Hayward High Injury Network Safety Plan: A Street, B Street, and Tennyson Road Corridors

Existing Conditions Summary

August 2025

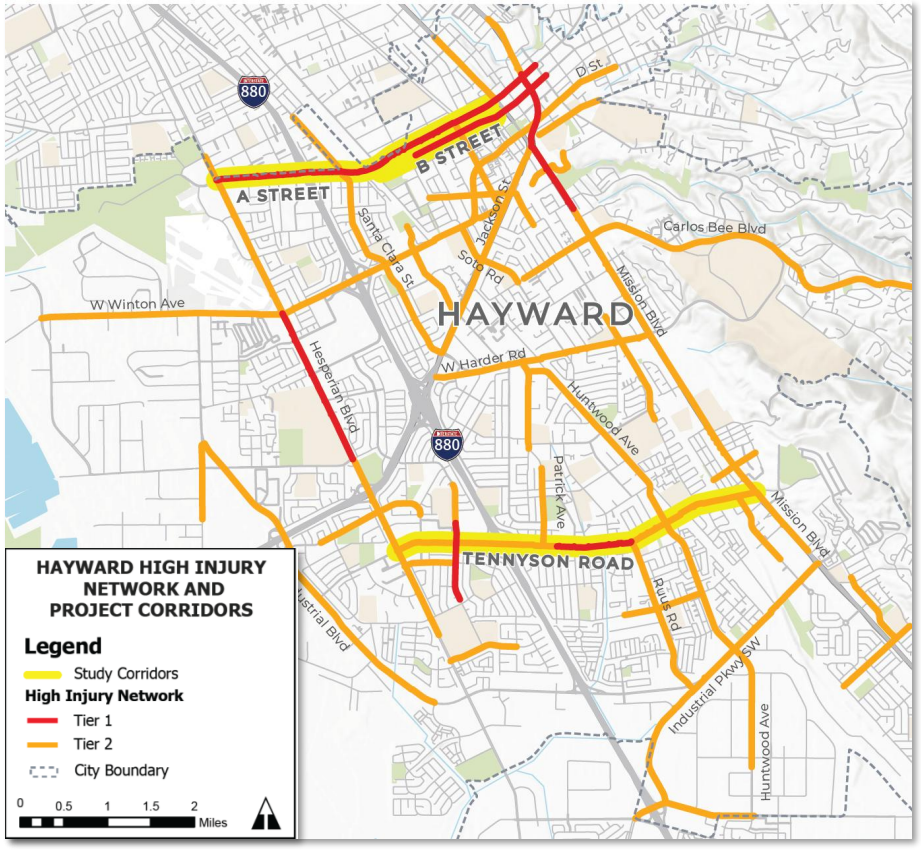
HAYWARD
Vision Zero

Table of Contents

Project Introduction

Project Background

The City of Hayward (City) adopted its first Local Road Safety Plan (LRSP) in 2023 and is looking to address safety concerns on its streets. This study is phase one of the City's effort to improve safety conditions on its High Injury Network (HIN). The HIN comprises just 14% of City streets while accounting for over 75% of serious and deadly crashes in the City. The study is federally funded through the Safe Streets and Roads for All (SS4A) grant program and will include identification and evaluation of safety countermeasures, conceptual plans, and cost estimates for each of the study corridors.



A Map of the City's High Injury Network

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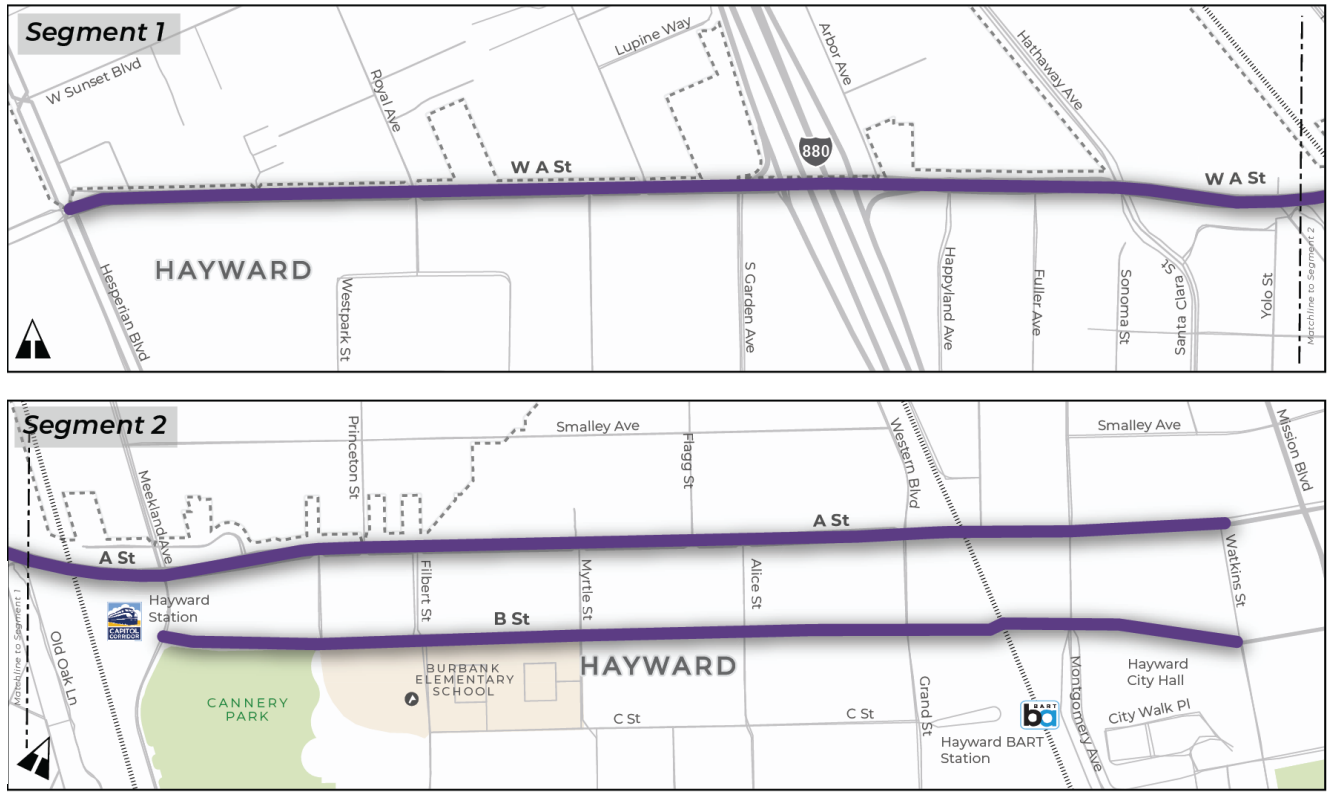
A Street and B Street Project Extents

Project Extents Include:

- **A Street** from Hesperian Boulevard to Watkins Street/Lucky Driveway.
- **B Street** from Martin Luther King Drive to Watkins Street/Lucky Driveway.



Legend

- Study Corridor
- Railroad
- School
- City Boundary

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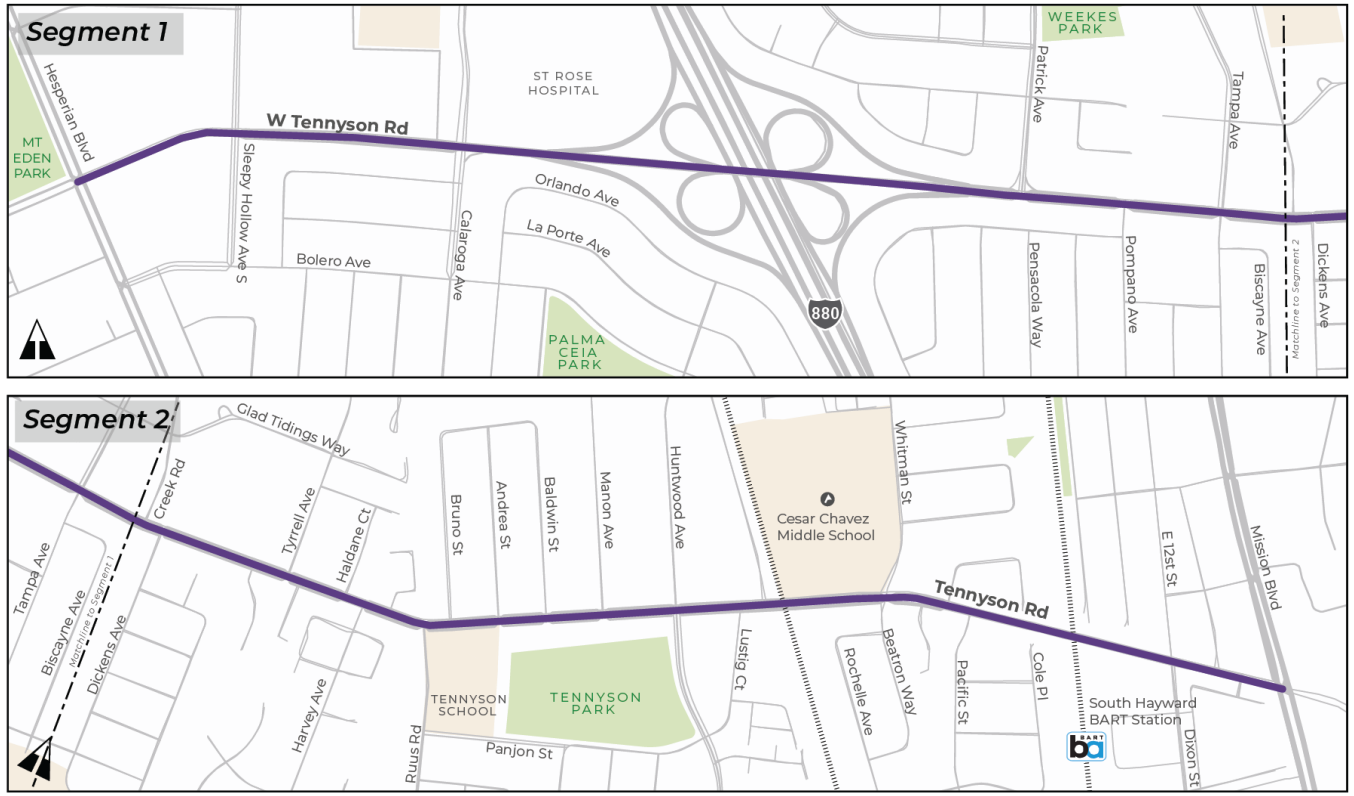
Tennyson Road Project Extents

Project Extents Include:

- **Tennyson Road** from Hesperian Boulevard to Mission Boulevard.



Legend

- Study Corridor
- Railroad
- School

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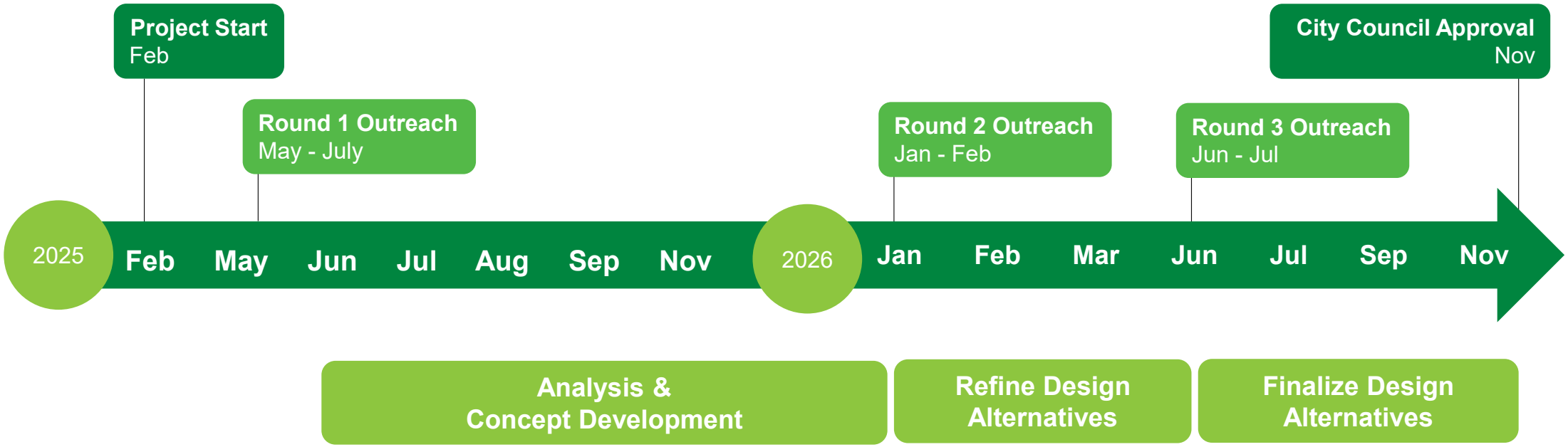
Project Timeline



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Project Outcomes and Objectives

- Project goals include:
  - The development, analysis, and design of community supported project alternatives to improve safety on each of the study corridors.
  - The completion of Roadway Safety Audits (RSAs) for each study corridor.
  - Final design concepts, which will include cost estimates and implementation plans.

Project team during Tennyson Road RSA

Existing Conditions

A St and B St Land Use

West of Meekland Avenue, **A Street** primarily consists of general commercial or mixed-use commercial/high density residential land uses. Between Meekland Avenue and Grand Street, **A Street and B Street** primarily consists of medium density residential. East of Grand Street the land use is primarily central city-retail and office commercial

Residential Land Use Designations

RER	Rural Estate Density, 0.2-1.0 dwelling units per net acre
SDR	Suburban Density, 1.0-4.3 dwelling units per net acre
LDR	Low Density, 4.3-8.7 dwelling units per net acre
MHP	Mobile Home Park, 8.7-12.0 dwelling units per net acre
LMD	Limited Medium Density, 8.7-12.0 dwelling units per net acre
MDR	Medium Density, 8.7-17.4 dwelling units per net acre
HDR	High Density, 17.4-34.8 dwelling units per net acre

Commercial Land Use Designations

ROC	Retail and Office Commercial
GC	General Commercial

Mixed-Use Land Use Designations

SMU	Sustainable Mixed-Use
CHDR	Commercial/High-Density Residential
CC-ROC	Central City-Retail and Office Commercial
CC-HDR	Central City-High Density Residential

Industrial Land Use Designations

IC	Industrial Technology and Innovation Corridor
MI	Mixed Industrial

Public and Quasi Public Land Use Designations

PQP	Public/Quasi-Public

Open Space Land Use Designations

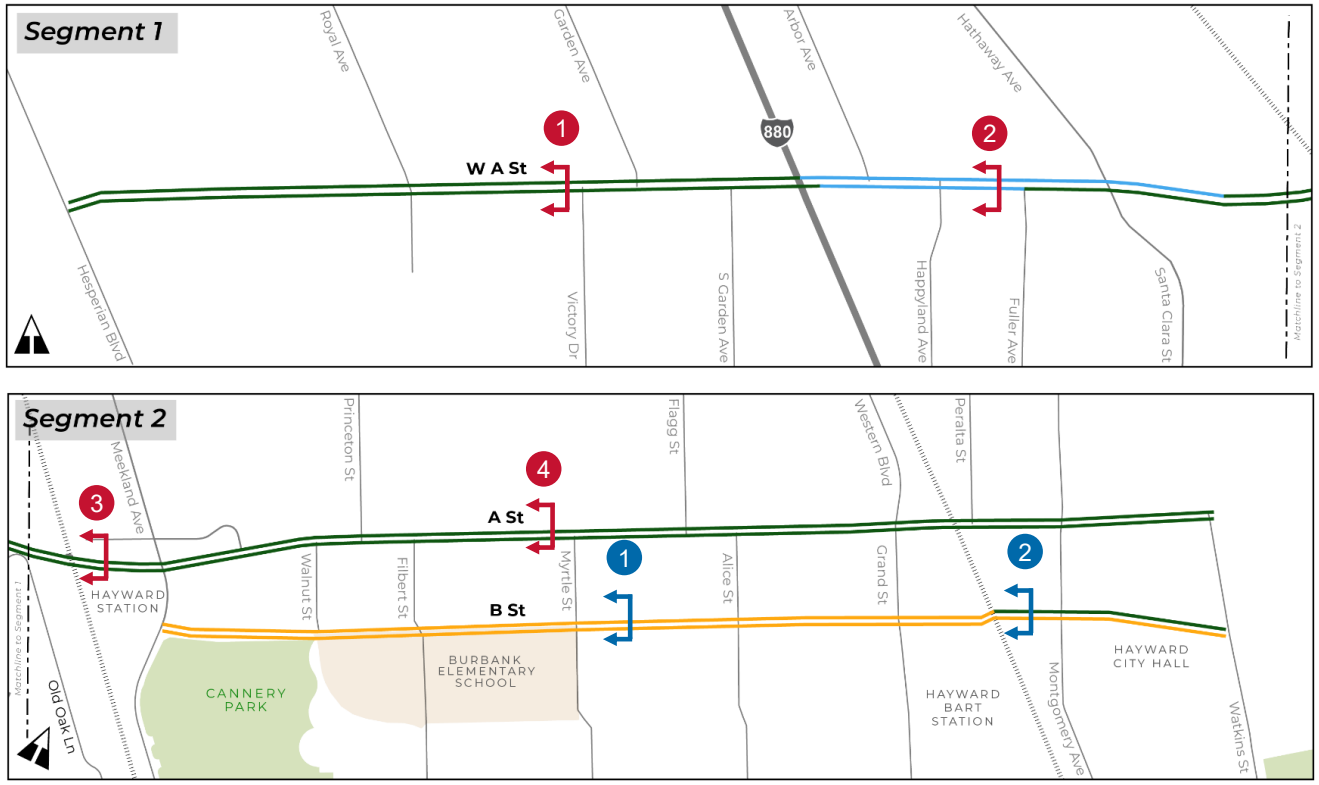
PR	Parks and Recreation
BL	Baylands
LOS	Limited Open Space

Urban Limit Line

A Street and B Street Existing Conditions

A Street primarily has two through lanes in each direction. Segments immediately east of I-880 have three through lanes in each direction. The corridor has a 30 MPH speed limit west of Grand Street and a 25 MPH speed limit east of Grand Street.

B Street primarily has one through lane in either direction. There is a second westbound lane from Watkins Street to the BART/UPRR railroad crossing. B Street has a 25 MPH speed limit for the entirety of the corridor.



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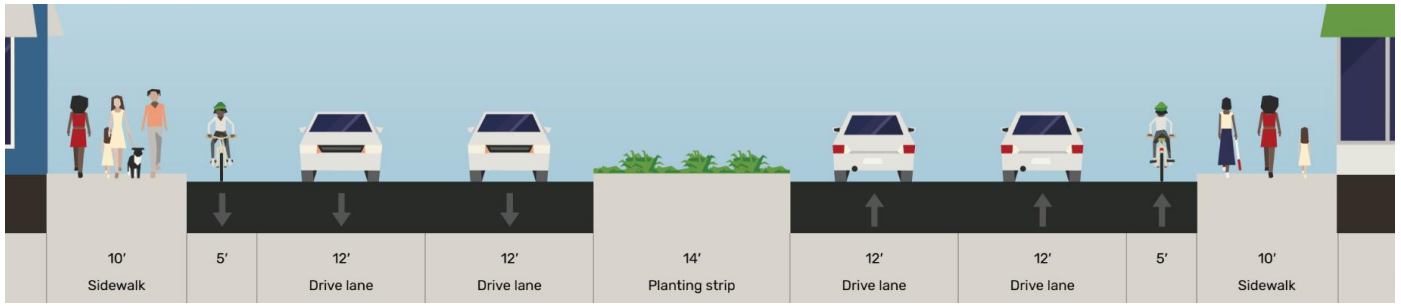
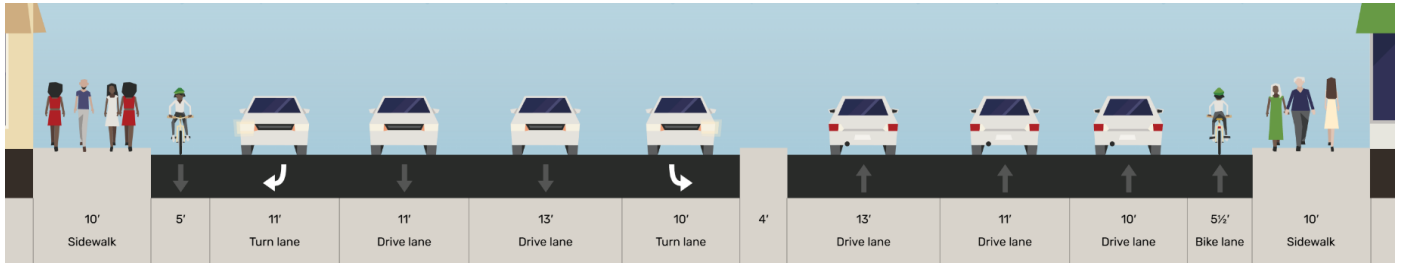
A Street Cross-sections



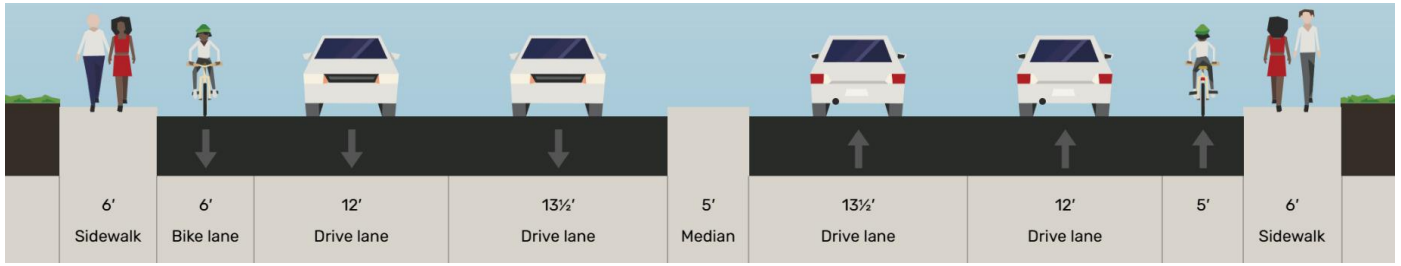
1 A Street between Hesperian Blvd and I-880 interchange (~92 ft ROW)



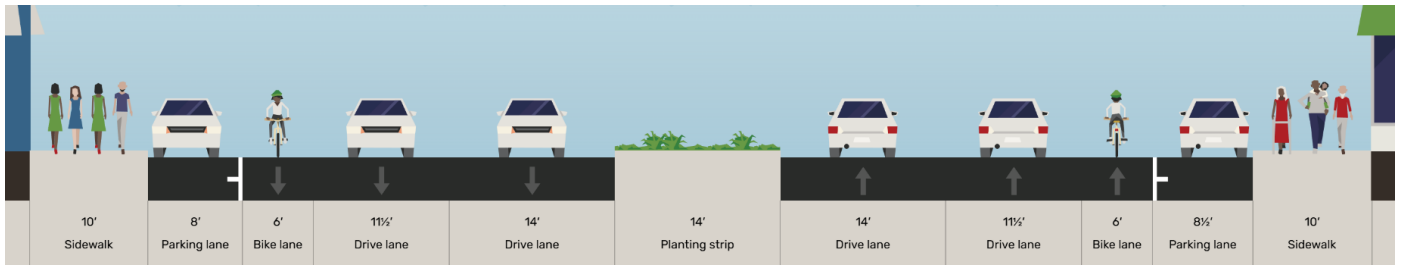
2 A Street between I-880 Interchange and Hathaway Ave (~113.5 ft ROW)

*Cross sections face westbound

A Street Cross-sections Cont.



3 A Street between Hathaway Avenue and Meekland Avenue (~79 feet ROW)



4 A Street between Meekland Avenue and Watkins Street (~113 feet ROW)

*Cross sections face westbound

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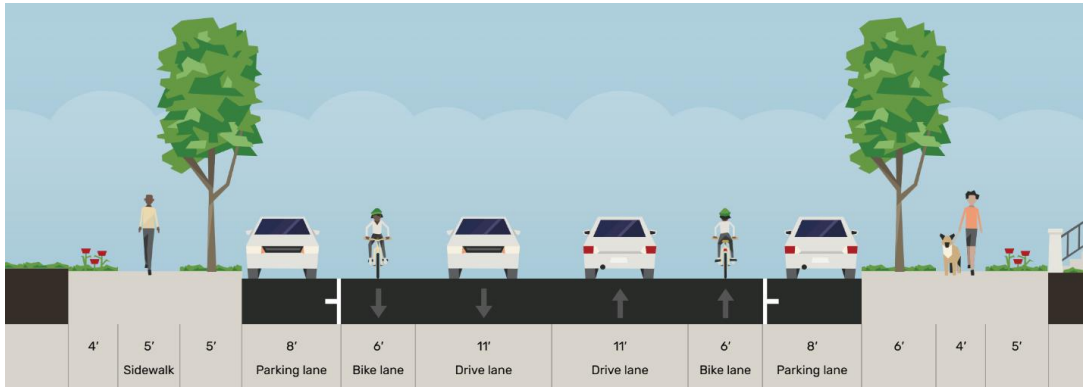
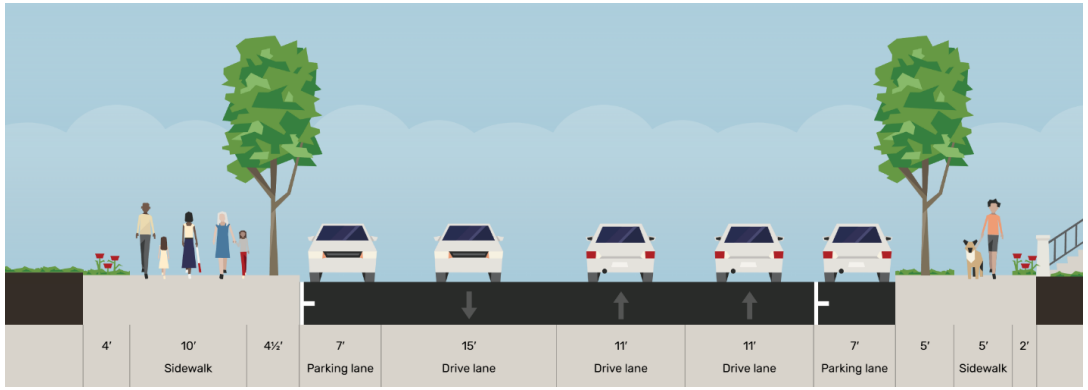
B Street Cross-sections



1 B Street between Hesperian Boulevard and Grand Street (~79' ROW)



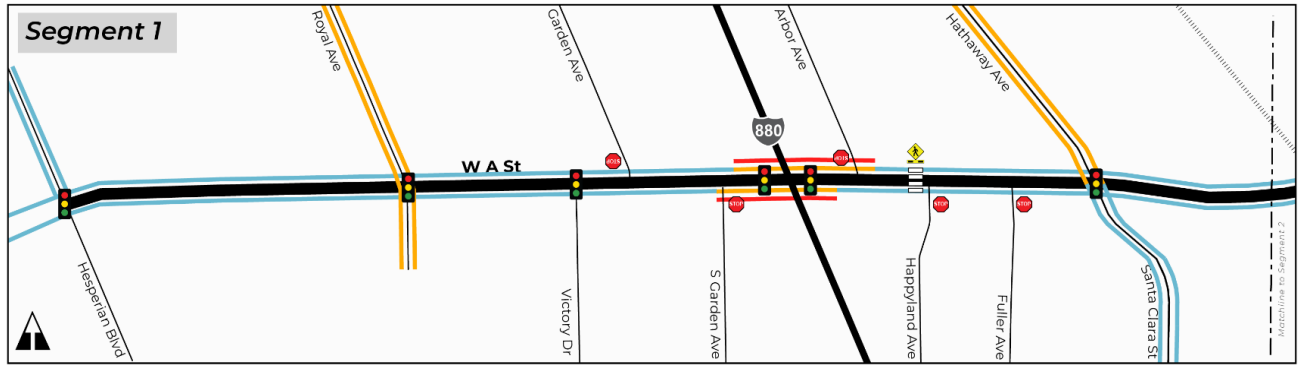
2 B Street between Hesperian Boulevard and Grand Street (~81' ROW)

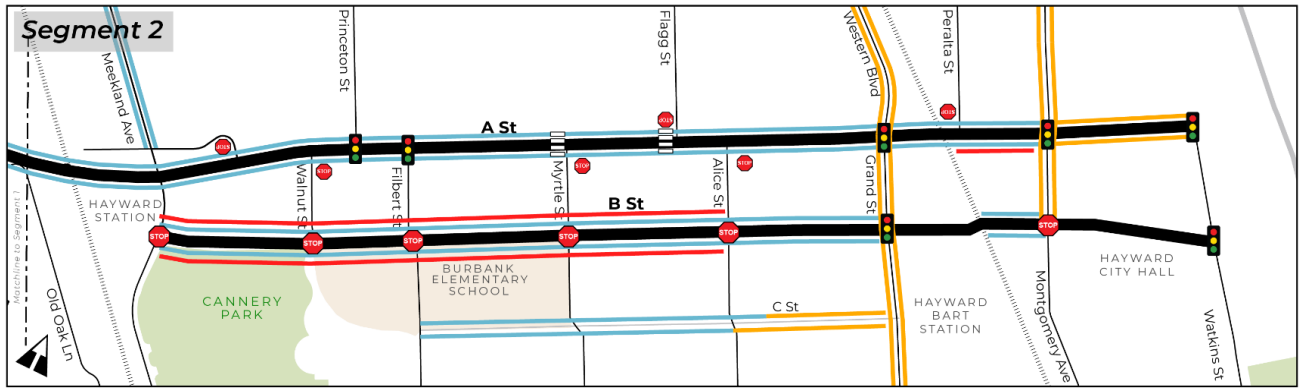
*Cross sections face westbound

A Street and B Street Existing Conditions

A Street primarily includes bicycle lanes (Class II), with gaps, designated as a bicycle route (Class III), at the I-880 underpass and east of Montgomery Avenue. The gap at the I-880 interchange is expected to be upgraded to bicycle lanes (Class II) as a part of the ongoing I-880 Interchange Improvements project. A Street has no sidewalk gaps, but sidewalks become narrow underneath the I-880 bridge and east of the UPRR railroad tracks on the south side of the street. A Street has three uncontrolled crossings; each located at a three-leg T-intersection. Of the three midblock crossings, one has a Rectangular Rapid-Flashing Beacon (RRFB). Most of the corridor's intersections are signalized with a few side street stop-controlled intersections.

