

# TECHNICAL MEMORANDUM

## CRASH ANALYSIS OF FIVE INTERSECTIONS FOR DEPLOYMENT PROJECT

**Project #:** 2300791 – RCOC SMART Grant

**Re:** **Crash Analysis of the Five Intersections for Demonstration Project**

---

For the RCOC SMART Grant project, the Road Commission for Oakland County (RCOC) has requested that a crash analysis be conducted for the five (5) intersections located in Oakland County that were selected to be the demonstration project. The RCOC is the largest county road system in Michigan and is responsible for the 2,700-plus miles of county roads including roads in townships. Since 1978, safety considerations have been the most-heavily weighted factor in road-improvement project selection, and a critical factor in the selection and performance of road maintenance activities for the RCOC.

The five (5) intersections that were selected by the RCOC were:

- 10 Mile Road and Greenfield Road (located in Southfield, Michigan)
- Greenfield Road and Lincoln Drive/Street (located in Southfield, Michigan)
- 12 Mile Road and N Main Street (located in Royal Oak, Michigan)
- 12 Mile Road and the traffic signal located 200' west of Maxwell Avenue (located in Royal Oak, Michigan)
- 10 Mile Road and Church Street (located in Oak Park, Michigan)

A crash analysis has been conducted for each of the five (5) intersections for a ten (10)-year period (January 1, 2013 to December 31, 2022) and within 250-ft of each intersection. The crash data was obtained using the RCOC's preferred database, the Transportation Improvement Association (TIA) Traffic Crash Analysis Tool (TCAT). The RCOC was one of the founding members of TIA since it was created in 1967, and has been the most frequent user of TIA data and the TIA's largest financial supporter ever since. TIA provides traffic-crash data and analysis that has helped to guide RCOC's road-project selection and design processes. The crash data from TIA are provided in **Tables 1-10**. For **Tables 1, 3, 5, 7, and 9**, they are focused on the number of scaled crashes (KABCO). For **Tables 2, 4, 6, 8, and 10**, they are focused on the number of the contributing factors of the crashes at the intersections. While there are many different types of factors that can contribute to a motor vehicle crash, **Tables 2, 4, 6, 8, and 10** only focuses on the factors for Alcohol-Involved, Drug-Involved, Animal-Involved, Pedestrian-Involved, Bicyclist-Involved, Speed-Related (Speeding), Red Light Violations (Disregard Traffic Control), Emergency Vehicles-Involved, and Work Zone-Involved (Construction Activities).

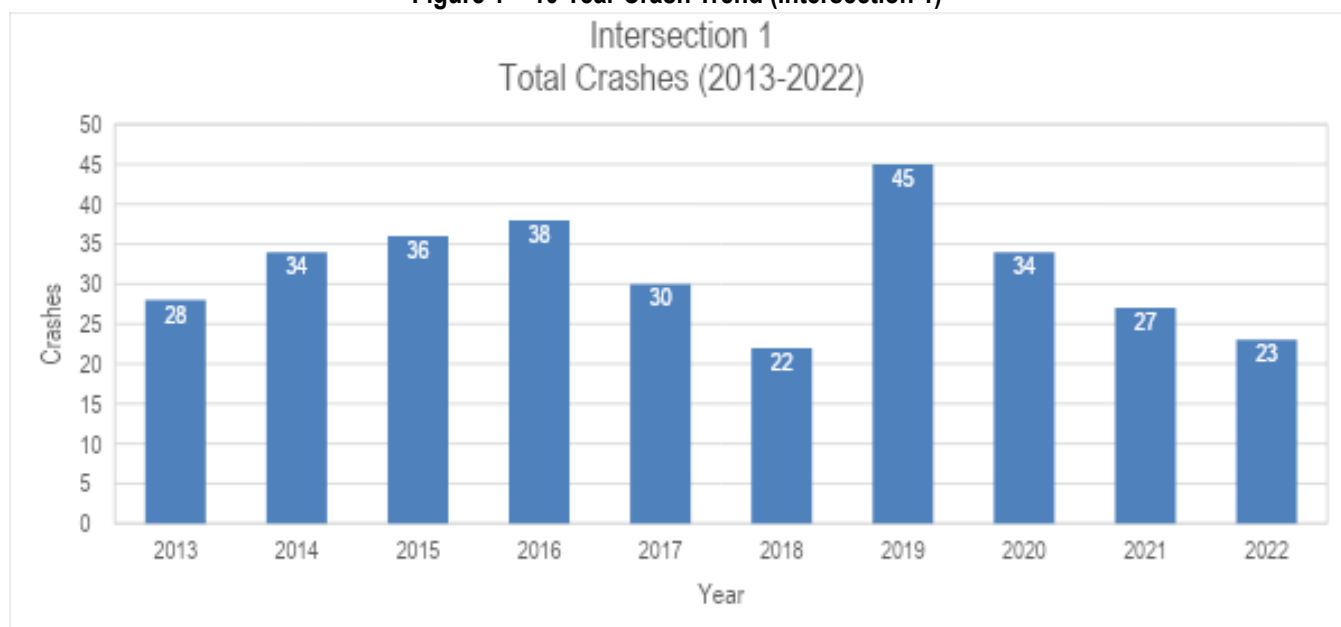
Table 1 – 10 Year Crash Summary (KABCO Crashes)

