Montgomery County, Indiana

2020

Local Road Safety Plan

Definitions

INLTAP	The Indiana Local Technical Assistance Program offers technical and training assistance for street departments, highway departments and local elected officials nation-wide.
INDOT	The acronym for the Indiana Department of Transportation.
FHWA	Federal Highway Administration which is an agency within the U.S. Department of Transportation. This agency supports state and local governments in the design, construction, and maintenance of the nation's highway system (Federal-Aid Highway Program) and various federally and tribally owned lands.
MUTCD	Manual on Uniform Traffic Control Devices is a technical manual published by the FHWA that defines standards for traffic control devices on all public roadways, highways and bikeways.
AADT	Annual Average Daily Traffic is the total traffic volume passing a point or segment of a road in both directions for one year divided by the number of days in a year.
PASER	Pavement Surface Evaluation and Rating is a 1-10 rating system for road pavement condition developed by the Wisconsin-Madison Transportation Information Center and utilized by highway departments across the nation to monitor roadway condition.

Montgomery County Local Road Safety Plan

INTRODUCTION

According to the National Highway Traffic Safety Administration, in 2017, over 50 percent of fatalities occurred on rural roads, but only 19 percent of Americans live in rural areas. As a rural county, Montgomery County is investing in transportation safety measures that reduce incidences of crashes with serious injury or fatalities. This Local Road Safety Plan is part of that investment and on-going efforts to increase the safety of the county's transportation network.

This plan is part of the Federal Highway Administration's Local Road Safety Plan Pilot 2.0 and was developed by the Montgomery County Highway Department with data analysis assistance from the Indiana Local Technical Assistance Program (INLTAP) and consulting assistance from HWC Engineering. The plan provides general guidance for decisions related to safety enhancements and improvements on county roadways, based on data and analysis identifying key risk factors and locations. This guidance and analysis are based on current data and as such, this plan should be viewed as a living document that can be updated to reflect changing local needs and priorities.

The intent of this plan is to:

- Increase awareness of road safety and risks
- Achieve a reduction in severe crashes
- Develop lasting partnerships for road safety
- Develop support for grant funding applications to address road safety
- Prioritize needed road safety investments.

VISION AND MISSION

Montgomery County is committed to improving transportation safety to reduce the risk of death and serious injury that result from incidents on our transportation systems. The Local Safety Plan tells the story of transportation safety needs and strategies for our County. Implementation and funding of recommendations in this plan will improve transportation safety for the county, its people, and its visitors with a goal towards zero deaths.

Support for transportation safety is also identified as a priority in several documents in Montgomery County including the 2019 Montgomery County Comprehensive Plan and the 2019 Montgomery County Thoroughfare Plan.

SAFETY PARTNERS

Multiple partners and stakeholders came together to provide input on the development this Local Road Safety Plan. Input was gained not only during the course of this safety plan, but also the county's thoroughfare plan, which was completed in the months preceding the safety plan.

- Montgomery County Highway Department
- Montgomery County Commissioners
- Montgomery County GIS
- Montgomery County Emergency Management Agency
- Indiana Local Technical Assistance Program
- Federal Highway Administration
- City of Crawfordsville
- North Montgomery School Corporation
- Town of New Market

PROCESS

The planning process involved the following steps:

Data Analysis	INLTAP provided data analysis as part of this planning effort. An initial meeting was held with the Montgomery County Highway Department, INLTAP, and HWC Engineering to review the preliminary analysis and discuss desired goals and outcomes for the plan.
Stakeholder Input	A stakeholder input meeting was held October 8, 2019 with several of the safety partners listed above. Additional input was solicited separately by the county engineer and during the development of the thoroughfare plan which was adopted in September 2019.
Draft Plan	A rough draft of the plan was developed and circulated for review by the Montgomery County Highway Department and INLTAP.
Review Meeting	A follow-up meeting was held with the Montgomery County Highway Department, INLTAP, and HWC Engineering to review the draft plan, feedback, and recommended strategies.
Revised Draft	A revised draft of the plan was circulated for review and comment by the Montgomery County Highway Department and INLTAP.
Final Plan	Final input was incorporated into the plan and a presented to the county commissioners.

EXISTING & PLANNED EFFORTS

Prior to the development of the Local Road Safety Plan, Montgomery County adopted the Montgomery County Thoroughfare Plan in September, 2019. The plan included analysis of key road networks throughout Montgomery County, with a focus on safely connecting all towns and cities in the county.

Additionally, the Montgomery County Highway Department has taken or is already planning several proactive steps to reduce crashes in the county through such efforts as:

Existing

- Adoption of Montgomery County Thoroughfare Plan
- Community Crossings Grant to improve CR 100 W from City of Crawfordsville limits to CR 1100 N
- Installation of thermoplastic lane marking on all new HMA paved roadway
- In 2021, replacing bridge #79 and removing existing s-curve on CR 100 W between CR 300 N and CR 400 N
- Purchase of berm and ditch cutting equipment to address ponding water on roadways
- Stone shoulders on CR 500 S from Ladoga Road to US 136
- Clearing right-of-way from heavy vegetation with knuckle boom mowers

Planned

- Collection of updated traffic count data and pavement markings information first focusing on roadways delineated on the thoroughfare plan
- Improve conditions along CR 625 E between US 32 and US 47
- Apply for Community Crossings grant to pave CR 400 W from SR 32 to US 136 and Camp Rotary Road/CR 300 S from SR 32 to SR 47
- Stabilize existing ¼ mile should along CR 500 N west of CR 300 W
- Improvements on CR 600 S around Lake Holiday
- Implement a bridge maintenance program to clear, clean, and seal structures as well as removal of debris, salt, and sand under approach guardrails
- Implement bridge improvements based upon the 2020-2030 bridge preservation plan
- Develop a snow removal policy
- Install AVL devices on all highway department equipment/vehicles. Implement a tracking system through the Montgomery County GIS/Mapping Department.

DATA SUMMARY

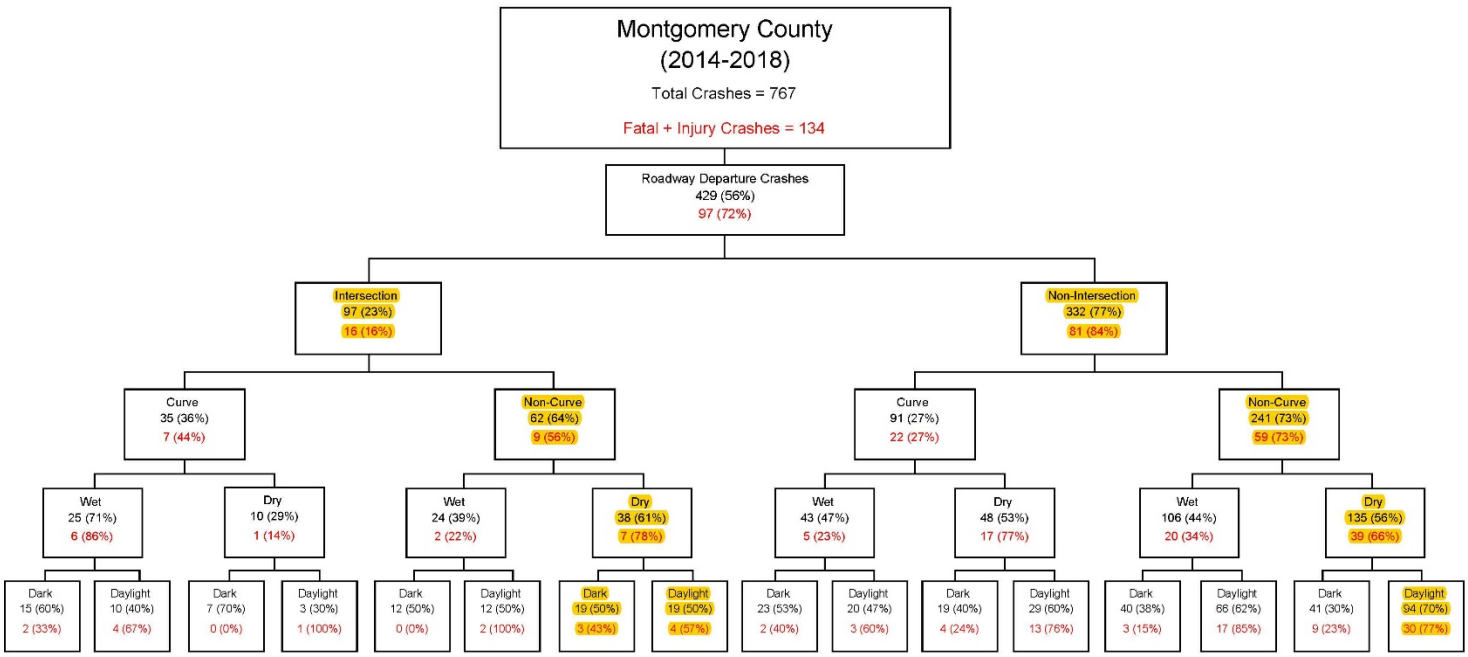
Data from the ARIES database was collected by INLTAP and combined with additional county data such as pavement rating, speed, road width and signage data. A total of 767 crashes were reported between 2014 and 2018. Table 1 below outlines the crash type and comparison to rural counties on average. Roadway departure crashes, making up 57 percent of total crashes are the most common crash, with dark roadways, wet roadways and animal crashes the next most common crash. Figure 1 illustrates the highest and lowest crash characteristics of roadway departure crashes within the County.

Table 1: Crash Summary Table

	Total Crashes	% Crashes	Rural County Average	Number of Crashes per Year				
				2014	2015	2016	2017	2018
Total Crashes	**767**	-	-	151	153	139	163	161
Fatal Crashes	**8**	1%	0.77%	0	2	0	1	5
Injury Crashes	**126**	17%	18%	24	23	24	27	28
Roadway Departure Crashes*	**429**	56%	53%	93	87	90	80	79
Animal Crashes	**195**	25%	31%	36	44	33	47	35
Angle/Left-Turn Crashes	**67**	9%	8%	15	9	8	18	17
Rear-End Crashes	**24**	3%	3%	3	2	5	7	7
Dark Roadway Crashes	**368**	48%	51%	70	73	72	86	67
Wet Roadway Crashes	**253**	33%	32%	57	57	49	39	51
Horizontal Curve Crashes	**148**	19%	22%	30	28	22	31	37
Intersection Crashes	**200**	26%	22%	39	37	32	43	49
Gravel Roadway Crashes	**64**	8%	7%	11	10	16	14	13

*Includes Run Off Road, Head-On and Sideswipe Crashes

Figure 1: Roadway Departure Crash Tree



ROADWAY DEPARTURE CRASHES

72 percent of crashes with a fatality or injury were due to roadway departure crashes. Most of these crashes occurred on non-intersection, straight roadways in dry and daylight conditions.

INTERSECTION CRASHES

Make up over 20 percent of total roadway departure crashes, are more likely to occur in dry conditions. Daylight or dark conditions did not have a significant factor.

