VISION ZERO

LOS ANGELES | 2015-2025

Vision Zero Safety Study

LADOT WITH SUPPORT FROM FEHR & PEERS

JANUARY 2024

Statement of Protection of Data from Discovery and Admissions

This study applies a systemic safety approach that identifies certain features on particular roadways that are correlated with specific collision types and frequencies. This broad approach is necessitated by the inherent nature of covering an entire agency's facilities in one study and the limited scope/budget available to prepare a safety study. Limited time is available to perform field observations throughout the study area to contextualize the data, and therefore, it is beyond the scope of work to perform in-depth "hot spot" evaluations at all locations.

Section 148 of Title 23, United States Code

REPORTS DISCOVERY AND ADMISSION INTO EVIDENCE OF CERTAIN REPORTS, SURVEYS, AND INFORMATION — Notwithstanding any other provisions of law, reports, surveys, schedules, lists, or data compiled or collected for any purpose relating to this section, shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at the location identified or addressed in the reports, surveys, schedules, lists, or other data.

Acknowledgments

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GRANT ID: LRSP224

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Executive Summary

LADOT remains steadfast in our commitment to ensure that all people are able to travel safely, with an emphasis on the most vulnerable users of our streets.

In 2015, the City of Los Angeles (City) responded to a trend of increasing local roadway traffic fatalities by undertaking Vision Zero – an ambitious initiative to reduce traffic fatalities citywide to zero by 2025. After the initiative was declared, the Los Angeles Department of Transportation (LADOT) investigated the state of traffic safety in depth and released its first High Injury Network (HIN) and Safety Study.

This plan, focusing primarily on data between 2017 and 2021, serves to show where progress has been made, where attention is needed, and what can be done to make improvements. The contents of the plan include a citywide systemic safety analysis, a new high injury network (HIN) and top scoring locations, and an update to LADOT's countermeasure toolbox.

Chapter 1 - Introduction provides an overview of the history of the Los Angeles Vision Zero program. This chapter also includes a summary of national safety trends, and an overview of current state and federal roadway safety programs and policies.

Chapter 2 – Citywide Safety Analysis summarizes the key findings from the collision landscape and systemic analyses which look at trends related to demographics, behavior, time and dates, and roadway and built environment characteristics. The analysis found that killed and severely-injured (KSI) collisions have increased by approximately 13%, from 1,472 in 2017 to 1,658 in 2021. Pedestrians were involved in 38% of these KSI collisions; 20% involved motorcyclists, 9% involved bicyclists, and the remaining 33% were vehicle-only collisions. These trends demonstrate that if Vision Zero is to be achieved, an updated approach is needed. The remaining chapters provide guidance for targeted action.

Chapter 3 – High Injury Network and Prioritization presents an updated HIN to help decision-makers strategically invest resources to have the largest impact on safety outcomes. The new HIN accounts for 549 miles of roadway, which represents 7.5% of the citywide roadway network. Additionally, mode-specific HINs for vehicles, motorcycles, pedestrians, and bicyclists were created as a part of this effort. To further hone Vision Zero strategic investments, LADOT identified and ranked a high-scoring subset of the HIN: Prioritization of Corridors and Intersections. Chapter 3 concludes by diving further into the systemic analysis which distinguishes 16 risk factors and 24 collision profiles, and presents key trends related to Council Districts, equity, and COVID-19.

Chapter 4 – Countermeasure Toolbox pairs the collision profiles in Chapter 3 with tailored countermeasures, and provides an updated toolbox of strategies for LADOT to implement on future projects.

Equipped with an updated understanding of the state of traffic safety, LADOT will deploy a renewed set of strategies that meet the challenges of today. LADOT remains steadfast in its commitment to ensure that all people are able to travel safely, with an emphasis on the most vulnerable users of our streets.

Key Takeaways

SEVERITY INCREASING

Fatal and severe injury collisions increased by 13% between 2017 and 2021.

STRATEGIES FOR SIGNALS

11% of LA intersections are signalized, but they account for over 50% of fatal and severe injury collisions.

IMPACT ON PEDESTRIANS

Pedestrians are involved in 38% of fatal and severe injury collisions, while 16% of all trips in LA are made on foot.

EVENING FOCUS

The largest share of fatal and severe injury collisions occur between 6 PM and 9 PM.

SPEED KILLS

Unsafe Speed is the primary violation type in 40% of vehicle-only collisions that resulted in a fatality.

EQUITY EMPHASIS

Equity emphasis areas, defined by LA's Health & Equity Index, make up 14% of LA, but represent 39% of fatal and severe injury collisions.

All Modes HIN

Top 10 Scoring Intersections

Top 10 Scoring Corridors

High Injury Network (HIN)

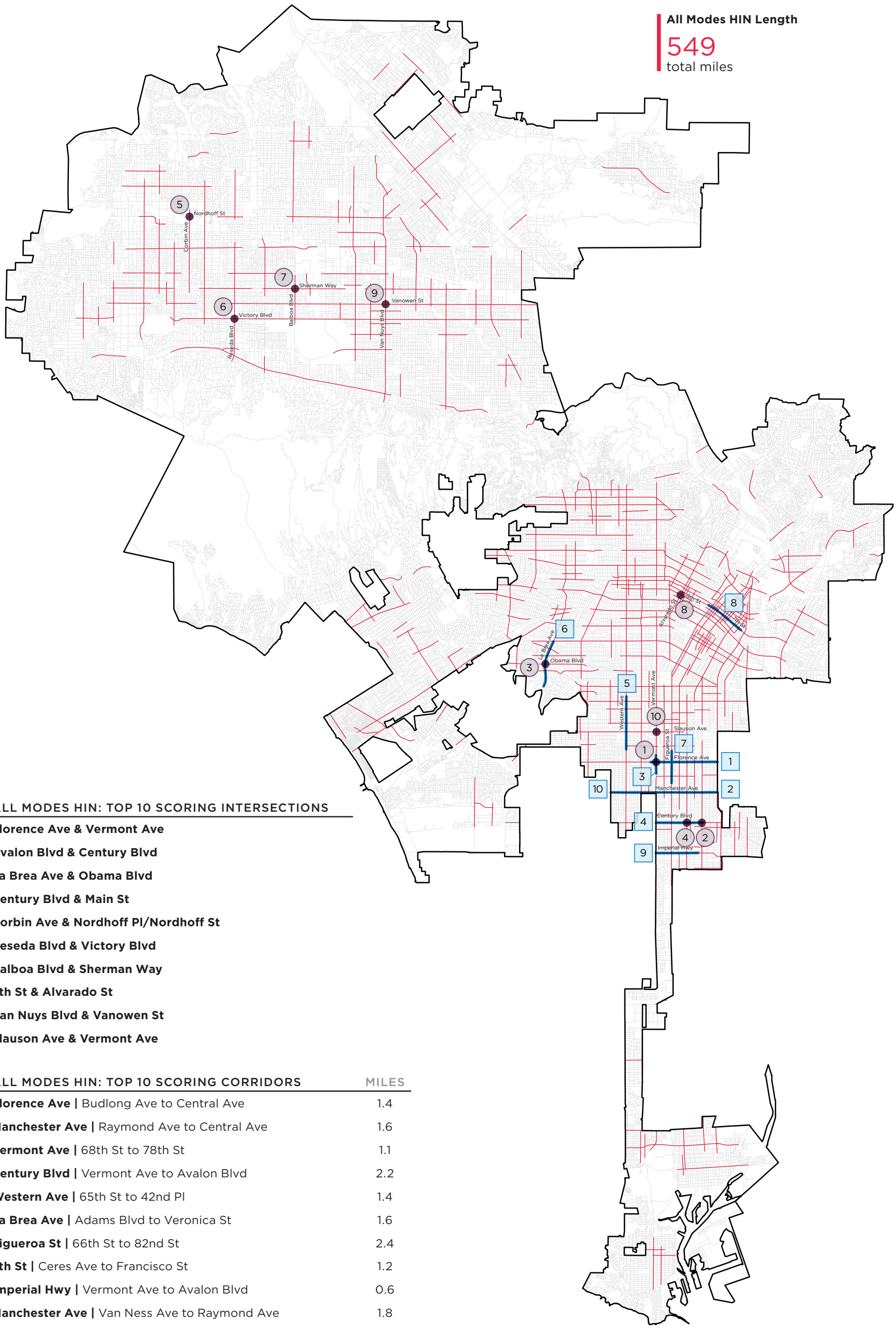
Where are collisions occurring?

61.8%
of all KSI collisions fall on

7.5%
of the citywide network

All Modes HIN Length

549
total miles



ALL MODES HIN: TOP 10 SCORING INTERSECTIONS

1	**Florence Ave & Vermont Ave**
2	**Avalon Blvd & Century Blvd**
3	**La Brea Ave & Obama Blvd**
4	**Century Blvd & Main St**
5	**Corbin Ave & Nordhoff Pl/Nordhoff St**
6	**Reseda Blvd & Victory Blvd**
7	**Balboa Blvd & Sherman Way**
8	**8th St & Alvarado St**
9	**Van Nuys Blvd & Vanowen St**
10	**Slauson Ave & Vermont Ave**

ALL MODES HIN: TOP 10 SCORING CORRIDORS

		MILES
1	**Florence Ave |** Budlong Ave to Central Ave	1.4
2	**Manchester Ave |** Raymond Ave to Central Ave	1.6
3	**Vermont Ave |** 68th St to 78th St	1.1
4	**Century Blvd |** Vermont Ave to Avalon Blvd	2.2
5	**Western Ave |** 65th St to 42nd Pl	1.4
6	**La Brea Ave |** Adams Blvd to Veronica St	1.6
7	**Figueroa St |** 66th St to 82nd St	2.4
8	**7th St |** Ceres Ave to Francisco St	1.2
9	**Imperial Hwy |** Vermont Ave to Avalon Blvd	0.6
10	**Manchester Ave |** Van Ness Ave to Raymond Ave	1.8

Chapter 1
INTRODUCTION

Purpose of the Safety Analysis Update

The Vision Zero initiative was established in 2015 by former Mayor Garcetti with the goal of eliminating traffic deaths in the City of Los Angeles by 2025. In issuing Executive Directive No. 10, safety was declared the City's "number one priority in designing and building our streets and sidewalks."

The Los Angeles Department of Transportation (LADOT) then went to work, identifying key roadway safety issues, patterns, and locations, which were documented in its 2017 Safety Study and the release of the City's first High Injury Network. This study builds on that early effort by examining new collision and related roadway data, using state-of-the-practice systemic analysis methodologies, to identify a new set of priority locations and uncover how roadway safety trends in Los Angeles have changed since Vision Zero was adopted.

Since 2017, LADOT has installed over 6,700 safety treatments on the High Injury Network as part of its Vision Zero Implementation Strategy.

Newly Installed High Intensity Activated CrossWalK (HAWK) at Western Ave and 39th Pl

City of Los Angeles Vision Zero Policy Statement

Mayor Eric Garcetti's Executive Directive 10, issued in August 2015, declared that **safety should be the number one priority** in designing and building streets and sidewalks. This directive established two Vision Zero goals for Los Angeles:

- **Reduce traffic fatalities citywide by 20%** by 2017, prioritizing pedestrian fatalities involving older adults and children
- **Reduce traffic fatalities citywide to zero** by 2025

The LADOT Vision Zero work plan objectives are:

- Prioritize projects with the highest potential to reduce the greatest number of collisions resulting in severe injuries and fatalities;
- Prioritize projects that address known threats to public safety, addressing severity, vulnerability, social equity, and cost-effectiveness;
- Design improvements according to collision data and crash patterns; and
- Update HIN and Priority Corridors regularly as new data becomes available.

Vision Zero Project on West Adams Blvd

Local Parallel Efforts

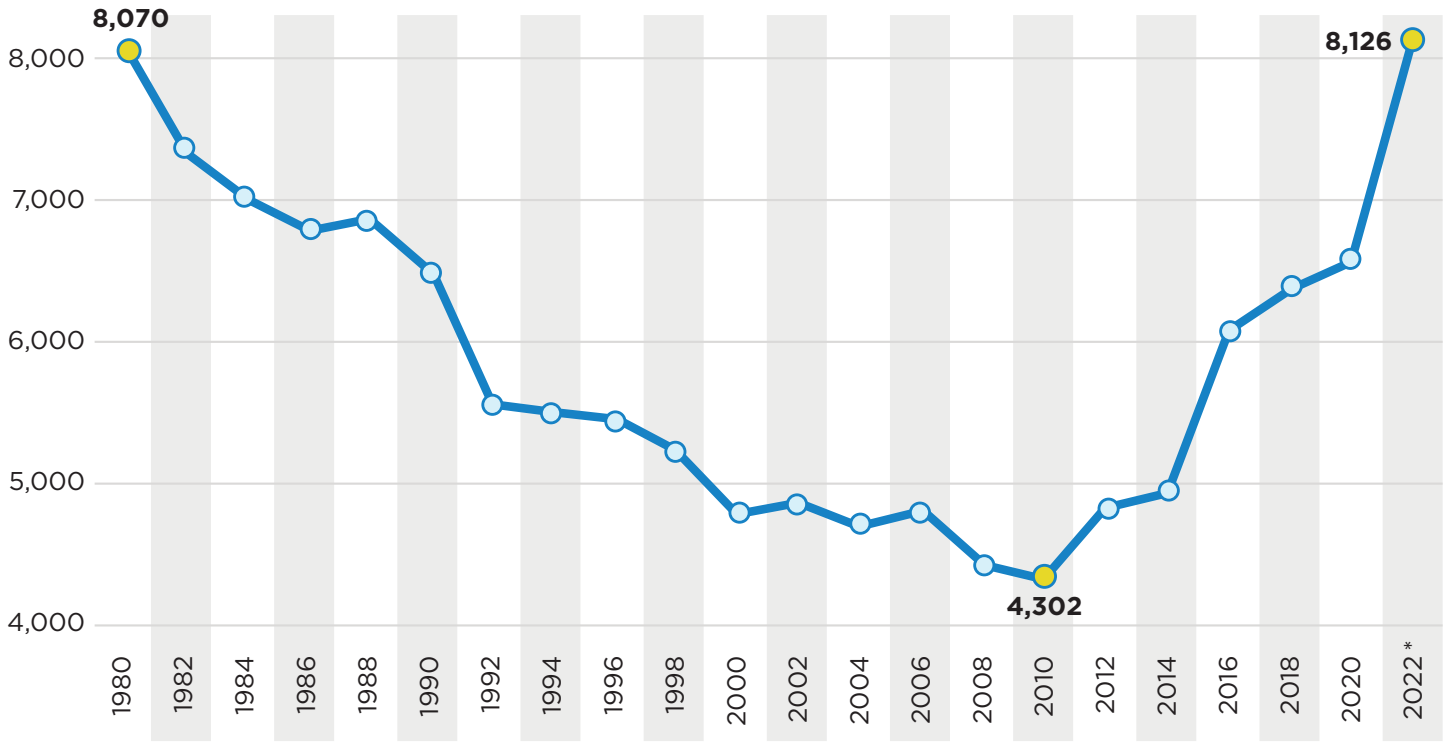
In 2020, Mayor Eric Garcetti put forward Executive Directive No. 25 - LA's Green New Deal: Leading by Example, which included direction to achieve "zero carbon ground transportation" through a menu of strategies such as prioritizing "active transportation infrastructure based on the Plan for a Healthy Los Angeles' Community Equity and Health Index and the High Injury Network."

LADOT is prioritizing work to implement the 2035 Mobility Plan Enhanced Network projects. The Los Angeles Vision Zero program is complementary to the 2035 Mobility Plan. Ensuring both plans inform and leverage mutually beneficial resources will be key to accomplishing their respective goals. An Interdepartmental MOU was established in January 2022 between LADOT and several other City departments responsible for delivering roadway projects, with the goal of increased coordination and more effective implementation. The information included in this study can help to inform and progress these efforts.

National Safety Trends

Nationally, road traffic fatalities have steadily increased since 2010, with a marked increase since the onset of the COVID-19 pandemic. Crashes on urban roads increased **16%**, and pedestrian fatalities have increased to the highest levels recorded in recent decades. Cities have also experienced increases in risk-taking driver behavior since 2020, including higher instances of speeding and impaired or distracted driving. Trends in Los Angeles have been similar to those occurring nationally.

Number of Annual U.S. Pedestrian Fatalities, 1980-2022



*Projected

Source: FARS and GHSA analysis of SHSO data, Governor's Highway Safety Association

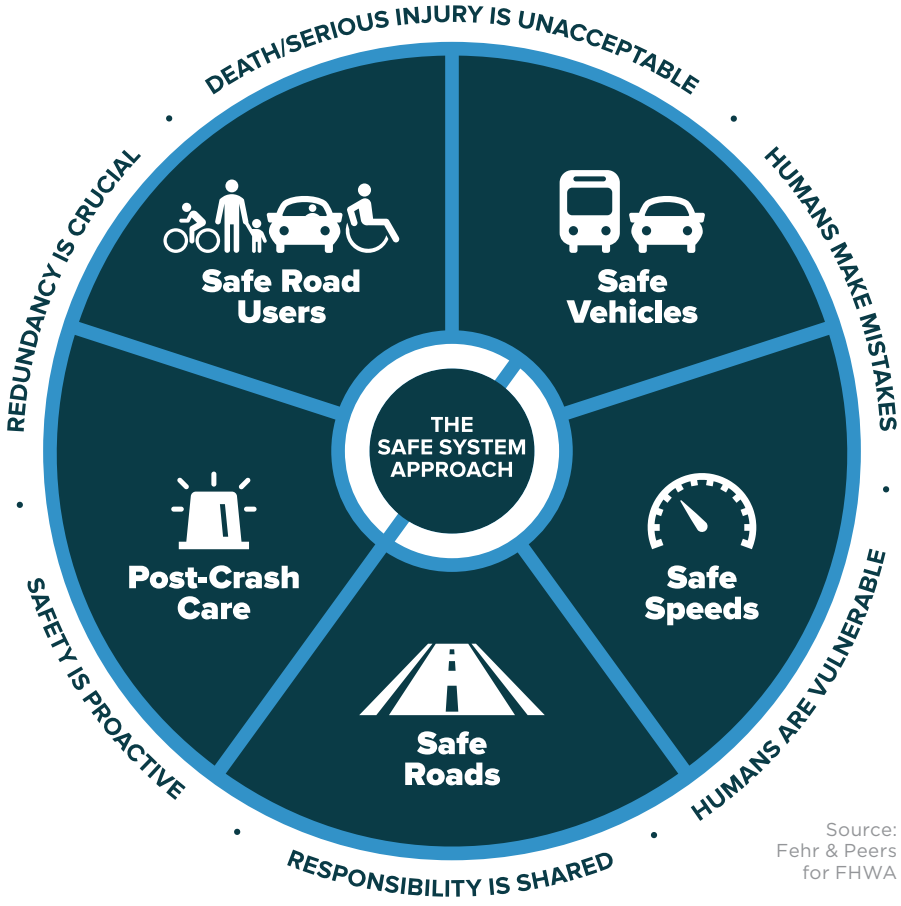
Vision Zero

In 2015, Los Angeles was an early adopter of Vision Zero in the United States. Since that time, the popularity of the movement has grown nationwide. Vision Zero plans have been created across 30 states, with many policymakers motivated following the recent significant increase in traffic fatalities. In recent years, cities like Fremont, CA and Jersey City, NJ, have achieved significant reductions in severe injuries and fatalities as a result of their Vision Zero efforts. Caltrans recently committed to a statewide goal of zero fatalities on state highways by 2050. Federally, the US Department of Transportation (USDOT) adopted the National Roadway Safety Strategy (NRSS) in 2022.

Safe System Approach

To achieve Vision Zero goals, the Safe System Approach has gained traction nationally as the best practice framework for roadway safety work. The approach comprises five design elements – safe road users, safe vehicles, safe speeds, safe roads, and post-crash care – all of which support and interact with one another. Additionally, the approach promotes six principles to create a safe roadway system – seen on the outer ring of the Safe System "wheel." Embedded in this approach is anticipating human mistakes by designing and managing road infrastructure to keep the risk of mistakes low; and, when a mistake leads to a crash, the result is not a fatality or serious injury.

For jurisdictions adopting this framework, Vision Zero remains the goal and the Safe System Approach provides a roadmap for achieving that goal, providing the framework for the City of Los Angeles as well.



