CITY OF MANTECA

Local Road Safety Plan (LRSP)

FINAL REPORT

FOR

CITY OF MANTECA
LOCAL ROAD SAFETY PLAN (LRSP)

JUNE 13, 2023

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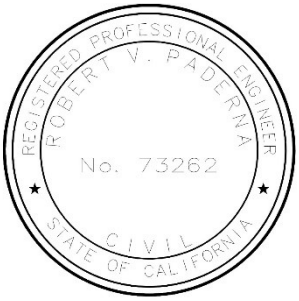

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By signing and stamping this Local Road Safety Plan, the engineer is attesting to this report's technical information and engineering data upon which local agency's recommendations, conclusions, and decisions are made.

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A	Serious Injury Crash
AASHTO	American Association of State Highway and Transportation Officials
ARIDE	Advance Roadside Impaired Enforcement
ATP	Active Transportation Program
B	Non-incapacitating Injury Crash
BCR	Benefit/Cost Ratio
C	Possible Injury Crash
Caltrans	California Department of Transportation
CCR	Critical Crash Rate
CMF	Crash Modification Factor
CRF	Crash Reduction Factor
CTC	California Transportation Commission
DEV	Daily Entering Volume
DRE	Drug Recognition Expert
EPDO	Equivalent Property Damage Only
FARS	Fatality Analysis Reporting System
FAST	Fixing America's Surface Transportation Act
FHWA	Federal Highway Administration
GIS	Geographic Information System
HFST	High Friction Surface Treatment
HSIP	Highway Safety Improvement Program
HSM	Highway Safety Manual
IIP	Interregional Improvement Program
ITIP	Interregional Transportation Improvement Program
K	Fatal Crash
K+SI	Fatal and Serious Injury Crashes
LPI	Leading Pedestrian Interval
LRSM	Local Roadway Safety: A Manual for California's Local Road Owners (Version 1.6, April 2022)
LRSP	Local Road Safety Plan
NHTSA	National Highway Traffic Safety Administration
O	No Injury Crash (Property Damage Only)

OTS	Office of Traffic Safety
PDO	Property Damage Only
RRFB	Rectangular Rapid Flashing Beacon
SB1	California Senate Bill 1
SHSP	Strategic Highway Safety Plan
STIP	State Transportation Improvement Program
SWITRS	Statewide Integrated Traffic Records System
VMT	Vehicle Miles Traveled

1. INTRODUCTION

The City of Manteca is in Central Valley of California, located between the cities of Stockton and Modesto in San Joaquin County. The City has a population of approximately 85,800 and covers 21.4 square miles. The City's transportation network includes 328 miles of City-maintained roads and 71 traffic signals located primarily on key arterial and collector roadways.

This Local Roadway Safety Plan (LRSP) identifies emphasis areas to inform and guide further safety evaluation of the City's transportation network. The emphasis areas include type of crash, certain locations, and notable relationships between current efforts and crash history. The LRSP analyzes crash data on an aggregate basis, as well as at specific locations to identify Citywide safety trends, high-crash locations, high-risk locations, and locations with unusual crash patterns or high-crash severities. The analysis of crash history throughout the City's transportation network allows for opportunities to:

- Identify safety factors in the transportation network that may be challenging for various roadway users
- Improve safety at specific high-crash and high-risk locations
- Develop safety measures aligning with the California Strategic Highway Safety Plan (SHSP) **Five Es of safety: Engineering, Enforcement, Education, Emergency Services, and Emerging Technologies**, to encourage safer driver behavior and reduce fatal and serious injury crashes

The process and analysis performed in development of the City's LRSP, including establishing the initial vision and goals for the LRSP, performing crash history analysis, identification of emphasis areas and recommended engineering and non-engineering safety countermeasures, are summarized in this LRSP. The information compiled provide a foundation for decision making and prioritization for safety countermeasures and projects that enhance safety for all modes of travel within the City.

This LRSP analyzes the most recent range of crash data that was available at the start of the project (January 1, 2017 – December 31, 2021) and roadway improvements to assess historic trends, crash patterns, and areas of increasing concern.

The intent of the LRSP is to:

- Create a greater awareness of road safety and risks
- Reduce the number of fatal and serious injury crashes
- Develop lasting partnerships through collaboration among professionals in various disciplines
- Support for grant funding applications
- Assist in prioritizing investments in traffic safety throughout the City's transportation network

1.1. Document Organization

The LRSP is organized into the following sections:

Section 1	Provides an introduction to the LRSP.
Section 2	Presents the vision, goal, and objectives for the LRSP.
Section 3	Summarizes the LRSP development process including guidance documents and analysis techniques.
Section 4	Presents the project stakeholders and stakeholder engagement.
Section 5	Summarizes the review of City planning documents.
Section 6	Contains the LRSP data sources.
Section 7	Provides a summary of safety trends.
Section 8	Includes recommended engineering and non-infrastructure countermeasures.
Section 9	Summarizes the evaluation and implementation of the safety countermeasures.
Section 10	Identifies next steps.
Appendices	

2. VISION, GOAL, AND OBJECTIVES

This LRSP evaluates the transportation network as well as non-infrastructure programs and policies within the City. Mitigation measures are evaluated using criteria to analyze the safety of road users (drivers and passengers, bicyclists, and pedestrians), the interaction of travel modes, and the potential benefits of safety countermeasures. This effort is also intended to use historical data to identify trends and develop a toolbox of countermeasures applicable to conditions in the City that can be used for proactive identification and implementation of opportunities, without relying solely on a reaction and response to crashes as they occur.

The Federal Highway Administration (FHWA) maintains a list of Proven Safety Countermeasures. The list currently contains twenty (20) Proven Safety Countermeasures, one of which is the development of a LRSP. Implementation of LRSPs has improved safety in local jurisdictions across the country by providing a guide for local jurisdictions to systemically address the conditions that are known to contribute to fatal and serious injury crashes. LRSPs provide a locally developed and customized "roadmap" to directly address the jurisdictions' most common safety challenges.

Following discussions with City staff and a review of existing plans and policies for the area, the following Vision, Goal, and Objectives were established for this LRSP:

	Vision: **Support the California vision of moving towards significantly reducing fatalities and serious injuries for all road users**
	Goal: Identify transportation safety initiatives (projects and programs) and partnerships under the 5 Es of traffic safety including Engineering, Enforcement, Education, Emergency Response, and Emerging Technologies, to continue reducing fatalities and serious injuries in the City of Manteca.
	Objectives: ▪ Identify major contributing factors to crashes and define priority locations for roadway safety improvements ▪ Identify cost-effective countermeasures and safety investments that can be applied systemically ▪ Promote safe, equitable, and multimodal mobility opportunities ▪ Create an LRSP document to capitalize on established safety initiatives and identify other strategies to prioritize safety investments ▪ Continuing documentation of the City of Manteca's procedures for continuing crash data monitoring ▪ Document proposed countermeasures, implementation considerations, and benefit/cost for priority locations identified through this study to aid in the evaluation and preparation of grant applications

3. PROCESS

Using a network screening process, locations within the City's roadway network that would most likely benefit from safety enhancements were identified. Using historical crash data, crash risk factors for the entire City were explored. These outcomes would help inform the identification and prioritization of engineering and non-infrastructure safety measures that are most likely to improve roadway safety in the City of Manteca. The following sections describe the data analysis process.

Guidance on the LRSP process is provided at both the national (FHWA) and California Department of Transportation (Caltrans) level. Both agencies have developed a general framework of data and recommendations to be included in a LRSP.

The FHWA encourages:

- The establishment of a working group (Stakeholders) to participate in developing an LRSP
- Review crash, traffic, and roadway data to identify areas of concern
- Establish goals, priorities, and countermeasures to recommend improvements at spot locations, systemically, and comprehensively

Caltrans' guidance follows a similar outline with the following steps:

- Establish leadership
- Analyze the safety data
- Determine emphasis areas
- Identify strategies
- Prioritize and incorporate strategies
- Evaluate and update the LRSP

This LRSP documents the results of data and information obtained, including the vision, goal, and objectives for the LRSP; existing safety efforts; crash data analysis; emphasis areas; and safety improvements for priority locations identified throughout the City. Furthermore, the development of the LRSP recommendations considers the "Five Es" of traffic safety defined by the California SHSP: Engineering, Enforcement, Education, Emergency Response, and Emerging Technologies throughout its process.

3.1. Guiding Manuals

The following section describes the analysis process undertaken to evaluate safety within the City at a systemic level. Using a network screening process, locations within the City that will most likely benefit from safety enhancements were identified. Using historical crash data, crash risk factors for the entire network are derived. The outcomes inform the identification and prioritization of engineering and non-infrastructure safety countermeasures that address certain roadway characteristics and related behaviors that contribute to motor vehicle crashes as well as crashes involving active transportation users.

This process uses the latest National and State best practices for statistical roadway analysis described in the following sections.

3.1.1. *Local Roadway Safety: A Manual for California's Local Road Owners*

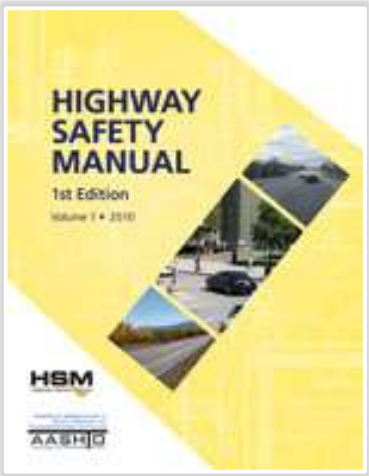
The *Local Roadway Safety: A Manual for California's Local Road Owners* (Version 1.6, April 2022) (LRSM) purpose is to encourage local agencies to pursue a proactive approach to identifying and analyzing safety issues, while preparing to compete for project funding opportunities. A proactive approach is defined as analyzing the safety of the entire roadway network through either a one-time, network-wide analysis, or by routine analyses of the roadway network.

According to the LRSM, "The California Department of Transportation (Caltrans) – Division of Local Assistance is responsible for administering California's federal safety funding intended for local safety improvements."

To provide the most benefit and to be competitive for grant funding, the analysis leading to countermeasure selection should focus on both intersections and roadway segments, and be considerate of roadway characteristics and traffic volumes. The result should be a list of locations that are most likely to benefit from cost-effective countermeasures, preferably prioritized by benefit/cost ratio (BCR). The LRSM suggests using a mixture of quantitative and qualitative measures to identify and rank locations that considers both crash frequency and crash rates. These findings should then be screened for patterns such as crash types and severity to aid in the determination of issues causing higher numbers of crashes and the potential countermeasures that could be most effective. Qualitative analysis should include field visits and a review of existing roadway characteristics and traffic control devices. The specific roadway context can then be used to assess what conditions may increase safety risk at the site and systematic level.

Countermeasure selection should be supported using Crash Modification Factors (CMFs). These factors are the peer reviewed product of before and after research that quantifies the expected rate of crash reduction that can be expected from implementation of a given countermeasure. If more than one countermeasure is under consideration, the LRSM provides guidance on how to apply multiple CMFs appropriately.

3.1.2. *Highway Safety Manual*



The American Association of State Highway and Transportation Officials (AASHTO) *Highway Safety Manual (HSM)*, published in 2010, presents a variety of methods for quantitatively estimating crash frequency or severity at a variety of locations. This four-part manual is divided into Parts: A) Introduction, Human Factors, and Fundamentals, B) Roadway Safety Management Process, C) Predictive Method, D) Crash Modification Factors.

Chapter 4 of Part B of the HSM discusses the Network Screening process. The Network Screening Process is a tool for an agency to analyze their entire network and identify/rank locations that, based on the implementation of a countermeasure, are most likely to least likely realize a reduction in the frequency of crashes.

The HSM identifies five steps in this process:

1. ***Establish Focus:*** *Identify the purpose or intended outcome of the network screening analysis. This decision will influence data needs, the selection of performance measures and the screening method that can be applied.*
2. ***Identify Network and Establish Reference Populations:*** *Specify the types of sites or facilities being screened (i.e., segments, intersections, geometrics) and identify groupings of similar sites or facilities.*
3. ***Select Performance Measures:*** *There are a variety of performance measures available to evaluate the potential to reduce crash frequency at a site. In this step, the performance measure is selected as a function of the screening focus and the data and analytical tools available.*
4. ***Select Screening Method:*** *There are three principal screening methods described in this chapter (i.e., ranking, sliding window, peak searching). Each method has advantages and disadvantages; the most appropriate method for a given situation should be selected.*
5. ***Screen and Evaluate Results:*** *The final step in the process is to conduct the screening and analysis and evaluate the results.*

The HSM provides several statistical methods for screening roadway networks to identify high risk locations based on overall crash histories. In addition to identifying the total number of crashes, this LRSP uses a method referred to as Critical Crash Rate (CCR) to analyze the data.

3.2. Analysis Techniques

3.2.1. *Crash and Network Screening Analysis*

Intersections and roadways were analyzed using four crash metrics:

- *Number of Crashes*
- *CCR (HSM Ch. 4)*
- *Probability of Specific Crash Types Exceeding Threshold Proportion (HSM Ch. 4)*
- *Equivalent Property Damage Only (HSM Ch. 4)*

The initial steps of the crash analysis established sub-populations of roadway segments and intersections that have similar characteristics. For this LRSP, intersections were grouped by their control type (Signalized or Unsignalized) and segments by their roadway category (Principal Arterial, Minor Arterial, Major Collector, Minor Collector, and Local). Individual crash rates were calculated for each sub-population. The population level crash rates were then used to assess whether a specific location has more or fewer crashes than expected. These sub-populations were also used to determine typical crash patterns to help identify locations where unusual numbers of specific crash types are occurring.

The network screening process ranks intersections and roadway segments by the number of crashes that occurred at each one over the analysis period, and then identifies areas that had more of a given type of crash than would be expected for that type of location. These crash type factors were:

- ***Crash severity*** *- fatal, serious injury, other visible injury, complaint of pain, and property damage only (PDO)*
- ***Crash type*** *- broadside, rear-end, sideswipe, head-on, hit object, overturned, bicycle, pedestrian, and other*
- ***Environmental factors*** *– lighting and wet roads*
- ***Driver behavior*** *- impaired, aggressive, and distracted driving*

From the results of the network screening analyses, a short-list of locations was chosen based on crash activity, CCR, crash severity, crash patterns, location type, and area within the City to provide the greatest variety of locations covering the widest range of safety opportunities for toolbox development. The intent is to populate the safety toolbox with mitigation measures that will be applicable to most of the crash activity in the City.

3.2.2. *Critical Crash Rate (CCR) Analysis*

Reviewing the number of crashes at a location is a good way to understand the cost to society incurred at the local level, but does not provide a complete indication of the level of risk for those who use that intersection or roadway segment on a daily basis. The HSM describes the CCR method, which provides a statistical review of locations to determine where risk is higher than that experienced by other similar locations. It is also the first step in analyzing for patterns that may suggest systemic issues that can be addressed at that location, and proactively at others to prevent new safety challenges from emerging.

The CCR analysis compares the observed crash rate to the expected crash rate at a particular location based on facility type and traffic volume using a locally calculated average crash rate for the specific type of intersection or roadway segment being analyzed. Based on traffic volumes and a weighted Citywide crash rate for each facility type, a critical crash rate threshold is established at the 95-percent confidence level to determine locations with higher crash rates that are unlikely to be random. The threshold is calculated for each location individually based on its traffic volume and the crash profile of similar facilities. A CCR value of greater than zero reflects a location that has a higher crash rate than facilities with similar volumes, while a negative CCR value signifies a below-average crash rate. It should be noted that the CCR does not reflect the severity of the crashes occurring at the location, but rather the number of crashes for the given volume.

Critical Crash Rate Formula

$$R_{c,i} = R_a + \left[P \times \sqrt{\frac{R_a}{MEV_i}}\right] + \left[\frac{1}{(2\times(MEV_i))}\right]$$

Where,

$R_{c,i}$ = Critical crash rate for intersection i

R_a = Weighted average crash rate for reference population

P = P-value for corresponding confidence level

MEV_i = Million entering vehicles for intersection i

Source: Highway Safety Manual

Data Needs

CCR is calculated using:

- *Daily Entering Volume (DEV) for intersections, or Vehicle Miles Traveled (VMT) for roadway segments*
- *Intersection control types to separate them into like populations*
- *Roadway functional classification to separate them into like populations*
- *Crash records in Geographic Information Systems (GIS) or tabular form including coordinates or linear measures*

Strengths

- *Reduces low volume exaggeration*
- *Considers variance*
- *Establishes comparison threshold*

Weaknesses

- *Does not account for regression to the mean bias*

3.2.3. *Probability of Specific Crash Types Exceeding Threshold Proportion*

When analyzing crash data systematically, it is important to identify areas where certain types of crashes are occurring with greater frequency. The HSM describes a method of identifying locations where probability of a specific crash type exceeds the threshold population. This method prioritizes locations based on the probability that the true proportion (long-term predicted proportion) of a type of crash or injury level will exceed the threshold proportion. The threshold proportion is based on the proportion of a specific crash type/severity to all crashes within the dataset (HSM, Chapter 4). This analysis identifies locations where certain crash types are over-represented to be isolated for further analysis.

3.2.4. *Equivalent Property Damage Only (EPDO)*

The EPDO method is described in the HSM. This method assigns weighting factors to crashes based on injury level (fatal, non-fatal injury, no injury) to develop a property damage only score.

In this analysis, the injury crash costs were calculated for each location (based on the latest Caltrans injury costs). This value is then divided by the injury cost for a PDO crash. The resulting number is the equivalent number of property damage only crashes at each site. This value allows all locations to be compared based on injury crash costs (HSM, Chapter 4).

EPDO Formula:

$$EPDO = \frac{(N_F + N_S) * 2{,}843{,}000 + (N_O * 159{,}900) + (N_C * 90{,}900) \ + (N_{PDO} * 14{,}900)}{14{,}900}$$

Where,

EPDO = Equivalent Property Damage Only (in units of crashes)

N_F = Number of fatal crashes

N_S = Number of serious injury crashes

N_O = Number of other visible injury crashes

N_C = Number of complaint of pain crashes

N_{PDO} = Number of PDO crashes

The cost to society for each crash type along non-signalized intersections is as follows:

- *Fatal: $2,843,000*
- *Serious: $2,843,000*
- *Other Visible Injury: $159,900*
- *Complaint of Pain: $90,900*
- *PDO: $14,900*

Source: Highway Safety Manual

To give an example from **Appendix B**, the intersection of Arrowsmith Drive and Lathrop Road experienced 10 crashes from 2017 to 2021. The crashes are broken down by severity as follows: 1 fatal crash, 1 crash resulting in serious injuries, 0 crashes resulting in other visible injuries, 4 crash resulting in complaint of pain, and 4 PDO crashes.

$$EPDO = \frac{(1 + 1) * 2{,}843{,}000 + (0 * 159{,}900) + (4 * 90{,}900) \ + (4 * 14{,}900)}{14{,}900} = 410$$

The 10 crashes of ranging severity that took place at the intersection of Arrowsmith Drive and Lathrop Road comprise the monetary equivalent of 410 PDO crashes. This intersection has a CCR Differential value of 0.06. Together the EPDO and CCR Differential values demonstrate that the intersection has historically had a relative crash rate that is slightly higher than average for similar facilities, and that that the crashes that have occurred at this intersection have generally resulted in significant injuries. Locations with fatal and serious injury crashes will have a higher EPDO value compared to locations with less serious (or non-injury) crashes.

4. STAKEHOLDER ENGAGEMENT

As part of the LRSP, local stakeholders were included in the process to ensure local perspective was kept at the forefront of this planning effort. A stakeholder group comprised of City staff and external stakeholders was formed. This group consisted of members of City staff representing engineering, Street Division, ADA/Bicycle/Pedestrian Advocate, and transit, as well as representatives from the Manteca Police Department.

The stakeholders were called together to offer insight on the safety concerns present in the City's transportation network. The summary of the stakeholder meetings is provided below.

4.1. Stakeholder Meetings

A project stakeholder workshop was conducted on February 1, 2023. At the virtual workshop, the LRSP stakeholder group was introduced to the project and provided an overview of the data used, data analysis approach, preliminary analysis results and priority/emphasis areas identified. In addition to the LRSP overview, stakeholders were asked to provide local insight and knowledge for several "priority" locations that were identified after the initial network screening and crash data analysis process.

Additionally, the stakeholder group met in the field in March 2023, at 13 "priority" locations selected based on the crash analysis and stakeholder input. This meeting provided an opportunity to perform a field assessment and offer another opportunity to solicit feedback from members of the multidisciplinary stakeholder group. Potential safety countermeasures for each location were recommended and discussed at the field review meeting.

5. REVIEW OF CITY PLANNING DOCUMENTS

Existing plans, policies, and projects that were recently completed, planned, or are on-going within the City were compiled at the start of the LRSP process to gain perspective on the existing efforts for transportation-related improvements within the City. High-level key points regarding transportation improvements and safety-related topics were identified to inform decision making in this LRSP.

The following planning documents were reviewed to obtain planned and programmed projects:

- Manteca General Plan Update, 2023
- Manteca Active Transportation Plan, 2020
- SJCOG Regional Transportation Plan/Sustainable Communities Strategy, 2022
- State Route 120/McKinley Avenue Interchange Project, 2014
- City of Manteca Traffic Calming Program, 2018
- State Route 99/120 and Austin Road Interchange Connector Project, 2023
- SJCOG Measure K Adopted Projects, 2017

A matrix identifying plans and improvements is included in **Appendix A**. The intent of this matrix is to provide an idea of the types of strategies in place or encouraged by the City and to reveal projects that may impact the safety analysis process.

6. DATA SOURCES

The following data was obtained from the City for use in crash data analysis.

6.1. Roadway Network

The collision analysis, which is described in detail in **Section 3**, used California Department of Transportation's (Caltrans') roadway classification system. The roadway network classification was assigned to each corridor roadway segment as either a major arterial, minor arterial, collector, or local road to develop crash rates specific to the functional design and capacity. Comparative statistics were stratified by roadway classification (i.e., only major arterials are compared to major arterials).

6.2. Intersections

The crash analysis also required each intersection within the City to be classified by control type. Intersections throughout the City were classified as either signalized or unsignalized. The safety analysis also only compared intersection safety performance with similar control types (i.e., signalized intersections are only compared to signalized intersections) within the City.

6.3. Crashes

Crash data for the most recent five-year period from January 1, 2017 through December 31, 2021 was used for the crash analysis. Using data for the past five-year period is sufficient to identify potential trends in crashes by location and type, while not being outdated as to have data that would include long-term technology and cultural changes. The crash data was obtained from Crossroads Software, which processes crash records from the Manteca Police Department. Crossroads provides the most up-to-date law enforcement records and geocodes them into a GIS format that can be used in the network screening process. Crash records were allocated to intersections and the roadway network segments.

7. SAFETY TRENDS

The following sections contain the results of the analysis process which included evaluation of fatal and serious injury (K+SI) crashes to statewide K+SI crashes, among other evaluations including crash by severity level, cause, pedestrian, and bicycle crashes. Summary tables presenting the crash data analysis and network screening results for all intersections and roadway segments are provided in **Appendix B** and **Appendix C**, respectively.

7.1. K+SI Crashes Compared to Statewide K+SI Crashes

The California Strategic Highway Safety Plan (SHSP) focuses on 16 challenge areas identified by the SHSP Executive Leadership and Steering Committees after an in-depth analysis of California K+SI (fatal and serious injury) crash data as well as an extensive statewide outreach process that involved hundreds of diverse traffic stakeholders around the state. **Table 1** contains a comparison of The City of Manteca's fatal and serious injury crashes to the statewide averages based on SWITRS data.

The crash data can be attributed to fourteen of the sixteen challenge areas. Challenge areas where the city's percentages were higher than the statewide percentages are noted in bold. The City of Manteca is notably higher than the statewide percentages in aggressive driving, commercial vehicles, and aging driver involved crashes.

Table 1 – City of Manteca K+SI Crashes Compared to Statewide K+SI Crashes

California SHSP Challenge Areas	City of Manteca Comparison to Statewide Percentages	City of Manteca	Statewide Percentages
Aggressive Driving	**Higher**	**49.2%**	**33.1%**
Commercial Vehicles	**Higher**	**15.5%**	**6.4%**
Aging Drivers	**Higher**	**16.6%**	**12.4%**
Impaired Driving	**Higher**	**28.5%**	**25.3%**
Driver Licensing*	**Higher**	**27.8%**	**24.7%**
Motorcyclists	**Higher**	**22.3%**	**21.0%**
Work Zones	**Higher**	**2.6%**	**1.4%**
Distracted Driving	**Higher**	**5.2%**	**5.0%**
Bicyclists	Lower	7.3%	8.3%
Occupant Protection	Lower	12.4%	14.2%
Young Drivers	Lower	9.3%	13.1%
Pedestrians	Lower	13.5%	19.2%
Lane Departure	Lower	35.2%	43.3%
Intersections	Lower	15.5%	23.6%

Source: Statewide Integrated Traffic Record (SWITRS, 2009 – 2018).
**Source: Fatality Analysis Reporting System (FARS)*

1. Percentages will not add up to 100%, as a fatality or serious injury could have involved multiple Challenge Areas (i.e., a young driver that was impaired and unrestrained)
2. California SHSP does not have reported crash data for the following two challenge areas: Emergency Response and Emerging Technology

7.2. Severity Level

Knowing the impacts of the crash (the injuries or type of damage which occurred) is a key part of assessing the environment and safety factors around the site of the crash. The National Safety Council developed the "KABCO" injury scale, which is frequently used by law enforcement for classifying injuries. The KABCO scale is referenced below:

- K – Fatal
- A – Serious injury
- B – Other Visible Injury
- C – Complaint of Pain
- O – No injury (property damage only)

Table 2 presents crash severity by location type—signalized intersections, non-signalized intersections, and roadway segments. As shown, of the 2,018 total crashes reported over the 5-year study period, fifty percent of crashes in the City of Manteca in the past five years have

occurred at an unsignalized intersection. The remaining 30 percent and 20 percent of the total crashes have occurred at signalized intersections and roadway segments, respectively.

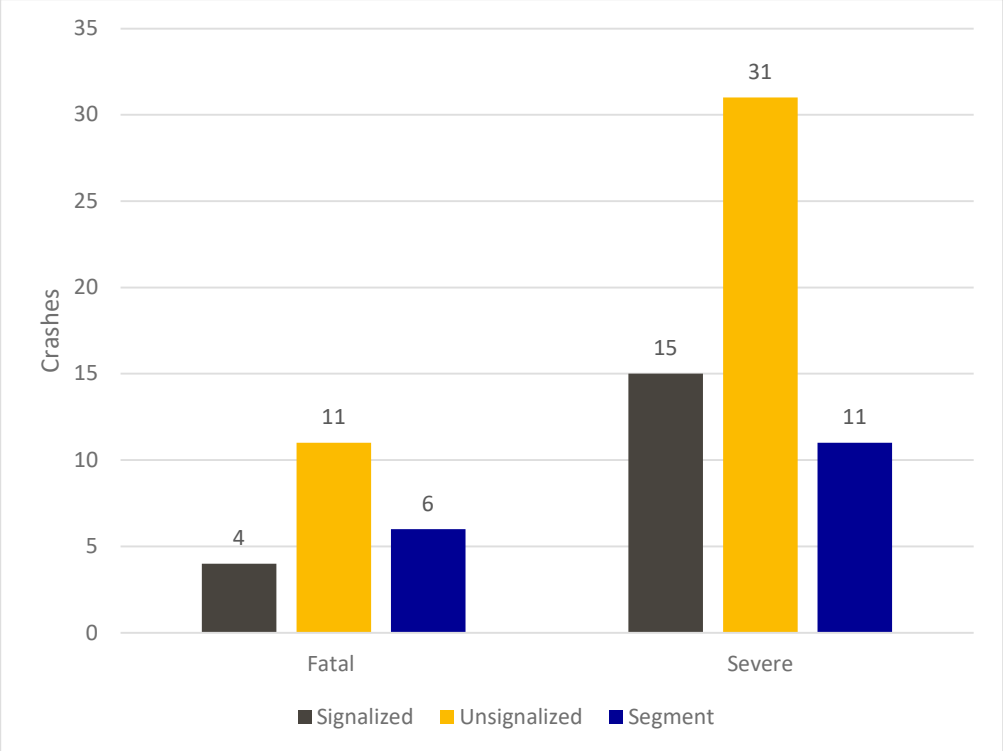
Table 2 – Crashes by Severity

Severity	Signalized Intersection		Unsignalized Intersection		Roadway Segments		Total	
	Crashes	%	Crashes	%	Crashes	%	Crashes	%
Fatal	4	19%	11	52%	6	29%	21	1%
Serious	15	26%	31	55%	11	19%	57	3%
Other Visible Injury	102	29%	179	52%	67	19%	348	17%
Complaint of Pain	232	35%	328	50%	101	15%	661	33%
No Injury (PDO)	246	26%	472	51%	213	23%	931	46%
Total	**599**	**30%**	**1,021**	**50%**	**398**	**20%**	**2,018**	

Source: Crossroads (2017 – 2021).

