Bi-State Regional Commission

Quad Cities Traffic Safety Plan, 2020

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December 2020

Quad Cities Strategic Traffic Safety Plan

DECEMBER 2020

Bi-State Regional Commission

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[1] The Policy Committee voting is restricted to one vote for each voting member. Voting members may authorize an alternate, with the stipulation that alternates of elected officials also be an elected representative of the appropriate jurisdiction.

[2] Chair, Transportation Policy Committee

[3] Vice-Chair, Transportation Policy Committee

[4] The mayors of the cities of Buffalo, Eldridge, LeClaire, Princeton, and Riverdale in the Iowa portion and the cities and villages of Andalusia, Carbon Cliff, Coal Valley, Colona, Hampton, Milan, Oak Grove, Port Byron, Rapids City, and Silvis in the Illinois portion select a representative from their jurisdictions (Iowa and Illinois separately) to represent them on the Policy and Technical Committees.

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[1] The Technical Committee system allows one vote per agency with delegated representative voting permitted in the absence of an agency's listed member. The City of Davenport has three votes. Transit managers for Bettendorf Transit and Davenport CitiBus are invited.

[2] Chair, Transportation Technical Committee.

[3] Vice-Chair, Transportation Technical Committee.

[4] The mayors of the cities of Buffalo, Eldridge, LeClaire, Princeton, and Riverdale in the Iowa portion and the cities and villages of Andalusia, Carbon Cliff, Coal Valley, Colona, Hampton, Milan, Oak Grove, Port Byron, Rapids City, and Silvis in the Illinois portion select a representative from their jurisdictions (Iowa and Illinois separately) to represent them on the Policy and Technical Committees.

NOTE: Additional membership may include advisory representatives from the Illinois and Iowa Departments of Transportation, planning and research engineers from the Illinois and Iowa Federal Highway Administration, and a community planning representative from the Federal Transit Administration Region VII.

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Background

The adoption of the Fixing America's Surface Transportation (FAST) Act continued many of the highway safety programs from the previous act, Moving Ahead for Progress in the 21st Century Act (MAP-21), including the Highway Safety Improvement Program (HSIP). The Strategic Highway Safety Plan (SHSP) is required under HSIP. These are statewide coordinated safety plans that work to reduce fatalities and serious injuries on all public roadways. As the Quad Cities MPO is on the boarder of two states, Bi-State Regional Commission has the benefit of receiving guidance from the SHSP of both the Iowa DOT and Illinois DOT.

In years past, Bi-State has developed an Intersection Crash Study for the Quad Cities MPO. The most recent such study was produced in 2013 using data from 2010 and 2011. This report identified and examined the top ten intersections for crashes in both the Iowa and Illinois Quad Cities based on frequency, severity, and crash rate. This report allowed stakeholders to locate problem areas and develop strategies to mitigate hazards at problem locations in this area. While this is valuable for identifying problem areas in the transportation network, it misses the opportunity to identify safety issues and behaviors that may occur across the system.

To support the goal of reducing fatalities and serious injuries on all public roadways—as specified in the HSIP and supported by the Iowa SHSP and Illinois SHSP—this report examines traffic safety in the Quad Cities Metro Area on a systemic level in addition to identifying high crash locations. The SHSP from both the Iowa and Illinois DOTs examine crashes in terms of safety emphasis areas. This plan builds on those emphasis areas and leverages the strategies developed at the state level to address safety challenges that affect the Quad Cities.

Safety Emphasis Areas

Safety emphasis area analysis is done by classifying crashes by designated emphasis areas to develop strategies that have the highest potential to reduce fatalities and serious injuries. Emphasis areas for this plan were derived from the emphasis areas that appear in both the Iowa and Illinois SHSP. By viewing the crash records in our area in terms of these emphasis areas, we can see what types of crashes we have and better understand countermeasures to address them.

The emphasis areas examined in this report are:

- Intersections
- Speed
- Younger Drivers: ages 14-24
- Lane Departure
- Unprotected Person
- Older Drivers: ages 65 and over
- Impaired Driving
- Motorcycle
- Distracted Driving
- Pedestrian
- Heavy Truck
- Winter Roads
- Bicycles
- Work Zones

The Four Es

Just as the causes of crashes are manifold, strategies to improve traffic safety reach across a range of disciplines. In keeping with a multi-disciplinary approach, four implementation areas are considered and provide a framework for developing strategies to address traffic safety. These areas are education, engineering, emergency medical services, and enforcement. These areas are not mutually exclusive silos, and professionals from one area may and should participate in strategies that have a primary focus in an adjacent area. For example, the success of education strategies is often dependent on experts from the other implementation areas providing input and often delivering educational resources.

Crash Data

The data found in this report comes from each state's DOT crash records for the years 2013 to 2017. This data includes primary and secondary causes, enabling classification of each crash by multiple emphasis areas. The datasets are independent from one another and were compiled at the DOT level using slightly different methods. Because of that, the crash data for each state is kept separate from one another, and only high-level comparisons between the emphasis areas will be made between them—both states have a high number of intersection and speed related crashes and high levels of severe injuries associated with them—for example. All of the crash records for the Iowa and Illinois Quad Cities aggregated by emphasis area can be found below in Table 1 and Table 2 respectively. Note that crashes can be attributed to multiple emphasis areas and are counted in all emphasis areas under which they fall. Crashes and injuries have been tabulated here under fatal, serious, and severe, where severe is the combination of fatal and serious crashes or injuries. Discussing emphasis areas in terms of total severe injuries allows a better understanding of the impact they have on traffic safety because there is a fine line between crashes that result in serious injuries and fatal injuries. A crash resulting in a serious injury may very well be fatal for another person in the same circumstance depending on their physical condition. Severe injuries can be considered to be a serious injury that requires hospitalization or a fatal injury.

Table 1: Iowa Quad Cities crashes 2013-2017 by emphasis area

Emphasis Area	Fatal Crashes	Serious Crashes	Severe Crashes	Fatalities	Serious Injuries	Severe Injuries	Severe Injury Rank	Percent of Severe Injuries	Total Crashes	% of Crashes Resulting in Severe Injury
Speed	33	110	143	39	134	173	1	52%	7,952	2%
Intersection	18	97	115	21	110	131	2	39%	7,223	2%
Lane Departure	26	76	102	30	100	130	3	39%	2,112	5%
Unprotected Person	25	66	91	31	84	115	4	35%	331	27%
Impaired Driving	19	56	75	25	69	94	5	28%	891	8%
Motorcycle	11	54	65	15	60	75	6	23%	322	20%
Younger Driver	13	33	46	14	40	54	7	16%	4,213	1%
Older Driver	9	34	43	9	42	51	8	15%	3,099	1%
Distracted Driving	5	26	31	6	37	43	9	13%	1,641	2%
Pedestrian	10	29	39	10	32	42	10	13%	174	22%
Bicycle	0	15	15	0	17	17	11	5%	129	12%
Heavy Truck	6	6	12	6	8	14	12	4%	488	2%
Work Zone	3	5	8	4	7	11	13	3%	370	2%
Winter Roads	2	5	7	2	6	8	14	2%	1,687	0%
Local Roads	19	111	130	20	125	145		44%	9,834	1%
Non-Local Roads	37	118	155	44	144	188		56%	8,449	2%
All Crashes	56	229	285	64	269	333			18,283	2%

Table 2: Illinois Quad Cities crashes 2013-2017 by emphasis area

Emphasis Areas	Fatal Crashes	Serious Crashes	Severe Crashes	Fatalities	Serious Injuries	Severe Injuries	Severe Injury Rank	Percent of Severe Injuries	Total Crashes	% of Crashes Resulting in Severe Injury
Intersection	9	220	229	10	290	300	1	47%	7,358	3%
Younger Driver	8	207	215	9	284	293	2	46%	6,491	3%
Speed	11	185	196	12	241	253	3	39%	6,048	3%
Lane Departure	19	149	168	21	173	194	4	30%	2,606	6%
Unprotected Person	19	115	134	21	151	172	5	27%	789	17%
Older Driver	7	118	125	9	158	167	6	26%	2,987	4%
Impaired Driving	19	77	96	20	97	117	7	18%	808	12%
Motorcycle	10	73	83	11	80	91	8	14%	275	30%
Distracted Driving	1	44	45	1	53	54	9	8%	924	5%
Pedestrian	5	33	38	5	36	41	10	6%	137	28%
Heavy Truck	5	30	35	5	33	38	11	6%	896	4%
Winter Roads	2	27	29	2	31	33	12	5%	1,739	2%
Bicycle	2	18	20	2	18	20	13	3%	122	16%
Work Zone	1	6	7	1	11	12	14	2%	354	2%
Local Roads	16	284	300	18	340	358		56%	9,571	3%
Non-Local Roads	21	196	217	22	263	285		44%	6,702	3%
All Crashes	37	480	517	40	603	643			16,273	3%

Table 3: Iowa Quad Cities cross-area relationships of emphasis areas

		Emphasis Area													
		Speed	Intersection	Lane Departure	Unprotected Person	Impaired Driving	Motorcycle	Younger Driver	Older Driver	Distracted Driving	Pedestrian	Bicycle	Heavy Truck	Work Zone	Winter Roads
Cross-area Relationship	Speed		35%	**72%**	**62%**	**83%**	**49%**	**46%**	31%	**44%**	24%	24%	**50%**	**73%**	38%
	Intersection	27%		22%	**45%**	30%	**51%**	**48%**	39%	**42%**	36%	**41%**	**50%**	0%	13%
	Lane Departure	**54%**	22%		**43%**	**56%**	36%	37%	**43%**	**44%**	12%	0%	**43%**	**55%**	**63%**
	Unprotected Person	**41%**	40%	38%		**56%**	**71%**	31%	16%	40%	0%	24%	36%	18%	13%
	Impaired Driving	**45%**	21%	**41%**	**46%**		35%	13%	4%	12%	12%	18%	14%	0%	13%
	Motorcycle	21%	29%	21%	**46%**	28%		19%	10%	23%	2%	0%	0%	18%	0%
	Younger Driver	14%	20%	15%	15%	7%	13%		18%	23%	10%	12%	29%	9%	25%
	Older Driver	9%	15%	17%	7%	2%	7%	17%		23%	12%	6%	14%	36%	38%
	Distracted Driving	11%	14%	15%	15%	5%	13%	19%	20%		10%	6%	36%	36%	0%
	Pedestrian	6%	11%	4%	0%	5%	1%	7%	10%	9%		0%	0%	9%	0%
	Bicycle	2%	5%	0%	3%	3%	0%	4%	2%	2%	0%		7%	0%	13%
	Heavy Truck	4%	5%	5%	4%	2%	0%	7%	4%	12%	0%	6%		18%	13%
	Work Zone	5%	0%	5%	2%	0%	3%	2%	8%	9%	2%	0%	14%		0%
	Winter Roads	2%	1%	4%	1%	1%	0%	4%	6%	0%	0%	6%	7%	0%	

Table 4: Illinois Quad Cities cross-area relationships of emphasis areas

		Emphasis Area													
		Intersection	Younger Driver	Speed	Lane Departure	Unprotected Person	Older Driver	Impaired Driving	Motorcycle	Distracted Driving	Pedestrian	Heavy Truck	Winter Roads	Bicycle	Work Zone
Cross-area Relationship	Intersection		50%	41%	13%	35%	64%	22%	36%	37%	22%	37%	21%	60%	8%
	Younger Driver	49%		49%	38%	44%	34%	44%	26%	54%	39%	24%	55%	30%	67%
	Speed	35%	43%		45%	47%	34%	48%	41%	35%	15%	42%	58%	0%	75%
	Lane Departure	9%	25%	34%		49%	15%	61%	37%	28%	0%	32%	55%	0%	25%
	Unprotected Person	20%	26%	32%	43%		19%	42%	73%	31%	12%	16%	12%	40%	58%
	Older Driver	36%	19%	23%	13%	19%		5%	16%	22%	12%	13%	12%	45%	8%
	Impaired Driving	9%	17%	22%	37%	28%	4%		14%	19%	20%	11%	9%	10%	17%
	Motorcycle	11%	8%	15%	18%	38%	9%	11%		11%	5%	5%	0%	5%	25%
	Distracted Driving	7%	10%	8%	8%	10%	7%	9%	7%		7%	5%	0%	0%	8%
	Pedestrian	3%	5%	2%	0%	3%	3%	7%	2%	6%		11%	3%	0%	0%
	Heavy Truck	5%	3%	6%	6%	3%	3%	3%	2%	4%	10%		9%	10%	8%
	Winter Roads	2%	6%	8%	9%	2%	2%	3%	0%	0%	2%	8%		10%	0%
	Bicycle	4%	2%	0%	0%	5%	5%	2%	1%	0%	0%	5%	6%		0%
	Work Zone	0%	3%	4%	2%	4%	1%	2%	3%	2%	0%	3%	0%	0%	

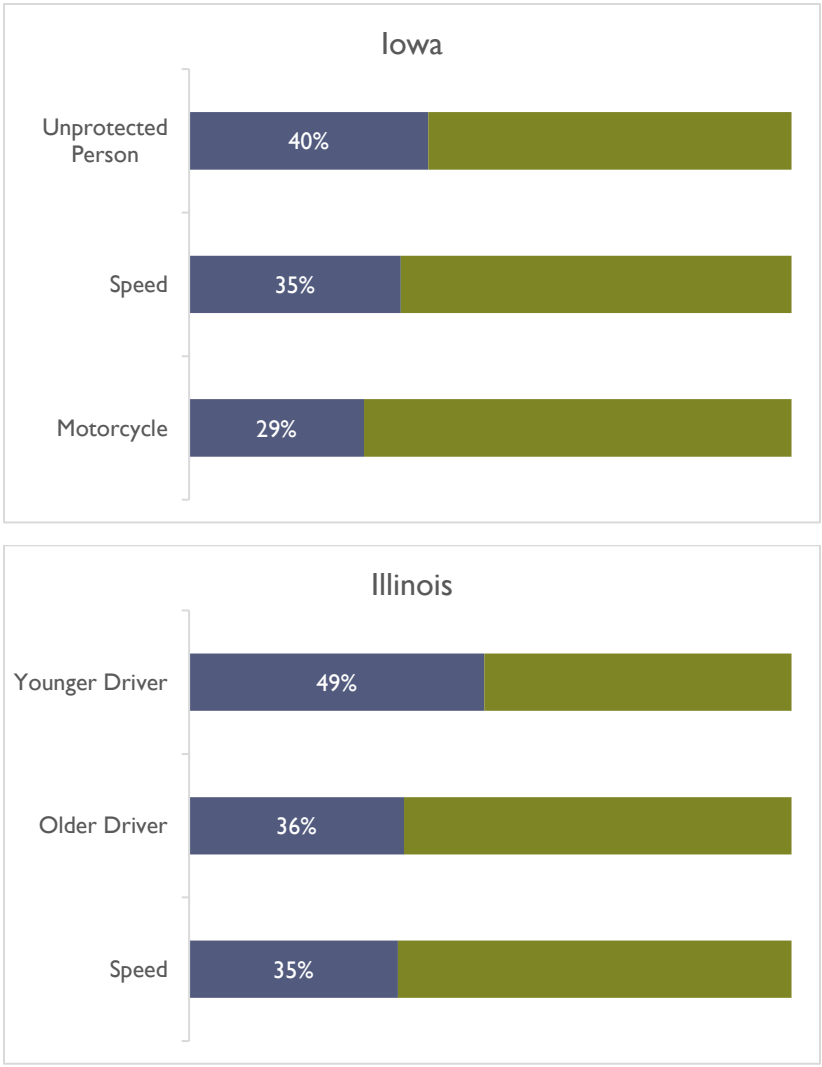
Focus Emphasis Areas

Intersections

Intersections present some of the greatest opportunity for crashes. They are designed points of interaction in the transportation system where vehicles, pedestrians, and cyclists cross paths. Transit stops are often located near intersections as well. All of the associated interaction between users and modes leads to conflicts between users and modes resulting in intersections being places with high concentrations of crashes. Tables 1 and 2 show intersection-related crashes account for 39 and 47 percent of severe injuries in the Iowa and Illinois Quad Cities respectively.