Source: Fehr & Peers for FHWA

The Safe System Approach serves as the foundation for federal programs like USDOT's National Roadway Safety Strategy, the updated national Manual on Uniform Traffic Control Devices (MUTCD), and the Safe Streets for All (SS4A) grant program. It also serves as the basis for the Caltrans Strategic Highway Safety Plan.

Vision Zero Community Activation by LA Walks, Gabba Gabba Gallery, Pilipino Workers Center, and Public Matters - June 2017

Other State and Federal Roadway Safety Programs

Having an updated comprehensive safety plan is now required for eligibility for certain State and Federal implementation safety funding. California's Local Highway Safety Improvement Program (HSIP) requires a Local Road Safety Plan (LRSP) be in place and updated regularly in order to compete for funds. Similarly, the new Safe Streets and Roads for All (SS4A) grant program, initiated as part of the 2021 Bipartisan Infrastructure Law (BIL)/ Infrastructure Investment and Jobs Act (IIJA) requires a Comprehensive Safety Action Plan (CSAP) in order to compete for implementation dollars. This study helps the City of Los Angeles remain current in its eligibility for these programs. Los Angeles has been awarded millions of dollars in implementation funding through HSIP, including as part of the latest funding cycle, and the City was awarded $9 million in SS4A implementation funding during the 2022 funding cycle.

Recent CA Roadway Safety Legislation

To advance roadway safety beyond funding contributions and infrastructure improvements, California legislators have recently passed two landmark roadway safety-related policies.

AB 645: Speed Safety Camera Pilot

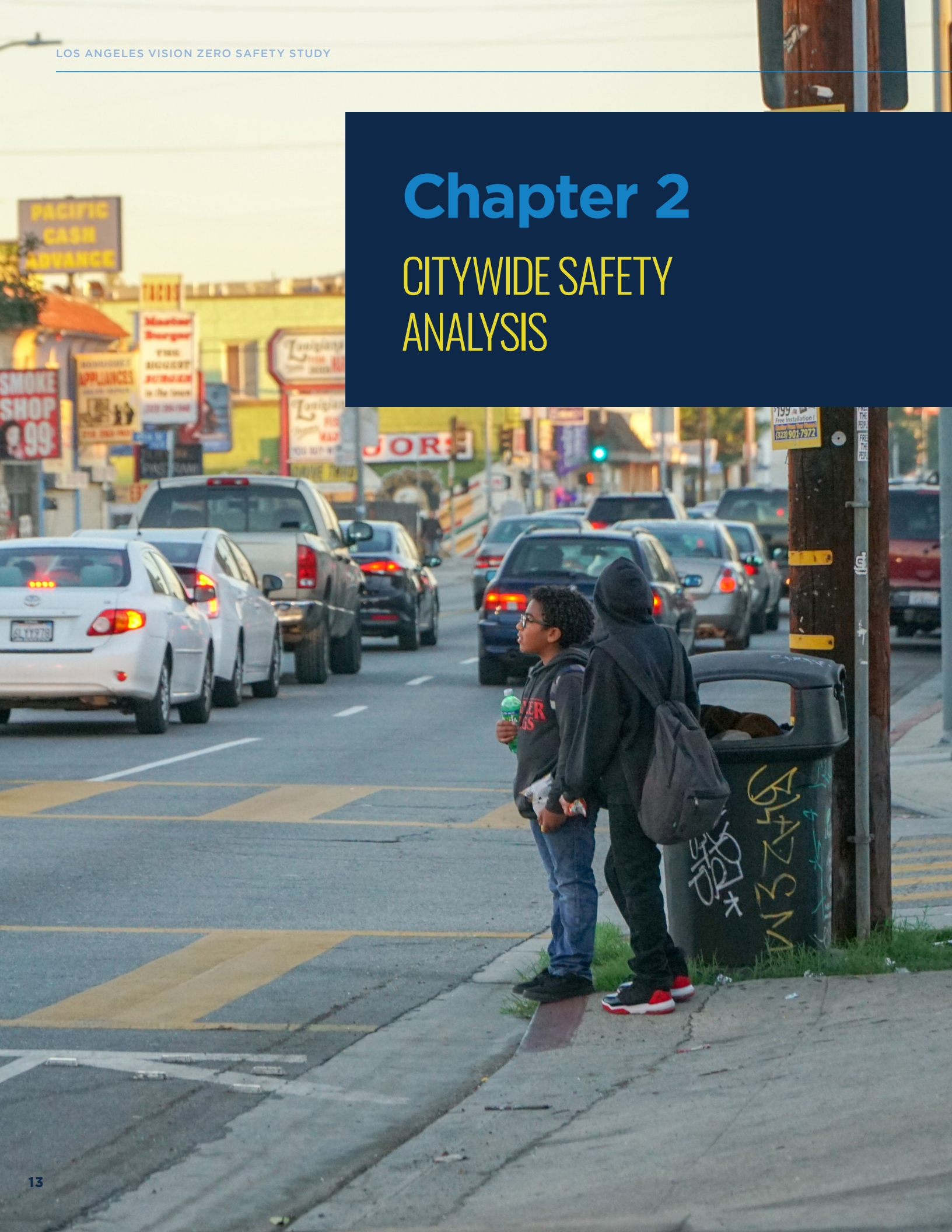
In October 2023, Governor Newsom signed Assembly Bill 645 (Friedman) into law, allowing the use of speed cameras in six California cities (San Francisco, Los Angeles, San Jose, Oakland, Glendale, and Long Beach). AB 645 allows cameras to capture images of the rear license plate of vehicles traveling 11 miles per hour or more over the posted speed limit. AB 645 presents an important opportunity for Los Angeles to participate in the pilot speed camera program. Managing vehicle speed is considered the most important factor in reducing the severity of traffic collisions, and speed camera systems have been demonstrated to be highly effective. For example, in New York City speeding at camera locations dropped an average of **73%.**

AB 43: Speed Limit Setting Flexibility

In October 2021, Governor Newsom signed AB 43 (Friedman) into law, giving local lawmakers greater power to set speed limits based on road safety as opposed to prevailing speed and road conditions. The law gives jurisdictions the authority to lower speed limits in business districts, and on designated Safety Corridors, among other location types. This law allows for an important strategy that LADOT can use in conjunction with roadway design changes to help lower vehicle speeds and reduce collision severity. Los Angeles has already begun AB 43 implementation, with 5 mph reductions on **177 miles** of streets across **77** segments, including **28** segments on the High Injury Network.

Chapter 2

CITYWIDE SAFETY ANALYSIS



This chapter summarizes the key findings from the collision landscape analysis and systemic analysis, with a focus on equity considerations, Council District trends, and trends related to COVID-19 shutdowns and changes in travel behavior. The collision landscape summary extracts insights by directly evaluating collision records. The systemic analysis builds on the landscape summary by identifying key roadway characteristics and other contextual risk factors related to severe and fatal collisions occurring in Los Angeles.

About the Data

Collision Data

Collision data was collected from the City's RoadSafeGIS database for the full years 2017 through 2021. Data was cleaned and compared with Statewide Integrated Traffic Records System (SWITRS) and LAPD data to develop the most comprehensive dataset as possible. Due to data cleaning and geocoding, a subset of collisions from the original database was used for this analysis, accounting for 99% of KSI collisions in the City's database.

Roadway and Contextual Data

Roadway and contextual data, such as intersection control, roadway classification, school and park locations, and transit stops were provided by LADOT or available through other public sources (e.g. LA County, Metro). A specific search radius was applied to each variable in order to determine a geographic relationship with collisions (e.g. collisions within 1,000' of a park boundary are considered to be "near a park").

Big Data Sources

This analysis uses the following big data sources to create the following contextual data layers that can be compared against geographic collision trends:

StreetLight location-based data:

- Average Weekday Average Daily Traffic (ADT) – May 2022 through April 2023
- Top Bicycle and Pedestrian Activity Centers (based on trip starts and ends by block group for all days) – September 2021 through April 2022

Wejo connected vehicle data:

- Driver incidents (hard braking and acceleration) – October 2022
- 85th percentile vehicle speeds – October 2022

2017 Safety Study

Throughout the document there are references to the "2017 Safety Study." The 2017 Safety Study was based on data from 2009 to 2013. Direct comparisons to the 2017 Safety Study were only made in cases where we had relative certainty in comparing apples-to-apples, based on the methodology. Comparisons that involve uncertainty about methodology are noted.

Killed or Severely Injured in a Collision (KSI)

Severe injuries resulting from a traffic collision can result in a number of catastrophic impacts, including permanent disability, lost productivity and wages, and ongoing healthcare costs. These injuries can include:

- Broken or fractured bones
- Dislocated or distorted limbs
- Severe lacerations
- Severe burns
- Skull, spinal, chest or abdominal injuries
- Unconsciousness at or when taken from the collision scene

Throughout this analysis, the acronym KSI is used to denote collisions where someone was killed or severely injured.

Collision Landscape Summary

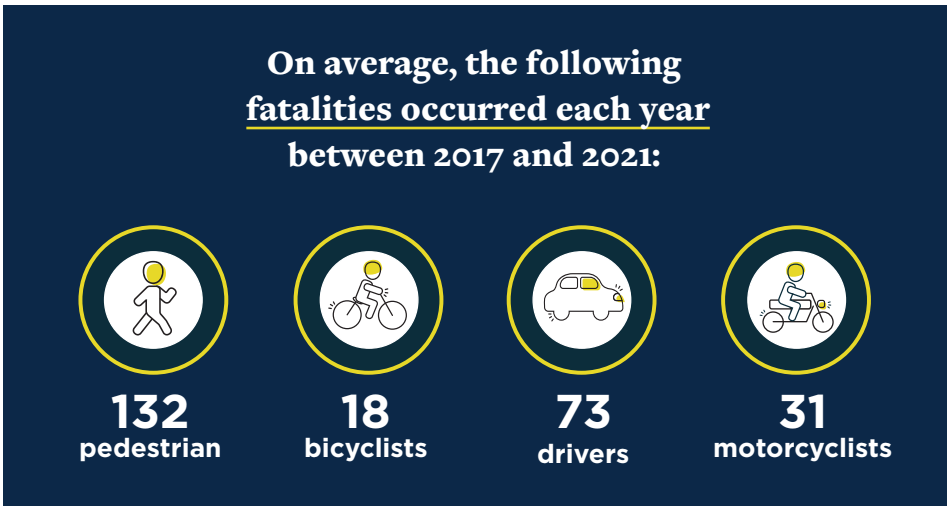
This summary uses collision data to identify demographic, behavioral, and temporal trends of collisions. The key takeaways cover collision severity, DUI-involved KSI collisions, lighting conditions, primary violation types, collisions with unsafe speed, pedestrian actions, collision types, party actions in vehicle-only KSI collisions, and time of day.

INCLUDED IN THIS SECTION:

- LAPD Reported Fatalities
- KSI Collisions
- All Injury Collisions
- DUI-Involved Collisions
- Primary Violation Type
- Unsafe Speed
- Pedestrian Actions
- Collision Type
- Party Actions
- Hit-and-Runs
- Lighting Conditions
- Time of Day
- Time of Day and Month

LAPD Reported Fatalities

LAPD reported traffic fatalities is the only data in this study that is sourced directly from the LAPD. The remainder of the analysis is based on collision data provided by LADOT via their RoadsafeGIS database. Due to data cleaning and geocoding, a subset of collisions from the original database was used for this analysis, accounting for 99% of KSI collisions in the City's database.



Between 2017 and 2021, annual traffic fatalities increased by approximately 20%, from **246 to 294 collisions**.

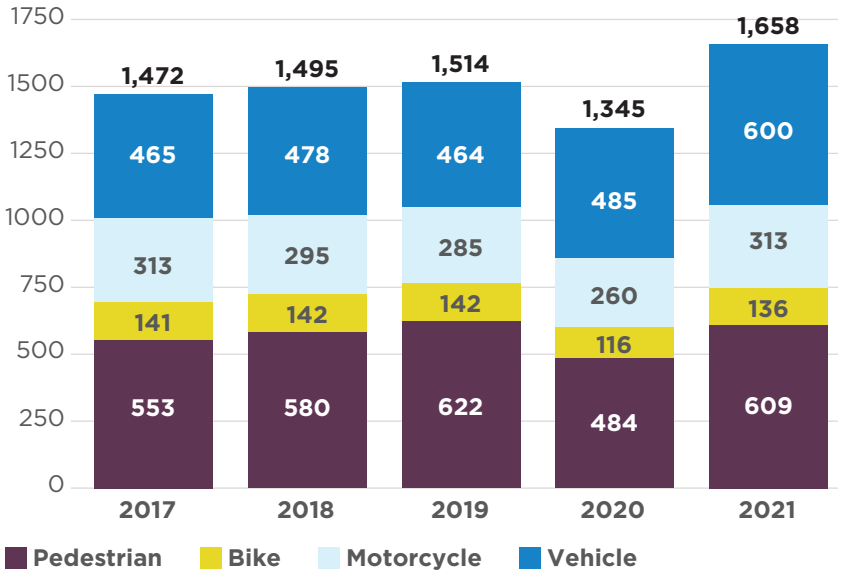
As reported by the Los Angeles Police Department (LAPD)

KSI Collisions

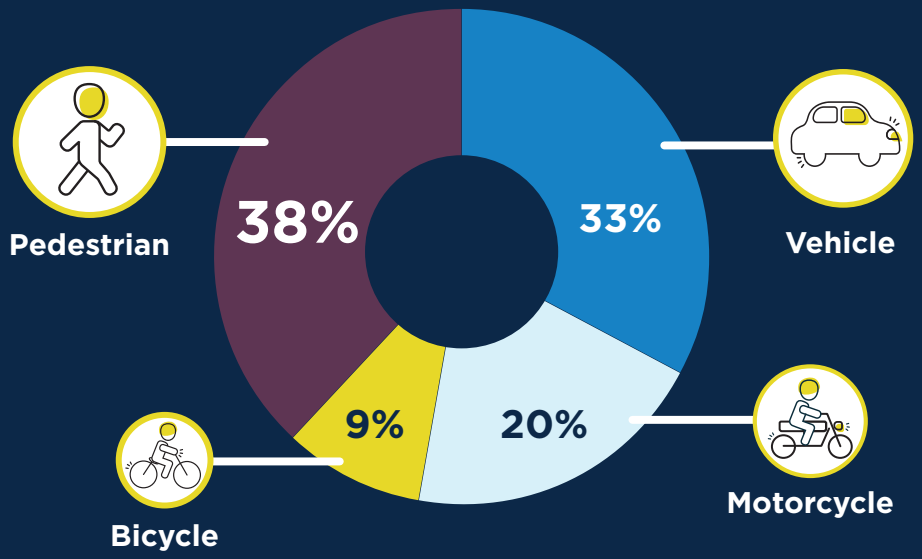
Between 2017 and 2021, there were 7,484 KSI collisions, an average of 1,497 KSI collisions per year.

KSI collisions have been on the rise, increasing by approximately 13% between 2017 and 2021.

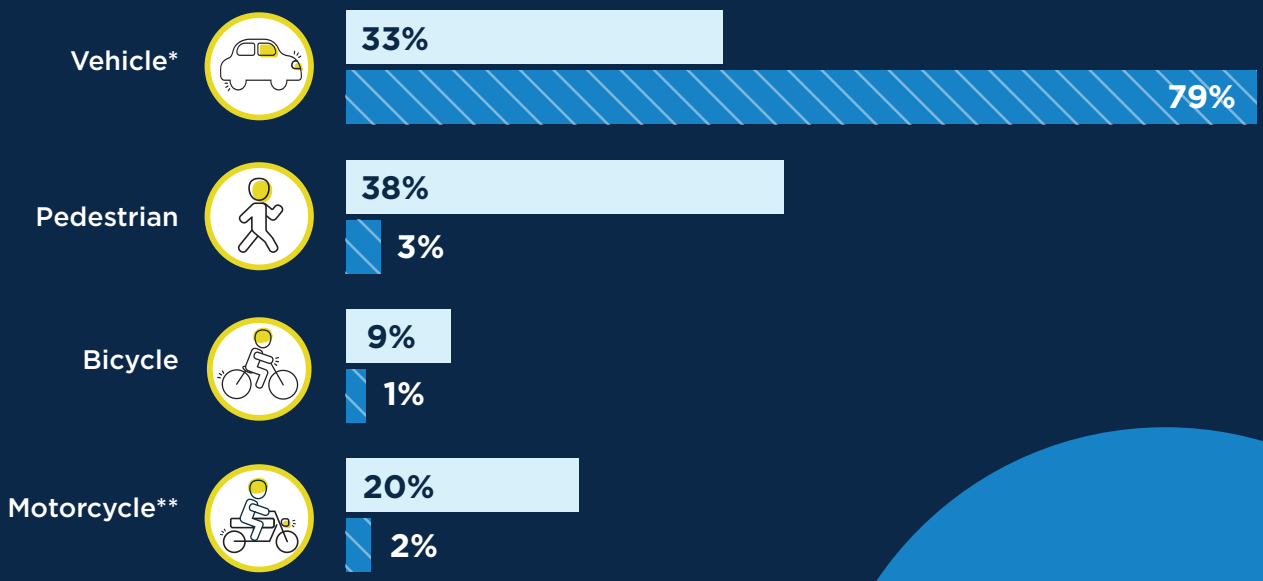
KSI Collisions by Year and Mode, 2017-2021



Share of KSI Collisions by Mode



Pedestrian KSI collisions increased 53% citywide in the 2017–2021 period from 2009–2013 levels



*Includes drove alone and carpool commutes
**Commute data includes taxi and other modes

While just 3% of residents walk to work, pedestrians make up 38% of KSI collisions

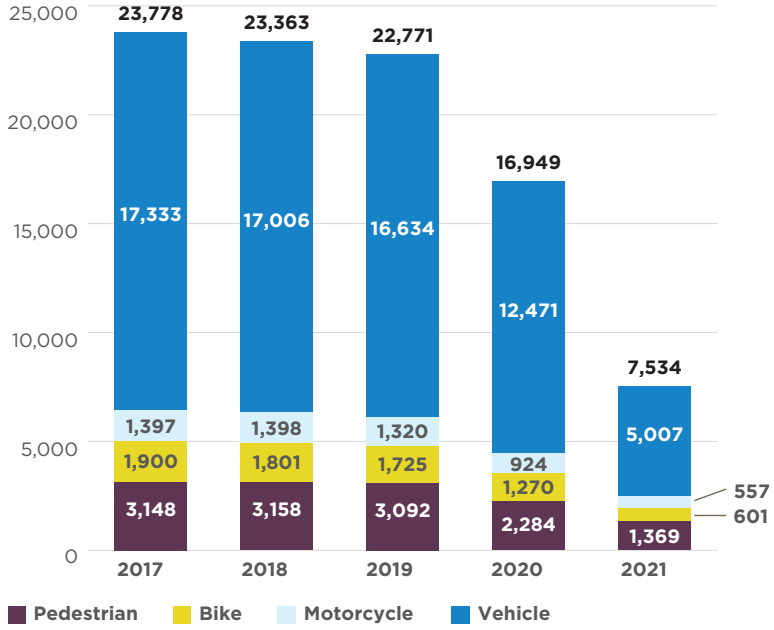
All Injury Collisions

Between 2017 and 2021, the number of injury collisions decreased 68%. The decrease in collisions in 2021 was primarily due to the change in LAPD collision response practices.

Beginning on January 1, 2021, LAPD collision reporting methodology required parties to self-report lower-severity collisions that did not involve a hit-and-run or DUI through the City's online police report portal. Prior to this methodology change, traffic officers were required to file these reports. This change has resulted in fewer recorded collisions, which is reflected in chart below for 2021.

Between 2017 and 2019 —prior to COVID-19 and the new LAPD collision reporting methodology —there were **69,912 collisions**, an average of 23,304 per year.

All Injury Collisions by Year and Mode, 2017-2021



Note: Collisions involving multiple modes are assigned to the "highest vulnerability" mode (e.g. pedestrian-bicycle collisions are assigned as pedestrian) so that collisions are not double-counted throughout the Annual Collision Trends section.

