Cupertino Traffic Collision Data Analysis

Presented to: Cupertino Bicycle & Pedestrian Commission
July 21 2021

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Oct 2020 - July 2021
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Changes

- Added Lighting Conditions Percentages
- Added Demographic
- Added Accidents Based On Road Sections For Large Roads

Background

- The Smart City pilot project's aims to make the city safer with new technology.

- The Commision wants data on which streets are more susceptible to accidents and what vehicles were involved.

- This data should be easily understandable through visualization.

- The Commission requires Collision data from the past 5 years.
- This data must be in the form of a map and display the collision type.
- The types of collisions are: motorcycles, vehicles, bicycles, and pedestrians.
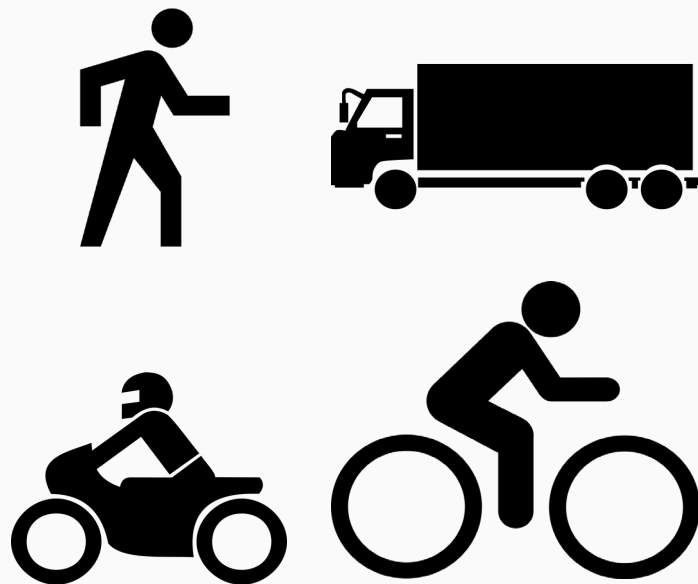
Methodology

Data Retrieval

Using the Santa Clara County SWITRS website, the raw data is retrieved as CSV file along with meta information about data.
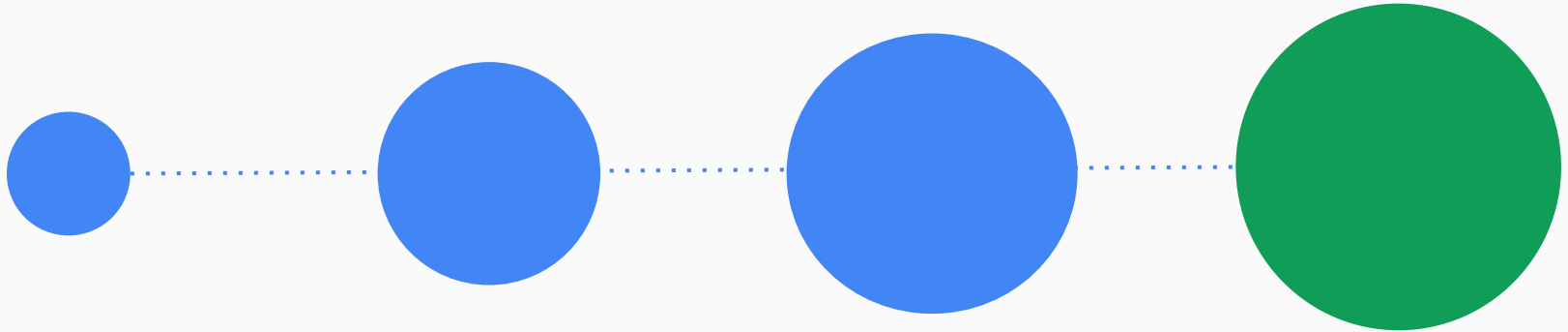
Data Processing

Using Java and Python programming, unnecessary data was cleaned up to make the map visuals relevant.

Data Visualization

Using Google maps, the data was applied in the map format for easier human interpretation.

Data Analysis

From the maps, data was interpreted and some conclusions were derived (in the following slides).