Strategies that can reduce the number and severity of crashes at intersections could have a significant impact on traffic safety outcomes. Emphasis areas that have significant overlap with intersection crashes are shown in Figure 1. Each entry shows the percentage of intersection crashes that also fall under the given emphasis area. For example, 49 percent of intersection-related crashes involve a younger driver in the Illinois Quad Cities. These connections reveal the multi-faceted nature of crashes and help to improve safety in one area by working on strategies that address related safety issues. In the case of intersection crashes, strategies that address speed related crashes—which account for 35 percent of intersection crashes—are likely to reduce fatalities and serious injuries at intersections. While these figures show associated emphasis areas as a percentage of all intersection crashes, it is important to note that the relationship goes both ways. Tables 3 and 4 show that intersections are contributing factors in many other emphasis areas and engineering intersection strategies will have ripple effects in safety improvements for these related areas.

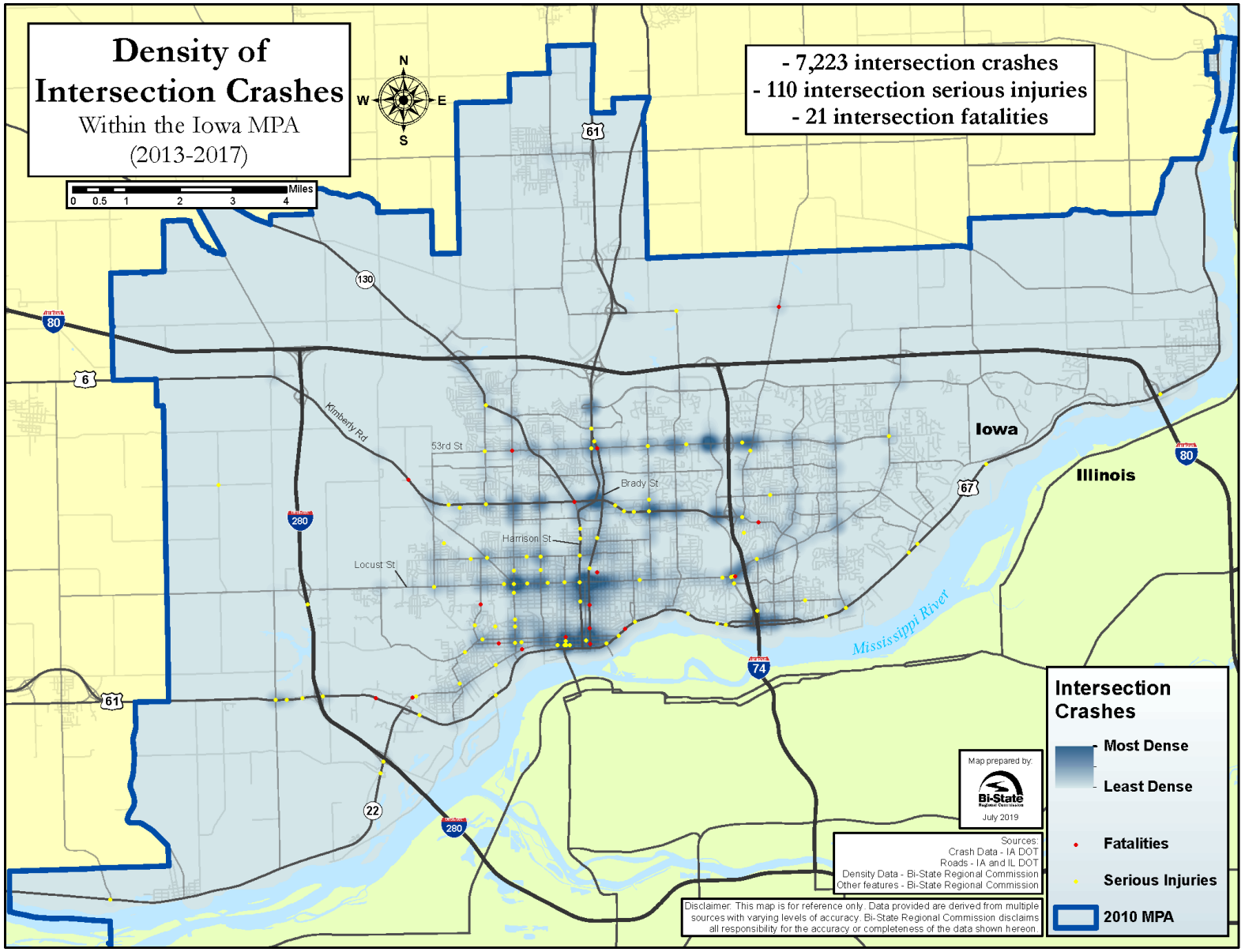
Figure 1: Intersection related emphasis areas



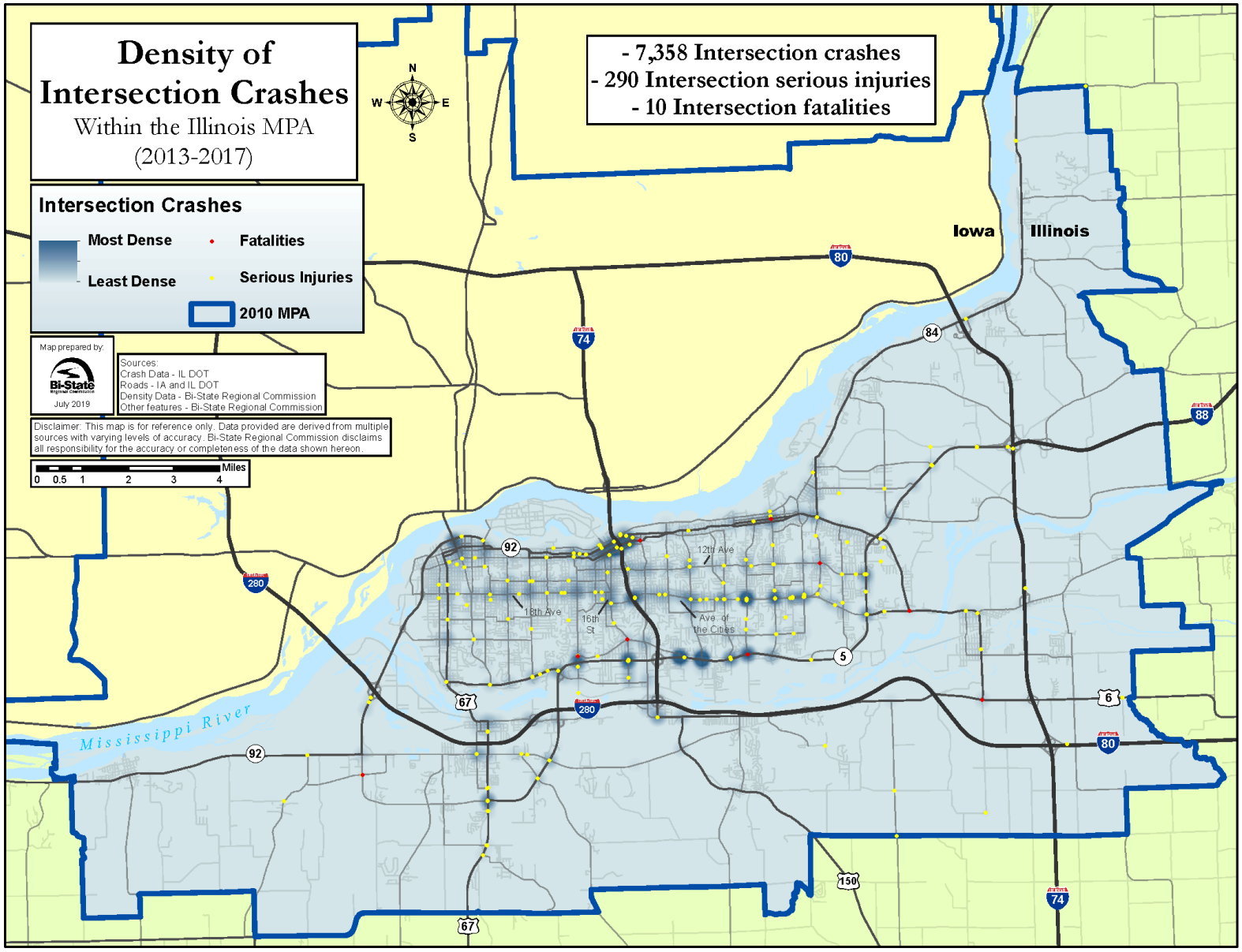
The hotspots within the Metropolitan Planning Area (MPA) identified in Maps 1 and 2 are somewhat expected as they occur at the intersection of many high volume, higher speed thoroughfares on both sides of the river.

Intersections play a big role in safety for a multitude of reasons. The opportunity for crashes and potential for severe crashes is amplified for vulnerable users such as pedestrians and cyclists. Crash outcomes are more severe for road users who neglect to use seatbelts or helmets as well. The presence of older and younger drivers in the list of associated emphasis areas speaks to risk at intersections associated with inexperience and diminishing reaction times. All road users would do well to approach intersections with caution and get familiar with new designs they encounter.

Map 1: Density of intersection crashes with Iowa MPA



Map 2: Density of intersection crashes within the Illinois MPA



Intersection Strategies

The strategies listed here are designed to reduce the number of fatalities and serious injuries on our road ways. They are grouped by implementation areas and range from short-term solutions like education campaigns to longer-term investments in changing transportation safety infrastructure.

Education	• Develop educational resources informing the public of alternative intersection types, traffic signals, and laws. • Establish education campaign for intersection safety. • Implement training and education for innovative intersection configurations.
Enforcement	• Conduct enforcement campaigns related to bicycle and pedestrian awareness at targeted intersections. • Evaluate the use of red light cameras at intersections. • Increase law enforcement presence and enforcement at known high crash intersections. • Develop a procedure for law enforcement officers to request engineering assessments of crash sites.
Engineering	• Implement alternative intersection designs that reduce conflict points and enhance safety and mobility, such as roundabouts, J-turns, median U-turn intersections, jug handles, displaced left turn intersections, offset tee intersections, continuous flow intersections, and diverging diamond interchanges. • Improve signal timing and vehicle detection, implementing all-red timing, adding protected turn phases when appropriate, and coordinating signal phasing between successive intersections or along corridors. • Evaluate intersection user lines of sight to traffic control devices and approaching motorists, pedestrians, and cyclists. • Revise design of intersection geometry and skew of the road. • Provide or improve turning movement channelization and storage. • Evaluate pavement design for intersection friction value and consider high friction surface treatment where appropriate. • Evaluate existing intersection locations with high crash trends. • Incorporate access management techniques including median construction, driveway closures or consolidations, and/or imposing left-turning restrictions. • Evaluate and implement pedestrian and bicycle accommodations. • Improve conspicuity of the intersection and its users through a variety of approaches such as lighting, advance warning devices, and upgrading of intersection signal head placement. • Consider intersection signing improvements to improve safety.

High Crash Intersections

The Quad Cities Intersection Crash Study focused on this emphasis area specifically for good reason. Intersections are related to a large share of the serious injuries and fatalities across the Quad Cities. The methodology used in previous intersection crash studies has been incorporated here to identify high crash intersections in the area. All intersections classified as collector and above were scored based on the frequency of crashes, the severity of the crashes, and the crash rate at the intersections. The severity score is a weighted total of the crashes at an intersection where additional weight is given to crashes with injuries and fatalities. The following equation describes the weighting.

$$S_i = N_n + (3 \times N_i) + (12 \times N_f)$$

Where:

S_i = Total weighted severity for intersection *i*

N_n = Number of non-injury crashes at intersection *i*

N_i = Number of injury crashes at intersection *i*

N_f = Number of fatal crashes at intersection *i*

The frequency, severity score, and crash rate were each given a point value from one to fifteen. The breakdown of the scoring values is shown in Table 5. The scoring process was done independently for the Iowa and Illinois Quad Cities.