Year	Crashes (Using 250-ft Buffer in TIA)						
	Total Crashes (Injury + Property Damage)	Total Injuries (K+A+B+C)	Fatal (K)	Suspected Serious Injuries (A)	Suspected Minor Injuries (B)	Possible Injuries (c)	Property Damage/No Injury (O)
2013	28	4	0	0	0	4	24
2014	34	2	0	0	1	1	32
2015	36	2	0	0	0	2	34
2016	38	9	0	1	4	4	29
2017	30	8	0	0	4	4	22
2018	22	4	0	0	3	1	18
2019	45	10	0	1	2	7	35
2020	34	10	0	0	5	5	24
2021	27	4	0	0	3	1	23
2022	23	3	0	0	2	1	20
<b>Total</b>	<b>317</b>	<b>56</b>	<b>0</b>	<b>2</b>	<b>24</b>	<b>30</b>	<b>261</b>

Note: KAB Crashes are fatal and severe crashes as noted by the K ABCO scale: K = fatal crash, A = incapacitating injury, B = non-incapacitating injury, C = possible injury, and O = no injury

Intersection 1 has had zero (0) fatal (Type K) crashes over the 10-year period. The largest number of crashes that have occurred at this intersection were property damage, and the second largest being possible (Type C) injury. The crashes that were property damage were also no injury (Type O) crashes. In 2019, this intersection had the largest number of motor vehicle crashes (45), possible injury crashes (7), and property damage (35) than the rest of the 10 years. In 2018, this intersection had the lowest number of motor vehicle crashes (22) and property damage (18) than the rest of the 10 years. During the COVID years (2019-2021), the number of crashes at this intersection decreased from 45 in 2019 to 27 in 2021. For a better visual of the trend in total crashes, the data from **Table 1** is represented in **Figure 1**.

Figure 1 – 10 Year Crash Trend (Intersection 1)



**Table 2 – 10 Year Crash Summary (Contributing Factors)**

Year	Crashes (Using 250-ft Buffer in TIA)								
	Alcohol Involved	Drug Involved	Animal Involved	Pedestrian Involved	Bicyclist Involved	Speed Related (Speeding)	Red Light Violations/ Disregard Traffic Control	Emergency Vehicles Involved	Work Zone Involved/Construction Activities
2013	0	0	0	0	0	0	2	0	0
2014	2	0	0	0	0	1	0	0	0
2015	0	0	0	0	0	0	0	0	7
2016	1	0	0	2	0	1	1	1	0
2017	1	0	0	0	0	0	1	0	1
2018	0	1	0	0	1	0	1	0	1
2019	2	0	0	1	1	3	6	0	0
2020	1	0	0	1	2	0	2	1	0
2021	0	0	0	0	0	0	4	0	0
2022	0	0	0	2	0	0	2	0	1
<b>Total</b>	<b>7</b>	<b>1</b>	<b>0</b>	<b>6</b>	<b>4</b>	<b>5</b>	<b>19</b>	<b>2</b>	<b>10</b>

Source: TIA

For Intersection 1, the contributing factor with the largest number of crashes over the 10-year period have been red light violation/disregard traffic control (19), and the second largest being work zone-involved (10). This intersection did not only have a large number of crashes in 2019, it also had the largest number of speeding crashes (3) and disregard traffic control crashes (6) than the rest of the 10 years. This intersection did not have too many crashes that include the factors shown in **Table 2**.

