City of San Luis Obispo

2017 TRAFFIC SAFETY & OPERATIONS REPORT

Public Works and Police Department

December 2018

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Executive Summary

The Public Works & Police Departments are pleased to present the 17th cycle of the City's Annual Traffic Safety Program. The Annual Traffic Safety Program began in 2002 in an attempt to identify high collision locations within the City. In addition, the program actively pursues corrective measures that may reduce collision rates and improve safety within the City. This program has had continued success with a 60% reduction in citywide collisions since the program began, despite increasing traffic volumes.

In 2017 the total number of collisions increased by 4% from the previous year. While reducing the overall collision rate continues to be a priority, the safety program continues to increase focus on the most serious collisions—those that result in severe injuries or death. Because injury collisions require a police report and an investigation by a peace officer, these reports provide a clearer picture of the collision circumstances and can establish a more reliable year-to-year trend as policies change with regard to collision response.

In 2017, injury collisions increased by 3% from the previous year. However, injury collisions have decreased by 35% from 2002 when the safety program began. There was one traffic-related fatality on City Right of Way in 2017. A bicyclist was rear-ended by a driver under the influence on Foothill Boulevard near Ferrini.

The Traffic Safety Program aligns with the City's Vision Zero Policy and includes thorough evaluations of bicycle and pedestrian safety, as these road users are more vulnerable to serious injury or death from collisions with motor vehicles. Bicycle collision trends have shown a 22% decline from the previous year and a 47% decline from peak levels in 2009. This year had the record lowest number of bicycle collisions. Except for a significant peak in 2013, annual pedestrian collisions have been relatively static since 2008. Although 2017 saw an 15% increase that number only represented 4 additional pedestrian collisions.

The following report displays trends in collision history, traffic citations, and traffic safety measures and identifies high-collision rate locations in 2017. As in previous Traffic Safety Reports, staff reviewed all high-collision rate intersections and street segments and has recommended mitigation measures to increase safety at the top five locations in each category.

Our Vision Zero goal is that the combination of data-driven analysis, appropriate mitigation, and consistent and focused education and enforcement will continue to reduce traffic collisions, eliminating injury and fatal collisions and improve the safety of our streets for all users.

The 2017 Traffic Safety and Operations Report identifies 13 new recommended projects. The new project recommendations are listed in the following table:

Summary Recommendation for New Projects

No.	Location	Project
1	Santa Rosa and Monterey	Install Flashing Left Yellow Arrows for EB & WB Traffic
2	Osos and Pismo	Implement pedestrian lead interval and install "yield to pedestrian" signage for all approaches. Install Flashing Left Yellow Arrows.
3	Broad and Higuera	Install additional "yield to pedestrian" signage for northbound and southbound approaches. Investigate installation of overhead mast arms with flashing yellow arrows for NB & SB Broad Approaches.
4	Higuera and Morro	Install pedestrian countdown signal heads and implement pedestrian lead interval. Install "yield to pedestrian" signage for all approaches.
5	Grand and Loomis	Install "Yield to Bike" sign for northbound traffic. Investigate installation of bulbouts on Grand at Loomis to bring stop sign closer to the intersection.
6	California and Mill	Install green bike lanes on California on the approaches to and through the intersection of Mill Street for both north and southbound directions. Install "Yield to Bike" signage for all directions. Upgrade to 12" signal indications, add overhead mast arm on EB approach and update pole locations.
7	Broad and Pismo	Investigate channelization enhancements to force drivers to start their turn further from the corner. Additionally, relocate traffic signal pole to back of sidewalk and work with PG&E to relocate power pole.
8	Johnson and Buchon	Increase visibility of median (yellow curb, reflectors, replace signage if necessary)
9	Broad and Industrial	Install flashing warning lights on advanced signal ahead signage for the southbound traffic.
10	LOVR and Calle Joaquin	Install Flashing Yellow left turn arrows on LOVR Approaches.
11	Foothill and Casa	Investigate two stage left turn channelization.
12	Marsh (Hwy 101 to Broad)	Investigate signage and legend markings at adjacent cross streets and make adjustments as necessary.
13	Casa (Murray to Foothill)	Refresh edge and centerline striping.

Introduction

Background

Since its inception in 2002, the annual Traffic Safety Report (TSR) provides an overview of the City of San Luis Obispo's efforts to monitor and improve safety for all road users. Every year, the City prepares a TSR for the previous twelve-month period with the following specific objectives:

- Identify the intersections and street segments within the City associated with the highest collision rates, and thoroughly analyze collision patterns in order to develop potential mitigation measures for the five highest locations that will reduce the potential for collisions—particularly those involving severe injuries and/or fatalities, and;
- Identify the predominant pedestrian and bicycle collision types and high-collision locations, and thoroughly analyze collision data and police reports so as to determine potential mitigation measures for the five highest-rate collision locations that may reduce the potential for collisions, and;
- Report on traffic enforcement efforts, traffic safety education activities, and evaluate the effectiveness of mitigation measures implemented in the previous twelve-month period.

The locations mentioned in this report should not be interpreted as a list of dangerous or "least safe" intersections or streets within the City. The specific total of collisions for any location for any year is a function of various factors such as weather patterns, construction, traffic volumes, roadway conditions and driver habits. Many of these factors are often difficult to identify and are most often beyond the ability of the engineer to change or control. However, the City's mitigation program attempts to identify roadway elements that can be modified so as to make the transportation infrastructure more driver friendly, reduce driver confusion, promote bicycle and pedestrian safety and comfort, and limit impact severity.

Vision Zero

Vision Zero is a multi-national traffic safety initiative with a straightforward message: No loss of life is acceptable. At its core, Vision Zero seeks the elimination of deaths and serious injuries from our roadways. By focusing on not only reducing overall traffic collisions, but preventing severe collisions, particularly to vulnerable users such as pedestrians, bicyclists and people with disabilities, communities can achieve real live benefits and save lives.

The City of San Luis Obispo formally adopted its Vision Zero policy in 2016 to eliminate traffic-related fatalities and serious injuries by 2030. Through the data-driven analysis performed in the annual TSR, regular collaboration between City Public Works and Police Departments to identify priorities for focused traffic safety enforcement and ongoing community education and outreach campaigns, the City continually strives to improve the safety and efficiency of transportation facilities for all modes and users.

Measuring Progress

Progress towards improving traffic safety for all road users and reaching Vision Zero is measured in the TSR using the following metrics:

- Total collisions, fatalities and serious injuries
- Total pedestrian collisions, fatalities and serious injuries
- Total bicycle collisions, fatalities and serious injuries

The traffic safety data for these metrics is obtained from traffic collision reports provided by the San Luis Obispo Police Department. The TSR for a given year will normally be prepared after City collision statistics become available in April or May of the following year; thus, the data analyzed in this TSR is for the 2017 calendar year. Collision data is reviewed for each intersection and roadway segment within the City and entered into the City Public Works Department's traffic collision database. Auto, pedestrian and bicycle volumes are then utilized in conjunction with collision totals to calculate collision rates for all locations in the City. Considering the calculated collision rates, as well as collision severity, locations are ranked for each type of intersection and roadway segment within the City. The five highest-ranked collision locations for each category are analyzed in further detail and mitigation measures are presented, where feasible.

Additional discussion regarding the technical analysis methodology applied in this TSR is provided in **Appendix A**.

How to Navigate this Report

The remainder of the 2017 TSR is organized into the following sections:

- **Citywide Travel Trends** – *Page 6*
  This section discusses percentage growths in motor vehicle travel and where that growth is concentrated.

- **Citywide Collision Trends** – *Page 6*
  How safe are San Luis Obispo's streets? This section describes the state of traffic safety in the City, discussing trends in traffic collisions from 1999 to 2017.

- **Traffic Enforcement Measures** – *Page 13*
  This section describes traffic enforcement efforts of the City Police Department, discussing traffic citations, DUI arrests and hazardous driving trends.

- **Traffic Safety Education Campaigns and Community Partnerships**– *Page 13*
  How are we making San Luis Obispo's streets safer? This section describes the ongoing efforts to improve the safety of transportation facilities for all modes of travel within the City.

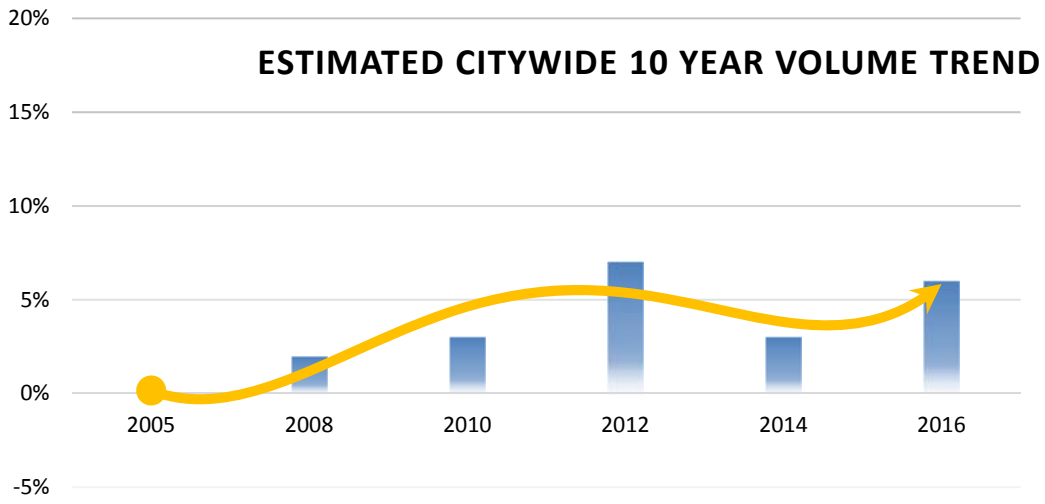
- **2017 High Collision Rate Locations & Recommendations** – *Page 21*
  What have we learned about traffic safety in 2017? This section describes the high collision rate intersections and roadway segments for 2017 and presents potential mitigation recommendations for high-priority locations.

Citywide Travel Trends

In order to provide context to the collision trends this section of report includes an overview of estimated Citywide automobile trends over the last 10 years and a more in-depth summary of traffic volume trends since the General Plan update in 2014. Future reports will also include bicycle and pedestrian volume trends. Aggregate volume trends are estimated based on recorded traffic counts across numerous screen lines and counting stations throughout the City.

As shown in the chart below traffic volumes have generally been increasing by approximately 1% year. However, year to year changes are affected by numerous social, economic, and environmental factors.

The City does experience seasonal fluctuations in traffic volumes primarily due to changes in school sessions at Cal Poly, Cuesta, and San Luis Unified School District. All volume data presented below was collected while all schools are in session, during fair weather, and unaffected by construction.



Between 2014, when the General Plan was adopted, and the latest data available at the time of this report overall Citywide traffic volumes have increased by approximately 3% or 1% per year.

Although overall Citywide volumes have increased from 2014-2016, different areas of the City have experienced different trends. The Margarita and Broad/Orcutt Areas experience the highest growth. Broad/Johnson, Old Town, LOVR/Madonna, and Santa Rosa areas experienced average growth. Downtown, Upper Monterey, and the Foothill area had volume declines or static growth.

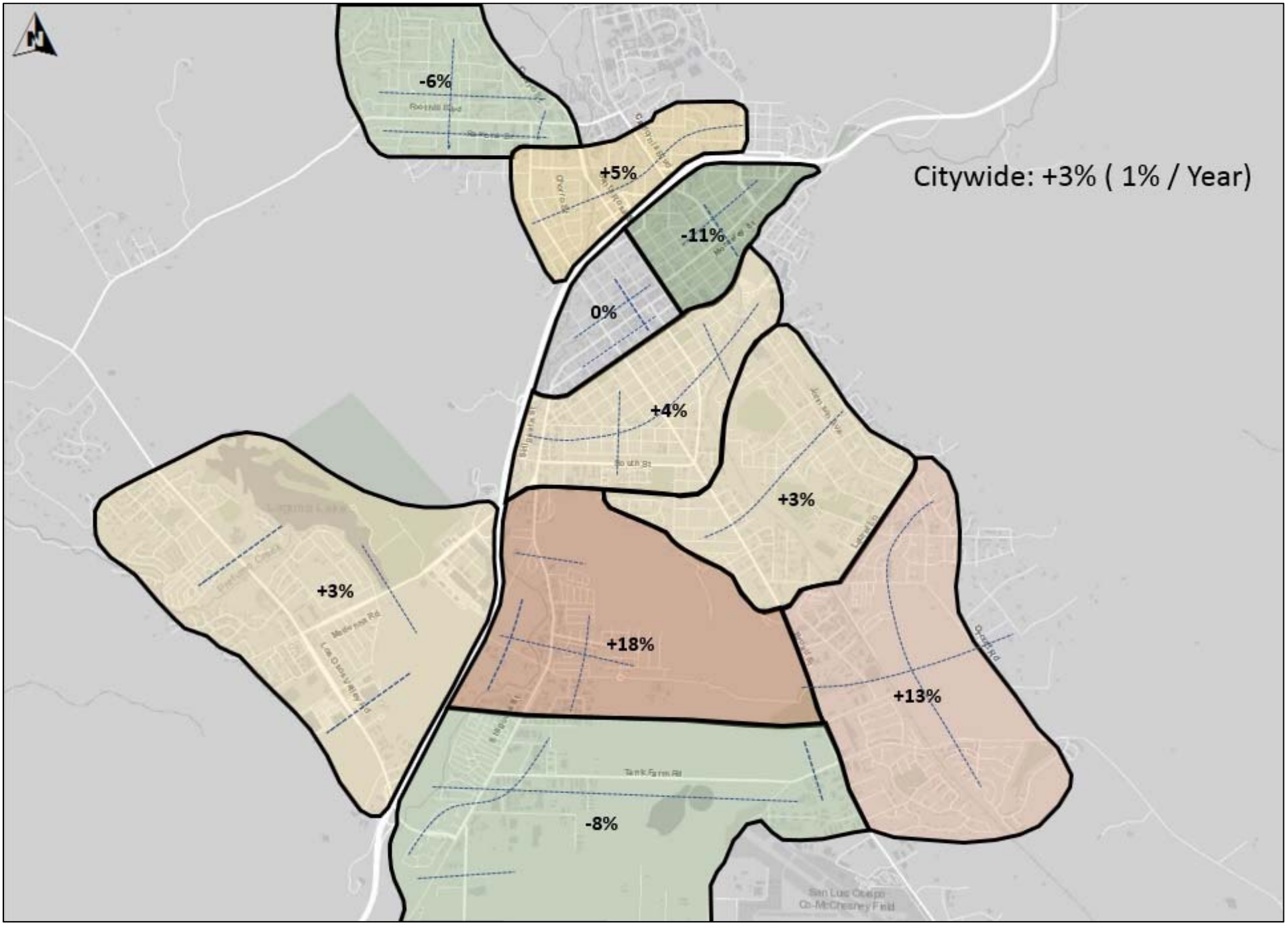
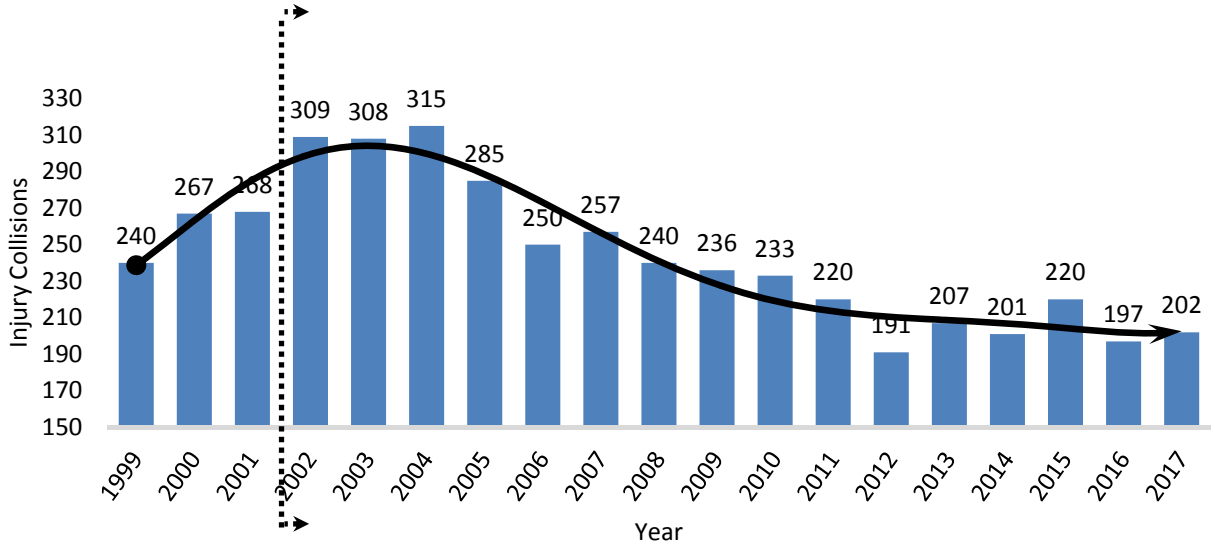