B Street has bicycle lanes (Class II) from Martin Luther King Drive to Grand Street. The bicycle lanes pick up again for a short segment between the BART/UPRR crossing and Montgomery Avenue. B Street has no sidewalk gaps, but the existing sidewalks west of the Alice Street are less than 5' in some areas. Other than the signalized intersections at Grand Street and Watkins Street, B Street has exclusively all-way stop controlled intersections.





Legend

- Study Corridor
- Railroad
- Mid-Block Crossing
- Rectangular Rapid-Flashing Beacon (RRFB)
- Stop Controlled Intersection
- Signalized Intersection

Existing Bikeways
- Bicycle Lane
- Bicycle Route

Sidewalk Gaps
- Missing Sidewalk
- Narrow Sidewalk (<5')

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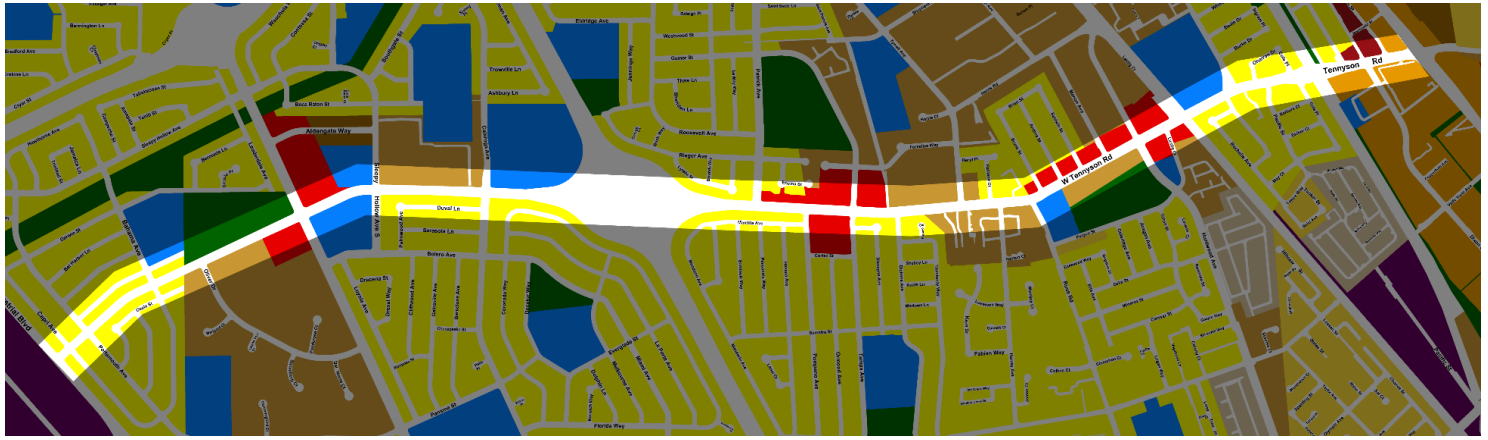
Tennyson Road Land Use

Tennyson Road's primary land uses are retail and office commercial concentrated between Ruus Road and the UPRR Railroad tracks, sustainable mixed-use on the eastern end of the corridor, and low to medium density residential for the remainder of the corridor.



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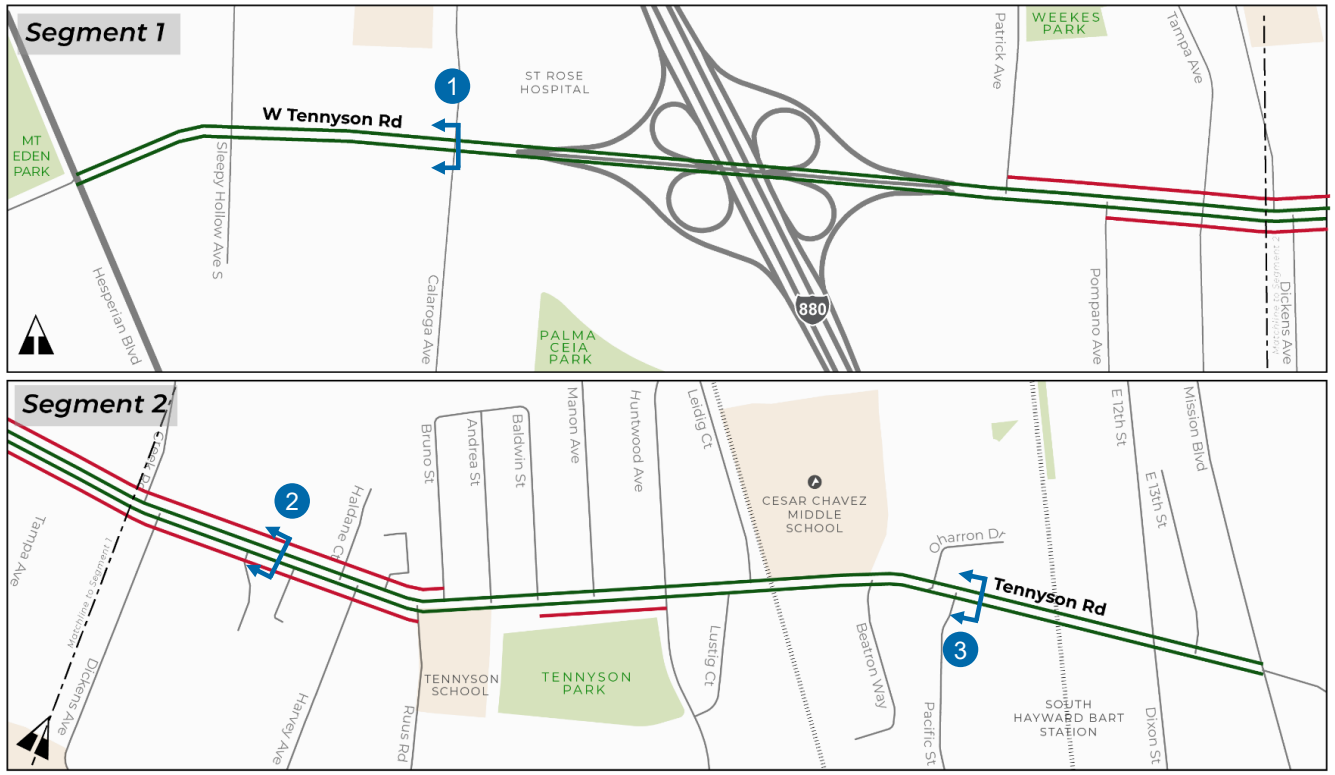
Urban Limit Line

Tennyson Road
Existing Conditions Cont.

Tennyson Road has two through lanes in each direction. The corridor has a 35 MPH speed limit west of Ruus Road, and a 25 MPH speed limit between Ruus Road and Mission Boulevard.

Roughly 1/3 includes a curb lane where parking is prohibited. This curb lane currently provides no functional use for roadway users and represents an opportunity for improved non-motorized facilities or other safety improvements.



Legend

Railroad

No Parking Curb Lane

Number of Through Lanes

1

2

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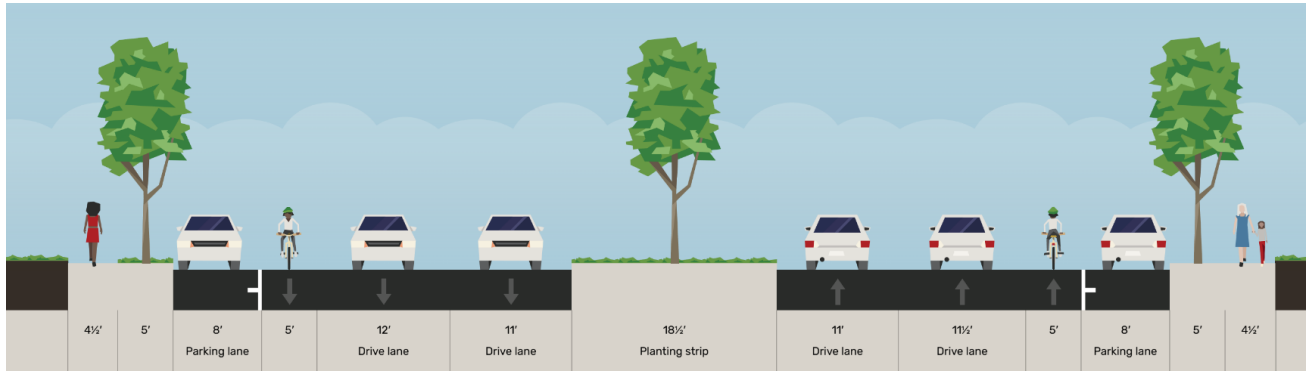
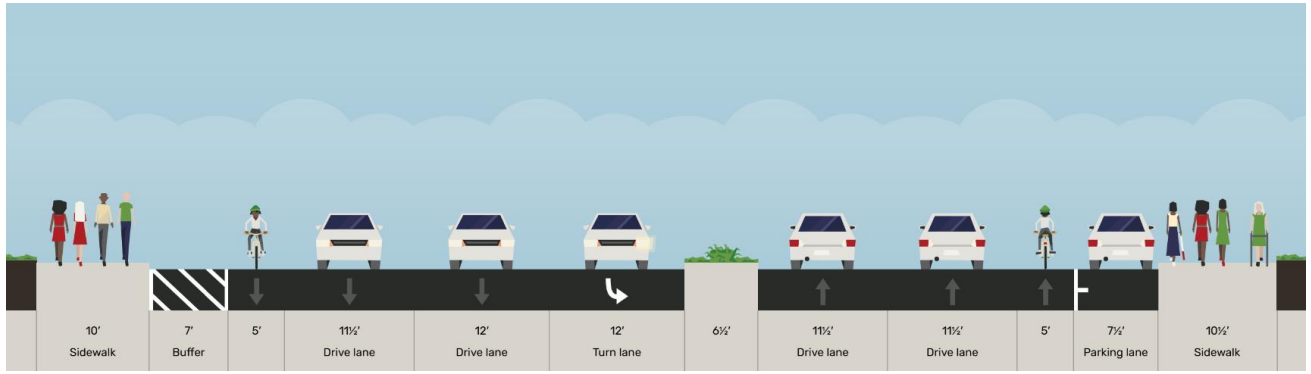
Tennyson Road Cross-sections



1 Tennyson Road between Hesperian Boulevard and I-880 Interchange (~109 feet ROW)



2 Tennyson Road between I-880 Interchange and Leidig Court (~110 feet ROW)

*Cross sections face westbound

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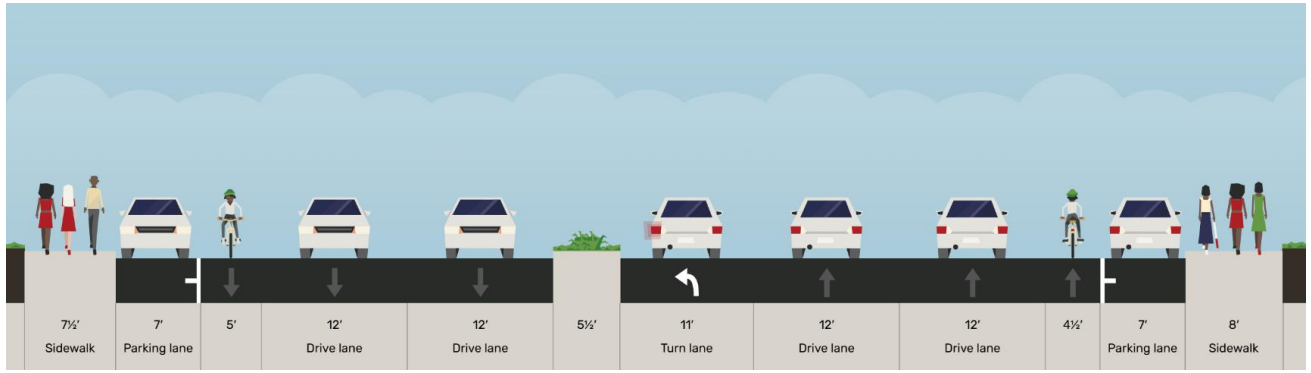
Tennyson Road Cross-sections (Cont.)

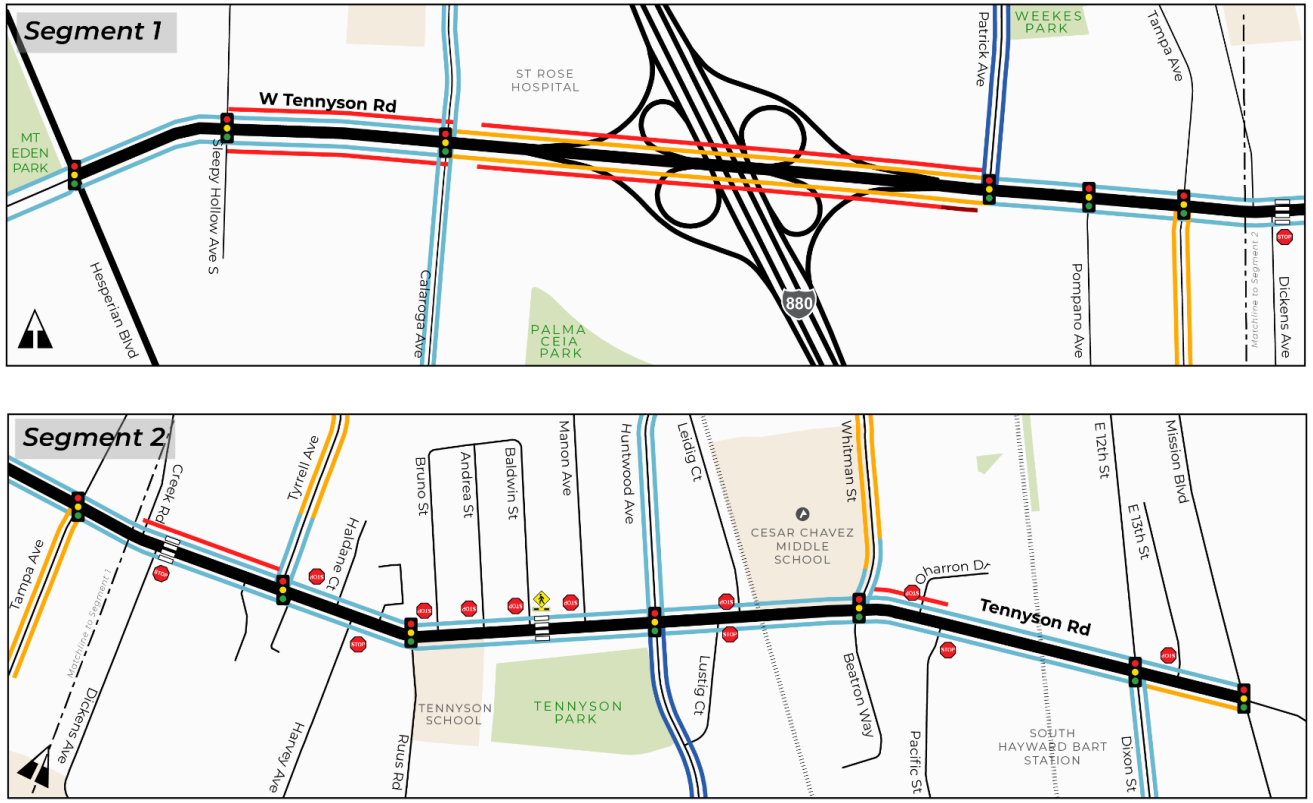


3 Tennyson Road between Leidig Court and Mission Boulevard (~103 feet ROW)

*Cross sections face westbound

Tennyson Road
Existing Conditions

Tennyson Road primarily includes bicycle lanes (Class II) with gaps, designated as a bicycle route (Class III), at the I-880 overpass and eastbound east of Dixon Street. Tennyson Road has a missing sidewalk connection on the south side of the corridor just east of I-880 and narrow sidewalks on various areas of the corridor including between Sleepy Hollow Avenue S and Caloraga Avenue, over I-880, and just west of Tyrell Avenue on the north side of the street. There are two uncontrolled crossings on the corridor, one of which has an RRFB (Baldwin Street). The corridor includes a combination of side-street stop-controlled intersections and signalized intersections.



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Existing Bikeways

- Bicycle Lane
- Buffered Bicycle Lane
- Bicycle Route

Sidewalk Gaps

- Missing Sidewalk
- Narrow Sidewalk (<5')

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Site Visits

- Two project team site visits were conducted, one for the A & B Street study area and one for the Tennyson Road study area.
- The A & B Streets site visit occurred in the afternoon of March 24th, 2025.
- The Tennyson Road site visit occurred in the morning of April 1st, 2025.

Biker rides on the sidewalk on West A Street

A Street: Key Findings

- Those rolling on the corridor (bike, scooter, and skateboard users) often used the sidewalks instead of bike facilities. Those that did use the bike facilities often rode in the opposing direction of the bike lane.
- Pedestrian crossings at the I-880 interchange felt uncomfortable due to low visibility at the off-ramps.
- Pedestrians were observed crossing A Street outside of crosswalks, specifically near Walnut Street and east of Hesperian Boulevard.
- Large eastbound left-turn queuing was observed at Santa Clara Street/ Hathaway Avenue that backed up to I-880.
- The eastern portion of the corridor has many driveways.

B Street: Key Findings

- There are narrow sidewalks on the western end of the corridor near Cannery Park.
- Parking on B Street Near Cannery Park was underutilized in the early afternoon hours.
- B Street east of Grand Street is missing bicycle facilities.
- Pedestrian scale lighting is missing from the majority of the north side of the corridor.

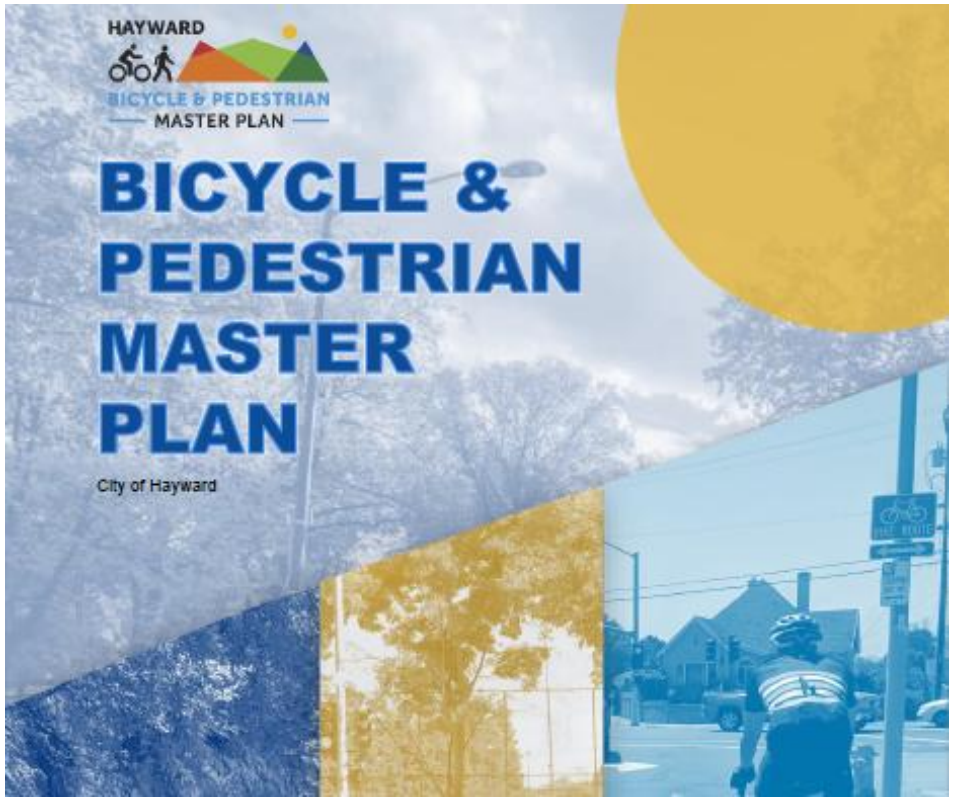
Tennyson Road: Key Findings

- Micromobility users use narrow sidewalks and crosswalks, creating bicycle/pedestrian conflicts.
- Several crosswalks were obstructed with median noses.
- Sidewalk gaps and obstructions exist throughout the corridor.
- High vehicle speeds were observed west of Patrick Avenue.
- Many of the three-leg T-intersections allow permissive left turning movements while the pedestrians are given a walk signal.
- Long stretches of Tennyson Road have eight-foot-wide curb-adjacent roadway space with “No Parking” signage.

Background Research

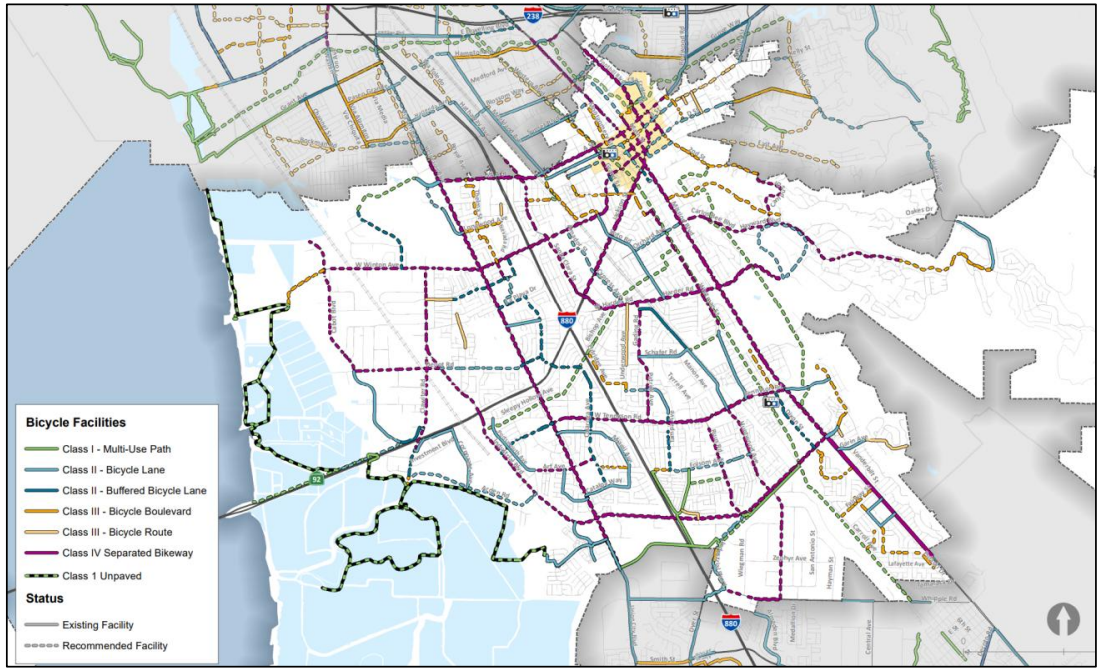
Bicycle & Pedestrian Master Plan 2020

- Overarching goals include safety, complete streets, access & mobility, and funding & implementation.
- The study identifies portions of A Street, B Street, and Tennyson Road as priority corridors for safety improvements.
- The plan also outlines infrastructure recommendations for pedestrian improvements and future bicycle network.



Bicycle & Pedestrian Master Plan 2020 Recommendations

- A Street
  - Class IV Separated Bikeway between Skywest Drive and 4th Street
- B Street
  - Class II Bicycle Lane between Grand Street and Watkins Street
  - Class III Bicycle Boulevard between Watkins Street and Foothill Boulevard
- Tennyson Road
  - Class IIB Buffered Bicycle Lane between Industrial Boulevard and Hesperian Boulevard
  - Class IV Separated Bikeway between Hesperian Boulevard and Mission Boulevard



City of Hayward BPMP - Bicycle and Pedestrian Bicycle Facilities Map

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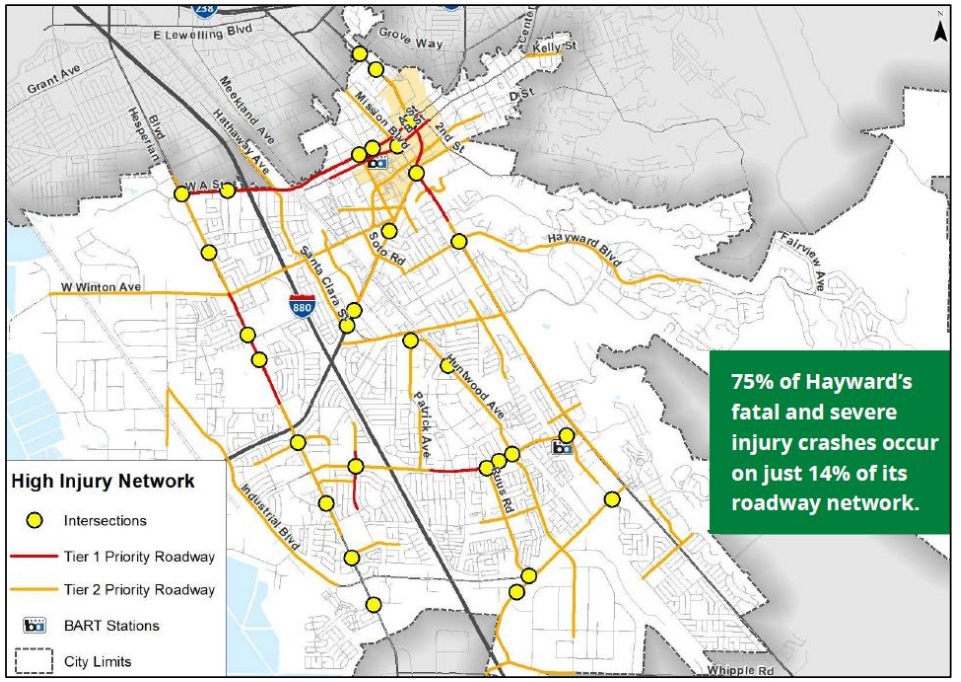
2023 Local Roadway Safety Plan

- Crashes were analyzed from 2017-2021.
- The study used crash data to identify a High Injury Network (HIN):
  - 9 intersections within the study area were identified as high injury network intersections.
  - A Street, B Street, and Tennyson Road between Pompano and Ruus Road were ranked Tier 1 priority roadway segments
  - Tennyson Road between Hesperian Boulevard and Mission Boulevard was ranked Tier 2 priority roadway segment
- The study also identified a set of countermeasures and strategies to address safety challenges in the City.



City of Hayward - High Injury Network Map

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2023 Local Roadway Safety Plan Cont.

High Injury Network Intersections

Rank	Location	Location Type
1	Tennyson Rd & Baldwin St	Unsignalized
3	Tennyson Rd & Calaroga Ave	Signalized
4	A St & Victory Dr	Signalized
8	A St & Foothill Blvd	Signalized
9	Tennyson Rd & Huntwood Ave	Signalized
11	A St & Western Blvd	Signalized
13	CA-185 & B St	Signalized
15	A St & Montgomery St	Signalized
16	Tennyson Rd & 12 St/Dixon St	Signalized
17	A St & Hesperian Blvd	Signalized
20	Tennyson Rd & Ruus Rd	Signalized

2023 Local Roadway Safety Plan Location-Specific Recommendations

Tennyson & Baldwin

Unsignalized Intersection

RECOMMENDED IMPROVEMENTS	
NS23PB	Install Pedestrian Signal (including Pedestrian Hybrid Beacon [HAWK])
NS19PB	Install raised medians/refuge islands (NS.I.)
NS20PB	Install pedestrian crossing at uncontrolled locations (new signs and markings only)
NS01	Add intersection lighting (NS.I.)
NS15	Create directional median openings to allow (and restrict) left turns and U-turns (NS.I.)
K10	Stripe bicycle lane through intersection
K12	Reduce curb radius
K13	Stripe high-visibility crosswalk markings
K17	Install raised crosswalk

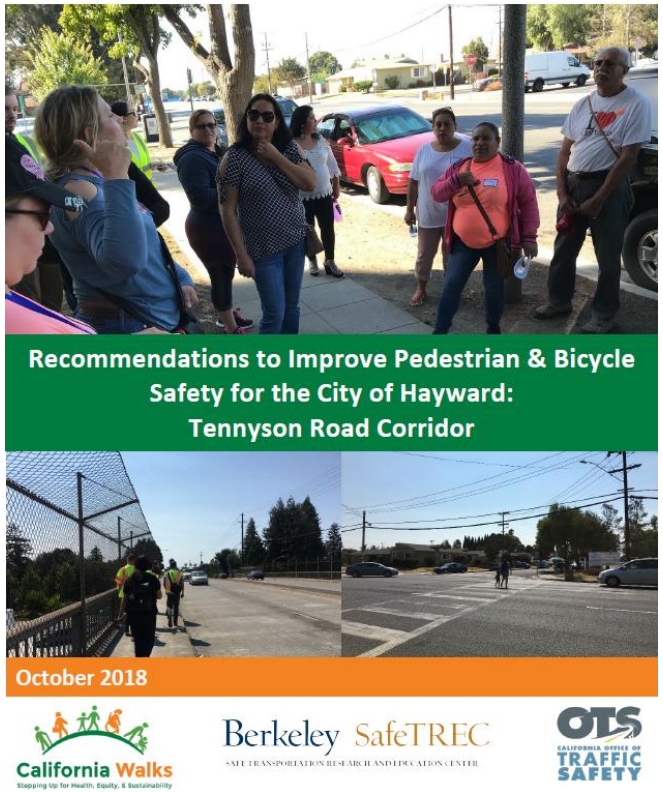
Tennyson & Calaroga

Signalized Intersection

RECOMMENDED IMPROVEMENTS	
S21PB	Modify signal phasing to implement a leading pedestrian interval (LPI)
K01	Modify lane geometry: consider eliminating one right-turn lane
S08	Convert signal to mast arm from pedestal-mounted
S11	Improve pavement friction using high friction surface treatments
S01	Add intersection lighting
S02	Improve signal hardware with lenses, back-plates with retroreflective borders, mounting, size, and number
K02	Restrict right turns on red
K03	Refresh pavement markings
K10	Stripe bicycle lane extension through intersection
K12	Reduce curb radius
K13	Stripe high-visibility crosswalk markings
K14	Modify signal phasing to implement a leading bicycle interval phase
K17	Install raised crosswalk
S03	Adjust signal timing parameters (red-and-yellow change intervals, bicycle clearance times, etc.) to increase clearance times

Recommendations to Improve Pedestrian and Bicycle Safety of the City of Hayward: Tennyson Road Corridor 2018

- A Community Pedestrian and Bicycle Safety Training (CPBST) workshop identified pedestrian and bike priorities and improvements.
- Attendees included representatives from transit agencies, organizations, businesses, and community members.