Pedestrian Collisions Map

2015-2020

2015-2020
9 views

SHARE   EDIT

☑ **Pedestrian Collisions**

˅   🚶 Fatal

   🚶 Severe Injury

   🚶 Visible Injury

   🚶 Reported Pain
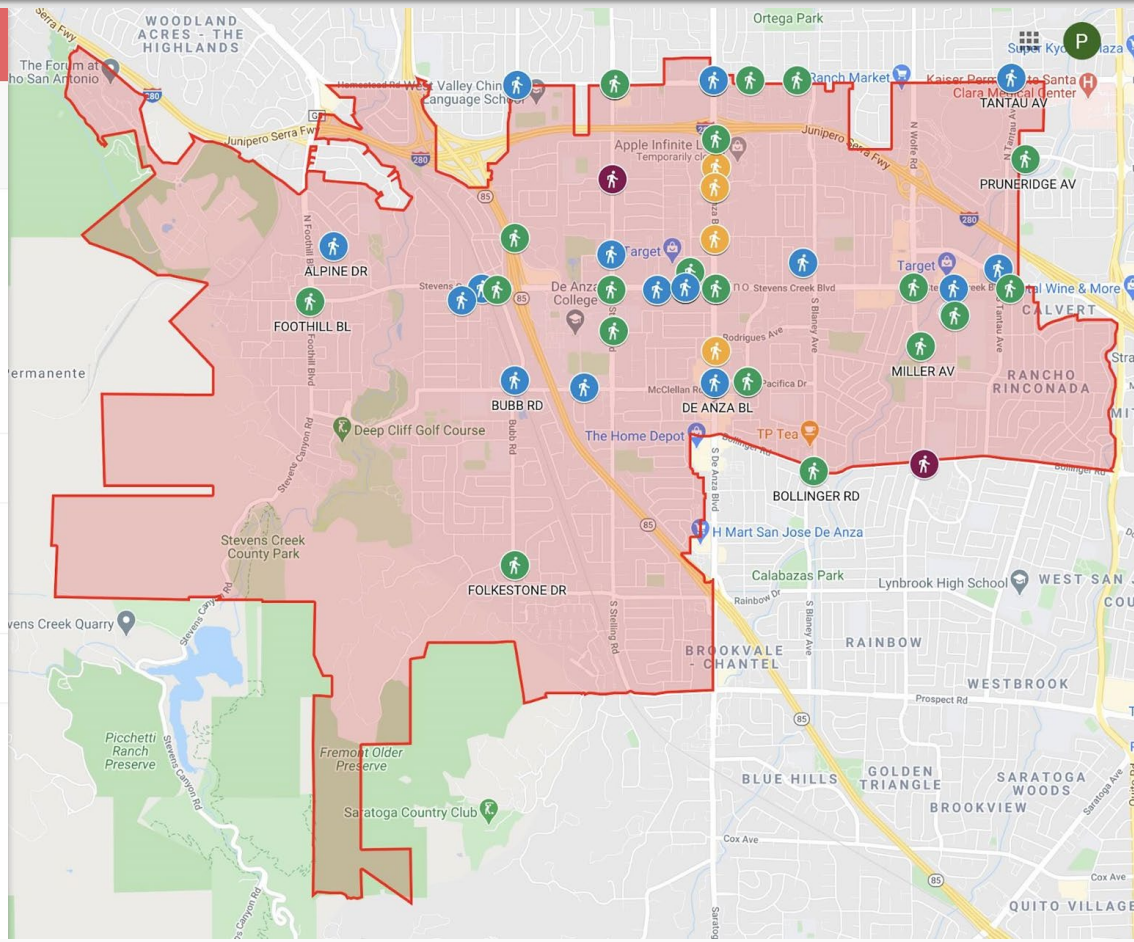
☐ Bicycle Collisions

☑ **City Boundary**

   CUPERTINO

☐ CD.csv

Bicycle Collisions Map

2015-2020

2015-2020
9 views

SHARE   EDIT

☐ Pedestrian Collisions

☑ **Bicycle Collisions**

∨   🚴 Severe Injury

   🚴 Visible Injury
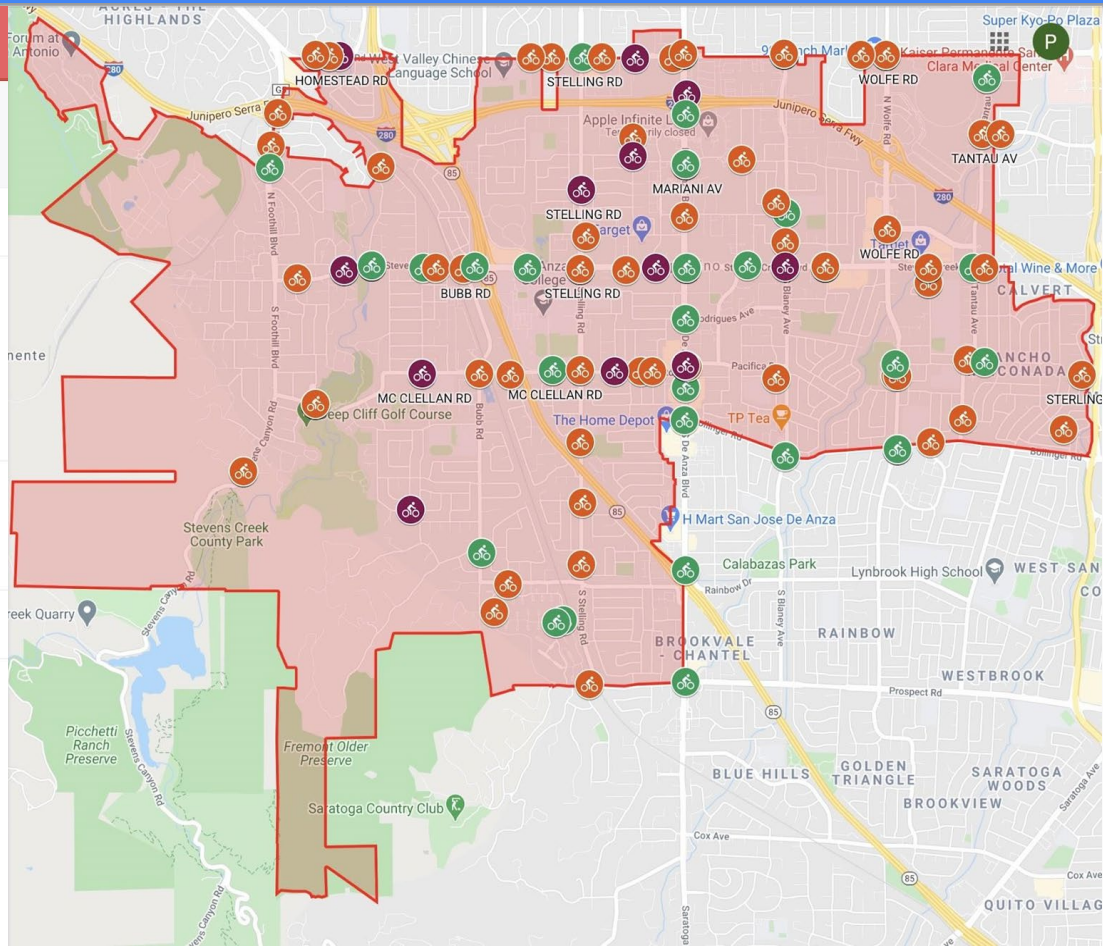
   🚴 Reported Pain

☑ **City Boundary**

   ◇ CUPERTINO

☐ CD.csv

What Classifies An Injury?

Fatal Injury: Results in death within 30 days after the crash occurred.

Suspected Serious Injury (Severe Injury):
Severe laceration exposing underlying tissues/muscles/organs or resulting in significant loss of blood.
Broken or distorted extremity (arm or leg)
Crush Injuries
Suspected skull, chest or abdominal injury other than bruises or minor lacerations
Significant burns (second and third degree burns over 10% or more of body)
Unconsciousness when taken from crash scene
Paralysis

Suspected Minor Injury (Visible Injury):
Minor injury is any injury evident at the scene, other than fatal or serious injuries. Ex: Lump on head, abrasions, bruises, minor lacerations.

Possible Injury (Reported Pain):
Any injury reported or claimed, not fatal, not suspected serious, or suspected minor. Ex: Possible injuries reported or indicated by behavior but not readily evident.

Source: CHP Enforcement and Planning Division (EPD)

Cupertino Pedestrian Collisions by Street

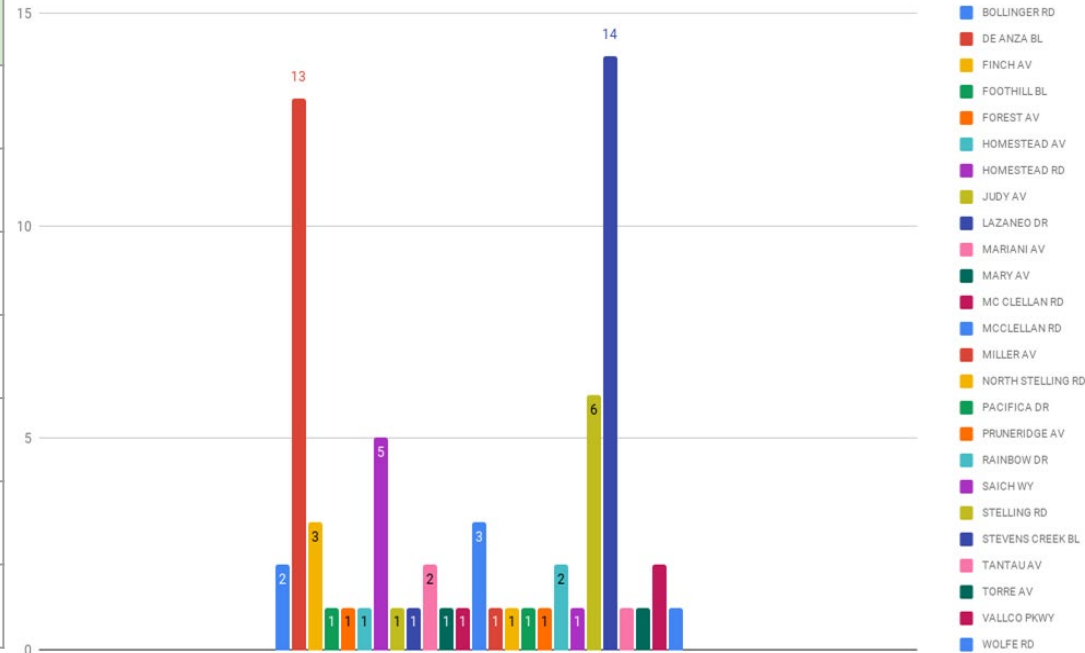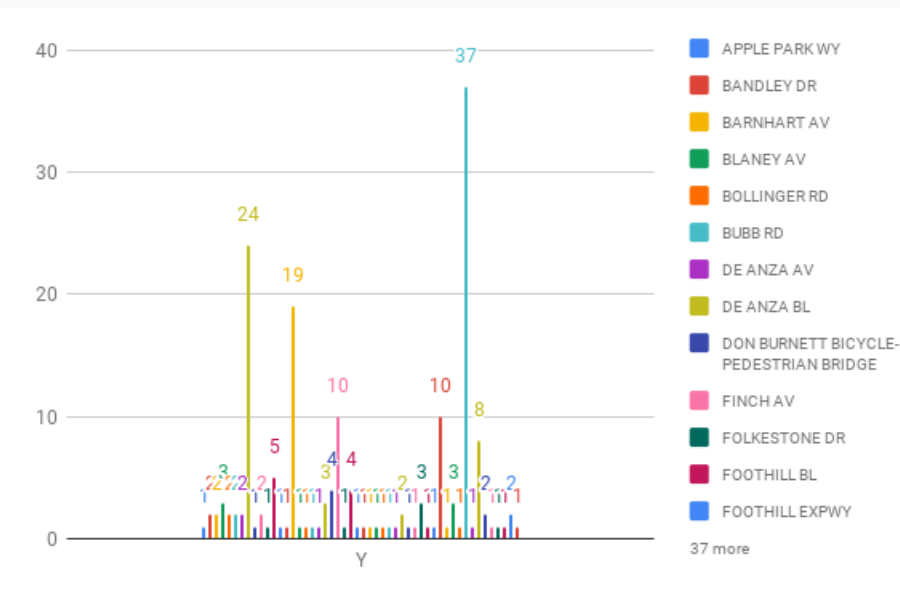| Street Name	Crashes
Stevens Creek Boulevard	14
De Anza Boulevard	13
Stelling Road	6
Homestead Road	5
Finch Avenue	3
McClellan Road	3
Bollinger Road	2

Table 6. Most frequent pedestrian collisions by primary street

Cupertino Pedestrian Collisions by Street Sections

Street Name	Crashes
Stevens Creek: Stelling - De Anza	4
Stevens Creek: Byrnie - 85	3
Stevens Creek: Wolfe - Tantau	3
S. De Anza: Stevens Creek- McClellan	2
Homestead: Stelling - De Anza	2
Homestead: De Anza - Blaney	2
Stelling: Grenola - Stevens Creek	2

Cupertino Bicycle Collisions by Street

Street Name	Crashes
Stevens Creek Boulevard	37
De Anza Boulevard	24
Homestead Road	19
Stelling Road	10
McClellan Road	10
Tantau Avenue	8

- Most crashes occur on major streets

Cupertino Bicycle Collisions by Street Sections

Street Name	Crashes
McClellan: Stelling - De Anza	5
Homestead: Stelling - De Anza	4
Stevens Creek: Byrnie - 85	4
Stevens Creek: Stelling - De Anza	4
Wolfe: Bollinger - Phil	4

Pedestrian Collision Data

Year	Total Pedestrian Incidents	1 Injury per incident	2 Injuries per incident
2015	13	2	11
2016	18	0	18
2017	23	2	21
2018	11	0	11
2019	9	2	7
2020	2	0	2
Total	76	6	70
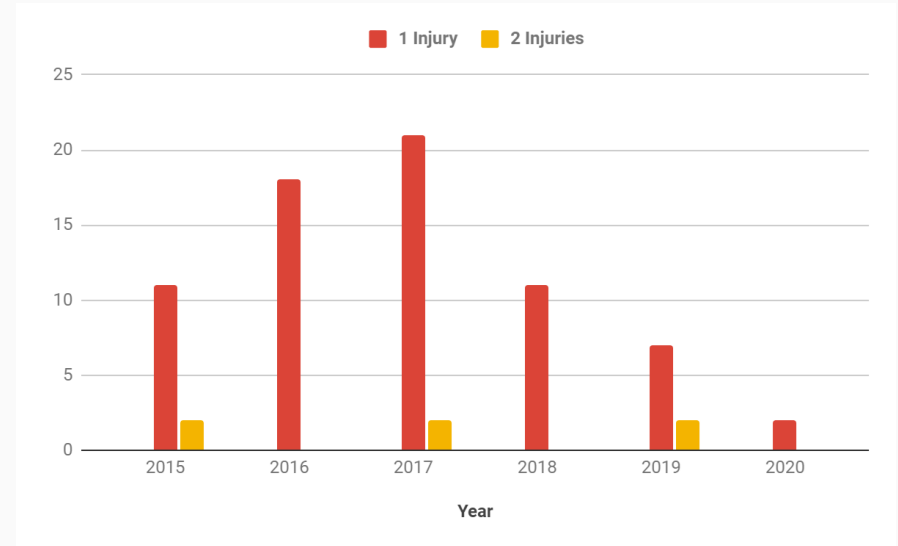
2 Fatalities recorded in this data grouping