FIGURE 1
2014-2016 VEHICLE VOLUME TRENDS

Citywide Collision Trends

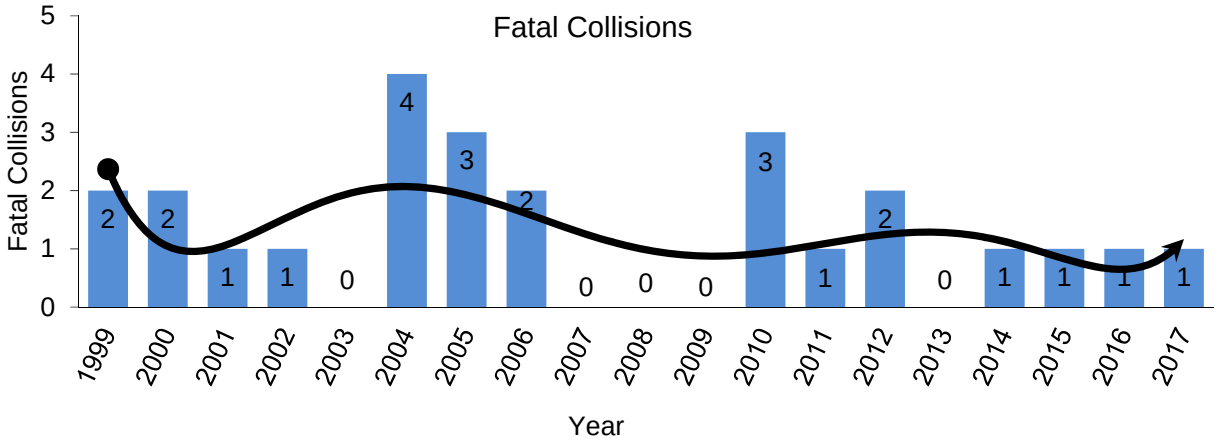
Injury Collision Trend

Injury collisions are the most accurate representation of City collision trends because these types of collision are most consistently reported and investigated. In 2017, injury collisions increased by 3% from 2016. However, injury collisions are 35% lower than 2002 when the safety program began.

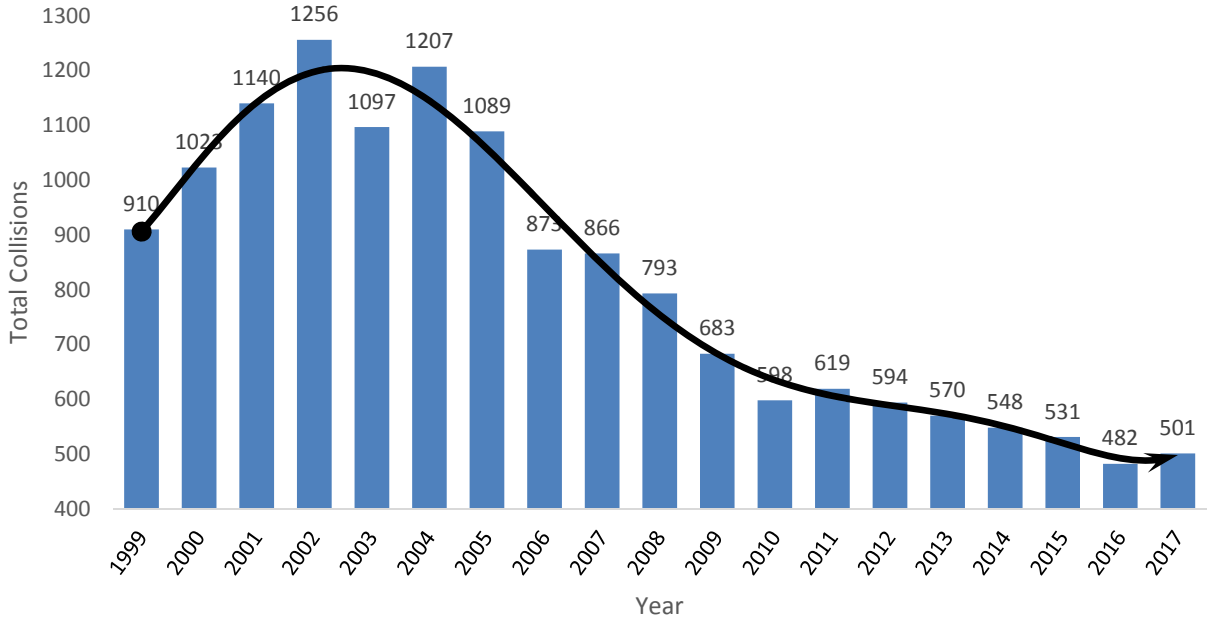


Fatal Collision Trend

It's difficult to identify a trend in fatal collisions because these types of collisions are typically sporadic, uncommon, and occur under unusual circumstances. There was one fatal collision within the City in 2017. A bicyclist was struck in the travel lane on Foothill Boulevard at Ferrini by a motorist under the influence of alcohol.



Overall Collision Trend

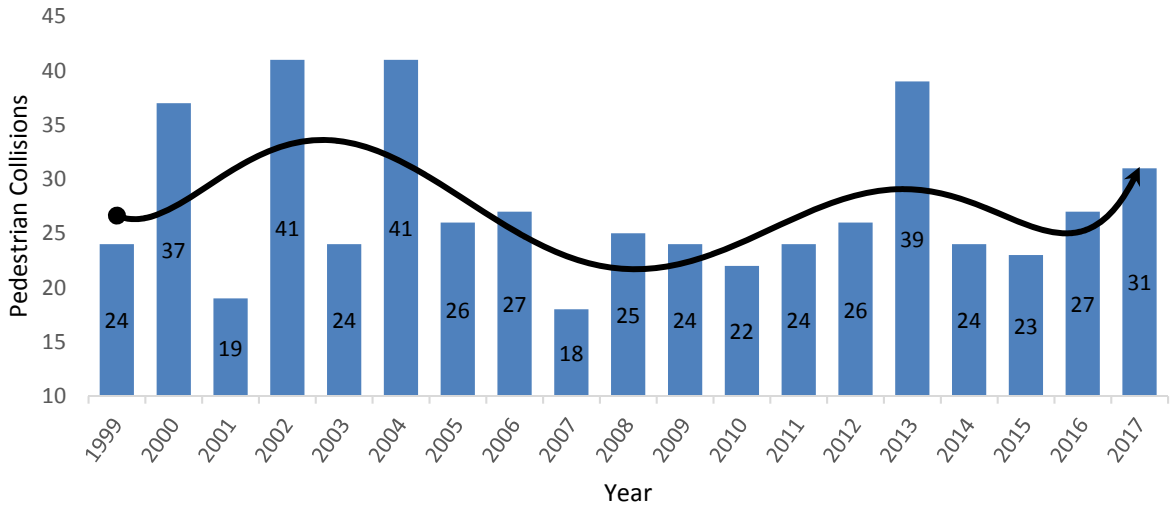


In 2017 there were 501 total reported collisions in the City—this is a 4% increase from 2016, however, is still 60% down from the introduction of the safety program.

It should be noted that the Overall Collision chart above does not represent all collisions that occur in the City—merely all reported collisions occurring on public streets for which a collision report is generated. Many collisions are either unreported by the involved parties, reported by the parties without an officer investigation, or there is no response to the collision by emergency services. Therefore, the actual total collisions may vary between years. A more accurate measure are the injury and fatal collision trends, as police always respond to collisions where the reporting party indicates there is an injury.

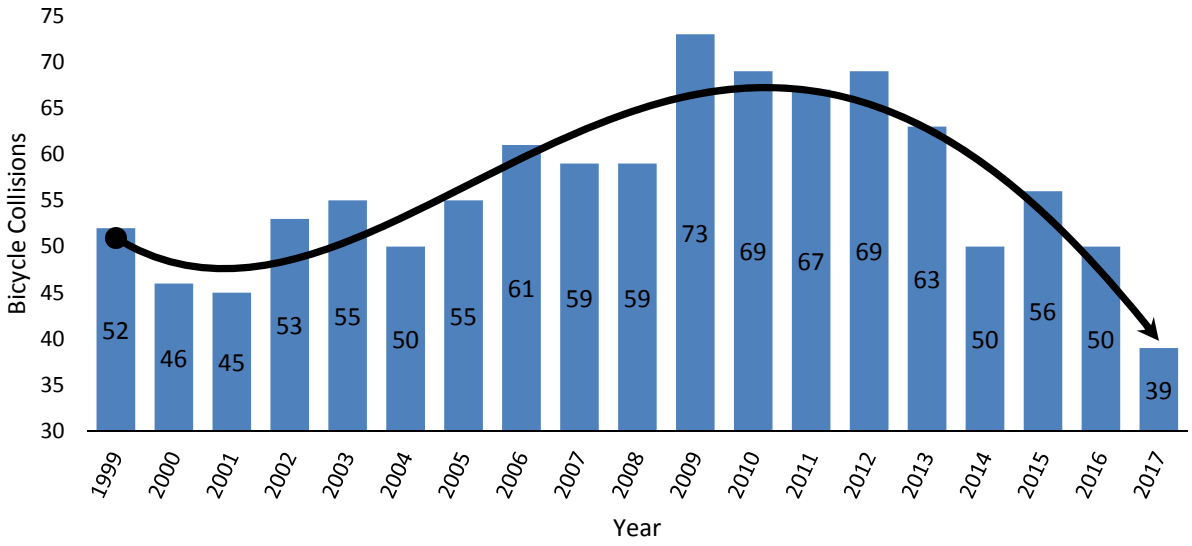
Pedestrian Collision Trend

Pedestrian collisions have remained relatively static since 2008, with the exception of an unexplained spike in 2013. In 2017, the number of pedestrian collisions rose slightly but are align with the recent trend.



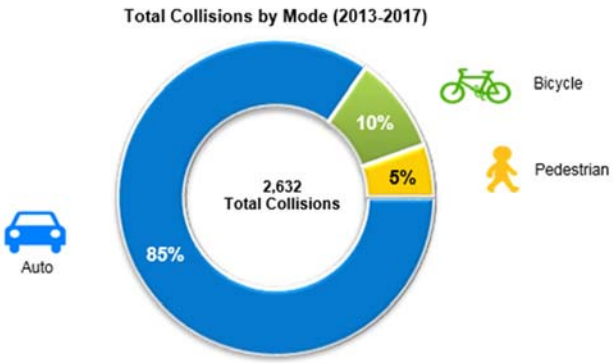
Bicycle Collision Trend

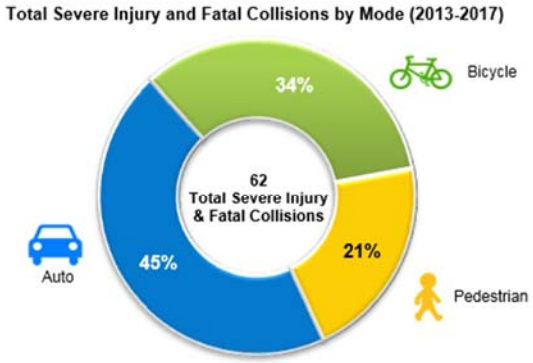
Despite rising bicycle volumes, bicycle collisions have generally been on the decline in recent years. 2017 had the lowest reported bicycle collisions on record. Bicycle collision trends have shown a 47% decline from peak levels in 2009. In 2017, bicycle collision totals represent an 22% decrease from 2016.



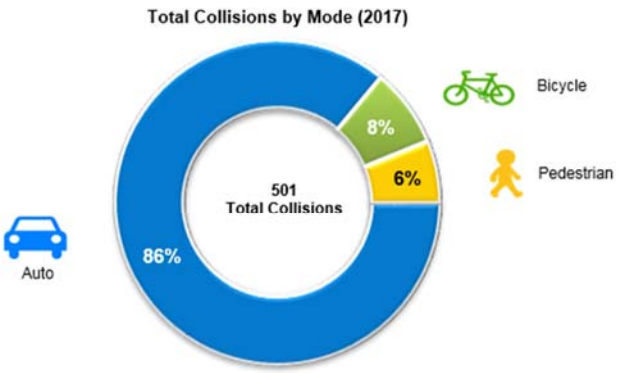
Pedestrian and Bicycle Serious Injuries and Fatalities

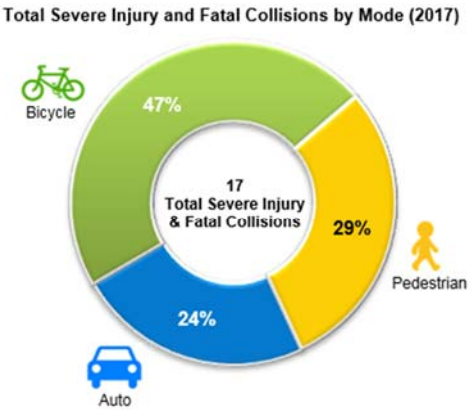
Over the past five years (2013-2017), 2,632 traffic collisions have been reported in the City—about 525 per year. Roughly 15% of these collisions involved a bicyclist or pedestrian, which is generally consistent with citywide bicycle & pedestrian mode share. However, as illustrated in the graphic below, 55% of the collisions resulting in severe injury or death involved a bicyclist or pedestrian. These trends indicate that bicyclists and pedestrians are overrepresented in collisions that resulted in severe and life-threatening injuries and there is continued need for mitigation strategies that target bicycle and pedestrian collisions.





In 2017, while the total collisions by mode were consistent with the five-year trend, the severe injury and fatal collisions by mode drastically demonstrate the overrepresentation of bicycle and pedestrian collisions. Taking a closer look at common collision types of bicycle and pedestrian collisions is critical in moving towards Vision Zero.





Human and Economic Impact

Traffic collisions result in direct economic costs to those involved—wages and productivity losses, medical expenses and legal costs, and motor vehicle damages—but, this represents only a portion of total costs associated with collisions. Traffic collisions also have indirect impacts to the families of those involved, employers and society as a whole. A study by the NHTSA found that more than 75 percent of collision costs are born by society in the form of insurance premiums, taxes and congestion-related costs such as travel delay, excess fuel consumption and lost quality of life associated with deaths and injuries.

Comprehensive costs include the economic cost components associated with traffic collisions, but also the indirect societal costs. Using cost estimates by crash severity published in the American Association of State Highway transportation Officials' (AASHTO) *Highway Safety Manual*, adjusted to reflect 2017 dollars, the comprehensive costs associated with the 501 citywide traffic collisions occurring in 2017 were calculated to be slightly less than $25 million. Comprehensive collision costs for 2017 by collision type are summarized in **Table 1** below.