Recommendations to Improve Pedestrian and Bicycle Safety of the City of Hayward: Tennyson Road Corridor 2018

Identified Issues

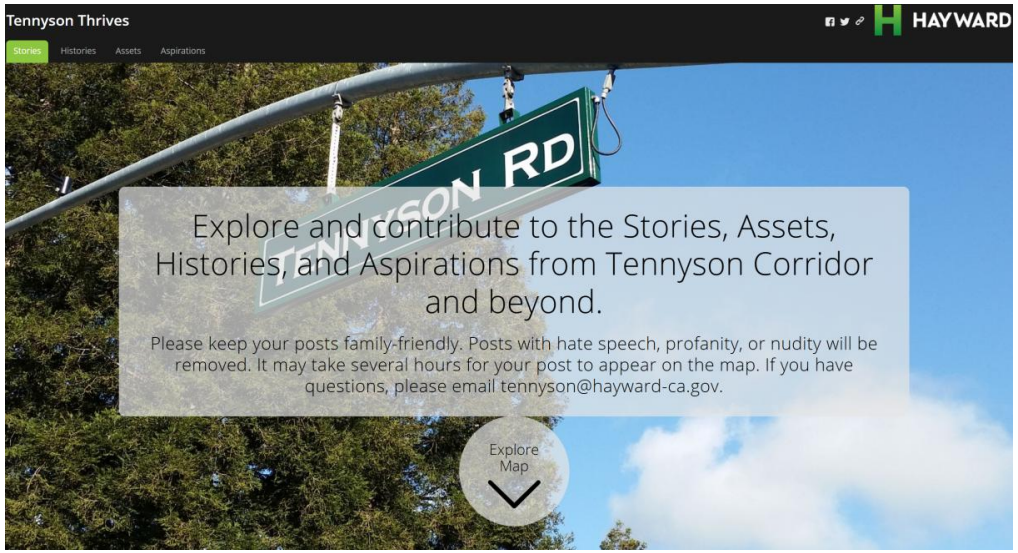
- Narrow and obstructed sidewalks
- High vehicle speeds
- Unsafe crossings
- Inadequate bike lanes

Community Priorities and Recommendations

- Enhance pedestrian and bicyclist safety
- Improve access to schools and community centers
- Address infrastructure deficiencies
  - Repair sidewalks
  - Create continuous and protected bike lanes
- Implement traffic calming measures

Tennyson Thrives Vision Plan

- The study was a collaboration between community members, City staff, and the Chabot College Student Initiative Center.
- It included the development of a Vision Plan focused on highlighting stories, histories, assets, and aspirations of communities along Tennyson Road.

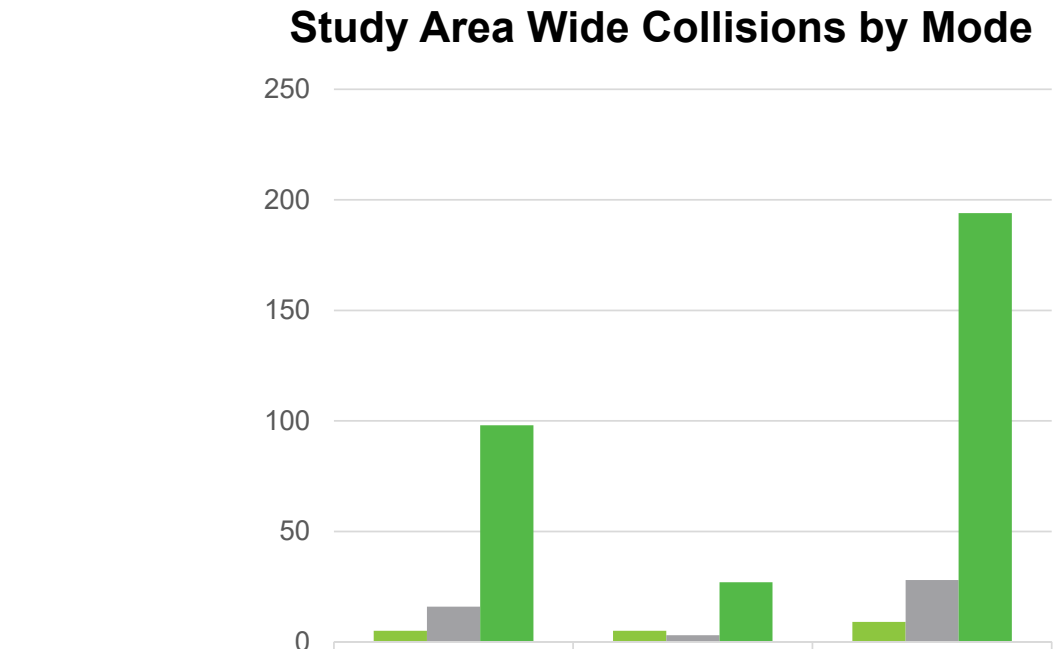


Safety Analysis

SWITRS Data and Locations

Study Period: 2019-2024 (6 years)

- A Street Total Collisions: 119
- B Street Total Collisions: 35
- Tennyson Road Total Collisions: 231



	A Street	B Street	Tennyson Road
Bike-Involved Collisions	5	5	9
Pedestrian-Involved Collisions	16	3	28
Auto-Only Collisions	98	27	194

Key Analysis Findings

385 crashes
on A/B Streets and Tennyson Road since 2019

31 severe injuries or fatalities
since 2019

46% of severe injury or fatal crashes
involved someone walking or biking

Vulnerable Road User Injuries

Pedestrian Collisions

Corridor	Fatality	Severe Injury
A St	2	3
B St	0	0
Tennyson Rd	1	4
Total	**3**	**7**

Bicycle Collisions

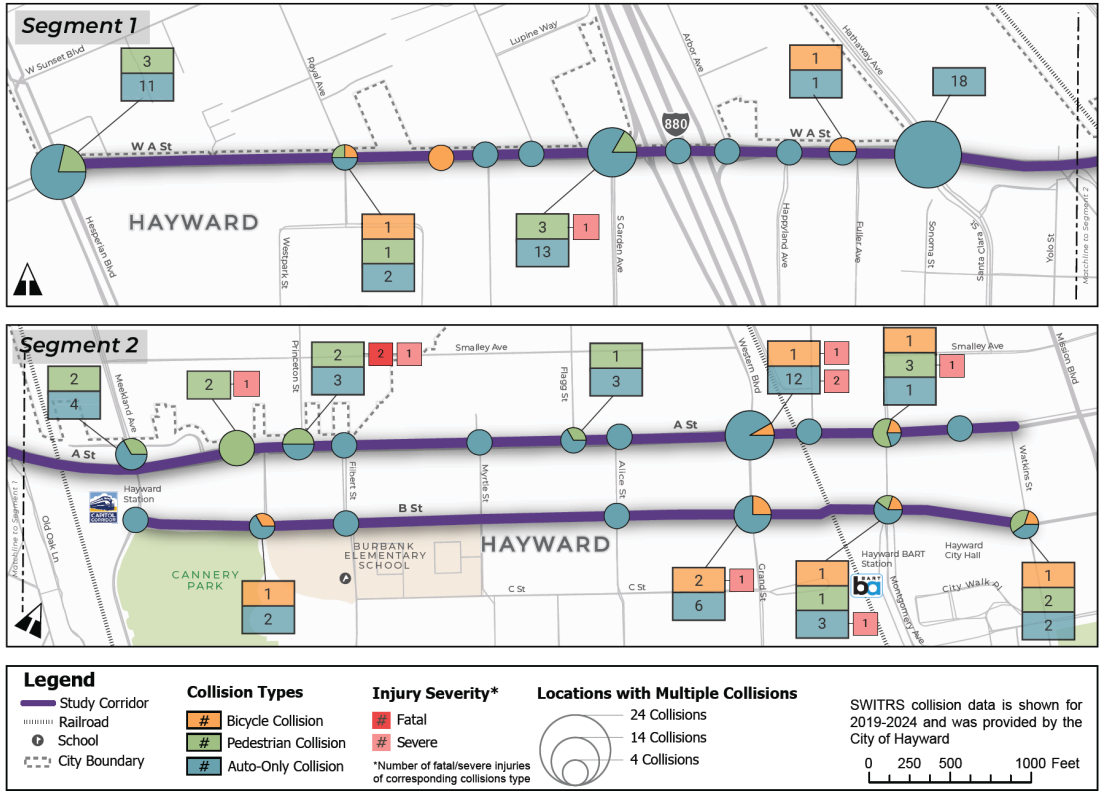
Corridor	Fatality	Severe Injury
A St	0	1
B St	0	1
Tennyson Rd	0	1
Total	**0**	**3**

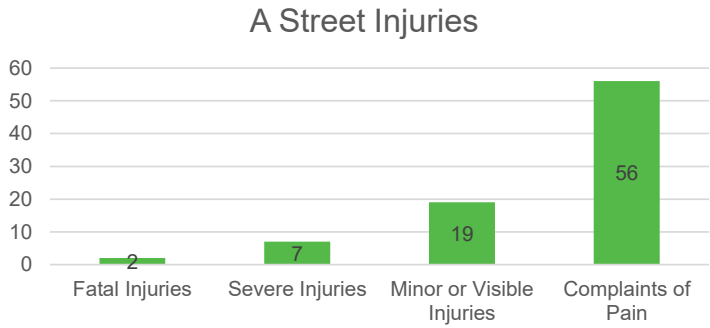
Vulnerable Road User Sever and Fatal Collisions

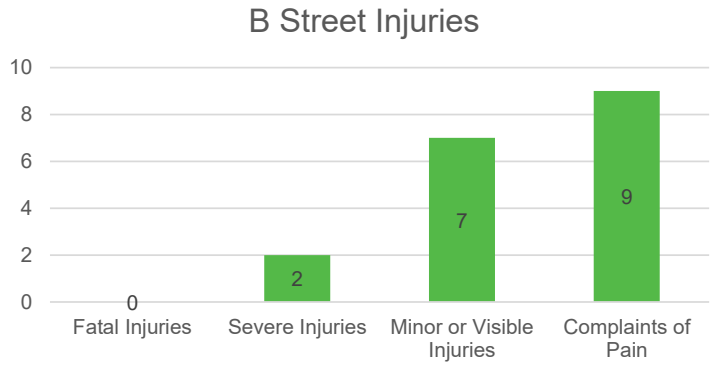
Location	Severity	Vulnerable Road User	Crash Cause
A St and Walnut St	Severe	Pedestrian	Pedestrian Violation
A St and Princeton St*	Fatal / Severe	Pedestrian	Pedestrian Violation
A St and Princeton St	Fatal	Pedestrian	Pedestrian Violation
A St and Western Blvd	Severe	Bicyclist	Wrong Side of the Road
A St and Montgomery Ave	Severe	Pedestrian	Pedestrian ROW
B St and Western Blvd	Severe	Bicyclist	Traffic Signals and Signs
Tennyson and Hesperian Blvd	Severe	Pedestrian	Unsafe Speed
Tennyson and Patrick Ave	Severe	Bicyclist	Wrong Side of the Road
Tennyson and Ruus Rd	Severe	Pedestrian	Pedestrian Violation
Tennyson and Ruus Rd	Severe	Pedestrian	Pedestrian Violation
Tennyson and Baldwin St	Fatal	Pedestrian	Pedestrian ROW
Tennyson and Baldwin St	Severe	Pedestrian	Pedestrian Violation

*This collision occurring at Princeton Street resulted in both a fatality and severe injury.

A Street and B Street Collision Analysis

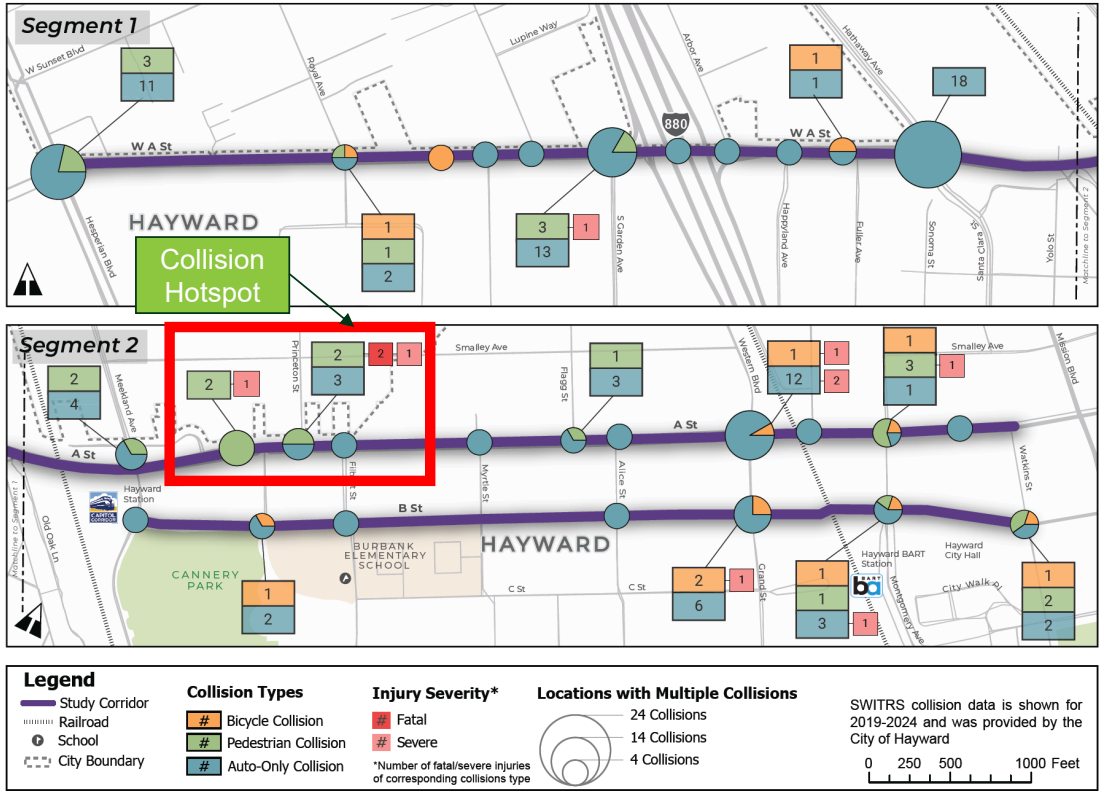






HAYWARD Vision Zero

A Street and B Street Collision Analysis



- The collision hotspot near **A Street** and Princeton Street had eight crashes, half of which resulted in either a fatality or severe injury. Based on the collision data, six of the eight crashes (including all four of the crashes that resulted in a sever or fatal injury) occurred at night.
- In 2019, **A Street** had six severe or fatal collisions. Since then, there have only been two severe or fatal collisions on the corridor.
- **B Street** had one severe or fatal collision in 2019 and has only had one since.

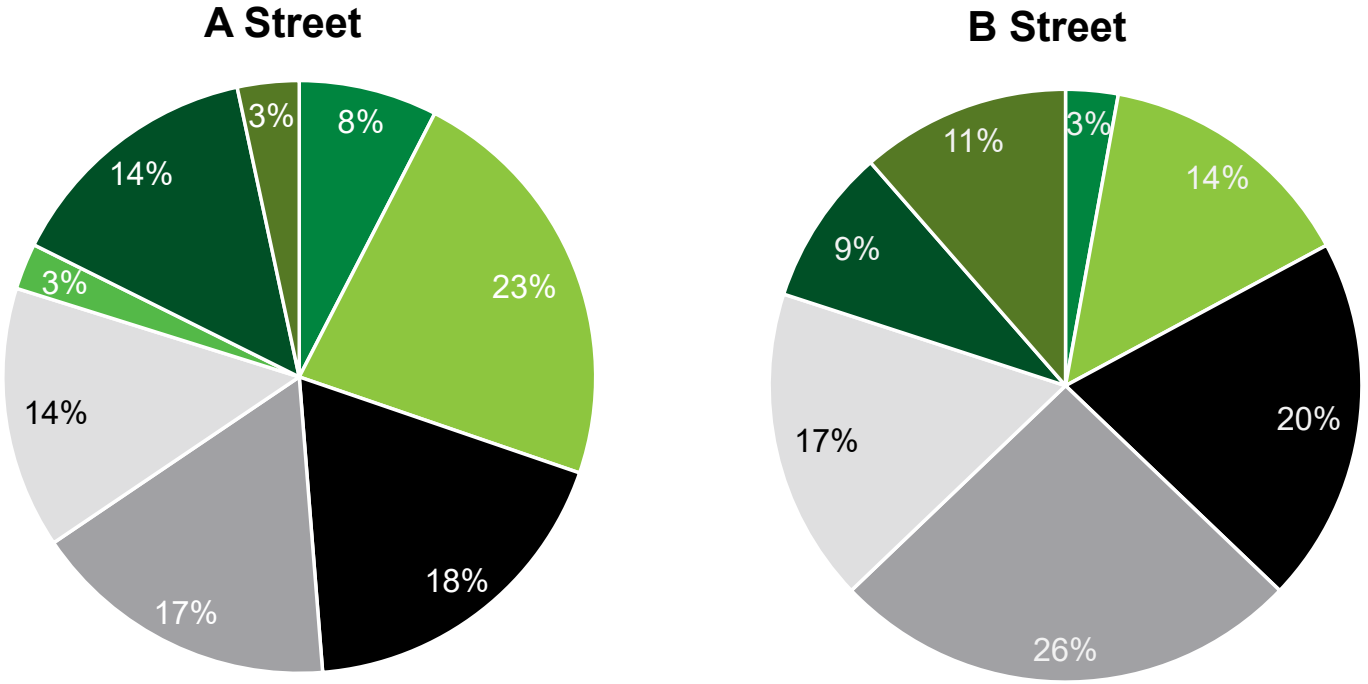
A Street
Intersection Collisions by Type

Intersection	Head On	Sideswipe	Rear End	Broadside	Hit Object	Overturned	Vehicle/Pedestrian	Other	Total
A St and Hesperian Blvd		3	1	1	5	1	3		14
A St and Royal Ave		1		1			2		4
A St and Victory Dr			1					1	2
A St and Garden Ave		1	1						2
A St and S Garden Ave	2	5	2	1			2		12
A St and I-880 On Ramp		2		1					3
A St and I-880 Overpass		1	1			1			3
A St and Happyland Ave		1		1					2
A St and Hathaway Ave	2	3	5	4	4				18
A St and Walnut St							1		1
A St and Princeton St		1	1		1		2		5
A St and Filbert St			1		1				2
A St and Myrtle St				2					2
A St and Flagg St	1			1			1		3
A St and Western Blvd	2	2	2	3	2			1	12
A St and Montgomery St					1		3	1	5
Total	**7**	**20**	**15**	**15**	**14**	**2**	**14**	**3**	**90**

B Street
Intersection Collisions by Type

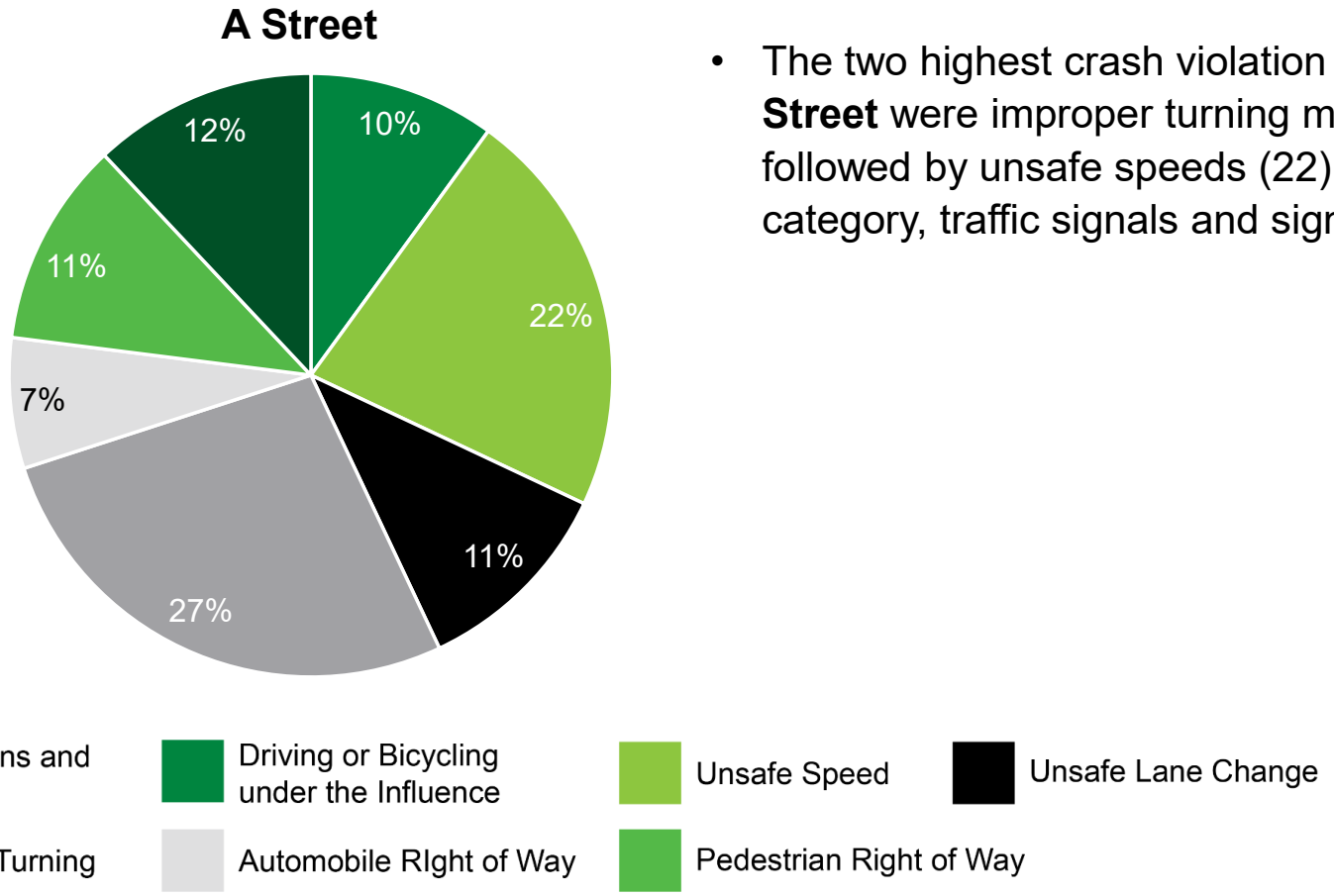
Intersection	Head On	Sideswipe	Rear End	Broadside	Hit Object	Overturned	Vehicle/Pedestrian	Other	Total
B St and Meekland Ave				1	1				2
B St and Walnut St			1	1	1				3
B St and Filbert St		1							1
B St and Alice St			2						2
B St and Western Blvd	1	1		2	2			2	8
B St and Montgomery St		1			1		1	2	5
B St and Watkins St		2	1				2		5
Total	**1**	**5**	**4**	**4**	**5**	**0**	**3**	**4**	**26**

A and B Street Collision Types



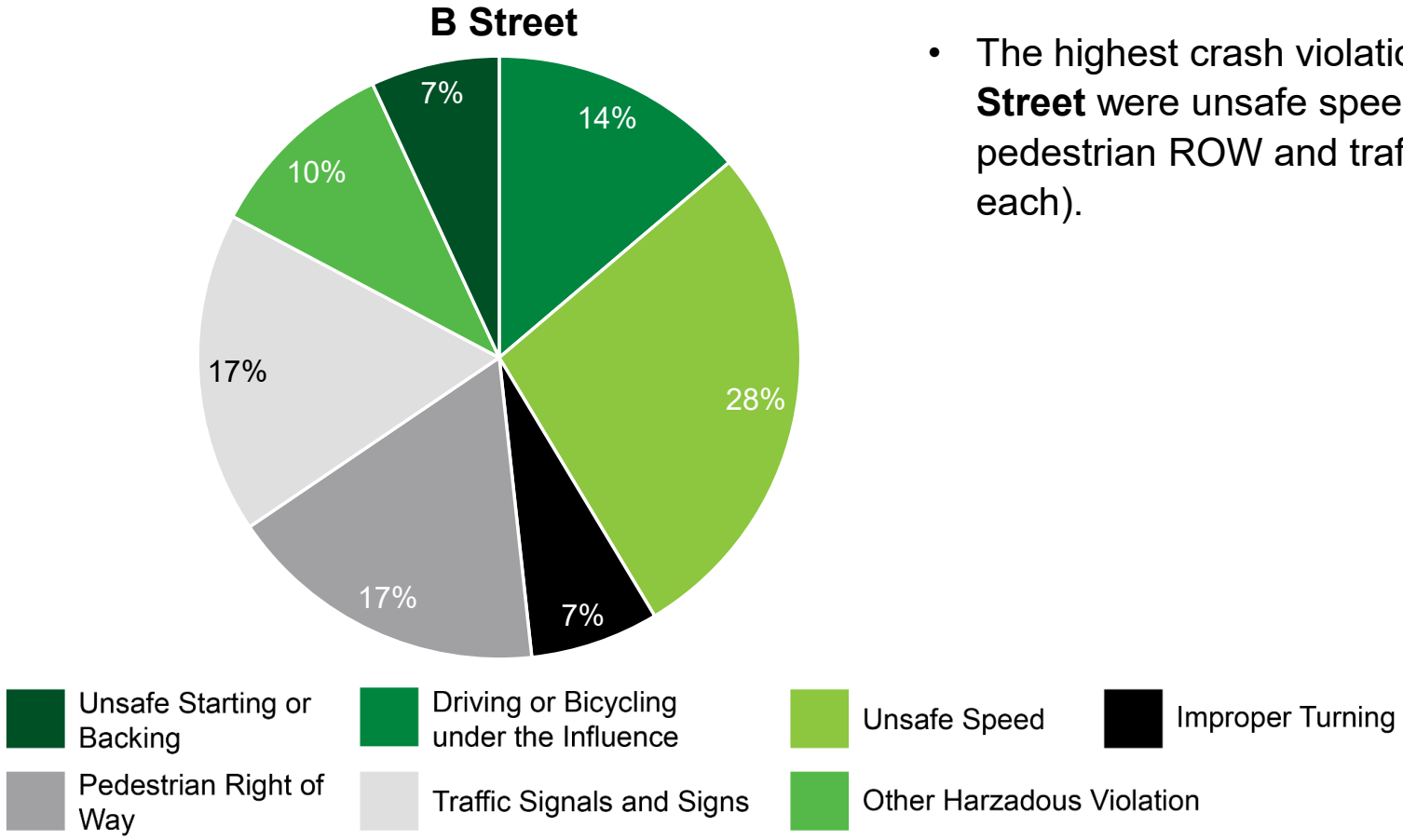
- **A Street's** most frequent type of collision was sideswipe, followed by rear end and broadside collisions.
- **B Street's** most frequent type of collision was broadside, followed by rear end collisions and hit objects.
  - 4 of the 6 hit objects on **B Street** occurred between Grand Street and Montgomery Avenue.

