



Data Driven Approaches to Crime and Traffic Safety Amarillo, TX Police Department Agency Evaluation and Future Planning Recommendations



Agency: Amarillo Police Department

Workshop Attended: Amarillo, Texas (February 23-24, 2017)

Date of DDACTS Implementation: August 2017

Agency Demographic and Background:

Amarillo is the largest city in the Texas Panhandle, located in Potter County, though part of it also extends into Randall County. The town has been a cattle marketing center for decades and operates one of the largest meat packing areas in the U.S. with Tyson Foods being the area's single largest employer. Chief Ed Drain was hired on September 12, 2016 after serving as the interim Chief since July of that year. Chief Drain brings a high level of energy and a desire to utilize a data driven policing strategies, which has been evident both through his words and actions.

Amarillo Police Department is a full-service police agency, located at 200 SE 3rd Avenue, Amarillo, Texas. At the time of the two-day DDACTS Implementation Workshop in 2017 there were 375 sworn staff and 60 civilian staff and the stated goal of the department was to utilize data to reduce both crashes and crime.

The workshop was well attended and included an excellent cross-section of the agency. Present were both Colonels (Assistant Chiefs); several of the Captains, Lieutenants, and Sergeants; the department's sworn officer assigned to Crime Analyst function; and the Civilian database administrator. While the Chief was not in the training for the entire day, he was able to attend the substantial portion of training and planning session. Chief Drain was very receptive to any suggested changes made in order to achieve the goal of an effective DDACTS implementation. The Chief was very supportive of the training, indicating a forward drive to implement DDACTS, re-evaluating how current resources were being utilized, and to make adjustments based on a Data-Driven Approach. This included looking at the creation of a civilian Crime Analyst position in the near future. On the second day of the workshop, a core group of command staff and supervisors participated in a strategic planning session, where timelines and benchmarks were discussed as well as the assignment of tasks was completed, once again demonstrating agency's desire to move ahead with a data-driven approach to policing.

During the technical assistance portion of the workshop, it was learned that the Amarillo employed a veteran officer who had been serving as an Intel/Crime Analyst as well as two (2) civilian statisticians. While there was not an outside database connection (ODBC) to their records management system (RMS), they indicated some ability to pull data, but recognized this as an area where improvement was needed. The Department uses the Intergraph I-LEADS RMS system, which is capable of accepting an ODBC. This was the approach that was recommended, along with the use of Microsoft Access to query and extract the pertinent data which is then exported to ArcGIS. To the agency credit, in the time since the 2017 workshop, the Police Department has worked toward a long term sustainable solution to their data needs and have begun the process of creating a data warehouse that will allow for online database connectivity. This type of solution offers the benefit of efficient data access and allows for the data to be reviewed and verified before being transferred to the data warehouse. These solutions included the agency sending two of its members, Intel Analyst/Corporal Steve Powers and IT Database Administrator Tommy Hill to the *Crime and Traffic Safety Analysis: Techniques to Support DDACTS Analytical*

workshop in San Antonio, Texas in June 2017 as part of the Texas- DDACTS project.

Since the conclusion of the agency workshop, Amarillo Police Department has made great strides in moving toward effective data collection and analytical support for a successful implementation of the DDACTS model in their community. The workshop proved to be, among other things, a catalyst of sorts, with Chief Drain making the decision to increase staffing to include two (2) full time Crime Analysts to work with Intel Analyst Corporal Powers. Subsequently, two (2) members from the city's GIS department were hired by the police department as analysts, with one starting in February 2018, and the other in April 2018. The newly hired Crime Analysts have been busy during their first several months in their new positions, visiting other Texas Police Departments, and various trainings including the TxDOT sponsored training, *Advancing the DDACTS Analytical Toolset* in San Antonio in June of 2018, which provided them with additional analytical skills as well as background on the DDACTS model.

Pre and Post DDACTS

Amarillo Police Department implemented the DDACTS model on August 1, 2017 in four (4) zones positioned throughout the city, these DDACTS Zones were designated Zones 1 - 4, each occupying a separate patrol area, with none sharing a border. Amarillo's DDACTS zones were identified using five (5) years of historical Uniformed Crime Report (UCR) Part I crime data, calls for service by census tracts, and crash data was considered to the extent that a call for service was assumed to be generated for each.

Note: It is worth mentioning that the DDACTS zones were created with an emphasis on areas of high crime and not where crashes and crimes were disproportionality occurring which is the basis of the DDCATS model.