It also didn't have a dangerously high number of pedestrian-involved crashes and bicyclist-involved crashes and the ones that did occur were not fatal (Type K).

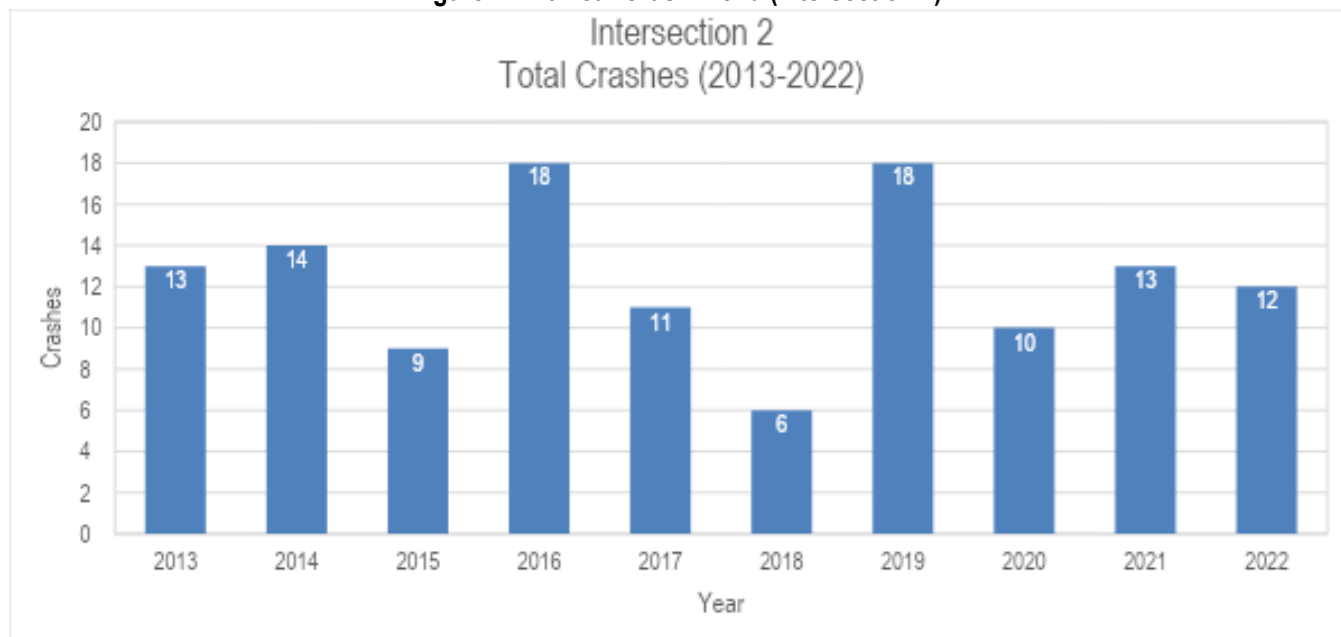
Table 3 – 10 Year Crash Summary (KABCO Crashes)

Year	Crashes (Using 250-ft Buffer in TIA)						
	Total Crashes (Injury + Property Damage)	Total Injuries (K+A+B+C)	Fatal (K)	Suspected Serious Injuries (A)	Suspected Minor Injuries (B)	Possible Injuries (c)	Property Damage/No Injury (O)
2013	13	2	0	1	0	1	11
2014	14	5	0	0	0	5	9
2015	9	3	0	0	0	3	6
2016	18	3	0	1	0	2	15
2017	11	1	0	0	0	1	10
2018	6	0	0	0	0	0	6
2019	18	2	0	0	1	1	16
2020	10	1	0	0	0	1	9
2021	13	1	0	0	0	1	12
2022	12	2	0	0	0	2	10
<b>Total</b>	<b>124</b>	<b>20</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>17</b>	<b>104</b>

