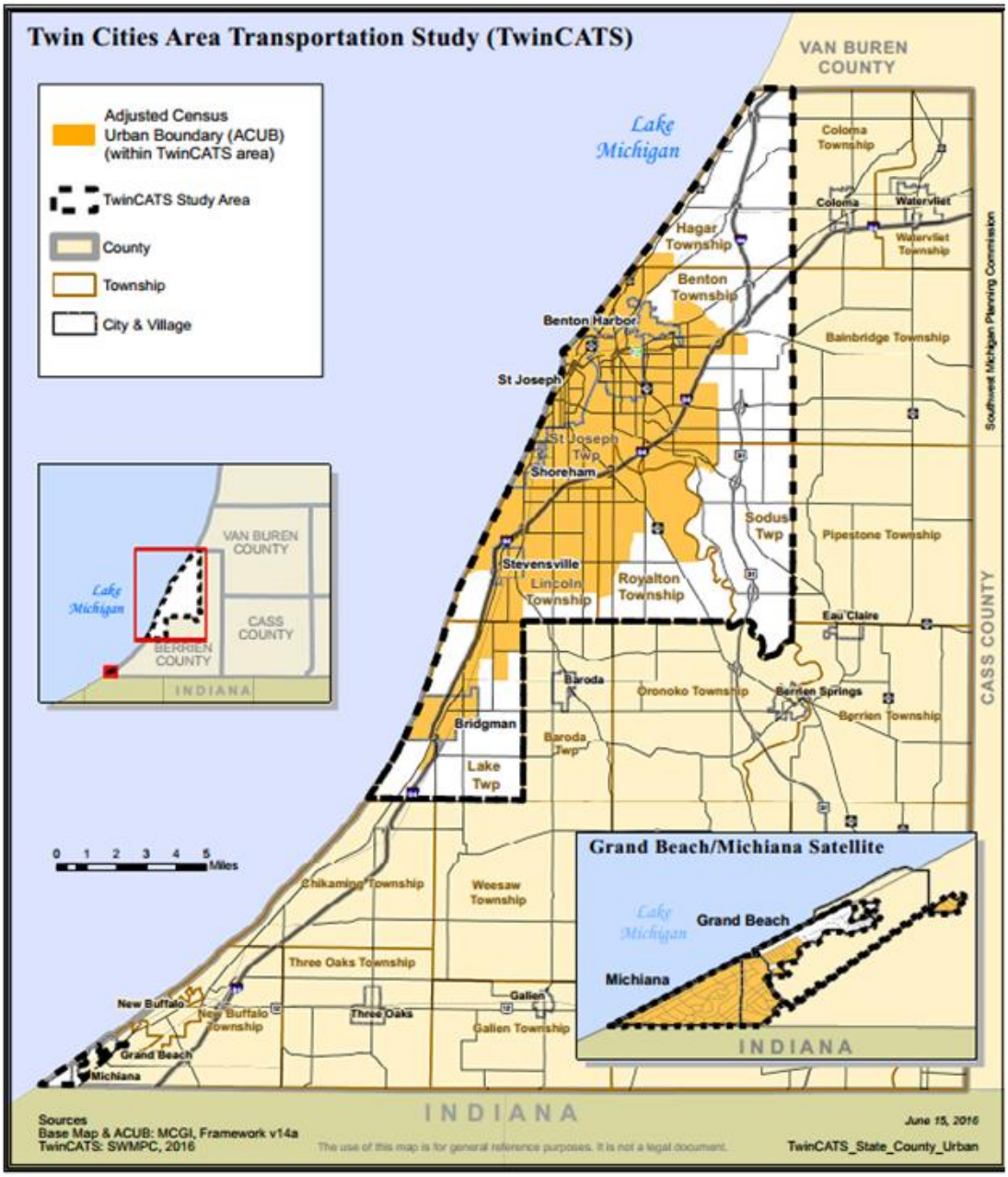
2006-2015 Traffic Safety Report

For The Twin Cities Area Transportation Study



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INTRODUCTION

In 2015 the National Highway Traffic Safety Administration (NHTSA) reported that more than 35,092 people were killed and 2.44 million were injured in crashes on the nation's roadways, making it the deadliest year on the road since 2008. The auto industry has made steady improvements in vehicle safety over the last few decades, which may have contributed to all –time low rate of crashes per Vehicle Miles Travelled (VMT) in 2014. Even with this low of crashes per VMT. motor vehicle crashes were the leading cause of death for individuals 11 years old and for age group 16-24 years old.

The consequences of traffic crashes are felt not only by those directly involved but also by family members, friends, and coworkers who must deal with a devastating loss or find resources to cope with disabling injuries. Beyond the pain and suffering of victims and their friends and relatives, these crashes are a significant economic burden to the U.S. The U.S. Department of Transportation's most recent estimate of the annual economic cost of crashes was $242 billion dollars. Years of experience with safety projects and strategies have shown that benefits far outweigh the resources consumed. The most critical safety benefit is in decreasing the number of fatal and serious injury crashes that occur each year.

Safety performance measures are key to ensuring that safety issues are considered and addressed throughout the transportation planning process. In 2016 the Federal Highway Administration (FHWA) published new Safety Performance Measures as a part of its national safety program, calling for state and regional targets to help reduce highway deaths and injuries, including for the first time, those people walking and bicycling.

The Safety Performance Measure final rule established five performance measures utilizing five year moving averages:

1. Number of Fatalities
2. Rate of Fatalities per 100 million Vehicle Miles Traveled (VMT)
3. Number of Serious Injuries
4. Rate of Serious Injuries
5. Number of Non-Motorized Fatalities and Non-Motorized Serious Injuries.

The Michigan Department of Transportation and the Twin City Area Transportation Study (TwinCATS) are now required to use the above performance measures as the primary mechanism to prioritize investments and demonstrate progress toward goals in statewide and metropolitan long-range transportation plans. In practice this means that while the total number of crashes and property damage are important factors, there is no requirement from FHWA to track that data.

This report focuses on safety in the TwinCATS planning area. The first step in safety planning is assessing where the TwinCATS MPO stands in relation to the performance measures. This report will give baseline data for the safety performance measures. It will assess the trends in safety and then identify the locations within TwinCATS where the crashes occurred. Unlike some MPO programs which are only concerned with roads which receive federal funding, this report includes crash data on all roads regardless of ownership or federal-aid status. Ten years of data (2006-2015) was used to analyze the baselines and trends in safety. The data was derived from U-D 10 reports from local and state law enforcement agencies. The U-D 10 report is used by law enforcement agencies to record the details of a crash scene including if there was a serious injury or a fatality. A serious injury is coded as an "A" in the U-D 10 report and defined as: *"Any injury, other than fatal, that prevents the injured person from walking, driving, or normally continuing the activities which he or she was capable of performing prior to the motor vehicle traffic crash. Includes: Severe lacerations, broken or distorted limbs, skull fracture, crushed chest, internal injuries, unconscious when taken from the crash scene, unable to leave crash scene without assistance."* Fatal crashes are coded as "K" on the U-D report. For the full explanation of UD-10 categories see Appendix. The UD-10s are compiled by the Michigan State Police and made available to Michigan Department of Transportation on an annual basis and posted online at *MichiganCrashFacts.org*.

OVERVIEW OF CRASHES IN TWINCATS PLANNING AREA 2006-2015

Over the ten-year period from 2006-2015 there were a total of 22,335 crashes, 100 fatalities and 478 serious injuries reported in the TwinCATS planning area (Table 1). This is for all crashes, which includes drivers, pedestrians, and bicyclists.

Table 1. Annual Total Crashes – TwinCATS Planning Area

Year	Total Crashes	Fatalities	Serious Injuries
2006	2,180	12	47
2007	2,439	12	77
2008	2,740	11	67
2009	2,306	5	36
2010	2,027	15	57
2011	2,015	9	32
2012	1,917	4	45
2013	2,150	16	44
2014	2,253	7	36
2015	2,308	9	37
Total	22,335	100	478

During the 10-year period, the highest number of crashes was reported in 2008 with 2,740 crashes while 2012 had the lowest number of crashes with 1,917 reported. This is high variability with a difference of 37 percent between the highest and lowest years.

Table 2 TwinCATS Crashes- Five Year Moving Average

Year	Total Crashes	Fatalities	Serious Injuries
2011	2305	10.4	53.8
2012	2201	8.8	47.4
2013	2083	9.8	42.8
2014	2072	10.2	42.8
2015	2129	9.0	38.8

In comparison to all crashes, serious and fatal crashes are relatively rare events, with only 2.6percent of all crashes being fatal or resulting in a serious injury. Due to the randomness of traffic crashes, it is likely that any one year could have a much higher or lower number of crashes than the typical year. A 5-yearr moving average normalizes crash data over a longer period than one year to account for annual anomalies that can skew analyses. Furthermore, the moving average smooths the data to more easily see the overall trends in variable data. The 5-year moving averages for total crashes, fatalities, and serious injuries are shown in Table 2. The moving averages constitute the typical crashes per year and is a baseline to be used to assess the effectiveness of safety improvements. While there is high annual variability in total crashes, the 5-year moving average seems to indicates a possible slight trend toward fewer crashes (Figure 1). Yet it is unclear if this is significant. This is due to the increase in crashes from 2012-2015, which indicates that crashes could be increasing in the future. With only 10 years of data and high variability per year, there is not enough data prove a significant trend.