Table 1: 2017 City of San Luis Obispo Comprehensive Collision Costs

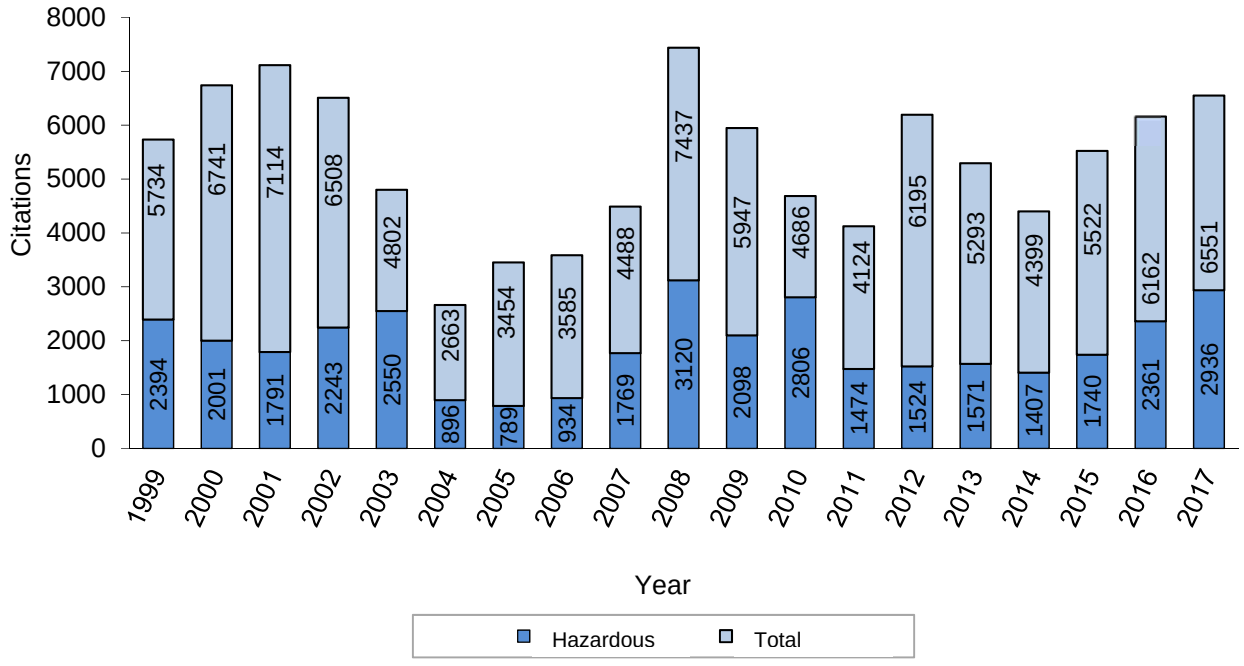
Collision Severity	Number of Collisions	Cost per Collision	Cost
Fatal	1	$4,554,898	$4,554,898
Disabling Injury	16	$261,325	$4,181,194
Non-Incapacitating Injury	60	$95,992	$5,759,546
Possible Injury	125	$56,205	$7,025,604
Property Damage Only	299	$9,881	$2,954,327
Total	**501**		$24,475,569

Source: Crash Cost Estimates based on AASHTO's *Highway Safety Manual,* 2010. Costs adjusted to 2017 dollars based on Consumer Price Index and Employment Cost Index per *Highway Safety Manual* guidance.

Traffic Enforcement Measures

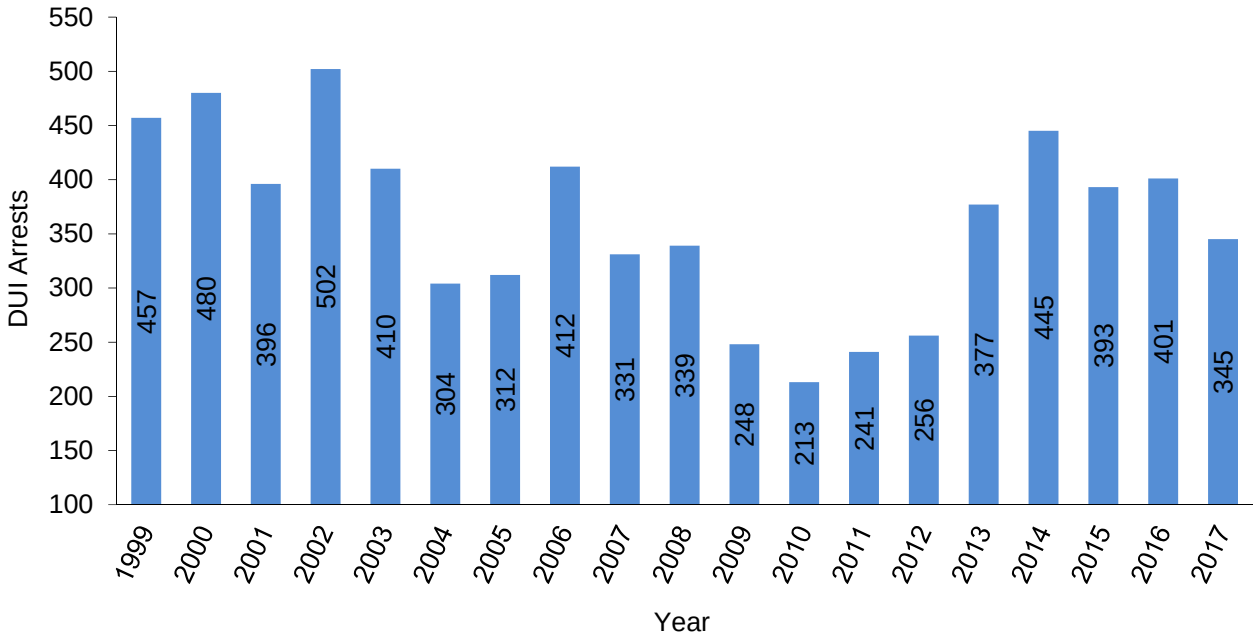
Traffic citations are one method used to promote compliance with the vehicle code and create a safer environment for road users. The vehicle code includes many sections for enforcement. Some vehicle code violations are more serious than others and are designated as “Hazardous Violations”. Vehicle Code Violations are tracked by the Department of Motor Vehicles, and hazardous violations are weighted by a point system. All hazardous vehicle code sections carry at least one point and some carry two points. The point system is used to assess the driving behavior of motorists and place restrictions on negligent drivers, which helps make roadways safer by removing drivers with hazardous driving behavior. The chart below depicts the total citations (hazardous and non-hazardous) by the Police Department since 1999.

Citation Trends

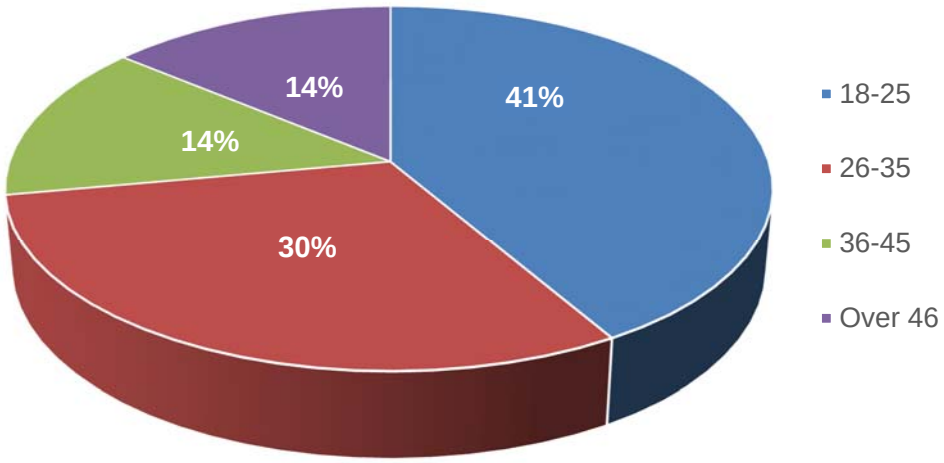


As shown in the chart above, citation trends can fluctuate from year-to-year. These trends are not necessarily a direct reflection of overall driving behavior but can coincide with the resources and staffing levels of the Police Department.

DUI Arrests



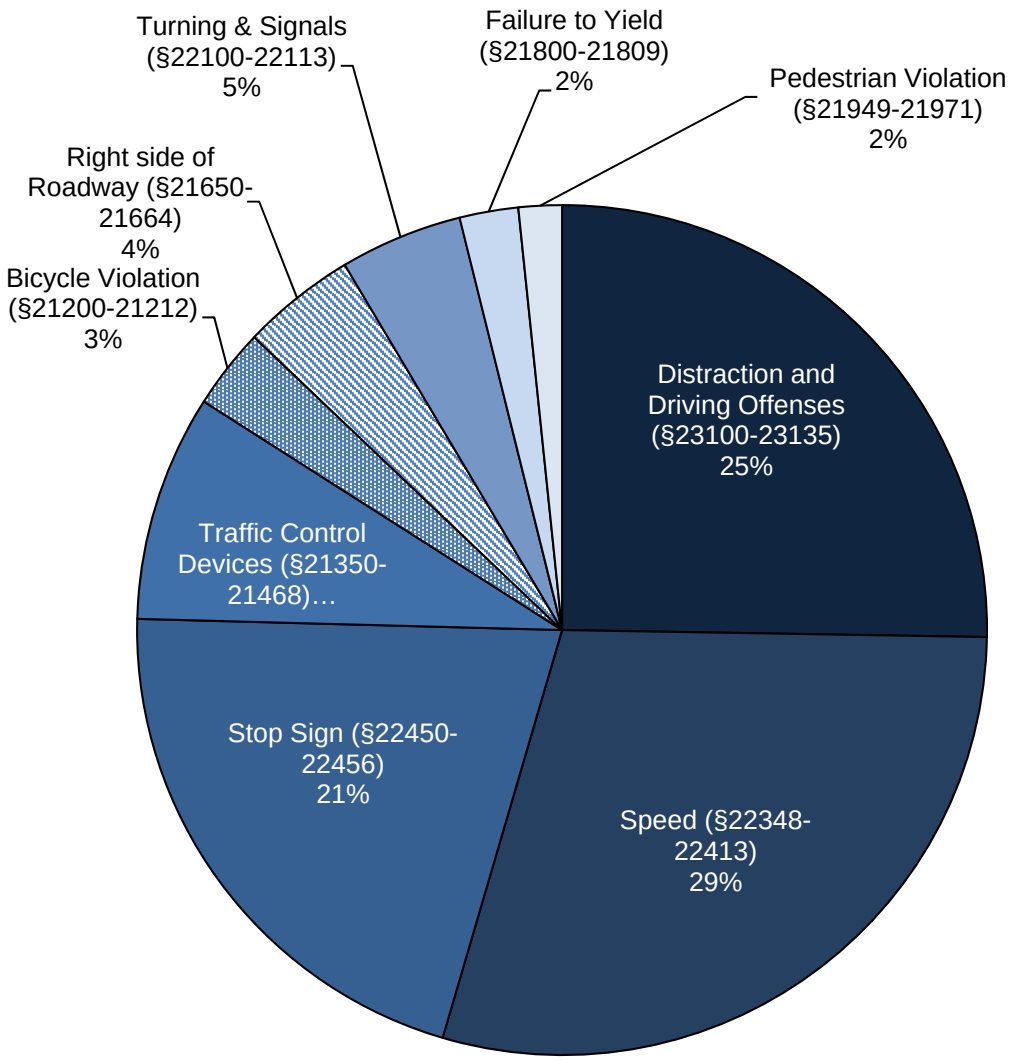
2017 DUI Arrests by Age



Driving under the influence (DUI) violations have been a focal point of enforcement in an effort to reduce injury traffic collisions. Since 1999, the Police Department has averaged 361 DUI arrests each year. Of those arrests, about five to ten drivers each year were arrested for felony DUI after being involved in a collision that causing injury to someone involved. In 2017 the Police Department arrested 345 people for DUI. Just under half (41%) of the DUI arrests involved drivers who were between 18 and 25 years old and almost three-quarters (71%) were between the 18 and 35 years old.

Citations by Vehicle Code Section

The following chart depicts the distribution of vehicle code citations by type for 2017.



Note: Above chart excludes citations related to Driver's License and Insurance violations.

Traffic Safety Education Campaigns and Community Partnerships

Between City-led efforts and activities led by local partners, such as Bike SLO County and SLOCOG/Rideshare, there are a multitude of ongoing traffic safety education and outreach campaigns provided to the community of San Luis Obispo each year. Key education and outreach activities are summarized below:

- **Partnership with the California Office of Traffic Safety**
  A Selective Enforcement Grant funds a full-time DUI officer position. This officer is utilized specifically for DUI enforcement in an effort to further reduce the number of alcohol and drug related driving incidents.
- **Annual Bicycle Rodeo**
  The City hosts a hands-on bicycle training class targeting youth teaching bicycle skills & operations.
- **Bike Month Activities and Promotion**
  The City participates and encourages participation in Bike Month activities and hosts an annual bike breakfast in May.
- **Pop-Up Bike Education Events**
  SLO Public Works and Police Department partner up with Bike SLO County and the County Public Health Department to have on-the-spot "pop-up" bike education events along high-volume bike corridors.
- **Pedestrian Halloween Safety Campaign**
  The City provides reflective Halloween bags with safety tips to local schools free of cost.
- **Impaired Driver Offender Classes**
  City police officers attend and supplement DUI offender courses to provide a unique positive opportunity to discuss, face to face, the impacts of driving under the influence.
- **Ticket Diversion Program for Bicyclists**
  Cal Poly University PD offers a diversion program for bicyclists that are ticketed for a traffic offense in SLO County.
- **Adult Bicycle Education Workshops**
  Bike SLO County provides offers an adult bicycle class which includes an in-class room and on-street portion, focusing on the rules of the road.

- **Transit Driver Awareness Training**

  City Transportation Staff annually leads a bicycle awareness training to contracted City transit drivers.

- **Every Fifteen Minutes Program**

  The City participates in a multi department and agency event simulating the psychological effects of student fatalities as a result of traffic collisions.

- **Child Car Seat Instruction & Assistance**

  The City provides child safety seat installation and inspection free of cost.

- **SLO PD Traffic Safety Presentations**

  City police officers presented at the following organizations regarding traffic safety in 2017:

  - Safety and Law Lectures: *Cuesta Junior College and Cal Poly University criminal justice programs*
  - Coast Riders Motorcycle Club: *Discussed motorcycle safety*
  - Sheriff's Day at the Ranch: *Discussed bicycle and motorcycle safety*
  - Cop's and Kid's Day: *Discussed bicycle and motorcycle safety*
  - National Walk to School Day: *Discussed pedestrian safety with school children*
  - National Bike to School Day: *Discussed bicycle safety with school children*

Completed/Planned Safety Projects & Programs

Transportation safety has always been a priority for the City. Each year the Public Works Department implements traffic safety improvements through a variety of programs and projects. These improvements are usually stand-alone projects but are often included in other City CIP projects or as part of individual land development projects.

Table 2 below identifies notable traffic safety improvements that were completed recently or planned for implementation in the near future.