Bicycle Collision Data

Year	Total Bicycle Collisions	1 Injury per incident	2 Injuries per incident
2015	11	11	0
2016	15	15	0
2017	15	15	0
2018	17	15	2
2019	8	8	0
2020	4	4	0
Total	70	68	2
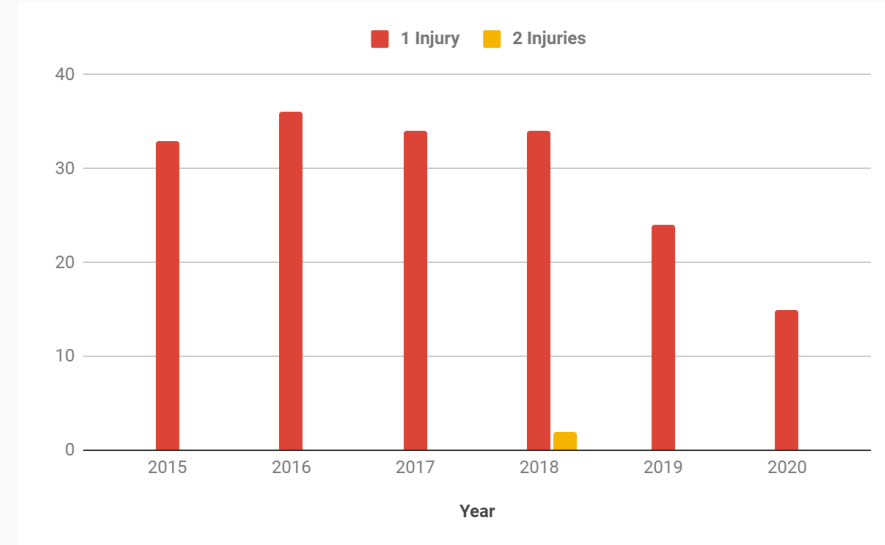
No fatalities recorded in this data grouping.

Bicycle Collision Data: Percentages

Type Of Collision	Number of Collisions	Percentage of Total Collisions
Head-On	1	3.23%
Sideswipe	2	1.82%
Rear End	3	0.59%
Broadside	10	5.62%
Hit Object	5	4.59%
Overturned	6	17.14%
Vehicle/Pedestrian	2	2.30%
Other*	40	39.60%

* Type not listed

Pedestrian Collisions Data: Percentages

Type Of Incident	Number of Incidents	Percentage of Total Incidents
Head-On	0	0%
Sideswipe	0	0%
Rear End	0	0%
Broadside	0	0%
Hit Object	0	0%
Overturned	0	0%
Vehicle/Pedestrian	20	95.24
Other*	1	4.76%

* Type not listed

Vehicle Type at Fault: Pedestrian

Primary Collision Factor	Total Accidents
Passenger Car	37
Pickup Truck	3
Bus	2
Bicycle	1
Pedestrian	16

Total Accidents
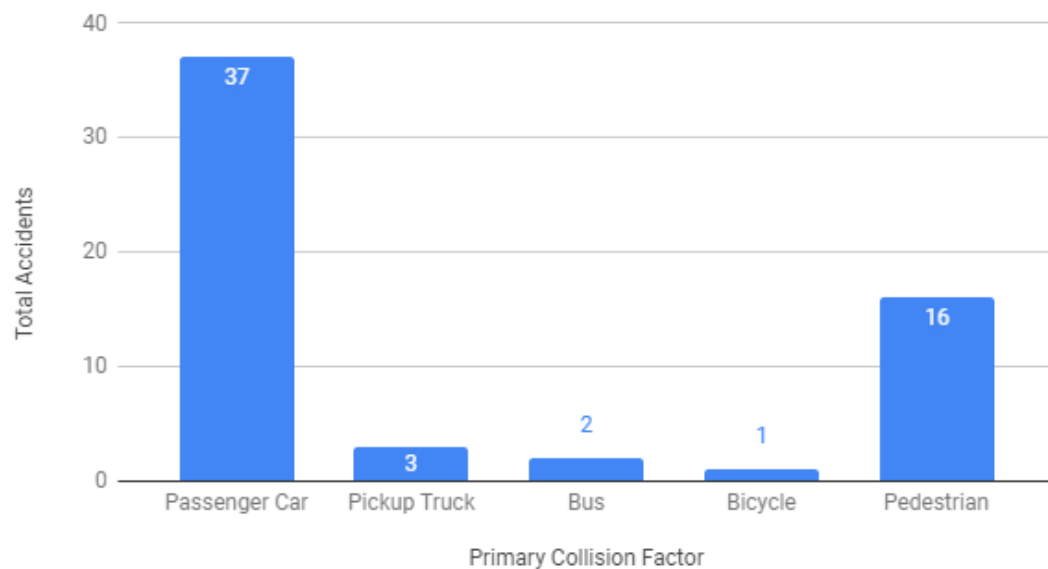
At Fault or Not: Pedestrian

Percentage of At Fault vs Not At Fault

At Fault
26.3%

89 (26.3%)

249 (73.7%)
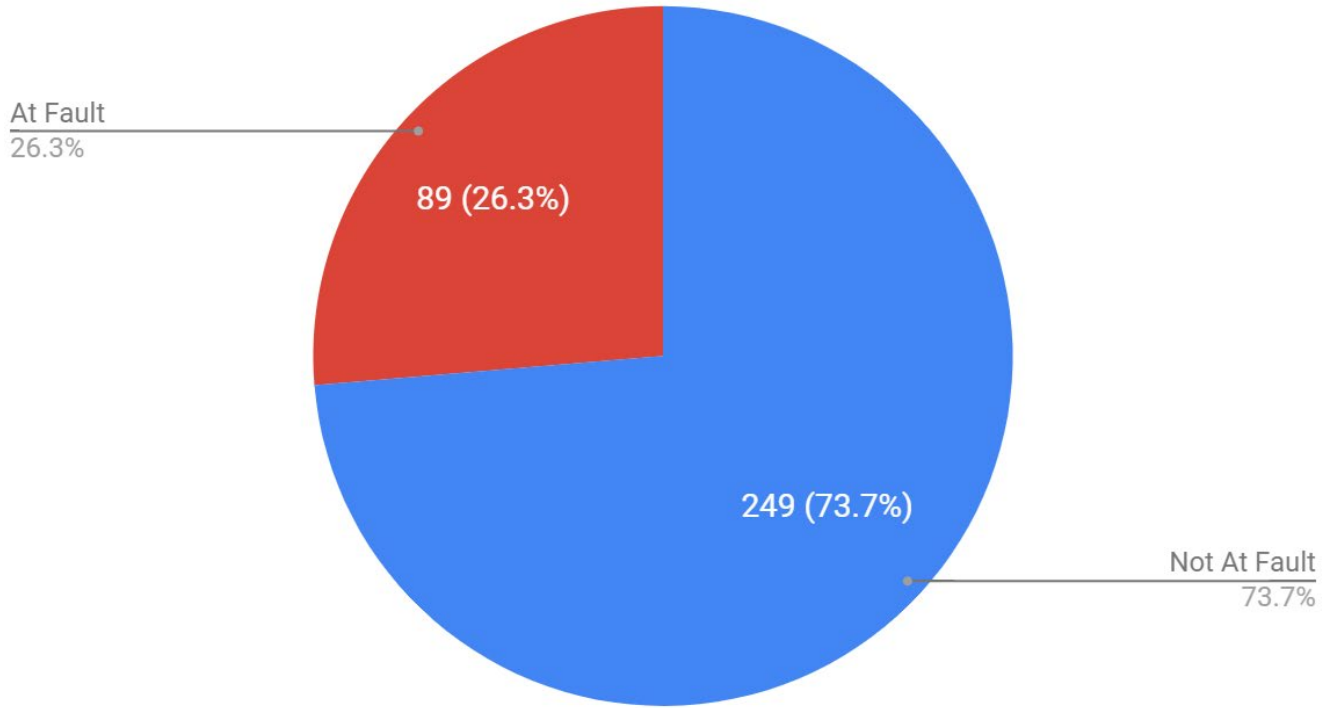
Not At Fault
73.7%

Vehicle Type at Fault: Bicycle

Primary Collision Factor	Total Accidents
Passenger Car	99
Pickup Truck	6
Truck	2
School Bus	1
Bus	2
Bicycle	79
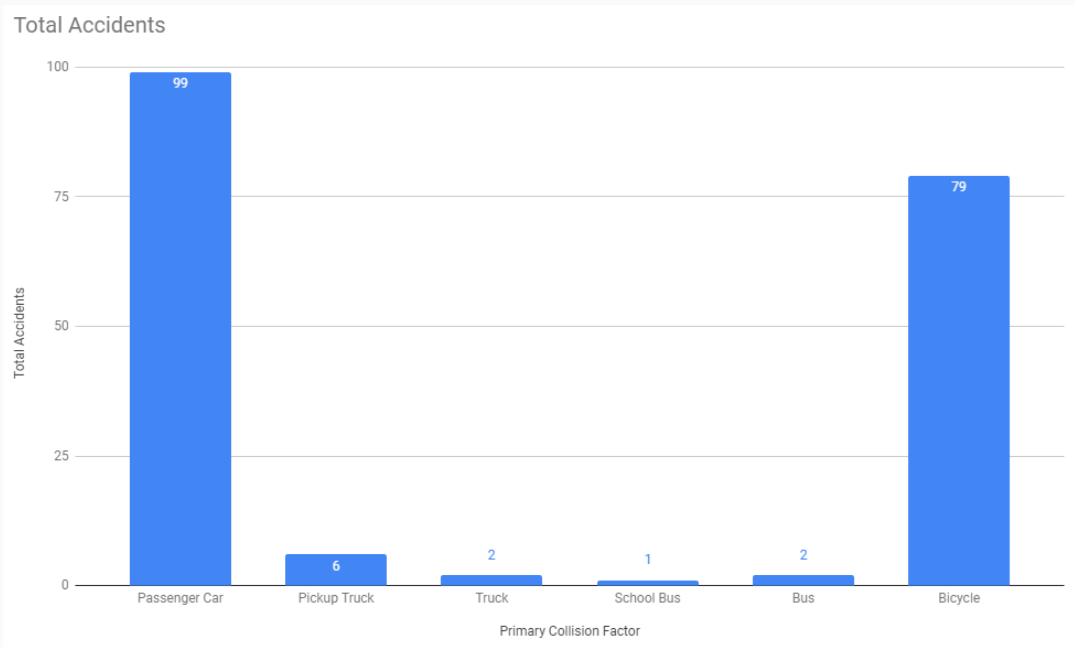
Total Accidents