Table 5: Point scale for ranking high crash locations

Frequency		Severity		Rate	
Crashes	Points	Severity	Points	Rate (MEV)	Points
≥ 29	15	≥ 56	15	≥ 3.50	15
27-28	14	53-55	14	3.26-3.49	14
25-26	13	49-52	13	3.01-3.25	13
23-24	12	45-48	12	2.76-3.00	12
21-22	11	41-44	11	2.51-2.75	11
19-20	10	37-40	10	2.26-2.50	10
17-18	9	33-36	9	2.01-2.25	9
15-16	8	29-32	8	1.76-2.00	8
13-14	7	25-28	7	1.51-1.75	7
11-12	6	21-24	6	1.26-1.50	6
9-10	5	17-20	5	1.01-1.25	5
7-8	4	13-16	4	0.76-1.00	4
5-6	3	9-12	3	0.51-0.75	3
3-4	2	5-8	2	0.26-0.50	2
1-2	1	1-4	1	0.01-0.25	1

The 10 highest scoring intersections from each side of the river are shown in Tables 6 and 7. Their locations are shown in Maps 3 and 4. These intersections represent areas with high numbers of severe crashes that have factored in the amount of traffic going through each intersection.

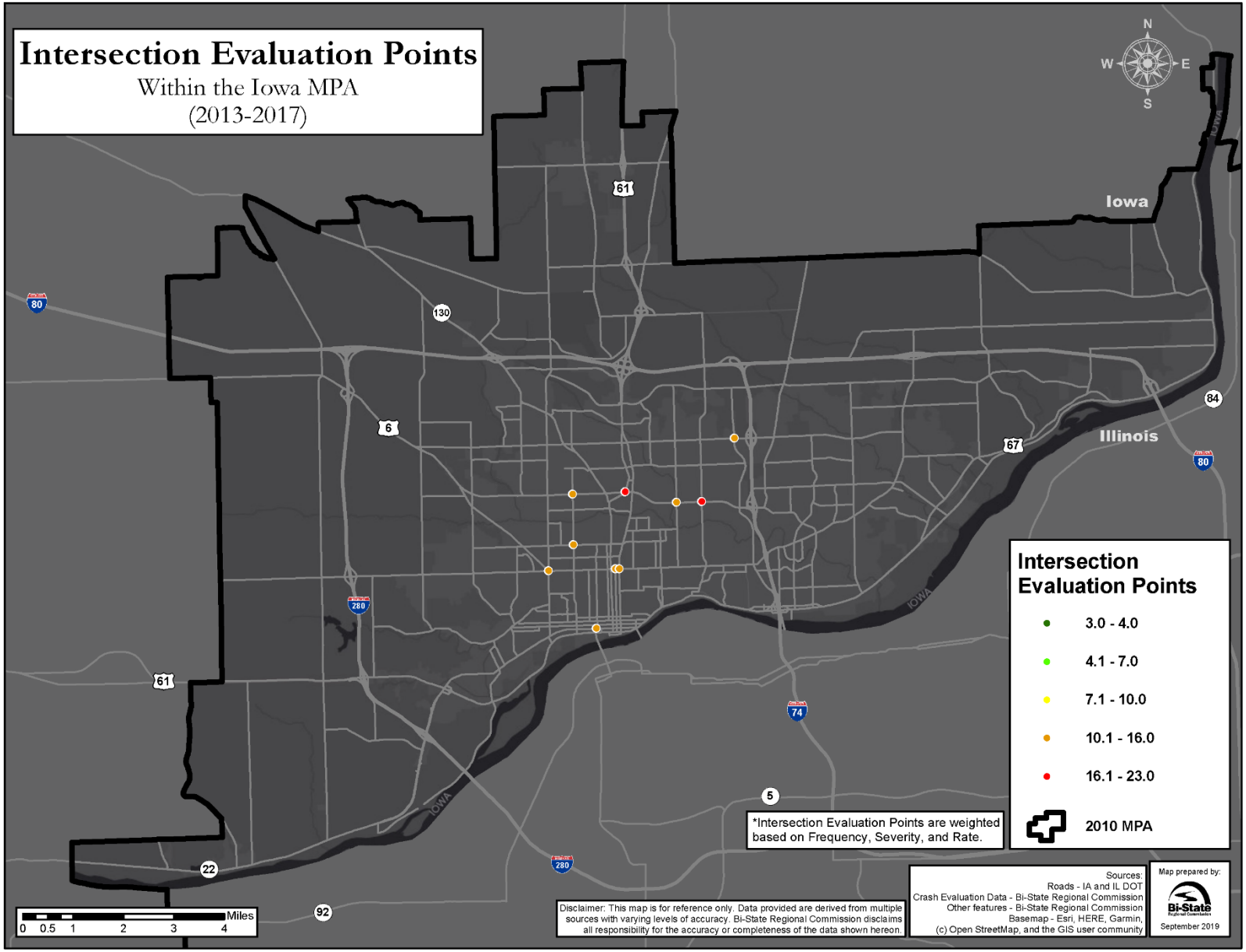
Table 6: Iowa Quad Cities High Crash Intersections

Rank	Intersection	Average Annual Crashes	Crash Rate	Average Annual Severity	Score
1	E. Kimberly Rd. & Jersey Ridge Rd. - Davenport	11	3.11	13	23
2	E. Kimberly Rd. & Welcome Way - Davenport	14.8	1.06	18	18
3	W. Kimberly Rd. & N Marquette St. - Davenport	11	1.45	16	16
3	E 53rd St. and Elmore Ave. - Davenport	14.4	0.94	17	16
5	E Kimberly Rd. & Eastern Ave. - Davenport	12.2	1.05	15	15
6	W Central Park Ave. & Marquette St. - Davenport	9.4	1.28	11	14
6	E Locust St. & Brady St. - Davenport	11.4	0.90	15	14
8	W Locust St., Hickory Grove Rd. & N Division St. - Davenport	10.6	0.87	11	13
8	W 2nd St. & N Gaines St. - Davenport	9.2	0.93	15	13
8	W Locust St. & Main St.	8.6	1.09	9	13

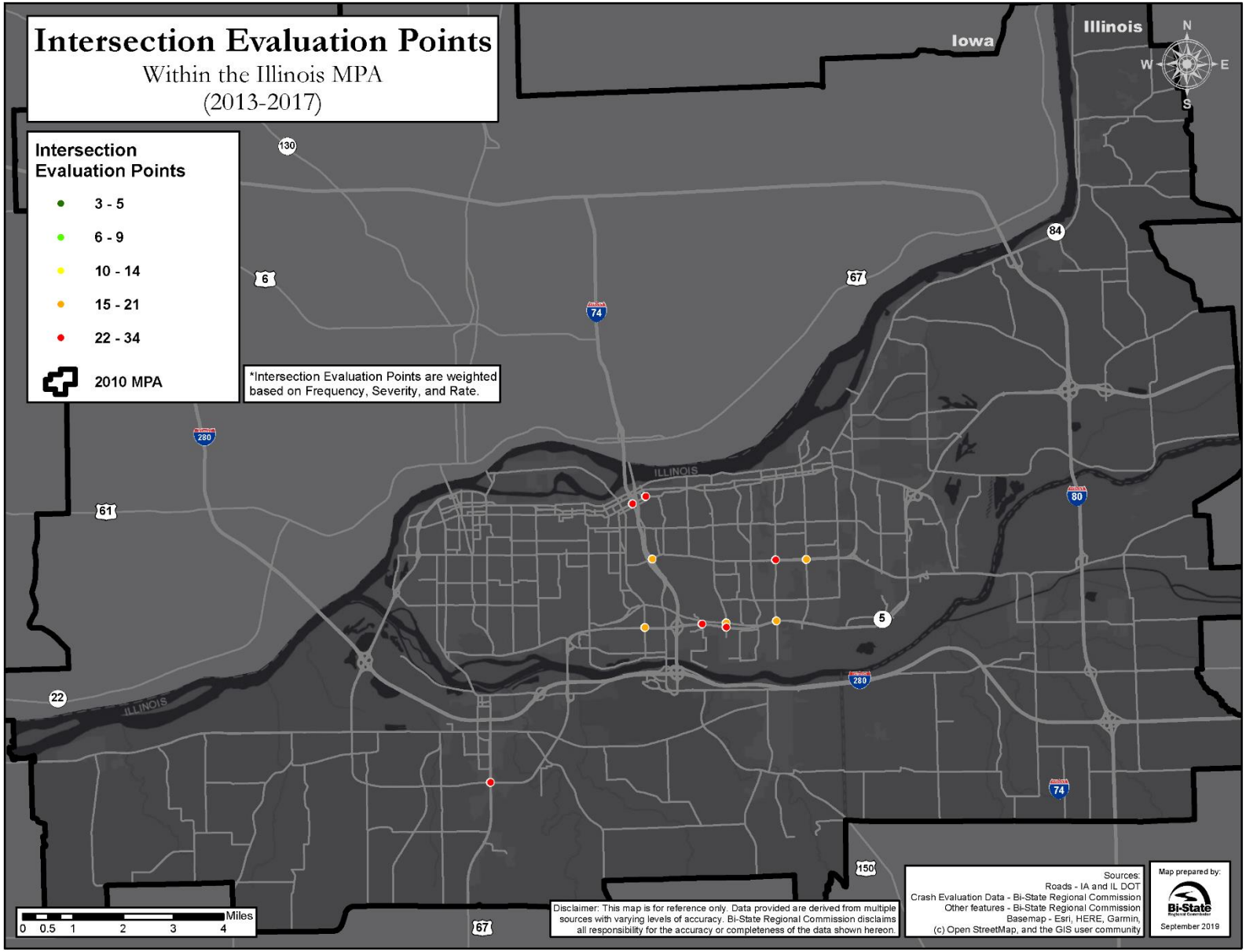
Table 7: Illinois Quad Cities High Crash Intersections

Rank	Intersection	Average Annual Crashes	Crash Rate	Average Annual Severity	Score
1	6th Ave. & 23rd St. - Moline	22.6	6.03	26	34
2	Avenue of the Cities & Kennedy Dr. - Moline	22.8	1.29	37	28
3	John Deere Rd. & 38th St. - Moline	29.2	0.88	31	27
4	John Deere Rd. & 41st St. - Moline	25.2	0.81	34	26
5	6th Ave. & 19th St. - Moline	14.4	2.81	22	25
6	92nd Ave./Milan Beltway & 1st St. - Milan	14.8	1.70	35	24
7	John Deere Rd. & 16th St. - Moline	20.2	0.99	28	21
7	John Deere Rd. & 60th St. - Moline	16.2	1.51	21	21
9	Avenue of the Cities & 19th St. NB - Moline	14.6	1.59	20	20
10	Avenue of the Cities & 7th St. - East Moline	14	0.96	28	18
10	38th Ave. & 41st St. - Moline	11.2	2.00	14	18

Map 3: Iowa high crash intersections



Map 4: Illinois high crash intersections



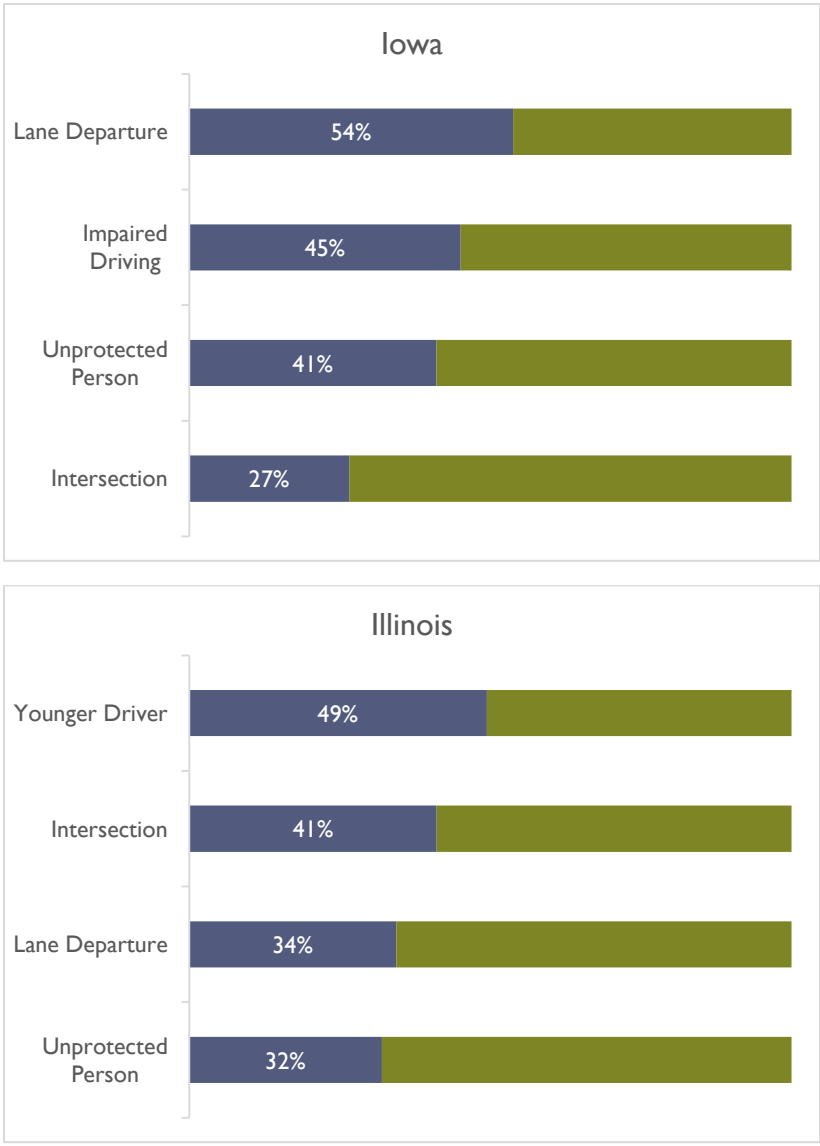
Speed Related

High speed is a significant factor in serious injuries and fatalities in crashes in the Quad Cities. Excessive speed reduces the time a driver has to react to conditions on the roadway. Whether they are existing features such as the geometry of the roadway or changing elements around them like other road users, weather conditions, or animals entering the roadway, the time available to react goes down as speed increases making crashes more likely at higher speeds. Crashes are also likely to become more dangerous at high speed because there is more energy that must be dissipated as vehicle speed goes up. This has implications for both passengers in the vehicle and non-motorists outside the vehicle.