Table 2: Completed or In Progress Transportation Safety Projects

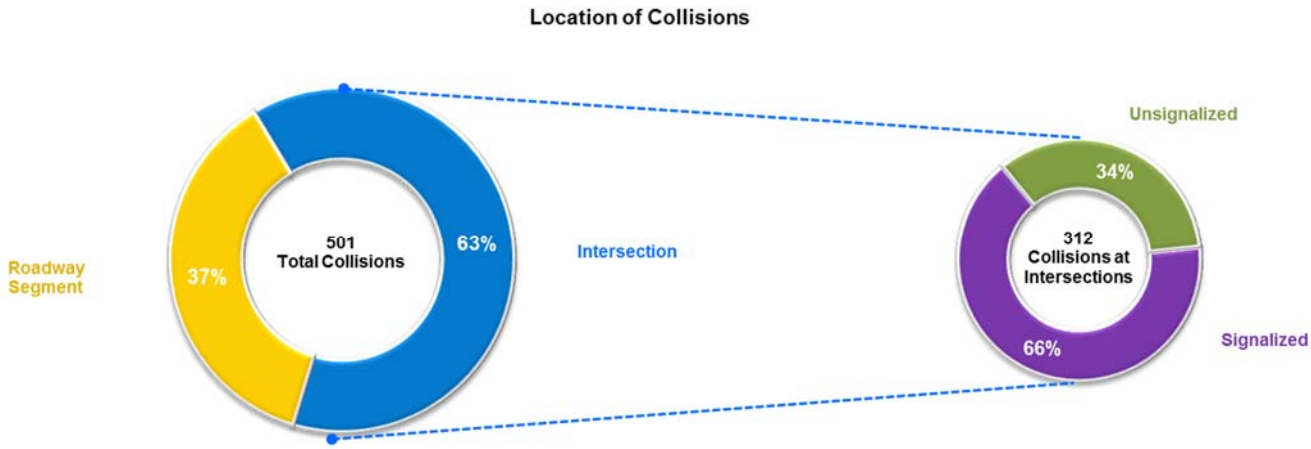
Location	Project Description
Traffic Signal Improvements	
Downtown Core Signal Timing*	Implemented Advanced Pedestrian Phasing.
Foothill & Broad*	Install Flashing Yellow Left-Turn Arrows. Implementation conditioned as part of private development.
Chorro & Higuera*	Relocate pedestrian signal heads at west crosswalk to adjacent signal poles to improve visibility of pedestrian indications for motorists and pedestrians.
Monterey & Osos Signal Mast Arms*	Construction completed early 2018.
Industrial & Broad*	Upgrade and add signal indicators for more visibility. Investigate the installation of officer assist red light enforcers. Planned for 2019.
Santa Rosa & Mill*	Upgrade and add signal indicators for more visibility. Investigate the installation of officer assist red light enforcers.
Higuera & Nipomo*	Upgrade traffic signal to include mast arms for each approach.
Marsh & Nipomo*	Upgrade traffic signal to include mast arms for each approach.
Broad & Marsh*	Traffic signal modifications planned for early 2019 to reduce red light violations by improving visibility of signal indications
Pedestrian & Bicycle Improvements	
Higuera & Marsh Lighted Crosswalks	Replaced downtown lighted crosswalks on Higuera and Marsh Streets in late 2016.
Santa Rosa Green Bike Lanes*	Installed green bike lanes on Santa Rosa Street between Montalban and Walnut Streets.
Montalban Crosswalk at Santa Rosa*	Paint crosswalk on Montalban at Santa Rosa. Planned for 2019.
Olive Crosswalk at Santa Rosa*	Paint crosswalk on Olive at Santa Rosa.
LOVR Interchange Green Bike Lanes	Installed green bike lanes on LOVR across the overcrossing in 2017.
Chorro Bike Box at Foothill	Bike box was installed as conditioned of adjacent private development.
Tank Farm Crosswalk at Poinsettia	Installed in-roadway pedestrian crossing signs at this uncontrolled crosswalk. Completed summer 2018.
Augusta Crosswalk at Sinsheimer Elementary	Installed in-roadway pedestrian crossing signs at this uncontrolled crosswalk. Completed fall 2018.
California & 101 NB Ramps*	Installed Yield to Bike signs to increase awareness of bicyclists at intersection. Completed early 2018.
California & Palm*	Installed green bike lanes on California. Completed spring 2018.
California & Monterey*	Install radar speed feedback signs and additional warning signs at NB & SB approaches.
Broad Street at Woodbridge HAWK	Design has begun for a signalized pedestrian crossing of Broad Street. Construction anticipated for summer 2019.
Foothill at Ferrini HAWK	Design has begun for a signalized pedestrian crossing of Foothill Boulevard. Construction anticipated for 1st Quarter 2019.
Roadway Improvements	

Location	Project Description
Laurel Lane Complete Streets Improvements*	Safety improvements included reducing travel lanes from four to three lanes, constructed bulbouts to reduce conflict points and crossing distance for pedestrians, installed buffer between bike and vehicle lane and increased on-street parking. Completed fall 2018.
California Taft Roundabout*	Design underway for roundabout at California and Taft. Construction anticipated summer 2020.
Orcutt Tank Farm Roundabout	Design underway for roundabout at Orcutt and Tank Farm. Construction is conditioned as part of private development and estimated for summer 2019.
Higuera at Bridge*	Currently working with Caltrans to widen Higuera between Bridge and Elks Lane to install a two-way-left-turn-lane. ROW acquisition planned to be complete 2019.
Foothill at SLO Student Living Driveway*	Increase sight visibility for existing westbound traffic.
Broad at High*	Evaluate (a) potential for sight distance improvements for WB approach (could include further parking restrictions and/or curb extension on northwest corner of Broad St.), or (b) turn restrictions for EB High St. approach.
Grand at Loomis*	Evaluate additional sight distance improvements, which could include further parking restrictions along Grand Ave. and/or bulbouts at intersection corners. Planned but currently not funded.
California: Foothill to Stafford*	Remove parking on one side to provide width for a two-way-center-turn lane.
Street Light Improvements	
Laurel Lane Street Lights	Replaced four street lights on Laurel Lane south of Southwood Drive during summer 2018.
Hathway at Via Carta	Design is underway for a new street light on Hathway. Construction anticipated to be complete by summer 2019.
Signing & Striping Improvements	
Augusta Drive	Centerline striping added from Laurel to Sinsheimer Elementary as part of 2018 roadway resurfacing project.
Mill at Osos*	Refresh SB stop bar and pavement legend to improve driver compliance at stop sign.
Toro & Marsh*	Replaced “stop” sign to increase visibility. Completed 2018.
Higuera & Vachell*	Installed “Keep Clear” striping and signage. Completed fall 2018.
Citywide	Replaced approximately 100 traffic signs to meet retroreflectivity standards
Several locations	Recent speed survey updates have resulted in lowering speed limits on several segments within the City by 5 MPH including upper Monterey Street, Broad Street, South Higuera and others.
**Project recommended in previous Traffic Safety Report*	

2017 High Collision Rate Locations & Recommendations

Where Collisions are Occurring

Intersections are the most common location for all collisions. As shown in the figure below, 63% of 2017 collisions in the City occurred at intersections, with 66% of those occurring at signalized intersections. This finding highlights the importance of focusing traffic safety efforts on intersections.



All of the traffic collision reported in 2017 are shown on the map in Figure 2. All pedestrian and bicycle collisions reported in 2017 are shown on the maps in Figure 3 and Figure 4**,** respectively. Figure 2 clearly indicates that there are “hot spots” for collisions—primarily intersections and segments with multiple driveways.

How Collisions are Occurring

Figure 3 and 4 indicate that bicycle and pedestrian collision occur at sporadic and random locations. A supplemental and beneficial review of bicycle and pedestrian collisions is to look for what the locations have in common, rather than looking at one individual intersection on its own.