At Fault or Not: Bicycle

Percentage of At Fault vs Not At Fault

At Fault
17.8%

27 (17.8%)

125 (82.2%)

Not At Fault
82.2%
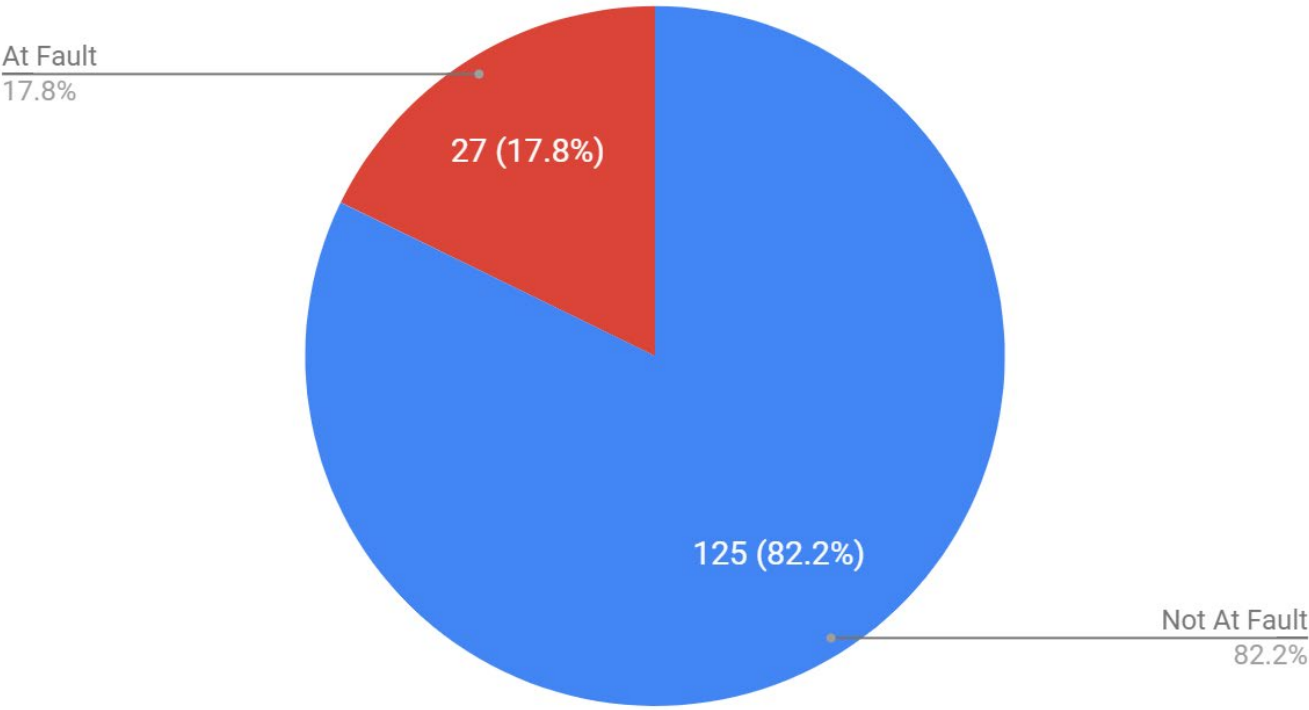
Collision Factor: Pedestrian

Primary Collision Factor	Total Accidents
(Vehicle) Code Violation	74
Unknown	1

Primary Collision Factors
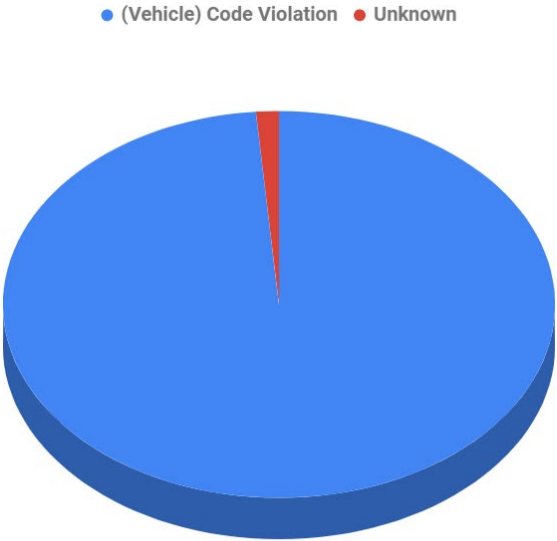
Collision Factor: Bicycle

Primary Collision Factor	Total Accidents
(Vehicle) Code Violation	175
Other Improper Driving	1
Unknown	3

Primary Collision Factors

● (Vehicle) Code Violation ● Other Improper Driving ● Unknown
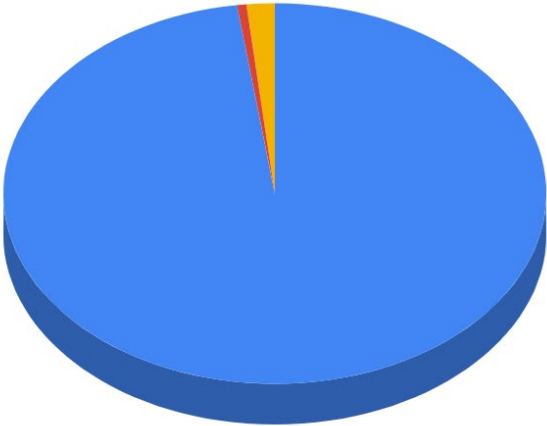
Seasonality: Pedestrian

Season	Total Accidents
Spring	15
Summer	13
Fall	20
Winter	27

Bicycle Accidents by Month

PEDESTRIAN ACCIDENT
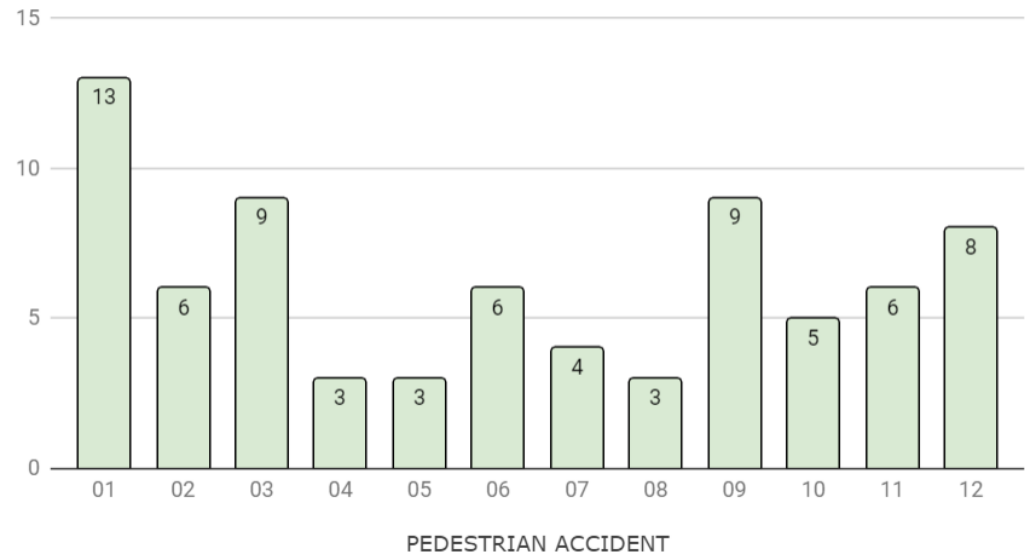
Seasonality: Pedestrian

Winter Months	Accidents	Spring Months	Accidents	Summer Months	Accidents	Fall Months	Accidents
December	8	March	9	June	6	September	9
January	13	April	3	July	4	October	5
February	6	May	3	August	3	November	6
Total	**27**	**Total**	**15**	**Total**	**13**	**Total**	**20**

Seasonality: Bicycle

Season	Total Accidents
Spring	42
Summer	52
Fall	56
Winter	29

Bicycle Accidents by Month

Bar chart "Bicycle Accidents by Month" with monthly values: 01: 12, 02: 10, 03: 12, 04: 9, 05: 21, 06: 13, 07: 8, 08: 31, 09: 32, 10: 13, 11: 11, 12: 7. X-axis labeled "BICYCLE ACCIDENT".
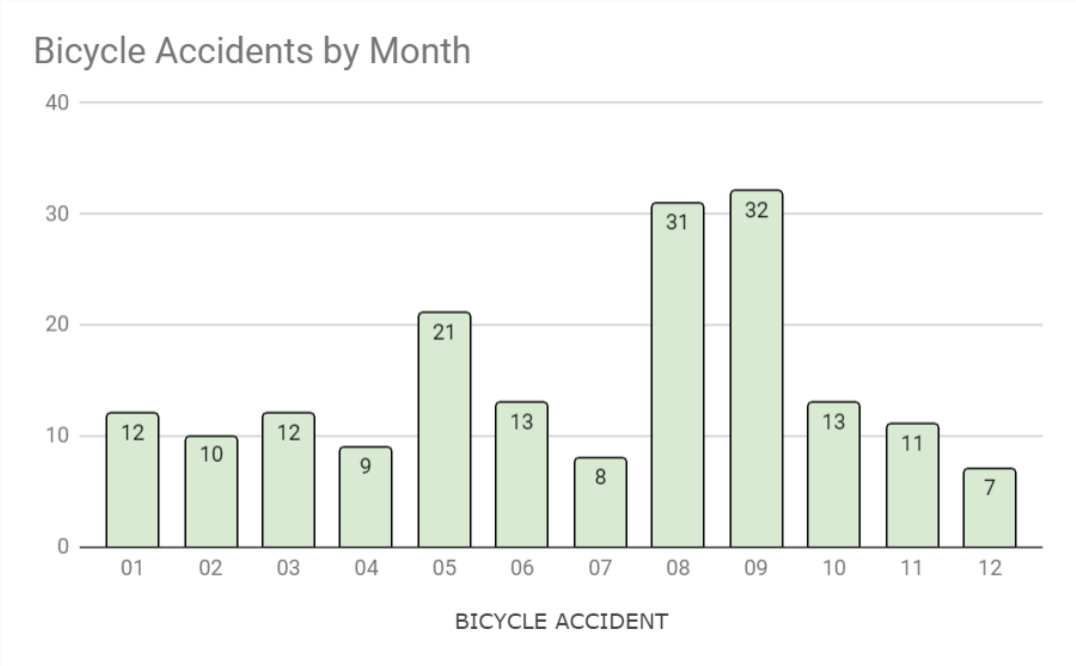
Seasonality: Bicycle