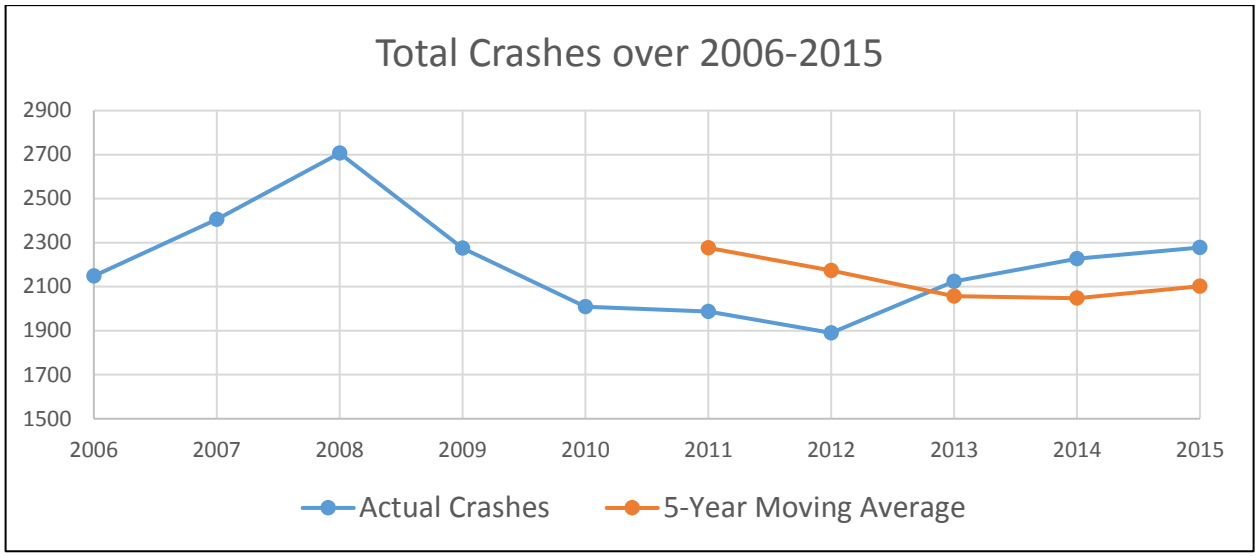


Figure 1. Annual Total Crashes & Five-Year Moving Average – TwinCATS Planning Area

There is also high variability in fatalities per year, with a high of 16 fatalities in 2013 and a low of 4 fatalities in 2012. (Figure 2). The 5-year moving average of fatalities does not indicate any trend. Serious injuries also show large variation per year, going from a high of 77 serious injuries in 2007 down a low of 32 serious injuries in 2011. However, the five year moving average indicates a clear downward trend in serious injuries.

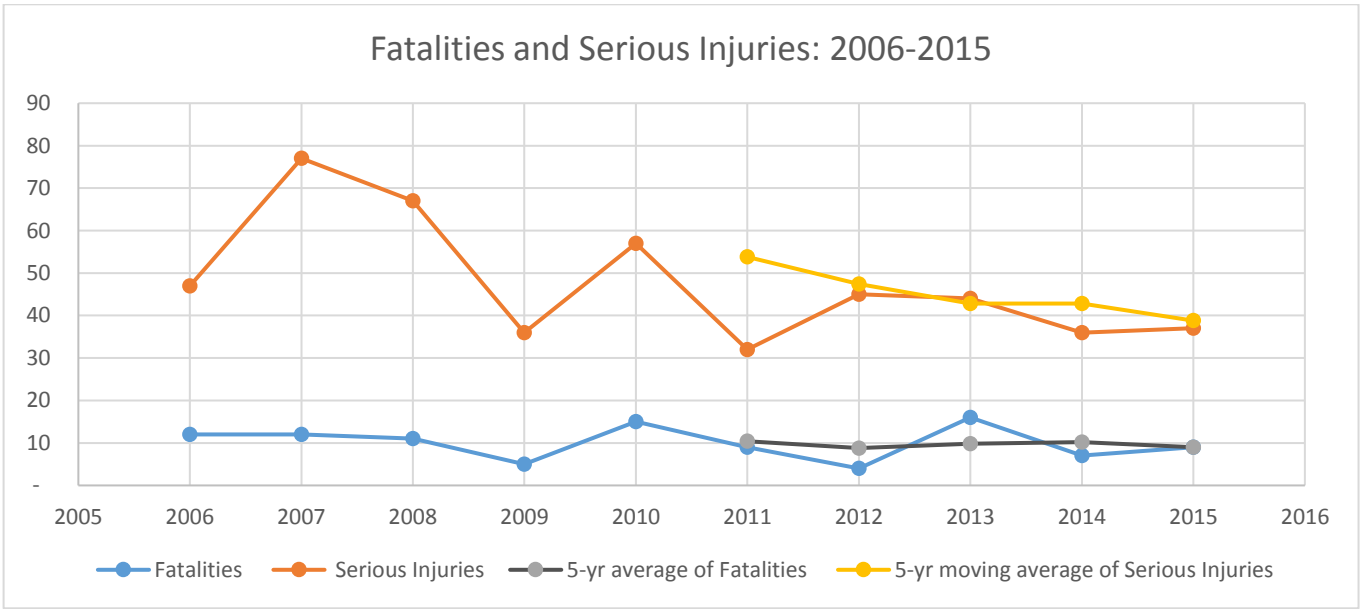


Figure 2. Annual fatalities & serious Injuries with 5-year moving average – TwinCATS Planning Area

To further assess trends within the TwinCATS area it is helpful to compare the local trends to the statewide trends. While TwinCATS doesn't track perfectly with the state data, there is a correlation (Figure 3). In 9 out of 10 years, when there was an increase in fatalities in the state, there was a increase in fatalities in TwinCATS. Similarly, when there was a decrease in TwinCATS, there was a decrease in statewide fatalities. Only in 2012 did the number of fatalities fall in TwinCATS but rise for the state of Michigan. This indicates that the same factors which are causing changes in fatalities statewide are likely also be affecting the TwinCATS area as well.

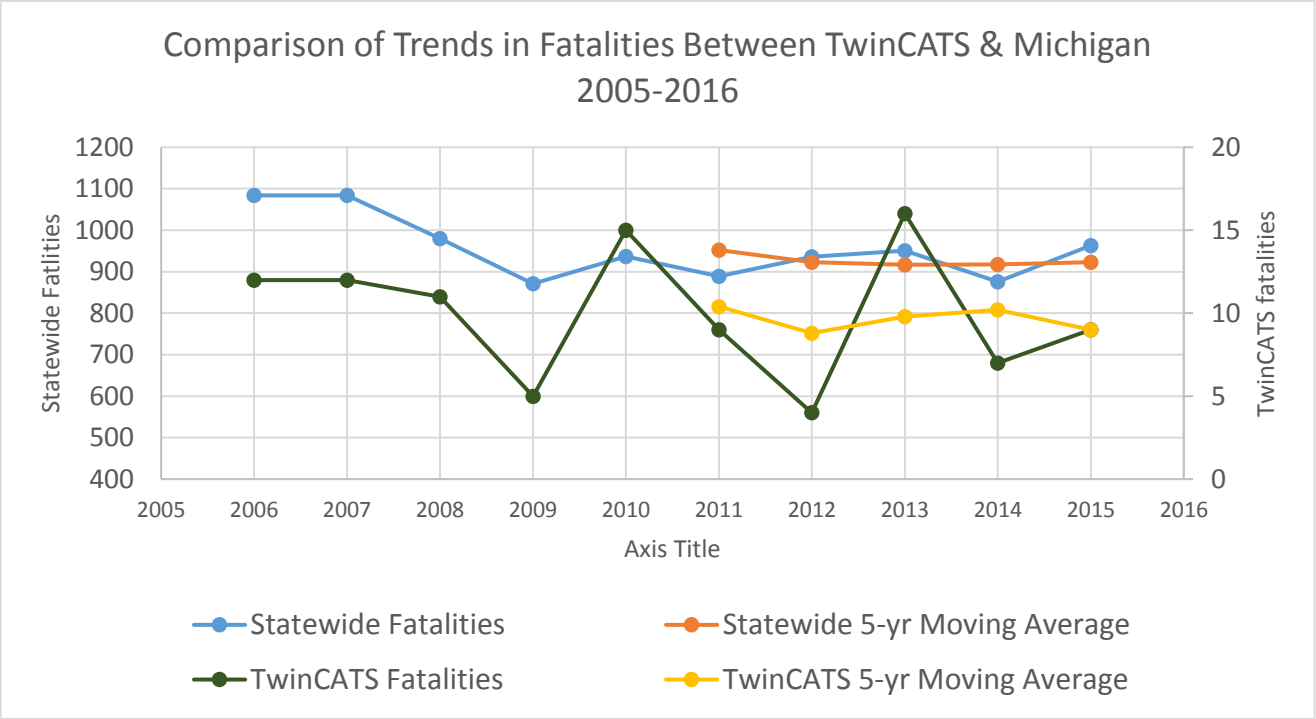


Figure 3. Comparison between TwinCATS and Statewide Trends in Fatalities

Trends in serious Injuries between Michigan and TwinCATS are even more closely related than those for fatalities (Figure 4). While there is more variability in the TwinCATS planning area, the 5-year moving average shows a similar downward trend in serious injuries between the state and TwinCATS.