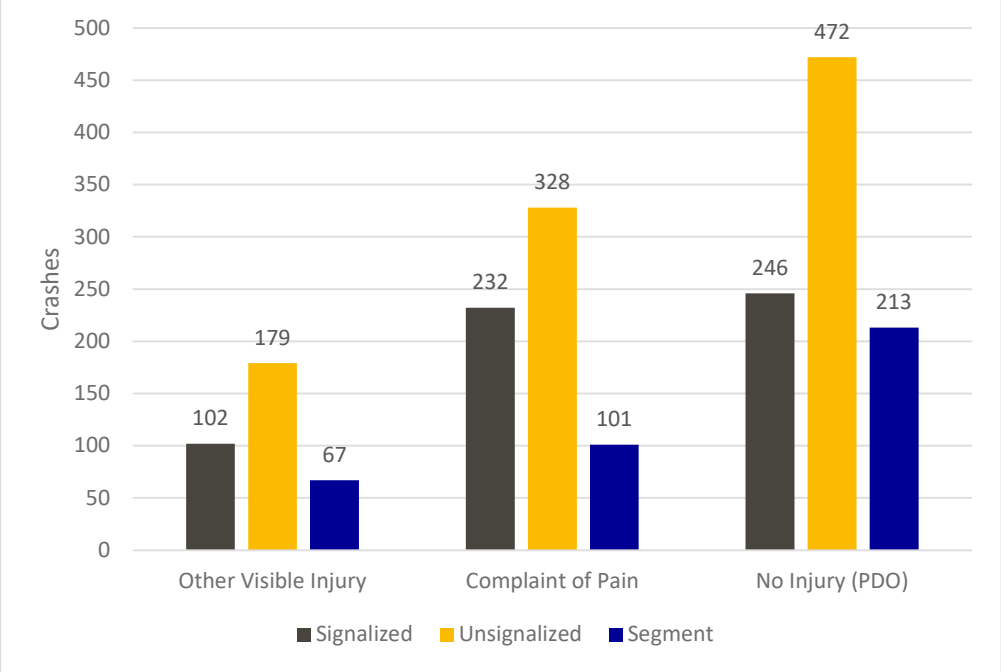
One percent of crashes recorded in the study period resulted in fatalities, and 3 percent resulted in serious injuries. Crashes resulting in property damage only accounted for 46 percent of all crashes. Crashes resulting in the various severity levels are presented in **Figure 1** and **Figure 2**.

Figure 1 – Crashes by Severity (Fatal and Serious)



Source: Crossroads (2017 – 2021).

Figure 2 – Crashes by Severity (Other Injury, Complaint of Pain, and PDO)



Source: Crossroads (2017 – 2021).

Figure 3 and **Figure 4** on the following pages present the locations where fatal and serious injury crashes occurred throughout the City, broken down by intersection and roadway segment crashes.

Figure 3 – Serious Injury Crash Map

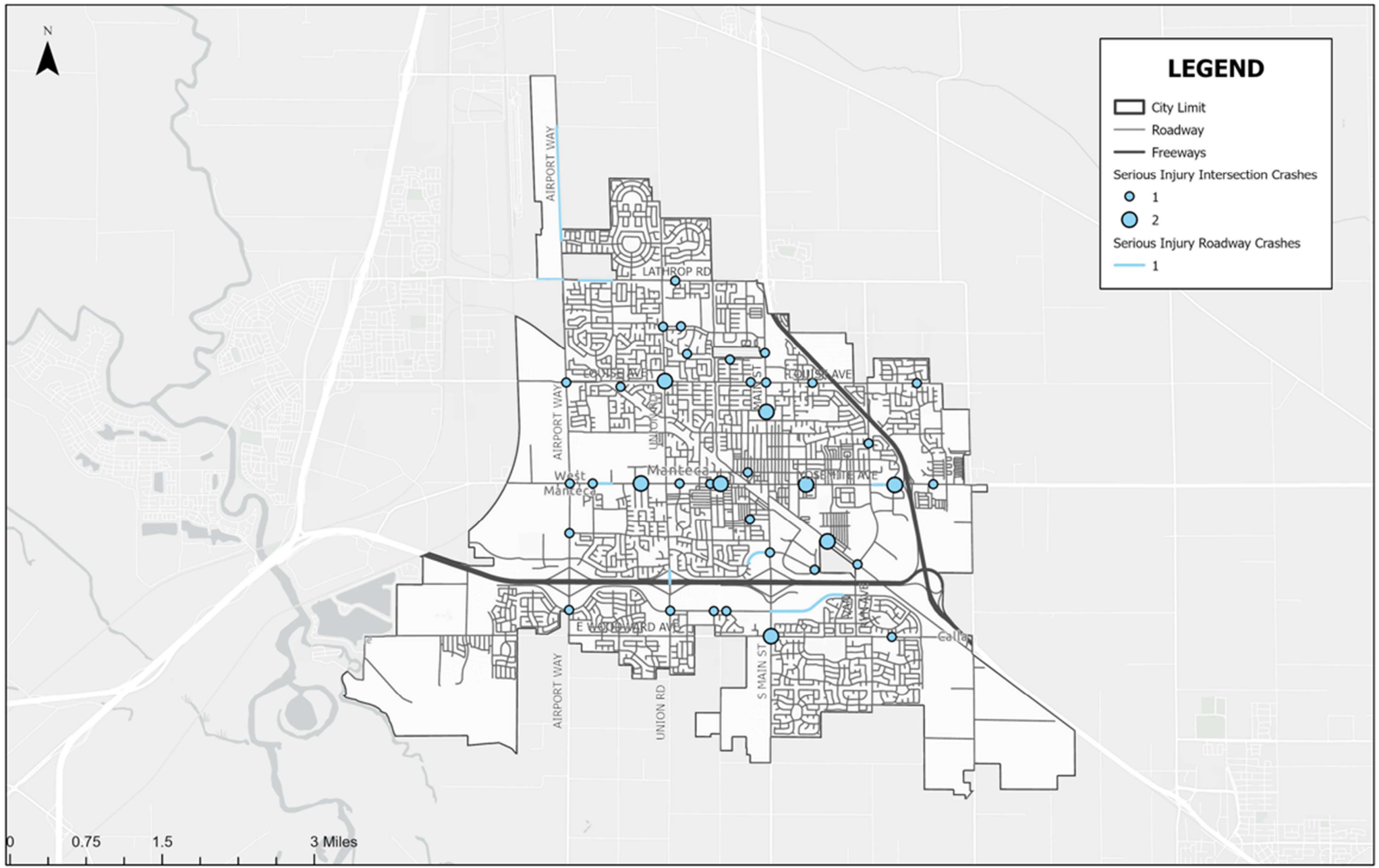
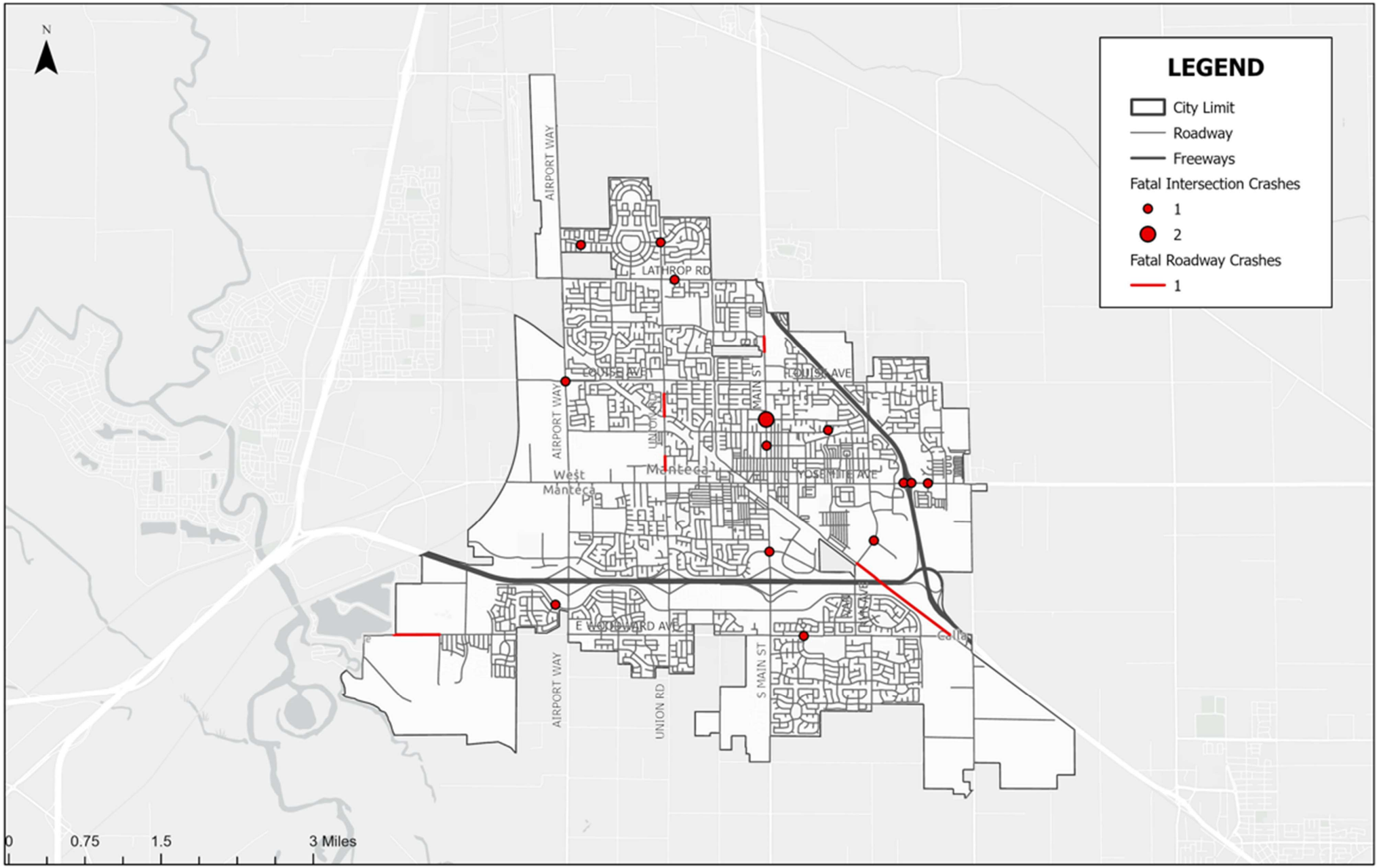


Figure 4 – Fatal Crash Map



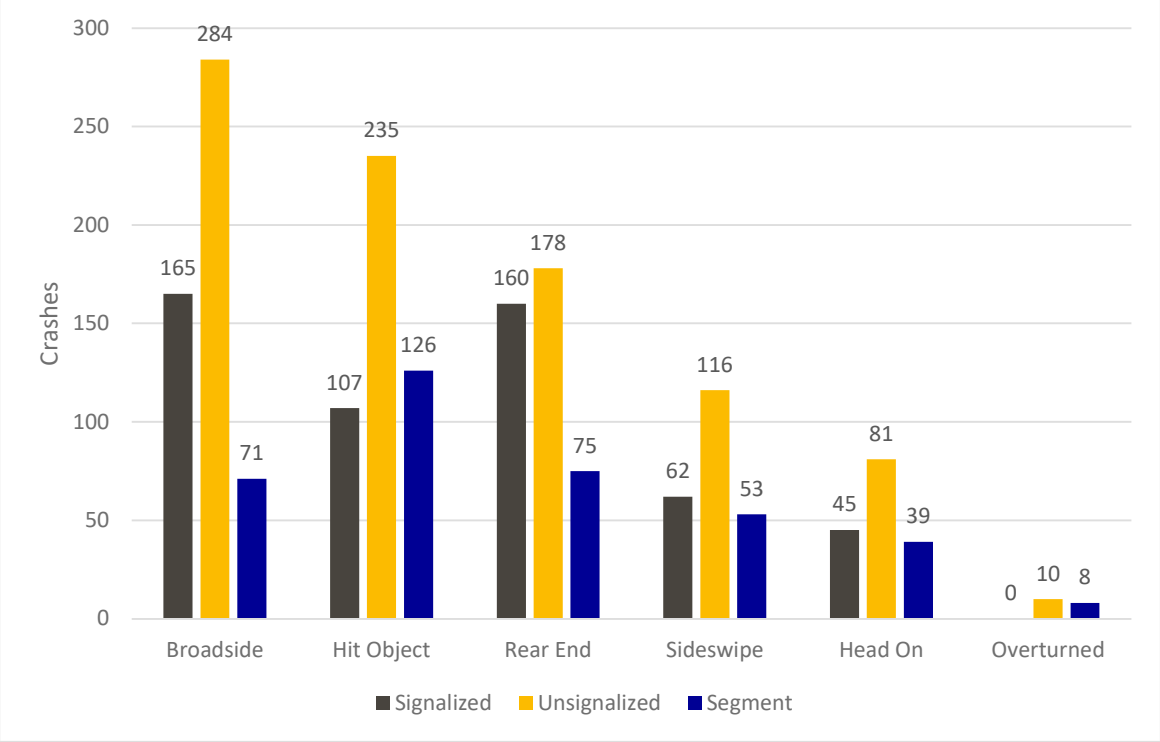
7.3. Highest Occurring Crash Types

According to reported data, approximately 2,018 crashes occurred within City of Manteca during the five-year study period which had clear, discernable spatial data that did not occur on private property. As summarized in **Table 3** and as shown in **Figure 5**, the most common crash types were broadside, hit object, and rear end. Unsignalized intersections experienced the highest number of crashes consistently among the various crash types.

Table 3 – Crashes by Type

Type	Signalized Intersection		Unsignalized Intersection		Roadway Segments		Total
	Crashes	%	Crashes	%	Crashes	%	Crashes
Broadside	165	31%	284	55%	71	14%	520
Hit Object	107	23%	235	50%	126	27%	468
Rear End	160	39%	178	43%	75	18%	413
Sideswipe	62	27%	116	50%	53	23%	231
Head On	45	27%	81	49%	39	24%	165
Overturned	0	0%	10	56%	8	44%	18
Impaired	67	25%	139	52%	62	23%	268

Figure 5 – Crashes by Type



Source: Crossroads (2017 – 2021).

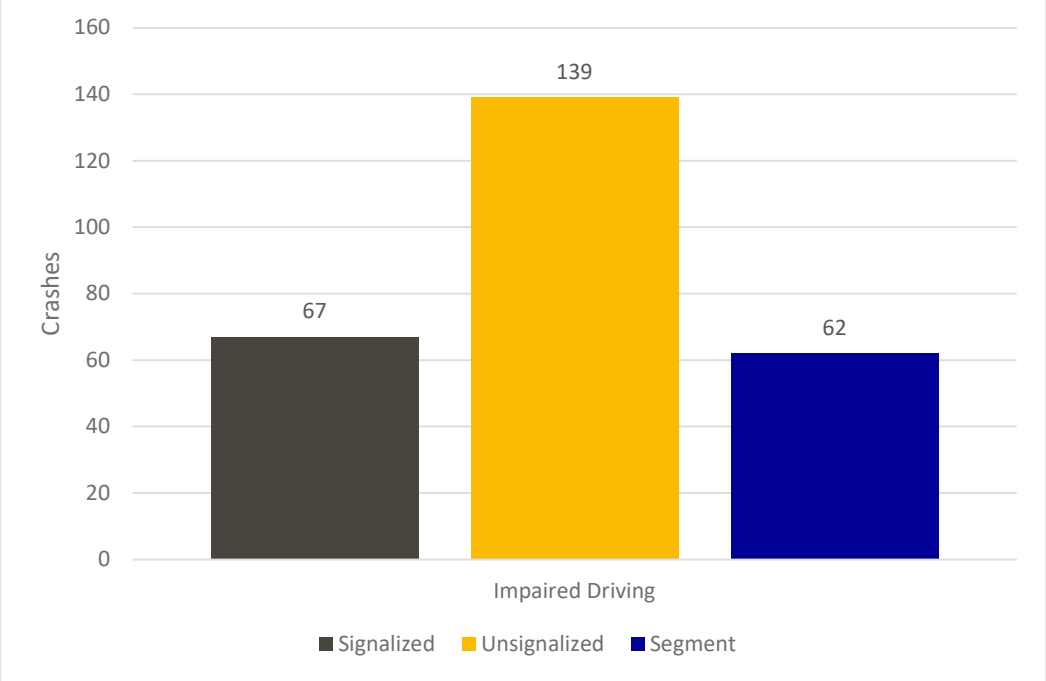
7.4. Lane Departure

Caltrans defines crashes involving lane departure as those with crash types listed as 'Head-On', 'Hit Object', or 'Overturned'. This also includes instances where a vehicle runs off the road or crosses into the opposing lane prior to the crash. There were 651 lane departure crashes over the study period within the City. Lane departure crashes account for 29 percent of all fatal crashes and 28 percent of all serious injury crashes within the study period. Of the 651 lane departure crashes, 6 were fatal, 16 were reported with serious injuries, 83 with other visible injuries, 81 with complaints of pain, and 465 with PDO.

7.5. Impaired Driving Crashes

Crashes involving drugs or alcohol include all crashes where there was any evidence of drug or alcohol use by the driver. This is different from impaired driving statistics in that drivers do not need to exceed the legally defined threshold of intoxication to be counted. Caltrans considers any level of alcohol consumption to have the potential to impact driver responsiveness and decision making. There were 268 impaired driving crashes between 2017 and 2021. There were 5 fatal crashes and 8 crashes resulting in serious injuries. Impaired driving was a contributing factor in 16 percent of all fatal and serious injury crashes within the study period. **Figure 6** below shows the distribution of impaired driving crashes across intersections and roadway segments.

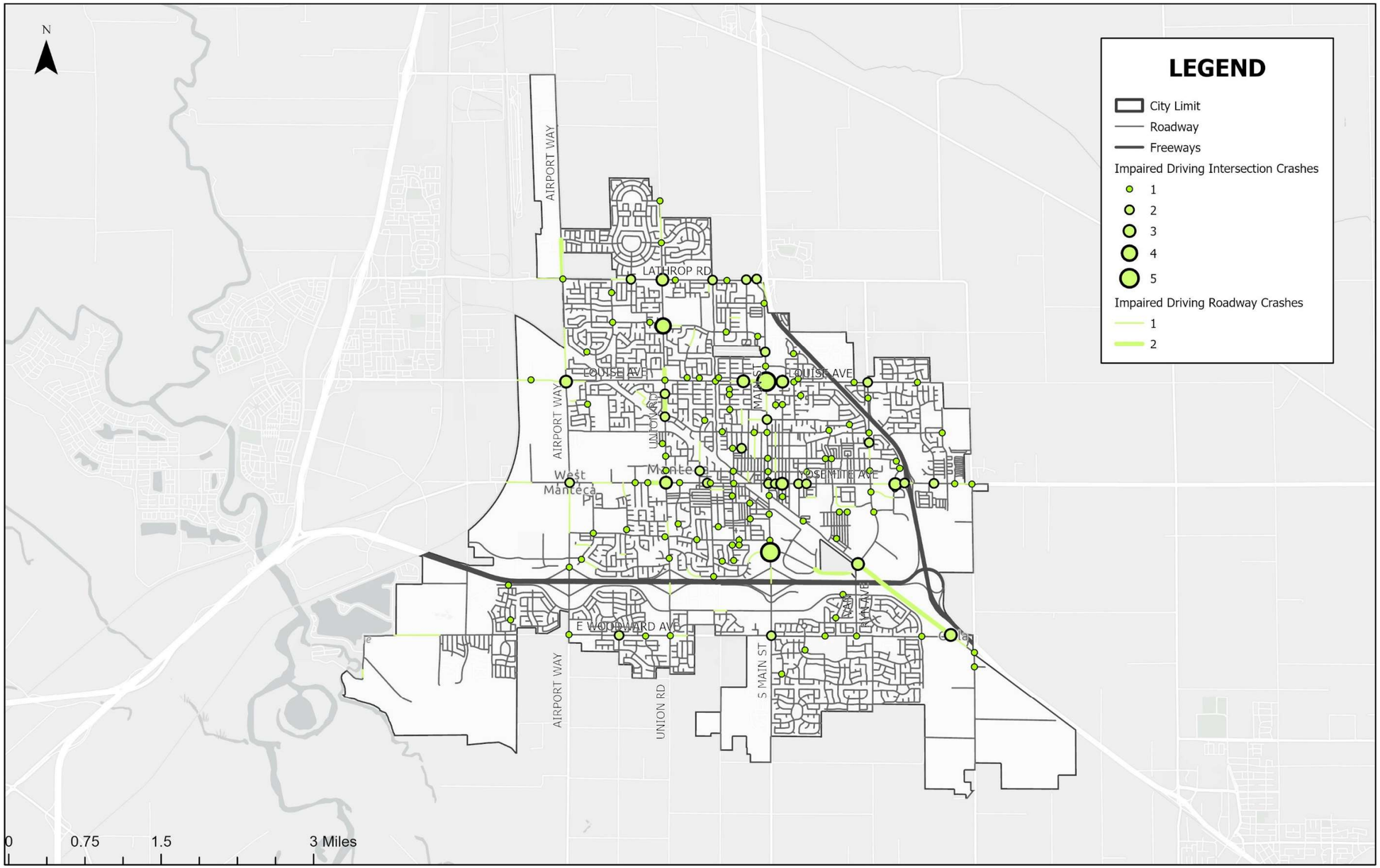
Figure 6 – Impaired Driving Crashes



Source: Crossroads (2017 – 2021).

Figure 7 presents a map of impaired driving crashes throughout the City.

Figure 7 – Impaired Driving Crash Map

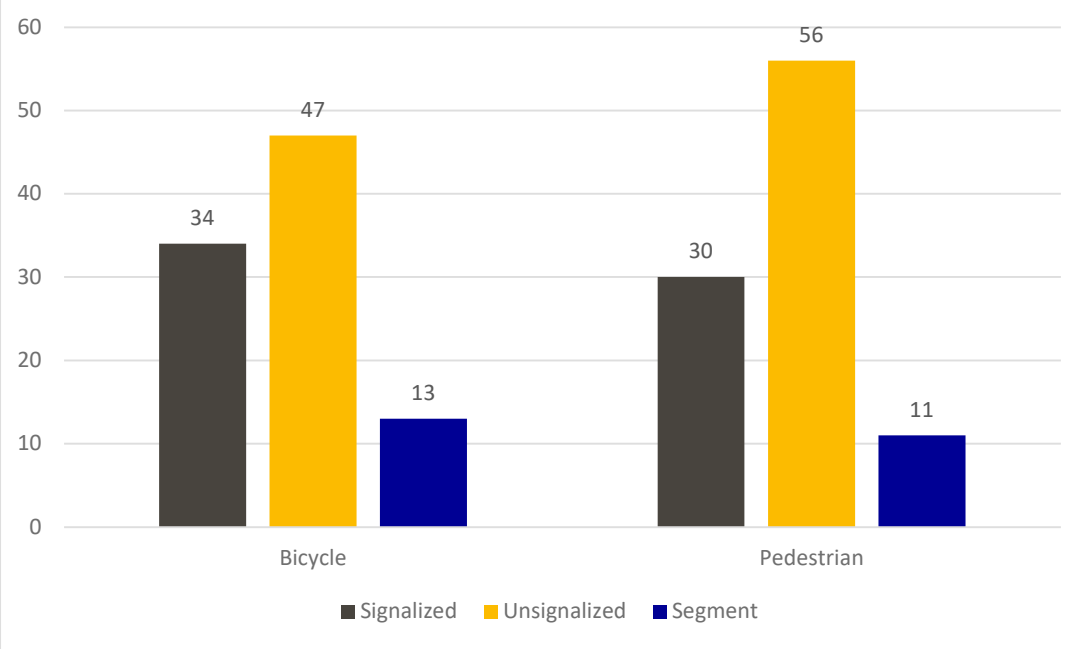


7.6. Bicycle and Pedestrian Crashes

Figure 8 presents the location of bicycle and pedestrian crashes. As shown, bicycle and pedestrian crashes were most common at unsignalized intersections. **Figure 9** illustrates the locations of pedestrian and bicycle crashes within the City. Additional information on pedestrian and bicycle crashes is provided in the following sections.

Bicycle and pedestrian crashes accounted for approximately 29 percent of all fatal and serious injury crashes in the 5-year study period. The intersection of North Union Road and Center Street experienced the highest number of bicycle crashes (4 crashes). The intersection of Yosemite Avenue and Veach Avenue (3 crashes, 1 resulting in Severe Injuries), and the intersection of Cottage Avenue and North Street experienced the highest number of pedestrian crashes (3 crashes).

Figure 8 – Bicycle and Pedestrian Crashes



Source: Crossroads (2017 – 2021).

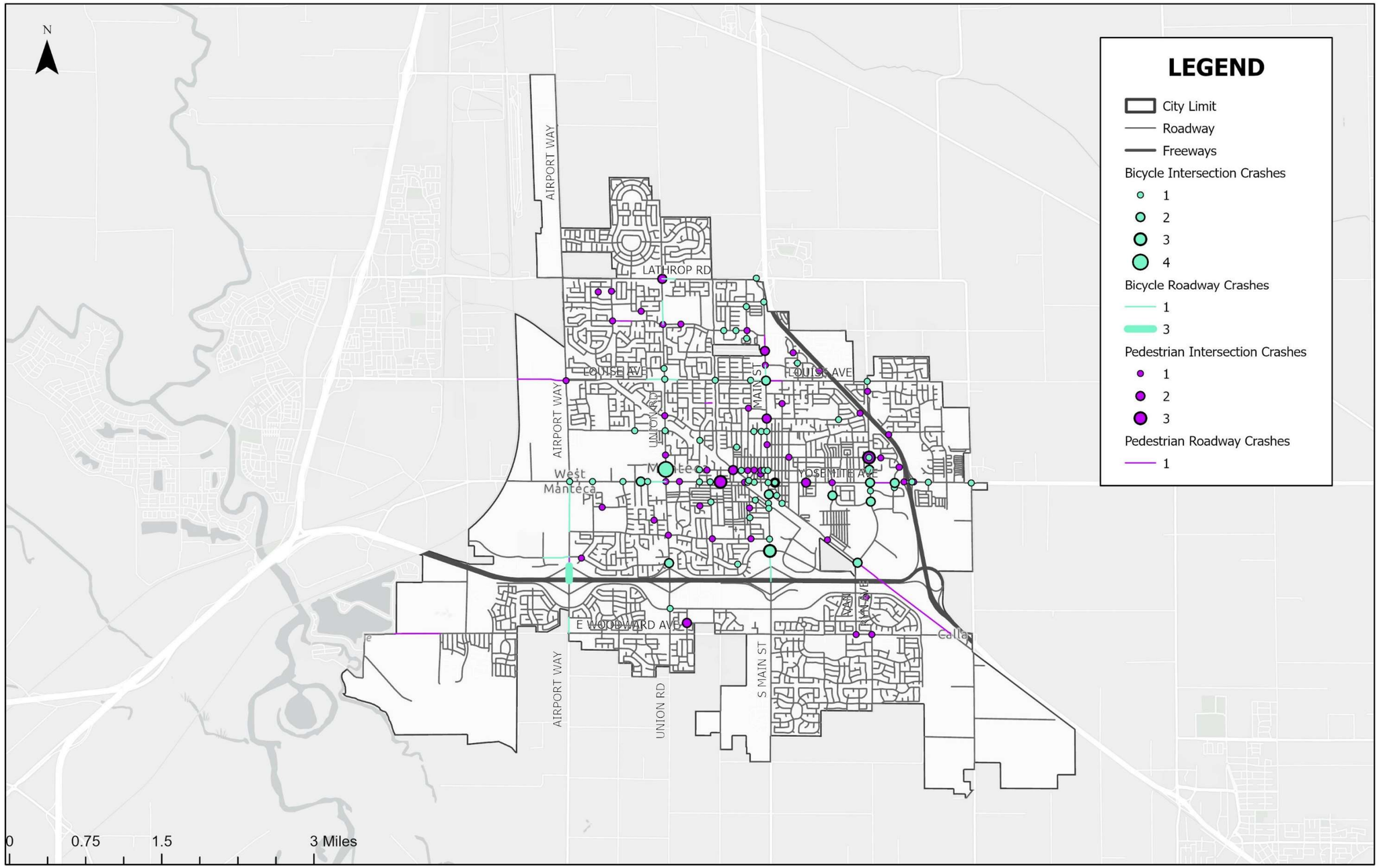
7.6.1. *Bicycle Crashes*

There were 94 bicycle-involved crashes that occurred across the City over the 5-year study period. Of the bicycle-involved injury crashes, 2 were fatal, 4 were reported with serious injuries, 48 with other visible injuries, 33 with complaints of pain, and 7 with no injuries (PDO).

