the following parameters:

- Latest 5 years of data (2019-2023)
- Crash Severity of 1-4 (All injury crashes)
- Located within the City of Lebanon

In calculating the overall list of spot and segment locations to be considered for safety improvements, 4 separate categories were used:

- All injury crash types (severity 1-4)
- Fatal and serious injury only crashes (severity 1-2)
- Pedestrian involved crashes
- Bicycle involved crashes

Crash points were imported into ArcGIS with the coordinates provided in the crash report. Points in abnormal locations were examined for coordinate accuracy, and if found to be inaccurate, were moved to accurate coordinates. Crashes near intersections were examined to determine if the crash was intersection related – if it was, the point was moved within 200' of the center of the intersection.

Crash points within 200' of an intersection were then joined to the intersection, were assigned as "spot crashes" and were removed from consideration for segment crashes. The remaining crashes were examined for relation to segments, and were manually assigned to segments if eligible.

Once relevant points had been assigned, the total frequency of crashes was imported into a priority list spreadsheet. Intersections with 3 or more all-injury crashes were considered, and segments with 1 or more all-injury crashes were considered.

Crash rates were calculated using the formulas outlined in Section 3.2 of the Roadway Safety Information Analysis published by the Federal Highway Administration. Crash rates for intersections were expressed as crashes per million entering vehicles, and crash rates for segments were expressed as per million vehicle miles.

A score and rank were calculated for all intersections and segments based on the relative severity of crashes. The spots and segments with the highest crash rate received a rank of 1. Intersections with fewer than 3 all-injury crashes were removed from intersection analysis due to low-crash volume and were factored into adjacent segments instead.

Fatal and serious, pedestrian, and bicycle categories contained few enough crashes that frequencies could be determined manually. These frequencies can be seen in the priority list figures. Intersections and segments with no crashes in these areas were given no score.

An overall score and rank were determined for each intersection and segment based on the scores of the intersections for each of the four categories.

Methodology - Frequency

Utilizing the tables from the crash rate methodology, new tables based on crash frequency were created for both intersections and segments. These tables assigned a rank to each of the 4 crash types based on their respective frequency. For intersection locations, the frequency was equal to the total number of crash points within a 200' radius. For segment locations, the frequency was determined as the number of crashes relating to the roadway segment (that were not already analyzed in an intersection).

The location with the highest frequency received a rank of 1. After each separate table was calculated, an overall table that took the weighted average of each frequency type was calculated. The same weights that were used to calculate the overall crash rate table were applied to the overall frequency table. These averages were then converted to a ranking based system, with the highest average receiving a rank of 1.

Methodology – Equity & Engagement

Throughout the study process, attention was given to potential relations between disadvantaged communities and transportation safety. In collaboration with the City of Lebanon, a public survey was issued to gather information about problematic areas in the City that haven't been revealed by crash data. Residents isolated problem areas, and in many cases, proposed solutions to the problems.

Priority Ranking

For both the frequency and crash rate analysis, weighted rankings were completed using the following weights:

- All Injury Crashes (30%)
- Serious Injury and Fatal Crashes (30%)
- Pedestrian Involved Crashes (20%)
- Bicycle Crashes (20%)

These priority lists were developed for intersection locations, as well as segments. This analysis, priority listings and separate categories, represent each type of safety concern.

The following tables are presented as examples of the data analysis completed throughout this process. They demonstrate the segment and spot locations listed by crash frequency and crash rate. The crash frequency can often over emphasize locations with high volumes. Developing supplemental ranking based upon crash rates allows a review of crashes per volume (or length) which can highlight disproportionately dangerous locations with lower volumes and/or non-congestion related crashes.

Spot – Crash Frequency

ID#	SPOT NAME	MAJOR STREET	MINOR STREET	CRASHES PER MILLION ENTERING VEHICLES ALL INJURY	FREQUENCY ALL INJURY	RANK ALL INJURY (30%)	CRASHES PER MILLION ENTERING VEHICLES FATAL & SERIOUS INJURY	FREQUENCY FATAL & SERIOUS INJURY	RANK FATAL & SERIOUS INJURY (30%)	CRASHES PER MILLION ENTERING VEHICLES PEDESTRIAN	FREQUENCY PEDESTRIAN	RANK PEDESTRIAN (20%)	CRASHES PER MILLION ENTERING VEHICLES BICYCLE	FREQUENCY BICYCLE	RANK BICYCLE (20%)	NUMBER OF SURVEY COMPLAINTS	SURVEY COMPLAINT RANK	OVERALL SCORE	OVERALL RANK
5	US 42 (Columbus Ave) & SR 48 (Miller Rd)	U.S. Highway 42 (Columbus Avenue)	State Route 48 (Miller Road)	0.7085	44	1	0.0322	2	2	0	0	4	0	0	3	12	3	3.45	1
3	SR 48 & Cook Road	State Route 48	Cook Road	0.3289	21	2	0.0470	3	1	0	0	4	0	0	3	10	4	1.8	2
2	SR 48 & Burt Avenue/Forge Drive	State Route 48	Burt Avenue/Forge Drive	0.2912	16	4	0.0364	2	2	0	0	4	0	0	3	1	12	1.35	3
1	SR 48 & Kingsview Drive	State Route 48	Kingsview Drive	0.2819	17	3	0	0	12	0	0	4	0	0	3	0	16	1.275	4
4	E Main Street & SR 48 NB Ramps/Oregonia Road	East Main Street	SR 48 NB Ramps/Oregonia Road	0.3692	13	5	0.0284	1	4	0	0	4	0	0	3	2	7	1.05	5
6	SR 48 & Miller Road	State Route 48 (North Broadway Street)	Miller Road (Twp Hwy 101)	0.2203	9	6	0.0245	1	4	0	0	4	0	0	3	2	7	0.75	6
8	SR 63 & Neil Armstrong Way/Glosser Road	SR 63 (W Main St)	Neil Armstrong Way (SR 123)/Glosser Rd	0.2694	9	6	0.0299	1	4	0	0	4	0	0	3	1	12	0.75	6
16	US 42 & Genntown Dr	US 42	Genntown Dr	0.3006	9	6	0.0334	1	4	0	0	4	0	0	3	0	16	0.75	6
15	Broadway St & Main St	S Broadway St	W Main St	0.2162	9	6	0	0	12	0	0	4	0.0240	1	1	16	2	0.725	9
11	Columbus Ave & Monroe Rd	Columbus Ave (US 42)	Monroe Rd	0.2719	9	6	0	0	12	0	0	4	0	0	3	1	12	0.675	10
17	E Main St & Dave Ave	E Main St	Dave Ave	0.2316	8	11	0	0	12	0.0290	1	1	0	0	3	0	16	0.65	11
18	Mason Morrow Millgrove & Columbia Rd	Mason Morrow Millgrove Rd	Columbia Rd	0.3464	6	12	0.0577	1	4	0	0	4	0	0	3	0	16	0.525	12
14	W Main St & West St	W Main St	West St	0.1660	5	13	0.0332	1	4	0	0	4	0	0	3	0	16	0.45	13
10	E Main St & SR 48 SB Ramps	SR 48/123 (E Main St)	SR 48 SB Ramps	0.1169	5	13	0	0	12	0.0234	1	1	0	0	3	27	1	0.425	14
19	Warren & East Street	E Warren Street	N East Street	0.2255	4	19	0.0564	1	4	0.0564	1	1	0	0	3	0	16	0.425	14
7	Broadway St & Silver St	N Broadway St/S Broadway St	W Silver St/E Silver St	0.1663	5	13	0	0	12	0	0	4	0	0	3	2	7	0.375	16
9	SR 48/123 & S Mechanic St	SR 48 (E Main St) (SR 123)	S Mechanic St	0.1686	5	13	0	0	12	0	0	4	0	0	3	9	5	0.375	16
13	Miller Rd & Twp Hwy 100	Miller Rd	Twp Hwy 100	0.1170	4	19	0.0293	1	4	0	0	4	0	0	3	2	7	0.375	16
23	E Silver St & N Mechanic St	E Silver St	N Mechanic St	0.7413	5	13	0	0	12	0	0	4	0	0	3	1	12	0.375	16
24	N Broadway St & E Warren St	N Broadway St	E Warren St	0.2355	5	13	0	0	12	0	0	4	0	0	3	2	7	0.375	16
12	SR 48 & Monroe Rd	SR 48	Monroe Rd	0.0751	4	19	0	0	12	0	0	4	0	0	3	3	6	0.3	21
21	Franklin Rd & Neil Armstrong Way	Franklin Rd	Neil Armstrong Way	0.1503	4	19	0	0	12	0	0	4	0	0	3	0	16	0.3	21
22	Columbus Ave & Kroger/Aldi Parking Lots	Columbus Ave (US 42)	Kroger/Aldi Parking Lots (1248 Columbus Ave)	0.1652	4	19	0	0	12	0	0	4	0	0	3	0	16	0.3	21
20	Silver St & East St	E Silver St	N East Street	0.3406	3	24	0	0	12	0	0	4	0.1135	1	1	0	16	0.275	24

