CITY OF MOUNTAIN VIEW

DATE: January 27, 2021

TO: Bicycle/Pedestrian Advisory Committee

FROM: Aruna Bodduna, Transportation Planner
              Ria Hutabarat Lo, Transportation Manager

SUBJECT: Local Road Safety Plan and Pedestrian and Bicycle Collision Data

RECOMMENDATION

Receive, review, and provide feedback on the Local Road Safety Plan crash data analysis, and receive information on collisions involving pedestrians and cyclists from the first and second quarters of 2020.

BACKGROUND

On January 15, 2019, Council reviewed a draft Vision Zero Policy and initial research on fatal and severe injury collisions in the City of Mountain View between 2006 and 2016. Based on this analysis, a High-Injury Network was identified, including El Camino Real, Shoreline Boulevard, Rengstorff Avenue, Middlefield Road, Central Expressway, California Street, segments of El Monte Avenue, Old Middlefield Way, Ellis Street, and San Antonio Road.

On October 22, 2019, the Mountain View City Council adopted the Sustainability Action Plan (SAP-4), including a package of 160 projects and other efforts aimed at achieving the City's greenhouse gas (GHG) emissions reduction targets and moving toward broader sustainability goals. The new projects included development and implementation of an integrated Vision Zero Action Plan (VZAP).

On December 10, 2019, Council adopted a Vision Zero Policy and reviewed an initial draft VZAP covering the "7Es": Engagement, Equity, Engineering, Education, Encouragement, Enforcement, and Evaluation. Strategies included prioritization of projects along the City's High-Injury Network as part of the Five-Year Capital Improvement Program (CIP), and Open Streets Events such as Thursday Night Live.

Since the adoption of the Vision Zero Policy, staff has collaborated via an interdepartmental Vision Zero Working Group to review capital projects and schedule for inclusion in the City's Five-Year Capital Improvement Program. Through these discussions, the CIP has been updated to include feasibility, pilot, design, and/or construction projects identified on the City's High-Injury Network such as El Camino Real Pedestrian and Bikeway Improvements, El Monte Corridor Improvements, California Street Complete Streets Pilot, and Middlefield Road Bikeway Pilot and Study. Staff implemented or planned various Vision Zero Engagement and Encouragement activities, most of which were canceled due to COVID-19. Instead, staff used a portion of SAP-4 funds to implement the Castro StrEATS program, which facilitated outdoor dining and simultaneously achieved the goal of piloting an Open Streets program.

Each quarter, the Police Department presents information on collisions involving pedestrians and bicycles. This data is incomplete because collisions under investigation are not included. This data can be found on the City website at https://www.mountainview.gov/depts/pw/transport/walkingandbicycling/collisions_involving_pedestrians_and_bicyclists.asp

ANALYSIS

In 2020, the City hired a consultant to prepare an integrated Vision Zero Action Plan (VZAP) and Local Road Safety Plan (LRSP). VZAPs typically use a *multi-pronged hotspot approach* to transportation safety by addressing key crash factors and improving corridors on the High-Injury Network using the 7Es. By comparison, LRSPs use a *systemic infrastructure approach* to transportation safety by identifying locations with similar characteristics or movements to those of fatal or severe injury collisions and treating these locations with engineering countermeasures. Key steps in developing an LRSP include gathering and analyzing data, identifying countermeasures, and developing projects.
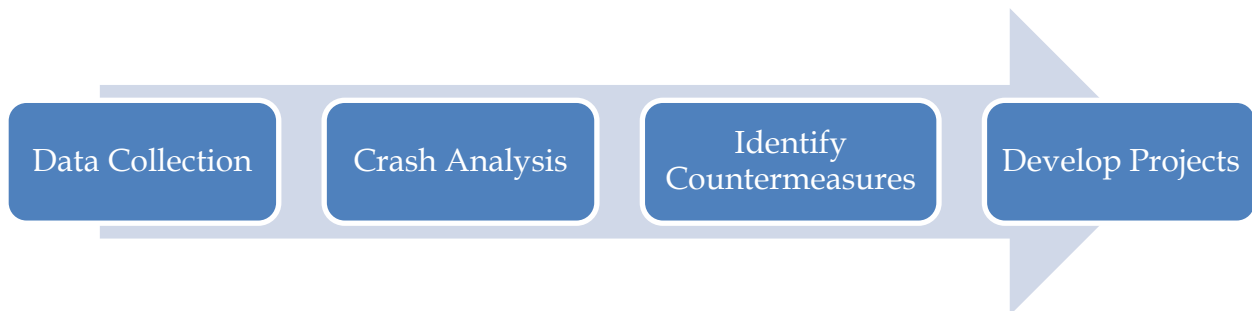

Figure 1: LRSP Key Steps

Integrating these two approaches allows the City to consider transportation safety issues and strategies within a holistic, proactive framework. A valid LRSP will also be an

eligibility requirement for cities to receive Highway Safety Improvement Program (HSIP) funding beginning Cycle 11 (2022).

Crash Data

As a part of the LRSP/VZAP, crash data was analyzed for the years 2014-2019 from UC Berkeley SafeTREC (Safe Transportation Research and Education Center) Transportation Injury Mapping System (TIMS). TIMS provides geocoded information based on the Statewide Integrated Traffic Records System (SWITRS) database.

For the purpose of this report, crash data on the freeways or expressways is not included in the analysis because the City does not have jurisdiction over these facilities. El Camino Real is included in the analysis because of the close proximity of intersections along the roadways and also because it was identified on the High-Injury Network. Ramp and expressway intersections with a City roadway are included in the analysis. Crashes that occur at railroad crossings with Mountain View streets (Rengstorff Avenue and Castro Street) are not reflected in SWITRS and were added using data from the Federal Railroad Administration (FRA) database.

Data analysis focused on fatal and severe crashes to identify systemic approaches towards reducing and eliminating fatal and severe injuries consistent with the Vision Zero policy.