7.6.2. *Pedestrian Crashes*

Over the span from 2017 to 2021, a total of 97 pedestrian-involved crashes occurred across the City. Of the pedestrian-involved injury crashes, 6 were fatal, 11 were reported with serious injuries, 30 with other visible injuries, 44 with complaints of pain, and 6 with no injuries (PDO).

Figure 9 – Non-Motorized (Bicycle and Pedestrian) Crashes



7.7. Priority Locations

Based on the network screening analysis, the following priority locations have been identified for the City to consider for case studies and identification of site-specific safety countermeasures. The short-list includes four signalized intersections, four Unsignalized intersections, and three roadway segments as presented in **Table 4**.

The full list of intersection and segment network screening results is included in **Appendix B** and **Appendix C**, respectively. Based on the crash data analysis and input received from the City and project stakeholders, the locations for field review and case study was narrowed down to 11 priority locations. Site-specific safety countermeasures were identified for these locations.

Table 4 – City of Manteca Short-List of Priority Locations

Location	Crashes	Local CCR Differential*	Equivalent Property Damage Only (EPDO)**	Notes
Signalized Intersections				
North Union Road and Center Street	23	0.03	143	1 Pedestrian and 4 Bicycle involved crashes, 13 Broadsides, 4 Dark
Airport Way and Yosemite Avenue	23	0.08	242	1 Severe Injury crash, 1 Bicycle involved crash, 2 Head On, 5 Rear ends, 8 Broadside, 5 Dark
Commerce Avenue/Northwoods Ave and Yosemite Avenue	32	0.22	350	2 Pedestrians and 2 Bicycle involved crash, 2 Severe Injuries, 2 Head On, 9 Rear Ends, 8 Broadside, 8 Sideswipes
Cottage Avenue and North Street	18	0.28	84	3 Pedestrian and 1 Bicycle involved crash, 9 Broadside
Unsignalized Intersections				
Spreckels Avenue and Norman Drive	17	0.47	125	2 Pedestrian and 2 Bicycle involved crash, 2 Head on, 7 Broadside
Main Street and Edison Street	7	-0.01	402	2 Fatal, 2 Pedestrian involved crash, 3 Dark
Arrowsmith Drive and Lathrop Road	10	0.11	410	1 Fatal, 1 Severe, 1 Bicycle involved crash, 3 Head On, 6 Broadside, 7 Dark
Main Street and Sutter Street	4	-0.09	199	1 Fatal, 1 Pedestrian involved crash

Location	Crashes	Local CCR Differential*	Equivalent Property Damage Only (EPDO)**	Notes
Roadway Segments				
Mission Ridge Drive, between Syrah Court and S Main Street	4	0.91	173	1 Severe injury crash
Yosemite Avenue, between Union Road and Trevino Avenue/ Pacific Road	25	2.14	434	2 Severe injury, 4 Bicycle involved crash, 10 Broadside, 5 Dark
Yosemite Avenue, between Cottage Avenue and Commerce Avenue	11	0.70	205	1 Severe injury, 1 Pedestrian involved crash, 1 Head on

** Local Critical Crash Rate (LCCR) Differential – The difference between the critical crash rate of a location and the maximum crash rate expected to occur at that location within the municipality. Positive LCCRs indicate a higher crash rate than expected.*

** Equivalent Property Damage Only Crashes – All severity levels are weighted and converted to PDO crashes for the benefit of having a single comparative value.

8. RECOMMENDATIONS

The following sections provide more information on potential engineering and non-infrastructure safety countermeasures that are likely to address safety concerns within the City.

8.1. Engineering Countermeasures

While there are many safety countermeasures that could be used to systemically improve roadway safety, the following sections provide countermeasures for consideration by the City. The following sections contain a description of Crash Modification Factors (CMFs) and Crash Reduction Factors (CRFs) associated with the engineering countermeasures toolbox.

8.1.1. *Crash Modification Factors (CMFs)*

When identifying potential systemic safety improvements, it is important to look at CMFs for the proposed improvements. The CMF Method is found in Part D of the HSM. CMFs are defined as the ratio of effectiveness of one condition in comparison to another condition and represent the relative change in crash frequency due to a change in one specific condition. In other words, a CMF is a multiplicative factor used to compute the expected number of crashes after implementing a given countermeasure at a specific site. Countermeasures with CMFs less than one are expected to reduce crashes if applied, while those countermeasures with CMFs greater than one are expected to increase crashes. **Figure 10** illustrates the definition of CMFs.

Figure 10 – CMF Calculation

$$CMF = \frac{\text{EXPECTED CRASHES WITH TREATMENT}}{\text{EXPECTED CRASHES WITHOUT TREATMENT}}$$

CMF = 1.0	Expected to have no impact on safety
CMF < 1.0	Expected to reduce crashes
CMF > 1.0	Expected to increase crashes

The CMF Method is used to calculate the expected number of crashes by taking the observed number of crashes and multiplying those crashes by the applicable CMF for the proposed countermeasure. It is recommended that CMFs be applied to a minimum of three years of crash data for urban and suburban sites and five years of crash data for a rural site. **Figure 11** is a sample calculation of the CMF method with one CMF being applied to a particular site for a single year.

Figure 11 – CMF Method Sample Calculation

10.1 crashes / year x 0.91 (CMF) =	9.2 crashes / year: a reduction of 0.9 total crashes per year and a CRF of 9%

A CRF is similar to a CMF but stated in different terms. A CRF is defined as a percentage of crash reduction that might be expected after the implementation of a given countermeasure at a specific site. **Figure 12** presents how a CRF is calculated in relationship to a CMF.

Figure 12 – CRF Calculation

$$CRF = (1 - CMF) \times 100$$

Caution should be used in the selection of appropriate CMFs. The following guidance should be considered when selecting CMFs for predictive crash analysis:

- CMFs should be selected from the HSM Part D, the LRSM, or from the FHWA CMF Clearinghouse website (http://www.cmfclearinghouse.org/).
- Read the countermeasure abstract to determine if the CMF is applicable to the proposed improvement.
- Only CMFs with a four-star rating or higher should be considered for use in analysis.
- Be sure the selected CMF is applicable to the set of crash data being used for analysis. Some CMFs may only be applicable to a subset of the crash data.
- The application of multiple CMFs can overestimate the expected crash reduction. Unless each CMF addresses independent crash types, multiple CMFs should not be used. It is suggested that no more than three independent CMFs be applied to a particular site.

The countermeasures proposed in this document were chosen because of their effectiveness in reducing crashes.

8.1.2. *Engineering Countermeasures Toolbox*

The systemic improvements identified as most likely effective for the City are listed in **Table 5**, and include low-cost and higher-cost items that can be implemented in phases where appropriate. The CMF indicates how effective the countermeasure is at reducing crashes. CMFs and CRFs have been provided for reference to aid the City in understanding potential reductions from crashes by different countermeasures.

Table 5 – Manteca Countermeasures Toolbox

Countermeasure	Also Addresses		Crash Modification Factor (CMF)	Crash Reduction Factor (CRF)	CRF Applies to			Caltrans Funding	Cost to Implement
	Pedestrian	Bicycle			All	Nighttime	Pedestrian and Bicycle		
Signalized Intersections									
Install intersection lighting			0.6	40%		X		100%	$$
Retroreflective backplates			0.85	15%	X			100%	$
Improve signal timing (coordination)			0.85	15%	X			50%	$$
Install Left Turn Lane, Add Left Turn Phase			0.45	55%	X			100%	$$$
Protected left turn phase			0.7	30%	X			100%	$$
Convert signal from pedestal-mounted to mast arm			0.7	30%	X			100%	$$$
Install raised pavement markers and striping			0.9	10%	X			100%	$
Install flashing beacons as advanced warning			0.7	30%	X			100%	$$
Install High Friction Surface Treatment (HFST)			0.45	55%	X			100%	$$$
Install raised median on approaches			0.75	25%	X			100%	$$
Install pedestrian median fencing on approaches	X		0.65	35%			X	90%	$$
Pedestrian countdown signal heads	X		0.75	25%			X	100%	$
Pedestrian scramble	X		0.6	40%			X	100%	$$
Advanced stop bar before crosswalk and bicycle box	X	X	0.85	15%			X	100%	$
Modify signal to provide a Leading Pedestrian Interval (LPI)	X		0.4	60%			X	100%	$
Flashing yellow arrow			0.94	6%	X			N/A	$
Signal ahead warning signs			0.85	15%	X			N/A	$
Add Near-Side Traffic Signal Heads			0.85	15%	X			90%	$
Unsignalized Intersection									
Add intersection lighting			0.6	40%		X		100%	$$
Install all-way STOP control			0.5	50%	X			100%	$
Convert intersection to roundabout			Varies	Varies	X			100%	$$$
Convert intersection to mini-roundabout			70%	30%	X			90%	$$
Install/upgrade intersection warning/regulatory signs			0.85	15%	X			100%	$
Upgrade pavement markings			0.75	25%	X			100%	$
Install flashing beacons at stop-controlled intersections			0.85	15%	X			100%	$$
Install flashing beacons as advanced warning			0.7	30%	X			100%	$$
Clear sight triangles			0.8	20%	X			90%	$ - $$$

Countermeasure	Also Addresses		Crash Modification Factor (CMF)	Crash Reduction Factor (CRF)	CRF Applies to			Caltrans Funding	Cost to Implement
	Pedestrian	Bicycle			All	Nighttime	Pedestrian and Bicycle		
Install High Friction Surface Treatment (HFST)			0.55	55%	X			100%	$$$
Install splitter-islands on minor road approaches			0.6	40%	X			100%	$$
Install raised median on approaches			0.75	25%	X			90%	$$
Directional median openings to restrict turning movements			0.5	50%	X			90%	$$
Reduced Left-Turn Conflict (R-CUT) intersections			0.5	50%	X			90%	$$$
Install right-turn lane			0.8	20%	X			90%	$$
Install left-turn lane			0.65	35%	X			90%	$$
Pedestrian refuge island	X		0.55	45%			X	90%	$$
Install/upgrade pedestrian crossing (with enhanced safety features)	X		0.65	35%			X	100%	$
Rectangular Rapid Flashing Beacon (RRFB)	X		0.65	35%			X	100%	$$ - $$$
Pedestrian Signal	X		0.45	55%			X	100%	$$$
Retroreflective strips on signposts			Not Available	Not Available	X				$
Crosswalk lighting	X		0.6	40%			X	100%	$$
Colored bicycle lanes		X	0.61	39%			X		$
Curb extensions	X		0.63	37%			X		$$$
Roadway Segments									
Add segment lighting			0.65	35%		X		100%	$$
Remove or relocate fixed object outside of Clear Recovery Zone			0.65	35%	X			90%	$$$
Install impact attenuators			0.75	25%	X			100%	$$
Install pedestrian median fencing	X	X	0.65	35%			X	90%	$$
Install bike lanes	X	X	0.65	35%			X	90%	$$
Install/upgrade pedestrian crossing (with enhanced safety features)	X	X	0.65	35%			X	90%	$
Install raised pedestrian crossing	X	X	0.65	35%			X	90%	$$
Rectangular Rapid Flashing Beacon (RRFB)	X	X	0.65	35%			X	100%	$$ - $$$
Speed feedback signs (mobile or fixed)			Not Available	Not Available	X			Opportunity for OTS funding	$
Curve Shoulder Widening (Outside Only)			0.55	45%	X			90%	$$$
Install chevron signs on horizontal curves			0.60	40%	X			100%	$
Install curve advance warning signs			0.75	25%	X			100%	$

Countermeasure	Also Addresses		Crash Modification Factor (CMF)	Crash Reduction Factor (CRF)	CRF Applies to			Caltrans Funding	Cost to Implement
	Pedestrian	Bicycle			All	Nighttime	Pedestrian and Bicycle		
Install curve advance warning signs (flashing beacon)			0.70	30%	X			100%	$$
Install centerline rumble strips/stripes			0.80	20%	X			100%	$$
Install edgeline rumble strips/stripes			0.85	15%	X			100%	$$
Improve pavement friction (High Friction Surface Treatment)			0.45	55%	X			100%	$$$
Install dynamic/variable speed warning signs			0.70	30%	X			100%	$$
Install/Upgrade signs with new fluorescent sheeting (regulatory or warning)			0.85	15%	X			100%	$
Install delineators, reflectors and/or object markers			0.85	15%	X			100%	$

$$$ Requires design and construction of extensive infrastructure improvements
$$ Requires procurement and/or minor construction activities
$ Requires limited staff resources and can be implemented in-house with current engineering and/or maintenance staff

8.1.3. *Project Sheets for Priority Locations*

From the citywide analysis, eleven project case study locations were selected for further analysis and development of safety improvement recommendations. For each priority location, project sheets were developed to provide a case study to organize projects when applying for funding. These locations were identified through the analysis process based on their crash histories, the observed crash patterns, and their differing characteristics to provide the most insight into potential systemic safety countermeasures that the City can employ to achieve the most cost-effective safety benefits.

Each project sheet includes location maps with a crash data summary and list of recommended safety countermeasures with corresponding CMFs, number of crashes anticipated to be reduced, 10-year crash reduction estimate and benefit, and planning level construction cost estimates. The potential safety countermeasures identified reflect safety improvements that can be applied to reduce the likelihood of future crashes. Countermeasures were subjected to a benefit/cost assessment to determine their potential return on investment.

The calculated benefit/cost ratio (BCR) value indicates the overall cost-effectiveness of a possible countermeasure if it were to be implemented. A project with a BCR greater than 1 indicates that the proposed countermeasure's benefit is greater than the cost to implement. This provides a basis of comparison of the benefits of potential safety countermeasures and compare their economic effectiveness.

These case studies can be used to select the most appropriate countermeasure(s), and to potentially phase improvements over the longer-term. The potential benefit of these countermeasures at locations with similar design characteristics can then be extrapolated regardless of crash history. These project sheets can also be used to position the City for future grant funding opportunities.

Table 6 presents a summary of the potential safety countermeasures identified for each of the priority locations and corresponding BCR. A project sheet was developed for each of the priority locations containing additional information and are included in **Appendix D.**

- North Union Road and Center Street
- Airport Way and Yosemite Avenue
- Commerce Avenue/Northwood Avenue and Yosemite Avenue
- Cottage Avenue and North Street
- Spreckels Avenue and Norman Drive
- Main Street and Edison Street
- Arrowsmith Drive and Lathrop Road
- Main Street and Sutter Street
- Mission Ridge Drive, between Syrah Court and South Main Street
- Yosemite Avenue, between Union Road and Trevino Avenue / Pacific Road
- Yosemite Avenue, between Cottage Avenue and Commerce Avenue / Northwoods Avenue
- Signalized Intersections Systemic Safety Improvements - Citywide Primary Arterials:
    - Lathrop Road, Louise Avenue, Yosemite Avenue, Woodward Avenue, Airport Way, Union Road, and Main Street

Table 6 – Priority Location Summary

Location	Countermeasure	B/C
North Union Road and Center Street	Modify signal phasing to implement Leading Pedestrian Interval (LPI)	17.2
	Install Advance Stop Bar	322.4
	Refresh Intersection Crosswalk Striping with High-Visibility Thermoplastic Striping	41.0
	Refresh Intersection Striping with High-Visibility Thermoplastic Striping (North and West Legs)	126.1
	Upgrade to Pedestrian Countdown Signals	7.5
	Signal timing Improvements (Review yellow, all-red times)	241.6
	Add Near-Side Traffic Signal Heads (All Approaches)	20.0
	Verify and Increase the Number of Through-Movement Signal Heads on Mast Arms per guidance in CA MUTCD	40.0
	Add Additional Intersection Safety Lighting (Northwest, Southwest, and Northeast corners)	6.5
Airport Way and Yosemite Avenue	Install Advance Stop Bar	478.7
	Install additional supplemental signal heads (EB and WB approaches)	67.5
	Upgrade to pedestrian countdown signals	20.5
	Restrict right turn on red (NB approach)	-
	Install median island (east leg) for driveway access restrictions	120.0
	Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	47.0
	Signal timing Improvements (Review yellow and all-red times, phasing modifications to provide NB right-turn overlap phase)	408.0
	Enhance lighting with replacement of all 1-B poles with type 15TS poles with luminaires	23.6

Location	Countermeasure	B/C
Commerce Avenue / Northwood Avenue and Yosemite Avenue	Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	55.8
	Install Advance Stop Bar	525.6
	Refresh Intersection Crosswalk Striping with High-Visibility Thermoplastic Striping	83.3
	Refresh Intersection Striping with High-Visibility Thermoplastic	153.6
	Install retroreflective border for signal heads	329.0
	Verify and Increase the Number of Through-Movement Signal Heads on Mast Arms per guidance in CA MUTCD	65.1
	Upgrade to pedestrian countdown signals	24.3
	Install bulb-out (SE corner)	-
	Install left-turn lane marking though the intersection for dual left-turns	32.2
	Extend WB left turn storage by modifying the existing landscaped median	-
	Restrict u-turns (WB & EB approaches)	-
	Enhance lighting with replacement of all 1-B poles with type 15TS poles with luminaires	2.0
	Signal coordination with the intersection of Yosemite Ave & SR-99 NB Ramps and Yosemite Ave & SR-99 SB Ramps & Signal phasing update (lead/leg left turns) (NBR overlapping with WBL after restricting u-turn for WB)	590.4
	Install a raised median on west leg	157.8
Cottage Avenue and North Street	Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	9.6
	Install Advance Stop Bar	324.6
	Refresh Intersection Crosswalk Striping with High-Visibility Thermoplastic Striping	31.8
	Install left turn pockets (striping improvements)	493.5
	Install red curb to prohibit on-street parking at intersection approach to provide room for left-turn pockets	690.9
	Signal timing improvements (add protected NB and SB left-turn phases, split phase left-turns EB and WB)	142.4
	Install retroreflective border for signal heads	125.6
	Upgrade to Pedestrian Countdown Signals	4.2

Location	Countermeasure	B/C
Spreckels Avenue and Norman Drive	Refresh Intersection Crosswalk Striping with High-Visibility Thermoplastic Striping	83.6
	Restripe TWLTL to add a left turn pocket for NBL and EBL, Install Green Bike Lane Striping in Conflict Areas	17.3
	Install Buffered Bike Lane with Raised Element	20.1
	Install Rectangular Rapid Flashing Beacon (RRFB)	6.5
	Install Pedestrian Signal (including Pedestrian Hybrid Beacon (HAWK))	1.8
	Install Median Island with Pedestrian Refuge (North Leg)	37.6
	Add intersection lighting	17.9
Main Street and Edison Street	Install HAWK Signal	10.8
	Install Rectangular Rapid Flashing Beacon (RRFB)	38.0
	Add intersection lighting (NW and SE corners)	304.0
	Install retroreflective strips on stop sign posts	3,593.1
	Install R1-5 & Install "No Pedestrian Crossing" regulatory sign on barricade	1,497.1
	Refresh Intersection Crosswalk Striping with High-Visibility Thermoplastic Striping	489.0
	Refresh Intersection Striping with High-Visibility Thermoplastic Striping, Install advanced stop bar and yield line	210.3
Arrowsmith Drive and Lathrop Road	Install median island providing dedicated receiving lanes for back-to-back NB left-turn movement and SB left-turn movement (from commercial driveway)	678.8
	Install intersection ahead warning sign of intersection	2,036.4
	Install retroreflective strips on stop sign posts	7,331.0
	Re-locate merge signage to east leg of intersection	2,036.4
	Re-design merge EB to be further downstream of intersection (re-striping of segment)	912.9
	Refresh Intersection Crosswalk Striping with High-Visibility Thermoplastic Striping	23.6

Location	Countermeasure	B/C
Main Street and Sutter Street	Refresh Intersection Crosswalk Striping with High-Visibility Thermoplastic Striping	592.3
	Install HAWK Signal	10.4
	Install Rectangular Rapid Flashing Beacon (RRFB)	36.9
	Add Intersection Lighting	0.4
	Install left turn pocket (SB)	1,481.9
	Remove crosswalk across the south leg and remove unused existing curb ramp	-
	Refresh Intersection Striping with High-Visibility Thermoplastic Striping, Install right edge line striping, Install advanced stop bar and yield line	113.8
	Install “Yield Here to Pedestrians” R1-5 sign, Install Pedestrian Crossing Ahead (W11-2 and W16-9P) advanced warning signs, Install "No Pedestrian Crossing" regulatory sign on barricade with elimination of marked crossing (South leg)	740.9
	Install median island (South leg) for driveway access restrictions	265.0
Mission Ridge Drive (between Syrah Court and South Main Street)	Install buffered bike lane with raised element, Install green bike lane striping in conflict areas.	0.0
	Install median island to more effectively define left turn access	35.9
	Install intersection ahead warning sign to enhance driver awareness of driveway, upgrade merge warning signs per current MUTCD standards.	430.3
	Redesign merge along WB approach to be further upstream of curve	-
	Install curve advisory speed warning sign	1,434.3
Yosemite Avenue, between Union Road and Trevino Avenue / Pacific Road)	Re-design splitter island at right-in/out driveway to provide more effective turn restrictions (includes signage)	430.6
	Install "No Pedestrian Crossing" regulatory sign on barricade at Yosemite Ave intersections at Watson Ave and Grand Prix Ave	1076.6
	Install buffered bike lane with raised element EB & WB (removing parking). Install green bike lane striping in conflict areas	62.1
	Install HAWK Signal along Yosemite Ave between Grand Prix Ave and Watson Ave	10.3

Location	Countermeasure	B/C
	Restripe and shorten TWLTL to have defined turn access at intersections (Watson Ave, Grand Prix Ave) and at Yosemite Ave driveways	-
	Refresh Intersection Crosswalk Striping with High-Visibility Thermoplastic Striping at Watson Ave, driveway adjacent to Carl's Jr, Grand Prix Ave	109.2
	Refresh Intersection Striping with high visibility thermoplastic	49.2
Yosemite Avenue, between Cottage Avenue and Commerce Avenue / Northwoods Avenue	Install buffered bike lane with raised element (after removing TWLTL), Install green bike lane striping in conflict areas	56.8
	Install median island (removing TWLTL) to provide defined access for commercial driveways	19.1
	Install pedestrian median fencing	16.4
Signalized Intersections Systemic Safety Improvements (Citywide - Primary Arterials: Lathrop Road, Louise Avenue, Yosemite Avenue, Woodward Avenue, Airport Way, Union Road, and Main Street)	Provide Advanced Dilemma Zone Detection for high speed approaches	67.2
	Modify signal phasing to implement Leading Pedestrian Interval (LPI)	35.5
	Install Retroreflective Backplates	25.5

8.2. Non-Infrastructure Countermeasures

The National Highway Traffic Safety Administration (NHTSA) *Countermeasures that Work, Ninth Edition,* is a reference to assist safety stakeholders in selecting effective, science-based non-infrastructure traffic safety countermeasures for major highway safety problem areas. While many of the countermeasures are more appropriate to apply at the state-level or require legislative modifications to implement, **Table 7** contains countermeasures that have demonstrated effectiveness and could be applied at the City level. Access to Drug Recognition Experts (DREs) and Advanced Roadside Impaired Driving Enforcement (ARIDE) training for law enforcement is not included in the document but is something that could also be considered for the City. These non-infrastructure countermeasures can be implemented through securing grant funding such as California Office of Traffic Safety (OTS) grants and other federal, state, and regional funding programs presented in **Section 9**.

Table 7 – Non-Infrastructure Countermeasures Toolbox

Countermeasure	Effectiveness	Cost to Implement	Use	Time to Implement
Aggressive Driving				
Automated enforcement systems *Red light camera systems used as a component of a broader traffic safety and speed management program to supplement traditional enforcement efforts to detect red-light violators*	*****	$$$[†]	Medium	Medium
Impaired Driving				
Publicized Sobriety Checkpoints *Enforcement campaign where law enforcement officers stop motorists at predetermined location(s) to check for driver impairment*	*****	$$$	Medium	Short
High-Visibility Saturation Patrols *Large number of law enforcement officers patrolling specific area(s) in search for impaired drivers*	****	$$	High	Short
Occupant Protection (Seat Belts, Helmets, Child Seats)				
Short-term high visibility enforcement *Short duration, highly publicized periods of increased seat belt enforcement campaign*	*****	$$$	Medium	Medium
Integrated nighttime seat belt enforcement *Short duration, highly visible seat belt enforcement campaign in conjunction with nighttime impaired driving and excessive speed enforcement initiatives*	****	$$$	Unknown	Medium
Distracted Driving				
High visibility cell phone/text messaging enforcement *High visibility enforcement campaign where officers actively seek out cell phone users among drivers*	****	$$$	Low	Medium

Effectiveness:
***** Demonstrated to be effective by several high-quality evaluations with consistent results*
**** Demonstrated to be effective in certain situations*
Cost to Implement:
$$$ Requires extensive new facilities, staff, equipment, or publicity, or makes heavy demands on current resources
$$ Requires some additional staff time, equipment, facilities, and/or publicity
$ Can be implemented with current staff, perhaps with training; limited costs for equipment, facilities, and publicity
[†]*Can be covered by income from citations*
Use:
High: More than two-thirds of States, or a substantial majority of communities
Medium: Between one-third and two-thirds of States or communities
Low: Less than one-third of States or communities
Unknown: Data not available
Time to Implement:
Long: More than 1 year
Medium: More than 3 months but less than 1 year
Short: 3 months or less

9. EVALUATION AND IMPLEMENTATION

9.1. Evaluation

The success of the LRSP will be evaluated using the preliminary process outlined below. This process will be useful to ensure proper implementation of goals and to determine when updates are needed.

- Progress meetings are recommended to be conducted to track the implementation of the plan. In addition, the success of the plan will be evaluated on a reoccurring basis.
- An update to the plan should be considered after no more than five to seven years.
- Continued monitoring and recording of traffic incidents on local roadways by law enforcement.
- Maintain a list of focus areas where there are transportation safety concerns, based on historical crash data.

9.2. Implementation

Implementation of the LRSP can be accomplished through several avenues including development of projects, the establishment of new policies and programs, and development/strengthening of relationships with stakeholders.

With regard to projects, the following identifies potential focus areas for the City in the near-to-mid-term.

9.2.1. *Near- and Mid-Term Focus Areas*

The opportunities identified in this LRSP provide more of the systemic countermeasures that can be applied within the City. Over the next three to five years, it is recommended that the City concentrate its efforts on the following emphasis areas:

- Aggressive Driving
- Commercial Vehicles
- Aging Drivers
- Impaired Driving
- Motorcyclists
- Bicyclists
- Pedestrians

Analysis conducted at the Citywide level indicated that these factors were some of the most frequent influences contributing to fatal and serious injury crashes within the City. The countermeasure opportunities previously discussed in this LRSP for both systemic and project-specific improvements can be used as a basis for developing projects at locations where addressing these focus areas would be of the most benefit. Projects that address these focus areas can be developed with a high benefit-to-cost ratio (by applying citywide crash rates), allowing competitive projects to be developed even at sites with little to no direct crash history, but with conditions that might contribute to future crashes.

9.3. Updates to the LRSP

The following steps outline the process for updating the City's LRSP every 5 to 7 years.

1) Access necessary data
   - Roadway and intersection classification/configurations
   - Average Daily Traffic Volumes (Collected from counts where available)
   - Collision history
2) Network screening
   - Calculate the CCR for each roadway functional classification and intersection control type
   - Rank for each facility type
     i) Roadway Segment
        (1) Primary
        (2) Secondary
        (3) Local
     ii) Intersection
        (1) Signalized
        (2) Unsignalized
3) Select locations
   - Identify the location with a higher CCR than what is typical of comparable facility types within City
   - Analyze the collision history and work with local officials to understand any significant exterior influences on the location
4) Countermeasures
   - Using the Engineering Countermeasures Toolbox (**Table 5**) and Non-Infrastructure Toolbox (**Table 7**), identify potential countermeasures that can be applied to the location to enhance safety features
5) Calculate the benefit and the cost of each applicable countermeasure using Highway Safety Improvement Program (HSIP) tool and LRSM countermeasures. If those are not available, refer to other resources such as the CMF Clearinghouse and follow a similar calculation (using 20-year cost and benefit numbers). See more information in the section **HSIP Analyzer** below.

Additional items the City can do to keep the LRSP current are:

1) When new or reconstruction projects arise, use the data processed to identify locations with similar characteristics and apply countermeasures which proved effective
2) Proactively update its roadway and transportation design standards to incorporate systemic safety improvements identified in the LRSP

9.3.1. *HSIP Analyzer*

The preferred way to calculate the BCR for the HSIP program uses Caltrans HSIP Analyzer tool in the form of an active PDF. The PDF tool contains 4 sections which are used to calculate the Benefit Cost Ratio for the Highway Safety Improvement Program.