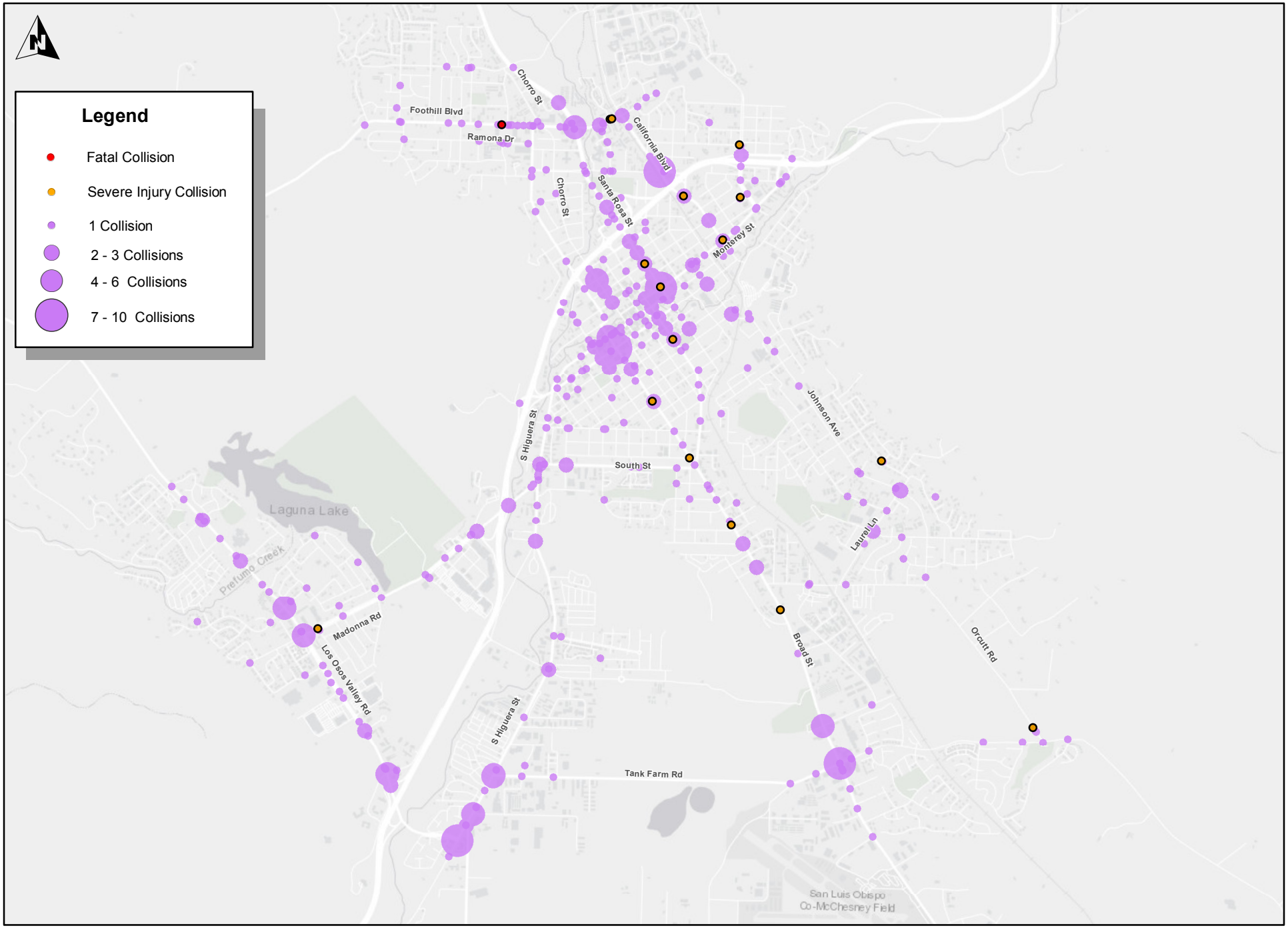


FIGURE 2
2017 CITYWIDE COLLISIONS

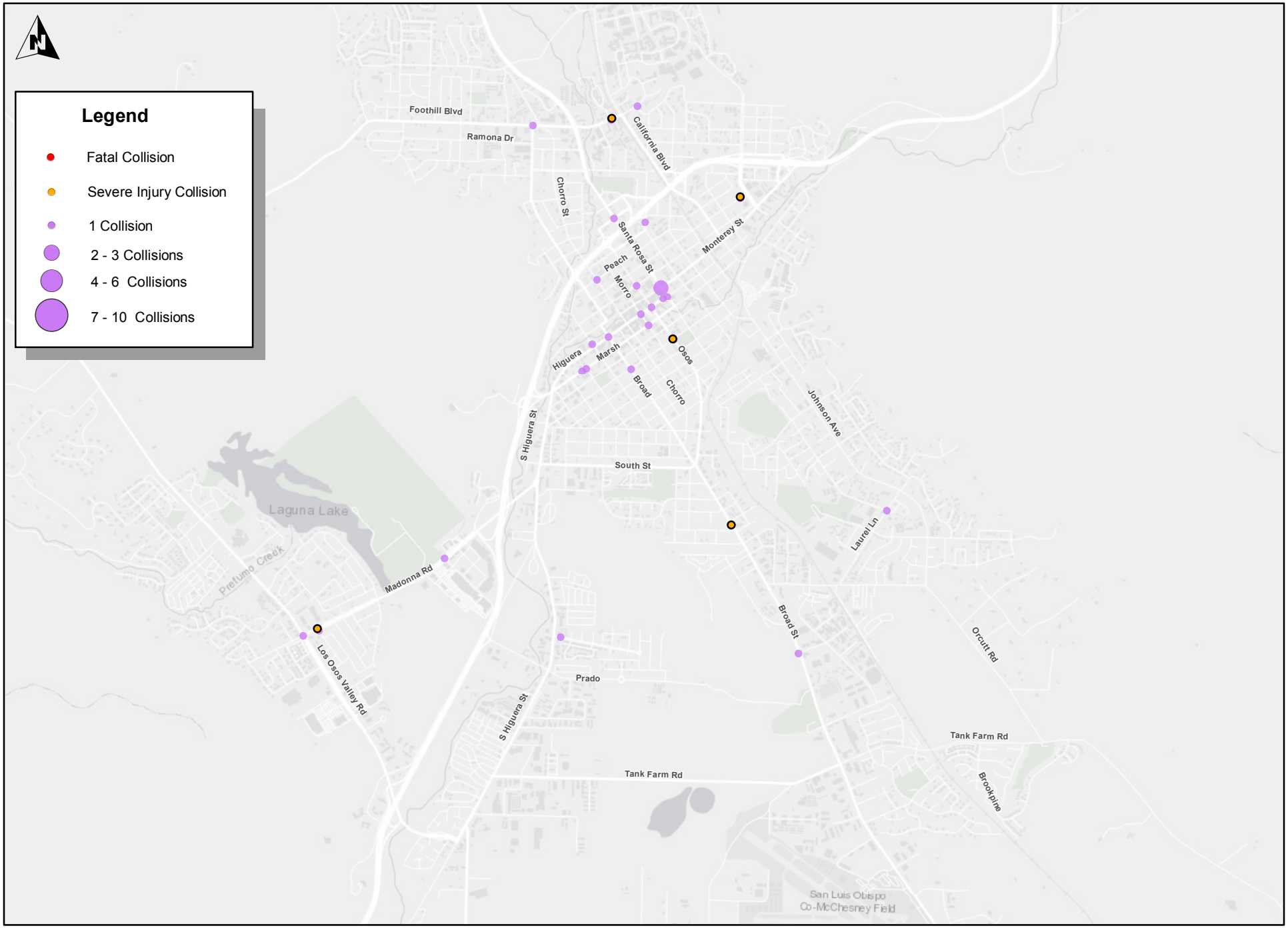


FIGURE 3

2017 CITYWIDE PEDESTRIAN COLLISIONS

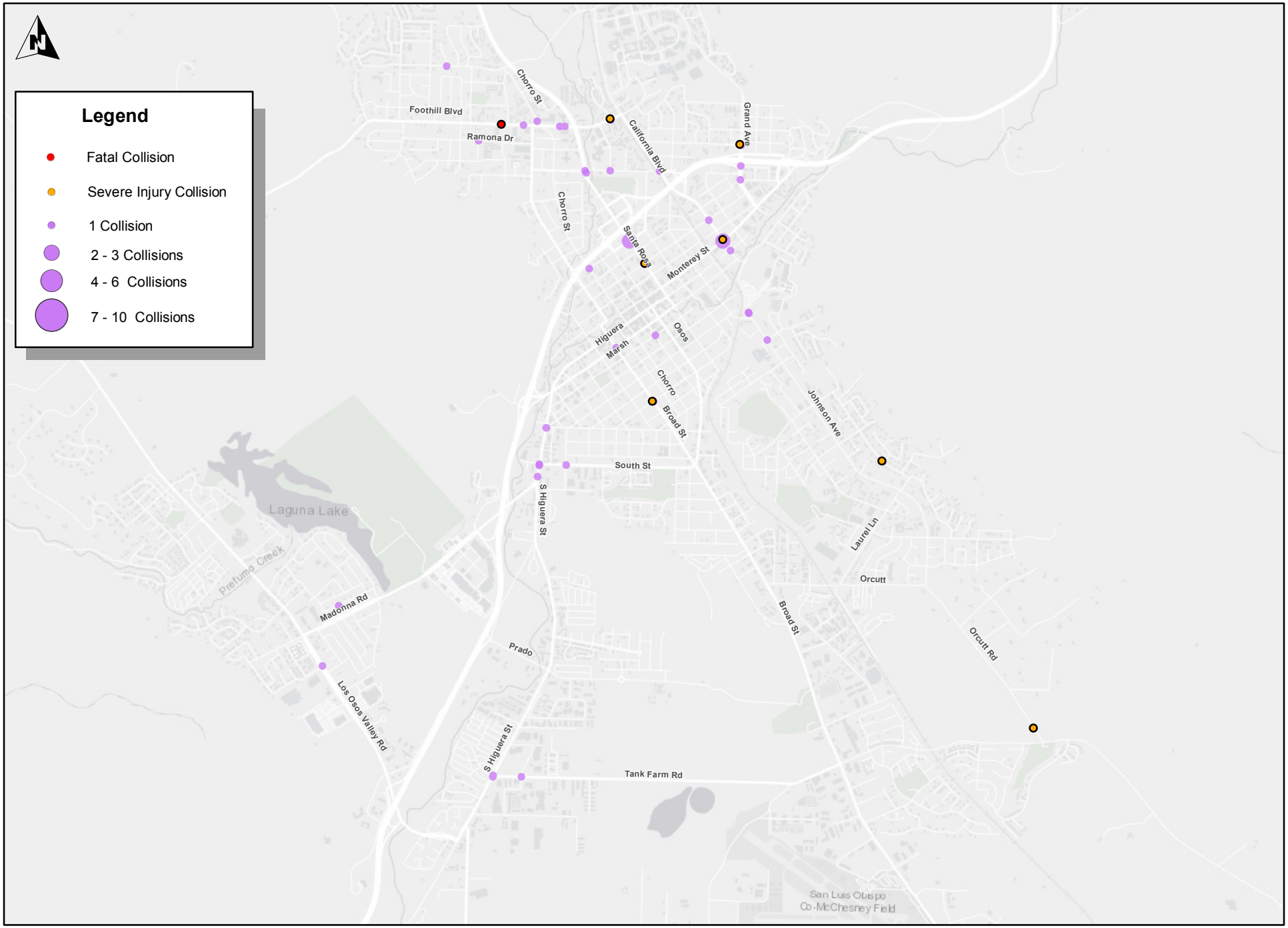
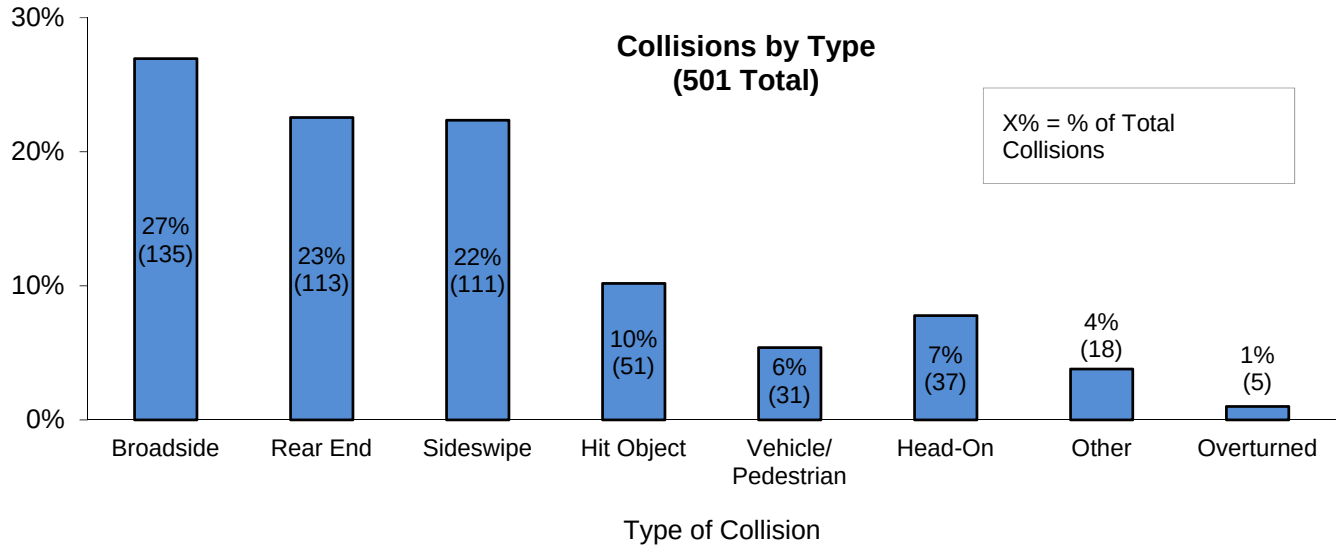


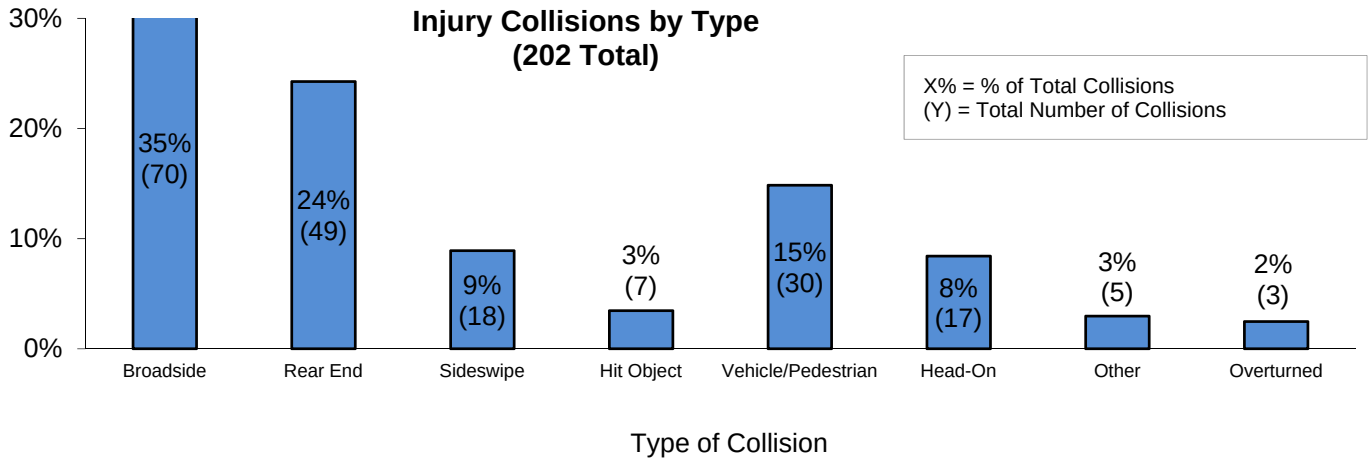
FIGURE 4
2017 CITYWIDE BICYCLE COLLISIONS

Most Common Collision Types and Factors

As shown in the figure below, broadside, rear-end collisions and sideswiped were the most common type of collisions reported in 2017, representing 72% of the total recorded incidents.



As shown below, broadside and rear-end collisions were the most common type of injury collision reported in 2017, representing 35% and 24% of total recorded injury collisions. While collisions involving vehicles with pedestrians represent only 6% of total collisions in 2017, they account for 15% of injury collisions. Collisions involving vehicles with pedestrians and bikes make nearly 55% of severe and fatal injury collisions. Thus, mitigating these crash types offers the greatest potential for reducing the number of serious injury and fatal incidents.



The most common factors attributed to recorded collisions in 2017 are summarized in **Table 3** below. Automobile right of way and speeding represent the most prevalent factors in overall collisions and injury collisions. Pedestrian Violation is not ranked in the top 5 of All Collisions (11th at 2%) but represented 18% of the Severe Injury and Fatal Collisions. DUI continue to rank as the most prevalent factor attributed to severe injury and fatal collisions.

Table 3: Primary Collision Factors

Factor	Rank	%
All Collisions		
Automobile Right of Way	1	17%
Unsafe Speed	2	16%
Improper Turning	3	13%
Drive/Bike Under Infl Alcohol/Drug	4	13%
Unsafe Lane Change	5	9%
Injury Collisions		
Automobile Right of Way	1	24%
Unsafe Speed	2	23%
Improper Turning	3	13%
Drive/Bike Under Infl Alcohol/Drug	4	5%
Unsafe Lane Change	5	4%
Severe Injury & Fatal Collisions		
Drive/Bike Under Infl Alcohol/Drug	1	24%
Pedestrian Violation	2	18%
Automobile Right of Way	3	12%
(blank)	4	12%
Unsafe Speed	5	6%

Pedestrian Common Collision Types and Factors

The table below lists the pedestrian collisions by type recorded in 2017, as well as the party at fault. As shown in the table, motorist left turning movements were the most frequent types of reported pedestrian collisions. The party at fault was about even between the driver or the pedestrian. Pedestrians failing to yield and crossing illegally made up 35% of reported pedestrian collisions.

Table 4: Pedestrian Collisions by Type

Pedestrian Collision Type	No.	%	Party at Fault	%
Motorist Left-Turn	10	32%	Driver	52%
Pedestrian Failed to Yield	5	16%	Pedestrian	48%
Pedestrian Violation (Jaywalking)	4	13%		
Scooter/Skateboarder in Roadway	4	13%		
Motorist Failed to Yield	4	13%		
Pedestrian Violation (Crossing Against Signal)	2	6%		
Motorist Right-Turn	2	6%		
Total	31	100%		

Systematic Planning for Pedestrian Safety

For pedestrian collisions, this TSR further analyzed pedestrian vs. motorist crashes where the motorist was found to be at fault (motorist turning movements and failing to yield). For purposes of this specific analysis, the crash locations studied were limited to intersections, as the majority of collisions within the City occurred at an intersection.

Detailed analysis indicated that pedestrians are more likely to be involved in a motor vehicle crash at signalized intersections that allow permissive left turns. Additionally, there is a direct correlation with surrounding land uses. Most pedestrian vs. motorist collisions happen within or near the downtown core or adjacent to neighborhood commercial areas.

Figure 5 identifies intersections within the City that are signalized allowing permissive movements within a quarter mile radius of the downtown core or commercial shopping areas. In line with the City's Vision Zero goals and to increase pedestrian safety within the City, these locations may need special attention. **It is recommended that these intersections be considered and evaluated for additional measures to address this risk such as, but not limited to, modifying signal phasing from permissive to protected and increasing visibility and awareness of crossing pedestrians by adding signage or other striping improvements such as hi-visibility crosswalks.**

In addition to implementing improvements at the above described locations, another pedestrian facility type can benefit from proactive countermeasures: uncontrolled marked crossings. An uncontrolled marked crossing is a location (either mid-block or at an intersection) where a crosswalk is marked but traffic is not controlled with either a stop sign or traffic signal. Per the Federal Highway Administration, uncontrolled pedestrian crossing locations correspond to higher pedestrian crash rates. The City of San Luis Obispo has 22 uncontrolled marked crossings.

Approaching pedestrian safety systematically, improving these types of uncontrolled marked crossings will proactively increase safety at these crossings and increase the comfort of crossing pedestrians of all ages and abilities. Figure 6 identifies the locations of uncontrolled marked crossings in the City. **It is recommended that these crossings be considered and evaluated for additional measures to increase crosswalk visibility such as but not limited to in-street pedestrian crossing signs, rectangular rapid flashing beacons (RRFBs) or pedestrian hybrid beacons (HAWK).** If implemented, locations should be prioritized with consideration of collision history, vehicle speeds, number of crossing lanes and proximity to schools. **Table 3** below lists the locations in recommended prioritization.

Table 5: Uncontrolled Pedestrian Crossing Locations

Priority	Location	Pedestrian collisions 5 yr total	Speed Limit	Number of Crossing Lanes	Designated School Crossing?
1	Tank Farm at Poinsettia Street	1	45	4	No
2	Monterey at Buena Vista	1	30	3	No
3	Higuera between Chorro and Morro	1	25	3	No
4	Marsh between Chorro and Morro	1	25	3	No
5	Monterey at Court Street	1	25	2	No
6	Johnson Ave at Sydney	0	35	4	Yes
7	Broad Street at Upham	0	30	2	Yes
8	High Street at Hutton	0	30	2	Yes
9	Marsh at Toro	0	25	3	No
10	Higuera at Garden	0	25	3	No
11	Chorro at Mill	0	25	2	Yes
12	Augusta Street at Sinsheimer Elementary	0	25	2	Yes
13	Hutton Street at Sandercock	0	25	2	Yes
14	Branch Street at Sandercock	0	25	2	Yes
15	Sandercock Street at Story	0	25	2	Yes
16	Broad at Mill	0	25	2	Yes
17	Galleon Way at Royal	0	25	2	Yes
18	Balboa Street at Lakeview	0	25	2	Yes
19	Bougainvillea Street	0	25	2	No
20	Osos at Pacific	0	25	2	No
21	Monterey between Chorro and Morro	0	25	2	No
22	Broad at Mission Plaza	0	25	2	No