figure 1- Heat Map of Part I Crime with the four DDACTS zones delineated

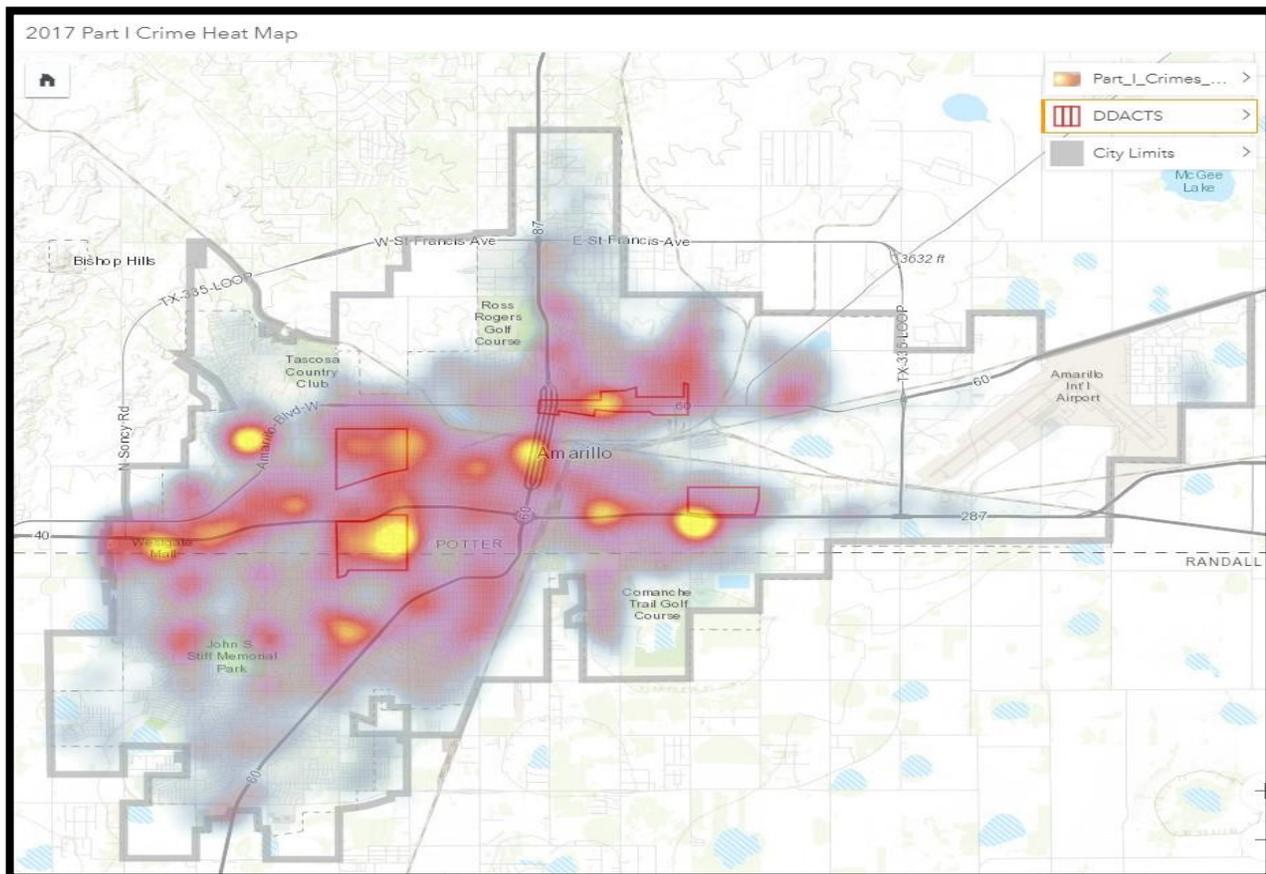
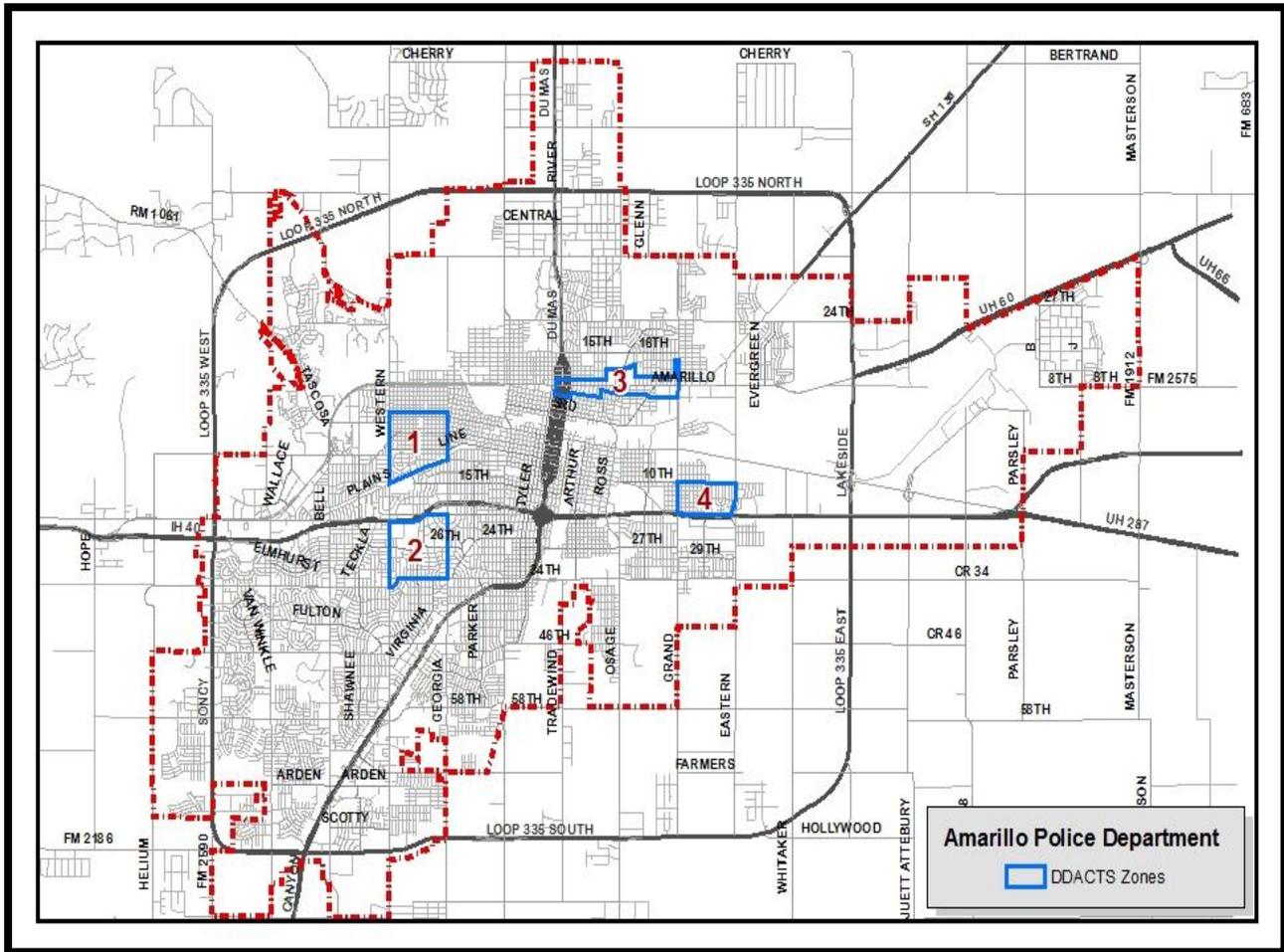


figure 2- DDACTS zones overlaid on a street map



The Amarillo Police Department Case Study was conducted a mere six (6) months after its implementation of the DDACTS model, and as such is representative of the first recommended initial review period. It is the practice of many agencies to use the six (6) month mark as an opportunity for the initial execution of Guiding Principle six (6): Monitoring, Evaluation and Adjustment. This case study will review these first six (6) months and make observations, recommendations and suggestions for the continued evolution and success of the DDACTS model.

Since this case study is taking place after only six (6) months of DDACTS operation, five (5) and six (6) month evaluation “periods” beginning 2/1/2015 were created prior to implementation in which to use as a baseline comparison with the one (1) six (6) month period available, post-implementation (8/1/2017 to 1/31/2018).

The charts below reflect a degree of performance measures captured pre and post DDACTS implementation. The average of the five (5) preceding periods were used for comparison.