A Street Top Collision Causes



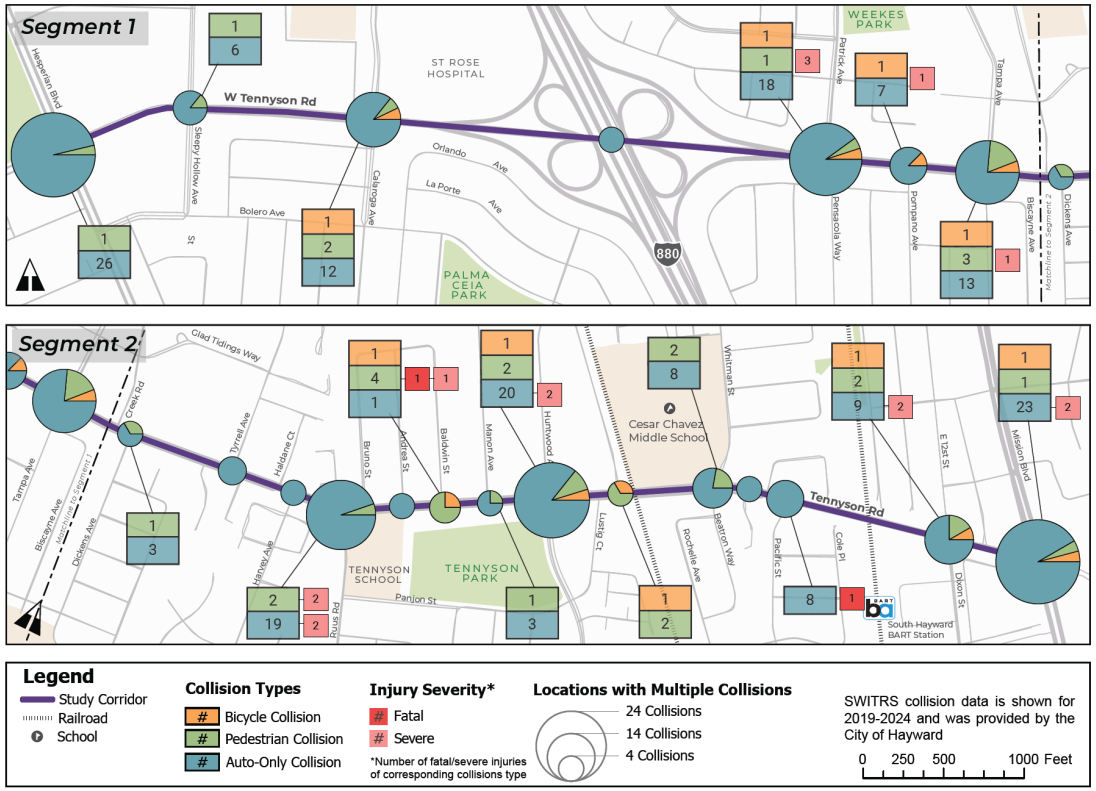
- The two highest crash violation categories on **A Street** were improper turning maneuvers (27) followed by unsafe speeds (22). The next highest category, traffic signals and signs, had 12 crashes.

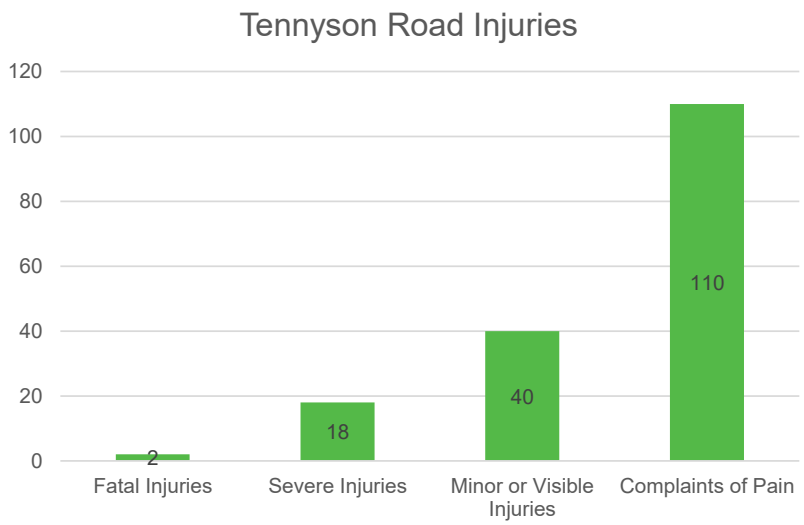
B Street Top Collision Causes



- The highest crash violation categories on **B Street** were unsafe speeds (8) followed by pedestrian ROW and traffic signals/signs (5 each).

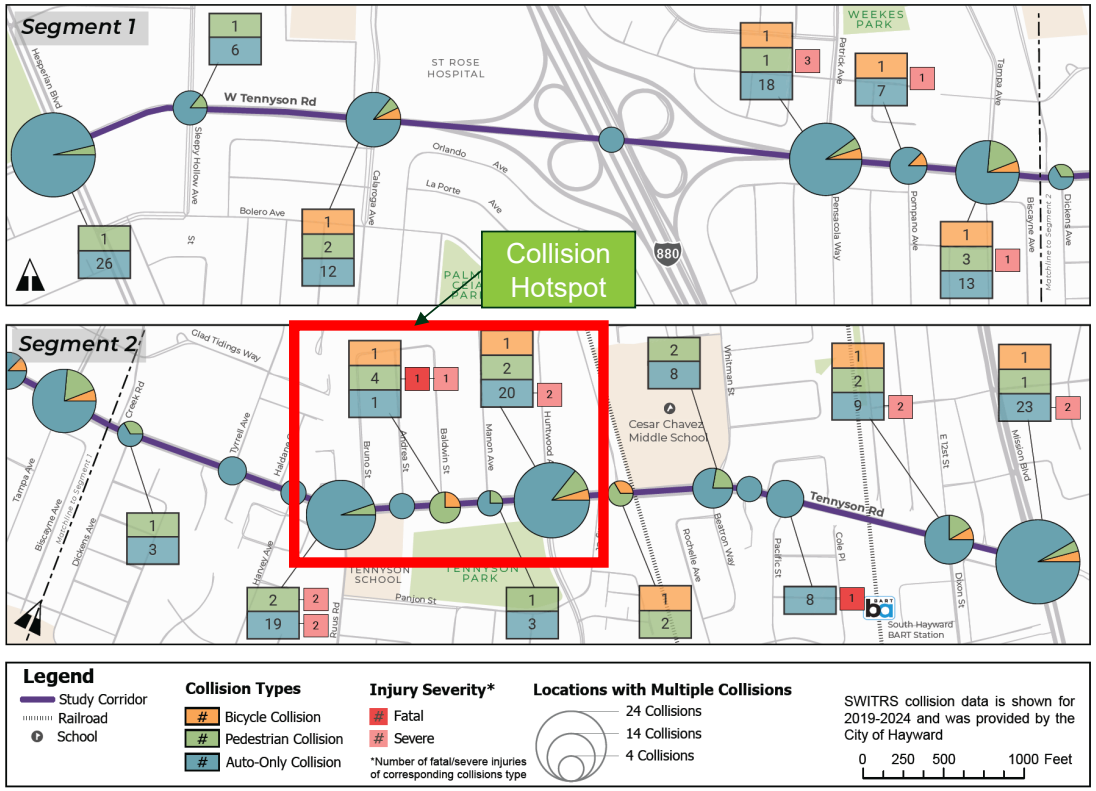
Tennyson Road Collision Analysis





HAYWARD Vision Zero

Tennyson Road Collision Analysis



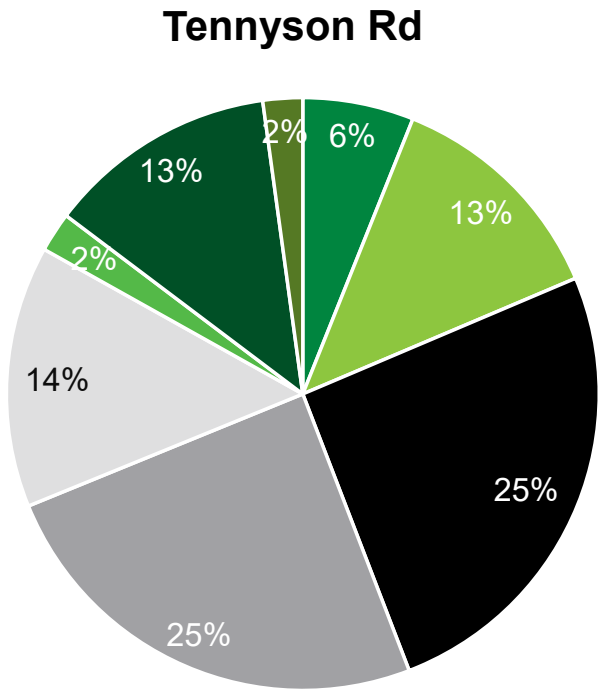
- The collision hotspot near the “downtown” area of **Tennyson Road** between Ruus Road and Huntwood Avenue (boxed in red to the left) had 56 crashes, over half of which occurred at night. This area also saw high levels of collisions involving unsafe speeds and alcohol/drug related driving.
- **Tennyson Road** consistently had between two and six severe or fatal collisions each year between 2019 and 2023. 2024 was the only year during the study period with fewer than two severe or fatal collisions.

Tennyson Road
Intersection Collisions by Type

Intersection	Head On	Sideswipe	Rear End	Broadside	Hit Object	Overturned	Vehicle/Pedestrian	Other	Total
Tennyson Rd and Hesperian Blvd		3	7	8	7	1	1		27
Tennyson Rd and Calaroga Ave			6	4	1	1	1	1	14
Tennyson Rd and I-880 Overpass								1	1
Tennyson Rd and Patrick Ave	1	2	11	5			1		20
Tennyson Rd and Pompano Ave		1	2	3	1		1		8
Tennyson Rd and Tampa Ave	1		5	5	1	1	4		17
Tennyson Rd and Dickens Ave		2					1		3
Tennyson Rd and Tyrell Ave		1	1	1	1			1	5
Tennyson Rd and Haldane Ct					1				1
Tennyson Rd and Harvey Ave		1	1						2
Tennyson Rd and Ruus Rd	1	2	5	3	6	1	1		19
Tennyson Rd and Andrea St				2					2
Tennyson Rd and Baldwin St	1						3		4
Tennyson Rd and Manon Ave				1					1
Tennyson Rd and Huntwood Ave	4	1	6	6	2		1	1	21
Tennyson Rd and Leidig Ct	1						2		3
Tennyson Rd and Beatron Way		3	2	1	1		2		9
Tennyson Rd and Pacific St		1	1	5	1				8
Tennyson Rd and E 12th St	1			6	2	1	1	1	12
Tennyson Rd and Mission Blvd	3	3	8	4	4		2		24
Total	**13**	**20**	**55**	**54**	**28**	**5**	**21**	**5**	**201**

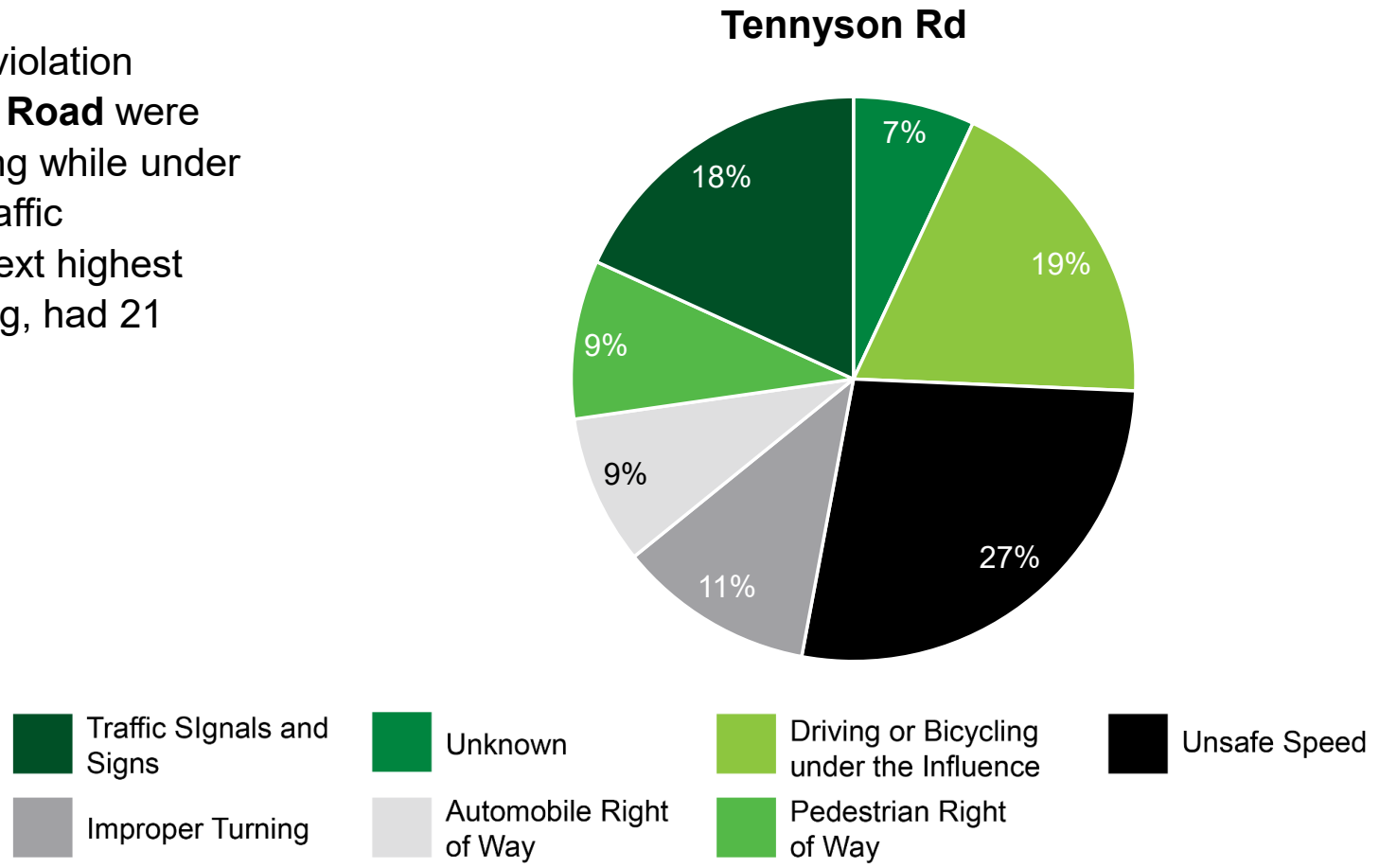
Tennyson Road Collision Types

- **Tennyson Road's** most frequent types of collision were broadside and rear end, followed by hit object, pedestrian and sideswipe collisions.
  - There were hit object collisions spaced throughout the corridor on **Tennyson Road;** however, hotspots with seven or more of these collisions were observed at Ruus Road and Hesperian Boulevard.



Tennyson Road Top Collision Causes

- The three highest crash violation categories on **Tennyson Road** were unsafe speeds (51) driving while under the influence (35), and traffic signs/signals (34). The next highest category, improper turning, had 21 crashes.



Advanced Data Analytics

Data Collection

- Conflict data by post-encroachment time (PET), modes involved, and movement type (including video recordings, and vehicle volumes)
- Red-light running counts
- Bicycle and pedestrian path of travel data
- All data was collected for one weekday and one weekend at 9 intersections across the study area
  - A Street and Hesperian Boulevard
  - A Street and Victory Drive
  - A Street and Western Boulevard/Grant Street
  - A Street and Montgomery Street
  - Tennyson Road and Calaroga Avenue
  - Tennyson Road and Ruus Road
  - Tennyson Road and Baldwin Street
  - Tennyson Road and Huntwood Avenue
  - Tennyson Road and 12th Street/Dixon Avenue
- Additional details broken down by intersection as well as an in-depth methodology are provided in **Appendix A**

Analysis Categories and Terms

- Analysis Categories
  - Vehicle-Vehicle Conflicts and Red-Light Running Analysis
  - Vulnerable Road User (VRU) Conflict Analysis
  - Video Observations
  - Bicycle and Pedestrian Path of Travel
- Terms
  - **Post Encroachment Time (PET)** is defined as the time between one road user crossing a certain point in space and the second road user crossing that same point. A lower PET indicates a higher risk.
  - **High Risk:** events with a PET less than 1.5 seconds
  - **Moderate Risk:** events with a PET between 1.5 and 3 seconds
    - Moderate risk events generally pose more significant threats to VRUs than to vehicles

Vehicle-Vehicle Conflict Findings

- No intersection was found to have more than one high-risk conflict between vehicles.
- Western Blvd/Grand St & A St was found to have the highest total number of vehicle-vehicle conflicts, which were primarily related to northbound left-turn movements.
- Additionally, as seen in the table to the right, Western Blvd/Grand St & A St had the highest rate of red-light running occurrences.

Red Light Runs per 1,000 Vehicles

Intersection	Weekday	Weekend
Average for all 8 signalized intersections	**1.95**	**2.15**
Hesperian Blvd and West A St	1.23	0.42
Victory Dr and West A St	3.29	4.37
Western Blvd/Grand St and A St	5.47	4.83
Montgomery Ave and A St	3.40	2.94
Calaroga Ave and Tennyson Rd	0.73	1.28
Ruus Rd and Tennyson Rd	1.03	0.86
Huntwood Ave and Tennyson Rd	0.94	1.22
E 12th Street/Dixon Street and Tennyson Road	0.91	2.84

VRU Conflict Findings

- Significantly higher pedestrian activity was observed than bicycle activity.
  - More conflicts between vehicles and pedestrians were observed, though there was often a higher conflict *rate* at intersections with bicyclists.
- VRU conflicts were predominantly from right turning vehicles
- Hesperian Blvd & West A St had the highest number of high-risk conflicts between bicyclists/pedestrians and vehicles.
  - Over the weekend period alone there were 13 high-risk pedestrian conflicts with vehicles.
- The intersection at Huntwood Avenue and Tennyson Road showed a broad distribution of vehicle-VRU conflicts for multiple movements in multiple legs of the intersection.
  - This intersection may consequently be a good candidate for a protected intersection.

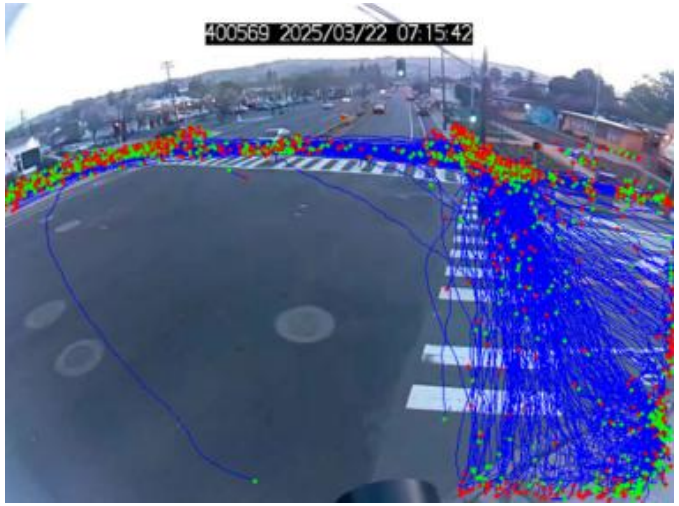
Conflicts per 100 Bikes/Pedestrians

Intersection	Weekday		Weekend	
	Pedestrian	Bicyclist	Pedestrian	Bicyclist
Hesperian Blvd and West A St	8.99	14.63	9.88	18.80
Victory Dr and West A St	3.44	1.85	1.60	6.12
Western Blvd/Grand St and A St	6.14	17.50	7.77	14.41
Montgomery Ave and A St	5.56	7.46	4.37	4.46
Calaroga Ave and Tennyson Rd	9.48	3.85	9.92	4.61
Ruus Rd and Tennyson Rd	7.43	7.05	10.87	5.71
Baldwin St and Tennyson Rd	4.71	4.50	2.95	7.28
Huntwood Ave and Tennyson Rd	6.09	8.46	5.41	9.80
E 12th Street/Dixon Street and Tennyson Road	10.63	15.85	4.73	4.7

Bike and Pedestrian Findings

- The bicycle and pedestrian path of travel analysis revealed that, at most intersections, pedestrians typically cross via the crosswalk while paths of travel of bicyclists were more varied.

Weekday bicycle path of travel at 12th/Dixon & Tennyson Road



Weekend pedestrian paths of travel, Ruus Rd & Tennyson Rd

Bike and Pedestrian Findings Cont.

- At some intersections bikers appear to be comfortable making left turns, whereas at other intersections there are relatively few observed left turns. One of such streets where few left turning movements were observed is the intersection at Hesperian Boulevard and A Street.

Weekday bicycle path of travel at 12th/Dixon & Tennyson Road

Weekday bicycle path of travel at Hesperian Blvd & West A St.

Appendix A – Advanced Data Analytics Analysis Methodology

To: Byron Tang, City of Hayward, CA

Adam Dankberg, Kimley-Horn

From: Kelly Dunn, Alta Planning + Design

Date: August 12, 2025

Re: Advanced Analytics Methodology and Findings (Task 2)

Introduction

This memo provides details on Alta's methodology and findings for Task 2: Advanced Analytics. This task involved accessing data from video analytics at nine intersections along two High Injury Network corridors: Tennyson Road and A Street/West A Street. The data detects behavior by pedestrians and bicyclists, collectively referred to as Vulnerable Road Users (VRUs), as well as motor vehicles.

Alta conducted the analysis using four types of data from video analytics:

- Conflicts between motor vehicles or motor vehicles and VRUs, including tabular summaries and raw video footage
- Red light running events by motor vehicles
- Path of travel diagrams for bikes and pedestrians
- Total counts of bikes, pedestrians, and vehicles through the intersection

This analysis was conducted at nine intersections:

- Hesperian Blvd and West A St
- Victory Dr and W A St
- Western Blvd and A St
- Montgomery Ave and A St
- Calaroga Ave and Tennyson Rd
- Ruus Rd and Tennyson Rd
- Baldwin St and Tennyson Rd[1]
- Huntwood Ave and Tennyson Rd
- 12th St/Dixon St and Tennyson Rd

Conflicts offer a different perspective on safety issues faced by drivers and VRUs. Alta's analysis details the occurrences of these conflicts by vehicle turning type, time of day, and more. While crash data can shed light on crashes that have already occurred, conflict data highlights potentially risky conditions that affect real and perceived safety for all road users, while video footage allows for a deeper understanding of driver behavior. Taking action

[1] Baldwin and Tennyson is an unsignalized intersection, so red light running data was not collected there.

based on these findings may help prevent crashes and improve perceived safety for future road users, though, as we will explain, the extent to which conflicts can be used to predict future crashes is unclear.

Methodology

Data Sources

Kimley-Horn provided Alta staff with raw data in Excel format from Quality Counts, a vendor supplying video analytics data from traffic cameras at intersections. The data contained the following data points for conflict events for both weekend and weekday observations at the nine intersections.[2] A conflict event is defined as any encounter between a vehicle and another vehicle or VRU with a Post Encroachment Time of three seconds or less. Post Encroachment Time (PET) is defined as the time between one road user crossing a certain point in space and the second road user crossing that same point. A lower PET indicates a higher risk. The raw data contained the following information:

Conflicts

- Counts of conflicts by Post-Encroachment Time (PET) and modes involved (vehicle-vehicle, vehicle-pedestrian, and vehicle-bike)
- Counts of all conflicts by movement type of each vehicle or vulnerable road user (such as northbound left or eastbound right)
- PET, time of day, pedestrian and vehicle movement type of each vehicle-pedestrian conflict occurrence
- PET, time of day, bicyclist, and vehicle movement type of each vehicle-bicyclist conflict occurrence
- PET, time of day, and vehicle movement type of each vehicle-vehicle conflict occurrence
- Links to videos of conflict occurrences
- Images of bicycle and pedestrian trajectories at each intersection

Volumes

- Count of vehicle, pedestrian, and bicycle volumes by movement and time of day in 5-minute increments
- Count of peak-hour volumes by mode and direction of travel or turning movement
- Red Light Counts
- Movement type, time of day, and seconds into red phase of red light running occurrences. Data was collected from a minimum of two cameras at each intersection in order to capture all approaches.

While the data that Alta obtained classified VRUs as either bicyclists or pedestrians, Alta noted that users of scooters and other micromobility were generally included among bicyclists.

[2] Each intersection was studied either on March 20 & 22, 2025, or April 3 & 5, 2025. Each pair of dates comprised a Thursday and a Saturday.

Data Cleaning

Alta applied the following steps to clean the data:

- Extracted every individual table from Excel and imported into R Studio for further analysis
- Removed red light running events where any special circumstances were noted, such as an ambulance or a traffic officer waving someone into the intersection.
- Categorized time stamps into time bins of night (midnight – 6 am), morning (6 – 10 am), midday (10 am – 3 pm), afternoon (3 – 7 pm), and evening (7 pm – midnight)
- Summarized data into formats that could be used to create tables and charts.

Assumptions

- Alta classified events with a PET of between 1.5 and 3 seconds as "moderate risk" and less than 1.5 seconds as "high risk." This was based on a review of a sample of videos provided by Quality Counts, with the threshold applied to both vehicle-VRU conflicts and vehicle-vehicle conflicts.
- In many vehicle-vehicle "moderate risk" events, a left-turning vehicle waited for a through vehicle to pass before turning left in a controlled manner less than three seconds later. Alta assumes that this is not a high-risk situation but kept the moderate risk data in the analysis because, in most cases, no or few high-risk conflicts occurred between vehicles.

Metrics Calculated

Alta calculated the following metrics for each of the nine intersections studied:

Vehicle-Vehicle Metrics

- **Total vehicles** is the total number of vehicles recorded passing through that intersection during the 24-hour study period for either the weekday or weekend day reported.
- **Total conflicts** is the total number of encounters between two vehicles with a PET of less than 3 seconds
- **Total red light running events** counts the number of events where a vehicle entered the intersection during the red-light phase (excluded at non-signalized intersections).
- **Total high-risk conflicts** is the total number of encounters between two vehicles with a PET of less than 1.5 seconds.
- **Conflicts per 1,000 vehicles** is the total conflicts divided by total vehicles, multiplied by 1,000.

Bicycle & Pedestrian Metrics

These metrics were calculated separately for bicyclists and pedestrians at each intersection:

- **Total counts** reports the total number of pedestrians or cyclists recorded at that intersection during the study period.
- **High-risk conflicts with vehicles** is the total number of encounters between a pedestrian or cyclist and a vehicle with a PET of less than 1.5 seconds.
- **Total conflicts with vehicles** is the total number of encounters between a pedestrian or cyclist and a vehicle with a PET of less than 3 seconds.
- **Conflicts per 100 bikes/pedestrians** is the total conflicts with vehicles divided by the total counts for that VRU mode, multiplied by 100. We used 100, rather than 1000, because the incidence rate involving VRUs was much higher than that involving only vehicles.

Findings

Overall Trends from the Data

Vehicle-Vehicle Conflicts

The vehicle-vehicle conflict analysis analyzed conflicts between two motor vehicles, shown in **Table 1**. The analysis found that no intersection had more than one high-risk conflict between vehicles on either a weekend or weekday. When comparing intersections, Western Boulevard/Grand Street & A Street had the highest total number of vehicle-vehicle conflicts, which were primarily concentrated in northbound left turn movements. Two intersections on Tennyson Road, Baldwin Street and Huntwood Ave, also saw much higher numbers of vehicle-vehicle conflicts than the other study intersections. Both of these intersections also had conflicts concentrated around left turn movements.

Table 1: Vehicle-vehicle conflicts by day type and by risk level

Intersection	Weekday	Weekend	Moderate Risk	High Risk
Hesperian Blvd and West A St	8	7	15	0
Victory Dr and West A St	0	1	1	0
Western Blvd/Grand St and A St	75	83	157	1
Montgomery Ave and A St	1	4	5	0
Calaroga Ave and Tennyson Rd	9	1	10	0
Ruus Rd and Tennyson Rd	3	4	6	1
Baldwin St and Tennyson Rd	17	24	40	1
Huntwood Ave and Tennyson Rd	56	44	99	11
E 12th St/Dixon St and Tennyson Rd	0	3	3	0

Red Light Running

Western Boulevard/Grand Street & A Street had the highest rate of red light running, with 5.47 runs per 1,000 vehicles during a weekday, and 4.83 on a weekend (**Table 2**). The second-highest rate was at Victory Drive & West A Street, with 3.29 runs per 1,000 vehicles during a weekday, and 4.37 on a weekend. As demonstrated here, some intersections had higher red light running rates on weekdays, while others had higher rates on weekends. The predominant time period for red light running at each intersection is also shown here as well as in the infographic.

Table 2. Red Light Runs per 1,000 Vehicles

Intersection	Total Events		Per 1,000 Vehicles		Predominant Time Period
	Weekday	Weekend	Weekday	Weekend	
All 9 intersections	484	477	1.95	2.15	Midday
Hesperian Blvd and West A St	55	16	1.23	0.42	Afternoon
Victory Dr and West A St	88	122	3.29	4.37	Midday
Western Blvd/Grand St and A St	156	123	5.47	4.83	Midday & Afternoon
Montgomery Ave and A St	72	55	3.40	2.94	Midday & Afternoon
Calaroga Ave and Tennyson Rd	29	39	0.73	1.28	Morning, Midday & Evening
Ruus Rd and Tennyson Rd	33	26	1.03	0.86	Midday & Evening
Huntwood Ave and Tennyson Rd	31	37	0.94	1.22	Evening
E 12th St/Dixon St and Tennyson Rd	20	59	0.91	2.84	Midday

Table 2 shows that intersections also differed in the time of day when red light running occurred most frequently (not adjusting for volumes). Along Tennyson Road, incidents occurred more in the evening (7 pm – midnight) and sometimes midday (10 am – 3 pm), whereas along West A Street they tended more toward the midday and afternoon (3 pm – 7 pm). Mornings (6 am – 10 am) were not the predominant time at any intersection, despite being one of the peak commute times. This suggests that exposure alone does not account for increases in red light running.

