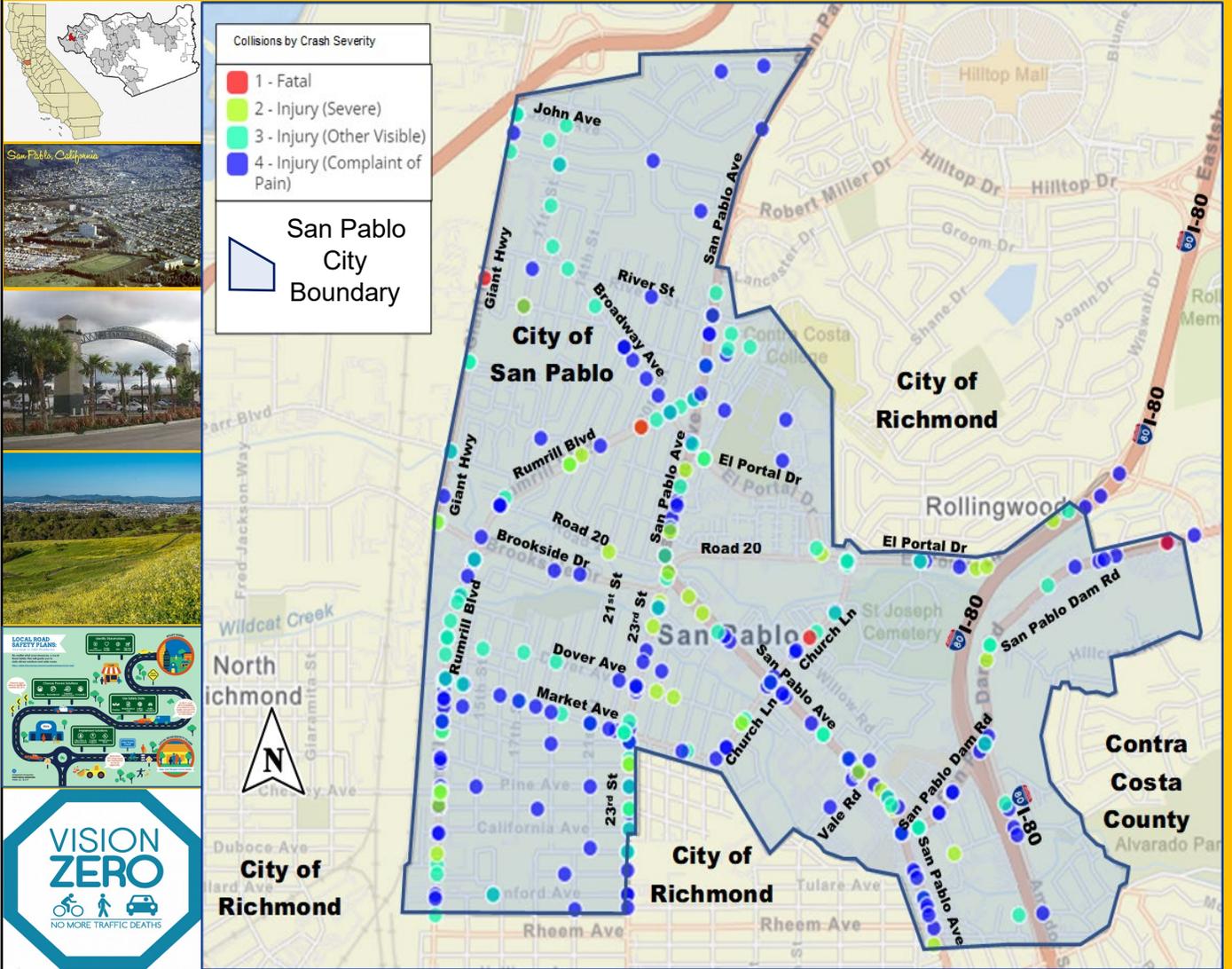


FINAL

Local Roadway Safety Plan (LRSP) Project

City of San Pablo

City of San Pablo Local Roadways Concentration of Collisions by "Point" (2018-2022)



PREPARED FOR:



City of San Pablo
 Department of Public Works
 1000 Gateway Avenue
 San Pablo, CA 94806



PREPARED FOR:



MINAGAR & ASSOCIATES, INC.
 Traffic/Civil/Electrical Engineering – ITS – Transportation Planning – CEM
 23282 Mill Creek Drive, Suite 120
 Laguna Hills, CA 92653
 Tel: (949) 707-1199



September 27, 2023



Table of Contents

ACKNOWLEDGEMENTS 8

Executive Summary 9

Statement of Protection of Data From Discovery and Admissions 10

List of Acronyms..... 11

 1. Introduction 12

 2. Vision and Goals..... 13

 3. Safety Partners 14

 3.1 Safety Leadership 14

 3.2 Stakeholders 15

 4. Process 16

 4.1 Systemic Approach 16

 4.2 Public Outreach 17

 5. Existing Efforts 18

 6. Data Analysis and Summary 19

 6.1 Overall Summary 19

 6.2 Victim Summary 27

 6.3 Pedestrian Crash Summary 31

 6.4 Active Transportation Program (ATP) Summary Data & Maps..... 36

 6.5 Crash Data Comparison and Analysis 43

 6.5 California Office of Traffic Safety (OTS) Ranking 47

 7. Emphasis Areas..... 50

 7.1 High Collision Intersections 51

 7.2 High Collision Roadway Segments 52

 7.3 Rear End Collisions Due to Unsafe Speed 53

 7.4 Sideswipe Collisions Due to Improper Turning..... 54

 8. High Collision Locations Identification, Pattern Analysis, and Recommended
 Improvements 55

 8.1 High Collision Intersections..... 58

 8.1.1 Intersection 1: San Pablo Av & 23rd St/Road 20..... 60

 8.1.2 Intersection 2: San Pablo Av & Lake St 60

 8.1.3 Intersection 3: Market Av & Rumrill Bl..... 61

 8.1.4 Intersection 4: El Portal Dr & Church Ln/Rollingwood Dr 61





8.1.5 Intersection 5: Church Ln & San Pablo Av 62

8.1.6 Intersection 6: Rumrill Bl & Broadway Av 62

8.1.7 Intersection 7: San Pablo Av & Broadway Av/El Portal Dr 63

8.1.8 Intersection 8: Rumrill Bl & Brookside Dr 63

8.1.9 Intersection 9: San Pablo Av & Rivers St 64

8.1.10 Intersection 10: 23rd St & Dover Av 64

8.1.11 Intersection 11: San Pablo Av & San Pablo Dam Rd 65

8.1.12 Intersection 12: San Pablo Av & Vale Rd 65

8.1.13 Intersection 13: Giant Rd & John Av 66

8.1.14 Intersection 14: Emeric Av & 23rd St 66

8.2 High Collision Roadway Segments 67

8.2.1 Roadway Segment 1: 23rd St (Market Av to Dover Av) 68

8.2.2 Roadway Segment 2: Rumrill Bl (Market Av to Post Av) 68

8.2.3 Roadway Segment 3: Vale Rd (Howard St to San Pablo Av) 69

8.2.4 Roadway Segment 4: San Pablo Av (Church Ln to Gateway Av) 69

8.2.5 Roadway Segment 5: San Pablo Av (Vale Rd to Gateway Av) 70

8.2.6 Roadway Segment 6: San Pablo Dam (Contra Costa Av to Ventura Av) 70

9. Collision Diagrams, Preliminary Conceptual Plans for Recommended Improvements
 at High Collision Intersections and High Collision Roadway Segments, Cost Estimates,
 and Benefit Cost Ratios 71

9.1 High Collision Intersections 72

9.1.1 Intersection 1: San Pablo Av & 23rd St/Road 20 72

9.1.1.1 Intersection 1 Cost Estimate and Cost/Benefit Analysis 73

9.1.2 Intersection 2: San Pablo Av & Lake St 74

9.1.2.1 Intersection 2 Cost Estimate and Cost/Benefit Analysis 76

9.1.3 Intersection 3: Market Av & Rumrill Bl 77

9.1.3.1 Intersection 3 Cost Estimate and Cost/Benefit Analysis 78

9.1.4 Intersection 4: El Portal Dr & Church Ln/Rollingwood Dr 79

9.1.4.1 Intersection 4 Cost Estimate and Cost/Benefit Analysis 81

9.1.5 Intersection 5: Church Ln & San Pablo Av 82

9.1.5.1 Intersection 5 Cost Estimate and Cost/Benefit Analysis 84

9.1.6 Intersection 6: Rumrill Bl & Broadway Av 85

9.1.6.1 Intersection 6 Cost Estimate and Cost/Benefit Analysis 86





9.1.7 Intersection 7: San Pablo Av & Broadway Av/El Portal Dr 87

9.1.7.1 Intersection 7 Cost Estimate and Cost/Benefit Analysis 89

9.1.8 Intersection 8: Rumrill Bl & Brookside Dr 90

9.1.8.1 Intersection 8 Cost Estimate and Cost/Benefit Analysis 91

9.1.9 Intersection 9: San Pablo Av & Rivers St 92

9.1.9.1 Intersection 9 Cost Estimate and Cost/Benefit Analysis 94

9.1.10 Intersection 10: 23rd St & Dover Av 95

9.1.10.1 Intersection 10 Cost Estimate and Cost/Benefit Analysis 97

9.1.11 Intersection 11: San Pablo Av & San Pablo Dam Rd 98

9.1.11.1 Intersection 11 Cost Estimate and Cost/Benefit Analysis 100

9.1.12 Intersection 12: San Pablo Av & Vale Rd 101

9.1.12.1 Intersection 12 Cost Estimate and Cost/Benefit Analysis 103

9.1.13 Intersection 13: Giant Rd & John Av 104

9.1.13.1 Intersection 13 Cost Estimate and Cost/Benefit Analysis 106

9.1.14 Intersection 14: Emeric Av & 23rd St 107

9.1.14.1 Intersection 14 Cost Estimate and Cost/Benefit Analysis 109

9.2 High Collision Roadway Segments 110

9.2.1 Roadway Segment 1: 23rd St (Market Av to Dover Av) 110

9.2.1.1 Roadway Segment 1 Cost Estimate and Cost/Benefit Analysis 112

9.2.2 Roadway Segment 2: Rumrill Bl (Market Av to Post Av) 113

9.2.2.1 Roadway Segment 2 Cost Estimate and Cost/Benefit Analysis 114

9.2.3 Roadway Segment 3: Vale Rd (Howard St to San Pablo Av) 115

9.2.3.1 Roadway Segment 3 Cost Estimate and Cost/Benefit Analysis 117

9.2.4 Roadway Segment 4: San Pablo Av (Church Ln to Gateway Av) 118

9.2.4.1 Roadway Segment 4 Cost Estimate and Cost/Benefit Analysis 120

9.2.5 Roadway Segment 5: San Pablo Av (Vale Rd to Gateway Av) 121

9.2.5.1 Roadway Segment 5 Cost Estimate and Cost/Benefit Analysis 123

9.2.6 Roadway Segment 6: San Pablo Dam (Contra Costa Av to Ventura Av) 124

9.2.6.1 Roadway Segment 6 Cost Estimate and Cost/Benefit Analysis 126

9.3 Total Construction Cost Summary and Discussion 127





List of Tables

Table 1: Number of Crashes per Day of Week per Time	24
Table 2: Active Transportation Program Number of Crashes per Day of Week per Time	41
Table 3: City of San Pablo OTS Crash Ranking Results 2020	47
Table 4: City of San Pablo Engineering Countermeasures Toolbox	57
Table 5: List of High Collision Intersections	58
Table 6: Intersection Number of Collisions and Ranking in the City of San Pablo	59
Table 7: Intersection 1 Number of Collisions and Corresponding Primary Collision Factor	60
Table 8: Intersection 2 Number of Collisions and Corresponding Primary Collision Factor	60
Table 9: Intersection 3 Number of Collisions and Corresponding Primary Collision Factor	61
Table 10: Intersection 4 Number of Collisions and Corresponding Primary Collision Factor	61
Table 11: Intersection 5 Number of Collisions and Corresponding Primary Collision Factor	62
Table 12: Intersection 6 Number of Collisions and Corresponding Primary Collision Factor	62
Table 13: Intersection 7 Number of Collisions and Corresponding Primary Collision Factor	63
Table 14: Intersection 8 Number of Collisions and Corresponding Primary Collision Factor	63
Table 15: Intersection 9 Number of Collisions and Corresponding Primary Collision Factor	64
Table 16: Intersection 10 Number of Collisions and Corresponding Primary Collision Factor	64
Table 17: Intersection 11 Number of Collisions and Corresponding Primary Collision Factor	65
Table 18: Intersection 12 Number of Collisions and Corresponding Primary Collision Factor	65
Table 19: Intersection 13 Number of Collisions and Corresponding Primary Collision Factor	66
Table 20: Intersection 14 Number of Collisions and Corresponding Primary Collision Factor	66
Table 21: List of High Collision Roadway Segments	67
Table 22: Roadway Segment Number of Collisions and Ranking in the City of San Pablo	67
Table 23: Roadway Segment 1 Number of Collisions and Corresponding Primary Collision Factor	68
Table 24: Roadway Segment 2 Number of Collisions and Corresponding Primary Collision Factor	68
Table 25: Roadway Segment 3 Number of Collisions and Corresponding Primary Collision Factor	69
Table 26: Roadway Segment 4 Number of Collisions and Corresponding Primary Collision Factor	69
Table 27: Roadway Segment 5 Number of Collisions and Corresponding Primary Collision Factor	70
Table 28: Roadway Segment 6 Number of Collisions and Corresponding Primary Collision Factor	70
Table 29: Intersection 2 Cost Estimate	76
Table 30: Intersection 4 Cost Estimate	81
Table 31: Intersection 5 Cost Estimate	84
Table 32: Intersection 7 Cost Estimate	89
Table 33: Intersection 9 Cost Estimate	94
Table 34: Intersection 10 Cost Estimate	97
Table 35: Intersection 11 Cost Estimate	100
Table 36: Intersection 12 Cost Estimate	103
Table 37: Intersection 13 Cost Estimate	106
Table 38: Intersection 14 Cost Estimate	109





Table 39: Roadway Segment 1 Cost Estimate	112
Table 40: Roadway Segment 3 Cost Estimate	117
Table 41: Roadway Segment 4 Cost Estimate	120
Table 42: Roadway Segment 5 Cost Estimate	123
Table 43: Roadway Segment 6 Cost Estimate	126
Table 44: Total Construction Cost of Intersections and Roadway Segments.....	127



List of Figures

Figure 1: Local Road Safety Plan – Your Map to Safer Roadways.....	12
Figure 2: City of San Pablo Display of Collisions by Point (State Data Omitted).....	20
Figure 3: City of San Pablo Display of Collisions by Cluster (State Data Omitted).....	21
Figure 4: City of San Pablo Number of Crashes by Crash Severity	22
Figure 5: City of San Pablo Number of Crashes by Type of Crash	23
Figure 6: Number of Crashes by (PCF) Primary Crash Factor Violation	26
Figure 7: Number of Victims by Victim Degree of Injury	27
Figure 8: Number of Victims by Victim Role	28
Figure 9: Number of Victims by Victim Safety Equipment.....	29
Figure 10: Number of Victims by Victim Gender and Age.....	30
Figure 11: City of San Pablo Number of Crashes by Type of Violation	32
Figure 12: City of San Pablo Number of Crashes by Pedestrian Action	33
Figure 13: City of San Pablo Number of Crashes by Lighting.....	34
Figure 14: City of San Pablo Number of Crashes by Weather.....	35
Figure 15: City of San Pablo Active Transportation Program Heat Map	36
Figure 16: City of San Pablo Transportation Program Hexagonal Grid Map.....	37
Figure 17: City of San Pablo Active Transportation Program Specific Collision Map	38
Figure 18: Active Transportation Program Number of Crashes by Crash Severity	39
Figure 19: Active Transportation Program Number of Crashes by Type of Crash	40
Figure 20: Number of Crashes by Primary Crash Factor PCF Violation	42
Figure 21: TIMS Number and Percentage of Crash Severity Types in Terms of Local, County, and State	43
Figure 22: TIMS Number and Percentage of Victims in Terms of Local, County, and State	44
Figure 23: TIMS Number and Percentage of Crash Locations in Terms of Local, County, and State	45
Figure 24: TIMS Number and Percentage of Crash Types in Terms of Local, County, and State	46
Figure 25: Intersection 1- San Pablo Av & 23rd St/Road 20 Crash Diagram- 20 Collisions	72
Figure 26: Intersection 2- San Pablo Av & Lake St Crash Diagram- 20 Collisions.....	74
Figure 27: Intersection 2- San Pablo Av & Lake St Recommended Improvements	75
Figure 28: Intersection 3- Market Av & Rumrill Bl Crash Diagram- 18 Collisions	77
Figure 29: Intersection 4- El Portal Dr & Church Ln/Rollingwood Dr Crash Diagram- 17 Collisions	79
Figure 30: Intersection 4- El Portal Dr & Church Ln/Rollingwood Dr.....	80
Recommended Improvements	80
Figure 31: Intersection 5- Church Ln & San Pablo Av Crash Diagram- 17 Collisions	82
Figure 32: Intersection 5- Church Ln & San Pablo Av Recommended Improvements	83
Figure 33: Intersection 6- Rumrill Bl & Broadway Av Crash Diagram- 17 Collisions	85
Figure 34: Intersection 7- San Pablo Av & Broadway Av/El Portal Dr.....	87
Crash Diagram- 16 Collisions.....	87
Figure 35: Intersection 7- San Pablo Av & Broadway Av/El Portal Dr.....	88
Recommended Improvements	88
Figure 36: Intersection 8- Rumrill Bl & Brookside Dr Crash Diagram- 16 Collisions.....	90
Figure 37: Intersection 9- San Pablo Av & Rivers St Crash Diagram- 14 Collisions	92
Figure 38: Intersection 9- San Pablo Av & Rivers St Recommended Improvements	93





Figure 39: Intersection 10-23rd St & Dover Av Crash Diagram- 14 Collisions95
 Figure 40: Intersection 10-23rd St & Dover Av Recommended Improvements96
 Figure 41: Intersection 11- San Pablo Av & San Pablo Dam Rd98
 Crash Diagram- 13 Collisions.....98
 Figure 42: Intersection 11- San Pablo Av & San Pablo Dam Rd99
 Recommended Improvements99
 Figure 43: Intersection 12- San Pablo Av & Vale Rd Crash Diagram- 10 Collisions 101
 Figure 44: Intersection 12- San Pablo Av & Vale Rd Recommended Improvements 102
 Figure 45: Intersection 13- Giant Rd & John Av Crash Diagram- 9 Collisions 104
 Figure 46: Intersection 13- Giant Rd & John Av Crash Recommended Improvements..... 105
 Figure 47: Intersection 14- Emeric Av & 23rd St Crash Diagram- 8 Collisions..... 107
 Figure 48: Intersection 14- Emeric Av & 23rd St Recommended Improvements 108
 Figure 49: Roadway Segment 1- 23rd St (Market Av to Dover Av)..... 110
 Crash Diagram - 12 Collisions..... 110
 Figure 50: Roadway Segment 1- 23rd St (Market Av to Dover Av)..... 111
 Recommended Improvements 111
 Figure 51: Roadway Segment 2- Rumrill Bl (Market Av to Post Av) 113
 Crash Diagram- 9 Collisions..... 113
 Figure 52: Roadway Segment 3- Vale Rd (Howard St to San Pablo Av) 115
 Crash Diagram- 8 Collisions..... 115
 Figure 53: Roadway Segment 3- Vale Rd (Howard St to San Pablo Av) 116
 Recommended Improvements 116
 Figure 54: Roadway Segment 4- San Pablo Av (Church Ln to Gateway Av)..... 118
 Crash Diagram- 8 Collisions..... 118
 Figure 55: Roadway Segment 4- San Pablo Av (Church Ln to Gateway Av)..... 119
 Recommended Improvements 119
 Figure 56: Roadway Segment 5- San Pablo Av (Vale Rd to Gateway Av)..... 121
 Crash Diagram- 6 Collisions..... 121
 Figure 57: Roadway Segment 5- San Pablo Av (Vale Rd to Gateway Av)..... 122
 Recommended Improvements 122
 Figure 58: Roadway Segment 6- San Pablo Dam (Contra Costa Av to Ventura Av) 124
 Crash Diagram- 5 Collisions..... 124
 Figure 59: Roadway Segment 6- San Pablo Dam (Contra Costa Av to Ventura Av)
 Recommended Improvements 125





ACKNOWLEDGEMENTS

CITY COUNCIL

Mayor: Abel Pineda

Vice Mayor: Patricia Ponce

Council Member: Arturo Cruz

Council Member: Elizabeth Pabon-Alvarado

Council Member: Rita Xavier

PARTNERS

City Departments: Administration, Community Development, Police, Fire, Public Works

Caltrans District 4

West Contra Costa Unified School District

Contra Costa Transportation Authority (CCTA)

San Pablo Chamber of Commerce

General Public of the City of San Pablo

CITY STAFF

Project Manager: Jimmy Zhou

City Manager: Matt Rodriguez

Assistant City Manager: Charles Ching

Public Works Director/City Engineer: Allan Panganiban

San Pablo Police Chief: Ron Raman

Contra Costa Fire Chief: Lewis Broschard



Executive Summary

The objective of the City of San Pablo Local Roadway Safety Plan (LRSP) is to establish a safe transportation environment that has safer roads, safer people, safer speeds, and safer vehicles. As part of this safety plan for the City of San Pablo, Minagar & Associates, Inc. identified, prioritized, and analyzed roadway safety improvements on the City of San Pablo's intersections and roadway segments. This safety plan also provides the proposed countermeasures to ultimately reduce collisions in the City's high collision locations. From January 1, 2018 until December 31, 2022, there were a total of 1,823 collisions that included 13 fatalities and 800 injured victims. The most common types of collision were Rear End (553), Sideswipe (460), Broadside (260), and Hit-Object (224) Collisions. Primary Collision Factor (PCF) violations that caused the most collisions were Unsafe Speed (543), Improper Turning (269), and Unsafe Lane Change (237), and Victims were mostly drivers (473) and passengers (212). There have been 87 collisions involved with pedestrians. Within the jurisdictions of San Pablo's local roadways, of the 1,823 collisions, 617 collisions were on state highways while 1,206 collisions were on local roadways. The highest number of victims happened to be in the age range of 20 to 24 years old. The Local Road Safety Plan is a major element to ameliorate transportation and traffic safety within a city. This LRSP was prepared and developed in compliance with the State and Federal guidelines for eligibility to apply for the funding of Highway Safety Improvement Program (HSIP). In addition to the provided countermeasures for collision patterns, this Safety Plan also provides the corresponding cost estimates and benefit-cost ratios, to support applications for the Highway Safety Improvement Program (HSIP).



Statement of Protection of Data From Discovery and Admissions

Per Section 148 of Title 23, United States Code [23 U.S.C. §148(h) (4)] REPORTS DISCOVERY AND ADMISSION INTO EVIDENCE OF CERTAIN REPORTS, SURVEYS, AND INFORMATION—Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for any purpose relating to this section, shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location identified or addressed in the reports, surveys, schedules, lists, or other data.

Per Section 409 of Title 23, United States Code [23 U.S.C. §409] DISCOVERY AND ADMISSION AS EVIDENCE OF CERTAIN REPORTS AND SURVEYS—Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 148 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.



List of Acronyms

AASHTO	American Association of State Highway and Transportation Officials
B/C Ratio	Benefit-Cost Ratio
Caltrans	California Department of Transportation
City	City of San Pablo
CMF	Crash Modification Factor
CRF	Crash Reduction Factor
DUI	Driving Under the Influence
FHWA	Federal Highway Administration
HSIP	Highway Safety Improvement Program
HSM	Highway Safety Manual
KSI	Killed or Severely Injured
LRSM	Local Roadway Safety Manual (Version 1.6, April 2022)
LRSP	Local Roadway Safety Plan
MUTCD	Manual on Uniform Traffic Control Devices
PCF	Primary Collision Factor
PDO	Property Damage Only
SHSP	Strategic Highway Safety Plan
SWITRS	Statewide Integrated Traffic Records System
TIMS	Transportation Injury Mapping System
5Es	The 5Es of Traffic Safety: Education, Engineering, Enforcement, Emergency Medical Services, Emerging Technologies



1. Introduction

The City of San Pablo is taking the initiative to improve the City’s traffic safety by implementing a Local Roadway Safety Plan that aims to reduce traffic collisions by analyzing the factors that previously impacted prominent intersections and roadway segments in the City. This report documents the City of San Pablo’s work to assess and improve transportation safety conditions.

In this Safety Plan, a systemic approach was utilized to identify and analyze collision patterns that had impacted high collision intersections and roadway segments. For each high collision location, whether it was an intersection or a roadway segment, a table of number of collisions with the corresponding primary collision factor has been provided to understand the prominent collision factors. As part of the collision analysis, collision diagrams have been provided for high collision intersections and roadway segments in the City of San Pablo.



Following the understanding and acknowledgement of collision patterns, countermeasures for each of the identified high collision intersections and roadway segments were developed to potentially reduce traffic collisions in the future and ameliorate active transportation within the City. Furthermore, this Local Roadway Safety Plan includes collision data for high collision locations between January 1, 2018 and December 31, 2022, the analysis of collision data, and the proposed countermeasures for collision patterns. Depicted below in Figure 1 is the Local Road Safety Plan process provided by the Federal Highway Administration (FHWA).



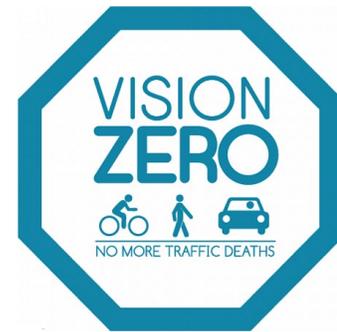
Figure 1: Local Road Safety Plan – Your Map to Safer Roadways



2. Vision and Goals

The objective of this plan is to strive towards a safer transportation environment by analyzing crash data and implementing countermeasures to eliminate traffic fatalities and severe injuries while assuring efficient and equitable mobility for all road users. The City of San Pablo plans to implement systemic countermeasures to target factors affecting citywide prominent intersections and roadways segments. This safety plan aims to reduce the risk of tragedies by taking a proactive, preventative approach that prioritizes traffic safety.

Vision Zero is an initiative approach to eliminate traffic fatalities and severe injuries. However, road users will sometimes make mistakes. Therefore, the road system, traffic control devices, and traffic laws should be designed to minimize those unavoidable mistakes and reduce their probability to result in severe injuries or fatalities. Transportation and traffic engineers are expected to improve the general traffic environment by ameliorating existing traffic geometries and laws based on a good engineering judgement. However, the roadway users of the City of San Pablo are still responsible for their mistakes and should follow all traffic laws.



Source: www.archive.kpcc.org

Vision Zero identifies stakeholders to address the factors causing collisions when it comes to traffic safety. It recognizes that many factors contribute to safe mobility including roadway design, speeds, behaviors, technology, and enforced laws. As a result and as part of this safety plan, it sets goals to achieve zero fatalities and severe injuries.



Source: www.visionzeronetwrok.org

One of the City’s visions is to collaborate with local agencies to promote a culture of continuous transportation safety improvement by coordinating with San Pablo Police Department, Contra Costa Public Health, and West Contra Costa Unified School District.



Source: U.S. Department of Transportation

The aforementioned Vision shall eliminate traffic fatalities and severe injuries by achieving the following goals:

- Obtain accurate collision databases. Systematically identify and prioritize the City’s highest collision locations based on a 5-year collision history.
- Engage with the local community, stakeholders, and City management to better understand factors that are affecting the traffic safety within the City of San Pablo.
- Utilize countermeasure strategies across all traffic safety disciplines, engineering, enforcement, education, emergency medical services, and emerging technologies.
- Strive to reduce the City’s primary contributing factors in traffic collisions by ensuring the automobile right of way, maintaining a safe speed, and clear traffic signals and signs.



3. Safety Partners

To promote and create a safe transportation environment, collaboration across agencies, known as safety partners, is a necessity. Safety partners are the agencies, departments, and organizations whose input and support are foundational to a successful Local Roadway Safety Plan.

The safety leadership team is primarily comprised of City Departments that have key roles in the development, implementation, and operation of safety projects, programs, and policies. The safety leadership team is ultimately responsible for developing, adopting, and implementing the safety plan and program. The stakeholder team is distinguished from the leadership team. It comprises partner agencies and organizations who collaborate with the City and contribute to and assist with developing and implementing the plan. These agencies and their roles in the plan's development and implementation are provided below:

3.1 Safety Leadership

I. City Council

The legislative body which is ultimately responsible for approving and adopting the final plan, setting safety policies, and approving budget and funding levels.

II. Public Works Department

Public Works is the lead City Department in developing and producing the Safety Plan and its periodic updates. The Public Works Department is responsible for assembling other City Departments and collaborating with Stakeholders. Public Works is responsible for capital project implementation. The City's Public Works staff may also lead or collaborate in education campaigns.

III. San Pablo Police Department

The Police Department maintains collision records and is responsible for carrying out enforcement practices and activities. The City's Police Department may also lead or collaborate in education campaigns.



3.2 Stakeholders

I. Contra Costa Fire Department

The County's Fire Department serves in a support role in developing and producing the plan.

II. Contra Costa Transportation Authority (CCTA)

The Contra Costa Transportation Authority (CCTA) works to plan, fund, and implement innovative transit programs that strengthen diverse communities and improve the lives of residents. CCTA is committed to outcomes-based delivery where all projects meet performance targets for reduced traffic, shortened commute times, reduced greenhouse gas emissions, and other mandates and goals.

III. Caltrans District 4

The California Department of Transportation (Caltrans) District 4 is headquartered in Oakland. The counties that are within this district are Sonoma, Napa, Solano, Marin, Contra Costa, Alameda, San Francisco, San Mateo, Santa Clara.

IV. San Pablo Chamber of Commerce

The San Pablo Chamber of Commerce coordinates engagement with City businesses. The Chamber of Commerce provides feedback on recommended strategies and countermeasures to addressing traffic safety issues. Feedback from the Business community can provide valuable insight on the benefits and impacts of safety measures.

V. General Public of the City of San Pablo

The general public provides feedback and insight on recommended emphasis areas, high incident locations, collision factors, countermeasures, and implementation. Although collision records and statistics are foundational to this plan, public feedback is a critical supplement to that data. This feedback provides the safety plan with a holistic view of safety issues and a recommendation for what types of countermeasures are and are not desired by the community.

VI. West Contra Costa Unified School District (WCCUSD)

Collaboration with the West Contra Costa Unified School District to maintain and promote safety for all students within the City of San Pablo.

VII. Association of Bay Area Governments (ABAG)

ABAG is a metropolitan planning organization (MPO) for the Contra Costa region. Member agencies include the County of Alameda, Contra Costa, Marin, Napa, City and County of San Francisco, San Mateo, Santa Clara, Solano, and Sonoma.

VIII. West Contra Costa Transportation Advisory Committee (WCCTAC)

WCCTAC is one of four Regional Transportation Planning Committees in Contra Costa County. The Regional Transportation Planning Committees were created to manage the 1988 Measure C 1/2 cent transportation sales tax projects and programs, and its Extension, Measure J, approved by Contra Costa voters in 2004.

VIII. San Pablo Safety Commission

The commission is comprised of representatives from the Police Department, Public Works Department and members of the community who are appointed by the City Council. The primary duty of the Safety Commission is to discuss traffic related issues affecting the community.



4. Process

This section describes the steps involved in preparing the safety plan, including a systemic approach that involves the analysis of collision data to identify high crash locations and prioritize countermeasures.



4.1 Systemic Approach

The systemic approach in preparing the safety plan comprises the following steps:

I. Develop Plan Goals and Objectives

Review the City’s existing planning documents to ensure the LRSP visions and goals align with planning effort and that the potential 5Es: Engineering, Education, Enforcement, Emergency Medical Services, and Emerging Technologies are consistent with local traffic safety and policies.

II. Analyze Collision Data

Obtain the latest 5-year collision data and analyze the collision factors. Determine high-risk intersections and roadway segments and identify significant risk factors.

III. Determine Focus Areas and Identify Crash Reduction Measures

Identify emphasis areas and recommend feasible countermeasures at high-risk locations. Evaluate Crash Reduction Factor (CRF) and the effectiveness of each countermeasure.

IV. Prioritize countermeasures/projects

Conduct Benefit-Cost Ratio (BCR) analysis on all countermeasures and projects. Prioritize projects that are most beneficial to the City’s roadway and intersection safety using BCR.

V. Prepare the Local Roadway Safety Plan

Prepare the LRSP that includes effective and efficient measures and implementation plan. Identify priority projects for state or federal programming, grant funding opportunities, and implementation.



4.2 Public Outreach

The purpose of public outreach is to acquire the community's concerns that are related to the safety of traffic. Such concerns may include speeding, jay walking, traffic signs and signals, pedestrian and bicycle safety on collector roads, and arterial streets. Public outreach is an essential tool to identify and summarize high-risk locations and collision factors based on the community's concerns in addition to the collision analysis.

The target audience for the public outreach of this safety plan include the following:

- **San Pablo City Council**
- **San Pablo Public Works**
- **San Pablo Police Department**
- **Contra Costa Fire Department**
- **West Contra Costa Unified School District**
- **Caltrans District 4**
- **Association of Bay Area Governments (ABAG)**
- **Contra Costa Transportation Authority (CCTA)**
- **San Pablo Chamber of Commerce**
- **West Contra Costa Transportation Advisory Committee (WCCTAC)**
- **San Pablo Safety Commission**
- **General Public of the City of San Pablo**



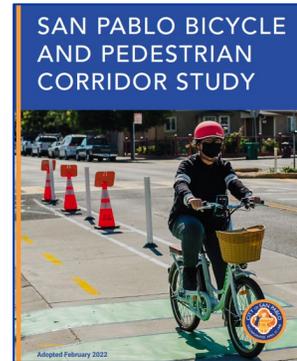
5. Existing Efforts

This section summarizes the findings from various planning documents for the City of San Pablo. The purpose of reviewing existing planning efforts is to ensure the LRSP goals and objectives along with recommended improvements are aligned with recent planning efforts for transportation safety.

The City of San Pablo has identified several goals and policies from the following documents:

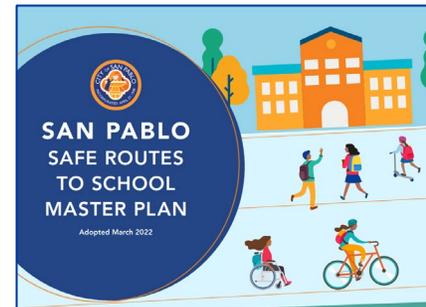
- **City of San Pablo Bicycle and Pedestrian Corridor Study (2022)**

This Report builds upon the recommendations and findings of previous planning efforts concerned with walking and bicycling (active transportation) in San Pablo, most notably the 2017 San Pablo Bicycle and Pedestrian Master Plan (BPMP). This Corridor Study is the result of over a year of robust community engagement and detailed analysis of existing conditions. By using this Report as a blueprint, the City will be well equipped to expand its active transportation network, thereby providing residents with comfortable, convenient, and healthy alternatives to driving.



- **City of San Pablo Safe Routes to School Master Plan (2022)**

The purpose of this Safe Routes to School Master Plan (SR2S Plan) is to identify ways to make walking and bicycling safer, more comfortable, and more enjoyable for students, families, and school staff in San Pablo. Safe Routes to School (SR2S) is an international movement that uses programming and infrastructure to improve safety and encourage students to walk and bicycle to school. This evaluation was centered around virtual and in person walk audits that allowed students, families, teachers, and principals to document their experiences walking and bicycling to school.





6. Data Analysis and Summary

This section summarizes the results of a citywide collision analysis for the time period between January 1, 2018 and December 31, 2022. The purpose of studying the collision patterns and trends is to identify the factors that caused collisions to occur within the study timeframe. The focus is to identify high crash locations in the City in order to target the factors that are affecting these prominent locations.

As part of the City's Local Roadway Safety Plan, data that displays collisions on State Routes or Interstate Freeways will be part of the overall data presentation. However, countermeasures on intersections and roadway segments will be performed only on San Pablo's local roadways. Therefore, data used and analyzed on the selection of top intersections and roadway segments will be 100% within city boundaries and on local roads.

6.1 Overall Summary

According to the California Highway Patrol (CHP) Statewide Integrated Traffic Records System (SWITRS) as of June 23, 2023, during the period of January 1, 2018 to December 31, 2022, there were 1,823 collisions in total, where collisions included fatal, serious injury, visible injury, complaint of pain, and property damage only (PDO). In regards to location, 1,206 collisions occurred on local roadways and 617 occurred on state highways. Of the total number of crashes that happened, there were 13 victims killed and 800 victims injured. There were 87 pedestrian collisions, 34 bike collisions, and 41 motorcycle collisions. Maps from the University of California, Berkeley Transportation Injury Mapping System (TIMS) displaying Non-PDO collisions by point as well as by cluster are shown in Figures 2 and 3 respectively.