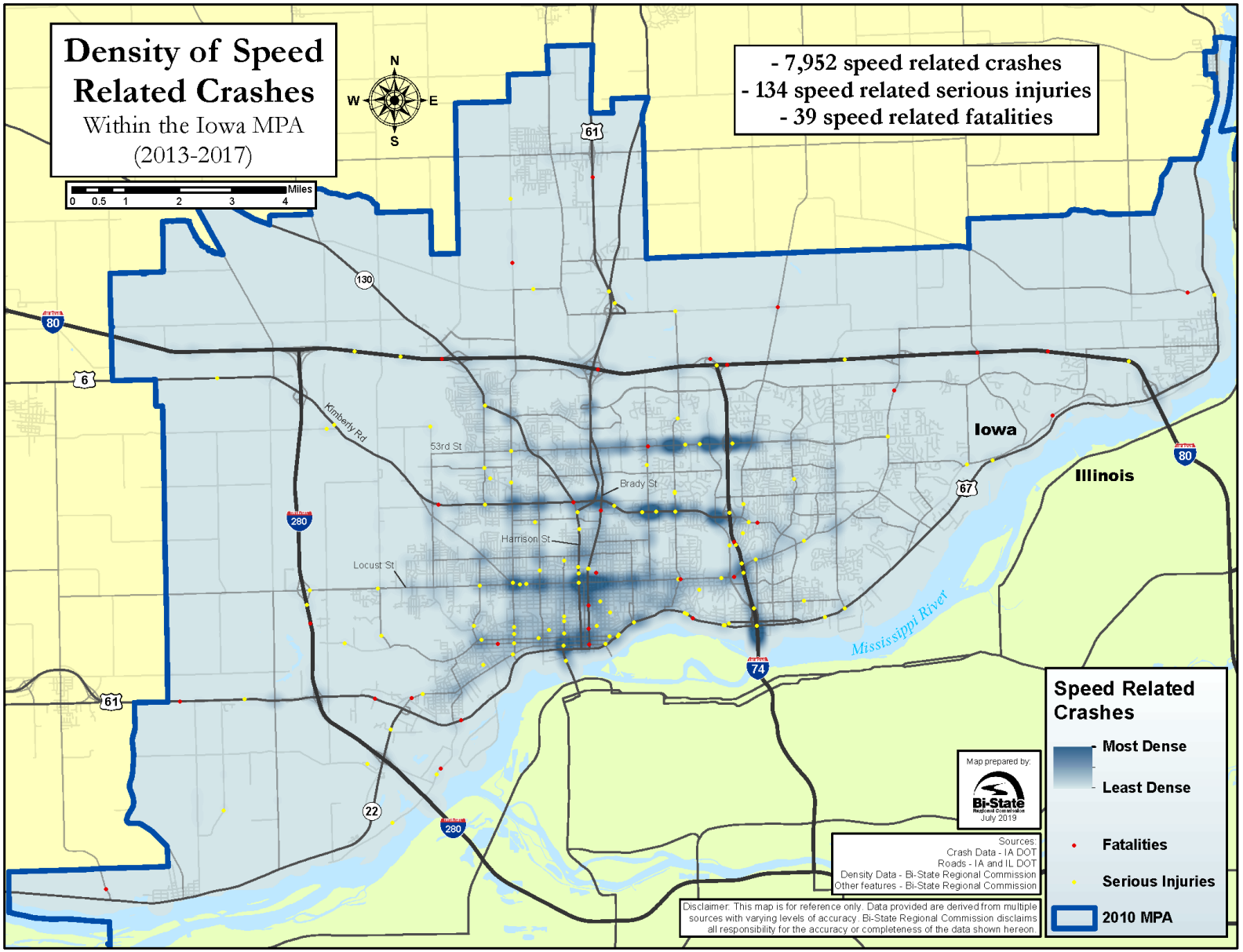
There is a distinct pattern of speed related crashes on east-west corridors on both sides of the river. This can be seen in Maps 5 and 6 where the Elmore Avenue, Kimberly Road, and Locust Street corridors in Iowa and the John Deere Road and Avenue of the Cities/18th Avenue corridors in Illinois show high concentrations of speed related crashes and injuries.

Speed related crashes accounted for 52 percent of severe injuries in Iowa and 39 percent of severe injuries in Illinois making this a significant contributor to traffic injuries in this area. Figure 2 shows a strong cross-area relationship between groups of people who are likely to participate in risky behavior such as young drivers, unprotected persons, and impaired drivers. Unprotected persons are those who do not use standard safety equipment including seatbelts, child restraints, and helmets. Impaired drivers also suffer from further reduction in reaction time. The relationships between lane departure, and intersection crashes demonstrate an inability to react to roadway conditions to avoid crashes. These areas should be worked on in concert to reduce crashes. Everyone should be sure to give enough time to reach his/her destination, be patient, slow down, and don't engage with aggressive drivers.

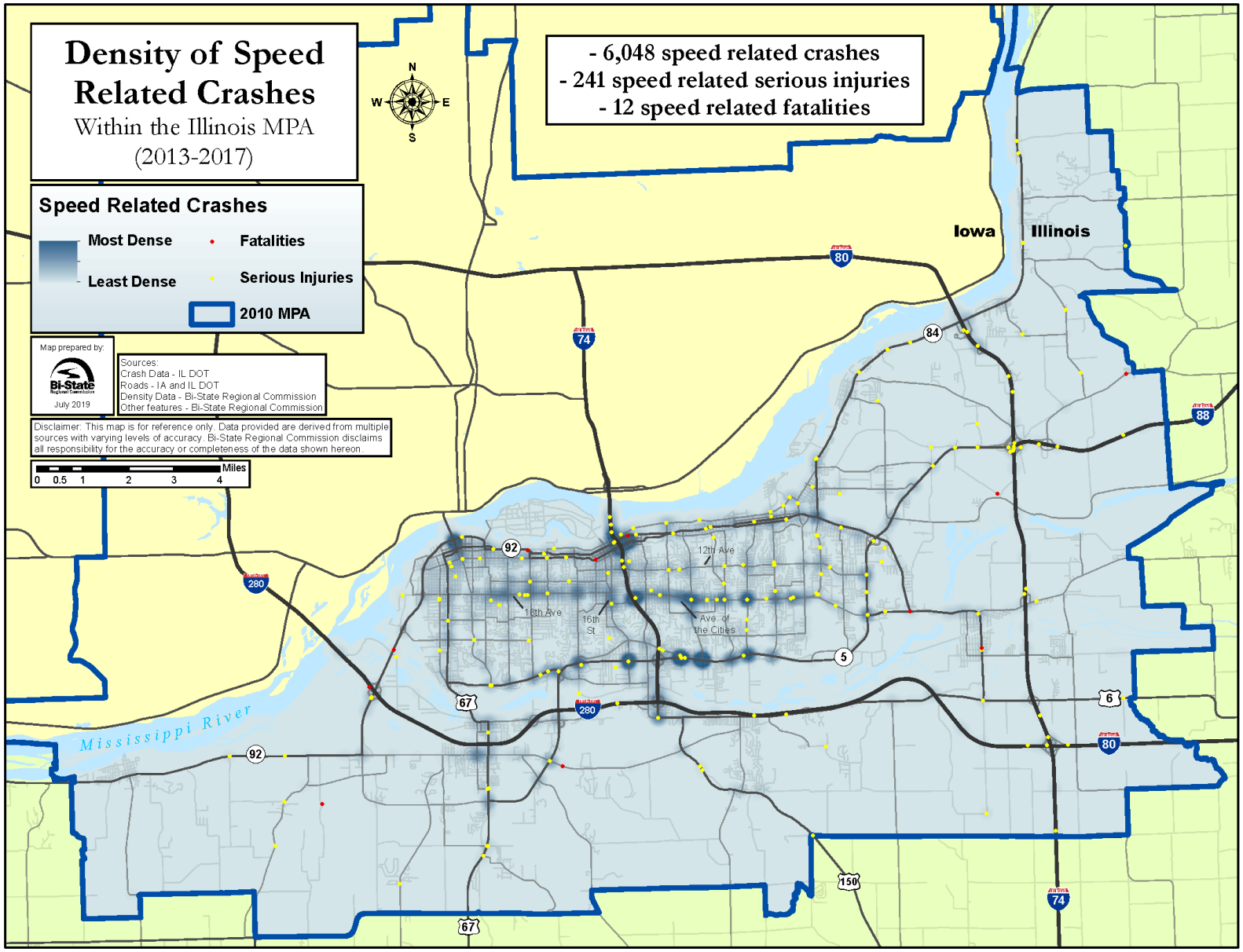
Figure 2: Speed related emphasis areas



Map 5: Density of speed related crashes within the Iowa MPA



Map 6: Density of speed related crashes within the Illinois MPA



Speed Related Strategies

Excessive speed is highly dependent on driver behavior, therefore strategies that reshape how drivers think and act about their speed are critical in addressing these types of crashes. Every driver knows if they speed. It's easy to drift a little faster than the posted limit. Education campaigns are valuable in reminding road users to slow down, but they only go so far. Consistent speed enforcement campaigns as well as speed and red-light cameras can be powerful motivators to keep speeds in a safe range, especially when targeted to areas that see high levels of speed related crashes. Engineering strategies can also be very effective in helping to identify speed related crash hotspots and implement speed and red-light cameras. They can also help to reshape driver behavior through roadway design. Designs can make driving at unsafe speeds feel uncomfortable for the driver, but they can also relieve driver frustration by eliminating bottlenecks and improving steady traffic flows at safe speeds. Other methods can incorporate any number of traffic calming solutions including speed humps or bumps and narrow lanes.

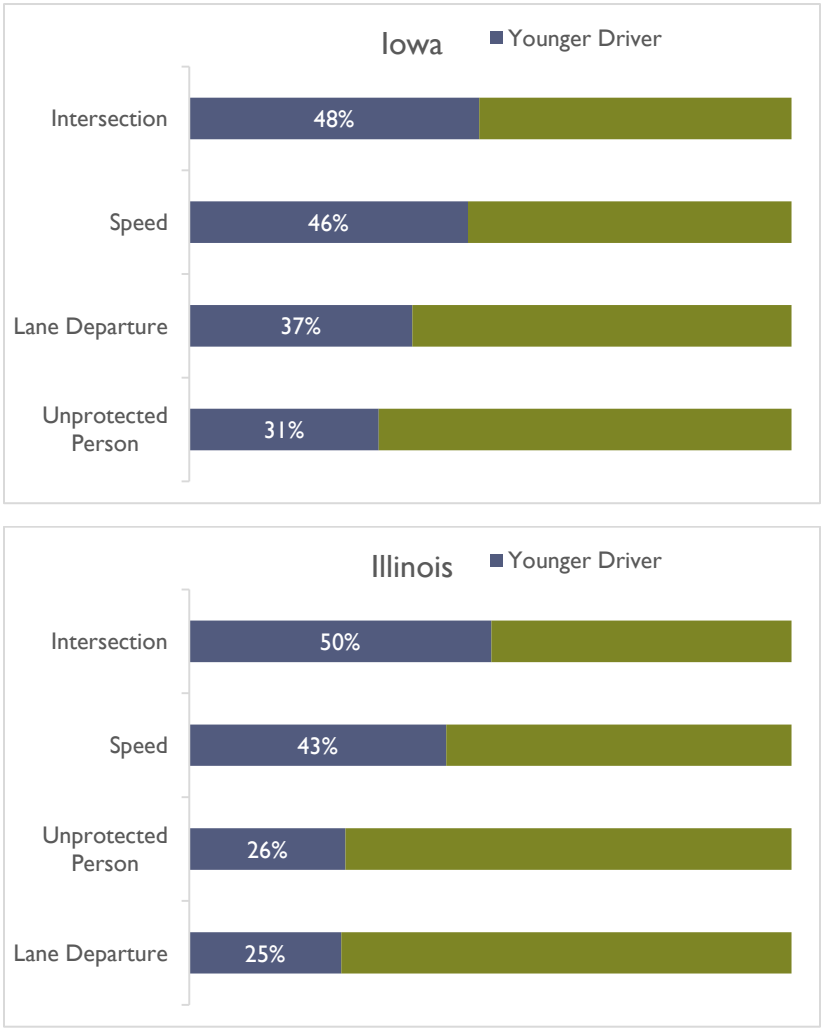
Education	• Educate drivers on the importance of controlling and managing vehicle speed utilizing multimedia approaches.
Enforcement	• Identify corridors with a high frequency of speed-related crashes, and implement high-visibility enforcement campaigns. • Explore opportunities to expand automated and red-light running enforcement where appropriate. • Expand the use of speed monitoring through dynamic speed feedback signs.
Engineering	• Evaluate and implement signing and geometric design strategies to moderate speeds and enhance safety. • Implement dynamic speed feedback signs at targeted locations. • Investigate adequacy of all-red clearance intervals at high-risk signalized intersections. • Evaluate roadway traffic calming measures to reduce high speeds. • Remove bottlenecks, and improve traffic flow to reduce motorist frustrations. • Reduce nonrecurring delays, and provide better information about these delays by the use of dynamic message signs.