The infographic also shows red light runs by vehicle turning movement. Across the study area, most red light runs were by vehicles traveling straight through the intersection, and primarily along either Tennyson Road or West A Street rather than the cross-street. For example, at Calaroga Avenue & Tennyson Road, almost all red light runs were eastbound or westbound through traffic, traveling along Tennyson Road. There were two notable exceptions: At Huntwood Avenue and Tennyson Road there were several red light runs by left-turning vehicles turning northbound, eastbound, and southbound, and the number of straight red light runs was lower here than for many other intersections. Meanwhile, at Hesperian Boulevard & West A Street, there were about as many westbound left red light runs as there were southbound straight red light runs.

Vulnerable Road User Conflict Analysis

The Vulnerable Road User (VRU) conflict analysis analyzed all moderate and high-risk conflicts between a VRU and a motor vehicle. **Table 3** summarizes rates of all conflicts by mode and intersection, normalized by bicycle and pedestrian volume. Across intersections, there were significantly more pedestrians than bicyclists counted, and the total number of conflicts with vehicles was higher among pedestrians than bicyclists. However, due to lower volumes, there were often higher conflict *rates* among bicyclists than pedestrians. The highest rate of conflicts per volume for bicyclists was at Hesperian Boulevard & West A Street on weekends, with a rate of 18.8 conflicts per 100 bicycles. For pedestrians, it was a rate of 10.87 conflicts per 100 pedestrians at Tennyson Road & Russ Road. This intersection also had the highest numbers of conflicts when not normalizing for volumes.

Table 4 and **Table 5** summarize the pedestrian and bicycle conflicts by vehicle movement type across the nine intersections, combining the weekday and weekend counts. While conflicts with right-turning vehicles were the most common type overall, almost all conflicts at Baldwin Street & Tennyson Road were with vehicles going straight, partly because this is a 3-legged intersection with fewer turning movements. Left-turn conflicts were very prevalent at Huntwood Avenue & Tennyson Road. U-Turn and unknown turning movements have been excluded from these tables.

Table 3: All Conflicts per 100 Bikes/Pedestrians

Intersection	Weekday		Weekend	
	Pedestrian	Bicyclist	Pedestrian	Bicyclist
Hesperian Blvd and West A St	8.99	14.63	9.88	18.80
Victory Dr and West A St	3.44	1.85	1.60	6.12
Western Blvd/Grand St and A St	6.14	17.50	7.77	14.41
Montgomery Ave and A St	5.56	7.46	4.37	4.46
Calaroga Ave and Tennyson Rd	9.48	3.85	9.92	4.61
Ruus Rd and Tennyson Rd	7.43	7.05	10.87	5.71
Baldwin St and Tennyson Rd	4.71	4.50	2.95	7.28
Huntwood Ave and Tennyson Rd	6.09	8.46	5.41	9.80
E 12th St/Dixon St and Tennyson Rd	10.63	15.85	4.73	4.70

Table 4: All Pedestrian Conflicts by Vehicle Turning Movements (Both observed days)

Intersection	Vehicle Turning Movement												
	Northbound			Eastbound			Southbound			Westbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	**Total**
Hesperian Blvd and West A St	4	4	42	--	1	5	7	1	4	7	--	40	**115**
Victory Dr and West A St	1	--	10	--	11	1	--	--	--	3	4	1	**31**
Western Blvd/Grand St and A St	11	4	11	1	1	14	--	2	8	--	--	6	**58**
Montgomery Ave and A St	--	3	2	7	6	4	--	3	17	3	9	2	**56**
Calaroga Ave and Tennyson Rd	--	1	25	1	--	--	2	--	1	1	1	5	**37**
Ruus Rd and Tennyson Rd	1	--	25	--	17	32	--	--	--	5	16	--	**96**
Baldwin St and Tennyson Rd	--	--	--	2	37	--	2	--	--	--	36	3	**80**
Huntwood Ave and Tennyson Rd	19	2	14	17	6	4	5	1	20	5	7	1	**101**
E 12th St/Dixon St and Tennyson Rd	1	1	--	--	4	14	--	--	5	--	4	3	**32**
Total	**37**	**15**	**129**	**28**	**83**	**74**	**16**	**7**	**55**	**24**	**77**	**61**	**606**

Note: U-turns and unknown turning movements have been excluded from this table.

Table 5: All Bicycle Conflicts by Vehicle Turning Movements (Both observed days)

Intersection	Vehicle Turning Movement												
	Northbound			Eastbound			Southbound			Westbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
Hesperian Blvd and West A St	1	2	18	--	--	2	8	2	1	3	1	10	**48**
Victory Dr and West A St	1		1	--	2	1	--	--	--	2	--	--	**7**
Western Blvd/Grand St and A St	2	4	12	2	1	--	--	3	2	2	1	1	**18**
Montgomery Ave and A St	--	4	--	3	3	1		2	6	--	3	2	**24**
Calaroga Ave and Tennyson Rd	--	--	2	--	--	1	1	--	--	2	2	4	**12**
Ruus Rd and Tennyson Rd	5	--	6	--	4	9	--	--	--	--	2	--	**26**
Baldwin St and Tennyson Rd	--	--	1	11	--	--	--	--	--	--	19	3	**34**
Huntwood Ave and Tennyson Rd	9	2	5	3	4	8	4	1	17	1	3	7	**64**
E 12th St/Dixon St and Tennyson Rd	1	3	--	2	1	3	1	--		2	--	3	**16**
Total	**19**	**15**	**45**	**21**	**15**	**25**	**14**	**8**	**26**	**12**	**31**	**30**	**249**

Note: U-turns and unknown turning movements have been excluded from this table.

The infographics further break down these numbers by high-risk and total conflicts. The highest number of high-risk conflicts between bicyclists/pedestrians and vehicles again occurred at Hesperian Boulevard & West A Street. This includes 13 high-risk pedestrian conflicts with vehicles over the weekend alone, which is much higher than other intersections and higher than any weekday count. While at least part of this is attributable to higher volumes of pedestrians at this location, several other intersections had higher pedestrian volumes on weekends, but none had more than four high-risk conflicts. Some intersections such as E 12th Street/Dixon Street and Tennyson Road had stark differences between weekend and weekday rates, with higher rates on weekdays, while others such as Calaroga Avenue & Tennyson Road had little variation by day.

Observations from Videos

Alta reviewed a selection of video footage for different conflict types. Most moderate risk conflicts between vehicles, as noted above, only appeared to happen in a controlled manner where a left-turning vehicle turned before or after a through vehicle passed.

High risk conflicts were more complicated. At most intersections, the number of high-risk conflicts between vehicles and VRUs exceeded the number of high-risk conflicts between vehicles. In many cases, a vehicle turned just after a pedestrian crossed, leaving very little buffer in time or space. In other cases, a vehicle turned in front of a pedestrian, even causing the pedestrian to step back in fear of being hit. Several other cases involved pedestrians or cyclists appearing to enter the intersection against the signal.

The Alta team conducted in-depth video review for the two intersections with the highest VRU conflicts: Hesperian Boulevard & West A Street, and Huntwood Avenue & Tennyson Road.

Hesperian Blvd & West A St

Alta reviewed raw video footage for all high-risk VRU conflicts at this intersection on both the weekday and weekend counts, which included 18 pedestrian and 5 bicycle conflicts. The most common scenario (seven during the day, one at night), was a vehicle making a right turn that passed the conflict point just after a pedestrian in the crosswalk. This typically occurred with vehicles making a northbound right onto Hesperian Boulevard or a westbound right onto West A Street. These types of conflicts can feel intimidating to pedestrians even if the driver is in control because there is typically very little space between the pedestrian and vehicle, and the pedestrian often cannot verify that the driver sees them. A representative example of this conflict type can be seen at timestamp 0:18.

Another two conflicts with right-turning vehicles occurred with people on bikes rather than pedestrians. In one case, the person on the bike was crossing in the marked bicycle area and in the other, they were at the crosswalk.

Five conflicts occurred when a VRU appeared to be traveling against a signal, either pedestrians crossing without a signal (4) or a person on a (likely motorized) bicycle doing wheelies and running a red light (1). In these cases, vehicles passed both in front and behind the VRU and did not seem to regard the VRU's presence.

Huntwood Avenue & Tennyson Road

Alta also reviewed raw video footage for all high-risk VRU conflicts at Huntwood Avenue & Tennyson Road, which included six pedestrian and five bicycle conflicts. Situations at this intersection were much more varied. In three instances, a left turning vehicle passed the conflict point just after a pedestrian in the crosswalk. In these cases, the vehicle waited in the intersection for the pedestrian but left very little room between them. In other cases, turning traffic turned just before a pedestrian who was already in the crosswalk.

Several of the bike conflicts involved what appeared to be a cyclist traveling against the signal or misunderstanding how to use the bike lane. In one instance, a cyclist waiting in the bike lane on Huntwood Avenue crossed in front of through traffic on their left once the light turned green to make a westbound left turn onto Tennyson, which put them at risk of being hit by through traffic.

Other incidents appear to stem from the inevitable conflict between drivers with permitted left turns at the same time that a pedestrian or bicyclist has a crosswalk signal. In one near miss, a bicyclist entered the crosswalk while a vehicle was in the process of executing a left turn.

This intersection appeared much darker on camera at night than Hesperian Boulevard & West A Street, making it difficult at times to discern what was happening. If this is reflective of actual nighttime visibility here, interventions for greater visibility at this intersection should be considered at night.

Bicycle & Pedestrian Path of Travel

The bicycle and pedestrian path of travel analysis reviewed diagrams showing the actual paths of travel of VRUs through the intersections. **Figure 1** shows the bicycle path of travel at Hesperian Boulevard & West A Street, looking southeast, as traffic moves along Hesperian Boulevard. The blue lines represent trajectories between a starting point (green dot) and end point (red dot)[3]. The analysis revealed that at most intersections, pedestrians typically cross via the crosswalk, paths of travel of bicyclists were much more varied**.** The diagram shows that while some southbound bicyclists use the crosswalk or green bike lane, many also use the travel lane. This is possibly because there is no southbound bike facility south of the intersection. On the westbound route, however, more cyclists appear to be using the bike facilities because they can continue westbound in the bike lane past the intersection. More consistent infrastructure may lead to more consistent choices about which facility to use.

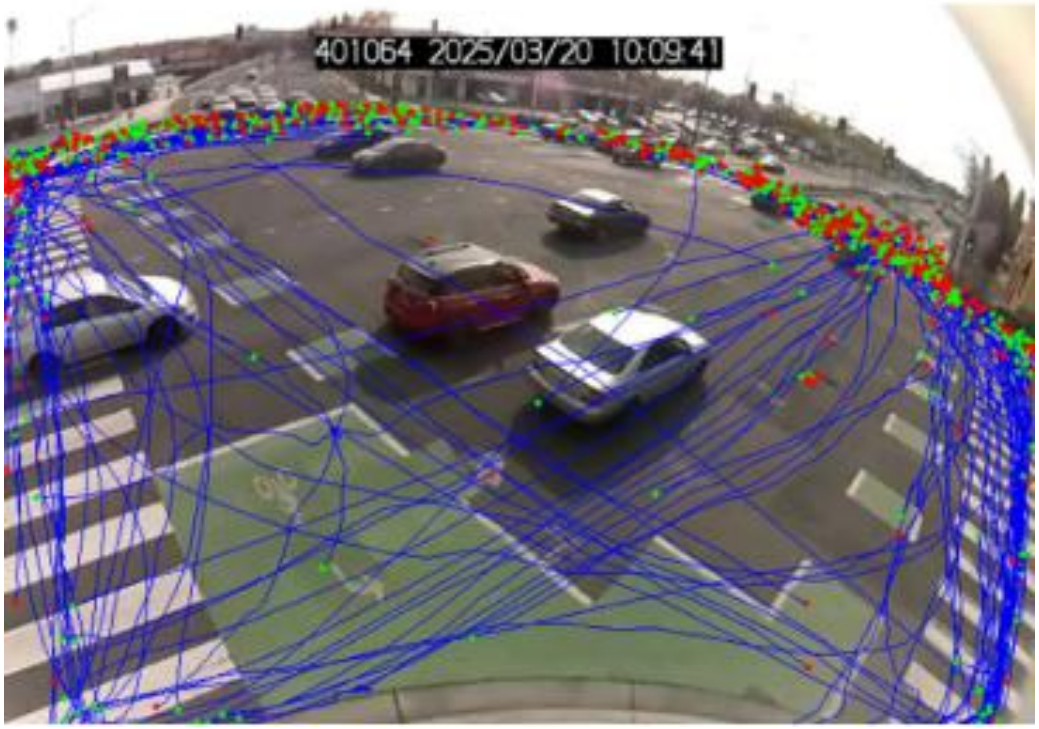


Figure 1: Weekday bicycle path of travel at Hesperian Blvd & West A St (looking southeast).

[3] As shown in the diagram, occasionally trajectories are mistakenly shown as starting or ending in the middle of the street or are too short to represent an actual path of travel. The data provider, QualityCounts, states that these are either false hits that got excluded from final data, or they represent trajectories that got interrupted and got reconnected before exporting final data.

In addition, a number of bicycle travel paths can be seen through the intersection that do not appear to be valid turning movements. These types of movements are less predictable for drivers and can contribute to conflicts as well.

Finally, it is notable that there do not appear to be many bicyclists at Hesperian Blvd & West A Street making left turns compared with 12th Street/Dixon Street & Tennyson Road, shown below in **Figure 2**. It could be that fewer people at Hesperian Boulevard & A Street desire to make left turns or that they prefer to cross via the crosswalk there because it does not feel safe to turn left in traffic.

Figure 2: Weekday bicycle path of travel at 12th/Dixon & Tennyson Road

For pedestrians, certain paths of travel were detected that would have placed a pedestrian in an unsafe position in the middle of the intersection, such as the weekend paths of travel at Ruus Road & Tennyson Road shown in **Figure 3.** While some of these may indicate a pedestrian cutting a corner or other unsafe behavior, others could have been misclassifications of bicyclists or scooter users making valid left turns.

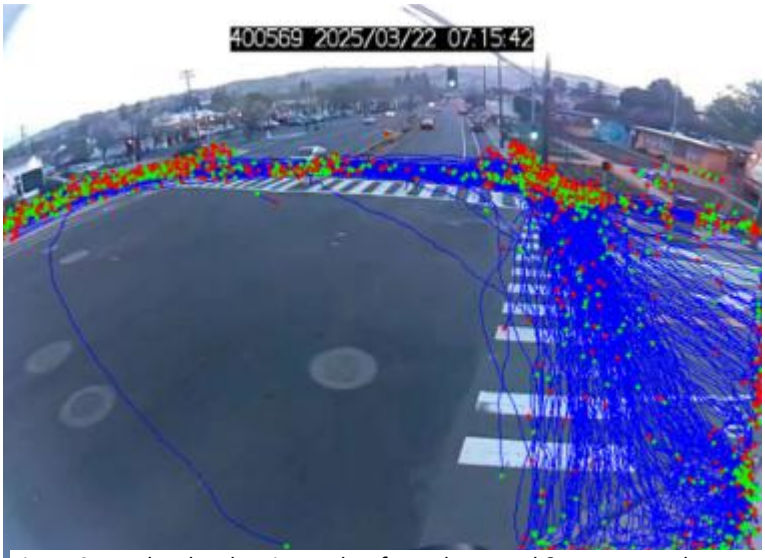


Figure 3: Weekend pedestrian paths of travel, Ruus Rd & Tennyson Rd

Limitations

The ability to automatically detect conflicts based on PET is a powerful tool to improve real and perceived safety. However, there are limitations when applying conflict data to improving safety in Hayward.

A study of conflicts in Reno, Nevada, acknowledged that PET alone does not reveal how a VRU would have perceived the risk to themselves during the event (Kelley et al., 2024). A VRU may feel completely safe and be taking a calculated risk to cross against a signal just after a vehicle has passed, for example. However, this could still indicate risk for a less-vigilant pedestrian. Conversely, events detected from traffic cameras may miss situations where a VRU feels at risk despite the event being over the PET threshold or situations where no actual conflict is detected, such as a close pass event. There are other factors that could impact how a VRU feels during an event, but that cannot be evaluated at scale using this data alone. These include:

- Whether the vehicle turned in front of or behind the VRU
- Whether the vehicle is waiting very close to the crosswalk or inching forward as they wait for the VRU
- The size of the vehicle
- Whether the VRU makes eye contact with the vehicle
- How close the vehicle is to the pedestrian while waiting for them to cross
- Vehicle speed before crossing the path of travel and whether they braked or not to avoid hitting the VRU

In addition, while conflicts indicate areas of concern for roadway users, there is limited evidence on how much they correlate with crash rates in Hayward because conflict data is not available for every intersection in the city, although previous research elsewhere has suggested a strong correlation (Kelley et al., 2024). Where conflicts do not correlate strongly with crash rates, it may indicate an intersection that VRUs avoid because it does not feel safe. Addressing perceived safety risks in these areas can encourage more biking and walking trips.

It is also unclear to what extent these events involve drivers disobeying the law. The California Driver Handbook, Section 7 says that drivers must reduce their speed or stop to allow the pedestrian to safely finish crossing, but does not specify if this means that a vehicle cannot enter an intersection at all while a pedestrian is crossing or how long they should wait (California DMV, n.d.). Even if such guidance existed, PET would not be a perfect measure of compliance. The data also does not indicate if a right-turning vehicle had a red or green light.

Finally, this data does not distinguish between instances where a VRU may have crossed the intersection against a signal. A review of a sample of videos revealed that while most VRUs appeared to be crossing with a signal, there were several conflict events where a pedestrian appeared to cross against the signal, as well as some instances where bicyclists or scooter users (who may have been detected as bicyclists here) ran red lights.

Conclusion

The advanced video analytics in this memo will supplement crash data, field observations, and public input in the development of countermeasures and concept designs for A Street, B Street, and Tennyson Road.

This supplemental analysis is critical to creating streets that are not only functionally safe, but also feel safe to all types of roadway users. Near-miss collisions can be a major cause of stress for people walking or biking along a street and can have a deterrent effect on people choosing to walk or bike in the future. Furthermore, documenting near-miss collisions and red-light running allows for predictive analysis of where serious and fatal collisions may be more likely to occur in the future due to high-risk behaviors.

Key takeaways from this analysis include:

- The majority of vehicle-VRU conflicts were from drivers making right-turning movements in conflict with a crosswalk user. This could be mitigated by "No-Right-on-Red" designations at intersections or the introduction of Leading Pedestrian Intervals (LPIs) at signals.
- Some intersections also showed high numbers of vehicle-VRU conflicts where drivers were making left turns. This could be mitigated by eliminating permissive lefts during signal phases and installing dedicated left turn signal phases separate from crosswalk walk phases. Hesperian Blvd at A Street, Western/Grand at A Street, and Huntwood Avenue at Tennyson Road all showed higher counts of vehicle-VRU left turn conflicts.
- Huntwood Avenue at Tennyson Road was the one intersection that showed a broad distribution of vehicle-VRU conflicts for multiple vehicle movements in multiple legs of the intersection. A protected intersection should be considered for this intersection, creating greater separation between vehicles and VRUs at the intersection and improving sight-lines and visibility for people walking or biking.
- Intersections varied substantially in red light running, even when normalized for volumes. Western Blvd/Grand Street at A Street led with 5.5 red light running incidents per 1,000 vehicles. Risks from red-light running could be mitigated by the introduction of all-way red phases at intersections and/or exploring automated red-light running enforcement.
- Baldwin Street at Tennyson Road, the one unsignalized intersection, showed a high count of vehicle-VRU conflicts for through movements – drivers failing to yield to bicyclists or pedestrians at the crosswalk. Additional measures should be considered for this unsignalized crossing to improve VRU visibility and encourage yielding by drivers.
- Path of travel analysis showed a high percentage of bicyclists using the sidewalk, which may contribute to higher rates of VRU-vehicle conflicts at intersections in the project area. The implementation of more robust and separated bike network infrastructure may help encourage people riding bicycles to not use the sidewalk and become more visible and expected for drivers at intersections. Raised cycle paths may also be worth exploring.
- On Western/Grand and A Street and other intersections along A Street/West A Street, the most red light runs occurred in the midday and afternoon. Along Tennyson Road, the most red light runs occurred in the midday and evening.
- Hesperian Blvd & West A Street had both the highest rate and the highest number of VRU-vehicle conflicts, both moderate and high risk. Rates were highest on the weekend.
- There was not a clear trend as to what day of the week most VRU-vehicle conflicts occurred. At some, conflicts were higher on weekdays and at others there was little difference.
- Research on pedestrian safety at night suggests that while lighting is a necessary factor, lighting alone is not sufficient to improve safety (Sanders, 2023). To be effective, lighting should provide high contrast and illuminate the front of a person crossing, not the side or back. Other important strategies to pair with lighting include lower speeds to decrease stopping distance.

References

California Department of Motor Vehicles (DMV). (n.d.). *Laws and rules of the road: Right-of-way*. California Driver Handbook. https://www.dmv.ca.gov/portal/handbook/california-driver-handbook/laws-and-rules-of-the-road/#rightofway

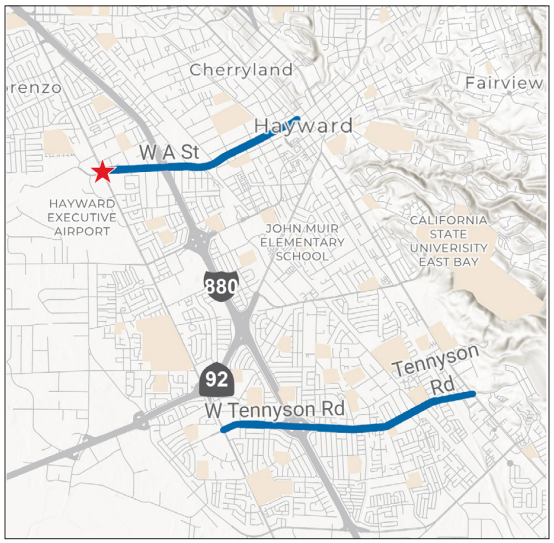
Kelley, S., Peiffer, C., Guan, F., Xu, H., Okorocha, J., Dunn, K., & Cardillo, C. (2024). *A geographic assessment of near-miss events involving vehicles and vulnerable road users in Reno and Sparks, Nevada* (Unpublished manuscript). University of Nevada, Reno.

Sanders, R. (2023, June 28). *NCHRP 17-97: Strategies to Improve Safety at Night.* Presentation at TRB Safety Performance Mid-Year Meeting. Available at https://trbacs20.org/wp-content/uploads/2023/06/2023MidyearWed_07_Sanders_NCHRP17-97_Update_Sanders_20230626.pdf.

Appendix B – Advanced Data Analytics Analysis Sheets

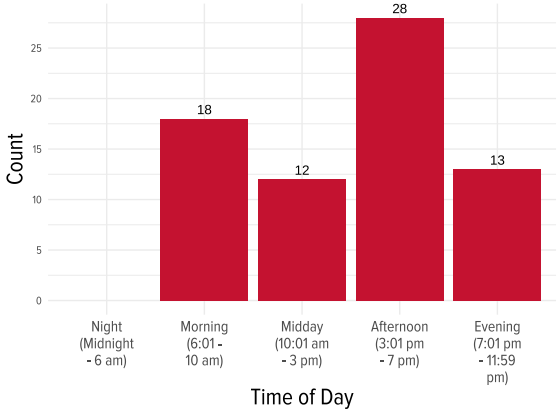
Hesperian Blvd & West A St

VEHICLE-VEHICLE CONFLICT ANALYSIS / MARCH 20 & 22, 2025

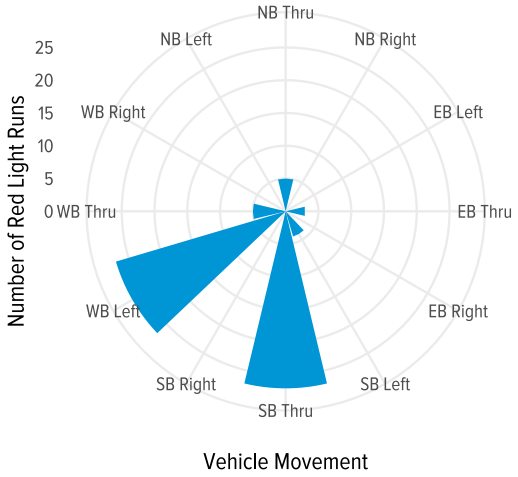


RED LIGHT RUNS (ALL DAYS)

By Time of Day



By Vehicle Movement



Indicators	Weekday	Weekend
Total Vehicles	44,594	37,969
Total Conflicts	8	7
High Risk Conflicts	0	0
Conflicts per 1,000 vehicles	0.18	0.18
Total Red Light Running Events	55	16
Red Light Runs per 1,000 Vehicles	1.23	0.42

Of the eight signalized intersections studied, the average red light running rate was 1.95 events per 1,000 vehicles on weekdays and 2.15 events per 1,000 vehicles on weekends.

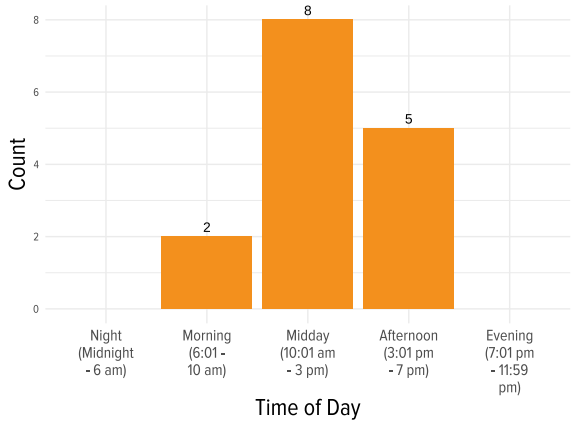
Notes

1. A high-risk conflict is any situation with a post-encroachment time (PET) < 1.5 seconds, with PET representing the gap between the first road user passing the conflict point and the second crossing the same point.

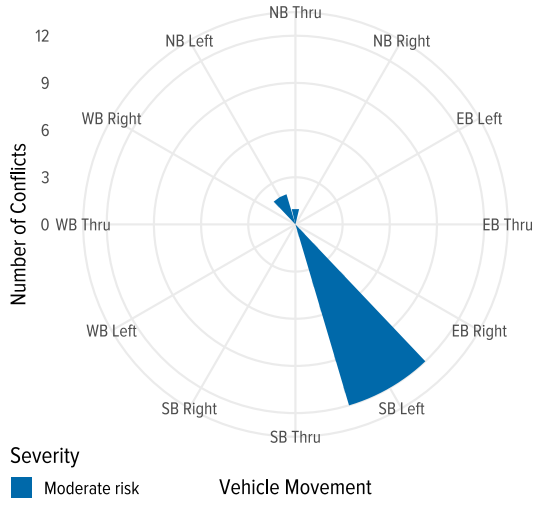
2. Some redlight running events had notes indicating that the event occurred but it was done because someone was waved into the intersection, or it was an emergency vehicle. These records were excluded from analysis.

VEHICLE CONFLICTS (ALL DAYS)

By Time of Day



By First Vehicle Movement



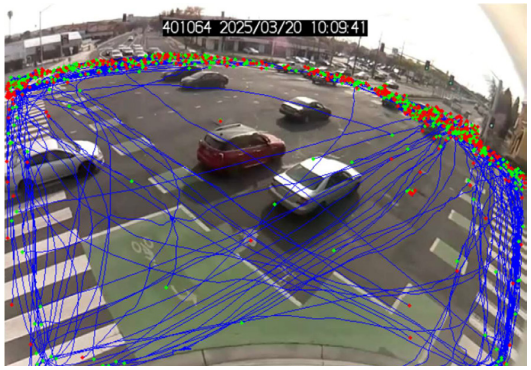
Hesperian Blvd & West A St

BICYCLE & PEDESTRIAN CONFLICT ANALYSIS / MARCH 20 & 22, 2025

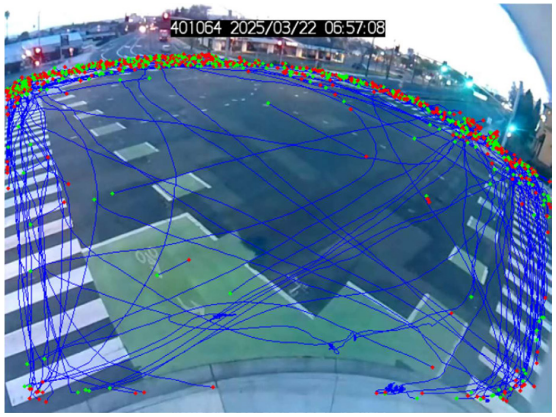
LOOKING SOUTHEAST

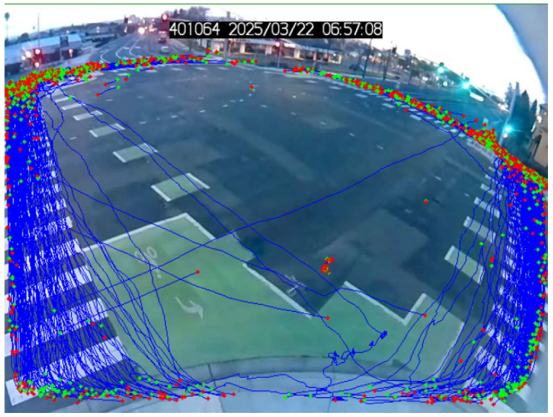
BIKE **PED**

WEEKDAY



WEEKEND





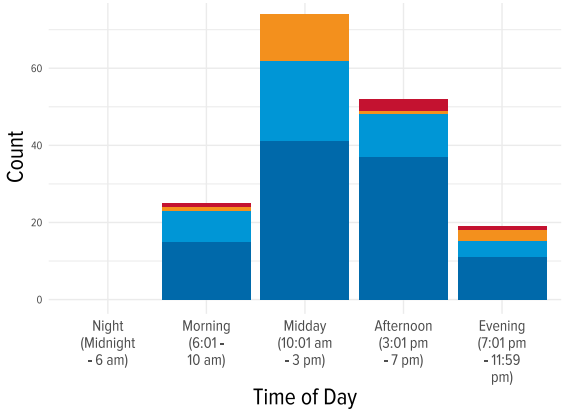
Indicators	Weekday		Weekend	
	Pedestrian	Bicyclist	Pedestrian	Bicyclist
Total Counts	601	164	678	133
High Risk Conflicts with Vehicles	4	3	13	2
Total Conflicts with Vehicles	54	24	67	25
Conflicts per 100 Bikes/Pedestrians	8.99	14.63	9.88	18.80

Notes:
A high-risk conflict is any situation with a post-encroachment time (PET) < 1.5 seconds, with PET representing the gap between the first road user passing the conflict point and the second crossing the same point.