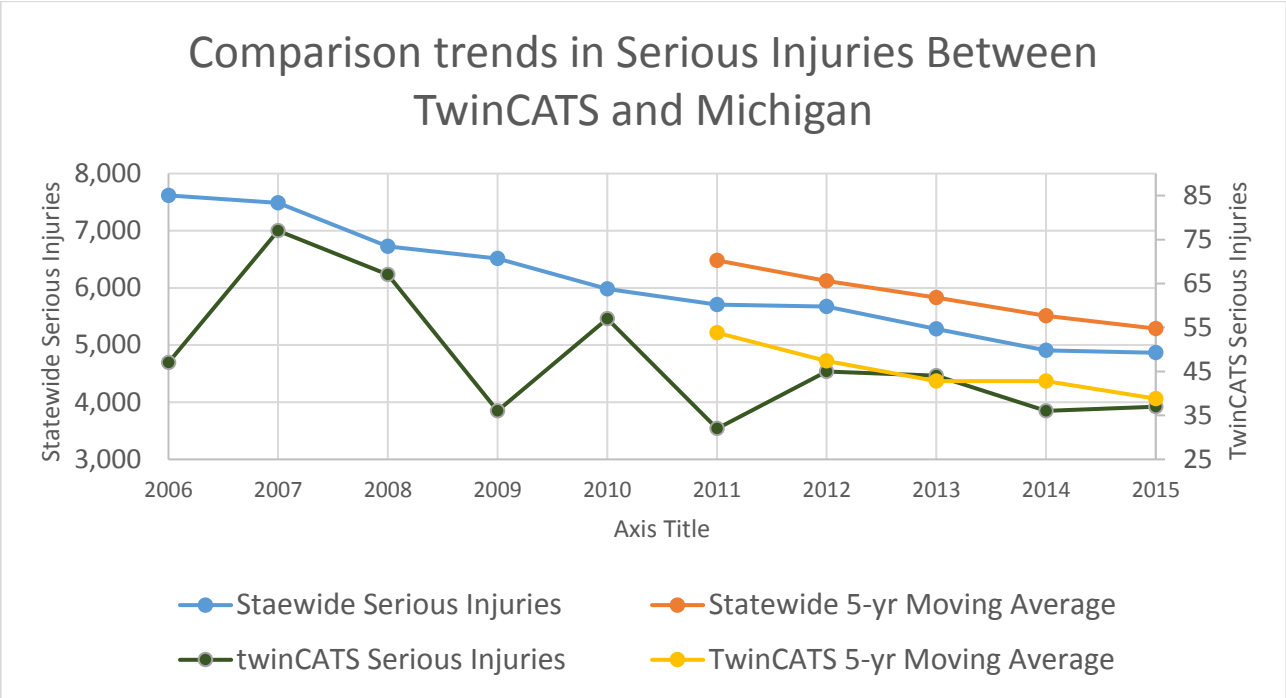


Figure 4. Comparison Between TwinCATS and Statewide Trends in Serious Injuries

NON MOTORIZED CRASH ANALYSIS

Non-motorized crashes consist of a crash which involves a pedestrian or cyclists. these crashes make up a

Between 2006-2015 out of a total of 22,335 crashes, there were a total of 321 non-motorized crashes; 186 of which involved pedestrian and 135 of which involved bicyclists (table 3).

Table 3. Annual Pedestrian & Bicycle crashes

Year	Total Crashes	Pedestrian	Bicyclist	Total Non-Motorized Crashes
2006	2,180	26	12	38
2007	2,439	17	11	28
2008	2,740	19	18	37
2009	2,306	13	15	28
2010	2,027	19	12	31
2011	2,015	21	18	39
2012	1,917	17	14	31
2013	2,150	19	11	30
2014	2,253	17	11	28
2015	2,308	18	13	31
Total	22,335	186	135	321

Over the 10-year period, 14 pedestrians and 3 bicyclists were killed. Over the same period, 42 pedestrians and 15 bicyclists received serious injuries (table 4). On average 5 percent of non-motorized crashes result in a fatality and 17 percent in a serious injury; this is compared to a fatality rate for automobile accidents of about 0.5 percent and a serious injury rate of about 2 percent. This indicates how much more vulnerable pedestrians and bicyclists are to injury when struck by an automobile. Furthermore, out of the 100 total fatalities, 17 were pedestrians or bicyclists. This means that while total number of non-motorized crashes may seem low, the number and likelihood of fatalities in non-motorized crashes is significant.

Table 4. Annual Pedestrian & Bicyclist Fatalities & Serious Injuries

	Pedestrian		Bicyclist	
Year	**Fatalities**	**Serious Injuries**	**Fatalities**	**Serious Injuries**
2006	1	6		
2007	1	2	1	2
2008	1	6		3
2009	2	3		1
2010	3	7		
2011	1	3		4
2012		5		1
2013	2	3	1	
2014	1	2		2
2015	2	5	1	2
Total	14	42	3	15

The 5-year moving average for non-motorized fatalities and non-motorized serious injuries is show in Table 5. The safety performance measure asks for the total number of non-motorized fatalities and serious Injuries. The baseline data in table 5 will be a primary tool for measuring the effectiveness of pedestrian and bicycle safety improvements.

Table 5. 5-year Moving Average for Non-Motorized Fatalities & Serious Injuries

	Pedestrian		Bicyclist		Non-Motorized Total
Year	Fatalities	Serious Injuries	Fatalities	Serious Injuries	Fatalities & Serious Injuries
2011	1.6	4.2	0	2	8
2012	1.4	4.8	0	1.8	8
2013	1.6	4.2	0.2	1.2	7.2
2014	1.4	4	0.2	1.4	7
2015	1.2	3.6	0.4	1.8	7

As show in Figure 5, both TwinCATS and the state have a slight downward trend in non-motorized fatalities and serious injuries.

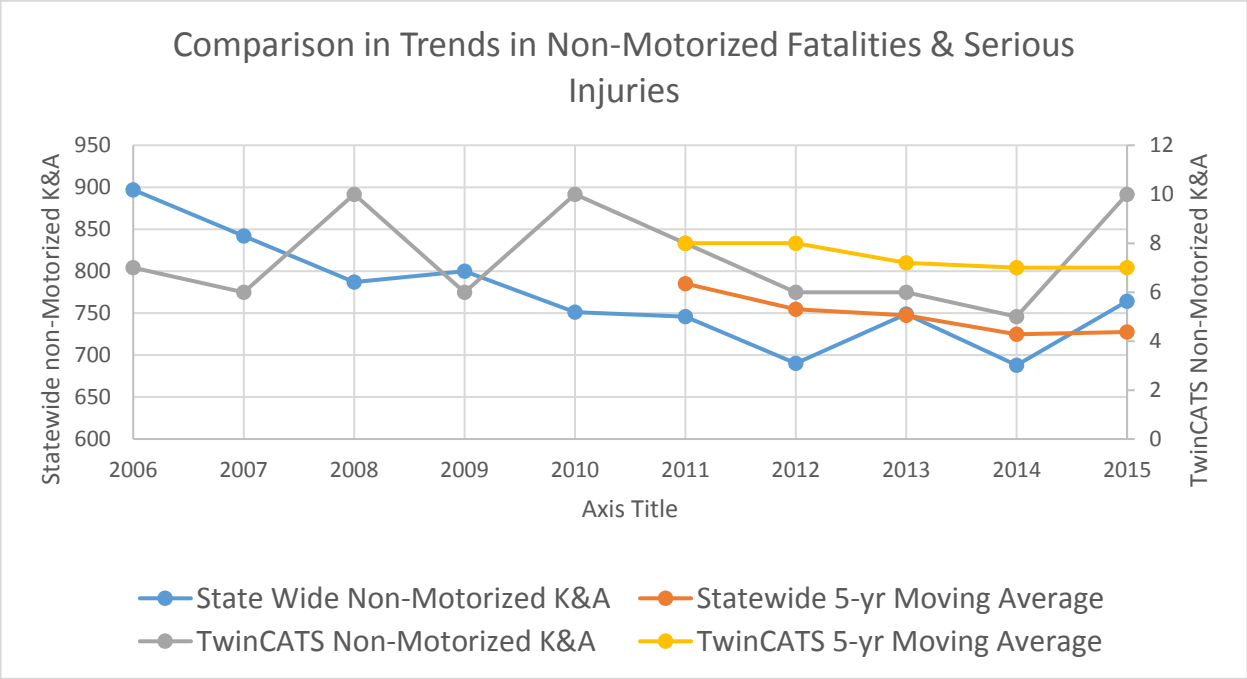
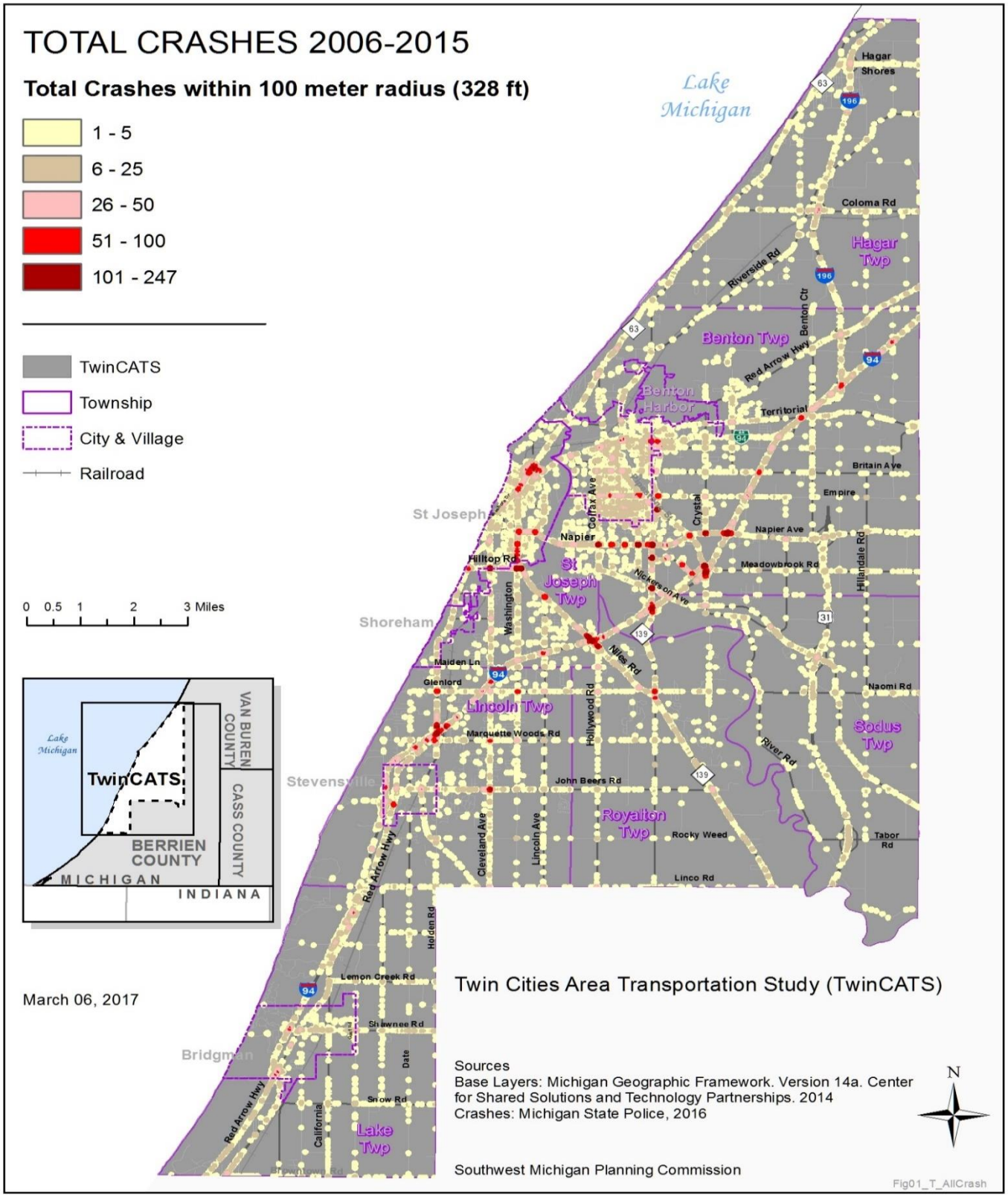