In review of the aggregated data, the DDACTS zones had decreases in all but Auto Theft, from 61 to 62 incidents (2%) and Burglary that remained unchanged at 115 incidents. Overall, the DDACTS zones saw a decrease of 52 UCR Part I crimes (-7%). This is in contrasts with the citywide data that saw each category increase and accounted for an additional 303 UCR Part I Crimes (6%). (See table 1)

Table 1

Amarillo: Citywide			
Crime	5 Period Average	Post DDACTS	Percentage Change
All Part 1 Crime	5249	5552	6%
Robbery	130	132	2%
Burglary	857	868	1%
Auto Theft	430	507	18%
Theft from MV	1084	1188	10%
Total Selected	2501	2695	8%
Amarillo: DDACTS ZONES			
Crime	5 Period Average	Post DDACTS	Percentage Change
All Part 1 Crime	738	686	-7%
Robbery	31	30	-4%
Burglary	115	115	0%
Auto Theft	61	62	2%
Theft from MV	135	93	-31%
Total Selected	331	300	-9%

A review of the crash data revealed a similar result, seeing a reduction of 14 crashes (-4%) in the DDACTS zone, compared with an increase of 50 crashes, or 2%, city wide. Of importance, this decrease, however small was statistically significant given that the normal range for the crashes during review period was from 337 to 350. (See Table 2)

Table 2- Crashes: Pre and Post DDACTS Implementation

Amarillo: Citywide			
Crashes	5 Period Average	Post DDACTS	Percentage Change
Crashes	2731	2781	2%
Amarillo: DDACTS ZONES			
Crashes	5 Period Average	Post DDACTS	Percentage Change
Crashes	344	330	-4%

One of the primary tenants of the DDACTS model is increased motor vehicles contacts and a high visibility presence in a given area. To its credit, the agency made great strides in this area. Car Stops, or traffic contacts, increased significantly (41%) in the DDACTS zone when compared to the five (5) period average. (See Table 3)

Table 3- Car Stops: Pre and Post DDACTS implementation

Amarillo: Citywide			
Car Stops	5 Period Average	Post DDACTS	Percentage Change
Car Stops	1528	1754	15%
Amarillo: DDACTS ZONES			
Car Stops	5 Period Average	Post DDACTS	Percentage Change
Car Stops	404	571	41%

For comparison purposes- the “Normal Range” denotes the average of the five periods with one standard deviation added and subtracted from that average. Those categories that fell below this “Normal Range” are indicated by an *. All Part 1 Crime includes all UCR Part 1 offenses, individual offense types (Robbery, Burglary, Auto Theft and Theft from Motor Vehicle) were also separately displayed. The entire dataset is attached as Appendix A

In Zone 1 (Table 4), there were seventy-six (76) crashes, or 14% less, Post-DDACTS, while the normal range for the period would be between 89-97.

Table 4

*indicates reductions below the normal range			
DDACTS Zone 1			
Outcome Measure	Normal Range	Post DDACTS	Percent Change
All Part 1 Crime	154-217	201	8%
Robbery	3-11	10	39%
Burglary	27-45	47	32%
Auto Theft	12-17	20	41%
Theft from MV	15-37	20	-23%
Crashes*	80-97	76	-14%

In Zone 2 (Table 5), the efforts put forth here had the most impact on Theft from MV Offenses which led to fifty-three (53), or 30% less, occurring Post-DDACTS, while the normal range for the period would be between 69-82.

Table 5

DDACTS Zone 2			
Outcome Measure	Normal Range	Post DDACTS	Percent Change
All Part 1 Crime	287-312	299	0%
Robbery	5-12	9	5%
Burglary	22-36	45	57%
Auto Theft	16-24	20	-2%
Theft from MV	69-82	53	-30%
Crashes	98-113	113	7%

Zone 3 (Table 6) displayed the greatest level of reductions where All Part 1 Crime, Burglary, Theft from Motor Vehicle and Crashes saw reductions that were below the normal range. In fact, this zone had reductions in every category, though some were still within the normal range.

Table 6

DDACTS Zone 3			
Outcome Measure	Normal Range	Post DDACTS	Percent Change
All Part 1 Crime*	161-179	134	-21%
Robbery	11-15	11	-15%
Burglary*	25-33*	16	-44%
Auto Theft	10-23	13	-21%
Theft from MV*	14-27	7	-65%
Crashes	116-130	108	-12%

Zone 4 (Table 7) saw reductions below the normal range for all UCR Part I Crimes as well as the selected offenses of Robbery, and Burglary.

Table 7

DDACTS Zone 4			
Outcome Measure	Normal Range	Post DDACTS	Percent Change
All Part 1 Crime*	65-100	52	-37%
Robbery*	1-4	0	-100%
Burglary*	15-30*	7	-69%
Auto Theft	6-13	9	-6%
Theft from MV	8-19	13	-6%
Crashes	22-32	33	23%

Note: The Analytical Specialist who worked on this case study conducted both onsite, and remote technical support with the two newly hired Crime Analysts, Jenifer Ramirez and Wesley Luginbyhl, both of whom have a professional background in GIS, but little prior experience in crime analysis. Both of these analysts were found to be quick learners and possessed an eagerness to learn more about crime analysis. There were some initial difficulties pulling data, as there was not always a clear differentiation made between CAD (calls for service) data and RMS (crime) data, however these hurdles were quickly addressed and a plan to create a data warehouse was initiated.

Staffing DDACTS Implementation

For enforcement in the DDACTS Zones, Amarillo Police Department reportedly primarily utilized its normal staffing of officers, four (4) per watch, per day that were directed to the DDACTS zone in their patrol area, with the additional staffing of one (1) detective spending ten (10) hours per week in the DDACTS Zones. It is unknown if the additional detective resource utilized marked patrol unit during that time, as would be recommended to reflect one of the major tenets of DDACTS, of a highly visible police presence.

Challenges/Lessons Learned

The following comments are feedback provided from various members of the Amarillo Police Department.

Staffing

- *With already current staffing shortages, it was difficult to generate buy-in and enthusiasm from troops.*
- *We were unable to dedicate as many resources as originally hoped, ADMIN, SWAT, and PACE have been unable to meet the minimum zone patrols requested.*

Initial Implementation

- *There was poor communication initially as officers did not understand the zones at first. Although the plan was outlined in detail, it was not effectively communicated to the line officers in the initial roll out.*
- *We originally didn't have maps but just descriptions of the zones.*

It should be noted that even with the above-mentioned challenges, the early data suggests that Amarillo's DDACTS efforts have had success in addressing the problem areas. Overall the DDACTS areas saw decreases in crime and crashes while citywide there were observed increases. This can be attributed in large part to the identification of the city's problem areas and the targeted efforts put forth by the officers of the department in those areas.

Agency Considerations

To its credit, the Amarillo Police Department has already begun working on improving and fine tuning its DDACTS implementation efforts to include the administration along with the newly formed Crime Analysis Unit instituting the following changes:

- Identifying and targeting specific high times of day, and day of the week for each zone
- Focus on patrol preventable crimes in DDACTS zones
- Create a method to review and analyze officer's uncommitted time
- Creation of control areas for DDACTS comparison.