Risk Factors

As part of the analysis, several risk factors were also analyzed which compared incidence of crashes on the roadway network as a whole versus incidence of crashes which shared the identified attributes. The data tables for this analysis can be found in the appendix. Data categories analyzed included:

- Traffic Volume (AADT)
- Roadway Width
- Shoulder Width
- Apparent Right-of-Way Width Beyond Edge of Pavement
- Roadway Classification
- Pavement Condition (PASER Rating)
- Location (Township Location)
- Curve Sign Distribution
- Speed Limit
- Pavement Type
- Snow Routes
- Ditch Condition

Heat Maps

In addition to the individual risk factors, heat maps were also created for specific crash types based on input from the highway department to understand cluster locations of certain types of crashes. These include the bulleted list below and are shown on the following pages.

- Roadway Departure Crashes
- Animal Crashes
- Snow/Ice Crashes
- Wet Crashes

Figure 2: Roadway Departure Crashes Hot Spots

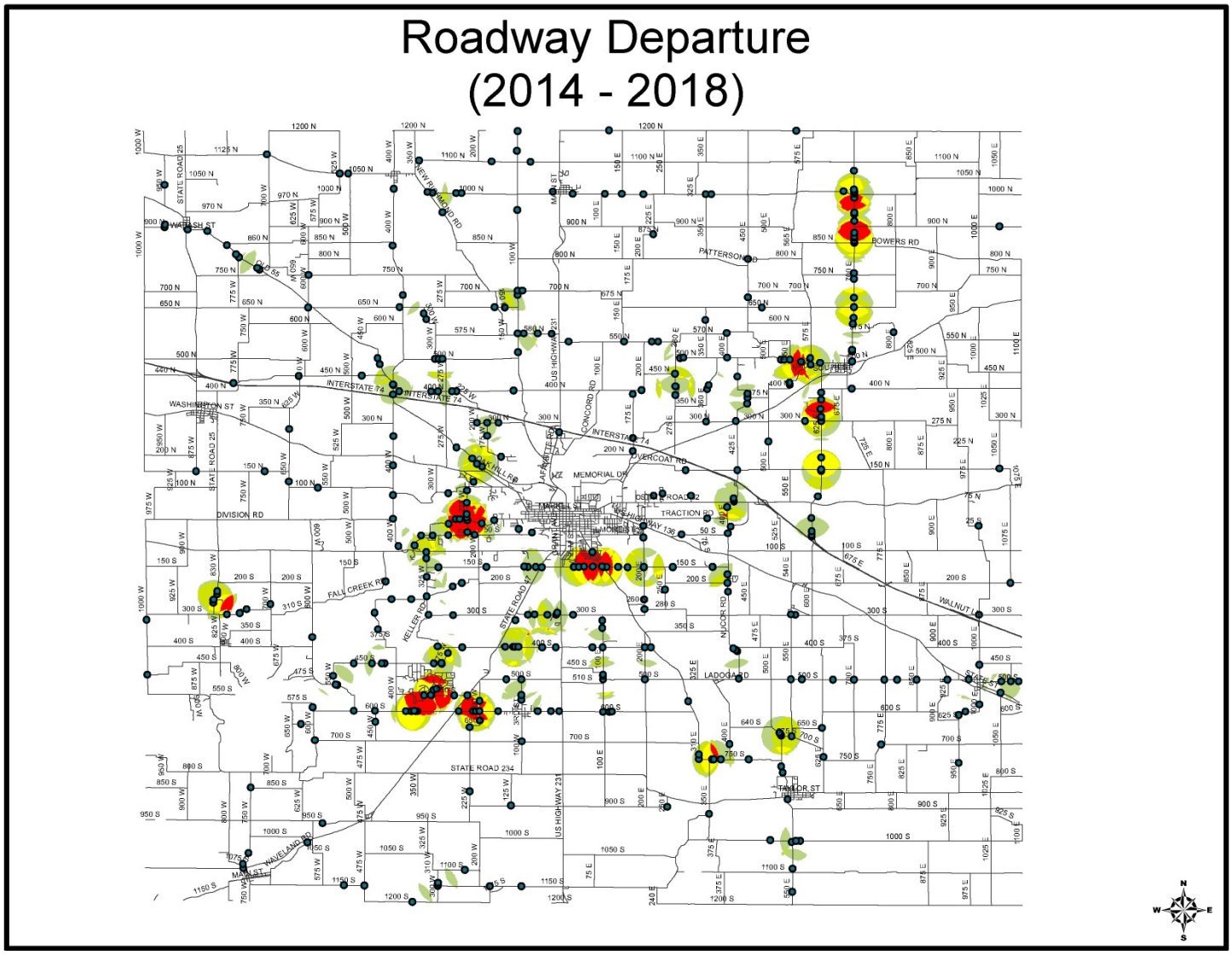


Figure 3: Animal Crash Hot Spots

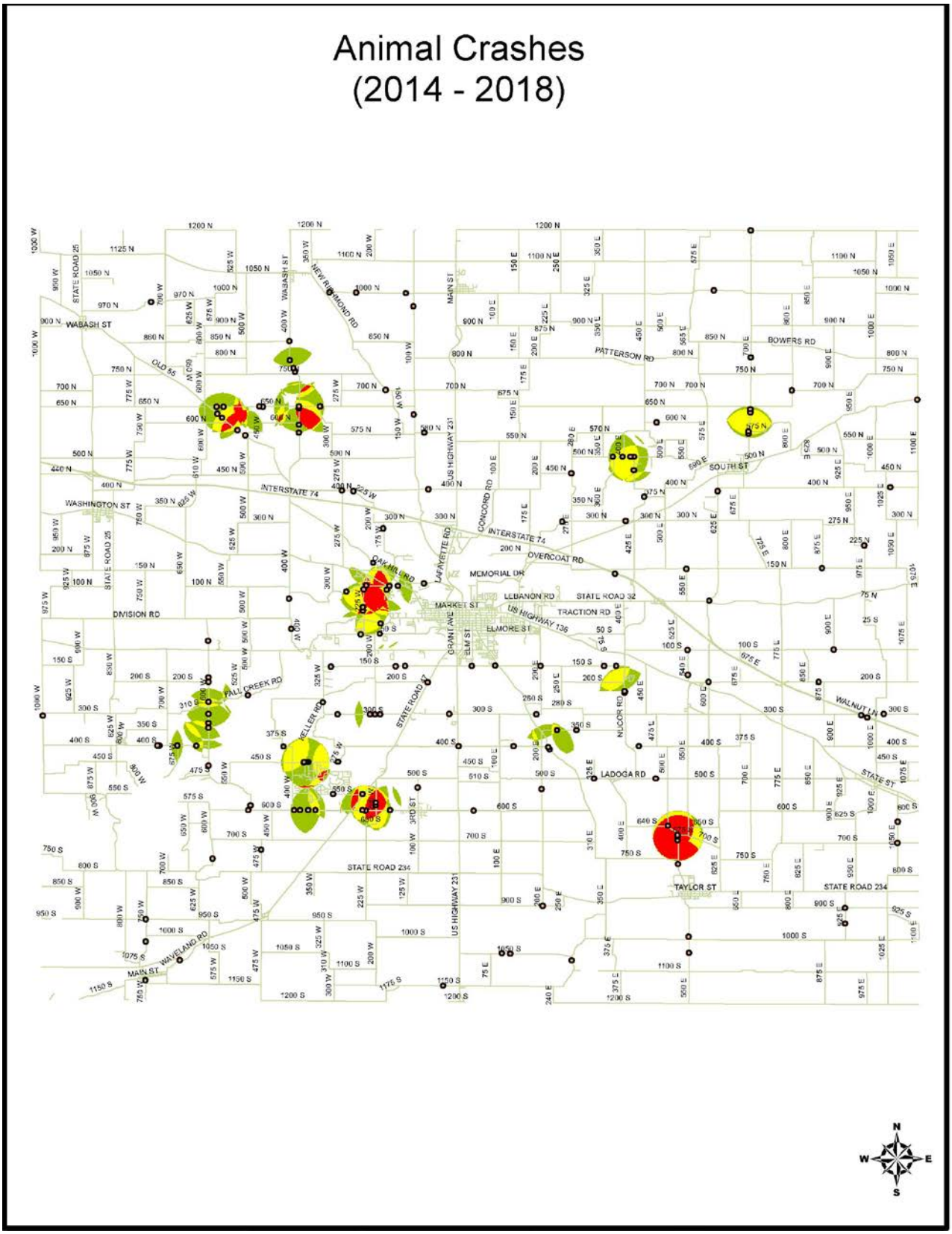


Figure 4: Snow and Ice Hot Spots

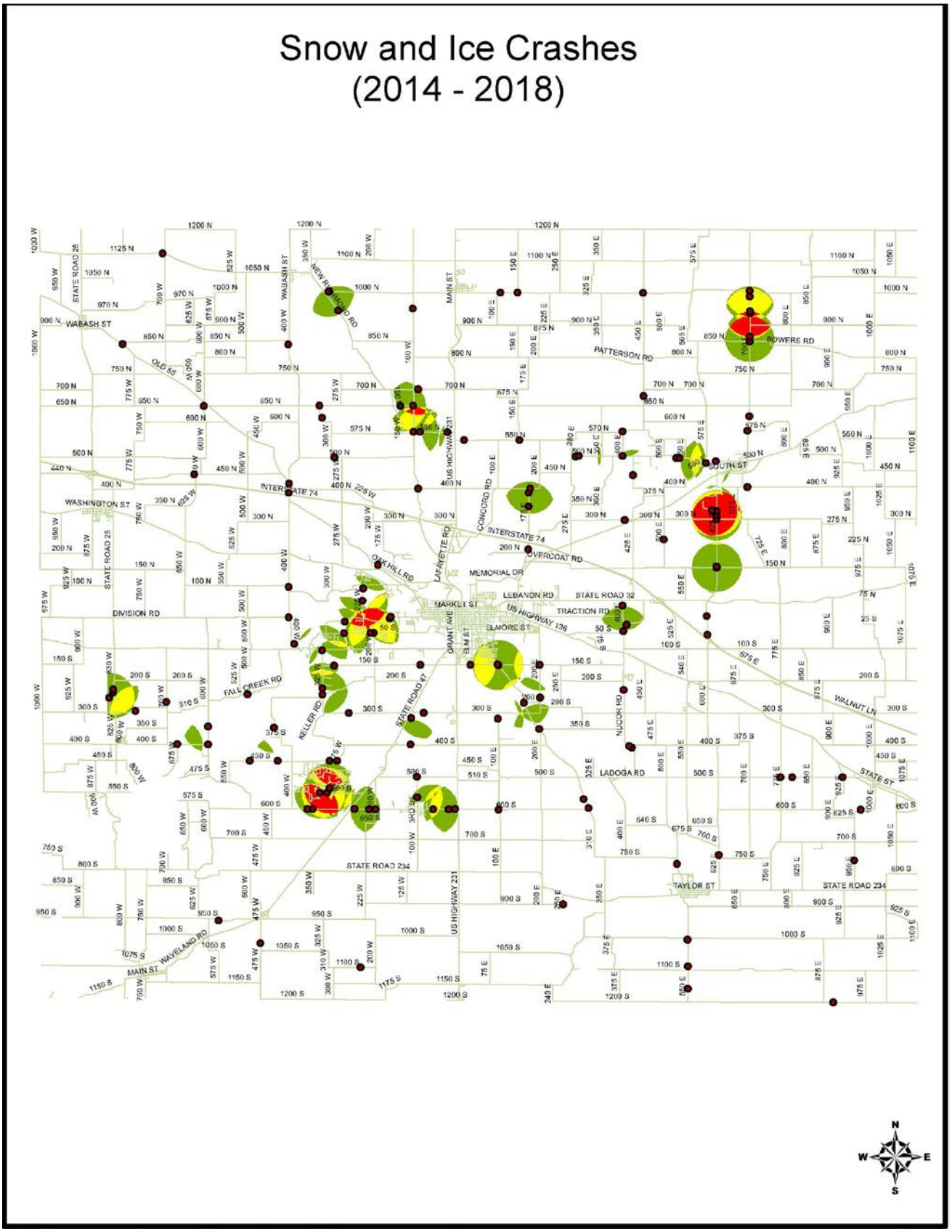
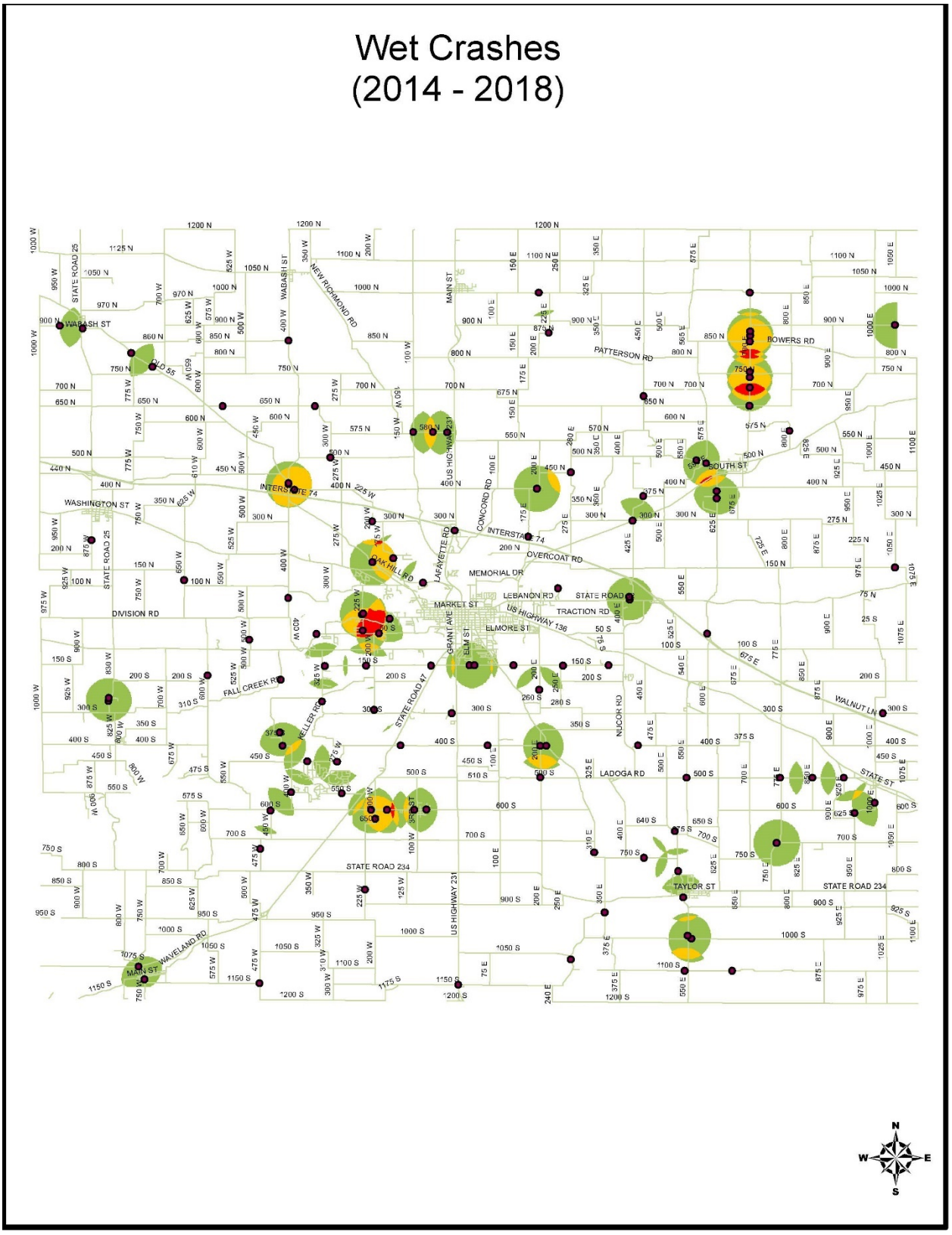


Figure 5: Wet Conditions Hot Spots



Primary Risk Factors

Based on the analysis of the types of crashes in the county, individual risk factors, and review of heat maps of crash locations, the clearest connections between roadway characteristics and crash data are related to the following:

- Higher volume roads (AADT greater than 1,000 vehicles per day)
- Somewhat wider roads (more than 20' wide)
- Fair or good pavement condition (PASER rating of 5 or more)
- Speeds above 50 mph
- Location in areas with topographical challenges of heavy vegetation

Contrary to what may be assumed by many, the data indicates that crashes are more prevalent on wider roads in good condition. This is likely due to the fact that speeds increase under such conditions. This is also supported by the higher incidence of crashes above 50 mph.

Hot Spots

The heat maps analyzed as part of this plan help to identify potential hot spot locations, that is specific individual locations where a higher number of crashes are currently occurring, regardless of risk factors. Some of these locations align with roads identified as high risk, while others occur along roads that do not appear to share the same high-risk factors. Input from community stakeholders also identified additional locations of concern.

Additional analysis to assess the needs for each of these hot spot locations should be done by the Montgomery County Highway Department.

Priority Corridors and Hot Spots

In addition to the risk factor analysis, a systematic analysis was performed to identify which road segments contain the highest number of potential risk factors. Figure 6: Priority Corridors, reflects those corridors in the county which reflect at least 8 of the risk factors identified above. Figure 7: Hot Spot Corridors with Priority Corridors, reflects those same corridors, in addition to locations with a high incidence of reported crashes.

It should also be noted that several roadways were identified for improvement in the thoroughfare plan in order to advance the county's goals for economic growth and in creating a well-maintained key road network which connects all towns and cities in the county. Priority corridors in this plan, which also overlap with the thoroughfare plan, should be top priorities for improvement.