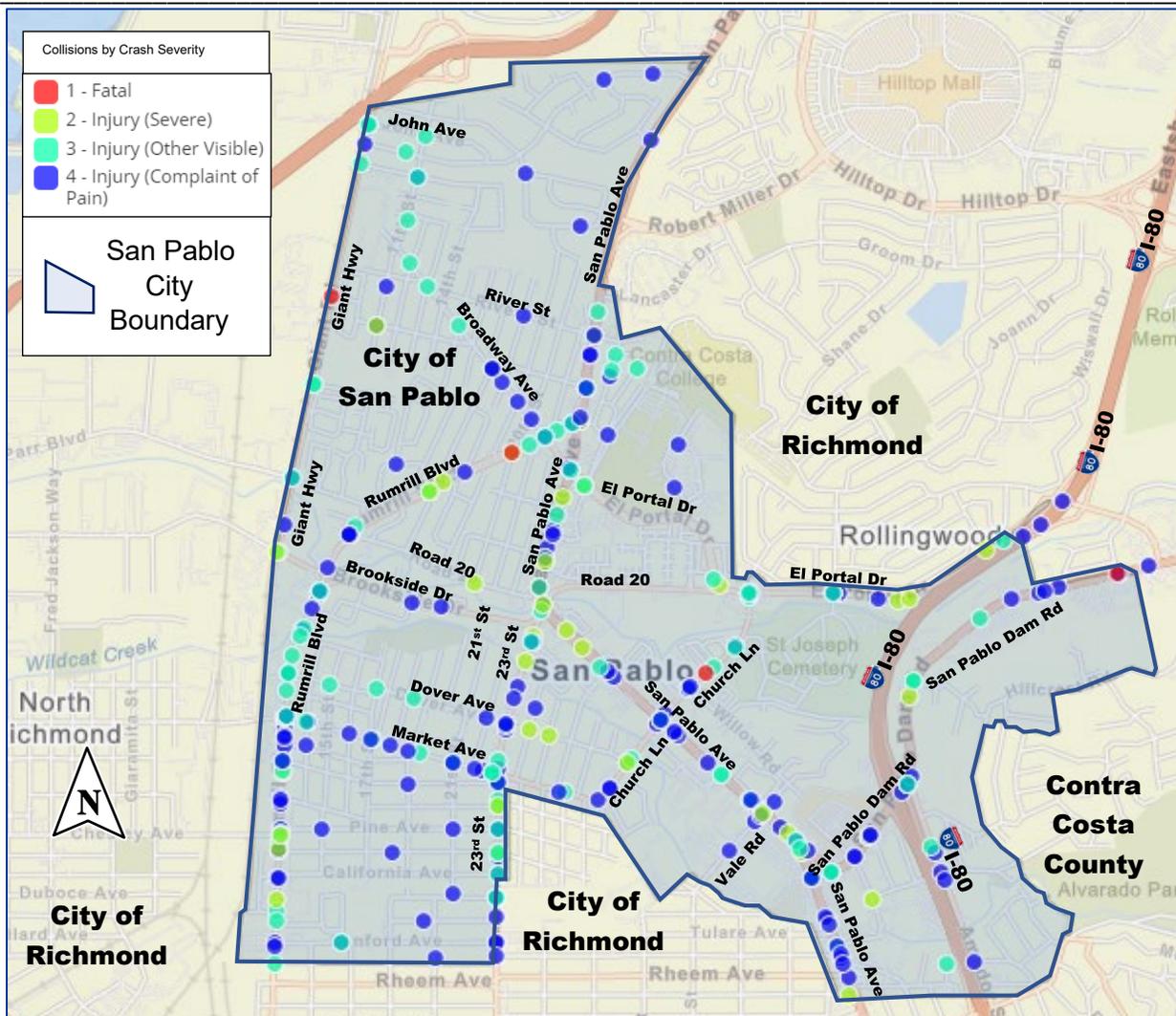


Figure 2: City of San Pablo Display of Collisions by Point (State Data Omitted)
 (January 1, 2018 – December 31, 2022)

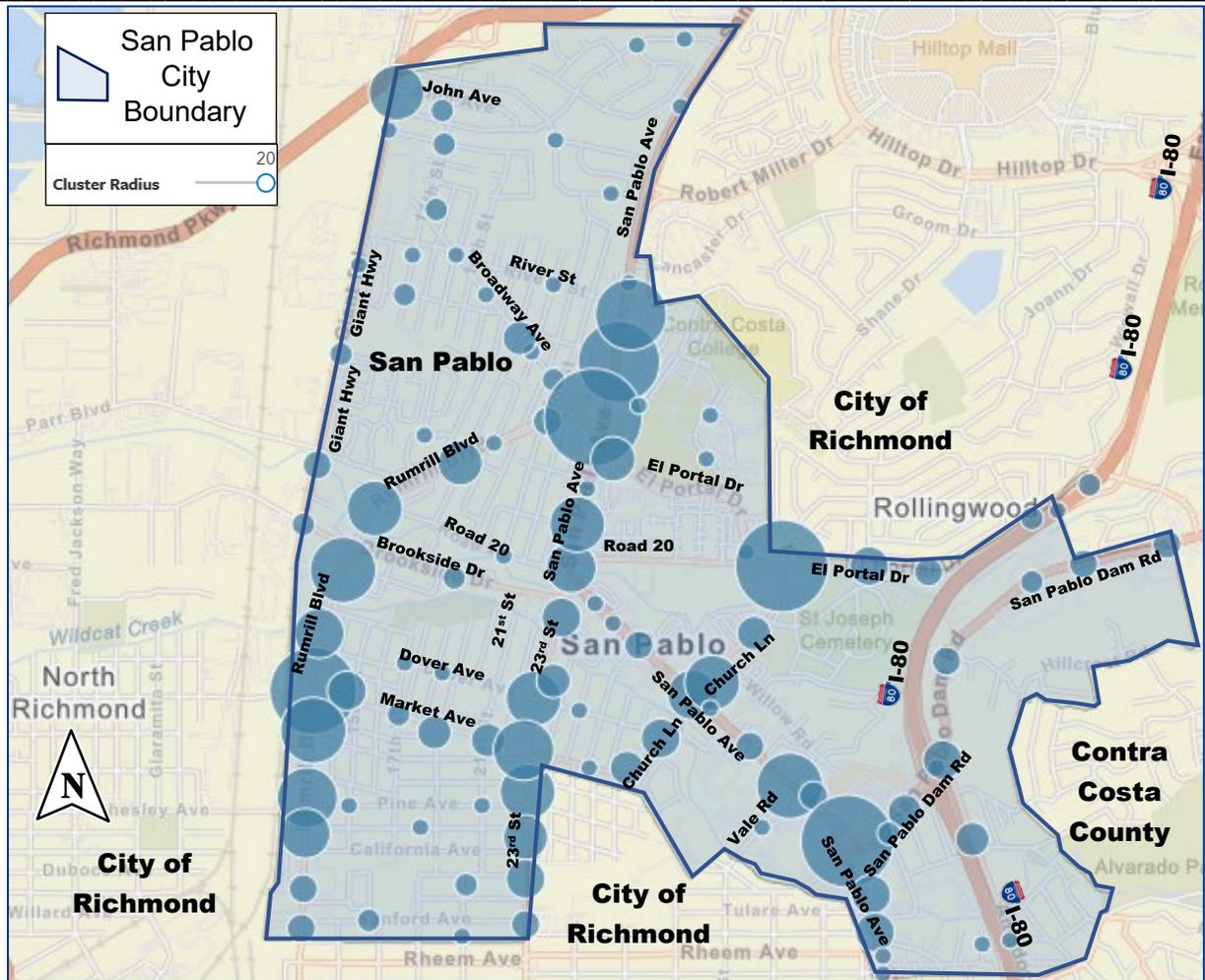


Figure 3: City of San Pablo Display of Collisions by Cluster (State Data Omitted)
 (January 1, 2018 - December 31, 2022)

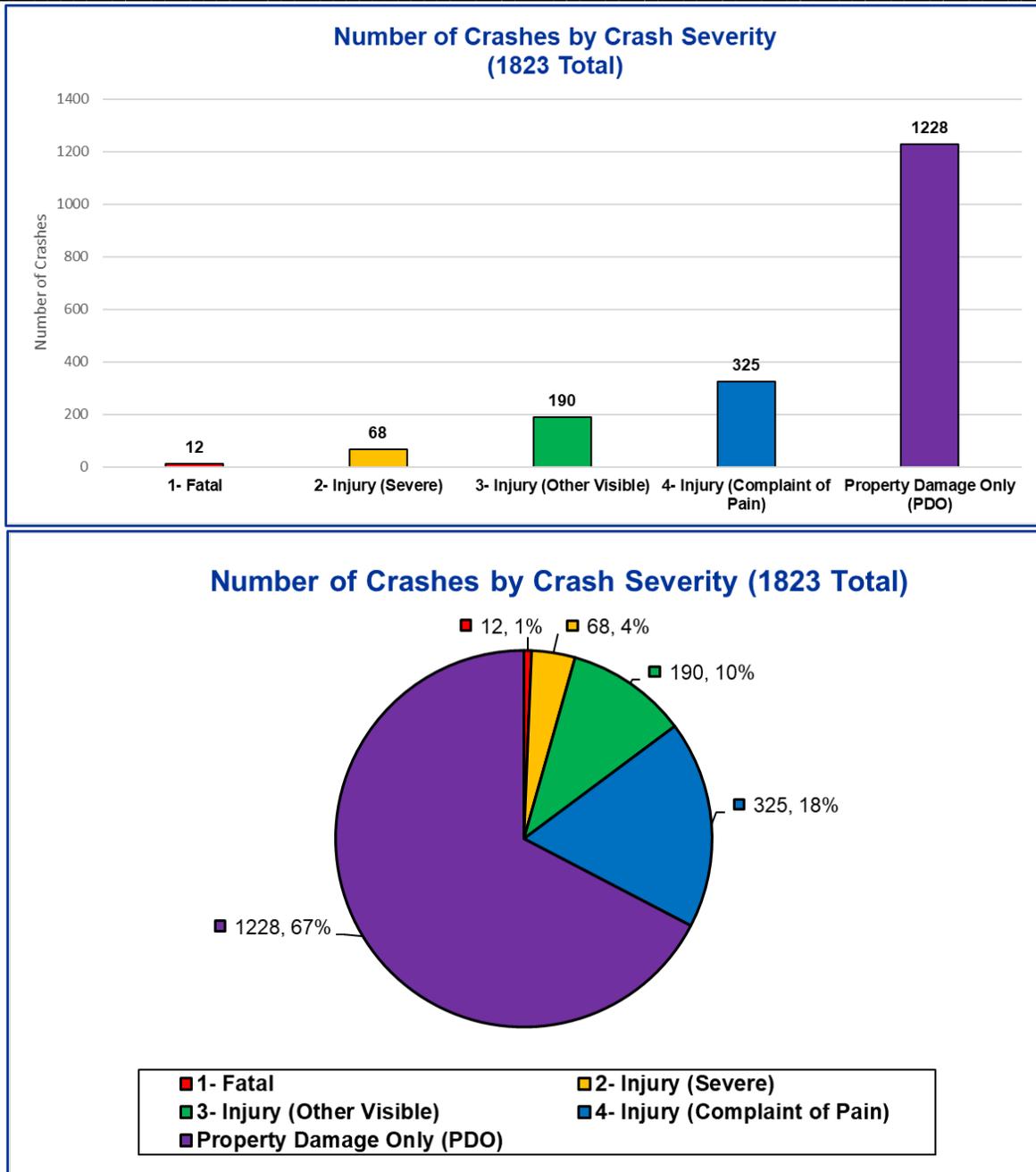


Figure 4: City of San Pablo Number of Crashes by Crash Severity
(January 1, 2018 - December 31, 2022)

Figure 4 displays number of crashes by crash severity, where the data is retrieved from California Highway Patrol (CHP) Statewide Integrated Traffic Records System. From 2018 to 2022, there were 12 fatal collisions, which was 1% of total collisions; 68 injury (severe) collisions, which was 4% of total collisions; 190 injury (other visible) collisions (10% of total collisions); 325 injury (complaint of pain) collisions (18%), and 1228 property damage only collisions (67%), which represented the greatest number of collisions in the 5-year span.



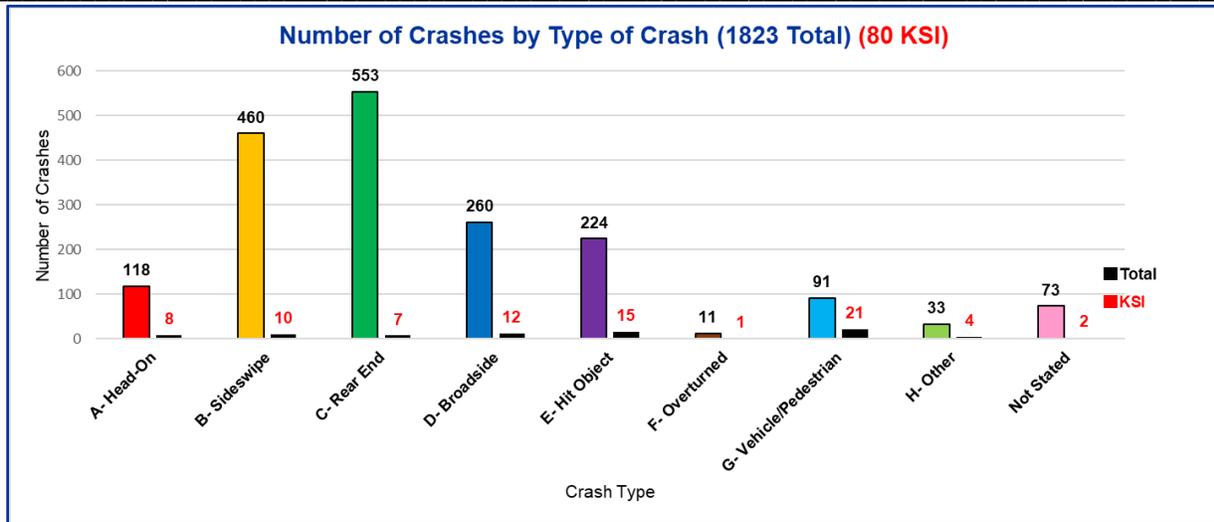


Figure 5: City of San Pablo Number of Crashes by Type of Crash
 (January 1, 2018 - December 31, 2022)

From 2018 to 2022, City of San Pablo’s types of collision were reported by California Highway Patrol’s (CHP) Statewide Integrated Traffic Records System SWITRS database. There were 533 Rear End collisions during the selected period. This was the most common type of collision, which was 30% of total collisions in the City of San Pablo. Sideswipe was the second most common type, which was 25% of the total (460 collisions). There were 260 Broadside, making it the third common type of collision (14% of the total). Within the 1823 total crashes, there were 80 Killed or Severely Injured (KSI) Crashes. 21 crashes of which were Vehicle/Pedestrian related, 15 were Hit Object, and 12 due to Broadside.



Table 1: Number of Crashes per Day of Week per Time
(January 1, 2018 - December 31, 2022)

Total Crashes (1,823)

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Scale
00:00 - 02:59	13	7	14	11	16	37	37	0
03:00 - 05:59	17	16	6	15	11	19	20	
06:00 - 08:59	31	50	34	40	33	23	29	20
09:00 - 11:59	24	36	42	32	26	16	21	
12:00 - 14:59	26	38	31	30	44	36	35	40
15:00 - 17:59	50	62	66	48	73	43	41	
18:00 - 20:59	50	43	44	49	49	43	36	60
21:00 - 23:59	24	24	25	26	36	43	29	
25:00 - Unknown	0	0	0	1	1	1	0	80

KSI Crashes* (80)

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Scale
00:00 - 02:59	0	0	1	1	1	4	0	0
03:00 - 05:59	2	2	1	2	0	3	0	1
06:00 - 08:59	0	2	0	0	1	1	2	
09:00 - 11:59	1	2	2	0	0	0	2	2
12:00 - 14:59	1	1	1	1	0	1	0	
15:00 - 17:59	1	3	3	2	4	1	0	4
18:00 - 20:59	2	2	0	3	6	4	0	
21:00 - 23:59	1	2	1	3	5	1	1	6
25:00 - Unknown	0	0	0	0	0	0	0	

*Killed and Severely Injured (KSI) Crashes are included in the Total Number of Crashes (1,823)

Collisions in the City of San Pablo were listed for different time periods for each day of the week. 13 collisions occurred on a Monday for the time period from 00:00 to 02:59 and 17 collisions from 03:00 to 05:59. There were 31 collisions from 06:00 to 08:59 and 24 collisions from 09:00 to 11:59. There were 26 collisions that occurred in the time period of 12:00 to 14:59, 50 collisions from 15:00 to 17:59, and 50 collisions from 18:00 to 20:59, which were the most on Mondays and 24 collisions from 21:00 to 23:59. The total amount for Monday was 235 collisions.

Tuesday from 00:00 to 02:59, there were 7 collisions, 16 collisions from 03:00 to 05:59, 50 collisions from 06:00 to 08:59, and 36 collisions from 09:00 to 11:59. In the afternoon, there were 38 collisions that occurred from 12:00 to 14:59, 62 collisions from 15:00 to 17:59, which was the most for Tuesday; 43 collisions from 18:00 to 20:59, and 24 collisions from 21:00 to 23:59. There were 276 collisions in total for Tuesday, making it the second highest of the week.

On Wednesdays, there were 14 collisions from 00:00 to 02:59 and 6 collisions from 03:00 to 05:59. 34 and 42 collisions occurred from 06:00 to 08:59 and 09:00 to 11:59. 31 collisions occurred during the periods between 12:00 to 14:59 and 66 collisions from 15:00 to 17:59, the



highest of Wednesday. 44 collisions occurred from 18:00 to 20:59 and 25 collisions occurred during the time of 21:00 to 23:59. Wednesday had 262 collisions, making it the third highest day of collisions.

Thursdays had 11 collisions from 00:00 to 02:59, 15 collisions from 03:00 to 05:59, 40 collisions from 06:00 to 08:59, 32 collisions from 09:00 to 11:59, 30 collisions from 12:00 to 14:59, 48 collisions from 15:00 to 17:59, and 49 collisions from 18:00 to 20:59. Lastly, there were 26 collisions from 21:00 to 23:59, making a total of 252 collisions for Thursday.

On Friday, there were 16 collisions from 00:00 to 02:59, 11 collisions from 03:00 to 05:59, 33 collisions from 06:00 to 08:59, and 26 collisions from 09:00 to 11:59. Additionally, 44 collisions occurred from 12:00 to 14:59 and 73 collisions from 15:00 to 17:59, which was the most of any time and day of the week. 49 collisions occurred from 18:00 to 20:59 and 36 collisions from 21:00 to 23:59. This makes Friday having the highest number of collisions (289) of the week.

On Saturdays, 37 collisions occurred from 00:00 to 02:59, 19 collisions from 03:00 to 05:59, and 23 collisions from 06:00 to 08:59. 16 collisions occurred from 09:00 to 11:59 and 36 collisions from 12:00 to 14:59. Lastly, 43 collisions occurred from 15:00 to 17:59, 18:00 to 20:59, and 21:00 to 23:59 which were the most for Saturday, totaling 261 collisions.

There were 37 collisions recorded from 00:00 to 02:59, 20 collisions from 03:00 to 05:59, and 29 collisions from 06:00 to 08:59 on Sunday. 21 collisions occurred from 09:00 to 11:59, 35 collisions from 12:00 to 14:59, 41 collisions from 15:00 to 17:59, and 36 collisions from 18:00 to 20:59. Lastly, there were 29 collisions that occurred from 21:00 to 23:59. This gives Sunday with a total of 248 collisions.

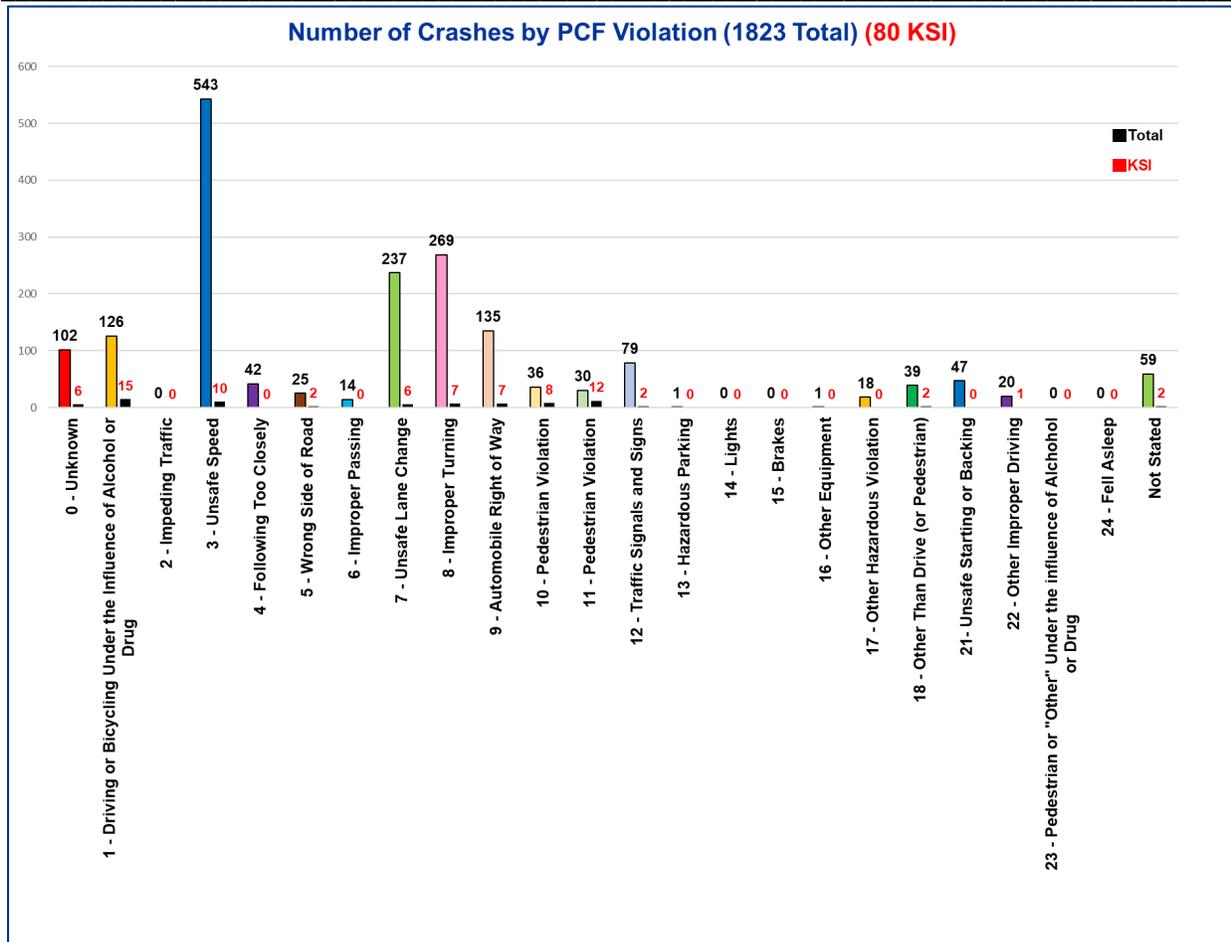


Figure 6: Number of Crashes by (PCF) Primary Crash Factor Violation
 (January 1, 2018 - December 31, 2022)

According to CHP SWITRS, the Primary Collision Factor (PCF) violation that caused the most collisions in the City of San Pablo (1823 Crashes Total) was Unsafe Speed, which resulted in 523 collisions (30%). The second most being 269 collisions were reported with PCF violation Improper Turning (21%). Unsafe lane change made up of 237 collisions (13%), being the third most. Out of the 80 Killed or Severely Injured crashes, 15 was due to Driving or Bicycling Under the Influence of Alcohol of Drug, 12 was due to Pedestrian Violation, and 10 was due to Unsafe Speed.

6.2 Victim Summary

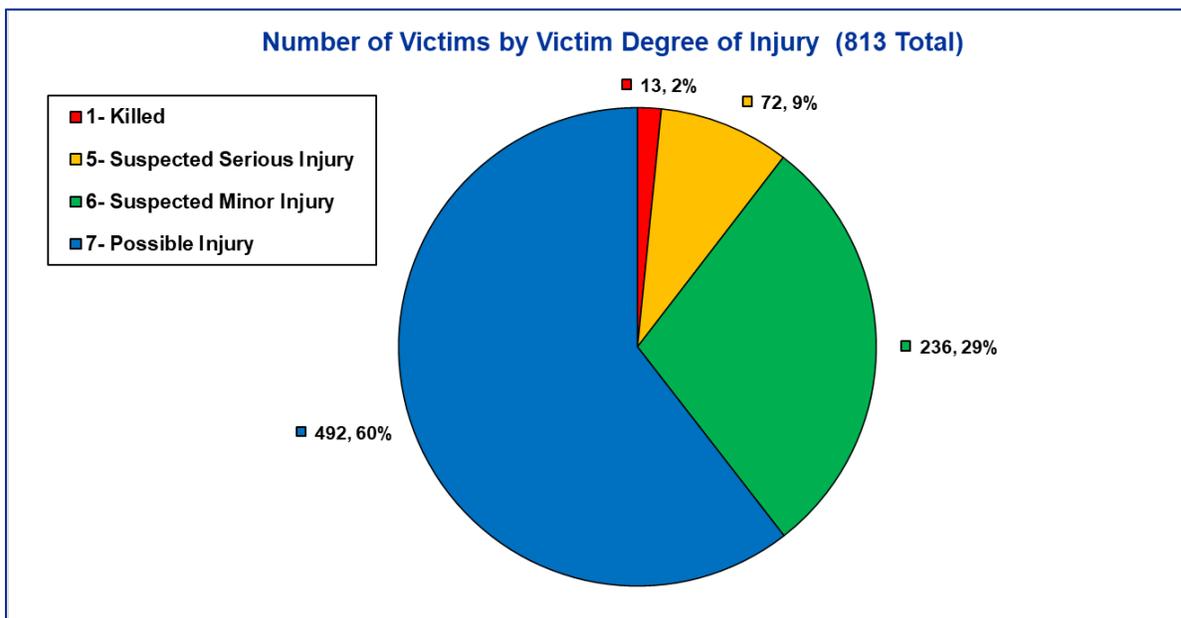
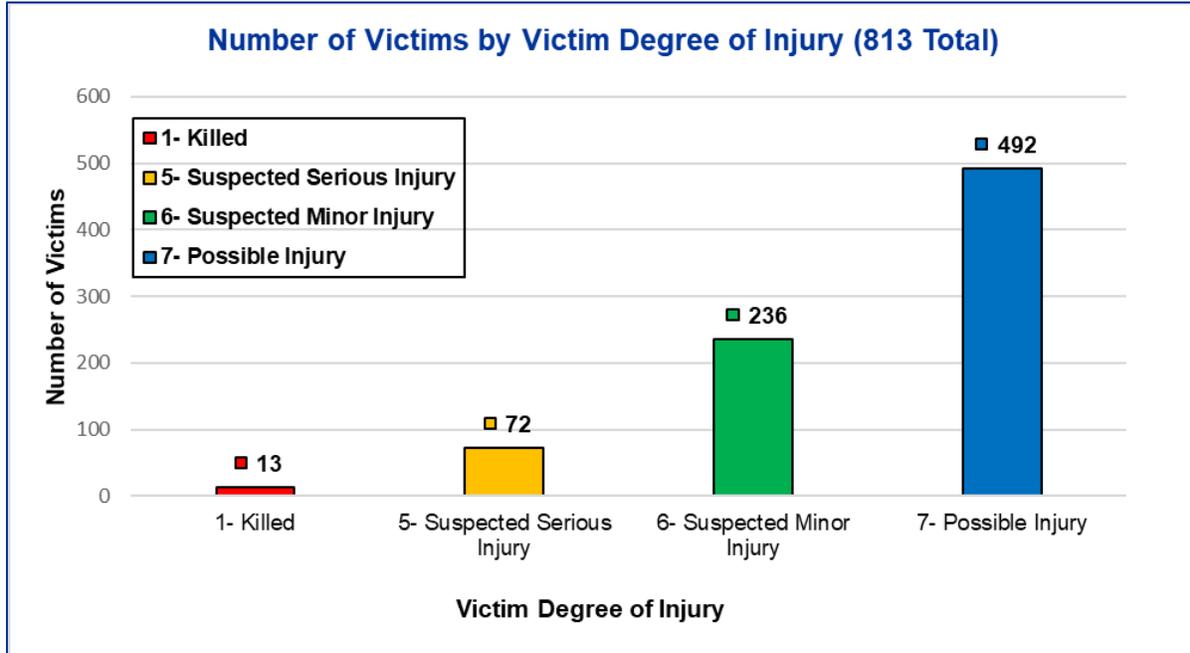


Figure 7: Number of Victims by Victim Degree of Injury
(January 1, 2018 - December 31, 2022)

There were 813 injured victims of traffic collisions in the City of San Pablo from 2018 to 2022. 13 victims were killed (2%), 72 victims reported with suspected serious injury (9%), 236 victims reported with suspected minor injury (29%), and 492 victims were reported with possible injury (60%).

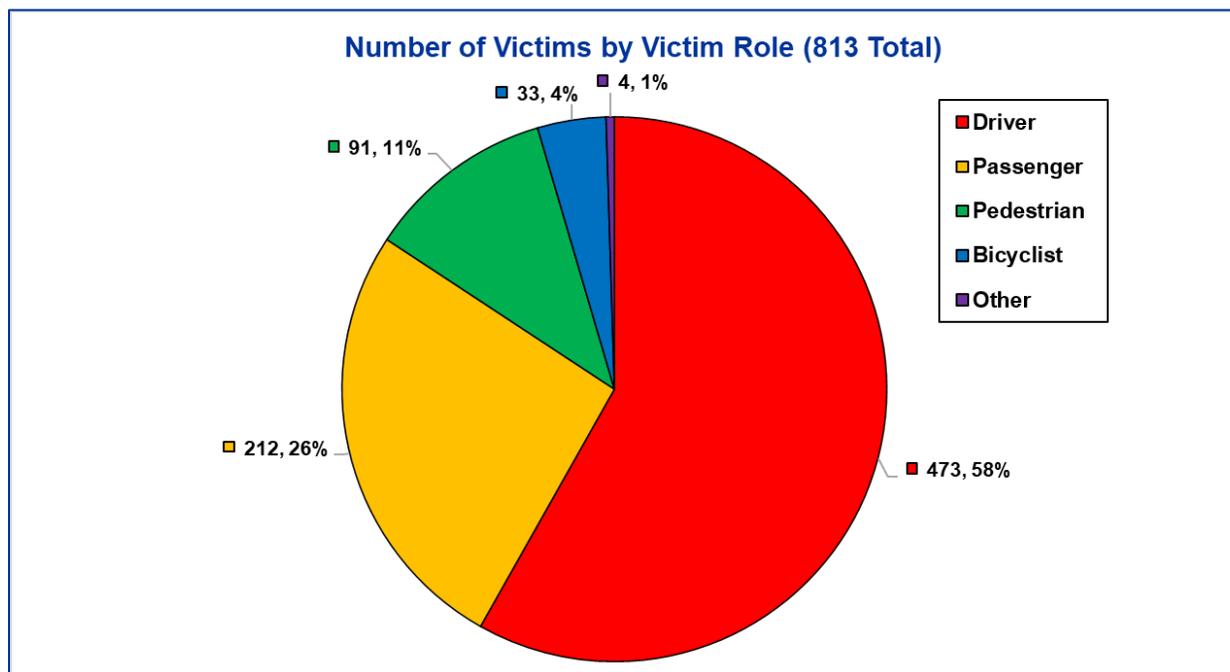
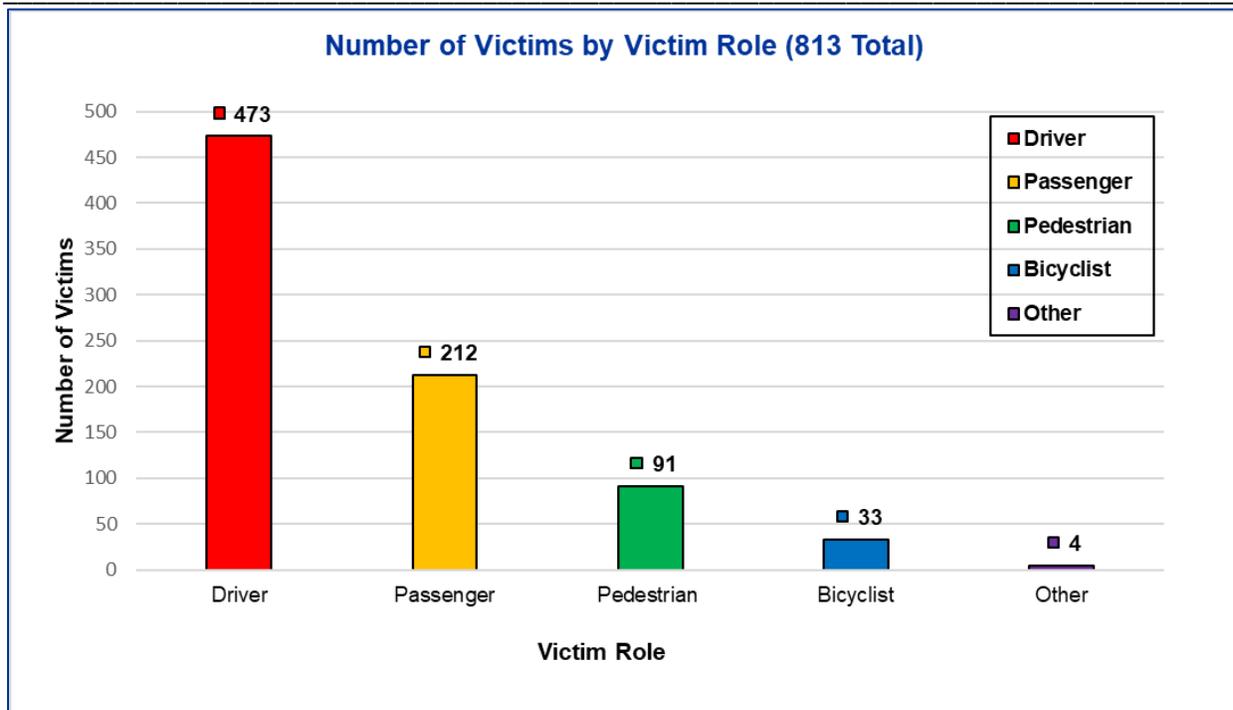


Figure 8: Number of Victims by Victim Role
(January 1, 2018 - December 31, 2022)

According to University of California, Berkeley Transportation Injury Mapping System (TIMS), of the collision injured victims, 473 were drivers (58%), 212 were passengers (26%), 91 were pedestrians (11%), 33 were bicyclists (4%), and 4 were other (1%).

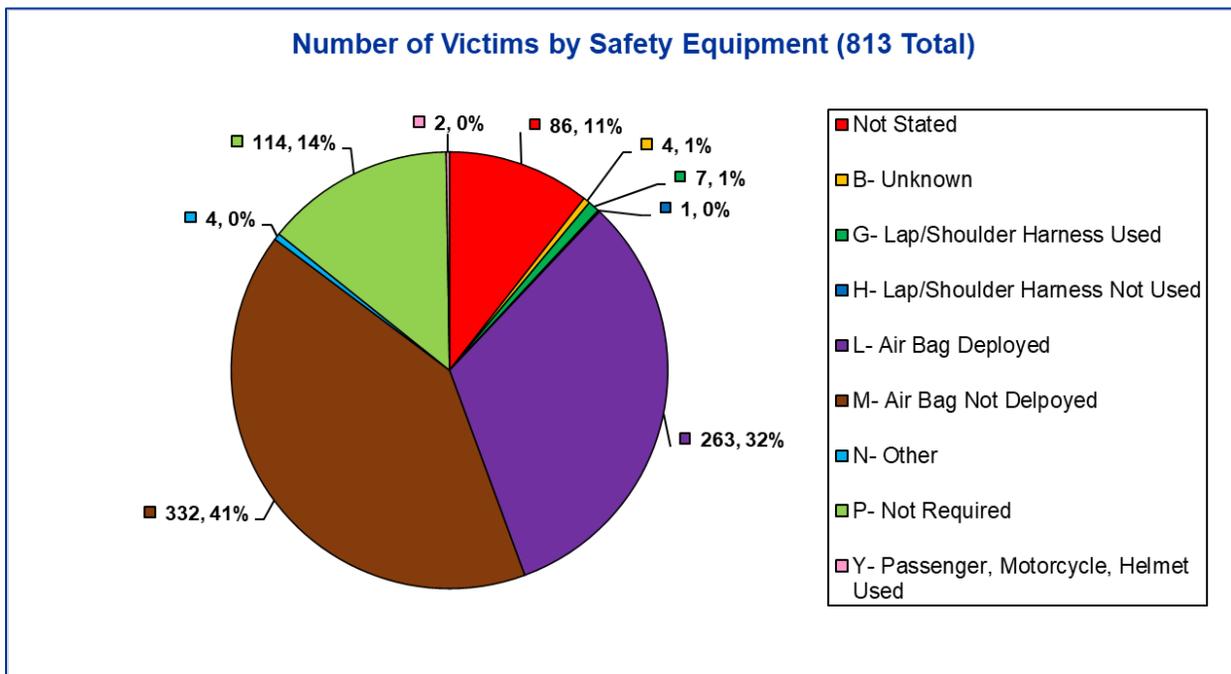
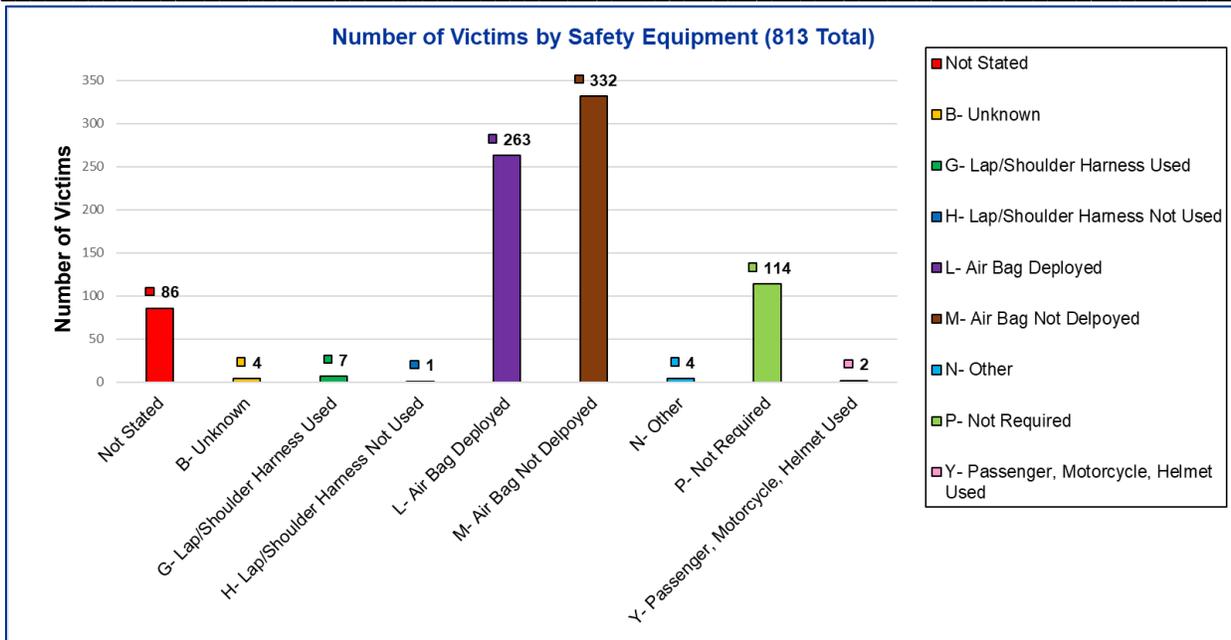
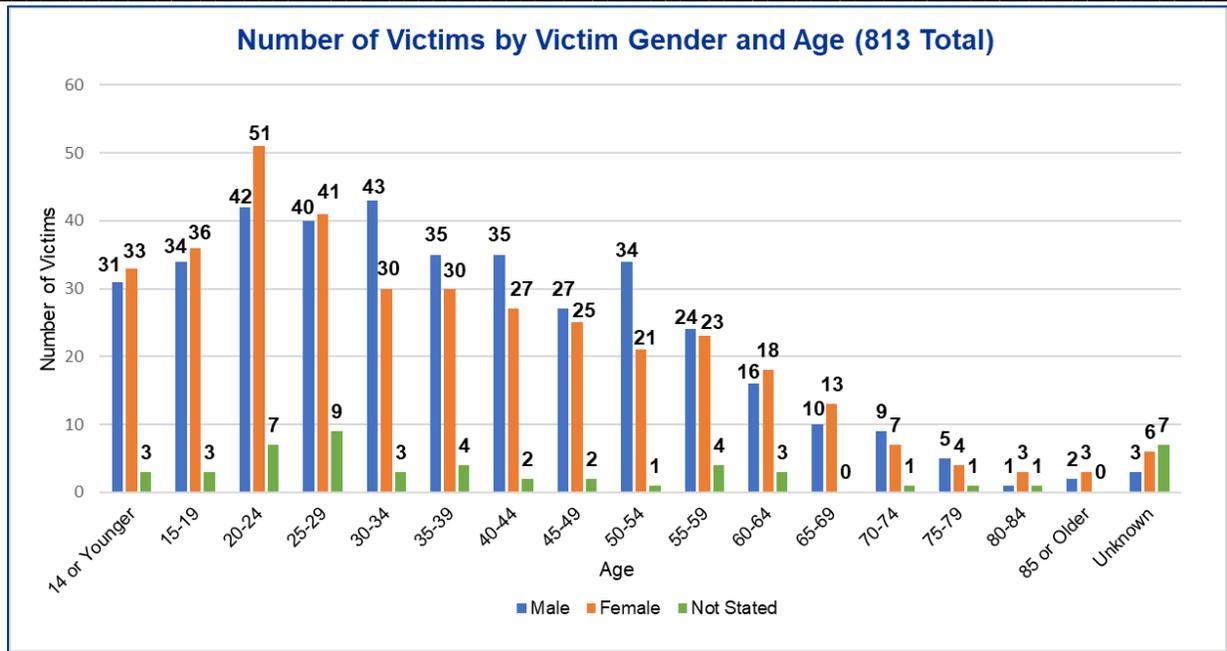


Figure 9: Number of Victims by Victim Safety Equipment
 (January 1, 2018 - December 31, 2022)

According to University of California, Berkeley Transportation Injury Mapping System (TIMS), the top 3 number of victims by safety equipment were 332 air bag not deployed (41%), 263 air bag deployed (32%), and 114 were “not required” (14%).