Figure 5. Comparison Between TwinCATS and Statewide Trends in Non-Motorized Fatalities & Serious Injuries

CRASH LOCATIONS

The location of all crashes within TwinCATS were aggregated within 100-meter radius (map 1). The highest concentration of crashes is grouped into 101-247 crashes. These high concentration of crashes occurred near each exit along I-94. In addition, high densities of crashes occur along Napier Avenue between Niles Avenue and I-94 exit, M-139, and Cleveland Ave. Overall, the City of St Joseph, City of Benton Harbor, and Benton Charter Township have the highest concentration of accidents. To look at the density of accidents in more detail, the data was analyzed by road segment and intersection (Table 6 and Table 7).



Map 1. Total Crashes in TwinCATS Planning Area 2006-2015

The top tesn segments with the most crashes is show in Table 6. The segments are the default segments from MDOT's road file, with segments beginning and amending at intersections, jurisdictional boundaries, and bridges/overpasses. The Table ranks segments by the total number of crashes, without taking into account the number of fatalities or serious injuries. The top 5 highest segments are all within Benton Charter Township close to the retail area around M-139, Pipestone and Napier Ave.

Table 6. Road Segments with the Most Crashes 2006-2016

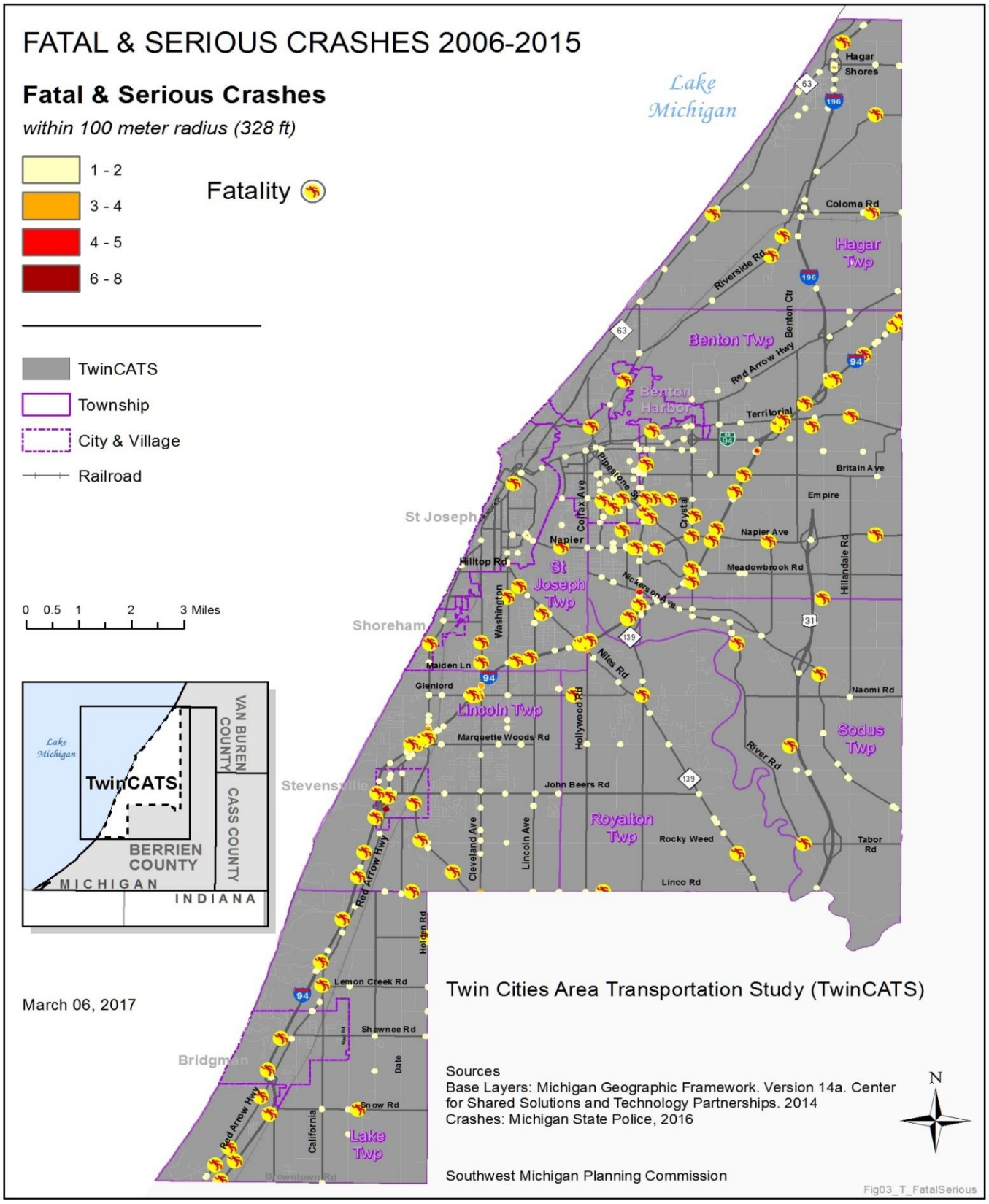
Road	From	To	Jurisdiction	Crashes 2006-2015
M-139	Fairplain Dr	E Napier Ave	Benton Twp	147
Mall Dr	Cinema Way	Pipestone Rd	Benton Twp	128
Mall Dr	Mall Place	Cinema Way	Benton Twp	110
E Napier Ave	Ogden Ave	Union St	Benton Twp	108
M-139	City of Benton Harbor	Nickerson Ave	Benton Twp	101
Hilltop Rd	S Cleveland Ave	Lakeview Ave	St Joseph	101
E I 94	Red Arrow Hwy (exit 23)	Roosevelt Rd	Lincoln Twp	94
Hilltop Rd	Washington Ave	Niles Rd	St Joseph Twp	88
E Napier Ave	Union St	Milton St	Benton Twp	85
Niles Rd	Riverfront Path	Lincoln Ave	St Joseph Twp	77

The total number of crashes within 350 feet of the intersection is shown in Table 7. Similar to the road segment ranking the 5 highest crash intersections are within Benton Charter Township. Furthermore, 4 of the top 10 highest crash intersections are on M-139 at every major intersection from Nickerson Ave to Pipestone St.

Table 7. Intersections with the Most Crashes 2006-2015

Intersection	Jurisdiction	Number of Crashes 2006-2015
M-139 & Napier Ave	Benton Twp	213
Pipestone Rd & Mall Dr	Benton Twp	189
M-139 & Nickerson	Benton Twp	184
M-139 Pipestone Rd	Benton Twp	160
M-139 & Fairplain Dr	Benton Twp	156
Hilltop Rd & S Cleveland Ave	St Joseph	155
E Napier Ave & Union St	Benton Twp	144
Niles Rd & W I 94/Niles RAMP	St Joseph Twp	140
Washington Ave & Hilltop Rd	St Joseph Twp	139
Main St & Ship St	St Joseph	129

Map 2 shows where the serious crashes occurred. While some of the locations with the highest total crashes also have fatalities and serious injuries, there are locations with a high total crashes but few fatalities or serious injuries. This is mainly due to the speed of vehicle. Roads with lower speeds are less likely to have crashes with fatalities or serious injuries. Most jurisdictions have only a few fatalities or serious injuries per year (Table 8 & Table 9). Benton Charter Township stands out with the highest number of fatalities and serious injuries with 35 percent of all fatalities within the TwinCATS area occurring there and 31 percent of serious injuries occurring there. This is not surprising since a majority of the top 10 highest crash locations are located in Benton Charter Township. Although the exact amount of miles traveled isn't known for each jurisdiction, Benton Charter ownship is among of highest traveled jurisdictions within the TwinCATS planning area.