This tool can be accessed on the Caltrans website:

https://dot.ca.gov/programs/local-assistance/fed-and-state-programs/highway-safety-improvement-program/apply-now

Projects appropriate for other state grant programs can be analyzed using the Life-Cycle Benefit Cost Analysis Model (CalB/C) which has a much more comprehensive benefit assessment tool set.

9.3.2. *HSIP Eligibility*

Per Chapter 9 of the Highway Safety Improvement Program, funds are eligible for projects that improve the safety of its users on any public road or publicly owned bicycle or pedestrian pathway or trail, or on tribal lands for general use of tribal members.

HSIP looks for safety projects that can be designed and constructed expeditiously and do not require significant acquisition of rights-of-way. Proposed projects should not require extensive environmental review and mitigation. Additional information on the HSIP project selection criteria can be accessed online.

HSIP project eligibility is subject to the California SHSP. The SHSP identifies statewide challenge areas that correspond to safety concerns at the statewide level and potential countermeasure to address them and determine HSIP project eligibility. SHSP's are developed in compliance with FHWA requirements. A list of eligible project types can be seen in the current HSIP Analyzer. More information can be accessed online at the Caltrans HSIP grant website:

https://dot.ca.gov/programs/local-assistance/fed-and-state-programs/highway-safety-improvement-program/apply-now

9.4. Funding

Competitive funding resources are available to assist in the development and implementation of safety projects in the City of Manteca. The City should continue to seek available funding and grant opportunities from local, state, and federal resources to accelerate their ability to implement safety improvements throughout Manteca. The following is a high-level introduction into some of the main funding programs and grants for which the City can apply.

9.4.1. *Highway Safety Improvement Program (HSIP)*

The Highway Safety Improvement Program (HSIP) is a Federal program housed under Fixing America's Surface Transportation (FAST) Act. This program apportions funding as a lump sum for each state, which is then divided among apportioned programs. These flexible funds can be used for projects to preserve or improve safety conditions and performance on any Federal-aid highway, bridge projects on any public road, facilities for non-motorized transportation, and other project types. Safety improvement projects eligible for this funding include:

- New or upgraded traffic signals
- Upgraded guard rails
- Marked crosswalks

California's local HSIP focuses on infrastructure projects with national recognized crash reduction factors. Normally HSIP call-for-projects is made at an interval of one to two years. The

applicant must be a city, a county, or a tribal government federally recognized within the State of California.

Additional information regarding this program at the Federal level is available at: https://safety.fhwa.dot.gov/hsip/

California specific HSIP information – including dates for upcoming call for projects – is available at: https://dot.ca.gov/programs/local-assistance/fed-and-state-programs/highway-safety-improvement-program

9.4.2. *Caltrans Active Transportation Program (ATP)*

Caltrans Active Transportation Program (ATP) is a statewide funding program, created in 2013, consolidating several federal and state programs. The ATP funds projects that encourage increased mode share for walking and bicycling, improve mobility and safety for non-motorized users, enhance public health, and decrease greenhouse gas emissions. Projects eligible for this funding include:

- Bicycle and pedestrian infrastructure projects
- Bicycle and pedestrian planning projects (e.g. safe routes to school)
- Non-infrastructure programs (education and enforcement)

This program funding is provided annually. The ATP call for projects typically comes out in the spring. Information on this program and cycles can be found online: https://dot.ca.gov/programs/local-assistance/fed-and-state-programs/active-transportation-program

9.4.3. *State Transportation Improvement Program (STIP)*

The State Transportation Improvement Program (STIP) provides state and federal gas tax money for improvements both on and off the state highway system. STIP programming occurs every two years. The programming cycle begins with the release of a proposed fund estimate, followed by California Transportation Commission (CTC) adoption of the fund estimate. The fund estimate serves to identify the amount of new funds available for the programming of transportation projects. Once the fund estimate is adopted, Caltrans and the regional planning agencies prepare transportation improvement plans for submittal. Caltrans prepares the Interregional Transportation Improvement Program (ITIP) using Interregional Improvement Program (IIP) funds, and regional agencies prepare Regional Transportation Improvement Programs (RTIPs) using Regional Improvement Program (RIP) funds. The STIP is then adopted by the CTC.

9.4.4. *California Senate Bill 1 (SB 1)*

SB 1 is a transportation investment to rebuild California by fixing neighborhood streets, freeways and bridges in communities across California and targeting funds toward transit and congested trade and commute corridor improvements.

California's state-maintained transportation infrastructure will receive roughly half of SB 1 revenue: $26 billion. The other half will go to local roads, transit agencies and an expansion of the state's growing network of pedestrian and cycle routes. Each year, this new funding will be

used to tackle deferred maintenance needs both on the state highway system and the local road system, including:

- Bike and Pedestrian Projects: $100 million
  - This funding will go to cities, counties, and regional transportation agencies to build or convert more bike paths, crosswalks, and sidewalks. It is a significant increase in subsidy for these projects through the Active Transportation Program (ATP).
- Local Planning Grants: $25 million

9.4.5. *California Office of Traffic Safety (OTS) Grants*

This program has funding for projects related to traffic safety, including transportation safety education and encouragement activities. Grants applications must be supported by local crash data (such as the data analyzed in this LRSP) and must relate to the following priority program areas:

- Alcohol Impaired Driving
- Distracted Driving
- Drug-Impaired Emergency Medical Services
- Motorcycle Safety
- Occupant Protection
- Pedestrian and Bicycle Safety
- Police Traffic Services
- Public Relations, Advertising, and Marketing Program
- Roadway Safety and Traffic Records

10. NEXT STEPS

The City of Manteca has completed this LRSP to guide the process of future transportation safety improvements for years to come. The data-driven analysis process identified crash types, related primary crash factors, locations with frequent crashes and similar risk factors. Based on this process, emphasis areas were identified. These emphasis areas will guide traffic safety improvements, education programs, and capital improvements for the City. Using the analyzed crash data and results from this LRSP, the City will:

- Apply for HSIP grant funding for implementation of safety improvements throughout the City that address the various emphasis areas identified
- Actively seek other funding opportunities to improve safety for all modal users, including vulnerable users
- Iteratively evaluate existing and proposed transportation safety programs and capital improvements to design and operate a safer transportation network in the City of Manteca
- Complete annual review of safety data

APPENDIX A

LITERATURE REVIEW

Literature Review: Table of Documents

ID	Document Name	Year	Agency	Document Description	Transportation Improvements / Policies	Safety
1	Manteca General Plan Update	2023	City of Manteca	Presents a vision for the City and establishes priorities for allocation of resources	-Goal C-1: Provide for a complete multimodal circulation system designed for the safe, balanced movement of all users, including children, persons with disabilities, seniors, underserved populations, goods, and services to destinations inside and outside of Manteca while minimizing vehicle miles traveled (VMT) and public costs to build and maintain the system. -Goal C-2: Provide a safe, high-quality, climate-resilient transportation system that addresses all modes of travel and includes attractive streetscapes with native and drought-resistant landscaping, street trees, planted berms, and landscaped medians.	
2	Manteca Active Transportation Plan	2020	City of Manteca	Outlines plan and vision to increase quality of life of residents/visitors by improving walkability and biking convenience and comfort	Goal 1: Allow all users to move safely on City bicycle and pedestrian networks. Goal 2: Develop convenient, low-stress bicycle and pedestrian networks that connect Manteca residents and visitors to destinations in the city and other jurisdictions.	-Implement infrastructure improvements to reduce collisions with bicyclists and pedestrians. -Implement programs to educate, encourage, and enforce safe travel by all modes to reduce collisions with bicyclists and pedestrians. -Regularly review collisions involving bicyclists and pedestrians and identify actions to reduce future collisions.
3	Regional Transportation Plan/Sustainable Communities Strategy	2022	SJCOG	Provide a sustainability vision through the year 2046 that recognizes the significant impact the transportation network has on the region's public health, mobility and economic vitality	Strategy No. 5 - Optimize the public transportation system to provide efficient and convenient access for users of all income levels. Strategy No. 7 - Provide transportation improvements to facilitate nonmotorized travel, including incorporation of complete streets elements as appropriate.	Strategy No. 10 - Facilitate projects that reduce the number of severity of traffic incidents.
4	SR 120/McKinley Avenue Interchange Project	In Progress	City of Manteca	Outlines plans, designs, and construction for a partial cloverleaf interchange on SR 120	See the following webpages for project description: https://www.mckinleyinterchangeproject.com/ https://www.manteca.gov/departments/engineering/project-information	
5	Traffic Calming Program	2018	City of Manteca	Outlines new traffic calming strategies as well as procedures for implementing new traffic calming measures	1. Define a process for neighborhoods to sponsor traffic calming plans and identify funding sources for specific streets, areas or neighborhoods 2. Provide guidance for the types of traffic calming measures that may be considered, both as part of the neighborhood process and during the City's review of new development applications	Maintain adequate access for emergency vehicles Alter driver behavior and improve conditions for non-motorized street users Bulbouts, ped islands, chicane, partial/full street closure
6	SR 99/120 Interchange Connector Project	Proposed	Caltrans	Relieve traffic congestion and improve operations of SR 99 with SR 120 and Austin Road Interchanges	Phase 1C will complete the Austin Road Interchange and complete the local road improvements.	
7	Measure K Bicylce, Pedestrian, and Safe Routes to School and Measure K Smart Growth Incentive Program Adopted Projects	2017-2021	SJCOG	Strategy to meet State and Federal in terms of accessibility / physical barriers	- Maintenance and repair projects, capital improvement projects and improvements for existing curb facilities	

APPENDIX B

INTERSECTION NETWORK SCREENING RESULTS

Intersection	Crashes	Local CCR Differential[1]	EPDO[2]	*Fatal*	*Severe Injury*	*Other Visible Injury*	*Complaint of Pain*	*Property Damage Only*	Broadside	Sideswipe	Rear End	Head On	Hit Object	Overturned	Pedestrian	Bicycle	Impaired	Dark	Wet	Priority Location
Signalized Intersections																				
MAIN ST & LOUISE AVE	**32**	0.16	261	0	1	4	14	13	6	4	8	1	7	0	2	3	5	7	4	
COMMERCE AVE & YOSEMITE AVE	**32**	0.22	350	0	2	4	8	18	8	8	9	2	2	0	2	2	3	8	4	X
NORTH UNION RD & YOSEMITE AVE	**25**	-0.04	158	0	0	9	9	7	11	0	8	2	3	0	1	0	4	10	1	
S MAIN ST & MISSION RIDGE DR	**24**	0.24	316	1	1	4	3	15	2	3	10	1	6	0	1	3	5	6	1	
AIRPORT WAY & YOSEMITE AVE	**23**	0.08	242	0	1	5	10	7	8	4	5	2	2	0	0	1	2	5	0	X
NORTH UNION RD & LOUISE AVE	**23**	-0.03	326	0	2	2	9	10	7	2	4	1	8	0	0	1	1	7	1	
NORTH UNION RD & CENTER ST	**23**	0.03	143	0	0	5	14	4	13	3	3	0	0	0	1	4	1	4	3	X
COTTAGE AVE & YOSEMITE AVE	**22**	0.00	121	0	0	6	8	8	10	1	7	0	2	0	0	2	0	3	0	
SPRECKELS AVE & MOFFAT BLVD	**18**	0.29	201	0	1	4	5	8	4	1	4	3	5	0	1	2	4	8	2	
COTTAGE AVE & NORTH ST	**18**	0.28	84	0	0	0	13	5	9	2	2	1	0	0	3	1	1	8	2	X
AIRPORT WAY & LOUISE AVE	**17**	-0.09	309	1	1	4	3	8	4	0	7	2	3	0	1	0	3	9	0	
UNION RD & NORTHGATE DR	**17**	0.07	181	0	1	2	5	9	7	0	2	0	6	0	1	0	4	6	2	
LATHROP RD & SR 99 SB RAMPS	**17**	-0.23	92	0	0	3	9	5	5	3	5	1	2	0	0	1	2	7	0	
UNION RD & LATHROP RD	**16**	-0.12	81	0	0	3	7	6	5	1	4	1	2	0	2	0	3	8	2	
CRESTWOOD AVE & LATHROP RD	**16**	0.04	90	0	0	5	5	6	4	3	4	2	2	0	0	0	2	6	1	
MAIN ST & CENTER ST	**16**	0.07	46	0	0	1	4	11	3	2	5	1	5	0	0	1	1	3	1	
COTTAGE AVE & LOUISE AVE	**16**	0.13	55	0	0	3	2	11	3	2	2	1	7	0	0	1	2	4	2	
MAIN ST & ALAMEDA ST	**14**	-0.07	69	0	0	3	5	6	7	3	2	0	0	0	1	1	1	4	1	
AIRPORT WAY & DANIELS ST	**13**	-0.09	68	0	0	2	7	4	2	2	8	0	0	0	1	0	0	4	0	
S MAIN ST & YOSEMITE AVE	**13**	-0.16	44	0	0	0	6	7	2	1	5	1	3	0	0	1	2	6	1	
N FREMONT AVE & YOSEMITE AVE	**13**	-0.04	296	0	2	1	7	3	2	1	5	3	0	0	2	0	2	4	2	
BIKEPED_TIDEWATER BIKEWAY & LOUISE AVE	**10**	-0.08	60	0	0	3	4	3	0	0	5	0	3	0	1	1	1	5	0	
MAIN ST & NORTHGATE DR	**10**	-0.10	35	0	0	2	1	7	1	0	3	0	6	0	0	0	0	4	1	
MAIN ST & NORTH ST	**10**	-0.13	35	0	0	1	3	6	1	2	3	1	3	0	0	0	1	1	1	
AIRPORT WAY & LATHROP RD	**9**	-0.23	40	0	0	0	6	3	4	0	3	1	1	0	0	0	1	1	1	

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Intersection	Crashes	Local CCR Differential[1]	EPDO[2]	*Fatal*	*Severe Injury*	*Other Visible Injury*	*Complaint of Pain*	*Property Damage Only*	Broadside	Sideswipe	Rear End	Head On	Hit Object	Overturned	Pedestrian	Bicycle	Impaired	Dark	Wet	Priority Location
NORTH UNION RD & WAWONA ST	**9**	-0.20	53	0	0	3	3	3	3	2	2	0	1	0	1	0	0	3	0	
AUSTIN RD & SHS_120	**9**	-0.19	49	0	0	1	6	2	2	0	5	0	1	0	0	1	1	3	0	
NORTH UNION RD & ALAMEDA ST	**8**	-0.23	23	0	0	0	3	5	3	0	0	1	3	0	1	0	2	3	0	
N WALNUT AVE & CENTER ST	**8**	0.01	43	0	0	2	3	3	3	2	2	1	0	0	0	1	2	3	1	
S MAIN ST & MOFFAT BLVD	**8**	-0.20	38	0	0	1	4	3	1	0	2	2	1	0	1	2	1	3	1	
POWERS AVE & YOSEMITE AVE	**8**	-0.19	38	0	0	1	4	3	0	2	3	0	2	0	1	0	0	1	0	
WINTERS DR & YOSEMITE AVE	**7**	-0.23	37	0	0	1	4	2	0	1	1	2	2	0	0	1	1	4	0	
UNION RD & W ATHERTON DR	**7**	-0.05	161	0	1	1	5	0	3	0	1	2	0	0	0	1	0	3	1	
BIKEPED_TIDEWATER BIKEWAY & LATHROP RD	**7**	-0.22	27	0	0	1	2	4	0	0	3	1	3	0	0	0	2	4	0	
UNION RD & DEL WEBB BLVD	**6**	-0.07	140	1	0	1	1	3	2	0	1	1	2	0	0	0	1	3	1	
NORTH UNION RD & CHERRY LN	**6**	-0.27	26	0	0	0	4	2	3	0	1	1	0	0	1	1	0	0	0	
AIRPORT WAY & DAISYWOOD DR	**5**	-0.27	20	0	0	0	3	2	1	1	1	1	0	0	0	0	0	0	0	
N WALNUT AVE & YOSEMITE AVE	**5**	-0.27	30	0	0	2	1	2	2	0	1	1	0	0	0	1	0	0	0	
MAIN ST & LANCASTER DR	**5**	-0.27	24	0	0	2	0	3	1	2	1	0	0	0	1	0	1	3	0	
S MAIN ST & W WESTMORE ST	**5**	-0.27	30	0	0	1	3	1	2	0	0	1	0	0	1	1	0	1	0	
S MAIN ST & E ATHERTON DR	**5**	-0.26	25	0	0	1	2	2	0	2	1	1	1	0	0	0	0	2	0	
BUENA VISTA DR & E WOODWARD AVE	**5**	-0.14	134	1	0	1	0	3	2	0	0	0	3	0	0	0	0	2	0	
PESTANA AVE & LOUISE AVE	**5**	-0.21	148	0	1	2	1	1	0	0	0	2	3	0	0	0	1	1	1	
LONDON AVE & LONDON AVE	**4**	-0.28	24	0	0	1	2	1	0	1	2	0	1	0	0	0	0	1	1	
PAGOLA AVE & E WOODWARD AVE	**4**	-0.23	24	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	
S VASCONCELLOS AVE & SHS_120	**4**	-0.31	9	0	0	0	1	3	2	0	2	0	0	0	0	0	0	1	1	
UNION RD & SPRAGUE ST	**3**	-0.33	23	0	0	1	2	0	1	0	2	0	0	0	0	0	0	0	0	
ELM AVE & LOUISE AVE	**3**	-0.33	18	0	0	0	3	0	1	0	2	0	0	0	0	0	0	0	0	
ELM AVE & CENTER ST	**3**	0.09	22	0	0	2	0	1	0	0	0	0	1	0	2	0	1	1	0	
Villa Ticino Dr & W Louise Ave	**3**	-0.33	8	0	0	0	1	2	0	0	2	0	1	0	0	0	1	1	0	
Unsignalized Intersections																				

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Intersection	Crashes	Local CCR Differential[1]	EPDO[2]	*Fatal*	*Severe Injury*	*Other Visible Injury*	*Complaint of Pain*	*Property Damage Only*	Broadside	Sideswipe	Rear End	Head On	Hit Object	Overturned	Pedestrian	Bicycle	Impaired	Dark	Wet	Priority Location
PESTANA AVE & SHS_120	**18**	0.21	317	0	1	7	8	2	11	0	2	4	1	0	0	0	2	3	0	
SPRECKELS AVE & NORMAN DR	**17**	0.47	125	0	0	8	6	3	7	1	1	2	2	0	2	2	0	3	2	X
GRANT AVE & YOSEMITE AVE	**14**	0.23	73	0	0	4	4	6	4	0	3	0	3	0	2	1	2	1	0	
COMMERCE AVE & HULSEY WAY	**12**	0.67	47	0	0	1	5	6	6	0	1	1	3	0	0	1	1	1	0	
E WOODWARD AVE & MOFFAT BLVD	**12**	0.58	42	0	0	1	4	7	1	1	1	5	3	0	0	0	3	7	2	
GRAND PRIX AVE & YOSEMITE AVE	**11**	0.09	26	0	0	0	3	8	2	1	2	1	4	0	0	1	1	4	0	
NORTH UNION RD & DANIELS ST	**10**	0.04	60	0	0	3	4	3	6	0	0	0	2	0	0	2	0	2	0	
ARROWSMITH DR & LATHROP RD	**10**	0.11	410	1	1	0	4	4	6	0	0	3	1	0	0	1	1	7	2	X
S MAIN ST & E WOODWARD AVE	**10**	0.13	415	0	2	1	3	4	3	0	3	1	2	0	0	0	2	6	0	
S MAIN ST & WAWONA ST	**9**	0.06	39	0	0	1	4	4	2	0	5	1	1	0	0	1	1	1	0	
N LINCOLN AVE & YOSEMITE AVE	**9**	0.07	24	0	0	1	1	7	2	0	1	0	5	0	0	0	3	4	2	
SPRECKELS AVE & HISTORICAL PLAZA WAY	**9**	0.15	54	0	0	2	5	2	6	0	1	0	0	0	1	1	1	4	0	
AIRPORT WAY & W ATHERTON DR	**8**	0.21	247	0	1	3	4	0	7	1	0	0	0	0	0	0	0	2	0	
SAINT DOMINICS DR & YOSEMITE AVE	**8**	0.05	53	0	0	2	5	1	4	1	1	1	1	0	0	0	0	1	2	
OLEANDER RD & E WOODWARD AVE	**8**	0.30	18	0	0	0	2	6	1	0	0	0	7	0	0	0	2	6	0	
N VEACH AVE & YOSEMITE AVE	**8**	0.06	412	0	2	1	3	1	0	1	2	0	2	0	3	0	0	1	2	
CRESTWOOD AVE & LOUISE AVE	**8**	0.05	18	0	0	1	0	7	0	0	1	2	5	0	0	0	3	4	1	
S MAIN ST & E OTIS ST	**8**	0.05	34	0	0	0	5	3	8	0	0	0	0	0	0	0	0	1	0	
SPRECKELS AVE & PHOENIX DR	**8**	0.09	43	0	0	1	5	2	6	0	0	0	1	1	0	0	1	2	1	
NB 99 RAMPS & SHS 120	**8**	-0.09	227	1	0	2	2	3	3	0	2	0	1	0	1	1	0	2	0	
FISHBACK RD & WAWONA ST	**7**	0.27	17	0	0	0	2	5	3	0	0	0	4	0	0	0	1	3	2	
AL FONSECA LN & E WOODWARD AVE	**7**	0.24	32	0	0	2	1	4	0	0	1	0	6	0	0	0	1	4	0	
LOCUST AVE & YOSEMITE AVE	**7**	0.01	212	0	1	0	3	3	0	1	3	1	0	0	1	1	1	2	2	
MAIN ST & EDISON ST	**7**	-0.01	402	2	0	0	3	2	1	1	1	0	2	0	2	0	3	3	0	X
GARFIELD AVE & YOSEMITE AVE	**7**	0.01	27	0	0	1	2	4	1	2	4	0	0	0	0	0	2	4	0	

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Intersection	Crashes	Local CCR Differential[1]	EPDO[2]	*Fatal*	*Severe Injury*	*Other Visible Injury*	*Complaint of Pain*	*Property Damage Only*	Broadside	Sideswipe	Rear End	Head On	Hit Object	Overturned	Pedestrian	Bicycle	Impaired	Dark	Wet	Priority Location
RAMP_117642 & YOSEMITE AVE	**7**	-0.10	202	1	0	0	1	5	0	1	3	1	1	0	1	0	3	5	0	
BUTTON AVE & SHS_120	**7**	0.53	52	0	0	2	5	0	5	0	1	0	0	0	1	0	0	1	1	
EL RANCHO DR & SHS_120	**7**	-0.03	232	1	0	1	5	0	6	0	1	0	0	0	0	1	0	0	0	
MARGUERITE AVE & LOUISE AVE	**6**	-0.02	21	0	0	0	3	3	3	0	0	1	2	0	0	0	0	1	0	
SHAEFER ST & SNYDER ST	**6**	3.48	16	0	0	1	0	5	0	0	0	0	6	0	0	0	0	4	0	
EL PORTAL AVE & YOSEMITE AVE	**6**	-0.02	221	0	1	1	3	1	1	2	1	1	0	0	1	0	1	1	1	
SYCAMORE AVE & W CENTER ST	**6**	0.50	41	0	0	2	3	1	3	1	1	0	0	0	1	0	0	0	0	
MAIN ST & JASON ST	**6**	-0.04	26	0	0	0	4	2	2	0	1	1	2	0	0	0	0	2	0	
S MELLON AVE & INDUSTRIAL PARK DR	**6**	0.46	21	0	0	0	3	3	3	0	1	0	2	0	0	0	0	1	0	
FELICE WAY & LOUISE AVE	**6**	0.02	16	0	0	1	0	5	0	1	0	1	4	0	0	0	1	1	0	
SPRECKELS AVE & DUPONT CT	**6**	0.08	235	1	0	3	2	0	4	1	0	1	0	0	0	0	0	1	0	
AIRPORT WAY & WAWONA ST	**5**	-0.06	205	0	1	0	2	2	1	0	2	1	1	0	0	0	0	1	0	
FISHBACK RD & YOSEMITE AVE	**5**	-0.03	205	0	1	0	2	2	2	0	0	0	2	0	0	1	0	0	0	
NORTH UNION RD & EUCALYPTUS ST	**5**	-0.08	30	0	0	2	1	2	0	2	2	0	0	0	1	0	1	2	0	
TRAILWOOD AVE & LOUISE AVE	**5**	-0.05	15	0	0	0	2	3	3	0	0	0	2	0	0	0	0	3	0	
ALMOND AVE & YOSEMITE AVE	**5**	-0.05	10	0	0	0	1	4	0	2	3	0	0	0	0	0	2	2	1	
POPLAR AVE & CENTER ST	**5**	0.35	214	0	1	2	0	2	1	0	0	0	1	0	1	0	1	3	0	
MAIN ST & BIRCHWOOD ST	**5**	-0.04	25	0	0	1	2	2	2	0	1	0	1	0	0	1	1	2	0	
FRANK AVE & LOUISE AVE	**5**	-0.02	20	0	0	1	1	3	1	0	3	0	1	0	0	0	4	4	1	
S POWERS AVE & HUTCHINGS ST	**5**	0.39	40	0	0	2	3	0	0	0	1	0	1	0	1	2	0	2	0	
COTTAGE AVE & ALAMEDA ST	**5**	0.02	35	0	0	2	2	1	2	1	2	0	0	0	0	0	1	2	0	
COTTAGE AVE & PINE ST / COTTAGE CT	**5**	0.02	20	0	0	1	1	3	0	0	0	1	2	0	0	2	1	4	0	
NORTHWOODS AVE & MC NARY CIR	**5**	0.24	34	0	0	3	0	2	0	0	3	1	0	0	1	0	1	2	0	
LONDON AVE & NORTHGATE DR	**5**	0.15	30	0	0	1	3	1	0	1	1	0	1	0	2	0	1	1	0	
AIRPORT WAY & NORTHGATE DR	**4**	-0.09	19	0	0	1	1	2	2	0	0	1	1	0	0	0	0	1	0	
ZURICH DR & LOUISE AVE	**4**	-0.08	14	0	0	0	2	2	1	0	1	0	2	0	0	0	1	1	0	

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Intersection	Crashes	Local CCR Differential[1]	EPDO[2]	*Fatal*	*Severe Injury*	*Other Visible Injury*	*Complaint of Pain*	*Property Damage Only*	Broadside	Sideswipe	Rear End	Head On	Hit Object	Overturned	Pedestrian	Bicycle	Impaired	Dark	Wet	Priority Location
MADISON GROVE DR & LONDON AVE	**4**	-0.04	14	0	0	1	0	3	0	1	0	1	2	0	0	0	2	1	0	
FOXFIRE DR & CROM ST	**4**	0.24	19	0	0	1	1	2	1	0	0	0	2	0	0	1	0	1	1	
WATSON AVE & YOSEMITE AVE	**4**	-0.09	398	0	2	1	1	0	1	0	1	0	0	0	0	2	0	0	0	
UNION RD & SHADY PINES ST	**4**	0.10	24	0	0	1	2	1	1	1	0	2	0	0	0	0	1	2	1	
NORTH UNION RD & SAPPHIRE WAY	**4**	-0.10	4	0	0	0	0	4	0	0	0	1	3	0	0	0	2	2	0	
AGATE AVE & LOUISE AVE	**4**	-0.07	4	0	0	0	0	4	0	0	0	1	3	0	0	0	0	3	0	
JUNEWOOD PL & NORTHGATE DR	**4**	0.24	204	0	1	0	2	1	2	0	1	0	0	0	1	0	1	1	0	
SHERWOOD AVE & LATHROP RD	**4**	-0.09	14	0	0	1	0	3	1	0	0	0	3	0	0	0	0	1	1	
LOCUST AVE & WAWONA ST	**4**	0.06	14	0	0	0	2	2	3	0	0	0	0	0	1	0	0	3	1	
SAND LN & W ATHERTON DR	**4**	0.01	204	0	1	1	0	2	0	1	0	0	3	0	0	0	0	1	0	
MAYWOOD AVE & NORTHGATE DR	**4**	0.04	34	0	0	2	2	0	3	0	1	0	0	0	0	0	0	1	0	
GOODALE CT & W YOSEMITE AVE	**4**	-0.08	14	0	0	0	2	2	0	1	3	0	0	0	0	0	0	2	0	
S WILLOW AVE & YOSEMITE AVE	**4**	-0.08	24	0	0	1	2	1	1	0	2	0	0	0	1	0	0	0	1	
MANTECA AVE & YOSEMITE AVE	**4**	-0.08	23	0	0	2	0	2	0	1	1	0	1	0	1	1	0	2	0	
POPLAR AVE & LOUISE AVE	**4**	-0.07	204	0	1	0	2	1	2	0	0	0	1	0	0	1	0	1	0	
SYCAMORE PL / SYCAMORE AVE & ALAMEDA ST	**4**	0.21	9	0	0	0	1	3	1	0	1	0	1	0	0	1	1	2	1	
MAPLE AVE & YOSEMITE AVE	**4**	-0.08	14	0	0	0	2	2	0	0	3	0	1	0	0	0	0	1	0	
MAIN ST & JOSEPH RD	**4**	-0.08	199	0	1	0	1	2	0	0	1	0	1	0	2	0	2	4	1	
MAIN ST & ARGONAUT ST	**4**	-0.09	389	0	2	0	1	1	1	0	0	1	2	0	0	0	1	3	1	
MAIN ST & SUTTER ST	**4**	-0.09	199	1	0	0	1	2	0	0	2	1	0	0	1	0	0	1	0	X
GRANT AVE & NORTH ST	**4**	0.21	29	0	0	1	3	0	2	2	0	0	0	0	0	0	0	0	0	
VAN RYN AVE & E WOODWARD AVE	**4**	-0.02	29	0	0	2	1	1	1	0	0	0	2	0	1	0	1	2	1	
AUSTIN RD & MOFFAT BLVD	**4**	0.03	19	0	0	1	1	2	1	0	2	0	0	0	0	0	1	2	0	
MCKINLEY AVE & WOODWARD AVE	**3**	-0.04	13	0	0	1	0	2	0	0	0	1	1	1	0	0	0	3	1	
STREET-UNNAMED_175577 & YOSEMITE AVE	**3**	-0.05	3	0	0	0	0	3	0	0	0	0	3	0	0	0	0	0	0	
AIRPORT WAY & WOODWARD AVE	**3**	-0.08	8	0	0	0	1	2	2	0	0	0	1	0	0	0	1	1	0	