Thoroughfare Plan Improvements

Thought not normally a component of Local Road Safety Plan, it is worthwhile noting the proposed improvements identified as part of the recently adopted thoroughfare plan. The improvement locations identified in this plan were developed with public input and review of previous priorities by the county. Understanding where the proposed improvements from the thoroughfare plan align with identified areas of concern with the local road safety plan can help the county prioritize their resources and investment.

Table 2: Areas of Concern

Table 2 below lists all the potential areas of concern identified through either data analysis, stakeholder input or the thoroughfare plan. The figures on the following pages illustrate these locations on county maps and Figure 10 illustrates all items identified on the table below.

The locations identified below are not ranked in any order. Priorities will be determined by the County Highway Department dependent on continual updated data and available funding.

Location	*Identified Through*			*Current Issues*	*Recommended Actions*
	*DA**	*SI**	*TP**		
**DA is the abbreviation for Data Analysis. SI is the abbreviation for Stakeholder Input and TP is the abbreviation for Thoroughfare Plan.*					
Ladoga Road (C.R. 150 S to C.R. 500 S)	X	X	X	Roadway departure crashes and animal crashes	Crack seal / chip seal with slurry seal, lane striping, deer crossing signage
Nucor Rd (S.R. 32 to Ladoga Road)	X			Roadway departure crashes. High volume freight traffic. Intersection with U.S. 136	Berm cutting, crack seal / chip seal with slurry seal, lane striping, advance intersection signage
Old S.R 55 (450 N to Oak Hill Rd)	X			Potential roadway conditions for departure	Asphalt wedge & leveling, asphalt overlay, lane striping
C.R. 300 S (U.S. 231 to Ladoga Road)	X		X	Roadway departure	Crack seal / chip seal with slurry seal, lane striping
Country Club Rd (Golf Blvd to C.R. 50 S)	X			Roadway departure	Crack seal / chip seal with slurry seal, lane striping
C.R. 550 N (U.S. 231 to C.R. 275 E)	X			Potential roadway conditions for departure	Crack seal / chip seal with slurry seal, lane striping
C.R. 400 W/U.S. 136		X		Intersection crashes	Advance intersection signage, oversize stop signs
C.R. 400 W/ Old S.R. 55		X		Intersection crashes	Advance intersection signage, oversize stop signs
C.R. 100 W/C.R. 400 N		X		Intersection crashes	Advance intersection signage, oversize stop signs
C.R. 400 N/U.S. 231 (railroad crossing)		X		Steep grade at railroad tracks (impossible to traverse with semi-trailer)	Coordination with INDOT for future at-grade crossing improvements
C.R. 580 N (C.R. 100 W to U.S. 231)	X	X		Roadway departure. Rough pavement surface	2020 CCMG asphalt wedge & leveling, asphalt overlay, lane striping
C.R. 225 W (County Club Road to Black Creek Valley Road)	X	X		Roadway departure, animal collisions, wet conditions and snow & ice crashes	Crack seal / chip seal with slurry seal, lane striping, deer crossing signage, narrow roadway signage
C.R. 600 S (Town of New Market to C.R. 400 W)	X	X		Roadway departure crashes, wet conditions and animal collision. Rough pavement	2020 cold mix asphalt overlay, chip seal with lane striping
C.R. 600 S/C.R. 200 W	X			Intersection crashes	Advance intersection signage, oversize stop signs
C.R. 500 S/U.S. 47		X		Intersection crashes, sight line issue with hillside	Coordination with INDOT for intersection improvement