Winter Months	Accidents	Spring Months	Accidents	Summer Months	Accidents	Fall Months	Accidents
December	7	March	12	June	13	September	32
January	12	April	9	July	8	October	13
February	10	May	21	August	31	November	11
Total	**29**	**Total**	**42**	**Total**	**52**	**Total**	**56**

Time of Day: Pedestrian

Time	Total Accidents
7 PM-6 AM	61
6 AM-7 PM	14

Total Accidents vs. Time
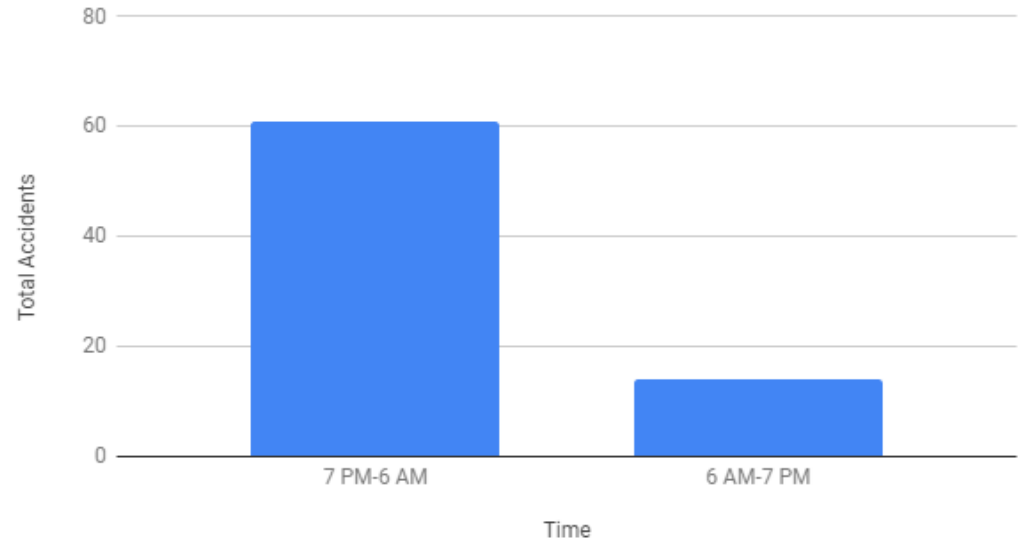
Time of Day: Bicycle

Time	Total Accidents
7 PM-6 AM	26
6 AM-7 PM	179

Total Accidents vs. Time
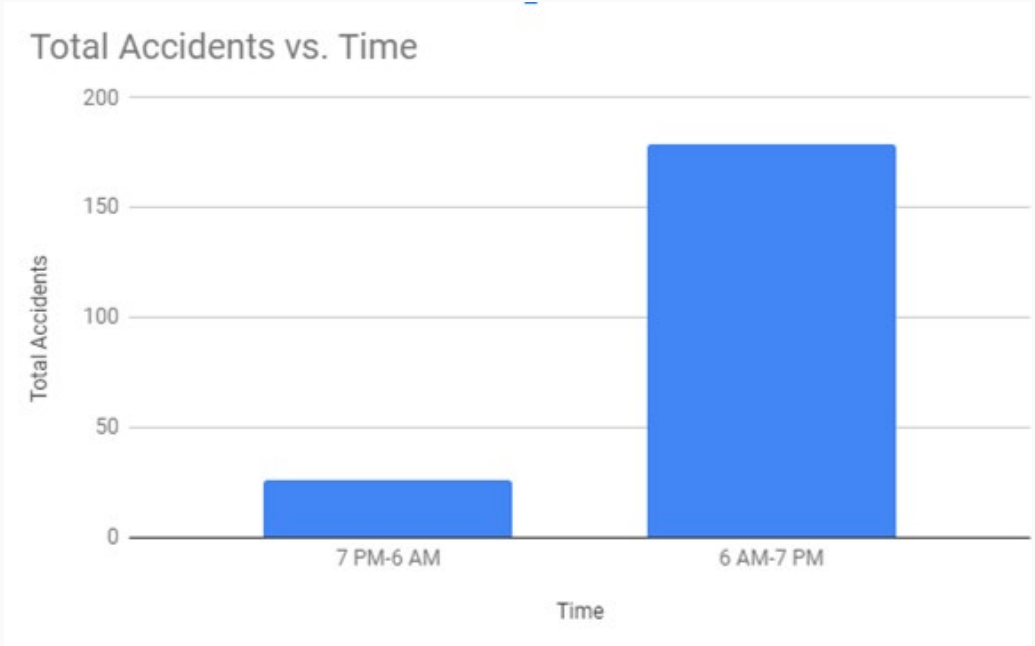
Lighting Conditions: Pedestrian Collisions

Time	Total Accidents
A. Daylight	169
B. Dusk-Dawn	10
C. Dark(Street Lights)	26
D. Dark	3
E. Dark(Lights Not Working)	1

Lighting Conditions: Bicycle Accident
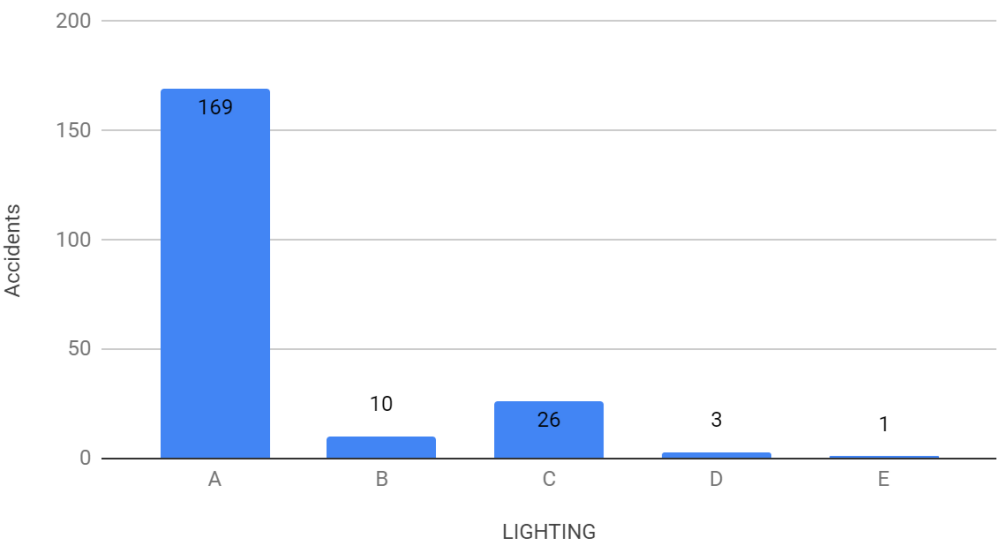
# Lighting Conditions: Pedestrian Collisions (Percentages)

Total Accidents

D. Dark
1.4%

C. Dark(Street Lights)
12.4%

26 (12.4%)

B. Dusk-Dawn
4.8%

10 (4.8%)