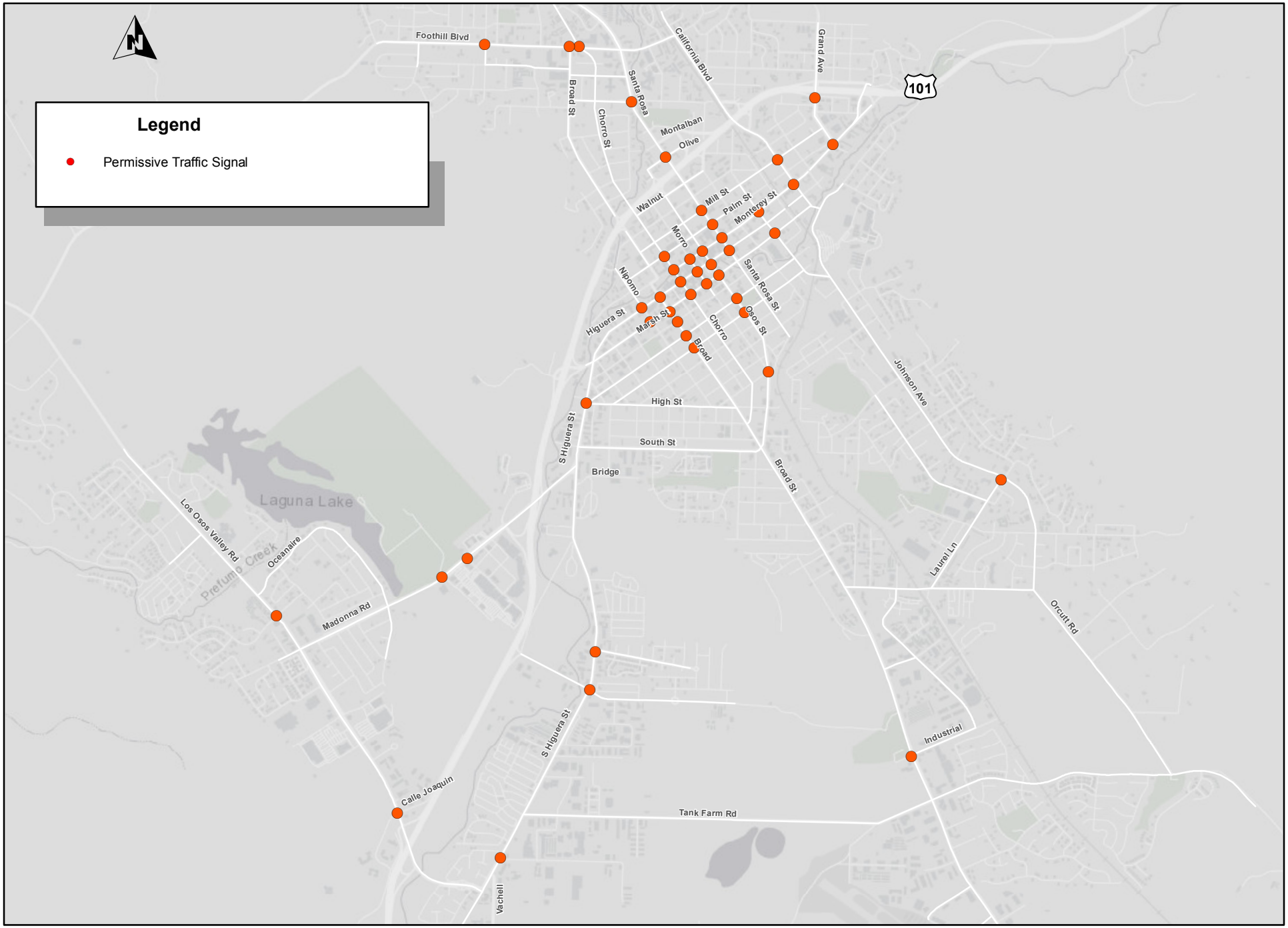


FIGURE 5

Permissive Signals within 1/4 Mile of Shopping

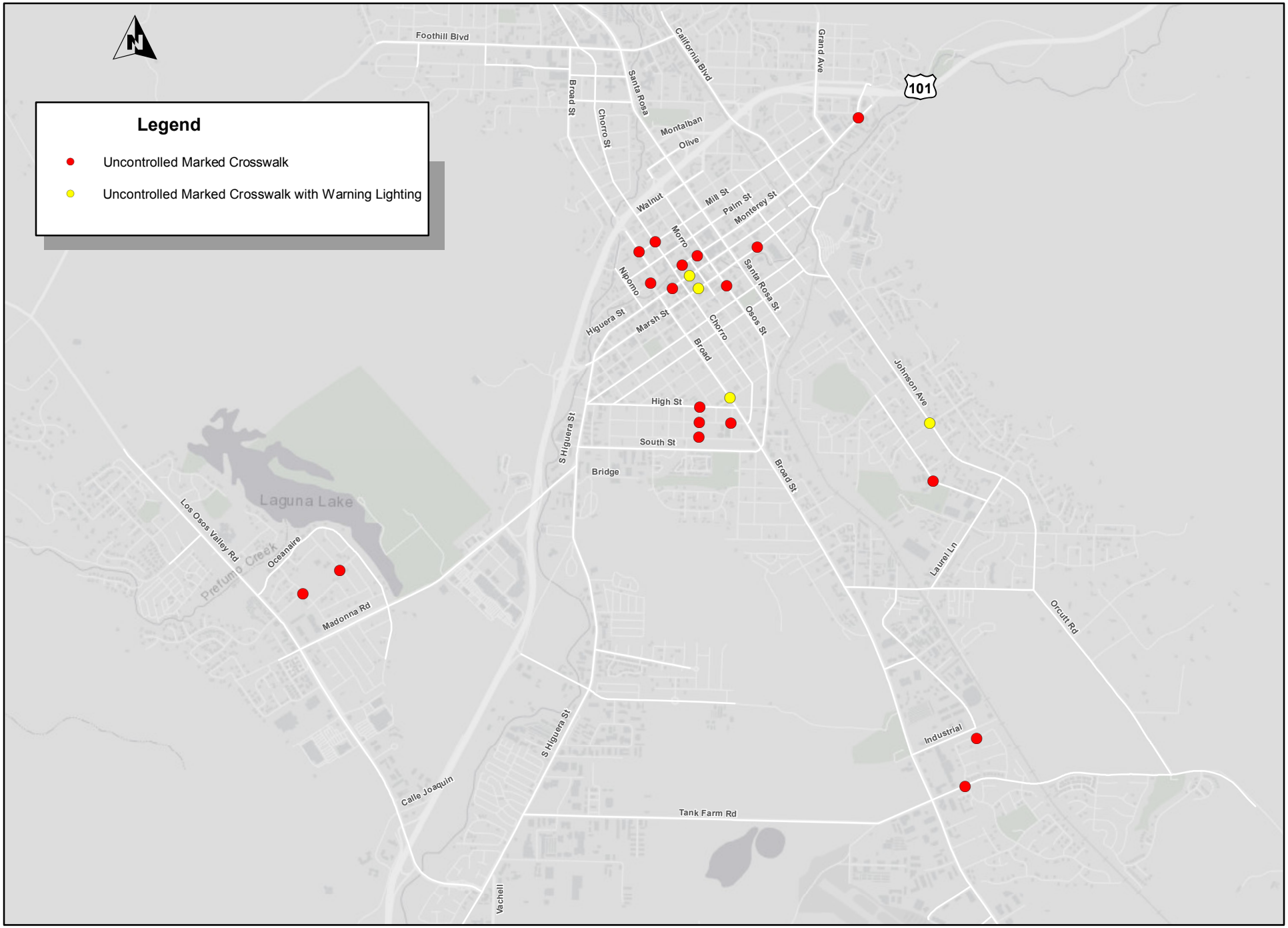


FIGURE 6

2017 Citywide Uncontrolled Marked Pedestrian Crossings

Bicycle Common Collision Types and Factors

The table below lists the bicycle collisions by type recorded in 2017, as well as the party at fault. Motorist right turn movements were the most common types of vehicle vs. bicycle collisions reported followed by motorist left turn movements. About 66% of reported vehicle vs. bicycle collisions were the fault of the motorist.

Table 6: Bicycle Collisions by Type

Bicycle Collision Type	No.	%
Motorist Right-Turn	10	26%
Motorist Left-Turn	6	15%
Cyclist Lost Control	4	10%
Motorist Failed to Yield	3	8%
Wrong-Way Cyclist	3	8%
Cyclist no Light	2	5%
Motorist Failed to Drive at Safe Distance	2	5%
Cyclist Failed to Stop	2	5%
Cyclist Under the Influence	2	5%
Cyclist Lane change	2	5%
Motorist Under the Influence	1	3%
Cyclist Failed to Yield	1	3%
Motorist Overtaking or Sideswipe	1	3%
Total	**39**	**100%**

Party at Fault Motorist Vs. Bicyclist	No.	%
Driver	23	66%
Bicyclist	12	34%

Systematic Planning for Bicycle Safety

For bicycle collisions, this report looked at the top two most common bicycle vs. motorist crash types: Motorist Right-Turn and Motorist left-turn. For purposes of this analysis, the crash locations studied were limited to intersections and driveways, as the majority of bicycle collisions within the City occurred at an intersection or driveway.

Motorist right-turn and left-turn collisions with bicycles is more likely to occur at intersections and driveways with traditional “Class 2” bike lanes striped on the edge of the road with no on-street parking. For right turning motorist, this type of configuration requires drivers to merge into the bicycle lane prior to making a right-hand turn. What is often seen, rather, is the driver making a right-hand turn from the travel lane. For left turning motorists, through bicyclists against the curb may sometimes be “hidden” behind other vehicles.

Figure 7 identifies segments within the City that have striped Class 2 bike lanes on the edge of the roadway with no on-street parking. In line with the City’s Vision Zero goals and to increase bicycle safety within the City, these locations may need special attention. **It is recommended that these segments be considered and evaluated for additional measures to address this risk such as, but not limited to, signage, hi-visibility green paint in conflict zones,**

separate right-turn phase from bicycle conflicts, bike scramble, lead phases, buffered or protected bike lanes and identify intersection locations that could benefit from bike box or protected intersection applications.

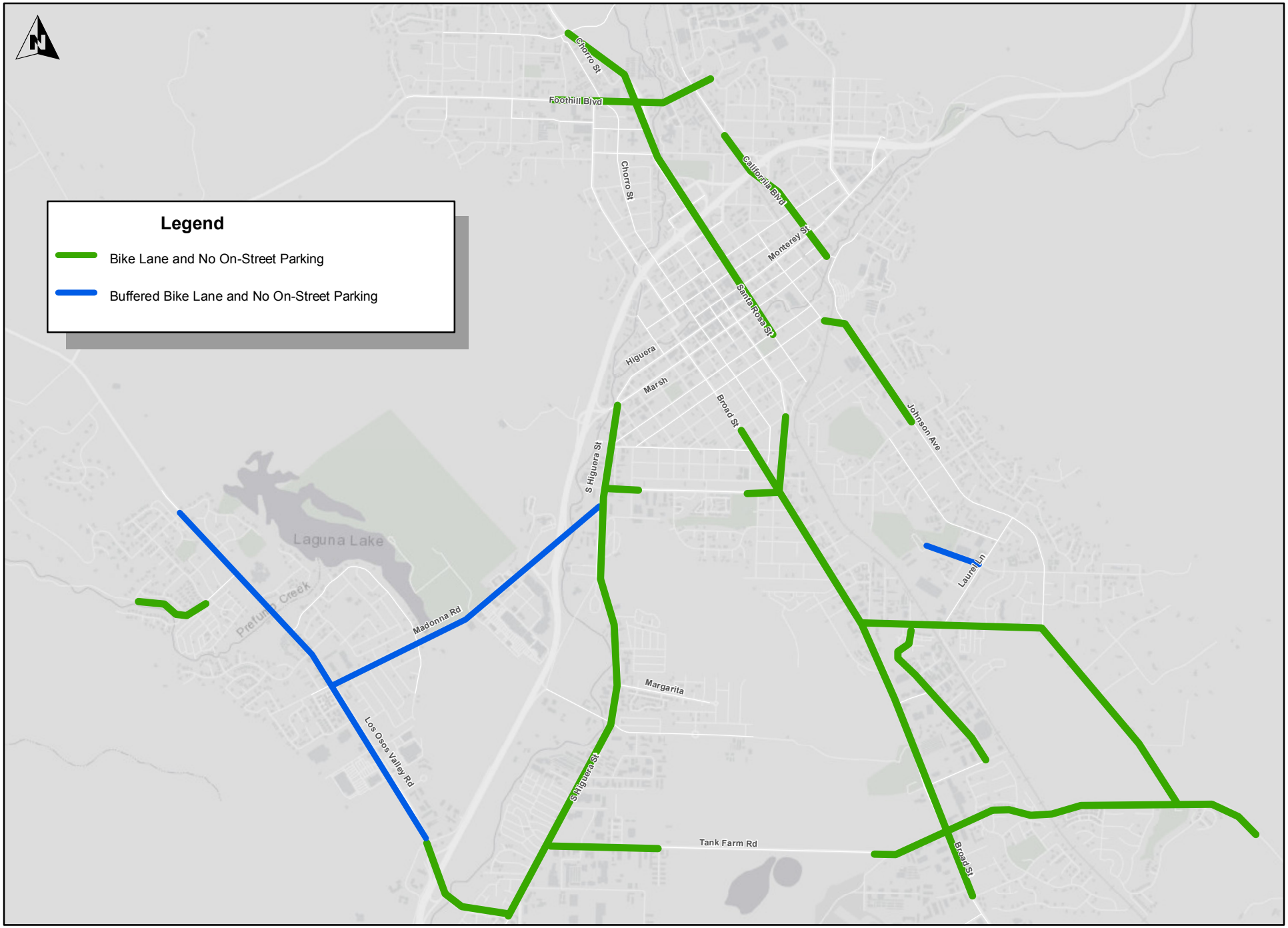


FIGURE 7

CITYWIDE COORIDORS WITH BIKE LANE AND NO STREET PARKING

High Collision Rate Locations – Pedestrians

Rank	Prev. Year Rank	Intersection	Control	Type of Crosswalk	5 Yr. Collisions	PH Veh. Vol	PH Ped. Vol	REV
N/A	3	Santa Rosa & Olive	Signal	Marked - Longitudinal	5	3,436	39	2,203
1	5	Santa Rosa & Monterey	Signal	Marked - Longitudinal	7	2,166	227	334
2	NR	Osos & Pismo	Signal	Marked - Longitudinal	3	1,061	126	126
3	7	Broad & Higuera	Signal	Marked - Longitudinal	7	1,158	988	41
4	NR	Higuera & Morro	Signal	Marked - Longitudinal	3	935	1,227	11

NR = Not Ranked
SSSC = Side Street Stop-Control
PH = Peak Hour
REV = Relative Exposure Value

Pedestrian Recommendations

Rank	Intersection
1	**Santa Rosa & Monterey**[1]
Pattern: Motorists turning left and failing to yield to pedestrians in crosswalk, particularly in the westbound direction. Recommendation: Install Flashing Left Yellow Arrows for EB & WB Traffic. Continue to monitor.	
2	**Osos & Pismo**[2]
Pattern: No discernable pattern, however Osos and Pismo is a signalized intersection within a half-mile radius of downtown that allows permissive lefts. As discussed in previous analysis, these types of intersections may need special attention to improve safety conditions for pedestrians. Recommendation: Implement pedestrian lead interval and install "yield to pedestrian" signage for all approaches. Install Flashing Left Yellow Arrows. Continue to monitor.	
3	**Broad & Higuera**[3]
Pattern: NB Broad Motorists turning left and failing to yield to pedestrians in crosswalk, particularly in the northbound direction. Recommendation: Install additional "yield to pedestrian" signage for northbound and southbound approaches. Investigate installation of overhead mast arms with flashing yellow arrows for NB & SB Broad Approaches. Continue to monitor.	
4	**Higuera & Morro**
Pattern: No discernable pattern, however Higuera and Morro is a signalized intersection within a half-mile radius of downtown that allows permissive lefts. As discussed in previous analysis, these types of intersections may need special attention to improve safety conditions for pedestrians. Recommendation: Install pedestrian countdown signal heads and implement pedestrian lead interval. Install "yield to pedestrian" signage for all approaches. Continue to monitor.	

1. Santa Rosa and Monterey is also ranked as a High Collision Rate Location for Arterial/Arterial Locations
2. Osos and Pismo is also ranked as a High Collision Rate Location for Arterial/Collector Locations
3. Broad and Higuera is also ranked as a High Collision Rate Location for Arterial/Arterial Location

Rank	Caltrans Intersections
NA	**Santa Rosa & Olive**
Pattern: No discernable pattern. Recommendation: Continue to work collaboratively with Caltrans to implement a District 5 Active Transportation Plan focusing on improvements of intersections and segments under Caltrans jurisdiction that interface with City facilities. Continue to monitor.	

High Collision Rate Locations – Bicycles

Rank	Prev. Year Rank	Intersection	Control	5 Yr. Collisions	PH Veh. Vol	PH Bike. Vol	REV
NA	**NR**	**Santa Rosa & Walnut**	**Signal**	**3**	**2741**	**18**	**2,284**
1	**2**	**California & Monterey**	**Signal**	**9**	**1,902**	**38**	**2,252**
2	**6**	**California & Taft**	**Signal**	**4**	**1,680**	**35**	**960**
3	**9**	**Broad & Leff**	**SSSC**	**3**	**1,017**	**16**	**953**
4	**NR**	**Grand & Loomis**	**SSSC**	**4**	**1,240**	**27**	**919**
5	**NR**	**California & Mill**	**Signal**	**3**	**1,902**	**38**	**751**
6	NR	Johnson & Lizzie	Signal	3	2,004	42	716

NR = Not Ranked
AWSC = All-way Stop-Control
SSSC = Side-Street Stop-Control
PH = Peak Hour
REV = Relative Exposure Value

Bicycle Recommendations

Rank	Intersection
1	**California & Monterey**
Pattern: "Right hook" collisions from drivers on California turning right onto Monterey. Recommendation: Green bike lanes were removed in 2017 during extensive construction activity of the intersection. Green bike lanes have since been reinstalled. Continue to monitor.	
2	**California & Taft[1]**
Pattern: Southbound drivers turning left and colliding with northbound bicyclists. Recommendation: Continues to be a high collision rate location, with roundabout control identified as a corrective measure. Design for roundabout control is currently underway with the projected anticipated to be shovel ready in the fall of 2019, however construction funding is not yet secured. Additionally, design work for the Railroad Safety Trail Extension through this location initiated in spring of 2016 with construction planned for fall of 2019. Continue to monitor.	
3	**Broad & Leff**
Pattern: No discernable pattern. Recommendation: Continue to monitor.	
4	**Grand & Loomis[2]**
Pattern: Northbound drivers failing to yield and turning left colliding with southbound bicyclists. Recommendation: Install "Yield to Bike" sign for northbound traffic. See additional recommendation in Arterial/Local Intersection Locations Table. Continue to monitor.	
5	**California & Mill[3]**
Pattern: No discernable pattern, however California at Mill has striped Class 2 bike lanes on the edge of the roadway with no on-street parking. As discussed in previous analysis, these types of locations may need special attention to improve safety conditions for bicyclists. Recommendation: Install green bike lanes on California on the approaches to and through the intersection of Mill Street for both north and southbound directions. Install "Yield to Bike" signage for all directions. Continue to monitor.	

1. California and Taft is also ranked as a High Collision Rate Location for Arterial/Local Locations
2. Grand and Loomis is also ranked as a High Collision Rate Location for Arterial/Local Locations
3. California and Mill is also ranked as a High Collision Rate Location for Arterial/Collector Locations

Rank	Caltrans Intersections
NA	**Santa Rosa & Walnut**
Pattern: No discernable pattern, however Santa Rosa and Walnut has striped Class 2 bike lanes on the edge of the roadway with no on-street parking. As discussed in previous analysis, these types of locations may need special attention to improve safety conditions for bicyclists. Recommendation: Continue to work collaboratively with Caltrans to implement a District 5 Active Transportation Plan focusing on improvements of intersections and segments under Caltrans jurisdiction that interface with City facilities. Continue to monitor.	