Spot – Crash Rate

ID#	SPOT NAME	MAJOR STREET	MINOR STREET	CRASHES PER MILLION ENTERING VEHICLES ALL INJURY	FREQUENCY ALL INJURY	RANK ALL INJURY (30%)	CRASHES PER MILLION ENTERING VEHICLES FATAL & SERIOUS INJURY	FREQUENCY FATAL & SERIOUS INJURY	RANK FATAL & SERIOUS INJURY (30%)	CRASHES PER MILLION ENTERING VEHICLES PEDESTRIAN	FREQUENCY PEDESTRIAN	RANK PEDESTRIAN (20%)	CRASHES PER MILLION ENTERING VEHICLES BICYCLE	FREQUENCY BICYCLE	RANK BICYCLE (20%)	NUMBER OF SURVEY COMPLAINTS	SURVEY COMPLAINT RANK	OVERALL SCORE	OVERALL RANK
19	Warren & East Street	E Warren Street	N East Street	0.2255	4	14	0.0564	1	2	0.0564	1	1	0	0	3	0	16	0.146	1
5	US 42 (Columbus Ave) & SR 48 (Miller Rd)	U.S. Highway 42 (Columbus Avenue)	State Route 48 (Miller Road)	0.7085	44	2	0.0322	2	7	0	0	4	0	0	3	12	3	0.114	2
18	Mason Morrow Millgrove & Columbia Rd	Mason Morrow Millgrove Rd	Columbia Rd	0.3464	6	4	0.0577	1	1	0	0	4	0	0	3	0	16	0.110	3
3	SR 48 & Cook Road	State Route 48	Cook Road	0.3289	21	6	0.0470	3	3	0	0	4	0	0	3	10	4	0.094	4
20	Silver St & East St	E Silver St	N East Street	0.3406	3	5	0	0	12	0	0	4	0.1135	1	1	0	16	0.084	5
2	SR 48 & Burt Avenue/Forge Drive	State Route 48	Burt Avenue/Forge Drive	0.2912	16	8	0.0364	2	4	0	0	4	0	0	3	1	12	0.077	6
23	E Silver St & N Mechanic St	E Silver St	N Mechanic St	0.7413	5	1	0	0	12	0	0	4	0	0	3	1	12	0.075	7
4	E Main Street & SR 48 NB Ramps/Oregonia Road	East Main Street	SR 48 NB Ramps/Oregonia Road	0.3692	13	3	0.0284	1	10	0	0	4	0	0	3	2	7	0.074	8
16	US 42 & Genntown Dr	US 42	Genntown Dr	0.3006	9	7	0.0334	1	5	0	0	4	0	0	3	0	16	0.074	9
8	SR 63 & Neil Armstrong Way/Glosser Road	SR 63 (W Main St)	Neil Armstrong Way (SR 123)/Glosser Rd	0.2694	9	11	0.0299	1	8	0	0	4	0	0	3	1	12	0.066	10
14	W Main St & West St	W Main St	West St	0.1660	5	19	0.0332	1	6	0	0	4	0	0	3	0	16	0.060	11
6	SR 48 & Miller Road	State Route 48 (North Broadway Street)	Miller Road (Twp Hwy 101)	0.2203	9	15	0.0245	1	11	0	0	4	0	0	3	2	7	0.054	12
13	Miller Rd & Twp Hwy 100	Miller Rd	Twp Hwy 100	0.1170	4	22	0.0293	1	9	0	0	4	0	0	3	2	7	0.050	13
17	E Main St & Dave Ave	E Main St	Dave Ave	0.2316	8	13	0	0	12	0.0290	1	2	0	0	3	0	16	0.049	14
10	E Main St & SR 48 SB Ramps	SR 48/123 (E Main St)	SR 48 SB Ramps	0.1169	5	23	0	0	12	0.0234	1	3	0	0	3	27	1	0.033	15
15	Broadway St & Main St	S Broadway St	W Main St	0.2162	9	16	0	0	12	0	0	4	0.0240	1	2	16	2	0.032	16
1	SR 48 & Kingsview Drive	State Route 48	Kingsview Drive	0.2819	17	9	0	0	12	0	0	4	0	0	3	0	16	0.029	17
11	Columbus Ave & Monroe Rd	Columbus Ave (US 42)	Monroe Rd	0.2719	9	10	0	0	12	0	0	4	0	0	3	1	12	0.028	18
24	N Broadway St & E Warren St	N Broadway St	E Warren St	0.2355	5	12	0	0	12	0	0	4	0	0	3	2	7	0.024	19
9	SR 48/123 & S Mechanic St	SR 48 (E Main St) (SR 123)	S Mechanic St	0.1686	5	17	0	0	12	0	0	4	0	0	3	9	5	0.017	20
7	Broadway St & Silver St	N Broadway St/S Broadway St	W Silver St/E Silver St	0.1663	5	18	0	0	12	0	0	4	0	0	3	2	7	0.017	21
22	Columbus Ave & Kroger/Aldi Parking Lots	Columbus Ave (US 42)	Kroger/Aldi Parking Lots (1248 Columbus Ave)	0.1652	4	20	0	0	12	0	0	4	0	0	3	0	16	0.017	22
21	Franklin Rd & Neil Armstrong Way	Franklin Rd	Neil Armstrong Way	0.1503	4	21	0	0	12	0	0	4	0	0	3	0	16	0.015	23
12	SR 48 & Monroe Rd	SR 48	Monroe Rd	0.0751	4	24	0	0	12	0	0	4	0	0	3	3	6	0.008	24