Recommendations Moving Forward

1. Overlay the agency's historical data for targeted offences, i.e. UCR Part I theft related offenses with historical crash data extracted from the RMS or CRIS (whichever is more accurate) and put them on the same map. This very well may move your established DDACTS to some extent.
 - a. This will enhance the agency's STEP enforcement in grant year FY 2019 beginning in October 2018 discussed later in this report.
2. Further review of agency data should be undertaken to determine what specific factors were responsible for the greater success in Zones 3 and Zone 4 compared to Zones 1 and 2, i.e. more manhours spent, etc.
 - a. Further differentiation of proactive efforts should be made, measure all self-initiated actions, not only car stops, i.e. business checks, field-interviews, directed patrols, etc.
3. Historically, agencies that have begun their DDACTS implementation plan with more than 3 targeted zones have struggled. This has been especially true when the agency has limited resources and/or issues with line officer buy in, which would seem to be the case in Amarillo. To that point, what has worked well most often in other agencies, both in Texas and around the country, and should be considered is:
 - a. Identify no more than three (3) areas that have experienced most historically disproportionate amount of

crime, crashes and other social harms and focus the agency's resources in those areas.

- b. If not being already, conduct in-service training for all personnel covering what the DDACTS model is and how the agency is implementing it.
4. Although, it is noteworthy the agency is deploying non-uniformed personnel as part of the DDACTS operational plan, it is important to remember the DDACTS model success depends greatly on the deterrent effect of marked patrol vehicles in a given area. Therefore, consider having non-uniform personnel utilize marked patrol vehicles while working within the DDACTS areas, at least part of the time.
5. As a way of increasing the level of activity in the DDACTS areas, the agency may want to consider expanding the number of non-patrol officers conducting high visibility enforcement in the designated areas. For example, Longview Tx. Police Department requires all of its sworn personnel, below the rank of Chief, not already assigned to the patrol function, to spend 8 hours over the course of each month conducting MV stops in the three (3) DDACTS zones. This approach has resulted in significant reductions in the rate of occurring rate in the targeted areas in the first 6 months.
6. As discussed during the recent on-site visit, develop a method to plot the location of MV and/or pedestrians stops being made city wide on a GIS map. This information will provide for a good visual aid for supervisor and officers alike regarding them working hard but not necessarily smart. It also allows supervisors a visual as to where his/her officers need to shift their self-initiated activity to.
7. As discussed during the recent on-site visit, it is recommended for the agency to develop a mechanism in which to track amount of time being spent in the DDACTS areas whether through a CAD incident, GPS in the vehicles, or some other means. This will for a more direct correlation to be made of the nexus between the efforts put forth and the outcomes experienced in the area.
8. Patrol level buy-in will be critical for DDACTS implementation and one method to increase the rapport will be requesting feedback from officers as to their thoughts and or experiences within the DDACTS areas. Therefore, it is encouraged that the analysts and uniform division develop mechanism for effective communication, such as having analysts periodically attend patrol briefings, so as to facilitate quick identification and resolution of issues.
9. Have the analysts create a DDACTS report template and request feedback from patrol, supervisors and commanders in order to meet the needs of all levels and most importantly to create an actionable product. Several such templates are available from other agencies and can be provided for consideration if so desired.
10. Resist the tendency to move the established DDACTS area(s) around the city in an effort to address your emerging "hot spots". With the number of crimes/calls for service your agency has in a given year should consider working your established DDACTS area for at least a year barring a re-examination of the data that would suggest the historically disproportionate amount of crime and crashes are in fact occurring elsewhere.
11. Operational maps should be created in such a way as to demonstrate density, either by graduated symbols, a heat map, or another means of displaying areas of concentration. This will aid in the visualization of "hot spots".
12. Make the most of the opportunity for remote analytical/technical assistance offered as part of the project, which can provide your agency with a variety of assistance.

Integration of DDACTS zones with STEP program

Considering the significant changes to the STEP program occurring in FY 2019 (beginning October 2018) to

include a renewed emphasis on law enforcement officials performing “quality” motor vehicle stops in areas where the agency’s data suggests there is an issue, and the TxDOT’s strong support for agencies to adopt the tenants of the Data Driven Approaches to Crime and Traffic Safety (DDACTS) model a review was conducted for possible integration of proposed DDACTS zones with the STEP zones submitted to the TxDOT for targeted enforcement in FY 2019. (see Appendixes B -F)

Which areas should be considered

The STEP enforcement zones created by Amarillo Police Department for FY 2019 were reviewed and although, the configuration of the current STEP maps (PDFs in two different counties) do not allow for a single multi-layered map to be created, some overlaps seem to be visible. While viewing both sets of maps it appears that STEP Zone 5 is in close proximity to the current DDACTS Zone 3, which has had the greatest success to date in reducing crime but not crashes. STEP Zone 1 also appears to be in close proximity to the current DDACTS Zone 2, which looking at figure 1 above clearly has the highest level of criminal activity, and the ongoing efforts have had some success with driving down some types criminal offenses.

Keeping in mind, one of the tenants of the DDACTS model that was discussed at length was in order to be able to correct a long-term problem (change people’s behavior) it takes a sustained effort on the part of the agency and not just a periodic one. During the agency’s workshop last year various potential obstacles that may impact a successful implementation of the DDACTS model in the city were discussed, to include staffing resources. Fortunately, the changes in the STEP program is affording an agency the opportunity to overcome some of the staffing shortfall by providing funding to put resources in the area(s) being disproportionately impacted by social harms (crashes and crime).

Determining the Number of STEP Enforcement Zones

Recommending the number of STEP Enforcement Zones is based on a formula that attempts to create approximately seventy (70) motor vehicle stops per zone per enforcement period. This approximate number of stops per zone per month is based on research on law enforcement agencies from five (5) states including Texas indicates that crash reduction begins to occur once an agency makes seven (7) motor vehicle stops per crash. Since KA crashes typically make up approximately 1.5% of all crashes, approximately 66.67 stops or twenty-seven (27) STEP patrol hours, should be required to reduce each KA crash. Agencies can supplement their STEP patrolling in these areas with regular patrols as well to provide additional stops. Reductions in crashes should be greater when the vehicle stops are targeted on data-driven areas, but also depend on the quality and consistency of those stops over time. Agencies making motor vehicle stops which maximize the deterrent effect on crashes and criminal behaviors by making stops when the agency’s data reveals to be the peak times of day and days of the week are most likely to experience the greatest reductions in social harms (crashes and crimes).

For all the reasons, as well as limited agency resources, Amarillo Police Department may want to reconsider the focus of it STEP program for FY 2019 and reduce the number of targeted STEP zones. By reducing the number of zones from five (5) to three (3) it will allow for a more concentrated effort in those areas and will not stretch the STEP funded hours, and thereby the manpower, even thinner. With the increased STEP hours utilized and by raising the awareness of the on-duty staffing to make MV contacts in these areas the chances of statistically significant outcomes for both crashes and crime are greatly increased. Further, it is important to point out that not only will TxDOT allow, but it encourages, agencies to make changes to its STEP zones after they been submitted as long as the revised zones are based on a data driven approach, which your changes most certainly are.