REPORTING BIAS IN COLLISION DATA

In roadway safety research, collision databases have been found to have certain reporting biases, including:

- Collisions involving people walking, on bicycles, or on motorcycles are less likely to be reported than collisions with people driving
- Younger victims are less likely to report collisions
- Alcohol-involved collisions may be underreported

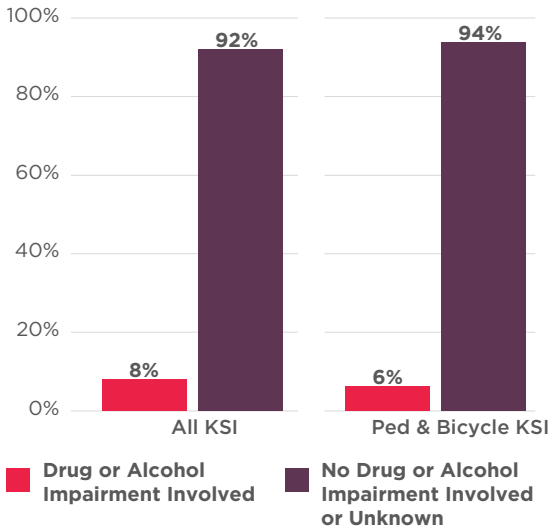
Race, income, immigration status, and English proficiency may also impact reporting, but there is limited research on these factors.

DUI-Involved KSI Collisions

Drug or alcohol impairment involvement in pedestrian and bicycle KSI collisions have remained the same since the 2017 Safety Study at around 6% of KSI collisions.

From 2017-2021, **approximately 8%** of all KSI collisions involved drug or alcohol impairment.

DUI-Involved KSI Collisions, 2017-2021



Note: For collisions that involved a bicyclist or pedestrian, the impaired individual could have been a vehicle driver and/or the pedestrian and bicyclist.

Primary Collision Factor

Primary Collision Factor (PCF) violation category codes are not always intuitive. Select violation types are described below.

VEHICLE RIGHT-OF-WAY VIOLATION

Covers a party (of any mode) not yielding to the driver's right-of-way or the driver observing his or her right-of-way improperly. A common citation under this category is for drivers who do not yield to oncoming traffic during a left turn or U-turn. Other citations include not yielding properly at a stop sign and not yielding when entering a road from a property. While the title specifies vehicle, a vehicle hitting a person on a bicycle or not yielding to pedestrians for right turns on red can also be cited.

PEDESTRIAN RIGHT-OF-WAY VIOLATION

Covers drivers violating a pedestrian's right-of-way. A common citation is for drivers not yielding at a crosswalk. It also includes drivers not yielding to a pedestrian on a sidewalk, such as at a driveway.

PEDESTRIAN VIOLATION

Covers pedestrians not following a rule of the road. In 2022, the Freedom to Walk Act (AB-2147) was passed, which allows people to cross outside of an intersection without being ticketed, provided there is no immediate danger. Prior to AB-2147, a pedestrian violation would be cited if a pedestrian was crossing outside of a crosswalk, not yielding to vehicles, or crossing during the flashing "Don't Walk" or red phase of a signal.

Most common violation types by mode

Bicycle

- Vehicle Right of Way **22%**
- Wrong Side of Road **17%**
- Traffic Signals and Signs **16%**

Pedestrian

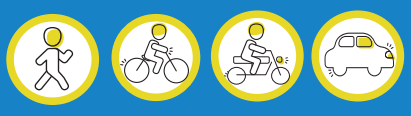
- Pedestrian Violation **49%**
- Pedestrian Right of Way **24%**
- Unsafe Speed **6%**

Motorcycle

- Vehicle Right of Way **44%**
- Unsafe Speed **20%**
- Improper Turning **10%**

Vehicle

- Unsafe Speed **28%**
- Vehicle Right of Way **22%**
- Traffic Signals & Signs **15%**



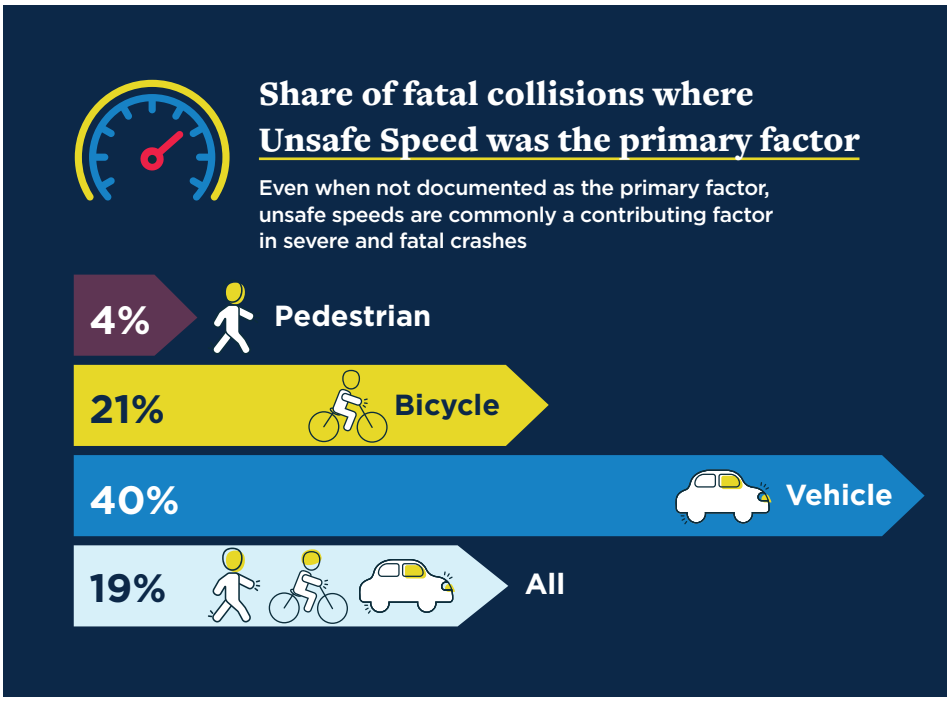
All KSI

- Vehicle Right of Way **19%**
- Pedestrian Violation **19%**
- Unsafe Speed **16%**

Unsafe Speed

Unsafe Speed is the primary collision factor in 40% of vehicle-only collisions that resulted in a fatality. Even in collisions where Unsafe Speed is not the primary violation type, speed is almost always a factor in severe and fatal collisions. For example, the primary collision factor in a pedestrian collision is often coded as Pedestrian Violation or Pedestrian Right-of-Way Violation, but vehicle speed is a key factor in collision severity. Speed at the time of the collision may be hard to determine due to lack of witnesses and hit-and-runs.

According to USDOT, a person hit by a driver traveling at 23 mph has a 90% chance of survival. A person hit by a driver traveling 42 mph has only a 50% chance of survival (Accident Analaysis & Prevention, *Impact Speed and a Pedestrian's Risk of Severe Injury or death,* July 2012).

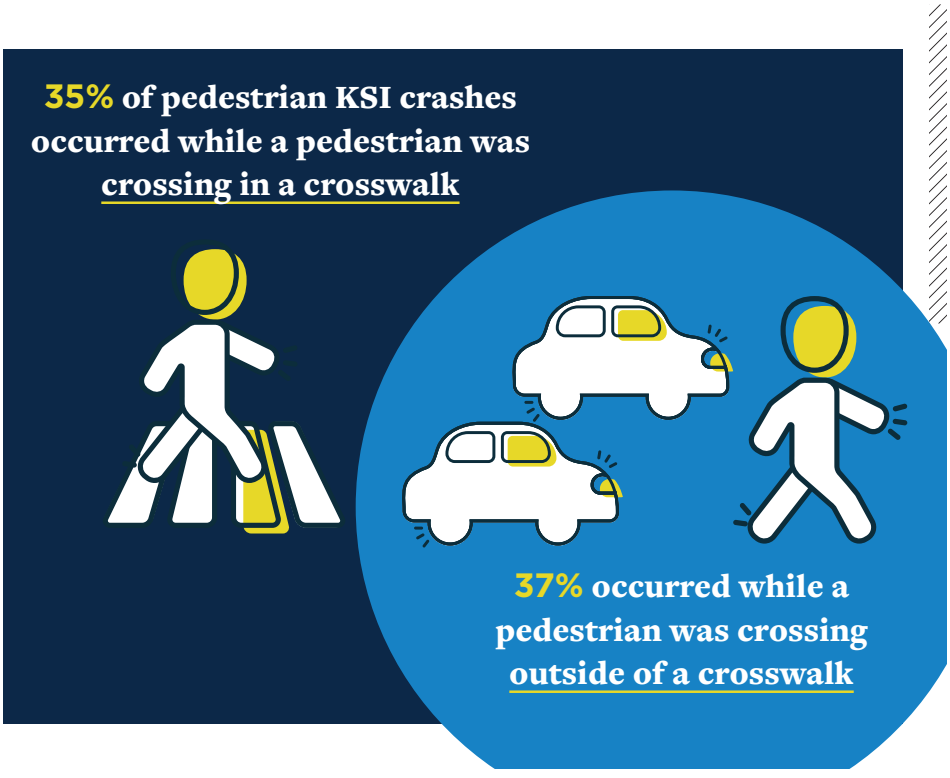


Note: If the reporting officer determines that speed was a collision factor – though not the primary collision factor – they may note it on the crash report.

Pedestrian Actions

Crossing the road presents the greatest danger for pedestrians relative to other actions preceding KSI collisions.

Nearly **75%** of pedestrian-involved KSI collisions happened when a pedestrian was attempting to cross the road.

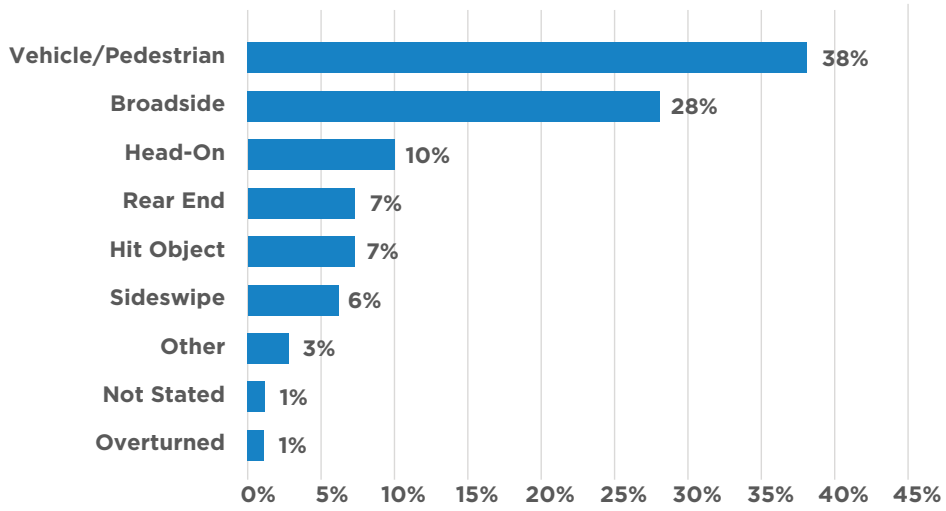


Note: The California Highway Patrol (CHP) handbook does not explicitly address marked versus unmarked crosswalks for actions prior to a collisions – other places in the handbook do make the distinction. LAPD training or the reporting officer's discretion determines how these characteristics are reported. For the purposes of this study, it is assumed "crosswalk" refers to marked crosswalks.

Collision Type

Vehicle/Pedestrian collisions was the top collision type for collisions that resulted in fatalities or severe injuries between 2017 and 2021. This trend has increased compared to the 2017 Safety Study, which reported that vehicle/pedestrian collisions accounted for 31% of KSI collisions.

KSI Collisions by Collision Type, 2017-2021

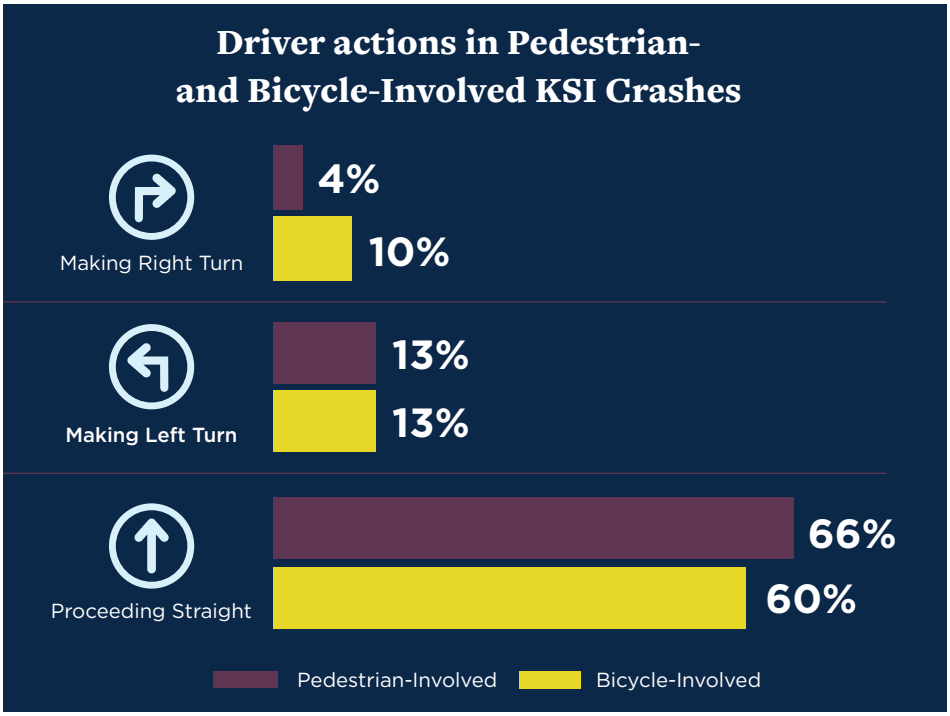


Party Actions

The majority of drivers in KSI bicyclist collisions were proceeding straight at the time of the collision. Approximately 23% of drivers were making a left or right turn at the time of the collision.

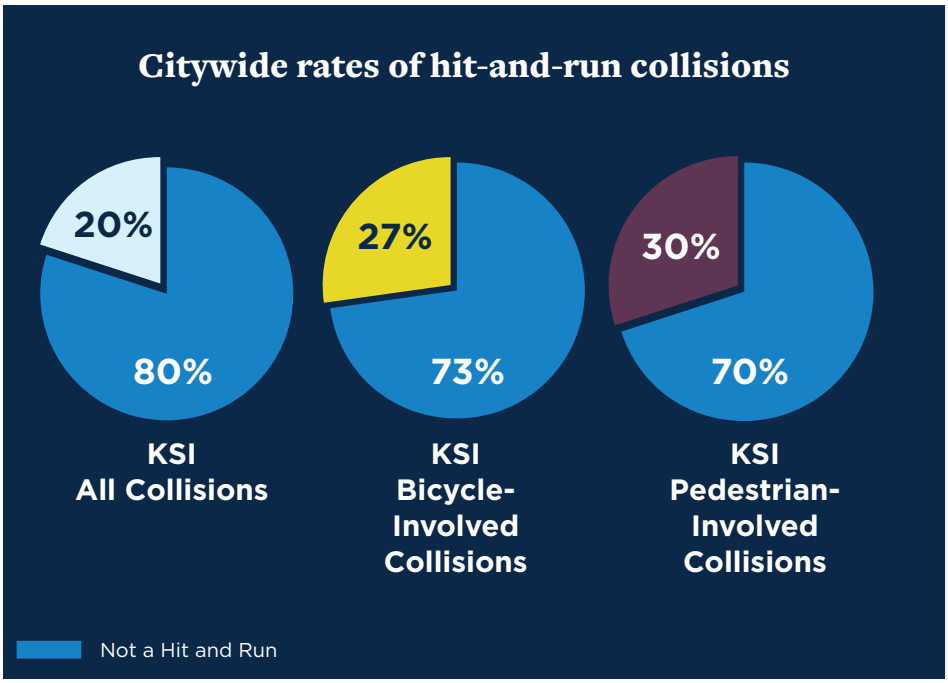
The majority of drivers – 66% – in KSI pedestrian collisions were proceeding straight at the time of the collision. This is a smaller percentage than in the 2017 Safety Study, which reported 71%.

Approximately 13% of drivers in KSI pedestrian collisions were making a left turn at the time of the collision, and 4% were making a right turn. The 2017 Safety Study reports the same approximate percentages.



Hit-and-Run Collisions

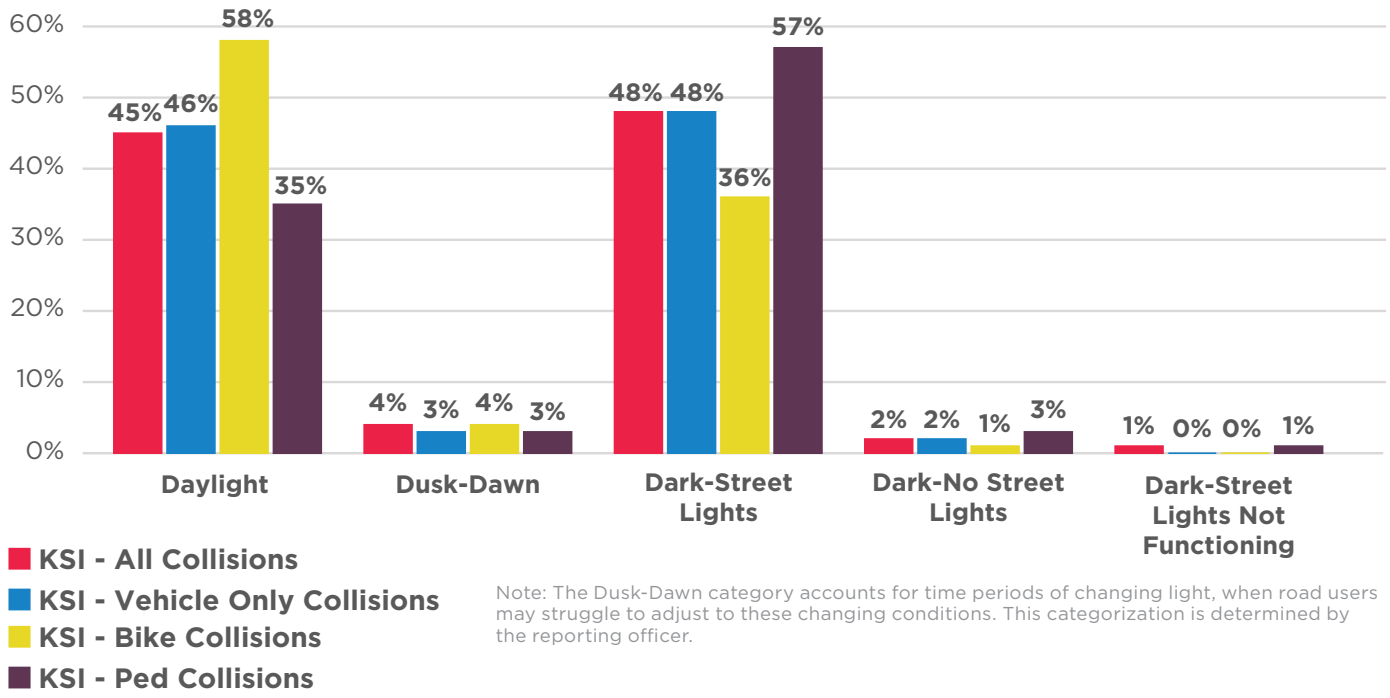
Approximately 20% of all KSI collisions were hit-and-run. This number is higher when people biking or walking are involved - 27% of bicycle-involved KSI collisions and 30% of pedestrian-involved KSI collisions were hit-and-run. These percentages have increased since the 2017 Safety Study, where hit-and-run collisions accounted for 18% of all collisions, and 22% of pedestrian and bike KSI collisions.



Lighting Conditions

Vehicle-only KSI collisions are approximately equally distributed between daylight and dark with street light conditions. Bike KSI collisions occurred more often in daylight conditions. Pedestrian KSI collisions occurred more often in dark with street light conditions relative to daylight conditions. While collisions occurring during dark conditions without functioning street lights accounts for a small share of collisions, the number of collisions in this category increased between 2017 and 2021.