Segment – Crash Frequency

ID#	SEGMENT	STARTING POINT	ENDING POINT	LENGTH (mi)	ESTIMATED AADT	CRASHES PER 100 MILLION VEHICLE MILES TRAVEL ALL INJURY	FREQUENCY ALL INJURY	RANK ALL INJURY (30%)	CRASHES PER 100 MILLION VEHICLE MILES TRAVEL FATAL & SERIOUS INJURY	FREQUENCY FATAL & SERIOUS INJURY	RANK FATAL & SERIOUS INJURY (30%)	CRASHES PER 100 MILLION VEHICLE MILES TRAVEL PEDESTRIAN	FREQUENCY PEDESTRIAN	RANK PEDESTRIAN (20%)	CRASHES PER 100 MILLION VEHICLE MILES TRAVEL BICYCLE	FREQUENCY BICYCLE	RANK BICYCLE (20%)	NUMBER OF SURVEY COMPLAINTS	SURVEY COMPLAINT RANK	OVERALL SCORE	OVERALL RANK
2	Mason Morrow Millgrove Rd	Columbia Rd	City Limits	0.422	8061	112.7545	7	1	32.2156	2	1	0	0	3	0	0	1	0	12	0.675	1
5	Main St	McClure Rd	Markey Rd	0.58	12790	44.3190	6	2	14.7730	2	1	0	0	3	0	0	1	0	12	0.6	2
8	SB SR 48	Lebanon Rd	Kingsview Drive	0.432	16548	38.3246	5	3	7.6649	1	3	0	0	3	0	0	1	0	12	0.45	3
11	Columbus Ave	Drake Rd	SR 48	0.374	10801	67.8222	5	3	0	0	8	0	0	3	0	0	1	0	12	0.375	4
12	Columbus Ave	SR 48	Genntown Rd	0.252	16000	54.3596	4	5	13.5899	1	3	0	0	3	0	0	1	0	12	0.375	4
13	Columbus Ave	Southline Dr	Monroe Rd	0.443	11602	42.6443	4	5	0	0	8	0	0	3	0	0	1	1	8	0.3	6
17	Miller Road	Broadway St	City Limits	0.901	10032	24.2485	4	5	0	0	8	0	0	3	0	0	1	0	12	0.3	6
19	Main St	Mound St	Dave Dr	0.208	16332	48.3900	3	8	0	0	8	0	0	3	0	0	1	0	12	0.225	8
23	Main St	Neil Armstrong Way	West St	0.552	12749	23.3584	3	8	0	0	8	0	0	3	0	0	1	0	12	0.225	8
21	Miller Road	Drake Rd	Broadway St	1	14655	11.2169	3	8	0	0	8	0	0	3	0	0	1	0	12	0.225	8
25	NB SR 48	Turtlecreek Rd Exit	Turtlecreek Rd Onramp	0.419	13695	19.0981	2	12	9.5491	1	3	0	0	3	0	0	1	0	12	0.225	8
24	SB SR 48	Deerfield Rd Exit	Deerfield Rd Onramp	0.41	13320	30.1003	3	8	0	0	8	0	0	3	0	0	1	0	12	0.225	8
27	NB SR 48	Main St	Monroe Rd	0.889	15069	4.0903	1	18	4.0903	1	3	4.0903	1	1	0	0	1	0	12	0.2	13
43	Columbia Rd	Mason Morrow Milgrove Rd	City Limits	0.682	3011	53.3669	2	12	0	0	8	0	0	3	0	0	1	0	12	0.15	14
30	Deerfield Rd	Cook Rd	Navaho Dr	0.244	5900	76.1246	2	12	0	0	8	0	0	3	0	0	1	0	12	0.15	14
41	Franklin Rd	Neil Armstrong Way	Silver St	0.744	4250	34.6581	2	12	0	0	8	0	0	3	0	0	1	0	12	0.15	14
29	Main St	Markey Rd	Neil Armstrong Way	0.289	12742	29.7599	2	12	0	0	8	0	0	3	0	0	1	0	12	0.15	14
32	SB SR 48	SR 48 Exit	SR 48 Onramp	0.329	11909	13.9851	1	18	13.9851	1	3	0	0	3	0	0	1	0	12	0.15	14
38	SB SR 48	SR 48 Onramp	Cook Rd	0.77	11978	11.8821	2	12	0	0	8	0	0	3	0	0	1	0	12	0.15	14
46	Monroe Road	Broadway St	Columbus Ave	0.843	5956	10.9133	1	18	0	0	8	10.9133	1	1	0	0	1	0	12	0.125	20
65	Cincinnati Ave	Sycamore St	Keever St	0.152	4696	76.7654	1	18	0	0	8	0	0	3	0	0	1	0	12	0.075	21
70	Cincinnati Ave	Ok Cha Circle	McClureRd	0.37	6345	23.3402	1	18	0	0	8	0	0	3	0	0	1	0	12	0.075	21
48	Columbus Ave	Monroe Rd	Drake Rd	0.204	10686	25.1357	1	18	0	0	8	0	0	3	0	0	1	0	12	0.075	21
49	Deerfield Rd	Burt Rd	SR 48	0.303	5364	33.7136	1	18	0	0	8	0	0	3	0	0	1	0	12	0.075	21
74	Deerfield Rd	McBurney Drive	East St	0.248	4671	47.3016	1	18	0	0	8	0	0	3	0	0	1	0	12	0.075	21
81	Deerfield Rd	Navaho Dr	Holland Ave	0.193	5884	48.2511	1	18	0	0	8	0	0	3	0	0	1	0	12	0.075	21
85	Kingsview Drive	SR 48	Turtlecreek Rd	1.649	3,233	10.2781	1	18	0	0	8	0	0	3	0	0	1	0	12	0.075	21
53	Main St	SR 48 SB Ramps	SR 48 NB Ramps	0.118	18523	25.0694	1	18	0	0	8	0	0	3	0	0	1	20	1	0.075	21