Targeted Areas

In reviewing of the data and maps available at this point it not clear if any of the five (5) STEP Zones would line up directly with the established four (4) DDACTS Zones. It would appear as though STEP Zone 1 and DDACTS Zone 2 are in close proximity and STEP Zone 5 and DDACTS 3 are also in the same vicinity. With some minor adjustments made to the boundaries of both the STEP and DDACTS Zones, both areas would therefore benefit

from a data driven and high visibility MV centric strategy. However, this is in no way to say the other identified zones do not deserve any attention of the agency. **Note:** The above is predicated upon the previously discussed re-examination of agency's crash and crime data and it being overlaid on one mapping product produces no changes to the current areas.

Closing:

The analysis conducted within this case study is an illustration of the continuing efforts being put forward not just by the newly created and energetic Crime Analysis Unit, but by the agency overall. Amarillo's successes in this early stage of DDACTS implementation should serve to demonstrate the importance of using data to determine the best position to place police resources in order to have the greatest impact on both crime and crashes. Amarillo should look forward to continuing and increasing success as it makes the necessary adjustment to its implementation.

IADLEST stands prepared to assist the Amarillo Police Department to greatest extent possible in any one of number of ways and such the agency is strongly encouraged to reach out should anyone have any questions/issues for which we could help, i.e. analytical support, operational questions, etc.

Appendix A

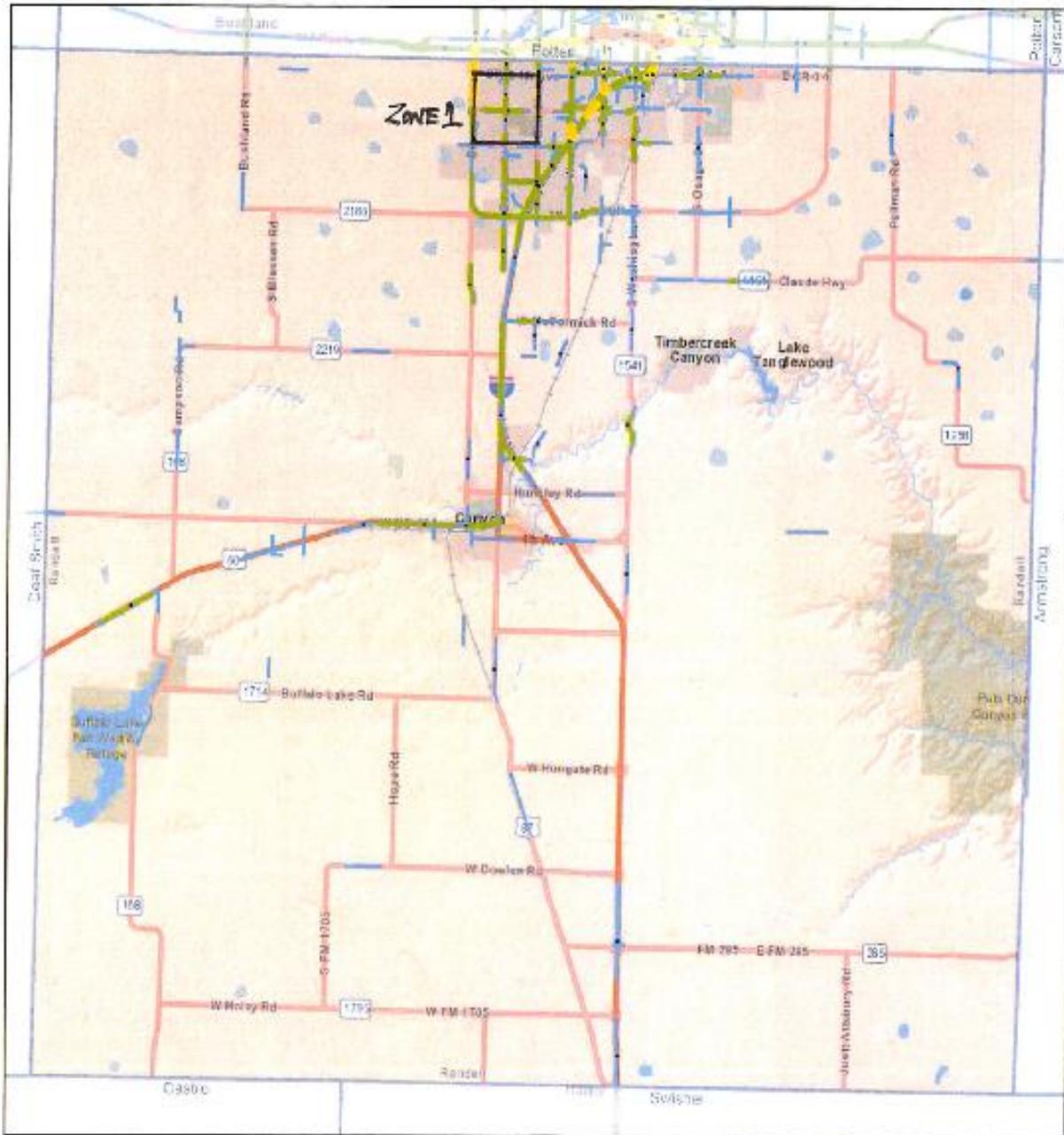
Citywide	P1	P2	P3	P4	P5	AVE	STD Dev	Normal Range	Post DDACTS	5 Period Average: Percent Change
Part 1 Crime	4974	5404	5290	5602	4976	5249	245.14	5004-5494	5552	6%
Robbery	135	142	141	123	109	130	12.49	118-142	132	2%
Burglary	831	942	884	862	765	857	58.51	798-915	868	1%
Auto Theft	365	408	425	481	469	430	42.08	388-472	507	18%
Theft from MV	1165	1029	1154	1012	1061	1084	63.56	1021-1148	1188	10%
Total Selected	2496	2521	2604	2478	2404	2501	64.76	2436-2565	2695	8%
Crashes	2626	2842	2740	2800	2649	2731	83.56	2648-2815	2781	2%
Calls for Service	63558	63128	53304	52915	55472	57675	4710.87	52965-62386	52550	-9%
Car Stops	1290	1354	1409	1719	1869	1528	225.32	1303-1754	1754	15%