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Intersection	Crashes	Local CCR Differential[1]	EPDO[2]	*Fatal*	*Severe Injury*	*Other Visible Injury*	*Complaint of Pain*	*Property Damage Only*	Broadside	Sideswipe	Rear End	Head On	Hit Object	Overturned	Pedestrian	Bicycle	Impaired	Dark	Wet	Priority Location
PASADA AVE & LATHROP RD	**3**	-0.11	22	0	0	2	0	1	0	0	1	0	1	0	0	0	0	2	0	
UNION RD & PHEASANT HOLLOW WAY	**3**	-0.11	3	0	0	0	0	3	0	1	0	0	2	0	0	0	0	0	1	
UNION RD & SAINT FRANCIS DR	**3**	-0.11	18	0	0	1	1	1	1	0	0	0	1	0	0	1	0	0	0	
NORTH UNION RD & VIRGINIA ST	**3**	-0.12	3	0	0	0	0	3	0	0	0	0	1	2	0	0	0	2	0	
NORTH UNION RD & MISSION RIDGE DR	**3**	-0.12	23	0	0	1	2	0	2	0	0	1	0	0	0	0	0	1	0	
JANET LN & MERCED WAY	**3**	1.29	3	0	0	0	0	3	1	1	1	0	0	0	0	0	0	0	0	
EL PORTAL AVE & WAWONA ST	**3**	0.08	18	0	0	1	1	1	0	0	0	2	1	0	0	0	0	0	0	
LOCUST AVE & MISSION RIDGE DR	**3**	0.01		0	0	0	1	2	2	0	1	0	0	0	0	0	1	1	0	
REDWOOD AVE & LATHROP RD	**3**	-0.11	8	0	0	0	1	2	0	0	1	0	1	1	0	0	1	2	1	
GREENBRIER AVE & ALAMEDA ST	**3**	0.06	8	0	0	0	1	2	1	2	0	0	0	0	0	0	0	0	0	
EASTWOOD AVE & NORTHGATE DR	**3**	-0.04	8	0	0	0	1	2	2	0	0	0	0	0	0	1	0	1	0	
POPLAR AVE & ALAMEDA ST	**3**	0.06	18	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	
PARK AVE & OREGON ST	**3**	0.89	8	0	0	0	1	2	1	0	1	0	1	0	0	0	1	2	0	
S MAIN ST & LUPTON ST	**3**	-0.11	13	0	0	1	0	2	2	1	0	0	0	0	0	0	0	1	0	
GRANT AVE & CENTER ST	**3**	0.06	18	0	0	1	1	1	1	2	0	0	0	0	0	0	1	1	0	
N LINCOLN AVE & NORTH ST	**3**	0.06	13	0	0	0	2	1	2	0	0	0	1	0	0	0	0	0	0	
N SHERMAN AVE & NORTH ST	**3**	0.06	23	0	0	1	2	0	1	0	1	0	0	0	1	0	0	0	0	
N SHERMAN AVE & CENTER ST	**3**	0.06	18	0	0	0	3	0	3	0	0	0	0	0	0	0	0	1	0	
N SHERMAN AVE & YOSEMITE AVE	**3**	-0.11	18	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	
MIKEY PL & E ALAMEDA ST	**3**	0.08	13	0	0	0	2	1	2	0	1	0	0	0	0	0	0	1	0	
GARDEN GATE DR & LOUISE AVE	**3**	-0.11	18	0	0	1	1	1	1	0	0	0	1	1	0	0	1	2	0	
N GARFIELD AVE & NORTH ST	**3**	0.08	13	0	0	1	0	2	1	0	0	2	0	0	0	0	0	0	0	
S GARFIELD AVE & MOFFAT BLVD	**3**	-0.05	18	0	0	1	1	1	1	0	1	0	1	0	0	0	0	0	1	
N FREMONT AVE & SUTTER ST	**3**	0.59	3	0	0	0	0	3	0	2	0	0	1	0	0	0	0	1	1	
S POWERS AVE & MOFFAT BLVD	**3**	-0.04	392	0	2	1	0	0	1	1	0	0	0	0	1	0	0	2	0	
POWERS AVE & E ALAMEDA ST	**3**	0.01	208	1	0	1	1	0	1	0	0	2	0	0	0	0	1	0	0	

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Intersection	Crashes	Local CCR Differential[1]	EPDO[2]	*Fatal*	*Severe Injury*	*Other Visible Injury*	*Complaint of Pain*	*Property Damage Only*	Broadside	Sideswipe	Rear End	Head On	Hit Object	Overturned	Pedestrian	Bicycle	Impaired	Dark	Wet	Priority Location
POWERS AVE & NORTH ST	**3**	-0.04	8	0	0	0	1	2	2	1	0	0	0	0	0	0	1	1	0	
VAN RYN AVE & INDUSTRIAL PARK DR	**3**	-0.07	3	0	0	0	0	3	0	0	0	0	3	0	0	0	0	2	2	
TESORO DR & ATHERTON DR	**3**	0.13	18	0	0	1	1	1	1	1	0	0	1	0	0	0	0	2	0	
PILLSBURY RD & E WOODWARD AVE	**3**	-0.03	8	0	0	0	1	2	0	0	0	0	1	0	1	0	0	0	0	
STAFFORD WAY & NORTH ST	**3**	0.04	13	0	0	0	2	1	0	1	1	0	0	0	1	0	0	0	0	
SR 99 SB RAMP & MOFFAT BLVD	**3**	-0.12	8	0	0	0	1	2	2	0	1	0	0	0	0	0	0	0	1	

1. Local Critical Crash Rate Differential

2. Equivalent Property Damage Only Crashes

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APPENDIX C

SEGMENT NETWORK SCREEN

Facility	Cross Street 1	Cross Street 2	Crashes	Local CCR Differential[1]	EPDO[2]	*Fatal*	*Severe Injury*	*Other Visible Injury*	*Complaint of Pain*	*Property Damage Only*	Broadside	Sideswipe	Rear End	Head On	Hit Object	Overturned	Pedestrian	Bicycle	Aggressive	Impaired	Dark	Wet	Priority Locations
Principal Arterial																							
AIRPORT WAY	AIRPORT WAY WB RAMPS	AIRPORT WAY EB RAMPS	**12**	2.08	72	0	0	3	6	3	3	1	3	1	2	0	0	3	6	0	5	0	
YOSEMITE AVE	SPRECKELS AVE	COMMERCE AVE	**12**	0.92	206	0	1	2	2	7	5	3	2	1	1	0	1	0	1	1	3	1	X
LATHROP RD	MADISON GROVE DR	S UNION RD	**12**	0.82	46	0	0	3	1	8	7	0	1	0	4	0	0	0	0	0	6	1	
AIRPORT WAY	WAWONA ST	YOSEMITE AVE	**11**	0.41	56	0	0	2	5	4	0	1	6	2	1	0	0	1	7	1	3	0	
S MAIN ST	SR 120 WB RAMPS	SR 120 EB RAMPS	**10**	1.64	65	0	0	2	7	1	2	0	5	0	2	0	0	1	6	1	1	1	
YOSEMITE AVE	GRAND PRIX AVE	NORTH UNION RD	**10**	0.97	60	0	0	2	6	2	7	0	0	0	1	0	0	1	0	1	1	0	X
S MAIN ST	SR 120 WB RAMPS	MISSION RIDGE DR	**7**	0.95	27	0	0	1	2	4	2	2	2	0	0	0	1	1	2	0	1	0	
SHS_120/YOSEMITE AVE	BUTTON AVE	EL RANCHO DR	**6**	0.54	36	0	0	1	4	1	4	0	2	0	0	0	0	0	2	0	1	0	
UNION RD	SR 12O WB RAMPS	SR 120 EB RAMPS	**6**	0.68	180	0	1	0	2	3	0	1	3	2	0	0	0	0	3	1	1	1	
LOUISE AVE	CITY LIMITS	AIRPORT WAY	**5**	-0.09	15	0	0	0	2	3	1	1	1	0	1	0	1	0	1	1	2	0	
AIRPORT WAY	DAISYWOOD DR	LOVELACE RD	**4**	-0.12	183	0	1	1	1	1	0	0	0	1	3	0	0	0	3	0	3	0	
AIRPORT WAY	MISONE ST	NORTHGATE DR	**4**	-0.01	19	0	0	0	3	1	0	0	4	0	0	0	0	0	3	1	2	0	
LOUISE AVE	MAIN ST	FRANK AVE	**4**	0.50	24	0	0	1	2	1	1	1	1	0	1	0	1	0	2	0	2	0	
LATHROP RD	CITY LIMITS	AIRPORT WAY	**4**	-0.14	178	0	1	0	2	1	0	0	2	1	1	0	0	0	1	1	3	1	
AIRPORT WAY	CROM ST	W YOSEMITE AVE	**3**	-0.11	18	0	0	1	1	1	1	0	2	0	0	0	0	0	2	0	1	0	
YOSEMITE AVE	FISHBACK RD	SAINT DOMINICS DR	**3**	0.16	177	0	1	0	2	0	2	0	1	0	0	0	0	0	0	1	2	0	
NORTH UNION RD	YOSEMITE AVE	CENTER ST	**3**	0.08	28	0	0	2	1	0	2	1	0	0	0	0	0	0	1	0	1	0	
MAIN ST	JOSEPH RD	NORTHGATE DR	**3**	0.13	172	1	0	0	1	1	0	0	0	0	2	0	1	0	2	0	3	0	
S MAIN ST	WAWONA ST	LUPTON ST	**3**	0.03	8	0	0	0	1	2	1	1	1	0	0	0	0	0	1	0	0	0	
LOUISE AVE	POPLAR AVE	MAIN ST	**3**	0.19	8	0	0	0	1	2	0	0	2	0	0	0	0	1	1	1	2	0	
UNION RD	LOUISE AVE	SAINT FRANCIS DR	**3**	0.31	3	0	0	0	0	3	0	0	1	0	2	0	0	0	0	2	2	0	
Minor Arterial																							
S MAIN ST	SR 120 WB RAMPS	SR 120 EB RAMPS	**13**	4.72	83	0	0	3	8	2	2	2	6	0	2	0	1	0	7	1	1	1	
YOSEMITE AVE	MCKINLEY AVE	SWANSON RD	**4**	0.10	24	0	0	1	2	1	1	1	1	1	0	0	0	0	1	1	1	0	
Major Colletor																							
MOFFAT BLVD	SPRECKELS AVE	E WOODWARD AVE	**8**	0.31	192	1	0	1	2	4	1	0	1	0	3	1	1	0	2	2	4	0	
INDUSTRIAL PARK DR	SYRAH CT	VAN RYN AVE	**4**	1.04	9	0	0	0	1	3	0	0	0	0	4	0	0	0	1	2	2	0	
MISSION RIDGE DR	SYRAH CT	S MAIN ST	**4**	0.91	173	0	1	0	1	2	0	2	0	0	2	0	0	0	2	1	2	0	X
UNION RD	DEL WEBB BLVD	SHADY PINES ST	**4**	0.34	14	0	0	0	2	2	0	0	1	2	1	0	0	0	0	1	2	1	
BUTTON AVE	SHS 120	NEHEMIAH DR	**3**	0.38	8	0	0	0	1	2	0	1	0	0	2	0	0	0	2	0	1	0	
WOODWARD AVE	BELLA LAGO WAY	JOSHUA ST	**3**	0.39	177	1	0	1	0	1	0	0	1	1	0	0	1	0	0	1	3	0	
WOODWARD AVE	JOSHUA ST	MCKINLEY AVE	**3**	1.09	8	0	0	0	1	2	0	1	0	0	1	1	0	0	1	0	2	0	

Kimley»Horn

Facility	Cross Street 1	Cross Street 2	Crashes	Local CCR Differential[1]	EPDO[2]	*Fatal*	*Severe Injury*	*Other Visible Injury*	*Complaint of Pain*	*Property Damage Only*	Broadside	Sideswipe	Rear End	Head On	Hit Object	Overturned	Pedestrian	Bicycle	Aggressive	Impaired	Dark	Wet	Priority Locations
Local Roads																							
SYCAMORE AVE	W NORTH ST	W ALAMEDA ST	**3**	9.24	3	0	0	0	0	3	0	2	1	0	0	0	0	0	2	1	2	1	
E ATHERTON DR	S MAIN ST	WELLINGTON AVE	**2**	-0.23	166	0	1	0	0	1	0	0	0	0	2	0	0	0	1	0	2	0	

1. Local Critical Crash Rate Differential

2. Equivalent Property Damage Only Crashes

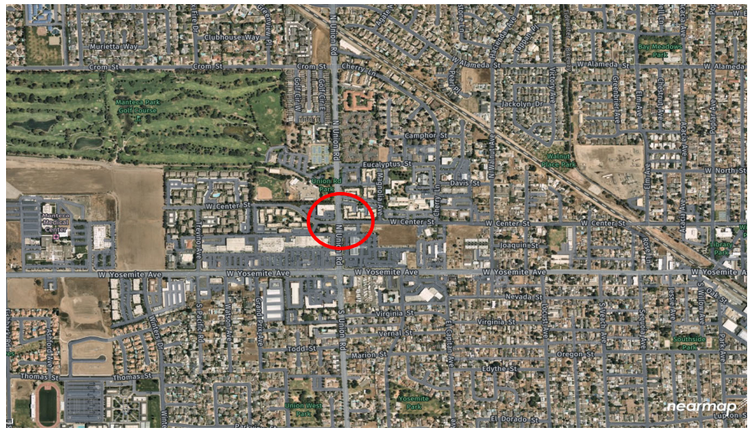
Kimley»Horn

APPENDIX D

PROJECT SHEETS

Signalized Intersection

Location: North Union Rd & Center St
Agency Name: City of Manteca
Contact Name: Beshoy Demyan
E-mail: bdemyan@manteca.gov

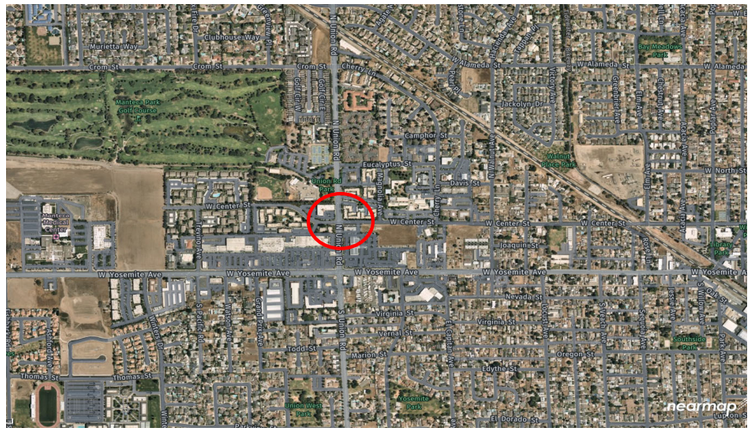


Total Crashes	23
Local CCR Differential	0.03
Equivalent Property Damage Only	143
Fatal	0
Severe Injury	0
Other Visible Injury	5
Complaint of Pain	14
PDO	4
Crash Type	
Broadside	13
Sideswipe	3
Rear End	3
Head On	0
Hit Object	0
Overturned	0
Non-Motorist Crashes	
Pedestrian	1
Bicycle	4
Contributing Factors	
Impaired	1
Crash Conditions	
Dark	4
Wet	3

NOTES	COLLISION TYPE	RECOMMENDATION	LRSM/CMF COUNTERMEASURE	LRSM #	Expected Life (Years)	CMF	CALTRANS FUNDING	NUMBER OF CRASHES (2017-2021)		NUMBER OF HISTORIC CRASHES REDUCED	10-YEAR CRASH REDUCTION ESTIMATE	CRASH SEVERITY COST	10-YEAR CRASH REDUCTION BENEFIT (2022)	TOTAL 10-YEAR CRASH REDUCTION BENEFIT (2022)	QUANTITY/ NUMBER OF UNITS	UNIT COST	COST ESTIMATE	BENEFIT/COST
-	Bike + Ped	Implement Leading Pedestrian Interval (LPI)	Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	S21PB	10	0.40	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 785,400	1 Lump Sum	$ 45,600	$ 45,600	**17.2**
								SEVERE	0	0	0.00	$ 1,787,000	$ -					
								OTHER VISIBLE	4	2.4	4.80	$ 159,900	$ 767,520					
								COMPLAINT OF PAIN	0	0	0.00	$ 90,900	$ -					
								PDO	1	0.6	1.20	$ 14,900	$ 17,880					
-	Bike + Ped	Install Advanced Stop Bar (North, South, West Legs)	Install Advance Stop Bar Before Crosswalk (Bicycle Box)	S20PB	10	0.85	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 196,350	87 SQFT of Striping	$ 7	$ 609	**322.4**
								SEVERE	0	0	0.00	$ 1,787,000	$ -					
								OTHER VISIBLE	4	0.6	1.20	$ 159,900	$ 191,880					
								COMPLAINT OF PAIN	0	0	0.00	$ 90,900	$ -					
								PDO	1	0.15	0.30	$ 14,900	$ 4,470					
-	All	Refresh Intersection Crosswalk Striping with High-Visibility Thermoplastic Striping	Install Raised Pavement Markers and Striping (Through Intersection)	S09	10	0.90	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 426,340	1485 SQFT of Striping	$ 7	$ 10,395	**41.0**
								SEVERE	0	0	0.00	$ 1,787,000	$ -					
								OTHER VISIBLE	5	0.5	1.00	$ 159,900	$ 159,900					
								COMPLAINT OF PAIN	14	1.4	2.80	$ 90,900	$ 254,520					
								PDO	4	0.4	0.80	$ 14,900	$ 11,920					
-	All	Refresh Intersection Striping with High-Visibility Thermoplastic (north & west legs)	Install Raised Pavement Markers and Striping (Through Intersection)	S09	10	0.90	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 426,340	483 SQFT of Striping	$ 7	$ 3,381	**126.1**
								SEVERE	0	0	0.00	$ 1,787,000	$ -					
								OTHER VISIBLE	5	0.5	1.00	$ 159,900	$ 159,900					
								COMPLAINT OF PAIN	14	1.4	2.80	$ 90,900	$ 254,520					
								PDO	4	0.4	0.80	$ 14,900	$ 11,920					
-	Bike + Ped	Upgrade to Pedestrian Countdown Signals	Install Pedestrian Countdown Signal Heads	S17PB	20	0.75	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 327,250	8 Pedestrian Signal Heads	$ 5,460	$ 43,680	**7.5**
								SEVERE	0	0	0.00	$ 1,787,000	$ -					
								OTHER VISIBLE	4	1	2.00	$ 159,900	$ 319,800					
								COMPLAINT OF PAIN	0	0	0.00	$ 90,900	$ -					
								PDO	1	0.25	0.50	$ 14,900	$ 7,450					
-	-	Install APS (accessible pedestrian signals)	-	-	-	-	-	FATAL	0	-	-	-	-	-	8 Push Buttons	$ 2,000	$ 16,000	**-**
								SEVERE	0	-	-	-	-					
								OTHER VISIBLE	5	-	-	-	-					
								COMPLAINT OF PAIN	14	-	-	-	-					
								PDO	4	-	-	-	-					

Signalized Intersection

Location: North Union Rd & Center St
Agency Name: City of Manteca
Contact Name: Beshoy Demyan
E-mail: bdemyan@manteca.gov



Total Crashes	23
Local CCR Differential	0.03
Equivalent Property Damage Only	143
Fatal	0
Severe Injury	0
Other Visible Injury	5
Complaint of Pain	14
PDO	4
Crash Type	
Broadside	13
Sideswipe	3
Rear End	3
Head On	0
Hit Object	0
Overturned	0
Non-Motorist Crashes	
Pedestrian	1
Bicycle	4
Contributing Factors	
Impaired	1
Crash Conditions	
Dark	4
Wet	3

NOTES	COLLISION TYPE	RECOMMENDATION	LRSM/CMF COUNTERMEASURE	LRSM #	Expected Life (Years)	CMF	CALTRANS FUNDING	NUMBER OF CRASHES (2017-2021)		NUMBER OF HISTORIC CRASHES REDUCED	10-YEAR CRASH REDUCTION ESTIMATE	CRASH SEVERITY COST	10-YEAR CRASH REDUCTION BENEFIT (2022)	TOTAL 10-YEAR CRASH REDUCTION BENEFIT (2022)	QUANTITY/ NUMBER OF UNITS	UNIT COST	COST ESTIMATE	BENEFIT/COST
-	-	ADA ramp upgrades	-	-	-	-	-	FATAL	0	-	-	-	-	-	4 Ramps	$ 5,000	$ 20,000	-
								SEVERE	0	-	-	-	-					
								OTHER VISIBLE	5	-	-	-	-					
								COMPLAINT OF PAIN	14	-	-	-	-					
								PDO	4	-	-	-	-					
-	All	Signal Timing Improvements (Checking Yellow / All-Red Time)	Improve signal timing (coordination, phases, red, yellow, or operation)	S03	10	0.15	50%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 3,623,890	1 Lump Sum	$ 15,000	$ 15,000	**241.6**
								SEVERE	0	0	0.00	$ 1,787,000	$ -					
								OTHER VISIBLE	5	4.25	8.50	$ 159,900	$ 1,359,150					
								COMPLAINT OF PAIN	14	11.9	23.80	$ 90,900	$ 2,163,420					
								PDO	4	3.4	6.80	$ 14,900	$ 101,320					
-	All	Add Near-Side Traffic Signal Heads (All Approaches)	Improve Signal Hardware: Lenses, Back-Plates with Retroreflective Borders, Mounting, Size, and Number	S02	10	0.85	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 639,510	4 Signal Heads	$ 8,000	$ 32,000	**20.0**
								SEVERE	0	0	0.00	$ 1,787,000	$ -					
								OTHER VISIBLE	5	0.75	1.50	$ 159,900	$ 239,850					
								COMPLAINT OF PAIN	14	2.1	4.20	$ 90,900	$ 381,780					
								PDO	4	0.6	1.20	$ 14,900	$ 17,880					
-	All	Verify and Increase the Number of Through-Movement Signal Heads on Mast Arms per guidance in CA MUTCD	Improve Signal Hardware: Lenses, Back-Plates with Retroreflective Borders, Mounting, Size, and Number	S02	10	0.85	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 639,510	2 Signal Heads	$ 8,000	$ 16,000	**40.0**
								SEVERE	0	0	0.00	$ 1,787,000	$ -					
								OTHER VISIBLE	5	0.75	1.50	$ 159,900	$ 239,850					
								COMPLAINT OF PAIN	14	2.1	4.20	$ 90,900	$ 381,780					
								PDO	4	0.6	1.20	$ 14,900	$ 17,880					
-	Night	Add Additional Intersection Safety Lighting (Northwest, Southwest, and Northeast Corners)	Add Intersection Lighting (Signalized Intersection => S.I.)	S01	20	0.60	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 290,880	3 Luminaires	$ 15,000	$ 45,000	**6.5**
								SEVERE	0	0	0.00	$ 1,787,000	$ -					
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -					
								COMPLAINT OF PAIN	4	1.6	3.20	$ 90,900	$ 290,880					
								PDO	0	0	0.00	$ 14,900	$ -					

Signalized Intersection

Location: Airport Way & Yosemite Ave
Agency Name: City of Manteca
Contact Name: Beshoy Demyan
E-mail: bdemyan@manteca.gov

Total Crashes	23
Local CCR Differential	0.08
Equivalent Property Damage Only	242
Fatal	0
Severe Injury	1
Other Visible Injury	5
Complaint of Pain	10
PDO	7
Crash Type	
Broadside	8
Sideswipe	4
Rear End	5
Head On	2
Hit Object	2
Overturned	0
Non-Motorist Crashes	
Pedestrian	0
Bicycle	1
Contributing Factors	
Impaired	2
Crash Conditions	
Dark	5
Wet	0

NOTES	COLLISION TYPE	RECOMMENDATION	LRSM/CMF COUNTERMEASURE	LRSM #	Expected Life (Years)	CMF	CALTRANS FUNDING	NUMBER OF CRASHES (2017-2021)		NUMBER OF HISTORIC CRASHES REDUCED	10-YEAR CRASH REDUCTION ESTIMATE	CRASH SEVERITY COST	10-YEAR CRASH REDUCTION BENEFIT (2022)	TOTAL 10-YEAR CRASH REDUCTION BENEFIT (2022)	QUANTITY/ NUMBER OF UNITS	UNIT COST	COST ESTIMATE	BENEFIT/COST
-	Bike + Ped	Install advanced stop bar (All approaches)	Install Advance Stop Bar Before Crosswalk (Bicycle Box)	S20PB	10	0.85	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 536,100	160 SQFT of Striping	$ 7	$ 1,120	**478.7**
								SEVERE	1	0.15	0.30	$ 1,787,000	$ 536,100					
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -					
								COMPLAINT OF PAIN	0	0	0.00	$ 90,900	$ -					
								PDO	0	0	0.00	$ 14,900	$ -					
-	All	Install additional supplemental signal heads (EB and WB approaches)	Improve signal hardware: lenses, back-plates with retroreflective borderd, mounting, size, and number	S02	10	0.85	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 1,079,940	2 Signal Heads	$ 8,000	$ 16,000	**67.5**
								SEVERE	1	0.15	0.30	$ 1,787,000	$ 536,100					
								OTHER VISIBLE	5	0.75	1.50	$ 159,900	$ 239,850					
								COMPLAINT OF PAIN	10	1.5	3.00	$ 90,900	$ 272,700					
								PDO	7	1.05	2.10	$ 14,900	$ 31,290					
-	Bike + Ped	Upgrade to pedestrian countdown signals	Install pedestrian countdown signal heads	S17PB	20	0.75	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 893,500	8 Pedestrian Signal Heads	$ 5,460	$ 43,680	**20.5**
								SEVERE	1	0.25	0.50	$ 1,787,000	$ 893,500					
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -					
								COMPLAINT OF PAIN	0	0	0.00	$ 90,900	$ -					
								PDO	0	0	0.00	$ 14,900	$ -					
-	-	ADA ramp upgrades	-	-	-	-	-	FATAL	0	-	-	-	-	-	3 Curb Ramp	$ 5,000	$ 15,000	-
								SEVERE	1	-	-	-	-					
								OTHER VISIBLE	5	-	-	-	-					
								COMPLAINT OF PAIN	10	-	-	-	-					
								PDO	7	-	-	-	-					
-	-	Restrict right turn on red (NB)	-	-	-	-	-	FATAL	0	-	-	-	-	-	1 Sign	$ 450	$ 450	-
								SEVERE	1	-	-	-	-					
								OTHER VISIBLE	5	-	-	-	-					
								COMPLAINT OF PAIN	10	-	-	-	-					
								PDO	7	-	-	-	-					
-		Install median island (east leg) for driveway access restrictions	Install raised median on approaches (S.I.)	S12	20	0.75	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 1,799,900	250 LF	$ 60	$ 15,000	**120.0**
								SEVERE	1	0.25	0.50	$ 1,787,000	$ 893,500					
								OTHER VISIBLE	5	1.25	2.50	$ 159,900	$ 399,750					
								COMPLAINT OF PAIN	10	2.5	5.00	$ 90,900	$ 454,500					
								PDO	7	1.75	3.50	$ 14,900	$ 52,150					