Location	Identified Through			Current Issues	Recommended Actions
	DA*	SI*	TP*		
*DA is the abbreviation for Data Analysis. SI is the abbreviation for Stakeholder Input and TP is the abbreviation for Thoroughfare Plan.					
C.R. 500 S/ C.R. 625 E		X		Intersection crashes, narrow roadway	Advance intersection signage, oversize stop signs, narrow roadway signage
C.R. 500 S (C.R. 500 E to U.S. 136)		X		Roadway departure, narrow roadway	Narrow roadway signage, future road widening project
C.R. 700 E (C.R. 650 N to C.R. 900 N)	X	X		Speed due to recent improvements	Increase law enforcement patrols
C.R. 100 W (C.R. 500 S to New Market corporate limits)		X		Roadway departure, narrow roadway	Complete engineering study using FDR, right of way acquisition, drainage improvements.
C.R. 625 E/C.R. 300 N	X			Roadway departure	Apply 2020-2 CCMG for asphalt wedge & leveling, asphalt overlay, lane striping (US 32 to US 47)
C.R. 625 E/C.R. 150 N	X			Intersection crashes	Apply 2020-2 CCMG for asphalt wedge & leveling, asphalt overlay, lane striping (US 32 to US 136)
C.R. 500 S/Ladoga Road	X			Intersection crashes	Advance intersection signage, oversize stop signs, skid resistant pavement treatments
C.R. 450 N/Old S.R. 55		X		Intersection crashes	Advance intersection signage, oversize stop signs, skid resistant pavement treatments
E. Ladoga Road (C.R. 310 E to C.R. 500 E)	X		X	Roadway departure	Crack seal/chip seal with slurry seal, lane striping, deer crossing signage
S. Ladoga Road (C.R. 500 S to Town of Ladoga/Garden Street)	X			Roadway departure, high volume freight traffic	Crack seal/chip seal with slurry seal, lane striping, deer crossing signage
C.R. 300 S/Ladoga Road		X		Intersection crashes	Advance intersection signage, oversize stop signs, skid resistant pavement treatments
Old S.R. 55 (C.R. 600 N to C.R. 650 N)	X			Animal collisions	Install deer crossing signage
C.R. 400 W (C.R. 600 N to C.R. 750 N)	X			Animal collisions	Install deer crossing signage
Lake Holiday	X	X		Snow and ice crashes	Private roadways
C.R. 625 E/C.R. 300 N	X	X		Snow and ice crashes	Apply 2020-2 CCMG for asphalt wedge & leveling, asphalt overlay, lane striping (U.S. 32 to U.S. 47)
County Club Road (C.R. 50 S to Rock River Ridge Road)	X			Potential roadway conditions for departure	Crack seal / chip seal with slurry seal, lane striping
County Club Road/C.R. 50 S		X		Intersection alignment	Engineering study to determine construction cost, determine priority