KSI Collisions by Lighting Condition, 2017-2021

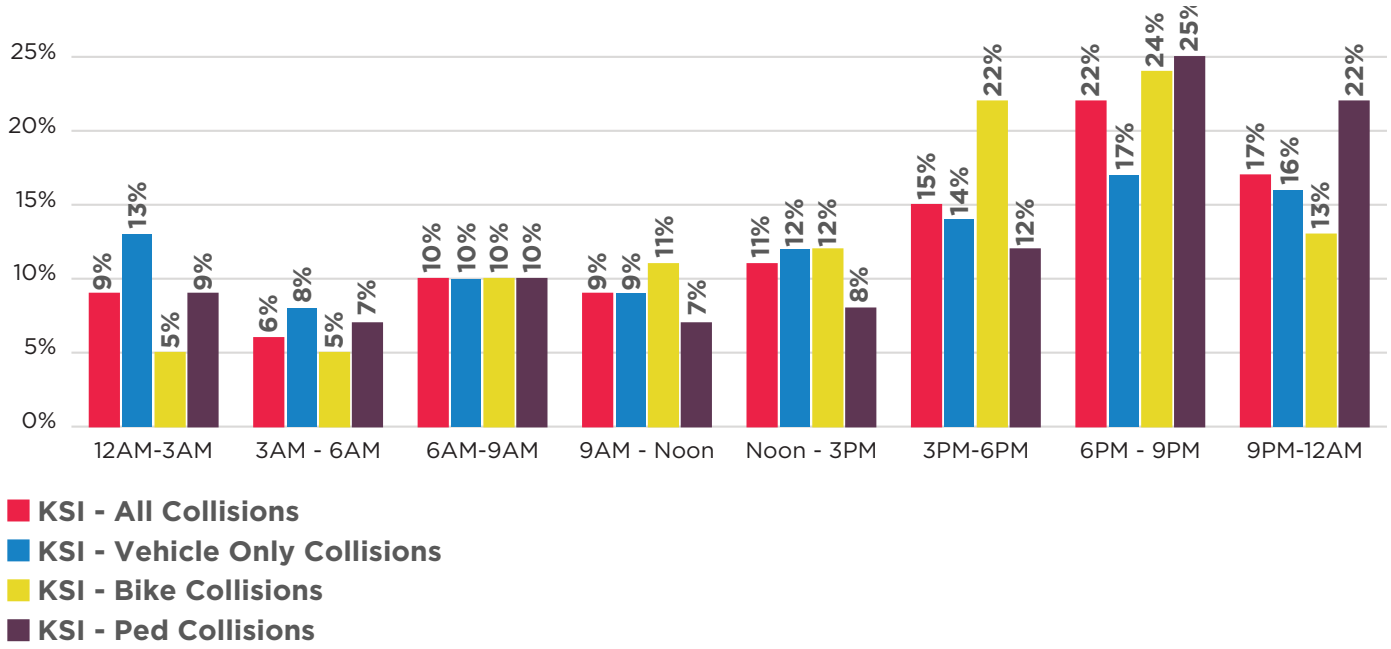


Note: The Dusk-Dawn category accounts for time periods of changing light, when road users may struggle to adjust to these changing conditions. This categorization is determined by the reporting officer.

Time of Day

The largest share of KSI collisions across all modes occurs between 6 and 9 PM. This trend holds true from the 2017 Safety Study. KSI pedestrian collisions also occur with high frequency between 9 PM and midnight, while KSI bicycle collisions tend to occur earlier, with 22% between 3 and 6 PM.

KSI Collisions by Time of Day, 2017-2021



Time of Day by Month

The chart below shows that collisions are not only concentrated in the latter part of the day, but they are also correlated with sunset times over the course of the year. Daylight Saving time changes during the study period occurred during the first week of November and in mid-March.

KSI Collisions by Month and Hour, 2017-2021

KSI Collisions

0-9	10-19	20-29	30-39	40-49	50-59	60-73

Lower — Higher

MONTH	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM	SUNSET*
JAN	19	12	21	12	11	20	16	20	20	17	10	18	17	25	18	17	24	60	54	53	41	30	26	18	5:07
FEB	17	18	10	10	9	16	17	13	19	14	20	16	17	28	26	21	17	31	52	48	45	32	27	29	5:35
MAR	19	23	14	11	12	16	22	27	20	16	21	25	17	18	30	31	28	28	47	53	42	47	29	34	6:35
APR	22	17	14	12	6	12	8	13	17	21	16	18	37	24	33	27	26	31	39	39	41	44	29	27	7:23
MAY	19	30	27	15	8	11	16	16	18	12	13	22	27	19	20	19	30	29	37	20	40	39	39	33	7:46
JUN	30	17	17	13	7	19	5	21	18	16	18	26	15	31	25	26	30	26	36	23	47	56	40	26	8:03
JUL	23	24	24	10	14	7	17	23	23	19	25	11	23	14	29	25	31	36	34	28	48	69	36	34	8:01
AUG	24	20	16	11	10	19	14	18	17	23	19	17	23	20	17	18	30	36	52	5	67	54	35	35	7:36
SEP	26	17	22	17	9	14	22	20	32	17	17	15	20	11	27	23	32	31	40	53	37	46	46	32	6:56
OCT	15	16	14	11	16	29	42	29	25	19	26	25	20	20	33	38	29	44	53	58	56	49	39	33	6:16
NOV	11	22	15	14	13	16	22	22	26	13	18	19	11	24	27	33	27	73	65	63	38	31	42	21	5:00
DEC	16	23	14	12	9	20	18	21	26	17	20	25	28	19	24	44	31	70	65	49	37	43	30	27	4:45

*Sunset time is the average for the month, 2021

Systemic Analysis

The systemic analysis uses contextual data to identify the roadway characteristics where collisions occur. Contextual data includes 85th percentile speed, weekday ADT, intersection characteristics, roadway classifications, council districts, Mobility Plan classifications, land use classifications, and disadvantaged communities indices. Furthermore, it relates these roadway geographical characteristics to the demographic, behavioral, and temporal collision trends identified in the landscape summary. Contextual data was derived from several sources – see **Appendix D** for more information.

INCLUDED IN THIS SECTION:

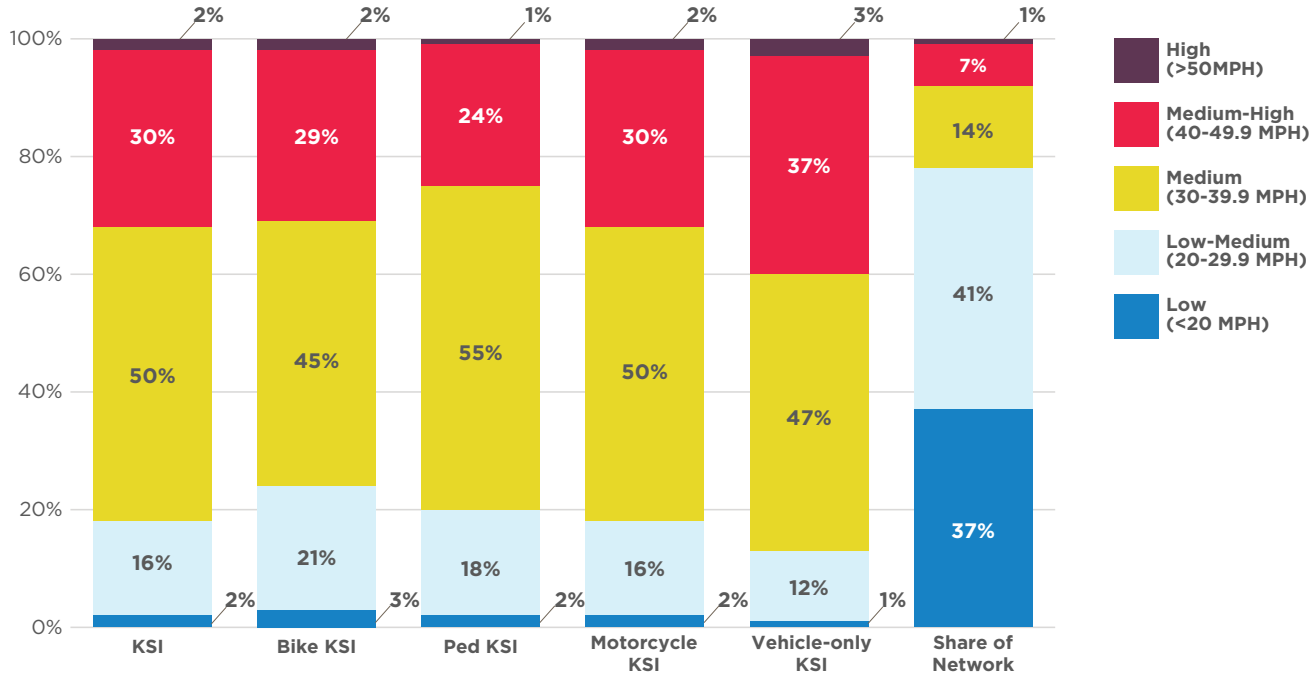
- 85th Percentile Speed
- Weekday ADT
- Intersection Control
- Roadway Classification
- Mobility Plan Designation
- Land Use
- Disadvantaged Communities
- Key Destinations

85th Percentile Speed

Roadways with 30-39.9 mph 85th percentile speeds make up 14% of the roadway network, but represent 45-55% of KSI collisions across all modes. 40-49.9 mph roadways make up 7% of the roadway network, but represent between 24-37% of KSI collisions across all modes.

KSI collisions occur disproportionately along roadways with observed 85th percentile speeds between 30 and 50 mph.

KSI Collisions by Observed 85th Percentile Speed of Street, 2017-2021



Note: 85th percentile speed data was sourced from Wejo connected vehicle data.

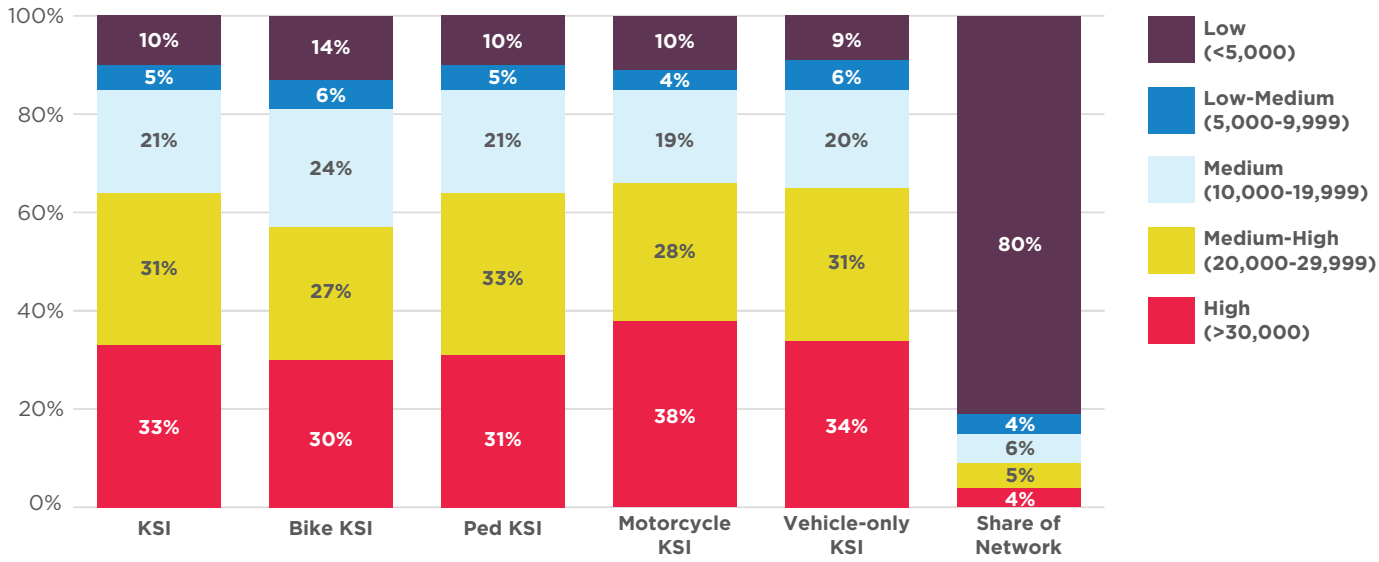
Weekday Average Daily Traffic (ADT)

Roadways with 10k+ ADT comprise approximately 15% of the roadway network; however, they represent approximately 80% of KSI collisions across all modes.

Higher ADT streets (10k+) also see a higher concentration of collisions happening at night, compared with lower ADT streets.

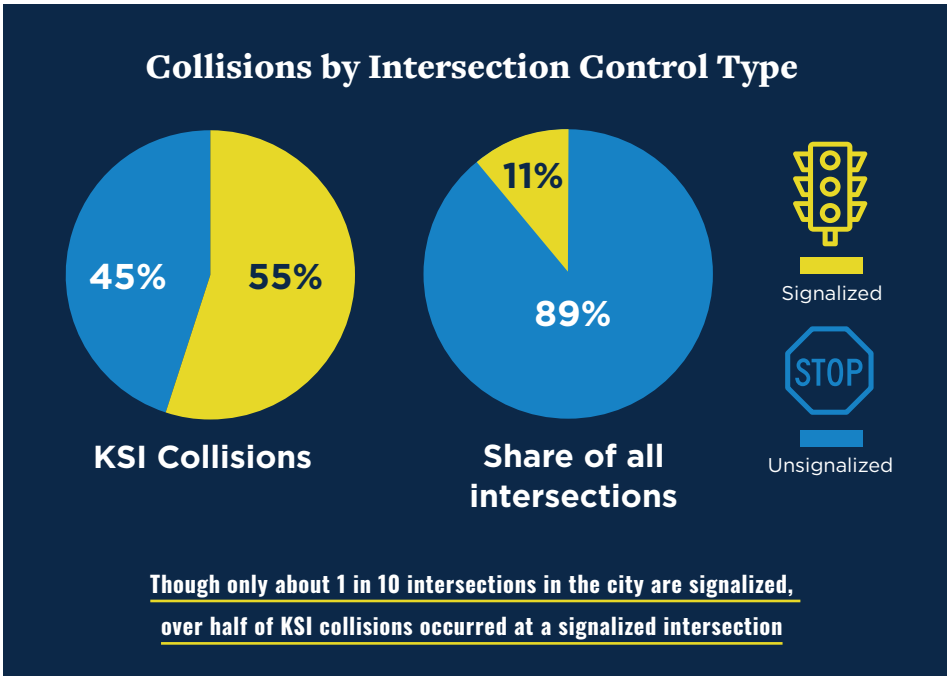
KSI collisions occur disproportionately on higher volume streets.

KSI Collisions by Weekday ADT of Street, 2017-2021



Intersection Control

KSI collisions occur disproportionately at signalized intersections compared to unsignalized intersections. Signalized intersections represent 11% of intersections, but account for more than 50% of KSI collisions across all modes.



Roadway Classification

Wider streets disproportionately represent KSI collisions compared to narrower streets. Wider streets, such as Boulevard II (≈80ft, 2-3 lanes in each direction), Avenue I (≈70 ft, 1-2 lanes in each direction), and Avenue II (≈56ft, 1-2 lanes in each direction, represent 19% of the roadway network, but account for 87% of KSI collisions across all modes.

Boulevards and Avenues make up 19% of streets in LA, but saw 87% of all KSI collisions

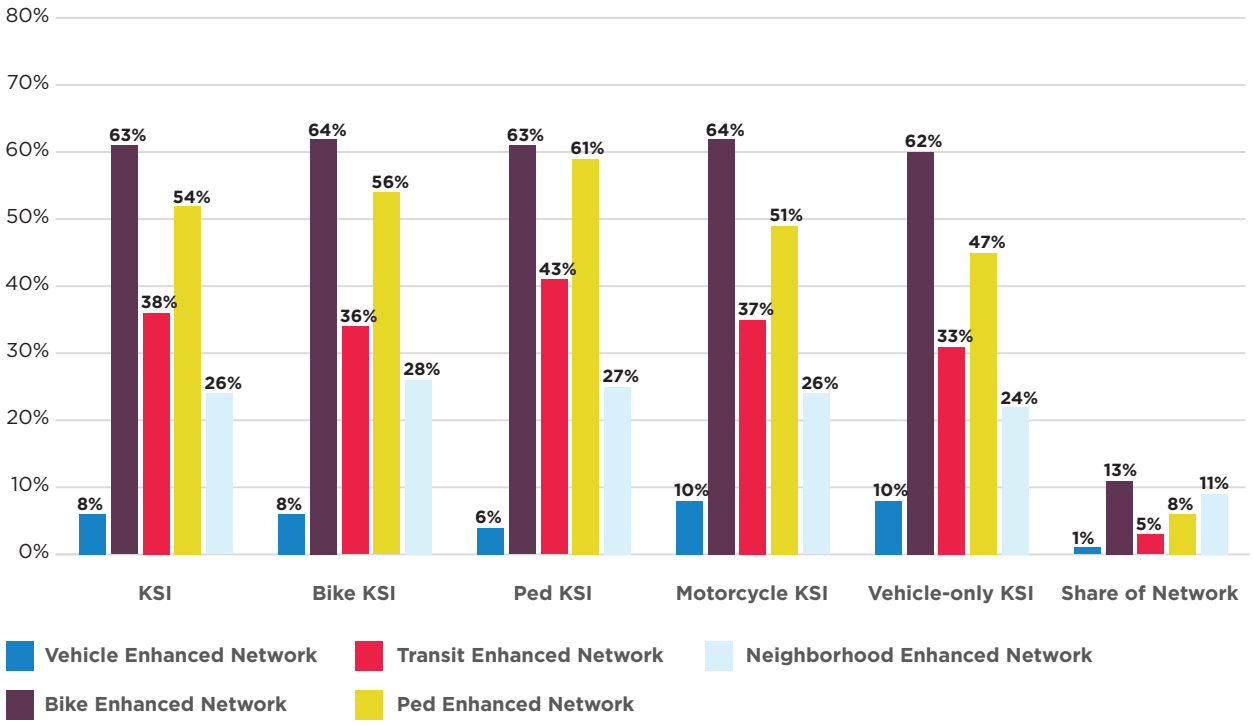
Local roads comprise 58% of the street network, but had only 6% of KSI collisions

Mobility Plan Designation

Streets designated as Pedestrian Enhanced Districts (PED) represent 8% of the roadway network, but account for 61% of all pedestrian KSI collisions. Relative to other modes, pedestrian KSI collisions occur disproportionately in designated Pedestrian Enhanced Districts.

63% of KSI collisions occur on streets designated as part of the Bike Enhanced Network (BEN) or Bike Lane Network (BLN). These streets account for 13% of the total network.

KSI Collisions by Mobility Plan Designation of Street, 2017-2021

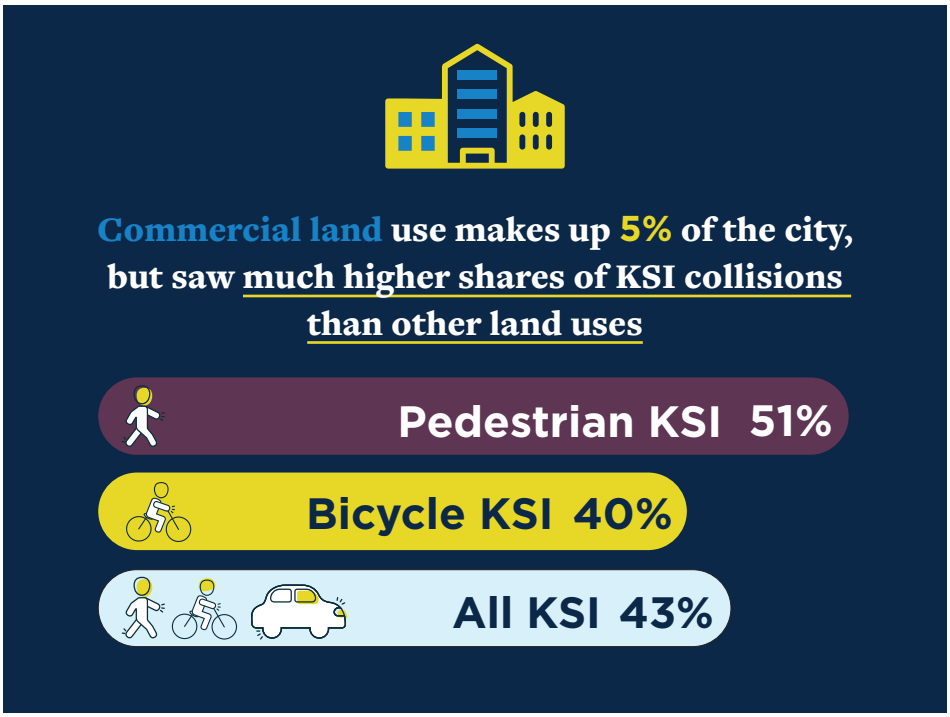


Note: Enhanced networks overlap (e.g. PED and BEN/BLN) - they are not mutually exclusive.