Map 2. Fatal and Serious Injury Crashes 2006-2015 TwinCATS Planning Area

Table 8. Annual Fatalities by TwinCATS Jurisdictions

Location	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Benton Harbor			1			1		1	1		**4**
Benton Twp	7	5	1	1	5	3	3	4	3	3	**35**
Bridgman	1				1	1					**3**
Grand Beach											**0**
Hagar Twp	1	1		1			1	1		1	**6**
Lake Twp	1	1		1	5			1		2	**11**
Lincoln Twp	1	2	4	1		2		5			**15**
Michiana											**0**
Royalton Twp			1	1				2		1	**5**
Shoreham								1			**1**
Sodus Twp		1	1		1				2	1	**6**
St Joseph										1	**1**
St Joseph Twp		2	2		3	1		1	1		**10**
Stevensville	1		1			1					**3**

Table 9. Annual Serious Injuries by TwinCATS Jurisdictions

Location	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	total
Benton Harbor	*5*	*2*	*4*	*7*	*4*		*3*	*4*		*4*	***33***
Benton Twp	13	24	23	5	22	7	8	19	19	8	**148**
Bridgman	1	1		2		6					**10**
Grand Beach	1										**1**
Hagar Twp		13	6	2	5	4	3	5	3	2	**43**
Lake Twp	2	9	6	1	5	1	7	3		3	**37**
Lincoln Twp	12	15	13	5	10	7	10	7	3	9	**91**
Michiana											**0**
Royalton Twp	2	4	3	3	6	3	1		1	1	**24**
Shoreham							4	1			**5**
Sodus Twp	4	8	8	5	4	2	1	1		1	**34**
St Joseph	2			2	1	1	1	1	3	2	**13**
St Joseph Twp	1	1	3			1	4	1	5	6	**22**
Stevensville	4		1	4			3	2	2	1	**17**

To further explain the crash locations, Figure 6 breaks down fatalities by the type of roads within the TwinCATS area while Figure 7 breaks down serious injuries by road type. TwinCATS contains 860 centerline miles of road which have been broken down into the following categories: “Interstate”, “US-31”, “Other MDOT Roads”, “Locally Controlled Federal-Aid roads”, and “Locally “Controlled non-Federal Aid Roads”. MDOT controls 145 centerline miles of roads (MDOT Controlled Roads are called trunkline) within TwinCATS, which includes I-94, I-I96, US-31, BL 94, M-139, M-63, and portions of Red Arrow Highway and Napier Ave (from US 31 to I-94). Between 2006-2015, 34 percent, of fatalities, have been on the interstate (I-94 or I-196). This is not surprising, since the key determination of whether a crash will be fatal is the speed of the impact. The interstate also had 24 percent of all serious injuries. The only other divided Freeway is US-31 witch did not have any fatalities and only three serious injuries. Over the studies 10-year period 12 percent of fatalities and 22 percent of serious injuries occurred on the other MDOT controlled roads. This is significant because, altogether 46 percent of fatalities and 47 percent of serious injuries occurred on non-locally controlled roads.

Outside of MDOT’s trunkline, the remaining 715 miles of roads are controlled by cities, villages, or the Berrien County Road Commission. Of these roads, 236 miles are eligible for federal aid. Between 2006-2015, 40 percent of fatalities and 37 percent of serious injuries occurred on locally controlled federal aid eligible roads. This indicates that there could be a significant improvement in safety overall if the federal funds allocated to TwinCATS were used for safety improvements. Within TwinCATS there are 479 miles of locally controlled roads not eligible for federal aid. Only 14 percent of fatalities and 16 percent of serious injuries occurred on non-federal aid eligible roads. Non-federal aid eligible roads tend to have less traffic and lower speeds explaining why they have less serious accidents than federal aid eligible roads.

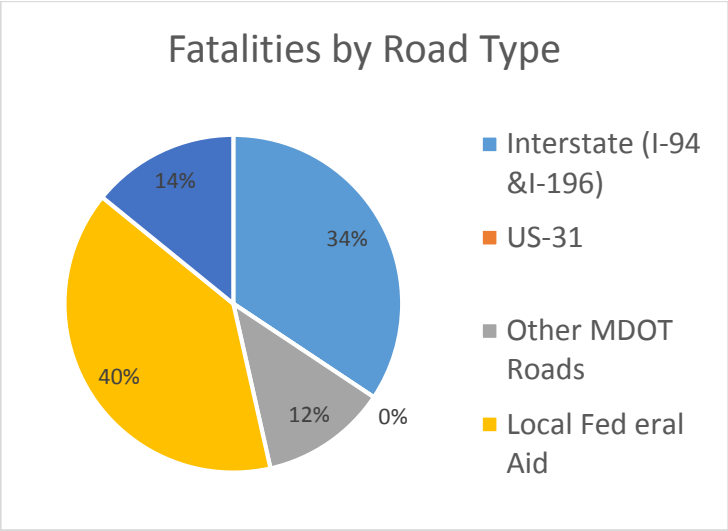


Figure 6. Fatalities by Road Type 2006-2015

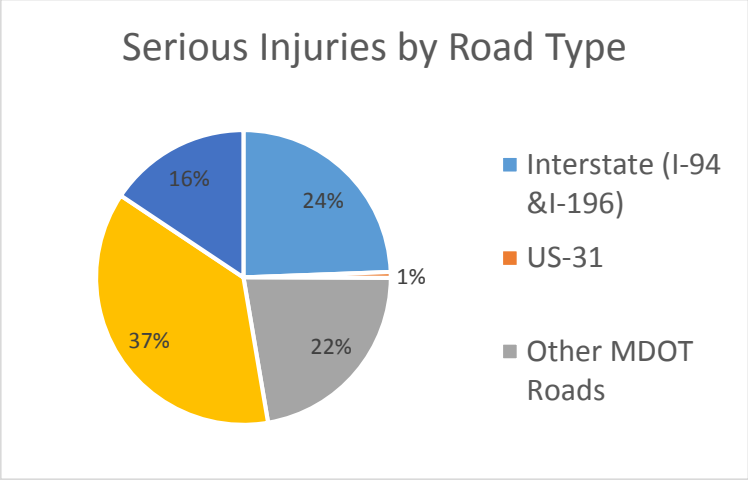
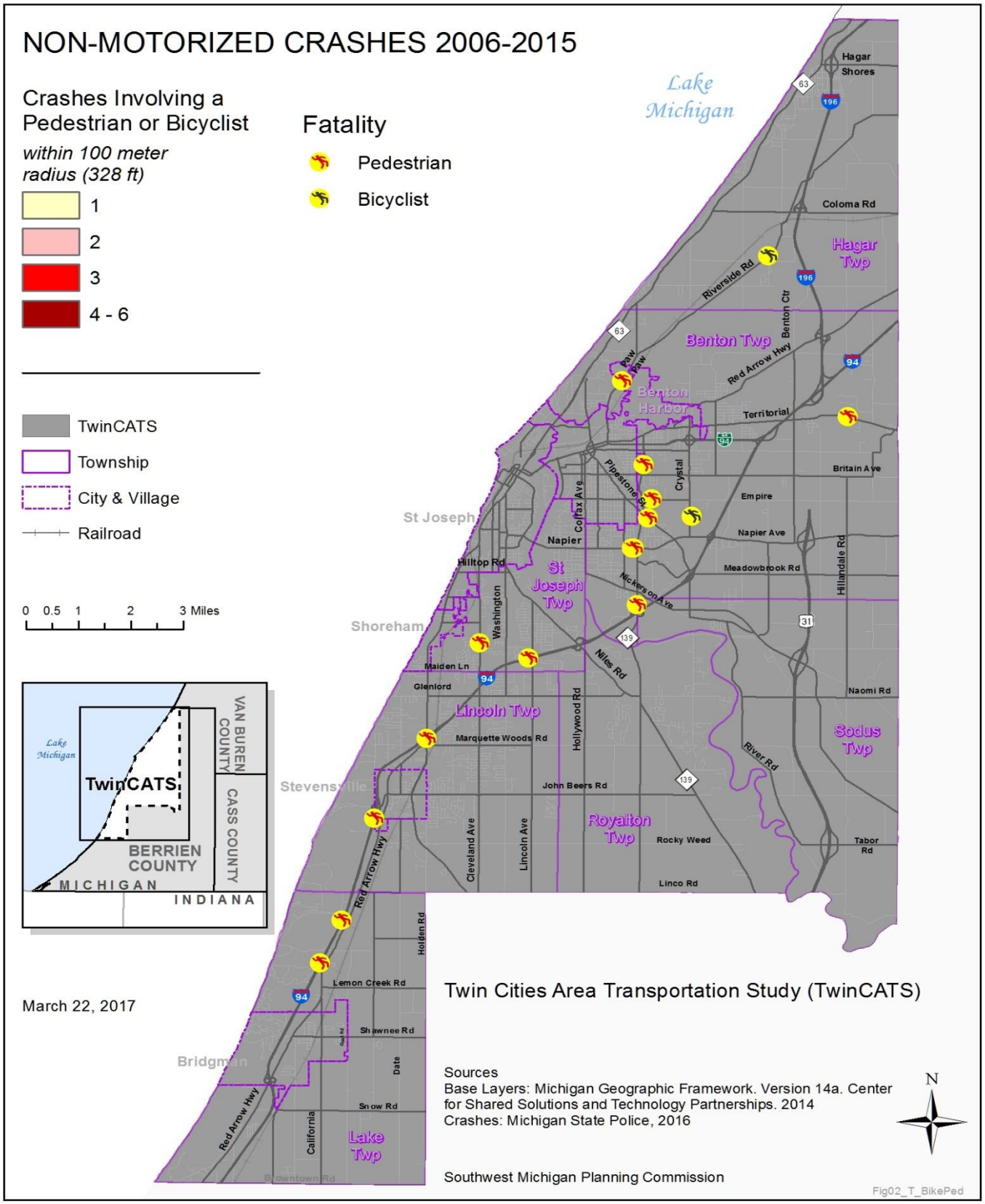


Figure 7. Serious Injuries by Road Type 2006-2015

NON-MOTORIZED CRASH LOCATIONS

The locations of pedestrian and bicycle crashes was aggregated into a density map based on the number of crashes within 100 meters (328 ft.) of each other. The highest density of non-motorized crashes was being 4-6 non-motorized crashes in 10 years. Many of the same locations which have high total crashes are also place with high non-motorized crashes.