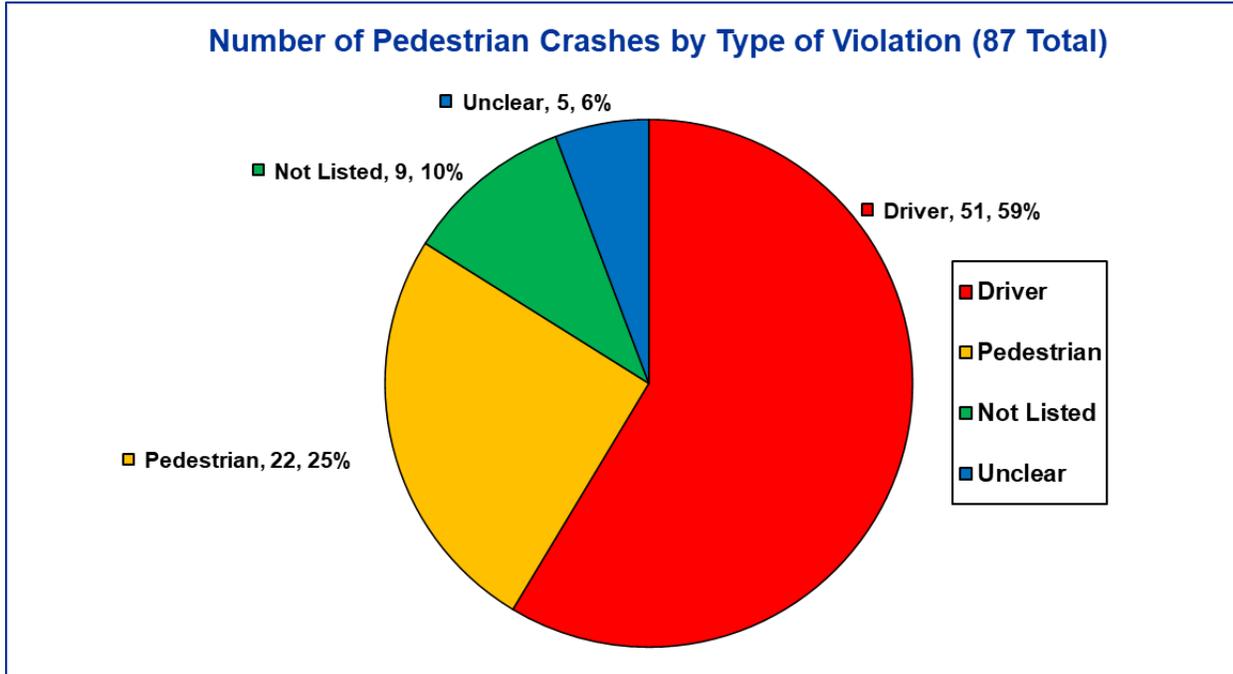


**Figure 10: Number of Victims by Victim Gender and Age
(January 1, 2018 - December 31, 2022)**

For the total of 813 victims during the 5-year period, 36% of victims were females, 48% were males, and 6% were not stated. 67 victims were 14 years old or younger, 73 victims were 15-19 years old, 100 victims were 20-24 years old, which was the highest number of victims for this age range. 90 victims were 25-29 years old, 76 victims were 30-34 years old, 69 victims were 35-39 years old, 64 victims were 40-44 years old. 54 victims were in the age range of 45-49 years old, 56 victims were in the age range of 50-54 years old, 51 victims were in the age range of 55-59 years old, and 37 victims were in the age range of 60-64 years old. 23 victims were 65-69 years old, 17 victims were 70-74 years old, and 10 were 75-79 years old. Lastly, 5 victims were at the age between 80-84 years old, 5 victims age 85 or higher, and 16 unknowns.



6.3 Pedestrian Crash Summary



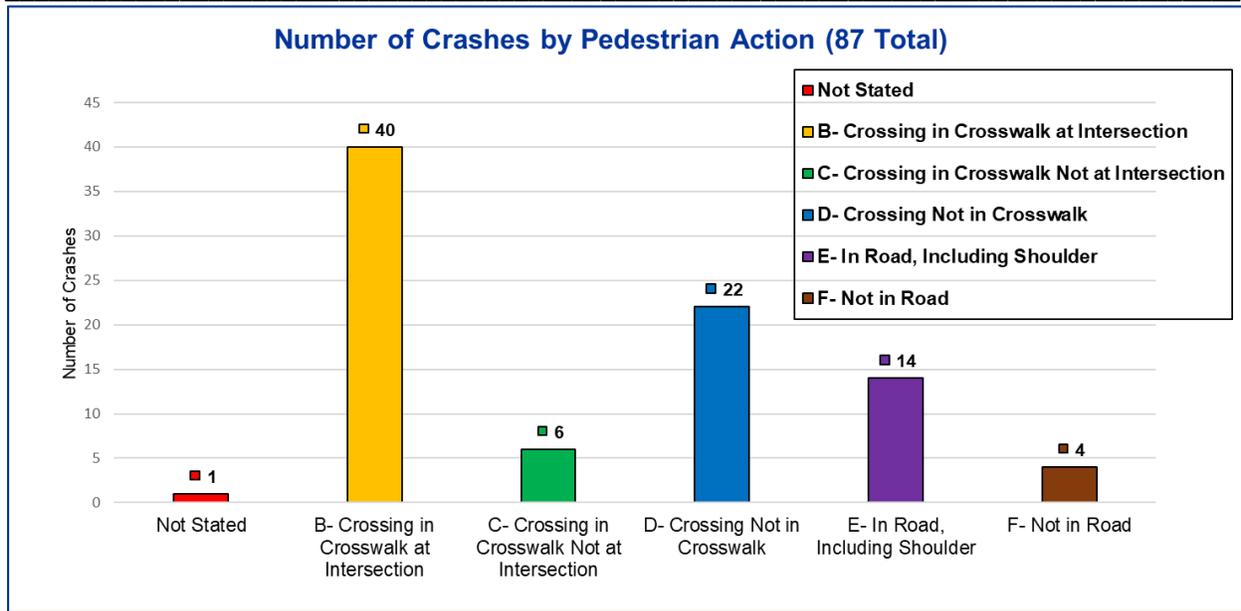
Party Violation Classification	Type of Violation	Description	Count	%
Driver	21950	Driver failure to yield right-of-way to pedestrians at a marked or unmarked crosswalk	31	35.63%
Driver	22350	Speeding on the highway / Driving at a dangerously high speed given highway conditions like weather, visibility, traffic, and highway measurements, or driving at a speed that endangers people or property	5	5.75%
Driver	22450	Driver failure to stop at a stop sign before a limit line (a crosswalk or intersection entrance). Failure to stop at limit line before a railroad	3	3.45%
Driver	21453	Failure to stop at limit line or crosswalk at a red light. Failure to yield right-of-way to pedestrian when turning on a red light	2	2.3%
Driver	21755	Failure to pass safely on the right	2	2.3%
Driver	21804	Driver failure to yield right-of-way when entering/crossing a highway	2	2.3%
Driver	21952	Driver failure to yield right-of-way to pedestrians on sidewalks	2	2.3%
Driver	22106	Unsafe starting or backing of a vehicle on a highway	2	2.3%
Driver	12500	Failure to operate a motor vehicle with a valid driver's license	1	1.15%



Driver	20001	Failure to stop in a collision resulting in injury or death (commonly known as hit-and-run)	1	1.15%
Pedestrian	21954	Pedestrian failure to yield right-of-way to vehicles when crossing outside of a marked or unmarked crosswalk	15	17.24%
Pedestrian	21955	Pedestrian failure to cross at crosswalks between adjacent traffic signal-controlled intersections	4	4.60%
Pedestrian	21456	Pedestrian failure to yield right-of-way at traffic signal / Failure of pedestrian to yield right-of-way to vehicles already in intersection Failure to obey crosswalk symbols or finish crossing before "countdown" ends	3	3.45%
Not Listed	Not Listed	Violation code was not included in the crash	9	10.34%
Unclear	22107	Unsafe turning or moving right or left on a roadway Turning without signaling	2	2.3%
Unclear	23152	Driving under the influence of alcohol (BAC 0.08+) or drugs	1	1.15%
Unclear	23153	Driving under the influence of alcohol or drugs, resulting in injury to another person	1	1.15%
Unclear	21650	Failure to drive/ride on right half of the roadway (with some exceptions)	1	1.15%
Total			87	100%

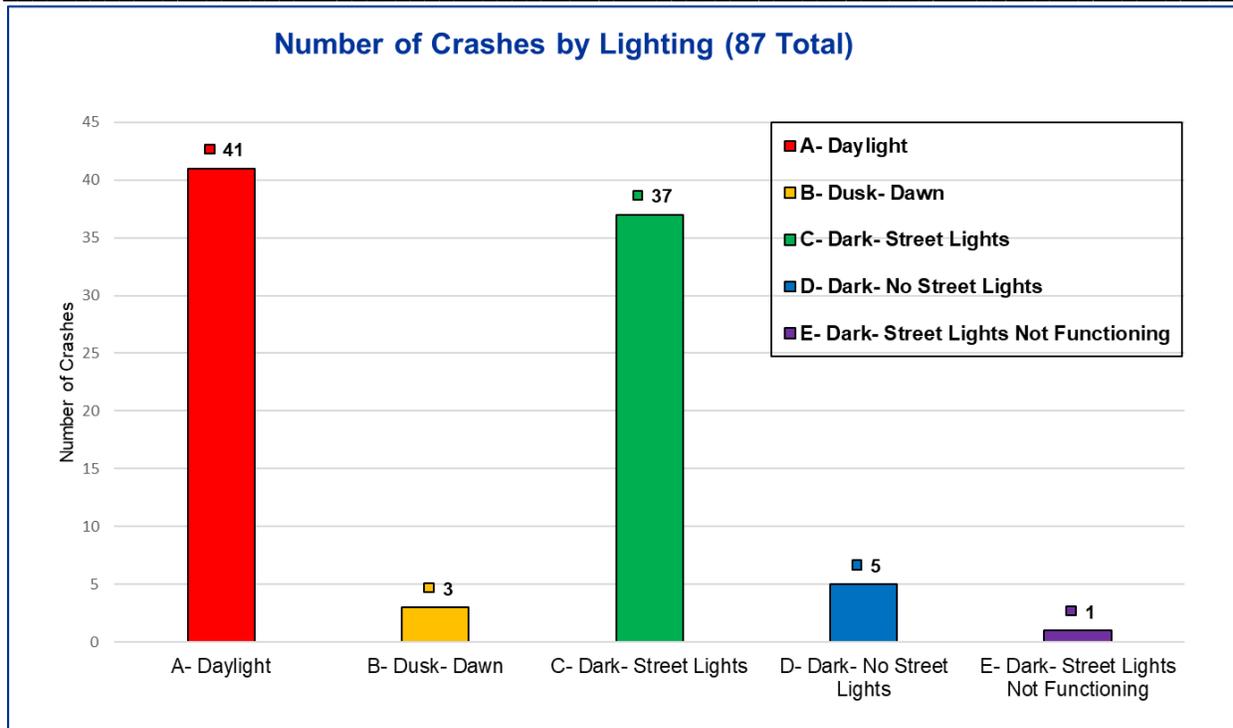
Figure 11: City of San Pablo Number of Crashes by Type of Violation

University of California, Berkeley Transportation Injury Mapping System (TIMS)
 (January 1, 2018 - December 31, 2022)



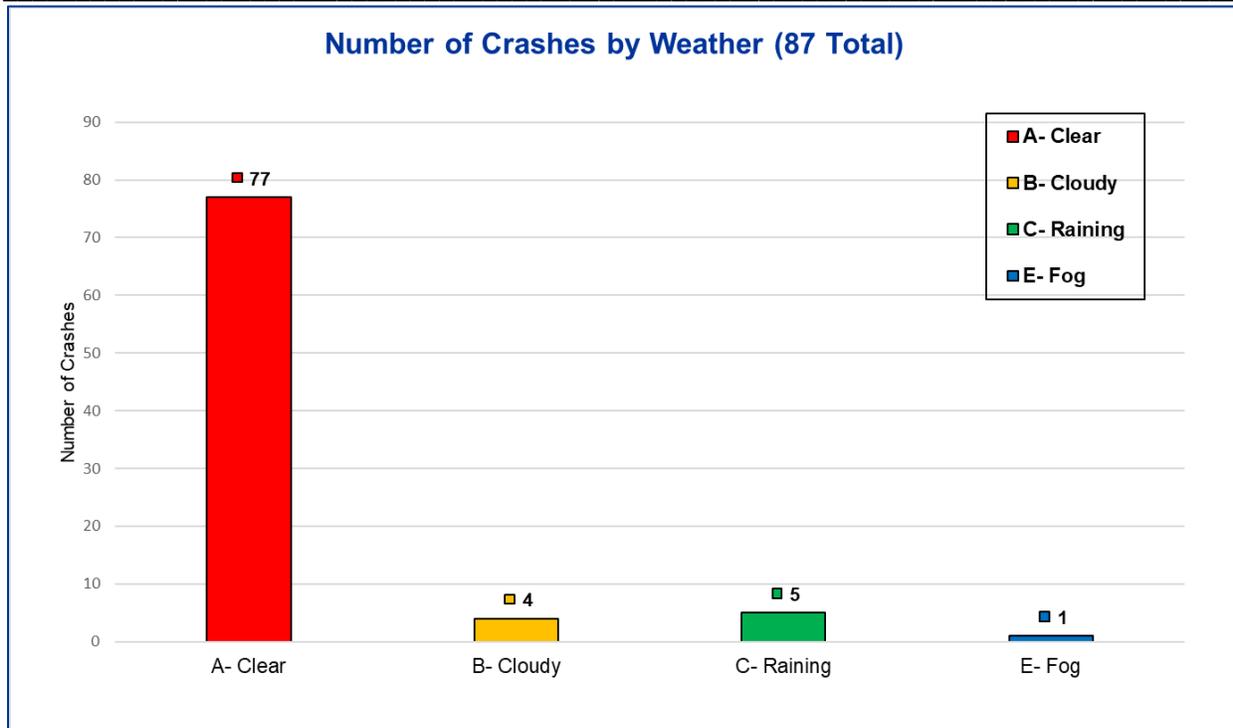
Pedestrian Action	Count	%
-Not Stated	1	1%
B - Crossing in Crosswalk at Intersection	40	46%
C - Crossing in Crosswalk Not at Intersection	6	7%
D - Crossing Not in Crosswalk	22	25%
E - In Road, Including Shoulder	14	16%
F - Not in Road	4	5%
Total	87	100%

Figure 12: City of San Pablo Number of Crashes by Pedestrian Action
University of California, Berkeley Transportation Injury Mapping System (TIMS)
(January 1, 2018 - December 31, 2022)



Lighting	Count	%
A - Daylight	41	47%
B- Dusk – Dawn	3	3%
C - Dark - Street Lights	37	43%
D - Dark - No Street Lights	5	6%
E - Dark – Street Lights Not Functioning	1	1%
Total	87	100%

Figure 13: City of San Pablo Number of Crashes by Lighting
University of California, Berkeley Transportation Injury Mapping System (TIMS)
(January 1, 2018 - December 31, 2022)



Weather	Count	%
A - Clear	77	88.51%
B - Cloudy	4	4.6%
C - Raining	5	5.75%
E - Fog	1	1.15%
Total	87	100%

Figure 14: City of San Pablo Number of Crashes by Weather
University of California, Berkeley Transportation Injury Mapping System (TIMS)
(January 1, 2018 - December 31, 2022)



6.4 Active Transportation Program (ATP) Summary Data & Maps

From 2018 to 2022 there were 87 pedestrian collisions and 34 bicycle collisions. Of the 87 pedestrian collisions, there were 4 fatalities, 23 severe injuries, 30 were visible injuries, and 30 complaint of pain. Of the 34 bicycle collisions, there were 2 fatalities, 4 were severe injury, 15 were visible injuries, and 13 were complaint of pain. The following figures display the City’s ATP heat and hexagonal grid map.

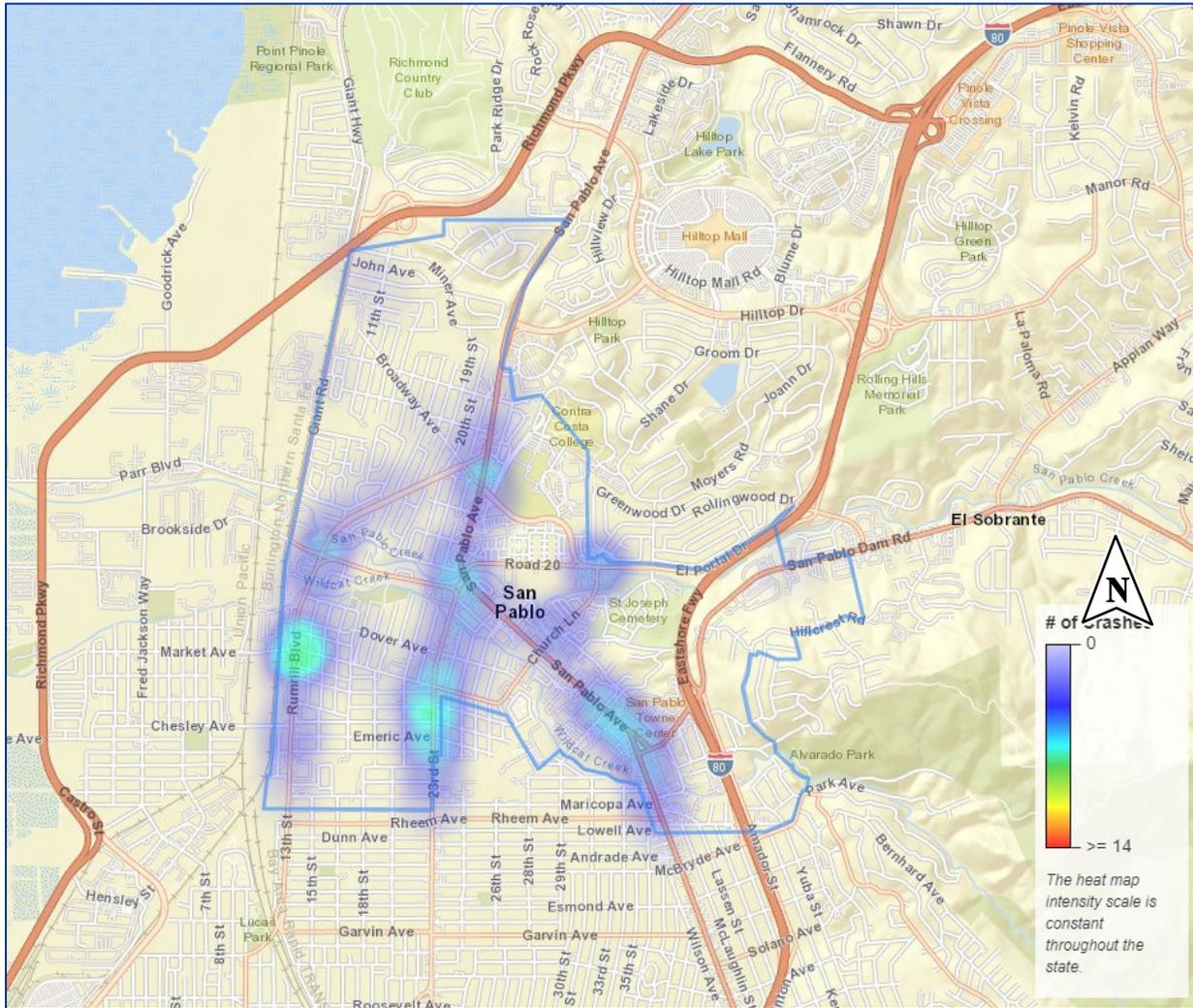


Figure 15: City of San Pablo Active Transportation Program Heat Map (January 1, 2018 - December 31, 2022)

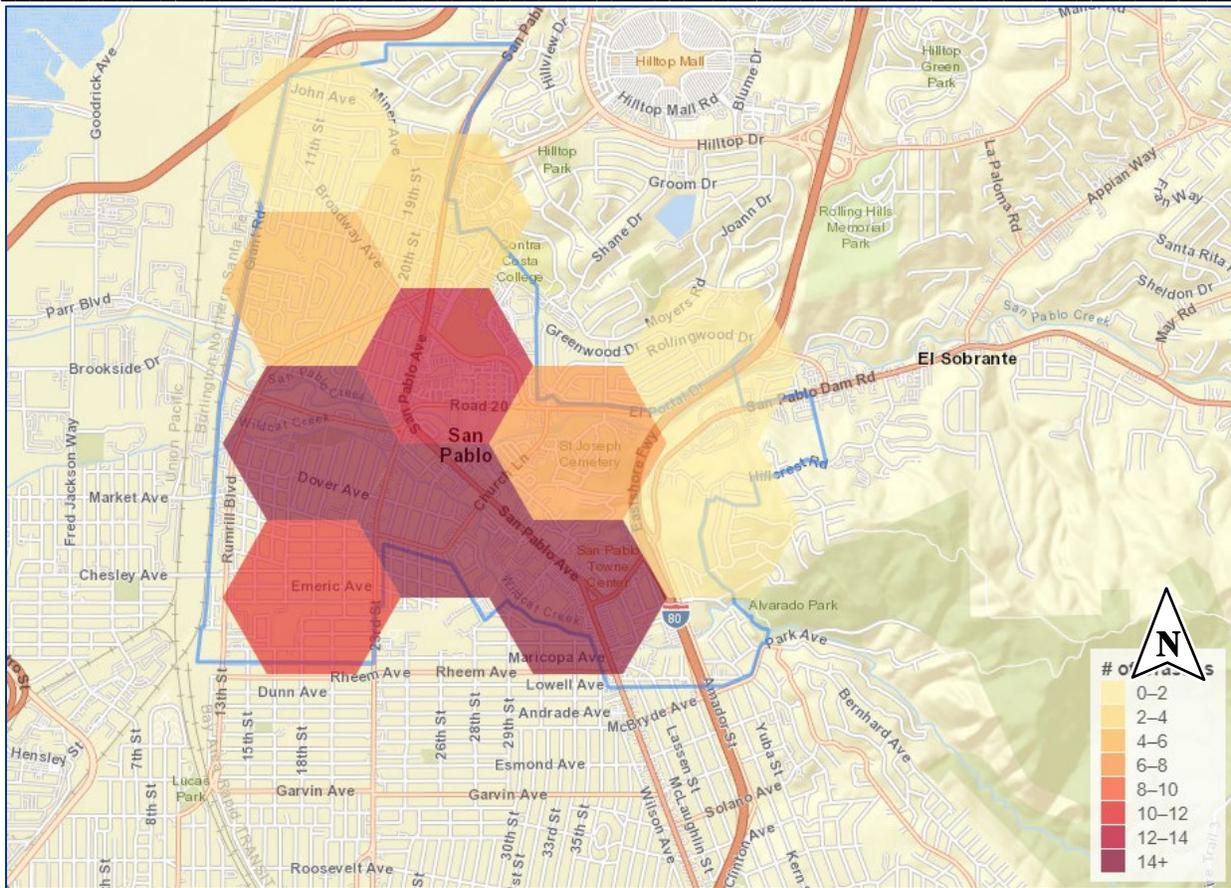


Figure 16: City of San Pablo Transportation Program Hexagonal Grid Map
 (January 1, 2018 - December 31, 2022)

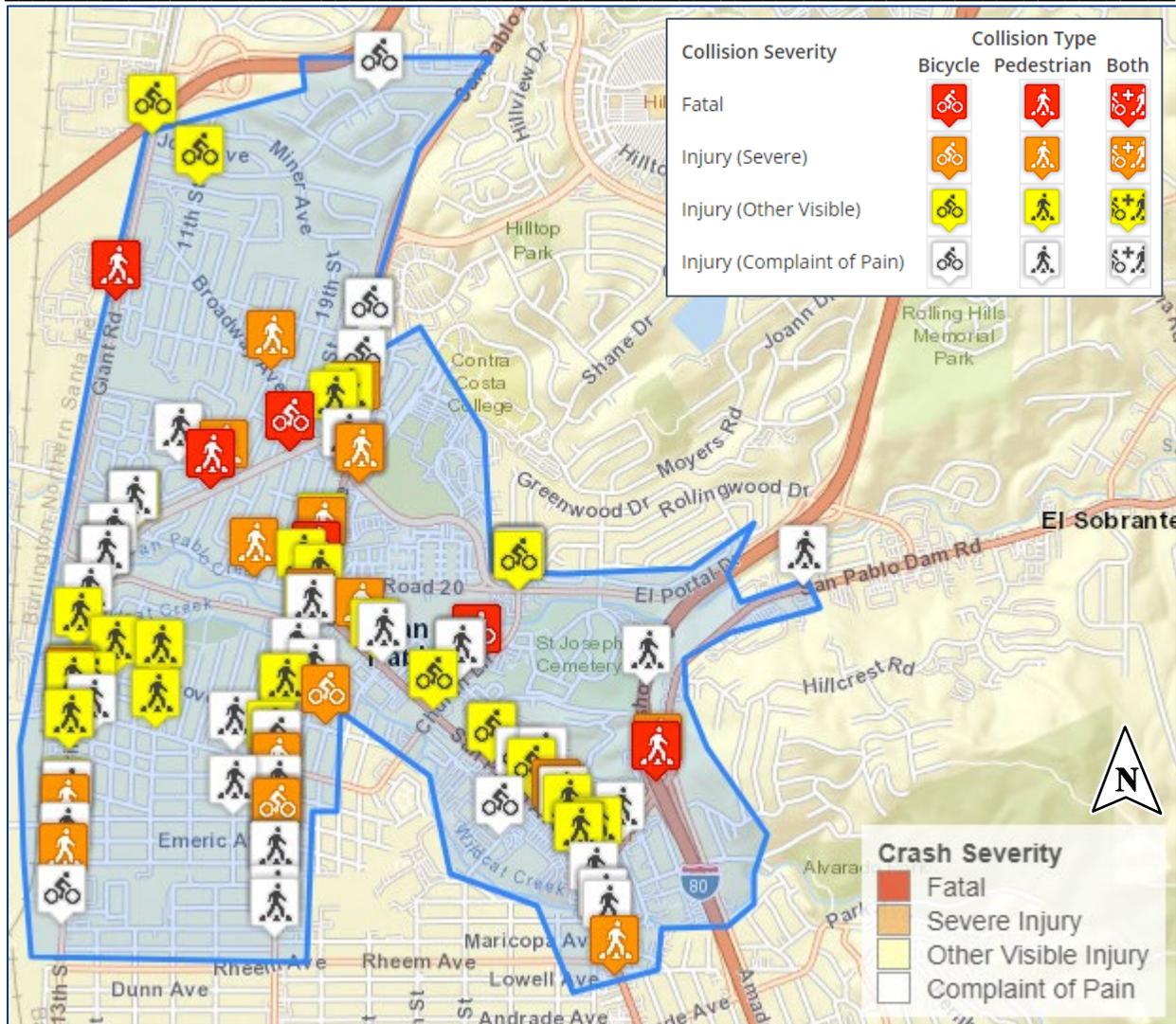
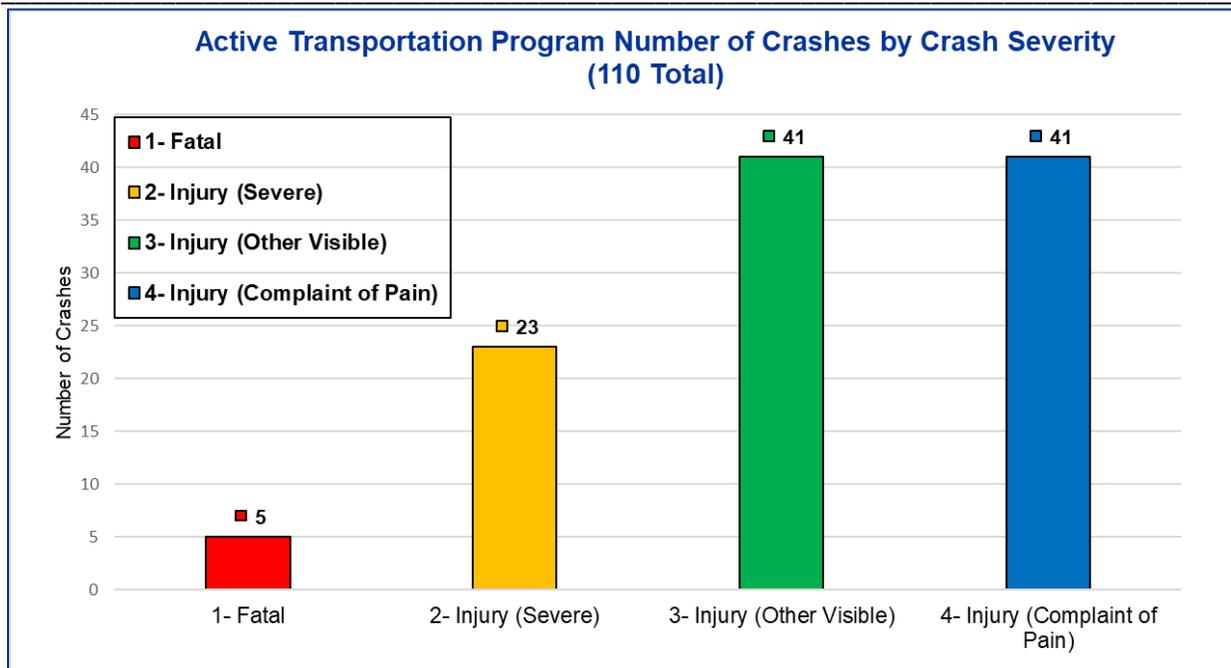


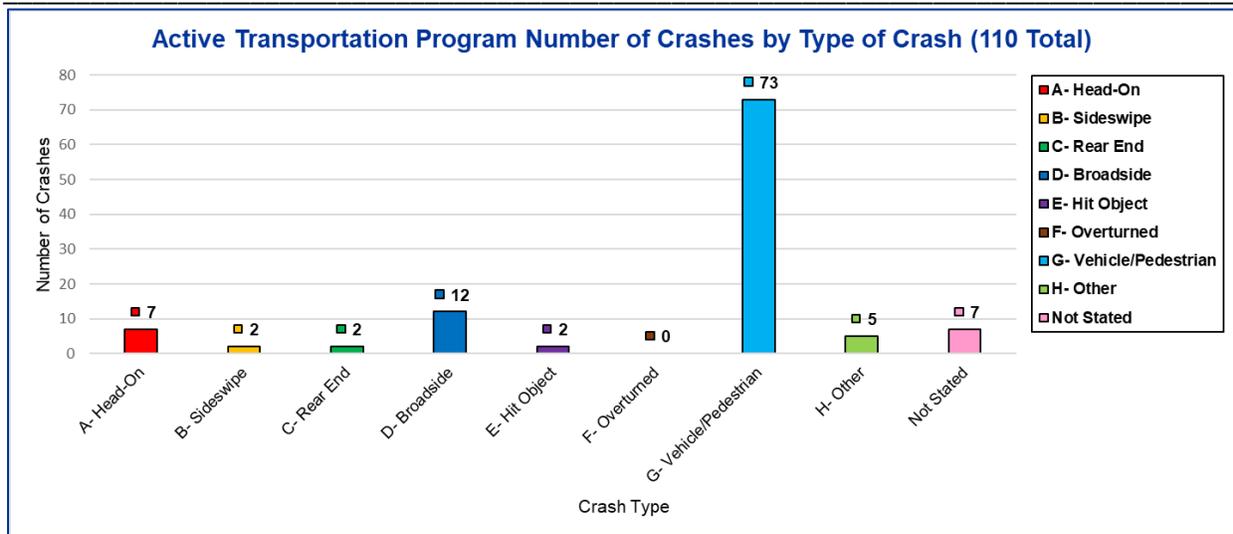
Figure 17: City of San Pablo Active Transportation Program Specific Collision Map (January 1, 2018 - December 31, 2022)



Crash Severity	Count	%
1 - Fatal	5	5%
2 - Injury (Severe)	23	21%
3 - Injury (Other Visible)	41	37%
4 - Injury (Complaint of Pain)	41	37%
Total	110	100

**Figure 18: Active Transportation Program Number of Crashes by Crash Severity
(January 1, 2018 - December 31, 2022)**

According to University of California, Berkeley Transportation Injury Mapping System (TIMS), from 2018 to 2022, there were 5 fatal collisions (5%), 23 severe injury collisions (21%), 41 visible injury collisions (37%), and 41 complaint of pain collisions (37%).



Type of Crash	Count	%
Not Stated	7	6%
A - Head-On	7	6%
B - Sideswipe	2	2%
C - Rear End	2	2%
D - Broadside	12	11%
E - Hit Object	2	2%
F - Overturned	0	0%
G - Vehicle/Pedestrian	73	66%
H - Other	5	5%
Total	110	100%

Figure 19: Active Transportation Program Number of Crashes by Type of Crash (January 1, 2018 - December 31, 2022)

The top 3 crash types were Vehicle/Pedestrian with 73 (66%), Broadside with 12 (11%), and Head-On and Not Stated with 7 (6%) each. This made up the majority of 83% of the other types of crashes in the City of San Pablo.

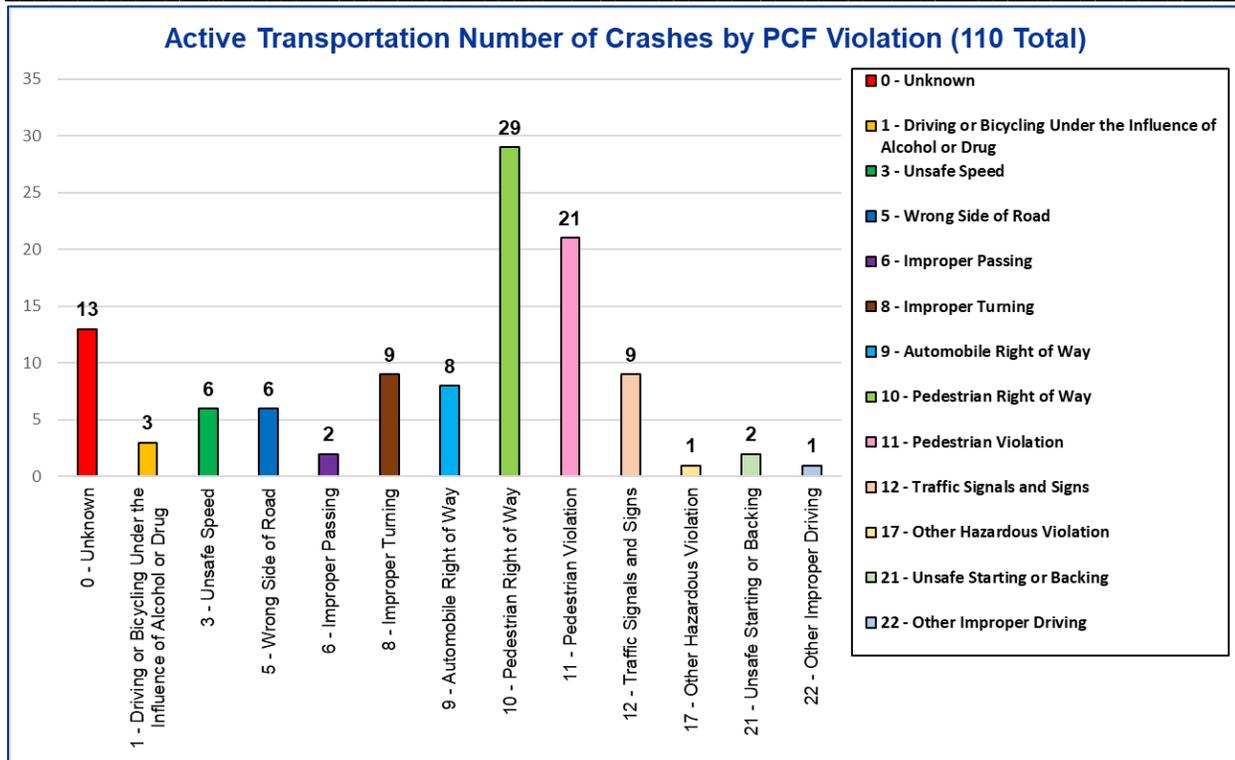


Table 2: Active Transportation Program Number of Crashes per Day of Week per Time (January 1, 2018 - December 31, 2022)

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Scale
00:00 - 02:59	0	0	1	0	0	2	2	0
03:00 - 05:59	1	1	0	1	0	2	0	2
06:00 - 08:59	2	6	0	2	1	2	1	4
09:00 - 11:59	2	2	3	1	1	1	0	4
12:00 - 14:59	1	2	2	2	2	4	1	6
15:00 - 17:59	2	7	3	1	4	0	0	6
18:00 - 20:59	3	4	8	5	5	6	2	8
21:00 - 23:59	1	2	1	0	4	2	2	8
25:00 - Unknown	0	0	0	0	0	0	0	8

*Active Transportation Program (ATP) Crashes are included in the Total Number of Crashes (110)

Of the active transportation program crashes, the highest amount of crashes occurred on a Tuesday with 24 crashes, the second highest was on a Saturday with 19 crashes, and the third highest was on Wednesday with 18 crashes. The highest number of ATP crashes occurred during the time frame between 18:00 – 20:49 with 33 crashes.