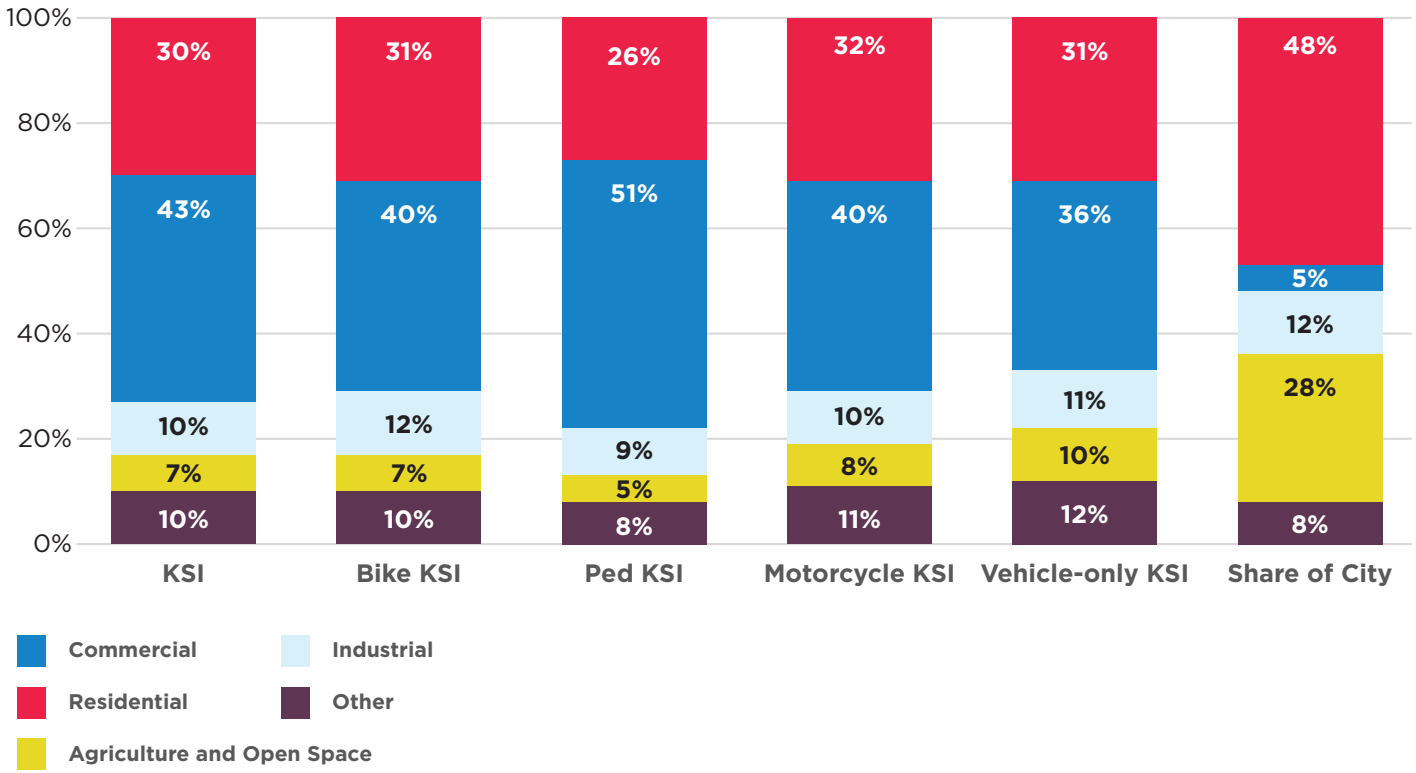
Land Use

Commercial land use accounts for the largest percentages of KSI collisions across all modes, relative to other land use types, but it represents just 5% of the land use adjacent to the roadway network. Over half of pedestrian KSI collisions occur adjacent to commercial land use.

Residential land use represents the most common land use type within Los Angeles, but accounts for 26-32% of KSI collisions across all modes.



KSI Collisions by Adjacent Land Use Classification, 2017-2021



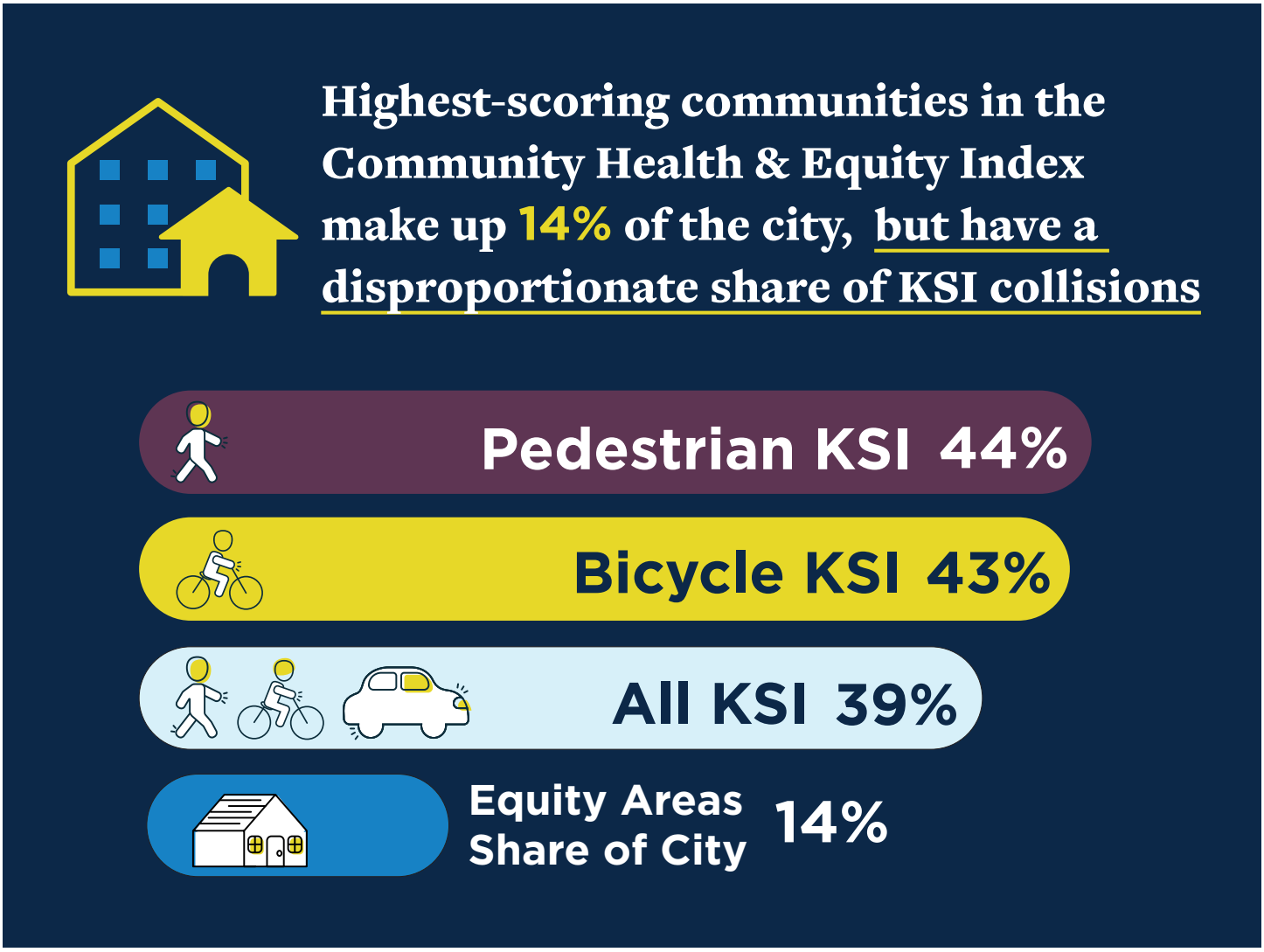
Disadvantaged Communities

Severe and fatal collisions occur disproportionately in Disadvantaged Communities.

This analysis examined three different Disadvantaged Community definitions:

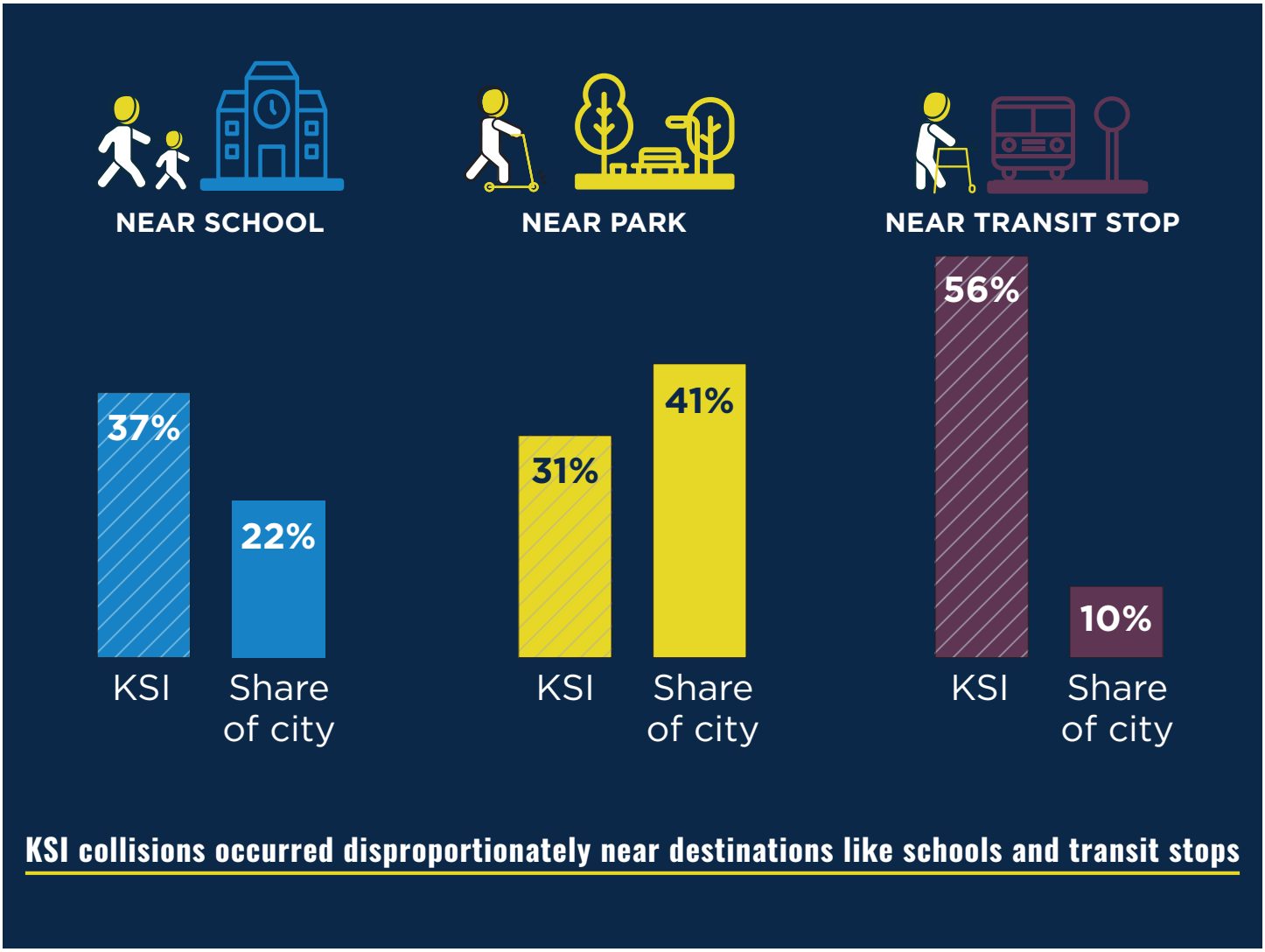
- Local: City of Los Angeles Community Health and Equity Index Top Quintile Areas
- State: CalEnviroScreen 4.0 Disadvantaged Communities
- Federal: USDOT Justice40 Disadvantaged Communities

For each definition, the share of KSI collisions occurring in Disadvantaged Communities was disproportionate to the share of the City land area that these communities account for.



Key Destinations

KSI collisions occur disproportionately near transit stops and schools, and at disproportionally lower rates near parks. Mode-specific KSI trends generally do not deviate from the overall KSI trend, but a larger share of pedestrian KSI collisions occur near schools when compared with other modes.



Note: Proximity was defined as follows - Schools: 1,000'; Parks: 1,000'; Transit Stops: 250' for bus stops, 1,000' for rail stations

LAPD RIPA Analysis

The LAPD Racial and Identity Profiling Act (RIPA) data was incorporated into the systemic analysis to illuminate how roadway safety is enforced, particularly with regard to the demographic information of people involved in traffic stops. The data is from the LAPD RIPA Dashboard and represents years 2018-2021.

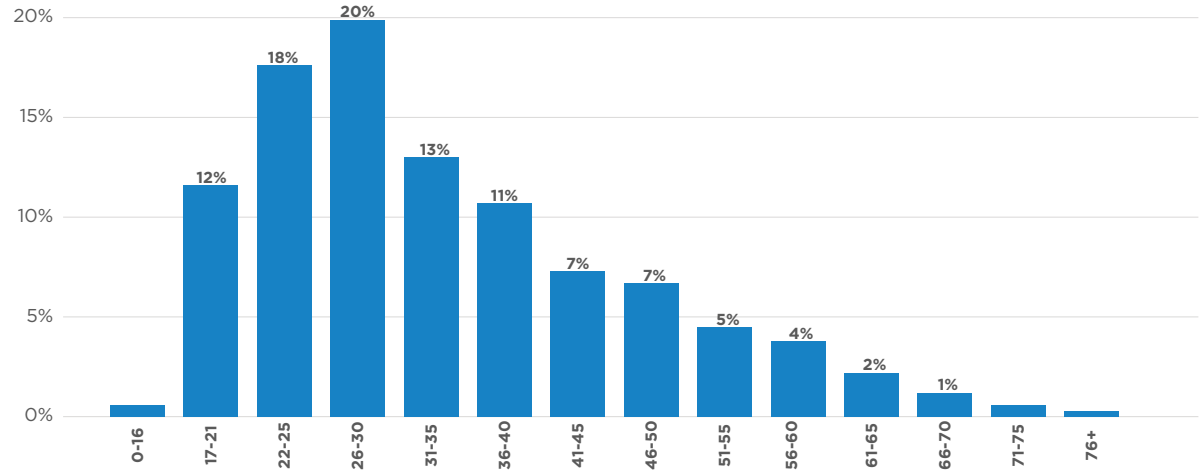
Gender

Men are involved in LAPD traffic stops nearly three times as often as women.

Age Group

LAPD traffic stops are concentrated among younger demographics, with age groups 17-30 representing nearly half of all traffic stops by the LAPD. The 26-30 age group bin represents the largest 5-year bin.

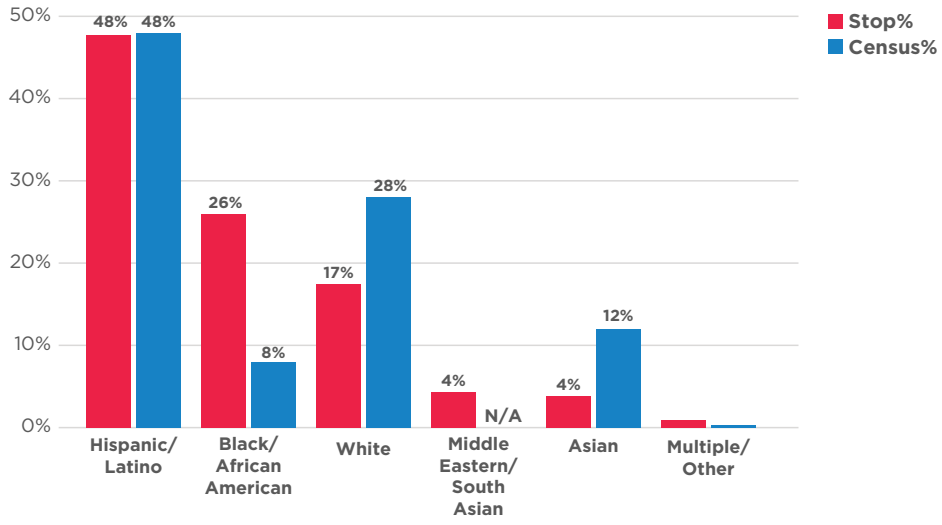
LAPD Traffic Stops by Age Group, 2018-2021

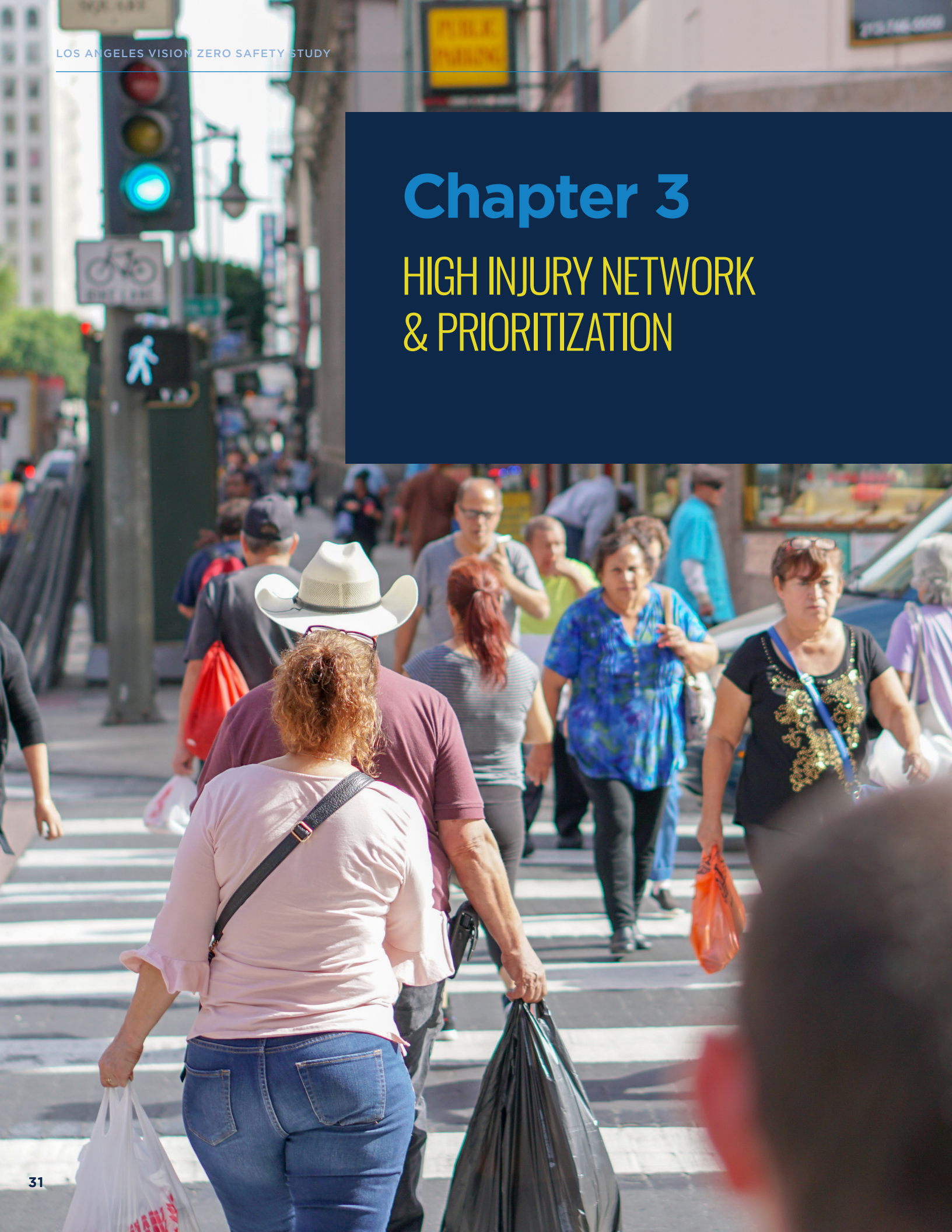


Race and Ethnicity

LAPD traffic stops by race/ethnicity are disproportionate relative to demographic composition. The Black/African American demographic accounts for approximately three times more LAPD traffic stops than their population proportion in the city.