57	Main St	Dave Dr	SR 48 SB Ramps	0.057	17120	56.1511	1	18	0	0	8	0	0	3	0	0	1	1	8	0.075	21
58	Main St	Stubbs Mills Rd	City Limits	0.07	10159	77.0527	1	18	0	0	8	0	0	3	0	0	1	0	12	0.075	21
69	Main St	High St	Mound St	0.114	14421	33.3301	1	18	0	0	8	0	0	3	0	0	1	0	12	0.075	21
71	Markey Rd	Main St	Franklin Rd	0.943	553	105.0752	1	18	0	0	8	0	0	3	0	0	1	1	8	0.075	21
61	Monroe Road	Columbus Ave	SR 48	0.316	6081	28.5151	1	18	0	0	8	0	0	3	0	0	1	0	12	0.075	21
56	N Broadway St	Monroe Rd	E Warren St	0.871	8501	7.4003	1	18	0	0	8	0	0	3	0	0	1	4	4	0.075	21
52	NB SR 48	I-71 Ramps	Kingsview Drive	0.39	16292	8.6238	1	18	0	0	8	0	0	3	0	0	1	0	12	0.075	21
60	NB SR 48	Monroe Rd	Columbus Ave	0.479	12257	9.3329	1	18	0	0	8	0	0	3	0	0	1	0	12	0.075	21
64	Neil Armstrong Way	Main St	Franklin Rd	0.673	4700	17.3230	1	18	0	0	8	0	0	3	0	0	1	0	12	0.075	21
78	SB SR 48	Deerfield Rd Onramp	Lebanon Rd	0.417	13320	9.8650	1	18	0	0	8	0	0	3	0	0	1	0	12	0.075	21
82	Stubbs Mills Rd	Main St	City Limits	0.303	4337	41.6970	1	18	0	0	8	0	0	3	0	0	1	5	3	0.075	21
67	West St	Main St	Cincinnati Ave	0.364	2608	57.7202	1	18	0	0	8	0	0	3	0	0	1	0	12	0.075	21
120	Broadway St	Cincinnati Ave	Orchard Ave	0.152	3304	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
110	Cincinnati Ave	Glosser-Richardson Rd	Silverwood Farms Dr	0.266	6142	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
112	Deerfield Rd	Orchard Ave	McBurney Drive	0.123	3221	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
115	Deerfield Rd	East St	Cook Rd	0.152	7363	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
125	E Mulberry St	Mound St	High St	0.109	707	0	0	41	0	0	8	0	0	3	0	0	1	1	8	0	41
87	Main St	Sr 48 NB Ramps	Stubbs Mills Rd	0.025	14467	0	0	41	0	0	8	0	0	3	0	0	1	3	5	0	41
124	Main St	West St	Broadway St	0.221	13711	0	0	41	0	0	8	0	0	3	0	0	1	2	6	0	41
99	Miller Road	Columbus Ave	Drake Rd	0.325	14358	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
89	N Broadway St	Miller Rd	City Limits	0.497	11929	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
100	N Broadway St	Miller Rd	Monroe Rd	0.496	8600	0	0	41	0	0	8	0	0	3	0	0	1	7	2	0	41
104	NB SR 48	Forge Dr	Cook Rd	1.937	14081	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
111	NB SR 48	Kingsview Drive	Arrow Springs Blvd	0.813	16230	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
116	NB SR 48	Cook Rd	Main St Exit	0.805	15767	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
119	NB SR 48	Main St Onramp	Main St Overpass	0.039	14960	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
123	NB SR 48	Turtlecreek Rd Onramp	Forge Dr	0.265	13695	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
126	NB SR 48	Main St Exit	Main St Onramp	0.168	11819	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
90	Orchard Ave	Broadway St	Deerfield Rd	0.059	3589	0	0	41	0	0	8	0	0	3	0	0	1	2	6	0	41
121	Oregonia Rd	Main St	Wilmington Rd	0.019	3683	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
91	SB SR 48	Cook Rd	Forge Dr	0.511	14180	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
107	SB SR 48	Columbus Ave	Monroe Rd	0.45	11965	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
117	SB SR 48	Forge Dr	Deerfield Rd Exit	0.152	13320	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
118	SB SR 48	Monroe Rd	SR 48 Exit	1	15392	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41