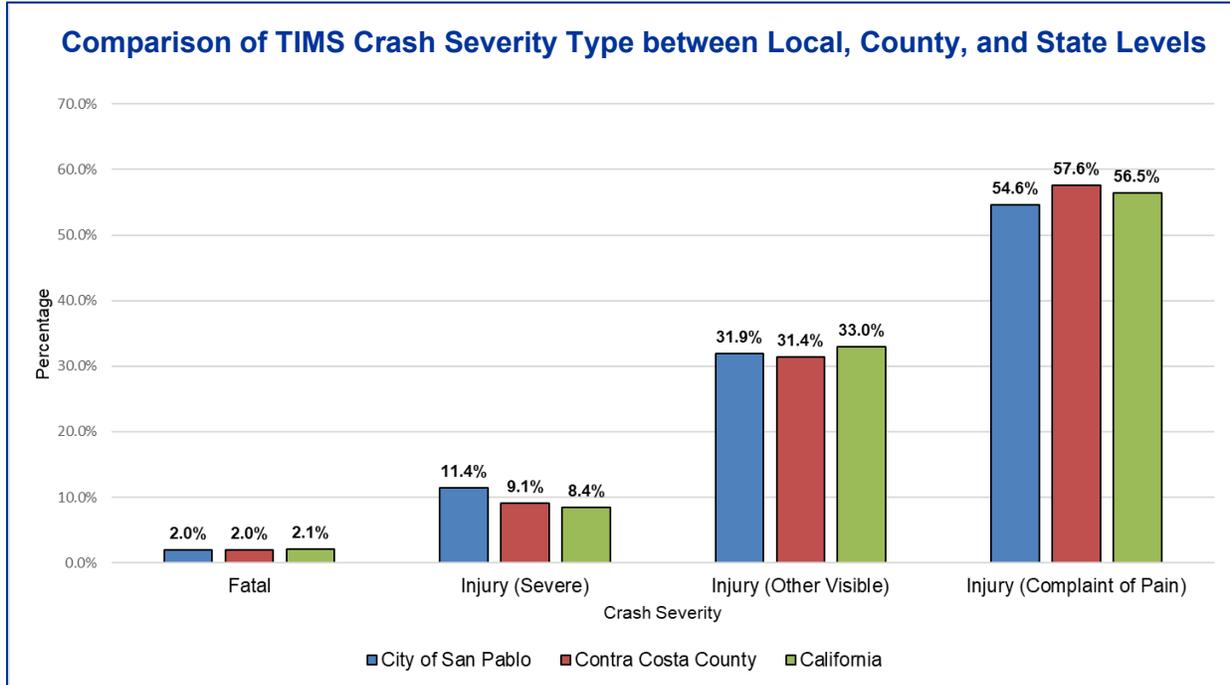
PCF Violation	Count	%
0 - Unknown	13	11.8%
1 - Driving or Bicycling Under the Influence of Alcohol or Drug	3	2.7%
3 - Unsafe Speed	6	5.5%
5 - Wrong Side of Road	6	5.5%
6 - Improper Passing	2	1.8%
8 - Improper Turning	9	8.2%
9 - Automobile Right of Way	8	7.3%
10 - Pedestrian Right of Way	29	26.4%
11 - Pedestrian Violation	21	19.1%
12 - Traffic Signals and Signs	9	8.2%
17 - Other Hazardous Violation	1	0.9%
21 - Unsafe Starting or Backing	2	1.8%
22 - Other Improper Driving	1	0.9%
Total	110	100%

Figure 20: Number of Crashes by Primary Crash Factor PCF Violation

According to University of California, Berkeley Transportation Injury Mapping System (TIMS) From 2018 to 2022, out of the 110 collisions, 29 collisions had (10-Pedestrian Right of Way), 21 collisions had (11-Pedestrian Violation), 10 collisions had (0-Unknown), 9 collisions had (08-Improper Turning) and 9 collisions had (12-Traffic Signals and Signs).



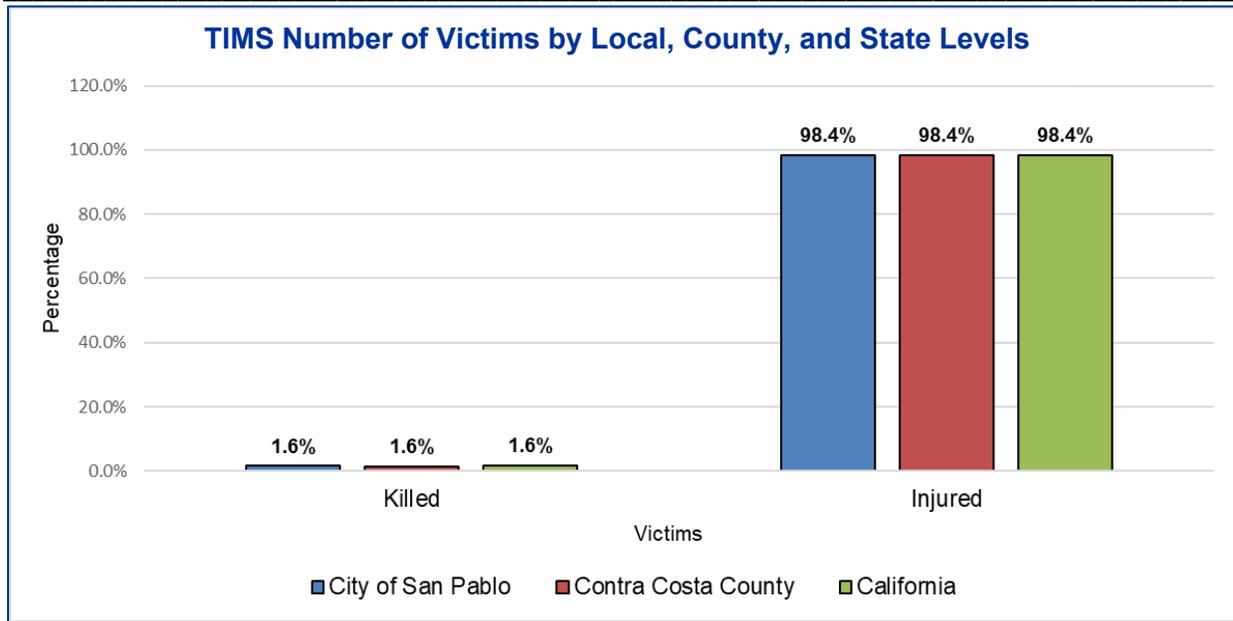
6.5 Crash Data Comparison and Analysis



Crash Severity	Count (%)		
	San Pablo, CA	Contra Costa County	California
Fatal	12 (2%)	361 (2%)	17,993 (2.1%)
Injury (Severe)	68 (11.4%)	1,684 (9.1%)	71,539 (8.4%)
Injury (Other Visible)	190 (31.9%)	5,802 (31.4%)	281,029 (33%)
Injury (Complaint of Pain)	325 (54.6%)	10,657 (57.6%)	480,712 (56.5%)
Total	595 (100%)	18,504 (100%)	851,273 (100%)

Figure 21: TIMS Number and Percentage of Crash Severity Types in Terms of Local, County, and State
(January 1, 2018 - December 31, 2022)

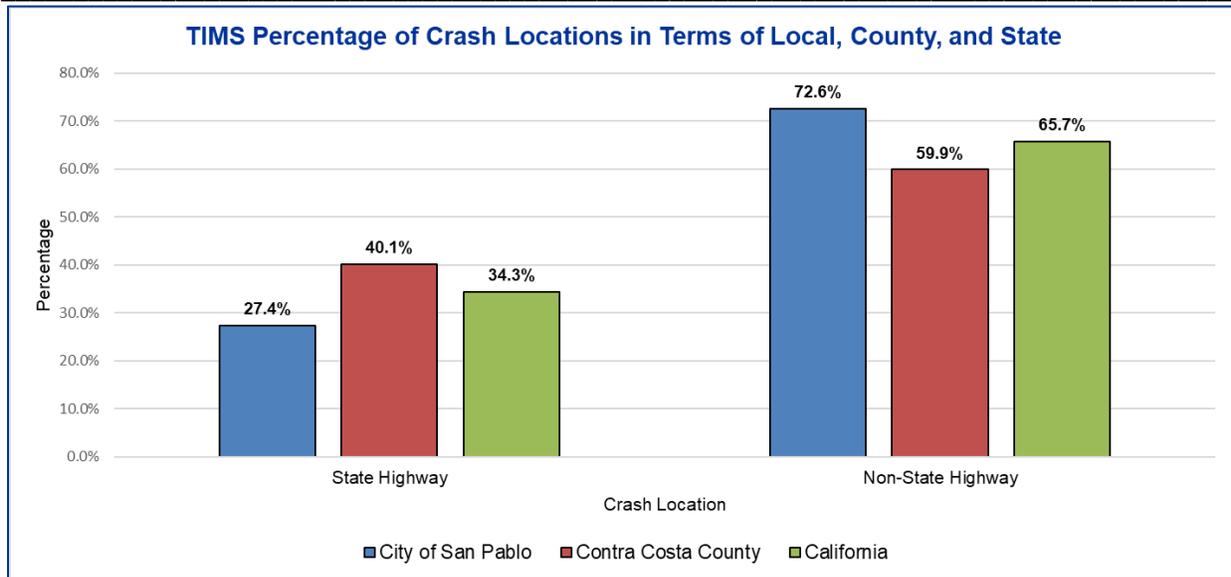
From the Transportation Injury Mapping System, the Statewide Integrated Traffic Records System contains crash data reported to California Highway Patrol (CHP) from the local and governmental agencies. From Figure 21, crash severity data is compared in the local, county, and state level. From the period between January 1, 2018 to December 31, 2022, City of San Pablo percentage proportions for 1) Fatal (2%), and 4) Injury-Complaint of Pain (54.6%) crash severity is the same or lower than the county (2%, 57.6%) and state (2.1%, 56.5%) categories. The percentage of 3) Injury-Other Visible (31.9%) is between the county (31.4%) and state (33%) categories. The percentage of 2) Injury-Severe (11.4%) is higher than the county (9.1%) and higher than state (8.4%) categories. The data displayed shows a higher percentage of severe injuries and lower or percentage of fatal and complaint of pain injury for the City of San Pablo, when compared to Contra Costa County and State of California. This data was not inclusive of property damage only (PDO) related crashes.



Victims	Count (%)		
	San Pablo, CA	Contra Costa County	California
Killed	13 (1.6%)	391 (1.6%)	19,483 (1.6%)
Injured	800 (98.4%)	24,763 (98.4%)	1,191,134 (98.4%)
Total	813 (100%)	25,154 (100%)	1,210,617 (100%)

Figure 22: TIMS Number and Percentage of Victims in Terms of Local, County, and State (January 1, 2018 - December 31, 2022)

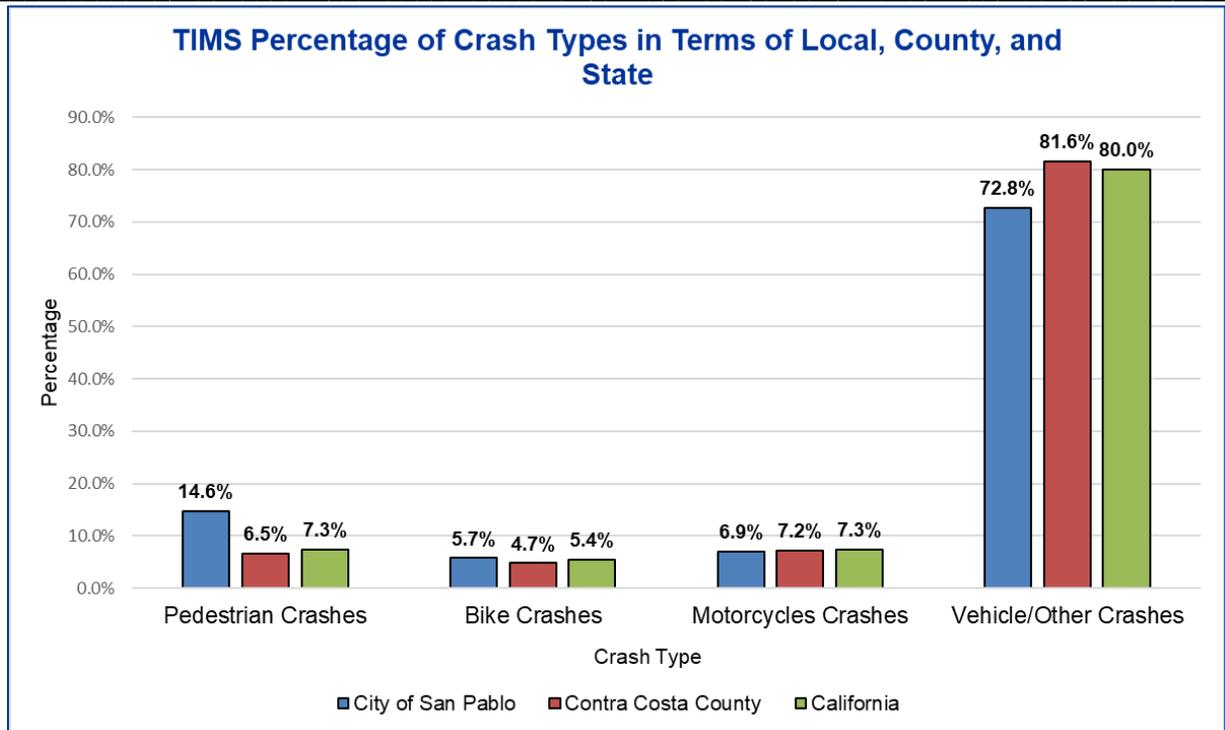
From the Transportation Injury Mapping System, the Statewide Integrated Traffic Records System contains crash data reported to California Highway Patrol (CHP) from the local and governmental agencies. From Figure 22, number of victims killed and injured is compared in the local, county, and state level. From the period between January 1, 2018 to December 31, 2022, the data displayed shows that the City of San Pablo has the same percentage of victims killed and injured (1.6%, 98.4%) as Contra Costa County (1.6%, 98.4%) and (1.6%, 98.4%) of California. This data was not inclusive of property damage only (PDO) related crashes.



Crash Location	Count (%)		
	San Pablo, CA	Contra Costa County	California
State Highway	163 (27.4%)	7,429 (40.1%)	292,337 (34.3%)
Non-State Highway	432 (72.6%)	11,075 (59.9%)	558,936 (65.7%)
Total	595 (100%)	18,504 (100%)	851,273 (100%)

Figure 23: TIMS Number and Percentage of Crash Locations in Terms of Local, County, and State
(January 1, 2018 - December 31, 2022)

From the Transportation Injury Mapping System, the Statewide Integrated Traffic Records System contains crash data reported to California Highway Patrol (CHP) from the local and governmental agencies. From Figure 23, crash location data is compared in the local, county, and state level. From the period between January 1, 2018 to December 31, 2022, City of San Pablo percentage proportion for State highway crashes (27.4%) is significantly lower than the county (40.1%) and state (34.3%) categories. The percentage Non-State Highway (72.6%) is much higher than the county (59.9%) and state (65.7%) categories. The data displayed shows a higher number of crashes that happened on local roadway than State Highway in terms of percentage proportion for the City of San Pablo, compared to Contra Costa County and California. This data was not inclusive of property damage only (PDO) related crashes.



Crash Type	Count (%)		
	San Pablo, CA	Contra Costa County	California
Pedestrian Crashes	87 (14.6%)	1,203 (6.5%)	61,971 (7.3%)
Bike Crashes	34 (5.7%)	878 (4.7%)	45,607 (5.4%)
Motorcycles Crashes	41 (6.9%)	1,326 (7.2%)	62,481 (7.3%)
Vehicle/Other Crashes	433 (72.8%)	15,097 (81.6%)	681,214 (80%)
Total	595 (100%)	18,504 (100%)	851,273 (100%)

Figure 24: TIMS Number and Percentage of Crash Types in Terms of Local, County, and State
(January 1, 2018 - December 31, 2022)

From the Transportation Injury Mapping System, the Statewide Integrated Traffic Records System contains crash data reported to California Highway Patrol (CHP) from the local and governmental agencies. From Figure 24, crash type data is compared in the local, county, and state level. From the period between January 1, 2018 to December 31, 2022, City of San Pablo percentage proportion pedestrian and bike crashes (14.6%, 5.7%) is higher than the county (6.5%, 4.7%) and state (7.3%, 5.4%). Meanwhile, the percentage for motorcycle crashes for the city (6.9%, 72.8%) was lower than the county (7.2%, 81.6%) and state (7.3%, 80%) categories. San Pablo was greater in pedestrian and bike crashes than Contra Costa County and California. San Pablo was smaller in motorcycle and vehicle/other crashes. This data was not inclusive of property damage only (PDO) related crashes.



6.5 California Office of Traffic Safety (OTS) Ranking

Table 3: City of San Pablo OTS Crash Ranking Results 2020

Agency	Year	County	Group	Population (Avg)	DVMT
San Pablo	2020	CONTRA COSTA COUNTY	D	31793	265591

TYPE OF CRASH	VICTIMS KILLED & INJURED	OTS RANKING
Total Fatal and Injury	78	44/91
Alcohol Involved	19	10/91
Had Been Drinking Driver < 21	1	20/91
Had Been Drinking Driver 21 - 34	6	11/91
Motorcycles	3	45/91
Pedestrians	9	20/91
Pedestrians < 15	1	26/91
Pedestrians 65+	1	37/91
Bicyclists	6	38/91
Bicyclists < 15	1	27/91
Composite	68	8/91

TYPE OF CRASH	FATAL & INJURY CRASHES	OTS RANKING
Speed Related	15	28/91
Nighttime (9:00pm - 2:59am)	12	19/91
Hit and Run	15	13/91

TYPE OF ARRESTS	ARRESTS	OTS RANKING*
DUI Arrests	45	46/91



The City of San Pablo with a composite score of 8/91 with 68 victims killed or injured (Below 25%) is below average in comparison to other incorporated cities with similar population in the most recent OTS ranking as of 2020. Based on “Types of Crashes”, total fatal and injury resulted to be 78 victims killed or injured, which ranked 44/91, which places the city below 50%. The City of San Pablo performed poor in speed related crashes with 15 fatal or injury crashes, ranking the City 28/91. Nighttime (9:00pm to 2:59 am) crashes has 12 fatal or injury crashes, ranking the City 19/91. There were also 15 fatal or injury hit and run crashes that ranked the City 13/91 (Bottom 14%).

Number 1 in the rankings is the highest, or “worst.” For example, a ranking of 1/74 is the highest or worst, 45/74 is average, and 74/74 is the lowest or best. The OTS Rankings were developed so that individual cities could compare their city’s traffic safety statistics to those of other cities with similar-sized populations. Cities could use these comparisons to see what areas they may have problems in and which they were doing well in. The results helped both cities and OTS identify emerging or on-going traffic safety problem areas in order to help plan how to combat the problems and help with the possibility of facilitating grants. It should be noted that OTS rankings are only indicators of potential problems; there are many factors that may either understate or overstate a city/county ranking that must be evaluated based on local circumstances. City rankings are for incorporated cities only, for local streets in those cities, and state highways that run through cities with shared jurisdiction with the CHP and the city.

Crash rankings are based on the Empirical Bayesian Ranking Method, which adds weights to different statistical categories including observed crash counts, population and vehicle miles traveled. The crash counts reflect the aggregated impacts of all influential factors containing even the unrecognized or unmeasurable ones (e.g. level of enforcement). The population and vehicle miles traveled represent the important traffic exposure factors that affect crash occurrence. Counties are assigned statewide rankings, while cities are assigned population group rankings. In Table 3, Population – estimates matched to “Year”. DVMT – Daily Vehicle Miles Traveled. Caltrans estimate of the total number of miles all vehicles traveled on that city’s streets on an average day during that year. The number of cities in each group varies by year.

Cities are grouped by 2020 population: Group A – 15 cities, populations over 250,000, Group B – 61 cities, population 100,001-250,000, Group C – 106 cities, population 50,001-100,000, Group D – 91 cities, population 25,001-50,000, Group E – 103 cities, population 10,001-25,000, Group F – 74 cities, population 2,501-10,000, Group G – 32 cities, population 1-2,500. City of San Pablo is in Group D with an average population of 31,793.

- Type of Crash – This column delineates the different types of crashes OTS has chosen to show in the rankings. These represent the types with larger percentages of total killed and injured and areas of focus for the OTS grant program.
- Victims Killed and Injured – This column shows the number of fatalities and injuries aggregated. Damage-only or fender-bender crashes are not included.
- Ranking – This column shows what ranking that city has as compared to other comparably sized incorporated cities in California for that particular type of crash. The first number is that city’s ranking for that type of crash. The second number is the total number of cities/counties within that population grouping.





- Types of Crashes: Total Fatal and Injury – The total number of victims involved in all crashes where there were fatalities and/or injuries in that city/county.
- Alcohol Involved – Crashes in which there were victims killed or injured where a party (driver, pedestrian, bicyclist) was classified as “Had Been Drinking.”
- Had Been Drinking Driver <21 – Crashes in which there were victims killed or injured where a driver who was under the age of 21 had been drinking.
- Had Been Drinking Driver 21-34 – Crashes in which there were victims killed or injured where a driver who was between the ages of 21 and 34 had been drinking.
- Motorcycles – Crashes in which there were victims killed or injured and a motorcycle was involved.
- Pedestrians – Crashes in which there were victims killed or injured and a pedestrian was involved.
- Pedestrians <15 – Crashes in which there were victims killed or injured and a pedestrian under the age of 15 was involved.
- Pedestrians 65+ – Crashes in which there were victims killed or injured and a pedestrian age 65 and older was involved.
- Bicycles – Crashes in which there were victims killed or injured and a bicyclist was involved.
- Bicycles <15 – Crashes in which there were victims killed or injured and a bicyclist under age 15 was involved.
- Composite – Figures which show rankings only, an aggregate of several of the other rankings (Had Been Drinking 21-34, Had Been Drinking Under 21, Alcohol Involved, Hit & Run, Nighttime and Speed crashes). These figures are a means to give an indication of over-all traffic safety. Bottom table: Speed Related – Crashes in which there were victims killed or injured where speed was the primary factor.
- Nighttime (9:00pm – 2:59am) – Crashes in which there were victims killed or injured that occurred between those hours, which are prime hours for DUI, speeding and drowsy driving crashes.
- Hit and Run – Crashes in which there were victims killed or injured and a driver left the scene.
- DUI Arrests – DUI arrest figures are shown for cities only, not counties. The number of cities ranked against may be different than from the number of cities in the other categories. Not all cities report DUI arrests to the Department of Justice.



7. Emphasis Areas

The project team identified four major emphasis areas for the City by utilizing the aforementioned analysis that included primary collision factors. The Strategic Highway Safety Plan (SHSP) addresses the “5 Es” of traffic safety: Engineering, Enforcement, Education, Emergency Response, and Emerging Technologies. Each emphasis area utilizes the 5 Es addressed by SHSP. In no particular order, the following emphasis areas are discussed and analyzed in this section.

1. High Collision Intersections
2. High Collision Roadway Segments
3. Rear End Collisions Due to Unsafe Speed
4. Sideswipe Collisions Due to Improper Turning

7.1 High Collision Intersections

The most prominent emphasis areas according to Local Roadway Safety Manual (LRSM) occur on intersections. Each intersection has its own unique geometry, therefore an analysis of each of the prominent fourteen (14) intersections in the City of San Pablo were conducted to understand the factors leading to collisions.



Education



- Conduct public information and education campaign for safety laws regarding a safe approach to an intersection.
- Raise awareness of the necessity of abiding by the traffic safety laws.



Engineering



- Identify and rank high collision intersections within the City every two to three years. Consider information obtained from public input and feedback regarding unreported collisions to supplement crash data.
- Evaluate the primary factors leading to collisions at high collision roadway segments.
- Develop and implement countermeasures to tackle those factors.
- Assess and report collision patterns before and after implementation of countermeasures and adjust as necessary.
- Maintain roadway signing and striping.
- Consider improving night time lighting.

Enforcement



- Prioritize patrol patterns at high-risk intersections to monitor traffic law violations which include unsafe speed, improper turning, unsafe lane change, and DUI.
- When laws are enforced and awareness of abiding by traffic safety laws is raised, intersection collisions will reduce abundantly.

Emergency Medical Services



- Consider targeted training for responding to specific high collision intersections and immediate treatment of predominant injuries at those locations.

Emerging Technologies



- Develop new methods to integrate multisource transportation data for developing different measurements of traffic safety for road users and identify safety issues associated with emerging electrical and automated vehicles.

7.2 High Collision Roadway Segments

Applying safety improvements to high collision roadway segments are also a necessity. Each roadway segment has its own unique geometry therefore, an analysis of each of the prominent six (6) roadway segments in the City of San Pablo were conducted to understand the factors leading to collisions that occurred.



Education



- Conduct public information and education campaign for safety laws regarding safe speed, improper turning, unsafe lane change, and driving on the wrong side of the road
- Raise awareness of the necessity of abiding by the traffic safety laws.



Source: Beverly Samperio, The Arrow

Engineering



- Identify and rank high collision roadway segments within the City every two to three years. Consider information obtained from public input and feedback regarding unreported collisions to supplement crash data.
- Evaluate the primary factors leading to collisions at high collision roadway segments.
- Develop and implement countermeasures to tackle those factors.
- Assess and report collision patterns before and after implementation of countermeasures and adjust as necessary.
- Maintain roadway signing and striping.
- Consider improving night time lighting.

Enforcement



- Prioritize patrol patterns at high collision roadway segments to monitor traffic law violations which include unsafe speed and improper turning.
- When laws are enforced and awareness of abiding by traffic safety laws is raised, roadway segment collisions will reduce abundantly.

Emergency Medical Services



- Consider targeted training for responding to specific high collision roadway segments and immediate treatment of predominant injuries at those locations.

Emerging Technologies



- Develop new methods to integrate multisource transportation data for developing different measurements of traffic safety for road users and identify safety issues associated with emerging electrical and automated vehicles.

7.3 Rear End Collisions Due to Unsafe Speed

On intersections and roadway segments, Rear End collisions ranked the highest type of collisions with a total count of five hundred and fifty-three (553) collisions out of 1823 total crashes (30%). Rear End collisions on local roadways occurred due to the primary collision factor (PCF) of Unsafe Speed (121). Analysis was performed on intersections and roadway segments that contained these specific traffic collisions.



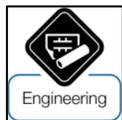
Education



- Conduct public information and education campaign for safety laws regarding the undesired risks of drinking and driving and as well as maintaining a safe speed.
- Raise awareness of the necessity of not drinking while driving and maintaining a safe speed to avoid many undesired tragic event collisions.



Engineering



- Identify locations where rear end collisions due to unsafe speed are occurring within the City every two to three years.
- Consider information obtained from public input and feedback regarding unreported collisions to supplement crash data.
- Develop and implement countermeasures to tackle rear end collisions due to unsafe speed.
- Assess and report collision patterns before and after implementation of countermeasures and adjust as necessary.



Enforcement



- Prioritize patrol patterns at high-speed locations observed by law enforcement to monitor traffic law violations which include not maintaining a safe speed while operating a vehicle.
- When laws are enforced and awareness of abiding by traffic safety laws and signs are raised, rear end collisions due to unsafe speeds will reduce.

Emergency Medical Services



- Consider targeted training for responding to high-speed locations and immediate treatment of predominant injuries at those locations.

Emerging Technologies



- Develop new methods to integrate multisource transportation data for developing different measurements of traffic safety for road users and identify safety issues associated with emerging electrical and automated vehicles.

7.4 Sideswipe Collisions Due to Improper Turning

On intersections and roadway segments, Sideswipe Collisions ranked the second highest type of collision with a total count of four hundred and sixty (460) collisions out of 1823 total crashes (25%). Sideswipe collisions on local roadways are due to primary collision factor (PCF) of Improper Turning (81). Analysis was performed on high-collision intersections and roadway segments that have these collisions.



Education



- Conduct public information and education campaign for safety laws regarding proper turning.
- Raise awareness of abiding by the traffic safety laws to avoid sideswipe due to improper turning collisions.



Engineering



- Identify locations where sideswipe collisions that occur within the city every two to three years.
- Consider information obtained from public input and feedback regarding unreported collisions to supplement crash data.
- Develop and implement countermeasures due to sideswipe collisions that occur mostly due to improper turning.
- Assess and report collision patterns before and after implementation of countermeasures and adjust as necessary.
- Maintain roadway signing and striping.

Enforcement



- Prioritize patrol patterns at high collision intersections where sideswipe collisions occur mostly due to improper turning.
- When laws are enforced and awareness of abiding by traffic safety laws and signs are raised, sideswipe collisions that occur mostly due to improper turning will reduce abundantly.

Emergency Medical Services



- Consider targeted training for responding to high collision intersections where sideswipe collisions that occur mostly due to improper turning are occurring mostly and immediate treatment of predominant injuries at those locations.

Emerging Technologies

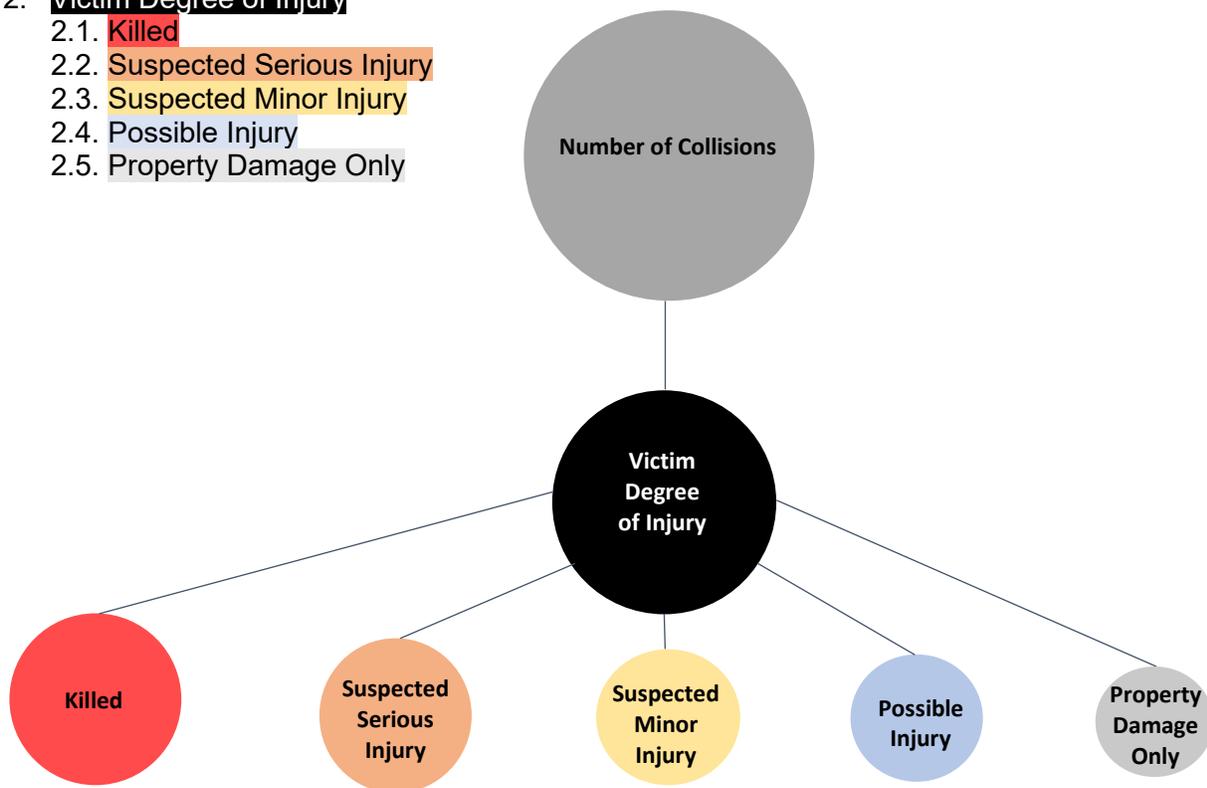


- Develop new methods to integrate multisource transportation data for developing different measurements of traffic safety for road users and identify safety issues associated with emerging electrical and automated vehicles.

8. High Collision Locations Identification, Pattern Analysis, and Recommended Improvements

As part of the quantitative analysis, high collision intersections and roadway segments were identified and prioritized using the Crash Frequency methodology as described in the Local Roadway Safety Manual. Crash Frequency is defined as the number of crashes occurring within a determined study area. Minagar & Associates, Inc. took a further step and included the number of victims and their corresponding degree of injury for each intersection and roadway segment. Conceptual plans were developed and updated with these safety countermeasures. For each of the identified high collision locations (intersections and roadway segments), prominent locations in the City were identified and ranked based on the following criteria:

1. Number of Collisions
2. Victim Degree of Injury
 - 2.1. Killed
 - 2.2. Suspected Serious Injury
 - 2.3. Suspected Minor Injury
 - 2.4. Possible Injury
 - 2.5. Property Damage Only



Upon identifying and ranking prominent intersections and roadway segments, collisions were analyzed by identifying the Primary Collision Factor (PCF). Upon completion of the analysis, recommendations were developed as safety mitigation measures to potentially mitigate similar collisions in the future. Countermeasures have been proposed in compliance with the California Manual on Uniform Traffic Control Devices. It is important to utilize Crash Modification Factor (CMF) when identifying potential systemic safety improvements. The CMF method is found in Part D of the American Association of State Highway and Transportation Officials (AASHTO) Highway Safety Manual (HSM). CMFs are defined as the ratio of effectiveness of expected crashes with treatment in comparison to expected crashes without treatment. Furthermore, CMF is a multiplicative factor used to determine the expected number of crashes after implementing the proposed countermeasures.



Countermeasures with CMFs less than one are expected to reduce crashes. On the other hand, countermeasures with CMFs greater than one are expected to increase crashes. CMFs are calculated as follows:

$CMF = \frac{\text{Expected Crashes WITH Treatment}}{\text{Expected Crashes WITHOUT Treatment}}$	CMF < 1.0	Expected to reduce crashes
	CMF = 1.0	Expected to have no impact on safety
	CMF > 1.0	Expected to increase crashes

A Crash Reduction Factor (CRF) is similar and related 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. CRFs are calculated as follows:

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

Appropriate CMFs shall be used with caution. CMFs should be selected from the Highway Safety Manual (HSM) Part D, the Local Roadway Safety Manual (LRSM), or from the Federal Highway Administration (FHWA) Crash Modification Factor (CMF) Clearinghouse website (<http://www.cmfclearinghouse.org>).



Table 4: City of San Pablo Engineering Countermeasures Toolbox

LRSM No. [1]	Countermeasure Name	Crash Type			CMF [2]	CRF [3]	HSIP Funding Eligibility
		All	Night	Ped and Bike			
NS06	Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs	X			0.85	15%	90%
NS07	Upgrade intersection pavement marking (NS.I.)	X			0.75	25%	90%
NS21PB	Install/upgrade pedestrian crossing at uncontrolled locations (new signs and markings only)			X	0.65	35%	90%
NS22PB	Install Rectangular Rapid Flashing Beacon (RRFB)			X	0.65	35%	90%
R22	Install/upgrade signs with new fluorescent sheeting (regulatory or warning)	X			0.85	15%	90%
R28	Install edge-lines and centerlines	X			0.75	25%	90%
S02	Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number	X			0.85	15%	90%
S09	Install raised pavement markers and striping (Through Intersection)	X			0.90	10%	90%
S18PB	Install pedestrian crossing (S.I.)			X	0.75	25%	90%

[1] Local Roadway Safety Manual Countermeasure Identification Number

- NS: Non-Signalized Intersection
- R: Roadway Segment
- S: Signalized Intersection

[2] Crash Modification Factor

[3] Crash Reduction Factor





8.1 High Collision Intersections

High collision intersections are critical intersections that require the most analytical focus since it is anticipated that many collisions will occur within a high collision intersection based on its crash history. Table 5 displays the fourteen (14) most prominent intersections in terms of number of collisions in the City of San Pablo. Table 6 displays the fourteen (14) prominent intersections with their ranking methodology.

Table 5: List of High Collision Intersections

Intersection Ranking Number**	Intersection	Control	Number of Collisions***
1*	San Pablo Av & 23rd St/Road 20	Signalized	20
2	San Pablo Av & Lake St	Unsignalized	20
3*	Market Av & Rumrill Bl	Signalized	18
4	El Portal Dr & Church Ln/Rollingwood Dr	Signalized	17
5	Church Ln & San Pablo Av	Signalized	17
6*	Rumrill Bl & Broadway Av	Signalized	17
7	San Pablo Av & Broadway Av/El Portal Dr	Signalized	16
8*	Rumrill Bl & Brookside Dr	Signalized	16
9	San Pablo Av & Rivers St	Signalized	14
10	23rd St & Dover Av	Signalized	14
11	San Pablo Av & San Pablo Dam	Signalized	13
12	San Pablo Av & Vale Rd	Signalized	10
13	Giant Rd & John Av	Unsignalized	9
14	Emeric Av & 23 rd St	Unsignalized	8

* Intersection is part of current and planned construction projects; therefore, countermeasures will not be developed for these intersections.

** Intersection Ranking Number is based on the number of contiguous collisions within each intersection.

*** Total Number of Collisions during the 5-year period between January 1, 2018 and December 31, 2022.



Table 6: Intersection Number of Collisions and Ranking in the City of San Pablo

Intersection Ranking Number**	Intersection	Number of Collisions***	Collision Severity				
			Killed	Severe Injury	Visible Injury	Complaint of Pain	Property Damage Only
1*	San Pablo Av & 23rd St/Road 20	20	1	1	2	3	13
2	San Pablo Av & Lake St	20	0	1	3	4	12
3*	Market Av & Rumrill Bl	18	0	0	2	7	9
4	El Portal Dr & Church Ln/ Rollingwood Dr	17	0	1	4	4	8
5	Church Ln & San Pablo Av	17	0	0	3	4	10
6*	Rumrill Bl & Broadway Av	17	0	0	2	3	12
7	San Pablo Av & Broadway Av/ El Portal Dr	16	0	0	2	4	10
8*	Rumrill Bl & Brookside Dr	16	0	0	1	5	10
9	San Pablo Av & Rivers St	14	0	2	2	2	8
10	23rd St & Dover Av	14	0	0	2	3	9
11	San Pablo Av & San Pablo Dam Rd	13	0	0	2	3	8
12	San Pablo Av & Vale Rd	10	0	0	1	2	7
13	Giant Rd & John Av	9	0	0	5	2	2
14	Emeric Av & 23 rd St	8	0	1	2	0	5

* Intersection is part of current and planned construction projects; therefore, countermeasures will not be developed for these intersections.