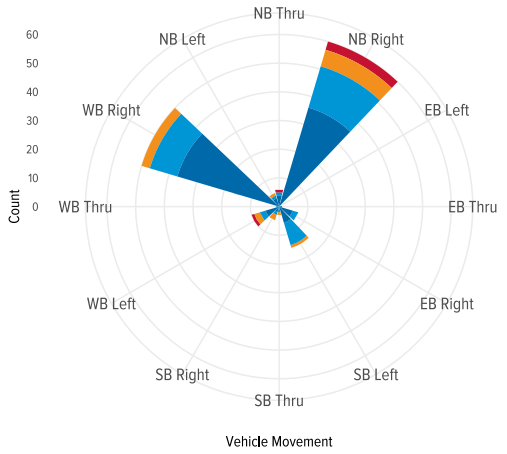
High Risk – Bicycle
High Risk – Pedestrian
Moderate Risk – Bicycle
Moderate Risk – Pedestrian

BIKE/PED CONFLICTS (ALL DAYS)

By Time of Day

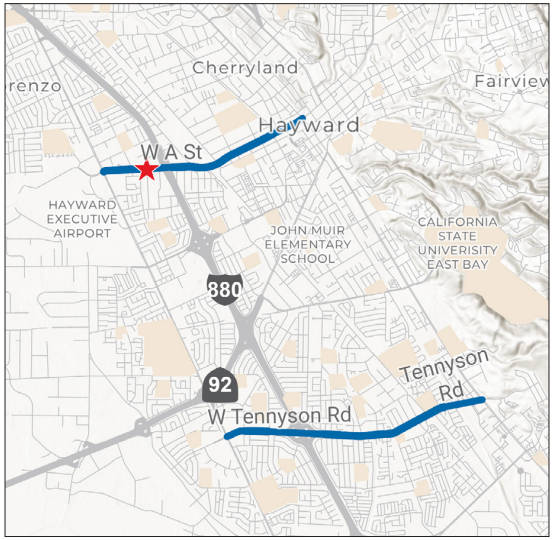


By First Vehicle Movement



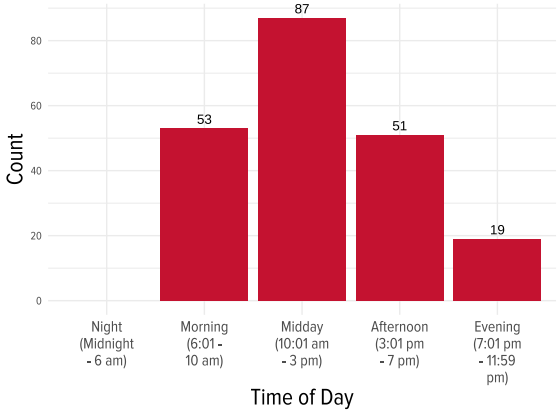
Victory Dr & W A St

VEHICLE-VEHICLE CONFLICT ANALYSIS / APRIL 3 & 5, 2025

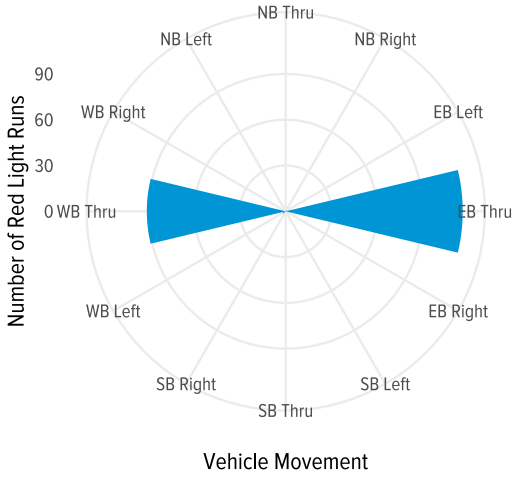


RED LIGHT RUNS (ALL DAYS)

By Time of Day



By Vehicle Movement



Indicators	Weekday	Weekend
Total Vehicles	26,728	27,943
Total Conflicts	0	1
High Risk Conflicts	0	0
Conflicts per 1,000 vehicles	0	0.04
Total Red Light Running Events	88	122
Red Light Runs per 1,000 Vehicles	3.29	4.37

Of the eight signalized intersections studied, the average red light running rate was 1.95 events per 1,000 vehicles on weekdays and 2.15 events per 1,000 vehicles on weekends.

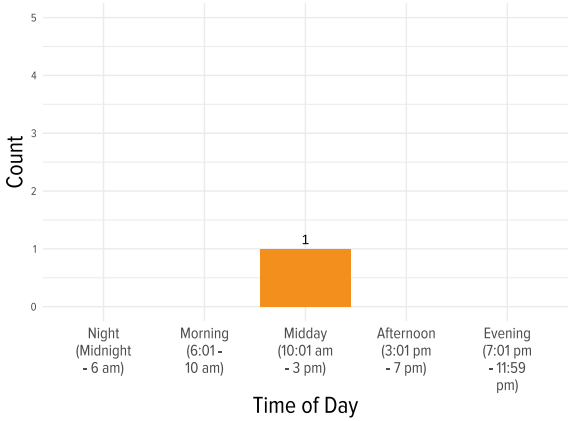
Notes

1. A high-risk conflict is any situation with a post-encroachment time (PET) < 1.5 seconds, with PET representing the gap between the first road user passing the conflict point and the second crossing the same point.

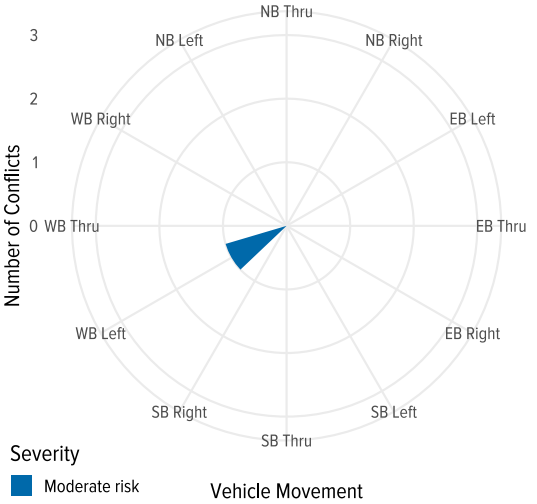
2. Some redlight running events had notes indicating that the event occurred but it was done because someone was waved into the intersection, or it was an emergency vehicle. These records were excluded from analysis.

VEHICLE CONFLICTS (ALL DAYS)

By Time of Day



By First Vehicle Movement



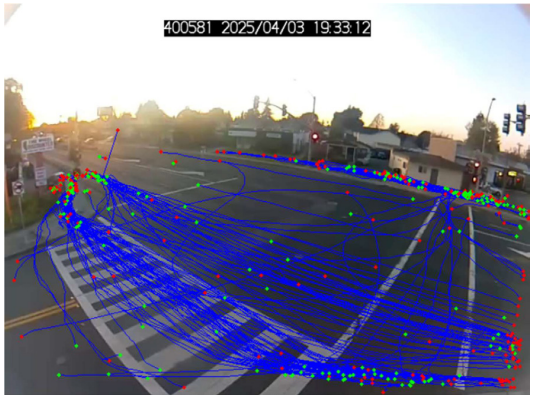
Victory Dr & W A St

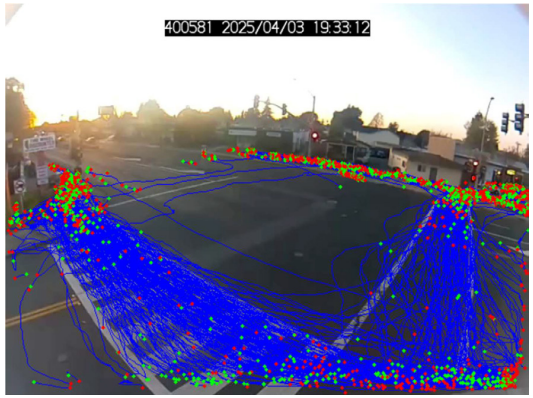
BICYCLE & PEDESTRIAN CONFLICT ANALYSIS / APRIL 3 & 5, 2025

LOOKING NORTHWEST

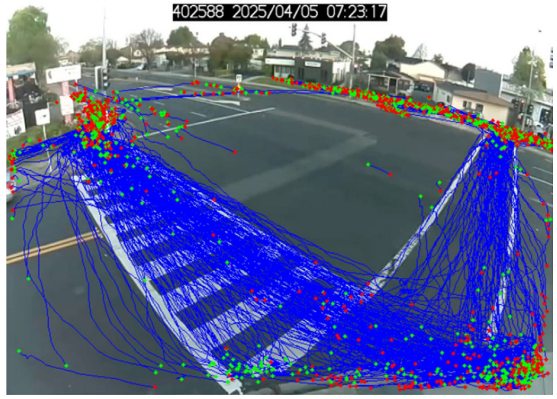
BIKE **PED**

WEEKDAY





WEEKEND



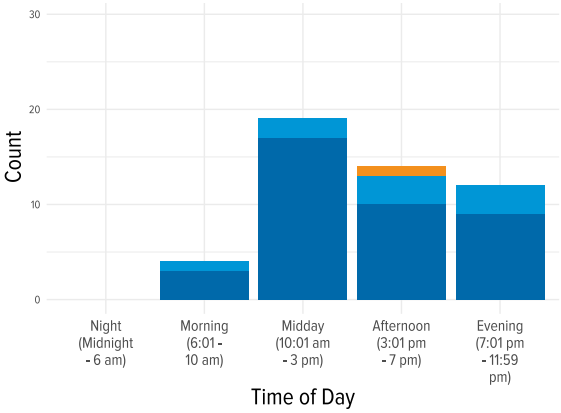
Indicators	Weekday		Weekend	
	Pedestrian	Bicyclist	Pedestrian	Bicyclist
Total Counts	523	182	1,371	98
High Risk Conflicts with Vehicles	0	0	1	0
Total Conflicts with Vehicles	18	3	22	6
Conflicts per 100 Bikes/Pedestrians	3.44	1.85	1.60	6.12

Notes:
A high-risk conflict is any situation with a post-encroachment time (PET) < 1.5 seconds, with PET representing the gap between the first road user passing the conflict point and the second crossing the same point.

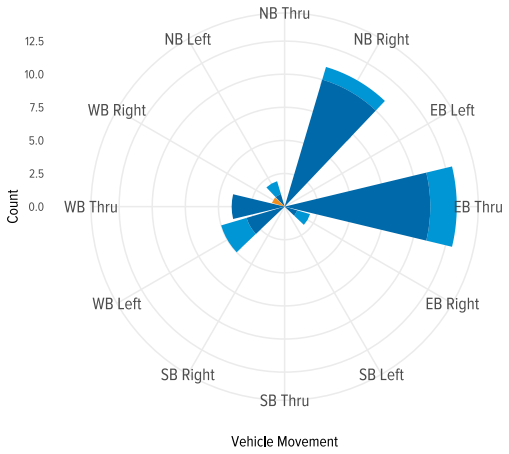
High Risk – Bicycle
High Risk – Pedestrian
Moderate Risk – Bicycle
Moderate Risk – Pedestrian

BIKE/PED CONFLICTS (ALL DAYS)

By Time of Day

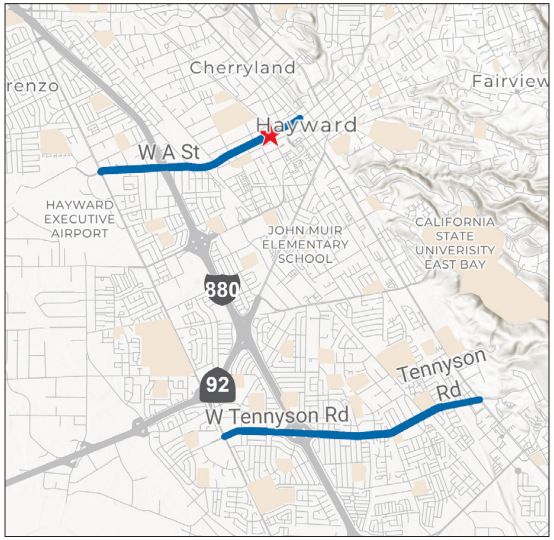


By First Vehicle Movement



Western Blvd/Grand St & A St

VEHICLE-VEHICLE CONFLICT ANALYSIS / APRIL 3 & 5, 2025



Indicators	Weekday	Weekend
Total Vehicles	28,538	25,467
Total Conflicts	75	83
High Risk Conflicts	1	0
Conflicts per 1,000 vehicles	2.63	3.26
Total Red Light Running Events	156	123
Red Light Runs per 1,000 Vehicles	5.47	4.83

Of the eight signalized intersections studied, the average red light running rate was 1.95 events per 1,000 vehicles on weekdays and 2.15 events per 1,000 vehicles on weekends.

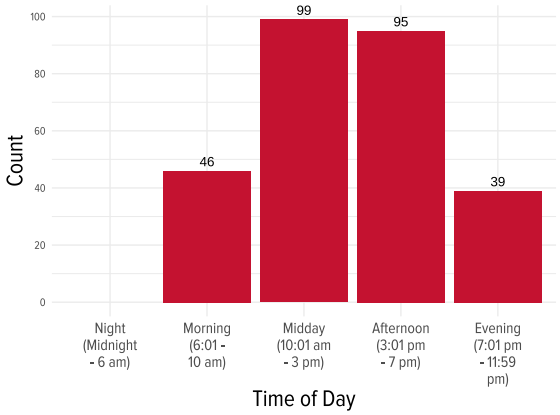
Notes

1. A high-risk conflict is any situation with a post-encroachment time (PET) < 1.5 seconds, with PET representing the gap between the first road user passing the conflict point and the second crossing the same point.

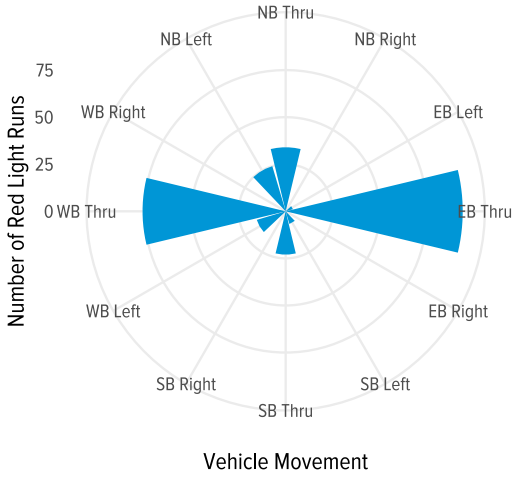
2. Some redlight running events had notes indicating that the event occurred but it was done because someone was waved into the intersection, or it was an emergency vehicle. These records were excluded from analysis.

RED LIGHT RUNS (ALL DAYS)

By Time of Day

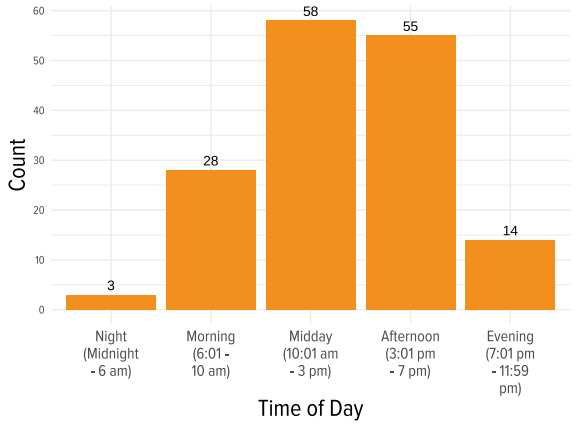


By Vehicle Movement

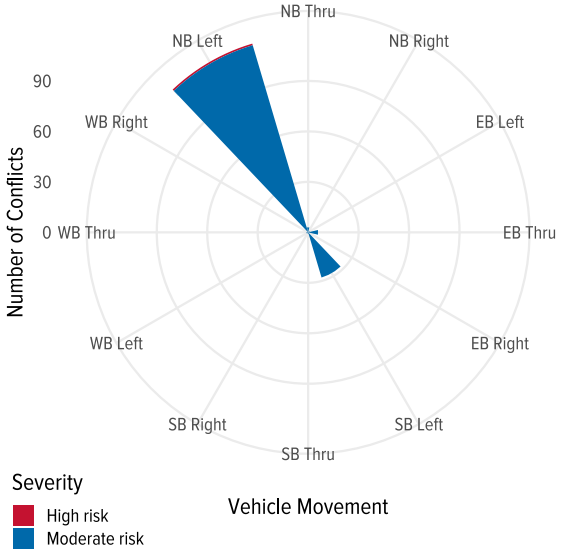


VEHICLE CONFLICTS (ALL DAYS)

By Time of Day



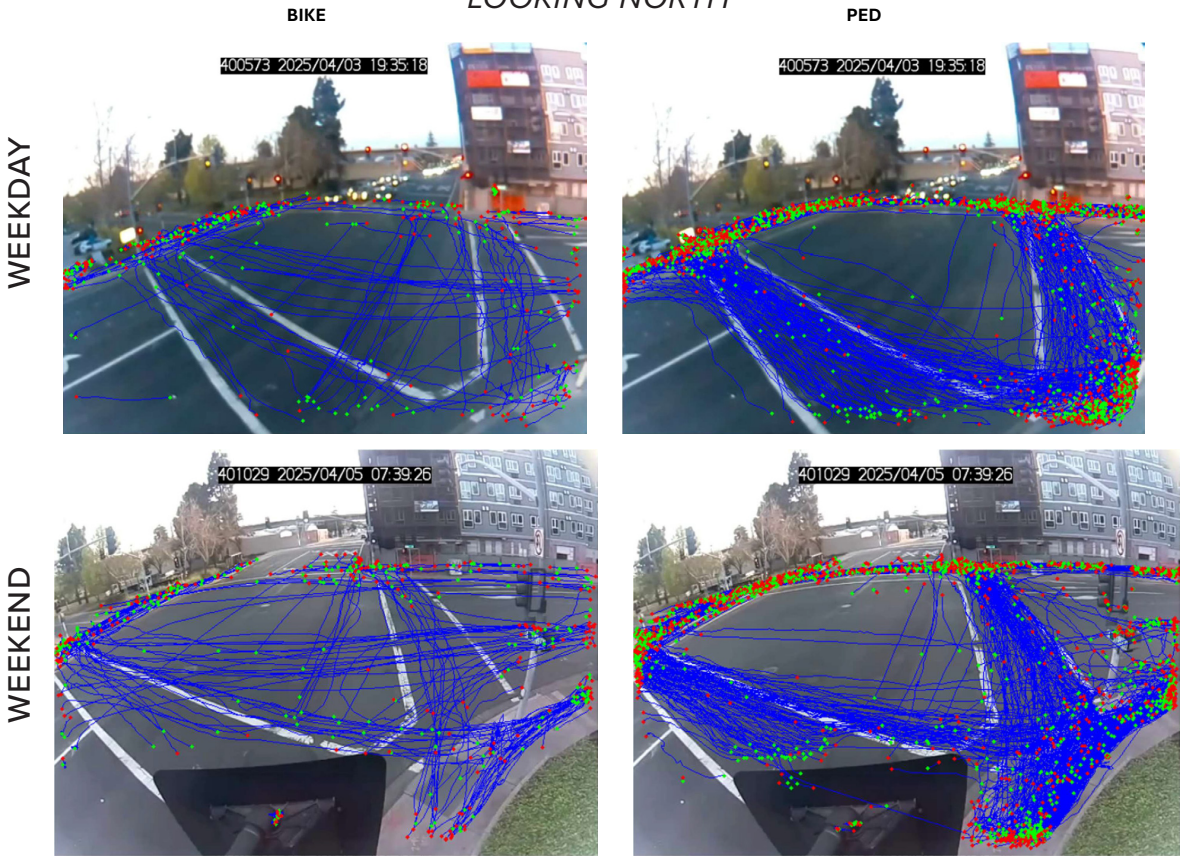
By First Vehicle Movement



Western Blvd/Grand St & A St

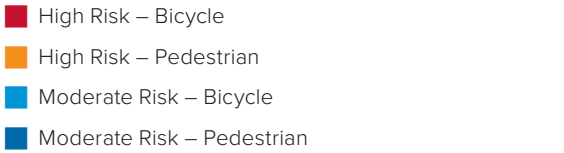
BICYCLE & PEDESTRIAN CONFLICT ANALYSIS / APRIL 3 & 5, 2025

LOOKING NORTH



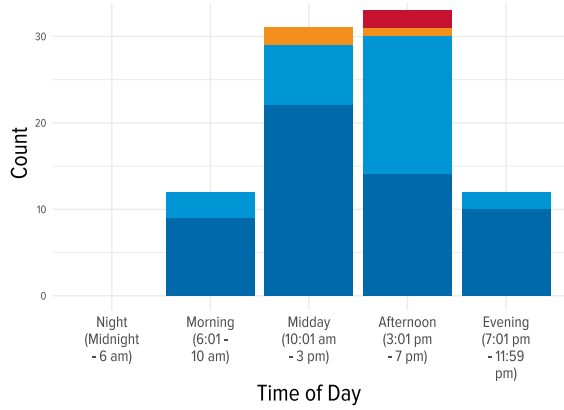
Indicators	Weekday		Weekend	
	Pedestrian	Bicyclist	Pedestrian	Bicyclist
Total Counts	456	80	386	111
High Risk Conflicts with Vehicles	1	1	2	1
Total Conflicts with Vehicles	28	14	30	16
Conflicts per 100 Bikes/Pedestrians	6.14	17.50	7.77	14.41

Notes:
A high-risk conflict is any situation with a post-encroachment time (PET) < 1.5 seconds, with PET representing the gap between the first road user passing the conflict point and the second crossing the same point.

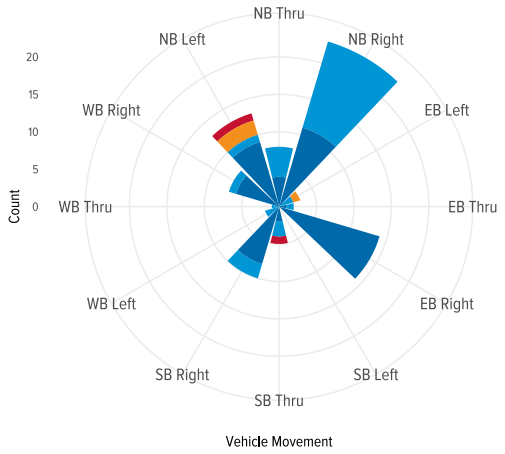


BIKE/PED CONFLICTS (ALL DAYS)

By Time of Day

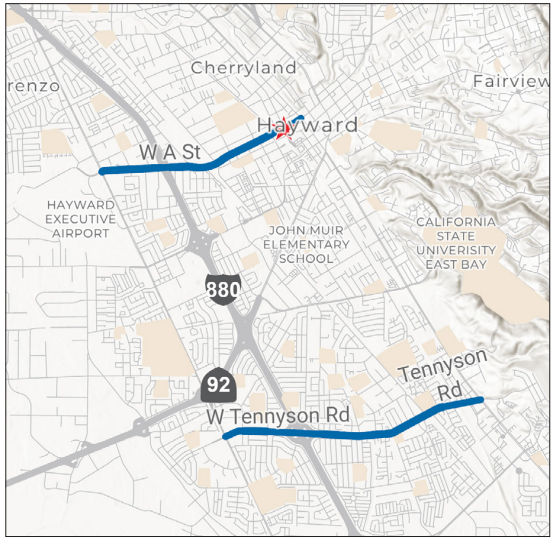


By First Vehicle Movement



Montgomery Ave & A St

VEHICLE-VEHICLE CONFLICT ANALYSIS / MARCH 20 & 22, 2025



Indicators	Weekday	Weekend
Total Vehicles	21,160	18,686
Total Conflicts	1	4
High Risk Conflicts	0	0
Conflicts per 1,000 vehicles	0.05	0.21
Total Red Light Running Events	72	55
Red Light Runs per 1,000 Vehicles	3.40	2.94

Of the eight signalized intersections studied, the average red light running rate was 1.95 events per 1,000 vehicles on weekdays and 2.15 events per 1,000 vehicles on weekends.

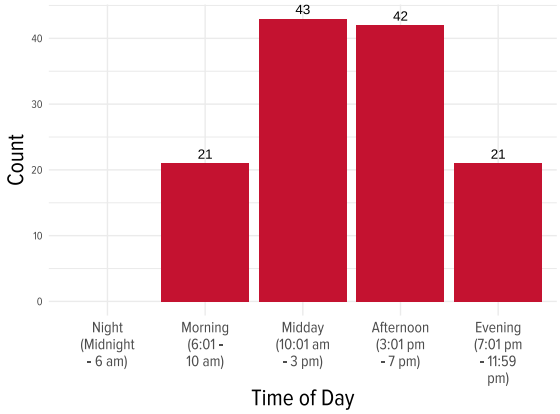
Notes

1. A high-risk conflict is any situation with a post-encroachment time (PET) < 1.5 seconds, with PET representing the gap between the first road user passing the conflict point and the second crossing the same point.

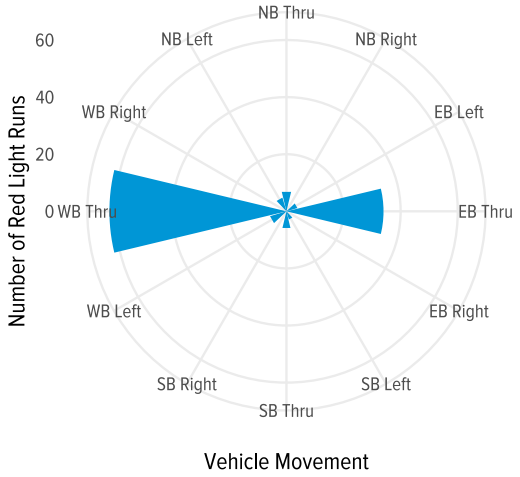
2. Some redlight running events had notes indicating that the event occurred but it was done because someone was waved into the intersection, or it was an emergency vehicle. These records were excluded from analysis.