Vision Zero Analysis Updates and Overall Trends

Crash data and overall trends were analyzed for the period 2014–2019 and compared with previous Vision Zero analysis for 2006–2016. Between 2014 and 2019, 1,242 collisions occurred in Mountain View, with the highest number of crashes (248) in 2017. As seen in Figure 2, the majority of collisions involve motor vehicles only, which is expected given the vehicle mode share of approximately 80 percent.
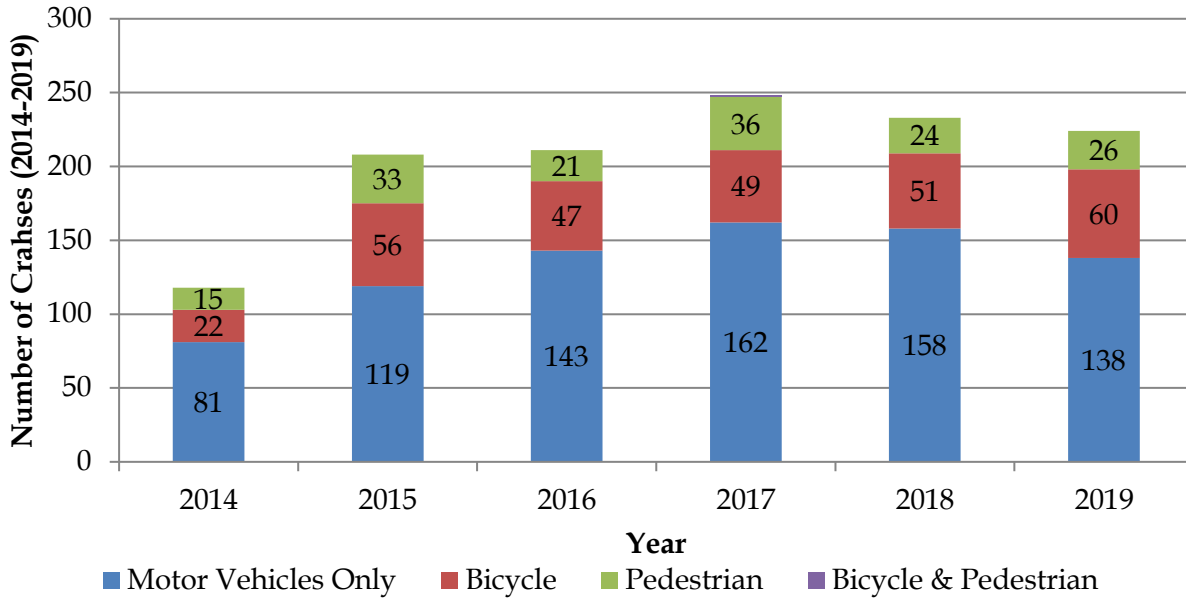
Figure 2: Mode of Transportation for Crashes, Mountain View, 2014-2019

Consistent with the previous Vision Zero analysis, pedestrians and bicyclists continued to be overrepresented among fatal and severe injury collisions between 2014 and 2019 as shown in Figure 3. Pedestrians represented an estimated 3 percent of trips, but 12 percent of total crashes, 36 percent of severe injury crashes, and 38 percent of fatal crashes. Likewise, bicyclists represented an estimated 6 percent of trips, but were involved in 23 percent of total crashes, 27 percent of severe injury crashes, and 8 percent of fatal crashes.
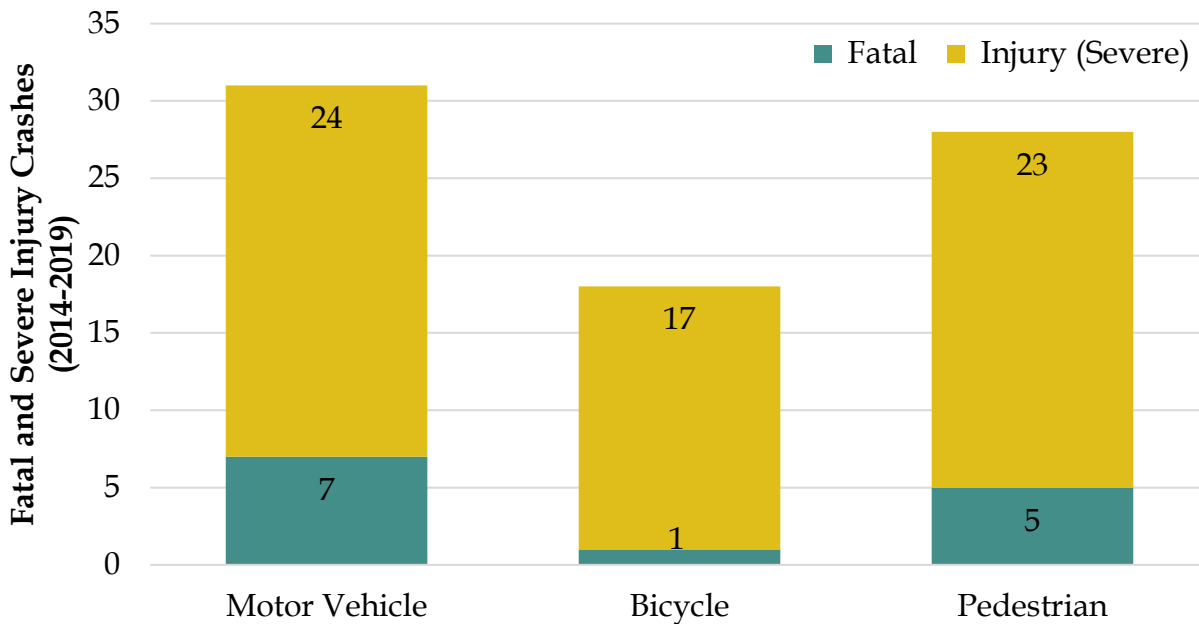
Figure 3: Mode of Transportation Fatal and Severe Injury Crashes, Mountain View, 2014-2019