Figure 6: Priority Corridors

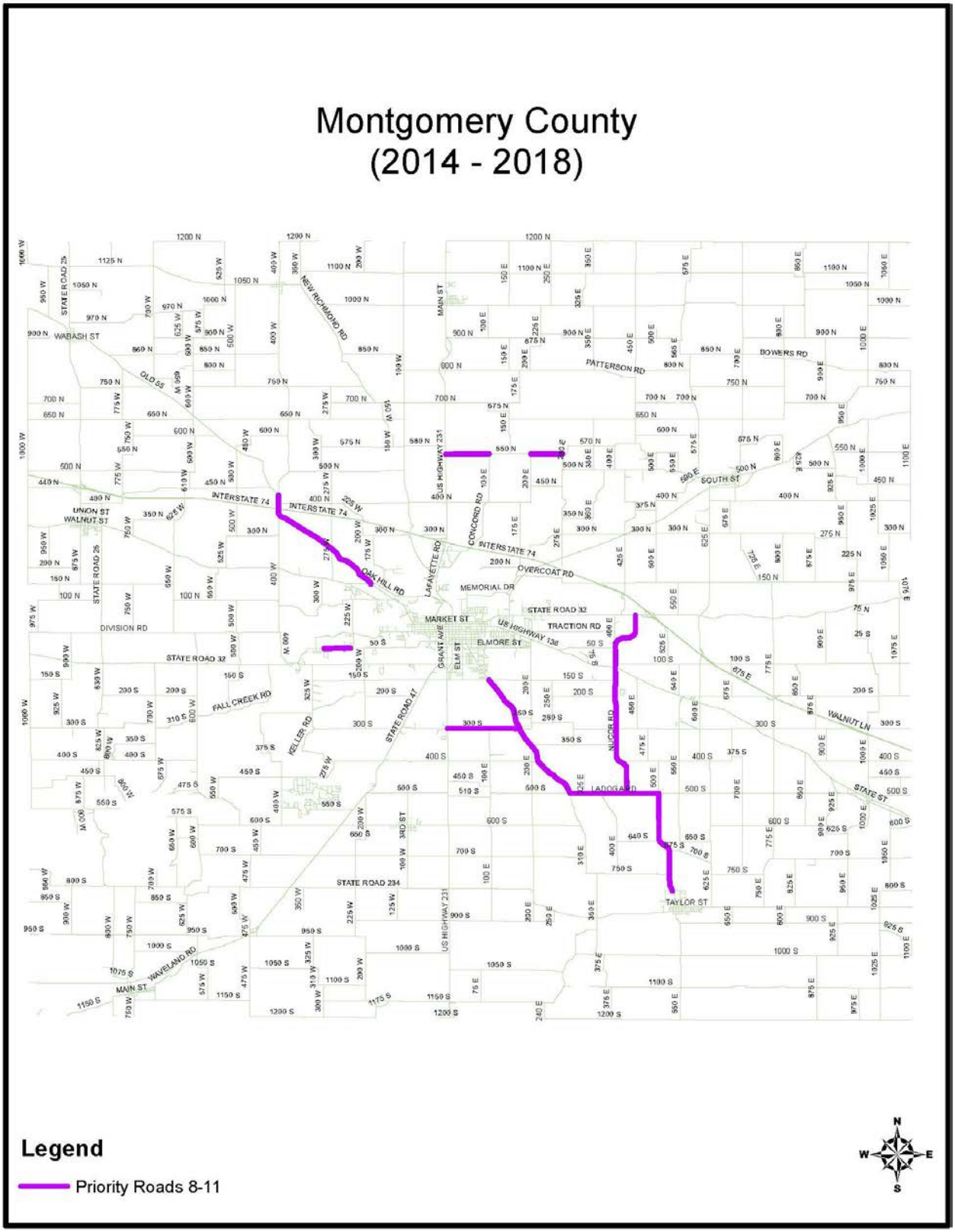


Figure 7: Hot Spot Corridors with Priority Corridors

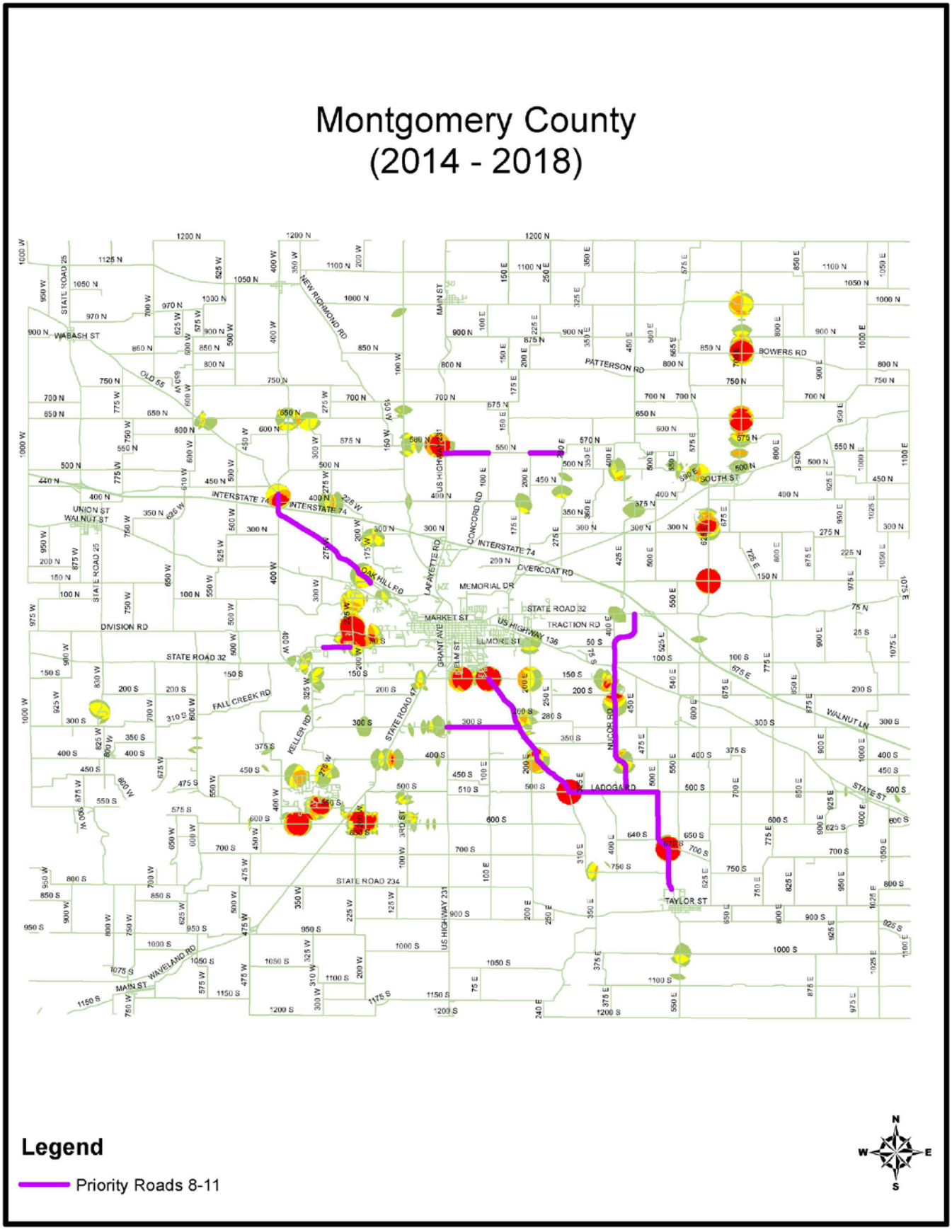


Figure 8: Stakeholder Identified Hot Spots

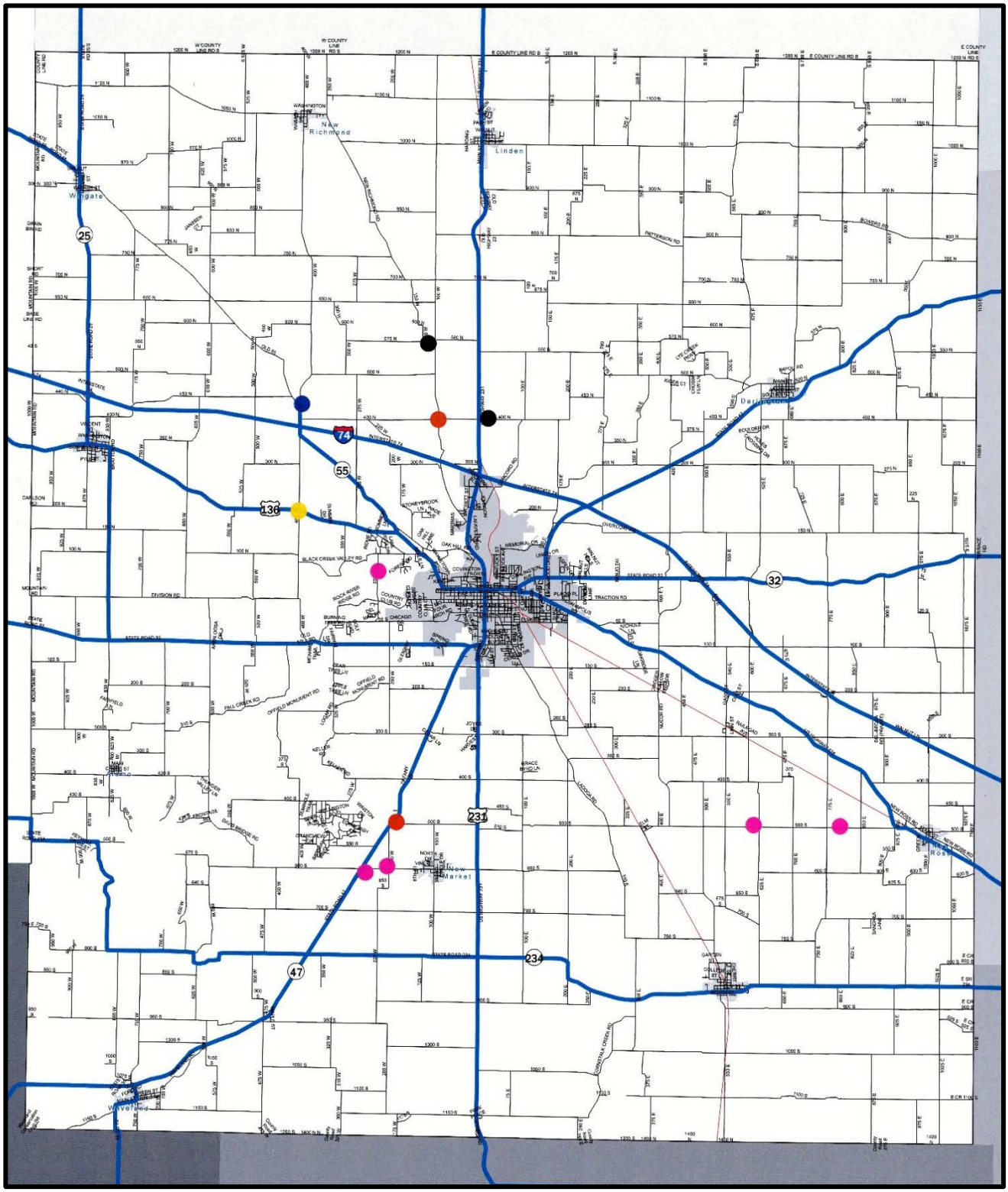


Figure 9: Thoroughfare Plan Improvements

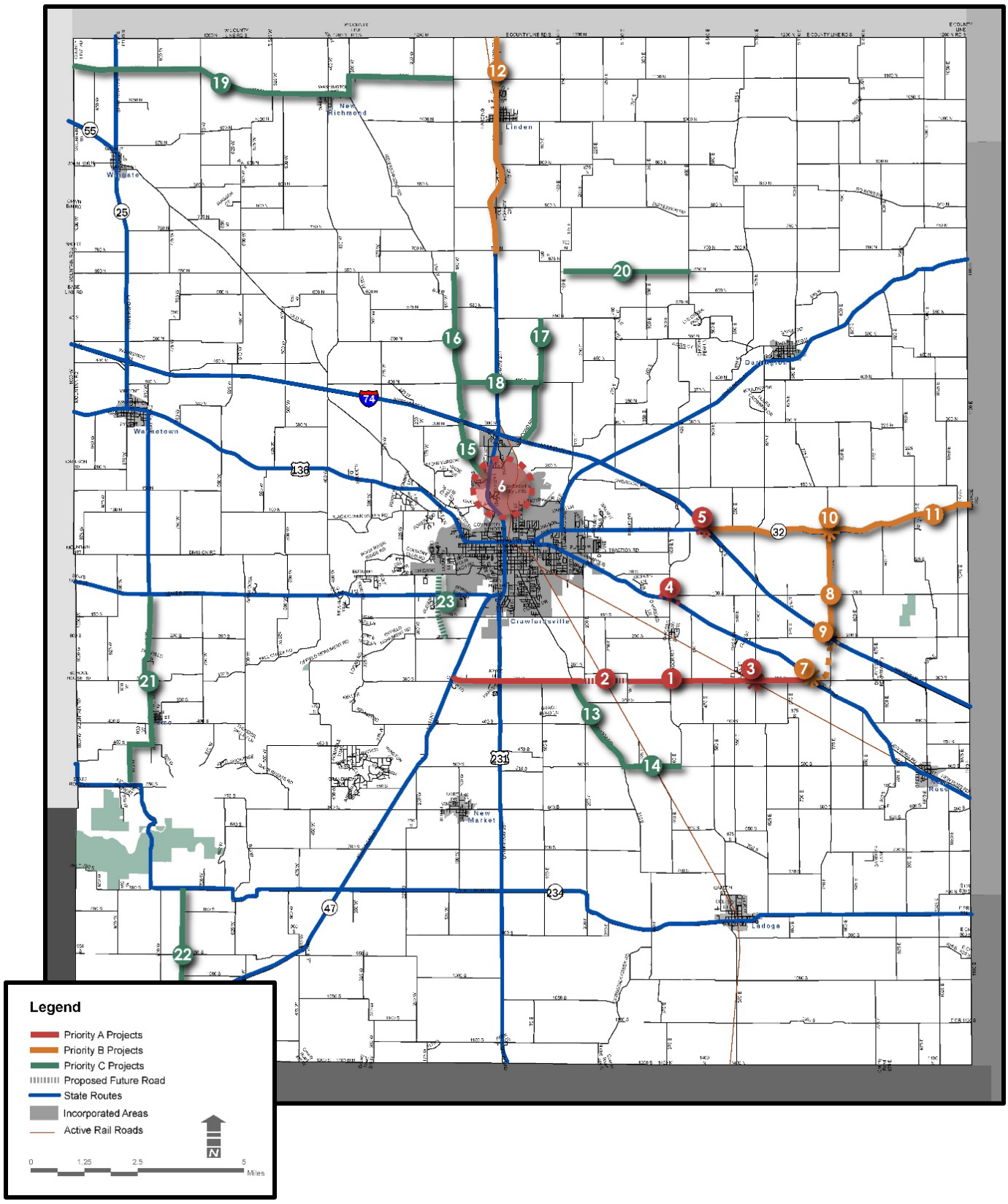
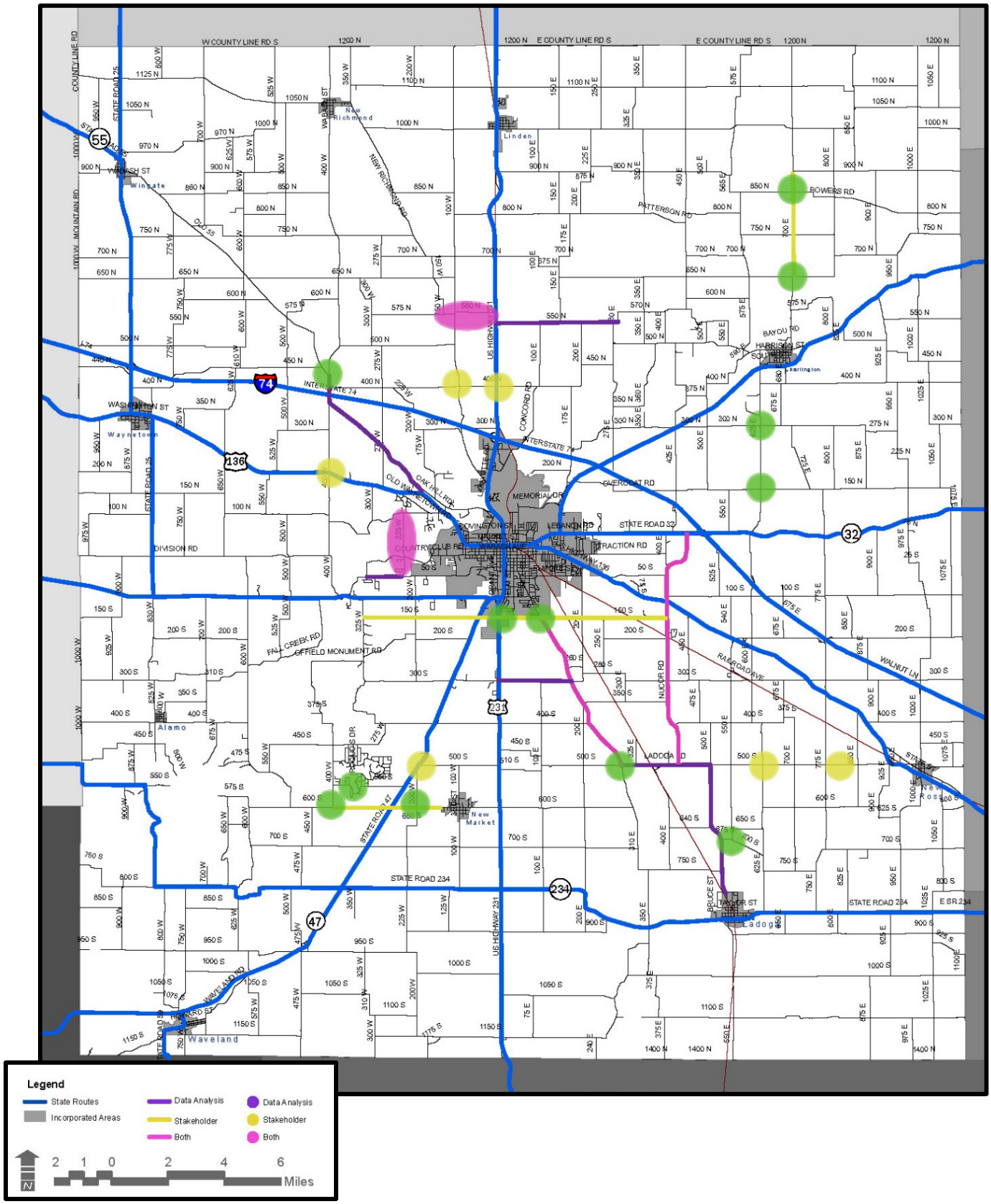


Figure 10: Areas of Concern



Recommendations made in this section will need to be carefully implemented to address unique site conditions, such as topography, site distance, right-of-way availability, roadway geometry, drainage conditions, environmental constraints, and existing utility conflicts. Budget limitations will also play a key role in determining the exact scope of what is addresses year to year.

1. **Develop a culture of safety within the Montgomery County Highway Department and all roadway improvement decisions and projects in the county.**

   The mission statement at the beginning of this plan stated that Montgomery County is committed to improving transportation safety to reduce the risk of death and serious injury that result from incidents on the county transportation system. To make this a reality, safety consciousness must permeate all aspects of the decision-making process and actual physical work on roadway improvements.