City of Manteca LRSP

Signalized Intersection

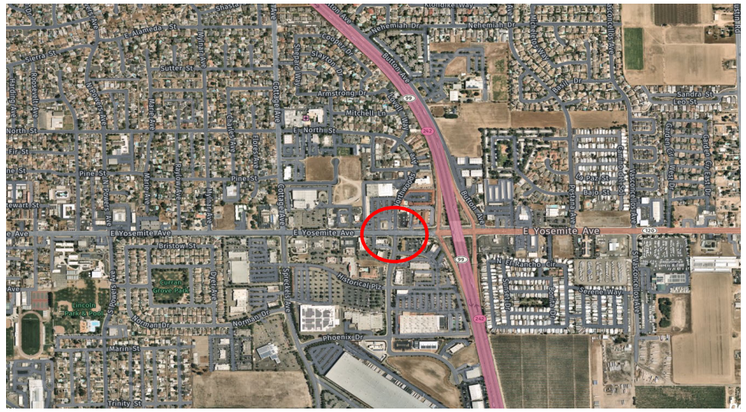
Location: Airport Way & Yosemite Ave
Agency Name: City of Manteca
Contact Name: Beshoy Demyan
E-mail: bdemyan@manteca.gov

Total Crashes	23
Local CCR Differential	0.08
Equivalent Property Damage Only	242
Fatal	0
Severe Injury	1
Other Visible Injury	5
Complaint of Pain	10
PDO	7
Crash Type	
Broadside	8
Sideswipe	4
Rear End	5
Head On	2
Hit Object	2
Overturned	0
Non-Motorist Crashes	
Pedestrian	0
Bicycle	1
Contributing Factors	
Impaired	2
Crash Conditions	
Dark	5
Wet	0

NOTES	COLLISION TYPE	RECOMMENDATION	LRSM/CMF COUNTERMEASURE	LRSM #	Expected Life (Years)	CMF	CALTRANS FUNDING	NUMBER OF CRASHES (2017-2021)		NUMBER OF HISTORIC CRASHES REDUCED	10-YEAR CRASH REDUCTION ESTIMATE	CRASH SEVERITY COST	10-YEAR CRASH REDUCTION BENEFIT (2022)	TOTAL 10-YEAR CRASH REDUCTION BENEFIT (2022)	QUANTITY/ NUMBER OF UNITS	UNIT COST	COST ESTIMATE	BENEFIT/COST
-	-	Install APS (accessible pedestrian signals)	-	-	-	-	-	FATAL	0	-	-	-	-	-	8 Push Buttons	$ 2,000	$ 16,000	-
								SEVERE	1	-	-	-	-					
								OTHER VISIBLE	5	-	-	-	-					
								COMPLAINT OF PAIN	10	-	-	-	-					
								PDO	7	-	-	-	-					
-	Bike + Ped	Install LPI (lead pedestrian interval)	Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	S21PB	10	0.40	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 2,144,400	1 Lump Sum	$ 45,600	$ 45,600	**47.0**
								SEVERE	1	0.6	1.20	$ 1,787,000	$ 2,144,400					
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -					
								COMPLAINT OF PAIN	0	0	0.00	$ 90,900	$ -					
								PDO	0	0	0.00	$ 14,900	$ -					
-	All	Signal timing improvements (checking yellow & all-red time). Signal phasing modification to provide NB right turn overlap phase, in conjunction with WB u-turn restriction	Improve signal timing (coordination, phases, red, yellow, or operation)	S03	10	0.15	50%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 6,119,660	1 Lump Sum	$ 15,000	$ 15,000	**408.0**
								SEVERE	1	0.85	1.70	$ 1,787,000	$ 3,037,900					
								OTHER VISIBLE	5	4.25	8.50	$ 159,900	$ 1,359,150					
								COMPLAINT OF PAIN	10	8.5	17.00	$ 90,900	$ 1,545,300					
								PDO	7	5.95	11.90	$ 14,900	$ 177,310					
-	Night	Enhance lighting with replacement of all 1-B poles with type 15TS poles with luminaires	Add Intersection Lighting (Signalized Intersection => S.I.)	S01	20	0.60	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 1,886,080	4 15TS Poles	$ 20,000	$ 80,000	**23.6**
								SEVERE	1	0.4	0.80	$ 1,787,000	$ 1,429,600					
								OTHER VISIBLE	3	1.2	2.40	$ 159,900	$ 383,760					
								COMPLAINT OF PAIN	1	0.4	0.80	$ 90,900	$ 72,720					
								PDO	0	0	0.00	$ 14,900	$ -					

Signalized Intersection

Location: Commerce Ave & Yosemite Ave
Agency Name: City of Manteca
Contact Name: Beshoy Demyan
E-mail: bdemyan@manteca.gov

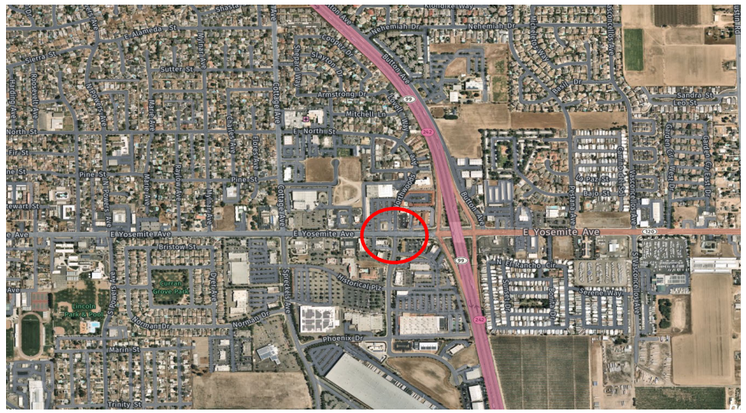


Total Crashes	32
Local CCR Differential	0.22
Equivalent Property Damage Only	350
Fatal	0
Severe Injury	2
Other Visible Injury	4
Complaint of Pain	8
PDO	18
Crash Type	
Broadside	8
Sideswipe	8
Rear End	9
Head On	2
Hit Object	2
Overturned	0
Non-Motorist Crashes	
Pedestrian	2
Bicycle	2
Contributing Factors	
Impaired	3
Crash Conditions	
Dark	8
Wet	4

NOTES	COLLISION TYPE	RECOMMENDATION	LRSM/CMF COUNTERMEASURE	LRSM #	Expected Life (Years)	CMF	CALTRANS FUNDING	NUMBER OF CRASHES (2017-2021)		NUMBER OF HISTORIC CRASHES REDUCED	10-YEAR CRASH REDUCTION ESTIMATE	CRASH SEVERITY COST	10-YEAR CRASH REDUCTION BENEFIT (2022)	TOTAL 10-YEAR CRASH REDUCTION BENEFIT (2022)	QUANTITY/ NUMBER OF UNITS	UNIT COST	COST ESTIMATE	BENEFIT/COST
-	Bike + Ped	Implement Leading Pedestrian Interval (LPI)	Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	S21PB	10	0.40	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 2,546,040	1 Lump Sum	$ 45,600	$ 45,600	**55.8**
								SEVERE	1	0.6	1.20	$ 1,787,000	$ 2,144,400					
								OTHER VISIBLE	2	1.2	2.40	$ 159,900	$ 383,760					
								COMPLAINT OF PAIN	0	0	0.00	$ 90,900	$ -					
								PDO	1	0.6	1.20	$ 14,900	$ 17,880					
-	Bike + Ped	Install Advanced Stop Bar	Install Advance Stop Bar Before Crosswalk (Bicycle Box)	S20PB	10	0.85	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 636,510	173 SQFT of Striping	$ 7	$ 1,211	**525.6**
								SEVERE	1	0.15	0.30	$ 1,787,000	$ 536,100					
								OTHER VISIBLE	2	0.3	0.60	$ 159,900	$ 95,940					
								COMPLAINT OF PAIN	0	0	0.00	$ 90,900	$ -					
								PDO	1	0.15	0.30	$ 14,900	$ 4,470					
-	All	Refresh Intersection Crosswalk Striping with High-Visibility Thermoplastic Striping (South, East, West legs)	Install Raised Pavement Markers and Striping (Through Intersection)	S09	10	0.90	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 1,041,800	1787.5 SQFT of Striping	$ 7	$ 12,513	**83.3**
								SEVERE	2	0.2	0.40	$ 1,787,000	$ 714,800					
								OTHER VISIBLE	4	0.4	0.80	$ 159,900	$ 127,920					
								COMPLAINT OF PAIN	8	0.8	1.60	$ 90,900	$ 145,440					
								PDO	18	1.8	3.60	$ 14,900	$ 53,640					
-	All	Refresh Intersection Striping with High-Visibility Thermoplastic	Install Raised Pavement Markers and Striping (Through Intersection)	S09	10	0.90	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 1,041,800	969 SQFT of Striping	$ 7	$ 6,783	**153.6**
								SEVERE	2	0.2	0.40	$ 1,787,000	$ 714,800					
								OTHER VISIBLE	4	0.4	0.80	$ 159,900	$ 127,920					
								COMPLAINT OF PAIN	8	0.8	1.60	$ 90,900	$ 145,440					
								PDO	18	1.8	3.60	$ 14,900	$ 53,640					
-	All	Install retroreflective border for signal heads	Improve signal hardware: lenses, back-plates with retroreflective borderd, mounting, size, and number	S02	10	0.85	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 1,562,700	19 Retroreflective Borders	$ 250	$ 4,750	**329.0**
								SEVERE	2	0.3	0.60	$ 1,787,000	$ 1,072,200					
								OTHER VISIBLE	4	0.6	1.20	$ 159,900	$ 191,880					
								COMPLAINT OF PAIN	8	1.2	2.40	$ 90,900	$ 218,160					
								PDO	18	2.7	5.40	$ 14,900	$ 80,460					
-	All	Verify and Increase the Number of Through-Movement Signal Heads on Mast Arms per guidance in CA MUTCD	Improve signal hardware: lenses, back-plates with retroreflective borderd, mounting, size, and number	S02	10	0.85	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 1,562,700	3 Signal Heads	$ 8,000	$ 24,000	**65.1**
								SEVERE	2	0.3	0.60	$ 1,787,000	$ 1,072,200					
								OTHER VISIBLE	4	0.6	1.20	$ 159,900	$ 191,880					
								COMPLAINT OF PAIN	8	1.2	2.40	$ 90,900	$ 218,160					
								PDO	18	2.7	5.40	$ 14,900	$ 80,460					

Signalized Intersection

Location: Commerce Ave & Yosemite Ave
Agency Name: City of Manteca
Contact Name: Beshoy Demyan
E-mail: bdemyan@manteca.gov

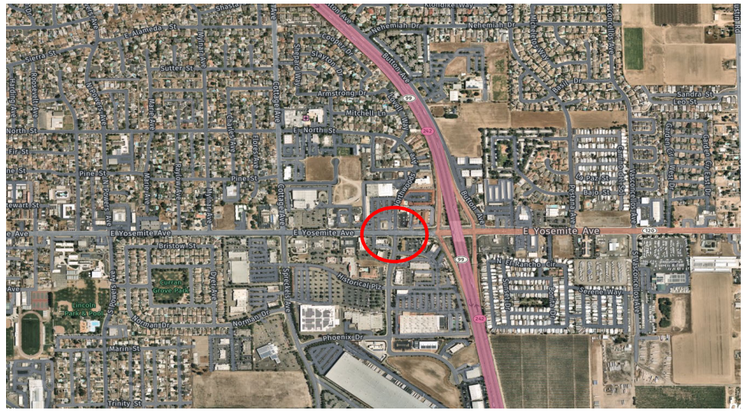


Total Crashes	32
Local CCR Differential	0.22
Equivalent Property Damage Only	350
Fatal	0
Severe Injury	2
Other Visible Injury	4
Complaint of Pain	8
PDO	18
Crash Type	
Broadside	8
Sideswipe	8
Rear End	9
Head On	2
Hit Object	2
Overturned	0
Non-Motorist Crashes	
Pedestrian	2
Bicycle	2
Contributing Factors	
Impaired	3
Crash Conditions	
Dark	8
Wet	4

NOTES	COLLISION TYPE	RECOMMENDATION	LRSM/CMF COUNTERMEASURE	LRSM #	Expected Life (Years)	CMF	CALTRANS FUNDING	NUMBER OF CRASHES (2017-2021)		NUMBER OF HISTORIC CRASHES REDUCED	10-YEAR CRASH REDUCTION ESTIMATE	CRASH SEVERITY COST	10-YEAR CRASH REDUCTION BENEFIT (2022)	TOTAL 10-YEAR CRASH REDUCTION BENEFIT (2022)	QUANTITY/ NUMBER OF UNITS	UNIT COST	COST ESTIMATE	BENEFIT/COST
-	Bike + Ped	Upgrade to pedestrian countdown signals	Install pedestrian countdown signal heads	S17PB	20	0.75	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 1,060,850	8 Pedestrian Signal Heads	$ 5,460	$ 43,680	**24.3**
								SEVERE	1	0.25	0.50	$ 1,787,000	$ 893,500				
								OTHER VISIBLE	2	0.5	1.00	$ 159,900	$ 159,900				
								COMPLAINT OF PAIN	0	0	0.00	$ 90,900	$ -				
								PDO	1	0.25	0.50	$ 14,900	$ 7,450				
-	-	Install APS (accessible pedestrian signals)	-	-	-	-	-	FATAL	0	-	-	-	-	-	8 Push Buttons	$ 2,000	$ 16,000	-
								SEVERE	2	-	-	-	-				
								OTHER VISIBLE	4	-	-	-	-				
								COMPLAINT OF PAIN	8	-	-	-	-				
								PDO	18	-	-	-	-				
-	-	Install bulb out (SE curb)	-	-	-	-	-	FATAL	0	-	-	-	-	-	1 Lump Sum	$ 20,000	$ 20,000	-
								SEVERE	2	-	-	-	-				
								OTHER VISIBLE	4	-	-	-	-				
								COMPLAINT OF PAIN	8	-	-	-	-				
								PDO	18	-	-	-	-				
-	-	Check crosswalk grade for ADA compliance (east leg)	-	-	-	-	-	FATAL	0	-	-	-	-	-	671 SQFT of Pavement	$ 5	$ 3,355	-
								SEVERE	2	-	-	-	-				
								OTHER VISIBLE	4	-	-	-	-				
								COMPLAINT OF PAIN	8	-	-	-	-				
								PDO	18	-	-	-	-				
-	All	Install left-turn lane marking though the intersection for dual left-turns	Install raised pavement markers and striping (Through Intersection)	S09	10	0.90	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 1,041,800	1 Lump Sum	$ 32,400	$ 32,400	**32.2**
								SEVERE	2	0.2	0.40	$ 1,787,000	$ 714,800				
								OTHER VISIBLE	4	0.4	0.80	$ 159,900	$ 127,920				
								COMPLAINT OF PAIN	8	0.8	1.60	$ 90,900	$ 145,440				
								PDO	18	1.8	3.60	$ 14,900	$ 53,640				
-	All	Extend WB left turn storage by modifying the existing landscaped median						FATAL	0	-	-	-	-	$ -	1 Lump Sum	$ 60,000	$ 60,000	-
								SEVERE	2	-	-	-	-				
								OTHER VISIBLE	4	-	-	-	-				
								COMPLAINT OF PAIN	8	-	-	-	-				
								PDO	18	-	-	-	-				

Signalized Intersection

Location: Commerce Ave & Yosemite Ave
Agency Name: City of Manteca
Contact Name: Beshoy Demyan
E-mail: bdemyan@manteca.gov

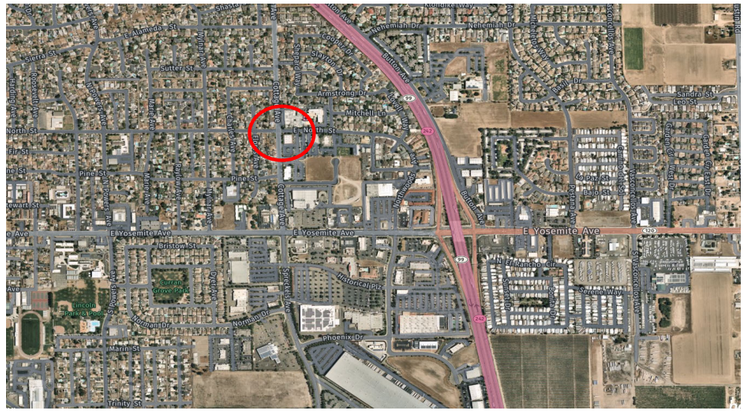


Total Crashes	32
Local CCR Differential	0.22
Equivalent Property Damage Only	350
Fatal	0
Severe Injury	2
Other Visible Injury	4
Complaint of Pain	8
PDO	18
Crash Type	
Broadside	8
Sideswipe	8
Rear End	9
Head On	2
Hit Object	2
Overturned	0
Non-Motorist Crashes	
Pedestrian	2
Bicycle	2
Contributing Factors	
Impaired	3
Crash Conditions	
Dark	8
Wet	4

NOTES	COLLISION TYPE	RECOMMENDATION	LRSM/CMF COUNTERMEASURE	LRSM #	Expected Life (Years)	CMF	CALTRANS FUNDING	NUMBER OF CRASHES (2017-2021)		NUMBER OF HISTORIC CRASHES REDUCED	10-YEAR CRASH REDUCTION ESTIMATE	CRASH SEVERITY COST	10-YEAR CRASH REDUCTION BENEFIT (2022)	TOTAL 10-YEAR CRASH REDUCTION BENEFIT (2022)	QUANTITY/ NUMBER OF UNITS	UNIT COST	COST ESTIMATE	BENEFIT/COST
-	All	Restict u-turns (WB & EB)	-	-	-	-	-	FATAL	0	-	-	-	-	$ -	2 Signs	$ 450	$ 900	-
								SEVERE	2	-	-	-	-					
								OTHER VISIBLE	4	-	-	-	-					
								COMPLAINT OF PAIN	8	-	-	-	-					
								PDO	18	-	-	-	-					
-	Night	Enhance lighting with replacement of all 1-B poles with type 15TS poles with luminaires	Add Intersection Lighting (Signalized Intersection => S.I.)	S01	20	0.60	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 163,680	4 15TS Poles	$ 20,000	$ 80,000	**2.0**
								SEVERE	0	0	0.00	$ 1,787,000	$ -					
								OTHER VISIBLE	1	0.4	0.80	$ 159,900	$ 127,920					
								COMPLAINT OF PAIN	0	0	0.00	$ 90,900	$ -					
								PDO	3	1.2	2.40	$ 14,900	$ 35,760					
-	All	Signal coordination with the intersection of Yosemite Ave & SR-99 NB Ramps and Yosemite Ave & SR-99 SB Ramps & Signal phasing update (lead/leg left turns) (NBR overlaping with WBL after restricting u-turn for WB)	Improve signal timing (coordination, phases, red, yellow, or operation)	S03	10	0.15	50%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 8,855,300	1 Lump Sum	$ 15,000	$ 15,000	**590.4**
								SEVERE	2	1.7	3.40	$ 1,787,000	$ 6,075,800					
								OTHER VISIBLE	4	3.4	6.80	$ 159,900	$ 1,087,320					
								COMPLAINT OF PAIN	8	6.8	13.60	$ 90,900	$ 1,236,240					
								PDO	18	15.3	30.60	$ 14,900	$ 455,940					
-	All	Install raised median (West leg)	Install raised median on approaches (S.I.)	S12	20	0.75	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 2,604,500	1 Lump Sum	$ 16,500	$ 16,500	**157.8**
								SEVERE	2	0.5	1.00	$ 1,787,000	$ 1,787,000					
								OTHER VISIBLE	4	1	2.00	$ 159,900	$ 319,800					
								COMPLAINT OF PAIN	8	2	4.00	$ 90,900	$ 363,600					
								PDO	18	4.5	9.00	$ 14,900	$ 134,100					

Signalized Intersection

Location: Cottage Ave & North St
Agency Name: City of Manteca
Contact Name: Beshoy Demyan
E-mail: bdemyan@manteca.gov

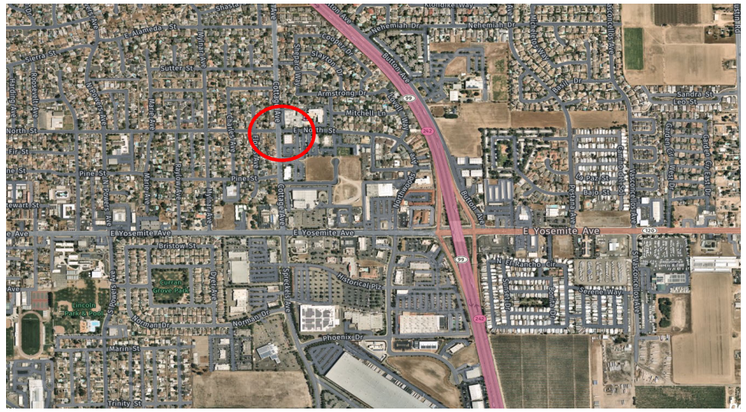


Total Crashes	18
Local CCR Differential	0.28
Equivalent Property Damage Only	84
Fatal	0
Severe Injury	0
Other Visible Injury	0
Complaint of Pain	13
PDO	5
Crash Type	
Broadside	9
Sideswipe	2
Rear End	2
Head On	1
Hit Object	0
Overturned	0
Non-Motorist Crashes	
Pedestrian	3
Bicycle	1
Contributing Factors	
Impaired	1
Crash Conditions	
Dark	8
Wet	2

NOTES	COLLISION TYPE	RECOMMENDATION	LRSM/CMF COUNTERMEASURE	LRSM #	Expected Life (Years)	CMF	CALTRANS FUNDING	NUMBER OF CRASHES (2017-2021)		NUMBER OF HISTORIC CRASHES REDUCED	10-YEAR CRASH REDUCTION ESTIMATE	CRASH SEVERITY COST	10-YEAR CRASH REDUCTION BENEFIT (2022)	TOTAL 10-YEAR CRASH REDUCTION BENEFIT (2022)	QUANTITY/ NUMBER OF UNITS	UNIT COST	COST ESTIMATE	BENEFIT/COST
-	Bike + Ped	Implement Leading Pedestrian Interval (LPI)	Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	S21PB	10	0.40	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 436,320	1 Lump Sum	$ 45,600	$ 45,600	**9.6**
								SEVERE	0	0	0.00	$ 1,787,000	$ -				
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -				
								COMPLAINT OF PAIN	4	2.4	4.80	$ 90,900	$ 436,320				
								PDO	0	0	0.00	$ 14,900	$ -				
-	Bike + Ped	Install Advanced Stop Bar (All approaches)	Install Advance Stop Bar Before Crosswalk (Bicycle Box)	S20PB	10	0.85	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 109,080	48 SQFT of Striping	$ 7	$ 336	**324.6**
								SEVERE	0	0	0.00	$ 1,787,000	$ -				
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -				
								COMPLAINT OF PAIN	4	0.6	1.20	$ 90,900	$ 109,080				
								PDO	0	0	0.00	$ 14,900	$ -				
-	All	Refresh Intersection Crosswalk Striping with High-Visibility Thermoplastic Striping (North, South, West legs)	Install Raised Pavement Markers and Striping (Through Intersection)	S09	10	0.90	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 251,240	1128 SQFT of Striping	$ 7	$ 7,896	**31.8**
								SEVERE	0	0	0.00	$ 1,787,000	$ -				
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -				
								COMPLAINT OF PAIN	13	1.3	2.60	$ 90,900	$ 236,340				
								PDO	5	0.5	1.00	$ 14,900	$ 14,900				
-	-	ADA ramp upgrades	-	-	-	-	-	FATAL	0	-	-	-	-	-	4 ADA Ramps	$ 5,000	$ 20,000	-
								SEVERE	0	-	-	-	-				
								OTHER VISIBLE	0	-	-	-	-				
								COMPLAINT OF PAIN	13	-	-	-	-				
								PDO	5	-	-	-	-				
-	All	Install left turn pockets (striping improvements)	Install left-turn lane and turn phase (signal has no left-turn lane or phase before)	S06	20	0.45	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 1,381,820	400 SQFT of Striping	$ 7	$ 2,800	**493.5**
								SEVERE	0	0	0.00	$ 1,787,000	$ -				
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -				
								COMPLAINT OF PAIN	13	7.15	14.30	$ 90,900	$ 1,299,870				
								PDO	5	2.75	5.50	$ 14,900	$ 81,950				
-	All	Install red curb to prohibit on-street parking at intersection approach to provide room for left-turn pockets	Install left-turn lane and turn phase (signal has no left-turn lane or phase before)	S06	20	0.45	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 1,381,820	400 LF of Curb	$ 5	$ 2,000	**690.9**
								SEVERE	0	0	0.00	$ 1,787,000	$ -				
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -				
								COMPLAINT OF PAIN	13	7.15	14.30	$ 90,900	$ 1,299,870				
								PDO	5	2.75	5.50	$ 14,900	$ 81,950				

Signalized Intersection

Location: Cottage Ave & North St
Agency Name: City of Manteca
Contact Name: Beshoy Demyan
E-mail: bdemyan@manteca.gov



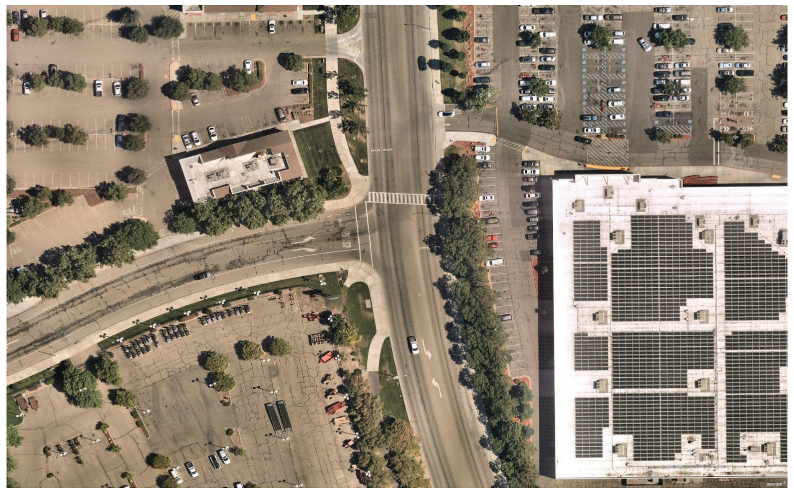
Total Crashes	18
Local CCR Differential	0.28
Equivalent Property Damage Only	84
Fatal	0
Severe Injury	0
Other Visible Injury	0
Complaint of Pain	13
PDO	5
Crash Type	
Broadside	9
Sideswipe	2
Rear End	2
Head On	1
Hit Object	0
Overturned	0
Non-Motorist Crashes	
Pedestrian	3
Bicycle	1
Contributing Factors	
Impaired	1
Crash Conditions	
Dark	8
Wet	2

NOTES	COLLISION TYPE	RECOMMENDATION	LRSM/CMF COUNTERMEASURE	LRSM #	Expected Life (Years)	CMF	CALTRANS FUNDING	NUMBER OF CRASHES (2017-2021)		NUMBER OF HISTORIC CRASHES REDUCED	10-YEAR CRASH REDUCTION ESTIMATE	CRASH SEVERITY COST	10-YEAR CRASH REDUCTION BENEFIT (2022)	TOTAL 10-YEAR CRASH REDUCTION BENEFIT (2022)	QUANTITY/ NUMBER OF UNITS	UNIT COST	COST ESTIMATE	BENEFIT/COST
-	All	Signal phasing update (add protected (NB/SB) and split left-turn phasing (EB/WB))	Improve signal timing (coordination, phases, red, yellow, or operation)	S03	10	0.15	50%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 2,135,540	1 Lump Sum	$ 15,000	$ 15,000	**142.4**
								SEVERE	0	0	0.00	$ 1,787,000	$ -					
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -					
								COMPLAINT OF PAIN	13	11.05	22.10	$ 90,900	$ 2,008,890					
								PDO	5	4.25	8.50	$ 14,900	$ 126,650					
-	All	Install retroreflective border for signal heads	Improve signal hardware: lenses, back-plates with retroreflective borderd, mounting, size, and number	S02	10	0.85	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 376,860	12 Retroreflective Borders	$ 250	$ 3,000	**125.6**
								SEVERE	0	0	0.00	$ 1,787,000	$ -					
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -					
								COMPLAINT OF PAIN	13	1.95	3.90	$ 90,900	$ 354,510					
								PDO	5	0.75	1.50	$ 14,900	$ 22,350					
-	Bike + Ped	Upgrade to Pedestrian Countdown Signals	Install Pedestrian Countdown Signal Heads	S17PB	20	0.75	90%	FATAL	0	0	0.00	$ 1,787,000	$ -	$ 181,800	8 Pedestrian Signal Heads	$ 5,460	$ 43,680	**4.2**
								SEVERE	0	0	0.00	$ 1,787,000	$ -					
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -					
								COMPLAINT OF PAIN	4	1	2.00	$ 90,900	$ 181,800					
								PDO	0	0	0.00	$ 14,900	$ -					
-	-	Install APS (accessible pedestrian signals)	-	-	-	-	-	FATAL	0	-	-	-	-	-	8 Push Buttons	$ 2,000	$ 16,000	-
								SEVERE	0	-	-	-	-					
								OTHER VISIBLE	0	-	-	-	-					
								COMPLAINT OF PAIN	13	-	-	-	-					
								PDO	5	-	-	-	-					