Demographics

As with the earlier Vision Zero analysis, young adults (age groups of 18-24) were overrepresented among collisions in the period 2014–2019. As shown in Figure 4, this age group represents 7 percent of Mountain View's population, but were involved in 12 percent of total crashes for the analysis period.
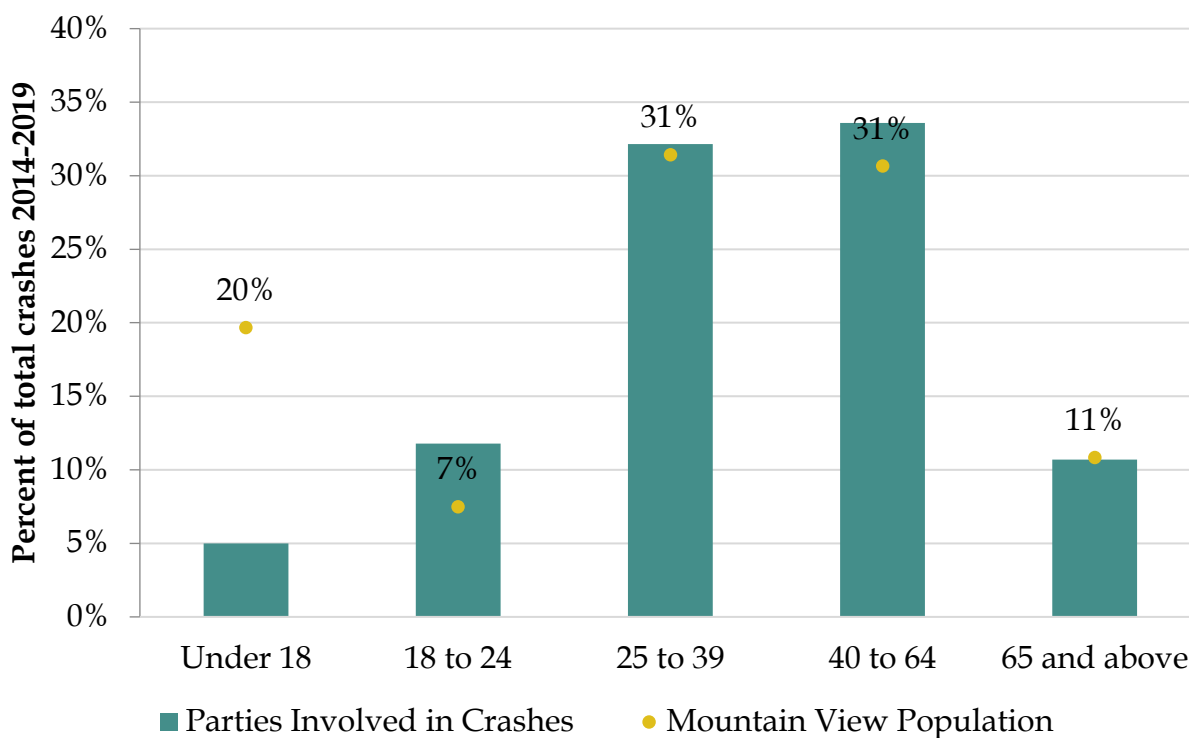
Figure 4: Age of Parties Involved in Crashes, 2014-2019
Compared to 2018 Age Distribution of Mountain View Population

Likewise, male bicyclists also continued to be very overrepresented among those involved in crashes between 2014 and 2019. In the Vision Zero analysis, males over 65 were overrepresented in fatal and severe injury crashes. The LRSP analysis has not yet assessed if this is the case. As shown in Figure 5, males represent 52 percent of Mountain View population and were involved in 76 percent of bicycle crashes and 57 percent of vehicle crashes. It should be noted that in U.S. cities, males are typically overrepresented among cyclists, so it is unclear to what degree this represents differences in exposure.

By contrast, females represent 48 percent of Mountain View population and were involved in more crashes involving pedestrians compared with other modes during the study period.
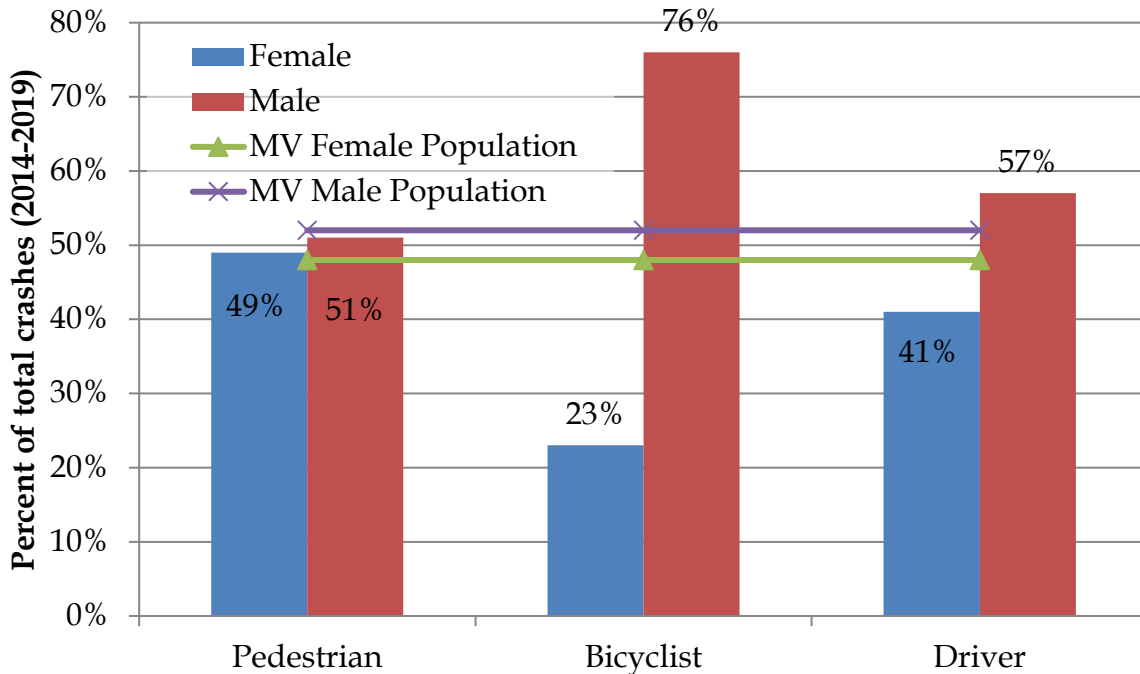
**Figure 5: Gender and Mode of Transportation for Those
Involved in Crashes, 2014-2019, Compared to 2018 Mountain View Population**

As part of the LRSP analysis, crashes were analyzed by the race and ethnicity of those involved. In Mountain View, the three largest racial or ethnic groups are White (44 percent), Asian (30 percent), and Latino/a (18 percent), followed by Black (2 percent).[1] As seen in Figure 6, Latinos/Latinas were overrepresented in all crashes involving all modes of transportation, including walking and bicycling, while Black and White community members were overrepresented in bicycle crashes.