Zone 1	P1	P2	P3	P4	P5	AVE	STD Dev	Normal Range	Post DDACTS	5 Period Average: Percent Change
Part 1 Crime	172	156	223	224	153	186	31.61	154-217	201	8%
Robbery	7	1	7	14	7	7	4.12	3-11	10	39%
Burglary	31	30	43	49	25	36	8.94	27-45	47	32%
Auto Theft	15	10	15	18	13	14	2.64	12-17	20	41%
Theft from MV	18	16	44	34	18	26	11.10	15-37	20	-23%
Total Selected	71	57	109	115	63	83	24.17	59-107	97	17%
Crashes	78	96	100	85	84	89	8.14	80-97	76	-14.22%
Calls for Service	3182	3082	4230	4249	4247	3798	544.75	3253-4343	4399	16%
Car Stops	101	147	169	206	205	166	39.28	126-205	215	30%

Zone 2	P1	P2	P3	P4	P5	AVE	STD Dev	Normal Range	Post DDACTS	5 Period Average: Percent Change
Part 1 Crime	313	316	290	296	284	300	12.62	287-312	299	0%
Robbery	3	14	11	7	8	9	3.72	5-12	9	5%
Burglary	28	23	42	26	24	29	6.92	22-36	45	57%
Auto Theft	28	20	16	19	19	20	4.03	16-24	20	-2%
Theft from MV	83	83	70	71	70	75	6.22	69-82	53	-30%
Total Selected	142	140	139	123	121	133	9.06	124-142	127	-5%
Crashes	118	103	96	103	107	105	7.23	98-113	113	7%
Calls for Service	1969	1816	2311	2403	1935	2087	228.25	1859-2315	2064	-1%
Car Stops	52	65	82	91	122	82	23.95	58-106	164	99%

Appendix B

Randall County Fatal/Incap (K/A) Crashes 8/1/2014 through 7/31/2017



3.5 Miles

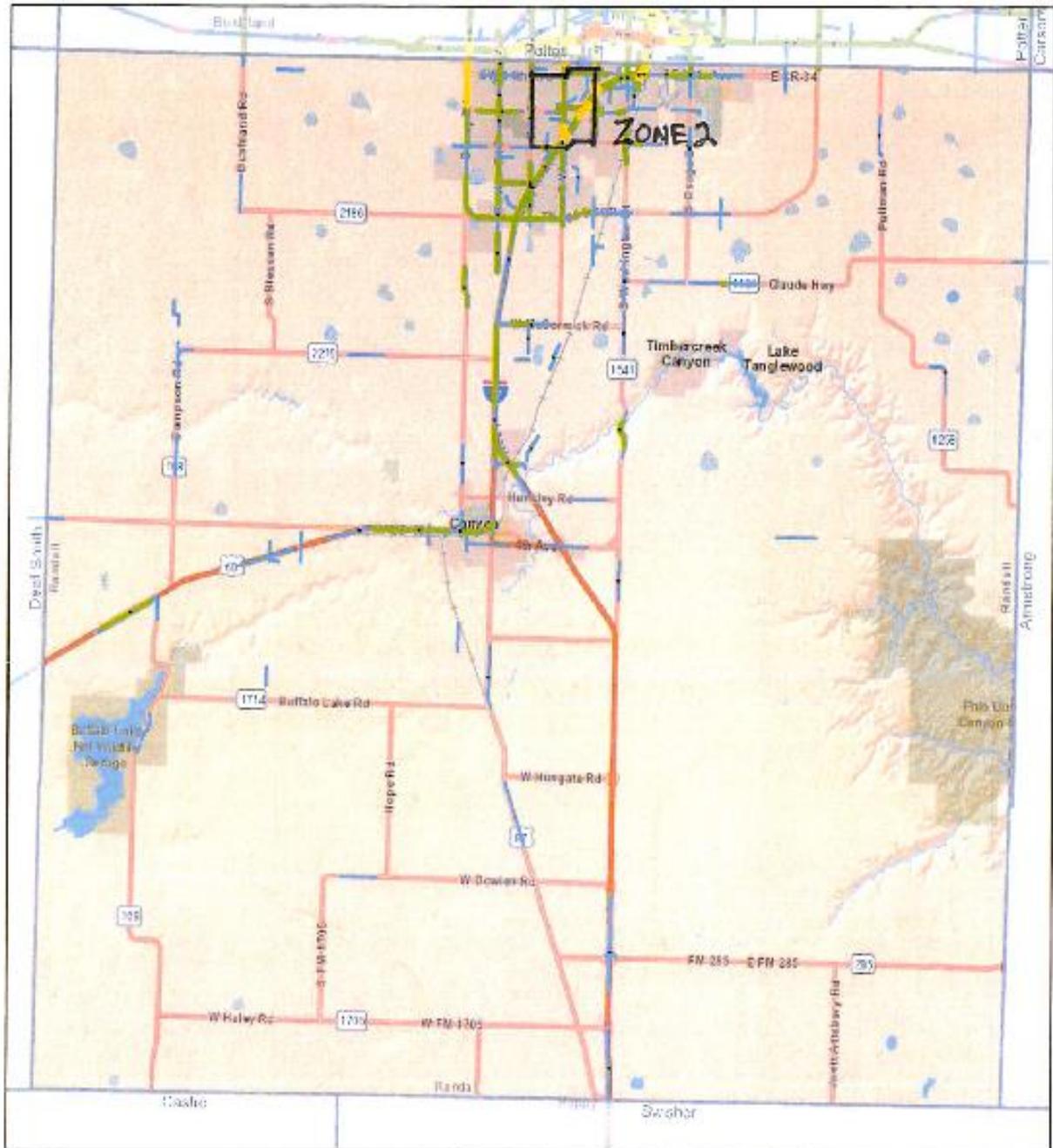


Fatal (K) and Incapacitating (A) crashes used for analysis occurred from 8/1/2014 through 7/31/2017. Data current as of 8/2017. K/A crashes are snapped to closest Open Street Map roadway and frequency is calculated within 1 minute drivetime ahead of and behind any given location.
Sources: TxDOT CRIS, Open Street Map

1 Yr K/A Crash (8/1/2014 - 7/31/2017)
3 Yr K/A Crashes Within 1 Min Drivetime:

Appendix C

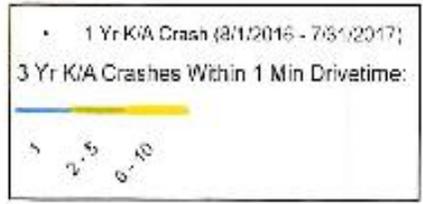
Randall County Fatal/Incap (K/A) Crashes 8/1/2014 through 7/31/2017