169 (80.9%)
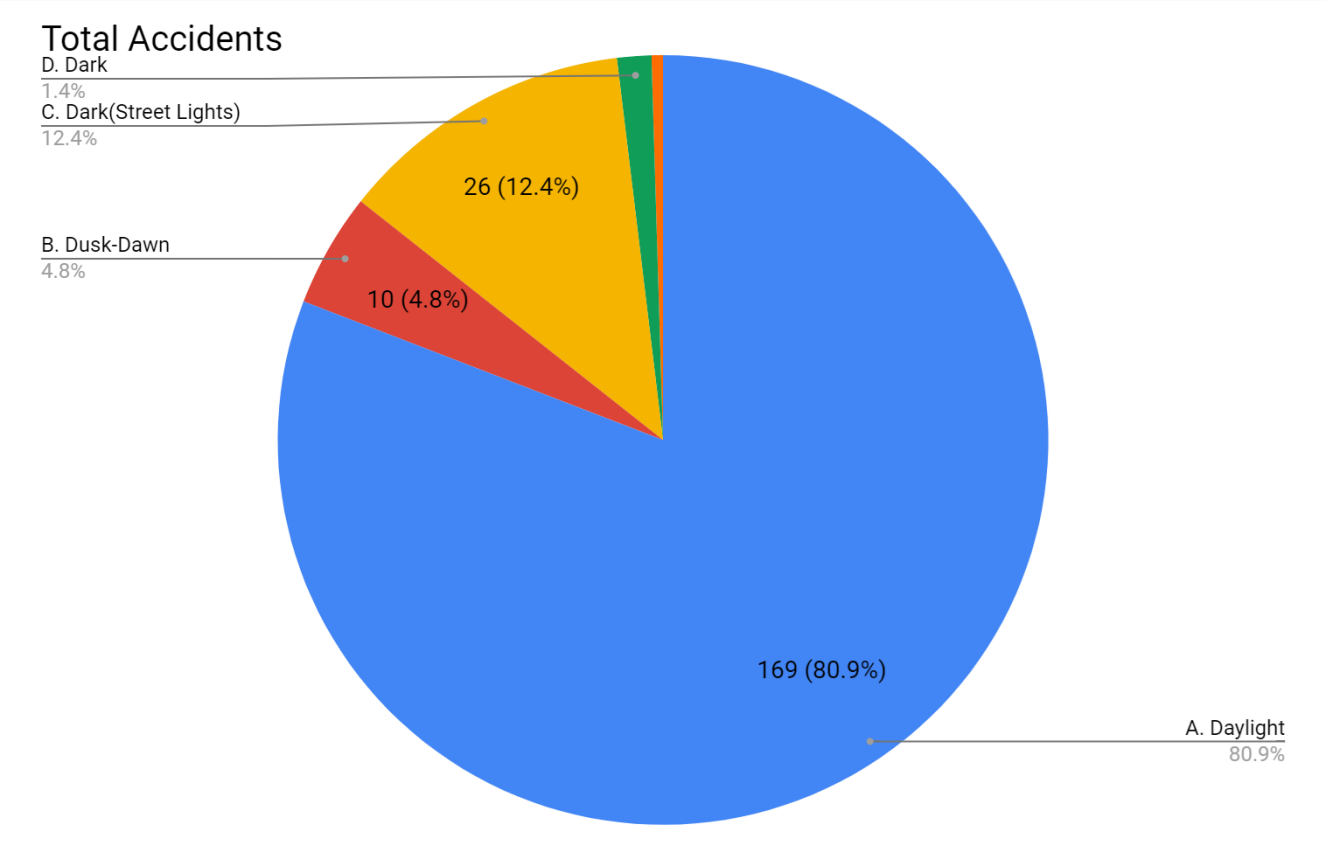
A. Daylight
80.9%

Lighting Conditions: Bicycle Collisions

Time	Total Accidents
A. Daylight	52
B. Dusk-Dawn	3
C. Dark(Street Lights)	23
D. Dark	0
E. Dark(Lights Not Working)	0
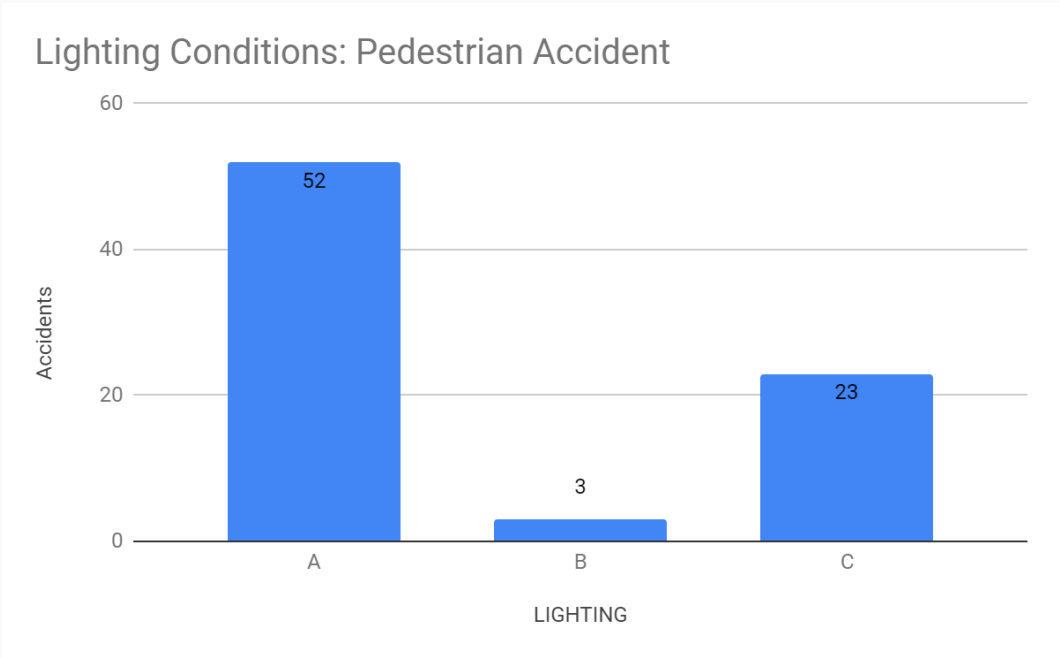
Lighting Conditions: Pedestrian Accident

Lighting Conditions: Bicycle Collisions (Percentages)

Total Accidents

- C. Dark(Street Lights) 29.5% — 23 (29.5%)
- B. Dusk-Dawn 3.8% — 3 (3.8%)
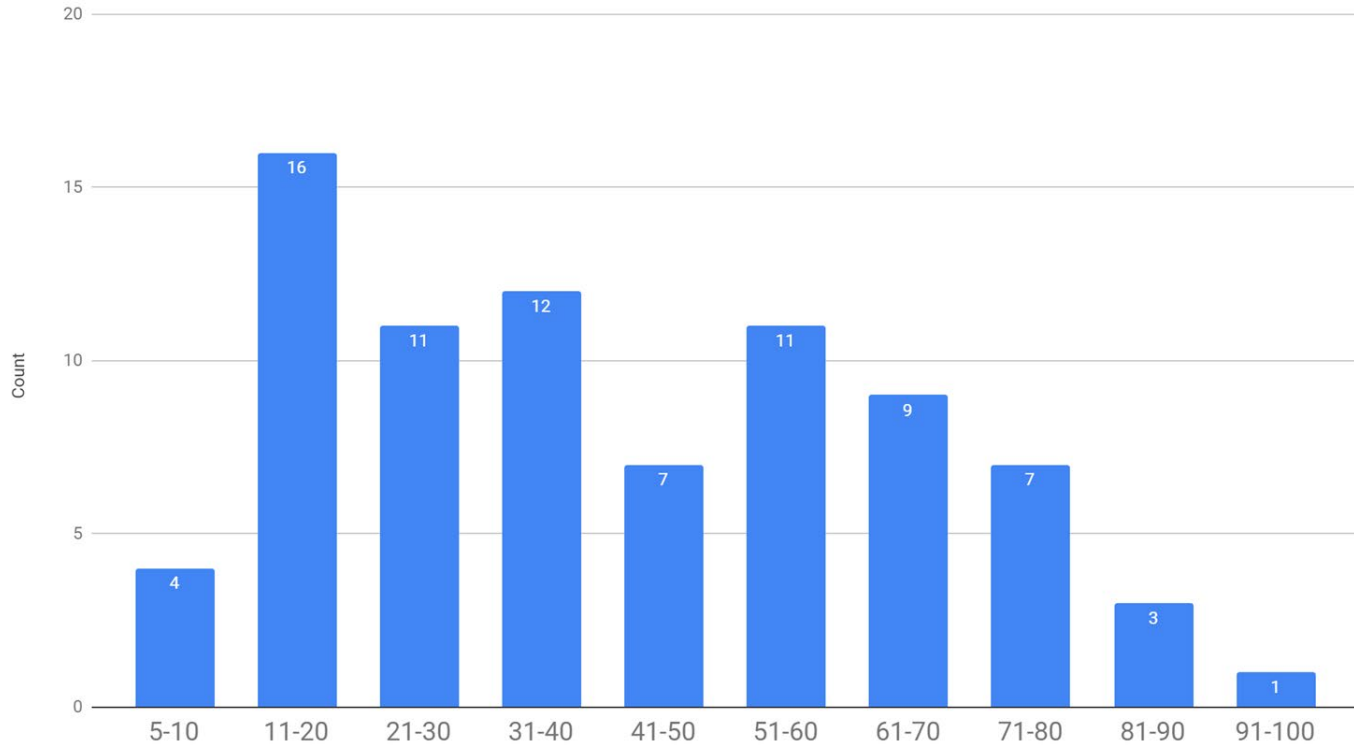- A. Daylight 66.7% — 52 (66.7%)
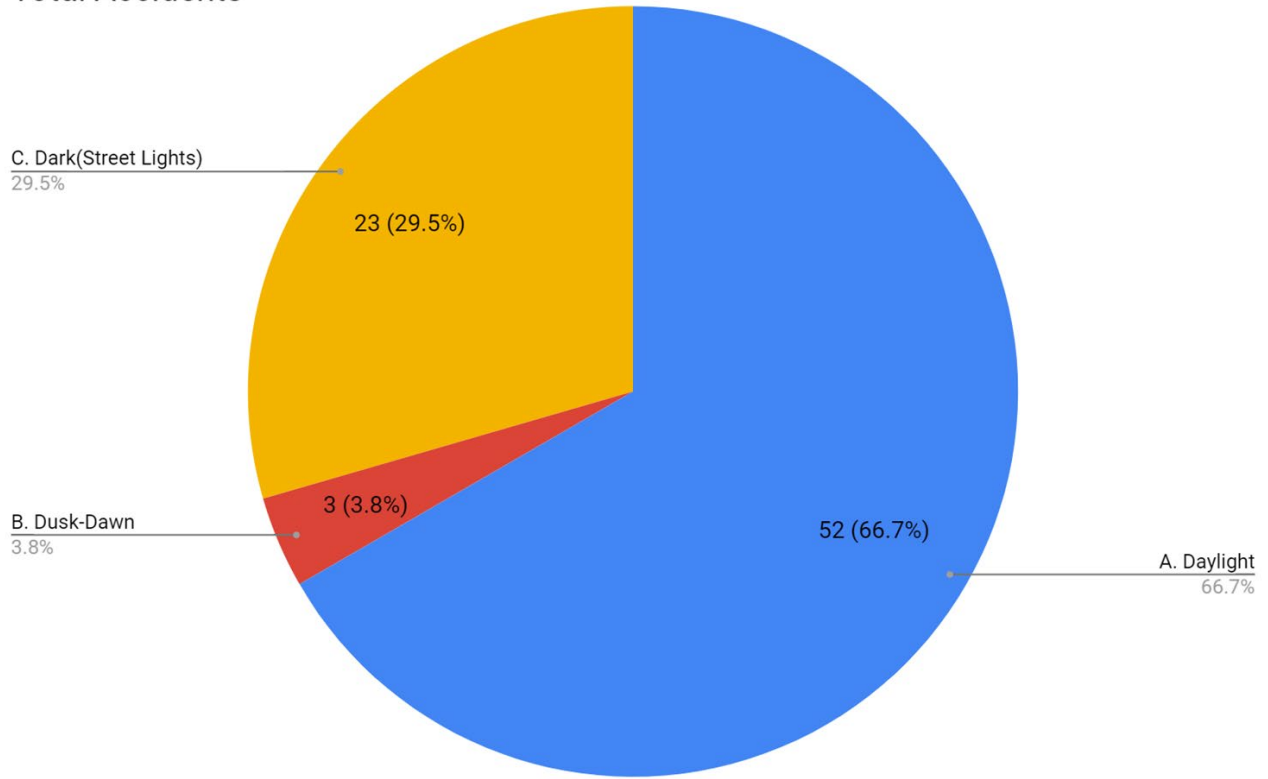
Accidents by Demographic (Bicycle)