LAPD Traffic Stops by Race & Ethnicity, 2018-2021





Chapter 3

HIGH INJURY NETWORK & PRIORITIZATION

In Los Angeles, a small percentage of streets account for a large share of the severe and fatal collisions. In 2016, the City created its first High Injury Network (HIN) to help decision-makers understand where efforts could be concentrated that would have the largest impact on safety outcomes. This study includes a new set of HINs that use newer collision data in combination with roadway and built environment risk factors to provide a new set of priority locations for the City.

HIN Process

The purpose of the HIN is to spotlight areas where collision-related severe injuries and deaths are concentrated, with an emphasis on vulnerable populations, which include people walking and bicycling as well as victim ages 65+ or 17 and under.

A new methodology was used to create the 2024 HINs, representing an evolution in roadway safety work since the first HIN was created for the City of Los Angeles in 2016. The methodology incorporates industry best practice for systemic and proactive roadway safety analysis. Roadway and other contextual factors that impact safety outcomes and take into account travel patterns are also scored as part of the HIN process. This is the first HIN update in Los Angeles since 2018.

Separate HINs were created for each of the following:

- All injury collisions
- Pedestrian injury collisions
- Bicycle injury collisions
- Motorcycle injury collisions
- Vehicle-only injury collisions

HIN contextual factors include:

- Equity emphasis areas
- Near schools and bus stops
- High bicyclist and pedestrian activity centers
- Roadways with high vehicle volumes, speeds, or designated truck routes

The HIN uses a 5-year collision dataset for 2017-2021 from the City's RoadSafeGIS database, and is supplemented by various contextual datasets.

To generate the HIN, collisions are scored separately from roadway segments and intersections. Collisions are given scores based on severity and the parties involved.

Roadway segments and intersections are scored based on contextual factors and the history of injury collisions.

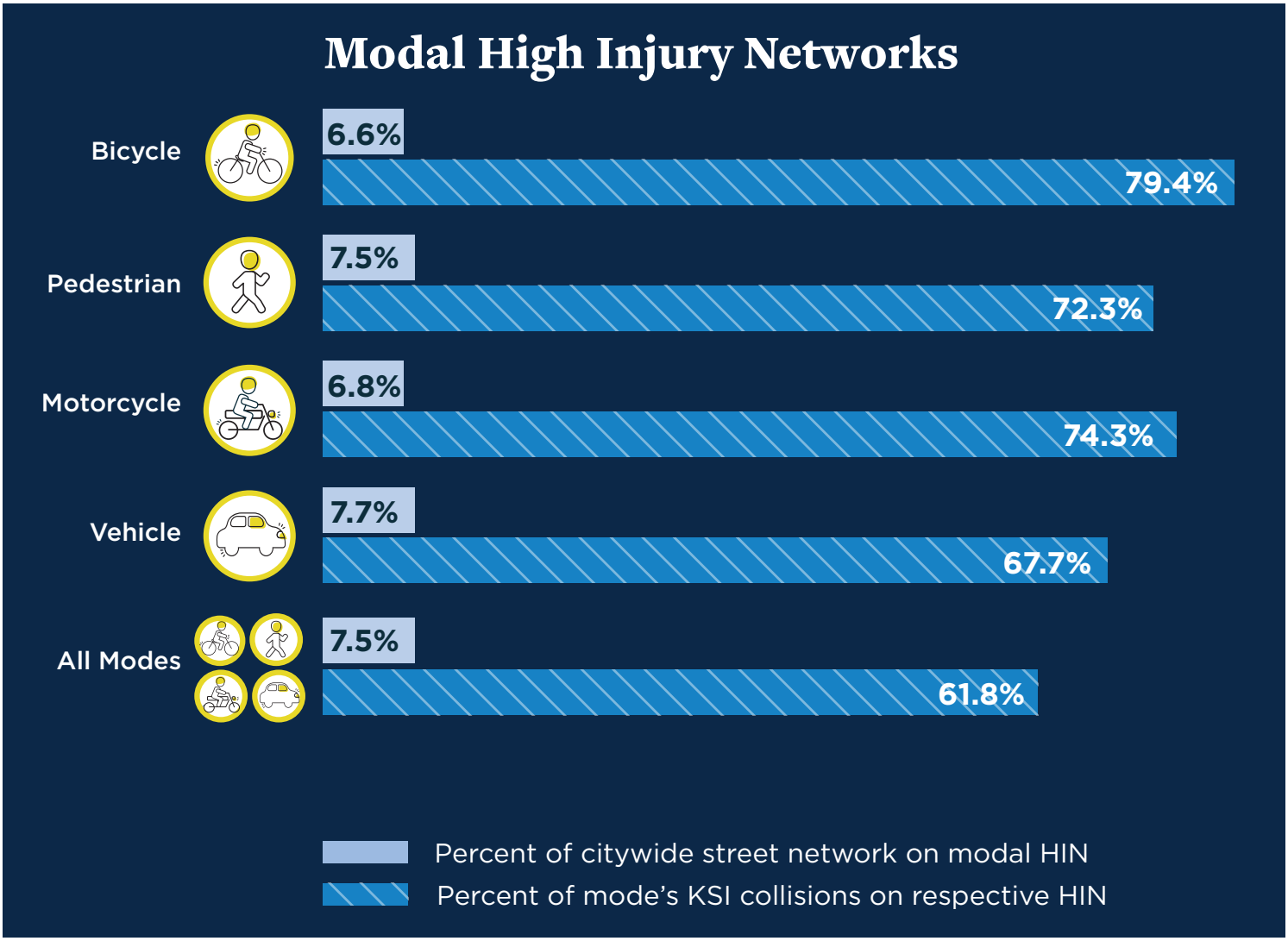
Collisions are then aggregated to segments and intersections, and cumulative scores are produced. See the summary table on the following page, and the HIN and Prioritization Memo for more details (**Appendix E**).

HIN Results

As a result of using a new methodology and evaluating new data, the updated All Modes HIN accounts for **549 miles** of roadway, which represents **7.5%** of the citywide roadway network and accounts for **61.8%** of KSI collisions in the City. Additionally, **32.6%** of the HIN falls within the City's equity emphasis areas (the top 20% of Census Tracts scored by the City's Health Atlas Community Health and Equity Index). See the graphic below and the following pages for details regarding the mode-specific HINs.

Prior HIN

The methodology used to create the HIN in 2016 (and then updated in 2018) relied only on historic collision data, and did not include contextual factors. Bicycle and pedestrian KSI collisions were weighted, but to a lesser extent than in the current methodology. The resulting HIN accounted for 65% of deaths and severe injuries, occurring on 6% of the street network (over 450 miles).



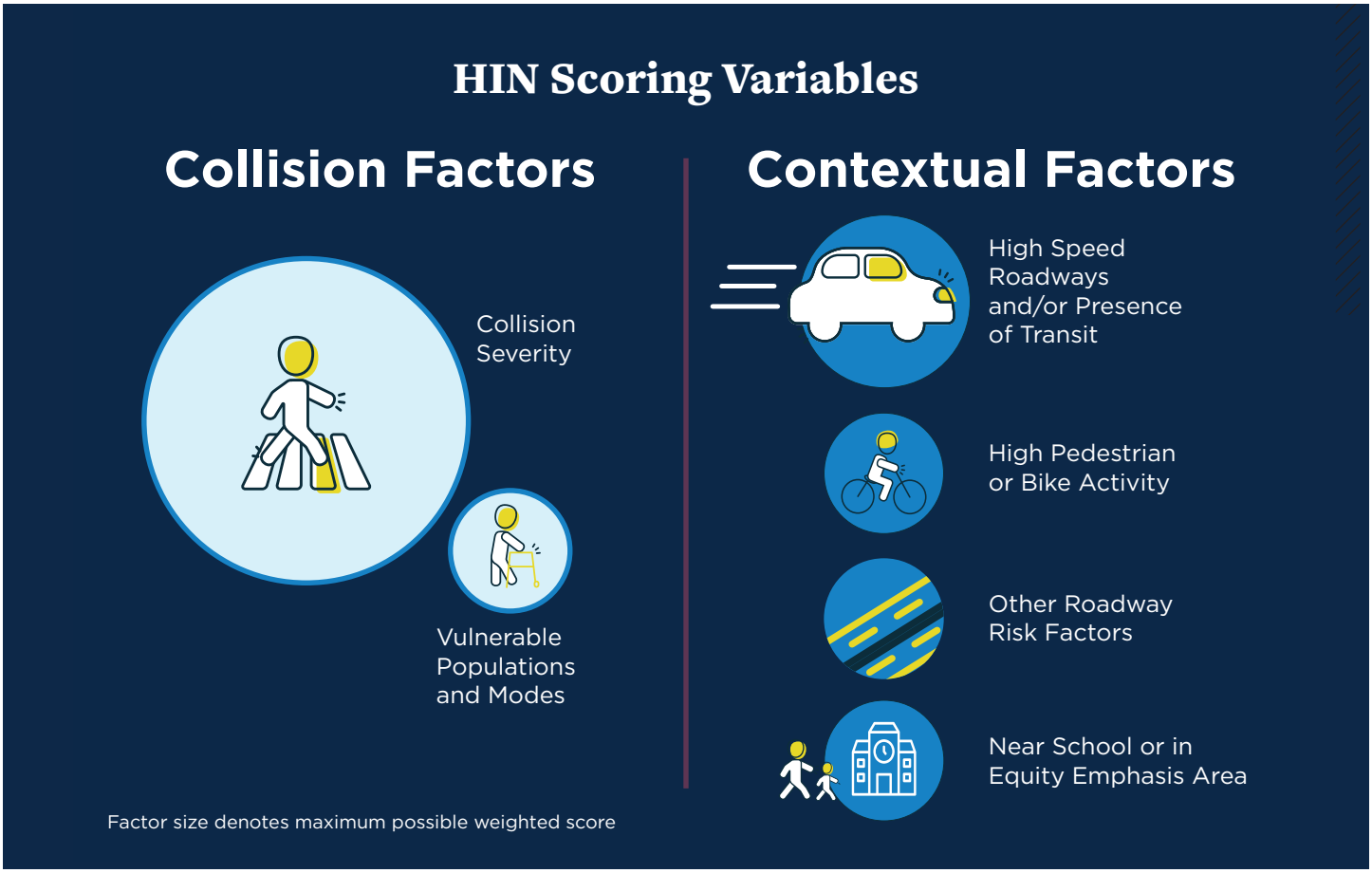
Prioritization Process and Results

To further hone Vision Zero strategic investments, LADOT focuses comprehensive safety improvements on a high-scoring subset of the HIN: the Priority Corridors and Intersections. Priority corridors and intersections are identified from the HIN using the same factors as the HIN process, but with contextual factors counting for a larger share of the score. In addition, this process prioritized corridors and intersections on a designated 2035 Mobility Plan Enhanced Network.

These prioritization factors allow LADOT to identify locations that have high concentrations of severe and fatal collisions while helping to achieve other departmental priorities, such as a focus on equity emphasis areas and implementation of the Mobility Plan.

This process was completed for each mode-specific HIN (i.e., bicycle, pedestrian, motorcycle, and motor vehicle) and the All Modes HIN, resulting in five final priority location lists. The prioritization process ranked all HIN corridors and all intersections citywide, allowing LADOT to continue use of the prioritization results into the future.

The HINs and top priority locations can be seen on the following pages.



All Modes HIN

Top 10 Scoring Intersections

Top 10 Scoring Corridors

High Injury Network (HIN)

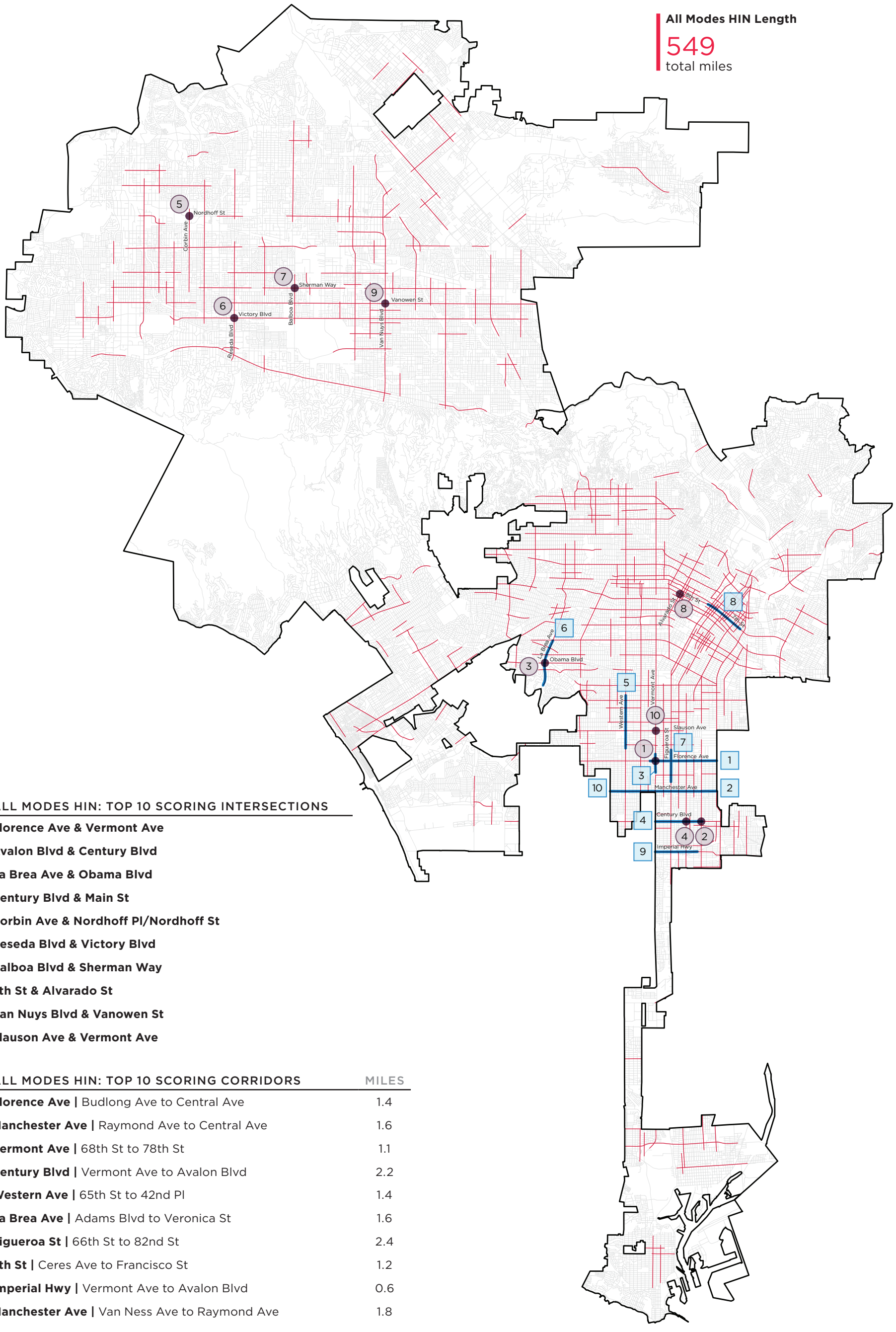
Where are collisions occurring?

61.8%
of all KSI collisions fall on

7.5%
of the citywide network

All Modes HIN Length

549
total miles



ALL MODES HIN: TOP 10 SCORING INTERSECTIONS

1	**Florence Ave & Vermont Ave**
2	**Avalon Blvd & Century Blvd**
3	**La Brea Ave & Obama Blvd**
4	**Century Blvd & Main St**
5	**Corbin Ave & Nordhoff Pl/Nordhoff St**
6	**Reseda Blvd & Victory Blvd**
7	**Balboa Blvd & Sherman Way**
8	**8th St & Alvarado St**
9	**Van Nuys Blvd & Vanowen St**
10	**Slauson Ave & Vermont Ave**

ALL MODES HIN: TOP 10 SCORING CORRIDORS

		MILES
1	**Florence Ave |** Budlong Ave to Central Ave	1.4
2	**Manchester Ave |** Raymond Ave to Central Ave	1.6
3	**Vermont Ave |** 68th St to 78th St	1.1
4	**Century Blvd |** Vermont Ave to Avalon Blvd	2.2
5	**Western Ave |** 65th St to 42nd Pl	1.4
6	**La Brea Ave |** Adams Blvd to Veronica St	1.6
7	**Figueroa St |** 66th St to 82nd St	2.4
8	**7th St |** Ceres Ave to Francisco St	1.2
9	**Imperial Hwy |** Vermont Ave to Avalon Blvd	0.6
10	**Manchester Ave |** Van Ness Ave to Raymond Ave	1.8

Pedestrian HIN

Top 10 Scoring Intersections

Top 10 Scoring Corridors

High Injury Network (HIN)

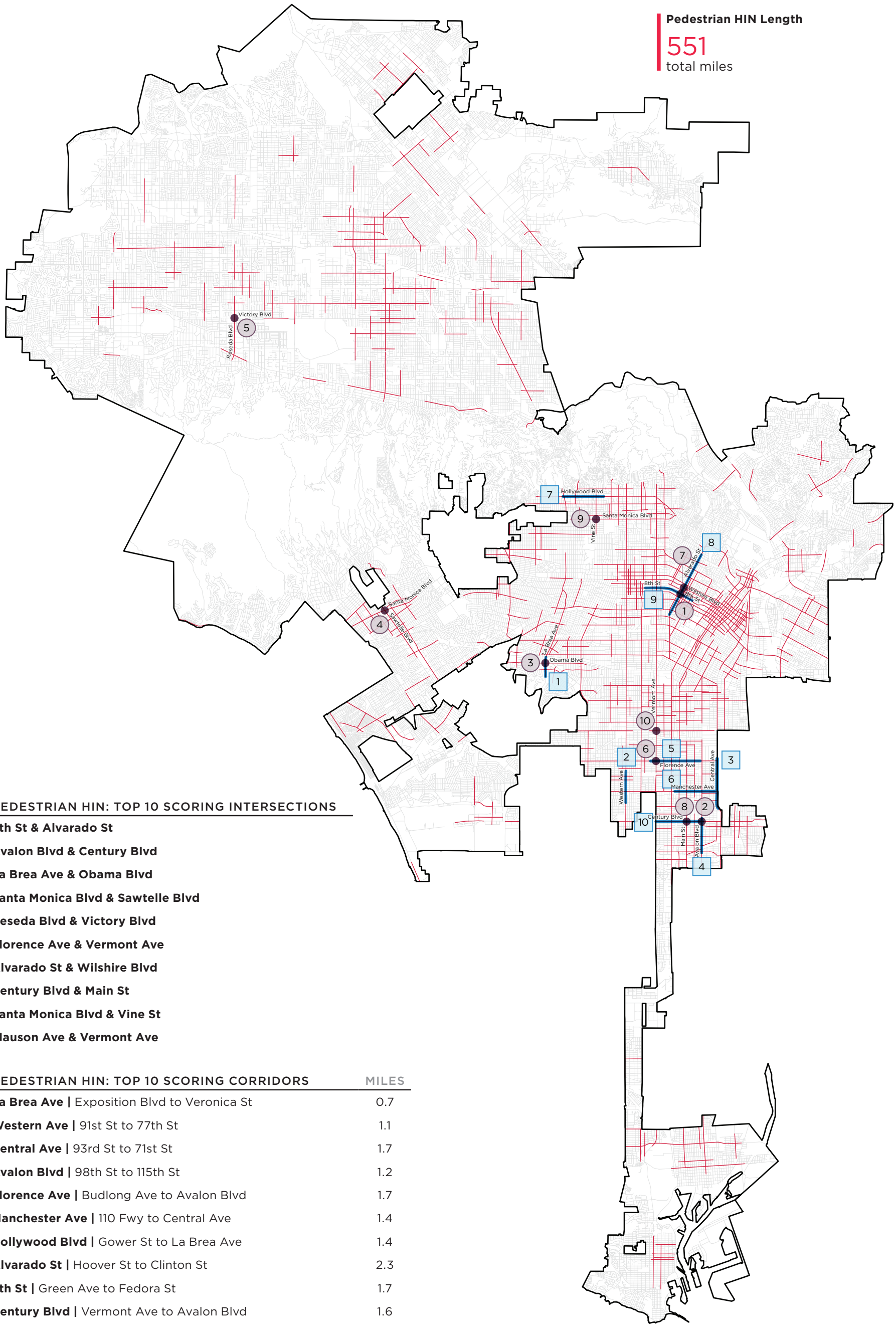
Where are collisions occurring?