   Action 1.1: Hold regular safety briefings for highway department staff. These regular briefings can take the form of tailgate talk or other informal structures. However, the briefings should touch on good safe practices observed, best practices for crews to follow, review of unsafe incidents, and education on other county efforts to increase safety, such as data collection and planning efforts.

   Action 1.2: **Report conditions to County Engineer for evaluation.** Make it a standard practice for any adverse roadway conditions to be reported to the Highway Director on a weekly or monthly basis. Area leaders should submit concerns to the Highway Director, who should document areas of concern and provide a list to the County Administrator and County Engineer.

   Action 1.3. County Engineer to evaluate conditions and determine funding sources. Once the County Engineer has been made aware of concerns by the Highway Director, potential mitigation strategies and cost estimates should be prepared. Improvements should be compared against the Local Road Safety Plan and Thoroughfare Plan to help set priorities. County Engineer to report recommendations and requested funding to address recommendations to the County Administrator. The County Administrator should take the information from the County Engineer and prepare a report for the County Commissioners. The County Administrator should report back to the County Engineer and Highway Director the County Commissioners recommendation.

2. **Reduce number of roadway departure crashes**

   The majority (57 percent) of Montgomery County's crashes are a result of a roadway departure. Over 70 percent of crashes with an injury of fatality are also roadway departure crashes, making this a top priority for the county to address.

   Action 2.1: Maintain striping on paved roads in the county. Montgomery County has been proactive in paving and maintaining its rural roads and should continue these efforts by providing centerline or edge striping on all paved roadways. Striping provides additional guidance to drivers in dark or wet conditions. The Highway Director should prepare and implement an annual road striping plan, with a focus on striping all roads receiving chip/seal with fog seal. Pavement striping should also be prioritized

along segments of roadways with high incidents of roadway departure crashes, regardless of pavement width or AADT. The department should also stay informed of proposed minimum retro reflectivity values for striping within the MUTCD and implement a monitoring system once minimums are adopted.

Action 2.2: Provide safety edge on new or resurfaced roads. Safety edges are recommended on high-volume, wide paved roadways to minimize roadway departure crashes. Safety edges can minimize recovery of limited shoulder areas. This is also important for the frequency of wide-load agricultural equipment and emergency response vehicles in the county's rural local road network. Safety edge should be prioritized along Community Crossing Matching Grant (CCGM) eligible roadways. Stone shoulders should be installed within three months of new pavement.

3. **Reduce animal related crashes.**

Animal related crashes account for 29 percent of crashes on Montgomery County's network. The majority of these involved deer. There are several advanced warning and proactive measures that can be implemented to reduce the number of animal related crashes.

Action 3.1: Keep road edges free of obstructions that block sight lines. Montgomery County's agricultural and rural character includes management of weeds, grasses and side edge obstructions. Currently, the county manages vegetation through efforts such as spraying guardrails and culverts to keep growth down. The county should continue to remove existing obstructions and clear vegetation on its road network system-wide. This also includes prohibiting new obstructions or requiring a clear zone between the roadway and any agricultural tract abutting major corridors where animals may be more prone.

Action 3.2: Install advanced advisory signage along high-risk routes. Warn drivers of potential animal crossings by installing signage or flashers in concentrated areas identified on the animal crashes heat map. The Highway Director should have the Road Sign Manager evaluate existing signage along these high-risk corridors as shown on the map and prepare remediation recommendations. Some of these concentrations appear near schools. Additional signage may be needed along the main entry and exit routes for these locations as well.

Action 3.3: Create a local education campaign to make drivers aware of times of heightened risk of collision with animals. Animal crashes are more frequent in November than any other time of the year. Awareness of potential animal crossings during this time can minimize crashes at key areas, illustrated in Figure 3. As the heat map shows a concentration of animal crashes near schools, the education campaign should be coordinated with the school districts as well. The County Administrator can assist in these efforts by posting warnings on social media and county web pages during peak-accident periods, in tandem with the Indiana State Police awareness campaigns in the fall.

4. **Establish an enforcement and education campaign about school zone safety and distracted driving.**

Distracted driving and crashes are correlated. Any activity that includes taking hands off the wheel, eyes off the road or mind off driving is considered distracted driving. Indiana recently enacted a hands-free law prohibiting drivers from holding mobile devices while driving. In Montgomery County, the data also illustrates a clear concentration of crashes around the high schools and distracted driving in school zones was voiced as a special concern.

Action 4.1: Establish a distracted driving working group to address local distracted driving. In addition to the new state law, a working group comprised of the Montgomery County Administrator, County Engineer, representatives of local school districts, and the Montgomery County Sheriff's office should review what other policies would be feasible in the county to address local distracted driving. Engagement with advocacy groups such as Students Against Destructive Decisions (SADD) and The Indiana Criminal Justice Association, which conducts outreach and education for young drivers, may be a resource to the working group as well.

Action 4.2: Develop a local education campaign to address distracted driving. One of the key outcomes of the working group should be to develop and implement a local education campaign focus on the schools that increases awareness of the risks and results of distracted driving.

Action 4.3: Update school zone warning signage in coordination with INDOT for signage on state routes. Update school zone warning signage with higher visibility signage that includes flashers programmed to be on while during morning arrival times and afternoon departures. While a Local Public Agency can set the speed limit in local school zones, the County should coordinate with INDOT on updating school signage along state routes.

5. **Expand resources and improve capacity for future traffic data collection and analysis.**

The Montgomery County Highway Department has been very proactive in data collection efforts. The data received by the county was in many ways more comprehensive than data received in other counties. More and specifically targeted data will continue to improve the ability of the county to identify and respond to risk factors on the road network.

Action 5.1: Continual traffic count updates and establish procedures for data collection. In order to gather, analyze and monitor success of the safety countermeasures in this plan, the Highway Director shall implement a traffic data plan with traffic counts completed on portions of local roads every year, eventually updating all roadway counts over an established time period, such as 5 years. Additionally, the County Administrator, Highway Director, and the GIS/Mapping Director should meet monthly to establish set procedures for how to collect and upload data consistently and correctly, to maximize the data's usefulness if future decisions. Data collection efforts should be reviewed twice a year.

Action 5.2: Educate local officers on the use of traffic safety data and their role in traffic safety planning. The Highway Director shall coordinate with the Montgomery County Sheriff's Department and local emergency response teams to stress the importance of accurate crash data not only for insurance purposes, but in order to accurately identify areas and risk factors of concern. A review of data collection between the Highway Department and County Sheriff's office should occur twice a year.

Action 5.3: Prepare a road signage replacement and enhancement plan. Just as striping needs to be maintained, signage wears out as well. Dents, loss of reflectivity, and angled support poles can all make signage be less effective. Identifying sign locations and preparing a plan to replace signs as needed and provide larger or higher visibility signage at high-risk locations can be yet another data point and tool in addressing safety. While an inventory of existing signage has already been completed, a plan should be prepared from the inventory to identify which regulatory signs need to be replaced.

Action 5.4: Submit for Federal and State programs for road signage replacement. Assistance from grants and reimbursement programs can increase the capacity of the county to replace signage, while focusing other funding on other mitigation and improvement efforts. INDOT facilitates a reimbursement program with a 10% local match through the annual LPA call for projects. The County Highway Department should prepare a plan and apply for this program.

Action 5.5: Update the Local Road Safety Plan on a regular basis. It is recommended that crash data as indicated in Table 1, be reviewed on an annual basis. The County Administrator, County Engineer, Highway Director, GIS Mapping Director, Sign Manager, and one County Commissioner should schedule to review the Local Road Safety Plan and make necessary revisions during the first week of November of each year.

6. Reduce crashes due to environmental conditions.

Dark roadway and wet roadway conditions contribute to the second and third most frequent cause of crashes in the county as shown in Table 1. Mechanisms to improve drainage on roadways and to ensure they are adequately visible at night are important for the county's overall road safety.

Action 6.1: Maintain a drainage and berm cutting maintenance program. Excess water on the roadways can be caused by accumulation of debris on the shoulder which blocks drainage or ditches which have silted up over time. The highway department should continue to refine the program that has been started for monitoring berm and ditch conditions along high risk roadways.

Action 6.2: Maintain striping in wooded areas. Segments of roadways where wooded areas abut the shoulder make dark conditions harder for drivers. Environmental conditions in these areas can also cause striping to degrade more quickly than other areas of the county. The Highway Department should be close attention to these areas as part of their striping plan identified in Action 2.1.

Action 6.3: Maintain high visibility signage. The reflectivity of signage can be reduced over time. Areas with warning signage, such as yield signs, curve signs, and speed advisory signs should be monitored for their effectiveness at night. INLTAP has a measurement device that the county department may utilize as needed. Included low visibility signage in the road signage replacement and enhancement plan identified in Action 5.3.

Action 6.4: Re-evaluate snow routes based on prevalence of crashes. The county is able to analyze crash data as it relates to current snow routes. Crashes due to snow and ice should be compared against current snow routes to determine if new routes need to be made or to change the priority of certain routes. Utilize Automatic Vehicle Location (AVL) tracking devices on snow plow to better understand the frequency which snow routes are currently being cleared.

Action 6.5: Maintain right-of-way sight distance. Trees and undergrowth which are not maintained within the right-of-way can significantly reduce visibility of road hazards, curves, and intersections. The county should ensure that the right-of-way sight distance is clear.

Table 3: Implementation Table

Goal/Action	*Responsible Party*	*Performance Measure/Timeframe*
1- Develop a culture of safety within the Montgomery County Highway Department and all roadway improvement decisions and projects in the county.		
Action 1.1: Hold regular safety briefings for highway department staff	Highway Director, Area Leaders	Monthly
Action 1.2: Report conditions to County Engineer for evaluation	Highway Director	Monthly
Action 1.3: County Engineer to evaluate conditions and determine funding sources.	Highway Dir., County Administrator, County Commissioners	Monthly
2- Reduce number of roadway departure crashes.		
Action 2.1: Maintain striping on paved roads in the county	Highway Director	Annual Review
Action 2.2: Provide safety edge on new or resurfaced roads	Highway Director, County Engineer	Annual Review
3- Reduce animal related crashes.		
Action 3.1: Keep road edges free of obstructions that block sight lines	Highway Director	Monthly Maintenance
Action 3.2: Install advanced advisory signage along high-risk routes	Highway Director, Road Sign Manager	Twice Annual Review
Action 3.3: Create a local education campaign to make drivers aware of times of heightened risk of collision with animals	Highway Director, County Administrator	Weekly Postings During High-Risk Periods
4- Establish an enforcement and education campaign about school zone safety and distracted driving.		
Action 4.1: Establish a distracted driving working group to address local distracted driving	County Administrator, County Engineer, North/South Mont. School Representatives, Sheriff's Office	Meet by mid-2021
Action 4.2: Develop a local education campaign to address distracted driving	County Administrator, County Engineer, North/South Mont. School Representatives, Sheriff's Office	Establish campaign by end of 2021
Action 4.3: Update school zone warning signage in coordination with INDOT for signage on state routes	Highway Director, County Engineer	Review signage by March 2021