RED LIGHT RUNS (ALL DAYS)

By Time of Day

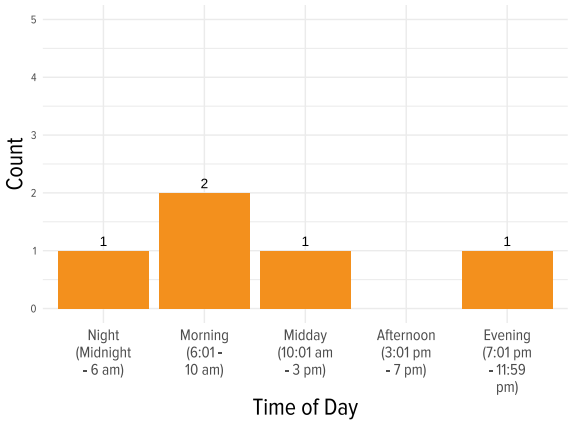


By Vehicle Movement

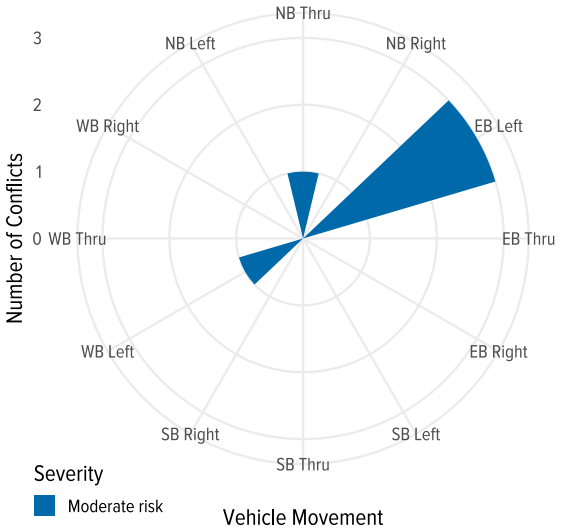


VEHICLE CONFLICTS (ALL DAYS)

By Time of Day



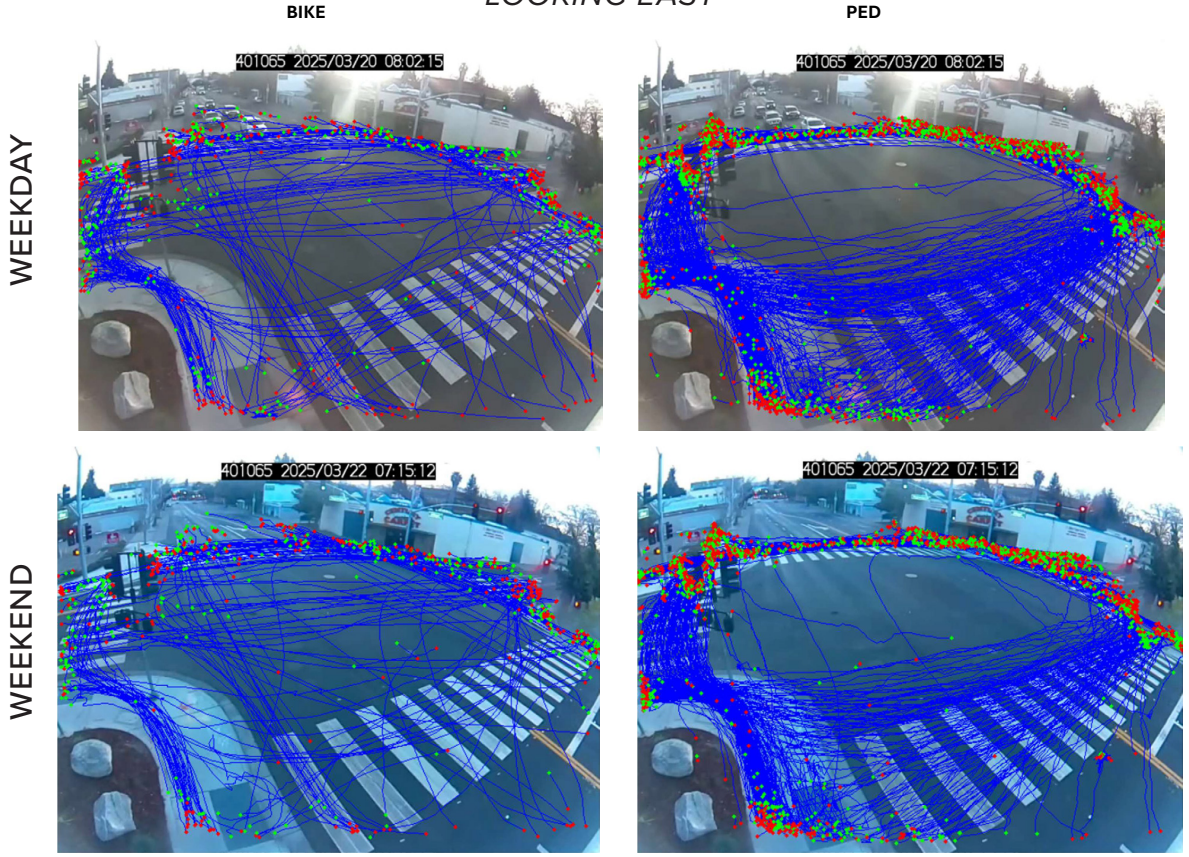
By First Vehicle Movement



Montgomery Ave & A St

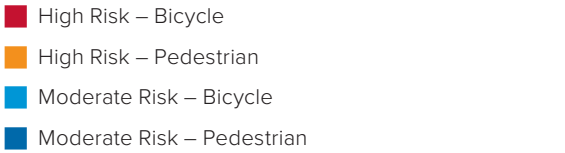
BICYCLE & PEDESTRIAN CONFLICT ANALYSIS / MARCH 20 & 22, 2025

LOOKING EAST



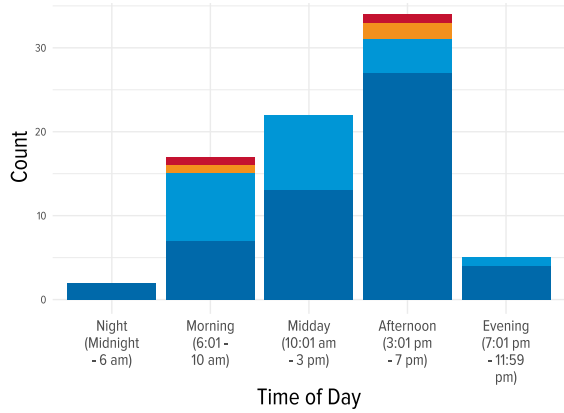
Indicators	Weekday		Weekend	
	Pedestrian	Bicyclist	Pedestrian	Bicyclist
Total Counts	630	201	481	202
High Risk Conflicts with Vehicles	1	0	2	2
Total Conflicts with Vehicles	35	15	21	9
Conflicts per 100 Bikes/Pedestrians	5.56	7.46	4.37	4.46

Notes:
A high-risk conflict is any situation with a post-encroachment time (PET) < 1.5 seconds, with PET representing the gap between the first road user passing the conflict point and the second crossing the same point.

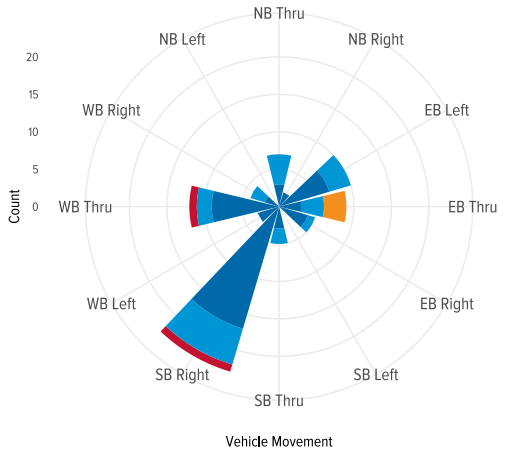


BIKE/PED CONFLICTS (ALL DAYS)

By Time of Day

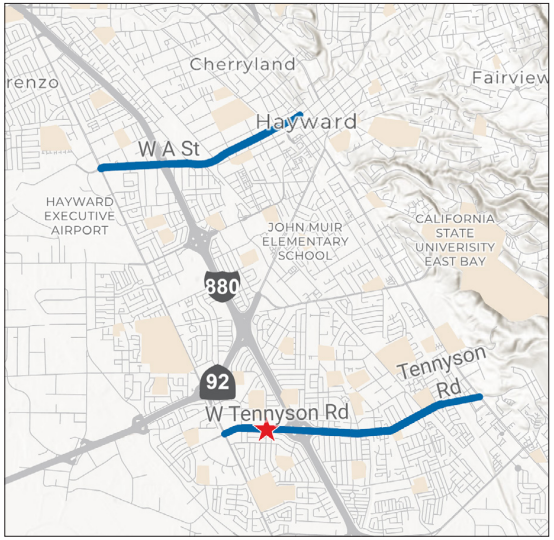


By First Vehicle Movement



Calaroga Ave & Tennyson Rd

VEHICLE-VEHICLE CONFLICT ANALYSIS / MARCH 20 & 22, 2025



Indicators	Weekday	Weekend
Total Vehicles	39,623	30,412
Total Conflicts	9	1
High Risk Conflicts	0	0
Conflicts per 1,000 vehicles	0.23	0.03
Total Red Light Running Events	29	39
Red Light Runs per 1,000 Vehicles	0.73	1.28

Of the eight signalized intersections studied, the average red light running rate was 1.95 events per 1,000 vehicles on weekdays and 2.15 events per 1,000 vehicles on weekends.

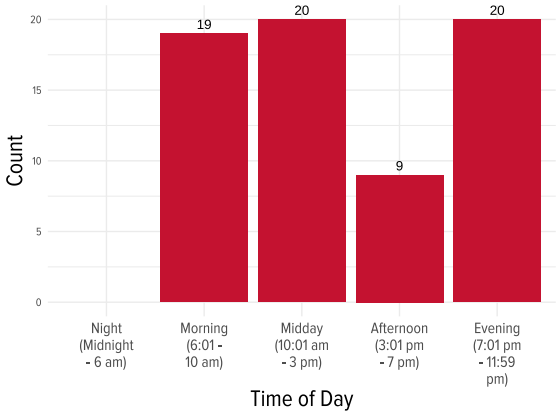
Notes

1. A high-risk conflict is any situation with a post-encroachment time (PET) < 1.5 seconds, with PET representing the gap between the first road user passing the conflict point and the second crossing the same point.

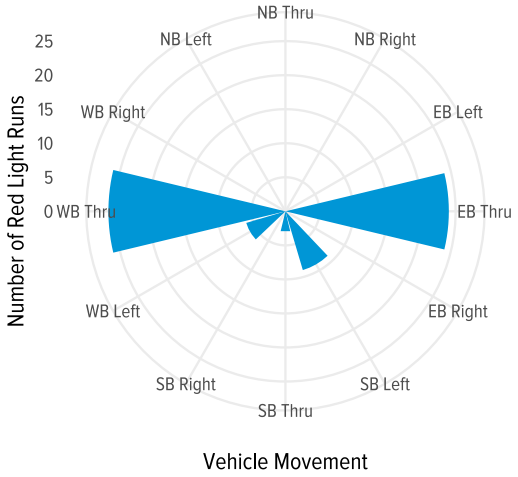
2. Some redlight running events had notes indicating that the event occurred but it was done because someone was waved into the intersection, or it was an emergency vehicle. These records were excluded from analysis.

RED LIGHT RUNS (ALL DAYS)

By Time of Day

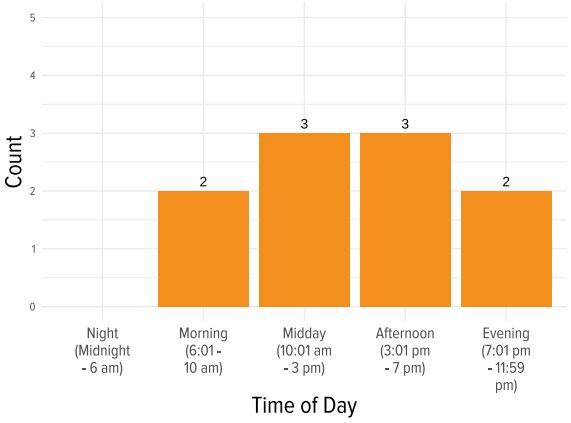


By Vehicle Movement

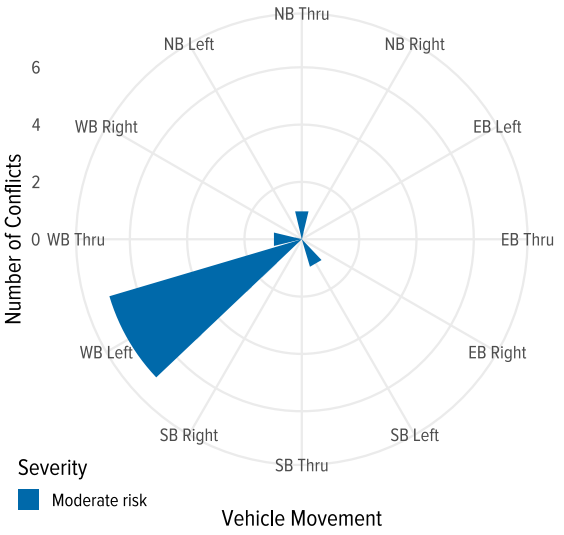


VEHICLE CONFLICTS (ALL DAYS)

By Time of Day



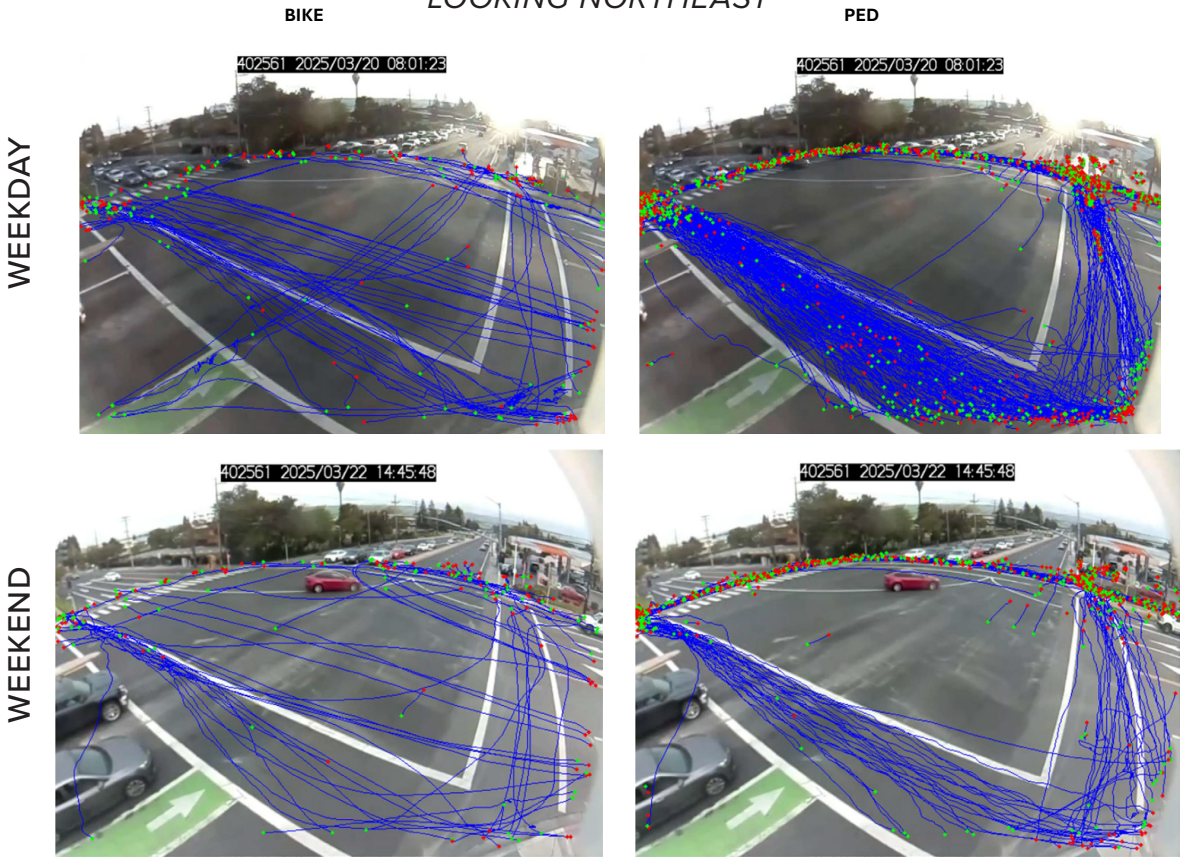
By First Vehicle Movement



Calaroga Ave & Tennyson Rd

BICYCLE & PEDESTRIAN CONFLICT ANALYSIS / MARCH 20 & 22, 2025

LOOKING NORTHEAST



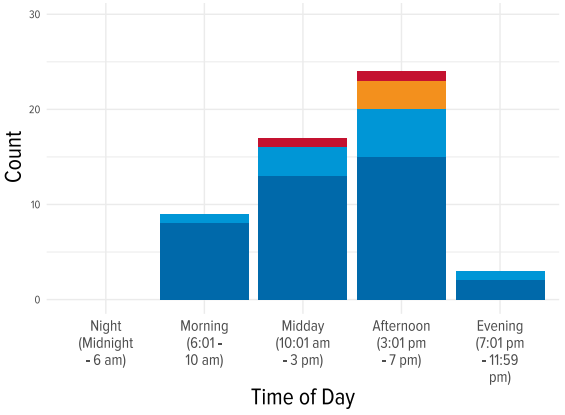
Indicators	Weekday		Weekend	
	Pedestrian	Bicyclist	Pedestrian	Bicyclist
Total Counts	306	130	121	152
High Risk Conflicts with Vehicles	2	0	1	2
Total Conflicts with Vehicles	29	5	12	7
Conflicts per 100 Bikes/Pedestrians	9.48	3.85	9.92	4.61

Notes:
A high-risk conflict is any situation with a post-encroachment time (PET) < 1.5 seconds, with PET representing the gap between the first road user passing the conflict point and the second crossing the same point.

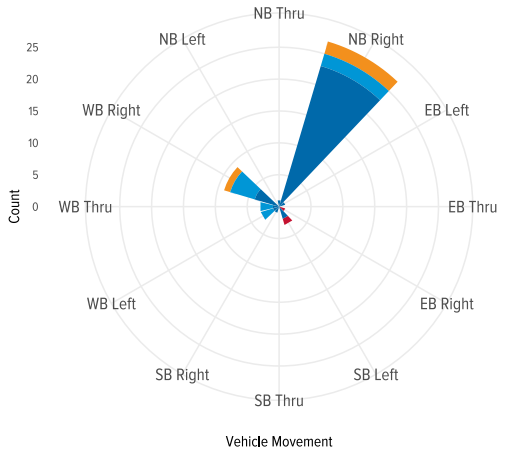
High Risk – Bicycle
High Risk – Pedestrian
Moderate Risk – Bicycle
Moderate Risk – Pedestrian

BIKE/PED CONFLICTS (ALL DAYS)

By Time of Day

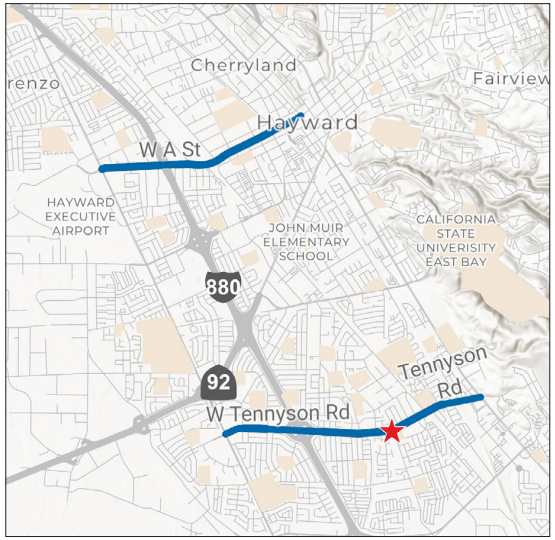


By First Vehicle Movement



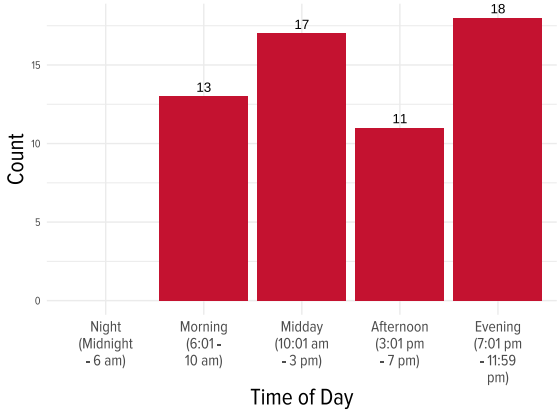
Ruus Rd & Tennyson Rd

VEHICLE-VEHICLE CONFLICT ANALYSIS / MARCH 20 & 22, 2025

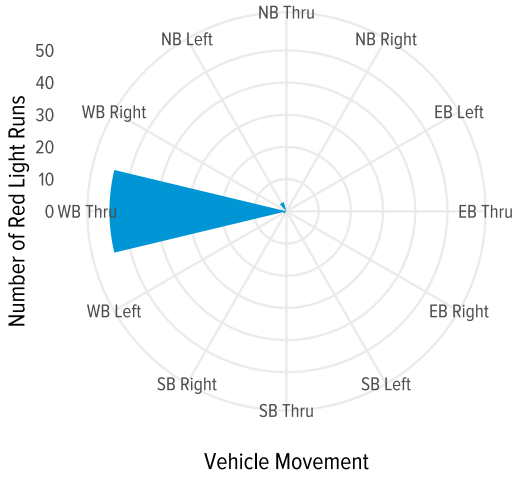


RED LIGHT RUNS (ALL DAYS)

By Time of Day



By Vehicle Movement



Indicators	Weekday	Weekend
Total Vehicles	32,001	30,088
Total Conflicts	3	4
High Risk Conflicts	0	1
Conflicts per 1,000 vehicles	0.09	0.13
Total Red Light Running Events	33	26
Red Light Runs per 1,000 Vehicles	1.03	0.86

Of the eight signalized intersections studied, the average red light running rate was 1.95 events per 1,000 vehicles on weekdays and 2.15 events per 1,000 vehicles on weekends.

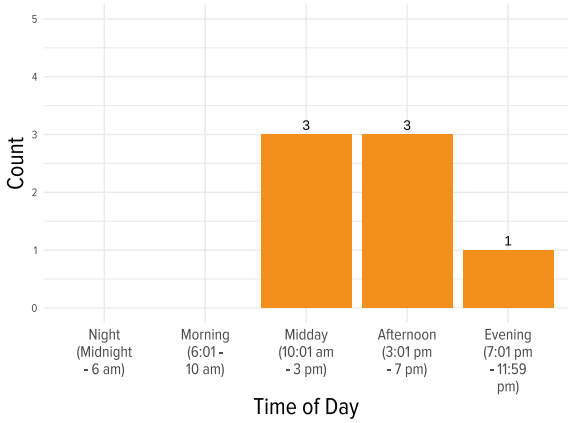
Notes

1. A high-risk conflict is any situation with a post-encroachment time (PET) < 1.5 seconds, with PET representing the gap between the first road user passing the conflict point and the second crossing the same point.

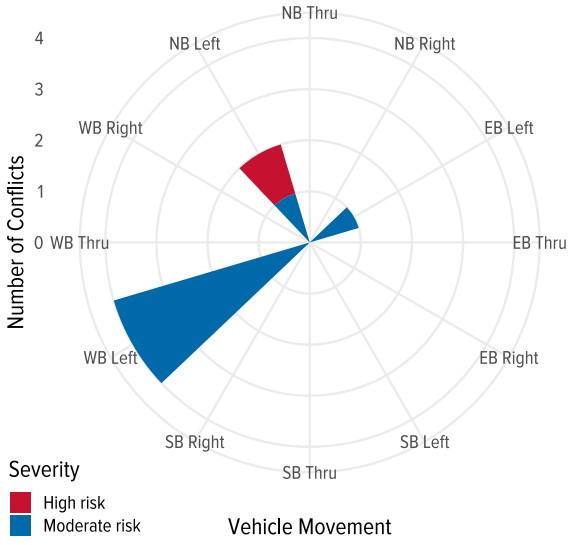
2. Some redlight running events had notes indicating that the event occurred but it was done because someone was waved into the intersection, or it was an emergency vehicle. These records were excluded from analysis.

VEHICLE CONFLICTS (ALL DAYS)

By Time of Day



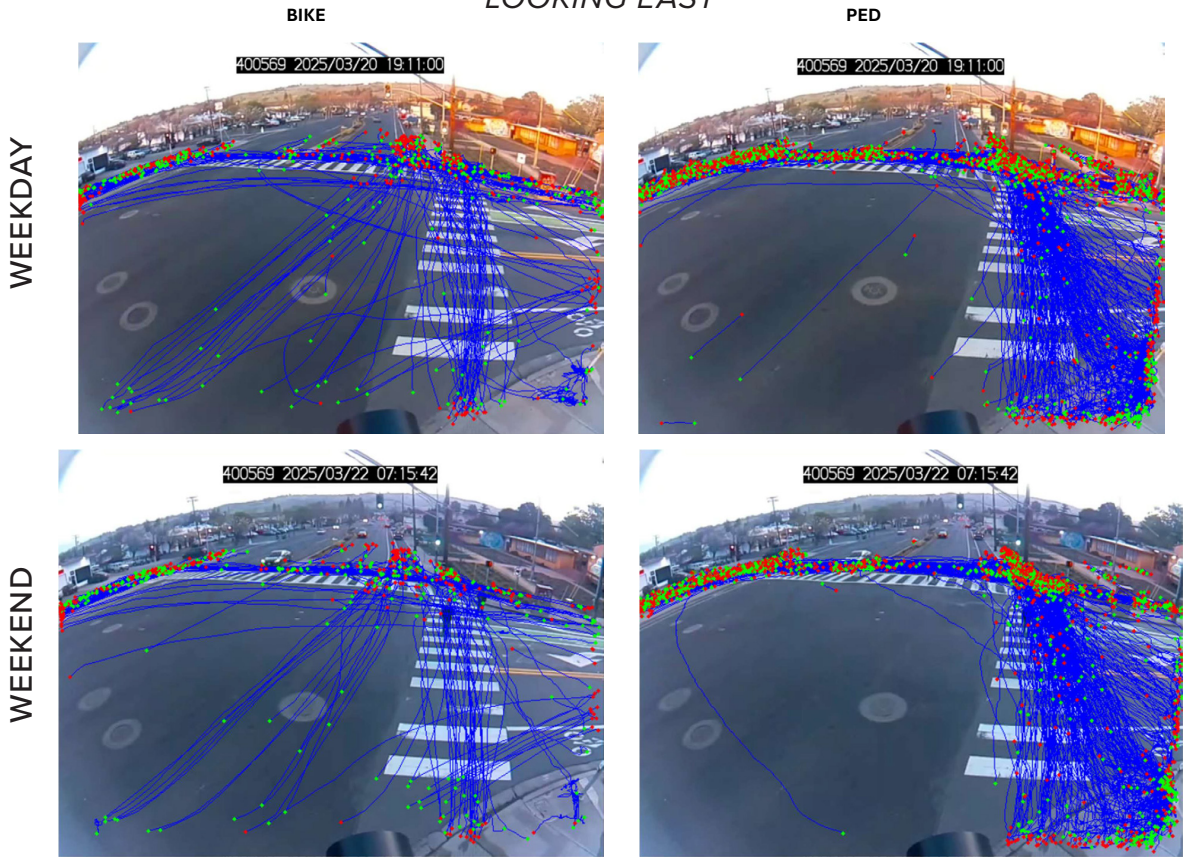
By First Vehicle Movement



Ruus Rd & Tennyson Rd

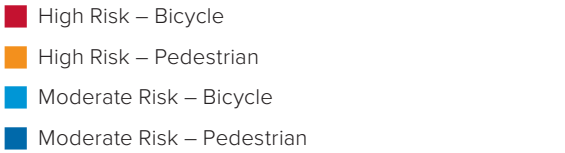
BICYCLE & PEDESTRIAN CONFLICT ANALYSIS / MARCH 20 & 22, 2025

LOOKING EAST



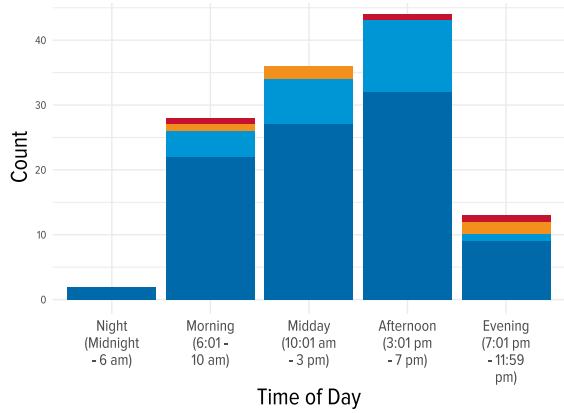
Indicators	Weekday		Weekend	
	Pedestrian	Bicyclist	Pedestrian	Bicyclist
Total Counts	579	227	497	175
High Risk Conflicts with Vehicles	1	2	4	1
Total Conflicts with Vehicles	43	16	54	10
Conflicts per 100 Bikes/Pedestrians	7.43	7.05	10.87	5.71

Notes:
A high-risk conflict is any situation with a post-encroachment time (PET) < 1.5 seconds, with PET representing the gap between the first road user passing the conflict point and the second crossing the same point.

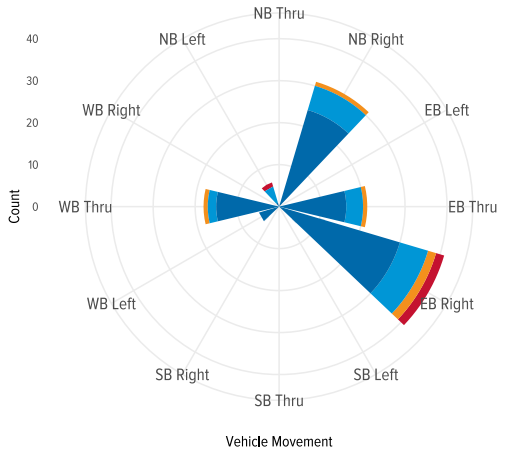


BIKE/PED CONFLICTS (ALL DAYS)

By Time of Day

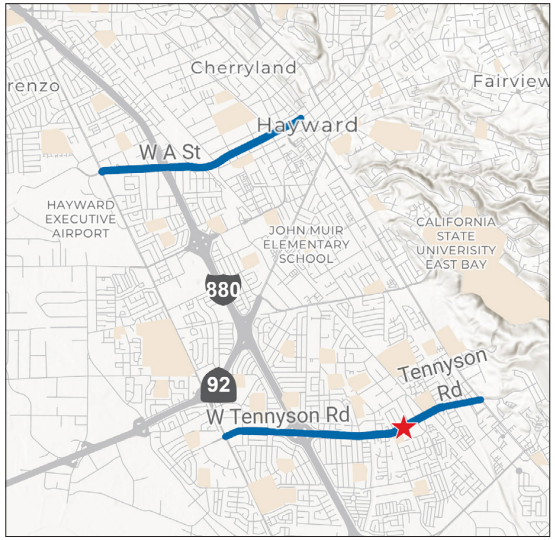


By First Vehicle Movement



Baldwin St & Tennyson Rd

VEHICLE-VEHICLE CONFLICT ANALYSIS / MARCH 20 & 22, 2025



Indicators	Weekday	Weekend
Total Vehicles	25,612	25,178
Total Conflicts	17	24
High Risk Conflicts	1	0
Conflicts per 1,000 vehicles	0.66	0.95
Total Red Light Running Events	NA	NA
Red Light Runs per 1,000 Vehicles	NA	NA

Of the eight signalized intersections studied, the average red light running rate was 1.95 events per 1,000 vehicles on weekdays and 2.15 events per 1,000 vehicles on weekends.