City of Manteca LRSP

Unsignalized Intersection

Location: Spreckels Ave & Norman Dr
Agency Name: City of Manteca
Contact Name: Beshoy Demyan
E-mail: bdemyan@manteca.gov



Total Crashes	17
Local CCR Differential	0.47
Equivalent Property Damage Only	125
Fatal	0
Severe Injury	0
Other Visible Injury	8
Complaint of Pain	6
PDO	3
Crash Type	
Broadside	7
Sideswipe	1
Rear End	1
Head On	2
Hit Object	2
Overturned	0
Non-Motorist Crashes	
Pedestrian	2
Bicycle	2
Contributing Factors	
Impaired	0
Crash Conditions	
Dark	3
Wet	2

NOTES	COLLISION TYPE	RECOMMENDATION	LRSM/CMF COUNTERMEASURE	LRSM #	Expected Life (Years)	CMF	CALTRANS FUNDING	NUMBER OF CRASHES (2017-2021)		NUMBER OF HISTORIC CRASHES REDUCED	10-YEAR CRASH REDUCTION ESTIMATE	CRASH SEVERITY COST	10-YEAR CRASH REDUCTION BENEFIT (2022)	TOTAL 10-YEAR CRASH REDUCTION BENEFIT (2022)	QUANTITY/ NUMBER OF UNITS	UNIT COST	COST ESTIMATE	BENEFIT/COST
-	Bike + Ped	Refresh Intersection Crosswalk Striping with High-Visibility Thermoplastic Striping (West Leg)	Install / upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features)	NS21PB	20	0.65	90%	FATAL	0	0	0.00	$ 2,843,000	$ -	$ 351,120	600 SQFT of Striping	$ 7	$ 4,200	**83.6**
								SEVERE	0	0	0.00	$ 2,843,000	$ -					
								OTHER VISIBLE	2	0.7	1.40	$ 159,900	$ 223,860					
								COMPLAINT OF PAIN	2	0.7	1.40	$ 90,900	$ 127,260					
								PDO	0	0	0.00	$ 14,900	$ -					
-	All	Restripe TWLTL to add a left turn pocket for NBL and EBL & Narrow Travel Lanes & Install Green Bike Lane Striping in Conflict Areas	Upgrade intersection pavement markings (NS.I.)	NS07	10	0.75	100%	FATAL	0	0	0.00	$ 2,843,000	$ -	$ 934,650	7700 SQFT of Striping	$ 7	$ 53,900	**17.3**
								SEVERE	0	0	0.00	$ 2,843,000	$ -					
								OTHER VISIBLE	8	2	4.00	$ 159,900	$ 639,600					
								COMPLAINT OF PAIN	6	1.5	3.00	$ 90,900	$ 272,700					
								PDO	3	0.75	1.50	$ 14,900	$ 22,350					
-	-	ADA Ramp Upgrades (NW, NE, SW corners)	-	-	-	-	-	FATAL	0	-	-	-	-	$ -	3 ADA Ramps	$ 5,000	$ 15,000	**-**
								SEVERE	0	-	-	-	-					
								OTHER VISIBLE	8	-	-	-	-					
								COMPLAINT OF PAIN	6	-	-	-	-					
								PDO	3	-	-	-	-					
-	Bike + Ped	Install Buffered Bike Lane with Raised Element	Install Seperated Bike Lanes	R33PB	20	0.55	90%	FATAL	0	0	0.00	$ 2,843,000	$ -	$ 451,440	1500	$ 15	$ 22,500	**20.1**
								SEVERE	0	0	0.00	$ 2,843,000	$ -					
								OTHER VISIBLE	2	0.9	1.80	$ 159,900	$ 287,820					
								COMPLAINT OF PAIN	2	0.9	1.80	$ 90,900	$ 163,620					
								PDO	0	0	0.00	$ 14,900	$ -					
-	Bike + Ped	Install HAWK Signal (North leg) (includes associated approach re-striping)	Install Pedestrian Signal (including Pedestrian Hybrid Beacon (HAWK))	NS23PB	20	0.45	90%	FATAL	0	0	0.00	$ 2,843,000	$ -	$ 551,760	1 HAWK Signal	$ 300,000	$ 300,000	**1.8**
								SEVERE	0	0	0.00	$ 2,843,000	$ -					
								OTHER VISIBLE	2	1.1	2.20	$ 159,900	$ 351,780					
								COMPLAINT OF PAIN	2	1.1	2.20	$ 90,900	$ 199,980					
								PDO	0	0	0.00	$ 14,900	$ -					
-	Bike + Ped	Install Rectangular Rapid Flashing Beacon (RRFB) (North leg)	Install Rectangular Rapid Flashing Beacon (RRFB)	NS22PB	20	0.65	90%	FATAL	0	0	0.00	$ 2,843,000	$ -	$ 351,120	1 Lump Sum	$ 54,000	$ 54,000	**6.5**
								SEVERE	0	0	0.00	$ 2,843,000	$ -					
								OTHER VISIBLE	2	0.7	1.40	$ 159,900	$ 223,860					
								COMPLAINT OF PAIN	2	0.7	1.40	$ 90,900	$ 127,260					
								PDO	0	0	0.00	$ 14,900	$ -					

Unsignalized Intersection

Location: Spreckels Ave & Norman Dr
Agency Name: City of Manteca
Contact Name: Beshoy Demyan
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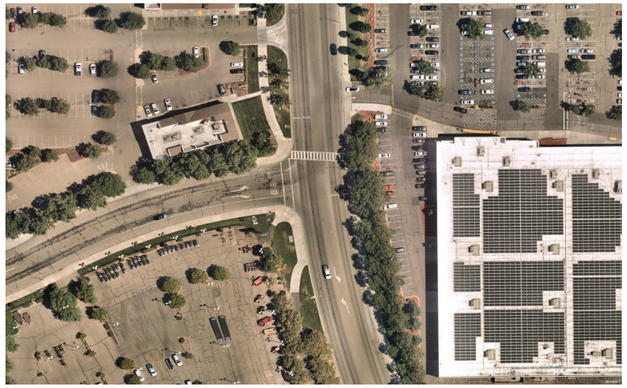


Total Crashes	17
Local CCR Differential	0.47
Equivalent Property Damage Only	125
Fatal	0
Severe Injury	0
Other Visible Injury	8
Complaint of Pain	6
PDO	3
Crash Type	
Broadside	7
Sideswipe	1
Rear End	1
Head On	2
Hit Object	2
Overturned	0
Non-Motorist Crashes	
Pedestrian	2
Bicycle	2
Contributing Factors	
Impaired	0
Crash Conditions	
Dark	3
Wet	2

NOTES	COLLISION TYPE	RECOMMENDATION	LRSM/CMF COUNTERMEASURE	LRSM #	Expected Life (Years)	CMF	CALTRANS FUNDING	NUMBER OF CRASHES (2017-2021)		NUMBER OF HISTORIC CRASHES REDUCED	10-YEAR CRASH REDUCTION ESTIMATE	CRASH SEVERITY COST	10-YEAR CRASH REDUCTION BENEFIT (2022)	TOTAL 10-YEAR CRASH REDUCTION BENEFIT (2022)	QUANTITY/ NUMBER OF UNITS	UNIT COST	COST ESTIMATE	BENEFIT/COST
-	Bike + Ped	Install Median Island with Pedestrian Refuge (North Leg)	Install raised medians (refuge island)	NS19PB	20	0.55	90%	FATAL	0	0	0.00	$ 2,843,000	$ -	$ 451,440	1 Lump Sum	$ 12,000	$ 12,000	**37.6**
								SEVERE	0	0	0.00	$ 2,843,000	$ -				
								OTHER VISIBLE	2	0.9	1.80	$ 159,900	$ 287,820				
								COMPLAINT OF PAIN	2	0.9	1.80	$ 90,900	$ 163,620				
								PDO	0	0	0.00	$ 14,900	$ -				
-	Night	Add Intersection Lighting (NW corner)	Add intersection lighting (NS.I.)	NS01	20	0.60	90%	FATAL	0	0	0.00	$ 2,843,000	$ -	$ 267,760	1 Luminaires	$ 15,000	$ 15,000	**17.9**
								SEVERE	0	0	0.00	$ 2,843,000	$ -				
								OTHER VISIBLE	2	0.8	1.60	$ 159,900	$ 255,840				
								COMPLAINT OF PAIN	0	0	0.00	$ 90,900	$ -				
								PDO	1	0.4	0.80	$ 14,900	$ 11,920				
-	-	Install Bulb Outs (NW and SW corners)	-	-	-	-	-	FATAL	0	-	-	-	-	-	1 Lump Sum	$ 20,000	$ 20,000	-
								SEVERE	0	-	-	-	-				
								OTHER VISIBLE	8	-	-	-	-				
								COMPLAINT OF PAIN	6	-	-	-	-				
								PDO	3	-	-	-	-				

Unsignalized Intersection

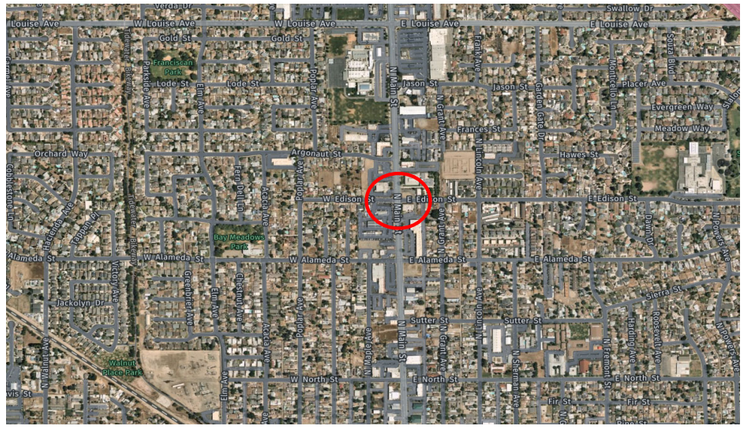
Location: Arrowsmith Dr & Lathrop Rd
Agency Name: City of Manteca
Contact Name: Beshoy Demyan
E-mail: bdemyan@manteca.gov

Total Crashes	10
Local CCR Differential	0.11
Equivalent Property Damage Only	410
Fatal	1
Severe Injury	1
Other Visible Injury	0
Complaint of Pain	4
PDO	4
Crash Type	
Broadside	6
Sideswipe	0
Rear End	0
Head On	3
Hit Object	1
Overturned	0
Non-Motorist Crashes	
Pedestrian	0
Bicycle	1
Contributing Factors	
Impaired	1
Crash Conditions	
Dark	7
Wet	2

NOTES	COLLISION TYPE	RECOMMENDATION	LRSM/CMF COUNTERMEASURE	LRSM #	Expected Life (Years)	CMF	CALTRANS FUNDING	NUMBER OF CRASHES (2017-2021)		NUMBER OF HISTORIC CRASHES REDUCED	10-YEAR CRASH REDUCTION ESTIMATE	CRASH SEVERITY COST	10-YEAR CRASH REDUCTION BENEFIT (2022)	TOTAL 10-YEAR CRASH REDUCTION BENEFIT (2022)	QUANTITY/ NUMBER OF UNITS	UNIT COST	COST ESTIMATE	BENEFIT/COST
-	All	Install median island providing dedicated receiving lanes for back-to-back NB left-turn movement and SB left-turn movement (from commercial driveway)	Create directional median openings to allow (and restrict) left-turns and u-turns (NS.I.)	NS15	20	0.50	90%	FATAL	1	0.5	1.00	$ 2,843,000	$ 2,843,000	$ 6,109,200	150 LF	$ 60	$ 9,000	**678.8**
								SEVERE	1	0.5	1.00	$ 2,843,000	$ 2,843,000				
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -				
								COMPLAINT OF PAIN	4	2	4.00	$ 90,900	$ 363,600				
								PDO	4	2	4.00	$ 14,900	$ 59,600				
-	All	Install intersection ahead warning sign of intersection	Install / upgrade larger or additional stop signs or other intersection warning / regulatory signs	NS06	10	0.85	90%	FATAL	1	0.15	0.30	$ 2,843,000	$ 852,900	$ 1,832,760	2 Signs	$ 450	$ 900	**2,036.4**
								SEVERE	1	0.15	0.30	$ 2,843,000	$ 852,900				
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -				
								COMPLAINT OF PAIN	4	0.6	1.20	$ 90,900	$ 109,080				
								PDO	4	0.6	1.20	$ 14,900	$ 17,880				
-	All	Install retroflective strips on stop sign post (South leg)	Install / upgrade larger or additional stop signs or other intersection warning / regulatory signs	NS06	10	0.85	90%	FATAL	1	0.15	0.30	$ 2,843,000	$ 852,900	$ 1,832,760	1 Retroflective Strip	$ 250	$ 250	**7,331.0**
								SEVERE	1	0.15	0.30	$ 2,843,000	$ 852,900				
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -				
								COMPLAINT OF PAIN	4	0.6	1.20	$ 90,900	$ 109,080				
								PDO	4	0.6	1.20	$ 14,900	$ 17,880				
-	All	Re-locate merge signage to east leg of intersection	Install / upgrade larger or additional stop signs or other intersection warning / regulatory signs	NS06	10	0.85	90%	FATAL	1	0.15	0.30	$ 2,843,000	$ 852,900	$ 1,832,760	2 Signs	$ 450	$ 900	**2,036.4**
								SEVERE	1	0.15	0.30	$ 2,843,000	$ 852,900				
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -				
								COMPLAINT OF PAIN	4	0.6	1.20	$ 90,900	$ 109,080				
								PDO	4	0.6	1.20	$ 14,900	$ 17,880				
-	All	Re-design merge EB to be further downstream of intersection (re-striping of segment)	Upgrade intersection pavement markings (NS.I.)	NS07	10	0.75	90%	FATAL	1	0.25	0.50	$ 2,843,000	$ 1,421,500	$ 3,054,600	250 SQFT of Striping and 380 SQFTof Striping Removal	$7 per SQFT of Striping $4.2 per SQFT of Striping	$ 3,346	**912.9**
								SEVERE	1	0.25	0.50	$ 2,843,000	$ 1,421,500				
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -				
								COMPLAINT OF PAIN	4	1	2.00	$ 90,900	$ 181,800				
								PDO	4	1	2.00	$ 14,900	$ 29,800				
-	Bike + Ped	Refresh Intersection Crosswalk Striping with High-Visibility Thermoplastic Striping across Arrowsmith Dr (South leg)	Install / upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features)	NS21PB	20	0.65	90%	FATAL	0	0	0.00	$ 2,843,000	$ -	$ 63,630	385 SQFT of Striping	$ 7	$ 2,695	**23.6**
								SEVERE	0	0	0.00	$ 2,843,000	$ -				
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -				
								COMPLAINT OF PAIN	1	0.35	0.70	$ 90,900	$ 63,630				
								PDO	0	0	0.00	$ 14,900	$ -				

Unsignalized Intersection

Location: Main St & Edison St
Agency Name: City of Manteca
Contact Name: Beshoy Demyan
E-mail: bdemyan@manteca.gov

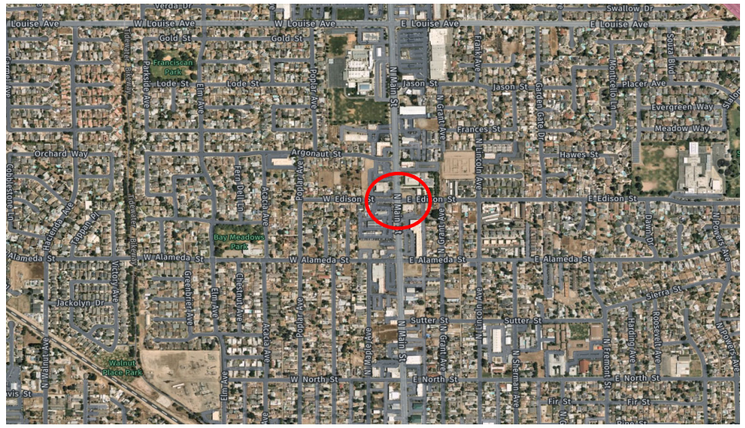


Total Crashes	7
Local CCR Differential	-0.01
Equivalent Property Damage Only	402
Fatal	2
Severe Injury	0
Other Visible Injury	0
Complaint of Pain	3
PDO	2
Crash Type	
Broadside	1
Sideswipe	1
Rear End	1
Head On	0
Hit Object	2
Overturned	0
Non-Motorist Crashes	
Pedestrian	2
Bicycle	0
Contributing Factors	
Impaired	3
Crash Conditions	
Dark	3
Wet	0

NOTES	COLLISION TYPE	RECOMMENDATION	LRSM/CMF COUNTERMEASURE	LRSM #	Expected Life (Years)	CMF	CALTRANS FUNDING	NUMBER OF CRASHES (2017-2021)		NUMBER OF HISTORIC CRASHES REDUCED	10-YEAR CRASH REDUCTION ESTIMATE	CRASH SEVERITY COST	10-YEAR CRASH REDUCTION BENEFIT (2022)	TOTAL 10-YEAR CRASH REDUCTION BENEFIT (2022)	QUANTITY/ NUMBER OF UNITS	UNIT COST	COST ESTIMATE	BENEFIT/COST
-	-	ADA ramp upgrades	-	-	-	-	-	FATAL	2	-	-	-	-	-	4 ADA Ramps	$ 5,000	$ 20,000	-
								SEVERE	0	-	-	-	-					
								OTHER VISIBLE	0	-	-	-	-					
								COMPLAINT OF PAIN	3	-	-	-	-					
								PDO	2	-	-	-	-					
-	Bike + Ped	Install HAWK Signal (North leg)	Install Pedestrian Signal (including Pedestrian Hybrid Beacon (HAWK))	NS23PB	20	0.45	90%	FATAL	1	0.55	1.10	$ 2,843,000	$ 3,127,300	$ 3,227,290	1 HAWK Signal	$ 300,000	$ 300,000	**10.8**
								SEVERE	0	0	0.00	$ 2,843,000	$ -					
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -					
								COMPLAINT OF PAIN	1	0.55	1.10	$ 90,900	$ 99,990					
								PDO	0	0	0.00	$ 14,900	$ -					
-	Bike + Ped	Install Rectangular Rapid Flashing Beacon (RRFB) (North Leg)	Install Rectangular Rapid Flashing Beacon (RRFB)	NS22PB	20	0.65	90%	FATAL	1	0.35	0.70	$ 2,843,000	$ 1,990,100	$ 2,053,730	1 RRFB	$ 54,000	$ 54,000	**38.0**
								SEVERE	0	0	0.00	$ 2,843,000	$ -					
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -					
								COMPLAINT OF PAIN	1	0.35	0.70	$ 90,900	$ 63,630					
								PDO	0	0	0.00	$ 14,900	$ -					
-	Night	Add Intersection Lighting (NW and SE corners)	Add intersection lighting (NS.I.)	NS01	20	0.60	90%	FATAL	2	0.8	1.60	$ 2,843,000	$ 4,548,800	$ 4,560,720	1 Luminaire	$ 15,000	$ 15,000	**304.0**
								SEVERE	0	0	0.00	$ 2,843,000	$ -					
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -					
								COMPLAINT OF PAIN	0	0	0.00	$ 90,900	$ -					
								PDO	1	0.4	0.80	$ 14,900	$ 11,920					
-	All	Install retroreflective strips on stop sign posts (West and East legs)	Install / upgrade larger or additional stop signs or other intersection warning / regulatory signs	NS06	10	0.85	90%	FATAL	2	0.3	0.60	$ 2,843,000	$ 1,705,800	$ 1,796,550	2 Retroflective Strips	$ 250	$ 500	**3,593.1**
								SEVERE	0	0	0.00	$ 2,843,000	$ -					
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -					
								COMPLAINT OF PAIN	3	0.45	0.90	$ 90,900	$ 81,810					
								PDO	2	0.3	0.60	$ 14,900	$ 8,940					
-	All	Install R1-5 & Install "No Pedestrian Crossing" regulatory sign on barricade	Install / upgrade larger or additional stop signs or other intersection warning / regulatory signs	NS06	10	0.85	90%	FATAL	2	0.3	0.60	$ 2,843,000	$ 1,705,800	$ 1,796,550	1 Lump Sum	$ 1,200	$ 1,200	**1,497.1**
								SEVERE	0	0	0.00	$ 2,843,000	$ -					
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -					
								COMPLAINT OF PAIN	3	0.45	0.90	$ 90,900	$ 81,810					
								PDO	2	0.3	0.60	$ 14,900	$ 8,940					

Unsignalized Intersection

Location: Main St & Edison St
Agency Name: City of Manteca
Contact Name: Beshoy Demyan
E-mail: bdemyan@manteca.gov

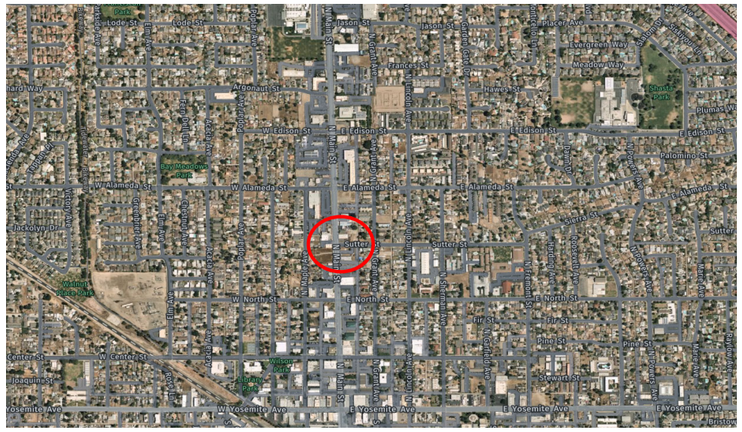


Total Crashes	7
Local CCR Differential	-0.01
Equivalent Property Damage Only	402
Fatal	2
Severe Injury	0
Other Visible Injury	0
Complaint of Pain	3
PDO	2
Crash Type	
Broadside	1
Sideswipe	1
Rear End	1
Head On	0
Hit Object	2
Overturned	0
Non-Motorist Crashes	
Pedestrian	2
Bicycle	0
Contributing Factors	
Impaired	3
Crash Conditions	
Dark	3
Wet	0

NOTES	COLLISION TYPE	RECOMMENDATION	LRSM/CMF COUNTERMEASURE	LRSM #	Expected Life (Years)	CMF	CALTRANS FUNDING	NUMBER OF CRASHES (2017-2021)		NUMBER OF HISTORIC CRASHES REDUCED	10-YEAR CRASH REDUCTION ESTIMATE	CRASH SEVERITY COST	10-YEAR CRASH REDUCTION BENEFIT (2022)	TOTAL 10-YEAR CRASH REDUCTION BENEFIT (2022)	QUANTITY/ NUMBER OF UNITS	UNIT COST	COST ESTIMATE	BENEFIT/COST
-	Bike + Ped	Refresh Intersection Crosswalk Striping with High-Visibility Thermoplastic Striping	Install / upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features)	NS21PB	20	0.65	90%	FATAL	1	0.35	0.70	$ 2,843,000	$ 1,990,100	$ 2,053,730	600 SQFT of Striping	$ 7	$ 4,200	**489.0**
								SEVERE	0	0	0.00	$ 2,843,000	$ -				
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -				
								COMPLAINT OF PAIN	1	0.35	0.70	$ 90,900	$ 63,630				
								PDO	0	0	0.00	$ 14,900	$ -				
-	All	Refresh Intersection Striping with high visibility thermoplastic & Install advanced stop bar & yield line	Upgrade intersection pavement markings (NS.I.)	NS07	10	0.75	90%	FATAL	2	0.5	1.00	$ 2,843,000	$ 2,843,000	$ 2,994,250	2034 SQFT of Striping	$ 7	$ 14,238	**210.3**
								SEVERE	0	0	0.00	$ 2,843,000	$ -				
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -				
								COMPLAINT OF PAIN	3	0.75	1.50	$ 90,900	$ 136,350				
								PDO	2	0.5	1.00	$ 14,900	$ 14,900				

Unsignalized Intersection

Location: Main St & Sutter St
Agency Name: City of Manteca
Contact Name: Beshoy Demyan
E-mail: bdemyan@manteca.gov

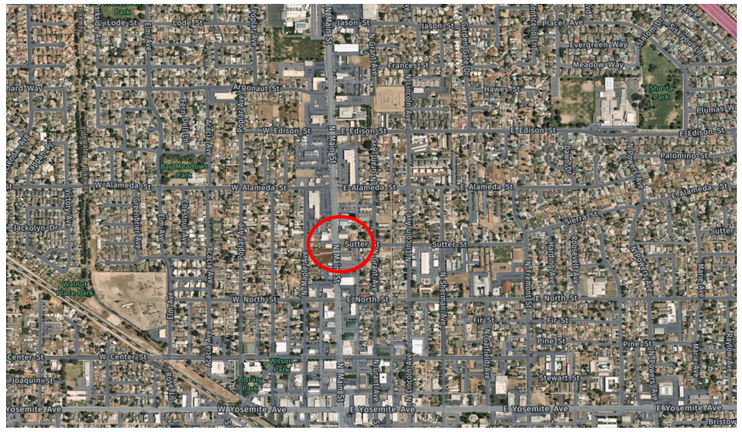


Total Crashes	4
Local CCR Differential	-0.09
Equivalent Property Damage Only	199
Fatal	1
Severe Injury	0
Other Visible Injury	0
Complaint of Pain	1
PDO	2
Crash Type	
Broadside	0
Sideswipe	0
Rear End	2
Head On	1
Hit Object	0
Overturned	0
Non-Motorist Crashes	
Pedestrian	1
Bicycle	0
Contributing Factors	
Impaired	0
Crash Conditions	
Dark	1
Wet	0

NOTES	COLLISION TYPE	RECOMMENDATION	LRSM/CMF COUNTERMEASURE	LRSM #	Expected Life (Years)	CMF	CALTRANS FUNDING	NUMBER OF CRASHES (2017-2021)		NUMBER OF HISTORIC CRASHES REDUCED	10-YEAR CRASH REDUCTION ESTIMATE	CRASH SEVERITY COST	10-YEAR CRASH REDUCTION BENEFIT (2022)	TOTAL 10-YEAR CRASH REDUCTION BENEFIT (2022)	QUANTITY/ NUMBER OF UNITS	UNIT COST	COST ESTIMATE	BENEFIT/COST
-	Bike + Ped	Refresh Intersection Crosswalk Striping with High-Visibility Thermoplastic Striping (North, South, East legs)	Install / upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features)	NS21PB	20	0.65	90%	FATAL	1	0.35	0.70	$ 2,843,000	$ 1,990,100	$ 1,990,100	480 SQFT of Striping	$ 7	$ 3,360	**592.3**
								SEVERE	0	0	0.00	$ 2,843,000	$ -				
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -				
								COMPLAINT OF PAIN	0	0	0.00	$ 90,900	$ -				
								PDO	0	0	0.00	$ 14,900	$ -				
-	-	ADA ramp upgrades	-	-	-	-	-	FATAL	1	-	-	-	-	-	3 ADA Ramps	$ 5,000	$ 15,000	**-**
								SEVERE	0	-	-	-	-				
								OTHER VISIBLE	0	-	-	-	-				
								COMPLAINT OF PAIN	1	-	-	-	-				
								PDO	2	-	-	-	-				
-	Bike + Ped	Install HAWK Signal (North leg)	Install Pedestrian Signal (including Pedestrian Hybrid Beacon (HAWK))	NS23PB	20	0.45	90%	FATAL	1	0.55	1.10	$ 2,843,000	$ 3,127,300	$ 3,127,300	1 HAWK Signal	$ 300,000	$ 300,000	**10.4**
								SEVERE	0	0	0.00	$ 2,843,000	$ -				
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -				
								COMPLAINT OF PAIN	0	0	0.00	$ 90,900	$ -				
								PDO	0	0	0.00	$ 14,900	$ -				
-	Bike + Ped	Install Rectangular Rapid Flashing Beacon (RRFB) (North leg)	Install Rectangular Rapid Flashing Beacon (RRFB)	NS22PB	20	0.65	90%	FATAL	1	0.35	0.70	$ 2,843,000	$ 1,990,100	$ 1,990,100	1 RRFB	$ 54,000	$ 54,000	**36.9**
								SEVERE	0	0	0.00	$ 2,843,000	$ -				
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -				
								COMPLAINT OF PAIN	0	0	0.00	$ 90,900	$ -				
								PDO	0	0	0.00	$ 14,900	$ -				
-	Night	Add Intersection Lighting (NE and SW corners)	Add intersection lighting (NS.I.)	NS01	20	0.60	90%	FATAL	0	0	0.00	$ 2,843,000	$ -	$ 11,920	2 Luminaire	$ 15,000	$ 30,000	**0.4**
								SEVERE	0	0	0.00	$ 2,843,000	$ -				
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -				
								COMPLAINT OF PAIN	0	0	0.00	$ 90,900	$ -				
								PDO	1	0.4	0.80	$ 14,900	$ 11,920				
-	All	Install left turn pocket (SB)	Install left-turn lane (where no left-turn lane exists)	NS18	20	0.65	90%	FATAL	1	0.35	0.70	$ 2,843,000	$ 1,990,100	$ 2,074,590	200 SQFT of Striping	$ 7	$ 1,400	**1,481.9**
								SEVERE	0	0	0.00	$ 2,843,000	$ -				
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -				
								COMPLAINT OF PAIN	1	0.35	0.70	$ 90,900	$ 63,630				
								PDO	2	0.7	1.40	$ 14,900	$ 20,860				