Note: KAB Crashes are fatal and severe crashes as noted by the K ABCO scale: K = fatal crash, A = incapacitating injury, B = non-incapacitating injury, C = possible injury, and O = no injury

Intersection 2 has had zero (0) fatal (Type K) crashes over the 10-year period. The largest number of crashes that have occurred at this intersection were property damage, and the second largest being possible (Type C) injury. The crashes that were property damage were also no injury (Type O) crashes. In 2019, this intersection had the largest number of motor vehicle crashes (18), non-incapacitating (Type B) injury crashes (1), and property damage (16) than the rest of the 10 years. In 2018, this intersection had the lowest number of motor vehicle crashes (6) than the rest of the 10 years. During the COVID years (2019-2021), the number of crashes at this intersection decreased from 18 in 2019 to 13 in 2021. For a better visual of the trend in total crashes, the data from **Table 3** is represented in **Figure 2**.

Figure 2 – 10 Year Crash Trend (Intersection 2)



**Table 4 – 10 Year Crash Summary (Contributing Factors)**

Year	Crashes (Using 250-ft Buffer in TIA)								
	Alcohol Involved	Drug Involved	Animal Involved	Pedestrian Involved	Bicyclist Involved	Speed Related (Speeding)	Red Light Violations/ Disregard Traffic Control	Emergency Vehicles Involved	Work Zone Involved/Construction Activities
2013	0	0	0	0	0	0	0	0	0
2014	0	1	0	0	0	0	3	0	0
2015	0	0	0	0	0	0	2	0	0
2016	1	0	0	1	0	0	1	0	0
2017	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0
2020	0	0	0	0	0	1	0	0	0
2021	0	0	0	0	0	0	2	0	0
2022	0	0	0	0	0	1	0	0	0
<b>Total</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>8</b>	<b>0</b>	<b>0</b>

Source: TIA

For Intersection 2, the contributing factor with the largest number of crashes over the 10-year period have been red light violation/disregard traffic control (8), and the second largest being speeding (2). This intersection did not have too many crashes that include the factors shown in **Table 4**.

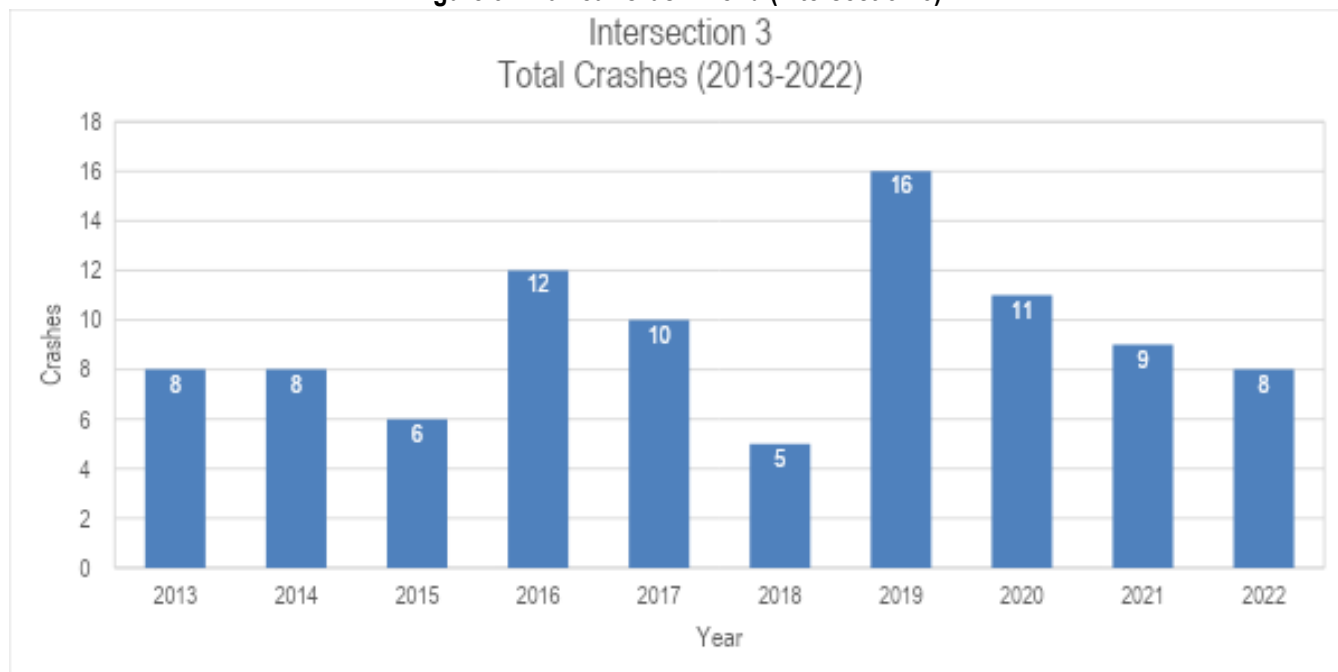
**Table 5 – 10 Year Crash Summary (KABCO Crashes)**