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[1] The categories in the crash data presented in these figures do not align exactly with U.S. Census Race and Ethnicity categories. Mountain View Total Population estimates shown here are from American Community Survey 2018 five-year estimates Table B03002, Hispanic or Latino Origin by Race.
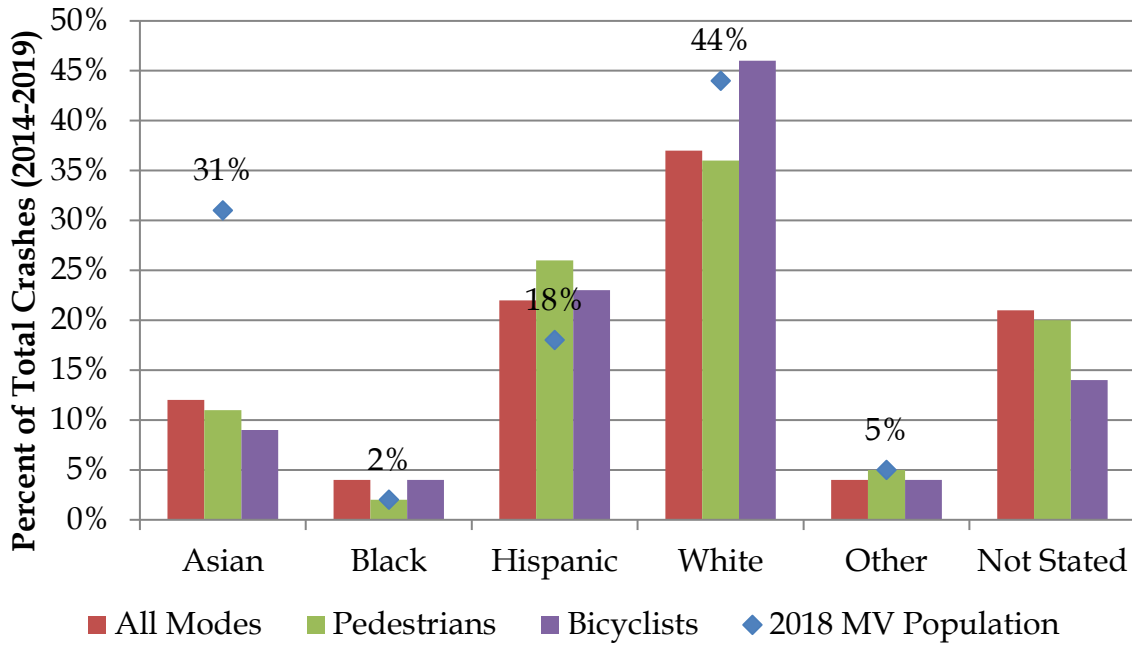
**Figure 6: Race, Ethnicity, and Mode of Transportation
for Those Involved in Crashes, 2014-2019**

Primary Collision Factors

A slight shift in primary collision factors (PCFs) for fatal and severe injury crashes was observed in the period 2014–2019. During the period 2006–2016, the Vision Zero analysis had identified the most common primary collision factors for fatal and severe injury collisions as:

- Driving or riding under the influence of alcohol or drugs;

- Failure to yield to a pedestrian in a crosswalk; and

- Unsafe speed.

For the period 2014–2019, the following primary collision factors were most commonly observed, as shown in Figure 6:

- Violating pedestrian right-of-way (failure to yield to a pedestrian in a crosswalk);

- Violating automobile right-of-way (failure to yield to oncoming vehicle during a turn);

- Driving or riding on wrong side of road; or

- Pedestrian violation (failure to yield to a vehicle outside of a crosswalk).

These results are displayed in Figure 6. Crashes in the "Other" category include crashes related to improper turning, unsafe lane change, and unsafe starting or backing.
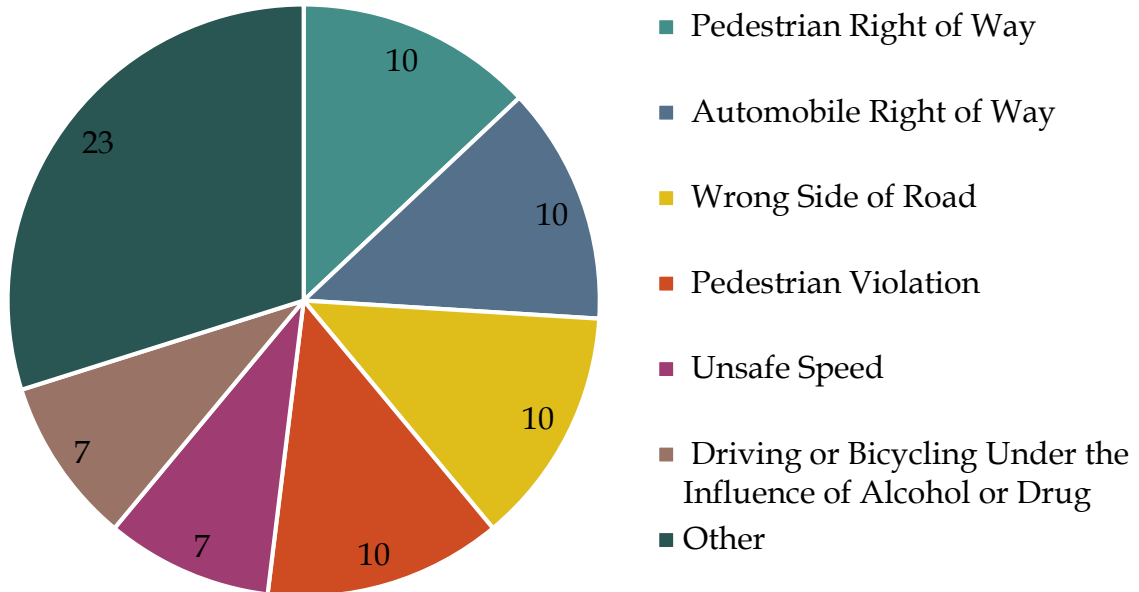

Figure 6: Primary Collision Factor (PCF) for Fatal and Severe Injury Crashes, 2014-2019

Roadway Characteristics

As part of the Systemic Safety Analysis (SSA) for the LRSP, analysts considered street type, geometric characteristics, and details regarding road user movements to provide more specific information on crash characteristics.