Young Drivers

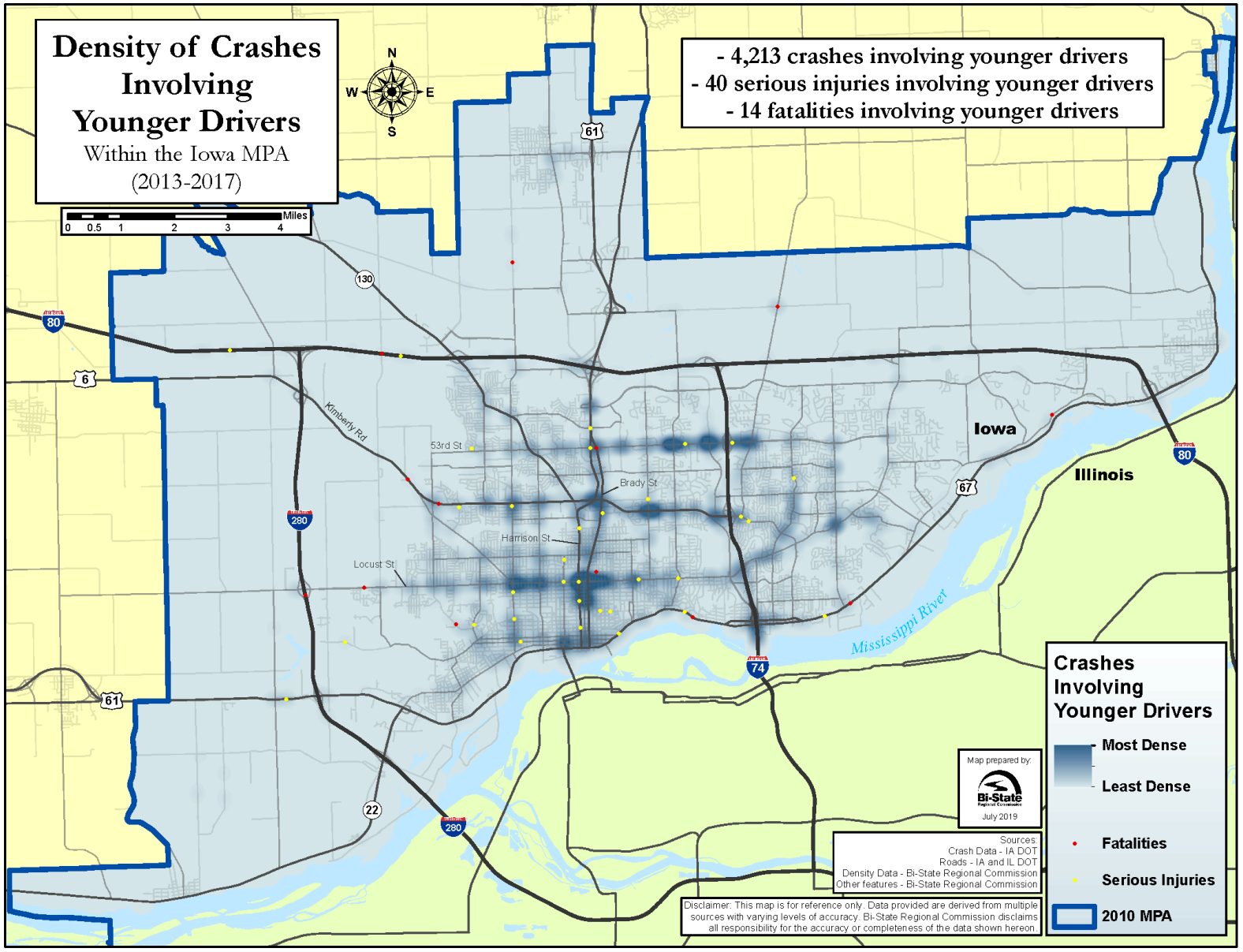
Young drivers have limited experience driving and because of this, it can be difficult for them to react to challenging roadway conditions. A crash is young driver related if at least one driver involved is between the ages of 14 and 24. This age group is more likely to engage in risky driving behaviors such as driving late at night with multiple passengers who may be distracting. Young drivers often drive at excessive speeds, which increases the likelihood and severity of crashes.

The related emphasis areas shown in Figure 3 show that about 45 percent of young driver crashes also involve speed. Another big factor is shown to be intersections with nearly 50 percent of young driver crashes occurring at intersections areawide. Slightly lower common emphasis areas are lane departures and unprotected person involved crashes among young driver crashes. These cross-area relationships are all consistent with the inexperience and higher risk behavior seen in young drivers and highlight areas where common improvements can be made to promote traffic safety. Everyone can encourage and support young drivers to avoid distractions and impairment.

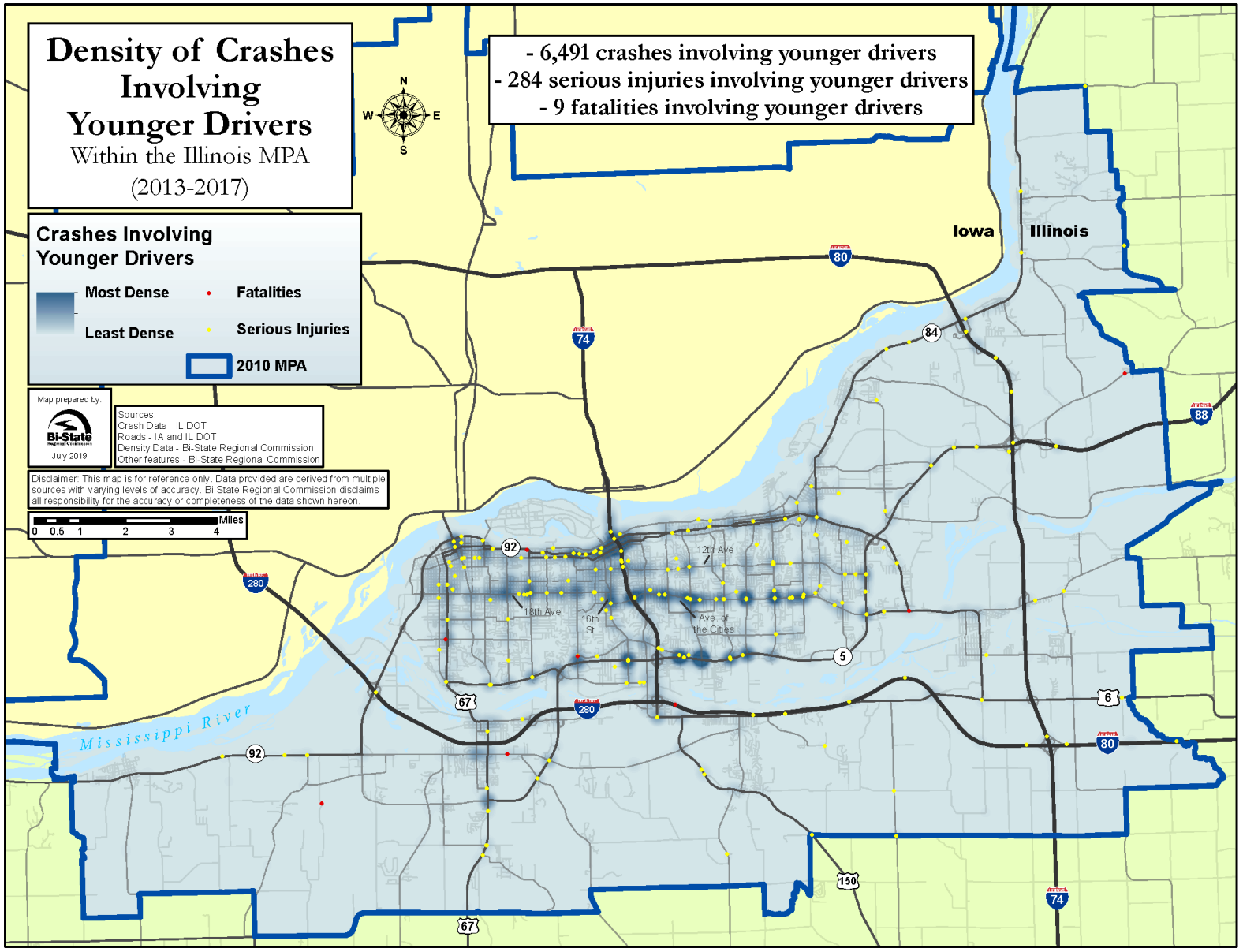
Figure 3: Young driver related emphasis areas



Map 7: Density of Crashes Involving Younger Drivers within the Iowa MPA



Map 8: Density of Crashes Involving Younger Drivers within the Illinois MPA



Young Driver Strategies

Young drivers are prime for education opportunities as they receive formal driver education already. Understanding the behavior and conditions that contribute to young driver classes can help to improve these programs, and that needs to be an ongoing process to ensure that young drivers are prepared to safely and responsibly participate in the traffic system. Education is only one piece of this puzzle. Enforcement can help ensure young drivers take on that responsibility by enforcing graduate driver license (GDL) program restrictions and underage drinking and driving. Engineering can also help by improving multimodal transportation—especially near schools—to improve the safety of non-motorists in those areas and provide easier operation for young drivers.

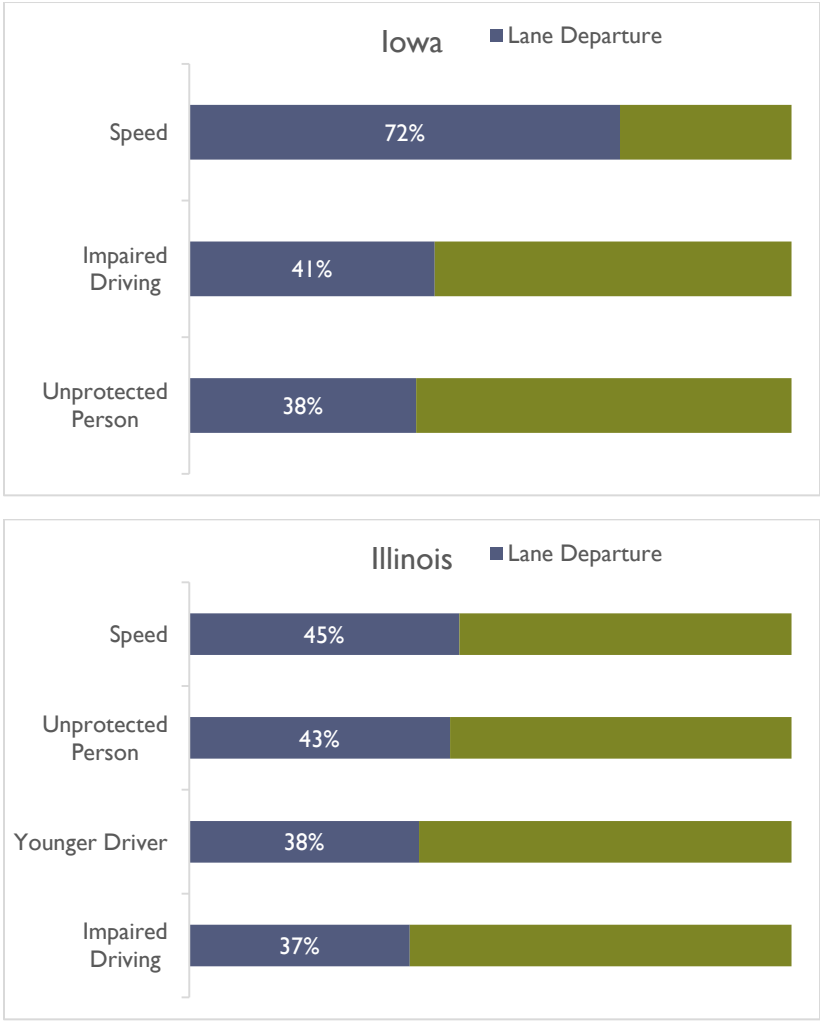
Education	• Improve content and delivery of driver education curriculum. • Continue educating young drivers in school-based settings using various training techniques, including those that simulate impairment. • Support a broad-based coalition to plan for addressing age-based transportation needs. • Encourage more diverse supervised driving practice environments (freeways, local roads, work zones) as well as varied weather and light conditions. • Require a parent/guardian component of driver education programs for parent/guardian and teen to attend prior to applying for a learner's permit. • Encourage selection of safer vehicles for young drivers. • Encourage parents to take student drivers to a variety of locations to ensure comprehensive driver experience and practice. • Review content and delivery to improve driver education/training including recovery skills training. • Incorporate and encourage peer-to-peer opportunities.
EMS	• Include EMS professional in educational campaigns.
Enforcement	• Publicize and enforce GDL restrictions. • Publicize and enforce laws pertaining to underage drinking and driving.
Engineering	• Review and expand multimodal plans to expand walking, cycling, and transit for school sites that consider the safety of the teen driver. • Investigate technology devices and insurance programs that monitor and provide feedback on safe driving habits.

Lane and Roadway Departure

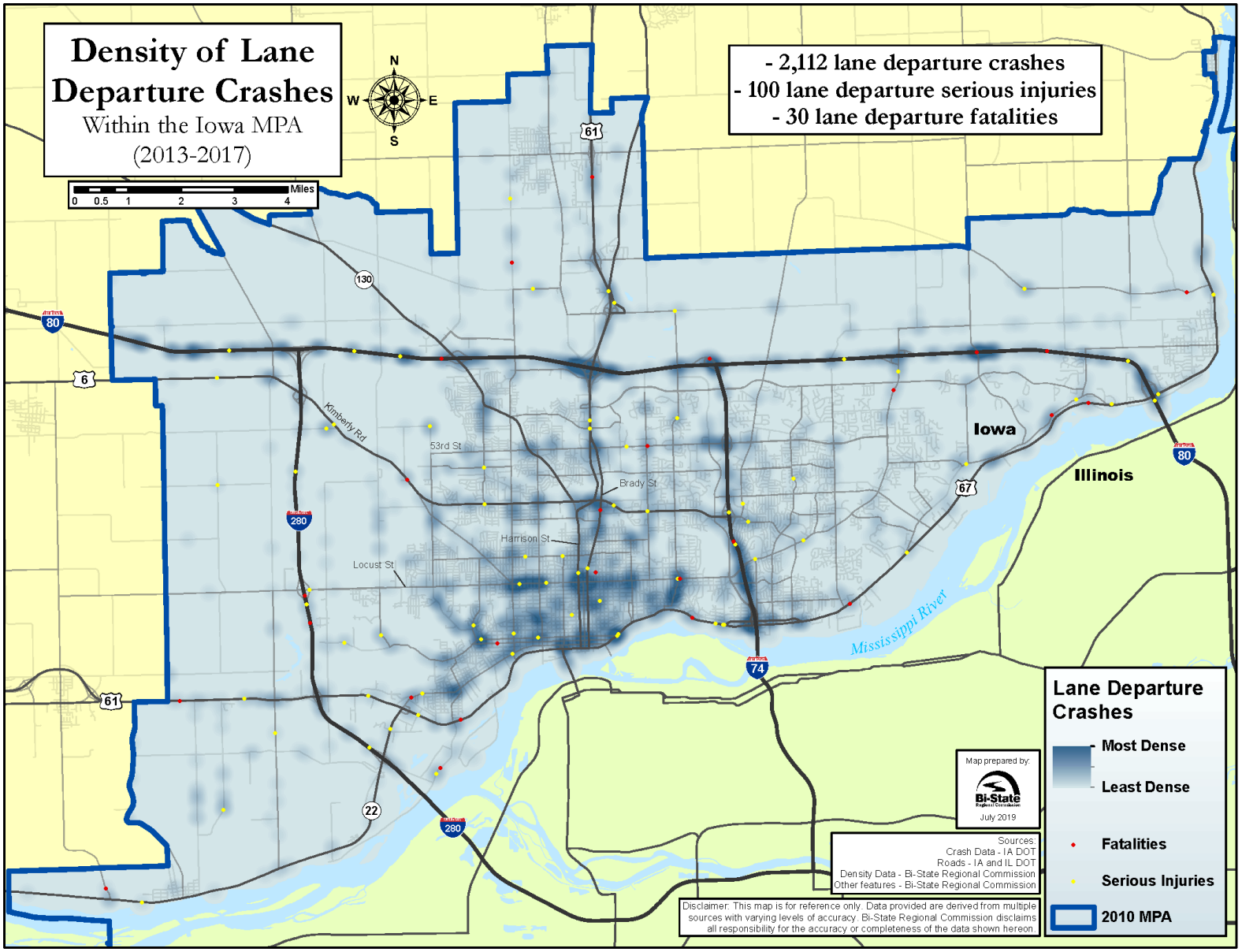
Lane and roadway departure crashes account for a significant share of the serious injuries and fatalities in the Quad Cities—39 and 30 percent in Iowa and Illinois respectively, which amounts to 273 serious injuries and 51 fatalities over the five-year period. Speed is a major factor in lane and roadway departure crashes with an overwhelming 72 percent of these crashes in Iowa having speed as a factor. Forty-five percent of roadway departure crashes in Illinois have speed as a factor as well. This combination of factors leads to high energy crashes that may leave the pavement and result in rollover crashes. This situation is worsened when people neglect to use seatbelts as it can lead to occupants being ejected from their vehicle.