Map 3. Non-Motorized Crashes 2006-2015 TwinCATS Planning Area

Identifying which roads have had the most non-motorized crashes is necessary to help target safety improvements. the top 10 roads with the most non-motorized crashes overall are shown in Table 10. I-94 is an outlier because there were total of 10 pedestrian crashes, and 9 of them were either fatal or led to a serious injury. It is unknown why Pedestrians were on I-94. The road with the most non-motorized crashes and the second most serious injuries is Napier Ave.

Table 10. Roads with the Most Non-Motorized Crashes 2006-2015

Road Name	Non-motorized Crashes	Fatalities & Serious Injuries
Napier	19	6
Empire	13	3
Main	11	2
Pipestone	11	2
I-94	10	9
Crystal	10	5
Broadway	9	3
Niles	8	2
Ogden	8	2
Lakeshore	8	1

By Jurisdiction Benton Charter Township had the most non-motorized crashes (Figure1). In addition, with 9 fatalities, Benton Charter Township has slightly more than half of all non-motorized fatalities. The City of Benton Harbor also has a high number of non-motorized crashes, but these are less serious, with no fatalities in 10 years.

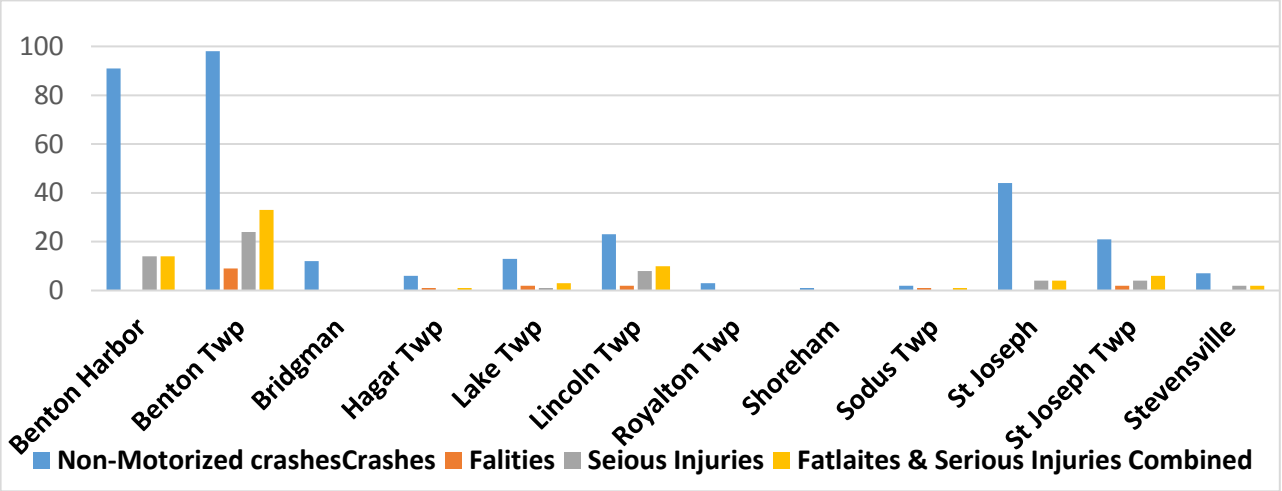


Figure 8. Non-Motorized Crashes by Jurisdiction

CRASH RATES

To make comparisons between TwinCATS and other areas the rate of fatalities per 100 million VMT and serious injuries per 100 million VMT Is used. The Vehicle Miles Travelled, or VMT, is the annual total miles driven in a particular area. Currently VMT is categorized by state, county, or urbanized area. VMT for just the TwinCATS planning area is not available. Therefore, crash rates are being reported based on the Benton Harbor-St. Joseph Urbanized Area (The TwinCATS planning area includes the entire urbanized area as well as un-urbanized portions of jurisdictions which contain some urbanized area and some non-urbanized are (see map 5 in the appendix). Furthermore, VMT is only available for 2011-2015. Therefore, while total crashes are being reported for a 10-year period, the crash rates are only for a 5-year period. Consequently, there will only be a single 5-year average. Table 12 below shows the VMT, fatalities, and Serious injuries in the Benton Harbor-St. Joseph Urbanized Area.

Table 11. VMT, Fatalities, and Serious Injuries in the Benton Harbor-St. Joseph Urbanized Area

Year	VMT	Fatalities	Serious Injuries
2011	711,197,427	8	24
2012	703,222,943	3	32
2013	724,719,326	12	35
2014	784,502,895	5	29
2015	756,114,619	5	30

The fatality rate constitutes the fatalities divided by the VMT then multiplied by 100 million (Table 13). As can be seen by the variability in crash rates, changes in VMT alone cannot predict fatalities or serious injuries. In fact, despite VMT decreasing between 2014 and 2015 the fatality rate and serious injury rate increased.

Table 12. Crash Rate per 100 Million VMT- Benton-Harbor St. Joseph urbanized Area

Year	Fatality Rate	Serious Injury Rate
2011	1.12	3.37
2012	0.43	4.55
2013	1.66	4.83
2014	0.64	3.70
2015	0.66	3.97
2015 5-year average	.90	4.08

Using the 5-year average, the fatality rate and Serous Injury for the Benton Harbor urbanized area can be compared the state and national fatality rates. By this comparison, the Benton Harbor urbanized area has a lower fatality rate than both the state and the U.S. The U.S. has records for injuries per year but does not differentiate out serious injuries. Furthermore, other states may measure crashes differently than Michigan. The FHWA performance measures are intended to make it easier to make national comparisons between different areas in the future.

Table 13. Comparison in fatality Rate between TwinCATS, Michigan & U.S.

	Twin CATS	State	U.S.
Fatality Rate	0.90	0.96	1.11
Serious Injury Rate	4.08	5.5	-

CONCLUSION

This report has given baseline data of crashes and identified the locations where crashes are concentrated. This report does not indicate the specific causes of crashes but gives an indication of which locations may warrant further study. Safety improvements can include education, enforcement, signage or changing road design. Future safety analysis is needed to determine what mix of methods would provide the best results. The next phase for safety planning is to assess the resources available for safety investments and determine out how best to target those resources to improve the performance measures. These resources include funding sources which can be used for safety improvements, as well as technical expertise available to do further analysis.

The Michigan Department of Transportation will be setting targets for the safety performance measures. To meet these targets TwinCATS will have to do it share to ensure safety improvements. Safety performance measures are the benchmark that will be used to evaluate progress. After any safety improvement is made the assessment of it will include evaluating if the number of fatalities and the number of serious injuries decreased within TwinCATS. The fatalities rate per 100 million VMT and serious injuries per 100 million VMT, will be used for making comparisons with other areas. This will assess if safety within TwinCATS is getting comparatively better or worse compared to peer region, the state and the nation.

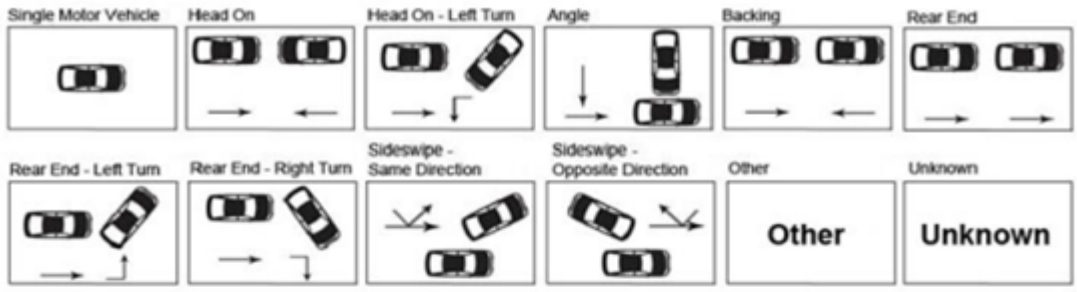
Currently the fatality rate for the urbanized area is lower than both the state and national rates. Furthermore, between 2006-2015, the trends in crashes, fatalities, and Serious injuries have either been steady or shown a small decrease. Even though TwinCATS is in a relatively good position with safety, there is room for improvement. This report provides a preliminary analysis of where TwinCATS is regards to safety and can be used as a guide for more in depth studies and a tool for assessing safety progress.

APPENDIX

STATE OF MICHIGAN TRAFFIC CRASH REPORT GUIDE

Revised 10/16/15

Crash Type (First Impact)



Animal

1. Deer
2. Turkey
3. Elk
4. Moose
5. Bear

97. Animal (Other)
98. Animal (Unknown)

Weather

1. Clear
2. Cloudy
3. Fog
4. Rain
5. Snow
6. Severe Crosswinds
7. Sleet / Hail
8. Blowing Snow
9. Blowing Sand, Soil, Dirt
10. Smoke

98. Unknown

Light

1. Daylight
2. Dawn
3. Dusk
4. Dark-Lighted
5. Dark-Unlighted

97. Other
98. Unknown

Road Surface Condition

1. Dry
2. Wet
3. Ice
4. Snow
5. Mud, Dirt, Gravel
6. Slush
7. Debris
8. Water (Standing / Moving)
9. Sand
10. Oily

97. Other
98. Unknown

Area

▶Freeway

1. Entrance / Exit Ramp Related
2. Authorized Median Crossover Related
3. Transition Area / Increase or Decrease in Travel Lanes
4. Rest Area Related
5. Scale / Weigh Station Related

20. Curved Roadway
6. All Other Freeway Areas

▶Intersection

7. Within Intersection
8. Driveway Related within 150 ft. of Nearest Edge of Intersection
9. Intersection Related-Other

21. Roundabout

▶Other Non-Freeway Areas

10. Straight Roadway Not Related to Other Selections
11. Curved Roadway Not Related to Other Selections
12. Driveway Related Not within 150 ft. of Intersection
13. Parking Related Legal Roadside
14. Transition Area / Increase or Decrease in Travel Lanes
15. Median Crossing Related
16. Railroad Crossing Related
17. Rest Area Related
18. Scale / Weigh Station Related
19. Non-Traffic Area