3.5 Miles

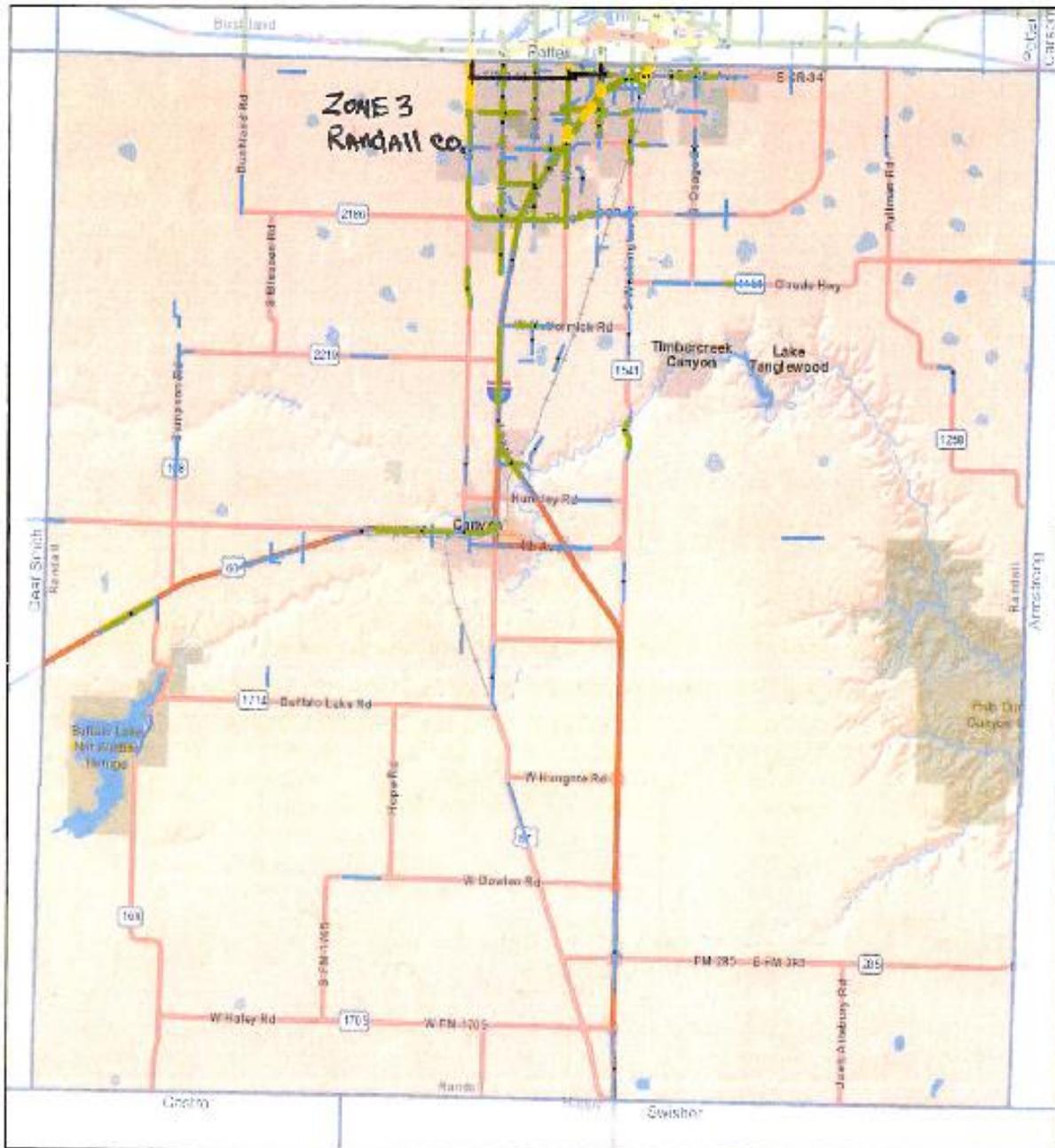


Fatal (K) and Incapacitating (A) crashes used for analysis occurred from 8/1/2014 through 7/31/2017; Data current as of 8/2017. K/A crashes are snapped to closest Open Street Map roadway and frequency is calculated within 1 minute drivetime ahead of and behind any given location.
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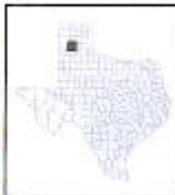


Appendix D

Randall County Fatal/Incap (K/A) Crashes 8/1/2014 through 7/31/2017



3.5 Miles



Fatal (K) and incapacitating (A) crashes used for analysis occurred from 8/1/2014 through 7/31/2017; Data current as of 9/2017. K/A crashes are snapped to closest Open Street Map roadway and frequency is calculated within 1 minute drivetime ahead of and behind any given location.
Sources: TxDOT CRIS; Open Street Map

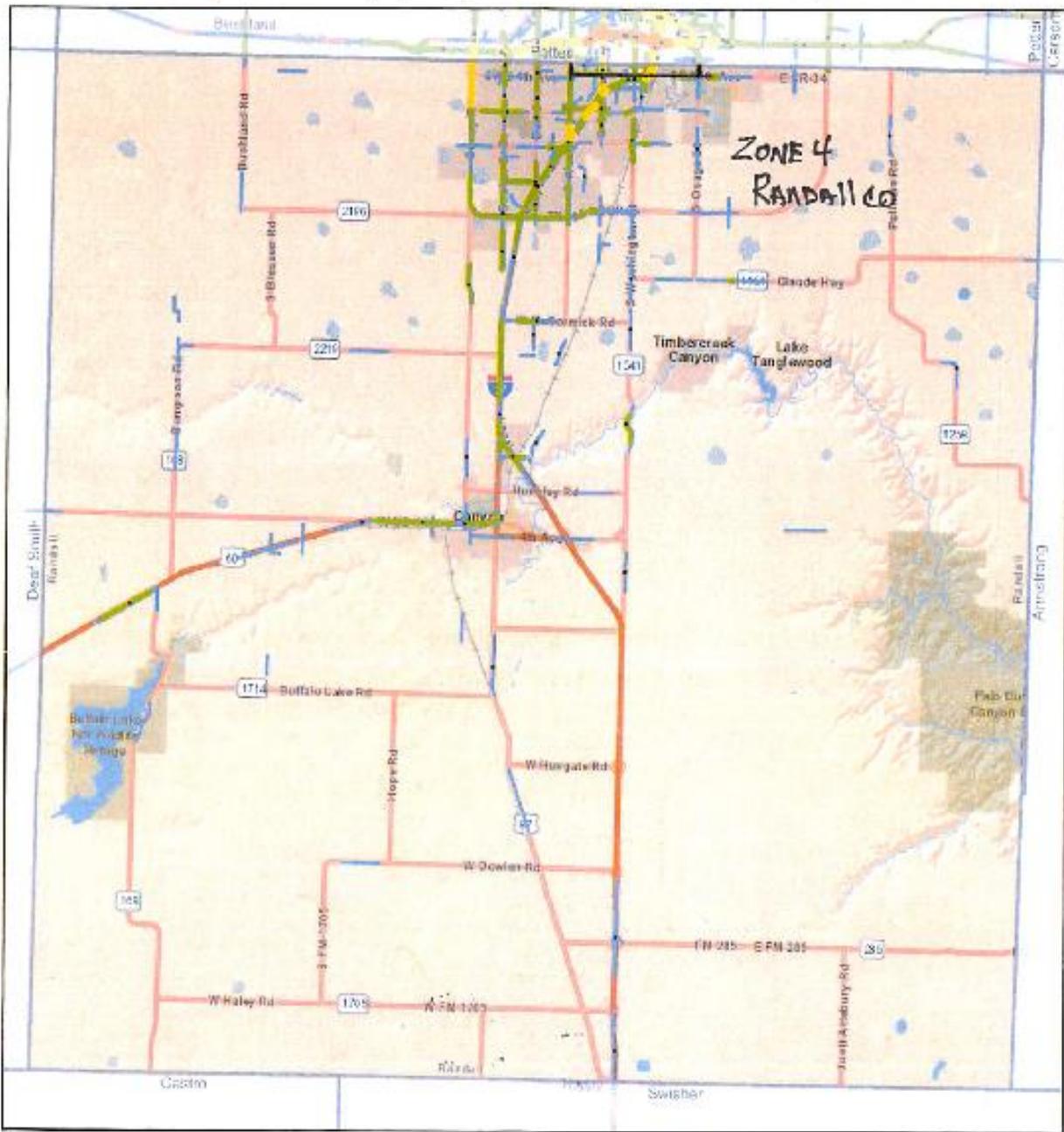
- 1 Yr K/A Crash (8/1/2016 - 7/31/2017)