The crash densities shown in Maps 9 and 10 show a broad distribution of land and roadway departure crashes with hotspots spread across many high traffic and high speed corridors, particularly along the I-74 corridor in Illinois and Iowa south of the Middle Road interchange. There are also several high crash areas along the I-80 corridor in Iowa—particularly at the US 61 interchange. Interchange hot spots may be a result in the transition between high and low speeds combined with sharp curves. Maintaining focus on the road, avoiding over-correction, and resisting the urge to veer for objects or animals in the roadway are ways to reduce these types of crashes.

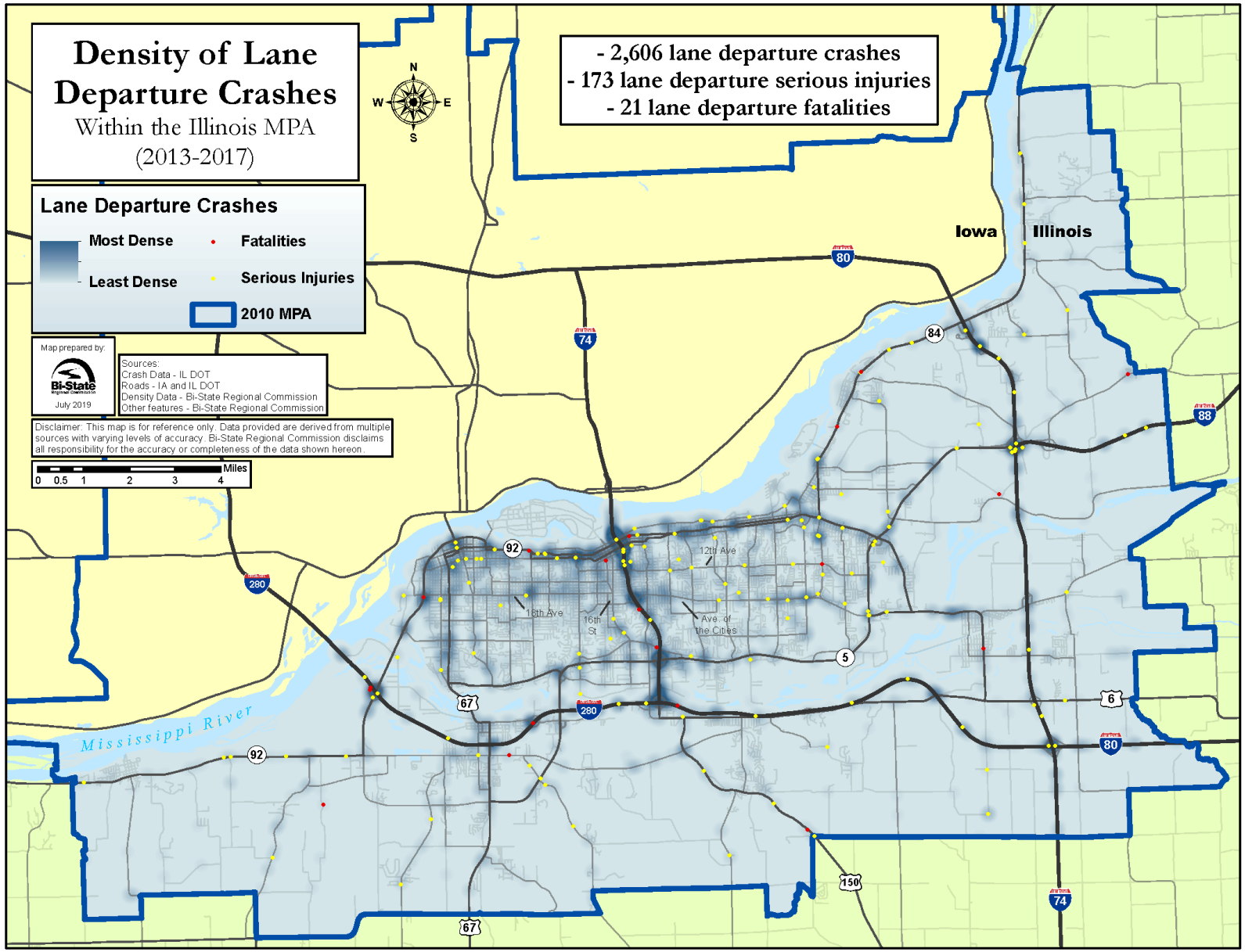
Figure 4: Lane and roadway departure related emphasis areas



Map 9: Density of lane departure crashes within the Iowa Quad Cities



Map 10: Density of lane departure crashes with the Illinois Quad Cities



Lane and Roadway Departure Strategies

Engineering strategies play a big role in addressing land and roadway departure crashes. Implementing advanced warning for sharp curves and designing road surfaces and geometries that work with the driver to maintain control of the vehicle are great ways to reduce these crashes. Roadway feedback such as rumble strips and shoulder treatments can also help. Strategies from related areas that reduce speed and impaired driving, and increased seatbelt use can also reduce crashes and improve safety outcomes.

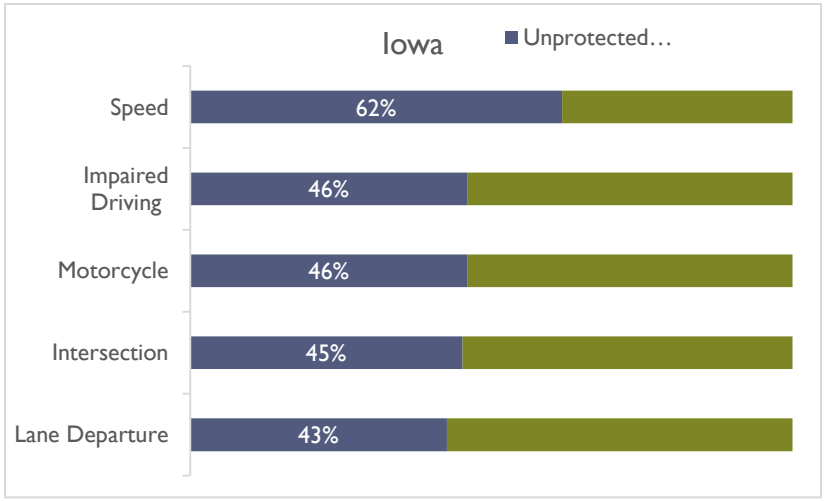
Education	• Educate drivers on the importance of controlling and managing vehicle speed utilizing multimedia approaches.
EMS	• Expand the use of intelligent transportation systems (ITS) to provide real-time information of potential crashes to EMS.
Enforcement	• Evaluate high lane departure crash corridors for two-lane highways and deploy road safety audit (RSA) teams to evaluate. • Implement strategic enforcement based on data-driven approaches, and enhance communication and coordination between agencies.
Engineering	• Install rumble strips. • Provide enhanced shoulder or in-lane delineation and marking for sharp curves. • Improve highway geometry for horizontal curves. • Provide enhanced pavement markings and median barrier devices/installations. • Apply shoulder treatments, eliminating shoulder drop-offs, and widen/pave shoulders. • Install only new guardrail and guardrail end sections that pass crashworthy tests. • Evaluate pavement and skid resistance to reduce roadway departure crashes. • Evaluate and address existing slopes and ditches where appropriate to prevent rollovers. • Remove or relocate objects in hazardous locations including evaluating need for guardrail. • Delineate roadside objects such as trees, utility poles, or drainage structures with the appropriate treatment. • Utilize improved designs for roadside hardware, where appropriate. • Use barrier and attenuation systems at needed locations. • Evaluate the use of intelligent transportation systems (ITS) to alert traffic of errant vehicles. • Develop a procedure for law enforcement officers to request engineering assessments of crash sites.

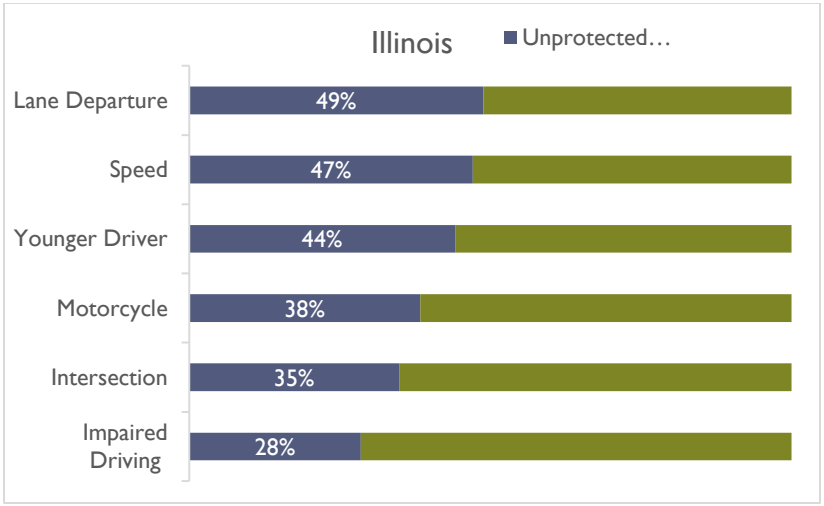
Unprotected Person

Unprotected person crashes are crashes that involve at least one person who was not using a safety restraint or protective device. These include seatbelts, child restraints, or helmets. Neglecting to use a safety restraint or protective device increases a person's exposure to severe injury. Tables 1 and 2 show that severe injury occurs in 2 – 3 percent of crashes. When there is an unprotected person involved, that jumps to 27 percent in Iowa and 17 percent in Illinois. This jump reveals a stark increase in the risk of injury or death by failing to buckle up or strap on a helmet.

Cross-area relationships in Figure 5 show that a large share—46 percent in Iowa and 38 percent in Illinois—of unprotected person crashes involved a motorcycle. That is a remarkably high share of severe injuries when compared to the percentage of the population who ride motorcycles. According to the ACS 5-year estimates for 2013 – 2017 for the Quad Cities, less than one percent of the population used a motorcycle for transportation to work. Admittedly this goes up when factoring in recreational purposes, but it does not come anywhere near 38 percent of road users. This highlights the vulnerability of motorcycle riders to severe injuries on our roads—especially when safety equipment is not used. Speed, intersections, and lane departure are also major factors in the area of unprotected persons. While improving safety in these related areas can improve safety for unprotected persons, using safety equipment is an easy step to take to make road travel safer. Everyone should wear a safety belt, and those traveling on two wheels should wear a helmet.

Figure 5: Unprotected person related emphasis areas





Unprotected Persons Strategies

Education campaigns are a valuable tool that should focus on awareness and the risks associated with failing to use safety restraints and devices. Law enforcement and EMS professionals should be included in these campaigns to drive home legal and personal health consequences of driving without seatbelts and proper child restraints. Community locations where instructions on safe installation and use of child restraints can be a great educational and community engagement opportunity for law enforcement and EMS personnel.