97. Other
98. Unknown

Traffic Control

1. Signal
2. Stop Sign
3. Stop Sign with Flashing Beacon
4. Yield Sign

96. None

Work Zone - Activity

1. Lane Closure
2. Lane Shift / Crossover
3. Work on Shoulder or Median
4. Intermittent or Moving Work

97. Other

Work Zone - Location

1. Before the First Work Zone Warning Sign
2. Between the First and Last Work Zone Warning Sign
3. No Warning Signs

Contributing Circumstances

1. Prior Crash
2. Backup Due to Regular Congestion
3. Backup Due to Other Incident
4. Glare
5. Traffic Control Device Inoperative, Missing or Obscured
6. Shoulders (None, Low, Soft, High)

96. None
97. Other
98. Unknown

Relation to Roadway

1. On the Road
2. Median
3. Shoulder
4. Outside of Shoulder / Curb
5. Gore
6. On-Street Parking
7. Off Roadway (Non-Traffic)
8. Sidewalk
9. Bicycle Lane

98. Unknown

Trafficway

1. Not Physically Divided (Two-Way Traffic)
2. Divided Highway without Traffic Barrier
3. Divided Highway with Traffic Barrier
4. One-Way Traffic
5. Non-Traffic
6. Two-Way, Not Divided, with a Continuous Left Turn Lane

Position

B Bicyclist
P Pedestrian
E Engineer (Railroad / Train)

13. Sleeper Section
14. Other Enclosed Passenger / Cargo Area
15. Other Unenclosed Passenger / Cargo Area
16. Riding In / On Trailing Unit
17. Riding On Vehicle Exterior

98. Unknown

▶Motorcycles, Snowmobiles, Etc. (In-Line Seating)

1. Driver
4. Passenger One
7. Passenger Two

15. Other Unenclosed Passenger / Cargo Area

Restraint Use

1. No Belts Available
2. Shoulder Belt Only Used
3. Lap Belt Only
4. Shoulder and Lap Belt
5. No Belts Used
6. Child Restraint System – Forward Facing
7. Child Restraint Not Used or Improperly Used
8. Child Restraint System – Rear Facing
9. Child Restraint System – Booster Seat
10. Restraint Failure
11. Restraint Use Unknown
12. Helmet Worn
13. Helmet Not Worn
14. Helmet Use Unknown

Airbag

1. Deployed-Front
2. Not Deployed
3. Not Equipped
4. Deployed-Side
5. Deployed-Curtain
6. Deployed-Other (Knee, Air Belt, Etc.)
7. Deployed-Combination

98. Unknown

Condition at Time of Crash

1. Appeared Normal
4. Sick
5. Fatigued or Asleep
7. Medication
10. Physically Disabled
11. Emotional
97. Other
99. Unknown

Driver Distracted By

1. Not Distracted
2. Manually Operating an Electronic Communications Device (Texting, Typing, Dialing)
3. Talking on Hands-Free Electronic Device
4. Talking on Hand-Held Electronic Device
5. Other Activity, Electronic Device (Book Player, Navigation Aid)
6. Passenger
7. Other Activity Inside the Vehicle (Eating, Personal Hygiene)
8. Outside the Vehicle (Includes Unspecified External Distractions)

98. Unknown

Hazardous Action

0. None
1. Speed Too Fast
2. Speed Too Slow
3. Failed to Yield
4. Disregard Traffic Control
5. Drove Wrong Way
6. Drove Left of Center
7. Improper Passing
8. Improper Lane Use
9. Improper Turn
10. Improper / No Signal
11. Improper Backing
12. Unable to Stop in Assured Clear Distance
13. Other
14. Unknown
15. Reckless Driving
16. Careless Driving

Action Prior to Crash

►Driver Action

1. Going Straight Ahead
2. Turning Left
3. Turning Right
4. Stopped on Roadway
5. Involved in Prior Crash at Same Location
6. Changing Lanes
7. Backing
8. Slowing / Stopping on Roadway
9. Slowing / Stopping Other Area
10. Starting Up on Roadway
11. Starting Up in Other Area
12. Entering Parking
13. Leaving Parking
14. Entering Roadway
15. Leaving Roadway
16. Making U-Turn
17. Overtaking or Passing
18. Avoiding Object
19. Avoiding Pedestrian
20. Avoiding Vehicle (Front / Back)
21. Avoiding Vehicle (Angle)
22. Driverless Moving
23. Parked
35. Other
36. Unknown
37. Avoiding Animal
38. Negotiating a Curve

►Pedestrian Action

24. Crossing at Intersection
25. Crossing Not at Intersection
26. Getting On / Off Vehicle
27. In Roadway with Traffic
28. In Roadway Against Traffic
29. Standing / Lying in Roadway
30. Pushing / Working on Vehicle
31. Other Working in Roadway
32. Playing in Roadway
33. In Roadway Other Reason
34. Not in Roadway
35. Other
36. Unknown

Sequence of Events

►Non-Collision

1. Loss of Control
2. Cross Centerline
46. Cross Median
3. Ran Off Roadway - Left
4. Ran Off Roadway - Right
5. Re-enter Roadway
6. Overturn
7. Separation of Units
8. Fire / Explosion
9. Immersion
10. Jackknife
11. Downhill Runaway
12. Cargo Loss / Shift
13. Individual Fell from Vehicle
47. Equipment Failure (Blown Tire, Brake Failure, Etc.)
14. Other Non-Collision

►Collision with Non-Fixed Object

15. Pedestrian
16. Bicyclist
17. Motor Vehicle in Transport*
18. Parked Motor Vehicle

Sequence of Events (cont.)

48. Work Zone / Maintenance Equipment
49. Cargo Falling / Shifting / or Anything Set in Motion (SIM) By a Motor Vehicle
19. Engineer (Railroad / Train)
20. Animal
21. Other Non-Fixed Object

►Collision with Fixed Object

22. Bridge Pier / Support
24. Bridge Rail
50. Bridge Overhead Structure
25. Guardrail Face
26. Guardrail End
51. Cable Barrier
27. Concrete Barrier
28. Traffic Sign / Post
29. Traffic Signal Equipment
30. Utility Pole / Light Support
32. Other Post / Pole / Support
33. Culvert
34. Curb
35. Ditch
36. Embankment
37. Fence
38. Mailbox
39. Tree
40. Railroad Crossing Signal
41. Building
42. Traffic Island
43. Fire Hydrant
44. Impact Attenuator / Crash Cushion
45. Other Fixed Object

** In transport means a motor vehicle in motion or on a roadway.*

Injury

K - Fatal Injury: Any injury which results in death

A - Suspected Serious Injury: Any injury other than fatal which prevents normal activities and generally requires hospitalization

B - Suspected Minor Injury: Any minor injury that is evident to others at the scene

C - Possible Injury: Any possible injury that is reported or claimed

O - No Injury: No indication of injury

Special Vehicles

1. Police
2. Fire
3. Bus
4. Ambulance
5. Farm Equipment
6. Construction / Maintenance Equipment
7. Tow Truck / Wrecker

Vehicle Use

1. Private
2. Commercial (Business)
3. In Pursuit / On Emergency
4. Farm
5. School / Education
6. Club / Church

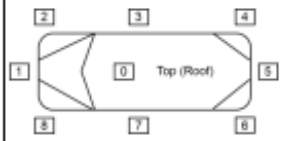
Vehicle Use (cont.)

7. Military
8. Other Government
9. Utility
10. Road Construction / Other Maintenance
11. Other

Vehicle Type

1. Passenger Car, SUV, Van
2. Motor Home
3. Pickup Truck
4. Small Truck (Under 10,000 lbs)
5. Motorcycle
6. Moped / Goped
7. Go-Cart / Golf Cart
8. Snowmobile
9. Off Road Vehicle (ATV Type)
10. Other
11. Truck / Bus

Location of Greatest Damage / First Impact



9. Undercarriage
10. Multiple
11. None
98. Unknown

Extent of Damage

1. No Damage
2. Minor Damage
3. Functional Damage
4. Disabling Damage

98. Unknown

Vehicle Direction

1. North
2. South
3. East
4. West

Private Trailer Type

1. Utility
2. Travel Trailer
3. Boat Trailer
4. Farm Equipment
5. Towed Auto
6. Recreational Double
7. Other

Vehicle Defects

1. Brakes
2. Lights
3. Steering
4. Tires / Rims
5. Windows / Windshield
6. Truck Coupling / Trailer Hitch / Safety Chains

97. Other

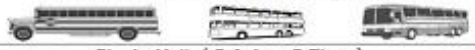
Vehicle Configuration

1 Passenger Car (Only if Vehicle Has HM Placard)

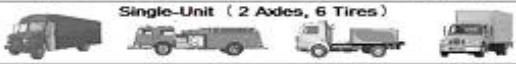
2 Light Truck (Only if Vehicle Has HM Placard)

3 Bus (9-15 Seats, Including Driver)

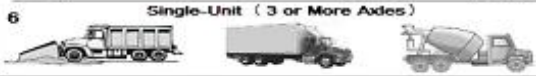
4 Bus (16 or More Seats, Including Driver)



5 Single-Unit (2 Axles, 6 Tires)



6 Single-Unit (3 or More Axles)



7 Truck/Trailer (Single-Unit Truck Pulling a Trailer)

8 Truck Tractor (Bobtail)

9 Tractor / Semi Trailer (One Trailer)

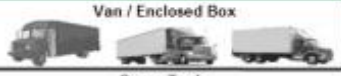
10 Truck Tractor / Double (Two Trailers)