3 Yr K/A Crashes Within 1 Min Drivetime:

0 2.5 5 7.5 10

Appendix E

Randall County Fatal/Incap (K/A) Crashes 8/1/2014 through 7/31/2017



0 1 2 Miles



Fatal (K) and Incapacitating (A) crashes used for analysis occurred from 8/1/2014 through 7/31/2017; Data current as of 9/20/17. KIA crashes are snapped to closest Open Street Map roadway and frequency is calculated within 1 minute drivetime ahead of and behind any given location.
Sources: TXDOT CRIS; Open Street Map

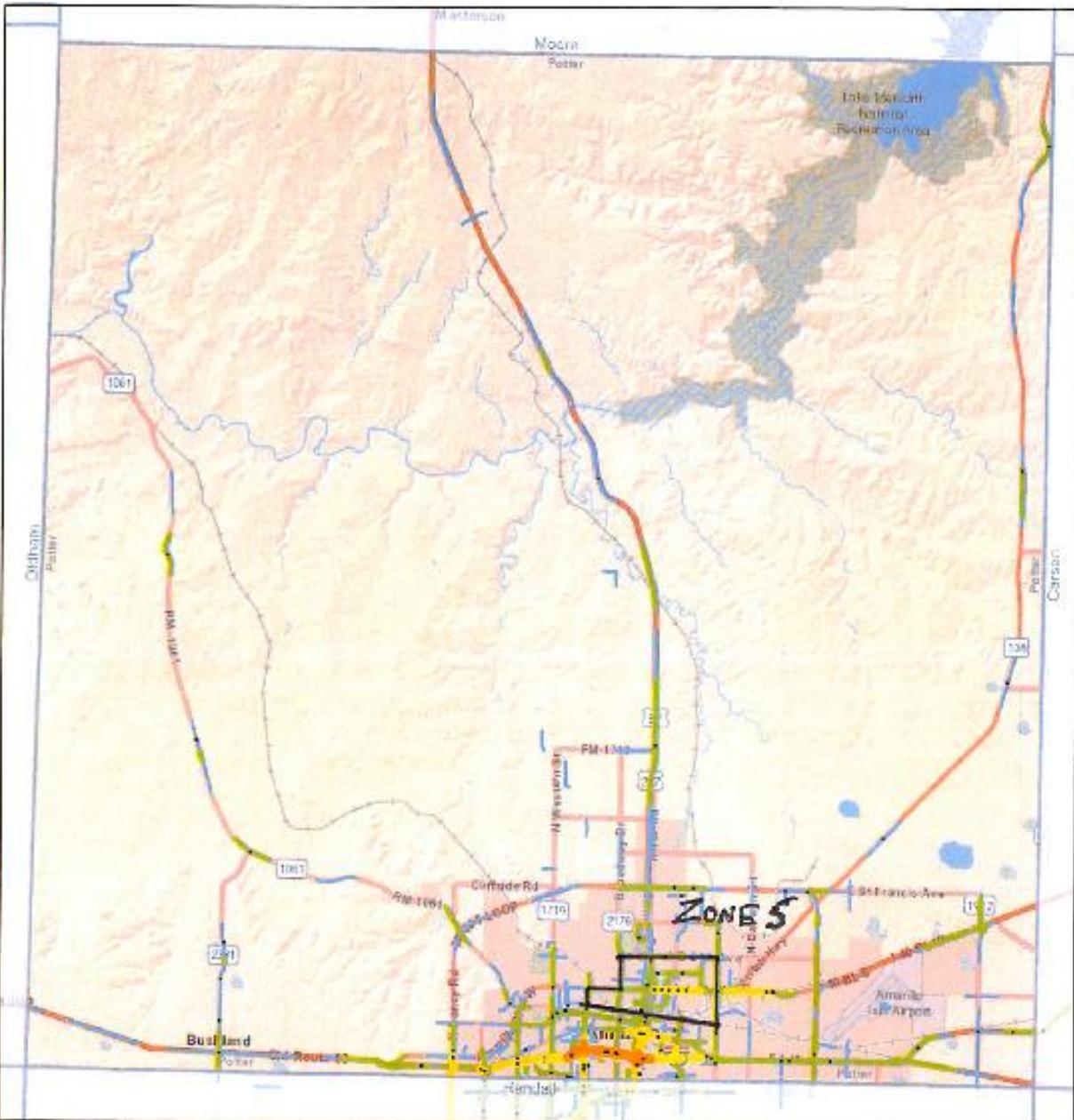
- 1 Yr KIA Crash (8/1/2016 - 7/31/2017)

3 Yr KIA Crashes Within 1 Min Drivetime.

1 2 3 4 5 6 7 8 9 10

Appendix F

Potter County Fatal/Incap (K/A) Crashes 8/1/2014 through 7/31/2017



3.5 Miles



Fatal (K) and Incapacitating (A) crashes used for analysis occurred from 8/1/2014 through 7/31/2017; Data current as of 9/2017. K/A crashes are snapped to closest Open Street; Map roadway and frequency is calculated within 1 minute drivetime ahead of and behind any given location.
Sources: TxDOT CRIS; Open Street Map