In Mountain View, major arterials such as Middlefield Road and Shoreline Boulevard constitute approximately 10 percent of the roadways and are overrepresented among crashes involving all modes of transportation (see Figure 7). Severe crashes were highest on the major arterials compared to other roadways. As shown in Figure 8, over 70 percent of fatal crashes occurred on the major arterials.
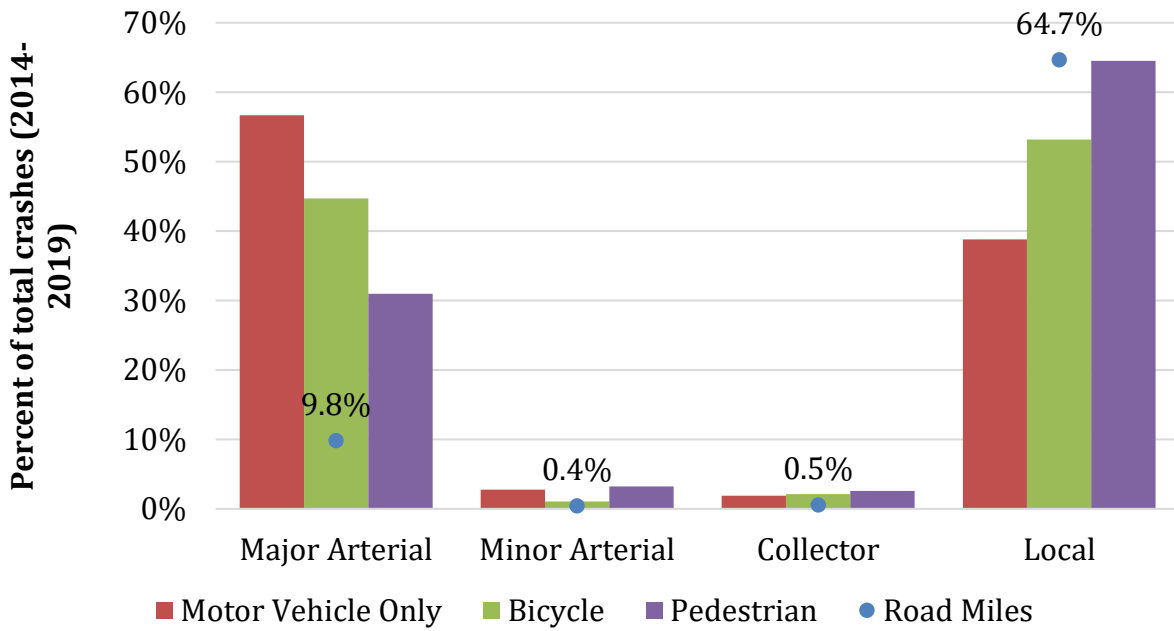
**Figure 7: Crashes by Mode of Transportation
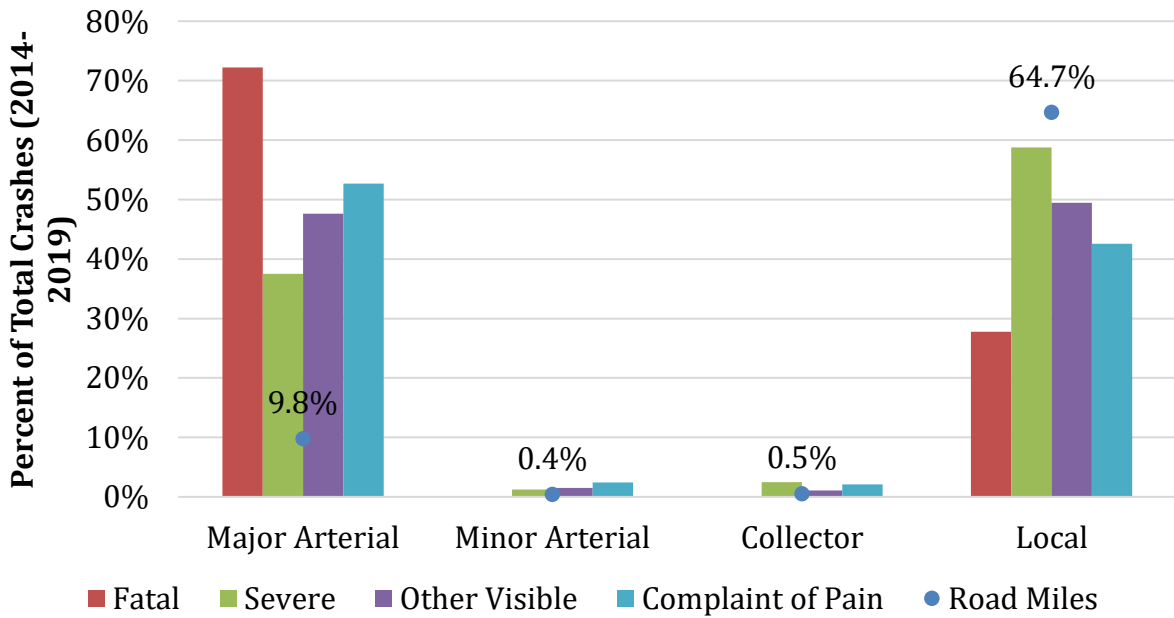and Roadway Classification, 2014-2019**

Figure 8: Crashes by Severity and Roadway Classification, 2014-2019

A majority of fatal and severe injury crashes occurred on roadways with higher speeds. Streets with posted speed limits of 35 miles per hour (mph) and over constitute 15 percent of the City's road network. However, over 65 percent of vehicle and bicycle crashes