Year	Crashes (Using 250-ft Buffer in TIA)						
	Total Crashes (Injury + Property Damage)	Total Injuries (K+A+B+C)	Fatal (K)	Suspected Serious Injuries (A)	Suspected Minor Injuries (B)	Possible Injuries (c)	Property Damage/No Injury (O)
2013	8	1	0	0	0	1	7
2014	8	4	0	0	2	2	4
2015	6	0	0	0	0	0	6
2016	12	3	0	1	0	2	9
2017	10	1	0	0	0	1	9
2018	5	1	0	0	1	0	4
2019	16	4	0	1	3	0	12
2020	11	2	0	0	0	2	9
2021	9	1	0	0	0	1	8
2022	8	0	0	0	0	0	8
<b>Total</b>	<b>93</b>	<b>17</b>	<b>0</b>	<b>2</b>	<b>6</b>	<b>9</b>	<b>76</b>

*Note: KAB Crashes are fatal and severe crashes as noted by the K ABCO scale: K = fatal crash, A = incapacitating injury, B = non-incapacitating injury, C = possible injury, and O = no injury*

Intersection 3 has had zero (0) fatal (Type K) crashes over the 10-year period. The largest number of crashes that have occurred at this intersection were property damage, and the second largest being possible (Type C) injury. The crashes that were property damage were also no injury (Type O) crashes. In 2019, this intersection had the largest number of motor vehicle crashes (16), non-incapacitating (Type B) injury crashes, and property damage (12) than the rest of the 10 years. In 2018, this intersection had the lowest number of motor vehicle crashes (5) and non-incapacitating injury crashes (1) than the rest of the 10 years. During the COVID years (2019-2021), the number of crashes at this intersection decreased from 16 in 2019 to 9 in 2021. For a better visual of the trend in total crashes, the data from **Table 5** is represented in **Figure 3**.

**Figure 3 – 10 Year Crash Trend (Intersection 3)**



**Table 6 – 10 Year Crash Summary (Contributing Factors)**

Year	Crashes (Using 250-ft Buffer in TIA)								
	Alcohol Involved	Drug Involved	Animal Involved	Pedestrian Involved	Bicyclist Involved	Speed Related (Speeding)	Red Light Violations/ Disregard Traffic Control	Emergency Vehicles Involved	Work Zone Involved/Construction Activities
2013	1	1	0	0	0	0	0	0	0
2014	0	0	0	0	0	1	2	0	0
2015	1	0	0	0	0	0	0	0	0
2016	1	0	0	1	1	0	1	0	0
2017	0	0	0	0	1	0	1	0	0
2018	0	0	0	0	0	0	2	0	0
2019	0	0	0	1	0	1	2	1	0
2020	0	0	0	0	1	0	0	0	0
2021	1	0	0	0	0	0	0	0	0
2022	0	0	0	0	0	0	2	1	0
<b>Total</b>	<b>4</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>10</b>	<b>2</b>	<b>0</b>

Source: TIA

For Intersection 3, the contributing factor with the largest number of crashes over the 10-year period have been red light violation/disregard traffic control (10), and the second largest being alcohol-involved crashes (4). This intersection did not have too many crashes that include the factors shown in **Table 6**. It also didn't have a dangerously high number of pedestrian-involved crashes and bicyclist-involved crashes and the ones that did occur were not fatal (Type K).