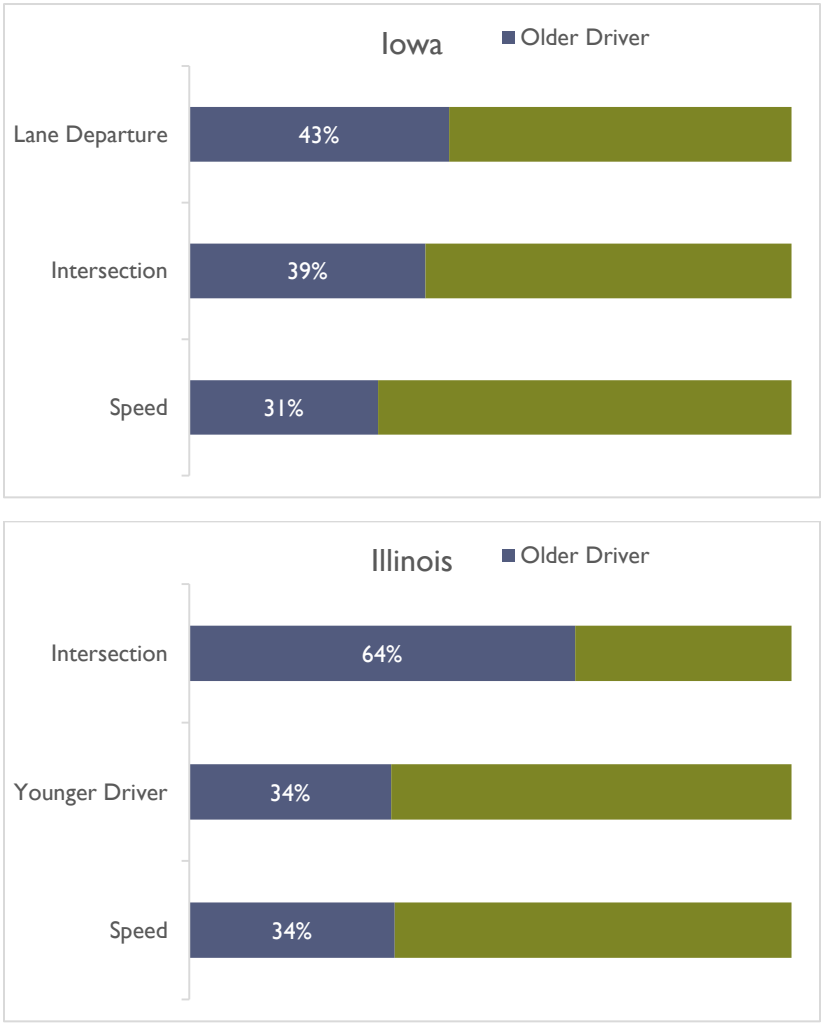
Education	• Conduct public awareness campaigns focused on generating awareness of the risks associated with unprotected persons. • Provide community locations for instruction in proper child restraint use and inspections, including both public safety agencies and health care providers. • Encourage the use of interactive educational tools. • Increase public awareness of consequences of non-usage (e.g. fines, injury, death). • Educate children, parents, and guardians on the importance of using seat belts. • Develop restraint-use awareness materials to distribute with impaired-driving information.
EMS	• Include medical professionals in educational efforts.
Enforcement	• Encourage employer programs that require seat belt use. • Improve restraint-usage data collection, integration, analysis, and sharing between agencies at all levels. • Conduct highly publicized enforcement campaigns focused on restraint use. • Increase enforcement for no seat belt use. • Pursue legislation for mandatory motorcycle helmet law.
Engineering	• Investigate opportunities to utilize technology to increase proper seat belt usage.

Older Drivers

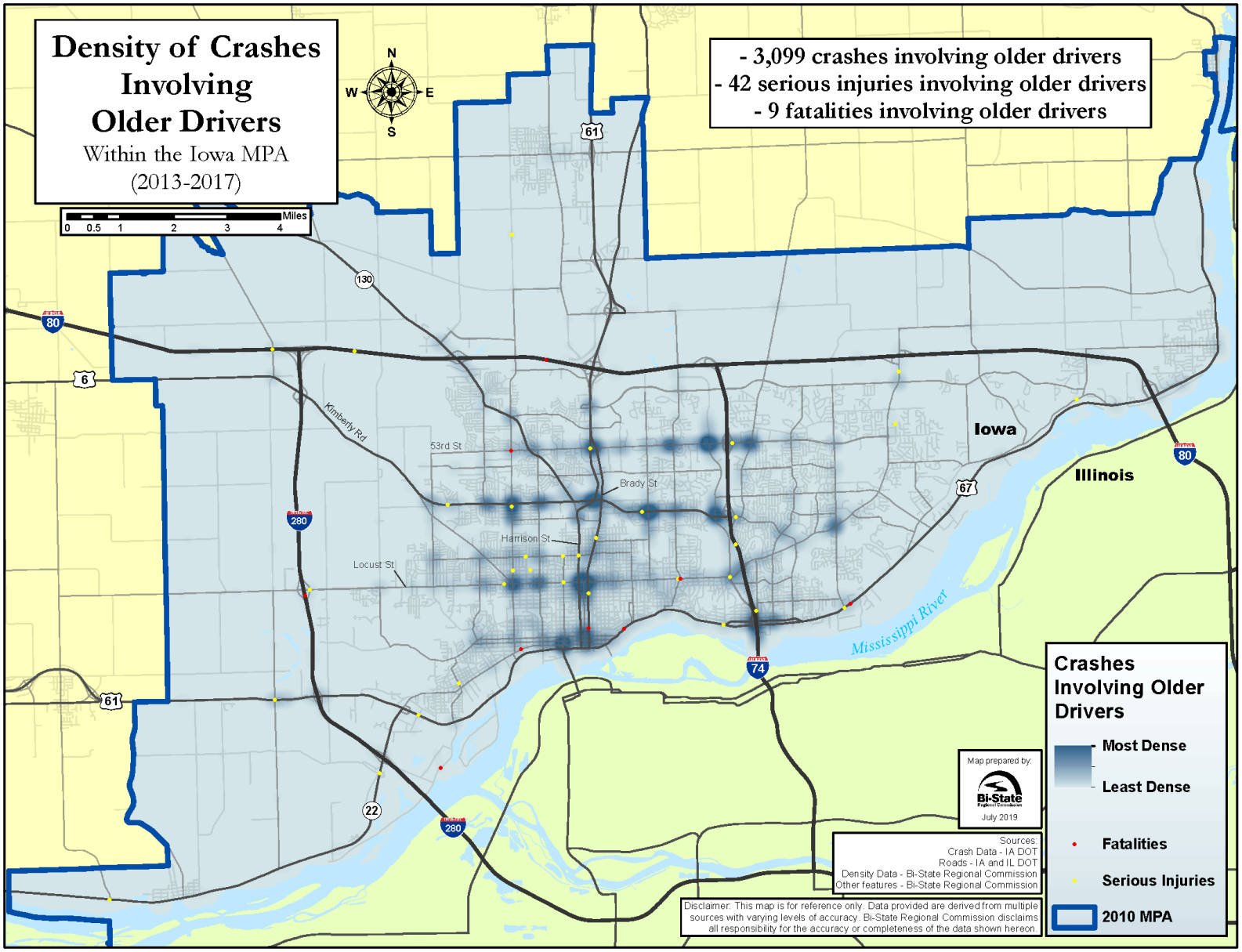
Aging means that physical conditions begin to decline, which affects the ability to safely operate a motor vehicle. Eye-sight can deteriorate, and reaction times can slow down. People can also become more susceptible to injury, and recovery can be difficult and take longer. These factors make it necessary for older drivers to be aware of both their safety as well as the risk they may pose to other road users. Older driver involved crashes are defined as any crash that involves at least one driver age 65 or older. While there are individuals in this age group who are in excellent physical shape and very capable drivers, on average, the issues mentioned previously affect this age group in varying degrees.

Intersections have already been well established as a contributor to traffic injuries in our area, but they really stand out when it comes to older drivers. As shown in the related emphasis areas in Figure 6, 64 percent of the older driver involved crashes in Illinois occurred at intersections. We can also see this in the densities shown in Maps 11 and 12. Major, high volume intersections stand out on both sides of the river as problem areas for older drivers. These intersections are mostly large, multi-lane intersections many with slightly higher speeds. Strategies that address speed, and intersection complexity may be helpful in addressing some of these safety issues. However, it's also very important to know when to put the keys down, or when to have a conversation with family members who may pose a hazard to others on the road.

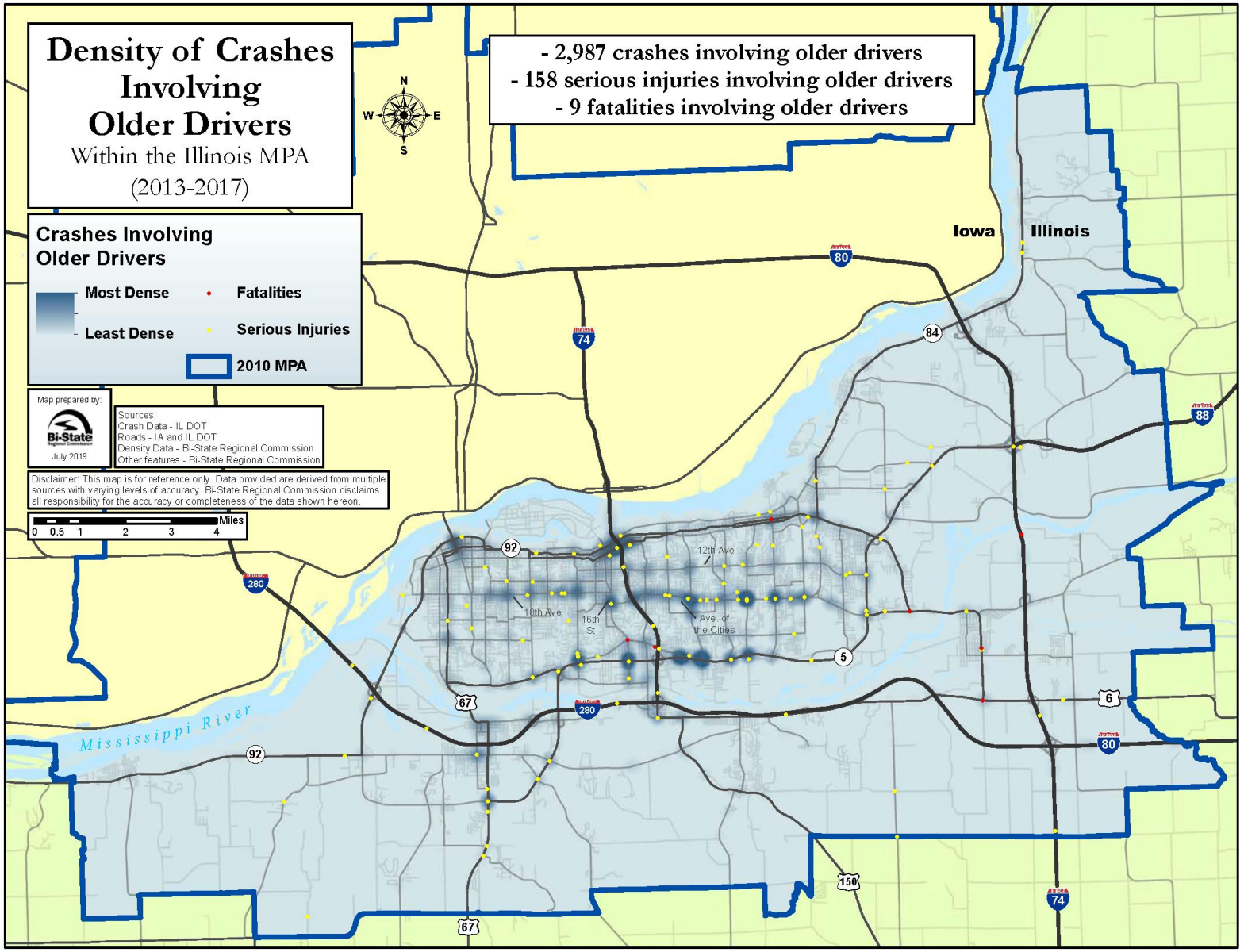
Figure 6: Older drivers related emphasis areas



Map 11: Density of Crashes Involving Older Drivers within the Iowa MPA



Map 12: Density of Crashes Involving Older Drivers within the Illinois MPA



Older Driver Strategies

Strategies to reduce serious injuries and fatalities in older driver involved crashes vary a great deal. Engineering has advanced both road and vehicle design a great deal since this demographic began driving. Many of these engineering solutions can be leveraged to enhance safety for seniors such as advanced warning systems both on the road and vehicles. Education needs to work with these solutions to ensure that older drivers are aware of them and know how to use them to promote their safety and the safety of others on the road. Education is also critical in helping families make plans for driving retirement including assessing alternative modes of transportation. EMS and law enforcement should be engaged in developing standards for medical and physical assessments for driver fitness.

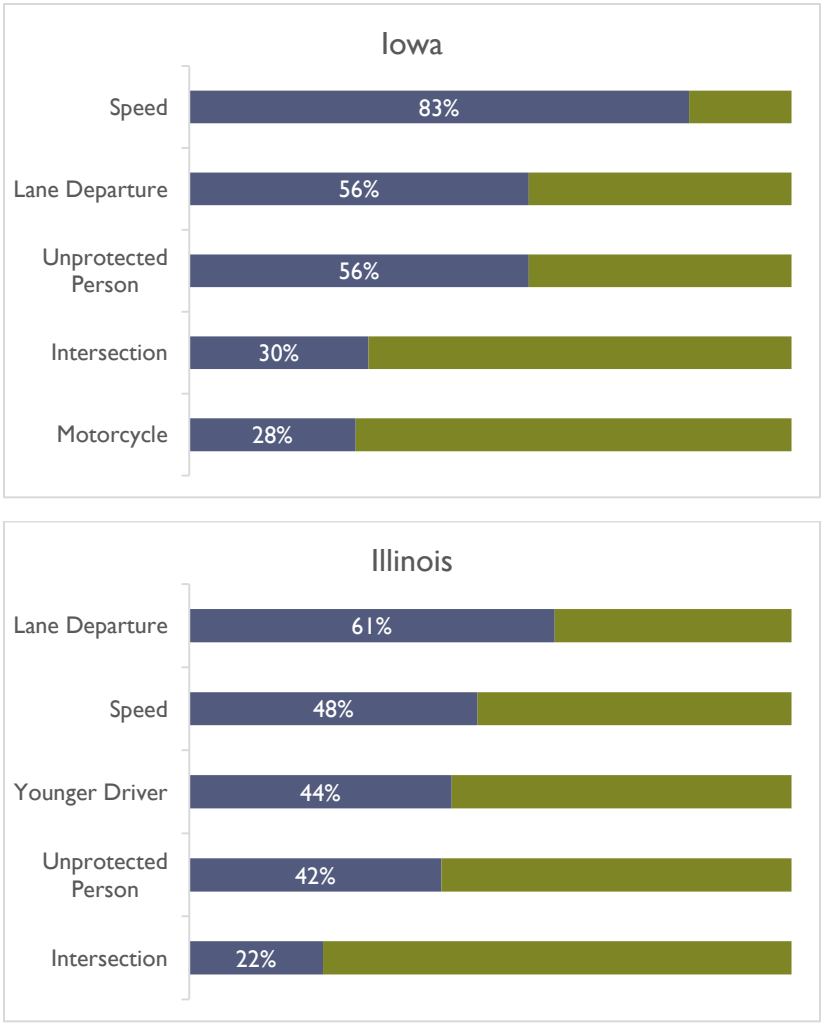
Education	• Support a broad-based coalition to plan for addressing age-based transportation needs • Provide educational and training opportunities for mature drivers that address driver safety, road engineering and signage, vehicle technology, driver licensing, health and vision concerns, and alternative transportation options. • Update publications and web resources for older drivers and their families to include safety strategies, warning signs, and planning for driving retirement. • Enhance informational resources and conduct outreach for older driver safety screening for family, friends, physicians, and law enforcement to report at-risk drivers. • Increase awareness about, and availability of, alternative transportation options. • Make older drivers aware of improved or enhanced technology and vehicle engineering. • Provide educational opportunities to the general older driver population and their families to assess capabilities, improve skills, and voluntarily limit driving to safe driving conditions. • Supplement older driver classroom education with one-on-one, behind the wheel instruction. • Review and enhance driver's license testing and renewal policies for at-risk older drivers. • Evaluate the need for safe driving course for older drivers emphasizing skill-specific training to sharpen driving skills.
EMS	• Strengthen the role of medical reviews in assessing the potential impairment of older drivers and recommending appropriate licensing actions, from restricted licenses to full revocation. • Update procedures for assessing medical fitness to drive.
Enforcement	• Promote/encourage mandatory reporting/referral of unsafe drivers to licensing for re-evaluation of driving skills. • Evaluate the need to expand the use of variable driver's license restrictions (e.g. high-speed roadways, night-time, geographic boundaries).
Engineering	• Provide clear advance warning, advance wayfinding, and street name signs. • Evaluate and improve the transportation system's ability to provide mobility for seniors who no longer drive to reduce the necessity of driving. • Consider enhanced technology and vehicle engineering to improve safety for older drivers.