** Intersection Ranking Number is based on the number of contiguous collisions within each intersection.

*** Total Number of Collisions during the 5-year period between January 1, 2018 and December 31, 2022.





8.1.1 Intersection 1: San Pablo Av & 23rd St/Road 20

Table 7: Intersection 1 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions		Primary Collision Factor
4		Improper Turning
2		Pedestrian Violation
2		Traffic Signals & Signs
2		Pedestrian Right of Way
2		Unsafe Speed
2		Automobile Right of Way
1		Unsafe Starting or Backing
1		Following Too Closely
1		Unsafe Lane Change
1		Driving or Bicycling Under the Influence of Alcohol or Drug
1		Unknown
1		Not Stated
Total	20	

High Collision Recommendations:

1. N/A, part of a planned construction project for San Pablo Av & 23rd St/Road 20 Intersection.

8.1.2 Intersection 2: San Pablo Av & Lake St

Table 8: Intersection 2 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions		Primary Collision Factor
9		Automobile Right of Way
3		Improper Turning
3		Unknown
1		Unsafe Speed
1		Unsafe Lane Change
1		Other than Driver
1		Wrong Side of Road
1		Driving or Bicycling Under the Influence of Alcohol or Drug
Total	20	

High Collision Recommendations:

1. Install [W4-4P] Sign
2. Install [W1-7] & [N-1 (CA)] Sign
3. Install [R4-7] & [N-1 (CA)] Sign
4. Install [W2-2R] Sign
5. Install [W2-2L] Sign
6. Install Thermoplastic Pavement Word/Arrow Marking
7. Install Thermoplastic Striping



8.1.3 Intersection 3: Market Av & Rumrill Bl

Table 9: Intersection 3 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
5	Unsafe Speed
3	Unknown
2	Pedestrian Right of Way
2	Automobile Right of Way
2	Unknown
1	Traffic Signals & Signs
1	Driving or Bicycling Under the Influence of Alcohol or Drug
1	Other than Driver
1	Other Hazardous Violation
Total	18

High Collision Recommendations:

1. N/A, this intersection is part of the Rumrill Boulevard Complete Streets Project.

8.1.4 Intersection 4: El Portal Dr & Church Ln/Rollingwood Dr

Table 10: Intersection 4 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
6	Improper Turning
4	Traffic Signals & Signs
2	Pedestrian Violation
2	Unsafe Speed
2	Unknown
1	Automobile Right of Way
Total	17

High Collision Recommendations:

1. Convert Signal to Type 19-1-100 Signal Pole & Case 1 Mast Arm with 12" Signal Lenses with Backplate & Retroreflective Borders
2. Upgrade with 12" Signal Lenses with Backplate & Retroreflective Borders
3. Install [R81-CA] Sign
4. Install [W3-3] Sign
5. Install [R3-7] Sign
6. Install [R10-12] Sign
7. Remove Raised Pavement Markers and Replace with Yellow Thermoplastic Striping
8. Repaint Intersection Traffic Striping (2 Coats)
9. Repaint Intersection Crosswalk Striping (2 Coats)



8.1.5 Intersection 5: Church Ln & San Pablo Av

Table 11: Intersection 5 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions		Primary Collision Factor
	5	Unsafe Speed
	4	Traffic Signals & Signs
	2	Automobile Right of Way
	2	Unknown
	1	Driving or Bicycling Under the Influence of Alcohol or Drug
	1	Improper Turning
	1	Following Too Closely
	1	Not Stated
Total	17	

High Collision Recommendations:

1. Install Signal with Backplate & Retroreflective Borders Upgrade with 12" Signal Lenses with Backplate & Retroreflective Borders
2. Replace Sign with [R73-2 (CA)] Sign
3. Replace Sign with [R73-3 (CA)] Sign
4. Install [R4-7] & [N-1 (CA)] Sign
5. Install [R3-7] Sign
6. Install [W11-2 & W16-7P] Sign
7. Remove Raised Pavement Markers and Replace with Yellow Thermoplastic Striping
8. Install Thermoplastic Pavement Word Marking
9. Install Thermoplastic Crosswalk/Traffic Striping

8.1.6 Intersection 6: Rumrill Bl & Broadway Av

Table 12: Intersection 6 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions		Primary Collision Factor
	7	Traffic Signals & Signs
	2	Improper Turning
	2	Driving or Bicycling Under the Influence of Alcohol or Drug
	1	Other Hazardous Violation
	1	Unsafe Speed
	1	Automobile Right of Way
	1	Wrong Side of Road
	1	Unsafe Starting or Backing
	1	Unknown
Total	17	

High Collision Recommendations:

1. N/A, this intersection is part of the Rumrill Boulevard Complete Streets Project.



8.1.7 Intersection 7: San Pablo Av & Broadway Av/EI Portal Dr

Table 13: Intersection 7 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
3	Traffic Signals & Signs
2	Improper Turning
2	Other than Driver
2	Automobile Right of Way
2	Following Too Closely
2	Unsafe Speed
2	Not Stated
1	Pedestrian Right of Way
Total	16

High Collision Recommendations:

1. Upgrade with 12" Signal Lenses with Backplate & Retroreflective Borders
2. Replace Sign with [R73-3 (CA)] Sign
3. Install [R4-7] & [N-1 (CA)] Sign
4. Install [R3-7] Sign
5. Install [W3-3] Sign
6. Install [R1-2] Sign
7. Install Thermoplastic Pavement Word Marking
8. Install Entire Thermoplastic Crosswalk Striping

8.1.8 Intersection 8: Rumrill Bl & Brookside Dr

Table 14: Intersection 8 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
4	Traffic Signals & Signs
3	Unsafe Speed
2	Improper Turning
2	Unsafe Starting or Backing
2	Driving or Bicycling Under the Influence of Alcohol or Drug
1	Automobile Right of Way
1	Pedestrian Right of Way
1	Unknown
Total	16

High Collision Recommendations:

1. N/A, this intersection is part of the Rumrill Boulevard Complete Streets Project.



8.1.9 Intersection 9: San Pablo Av & Rivers St

Table 15: Intersection 9 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
5	Traffic Signals & Signs
2	Pedestrian Violation
2	Improper Turning
1	Unsafe Speed
1	Following Too Closely
1	Driving or Bicycling Under the Influence of Alcohol or Drug
1	Unknown
1	Not Stated
Total	14

High Collision Recommendations:

1. Upgrade with 12" Signal Lenses with Backplate & Retroreflective Borders
2. Convert Signal to Type 16-1-100 Signal Pole & Case 1 Mast Arm with Backplate & Retroreflective Borders
3. Install [R4-7] & [N-1 (CA)] Sign
4. Move [R73-3] Sign Above Traffic Signal and Install [R3-7] Sign Above [N-1 (CA)] Sign
5. Install [R10-12] Sign
6. Install [W3-3] Sign
7. Remove Raised Pavement Markers and Replace with Thermoplastic Pavement Striping

8.1.10 Intersection 10: 23rd St & Dover Av

Table 16: Intersection 10 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
3	Traffic Signals & Signs
3	Unsafe Speed
2	Improper Turning
2	Driving or Bicycling Under the Influence of Alcohol or Drug
2	Pedestrian Right of Way
1	Automobile Right of Way
1	Following Too Closely
Total	14

High Collision Recommendations:

1. Upgrade with 12" Signal Lenses with Backplate & Retroreflective Borders
2. Convert Signal to Type 19-1-100 Signal Pole & Case 1 Mast Arm with 12" Signal Lenses with Backplate & Retroreflective Borders
3. Install [R10-12] Sign to Mast Arm
4. Replace Sign with [R73-3 (CA)] Sign on Mast Arm
5. Remove Raised Pavement Markers and Replace with Thermoplastic Pavement Striping



8.1.11 Intersection 11: San Pablo Av & San Pablo Dam Rd

Table 17: Intersection 11 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
5	Traffic Signals & Signs
2	Unsafe Speed
2	Unsafe Lane Change
2	Unknown
1	Pedestrian Violation
1	Following Too Closely
Total	13

High Collision Recommendations:

1. Install [R4-7] & [N-1 (CA)] Sign
2. Install [W11-2] & [W16-7P] Sign
3. Install [R3-7] Sign
4. Install Thermoplastic Pavement Word Marking
5. Install Thermoplastic Striping

8.1.12 Intersection 12: San Pablo Av & Vale Rd

Table 18: Intersection 12 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
3	Unknown
2	Automobile Right of Way
2	Traffic Signals & Signs
1	Following Too Closely
1	Other Hazardous Violation
1	Unsafe Starting or Backing
Total	10

High Collision Recommendations:

1. Upgrade with 12" Signal Lenses with Backplate & Retroreflective Borders
2. Install [R4-7] & [N-1 (CA)] Sign
3. Install [R3-7] Sign
4. Install [W3-3] Sign
5. Remove Raised Pavement Markers and Replace with Thermoplastic Pavement Striping
6. Replace Sign with [R73-3 (CA)] Sign
7. Install Thermoplastic Entire Crosswalk Striping
8. Install Thermoplastic Striping
9. Install Thermoplastic Pavement Marking



8.1.13 Intersection 13: Giant Rd & John Av

Table 19: Intersection 13 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions		Primary Collision Factor
	7	Automobile Right of Way
	1	Improper Turning
	1	Following Too Closely
Total	9	

High Collision Recommendations:

1. Install Yellow Centerline Thermoplastic Striping with Raised Pavement Markings
2. Install Yellow Thermoplastic Two Way Left Turn Striping with New Raised Pavement Markers Where Missing
3. Install Pavement Marking (Thermoplastic)
4. Install Intersection Striping (Thermoplastic)
5. Install [W10-2L] & [W16-9P] Sign
6. Install [R2-1] (35) Sign
7. Install [R8-8] Sign

8.1.14 Intersection 14: Emeric Av & 23rd St

Table 20: Intersection 14 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions		Primary Collision Factor
	2	Pedestrian Right of Way
	2	Unknown
	1	Automobile Right of Way
	1	Unsafe Speed
	1	Traffic Signals & Signs
	1	Improper Turning
Total	8	

High Collision Recommendations:

1. Install [R1-5] Sign
2. Install with Solar Rapid Rectangular Flashing Beacon System & [W16-7P] Sign
3. Install Pavement Yield Line Marking (Thermoplastic)
4. Remove Raised Pavement Markers and Replace with Thermoplastic Pavement Striping
5. Install Intersection Thermoplastic Striping
6. Install Intersection Thermoplastic Ladder Crosswalk



8.2 High Collision Roadway Segments

High collision roadway segments are critical segments that require focus since it is anticipated that collisions will occur within a high collision roadway segment based on its crash history. Table 21 displays the six (6) most prominent roadway segments in the City of San Pablo. Table 22 displays the six (6) prominent roadway segments with their ranking methodology.

Table 21: List of High Collision Roadway Segments

Roadway Segment Ranking Number**	Roadway Segment	Number of Collisions***
1	23 rd St (Market Av to Dover Av)	12
2*	Rumrill Bl (Market Av to Post Av)	9
3	Vale Rd (Howard St to San Pablo Av)	8
4	San Pablo Av (Church Ln to Gateway Av)	8
5	San Pablo Av (Vale Rd to Gateway Av/ Evergreen Ter)	6
6	San Pablo Dam (Contra Costa Av to Ventura Av)	5

* Roadway Segment is part of current and planned construction projects; therefore, countermeasures will not be developed for these intersections.

** Roadway Segment Ranking Number is based on the number of collisions that occurred on a roadway segment.

*** Total Number of Collisions during the 5-year period between January 1, 2018 and December 31, 2022.

Table 22: Roadway Segment Number of Collisions and Ranking in the City of San Pablo

Roadway Segment Ranking Number**	Roadway Segment	Number of Collisions***	Collision Severity				
			Killed	Severe Injury	Visible Injury	Complaint of Pain	Property Damage Only
1	23 rd St (Market Av to Dover Av)	12	0	0	1	3	8
2*	Rumrill Bl (Market Av to Post Av)	9	0	1	1	4	3
3	Vale Rd (Howard St to San Pablo Av)	8	0	1	0	3	4
4	San Pablo Av (Church Ln to Gateway Av)	8	0	0	2	4	2
5	San Pablo Av (Vale Rd to Gateway Av)	6	0	0	1	4	1
6	San Pablo Dam (Contra Costa Av to Ventura Av)	5	0	1	0	3	1

* Roadway Segment is part of current and planned construction projects; therefore, countermeasures will not be developed for these intersections.

**Roadway Segment Ranking Number is based on the number of collisions that occurred on a roadway segment.

*** Total Number of Collisions during the 5-year period between January 1, 2018 and December 31, 2022.



8.2.1 Roadway Segment 1: 23rd St (Market Av to Dover Av)

Table 23: Roadway Segment 1 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions		Primary Collision Factor
7		Improper Turning
2		Automobile Right of Way
1		Following Too Closely
1		Unsafe Starting or Backing
1		Driving or Bicycling Under the Influence of Alcohol or Drug
Total	12	

High Collision Recommendations:

1. Install [W3-3] Sign
2. Remove Raised Pavement Markers and Install Yellow Thermoplastic Two Way Left Turn Striping with New Raised Pavement Markers
3. Repaint Roadway Segment Edgeline (2 Coats)
4. Install Thermoplastic Pavement Marking

8.2.2 Roadway Segment 2: Rumrill Bl (Market Av to Post Av)

Table 24: Roadway Segment 2 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions		Primary Collision Factor
3		Unsafe Speed
2		Improper Turning
2		Automobile Right of Way
1		Following Too Closely
1		Pedestrian Violation
Total	9	

High Collision Recommendations:

1. N/A, this intersection is part of the Rumrill Boulevard Complete Streets Project.



8.2.3 Roadway Segment 3: Vale Rd (Howard St to San Pablo Av)

Table 25: Roadway Segment 3 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions		Primary Collision Factor
	4	Unsafe Speed
	2	Improper Turning
	1	Automobile Right of Way
	1	Unknown
Total	8	

High Collision Recommendations:

1. Install [W11-2] Sign
2. Install [R1-5] Sign
3. Install [W3-3] Sign
4. Remove Raised Pavement Markers and Install Yellow Thermoplastic Two Way Left Turn Striping with New Raised Pavement Markers
5. Remove Raised Pavement Markers and Install Yellow Thermoplastic Centerline Striping with New Raised Pavement Markers
6. Remove Pavement Marking/Striping
7. Install Pavement Arrow Marking
8. Replace & Install [W1-2L] Sign

8.2.4 Roadway Segment 4: San Pablo Av (Church Ln to Gateway Av)

Table 26: Roadway Segment 4 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions		Primary Collision Factor
	4	Unsafe Speed
	2	Following Too Closely
	1	Wrong Side of Road
	1	Unsafe Lane Change
Total	8	

High Collision Recommendations:

1. Remove Sign and Install [R4-7] & [N-1 (CA)] Sign
2. Install [R6-1R] Sign
3. Install [W3-3] Sign
4. Install [W1-7] & [N-1 (CA)] Sign
5. Install [W4-4P] Sign
6. Install [R5-1] Sign
7. Install New Dot Markers/Pavement Markers to Missing Dot/Pavement Markers



8.2.5 Roadway Segment 5: San Pablo Av (Vale Rd to Gateway Av)

Table 27: Roadway Segment 5 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions		Primary Collision Factor
	3	Unsafe Speed
	1	Following Too Closely
	1	Wrong Side of Road
	1	Unsafe Lane Change
Total	6	

High Collision Recommendations:

1. Remove Sign and Install [R4-7] & [N-1 (CA)] Sign
2. Install [R6-1R] Sign
3. Install [W3-3] Sign Above [R26 (S) (CA)] Sign
4. Replace Sign(s) with New Fluorescent Sheeting
5. Install New Dot Markers/Pavement Markers to Missing Dot/Pavement Markers

8.2.6 Roadway Segment 6: San Pablo Dam (Contra Costa Av to Ventura Av)

Table 28: Roadway Segment 6 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions		Primary Collision Factor
	2	Unsafe Speed
	2	Improper Turning
	1	Unknown
Total	5	

High Collision Recommendations:

1. Install [R4-7] & [N-1 (CA)] Sign
2. Install [W3-3] Sign
3. Install [D3-1] "Ventura Ave" Sign (2 Post)
4. Install [D3-1] "Contra Costa Ave" Sign (2 Post)
5. Install New Dot Markers/Pavement Markers to Missing Dot/Pavement Markers



9. Collision Diagrams, Preliminary Conceptual Plans for Recommended Improvements at High Collision Intersections and High Collision Roadway Segments, Cost Estimates, and Benefit Cost Ratios

At each of the aforementioned high collision intersections and roadway segments, the collision patterns have been evaluated and countermeasures to those patterns have been developed through a preliminary conceptual plan and the preliminary cost of those measures has been estimated. This section of this report summarizes those results.

This Highway Safety Improvement Program (HSIP) is a federal program that aims to reduce traffic fatalities and serious injuries on all public roads. The HSIP uses a data-driven approach to improve highway safety. HSIP grant funding is prioritized and awarded based on the grant funding's economic effectiveness, which is established by a benefit to cost ratio. Under the most recent HSIP Cycle 11 call for projects, the minimum Benefit to Cost Ratio is 3.5. A summary of the benefit to cost ratios is provided in this section. Project cost estimates are calculated on a line-item basis using the Caltrans Contract Cost Database. In some cases, recent construction bids and benefit values are calculated based on Caltrans established countermeasure values. A summation of the total construction cost of all intersections and road segments are displayed at the end of the report.

The cost estimate used in this analysis is used to develop benefit to cost ratio comparison for concept plans and do not reflect actual cost of implementation or construction.

Depending on the City's priorities, it is highly recommended that multiple projects as provided below are grouped into one HSIP application to maximize potential funding allocations.



9.1 High Collision Intersections

9.1.1 Intersection 1: San Pablo Av & 23rd St/Road 20



Figure 25: Intersection 1- San Pablo Av & 23rd St/Road 20 Crash Diagram- 20 Collisions (January 1, 2018 - December 31, 2022)

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)

*Collision Locations are approximate due to the size and overlapping of collisions

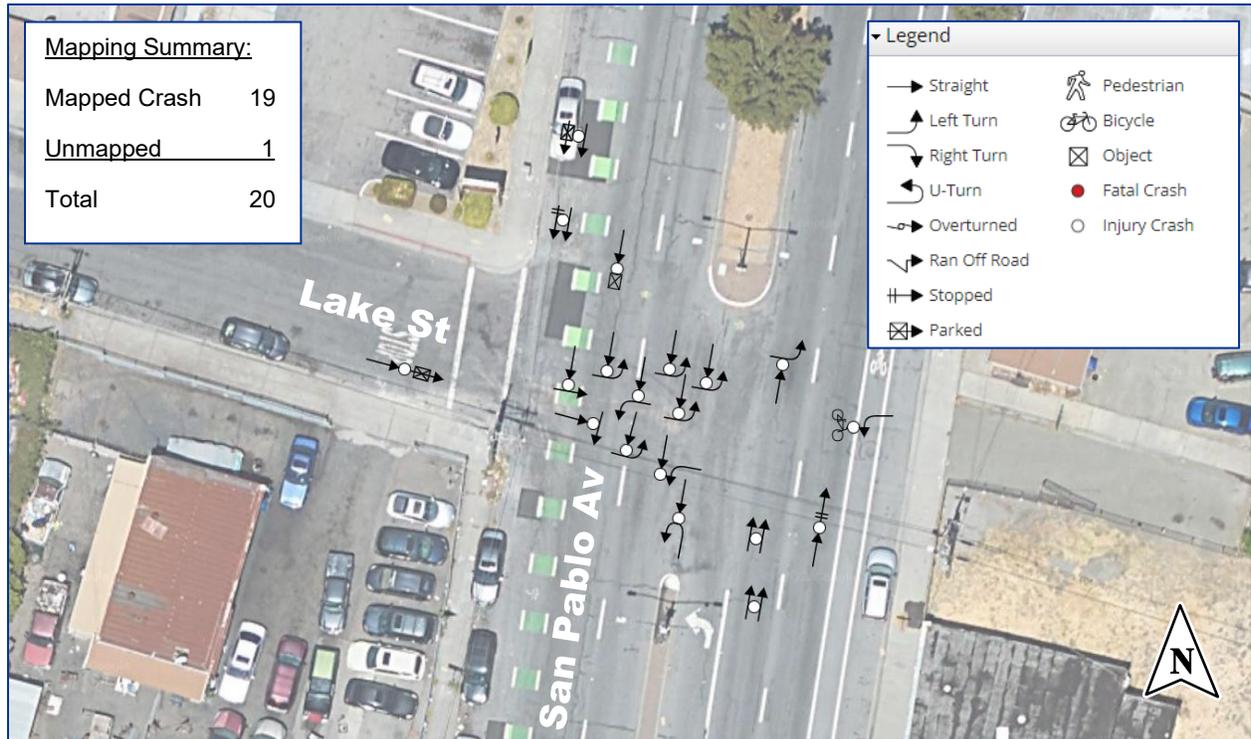


9.1.1.1 Intersection 1 Cost Estimate and Cost/Benefit Analysis

Due to the City's ongoing improvement project on the Intersection, the recommended safety countermeasures and benefit-cost-analysis will not be applied to this intersection.



9.1.2 Intersection 2: San Pablo Av & Lake St



**Figure 26: Intersection 2- San Pablo Av & Lake St Crash Diagram- 20 Collisions
(January 1, 2018 - December 31, 2022)**

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)

*Collision Locations are approximate due to the size and overlapping of collisions

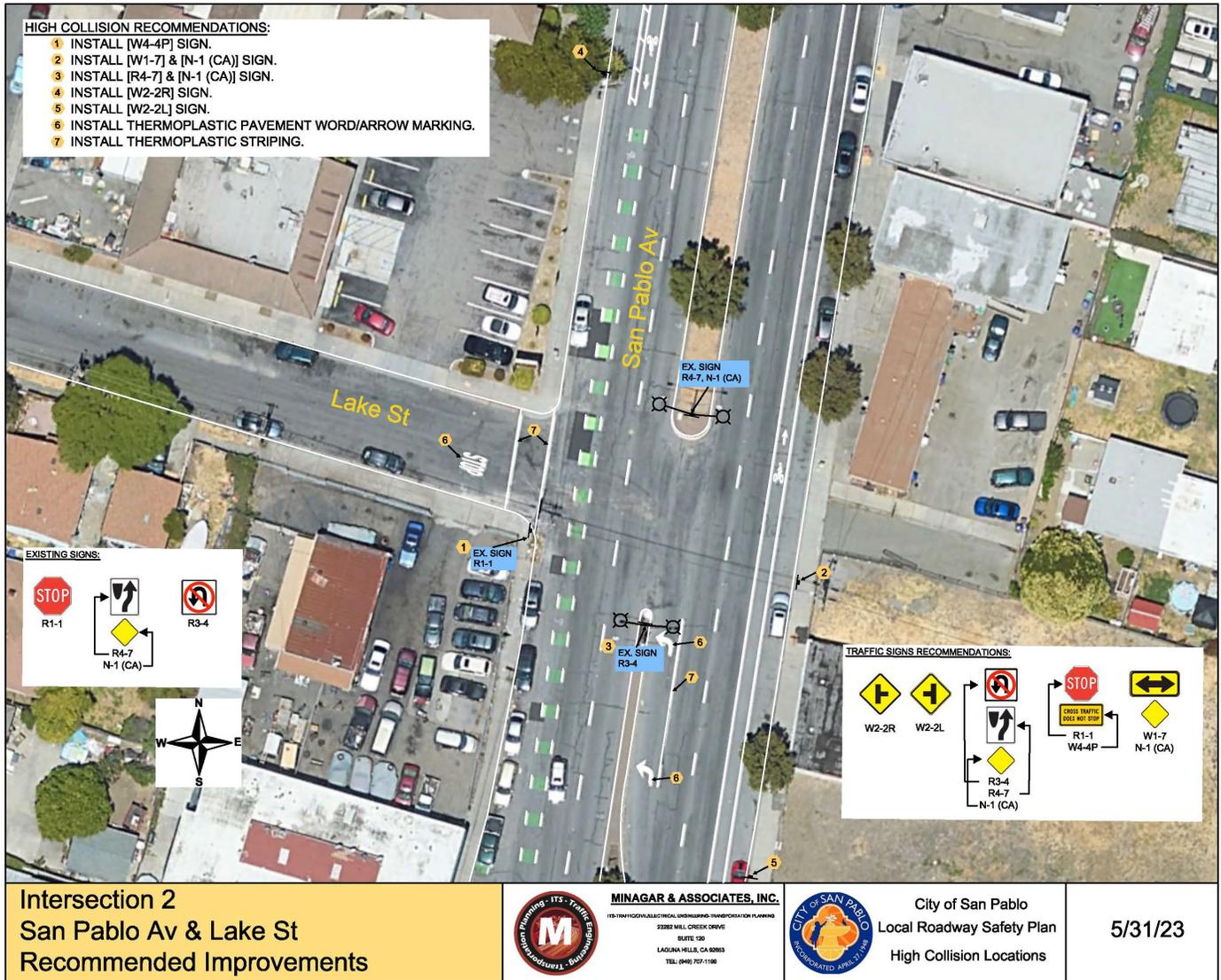


Figure 27: Intersection 2- San Pablo Av & Lake St Recommended Improvements





9.1.2.1 Intersection 2 Cost Estimate and Cost/Benefit Analysis

Construction Cost Estimate:

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 4.

Table 29: Intersection 2 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility	
						LRSM CM No. (NS07)*	LRSM CM No. (NS06)*
1	Install [W4-4P] Sign	EA	1	\$ 200.71	\$ 200.71		90%
2	Install [W1-7] & [N-1 (CA)] Sign	EA	1	\$ 569.38	\$ 569.38		90%
3	Install [R4-7] & [N-1 (CA)] Sign	EA	1	\$ 401.42	\$ 401.42		90%
4	Install [W2-2R] Sign	EA	1	\$ 368.67	\$ 368.67		90%
5	Install [W2-2L] Sign	EA	1	\$ 368.67	\$ 368.67		90%
6	Install Thermoplastic Pavement Word/Arrow Marking	SQFT	52	\$ 10.03	\$ 521.56	90%	
7	Install Thermoplastic Striping	LF	121	\$ 1.84	\$ 222.64	90%	
Total					\$ 2,653.05		
Weighted Percentage (%)					100%		100.0%
*Unsignalized Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)							

Total Construction Cost:	\$	2,653.05
Contingencies percentage of the aforementioned Total Construction Cost:	20%	\$ 530.61
Total Construction Cost (Including Contingencies):	\$	3,183.66

Total Cost and Benefit:

The project's total cost is estimated at \$3,184 which does not include the design and engineering costs. The estimated benefit of these improvements is \$1,618,652 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 508.37.

The most recent HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 508.37, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

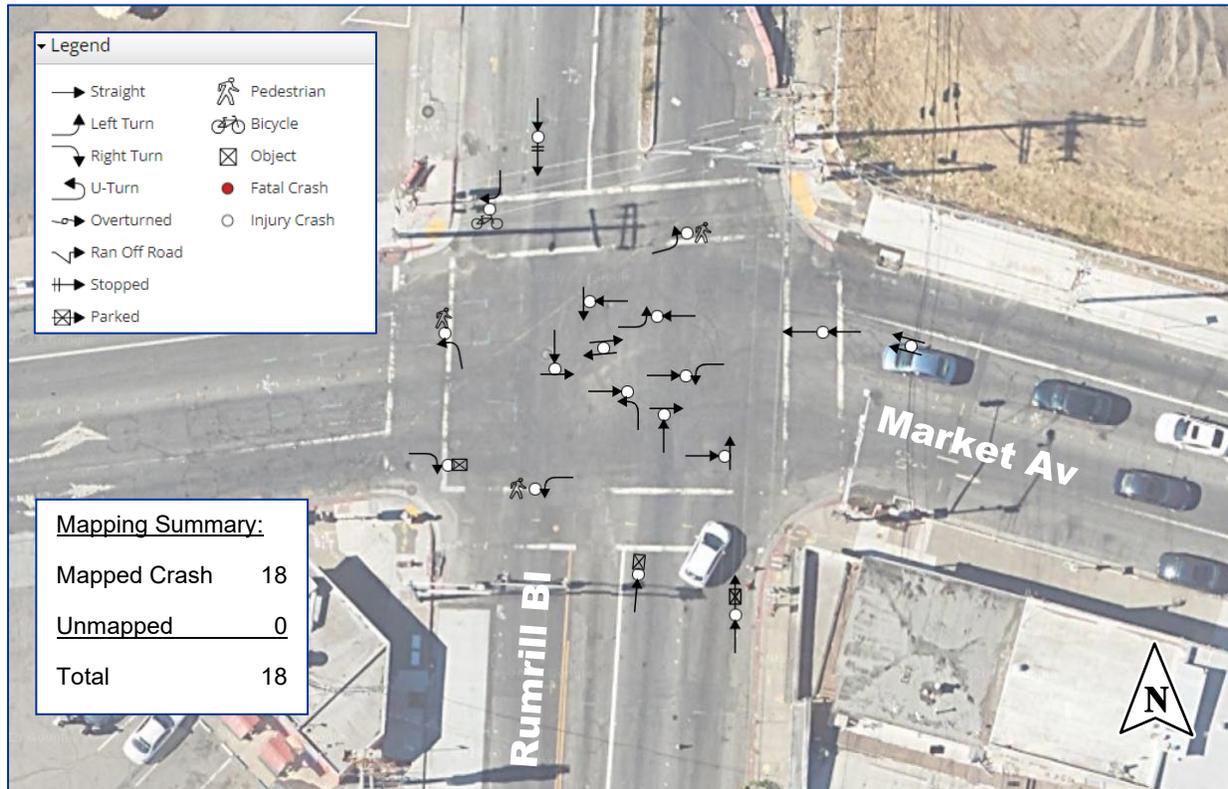
Itemized Benefits	
Safety	\$1,612,643
Travel Time	\$5,436
Vehicle Operating Cost	\$530
Emissions	\$44
Total Benefits	\$1,618,652

Summary of Total Cost & Benefit	
Present Value Costs (\$ Dollars)	\$3,184
Present Value Benefits (\$ Dollars)	\$1,618,652
Net Present Value (\$ Dollars)	\$1,615,468
Benefit / Cost Ratio	508.37





9.1.3 Intersection 3: Market Av & Rumrill Bl



**Figure 28: Intersection 3- Market Av & Rumrill Bl Crash Diagram- 18 Collisions
(January 1, 2018 - December 31, 2022)**

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)

*Collision Locations are approximate due to the size and overlapping of collisions

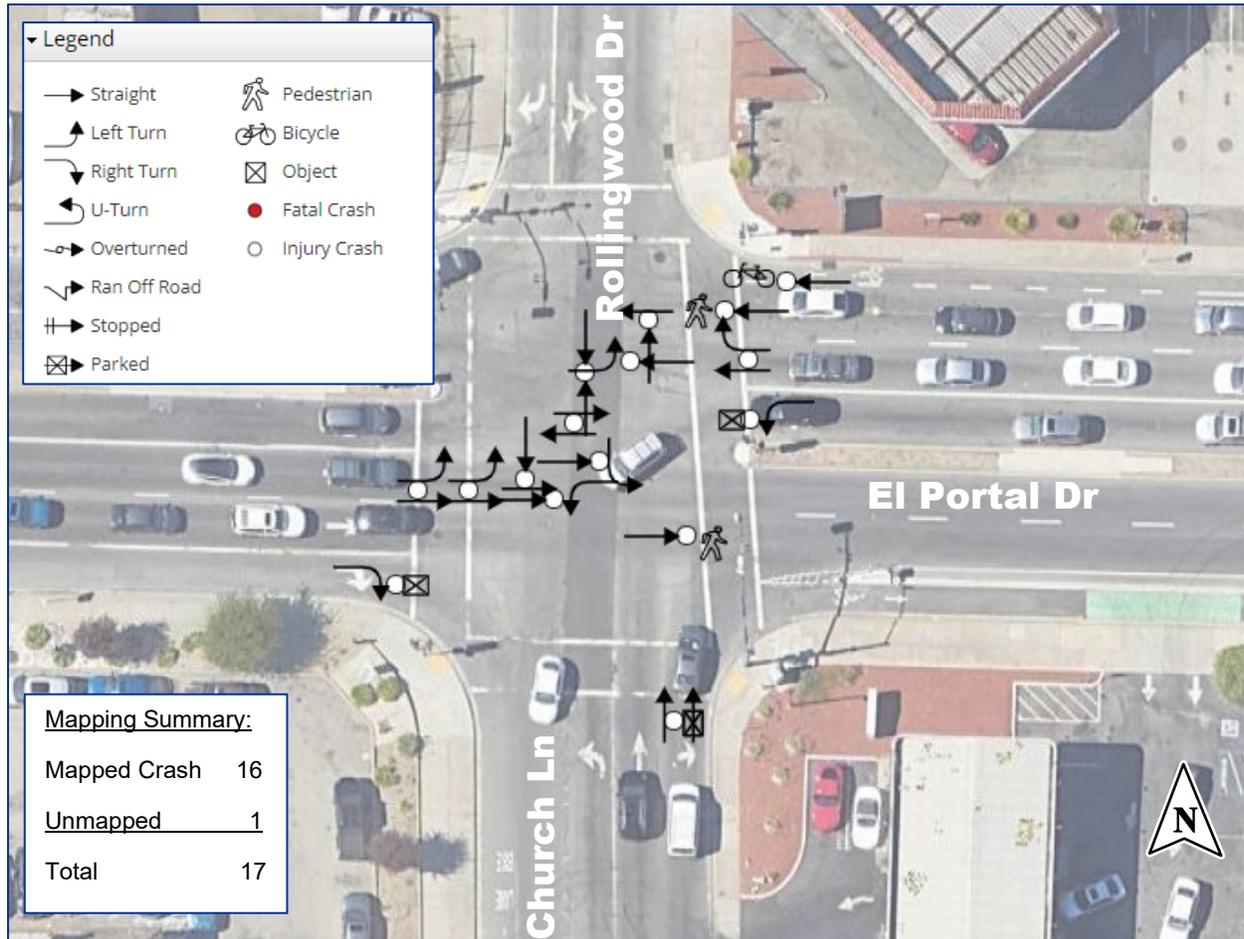


9.1.3.1 Intersection 3 Cost Estimate and Cost/Benefit Analysis

Due to the City's ongoing improvement project on the Intersection, the recommended safety countermeasures and benefit-cost-analysis will not be applied to this intersection.



9.1.4 Intersection 4: El Portal Dr & Church Ln/Rollingwood Dr



**Figure 29: Intersection 4- El Portal Dr & Church Ln/Rollingwood Dr Crash Diagram-
17 Collisions
(January 1, 2018 - December 31, 2022)**

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)

*Collision Locations are approximate due to the size and overlapping of collisions

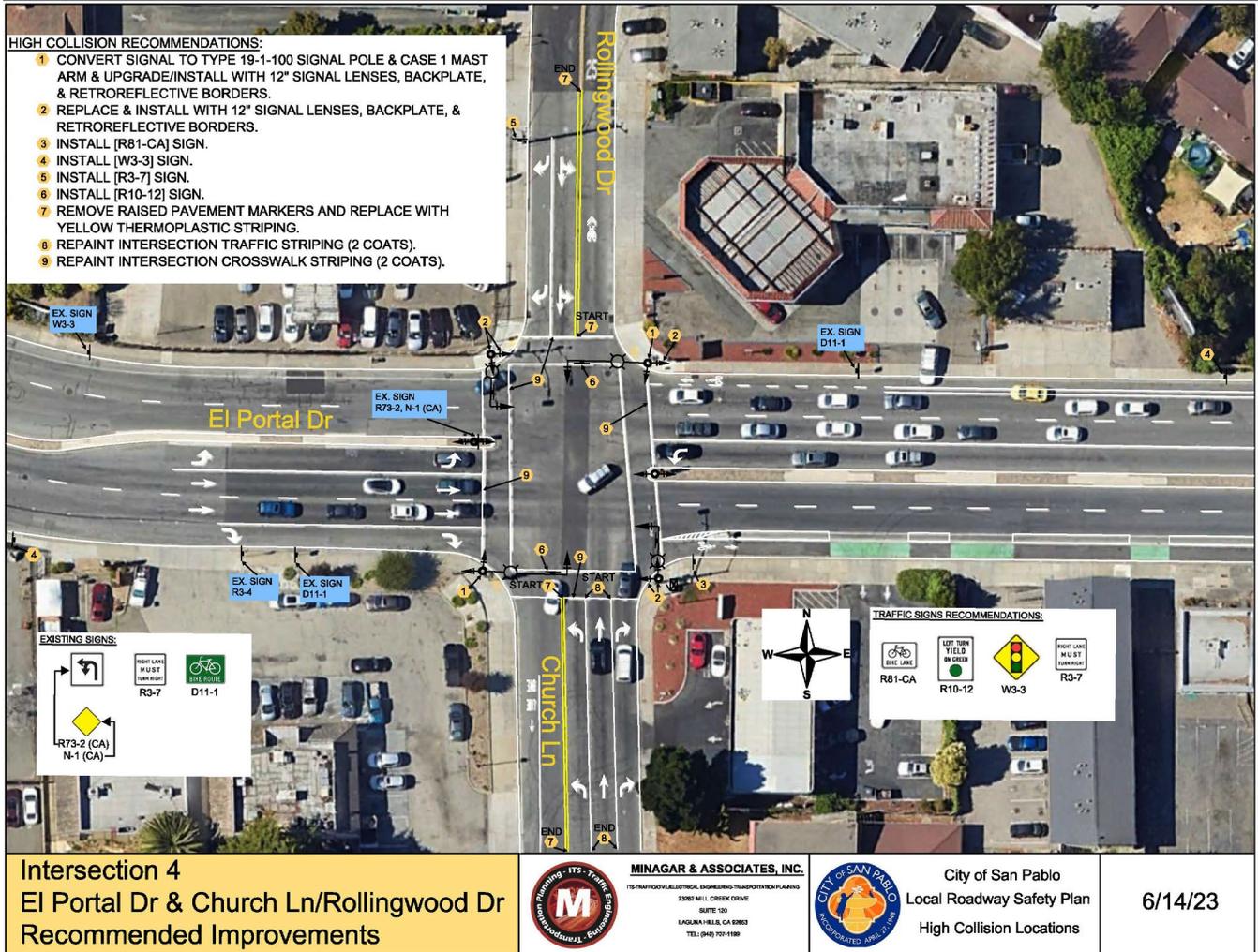


Figure 30: Intersection 4- El Portal Dr & Church Ln/Rollingwood Dr Recommended Improvements





9.1.4.1 Intersection 4 Cost Estimate and Cost/Benefit Analysis

Construction Cost Estimate:

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 4.

Table 30: Intersection 4 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility			
						LRSM CM No. (S08)*	LRSM CM No. (S02)*	LRSM CM No. (R22)*	LRSM CM No. (S09)*
1	Convert Signal to Type 19-1-100 Signal Pole & Case 1 Mast Arm with 12" Signal Lenses with Backplate & Retroreflective Borders	LS	2	\$ 50,000.00	\$ 100,000.00	90%			
2	Upgrade with 12" Signal Lenses with Backplate & Retroreflective Borders	EA	5	\$ 935.00	\$ 4,675.00		90%		
3	Install [R81-CA] Sign	EA	1	\$ 368.67	\$ 368.67			90%	
4	Install [W3-3] Sign	EA	2	\$ 368.67	\$ 737.34			90%	
5	Install [R3-7] Sign	EA	1	\$ 368.67	\$ 368.67			90%	
6	Install [R10-12] Sign	EA	1	\$ 200.71	\$ 200.71			90%	
7	Remove Raised Pavement Markers and Replace with Yellow Thermoplastic Striping	EA	112	\$ 1.78	\$ 199.36				90%
		LF	400	\$ 1.84	\$ 736.00				90%
8	Repaint Intersection Traffic Striping (2 Coats)	LF	200	\$ 1.05	\$ 210.00				90%
9	Repaint Intersection Crosswalk Striping (2 Coats)	LF	513.3	\$ 1.05	\$ 538.97				90%
					\$ 108,034.72				
				Weighted Percentage (%)	100%	92.6%	4.3%	1.6%	1.6%

* Signalized/Roadway Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)	
Total Construction Cost:	\$ 108,034.72
Contingencies percentage of the aforementioned Total Construction Cost:	20% \$ 21,606.94
Total Construction Cost (Including Contingencies):	\$ 129,641.66

Total Cost and Benefit:

The project's total cost is estimated at \$129,642 which does not include the design and engineering costs. The estimated benefit of these improvements is \$1,844,237 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 14.27.