occurred on these roadways, and over 70 percent of fatal collisions occurred on these roadways (see Figures 9 and 10).
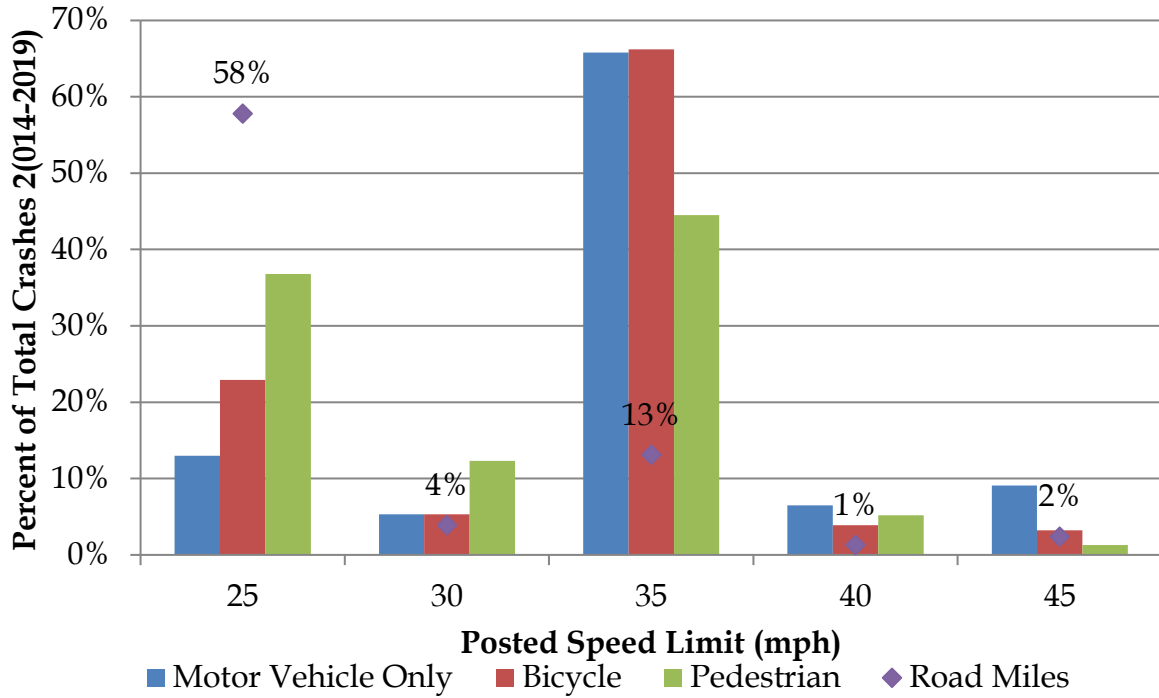

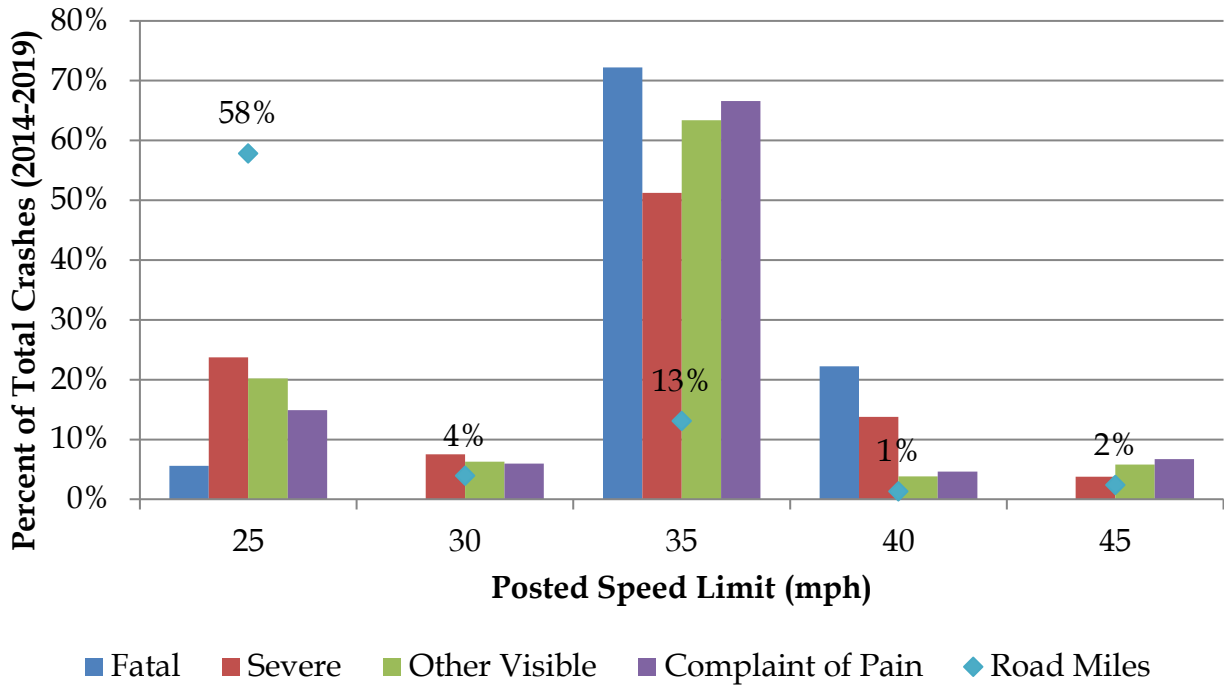**Figure 9: Crashes by Posted Speed Limit and Mode of Crash, 2014-2019**

Figure 10: Crashes by Posted Speed Limit and Severity of Crash (2014-2019)

According to crash data from 2014-2019, there were fewer crashes involving motor vehicles at intersections relative to other locations.[2] For crashes involving bicycles and pedestrians, most crashes occurred at an intersection.

Nearly 70 percent of pedestrian-involved crashes that occurred at an intersection involved a stop-controlled (one-, two-, three-, or four-way stop) or uncontrolled intersection, while 35 percent involved a signalized intersection (Figures 11 and 12). For bicycle-involved crashes at intersections, nearly equal numbers occurred at signal and stop and uncontrolled intersections.