High Collision Rate Locations – Arterial/Arterial Intersections

Rank	Prev. year Rank	Intersection	Control	Collisions	Volume	Rate*
1	**7**	**Marsh & Broad**	**Signal**	**9**	**18,300**	**1.347**
2	**5**	**Santa Rosa & Monterey**	**Signal**	**9**	**25,936**	**0.951**
3	**1**	**Higuera & Broad**	**Signal**	**4**	**12,349**	**0.887**
4	**13**	**Higuera & Los Osos Valley**	**Signal**	**7**	**24,333**	**0.788**
5	**NR**	**Higuera & Osos**	**Signal**	**3**	**11,770**	**0.698**
6	NR	Johnson & Laurel	Signal	3	14,938	0.550
7	NR	Tank Farm & Broad	Signal	8	42,021	0.522
NA	10	Foothill & Santa Rosa	Signal	8	50,862	0.431
9	NR	Higuera S & Tank Farm	Signal	4	26,163	0.419
10	11	California & Monterey	Signal	3	22,172	0.371
11	NR	Higuera & Prado	Signal	3	23,992	0.343
12	12	Los Osos Valley & Madonna	Signal	4	38,267	0.286
13	NR	Higuera & South	Signal	3	29,334	0.280
14	NR	Madonna & 101 S/B On/Off Ramp	Signal	3	34,831	0.236

NR = Not Ranked
Rate = Collision frequency per million vehicles entering the intersection

Arterial/Arterial Intersections Recommendations

Rank	Intersection	Control	Collisions	Volume	Rate
1	**Marsh & Broad**	**Signal**	**9**	**18,300**	**1.347**
Pattern: Eastbound large vehicles turning right onto Broad Street colliding into traffic signal pole. Recommendation: Signal modifications and corner improvements planned for 2019, which will include measures to prevent right-turn overtracking by large vehicles. Continue to monitor.					
2	**Santa Rosa & Monterey[1]**	**Signal**	**9**	**25,936**	**0.951**
Pattern: Left turning drivers failing to yield to pedestrians crossing Santa Rosa. 5 of the 9 total collisions occurred at nighttime. Recommendation: Refer to recommendation in Pedestrian Location Recommendations Table. Continue to monitor.					
3	**Higuera & Broad[2]**	**Signal**	**4**	**12,349**	**0.887**
Pattern: No discernable pattern for vehicle vs. vehicle. Vehicle vs. pedestrian pattern of motorists turning left and failing to yield to pedestrians in crosswalk, particularly in the northbound direction. Recommendation: Refer to recommendation in Pedestrian Location Recommendations Table. Continue to monitor for vehicle vs. vehicle trends.					
4	**Higuera & Los Osos Valley**	**Signal**	**7**	**24,333**	**0.788**
Pattern: No discernable pattern. Recommendation: Continue to monitor.					
5	**Higuera & Osos**	**Signal**	**3**	**11,770**	**0.698**
Pattern: No discernable pattern. Recommendation: Continue to monitor.					

1. Santa Rosa and Monterey is also ranked as a High Collision Rate Location for Pedestrian Locations
2. Higuera and Broad is also ranked as a High Collision Rate Location for Pedestrian Locations

High Collision Rate Locations – Arterial/Collector Intersections

Rank	Prev. Year Rank	Intersection	Control	Collisions	Volume	Rate
1	**N/R**	**California & Mill**	**Signal**	**3**	**9422**	**0.872**
2	**N/R**	**Broad & Pismo**	**Signal**	**3**	**10591**	**0.776**
3	**N/R**	**Osos & Pismo**	**Signal**	**3**	**13658**	**0.602**
4	**N/R**	**Johnson & Buchon**	**SSSC**	**3**	**14812**	**0.555**
5	**4**	**Broad & Industrial**	**Signal**	**5**	**32749**	**0.418**
6	5	Santa Rosa & Mill	Signal	3	22165	0.371
7	N/R	Santa Rosa & Walnut	Signal	3	30872	0.266

NR = Not Ranked
SSSC = Side-Street Stop-Control
Rate = Collision frequency per million vehicles entering the intersection

Arterial/Collector Intersections Recommendations

Rank	Intersection	Control	Collisions	Volume	Rate
1	**California & Mill**[1]	**Signal**	**3**	**9422**	**0.872**
Pattern: Red light running and left turning vehicles failing to yield to through traffic from all directions. Recommendation: Upgrade to 12" signal indications, add overhead mast arm on EB approach and update pole locations. Continue to monitor.					
2	**Broad & Pismo**	**Signal**	**3**	**10591**	**0.776**
Pattern: Westbound drivers making right hand turn onto Broad and colliding with the traffic signal pole. Recommendation: Investigate channelization enhancements to force drivers to start their turn further from the corner. Additionally, relocate traffic signal pole to back of sidewalk and work with PG&E to relocate power pole. Continue to monitor.					
3	**Osos & Pismo**[2]	**Signal**	**3**	**13658**	**0.602**
Pattern: High collision location for pedestrian collisions. Osos and Pismo is a signalized intersection within a half-mile radius of downtown that allows permissive lefts. As discussed in previous analysis, these types of intersections may need special attention to improve safety conditions for pedestrians. Recommendation: Implement pedestrian lead interval and install "yield to pedestrian" signage for all approaches. Install Flashing Left Yellow Arrows. Continue to monitor.					
4	**Johnson & Buchon**	**SSSC**	**3**	**14812**	**0.555**
Pattern: Drivers hitting the median island prohibiting left turn from Johnson to Buchon. Recommendation: Increase visibility of median (yellow curb, reflectors, replace signage if necessary) Continue to monitor.					
5	**Broad & Industrial**	**Signal**	**5**	**32749**	**0.418**
Pattern: Southbound rear end collisions. Recommendation: Install additional north facing signal head on northeast signal pole. Install flashing warning lights on advanced signal ahead signage for the southbound traffic. Continue to monitor.					

1. California and Mill is also ranked as a High Collision Rate Location for Bicycle Locations
2. Osos and Pismo is also ranked as a High Collision Rate Location for Pedestrian Locations

High Collision Rate Locations – Arterial/Local Intersections

Rank	Prev. Year Rank	Intersection	Control	Collisions	Volume	Rate
1	**N/R**	**California & Taft**	**SSSC**	**7**	**16883**	**1.136**
2	**N/R**	**Monterey & Osos**	**Signal**	**3**	**8348**	**0.985**
3	**N/R**	**Grand & Loomis**	**SSSC**	**3**	**12400**	**0.663**
4	**5**	**Los Osos Valley & Calle Joaquin**	**Signal**	**7**	**34085**	**0.563**
5	**N/R**	**Foothill & Casa**	**SSSC**	**3**	**15346**	**0.536**
6	N/R	Los Osos Valley & Royal	Signal	5	26570	0.516
7	N/R	Higuera S & Elks	SSSC	3	16765	0.490
8	N/R	Higuera S & Suburban	Signal	4	26010	0.421
9	N/R	Los Osos Valley & Laguna	Signal	3	22479	0.366
10	4	Higuera S & Vachell	SSSC	3	25347	0.324
11	N/R	Santa Rosa & Boysen	SSSC	3	32217	0.255
12	6	Santa Rosa & Montalban	SSSC	3	37986	0.216

NR = Not Ranked

SSSC = Side-Street Stop-Control

Rate = Collision frequency per million vehicles entering the intersection

Arterial/Local Intersections Recommendations

Rank	Intersection	Control	Collisions	Volume	Rate
1	**California & Taft**[1]	**SSSC**	**7**	**16883**	**1.136**
Pattern: Drivers pulling out in front of other vehicles from all directions. Rear end collisions. Additionally, southbound drivers turning left and colliding with northbound bicyclists. Recommendation: Continue design on a roundabout for California and Taft and prioritize funding for construction.					
2	**Monterey & Osos**	**Signal**	**3**	**8348**	**0.985**
Pattern: No discernable pattern in 2017. Historic pattern of red light violations in all directions. Recommendation: Signal mast arms installed in early 2018. Continue to monitor.					
3	**Grand & Loomis**[2]	**SSSC**	**3**	**12400**	**0.663**
Pattern: Drivers westbound on Loomis attempting to access the Highway 101 on-ramp pull out in front of southbound through vehicles. Additionally, northbound left turning vehicles fail to yield to southbound bicyclists. Recommendation: Investigate installation of bulbouts on Grand at Loomis to bring stop sign closer to the intersection. See additional recommendation in Bicycle Locations Table. Continue to monitor.					
4	**Los Osos Valley & Calle Joaquin**	**Signal**	**7**	**34085**	**0.563**
Pattern: Left turning vehicles failing to yield to through traffic. Recommendation: Install Flashing Yellow left turn arrows on LOVR Approaches. Continue to monitor.					
5	**Foothill & Casa**	**SSSC**	**3**	**15346**	**0.536**
Pattern: Northbound Casa Drivers Vs. Eastbound Foothill vehicles. Recommendation: Investigate two stage left turn channelization. Continue to monitor.					

1. California and Taft is also ranked as a High Collision Rate Location for Bicycle Locations
2. Grand and Loomis is also ranked as a High Collision Rate Location for Bicycle Locations

High Collision Rate Locations – Collector/Collector Intersections

No Locations Ranked Under this Category

High Collision Rate Locations – Collector/Local Intersections

Rank	Prev. Year Rank	Intersection	Control	Collisions	Volume	Rate
1	**N/R**	**Chorro & Peach**	**SSSC**	**4**	**7844**	**1.397**

NR = Not Ranked

SSSC = Side-Street Stop-Control

Rate = Collision frequency per million vehicles entering the intersection

Collector/Local Intersections Recommendations

Rank	Intersection	Control	Collisions	Volume	Rate
1	**Chorro & Peach**	**SSSC**	**4**	**7844**	**1.397**
Pattern: Broad side collisions from both east and westbound drivers pulling out of Peach Street and colliding with vehicles north and southbound on Chorro. Recommendation: Implement Anholm Bikeway Plan & continue to work with PGE on power pole relocation. Continue to monitor.					

Local/Local Intersections

No Locations Ranked Under this Category

High Collision Rate Locations – Arterial Segments

Rank	Prev. Rank	Segment	Collisions	Ped-Bike Coll.	Vol.	Seg. Length (mi.)	Rate	Location
1	**n/a**	**Higuera**	**8**	**0**	**8,623**	**0.20**	**12.71**	**Morro to Broad**
2	**n/a**	**Foothill**	**9**	**2**	**15,195**	**0.36**	**4.51**	**Tassajara to Broad**
3	**7**	**Marsh**	**5**	**1**	**10,994**	**0.52**	**2.40**	**Hwy 101 to Broad**
4	**4**	**Foothill**	**4**	**2**	**17,227**	**0.30**	**2.14**	**Santa Rosa to California**
5	**n/a**	**Santa Barbara**	**3**	**0**	**13,984**	**0.46**	**1.28**	**Leff to Broad**
6	8	Broad	3	0	22,944	0.39	0.92	Tank Farm to Fuller
7	n/a	Los Osos Valley	3	0	19,643	0.48	0.87	City Limit to Prefumo
8	5	Los Osos Valley	5	0	30,988	0.59	0.75	Froom to Calle Joaquin

NR = Not Ranked
Rate = Collision frequency per million vehicle-miles traveled along segment

Arterial Segments Recommendations

Rank	Segment	Collisions	Volume	Seg. Length (mi.)	Rate	Location
1	Higuera	8	8,623	0.20	12.71	Morro to Broad
Pattern: Merging collisions and parallel parking maneuver collisions. Recommendation: Significant construction activities in 2017. Continue to monitor.						
2	Foothill	9	15,195	.36	4.51	Tassajara to Broad
Pattern: Turning across the roadway when it is not safe to do so (either exiting driveways or u-turning). Recommendation: Implement Pacheco/Bishop's Peak Safe Routes to School & Anholm Bikeway Plans. Continue to monitor.						
3	Marsh	5	10,994	.52	2.40	Hwy 101 to Broad
Pattern: Wrong way driving. Recommendation: Significant construction activities in 2017. Investigate signage and legend markings at adjacent cross streets and make adjustments as necessary.						
4	Foothill	4	17,227	0.30	2.14	Santa Rosa to California
Pattern: Eastbound rear end and other collisions due to traffic being stopped from California/Foothill signal. Recommendation: Complete Railroad Safety Trail Improvements Planned at Intersection, investigate turn channelization. Continue to monitor.						
5	Santa Barbara	3	13,984	.46	1.28	Leff to Broad
Pattern: No discernable pattern. Recommendation: Continue to monitor.						

High Collision Rate Locations – Collector Segments

Rank	Prev. Rank	Segment	Collisions	Ped-Bike Coll.	Vol.	Seg. Length (mi.)	Rate	Location
1	n/a	Nipomo	6	1	3,431	0.19	25.22	Higuera to Peach
2	n/a	Ramona	3	0	4,107	0.35	5.72	Tassajara to Broad

Collector Segments Recommendations

Rank	Segment	Collisions	Volume	Seg. Length (mi.)	Rate	Location
1	Nipomo	6	3,431	.19	25.22	Higuera to Peach
Pattern: Various turning movements and parking maneuvers. Recommendation: Implement identified safety features as part of private development and development of the Palm/Nipomo Parking Garage which include reducing on-street parking, widening sidewalks and installing pedestrian crossing facilities.						
2	Ramona	3	4,107	.35	5.72	Tassajara to Broad
Pattern: Speeding vehicles sideswiping parked cars. Recommendation: Implement Anholm Bikeway Improvements, converting parking on north side of Ramona to a cycle track.						

High Collision Rate Locations – Local Segments

Rank	Prev. Rank	Segment	Collisions	Ped-Bike Coll.	Vol.	Seg. Length (mi.)	Rate	Location
1	n/a	Casa	4	0	2,741	.24	16.66	Murray to Foothill

Local Segments Recommendations

Rank	Segment	Collisions	Volume	Seg. Length (mi.)	Rate	Location
1	Casa	4	2,741	.24	16.66	Murray to Foothill
Pattern: Speeding vehicles sideswiping parked cars. Recommendation: Refresh edge and centerline striping.						