Goal/Action	*Responsible Party*	*Performance Measure/Timeframe*
5- Expand resources and improve capacity for future traffic data collection and analysis.		
Action 5.1: Continual traffic count updates and establish procedures for data collection.	Highway Director, County Administrator, GIS/Mapping Director	Meet by April 2021. Twice annual review of procedures
Action 5.2: Educate local officers on the use of traffic safety data and their role in traffic safety planning	Highway Director, GIS/Mapping Director, Sheriff's Office	Meet by May 2021. Twice annual review of procedures
Action 5.3: Prepare a road signage replacement and enhancement plan	Highway Director, Road Sign Manager	Update by January 2021
Action 5.4: Submit for Federal and State grants to fund road signage replacement	Highway Director, Road Sign Manager, County Engineer	Submit with 2020 LPA Local Call for Projects
Action 5.5: Update the Local Road Safety Plan on a regular basis	County Administrator, County Engineer, Highway Director, GIS Mapping Director, Road Sign Manager, County Commissioner	Yearly review first week of November
6- Reduce crashes due to environmental conditions.		
Action 6.1: Maintain a drainage and berm cutting maintenance program	Highway Director	Monthly maintenance
Action 6.2: Maintain striping in wooded areas	Highway Director	Monthly maintenance
Action 6.3: Maintain high visibility signage	Highway Director, Road Sign Manager	Review every 4 months
Action 6.4: Reevaluate snow routes based on prevalence of crashes	Highway Director	Review before and after each snow season
Action 6.5: Maintain right-of-way sight distance	Highway Director	Monthly maintenance

Figure A.1: Total Crashes 2014-2018

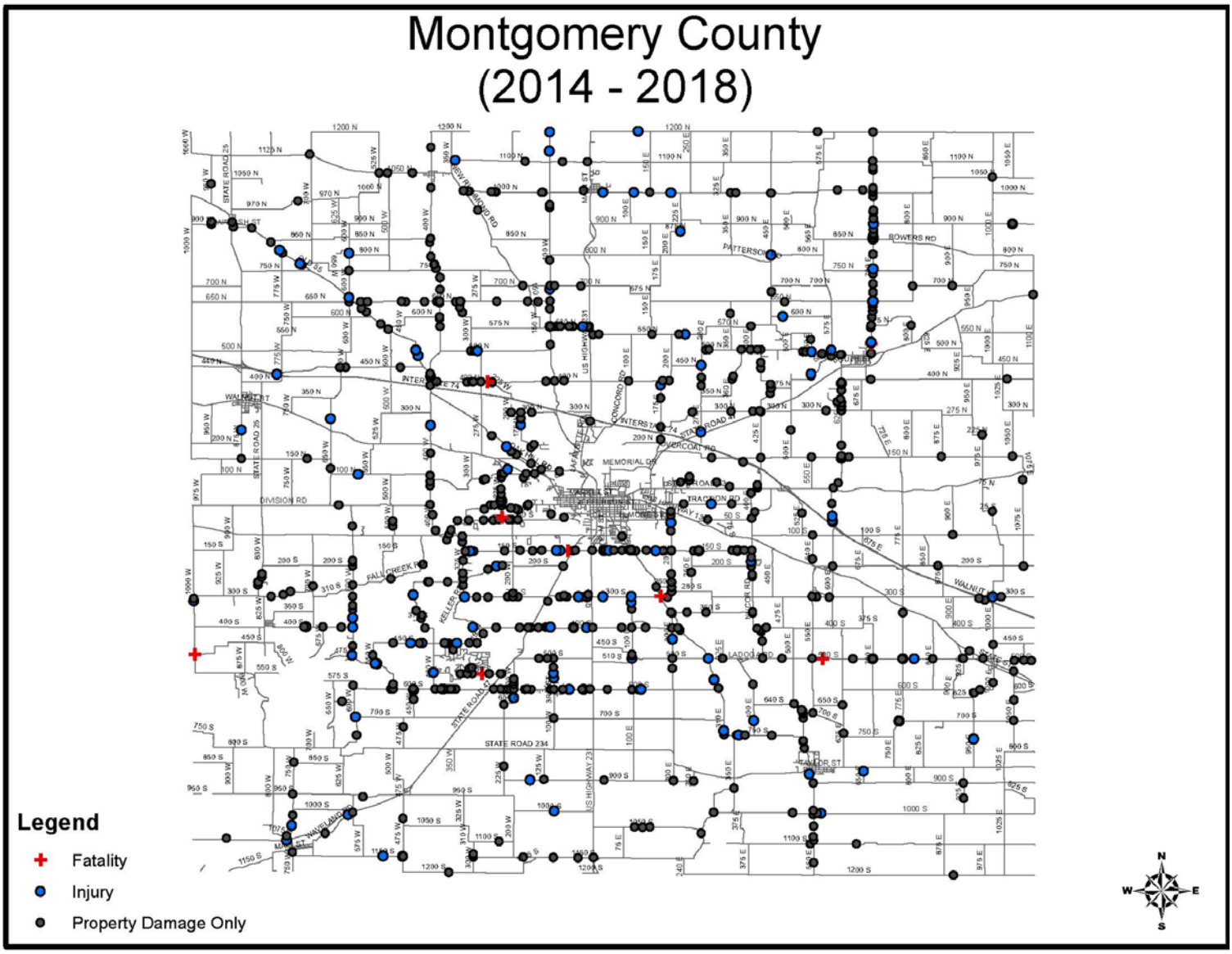
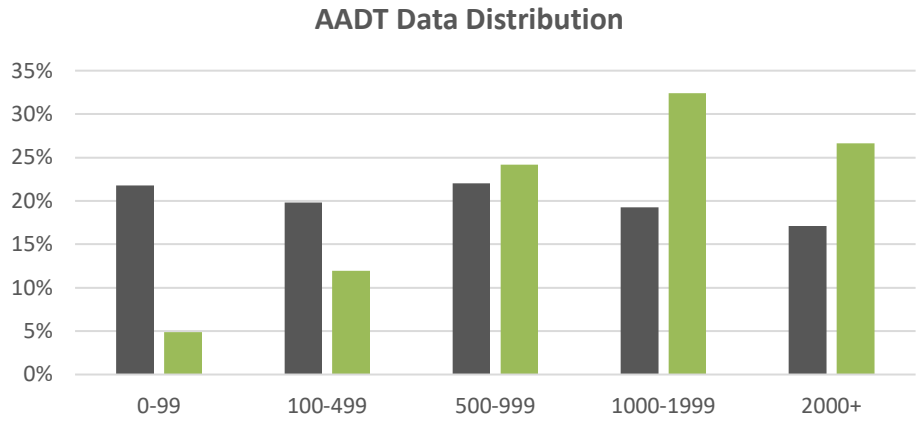
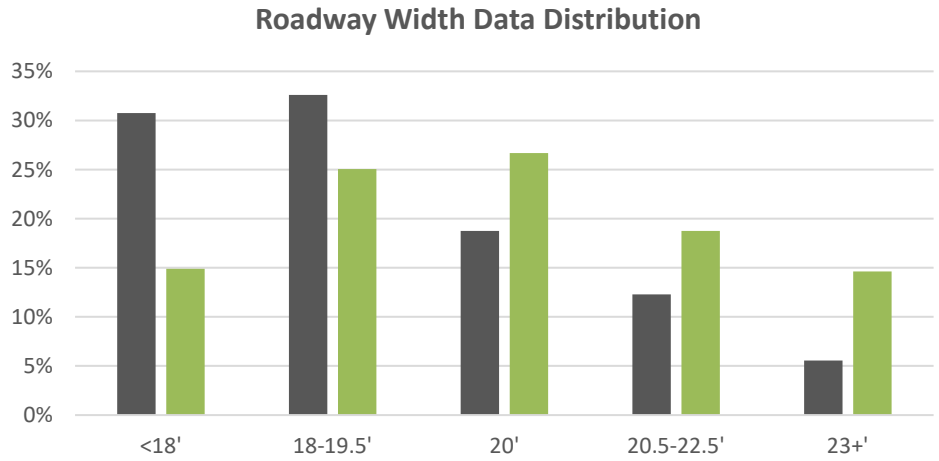


Figure A.2: Traffic Volume



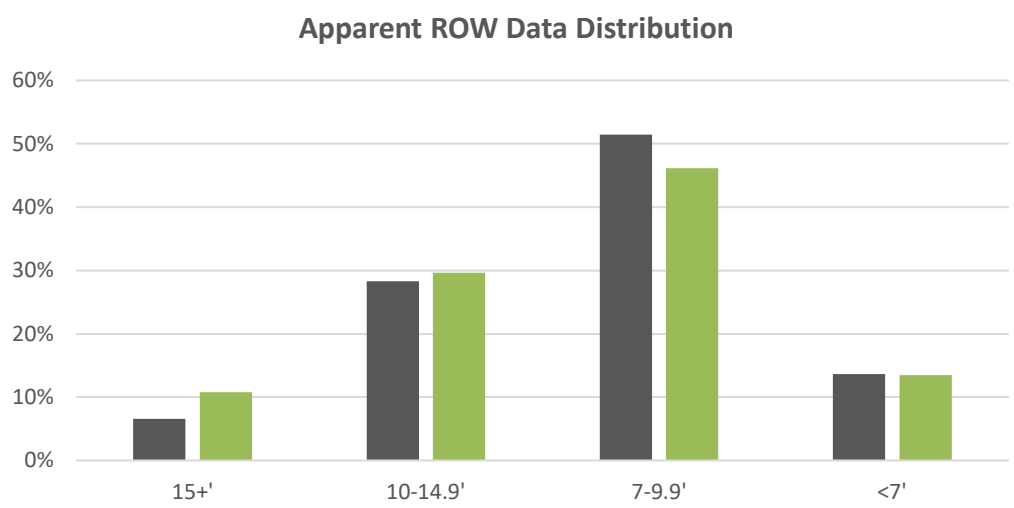
- Roads over 1,000 AADT have a higher prevalence of crashes than those under 1,000 AADT.