Accident Count By Demographic
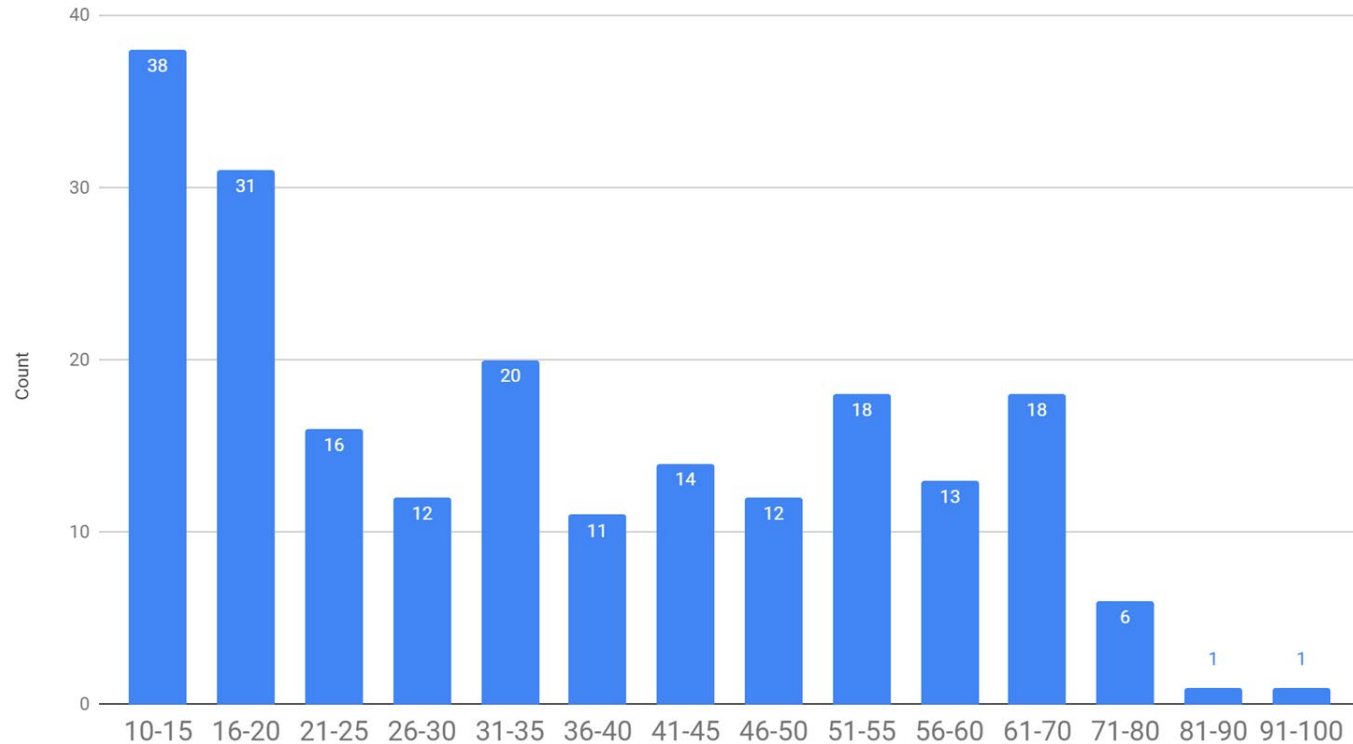
Accidents by Demographic (Pedestrian)

Accident Count By Demographic

Highest Collisions By Location

- **Intersections**
  - Stevens Creek(63)
  - De Anza(45)
  - Homestead(19)
  - Wolfe(16)
  - Bollinger(12)
- **Streets**
  - Stevens Creek(142)
  - De Anza(111),
  - Homestead(55),
  - Stelling(40),
  - Wolfe(38),
  - Bollinger(27)
- **Highways**
  - I280S/B(126)
  - I280N/B(98)

Conclusions

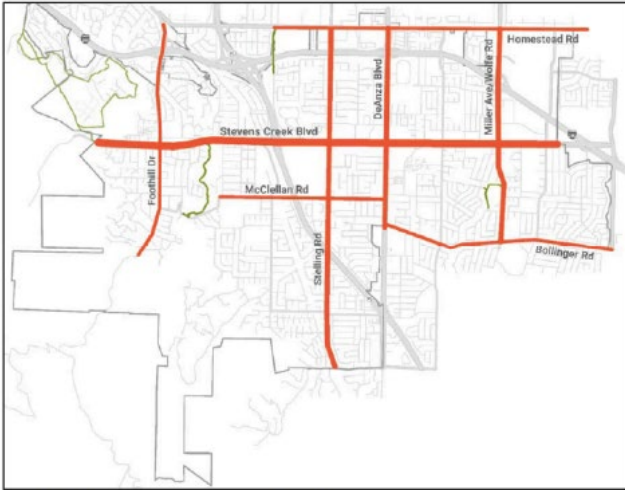## High Risk Corridors from the Previous Master Plan

Figure 14. High-injury corridors: From 2005 to 2014, 71 percent of pedestrian injury crashes occurred on eight corridors.

Conclusions from This Analysis

- The two corridors with the **highest number of reported collisions** (Bicycles and Pedestrian) were
  - Stevens Creek: Stelling - De Anza (8)
  - Stevens Creek: Byrnie - 85 (7)
- Stevens Creek and De Anza Boulevard both have **higher volumes of auto traffic and vehicle speeds** since they are larger main roads

- Find a database for Vehicle Miles Traveled(VMT) for major roads(or count of vehicles passed through the road)

References

- **Santa Clara County Police Dept.**
- **SWITRS Website**
- **2016 Bike Transportation Plan**
- **2018 Pedestrian Transportation Plan**
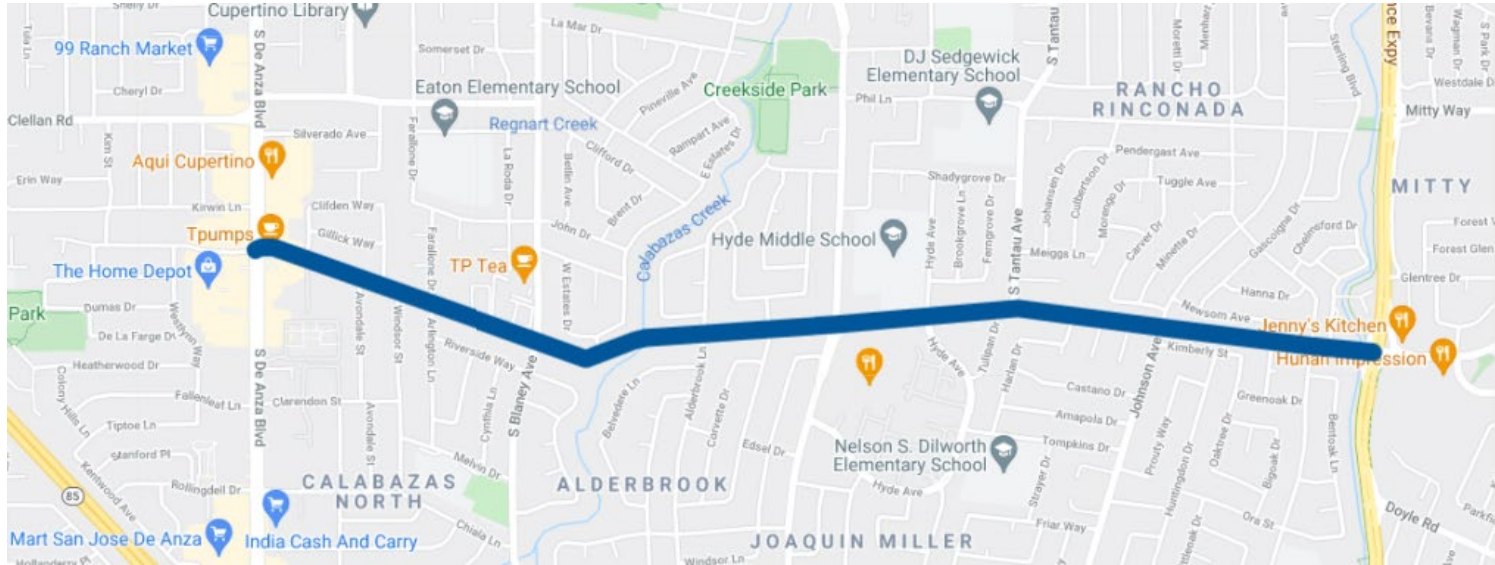- **CHP**

STUDY OVERVIEW

Study Area: Bollinger Road from De Anza Boulevard to Lawrence Expressway
Objective: Identify improvements to create a safer and more comfortable corridor for pedestrians, bicyclists, transit riders and motorists

COMMUNITY PRIORITIES (ROUND 1 SURVEY)

Category	Average Rating (1 to 5)
New or safer crossings at intersections for pedestrians and bicyclists	4.2
Safer or more comfortable bike lanes	3.8
Reduce vehicle speeds	3.7
Reduce vehicle congestion	3.7
Better lighting	3.6
Safer or more comfortable sidewalks	3.4
Improvements for people with disabilities	3.3
Better landscaping	2.7
Better access and amenities at bus stops	2.6

HIGHER PRIORITY

LOWER PRIORITY

3

COMMUNITY PRIORITIES / PROPOSED STRATEGIES

Easier pedestrian connections across Bollinger Road

- Provide new and improved pedestrian crossings
- Shorten crossing distances

Safer and more comfortable bike lanes

- Bike buffers and raised protection

Reduce auto speeds

- Install speed feedback signage
- Narrow lane widths and lane conversion

Improve pedestrian comfort and safety

- Reduce curb radii to slow auto turn speeds
- Upgrades to meet ADA standards
- Provide landscape buffer for sidewalk

Sidewalk Improvements

Reduce Auto Speeds

Improved Crossings

Protected Bikeways

IMPROVEMENT ALTERNATIVES

Alternative A: Lane Conversion

Bollinger Road would be reduced from 4 lanes to 2 lanes (1 lane in each direction), creating space for a continuous two-way left-turn lane or median, improved pedestrian crossings, and improved bicycle facility.