The most recent HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 14.27, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	\$1,844,237
Travel Time	\$5,175
Vehicle Operating Cost	\$548
Emissions	\$46
Total Benefits	\$1,850,401

Summary of Total Cost & Benefit	
Present Value Costs (\$ Dollars)	\$129,642
Present Value Benefits (\$ Dollars)	\$1,850,401
Net Present Value (\$ Dollars)	\$1,720,759
Benefit / Cost Ratio	14.27





9.1.5 Intersection 5: Church Ln & San Pablo Av

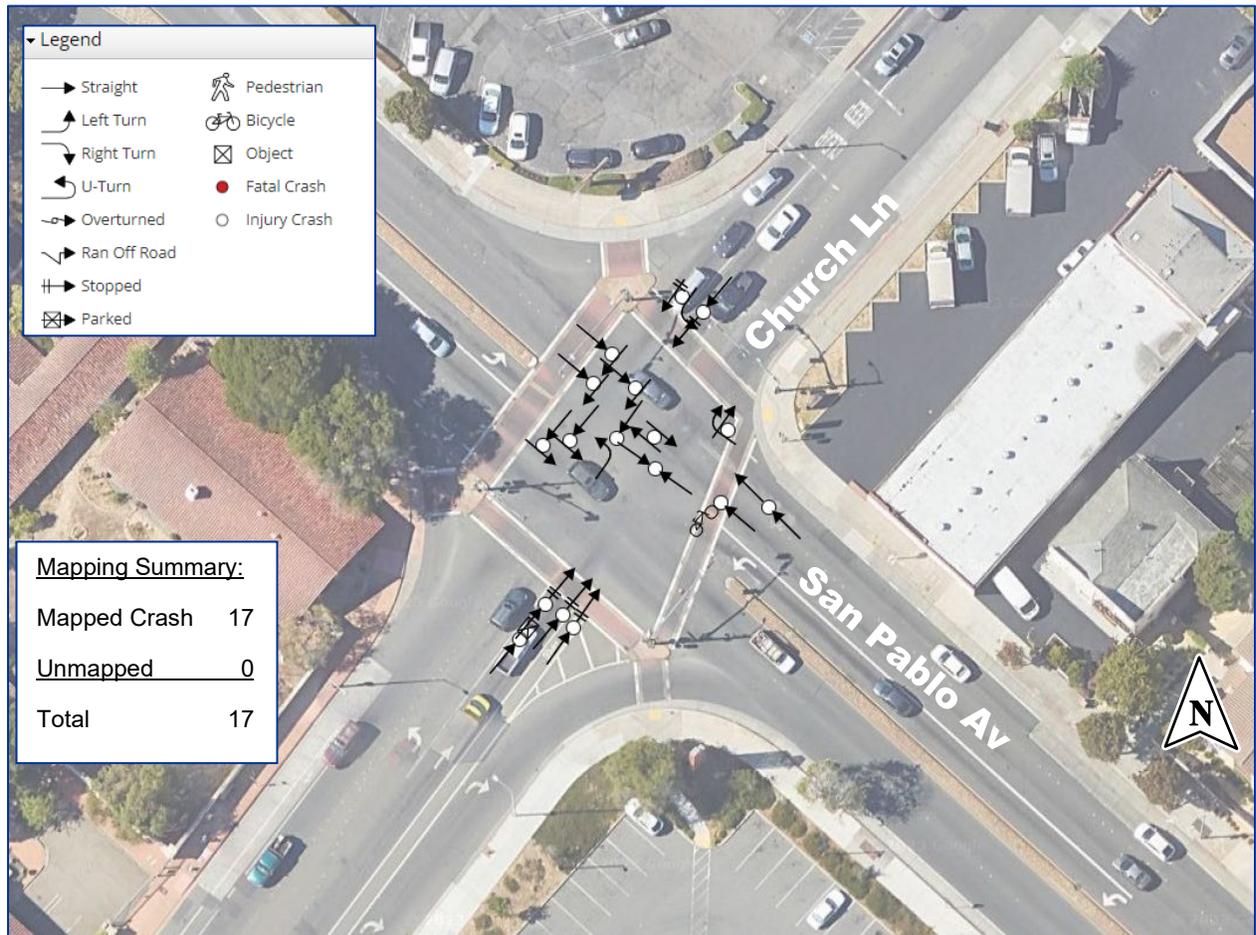


Figure 31: Intersection 5- Church Ln & San Pablo Av Crash Diagram- 17 Collisions (January 1, 2018 - December 31, 2022)

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)

*Collision Locations are approximate due to the size and overlapping of collisions

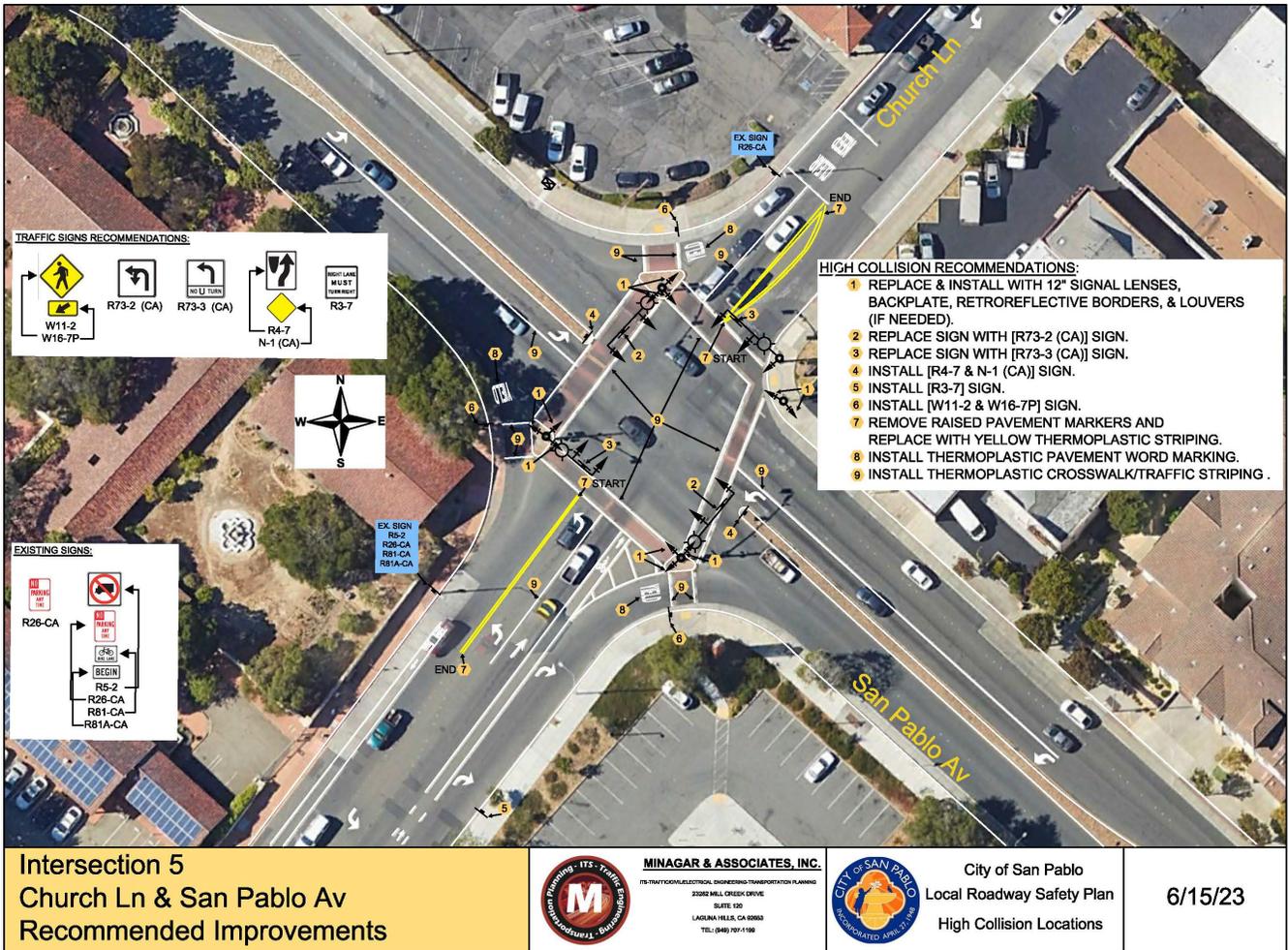


Figure 32: Intersection 5- Church Ln & San Pablo Av Recommended Improvements





9.1.5.1 Intersection 5 Cost Estimate and Cost/Benefit Analysis

Construction Cost Estimate:

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 4.

Table 31: Intersection 5 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility			
						LRSM CM No. (S02)*	LRSM CM No. (R22)*	LRSM CM No. (S09)*	LRSM CM No. (NS07)*
1	Upgrade with 12" Signal Lenses with Backplate & Retroreflective Borders	EA	11	\$ 935.00	\$ 10,285.00	90%			
2	Replace Sign with [R73-2 (CA)] Sign	EA	1	\$ 301.12	\$ 301.12		90%		
3	Replace Sign with [R73-3 (CA)] Sign	EA	1	\$ 301.12	\$ 301.12		90%		
4	Install [R4-7] & [N-1 (CA)] Sign	EA	2	\$ 569.38	\$ 1,138.76		90%		
5	Install [R3-7] Sign	EA	1	\$ 368.67	\$ 368.67		90%		
6	Install [W11-2 & W16-7P] Sign	EA	1	\$ 569.38	\$ 569.38		90%		
7	Remove Raised Pavement Markers and Replace with Yellow Thermoplastic Striping	EA	100	\$ 1.78	\$ 178.00			90%	
		LF	412	\$ 1.84	\$ 758.08			90%	
8	Install Thermoplastic Pavement Word Marking	SQFT	72	\$ 10.03	\$ 722.16				90%
9	Install Thermoplastic Crosswalk/Traffic Striping	LF	1075	\$ 1.84	\$ 1,978.00			90%	
Total					\$ 16,600.29				
Weighted Percentage (%)					100%	62.0%	16.1%	17.6%	4.4%

*Signalize/Unsignalized/Roadway Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)

Total Construction Cost:	\$	16,600.29
Contingencies percentage of the aforementioned Total Construction Cost:	20%	\$ 3,320.06
Total Construction Cost (Including Contingencies):	\$	19,920.35

Total Cost and Benefit:

The project's total cost is estimated at \$19,920 which does not include the design and engineering costs. The estimated benefit of these improvements is \$738,699 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 37.08.

The most recent HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 37.08, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

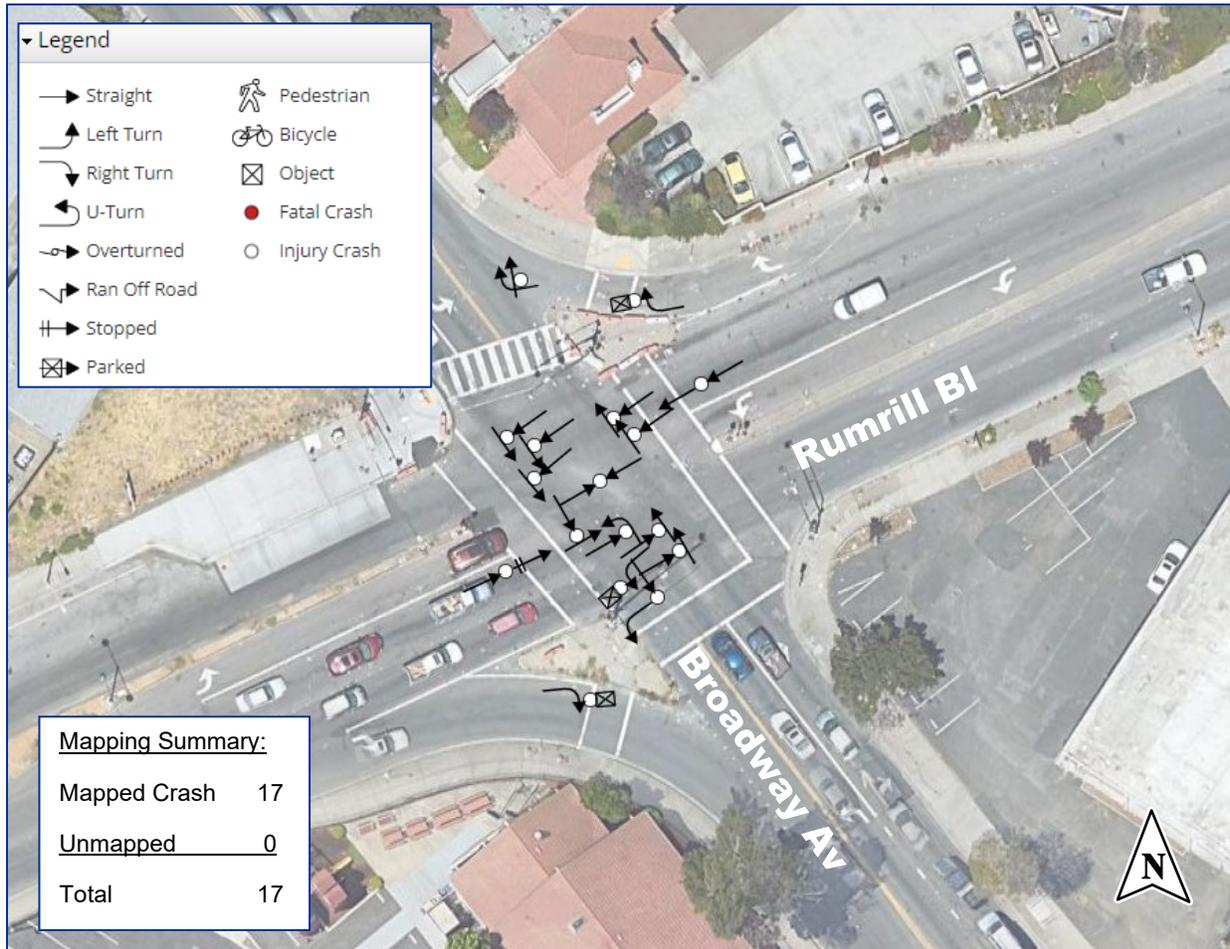
Itemized Benefits	
Safety	\$735,047
Travel Time	\$3,299
Vehicle Operating Cost	\$322
Emissions	\$31
Total Benefits	\$738,699

Summary of Total Cost & Benefit	
Present Value Costs (\$ Dollars)	\$19,920
Present Value Benefits (\$ Dollars)	\$738,699
Net Present Value (\$ Dollars)	\$718,779
Benefit / Cost Ratio	37.08





9.1.6 Intersection 6: Rumrill Bl & Broadway Av



**Figure 33: Intersection 6- Rumrill Bl & Broadway Av Crash Diagram- 17 Collisions
(January 1, 2018 - December 31, 2022)**

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions

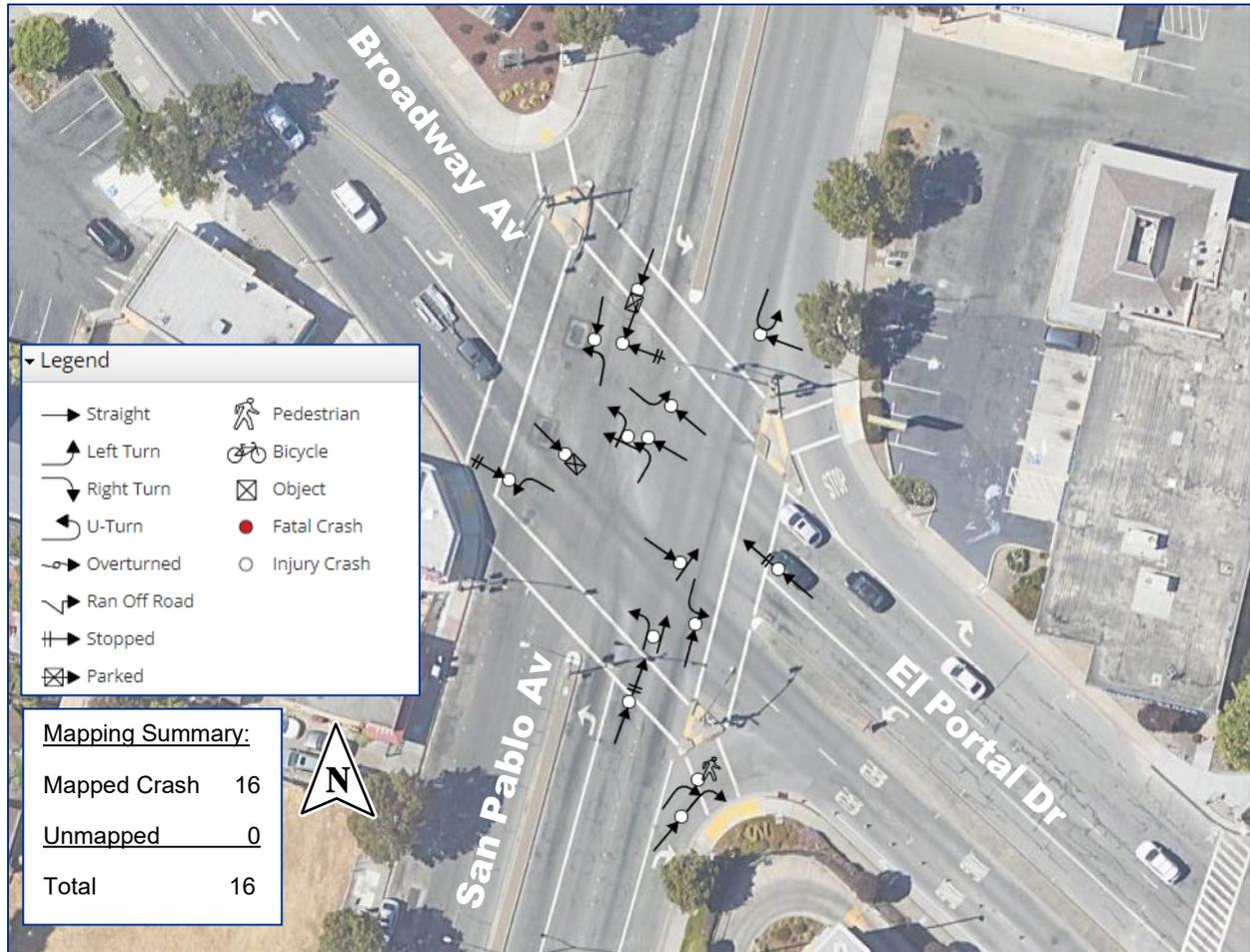


9.1.6.1 Intersection 6 Cost Estimate and Cost/Benefit Analysis

Due to the City's ongoing improvement project on the Intersection, the recommended safety countermeasures and benefit-cost-analysis will not be applied to this intersection.



9.1.7 Intersection 7: San Pablo Av & Broadway Av/El Portal Dr



**Figure 34: Intersection 7- San Pablo Av & Broadway Av/El Portal Dr
Crash Diagram- 16 Collisions
(January 1, 2018 - December 31, 2022)**

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions



Figure 35: Intersection 7- San Pablo Av & Broadway Av/El Portal Dr Recommended Improvements





9.1.7.1 Intersection 7 Cost Estimate and Cost/Benefit Analysis

Construction Cost Estimate:

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 4.

Table 32: Intersection 7 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility			
						LRSM CM No. (S02)*	LRSM CM No. (R22)*	LRSM CM No. (S09)*	LRSM CM No. (NS07)*
1	Upgrade with 12" Signal Lenses with Backplate & Retroreflective Borders	EA	9	\$ 935.00	\$ 8,415.00	90%			
2	Replace Sign with [R73-3 (CA)] Sign	EA	1	\$ 301.12	\$ 301.12		90%		
3	Install [R4-7] & [N-1 (CA)] Sign	EA	4	\$ 569.38	\$ 2,277.52		90%		
4	Install [R3-7] Sign	EA	1	\$ 368.67	\$ 368.67		90%		
5	Install [W3-3] Sign	EA	2	\$ 368.67	\$ 737.34		90%		
6	Install [R1-2] Sign	EA	1	\$ 368.67	\$ 368.67		90%		
7	Install Thermoplastic Pavement Word Marking	SQFT	145	\$ 10.03	\$ 1,454.35				90%
8	Install Entire Thermoplastic Crosswalk Striping	LF	582	\$ 1.84	\$ 1,070.88			90%	
Total					\$ 14,993.55				
Weighted Percentage (%)					100%	56.1%	27.0%	7.1%	9.7%

*Signalize/Unsignalized/Roadway Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)

Total Construction Cost:	\$	14,993.55
Contingencies percentage of the aforementioned Total Construction Cost:	20%	\$ 2,998.71
Total Construction Cost (Including Contingencies):	\$	17,992.26

Total Cost and Benefit:

The project's total cost is estimated at \$17,992 which does not include the design and engineering costs. The estimated benefit of these improvements is \$870,134 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 48.36.

The most recent HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 48.36, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

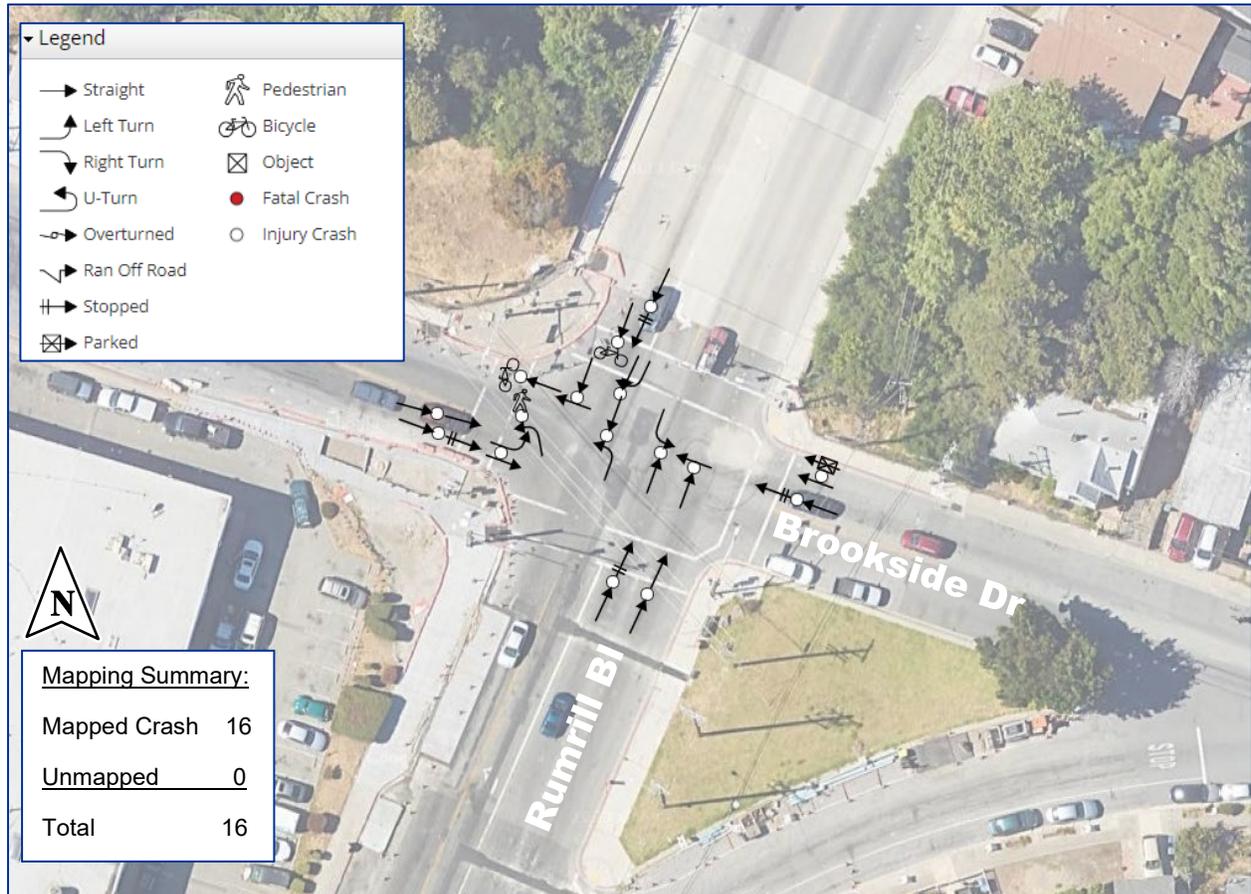
Itemized Benefits	
Safety	\$865,368
Travel Time	\$4,304
Vehicle Operating Cost	\$418
Emissions	\$44
Total Benefits	\$870,134

Summary of Total Cost & Benefit	
Present Value Costs (\$ Dollars)	\$17,992
Present Value Benefits (\$ Dollars)	\$870,134
Net Present Value (\$ Dollars)	\$852,142
Benefit / Cost Ratio	48.36





9.1.8 Intersection 8: Rumrill Bl & Brookside Dr



**Figure 36: Intersection 8- Rumrill Bl & Brookside Dr Crash Diagram- 16 Collisions
(January 1, 2018 - December 31, 2022)**

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)

*Collision Locations are approximate due to the size and overlapping of collisions

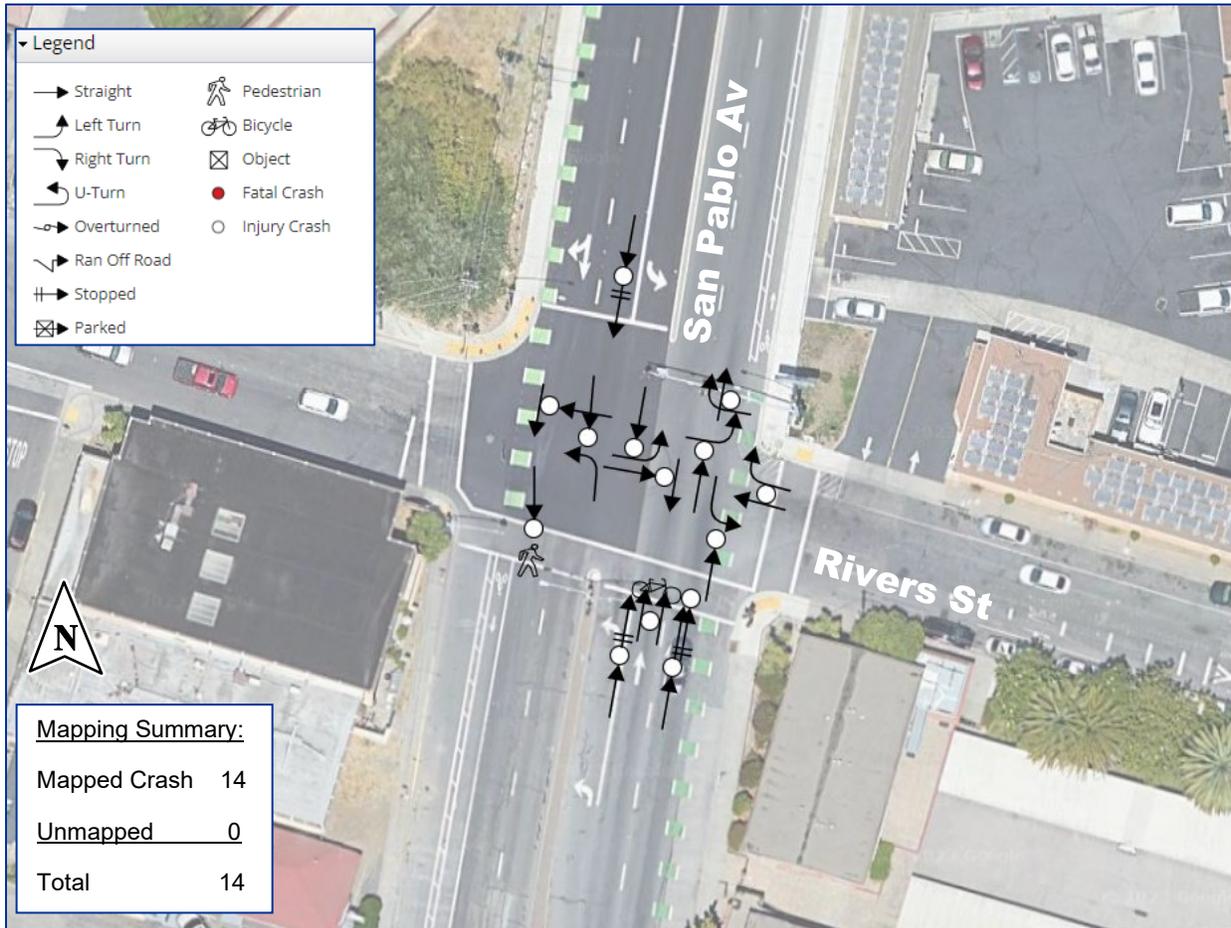


9.1.8.1 Intersection 8 Cost Estimate and Cost/Benefit Analysis

Due to the City's ongoing improvement project on the Intersection, the recommended safety countermeasures and benefit-cost-analysis will not be applied to this intersection.



9.1.9 Intersection 9: San Pablo Av & Rivers St



**Figure 37: Intersection 9- San Pablo Av & Rivers St Crash Diagram- 14 Collisions
(January 1, 2018 - December 31, 2022)**

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions

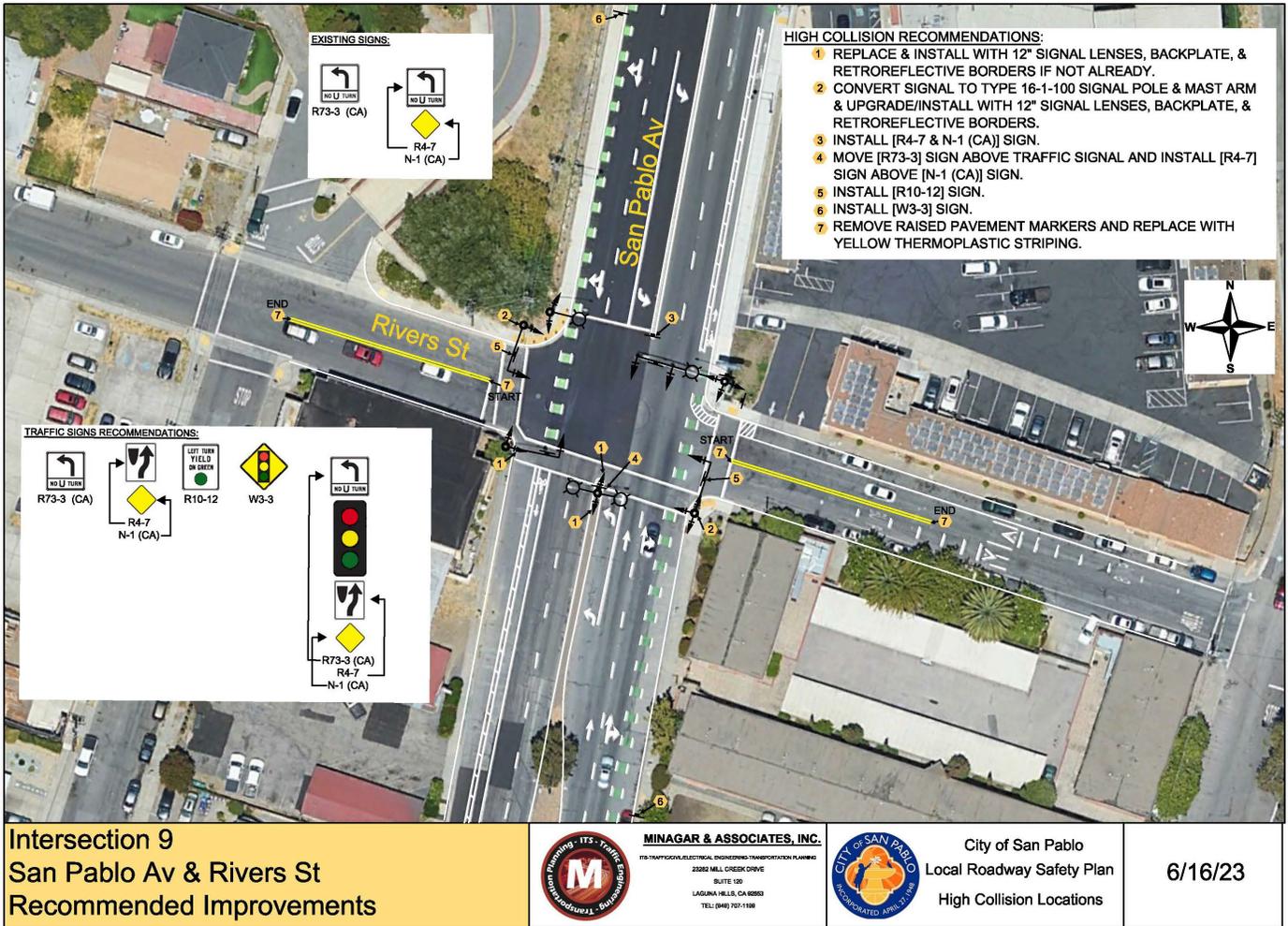


Figure 38: Intersection 9- San Pablo Av & Rivers St Recommended Improvements





9.1.9.1 Intersection 9 Cost Estimate and Cost/Benefit Analysis

Construction Cost Estimate:

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 4.

Table 33: Intersection 9 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility			
						LRSM CM No. (S02)*	LRSM CM No. (S08)*	LRSM CM No. (R22)*	LRSM CM No. (S09)*
1	Upgrade with 12" Signal Lenses with Backplate & Retroreflective Borders	EA	1	\$ 935.00	\$ 935.00	90%			
		EA	2	\$ 135.00	\$ 270.00	90%			
2	Convert Signal to Type 16-1-100 Signal Pole & Case 1 Mast Arm with 12" Signal Lenses with Backplate & Retroreflective Borders	LS	2	\$ 40,000.00	\$ 80,000.00		90%		
3	Install [R4-7] & [N-1 (CA)] Sign	EA	1	\$ 569.38	\$ 569.38			90%	
4	Move [R73-3] Sign Above Traffic Signal and Install [R3-7] Sign Above [N-1 (CA)] Sign	EA	1	\$ 301.12	\$ 301.12			90%	
5	Install [R10-12] Sign	EA	2	\$ 200.71	\$ 401.42			90%	
6	Install [W3-3] Sign	EA	2	\$ 368.67	\$ 737.34			90%	
7	Remove Raised Pavement Markers and Replace with Thermoplastic Pavement Striping	EA	15	\$ 1.78	\$ 26.70				90%
		LF	390	\$ 1.84	\$ 717.60				90%
Total					\$ 83,958.56				
Weighted Percentage (%)					100%	1.4%	95.3%	2.4%	0.9%

*Signalize/Roadway Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)

Total Construction Cost:	\$	83,958.56
Contingencies percentage of the aforementioned Total Construction Cost:	20%	\$ 16,791.71
Total Construction Cost (Including Contingencies):	\$	100,750.27

Total Cost and Benefit:

The project's total cost is estimated at \$100,750 which does not include the design and engineering costs. The estimated benefit of these improvements is \$1,863,532 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 18.50.

The most recent HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 18.50, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

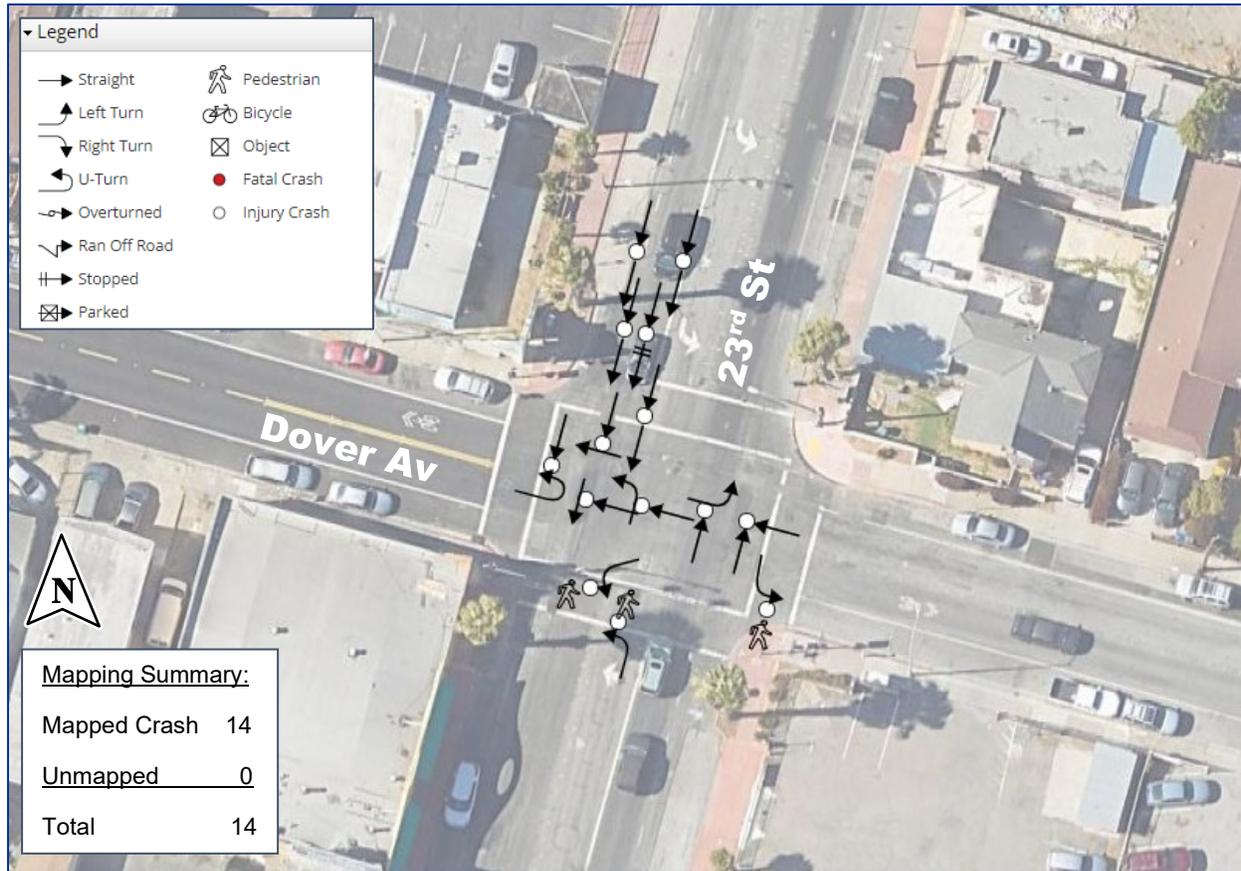
Itemized Benefits	
Safety	\$1,859,015
Travel Time	\$4,094
Vehicle Operating Cost	\$401
Emissions	\$23
Total Benefits	\$1,863,532

Summary of Total Cost & Benefit	
Present Value Costs (\$ Dollars)	\$100,750
Present Value Benefits (\$ Dollars)	\$1,863,532
Net Present Value (\$ Dollars)	\$1,762,782
Benefit / Cost Ratio	18.50





9.1.10 Intersection 10: 23rd St & Dover Av



**Figure 39: Intersection 10- 23rd St & Dover Av Crash Diagram- 14 Collisions
(January 1, 2018 - December 31, 2022)**

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)

*Collision Locations are approximate due to the size and overlapping of collisions



Figure 40: Intersection 10- 23rd St & Dover Av Recommended Improvements



9.1.10.1 Intersection 10 Cost Estimate and Cost/Benefit Analysis

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 4.