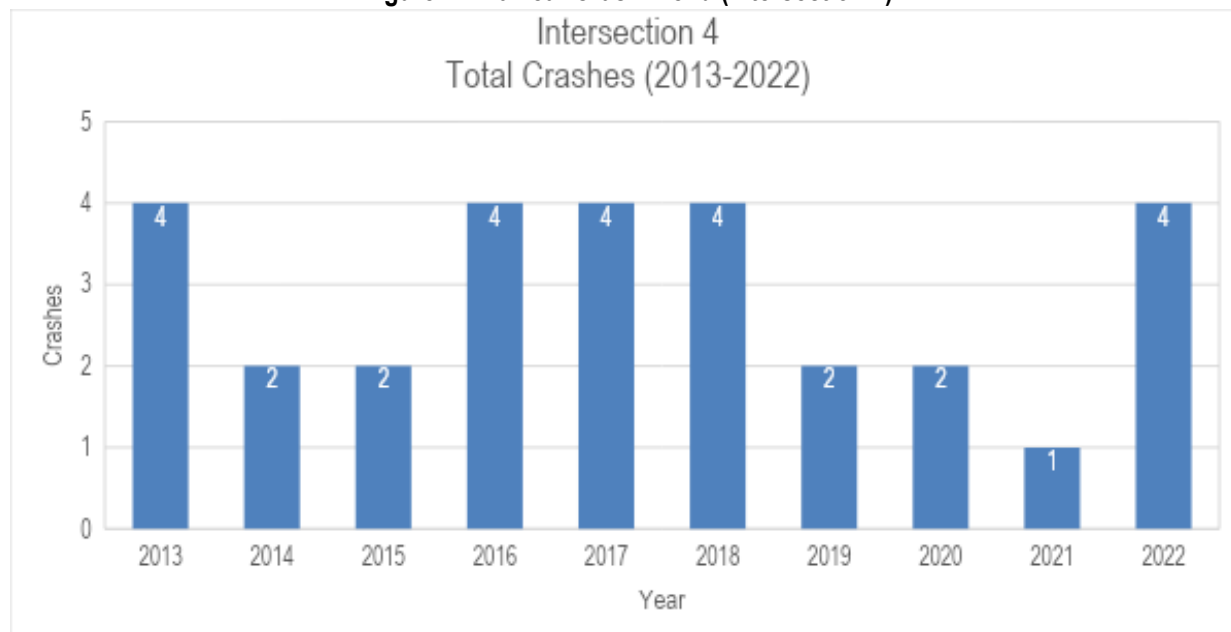
Table 7 – 10 Year Crash Summary (KABCO Crashes)

Year	Crashes (Using 250-ft Buffer in TIA)						
	Total Crashes (Injury + Property Damage)	Total Injuries (K+A+B+C)	Fatal (K)	Suspected Serious Injuries (A)	Suspected Minor Injuries (B)	Possible Injuries (c)	Property Damage/No Injury (O)
2013	4	0	0	0	0	0	4
2014	2	1	0	0	1	0	1
2015	2	1	0	0	0	1	1
2016	4	0	0	0	0	0	4
2017	4	3	0	0	1	2	1
2018	4	1	0	0	0	1	3
2019	2	0	0	0	0	0	2
2020	2	1	0	0	0	1	1
2021	1	0	0	0	0	0	1
2022	4	0	0	0	0	0	4
<b>Total</b>	<b>29</b>	<b>7</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>5</b>	<b>22</b>

Note: KAB Crashes are fatal and severe crashes as noted by the K ABCO scale: K = fatal crash, A = incapacitating injury, B = non-incapacitating injury, C = possible injury, and O = no injury

Intersection 4 has had zero (0) fatal (Type K) crashes over the 10-year period. The largest number of crashes that have occurred at this intersection were property damage, and the second largest being possible (Type C) injury. The crashes that were property damage were also no injury (Type O) crashes. This intersection has had the same large number of motor vehicle crashes (4) in the years 2013, 2016, 2017, 2018, and 2022. In 2021, this intersection had the lowest number of motor vehicle crashes (1) than the rest of the 10 years. During the COVID years (2019-2021), the number of crashes at this intersection decreased from 2 in 2019 to 1 in 2021. For a better visual of the trend in total crashes, the data from **Table 7** is represented in **Figure 4**.