Segment – Crash Rate

FID	SEGMENT	STARTING POINT	ENDING POINT	LENGTH (mi)	ESTIMATED AADT	CRASHES PER 100 MILLION VEHICLE MILES TRAVEL ALL INJURY	FREQUENCY ALL INJURY	RANK ALL INJURY (30%)	CRASHES PER 100 MILLION VEHICLE MILES TRAVEL FATAL & SERIOUS INJURY	FREQUENCY FATAL & SERIOUS INJURY	RANK FATAL & SERIOUS INJURY (30%)	CRASHES PER 100 MILLION VEHICLE MILES TRAVEL PEDESTRIAN	FREQUENCY PEDESTRIAN	RANK PEDESTRIAN (20%)	CRASHES PER 100 MILLION VEHICLE MILES TRAVEL BICYCLE	FREQUENCY BICYCLE	RANK BICYCLE (20%)	NUMBER OF SURVEY COMPLAINTS	SURVEY COMPLAINT RANK	OVERALL SCORE	OVERALL RANK
124	Mason Morrow Millgrove Rd	Columbia Rd	City Limits	0.422	8061	112.7545	7	3	32.2156	2	1	0	0	3	0	0	1	0	12	12.520	1
38	Main St	Dave Dr	SR 48 SB Ramps	0.057	17120	168.4534	3	1	0	0	8	0	0	3	0	0	1	1	8	7.500	2
90	SB BP 48	BP 48 Exit	SR 48 Onramp	0.329	11909	69.9256	5	6	13.9851	1	3	0	0	3	0	0	1	0	12	6.369	3
2	Columbus Ave	Monroe Rd	Drake Rd	0.204	10686	125.6787	5	2	0.0000	0	8	0	0	3	0	0	1	0	12	5.596	4
32	Columbus Ave	SR 48	Genntown Rd	0.252	16000	54.3596	4	7	13.5899	1	4	0	0	3	0	0	1	0	12	5.584	5
65	Main St	McClure Rd	Markey Rd	0.58	12790	44.3190	6	9	14.7730	2	2	0	0	3	0	0	1	0	12	5.412	6
29	Monroe Road	Broadway St	Columbus Ave	0.843	5956	10.9133	1	18	0	0	8	10.9133	1	1	0	0	1	0	12	5.015	7
69	Main St	High St	Mound St	0.114	14421	99.9904	3	4	0	0	8	0	0	3	0	0	1	0	12	4.452	8
89	Deerfield Rd	Cook Rd	Navaho Dr	0.244	5900	76.1246	2	5	0	0	8	0	0	3	0	0	1	0	12	3.389	9
120	NB BP 48	Main St	Monroe Rd	0.889	15069	8.1805	2	17	4.0903	1	7	4.0903	1	2	0	0	1	0	12	3.190	10
125	Columbia Rd	Mason Morrow Milgrove Rd	City Limits	0.682	3011	53.3669	2	8	0	0	8	0	0	3	0	0	1	0	12	2.376	11
85	SB SR 48	Deerfield Rd Exit	Deerfield Rd Onramp	0.41	13320	10.0334	1	18	10.03342133	1	5	0	0	3	0	0	1	0	12	2.351	12
111	NB SR 48	Turtlecreek Rd Exit	Turtlecreek Rd Onramp	0.419	13695	9.5491	1	18	9.5491	1	6	0	0	3	0	0	1	0	12	2.238	13
123	Franklin Rd	Neil Armstrong Way	Silver St	0.744	4250	34.6581	2	10	0	0	8	0	0	3	0	0	1	0	12	1.543	14
23	Main St	Markey Rd	Neil Armstrong Way	0.289	12742	29.7599	2	11	0	0	8	0	0	3	0	0	1	0	12	1.325	15
119	Miller Road	Broadway St	City Limits	0.901	10032	24.2485	4	12	0	0	8	0	0	3	0	0	1	0	12	1.080	16
58	SB SR 48	Lebanon Rd	Kingsview Drive	0.432	16548	22.9948	3	13	0	0	8	0	0	3	0	0	1	0	12	1.024	17
53	Columbus Ave	N East St	Monroe Rd	1	11602	18.8914	4	14	0	0	8	0	0	3	0	0	1	1	8	0.841	18
116	SB SR 48	SR 48 Onramp	Cook Rd	0.77	11978	11.8821	2	15	0	0	8	0	0	3	0	0	1	0	12	0.529	19
24	Miller Road	Drake Rd	Broadway St	1	14655	11.2169	3	16	0	0	8	0	0	3	0	0	1	0	12	0.499	20
56	Cincinnati Ave	Glosser-Richardson Rd	Silverwood Farms Dr	0.266	6142	33.5387	1	18	0	0	8	0	0	3	0	0	1	0	12	0.015	21
61	Cincinnati Ave	Sycamore St	Keever St	0.152	4696	76.7654	1	18	0	0	8	0	0	3	0	0	1	0	12	0.015	21
11	Columbus Ave	Drake Rd	BP 48	0.374	10801	13.5644	1	18	0	0	8	0	0	3	0	0	1	0	12	0.015	21
12	Deerfield Rd	Burt Rd	SR 48	0.303	5364	33.7136	1	18	0	0	8	0	0	3	0	0	1	0	12	0.015	21
82	Deerfield Rd	McBurney Drive	East St	0.248	4671	47.3016	1	18	0	0	8	0	0	3	0	0	1	0	12	0.015	21
110	Deerfield Rd	Navaho Dr	Holland Ave	0.193	5884	48.2511	1	18	0	0	8	0	0	3	0	0	1	0	12	0.015	21
126	Kingsview Drive	SR 48	Turtlecreek Rd	1.649	3,233	10.2781	1	18	0	0	8	0	0	3	0	0	1	0	12	0.015	21
13	Main St	Mound St	Dave Dr	0.208	16332	16.1300	1	18	0	0	8	0	0	3	0	0	1	0	12	0.015	21
21	Main St	SR 48 SB Ramps	SR 48 NB Ramps	0.118	18523	25.0694	1	18	0	0	8	0	0	3	0	0	1	20	1	0.015	21
78	Main St	Neil Armstrong Way	West St	0.552	12749	7.7861	1	18	0	0	8	0	0	3	0	0	1	0	12	0.015	21
115	Main St	West St	Broadway St	0.221	13711	18.0832	1	18	0	0	8	0	0	3	0	0	1	2	6	0.015	21
71	Markey Rd	Main St	Franklin Rd	0.943	553	105.0752	1	18	0	0	8	0	0	3	0	0	1	1	8	0.015	21
52	Monroe Road	Columbus Ave	BP 48	0.316	6081	28.5151	1	18	0	0	8	0	0	3	0	0	1	0	12	0.015	21
41	N Broadway St	Miller Rd	Monroe Rd	0.496	8600	12.8457	1	18	0	0	8	0	0	3	0	0	1	7	2	0.015	21
19	NB SR 48	I-71 Ramps	Kingsview Drive	0.39	16292	8.6238	1	18	0	0	8	0	0	3	0	0	1	0	12	0.015	21
81	NB SR 48	Cook Rd	Main St Exit	0.805	15767	4.3171	1	18	0	0	8	0	0	3	0	0	1	0	12	0.015	21
60	Neil Armstrong Way	Main St	Franklin Rd	0.673	4700	17.3230	1	18	0	0	8	0	0	3	0	0	1	0	12	0.015	21
107	SB SR 48	Deerfield Rd Onramp	Lebanon Rd	0.417	13320	9.8650	1	18	0	0	8	0	0	3	0	0	1	0	12	0.015	21
117	Stubbs Mills Rd	Main St	City Limits	0.303	4337	41.6970	1	18	0	0	8	0	0	3	0	0	1	5	3	0.015	21
67	West St	Main St	Cincinnati Ave	0.364	2608	57.7202	1	18	0	0	8	0	0	3	0	0	1	0	12	0.015	21
100	Broadway St	Cincinnati Ave	Orchard Ave	0.152	3304	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
70	Cincinnati Ave	Ok Cha Circle	McClureRd	0.37	6345	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
64	Deerfield Rd	Orchard Ave	McBurney Drive	0.123	3221	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
74	Deerfield Rd	East St	Cook Rd	0.152	7363	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
118	E Mulberry St	Mound St	High St	0.109	707	0	0	41	0	0	8	0	0	3	0	0	1	1	8	0	41
5	Main St	Sr 48 NB Ramps	Stubbs Mills Rd	0.025	14467	0	0	41	0	0	8	0	0	3	0	0	1	3	5	0	41
43	Main St	Stubbs Mills Rd	City Limits	0.07	10159	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
30	Miller Road	Columbus Ave	Drake Rd	0.325	14358	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
8	N Broadway St	Miller Rd	City Limits	0.497	11929	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
27	N Broadway St	Monroe Rd	Warren St	0.871	8501	0	0	41	0	0	8	0	0	3	0	0	1	4	4	0	41
48	NB BP 48	Monroe Rd	Columbus Ave	0.479	12257	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
121	NB BP 48	Main St Exit	Main St Onramp	0.168	11819	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
46	NB SR 48	Forge Dr	Cook Rd	1.937	14081	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
57	NB SR 48	Kingsview Drive	Arrow Springs Blvd	0.813	16230	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
99	NB SR 48	Main St Onramp	Main St Overpass	0.039	14960	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
112	NB SR 48	Turtlecreek Rd Onramp	Forge Dr	0.265	13695	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
17	Orchard Ave	Broadway St	Deerfield Rd	0.059	3589	0	0	41	0	0	8	0	0	3	0	0	1	2	6	0	41
104	Oregonia Rd	Main St	Wilmington Rd	0.019	3683	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
25	SB SR 48	Cook Rd	Forge Dr	0.511	14180	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
49	SB SR 48	Columbus Ave	Monroe Rd	0.45	11965	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
87	SB SR 48	Forge Dr	Deerfield Rd Exit	0.152	13320	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41
91	SB SR 48	Monroe Rd	SR 48 Exit	1	15392	0	0	41	0	0	8	0	0	3	0	0	1	0	12	0	41