Notes

1. A high-risk conflict is any situation with a post-encroachment time (PET) < 1.5 seconds, with PET representing the gap between the first road user passing the conflict point and the second crossing the same point.

2. Some redlight running events had notes indicating that the event occurred but it was done because someone was waved into the intersection, or it was an emergency vehicle. These records were excluded from analysis.

RED LIGHT RUNS (ALL DAYS)

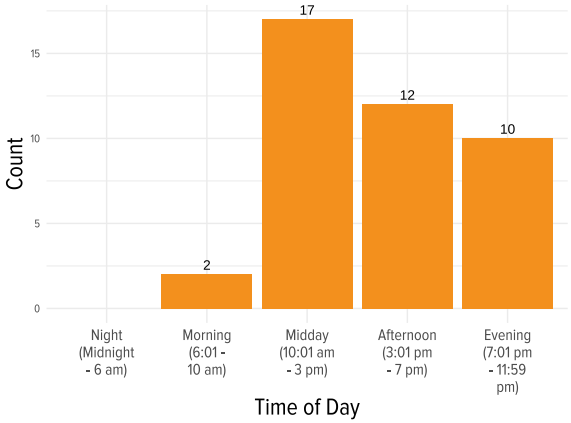
By Time of Day

By Vehicle Movement

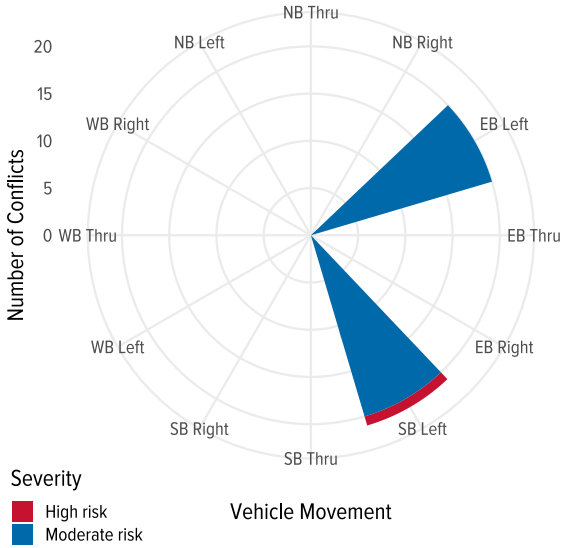
This location does not have a traffic signal so red light running data is not applicable.

VEHICLE CONFLICTS (ALL DAYS)

By Time of Day



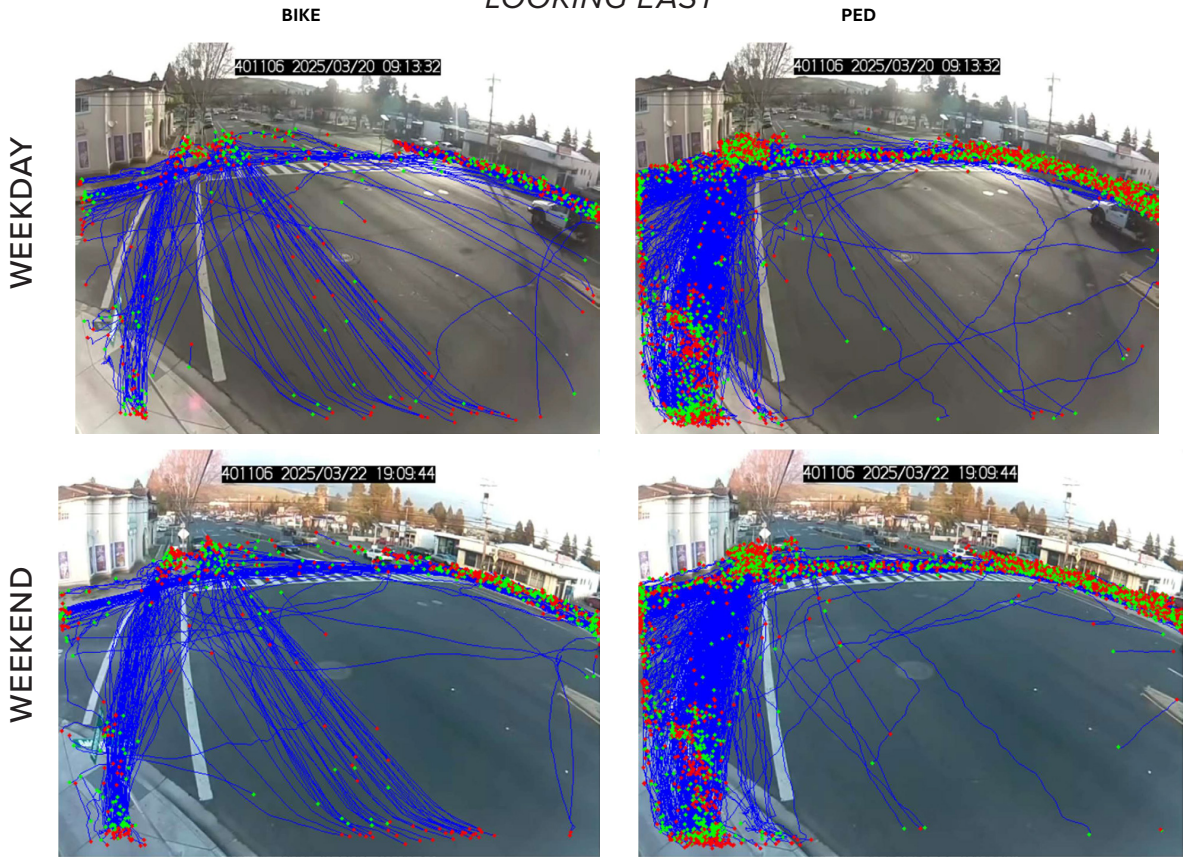
By First Vehicle Movement



Baldwin St & Tennyson Rd

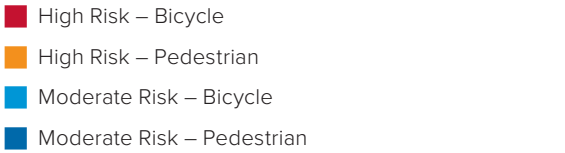
BICYCLE & PEDESTRIAN CONFLICT ANALYSIS / MARCH 20 & 22, 2025

LOOKING EAST



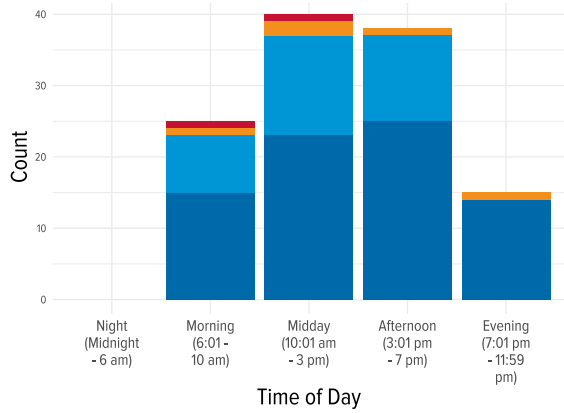
Indicators	Weekday		Weekend	
	Pedestrian	Bicyclist	Pedestrian	Bicyclist
Total Counts	1,061	289	1,085	316
High Risk Conflicts with Vehicles	2	0	3	2
Total Conflicts with Vehicles	50	13	32	23
Conflicts per 100 Bikes/Pedestrians	4.71	4.50	2.95	7.28

Notes:
A high-risk conflict is any situation with a post-encroachment time (PET) < 1.5 seconds, with PET representing the gap between the first road user passing the conflict point and the second crossing the same point.

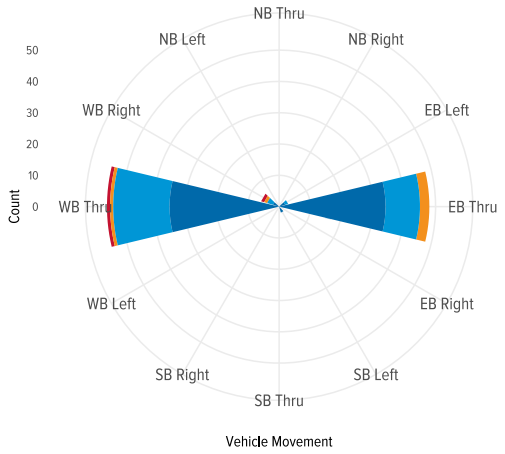


BIKE/PED CONFLICTS (ALL DAYS)

By Time of Day



By First Vehicle Movement



Huntwood Ave & Tennyson Rd

VEHICLE-VEHICLE CONFLICT ANALYSIS / MARCH 20 & 22, 2025

Indicators	Weekday	Weekend
Total Vehicles	32,967	30,433
Total Conflicts	56	44
High Risk Conflicts	1	0
Conflicts per 1,000 vehicles	1.70	1.45
Total Red Light Running Events	31	37
Red Light Runs per 1,000 Vehicles	0.94	1.22

Of the eight signalized intersections studied, the average red light running rate was 1.95 events per 1,000 vehicles on weekdays and 2.15 events per 1,000 vehicles on weekends.

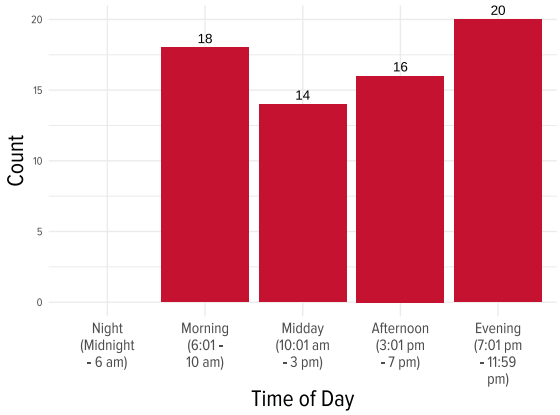
Notes

1. A high-risk conflict is any situation with a post-encroachment time (PET) < 1.5 seconds, with PET representing the gap between the first road user passing the conflict point and the second crossing the same point.

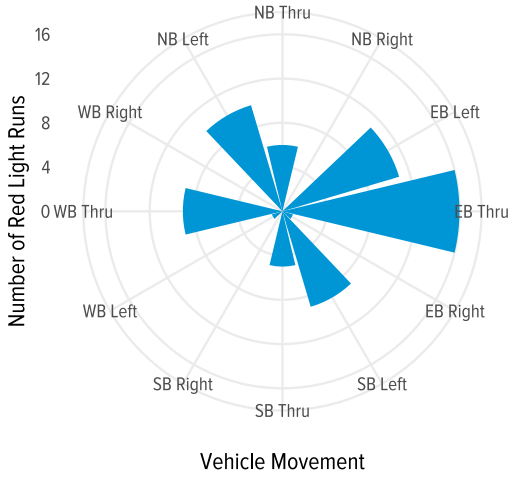
2. Some redlight running events had notes indicating that the event occurred but it was done because someone was waved into the intersection, or it was an emergency vehicle. These records were excluded from analysis.

RED LIGHT RUNS (ALL DAYS)

By Time of Day

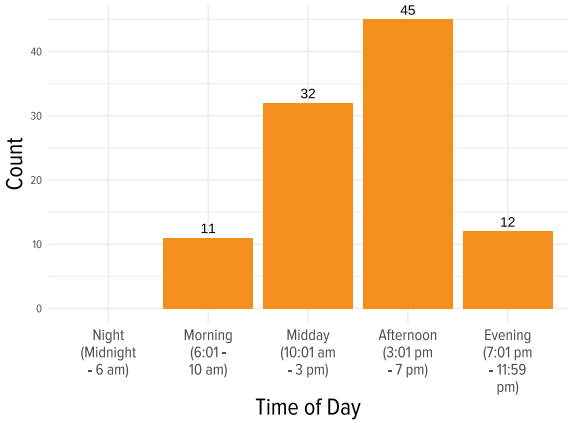


By Vehicle Movement

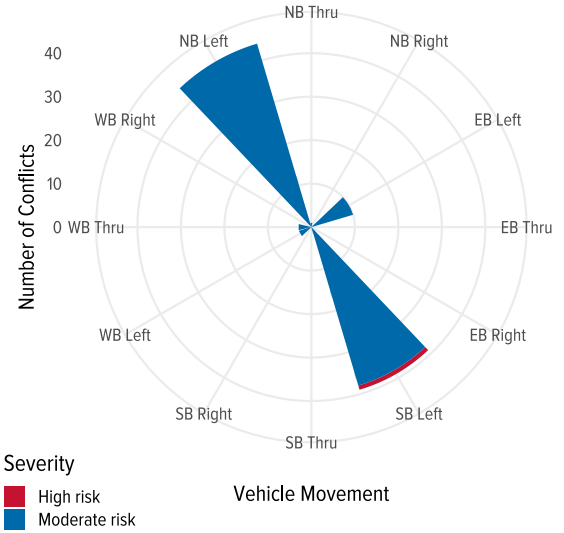


VEHICLE CONFLICTS (ALL DAYS)

By Time of Day



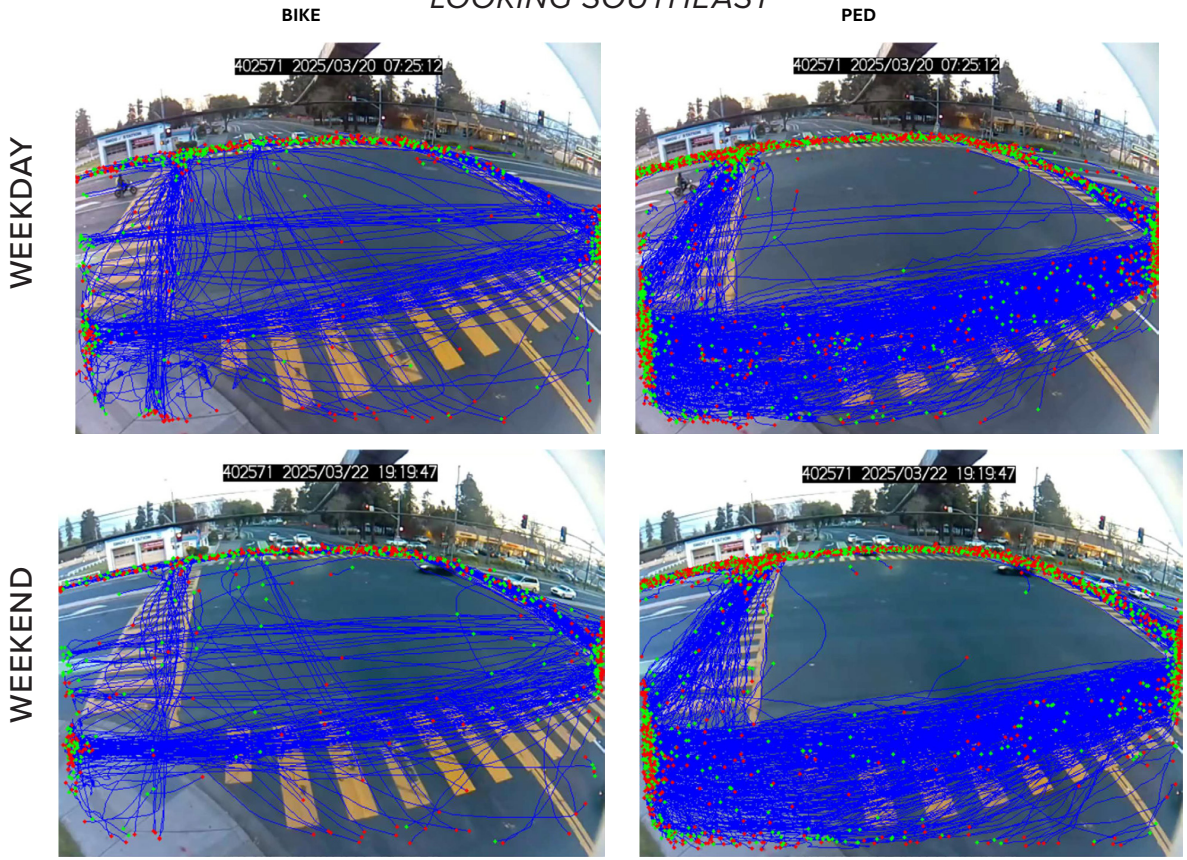
By First Vehicle Movement



Huntwood Ave & Tennyson Rd

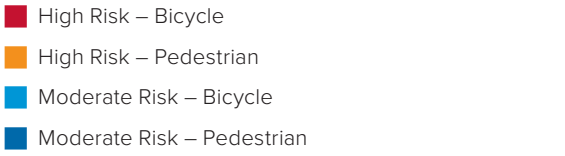
BICYCLE & PEDESTRIAN CONFLICT ANALYSIS / MARCH 20 & 22, 2025

LOOKING SOUTHEAST



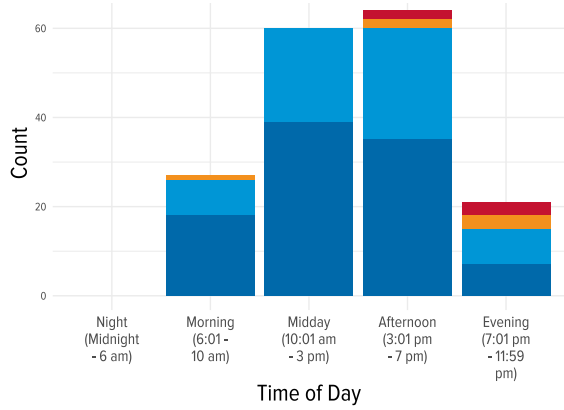
Indicators	Weekday		Weekend	
	Pedestrian	Bicyclist	Pedestrian	Bicyclist
Total Counts	887	390	942	347
High Risk Conflicts with Vehicles	3	3	3	2
Total Conflicts with Vehicles	54	33	51	34
Conflicts per 100 Bikes/Pedestrians	6.09	8.46	5.41	9.80

Notes:
A high-risk conflict is any situation with a post-encroachment time (PET) < 1.5 seconds, with PET representing the gap between the first road user passing the conflict point and the second crossing the same point.

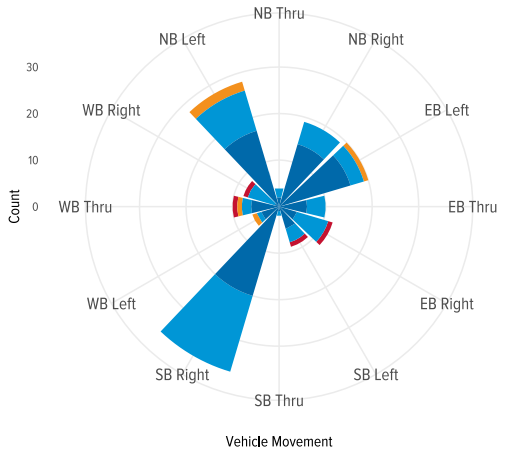


BIKE/PED CONFLICTS (ALL DAYS)

By Time of Day

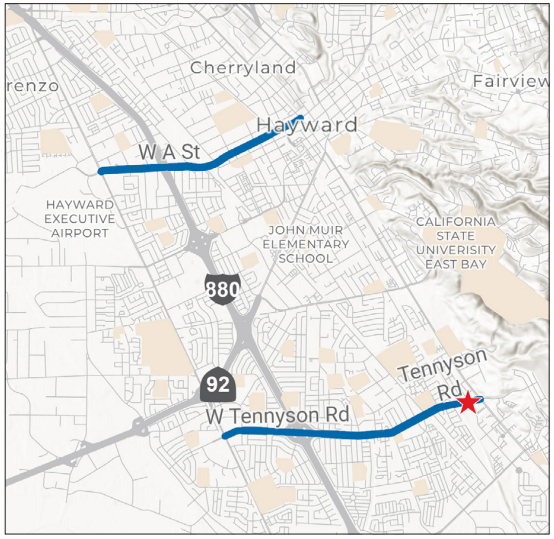


By First Vehicle Movement



12th St/Dixon St & Tennyson Rd

VEHICLE-VEHICLE CONFLICT ANALYSIS / APRIL 3 & 5, 2025



Indicators	Weekday	Weekend
Total Vehicles	21,899	20,767
Total Conflicts	0	3
High Risk Conflicts	0	0
Conflicts per 1,000 vehicles	0	0.14
Total Red Light Running Events	20	59
Red Light Runs per 1,000 Vehicles	0.91	2.84

Of the eight signalized intersections studied, the average red light running rate was 1.95 events per 1,000 vehicles on weekdays and 2.15 events per 1,000 vehicles on weekends.

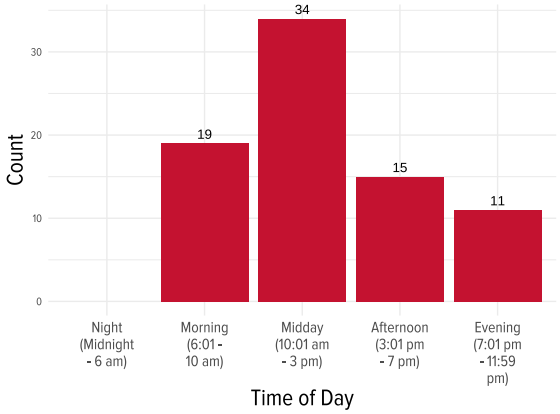
Notes

1. A high-risk conflict is any situation with a post-encroachment time (PET) < 1.5 seconds, with PET representing the gap between the first road user passing the conflict point and the second crossing the same point.

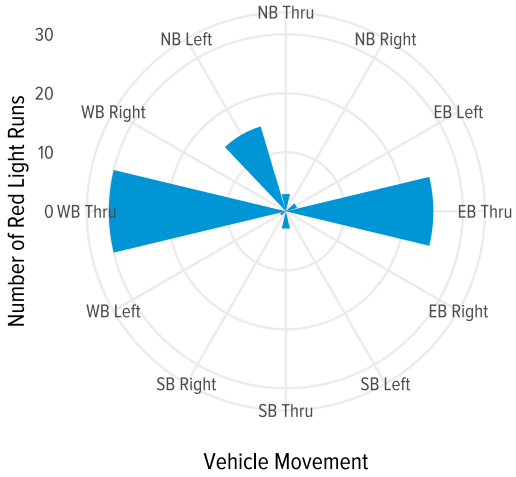
2. Some redlight running events had notes indicating that the event occurred but it was done because someone was waved into the intersection, or it was an emergency vehicle. These records were excluded from analysis.

RED LIGHT RUNS (ALL DAYS)

By Time of Day

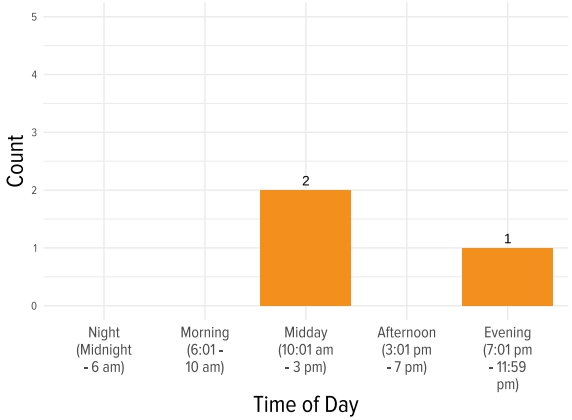


By Vehicle Movement

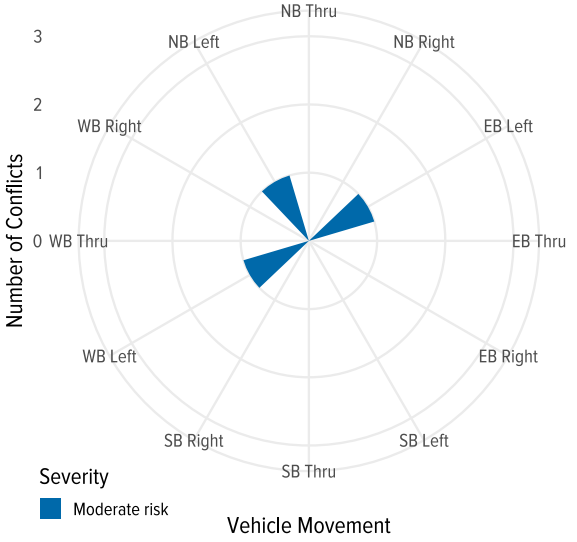


VEHICLE CONFLICTS (ALL DAYS)

By Time of Day



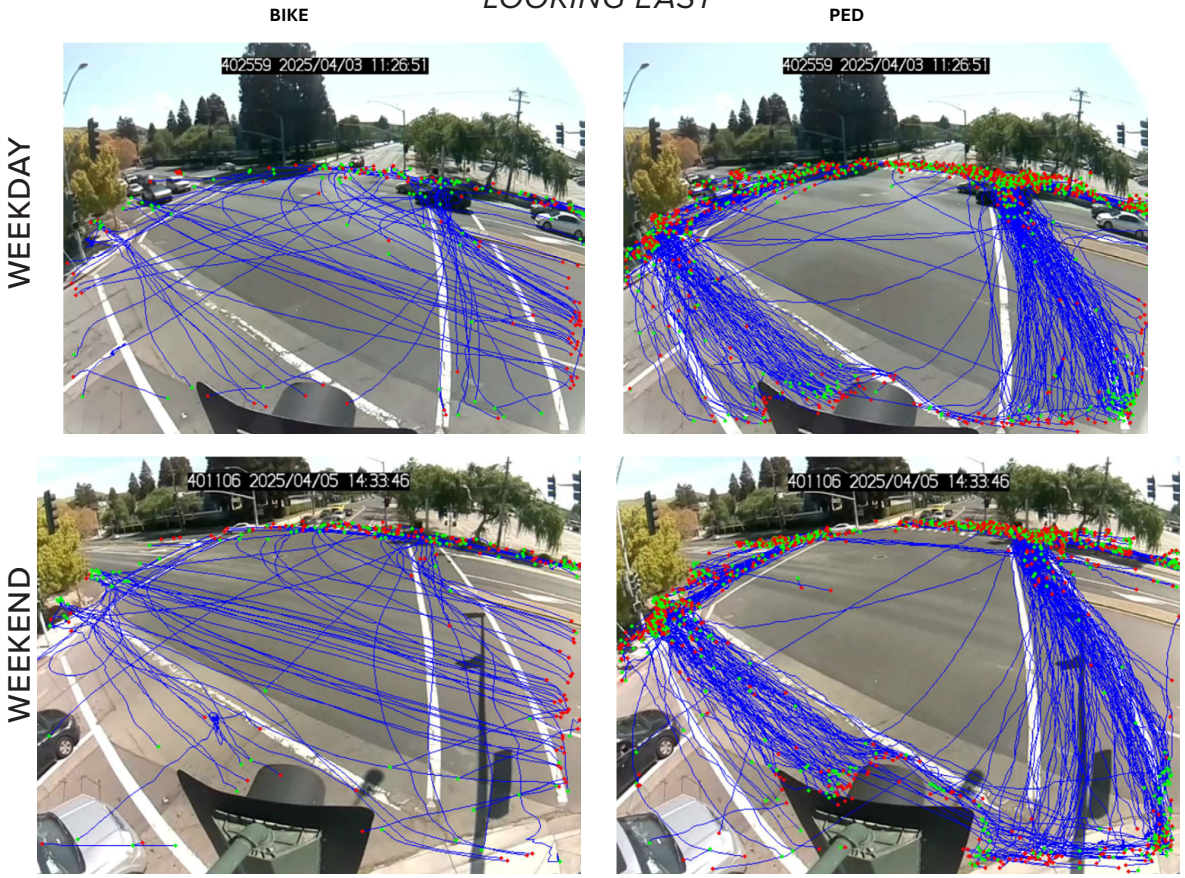
By First Vehicle Movement



12th St/Dixon St & Tennyson Rd

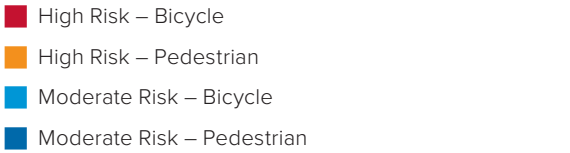
BICYCLE & PEDESTRIAN CONFLICT ANALYSIS / APRIL 3 & 5, 2025

LOOKING EAST



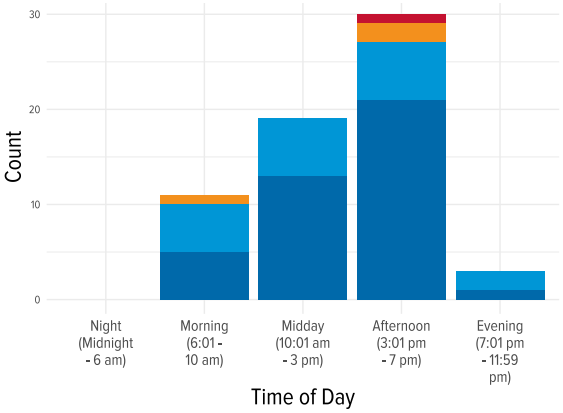
Indicators	Weekday		Weekend	
	Pedestrian	Bicyclist	Pedestrian	Bicyclist
Total Counts	254	82	338	149
High Risk Conflicts with Vehicles	3	1	0	0
Total Conflicts with Vehicles	27	13	16	7
Conflicts per 100 Bikes/Pedestrians	10.63	15.85	4.73	4.70

Notes:
A high-risk conflict is any situation with a post-encroachment time (PET) < 1.5 seconds, with PET representing the gap between the first road user passing the conflict point and the second crossing the same point.



BIKE/PED CONFLICTS (ALL DAYS)

By Time of Day



By First Vehicle Movement