Alternative B: Maintain Existing Lanes

Bollinger Road would maintain the existing 4 lanes. Provide spot improvements to improve pedestrian crossings and bicycle facilities where feasible.
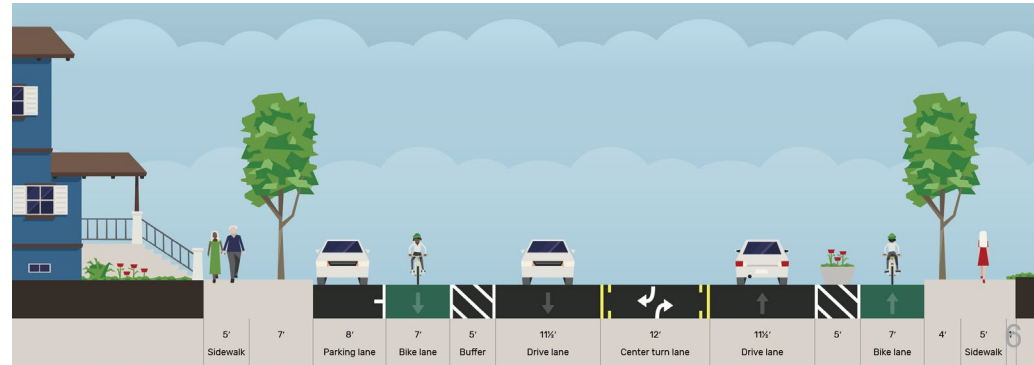
ALTERNATIVE A

Lane conversion with protected bike lanes

Benefits

- Reducing the number of lanes will slow vehicle speeds
- Protected bike lanes provides a safer and more comfortable environment for cyclists of all ages and abilities
- Allows for new, safe crossings of Bollinger Road with a median refuge
- A center-turn lane makes it easier and safer to turn onto or off the corridor
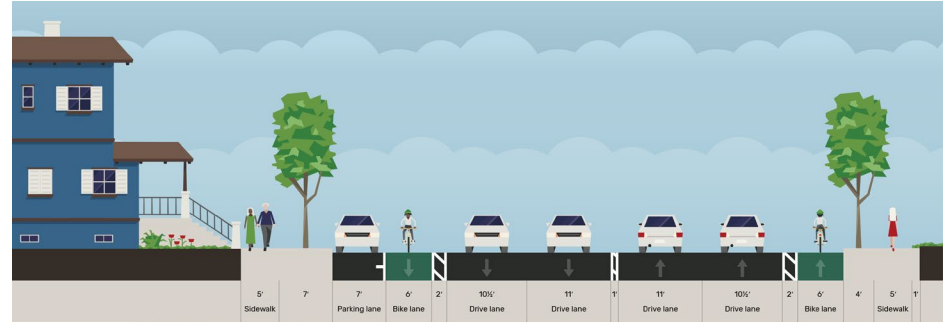
Drawbacks

- Reducing the number of lanes may increase vehicle travel times in the corridor. Traffic analysis will be needed to quantify these effects.

ALTERNATIVE B

Lane narrowing with buffered bike lanes

Benefits

- Increases separation between bikes and cars with bike buffers
- Does not reduce the auto capacity of the road
- Allows for transit islands in limited locations to remove bus and bike conflicts and allow in-lane stops

Drawbacks

- Will achieve less of a reduction in vehicle speeds than Alternative A; high vehicle speeds were a common complaint raised in the initial public survey
- Limited opportunities for vertical separation between bikes and cars
- Limited opportunities for implementing Rapid Rectangular Flashing Beacons (RRFB) at pedestrian crossings due to safety concerns

OTHER NOTABLE IMPROVEMENTS IN BOTH ALTERNATIVES

- Consideration for pedestrian-scale lighting
- Tighten curb radii, remove "free" right-turns at Miller Ave and Johnson Ave, and provide directional curb ramps to shorten crossing distances and slow vehicle speeds
- Upgrade curb ramps, crosswalk striping, and provide leading pedestrian intervals to additionally improve crossing safety
- Relocate bus stops closer to crosswalks
- Provide bike boxes and two-stage bike turn boxes to facilitate bike turning movements

Pedestrian-Scale Lighting

Bollinger Rd

Miller Ave

Source: Washington University in St. Louis

Bike Box

Two-Stage Bike Turn Box
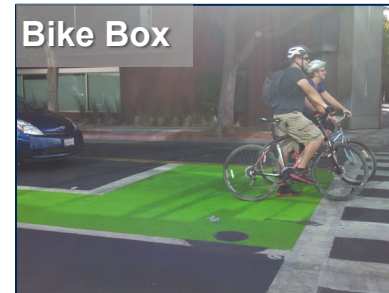
Source: Silicon Valley Bicycle Coalition

COMMUNITY FEEDBACK (ROUND 2 OUTREACH)

Alternative A

Type of Engagement	# of comments	Thumbs Up	Thumbs Down
Positive Comments	24	55	92
Negative Comments	4	32	19
Spot Improvements	20		
Something I Like	15		
Something I'd Like to Change	12		
Unique Users	139		

Alternative B

Type of Engagement	# of comments	Thumbs Up	Thumbs Down
Positive Comments	3	2	0
Negative Comments	7	21	7
Spot Improvements	10		
Something I Like	3		
Something I'd Like to Change	11		
Unique Users	81		

Topics

- 2021 Bike Fest Logistics
- Goals
- Pre-Bike Fest Engagement
- Confirmed Booths/Activities
- Potential Booths/Activities
- BPC Feedback

Basic Logistics

Hosts: Cupertino Safe Routes to School (SR2S) and Bicycle Pedestrian Commission

Date: Saturday, September 25, 2021
Time: 9:00 a.m. to 1 or 2 p.m.
Location: City Hall Parking Lot

Goals

- Culture Shift

- Bike Fest Encourages
    - Biking for Personal Health
    - Biking for the Planet
    - Bike Safety Education
    - Fun

Pre-Bike Fest:

Summer Bike Challenges

JULY BIKE CHALLENGES

For more information, visit: cupertino.org/bikechallenge

RIDE MORE MILES CUPERTINO

- Ride at least 10 miles

Prizes:
- "I Bike Cupertino" tee

ORGANIZE A GROUP RIDE

- Ride with friends. Optional: Make a theme!

Prizes:
- Ice cream

BIKE TO SCHOOL/WORK/SHOP

- Practice your route to school. Bike to work. Shop by bike.

Prizes:
- SR2S swag bag, boba, t-shirt, water bottle, or bike bell

BIKE TO ART

- Use the City's virtual ARTour App to explore art in Cupertino.

Prizes:
- Bike Decorations

BIKE DATE

- Go on a bike adventure with your sweetheart.

Prizes:
- Ice cream

SUMMER IS A GREAT TIME TO BIKE!

2016 MEASURE B VTA

Prizes paid for by VTA's 2016 Measure B.

Confirmed Booths/Activities

- Registration Table
- Walk Bike Cupertino
- Bike Checks
- Safe Moves: Bike Rodeo for Youngsters
- SR2S
- Prize Distribution Booth
- CERT: First Aid

Confirmed Booths/Activities

- Via Community Shuttle
- VTA
- Activities:
    - Decorate Your Bike
    - How Much Can You Carry
- Yuba Bikes: Cargo Bike Demo
- Trailhead Cyclery

Confirmed Booths/Activities

Potential Booths/Activities

Historically BPC-Hosted Activities:

- Blender Bike Smoothies
- Bike Ride(s)

Potential Booths/Activities

- Electric Bike Demo
- Food Truck

NEW:

- ABC Quick Check
- Turtle Race
- Decorate the Fence
- Museum of Tomorrow
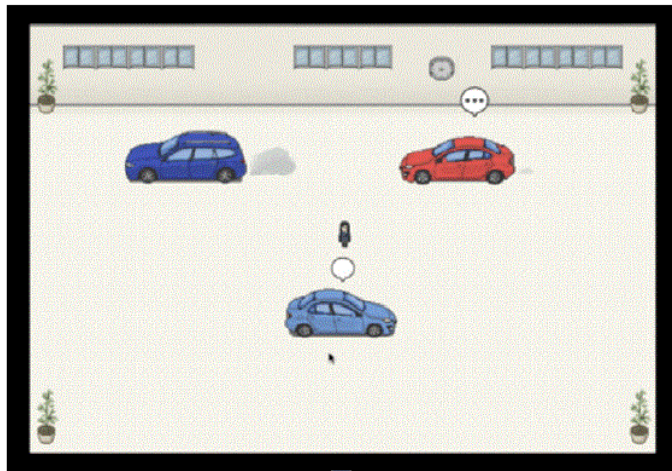
Museum of Tomorrow

Museum of Tomorrow

Carbon Race

Museum of Tomorrow

Plow-Up Igloo with Photo Props

Museum of Tomorrow

Fuelish Idling

Museum of Tomorrow

Customizable Key Chain

BPC Input

Please provide feedback on the following topics

- BPC Involvement:
  - Blender Bike Smoothies?
  - Bike Ride(s)?
- Extend End Time to 2 p.m.?
- Museum of Tomorrow?
- Next Year's Dates
- Other Input?