Project Sites

Segments

Columbus Ave

Columbus Ave has many frequently used driveways and provides access to many residential areas – since the street is also very wide, turning onto Columbus from a driveway or side street can be difficult, and is the cause of many crashes. A road diet could be considered for the road if traffic volumes are sufficiently low.

Figure 31: Columbus Ave, looking southwest.

Main St

From McClure Rd to Neil Armstrong Way, there were several run-off-road crashes and rear end crashes involving slowing or turning traffic. If the road were widened to 3 lanes from 2, left-turning traffic and thru/right traffic would be separated, reducing rear-end crashes. The likelihood of a left-of-center crash would also decrease because of the buffer distance between through lanes. *The planned SR 63 corridor improvements implement this countermeasure.*

For the entire span of Main St, speeding is an everyday occurrence. Particularly in downtown, speeding causes dangerous conflicts with pedestrians. *The City is considering reducing the speed limit west of downtown, which would partially address speeding. A planned roundabout at Markey Rd will partially address speeding west of downtown.*

Figure 32: Main St, looking northeast.

Mason Morrow Millgrove Rd

A high number of run-off-road crashes has indicated poor road alignment on this road. *This will be addressed in the active improvement, "MASON-MORROW-MILLGROVE RD. REALIGNMENT PROJECT".*

Miller Rd

Miller Rd was originally intended to be a bypass for vehicles, so pedestrian amenities were not constructed along the road. However, Miller now connects two of Lebanon's main schools, and would be a good location for a multi-use path. *The City currently has a sidewalk planned from Broadway St to Drake Rd.*

State Route 48/Bypass 48

From the city limits to Columbus Ave, SR 48 is the highest speed road in Lebanon. For the next time the road is restriped, the thickness of edge lines, centerlines, and dotted lines should be increased to 6" from 4". This makes the barrier more noticeable at high speeds. Dilemma zone detection and backplates are present on some of SR 48's signals, but they should be installed on all signals to accommodate the high-speed approach.

N Broadway St

Based on public input, the bike path on the west side of the road is unpopular with residents of Lebanon. *This will be addressed in the active improvement, "N BROADWAY BIKE PATH RECONFIGURATION".*

Figure 33: Queueing on Bypass 48.

Spots

Columbus Ave & Bypass 48

The signal could be considered for replacement with a multi-lane roundabout with slip ramps for right-turning traffic. Existing ADT is roughly 34000 vpd, and double-lane roundabouts can process 40,000-50,000 vpd. This would greatly simplify the intersections geometry and would provide islands for installation of pedestrian facilities.

The northbound rightmost lane of BP-48 terminates as a right-turn only lane at this intersection without much warning. More advanced warning should be installed for the northbound right turn lane, including but not limited to pavement tattoos.

Alternatively, if a roundabout is not installed, improvements can be made to the signalized intersection. The southern striped island may be converted to landscaped island for pedestrian refuge, pedestrian amenities may be installed, and signal heads may be fitted with backplates. Signal timing should be checked to confirm adequate left-turn green time.

Figure 34: BP 48, Columbus Ave, & Miller existing and proposed configurations.

State Route 48 & Burt Ave/Forge Dr

Most crashes at this intersection are rear end crashes due to the signal. Dilemma zone detection should be installed, and the existing signal heads should be replaced by black signal heads with yellow backplates. Crosswalks and pedestrian signal devices should be considered for installation to provide connection to downtown Lebanon. Dotted lines should be considered for left turn movement tracking through the intersection.

Existing left-turn lanes should be extended. Right-turn lanes should be installed on the SB and EB approaches.

State Route 48 & Cook Rd

This signal's heads should be replaced by black signal heads with backplates. The WB Cook Rd approach should be equipped with a 5-section signal head for a protected/permissive left turn phase, as the visibility onto EB Cook Rd is limited by vertical grade. Right-turn lanes should be installed on the SR 48 approaches to separate slowing, turning traffic from fast through traffic. Existing left-turn lanes on the N/S approaches should be extended.