Unsignalized Intersection

Location: Main St & Sutter St
Agency Name: City of Manteca
Contact Name: Beshoy Demyan
E-mail: bdemyan@manteca.gov



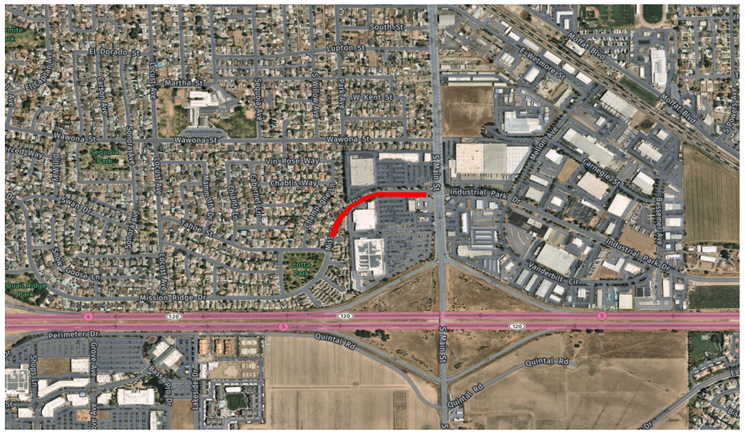
Total Crashes	4
Local CCR Differential	-0.09
Equivalent Property Damage Only	199
Fatal	1
Severe Injury	0
Other Visible Injury	0
Complaint of Pain	1
PDO	2
Crash Type	
Broadside	0
Sideswipe	0
Rear End	2
Head On	1
Hit Object	0
Overturned	0
Non-Motorist Crashes	
Pedestrian	1
Bicycle	0
Contributing Factors	
Impaired	0
Crash Conditions	
Dark	1
Wet	0

NOTES	COLLISION TYPE	RECOMMENDATION	LRSM/CMF COUNTERMEASURE	LRSM #	Expected Life (Years)	CMF	CALTRANS FUNDING	NUMBER OF CRASHES (2017-2021)		NUMBER OF HISTORIC CRASHES REDUCED	10-YEAR CRASH REDUCTION ESTIMATE	CRASH SEVERITY COST	10-YEAR CRASH REDUCTION BENEFIT (2022)	TOTAL 10-YEAR CRASH REDUCTION BENEFIT (2022)	QUANTITY/ NUMBER OF UNITS	UNIT COST	COST ESTIMATE	BENEFIT/COST
-	-	Remove crosswalk across the south leg and remove existing curb ramp	-	-	-	-	-	FATAL	1	-	-	-	-	$ -	1 Lump Sum	$ 4,000	$ 4,000	-
								SEVERE	0	-	-	-	-					
								OTHER VISIBLE	0	-	-	-	-					
								COMPLAINT OF PAIN	0	-	-	-	-					
								PDO	0	-	-	-	-					
-	All	Refresh Intersection Striping with high visibility thermoplastic & Install right edge line striping & Install advanced stop bar and yield line	Upgrade intersection pavement markings (NS.I.)	NS07	10	0.75	90%	FATAL	1	0.25	0.50	$ 2,843,000	$ 1,421,500	$ 1,481,850	1860 SQFT of Striping	$ 7	$ 13,020	**113.8**
								SEVERE	0	0	0.00	$ 2,843,000	$ -					
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -					
								COMPLAINT OF PAIN	1	0.25	0.50	$ 90,900	$ 45,450					
								PDO	2	0.5	1.00	$ 14,900	$ 14,900					
-	All	Install R1-5 (20 to 50 ft) & Install W11-2 and W16-9P & Install "No Pedestrian Crossing" regulatory sign on barricade	Install / upgrade larger or additional stop signs or other intersection warning / regulatory signs	NS06	10	0.85	90%	FATAL	1	0.15	0.30	$ 2,843,000	$ 852,900	$ 889,110	1 Lump Sum	$ 1,200	$ 1,200	**740.9**
								SEVERE	0	0	0.00	$ 2,843,000	$ -					
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -					
								COMPLAINT OF PAIN	1	0.15	0.30	$ 90,900	$ 27,270					
								PDO	2	0.3	0.60	$ 14,900	$ 8,940					
-	All	Install median island (South leg) for driveway access restrictions	Install raised median on approaches (S.I.)	S12	20	0.75	90%	FATAL	1	0.25	0.50	$ 1,787,000	$ 893,500	$ 953,850	60 LF	$ 60	$ 3,600	**265.0**
								SEVERE	0	0	0.00	$ 1,787,000	$ -					
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -					
								COMPLAINT OF PAIN	1	0.25	0.50	$ 90,900	$ 45,450					
								PDO	2	0.5	1.00	$ 14,900	$ 14,900					

City of Manteca LRSP

Roadway Segment

Location: MISSION RIDGE DR (Btw: SYRAH CT & S MAIN ST)
Agency Name: City of Manteca
Contact Name: Beshoy Demyan
E-mail: bdemyan@manteca.gov

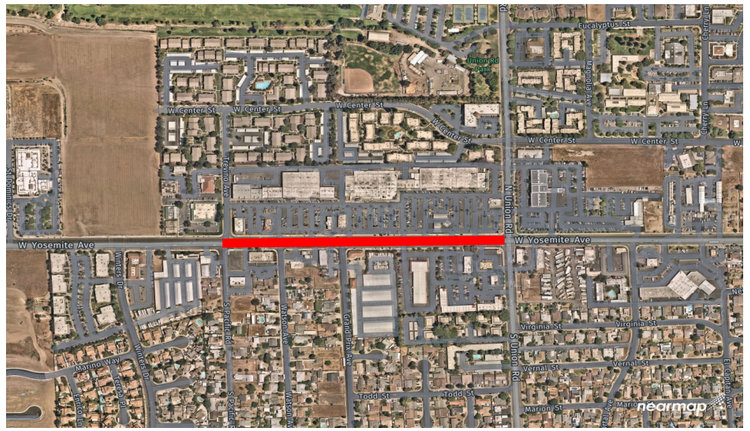


Total Crashes	4
Local CCR Differential	0.91
Equivalent Property Damage Only	173
Fatal	0
Severe Injury	1
Other Visible Injury	0
Complaint of Pain	1
PDO	2
Crash Type	
Broadside	0
Sideswipe	2
Rear End	0
Head On	0
Hit Object	2
Overturned	0
Non-Motorist Crashes	
Pedestrian	0
Bicycle	0
Contributing Factors	
Impaired	1
Crash Conditions	
Dark	2
Wet	0

NOTES	COLLISION TYPE	RECOMMENDATION	LRSM/CMF COUNTERMEASURE	LRSM #	Expected Life (Years)	CMF	CALTRANS FUNDING	NUMBER OF CRASHES (2017-2021)		NUMBER OF HISTORIC CRASHES REDUCED	10-YEAR CRASH REDUCTION ESTIMATE	CRASH SEVERITY COST	10-YEAR CRASH REDUCTION BENEFIT (2022)	TOTAL 10-YEAR CRASH REDUCTION BENEFIT (2022)	QUANTITY/ NUMBER OF UNITS	UNIT COST	COST ESTIMATE	BENEFIT/COST
-	Bike + Ped	Install buffered bike lane with raised element (To narrow lanes & extend bike lane to intersection). Install green bike lane striping in conflict areas.	Install separated bike lanes	R33PB	20	0.55	90%	FATAL	0	0	0.00	$ 2,461,000	$ -	$ -	2000 LF	$ 15	$ 30,000	**0.0**
								SEVERE	0	0	0.00	$ 2,461,000	$ -				
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -				
								COMPLAINT OF PAIN	0	0	0.00	$ 90,900	$ -				
								PDO	0	0	0.00	$ 14,900	$ -				
-	All	Install median island to more effectively define left turn access	Install raised median	R08	20	0.75	90%	FATAL	0	0	0.00	$ 2,461,000	$ -	$ 1,290,850	900 LF	$ 40	$ 36,000	**35.9**
								SEVERE	1	0.25	0.50	$ 2,461,000	$ 1,230,500				
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -				
								COMPLAINT OF PAIN	1	0.25	0.50	$ 90,900	$ 45,450				
								PDO	2	0.5	1.00	$ 14,900	$ 14,900				
-	All	Install intersection ahead warning sign to enhance driver awareness of driveway & update merging signs per current MUTCD standards.	Install / Upgrade signs with new fluores	R22	10	0.85	90%	FATAL	0	0	0.00	$ 2,461,000	$ -	$ 774,510	4 Signs	$ 450	$ 1,800	**430.3**
								SEVERE	1	0.15	0.30	$ 2,461,000	$ 738,300				
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -				
								COMPLAINT OF PAIN	1	0.15	0.30	$ 90,900	$ 27,270				
								PDO	2	0.3	0.60	$ 14,900	$ 8,940				
-	All	Redesign merge along WB approach to be further upstream of curve.	-	-	-	-	-	FATAL	0	-	-	-	-	-	250 SQFT of Striping and 250 LF of Striping Removal	$7 per SQFT of Striping $4.2 per LF of Striping Removal	$ 2,800	-
								SEVERE	1	-	-	-	-					
								OTHER VISIBLE	0	-	-	-	-					
								COMPLAINT OF PAIN	1	-	-	-	-					
								PDO	2	-	-	-	-					
-	All	Install curve advisory speed warning sign	Install curve advance warning signs	R24	10	0.75	90%	FATAL	0	0	0.00	$ 2,461,000	$ -	$ 1,290,850	2 Signs	$ 450	$ 900	**1,434.3**
								SEVERE	1	0.25	0.50	$ 2,461,000	$ 1,230,500				
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -				
								COMPLAINT OF PAIN	1	0.25	0.50	$ 90,900	$ 45,450				
								PDO	2	0.5	1.00	$ 14,900	$ 14,900				

Roadway Segment

Location: Yosemite Ave (Btw: Union Rd & Trevino Ave/ Pacific Rd)
Agency Name: City of Manteca
Contact Name: Beshoy Demyan
E-mail: bdemyan@manteca.gov

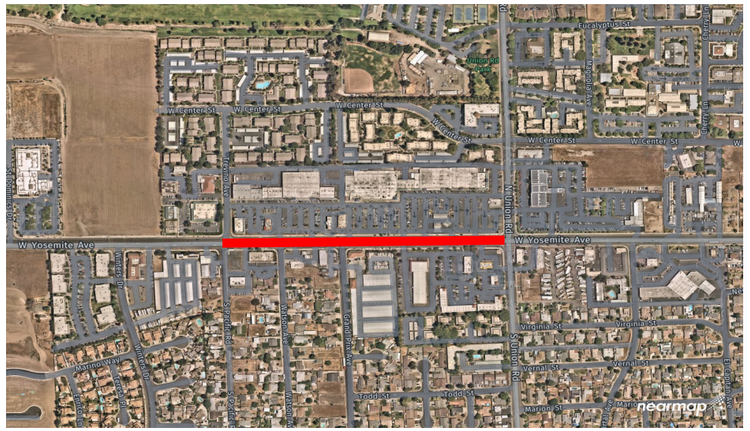


Total Crashes	25
Local CCR Differential	2.14
Equivalent Property Damage Only	434
Fatal	0
Severe Injury	2
Other Visible Injury	3
Complaint of Pain	10
PDO	10
Crash Type	
Broadside	10
Sideswipe	1
Rear End	3
Head On	1
Hit Object	5
Overturned	0
Non-Motorist Crashes	
Pedestrian	0
Bicycle	4
Contributing Factors	
Impaired	2
Crash Conditions	
Dark	5
Wet	0

NOTES	COLLISION TYPE	RECOMMENDATION	LRSM/CMF COUNTERMEASURE	LRSM #	Expected Life (Years)	CMF	CALTRANS FUNDING	NUMBER OF CRASHES (2017-2021)		NUMBER OF HISTORIC CRASHES REDUCED	10-YEAR CRASH REDUCTION ESTIMATE	CRASH SEVERITY COST	10-YEAR CRASH REDUCTION BENEFIT (2022)	TOTAL 10-YEAR CRASH REDUCTION BENEFIT (2022)	QUANTITY/ NUMBER OF UNITS	UNIT COST	COST ESTIMATE	BENEFIT/COST
-	-	ADA ramp upgrades at Yosemite Ave/Watson Ave (north sidewalk at private driveway splitter island)	-	-	-	-	-	FATAL	0	-	-	-	-	-	2 ADA Ramps	$ 5,000	$ 10,000	-
								SEVERE	2	-	-	-	-				
								OTHER VISIBLE	3	-	-	-	-				
								COMPLAINT OF PAIN	10	-	-	-	-				
								PDO	10	-	-	-	-				
-	All	Re-design splitter island at right-in/out driveway at Yosemite Ave/Watson Ave to provide more effective turn restrictions (includes signage)	Install splitter-islands on the minor road approaches	NS13	20	0.60	90%	FATAL	0	0	0.00	$ 2,461,000	$ -	$ 5,167,760	1 Lump Sum	$ 12,000	$ 12,000	**430.6**
								SEVERE	2	0.8	1.60	$ 2,461,000	$ 3,937,600				
								OTHER VISIBLE	3	1.2	2.40	$ 159,900	$ 383,760				
								COMPLAINT OF PAIN	10	4	8.00	$ 90,900	$ 727,200				
								PDO	10	4	8.00	$ 14,900	$ 119,200				
-	All	Install "No Pedestrian Crossing" regulatory sign on barricade at Yosemite Ave intersections at Watson Ave and Grand Prix Ave	Install / Upgrade signs with new fluoresent sheeting	R22	10	0.85	90%	FATAL	0	0	0.00	$ 2,461,000	$ -	$ 1,937,910	4 Signs	$ 450	$ 1,800	**1,076.6**
								SEVERE	2	0.3	0.60	$ 2,461,000	$ 1,476,600				
								OTHER VISIBLE	3	0.45	0.90	$ 159,900	$ 143,910				
								COMPLAINT OF PAIN	10	1.5	3.00	$ 90,900	$ 272,700				
								PDO	10	1.5	3.00	$ 14,900	$ 44,700				
-	Bike + Ped	Install buffered bike lane with raised element EB & WB (removing parking). Install green bike lane striping in conflict areas.	Install separated bike lanes	R33PB	20	0.55	90%	FATAL	0	0	0.00	$ 2,461,000	$ -	$ 2,516,130	2700 LF	$ 15	$ 40,500	**62.1**
								SEVERE	1	0.45	0.90	$ 2,461,000	$ 2,214,900				
								OTHER VISIBLE	2	0.9	1.80	$ 159,900	$ 287,820				
								COMPLAINT OF PAIN	0	0	0.00	$ 90,900	$ -				
								PDO	1	0.45	0.90	$ 14,900	$ 13,410				
-	Bike + Ped	Install HAWK Signal along Yosemite Ave between Grand Prix Ave and Watson Ave	Install Pedestrian Signal (including Pedestrian Hybrid Beacon (HAWK))	NS23PB	20	0.45	90%	FATAL	0	0	0.00	$ 2,461,000	$ -	$ 3,075,270	1 HAWK Signal	$ 300,000	$ 300,000	**10.3**
								SEVERE	1	0.55	1.10	$ 2,461,000	$ 2,707,100				
								OTHER VISIBLE	2	1.1	2.20	$ 159,900	$ 351,780				
								COMPLAINT OF PAIN	0	0	0.00	$ 90,900	$ -				
								PDO	1	0.55	1.10	$ 14,900	$ 16,390				
-	All	Restripe and shorten TWLTL to have defined turn access at intersections (Watson Ave, Grand Prix Ave) and at Yosemite Ave driveways	-	-	-	-	-	FATAL	0	-	-	-	-	$ -	2020 SQFT of Striping and additional Striping Removal	$ 7	$ 14,140	-
								SEVERE	2	-	-	-	-				
								OTHER VISIBLE	3	-	-	-	-				
								COMPLAINT OF PAIN	10	-	-	-	-				
								PDO	10	-	-	-	-				

Roadway Segment

Location: Yosemite Ave (Btw: Union Rd & Trevino Ave/ Pacific Rd)
Agency Name: City of Manteca
Contact Name: Beshoy Demyan
E-mail: bdemyan@manteca.gov

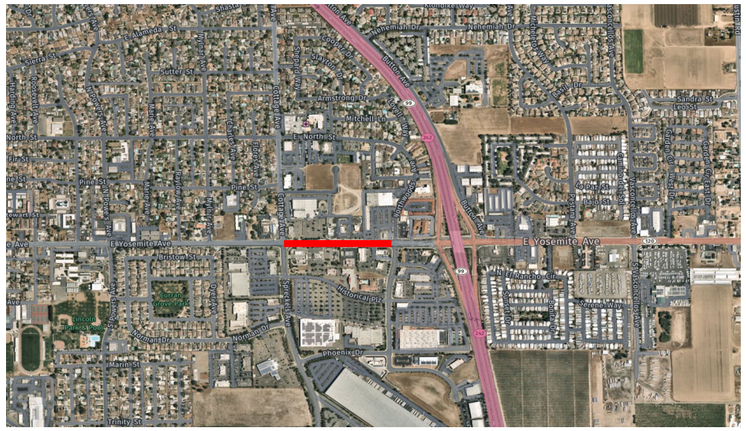


Total Crashes	25
Local CCR Differential	2.14
Equivalent Property Damage Only	434
Fatal	0
Severe Injury	2
Other Visible Injury	3
Complaint of Pain	10
PDO	10
Crash Type	
Broadside	10
Sideswipe	1
Rear End	3
Head On	1
Hit Object	5
Overturned	0
Non-Motorist Crashes	
Pedestrian	0
Bicycle	4
Contributing Factors	
Impaired	2
Crash Conditions	
Dark	5
Wet	0

NOTES	COLLISION TYPE	RECOMMENDATION	LRSM/CMF COUNTERMEASURE	LRSM #	Expected Life (Years)	CMF	CALTRANS FUNDING	NUMBER OF CRASHES (2017-2021)		NUMBER OF HISTORIC CRASHES REDUCED	10-YEAR CRASH REDUCTION ESTIMATE	CRASH SEVERITY COST	10-YEAR CRASH REDUCTION BENEFIT (2022)	TOTAL 10-YEAR CRASH REDUCTION BENEFIT (2022)	QUANTITY/ NUMBER OF UNITS	UNIT COST	COST ESTIMATE	BENEFIT/COST
-	Bike + Ped	Refresh Intersection Crosswalk Striping with High-Visibility Thermoplastic Striping at Watson Ave, driveway adjacent to Carl's Jr, Grand Prix Ave	Install / upgrade pedestrian crossing (with enhanced safety features)	R35PB	20	0.65	90%	FATAL	0	0	0.00	$ 2,461,000	$ -	$ 1,956,990	2560 SQFT of Striping	$ 7	$ 17,920	**109.2**
								SEVERE	1	0.35	0.70	$ 2,461,000	$ 1,722,700				
								OTHER VISIBLE	2	0.7	1.40	$ 159,900	$ 223,860				
								COMPLAINT OF PAIN	0	0	0.00	$ 90,900	$ -				
								PDO	1	0.35	0.70	$ 14,900	$ 10,430				
-	All	Refresh Intersection Striping with high visibility thermoplastic	Install Raised Pavement Markers and Striping (Through Intersection)	S09	10	0.90	90%	FATAL	0	0	0.00	$ 2,461,000	$ -	$ 1,291,940	3750 SQFT of Striping	$ 7	$ 26,250	**49.2**
								SEVERE	2	0.2	0.40	$ 2,461,000	$ 984,400				
								OTHER VISIBLE	3	0.3	0.60	$ 159,900	$ 95,940				
								COMPLAINT OF PAIN	10	1	2.00	$ 90,900	$ 181,800				
								PDO	10	1	2.00	$ 14,900	$ 29,800				

Roadway Segment

Location: Yosemite Ave (Btw: Cottage Ave & Commerce Ave)
Agency Name: City of Manteca
Contact Name: Beshoy Demyan
E-mail: bdemyan@manteca.gov



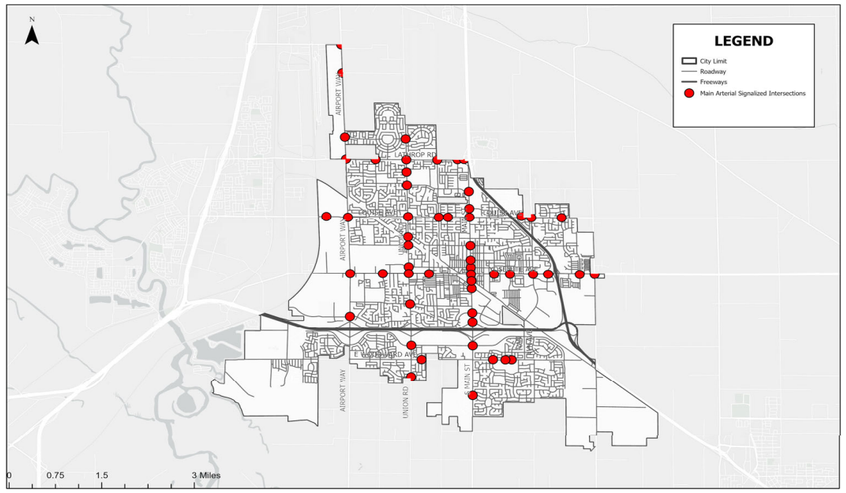
Total Crashes	11
Local CCR Differential	0.70
Equivalent Property Damage Only	205
Fatal	0
Severe Injury	1
Other Visible Injury	2
Complaint of Pain	2
PDO	6
Crash Type	
Broadside	4
Sideswipe	3
Rear End	2
Head On	1
Hit Object	1
Overturned	0
Non-Motorist Crashes	
Pedestrian	1
Bicycle	0
Contributing Factors	
Impaired	1
Crash Conditions	
Dark	3
Wet	1

NOTES	COLLISION TYPE	RECOMMENDATION	LRSM/CMF COUNTERMEASURE	LRSM #	Expected Life (Years)	CMF	CALTRANS FUNDING	NUMBER OF CRASHES (2017-2021)		NUMBER OF HISTORIC CRASHES REDUCED	10-YEAR CRASH REDUCTION ESTIMATE	CRASH SEVERITY COST	10-YEAR CRASH REDUCTION BENEFIT (2022)	TOTAL 10-YEAR CRASH REDUCTION BENEFIT (2022)	QUANTITY/ NUMBER OF UNITS	UNIT COST	COST ESTIMATE	BENEFIT/COST
-	Bike + Ped	Install buffered bike lane with inflexible barrier (after removing TWLTL) (Install green bike lane striping in conflict areas)	Install separated bike lanes	R33PB	20	0.55	90%	FATAL	0	0	0.00	$ 2,461,000	$ -	$ 2,214,900	2600 LF	$ 15	$ 39,000	**56.8**
								SEVERE	1	0.45	0.90	$ 2,461,000	$ 2,214,900				
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -					
								COMPLAINT OF PAIN	0	0	0.00	$ 90,900	$ -					
								PDO	0	0	0.00	$ 14,900	$ -					
-	All	Install median island (removing TWLTL) to provide defined access for commercial driveways	Install raised median	R08	20	0.75	90%	FATAL	0	0	0.00	$ 2,461,000	$ -	$ 1,526,000	1 Lump Sum	$ 80,000	$ 80,000	**19.1**
								SEVERE	1	0.25	0.50	$ 2,461,000	$ 1,230,500				
								OTHER VISIBLE	2	0.5	1.00	$ 159,900	$ 159,900				
								COMPLAINT OF PAIN	2	0.5	1.00	$ 90,900	$ 90,900				
								PDO	6	1.5	3.00	$ 14,900	$ 44,700				
-	Bike + Ped	Install pedestrian median fencing	Install pedestrian median fencing	R10PB	20	0.65	90%	FATAL	0	0	0.00	$ 2,461,000	$ -	$ 1,722,700	1050 LF	$ 100	$ 105,000	**16.4**
								SEVERE	1	0.35	0.70	$ 2,461,000	$ 1,722,700				
								OTHER VISIBLE	0	0	0.00	$ 159,900	$ -					
								COMPLAINT OF PAIN	0	0	0.00	$ 90,900	$ -					
								PDO	0	0	0.00	$ 14,900	$ -					

City of Manteca LRSP
Systemic Safety Improvements

Signalized Intersections

Location: Citywide Primary Arterials Signalized
Agency Name: City of Manteca
Contact Name: Beshoy Demyan
E-mail: bdemyan@manteca.gov



Total Crashes	551
Local CCR Differential	N/A
Equivalent Property Damage Only	4563
Fatal	4
Severe Injury	13
Other Visible Injury	95
Complaint of Pain	209
PDO	230
Crash Type	
Broadside	147
Sideswipe	57
Rear End	151
Head On	40
Hit Object	104
Overturned	0
Non-Motorist Crashes	
Pedestrian	23
Bicycle	30
Contributing Factors	
Impaired	59
Crash Conditions	
Dark	177
Wet	35

NOTES	COLLISION TYPE	RECOMMENDATION	LRSM/CMF COUNTERMEASURE	LRSM #	Expected Life (Years)	CMF	CALTRANS FUNDING	NUMBER OF CRASHES (2017-2021)		NUMBER OF HISTORIC CRASHES REDUCED	10-YEAR CRASH REDUCTION ESTIMATE	CRASH SEVERITY COST	10-YEAR CRASH REDUCTION BENEFIT (2022)	TOTAL 10-YEAR CRASH REDUCTION BENEFIT (2022)	QUANTITY/ NUMBER OF UNITS	UNIT COST	COST ESTIMATE	BENEFIT/COST
-	All	Provide Advanced Dilemma Zone Detection for high speed approaches	Provide Advanced Dilemma Zone Detection for high speed approaches	S04	10	0.60		FATAL	4	1.6	3.20	$ 1,787,000	$ 5,718,400	$ 54,395,680	54 Detectors	$ 15,000	$ 810,000	**67.2**
								SEVERE	13	5.2	10.40	$ 1,787,000	$ 18,584,800					
								OTHER VISIBLE	95	38	76.00	$ 159,900	$ 12,152,400					
								COMPLAINT OF PAIN	209	83.6	167.20	$ 90,900	$ 15,198,480					
								PDO	230	92	184.00	$ 14,900	$ 2,741,600					
-	Ped+Bike	Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	S21PB	10	0.40		FATAL	1	0.6	1.20	$ 1,787,000	$ 2,144,400	$ 19,176,360	54 LPIs	$ 10,000	$ 540,000	**35.5**
								SEVERE	5	3	6.00	$ 1,787,000	$ 10,722,000					
								OTHER VISIBLE	22	13.2	26.40	$ 159,900	$ 4,221,360					
								COMPLAINT OF PAIN	18	10.8	21.60	$ 90,900	$ 1,963,440					
								PDO	7	4.2	8.40	$ 14,900	$ 125,160					
-	All	Install Retroreflective Backplates	Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number	S02	10	0.85		FATAL	4	0.6	1.20	$ 1,787,000	$ 2,144,400	$ 20,398,380	1065 Retroreflective Backplates	$ 750	$ 798,750	**25.5**
								SEVERE	13	1.95	3.90	$ 1,787,000	$ 6,969,300					
								OTHER VISIBLE	95	14.25	28.50	$ 159,900	$ 4,557,150					
								COMPLAINT OF PAIN	209	31.35	62.70	$ 90,900	$ 5,699,430					
								PDO	230	34.5	69.00	$ 14,900	$ 1,028,100					