11 Truck Tractor / Triple (Three Trailers)

99 Unknown Heavy Truck > 10,000 lbs - Unclassified (Not Listed Above)

Cargo Body Type

1 Van / Enclosed Box



2 Cargo Tank

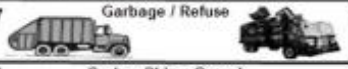
3 Flat Bed

4 Dump

5 Concrete Mixer

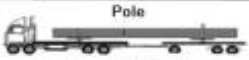
6 Auto Transporter

7 Garbage / Refuse

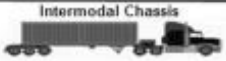


8 Grains, Chips, Gravel

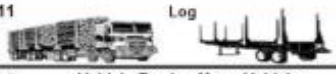
9 Pole



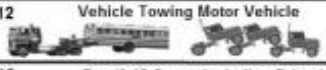
10 Intermodal Chassis



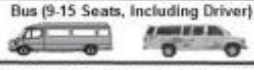
11 Log



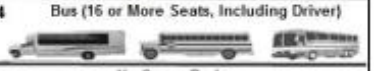
12 Vehicle Towing Motor Vehicle



13 Bus (9-15 Seats, Including Driver)



14 Bus (16 or More Seats, Including Driver)



15 No Cargo Body

97 Other

Hazardous Materials

CLASS 1 Explosives: Divisions 1.1, 1.2, 1.3, 1.4, 1.5, 1.6

CLASS 2 Gases: Divisions 2.1, 2.2, 2.3

CLASS 3 Flammable Liquid and Combustible Liquid

CLASS 4 Flammable Solid, Spontaneously Combustible, and Dangerous When Wet: Divisions 4.1, 4.2, 4.3

CLASS 5 Oxidizer, Organic Peroxide: Divisions 5.1 and 5.2

CLASS 6 Poison (Toxic) Poison Inhalation Hazard, Infectious Substance: Divisions 6.1 and 6.2

CLASS 7 Radioactive

CLASS 8 Corrosive

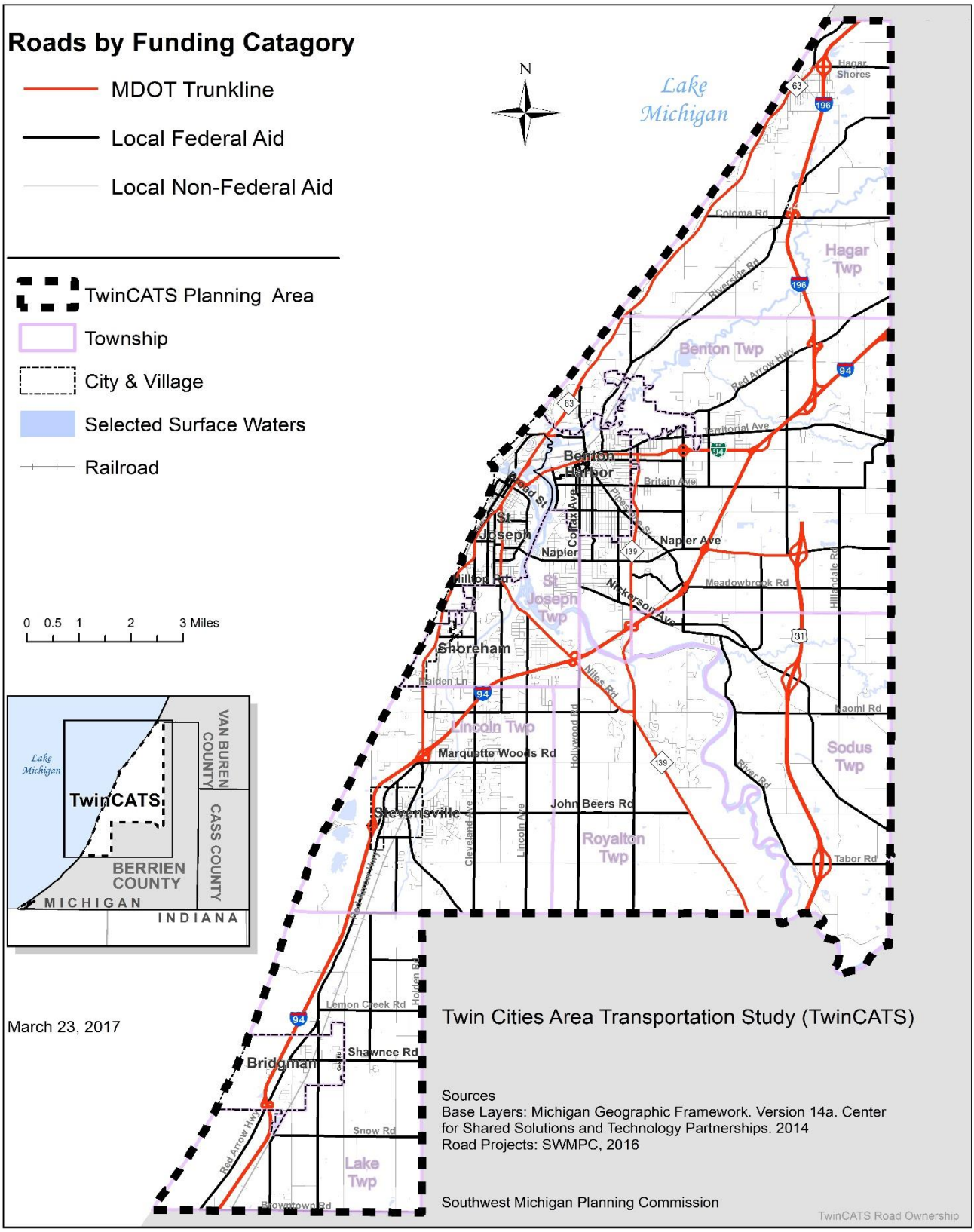
CLASS 9 Miscellaneous Hazardous Material

Endorsements

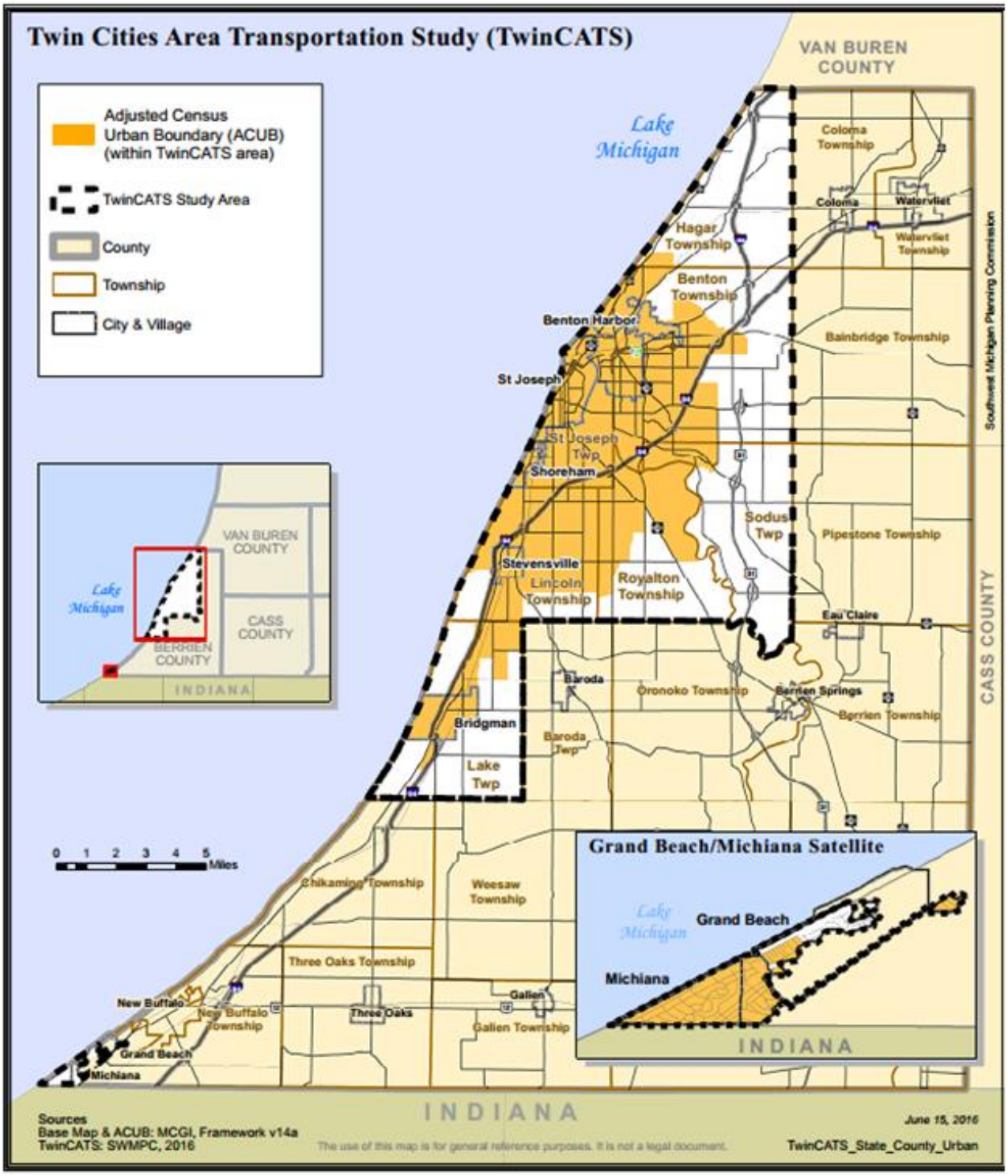
H. Hazardous	P. Passenger	T. Double/Triple
N. Tank	S. School Bus	X. Tank and Hazardous

Contact Information

For any questions, please contact the Criminal Justice Information Center at CrashTCRS@michigan.gov.



Map 4. MDOT, Local Federal-Aid, and Non-Federal Aid Roads within TwinCATS



Map 5. Urbanized Area Within the TwinCATS Planning Area