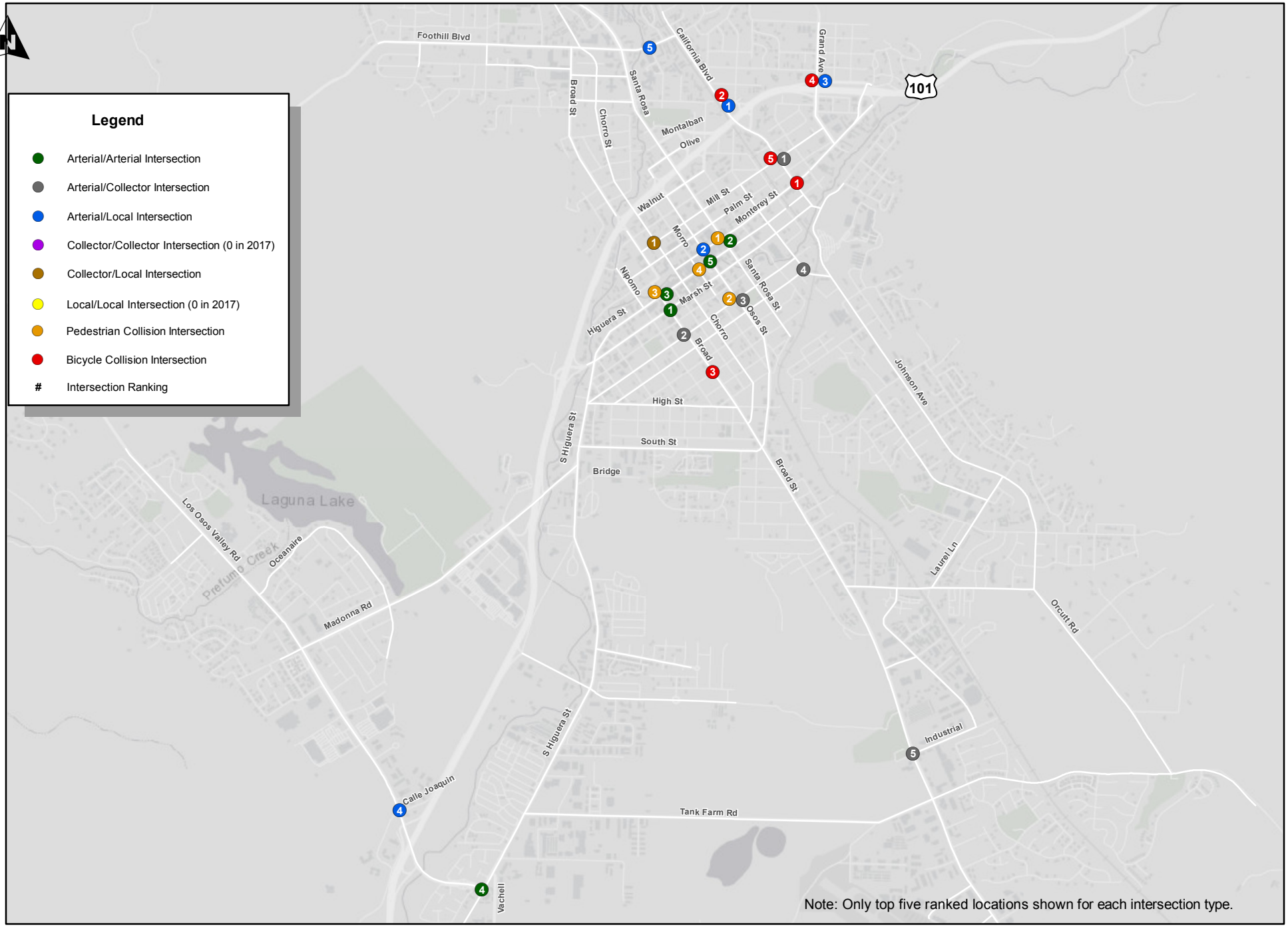
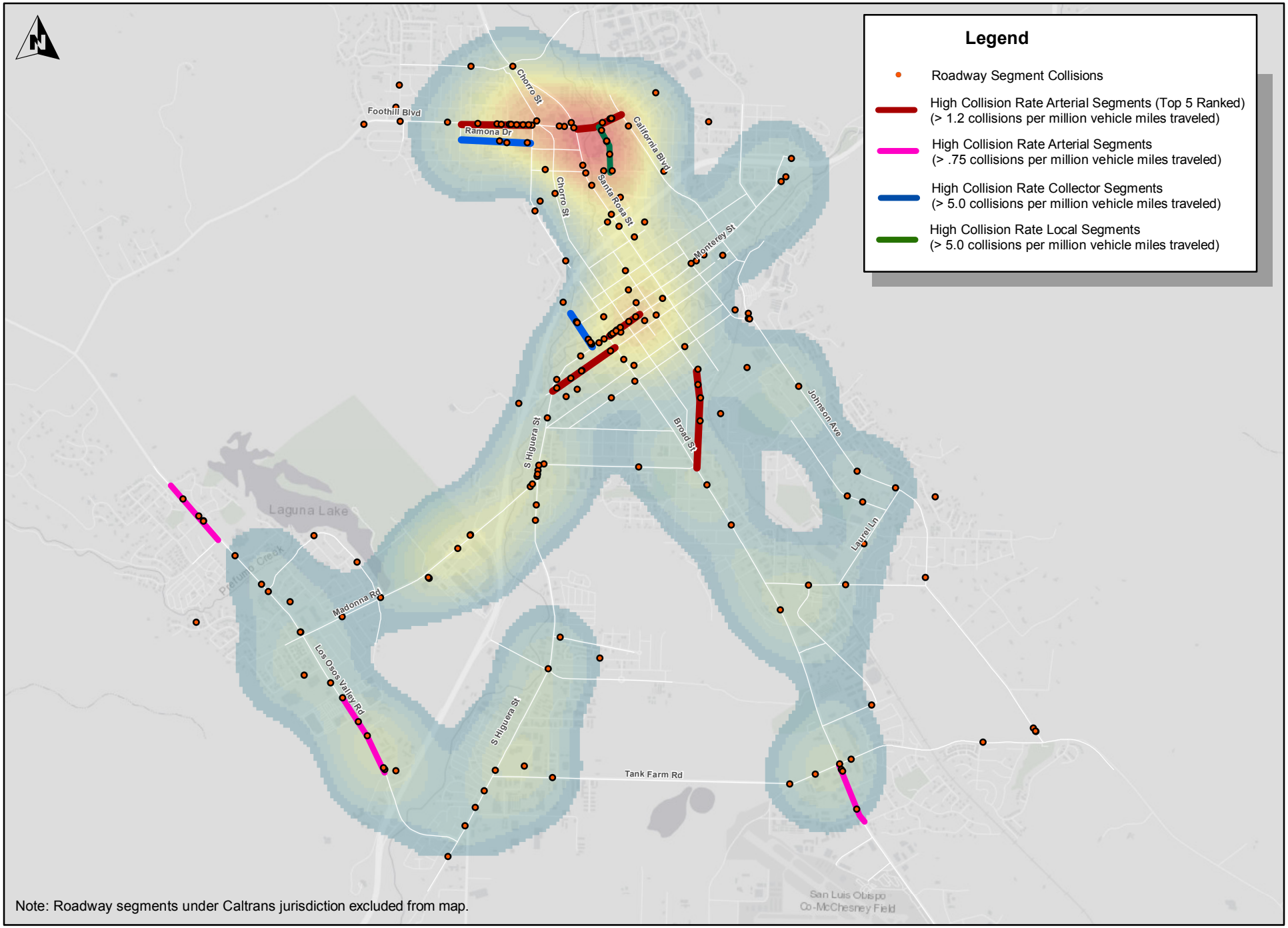


FIGURE 8
2017 HIGH COLLISION INTERSECTION LOCATIONS



Note: Roadway segments under Caltrans jurisdiction excluded from map.

FIGURE 9

2017 HIGH COLLISION RATE ROADWAY SEGMENTS

APPENDIX A

Collision Analysis Methodology

Study Methodology

Collision Data

Reported traffic collisions obtained by the City of San Luis Obispo Police Department are the basis used by the City Traffic Engineering group to evaluate traffic safety[1]. Collisions totals are obtained for each intersection and roadway segment within the City and entered into the City's traffic collision database. Collisions occurring on private property or outside of the City Limits are not included in the dataset. Collision locations are then grouped by intersection type (i.e. arterial-arterial, arterial-collector, collector-collector, etc.) and street segment. For locations with at least three (3) total collisions in the past year or at least three (3) bicycle or pedestrian collisions in the previous five-year period, collision rates are calculated and collision diagrams are generated.

Based on the collision patterns for the five highest ranked intersections and roadway segments, as ranked based on collision rate, mitigation measures are formulated where a collision pattern can be identified. Mitigation measures for these sub-categories will be implemented in as projects are designed and funding becomes available.

Traffic Volumes

Vehicle and pedestrian volumes play an important role in calculating collision rates for selected locations within the City. Vehicle volume counts were collected in 2014 as a basis to establish actual conditions in the field environment. Where volume counts were not available, volumes were estimated based on previous experience and engineering judgment.

Collision Rate Calculations

Collision rates were calculated using the following formulas:

Intersections:

$$RI = \frac{N \times 1{,}000{,}000}{V \times 365}$$

Segments:

$$RS = \frac{N \times 1{,}000{,}000}{365 \times V \times L}$$

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[1] It is important to note that the data contained within the Public Works Traffic Collision Database may vary from other sources of collision data such as the California - Statewide Integrated Traffic Records System (SWITRS) or the City's Emergency Dispatch Records System. While SWITRS data is similarly derived from official police collision reports, many times the reports are coded incorrectly due to jurisdictional boundary issues and/or agency reporting inaccuracies. Likewise, City emergency dispatch may receive a call regarding a traffic collision but when the dispatched officer arrives, the vehicles have been moved on or there is no evidence of occurrence. Therefore, statistics derived from this data may be inaccurate for engineering purposes because no official proof or record exists of the actual collision type.

Where:

RI = Intersection Collision Rate = Collision frequency per million vehicles entering the intersection.
RS = Segment Collision Rate = Collision frequency per million vehicle miles traveled along the segment.
N = Number of collisions (collision frequency) of the location.
V = Average daily vehicular volume using the street segment or intersection.
L = Length of street segment (in miles) being analyzed.

For high-rate bicycle and pedestrian collision locations, collision rates were calculated as follows:

Pedestrians:

$$PREV = \frac{5 \times N \times PHVV}{PHPV}$$

Bicycles:

$$BEV = \frac{5 \times N \times PHVV}{PHBV}$$

Where:

PREV = Pedestrian relative exposure value.
PREV = Bicycle relative exposure value.
N = Number of collisions (5-year collision frequency) of the location.
PHVV = Average peak hour vehicular volume.
PHPV = Average peak hour pedestrian volume.
PHBV = Average peak hour bicycle volume.

The pedestrian and bicycle relative exposure value formula is derived from the traditional collision rate calculation, however it factors the volume of either the bicycle or pedestrian with that of vehicles at a given location.

APPENDIX B

2016 High Collision Locations – Status Update

2016 High Collision Locations - Status Update

Location	2016		2017			2016 TSR Recommendation	Status
	Rank	Collisions	Rank	Collisions	Increase/ Decrease		
Pedestrian Intersections*							
Santa Rosa & Montalban	1	3	NR	3	-	Paint crosswalks across Montalban on both sides of Santa Rosa to more clearly define the crosswalk and where vehicles should stop and wait.	Collision frequency same in 2017. 2016 TSR recommendation remains relevant.
Santa Rosa & Walnut	2	4	NR	3	↓	Intersection under State jurisdiction. Forward to Caltrans for study and continue to monitor in 2017.	Collision frequency decreased; 0 pedestrian collisions in 2017.
Santa Rosa & Olive	3	4	NA	5	↑	Intersection under State jurisdiction. Forward to Caltrans for study and continue to monitor in 2017.	Collision frequency increased in 2017. 2016 TSR recommendation remains relevant.
Foothill & Santa Rosa	4	4	NR	3	↓	Intersection under State jurisdiction. Forward to Caltrans for study and continue to monitor in 2017.	Collision frequency decreased in 2017.
Monterey & Santa Rosa	5	5	1	7	↑	Yield to Pedestrian signs installed in April of 2011. Advanced Pedestrian Phasing implemented in spring of 2016. Flashing Yellow Arrows were installed in late 2016. No pedestrian collisions occurred after the installation of the Flashing Yellow Arrows. Continue to monitor and report it 2017 Traffic Safety Report.	Collision frequency increased in 2017. 2016 TSR recommendation remains relevant.
Bicycle Intersections*							
Santa Rosa & Olive	1	4	NR	2	↓	Green bike lane extensions through intersections installed along Santa Rosa from Walnut to Montalban in August of 2015 and reinstalled in July 2016. Only collisions in 2016 were due to red light violations. Continue to monitor in 2017.	Collision frequency decreased; 0 bicycle collisions in 2017.
California & Monterey	2	7	1	3	↓	Green bike lanes were reinstalled and only collisions in 2016 were red light violations.	Collision frequency decreased; 2 bicycle collisions in 2017.
Foothill & Santa Rosa	3	5	NR	4	↓	Intersection under State jurisdiction. Forward to Caltrans for study and continue to monitor in 2017.	Collision frequency decreased; 0 bicycle collisions in 2017.
Broad & South	4	3	NR	3	-	Continue to monitor in 2017.	Collision frequency same in 2017. 2016 TSR recommendation remains relevant.
101 N/B On/Off Ramp & California	5	4	NR	4	-	Green bike lanes were installed and there were no collisions in 2016. Continue to monitor.	Collision frequency same in 2017. 2016 TSR recommendation remains relevant.
Arterial/Arterial Intersections							
Broad & Higuera	1	4	3	4	-	A pedestrian lead time was implemented at this intersection. Pedestrian collisions that in 2016 occurred before a pedestrian lead time had been implemented. Staff will continue to monitor.	Collision frequency same in 2017. 2016 TSR recommendation remains relevant.
Higuera & Chorro	2	4	NR	0	↓	Continue to monitor in 2017.	Collision frequency significantly decreased; no collisions in 2017.
Marsh & Nipomo	3	4	NR	2	↓	Upgrade traffic signal to include mast arms for each approach.	Collision frequency decreased; 2 collisions in 2017. 2016 TSR recommendation remains relevant.
Higuera & Nipomo	4	3	NR	2	↓	Upgrade traffic signal to include mast arms for each approach.	Collision frequency decreased; 2 collisions in 2017. 2016 TSR recommendation remains relevant.
Santa Rosa & Monterey	5	6	2	5	↓	A pedestrian lead time was implemented at this intersection. One pedestrian collision occurred after the pedestrian lead time was implemented. Staff will continue to monitor.	Collision frequency decreased, however remains the 2nd highest ranking in 2017. 2016 TSR recommendation remains relevant.

Arterial/Collector Intersections							
Higuera & High	1	4	NR	1	↓	Continue to monitor in 2017.	Collision frequency significantly decreased; one collision in 2017.
Foothill & Broad	2	5	NR	1	↓	Evaluate signal and driveway modifications with adjacent development.	Collision frequency significantly decreased; one collisions in 2017.
Madonna & Oceanaire	3	4	NR	0	↓	Continue to monitor in 2017.	Collision frequency significantly decreased; no collisions in 2017.
Broad & Industrial	4	5	5	5	-	Upgrade and add signal indicators for more visibility. Investigate the installation of officer assist red light enforcers. Continue to monitor.	Collision frequency same in 2017. 2016 TSR recommendation remains relevant.
Mill & Santa Rosa	5	3	6	3	-	Upgrade and add signal indicators for more visibility. Investigate the installation of officer assist red light enforcers. Continue to monitor.	Collision frequency same in 2017. 2016 TSR recommendation remains relevant.
Arterial/Local Intersections							
Marsh & Toro	1	3	NR	0	↓	Install advanced "STOP AHEAD" signing and striping. Targeted enforcement and continue to monitor.	Collision frequency decreased; no collisions in 2017. Signage was replaced in 2018.
Higuera & Morro	2	4	NR	2	↓	Existing parking stalls currently meet City standard. No historical pattern - continue to monitor.	Collision frequency decreased in 2017.
Higuera & Bridge	3	4	NR	0	↓	Currently working with Caltans to widen Higuera between Bridge and Elks Lane to install a two-way-left-turn-lane.	Collision frequency significantly decreased; no collisions in 2017. The City continue its work with Caltrans to secure right-of-way for future widening.
Higuera & Vachell	4	5	10	3	↓	Paint "KEEP CLEAR" in intersection to increase visibility. Avila Ranch development includes improvements at this intersection to restrict access to right in/right out only.	Collision frequency decreased in 2017. Keed Clear legend installed in fall 2018. Further improvements will be implemented through Avila Ranch development.
Los Osos Valley Road & Calle Joaquin	5	4	4	7	↑	Targeted enforcement and continue to monitor.	Collision frequency increased in 2017. 2016 TSR recommendation remains relevant.
Collector/Collector Intersections							
No Locations Ranked Under this Category in 2016.							
Collector/Local Intersections							
No Locations Ranked Under this Category in 2016.							
Local/Local Intersections							
No Locations Ranked Under this Category in 2016.							

Arterial Segments							
Higuera (Nipomo to Marsh)	1	4	NR	2		Continue to monitor in 2017.	Collision frequency decreased in 2017.
Monterey (California to Grand)	2	3	NR	2		Continue to monitor in 2017.	Collision frequency decreased in 2017.
California (Foothill to Hathway)	3	3	NR	2		Continue to monitor in 2017.	Collision frequency decreased in 2017.
Foothill (Santa Rosa to California)	4	3	4	4		Coordinate with The SLO Student Living facility to move their sign to the other side of the driveway to improve sight distance of westbound traffic. Continue to monitor in 2017.	Collision frequency increased in 2017; segment is ranked 4th in 2017 report. 2016 TSR recommendation remains relevant.
LOVR (Froom to Calle Joaquin)	5	10	8	5		Several factors should begin to alleviate some of this congestion. The interchange widening has already decreased congestion along this corridor. Recent striping changes should slow traffic and provide more clear lane assignments. The Prado interchange in the City Master Plan will also alleviate congestion in the long term. Continue to monitor in 2017.	Collision frequency decreased on 2017.
Collector Segments							
No Locations Ranked Under this Category in 2016.							

NA = Location under State jurisdiction. Not assigned a ranking in 2017 TSR, but included for reference purposes.
NR = Not Ranked
*For Pedestrian and Bicycle Intersections, five-year collision total listed.