Impaired Driving

Impaired driving crashes are any crashes where a driver or non-motorist involved in a crash are found to be under the influence of alcohol or drugs. Impairment is a factor in 28 percent of severe injuries in the Iowa Quad Cities and 18 percent of severe injuries in Illinois. This amounts to 45 fatalities and 166 serious injuries over the five-year period.

Driving impaired leads to other dangerous driving behaviors. Notably, driving at high speeds, which in turn increases the likelihood of a roadway departure crash. Because drivers are impaired, they also tend to neglect or forget to buckle up, which makes a high-speed roadway departure even more dangerous. Figure 7 shows these related emphasis areas with a remarkable 83 percent of impaired driver severe injuries in Iowa involving excessive speed. Because an impaired driver is much more likely to make poor decisions, its critical to make a plan before planning to drink. Designate a driver, call for a ride, or leave the car at home, but don't risk driving impaired.

Figure 7: Impaired driving related emphasis areas



Impaired Driving Strategies

Strategies to reduce the negative safety impacts of impaired driving really focuses on two phases: prevention and intervention. All implementation areas are necessary to engage in the prevention aspect. Enforcement, EMS, and Education should partner to reach out to the public to raise their awareness to the consequences of driving impaired that range from the obvious safety risks to the criminal implications of operating a vehicle under the influence. Engineering can work on technologies that reduce impaired driving by enabling individuals to have reliable self-assessments of their level of impairment before getting behind the wheel. Law enforcement is the primary responsible party for intervention through publicized OWI patrols and enforcement campaigns as well as monitoring sentences for offenses.

Education	• Educate drivers on the different types of impairments and their effects on driving. • Conduct public outreach on the mandatory use of ignition interlock for all DUI offenders to deter drinking and driving. • Expand education of the consequences of underage drinking to address these consequences.
EMS	• Provide a variety of initiatives to reduce excessive alcohol use and impaired driving within high school and collegiate settings. • Employ screening and brief interventions in healthcare settings.
Enforcement	• Publicize and enforce zero tolerance laws for drivers under age 21. • Develop and implement a standardized approach for law enforcement to identify impaired drivers. • Enhance detection through special OWI patrols and related traffic enforcement. • Enforce responsible beverage service policies and check compliance for alcohol servers and retailers. • Control hours, locations, and promotion of alcohol sales. • Expand high-visibility DUI enforcement saturations including roadside safety checks. • Strengthen and expand law enforcement training to promote effective alcohol and/or drug-impairment driving detection and arrest. • Expand training and technical assistance for law enforcement and prosecutors to implement DUI No-Refusal search warrant programs and processes in their communities. • Expand nighttime seat belt enforcement to detect unbelted drinking drivers. • Expand judicial education and outreach to promote the use of alcohol ignition interlock as well as highly supervised DUI and Drug Courts to monitor offenders. • Provide training, technical assistance, and support to those who prosecute DUI offenses. • Eliminate diversion programs and plea bargains to nonalcoholic offenses. • Continue to screen all convicted DUI offenders for alcohol problems and require treatment when appropriate.
Engineering	• Consider emerging technologies that will continue to reduce impaired driving. • Implement countermeasures at access locations to reduce wrong-way driving on multi-lane divided highways.

Vulnerable Road Users

To this point, emphasis areas that have high numbers of serious injuries and fatalities have been the focus. This section considers a different standard. Emphasis areas included here have lower numbers of crashes and severe injuries compared to other emphasis areas, but crashes are much more likely to result in a severe injury. Table 8 shows the severe crash rate for crashes involving pedestrians, bicycles, and motorcycles compared to the rate for all crashes. It shows 2 to 3 percent of all crashes result in a severe injury. Between 12 and 30 percent of crashes involving these emphasis areas result in serious injury or death in the Quad Cities. Because of the elevated risk pedestrians, and motor and pedal cyclists face in the event the are involved in a crash, strategies to avoid crashes for these groups are important in reducing severe traffic injuries.

Table 8: Vulnerable Road User Injuries

	Iowa			Illinois		
	Severe Crashes	Total Crashes	Severe Injury %	Severe Crashes	Total Crashes	Severe Injury %
Pedestrian	39	174	22%	38	137	28%
Bicycle	15	129	12%	20	122	16%
Motorcycle	65	322	20%	83	275	30%
All Crashes	285	18283	2%	517	16273	3%

Related emphasis areas

Cross-area relationships for vulnerable road user emphasis areas are shown in Table 9. The constant contributors of intersections, high speed, and unprotected person involved crashes are common to vulnerable road user crashes. Strategies that address these areas will help reduce severe injuries in the areas of vulnerable road users as well.

Table 9: Vulnerable road user cross-area relationships

		Emphasis Area					
		Iowa			Illinois		
		Motorcycle	Pedestrian	Bicycle	Motorcycle	Pedestrian	Bicycle
Cross-area Relationship	Intersection	**51%**	36%	**41%**	36%	22%	**60%**
	Speed	**49%**	24%	24%	**41%**	15%	0%
	Younger Driver	13%	10%	12%	26%	39%	30%
	Lane Departure	36%	12%	0%	37%	0%	0%
	Unprotected Person	**71%**	0%	24%	**73%**	12%	40%
	Older Driver	7%	12%	6%	16%	12%	**45%**
	Impaired Driving	35%	12%	18%	14%	20%	10%
	Motorcycle	0%	2%	0%	0%	5%	5%
	Distracted Driving	13%	10%	6%	7%	7%	0%
	Pedestrian	1%	0%	0%	2%	0%	0%
	Heavy Truck	0%	0%	6%	2%	10%	10%
	Winter Roads	0%	0%	6%	0%	2%	10%
	Bicycle	0%	0%	0%	1%	0%	0%
	Work Zone	3%	2%	0%	3%	0%	0%

Motorcycle Strategies

Motorcycle riders are exposed to the risk of more severe crashes with 20 to 30 percent of their crashes resulting severe injury. Over 70 percent of the severe injuries related to motorcycles involve someone who was not using safety equipment. A central piece of improving motorcycle safety is encouraging helmet use through both education and the pursuit of mandatory helmet laws. Engineering can also help improve motorcycle safety by improving roadway geometry and removing physical roadway conditions that may be hazardous to motorcycle riders such as irregular road surfaces or fixed roadside barriers.

Education	• Increase training opportunities for beginning, intermediate, and advanced motorcycle riders in Illinois through education campaigns. • Continue to implement motorcycle awareness public information and education campaigns. • Enhance rider training programs to improve motorcycle safety. • Increase awareness of the benefits of wearing a helmet and proper gear through educational campaigns.
EMS	• Involve EMS professionals helmet use educations and campaigns.
Enforcement	• Pursue legislation for mandatory motorcycle helmet law. • Develop and execute enforcement programs to improve equipment maintenance and reduce improper equipment usage.
Engineering	• Improve surface irregularities, unpaved shoulders, and unforgiving roadside conditions including barriers. • Enhance horizontal curves safety treatments to improve motorcycle safety.

Pedestrian Strategies

Intersections are meant to be the primary location where pedestrians interact with other roadway users. While 22 to 36 percent of pedestrian involved crashes occur at intersections, that leaves the vast majority occurring at locations where pedestrians were not expected to be crossing paths with vehicles. This creates a lot of space for improvement from a lot of different angles. Education campaigns that improve driver awareness of pedestrian right-of-way as well as pedestrian education can help reduce negative interactions between modes. Pedestrians may also be choosing to cross streets away from intersections and designed crossing locations because they are unavailable, burdensome to use, or fail to make pedestrians feel safe. Engineers can step in here to add and improve safe crossing locations where they are missing. Drivers and pedestrians both need to look out for one another on the roads.

Education	• Promote awareness and increase enforcement of existing laws regarding pedestrians' right-of-way. • Implement pedestrian programs and include outreach to schools, churches, and senior centers. • Participate in the national discussion on pedestrian safety. • Continue to improve driver education by incorporating components into licensure, including for CDLs.
Enforcement	• Increase equitable enforcement of existing laws that promote safety for pedestrians and other roadway users. • Increase enforcement for speeding and aggressive driving. • Consider opportunities to reduce speeds through automated enforcement. • Provide education, outreach, and training for all roadway users of the dangers of exiting their vehicle (disabled vehicle, crash, etc).
Engineering	• Evaluate and implement more lane narrowing and road diet measures where appropriate. • Provide sidewalks/walkways with curb ramps. • Install or upgrade traffic and pedestrian signals such as pedestrian countdown timers, pedestrian scramble, and pedestrian detectors. • Construct pedestrian corner and median refuge islands. • Evaluate and consider opportunities for access management or diverting vehicular traffic to nearby routes to avoid high pedestrian travel areas. • Provide grade separated facilities where appropriate. • Provide school route improvements. • Enhance crosswalks and sight lines to improve visibility of pedestrians (e.g. bump-outs). • Implement lighting/crosswalk illumination measures. • Provide signs, signals, and/or flashing beacons to alert motorists that pedestrians are crossing. • Encourage increases in state and local contributions for pedestrian facilities. • Provide guidance and criteria to assist state and local agencies in identifying effective countermeasures for application under specific roadway, traffic volume, and traffic speed conditions.

Bicycle Related Strategies

Bicycle related crashes—like nearly every emphasis area—frequently occur at intersections. This makes intersection strategies valuable in reducing injuries to cyclists. The vulnerability of cyclists in crashes makes it critical that education campaigns raise awareness about how cyclist should interact with other road users, but also promote the rights cyclist have as road users. Law enforcement needs to be proactive in equitable enforcement with an emphasis on safety for all users. Roadway designs that incorporate safety measures for cyclists can relieve conflicts between modes and reduce frustration road users from sharing the road.

Education	• Improve public awareness and enhance training to promote safer behavior by all roadway users relative to bicycle traffic. • Increase and enhance training programs and events for state and local planners, engineers, safety practitioners, and officials that are focused on best practices in bicycle facility design.
Enforcement	• Promote, research, and identify effective policies to improve bicycle safety that can be implemented by state and local governments. • Promote and fund state and local agencies and organizations to create projects with proper bicycle-motor vehicle interaction and cyclist initiatives. • Pilot and conduct equitable enforcement programs for all roadway users relative to bicycle traffic. • Increase driver and bicycle compliance with traffic laws. • Engage with bicycle safety committees/councils/groups. • Emphasize the presence and vulnerability of cyclists to all roadway users.
Engineering	• Consider the presence and vulnerability of cyclists in roadway designs. • Promote and conduct training for local agencies on innovative strategies and techniques for bicycle accommodation. • Evaluate and implement more lane narrowing and road diet measures where appropriate.

Other Emphasis Areas

Four emphasis areas considered in this report did not represent a large share of severe injuries in the Quad Cities. These are distracted driving, heavy trucks, winter roads, and work zones. While the severe injuries are low across these categories, they should not be ignored. Tables 3 and 4 show safety emphasis areas that are related to emphasis areas and strategies from common emphasis areas that can be used to make progress in these areas.

Distracted driving in particular presents a challenge in identifying when it is a contributor to crashes as it can be concealed by drivers from being documented and is likely a much greater contributor to crashes than the data shows. Everyone needs put in the effort to avoid distractions by not using phones and focusing on the road ahead.

Heavy truck severe injuries often involve high speed, and while the number of injuries in the Quad Cities is low, implementing strategies to reduce speeds can help in avoiding heavy truck crashes. Large trucks may have difficulty seeing other road users in some circumstances. People should stay alert and control speed around trucks to help avoid crashes and reduce severe injuries.

Winter roads can be hazardous because they can be unpredictable and cause drivers to lose control of their vehicles. Stopping times increase in slippery conditions and reduce the time drivers have to react to unexpected situations. This can lead to dangerous situations very quickly. Fortunately these conditions only happen for a short time each year and drivers can be prepared. People should slow down, plan ahead, and stay of the roads when conditions are bad.

Work zones often introduce unexpected lane changes and reduction in speed. These situations can become dangerous when drivers are inattentive and not expecting changes to traffic patterns to. Using advance warning as drivers approach work zones as well as publicizing significant construction activity can alert drivers to change their regular driving routines so they are prepared to reduce speeds and change lanes safely in construction zones. Everyone needs to stay alert on the road and moderate speeds to foster a safe traffic environment.