Figure 4 – 10 Year Crash Trend (Intersection 4)





Intersection 4 – 12 Mile Road and the traffic signal located 200-ft west of Maxwell Avenue

**Table 8 – 10 Year Crash Summary (Contributing Factors)**

Year	Crashes (Using 250-ft Buffer in TIA)								
	Alcohol Involved	Drug Involved	Animal Involved	Pedestrian Involved	Bicyclist Involved	Speed Related (Speeding)	Red Light Violations/ Disregard Traffic Control	Emergency Vehicles Involved	Work Zone Involved/Construction Activities
2013	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	1	0	0	0	0
2016	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	1	0	0	0	0
2018	0	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0
2020	0	0	0	0	0	0	0	0	0
2021	0	0	0	0	0	0	0	0	0
2022	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

Source: TIA

For Intersection 4, the contributing factor with the largest number of crashes over the 10-year period have been bicyclist-involved (2). Other than the bicyclist-involved crashes, this intersection has had zero (0) crashes that include the other factors shown in **Table 8**.

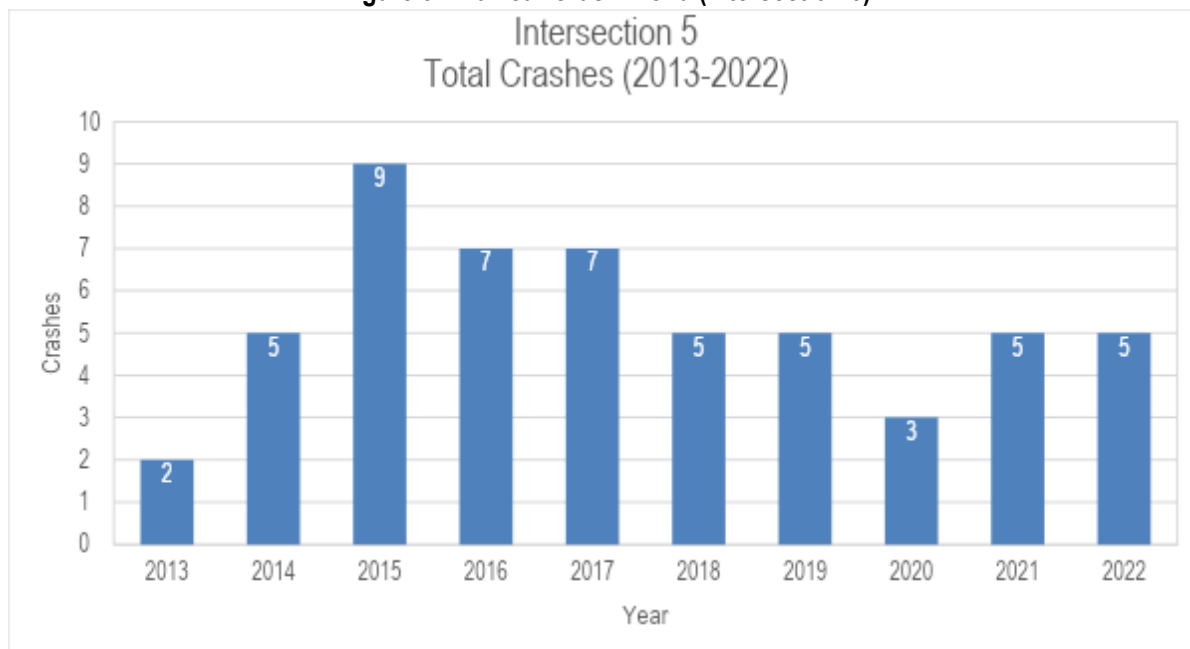
**Table 9 – 10 Year Crash Summary (KABCO Crashes)**