There are no pedestrian facilities at the intersection, which separates the eastern residential area from downtown Lebanon. Installation of pedestrian facilities should be considered. Dotted lines should be considered for left turn movement tracking through the intersection.

Figure 35: Intersection of SR 48 with Burt/Forge Ave (top) and Cook Rd (bottom) proposed conditions.

E Main St & State Route 48 NB Ramps/Oregonia Rd

Most crashes at this intersection are left-turn crashes and rear ends. The intersection also has inadequate pedestrian facilities for reaching downtown Lebanon.

Roundabouts are a proven countermeasure to address left turn crashes. This intersection should be upgraded together with the SR/BP 48 SB ramps to a dumbbell roundabout configuration. While this area is being studied, improvements at Stubbs Mills Road should also be considered. The pedestrian connectivity should be reviewed as well.

E Main St & SR 48 SB Ramps

This intersection, alongside the SR/BP 48 NB ramps, should be upgraded to a dumbbell roundabout configuration with pedestrian amenities that continue under the BP 48 bridge.

E Main St & Dave Ave

This intersection has a few rear end crashes, but the majority of nearby crashes involve vehicles exiting/entering adjacent driveways. Access management surrounding the intersection would simplify nearby traffic patterns.

Main St & Mechanic St

The western crosswalk is equipped with an RRFB that is frequently disregarded by motorists. The RRFB could be reconfigured to be mounted overhead, or could be changed to a HAWK signal.

Figure 36: E Main St & SR 48 Ramps existing and proposed configurations.

US 42 & Genntown Dr

This intersection is expected to see increased traffic volumes with the construction of "The Retreat" subdivision. Existing signal heads should be replaced by black signal heads with yellow backplates. Lebanon's 2009 Comprehensive plan indicates that US 42 will be increase to 5 lanes from 4 lanes to accommodate 2030 traffic. The details of this expansion are not known, but it is feasible that the intersection will need rebuilt to accommodate the new 5-lane configuration. The traffic impact study for "The Retreat" noted that the WBL movement's 95th percentile queue length exceeds available capacity in 2024 build and 2044 no build/build scenarios. In the event this turn lane is extended, the left-turn green time should also be extended.

The intersection may benefit from a "Green-T" configuration, in which SB through traffic is separated from turning traffic, permitting SB through traffic to flow constantly.

Figure 37: US-42 & Genntown Dr existing and proposed conditions.

Miller Rd & Twp Hwy 100 (Drake Rd)

Pedestrian facilities should be added to the intersection so students can safely walk up to the high school. Existing signal heads should be replaced by black signal heads with backplates. Public survey data suggested that the left-turn phasing on the E/W approaches may be too short – check and confirm adequate timing. Consider increasing WB turn lane length to accommodate school bus queueing. Possibly add left turn lanes for NB & SB approaches could be considered.

Mason Morrow Millgrove Rd & Columbia Rd

This intersection is influenced by Mason Morrow Millgrove's improper superelevation, and is adjacent to several run-off-road crashes. However, several crashes have occurred due to left-turning traffic from Columbia Rd not seeing WB traffic on Mason Morrow Millgrove. Several rear-ends have also occurred at the intersection. *The planned realignment of Mason Morrow Millgrove will, in part, address crashes at this intersection.*

Silver St & Mechanic St

Pedestrian curb bumpouts were recently constructed at this intersection, which shortens crosswalk length and improves safety for pedestrians. Several factors can combine to reduce vehicular visibility at this intersection, including the presence of on-street parking and foliage. Despite "cross traffic does not stop" signs, some motorists assume the intersection is an all-way stop instead of a two-way stop. Public survey data suggests motorists also exceed the speed limit when traversing Silver St, which further increases the need for visibility. In line with the proposed downtown traffic calming plan, this intersection should be studied for conversion to a four-way stop.

Columbus Ave & Monroe Rd

The EB and WB left-turn lane should be extended, and left-turn phase timings should be checked for adequacy. Existing signal heads should be replaced by black signal heads with yellow backplates. Dotted lines should be considered for left turn movement tracking through the intersection given the significant skew of the intersection.

Broadway St (SR 48) & Miller Rd

The existing signal heads should be replaced by black signal heads with backplates.

Broadway St & Main St

Consider lengthening the left-turn phase time to reduce left-turn red light running.

N Broadway St & E Warren St

SB left turns from N Broadway St are difficult in peak hours, since there's no protected left. Consider installing a protected left phase.

Broadway St & Silver St

Existing signal heads should be replaced by black signal heads with yellow backplates.

Broadway St & South St

On-street parking should be studied for removal just south of the intersection to increase visibility when turning EB from South St.

BP 48 & Monroe Rd

There are several rear-ends at the intersection, mainly on the BP 48 approaches. In line with systemic improvements on BP/SR 48, dilemma zone detection should be installed, and the existing signal heads should be replaced by black signal heads with yellow backplates. Dotted lines should be considered for left turn movement tracking through the intersection.

Systemic Improvements

Some of the recommendations for spot and segment project sites are not intended to function in isolation to increase safety, but rather are intended for systemic implementation across several sites in the city.

Systemic recommendations can be considered preventative in some cases – if an area with standard crosswalks experienced pedestrian safety issues at 25% of their intersections, and restriping to high-visibility crosswalks was shown to alleviate the safety issues at those intersections, it would be wise to restripe the remaining 75% of crosswalks as high-visibility to eliminate a safety issue before it begins.

The following are a select number of systemic recommendations for the City's transportation network.

High-Speed Roads

For roads with speed limits of 45 mph or greater, edge lines and lane lines should be striped at a width of 6 inches instead of the standard 4-inch width (this countermeasure has a CMF of ~0.8, eliminating 20% of crashes). Channelizing lines should be striped at a width of 12 inches.

On high-speed roads with signalized intersections, dilemma zone detection should be installed at each intersection to reduce the risk of red-light running.

For roads with a *design speed* (speed limit + 5 mph) of 40 mph or greater, turn lanes should be designed to include high-speed deceleration length per the ODOT L&D Manual, Figures 401-9 and 401-10. These standards were recently updated by ODOT, so a reevaluation of existing turn lane lengths would be beneficial as well.

Figure 38: Wider pavement markings can greatly impact the feel of the road. Note that the above comparison is between 4" markings (left) and 12" markings (right).