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[2] A distance of 25' or more from the intersection is defined as "not at intersection."
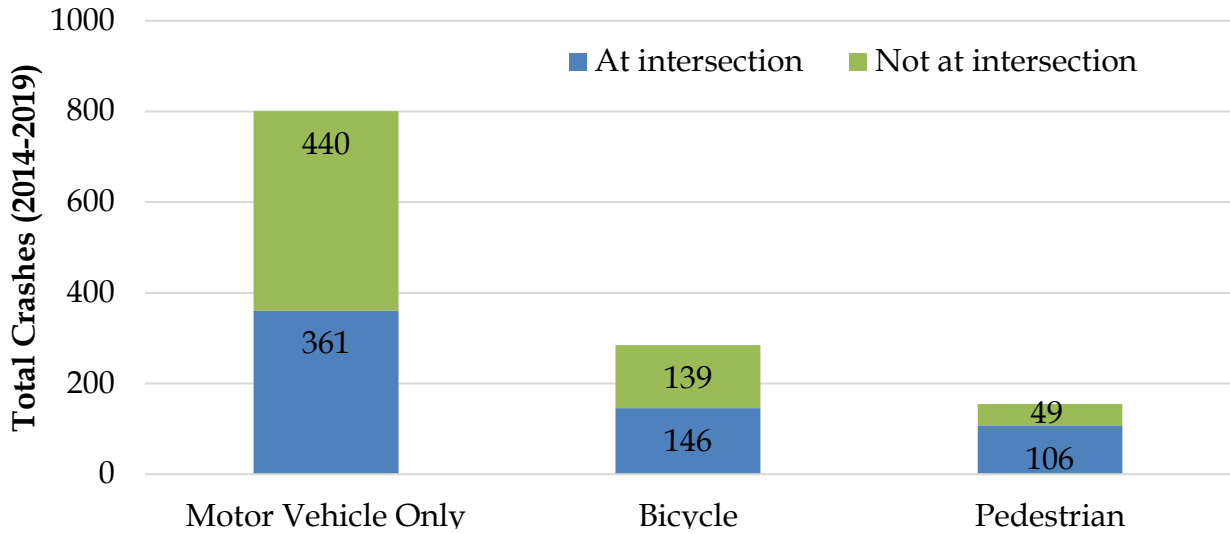
Figure 11: Number of Crashes at Intersections by Travel Mode, 2014-2019
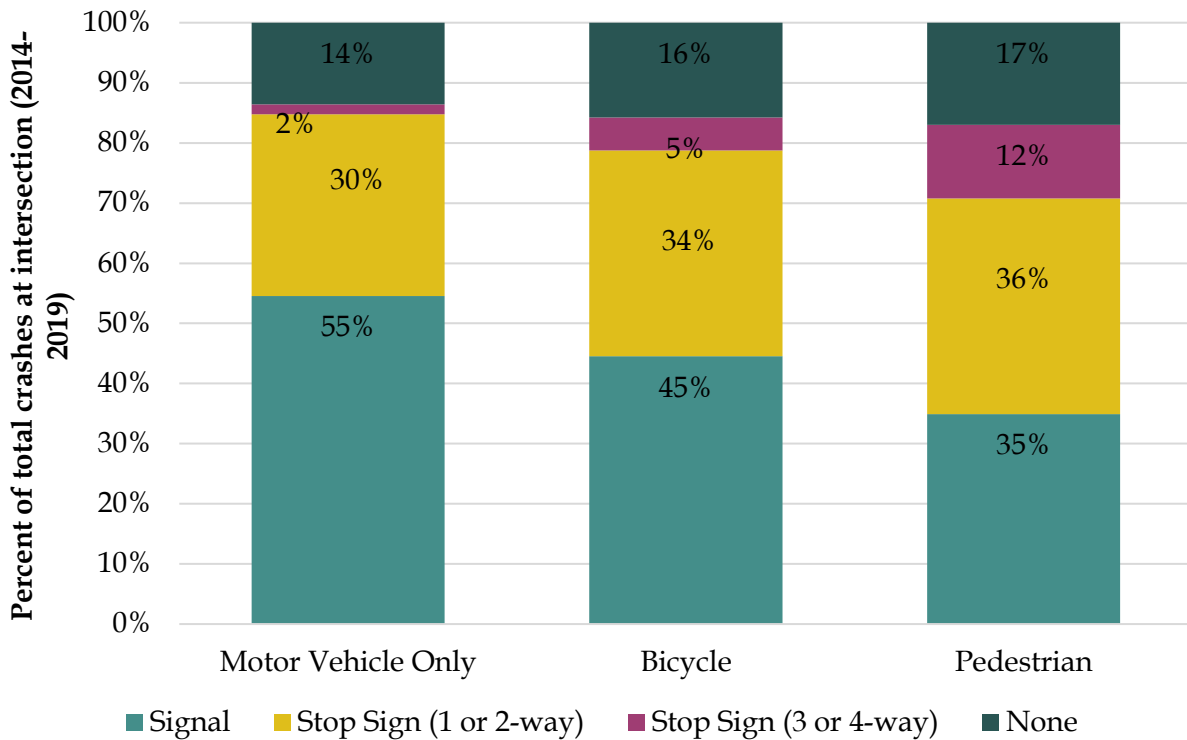

Figure 12: Crashes by Intersection Control Type and Travel Mode, 2014-2019

Movements Preceding Crash

In order to appropriately target countermeasures, the SSA includes analysis of movements that precede collisions. Based on this analysis, over 50 percent of crashes

involving pedestrians occurred while a pedestrian was crossing in a crosswalk at an intersection. As shown in Table 1, nearly 40 percent of pedestrian-involved crashes occurred while a pedestrian was in the crosswalk with vehicles making left or right turns. Figure 13 presents a schematic representation of such crashes.

Table 1: Vehicle-Pedestrian Crashes by Movement Preceding Crash, 2014-2019

Motorist Action	Pedestrian Action					
	Crossing in Crosswalk at Intersection	Crossing in Crosswalk Not at Intersection	Crossing Not in Crosswalk	In Road, Including Shoulder	Not in Road	Total
Proceeding Straight	21	6	18	7	6	58
Making Left Turn	36	2	6	3	1	48
Making Right Turn	23			2	8	33
Backing	1		2	1	2	6
Other	4	2	1	2	4	13
Total	85	10	27	14	18	154

PEDESTRIAN CROSSING IN CROSSWALK AT INTERSECTION, DRIVER TURNING LEFT (23%)