Construction Cost Estimate:

Table 34: Intersection 10 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility			
						LRSM CM No. (S02)*	LRSM CM No. (S08)*	LRSM CM No. (R22)*	LRSM CM No. (S09)*
1	Upgrade with 12" Signal Lenses with Backplate & Retroreflective Borders	EA	4	\$ 935.00	\$ 3,740.00	90%			
2	Convert Signal to Type 19-1-100 Signal Pole & Case 1 Mast Arm with 12" Signal Lenses with Backplate & Retroreflective Borders	LS	2	\$ 50,000.00	\$ 100,000.00		90%		
3	Install [R10-12] Sign to Mast Arm	EA	2	\$ 200.71	\$ 401.42			90%	
4	Replace Sign with [R73-3 (CA)] Sign on Mast Arm	EA	2	\$ 301.12	\$ 602.24			90%	
5	Remove Raised Pavement Markers and Replace With Thermoplastic Pavement Striping	EA	128	\$ 1.78	\$ 227.84				90%
		LF	448	\$ 1.84	\$ 824.32				90%
Total					\$ 105,795.82				
Weighted Percentage (%)					100%	3.5%	94.5%	0.9%	1.0%
*Signalize/Roadway Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)									

Total Construction Cost:	\$ 105,795.82
Contingencies percentage of the aforementioned Total Construction Cost:	20% \$ 21,159.16
Total Construction Cost (Including Contingencies):	\$ 126,954.98

Total Cost and Benefit:

The project's total cost is estimated at \$126,955 which does not include the design and engineering costs. The estimated benefit of these improvements is \$800,393 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 6.30.

The most recent HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 6.30, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	\$795,998
Travel Time	\$3,975
Vehicle Operating Cost	\$385
Emissions	\$35
Total Benefits	\$800,393

Summary of Total Cost & Benefit	
Present Value Costs (\$ Dollars)	\$126,955
Present Value Benefits (\$ Dollars)	\$800,393
Net Present Value (\$ Dollars)	\$673,438
Benefit / Cost Ratio	6.30

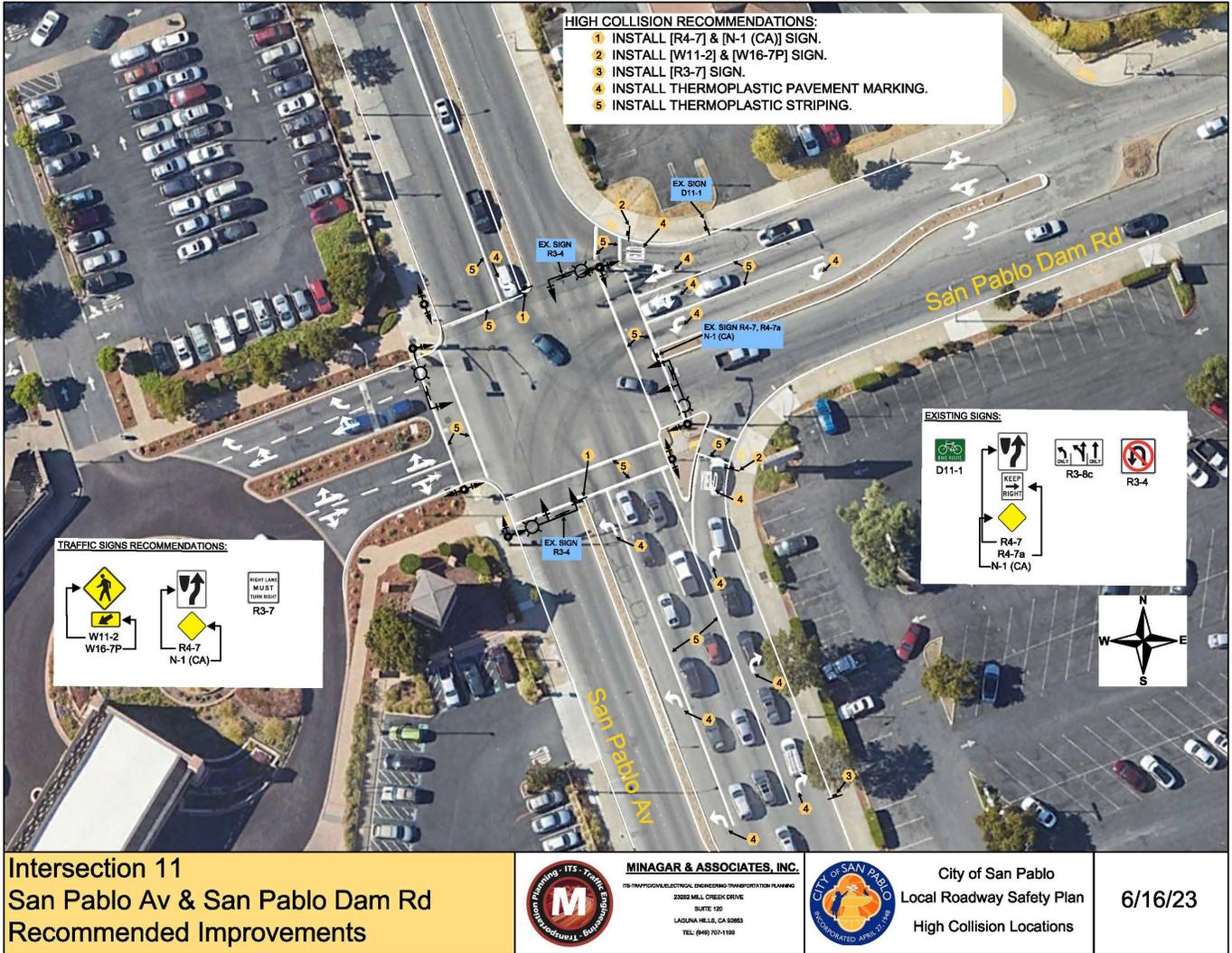


9.1.11 Intersection 11: San Pablo Av & San Pablo Dam Rd



**Figure 41: Intersection 11- San Pablo Av & San Pablo Dam Rd
Crash Diagram- 13 Collisions
(January 1, 2018 - December 31, 2022)**

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions



**Figure 42: Intersection 11- San Pablo Av & San Pablo Dam Rd
Recommended Improvements**





9.1.11.1 Intersection 11 Cost Estimate and Cost/Benefit Analysis

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 4.

Construction Cost Estimate:

Table 35: Intersection 11 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility		
						LRSM CM No. (R22)*	LRSM CM No. (S09)*	LRSM CM No. (NS07)*
1	Install [R4-7] & [N-1 (CA)] Sign	EA	2	\$ 569.38	\$ 1,138.76	90%		
2	Install [W11-2] & [W16-7P] Sign	EA	2	\$ 569.38	\$ 1,138.76	90%		
3	Install [R3-7] Sign	EA	1	\$ 368.67	\$ 368.67	90%		
4	Install Thermoplastic Pavement Word Marking	SQFT	243	\$ 10.03	\$ 2,437.29			90%
5	Install Thermoplastic Striping	LF	1076	\$ 1.84	\$ 1,979.84		90%	
Total					\$ 7,063.32			
Weighted Percentage (%)					100%	37.5%	28.0%	34.5%

*Unsignalize/Roadway Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)

Total Construction Cost:	\$	7,063.32
Contingencies percentage of the aforementioned Total Construction Cost:	20%	\$ 1,412.66
Total Construction Cost (Including Contingencies):	\$	8,475.98

Total Cost and Benefit:

The project's total cost is estimated at \$8,476 which does not include the design and engineering costs. The estimated benefit of these improvements is \$742,419 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 87.59.

The most recent HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 87.59, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

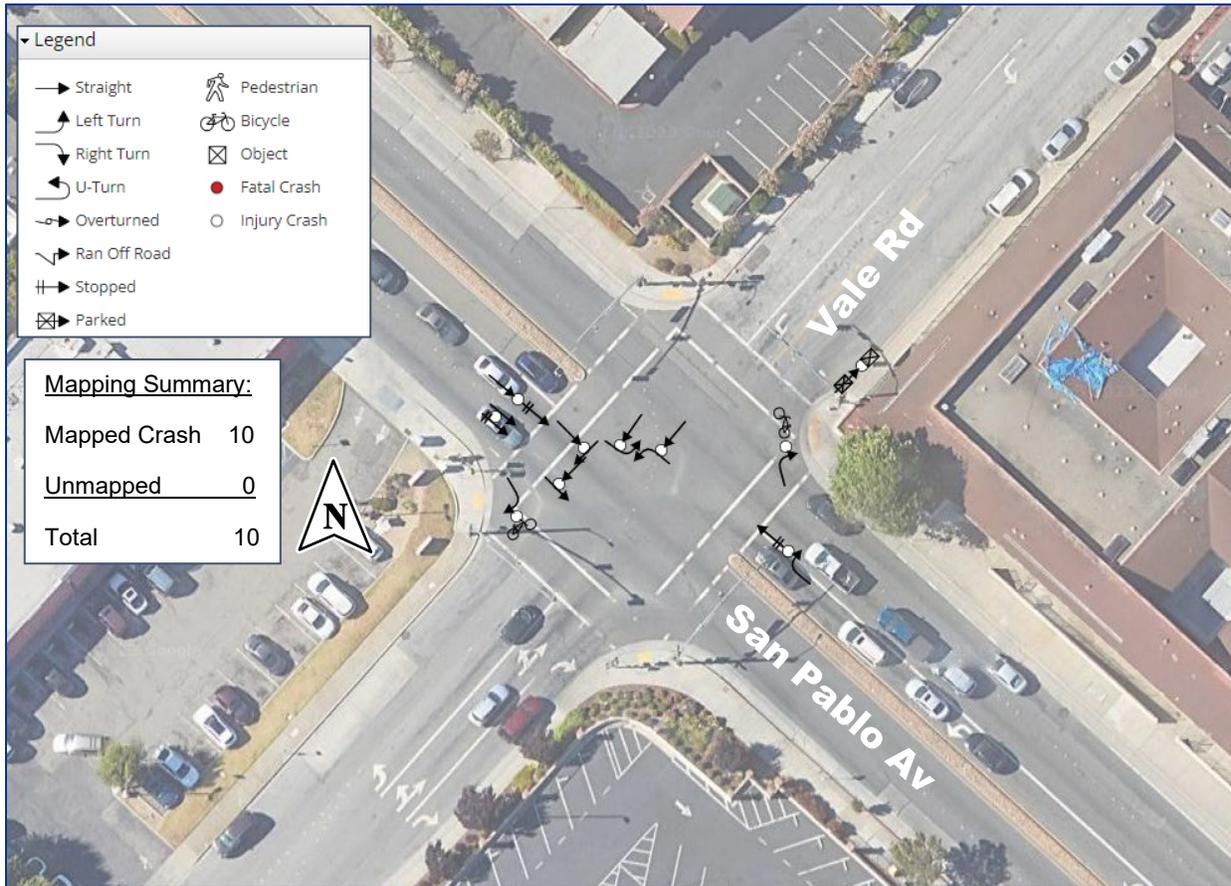
Itemized Benefits	
Safety	\$738,534
Travel Time	\$3,511
Vehicle Operating Cost	\$341
Emissions	\$33
Total Benefits	\$742,419

Summary of Total Cost & Benefit	
Present Value Costs (\$ Dollars)	\$8,476
Present Value Benefits (\$ Dollars)	\$742,419
Net Present Value (\$ Dollars)	\$733,943
Benefit / Cost Ratio	87.59





9.1.12 Intersection 12: San Pablo Av & Vale Rd



**Figure 43: Intersection 12- San Pablo Av & Vale Rd Crash Diagram- 10 Collisions
(January 1, 2018 - December 31, 2022)**

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions

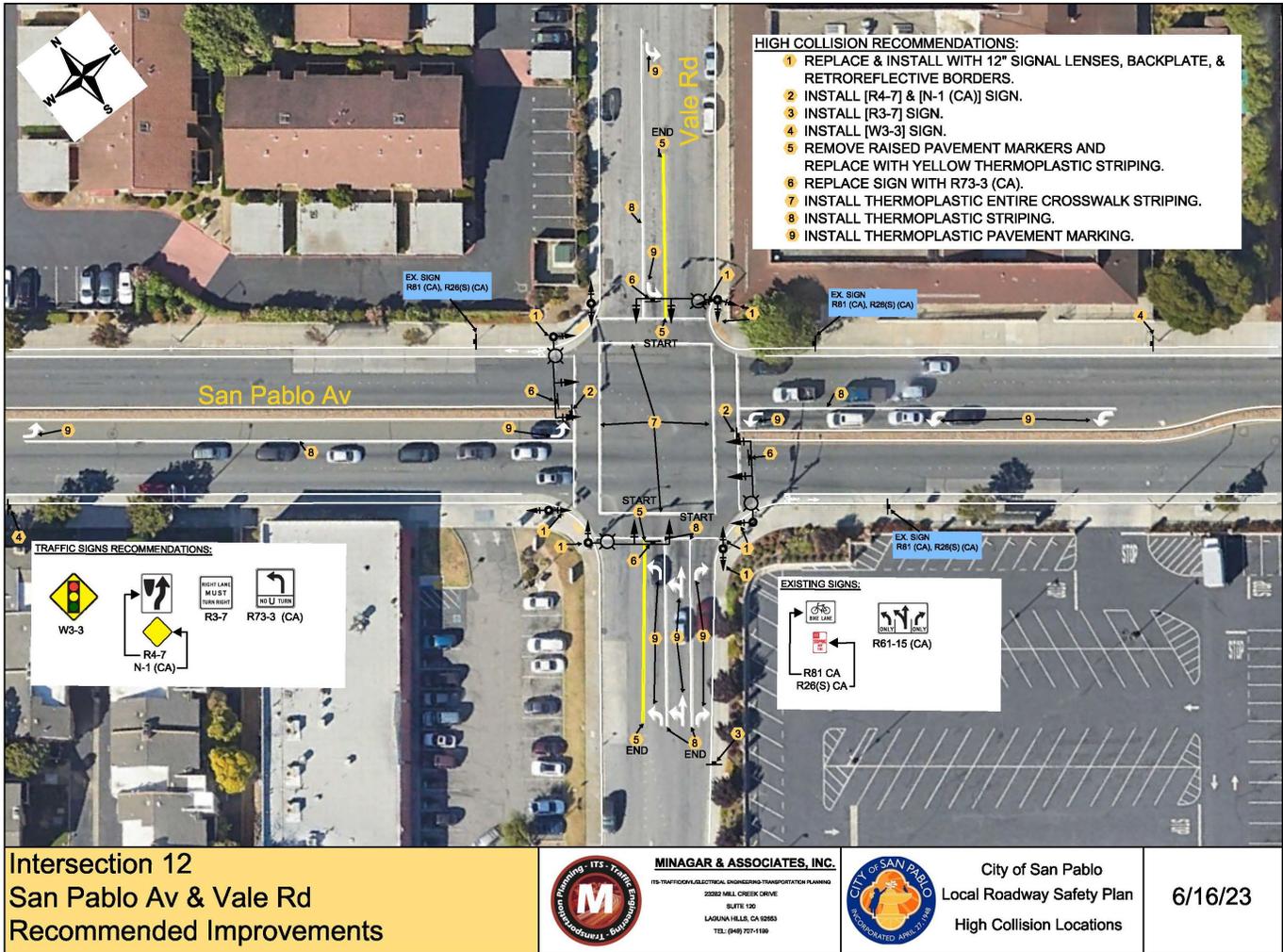


Figure 44: Intersection 12- San Pablo Av & Vale Rd Recommended Improvements





9.1.12.1 Intersection 12 Cost Estimate and Cost/Benefit Analysis

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 4.

Construction Cost Estimate:

Table 36: Intersection 12 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility		
						LRSM CM No. (S02)*	LRSM CM No. (R22)*	LRSM CM No. (S09)*
1	Upgrade with 12" Signal Lenses with Backplate & Retroreflective Borders	EA	9	\$ 935.00	\$ 8,415.00	90%		
2	Install [R4-7] & [N-1 (CA)] Sign	EA	2	\$ 569.38	\$ 1,138.76		90%	
3	Install [R3-7] Sign	EA	1	\$ 368.67	\$ 368.67		90%	
4	Install [W3-3] Sign	EA	2	\$ 368.67	\$ 737.34		90%	
5	Remove Raised Pavement Markers and Replace With Thermoplastic Pavement Striping	EA	1	\$ 1.78	\$ 1.78			90%
		LF	307	\$ 1.84	\$ 564.88			90%
6	Replace Sign with [R73-3 (CA)] Sign	EA	4	\$ 301.12	\$ 1,204.48		90%	
7	Install Thermoplastic Entire Crosswalk Striping	LF	476	\$ 1.84	\$ 875.84			90%
8	Install Thermoplastic Striping	LF	1061	\$ 1.84	\$ 1,952.24			90%
9	Install Thermoplastic Pavement Marking	SQFT	219	\$ 10.03	\$ 2,196.57			90%
Total					\$ 17,455.56			
Weighted Percentage (%)					100%	48.2%	19.8%	32.0%

*Signalized/Roadway Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)

Total Construction Cost:	\$	17,455.56
Contingencies percentage of the aforementioned Total Construction Cost:	20%	\$ 3,491.11
Total Construction Cost (Including Contingencies):	\$	20,946.67

Total Cost and Benefit:

The project's total cost is estimated at \$20,947 which does not include the design and engineering costs. The estimated benefit of these improvements is \$323,769 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 15.46.

The most recent HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 15.46, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

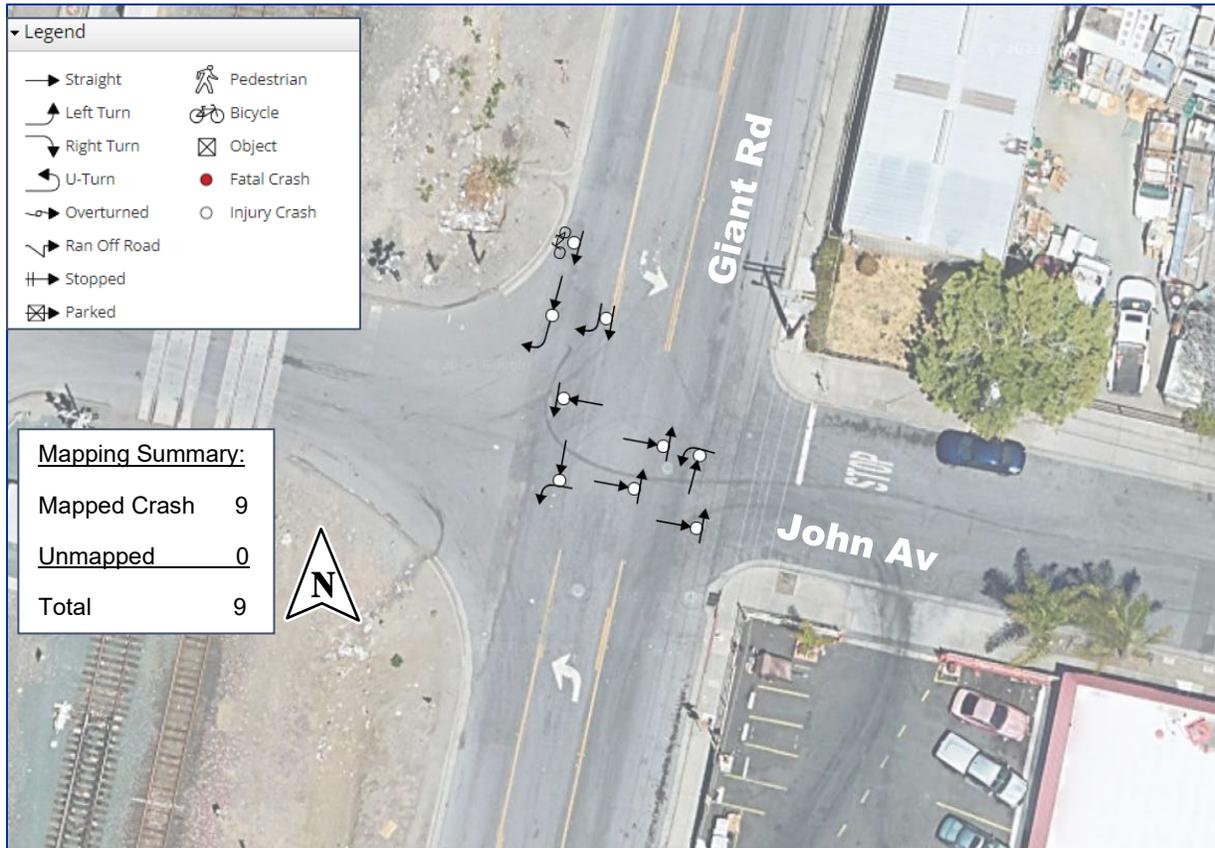
Itemized Benefits	
Safety	\$321,724
Travel Time	\$1,852
Vehicle Operating Cost	\$178
Emissions	\$16
Total Benefits	\$323,769

Summary of Total Cost & Benefit	
Present Value Costs (\$ Dollars)	\$20,947
Present Value Benefits (\$ Dollars)	\$323,769
Net Present Value (\$ Dollars)	\$302,22
Benefit / Cost Ratio	15.46





9.1.13 Intersection 13: Giant Rd & John Av



**Figure 45: Intersection 13- Giant Rd & John Av Crash Diagram- 9 Collisions
(January 1, 2018 - December 31, 2022)**

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)

*Collision Locations are approximate due to the size and overlapping of collisions

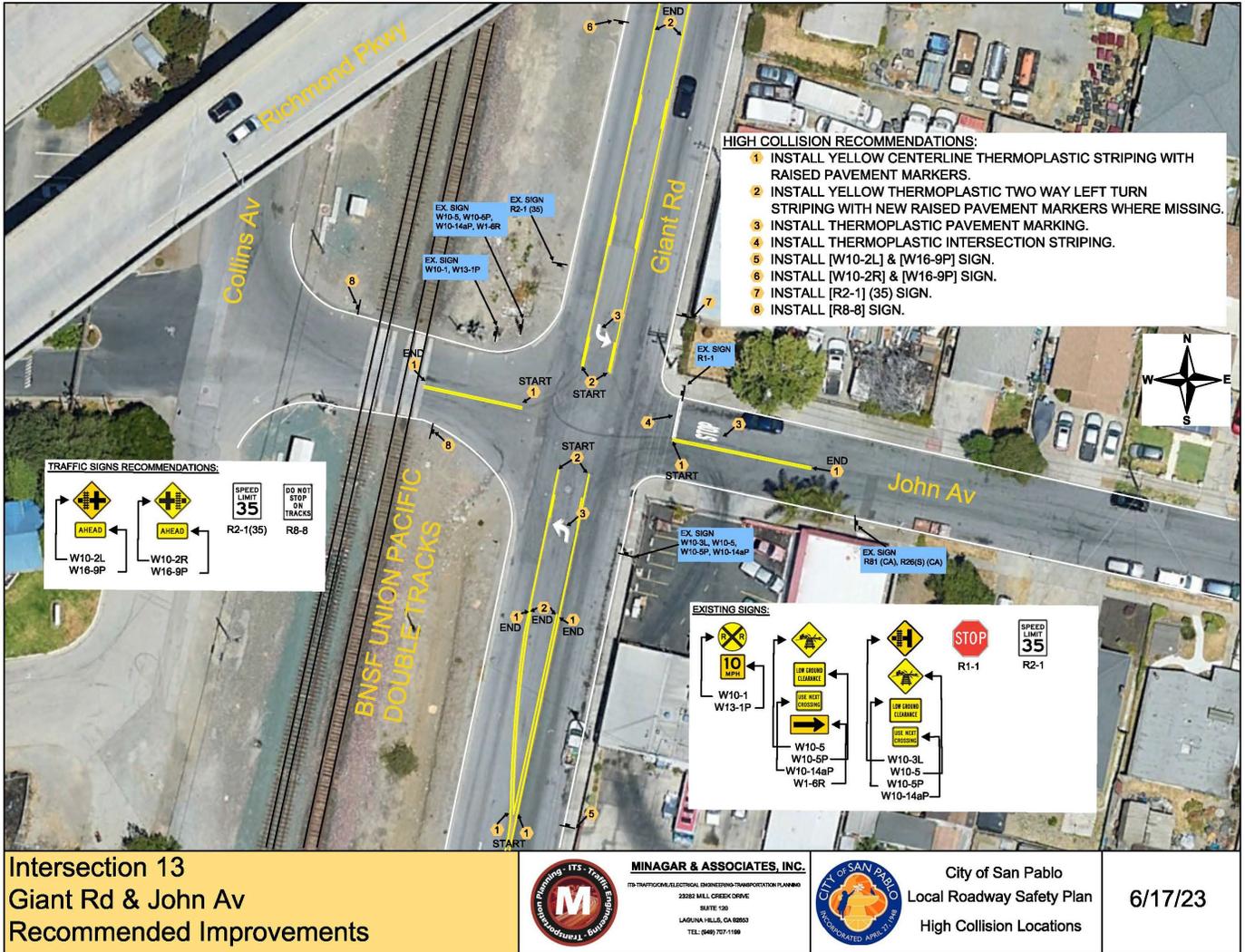


Figure 46: Intersection 13- Giant Rd & John Av Crash Recommended Improvements



9.1.13.1 Intersection 13 Cost Estimate and Cost/Benefit Analysis

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 4.

Construction Cost Estimate:

Table 37: Intersection 13 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility		
						LRSM CM No. (NS07)*	LRSM CM No. (R28)*	LRSM CM No. (NS06)*
1	Install Yellow Centerline Thermoplastic Striping with Raised Pavement Markings	LF	540	\$ 1.84	\$ 993.60		90%	
		EA	11	\$ 5.64	\$ 62.04		90%	
2	Install Yellow Thermoplastic Two Way Left Turn Striping with New Raised Pavement Markers Where Missing	LF	427	\$ 1.84	\$ 785.68		90%	
		EA	7	\$ 5.64	\$ 39.48		90%	
3	Install Pavement Marking (Thermoplastic)	SQFT	52	\$ 10.03	\$ 521.56	90%		
4	Install Intersection Striping (Thermoplastic)	LF	15	\$ 1.84	\$ 27.60	90%		
5	Install [W10-2L] & [W16-9P] Sign	EA	1	\$ 547.76	\$ 547.76			90%
6	Install [W10-2L] & [W16-9P] Sign	EA	1	\$ 547.76	\$ 547.76			90%
7	Install [R2-1] (35) Sign	EA	1	\$ 368.67	\$ 368.67			90%
8	Install [R8-8] Sign	EA	2	\$ 368.67	\$ 737.34			90%
Total					\$ 4,631.49			
Weighted Percentage (%)					100%	11.9%	41%	47.5%

*Unsignalized/Roadway Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)

Total Construction Cost:	\$	4,631.49
Contingencies percentage of the aforementioned Total Construction Cost:	20%	\$ 926.30
Total Construction Cost (Including Contingencies):	\$	5,557.79

Total Cost and Benefit:

The project's total cost is estimated at \$5,558 which does not include the design and engineering costs. The estimated benefit of these improvements is \$1,081,717 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 194.62.

The most recent HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 194.62, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

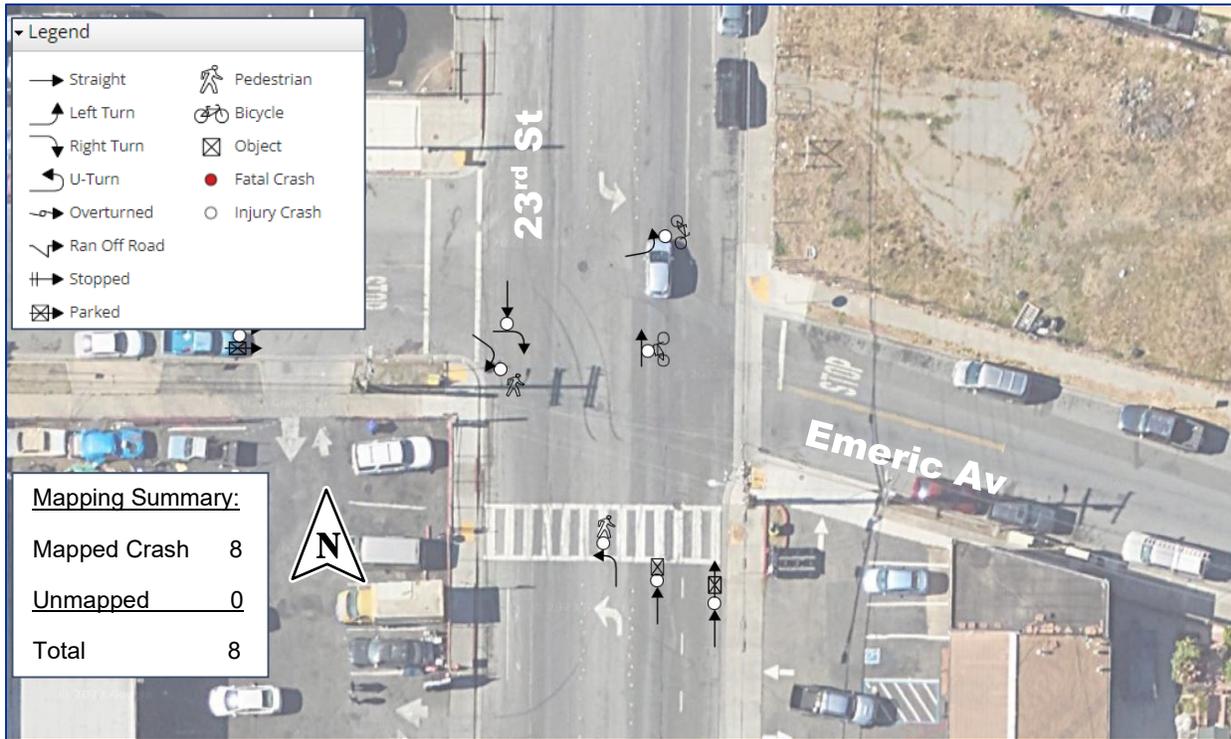
Itemized Benefits	
Safety	\$1,078,581
Travel Time	\$2,826
Vehicle Operating Cost	\$288
Emissions	\$22
Total Benefits	\$1,081,717

Summary of Total Cost & Benefit	
Present Value Costs (\$ Dollars)	\$5,558
Present Value Benefits (\$ Dollars)	\$1,081,717
Net Present Value (\$ Dollars)	\$1,076,159
Benefit / Cost Ratio	194.62





9.1.14 Intersection 14: Emeric Av & 23rd St



**Figure 47: Intersection 14- Emeric Av & 23rd St Crash Diagram- 8 Collisions
(January 1, 2018 - December 31, 2022)**

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions

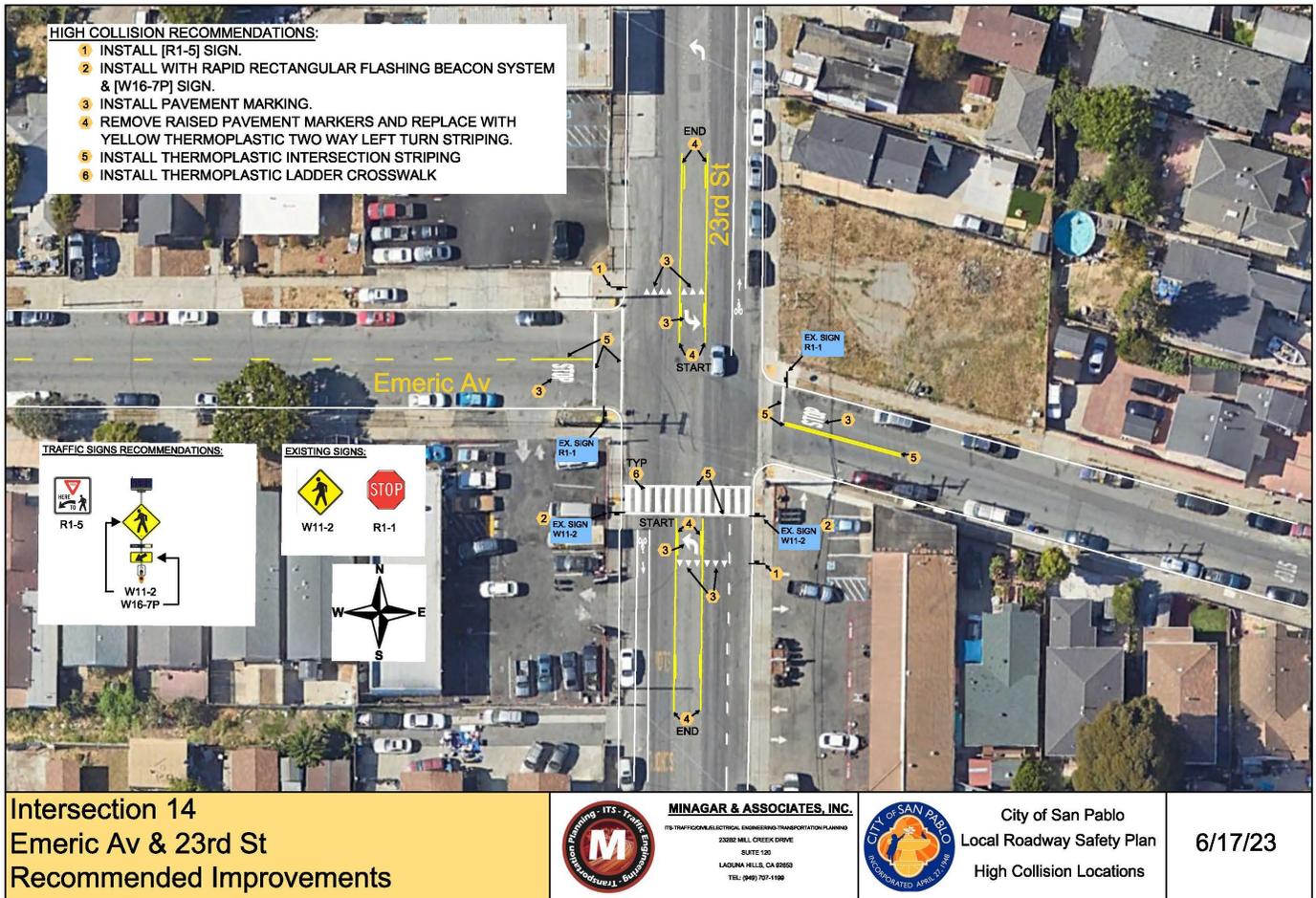


Figure 48: Intersection 14- Emeric Av & 23rd St Recommended Improvements





9.1.14.1 Intersection 14 Cost Estimate and Cost/Benefit Analysis

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 4.

Construction Cost Estimate:

Table 38: Intersection 14 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility			
						LRSM CM No. (NS06)*	LRSM CM No. (NS22PB)*	LRSM CM No. (NS21PB)*	LRSM CM No. (NS07)*
1	Install [R1-5] Sign	EA	2	\$ 368.67	\$ 737.34	90%			
	Install with Solar Rapid Rectangular Flashing Beacon System & [W16-7P] Sign	LS	1	27,155.38	27,155.38		90%		
3	Install Pavement Yield Line Marking (Thermoplastic)	SQFT	39	\$ 10.03	\$ 391.17			90%	
4	Remove Raised Pavement Markers and Replace With Thermoplastic Pavement Striping	EA	120	\$ 1.78	\$ 213.60				90%
		LF	320	\$ 1.84	\$ 588.80				90%
5	Install Intersection Thermoplastic Striping	LF	313	\$ 1.84	\$ 575.92				90%
6	Install Intersection Thermoplastic Ladder Crosswalk	SQFT	260	\$ 10.03	\$ 2,607.80			90%	
Total					\$ 32,270.01				
Weighted Percentage (%)					100%	2.3%	84.2%	9.3%	4.3%

*Unsignalized Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)

Total Construction Cost:	\$	32,270.01
Contingencies percentage of the aforementioned Total Construction Cost:	20%	\$ 6,454.00
Total Construction Cost (Including Contingencies):	\$	38,724.01

Total Cost and Benefit:

The project's total cost is estimated at \$38,724 which does not include the design and engineering costs. The estimated benefit of these improvements is \$1,235,289 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 31.90.

The most recent HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 31.90, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	\$1,232,214
Travel Time	\$2,802
Vehicle Operating Cost	\$272
Emissions	\$0
Total Benefits	\$1,235,289

Summary of Total Cost & Benefit	
Present Value Costs (\$ Dollars)	\$38,724
Present Value Benefits (\$ Dollars)	\$1,235,289
Net Present Value (\$ Dollars)	\$1,196,565
Benefit / Cost Ratio	31.90





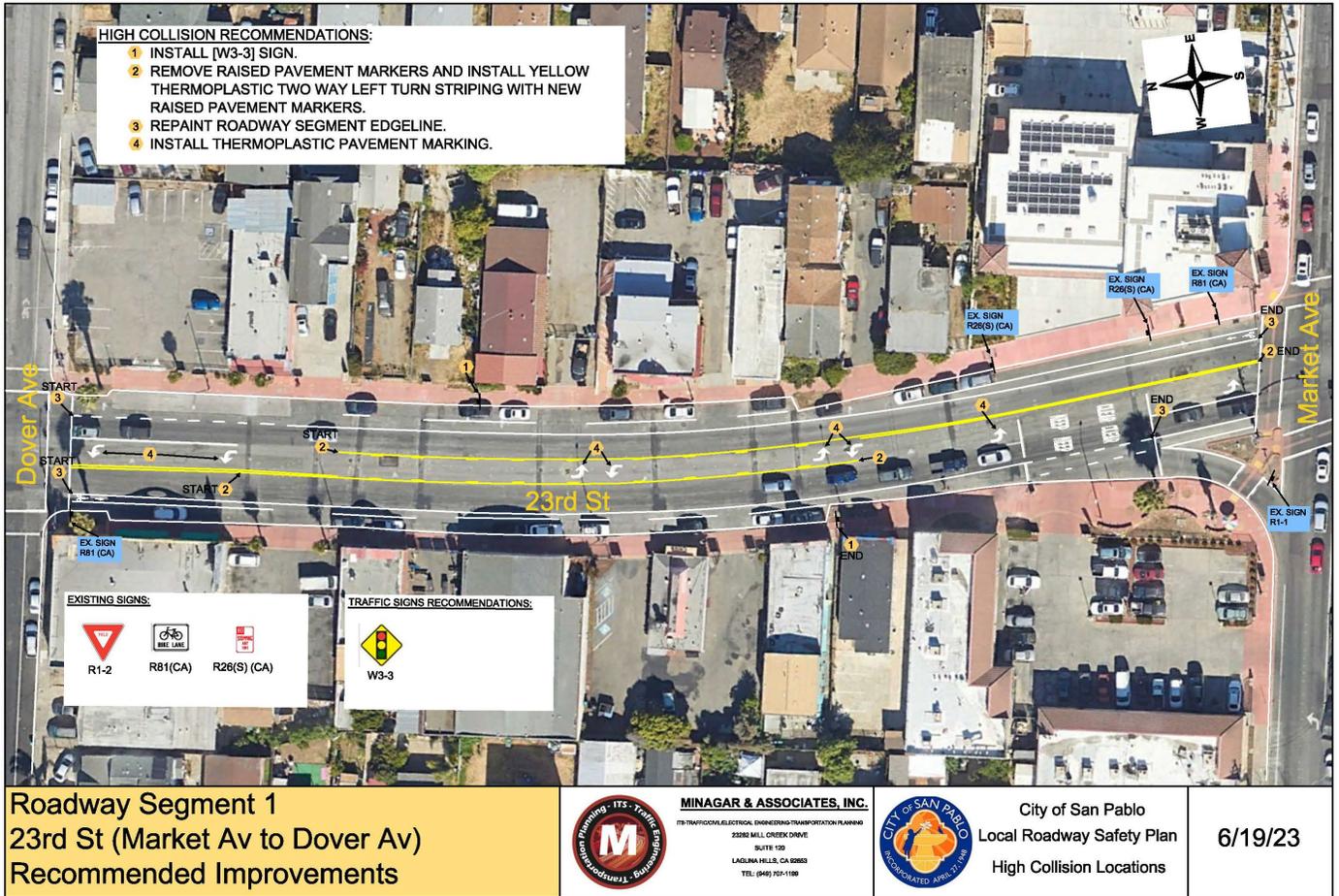
9.2 High Collision Roadway Segments

9.2.1 Roadway Segment 1: 23rd St (Market Av to Dover Av)



**Figure 49: Roadway Segment 1- 23rd St (Market Av to Dover Av)
Crash Diagram - 12 Collisions
(January 1, 2018 - December 31, 2022)**

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions



**Figure 50: Roadway Segment 1- 23rd St (Market Av to Dover Av)
 Recommended Improvements**





9.2.1.1 Roadway Segment 1 Cost Estimate and Cost/Benefit Analysis

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 4.