Year	Crashes (Using 250-ft Buffer in TIA)						
	Total Crashes (Injury + Property Damage)	Total Injuries (K+A+B+C)	Fatal (K)	Suspected Serious Injuries (A)	Suspected Minor Injuries (B)	Possible Injuries (c)	Property Damage/No Injury (O)
2013	2	1	0	0	0	1	1
2014	5	0	0	0	0	0	5
2015	9	1	0	0	0	1	8
2016	7	0	0	0	0	0	7
2017	7	3	0	0	2	1	4
2018	5	0	0	0	0	0	5
2019	5	2	0	0	0	2	3
2020	3	0	0	0	0	0	3
2021	5	2	0	0	0	2	3
2022	5	2	0	1	1	0	3
<b>Total</b>	<b>53</b>	<b>11</b>	<b>0</b>	<b>1</b>	<b>3</b>	<b>7</b>	<b>42</b>

Note: KAB Crashes are fatal and severe crashes as noted by the K ABCO scale: K = fatal crash, A = incapacitating injury, B = non-incapacitating injury, C = possible injury, and O = no injury

Intersection 5 has had zero (0) fatal (Type K) crashes over the 10-year period. The largest number of crashes that have occurred at this intersection were property damage, and the second largest being possible (Type C) injury. The crashes that were property damage were also no injury (Type O) crashes. In 2015, this intersection had the largest number of motor vehicle crashes (1) and property damage (8) than the rest of the 10 years. In 2013, this intersection had the lowest number of motor vehicle crashes (5) and property damage (1) than the rest of the 10 years. During the COVID years (2019-2021), the number of crashes at this intersection decreased from 5 in 2019 to 3 in 2020, and then back to 5 in 2021. For a better visual of the trend in total crashes, the data from **Table 9** is represented in **Figure 5**.

**Figure 5 – 10 Year Crash Trend (Intersection 5)**



**Table 10 – 10 Year Crash Summary (Contributing Factors)**

Year	Crashes (Using 250-ft Buffer in TIA)								
	Alcohol Involved	Drug Involved	Animal Involved	Pedestrian Involved	Bicyclist Involved	Speed Related (Speeding)	Red Light Violations/ Disregard Traffic Control	Emergency Vehicles Involved	Work Zone Involved/Construction Activities
2013	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	3	0	0
2016	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	2	0	0
2018	0	0	0	0	0	0	1	0	1
2019	0	0	0	0	0	0	1	0	0
2020	0	0	0	0	0	0	0	0	0
2021	0	0	0	0	0	0	0	0	0
2022	0	0	0	0	0	1	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>7</b>	<b>0</b>	<b>1</b>

Source: TIA

For Intersection 5, the contributing factor with the largest number of crashes over the 10-year period have been red light violation/disregard traffic control (7). This intersection did not have too many crashes that include the factors shown in **Table 10**.

## Conclusions

- Each of the five intersections have had zero (0) fatal (Type K) crashes over the 10-year period.
- Each of the five intersections have had a low number of incapacitating (Type A) injury crashes over the 10-year period.
- The largest number of crashes that have occurred at each of the five intersections were property damage.
- The second largest number of crashes that have occurred at each of the five intersections were possible (Type C) injury.
- Over the 10-year period, Intersection 1 (10 Mile Road and Greenfield Road) has the highest number of motor vehicle crashes (317), non-incapacitating (Type B) injury crashes (24), possible (Type C) injury crashes (30), and property damage (261) than the rest of the 5 intersections.
- Over the 10-year period, Intersection 4 (20 Mile Road and the traffic signal located 200-ft west of Maxwell Avenue) has the lowest number of motor vehicle crashes (29), possible (Type C) injury crashes (5), and property damage (22) than the rest of the five intersections.
- Each of the five intersections has a low number of pedestrian-involved crashes and bicyclist-involved crashes.
- Out of the five intersections, Intersection 1 has the most pedestrian-involved crashes and bicyclist-involved crashes.