Figure A.3: Roadway Width



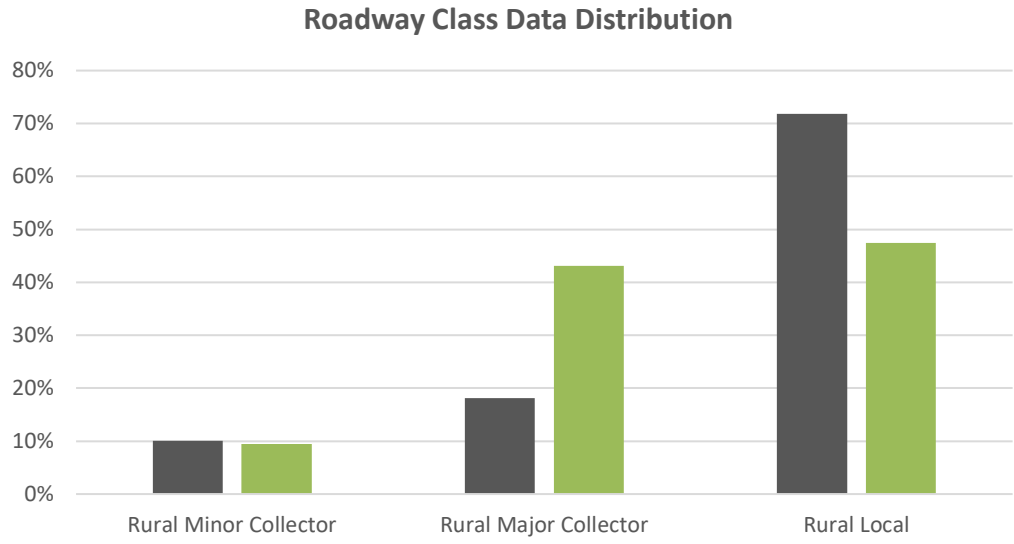
- Wider roads (20 feet wide or more) have a higher prevalence of crashes.
- Majority of Montgomery County roadways are 19.5 feet or less.

Figure A.4: Apparent Right-of-Way Width Beyond Edge of Pavement



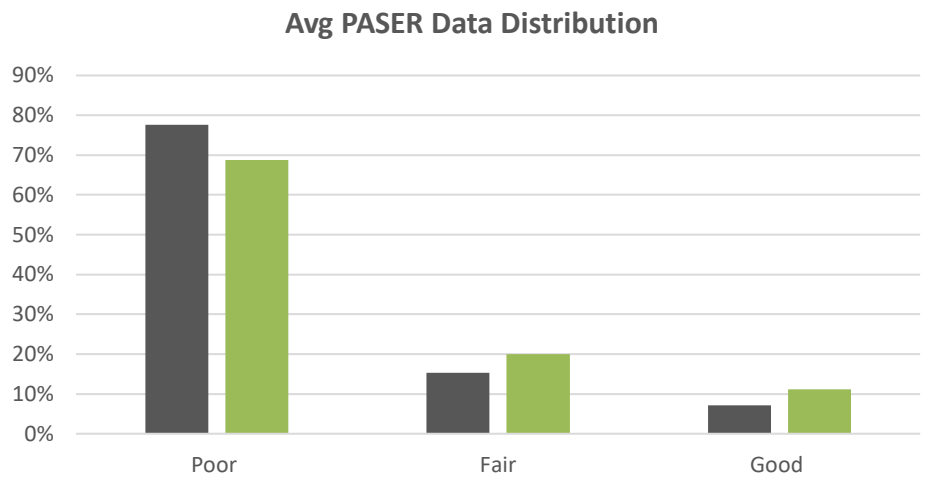
- Crashes are slightly more likely to occur where the right-of-way width beyond the edge of pavement is greater than 10 feet.

Figure A.5: Roadway Classification



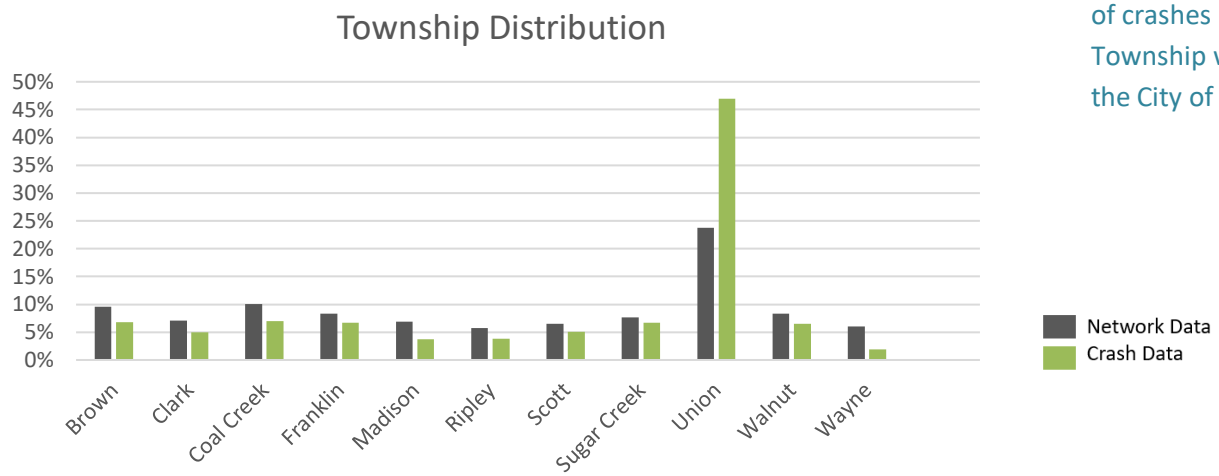
- Data indicates a higher prevalence of crashes on roadways classified as rural major collectors.

Figure A.6: Pavement Condition



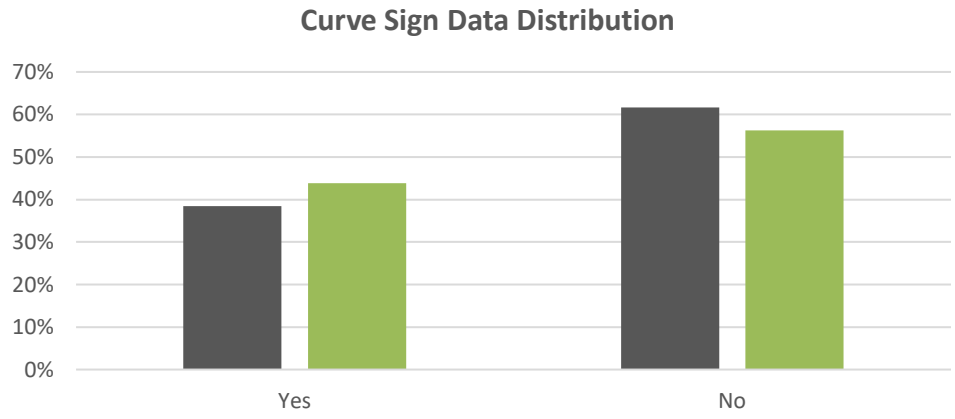
- Pavement in good and fair condition have higher prevalence of crashes in relation to poor condition roads.

Figure A.7: Location



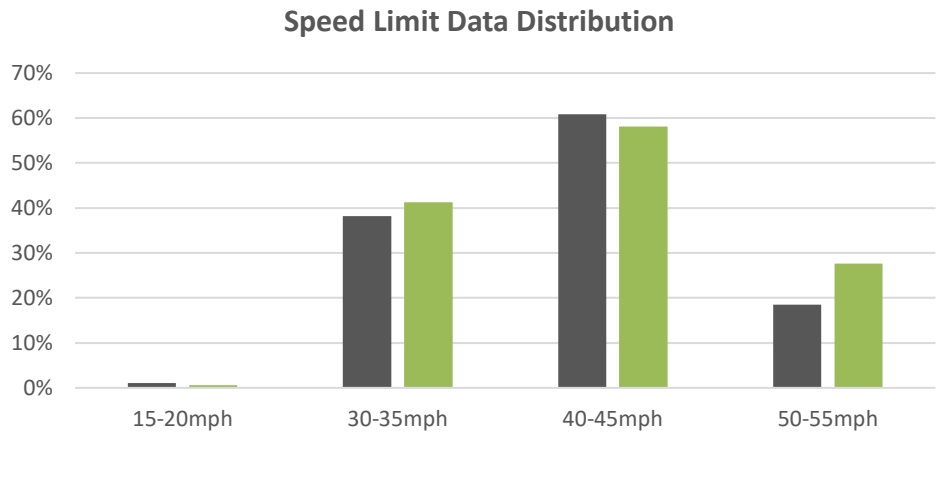
- There is a higher frequency of crashes in Union Township which contains the City of Crawfordsville.

Figure A.8: Curves



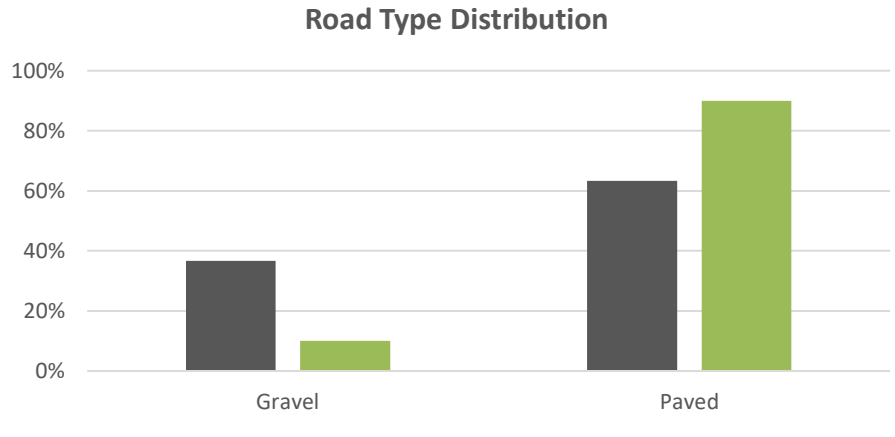
- Roadway segments with curves have a higher frequency of crashes than straight roadways.

Figure A.9: Speed



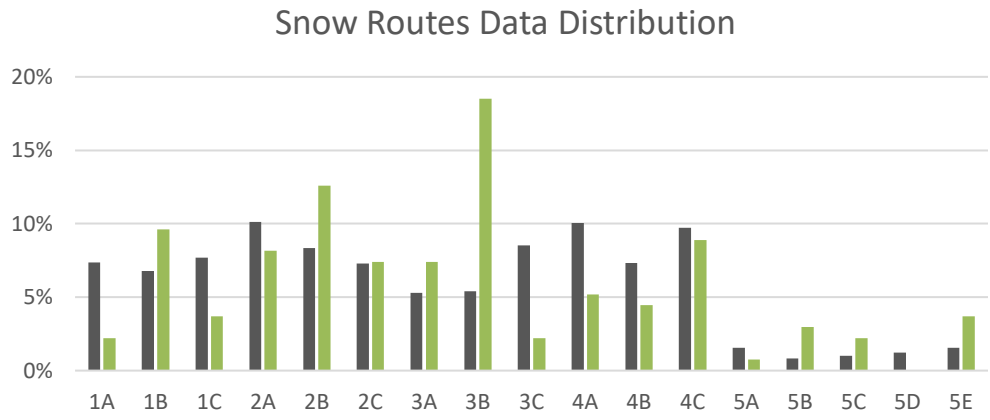
- The majority of local roads have a speed limit posted of 40-45 mph. However, roads with this speed limit show a lower prevalence of crashes.
- Roadways with a posted speed limit of 50-55 have a higher prevalence of crashes.

Figure A.10: Pavement Type



- Paved roads have a much higher prevalence of crashes than gravel roadways.

Figure A.11: Snow Routes



- Area 3B (Southwest corner of the county) has substantially higher prevalence of crashes than other locations, likely due to topographical challenges.