Construction Cost Estimate:

Table 39: Roadway Segment 1 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility		
						LRSM CM No. (R22)*	LRSM CM No. (S09)*	LRSM CM No. (R28)*
1	Install [W3-3] Sign	EA	2	\$ 200.71	\$ 401.42	90%		
2	Remove Raised Pavement Markers and Install Yellow Thermoplastic Two Way Left Turn Striping with New Raised Pavement Markers	EA	280	\$ 1.78	\$ 498.40		90%	
		LF	1150	\$ 1.84	\$ 2,116.00		90%	
3	Repaint Roadway Segment Edgeline (2 Coats)	EA	44	\$ 5.64	\$ 248.16		90%	
		LF	1117	\$ 1.05	\$ 1,172.85			90%
4	Install Thermoplastic Pavement Marking	SQFT	105	\$ 10.05	\$ 1,055.25			90%
Total					\$ 5,492.08			
Weighted Percentage (%)					100%	7.3%	52.1%	40.6%

*Roadway/Signalized Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)

Total Construction Cost:	\$	5,492.08
Contingencies percentage of the aforementioned Total Construction Cost:	20%	\$ 1,098.42
Total Construction Cost (Including Contingencies):	\$	6,590.50

Total Cost and Benefit:

The project's total cost is estimated at \$6,591 which does not include the design and engineering costs. The estimated benefit of these improvements is \$573,053 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 86.94.

The most recent HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 86.94, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	\$569,542
Travel Time	\$3,172
Vehicle Operating Cost	\$306
Emissions	\$33
Total Benefits	\$573,053

Summary of Total Cost & Benefit	
Present Value Costs (\$ Dollars)	\$6,591
Present Value Benefits (\$ Dollars)	\$573,053
Net Present Value (\$ Dollars)	\$566,462
Benefit / Cost Ratio	86.94





9.2.2 Roadway Segment 2: Rumrill BI (Market Av to Post Av)



**Figure 51: Roadway Segment 2- Rumrill BI (Market Av to Post Av)
Crash Diagram- 9 Collisions
(January 1, 2018 – December 31, 2022)**

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions

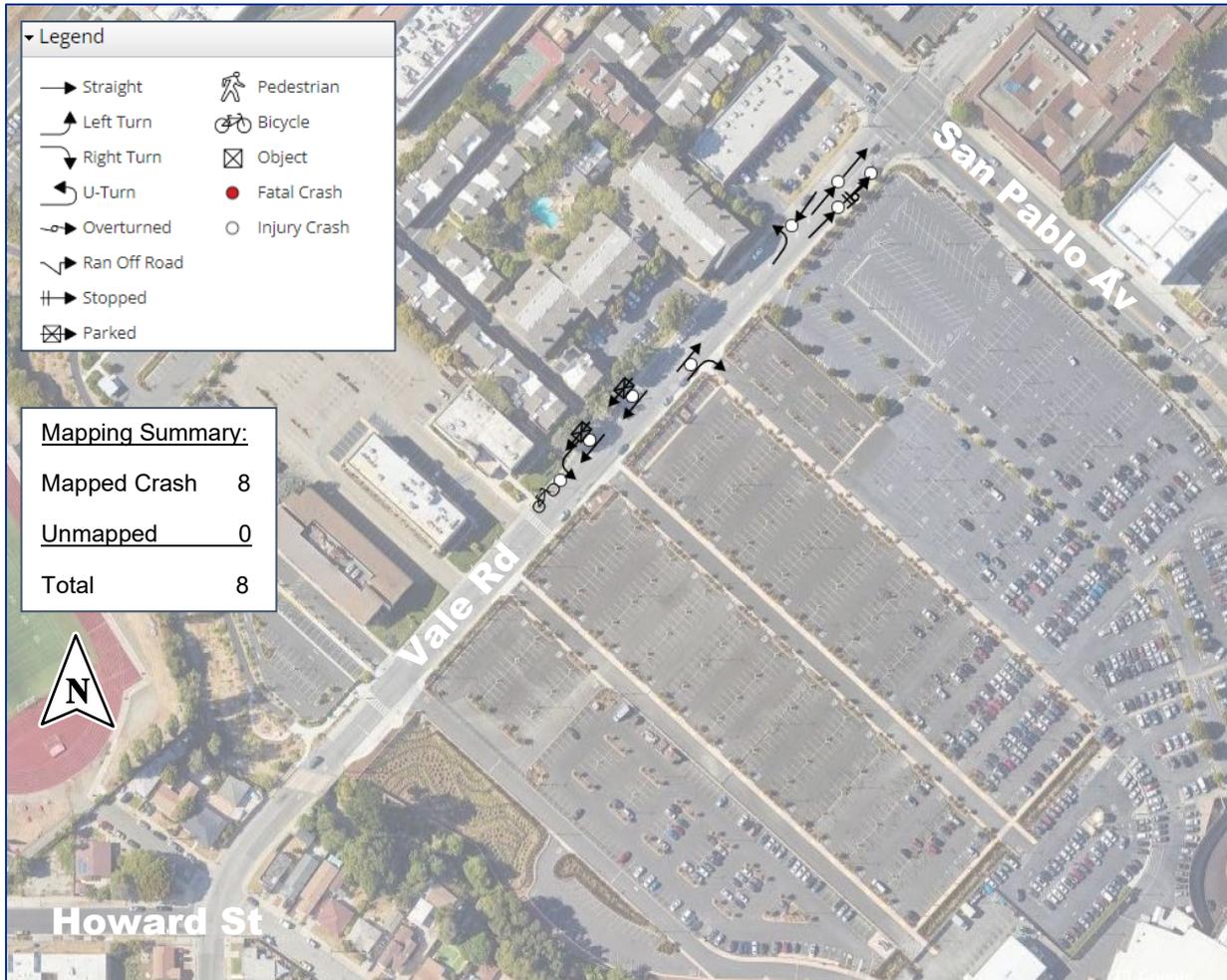


9.2.2.1 Roadway Segment 2 Cost Estimate and Cost/Benefit Analysis

Due to the City's ongoing improvement project on the roadway segment, the recommended safety countermeasures and benefit-cost-analysis will not be applied to this intersection.



9.2.3 Roadway Segment 3: Vale Rd (Howard St to San Pablo Av)



**Figure 52: Roadway Segment 3- Vale Rd (Howard St to San Pablo Av)
Crash Diagram- 8 Collisions
(January 1, 2018 - December 31, 2022)**

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions

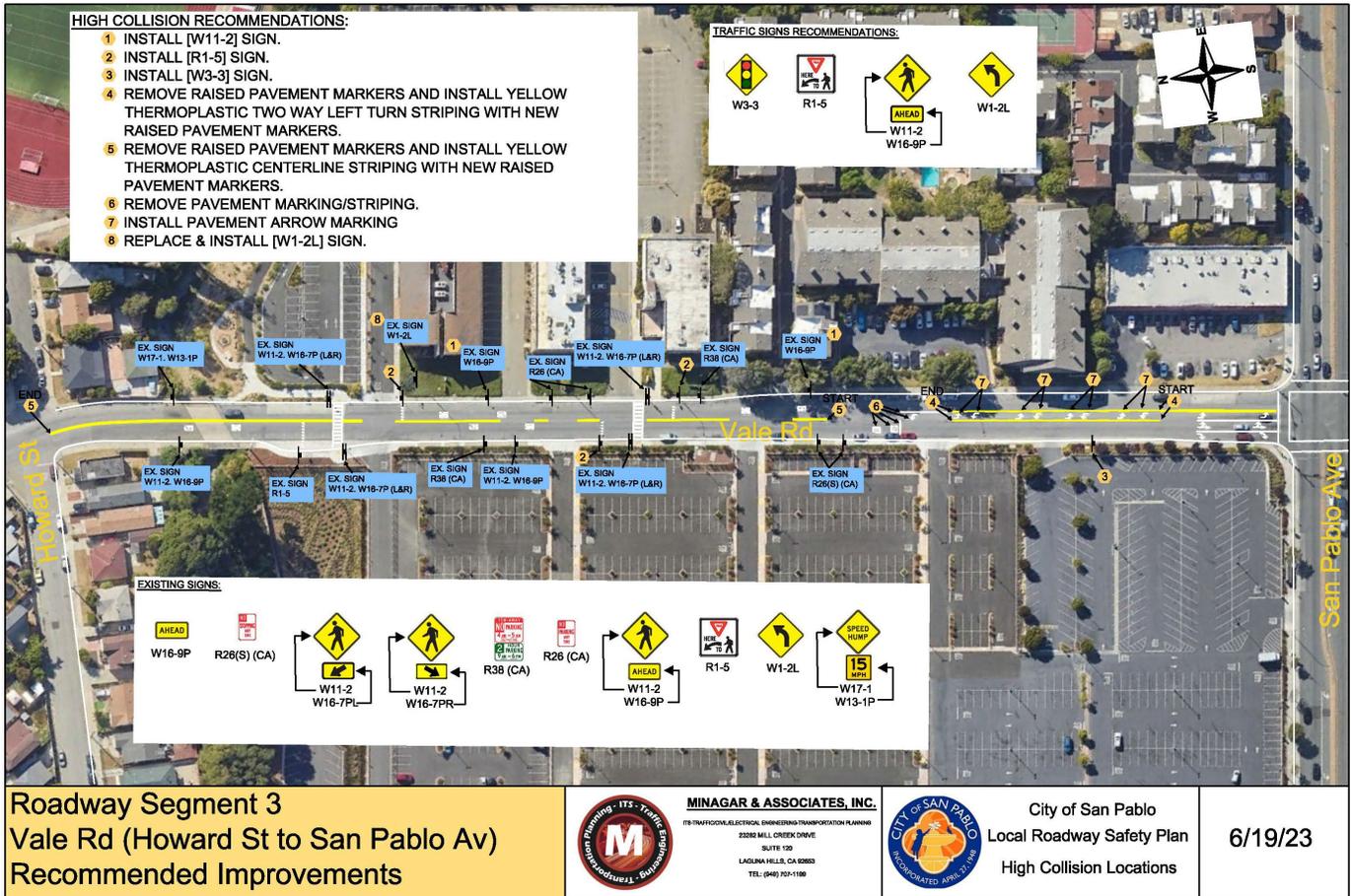


Figure 53: Roadway Segment 3- Vale Rd (Howard St to San Pablo Av)
Recommended Improvements



9.2.3.1 Roadway Segment 3 Cost Estimate and Cost/Benefit Analysis

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 4.

Construction Cost Estimate:

Table 40: Roadway Segment 3 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility		
						LRSM CM No. (R22)*	LRSM CM No. (S09)*	LRSM CM No. (NS07)*
1	Install [W11-2] Sign	EA	2	\$ 200.71	\$ 401.42	90%		
2	Install [R1-5] Sign	EA	3	\$ 200.71	\$ 602.13	90%		
3	Install [W3-3] Sign	EA	1	\$ 368.67	\$ 368.67	90%		
4	Remove Raised Pavement Markers and Install Yellow Thermoplastic Two Way Left Turn Striping with New Raised Pavement Markers	EA	177	\$ 1.78	\$ 315.06		90%	
		LF	624	\$ 1.84	\$ 1,148.16		90%	
5	Remove Raised Pavement Markers and Install Yellow Thermoplastic Centerline Striping with New Raised Pavement Markers	EA	20	\$ 5.64	\$ 112.80		90%	
		EA	117	\$ 1.78	\$ 208.26		90%	
		LF	1146	\$ 1.84	\$ 2,108.64		90%	
6	Remove Pavement Marking/Striping	EA	94	\$ 5.64	\$ 530.16		90%	
		SQFT	100.5	\$ 1.78	\$ 178.89			90%
7	Install Pavement Arrow Marking	SQFT	120	\$ 10.03	\$ 1,203.60			90%
8	Replace & Install [W1-2L] Sign	EA	1	\$ 301.12	\$ 301.12	90%		
Total					\$ 7,478.91			
Weighted Percentage (%)					100%	22.4%	59.1%	18.5%

*Roadway/Signalized Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)

Total Construction Cost:	\$	7,478.91
Contingencies percentage of the aforementioned Total Construction Cost:	20%	\$ 1,495.78
Total Construction Cost (Including Contingencies):	\$	8,974.69

Total Cost and Benefit:

The project's total cost is estimated at \$8,975 which does not include the design and engineering costs. The estimated benefit of these improvements is \$654,642 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 72.94.

The most recent HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 72.94, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	\$652,851
Travel Time	\$1,609
Vehicle Operating Cost	\$159
Emissions	\$23
Total Benefits	\$654,642

Summary of Total Cost & Benefit	
Present Value Costs (\$ Dollars)	\$8,975
Present Value Benefits (\$ Dollars)	\$654,642
Net Present Value (\$ Dollars)	\$645,668
Benefit / Cost Ratio	72.94





9.2.4 Roadway Segment 4: San Pablo Av (Church Ln to Gateway Av)



**Figure 54: Roadway Segment 4- San Pablo Av (Church Ln to Gateway Av)
Crash Diagram- 8 Collisions
(January 1, 2018 - December 31, 2022)**

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)

*Collision Locations are approximate due to the size and overlapping of collisions



Figure 55: Roadway Segment 4- San Pablo Av (Church Ln to Gateway Av)
Recommended Improvements



9.2.4.1 Roadway Segment 4 Cost Estimate and Cost/Benefit Analysis

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 4.

Construction Cost Estimate:

Table 41: Roadway Segment 4 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility	
						LRSM CM No. (S09)*	LRSM CM No. (R22)*
1	Remove Sign and Install [R4-7] & [N-1 (CA)] Sign	EA	1	\$ 569.38	\$ 569.38		90%
2	Install [R6-1R] Sign	EA	3	\$ 368.67	\$ 1,106.01		90%
3	Install [W3-3] Sign	EA	2	\$ 200.71	\$ 401.42		90%
4	Install [W1-7] & [N-1 (CA)] Sign	EA	1	\$ 569.38	\$ 569.38		90%
5	Install [W4-4P] Sign	EA	1	\$ 200.71	\$ 200.71		90%
6	Install [R5-1] Sign	EA	1	\$ 368.67	\$ 368.67		90%
7	Install New Dot Markers/Pavement Markers to Missing Dot/Pavement Markers	EA	26	\$ 0.75	\$ 19.50	90%	
		EA	10	\$ 5.64	\$ 56.40	90%	
Total					\$ 3,291.47		
Weighted Percentage (%)					100%	2.3%	97.7%

*Roadway/Signalized Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)

Total Construction Cost:	\$	3,291.47
Contingencies percentage of the aforementioned Total Construction Cost:	20%	\$ 658.29
Total Construction Cost (Including Contingencies):	\$	3,949.76

Total Cost and Benefit:

The project's total cost is estimated at \$3,950 which does not include the design and engineering costs. The estimated benefit of these improvements is \$559,953 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 141.76.

The most recent HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 141.76, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

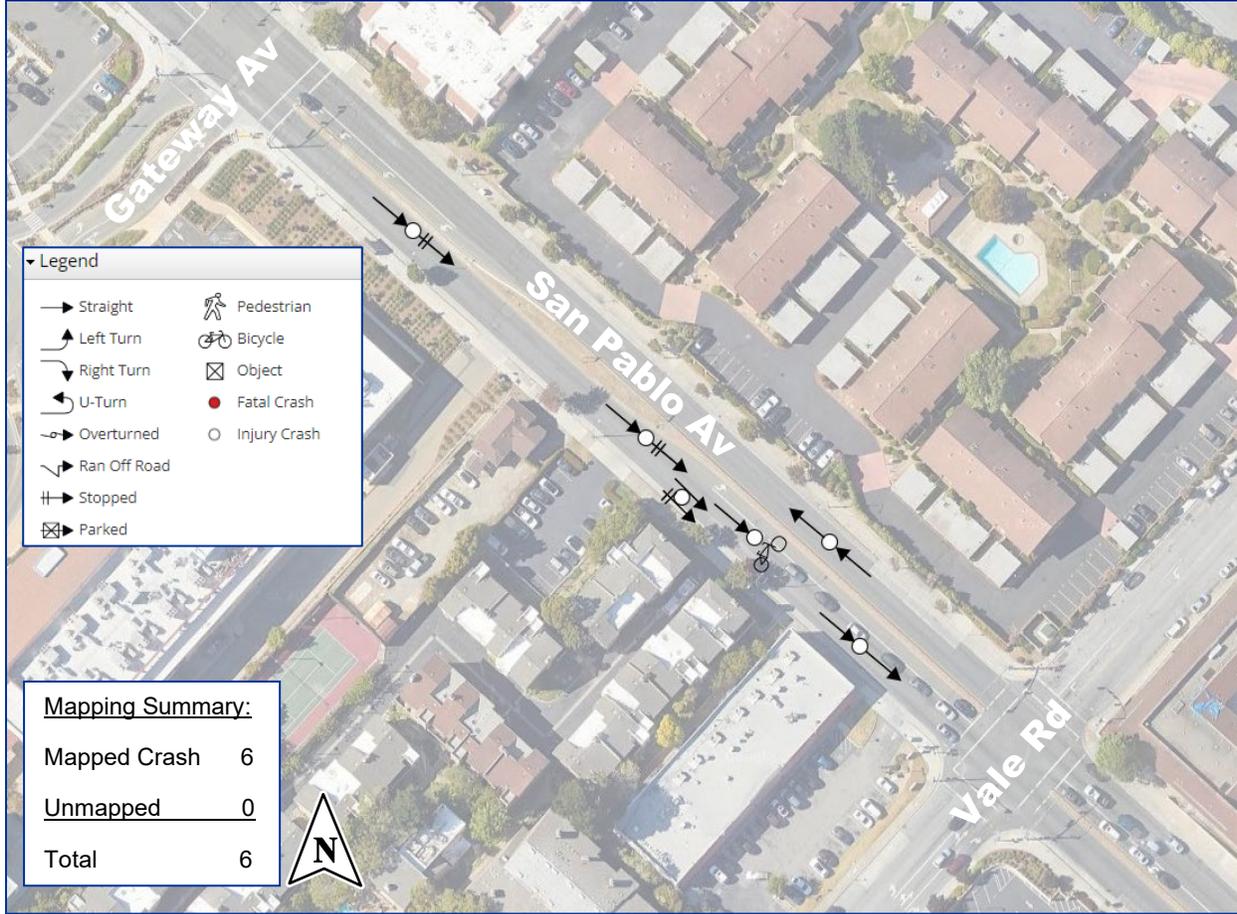
Itemized Benefits	
Safety	\$557,974
Travel Time	\$1,768
Vehicle Operating Cost	\$179
Emissions	\$31
Total Benefits	\$559,953

Summary of Total Cost & Benefit	
Present Value Costs (\$ Dollars)	\$3,950
Present Value Benefits (\$ Dollars)	\$559,953
Net Present Value (\$ Dollars)	\$556,003
Benefit / Cost Ratio	141.76





9.2.5 Roadway Segment 5: San Pablo Av (Vale Rd to Gateway Av)



**Figure 56: Roadway Segment 5- San Pablo Av (Vale Rd to Gateway Av)
Crash Diagram- 6 Collisions
(January 1, 2018 - December 31, 2022)**

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)

*Collision Locations are approximate due to the size and overlapping of collisions

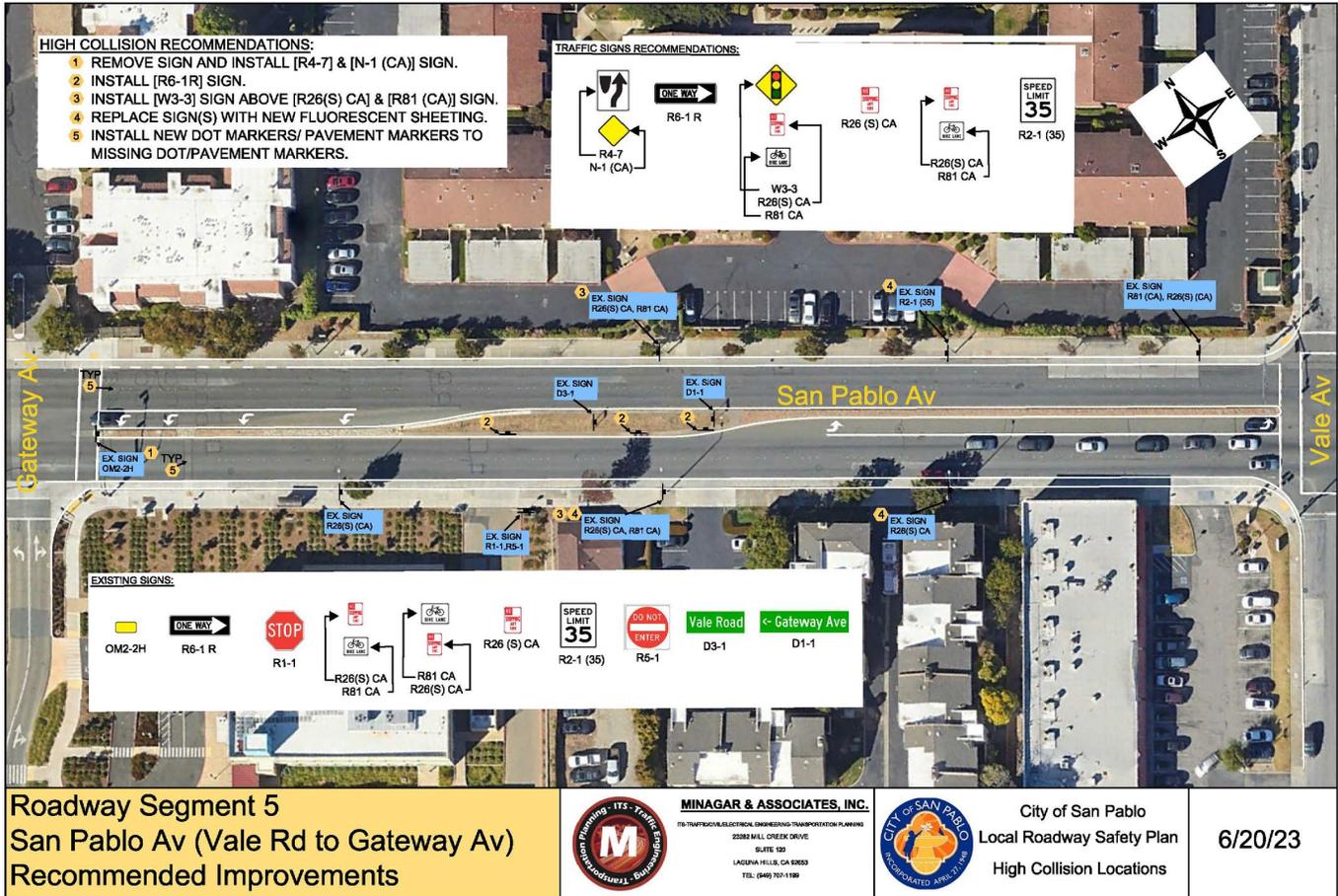


Figure 57: Roadway Segment 5- San Pablo Av (Vale Rd to Gateway Av) Recommended Improvements





9.2.5.1 Roadway Segment 5 Cost Estimate and Cost/Benefit Analysis

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 4.

Construction Cost Estimate:

Table 42: Roadway Segment 5 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility	
						LRSM CM No. (S09)*	LRSM CM No. (R22)*
1	Remove Sign and Install [R4-7] & [N-1 (CA)] Sign	EA	1	\$ 569.38	\$ 569.38		90%
2	Install [R6-1R] Sign	EA	3	\$ 368.67	\$ 1,106.01		90%
3	Install [W3-3] Sign Above [R26 (S) (CA)] Sign	EA	2	\$ 200.71	\$ 401.42		90%
4	Replace Sign(s) with New Fluorescent Sheeting	EA	4	\$ 200.71	\$ 802.84		90%
5	Install New Dot Markers/Pavement Markers to Missing Dot/Pavement Markers	EA	34	\$ 0.75	\$ 25.50	90%	
		EA	28	\$ 5.64	\$ 157.92	90%	
Total					\$ 3,063.07		
Weighted Percentage (%)					100%	6.0%	94.0%

*Roadway/Signalized Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)

Total Construction Cost:	\$	3,063.07
Contingencies percentage of the aforementioned Total Construction Cost:	20%	\$ 612.61
Total Construction Cost (Including Contingencies):	\$	3,675.68

Total Cost and Benefit:

The project's total cost is estimated at \$3,676 which does not include the design and engineering costs. The estimated benefit of these improvements is \$432,298 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 117.60.

The most recent HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 117.60, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	\$430,761
Travel Time	\$1,365
Vehicle Operating Cost	\$140
Emissions	\$31
Total Benefits	\$432,298

Summary of Total Cost & Benefit	
Present Value Costs (\$ Dollars)	\$3,676
Present Value Benefits (\$ Dollars)	\$432,298
Net Present Value (\$ Dollars)	\$428,622
Benefit / Cost Ratio	117.60





9.2.6 Roadway Segment 6: San Pablo Dam (Contra Costa Av to Ventura Av)



**Figure 58: Roadway Segment 6- San Pablo Dam (Contra Costa Av to Ventura Av)
Crash Diagram- 5 Collisions
(January 1, 2018 - December 31, 2022)**

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)

*Collision Locations are approximate due to the size and overlapping of collisions

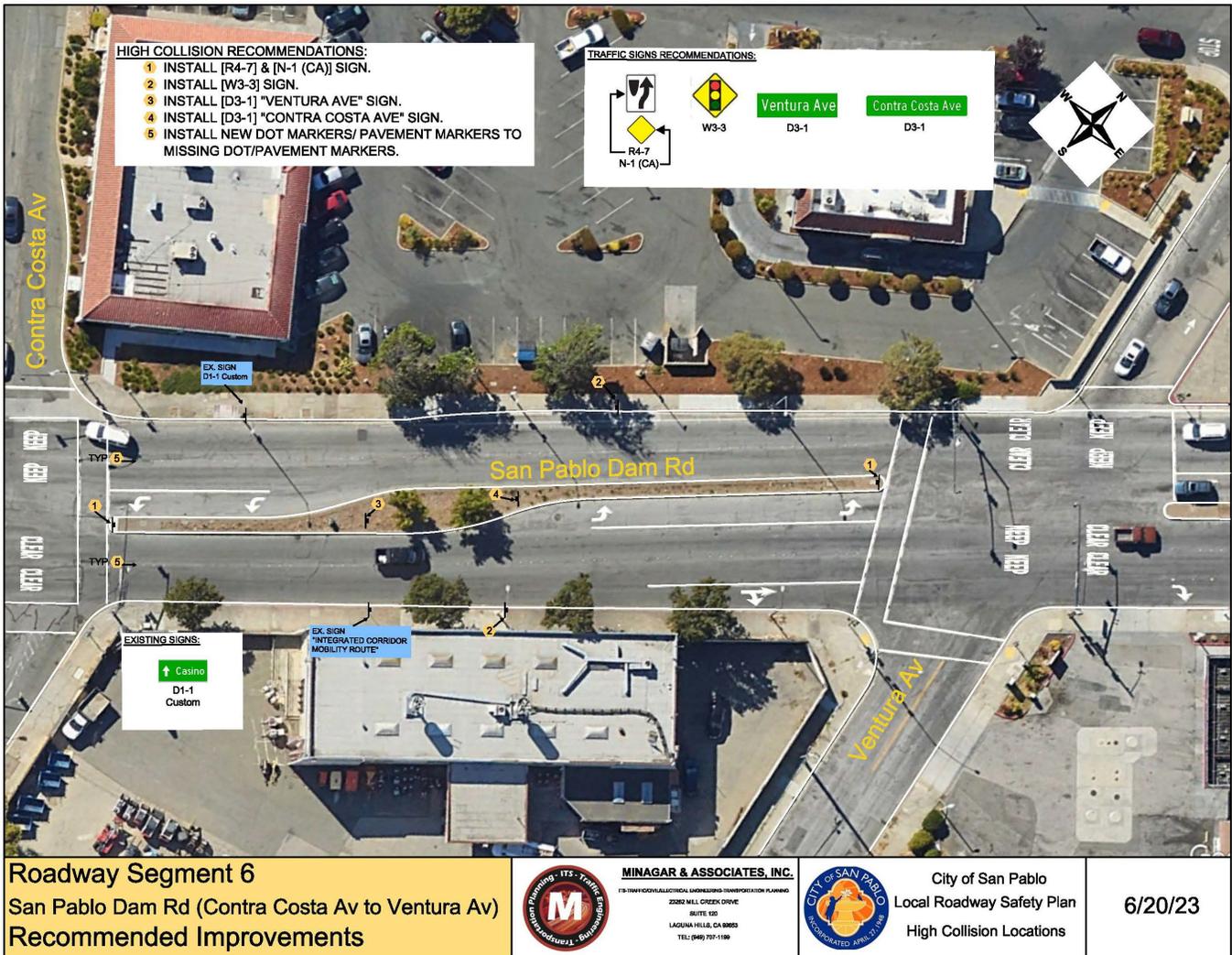


Figure 59: Roadway Segment 6- San Pablo Dam (Contra Costa Av to Ventura Av) Recommended Improvements



9.2.6.1 Roadway Segment 6 Cost Estimate and Cost/Benefit Analysis

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 4.

Construction Cost Estimate:

Table 43: Roadway Segment 6 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility	
						LRSM CM No. (R22)*	LRSM CM No. (S09)*
1	Install [R4-7] & [N-1 (CA)] Sign	EA	2	\$ 569.38	\$ 1,138.76	90%	
2	Install [W3-3] Sign	EA	2	\$ 368.67	\$ 737.34	90%	
3	Install [D3-1] "Ventura Ave" Sign (2 Post)	EA	1	\$ 547.76	\$ 547.76	90%	
4	Install [D3-1] "Contra Costa Ave" Sign (2 Post)	EA	1	\$ 547.76	\$ 547.76	90%	
5	Install New Dot Markers/Pavement Markers to Missing Dot/Pavement Markers	EA	9	\$ 0.75	\$ 6.75		90%
		EA	18	\$ 5.64	\$ 101.52		90%
Total					\$ 3,079.89		
Weighted Percentage (%)					100%	96.5%	3.5%

*Roadway/Signalized Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)

Total Construction Cost:	\$	3,079.89
Contingencies percentage of the aforementioned Total Construction Cost:	20%	\$ 615.98
Total Construction Cost (Including Contingencies):	\$	3,695.87

Total Cost and Benefit:

The project's total cost is estimated at \$3,696 which does not include the design and engineering costs. The estimated benefit of these improvements is \$632,746 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 171.20.

The most recent HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 171.20, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	\$631,283
Travel Time	\$1,125
Vehicle Operating Cost	\$115
Emissions	\$23
Total Benefits	\$632,746

Summary of Total Cost & Benefit	
Present Value Costs (\$ Dollars)	\$3,696
Present Value Benefits (\$ Dollars)	\$632,746
Net Present Value (\$ Dollars)	\$629,050
Benefit / Cost Ratio	171.20





9.3 Total Construction Cost Summary and Discussion

To qualify for HSIP funding, all applicable intersections and roadway segments mentioned above meet the minimum benefit/cost ratio of 3.5, ranging from 6.3 to 508.37. All benefit costs are based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The source of each construction cost comes from Caltrans District 4 contract cost data 2022. Table 44 below displays the total construction cost of intersections and roadway segments. The cost estimate used in this analysis is used to develop benefit/cost ratio comparison for concept plans and do not reflect actual cost of implementation or construction

The grand total cost (including contingencies) for all intersections and roadway segments came out to be **\$499,034.14**, where HSIP funding would cover \$449,130.73 and the City of San Pablo would contribute \$49,903.41.

The total cost for all intersections is **\$472,147.64**, where HSIP funding would cover \$424,932.86 and the City of San Pablo would contribute \$47,214.78.

The total for all roadway segments is **\$26,886.50**, where HSIP funding would cover \$24,197.85 and the City of San Pablo would contribute \$2,688.65.

Table 44: Total Construction Cost of Intersections and Roadway Segments

Intersection/ Roadway Segment	Street Name(s)	Benefit/Cost Ratio (3.5 minimum)	Total Construction Cost (Including Contingencies)	HSIP Amount Local Amount	
				(Including Contingencies)	
Intersection 1*	San Pablo Av & 23rd St/Road 20	N/A	N/A	N/A	N/A
Intersection 2	San Pablo Av & Lake St	508.37	\$ 3,183.66	\$ 2,865.29	\$ 318.37
Intersection 3*	Market Av & Rumrill Bl	N/A	N/A	N/A	N/A
Intersection 4	El Portal Dr & Church Ln/Rollingwood Dr	14.27	\$ 129,641.66	\$116,677.49	\$12,964.17
Intersection 5	Church Ln & San Pablo Av	37.08	\$ 19,920.35	\$ 17,928.31	\$ 1,992.03
Intersection 6*	Rumrill Bl & Broadway Av	N/A	N/A	N/A	N/A
Intersection 7	San Pablo Av & Broadway Av/El Portal Dr	48.36	\$ 17,992.26	\$ 16,193.03	\$ 1,799.23
Intersection 8*	Rumrill Bl & Brookside Dr	N/A	N/A	N/A	N/A
Intersection 9	San Pablo Av & Rivers St	18.5	\$ 100,750.27	\$ 90,675.24	\$10,075.03
Intersection 10	23rd St & Dover Av	6.3	\$ 126,954.98	\$114,259.49	\$12,695.50
Intersection 11	San Pablo Av & San Pablo Dam Rd	87.59	\$ 8,475.98	\$ 7,628.39	\$ 847.60
Intersection 12	San Pablo Av & Vale Rd	15.46	\$ 20,946.67	\$ 18,852.00	\$ 2,094.67
Intersection 13	Giant Rd & John Av	194.62	\$ 5,557.79	\$ 5,002.01	\$ 555.78
Intersection 14	Emeric Av & 23rd St	31.9	\$ 38,724.01	\$ 34,851.61	\$ 3,872.40
Roadway Segment 1	23rd St (Market Av to Dover Av)	86.94	\$ 6,590.50	\$ 5,931.45	\$ 659.05
Roadway Segment 2*	Rumrill Bl (Market Av to Post Av)	N/A	N/A	N/A	N/A
Roadway Segment 3	Vale Rd (Howard St to San Pablo Av)	72.94	\$ 8,974.69	\$ 8,077.22	\$ 897.47
Roadway Segment 4	San Pablo Av (Church Ln to Gateway Av)	141.76	\$ 3,949.76	\$ 3,554.79	\$ 394.98
Roadway Segment 5	San Pablo Av (Vale Rd to Gateway Av/Evergreen Ter)	117.60	\$ 3,675.68	\$ 3,308.12	\$ 367.57
Roadway Segment 6	San Pablo Dam (Contra Costa Av to Ventura Av)	171.2	\$ 3,695.87	\$ 3,326.28	\$ 369.59
Total			\$ 499,034.14	\$ 449,130.73	\$ 49,903.41

*Intersection is currently part of future construction projects and countermeasures will not be developed for these intersections.





MINAGAR & ASSOCIATES, INC.

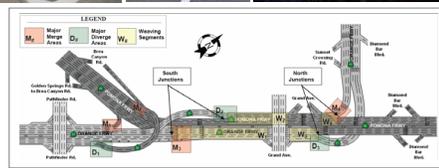
ITS - Traffic/Civil/Electrical Engineering - Transportation Planning - Homeland Security - CEM

	2019 Winner of the Orange County Engineering Council's Outstanding Service Award	
	2016 Winner of the ASCE's Outstanding Civil Engineer in the Private Sector Award in the State of California	
	2016 Winner of the ASCE Los Angeles Section's Outstanding Civil Engineer in the Private Sector Award	
	2016 Winner of the ASCE Orange County Chapter's Outstanding Civil Engineer in the Private Sector Award	
	2016 Certificate of Recognition for Dedication to Support the ELTP Program by Los Angeles County MTA/Metro	
	2016 Winner of the Orange County Engineering Council's Outstanding Engineering Service Award	
	2015 Orange County Business Journal's 2015 Excellence in Entrepreneurship Award Nominee	
	2014 Orange County Business Journal's 2014 Excellence in Entrepreneurship Award Nominee	
	2012 Winner of Cal-EPA/California Air Resources Board's Cool California Climate Leader	
	2011 Award of Excellence in Service by Los Angeles County MTA/Metro in the County of Los Angeles	
	2011 Award of Excellence in Service by Los Angeles County MTA/Metro in the County of Los Angeles	
	2010 Award of Excellence in Service by Los Angeles County MTA/Metro in the County of Los Angeles	
	2009 Winner of the ASCE's Outstanding Private Sector Civil Engineering Project in Metropolitan Los Angeles	
	2009 Winner of the Caltrans' 2009 Excellence in Transportation Award in the State of California	
	2007 Winner of the ASCE's Outstanding Public/Private Sector Civil Engineering Project in Metropolitan Los Angeles	 
	2005 Winner of the APWA's Best Traffic Congestion Mitigation Project of the Year in Southern California	 
	2004 Top Nominee of Transportation Foundation's Highway Management Program in the State of California	
	2003 Winner of the PTI's Best Transportation Technology Solutions Award in the United States	  
	2002 Winner of the ITS-CA's Best Return on Investment Project Award in the State of California	  
	2000 Award of Excellence in Service by Los Angeles County MTA/Metro in the County of Los Angeles	



Celebrating 30 Years of Planning & Engineering Excellence

- **Traffic Engineering**
- **Transportation Planning**
- **ITS (Intelligent Transportation Systems)**
- **Civil/Electrical Engineering**
- **Homeland Security**
- **Construction Engineering Management**



MINAGAR & ASSOCIATES, INC.

23282 Mill Creek Drive, Suite 120
Laguna Hills, CA 92653

Tel: (949)707-1199
Web: www.minagarinc.com