PEDESTRIAN CROSSING IN CROSSWALK AT INTERSECTION, DRIVER TURNING RIGHT (15%)
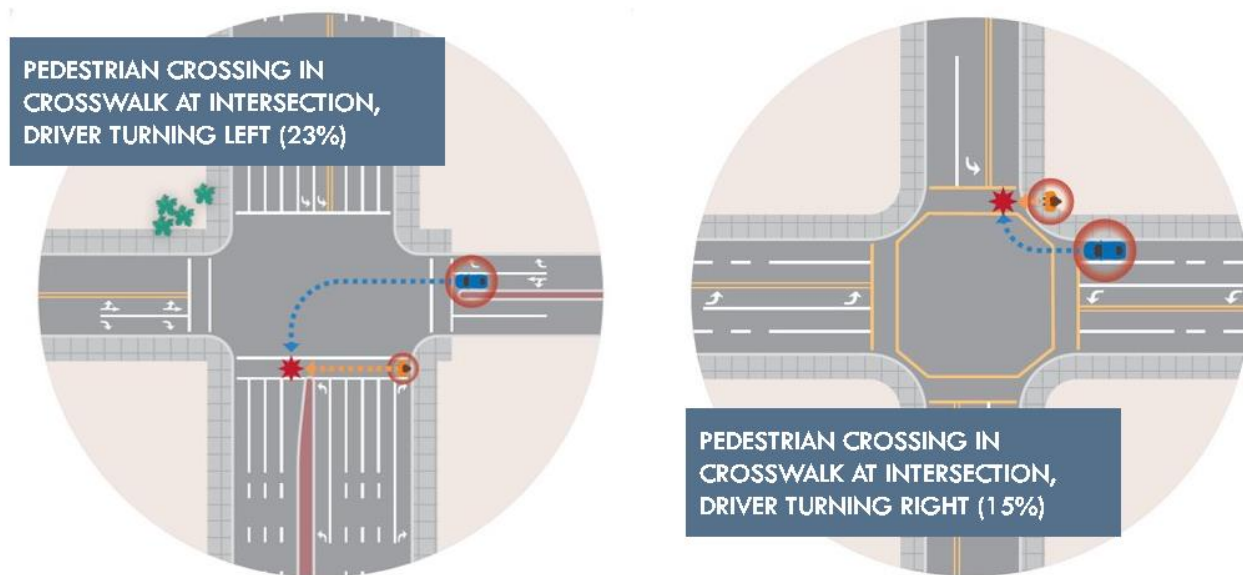
Figure 13: Pedestrian and Motorist Action Preceding Crash

Nearly 75 percent of crashes involving bicyclists occurred while the bicyclist was traveling straight and the motorist was either turning or traveling straight. As shown in Table 2, nearly one-third of bicycle crashes involved motorists turning, and one-quarter involved motorists proceeding straight. Figure 14 presents a schematic representation of these crashes.

Table 2: Vehicle-Bicycle Crashes by Movement Preceding Crash, 2014-2019

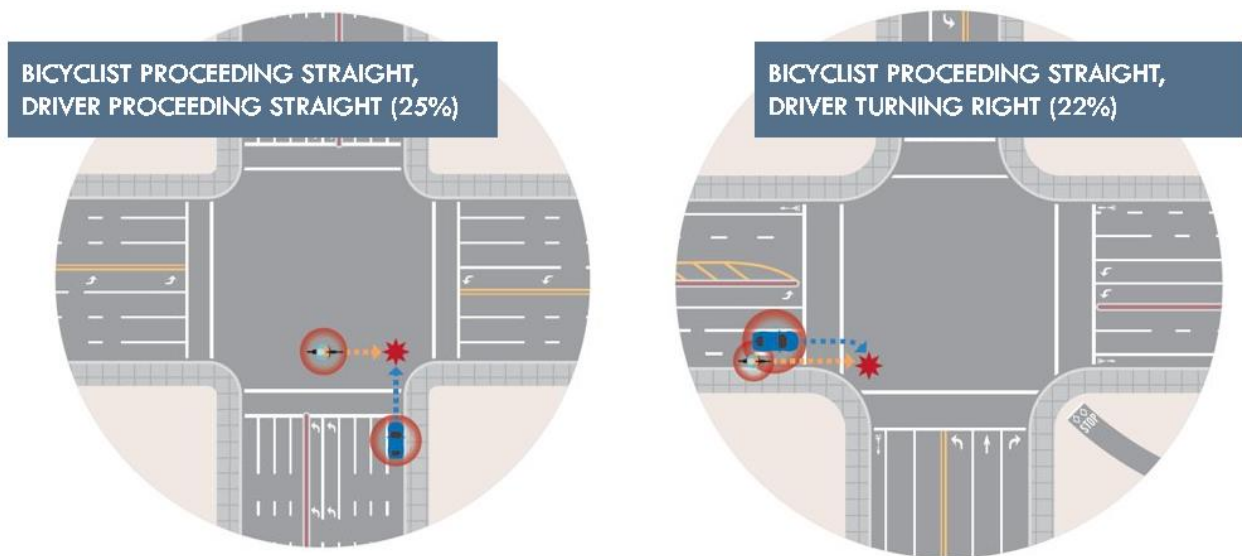| Motorist Action	Bicyclist Action						
	Proceeding Straight	Left turn	Changing lanes	Traveling wrong way	Right turn	Other	Total
Proceeding Straight	71	13	9	5	2	10	110
Right turn	62	3		12		3	80
Left turn	33					3	36
Other	47	2		3	3	4	59
Total	213	18	9	20	5	20	285

Figure 14: Bicyclist and Motor Vehicle Action Preceding Crash

Summary of Issues

The crash data analysis (2014-2019) conducted shows:

- Pedestrians and bicyclists are overrepresented among fatal and severe injury collisions; male bicyclists and female pedestrians overrepresented among those involved in crashes.

- Primary collision factors are violation of vehicle or pedestrian right-of-way, driving/riding on wrong side of the road.

- Latinos/as are overrepresented in all crashes involving all modes of transportation, including walking and bicycling.

- Fatal and severe injury crashes occurred on major arterial compared to other roadways, with nearly two-thirds vehicle and bicycle crashes on roads with 35 miles per hour posted speed limit, which represents only 15 percent of the City's road network.

- Crashes involving bicycles and pedestrians mostly occurred at intersections; over one-half of pedestrian crashes occurred when a pedestrian was crossing in a crosswalk at an intersection with a turning vehicle, and most bicyclist crashes occurred when a bicyclist was traveling straight and the motorist was either turning or traveling straight.

Next Steps

The data analysis above helps us understand the primary collision factors, most vulnerable users, and roadway characteristics of the high-crash locations. The next step of the systemic analysis is to group locations that have similar crash patterns. This analysis will look at each crash type across the City and identify common physical features associated with it among the various locations where it occurs. A list or tool kit of proven countermeasures will be identified to address the safety challenges. Staff will bring the item back to the B/PAC for feedback at this stage of the project.

DISCUSSION

B/PAC input is sought on the following questions:

- Does the B/PAC concur with the summary of issues to be addressed by countermeasures?

- Are there any additional areas of analysis that need to be included?

AB-RHL/2/PWK
903-01-27-21M

cc: APWD—Skinner, PWD