Limited Visibility Signals

For signals that are difficult to see, consider installing backplates to increase contrast between the signal LEDs and the surrounding area. Backplates will increase the amount of wind pressure experienced by the signal, so the intersection should be studied first to evaluate whether existing strain poles can support the increased wind load, or if the signal needs rebuilt.

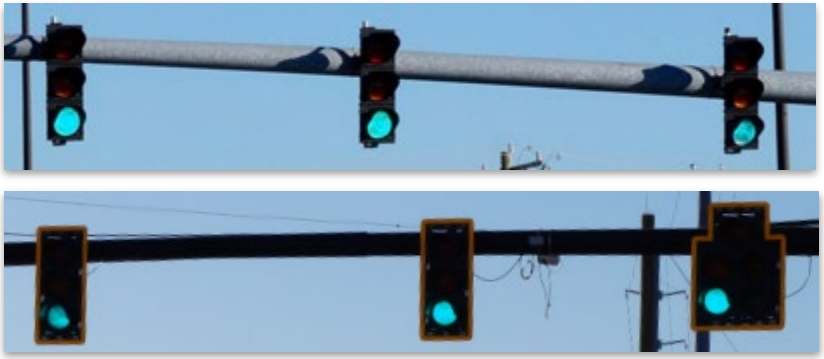


Figure 39: Backplates increase contrast between signal bulbs and the background.

Policy

The effect of engineering projects and physical roadway network improvements should not be understated – but local law, law enforcement, and driver's education can also have significant impact on roadway safety. Listed below are several engineering and non-engineering policy recommendations that address existing and future transportation problems.

Multimodal Considerations

The City will increase consideration for non-vehicular transportation methods through implementation of several policies:

- If a lot has no existing sidewalks adjacent to any public road, and a developer wishes to develop the lot, the developer shall construct sidewalks adjacent to all public roads as part of the development. If the development is near a bike path, consideration should be given to expanding the bike path.
- Traffic counts for engineering projects shall count, in addition to vehicular traffic, pedestrian and bicycle traffic.
- For signals with pedestrian facilities (pushbuttons), implement Leading Pedestrian Intervals
- Pedestrian-heavy areas shall be designed for low speeds to increase safety

Stakeholder Task Force Meetings

The City of Lebanon will continue to hold SS4A Task Force meetings with stakeholders on a regular basis. The City will use these meetings to work towards the Vision Zero initiative.

Injury Crashes

Crash analysis on all injury crashes completed as part of this Plan will be completed again every 1-3 years to review current safety trends. Whenever the analysis is completed, it should contain crash data from the past 3-5 years, even if the data has been included in a past analysis. The analysis should be compiled and issued as an addendum to this Plan.

After Studies

Following implementation of safety improvement projects, the City will continue to monitor crashes at the project site to confirm the safety issue has been addressed.

Transparency & Progress

The Lebanon SS4A Plan will be publicly available on the City of Lebanon's website.

LSSI

Implementation Timeline

Strategy	Projects	Quantity	Completion Date
Crosswalk Improvements	Leading Pedestrian Interval	10 intersections	2027
	Pedestrian Crossings at Existing Intersections	5 intersections	2030
	Review all Mid-Block Crossings		2028
Intersection Improvements	Review 2-Way Stops to 4-Way Stops	6 intersections	2026
	Curb bumpouts	5 intersections	2029
	ADA compliant curb ramps	10 intersections	2029
	Traffic signal rebuilds	15 intersections	2030
	Review Intersection & Sidewalk Lighting	15 Locations	2030
	Major Intersection Improvement (Roundabout, Geometric changes, etc.)	1 Location	2030
Corridor Improvements	Infrastructure for Speed Reduction	5 locations	2027
	Evaluation & Implementation of lane control	1 corridor	2027
	Expand sidewalk network where none is present	3 corridor	2030
	Focus on High Speed Corridors & Crash Reduction Methodologies	5 miles	2030

Conclusion

The data-driven Lebanon SSI has helped to identify three major focus areas: 1. Expansion of the existing pedestrian network. 2. Safety improvements on high crash roadway segments and intersections. 3. Targeted safety improvements on high speed roadways. These focuses are critical towards achieving the goal of eliminating traffic-related fatalities and serious injuries in the community.

1. Expansion of the Existing Pedestrian Network.

The City of Lebanon has done an exceptional job of building a robust pedestrian network; within this network there are improvements that can be made, including connecting sidewalk across existing sidewalk gaps and improving pedestrian facilities at intersections. Given the nature of Lebanon and its pedestrian focused downtown business community, the City wishes to continue to develop this pedestrian network.

The Lebanon SSI strategically directs the implementation of this commitment. The Plan has provided a data driven analysis of the most problematic roadway segments and intersections that allows us to systematically improve areas in the community for the safety of pedestrians and bicyclists. The City is already discussing the highest priority projects to begin implementing.

2. Safety improvements on high crash roadway segments and intersections.

While pedestrians and cyclists are at the greatest risk for traffic-related serious injuries, Lebanon's road network needs to be improved for all users. State routes and other arterials are the primary road network through Lebanon, connecting numerous employment and residential areas throughout Warren County. State Routes 48, 63, 123 and U.S. Route 42 all converge in the City bringing thousands of additional vehicles through the City on a daily basis. Since the downtown includes the convergence point of all four of these routes, and since SR 63 to SR 123 is a direct connection between I-75 and I-71, the downtown streets experience a high level of truck traffic (8%-10%). This level of traffic congestion and percentage of truck traffic results in significant safety concerns. The Lebanon SSI serves as a roadmap to address these problem areas.

3. Targeted Safety Improvements on High Speed Roadway

As the City has reviewed the data as part of this initiative and has taken note of the crashes along high speed roadways. The City of Lebanon has the SR 48 Bypass, Miller Road and US 42 - all of which have speed limits of 45 miles per hour or greater. These roadways not only have vehicular safety issues, but it is notoriously difficult to provide safe pedestrian crossings across such roads. Through improvements to these locations, the City will focus on improving safety for both vehicles and pedestrians to help increase connectivity along these roadways.

As the LSSI Plan is implemented, the City of Lebanon is committed to tracking the progress of the efforts and will be analyzing the impacts the roadway improvements have on safety outcomes. The data will be routinely updated and projects will be evaluated to understand which strategies are yielding the desired results, and where the process may need to improve. This accountability in monitoring project performance will ensure that all parties will continue to work collectively on actions that are advancing the goal of zero crash deaths and serious injuries on City of Lebanon streets.

Partners