72.3%
of Pedestrian KSI collisions fall on

7.5%
of the citywide network

Pedestrian HIN Length

551
total miles



PEDESTRIAN HIN: TOP 10 SCORING INTERSECTIONS

1	**8th St & Alvarado St**
2	**Avalon Blvd & Century Blvd**
3	**La Brea Ave & Obama Blvd**
4	**Santa Monica Blvd & Sawtelle Blvd**
5	**Reseda Blvd & Victory Blvd**
6	**Florence Ave & Vermont Ave**
7	**Alvarado St & Wilshire Blvd**
8	**Century Blvd & Main St**
9	**Santa Monica Blvd & Vine St**
10	**Slauson Ave & Vermont Ave**

PEDESTRIAN HIN: TOP 10 SCORING CORRIDORS

		MILES
1	**La Brea Ave |** Exposition Blvd to Veronica St	0.7
2	**Western Ave |** 91st St to 77th St	1.1
3	**Central Ave |** 93rd St to 71st St	1.7
4	**Avalon Blvd |** 98th St to 115th St	1.2
5	**Florence Ave |** Budlong Ave to Avalon Blvd	1.7
6	**Manchester Ave |** 110 Fwy to Central Ave	1.4
7	**Hollywood Blvd |** Gower St to La Brea Ave	1.4
8	**Alvarado St |** Hoover St to Clinton St	2.3
9	**8th St |** Green Ave to Fedora St	1.7
10	**Century Blvd |** Vermont Ave to Avalon Blvd	1.6

Bicycle HIN

Top 10 Scoring Intersections

Top 10 Scoring Corridors

High Injury Network (HIN)

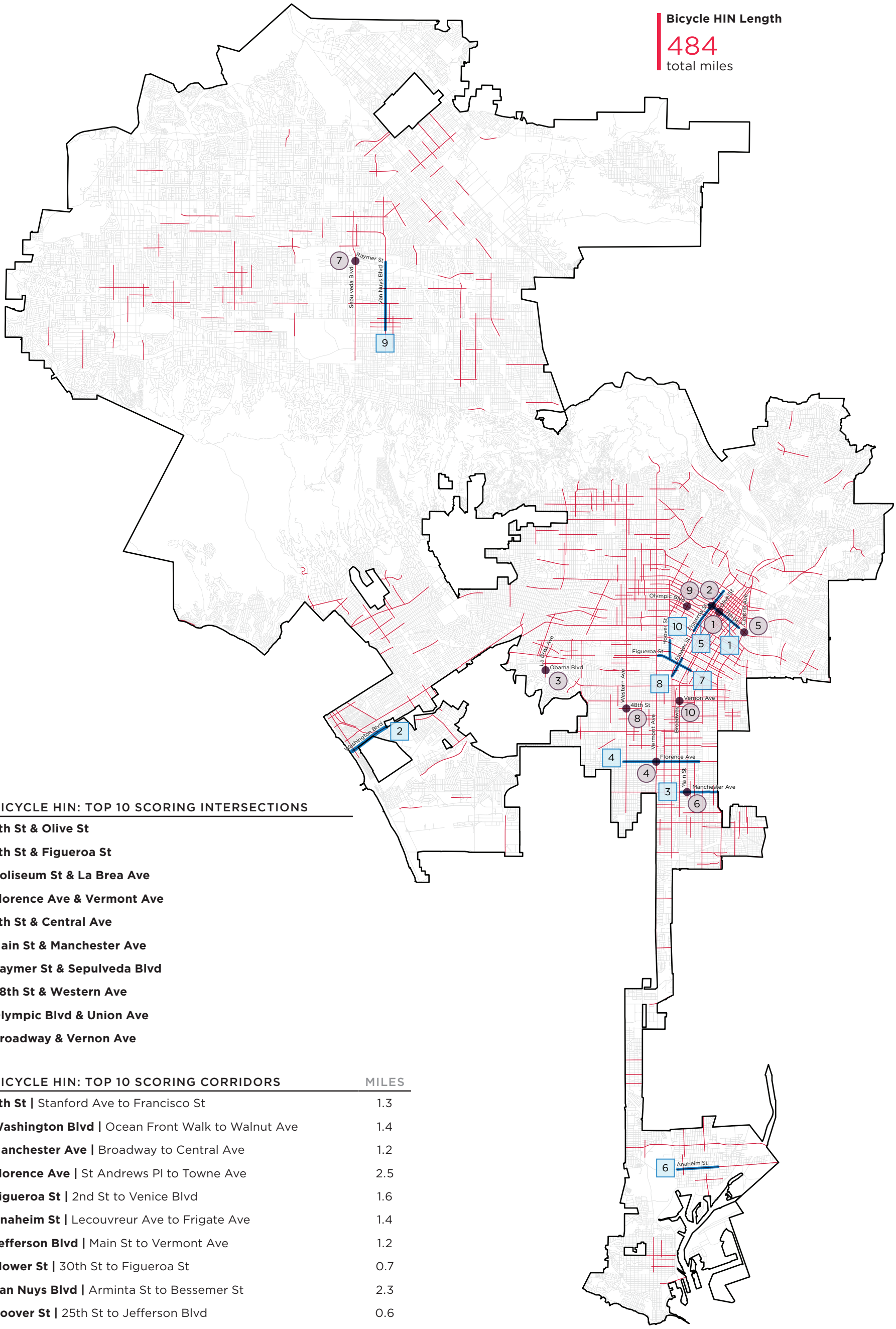
Where are collisions occurring?

79.4%
of Bicycle KSI collisions fall on

6.6%
of the citywide network

Bicycle HIN Length

484
total miles



BICYCLE HIN: TOP 10 SCORING INTERSECTIONS

1	**7th St & Olive St**
2	**7th St & Figueroa St**
3	**Coliseum St & La Brea Ave**
4	**Florence Ave & Vermont Ave**
5	**7th St & Central Ave**
6	**Main St & Manchester Ave**
7	**Raymer St & Sepulveda Blvd**
8	**48th St & Western Ave**
9	**Olympic Blvd & Union Ave**
10	**Broadway & Vernon Ave**

BICYCLE HIN: TOP 10 SCORING CORRIDORS

		MILES
1	**7th St** | Stanford Ave to Francisco St	1.3
2	**Washington Blvd** | Ocean Front Walk to Walnut Ave	1.4
3	**Manchester Ave** | Broadway to Central Ave	1.2
4	**Florence Ave** | St Andrews Pl to Towne Ave	2.5
5	**Figueroa St** | 2nd St to Venice Blvd	1.6
6	**Anaheim St** | Lecouvreur Ave to Frigate Ave	1.4
7	**Jefferson Blvd** | Main St to Vermont Ave	1.2
8	**Flower St** | 30th St to Figueroa St	0.7
9	**Van Nuys Blvd** | Arminta St to Bessemer St	2.3
10	**Hoover St** | 25th St to Jefferson Blvd	0.6

Motorcycle HIN

Top 10 Scoring Intersections

Top 10 Scoring Corridors

High Injury Network (HIN)

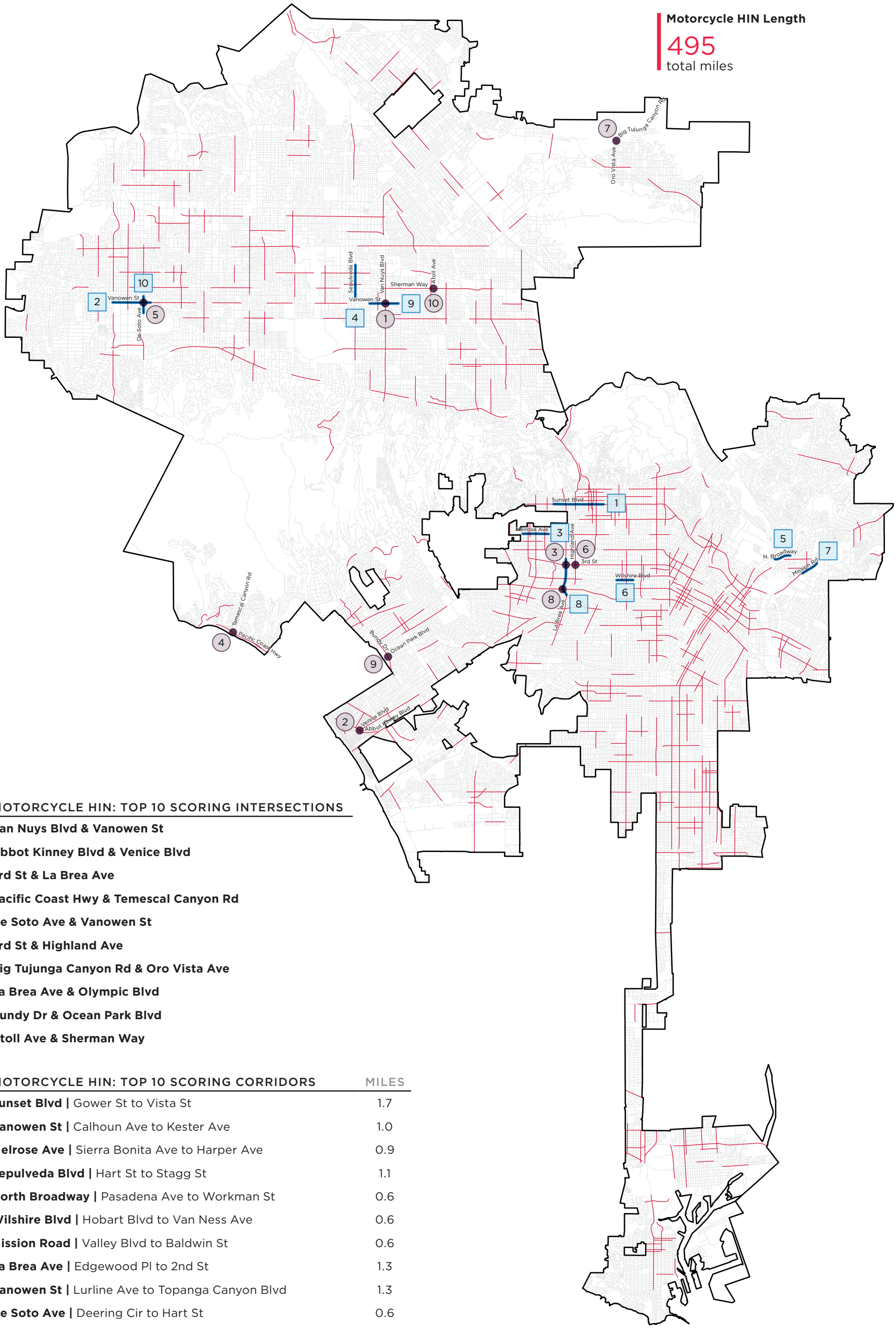
Where are collisions occurring?

74.3%
of Motorcycle KSI collisions fall on

6.8%
of the citywide network

Motorcycle HIN Length

495
total miles



MOTORCYCLE HIN: TOP 10 SCORING INTERSECTIONS

1	**Van Nuys Blvd & Vanowen St**
2	**Abbot Kinney Blvd & Venice Blvd**
3	**3rd St & La Brea Ave**
4	**Pacific Coast Hwy & Temescal Canyon Rd**
5	**De Soto Ave & Vanowen St**
6	**3rd St & Highland Ave**
7	**Big Tujunga Canyon Rd & Oro Vista Ave**
8	**La Brea Ave & Olympic Blvd**
9	**Bundy Dr & Ocean Park Blvd**
10	**Atoll Ave & Sherman Way**

MOTORCYCLE HIN: TOP 10 SCORING CORRIDORS

		MILES
1	**Sunset Blvd |** Gower St to Vista St	1.7
2	**Vanowen St |** Calhoun Ave to Kester Ave	1.0
3	**Melrose Ave |** Sierra Bonita Ave to Harper Ave	0.9
4	**Sepulveda Blvd |** Hart St to Stagg St	1.1
5	**North Broadway |** Pasadena Ave to Workman St	0.6
6	**Wilshire Blvd |** Hobart Blvd to Van Ness Ave	0.6
7	**Mission Road |** Valley Blvd to Baldwin St	0.6
8	**La Brea Ave |** Edgewood Pl to 2nd St	1.3
9	**Vanowen St |** Lurline Ave to Topanga Canyon Blvd	1.3
10	**De Soto Ave |** Deering Cir to Hart St	0.6

Vehicle HIN

Top 10 Scoring Intersections

Top 10 Scoring Corridors

High Injury Network (HIN)

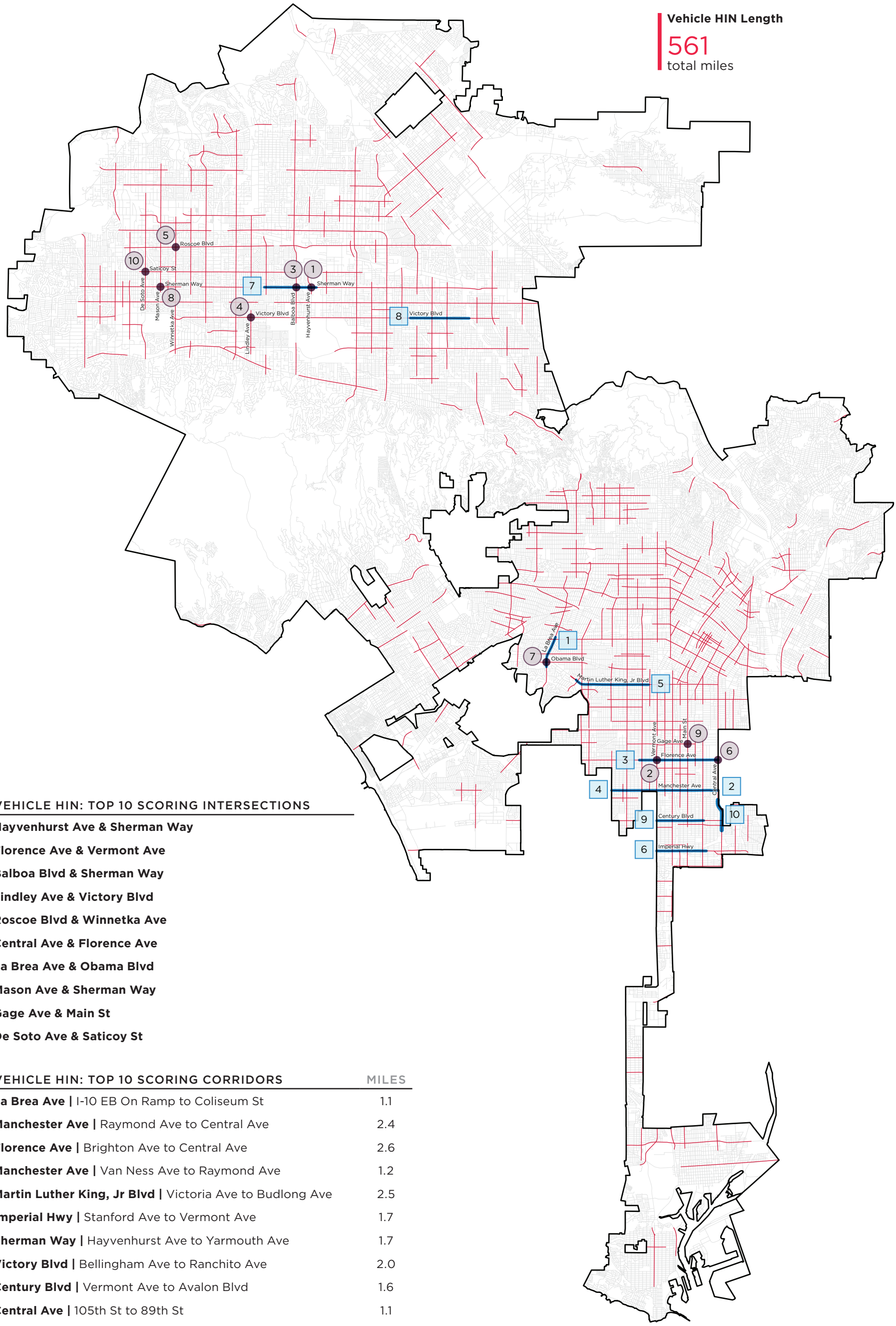
Where are collisions occurring?

67.7%
of Vehicle KSI collisions fall on

7.7%
of the citywide network

Vehicle HIN Length

561
total miles



VEHICLE HIN: TOP 10 SCORING INTERSECTIONS

1	**Hayvenhurst Ave & Sherman Way**
2	**Florence Ave & Vermont Ave**
3	**Balboa Blvd & Sherman Way**
4	**Lindley Ave & Victory Blvd**
5	**Roscoe Blvd & Winnetka Ave**
6	**Central Ave & Florence Ave**
7	**La Brea Ave & Obama Blvd**
8	**Mason Ave & Sherman Way**
9	**Gage Ave & Main St**
10	**De Soto Ave & Saticoy St**

VEHICLE HIN: TOP 10 SCORING CORRIDORS

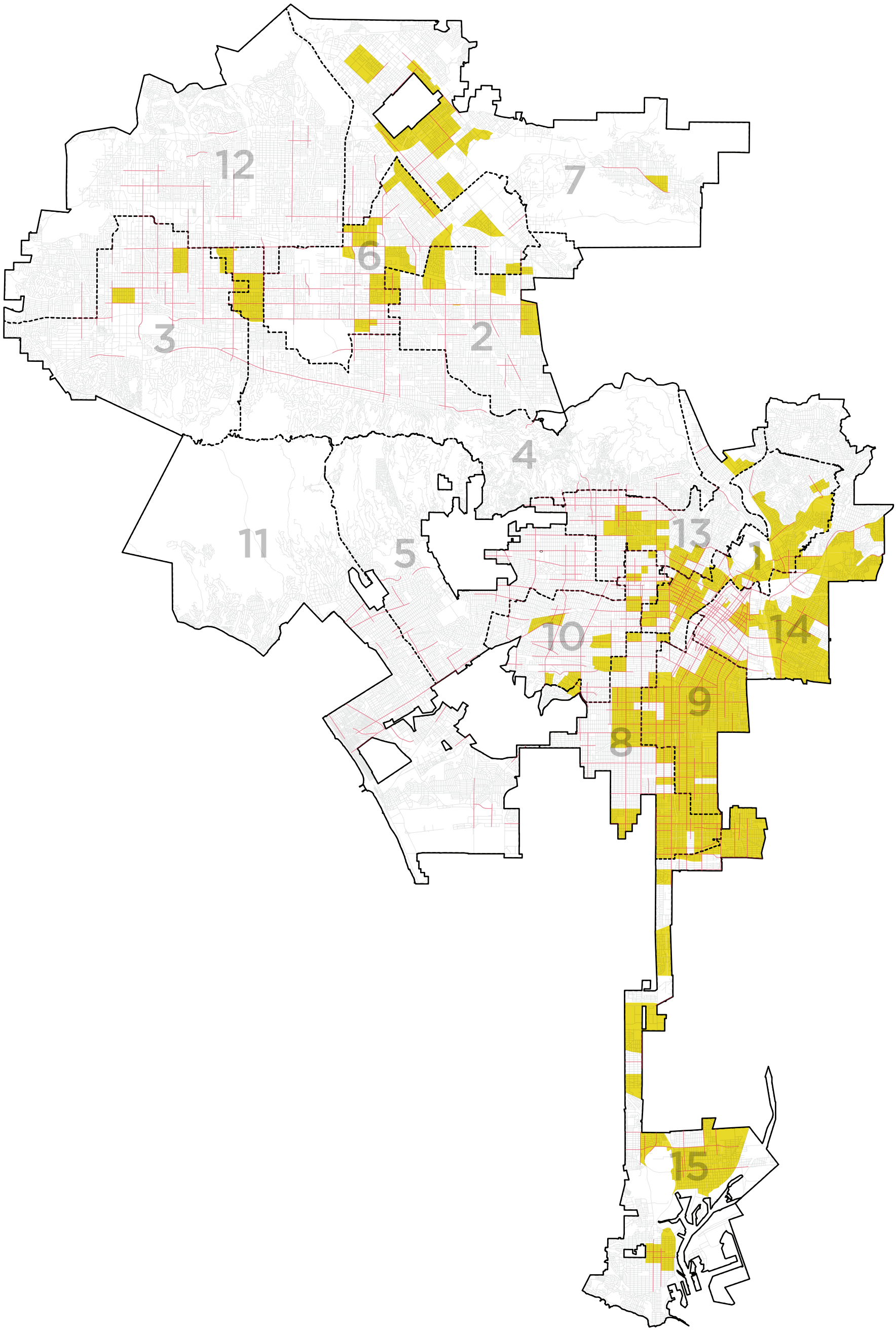
		MILES
1	**La Brea Ave |** I-10 EB On Ramp to Coliseum St	1.1
2	**Manchester Ave |** Raymond Ave to Central Ave	2.4
3	**Florence Ave |** Brighton Ave to Central Ave	2.6
4	**Manchester Ave |** Van Ness Ave to Raymond Ave	1.2
5	**Martin Luther King, Jr Blvd |** Victoria Ave to Budlong Ave	2.5
6	**Imperial Hwy |** Stanford Ave to Vermont Ave	1.7
7	**Sherman Way |** Hayvenhurst Ave to Yarmouth Ave	1.7
8	**Victory Blvd |** Bellingham Ave to Ranchito Ave	2.0
9	**Century Blvd |** Vermont Ave to Avalon Blvd	1.6
10	**Central Ave |** 105th St to 89th St	1.1

Community Health & Equity

Top 20% Community Health & Equity Locations
Source: Health Atlas for the City of Los Angeles, 2021

All Modes High Injury Network (HIN)

Council Districts



Risk Factors & Collision Profiles

Systemic Analysis

The systemic analysis paired collision factors (e.g. mode, type, time of day, cause of collision) with roadway and built environment contextual factors (e.g. roadway speed, intersection control type, adjacent land use) to uncover systemic patterns for severe and fatal collisions across the city. Systemic analysis is an important component of identifying roadway safety issues because it allows the City to go beyond hot spot identification and understand the risk factors underlying severe and fatal collision trends.

Risk Factors

Risk factors identified through the systemic analysis are roadway or other contextual characteristics that account for the highest share of fatal and severe injury collisions.

The risk factors identified account for a disproportionate share of KSI collisions compared with the factor's share of the total street network. In Los Angeles, the factors are:

- **30+ mph 85th percentile speed**
- **40-50 mph 85th percentile speed (esp. vehicle-only collisions)**
- **20-30k ADT**
- **30k+ ADT**
- **Major Signal without Protected Left Turns or Variable Left Turns**
- **Truck Routes**
- **Commercial Land Use**
- **Poor Pavement Condition**
- **Los Angeles Equity Emphasis Areas**
- **CA Disadvantaged Communities**
- **USDOT Disadvantaged Communities**
- **Locations Near Transit Stops**
- **Bike Enhanced and Bike Lane Networks**
- **Transit Enhanced Network**
- **Pedestrian Enhanced Districts**
- **Boulevard II Roadway Classification (esp. vehicle-only and motorcycle collisions)**

Collision Profiles

Collision profiles highlight specific conditions that account for a large share of fatal and severe injuries, for each of the modes analyzed.

The following pages present the **24 collision profiles** identified for the City of Los Angeles, along with the top locations where each collision type occurs most frequently.

Chapter 4 of this report details countermeasures that are suggested for particular collision profiles. The combination of collision profiles, top locations and countermeasures will directly inform recommended projects to help the City advance its Vision Zero commitment through the systemic implementation of safety countermeasures.

Collision Profile Key Terms

Major Signals are signalized intersections where at least one leg is designated as a Boulevard or Avenue roadway, per Mobility Plan 2035. All other signalized intersections are categorized as Minor Signals.

Major Unsignalized Intersections are intersections where at least one leg is designated as a Boulevard or Avenue roadway. This category is built on the LADOT signal database, so signals not maintained by LADOT or not included in this database may be identified as Major Unsignalized Intersections.

Collision profiles are defined as a combination of at least one collision factor and at least one contextual factor.

Major Signals without Fully Protected Lefts are signalized intersections where at least one leg is designated as a Boulevard or Avenue roadway and at least one leg has a left turn that is not fully protected. This includes locations where left-turn phasing is protected/permissive on at least one leg.

ADT is a 2022-2023 estimate for weekday (Tuesday-Thursday) Average Daily Traffic as determined through StreetLight Data connected vehicle data (CVD) estimates. ADT for local roadways was not available, and assumed to be less than 5k.

The determination of how and where a collision occurred is at the discretion of the police officer writing the collision report. For example, the collision factor **Dark-Street Lights** refers to collisions that occur post-sunset where there are street lights present. Officers will use their discretion to determine presence of a street light.

COLLISION PROFILES

Profile 1 (2017-2021 Injury Collisions)

Roads with 40-50 MPH Speeds in Dark Conditions (Street Lights Present)

MODES	**All Modes**
COLLISION FACTOR	**Dark-Street Lights**
CONTEXTUAL FACTOR	**40-49.9 MPH (85th percentile speed)**

7,102
Total Collisions

1,066 (14% of citywide KSI collisions)
KSI Collisions

Avalon Blvd & Century Blvd
Century Blvd & Sepulveda Blvd
Balboa Blvd & Sherman Way
Top Locations

Profile 2 (2017-2021 Injury Collisions)

Bicyclists Hit by Drivers Proceeding Straight on Streets with ADT between 10k and 20k

MODES	**Bicycle**
COLLISION FACTOR	**Driver Proceeding Straight**
CONTEXTUAL FACTOR	**10-19.9k ADT**

628
Total Collisions

117 (17% of citywide bike KSI collisions)
KSI Collisions

6th St & San Pedro St
7th St & Central Ave
7th St & Crocker St
Top Locations

COLLISION PROFILES

Profile 3 (2017-2021 Injury Collisions)

Bicyclists Hit by Drivers Proceeding Straight at Major Unsignalized Intersections

MODES	**Bicycle**
COLLISION FACTOR	**Driver Proceeding Straight**
CONTEXTUAL FACTOR	**Major Unsignalized Intersection**

Note: Includes signals not owned by LADOT

794
Total Collisions

139 (20% of citywide bike KSI collisions)
KSI Collisions

7th St & Crocker St
Anaheim St & King Ave
35th St & Western Ave
Top Locations

Profile 4 (2017-2021 Injury Collisions)

Bicyclists Hit by Drivers Proceeding Straight On Roadways with 40-50 MPH Speeds

MODES	**Bicycle**
COLLISION FACTOR	**Driver Proceeding Straight**
CONTEXTUAL FACTOR	**40-49.9 MPH (85th percentile speed)**

561
Total Collisions

133 (19% of citywide bike KSI collisions)
KSI Collisions

Chandler Blvd & Leghorn Ave
Compton Ave & Imperial Hwy
Haskell Ave & Nordhoff St
Top Locations

COLLISION PROFILES

Profile 5 (2017-2021 Injury Collisions)

Bicyclists Hit Broadside Adjacent to Residential Land Use

779
Total Collisions

90 (13% of citywide bike KSI collisions)
KSI Collisions

MODES	**Bicycle**
COLLISION FACTOR	**Broadside**
CONTEXTUAL FACTOR	**Residential Land Use**

81st St & Hoover St
9th St & Grand Ave
Coliseum St & La Brea Ave
Top Locations

Profile 6 (2017-2021 Injury Collisions)

Motorcyclists Hit Broadside On Roadways With 40-50 MPH Speeds

636
Total Collisions

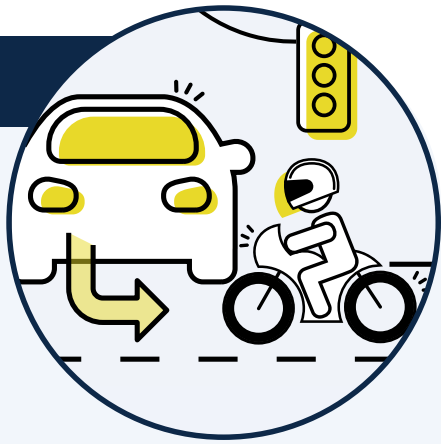
226 (15% of citywide motorcycle KSI collisions)
KSI Collisions

MODES	**Motorcycle**
COLLISION FACTOR	**Broadside**
CONTEXTUAL FACTOR	**40-49.9 MPH (85th percentile speed)**

Lassen St & Reseda Blvd
Bristol Cir & Sunset Blvd
Manchester Ave & Wadsworth Ave
Top Locations

COLLISION PROFILES

Profile 7 (2017-2021 Injury Collisions)



Motorcyclists Hit by Drivers Turning Left at Major Signals with No Fully Protected Lefts

MODES	**Motorcycle**
COLLISION FACTOR	**Driver Making Left Turn**
CONTEXTUAL FACTOR	**Major Signal with No Protected Lefts**

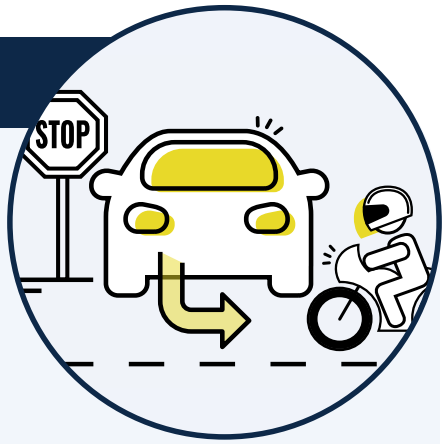
Note: Includes signals with protected/ permissive phasing

924
Total Collisions

305 (20% of citywide motorcycle KSI collisions)
KSI Collisions

Bundy Dr & Ocean Park Blvd
3rd St & La Brea Ave
Magnolia Blvd & Tujunga Ave
Top Locations

Profile 8 (2017-2021 Injury Collisions)



Motorcyclists Hit by Drivers Turning Left at Major Unsignalized Intersections

MODES	**Motorcycle**
COLLISION FACTOR	**Driver Making Left Turn**
CONTEXTUAL FACTOR	**Major Unsignalized Intersection**

Note: Includes signals not owned by LADOT

728
Total Collisions

226 (15% of citywide motorcycle KSI collisions)
KSI Collisions

Grant Ave & Lincoln Blvd
Big Tujunga Canyon Rd & Oro Vista Ave
20th St & Figueroa St
Top Locations

COLLISION PROFILES

Profile 9 (2017-2021 Injury Collisions)

Pedestrians Hit between the Hours of 9 PM and 6 AM with No Marked Crosswalk

MODES	**Pedestrian**
COLLISION FACTOR	**9PM-6AM**
CONTEXTUAL FACTOR	**No Marked Crosswalk**

1,230
Total Collisions

529 (19% of citywide pedestrian KSI collisions)
KSI Collisions

90th St & Central Ave
89th St & Central Ave
Century Blvd & Wall St
Top Locations

Profile 10 (2017-2021 Injury Collisions)

Pedestrians Hit When Crossing Not in a Crosswalk at Major Unsignalized Intersections

MODES	**Pedestrian**
COLLISION FACTOR	**Crossing Not in Crosswalk**
CONTEXTUAL FACTOR	**Major Unsignalized Intersection**

Note: Includes signals not owned by LADOT

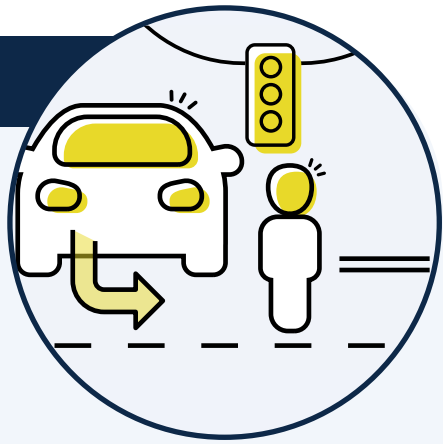
1,070
Total Collisions

422 (15% of citywide pedestrian KSI collisions)
KSI Collisions

116th St & Avalon Blvd
89th St & Central Ave
81st St & Avalon Blvd
Top Locations

COLLISION PROFILES

Profile 11 (2017-2021 Injury Collisions)



Pedestrians Hit When Crossing Not in a Crosswalk at Major Signals with No Fully Protected Lefts

MODES	**Pedestrian**
COLLISION FACTOR	**Crossing Not in Crosswalk**
CONTEXTUAL FACTOR	**Major Signal with No Protected Lefts**

Note: Includes signals with protected/ permissive phasing

899
Total Collisions

298 (10% of citywide pedestrian KSI collisions)
KSI Collisions

6th St & San Pedro St
8th St & Alvarado St
Century Blvd & Main St
Top Locations

Profile 12 (2017-2021 Injury Collisions)

Pedestrians Hit Near Transit Stops between 9 PM and Midnight

MODES	**Pedestrian**
COLLISION FACTOR	**9PM-Midnight**
CONTEXTUAL FACTOR	**Near Transit Stop**

1,100
Total Collisions

340 (12% of citywide pedestrian KSI collisions)
KSI Collisions

Avalon Blvd & Century Blvd
Santa Monica Blvd & Sawtelle Blvd
Coliseum St & MLK Jr Blvd
Top Locations

COLLISION PROFILES

Profile 13 (2017-2021 Injury Collisions)

Pedestrians Age 65+ Hit on Streets Designated as Pedestrian Enhanced Districts

MODES	**Pedestrian**
COLLISION FACTOR	**Victim Age 65+**
CONTEXTUAL FACTOR	**Pedestrian Enhanced Districts**

1,259
Total Collisions

341 (12% of citywide pedestrian KSI collisions)
KSI Collisions

College St & N Broadway
6th St & Grand View St
Eastlake Ave & N Broadway
Top Locations

Profile 14 (2017-2021 Injury Collisions)

Pedestrians Hit by Drivers Proceeding Straight Near Schools

MODES	**Pedestrian**
COLLISION FACTOR	**Driver Proceeding Straight**
CONTEXTUAL FACTOR	**Near School**

2,731
Total Collisions

820 (29% of citywide pedestrian KSI collisions)
KSI Collisions

Century Blvd & Main St
Santa Monica Blvd & Sawtelle Blvd
Santa Monica Blvd & Vine St
Top Locations

COLLISION PROFILES

Profile 15 (2017-2021 Injury Collisions)

Pedestrians Hit Near Parks in Dark Conditions (Street Lights Present)

MODES	**Pedestrian**
COLLISION FACTOR	**Dark-Street Lights**
CONTEXTUAL FACTOR	**Near Park**

1,703
Total Collisions

526 (18% of citywide pedestrian KSI collisions)
KSI Collisions

8th St & Alvarado St
6th St & San Pedro St
Florence Ave & Vermont Ave
Top Locations

Profile 16 (2017-2021 Injury Collisions)

Head-On Vehicle Collisions Along Roadways in CA Disadvantaged Communities

MODES	**Vehicle-Only**
COLLISION FACTOR	**Head-On**
CONTEXTUAL FACTOR	**Disadvantaged Community-CalEnviroScreen**

5,248
Total Collisions

317 (13% of citywide vehicle-only KSI collisions)
KSI Collisions

Slauson Ave & Western Ave
MLK Jr Blvd & Vermont Ave
Hoover St & Manchester Ave
Top Locations

COLLISION PROFILES

Profile 17 (2017-2021 Injury Collisions)

Vehicle Collisions Along Truck Routes that Result from Unsafe Speed Violations

MODES	Vehicle-Only
COLLISION FACTOR	Unsafe Speed Violation
CONTEXTUAL FACTOR	Truck Route

5,811
Total Collisions

260 (10% of citywide vehicle-only KSI collisions)
KSI Collisions

Manchester Ave & Western Ave
Century Blvd & Figueroa St
Figueroa St & Manchester Ave
Top Locations

Profile 18 (2017-2021 Injury Collisions)

Vehicles Collisions at Major Unsignalized Intersections in Dark Conditions (Street Lights Present)

MODES	Vehicle-Only
COLLISION FACTOR	Dark-Street Lights
CONTEXTUAL FACTOR	Major Unsignalized Intersection

Note: Includes signals not owned by LADOT

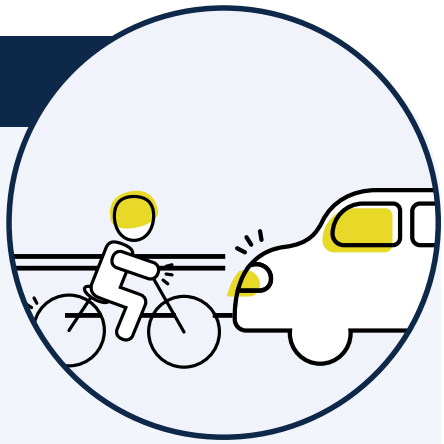
5,108
Total Collisions

342 (14% of citywide vehicle-only KSI collisions)
KSI Collisions

9nd St & Central Ave
Florence Ave & Harvard Blvd
65th St & Figueroa St
Top Locations

COLLISION PROFILES

Profile 19 (2017-2021 Injury Collisions)



Bicycles Collisions with Wrong Side of the Road Violations on Streets with No Bicycle Facilities

MODES	**Bicycle**
COLLISION FACTOR	**Wrong Side of Road Violation**
CONTEXTUAL FACTOR	**No On-Street Bike Facility**

787
Total Collisions

73 (11% of citywide bike KSI collisions)
KSI Collisions

Manchester Ave & Vermont Ave
Parthenia St & Sepulveda Blvd
San Pedro St & Washington Blvd
Top Locations

Profile 20 (2017-2021 Injury Collisions)

Pedestrians Hit by Drivers Turning Right at Major Signals

MODES	**Pedestrian**
COLLISION FACTOR	**Driver Turning Right**
CONTEXTUAL FACTOR	**Major Signal**

1,176
Total Collisions

100 (4% of citywide pedestrian KSI collisions)
KSI Collisions

Reseda Blvd & Vanowen St
Sunset Blvd & Western Ave
La Brea Ave & Obama Blvd
Top Locations

COLLISION PROFILES

Profile 21 (2017-2021 Injury Collisions)

Unsafe Speed Violation Collisions on Streets Designated as Neighborhood Enhanced Network

MODES	**All Modes**
COLLISION FACTOR	**Unsafe Speed Violations**
CONTEXTUAL FACTOR	**Neighborhood Enhanced Network**

4,359
Total Collisions

295 (4% of citywide KSI collisions)
KSI Collisions

Manchester Ave & Western Ave
Florence Ave & Hoover St
Florence Ave & Western Ave
Top Locations

Profile 22 (2017-2021 Injury Collisions)

Unsafe Speed Violation Collisions Near Schools

MODES	**All Modes**
COLLISION FACTOR	**Unsafe Speed Violations**
CONTEXTUAL FACTOR	**Near School**

6,112
Total Collisions

391 (5% of citywide KSI collisions)
KSI Collisions

Florence Ave & Vermont Ave
Figueroa St & Manchester Ave
Slauson Ave & Vermont Ave
Top Locations

COLLISION PROFILES

Profile 23 (2017-2021 Injury Collisions)

Vehicles Hitting Objects at Major Unsignalized Intersections

900
Total Collisions

129 (5% of citywide vehicle-only KSI collisions)
KSI Collisions

MODES	Vehicle-Only
COLLISION FACTOR	Hit Object
CONTEXTUAL FACTOR	Major Unsignalized Intersection

Note: Includes signals not owned by LADOT

Reseda Blvd & Sesnon Blvd
Dona Dorotea Dr & Laurel Canyon Blvd
Burbank Blvd & McLennan Ave
Top Locations

Profile 24 (2017-2021 Injury Collisions)

Pedestrians Hit while Crossing in Crosswalks on Roads Classified as Avenue I or II

4,022
Total Collisions

712 (25% of citywide pedestrian KSI collisions)
KSI Collisions

MODES	Pedestrian
COLLISION FACTOR	Crossing in Crosswalk
CONTEXTUAL FACTOR	Avenue I or II

Vermont Ave & Wilshire Blvd
Hollywood Blvd & La Brea Ave
Broadway & Florence Ave
Top Locations

Equity Analysis Summary

Black residents make up 8% of LA's population, but account for 20% of pedestrians involved in KSI collisions.

Maintaining a focus on equity is a high priority for LADOT, and equity considerations can be found throughout this report. This summary highlights a sample of key takeaways from this analysis. Additional details can be found in **Appendix C** and **Appendix D.**

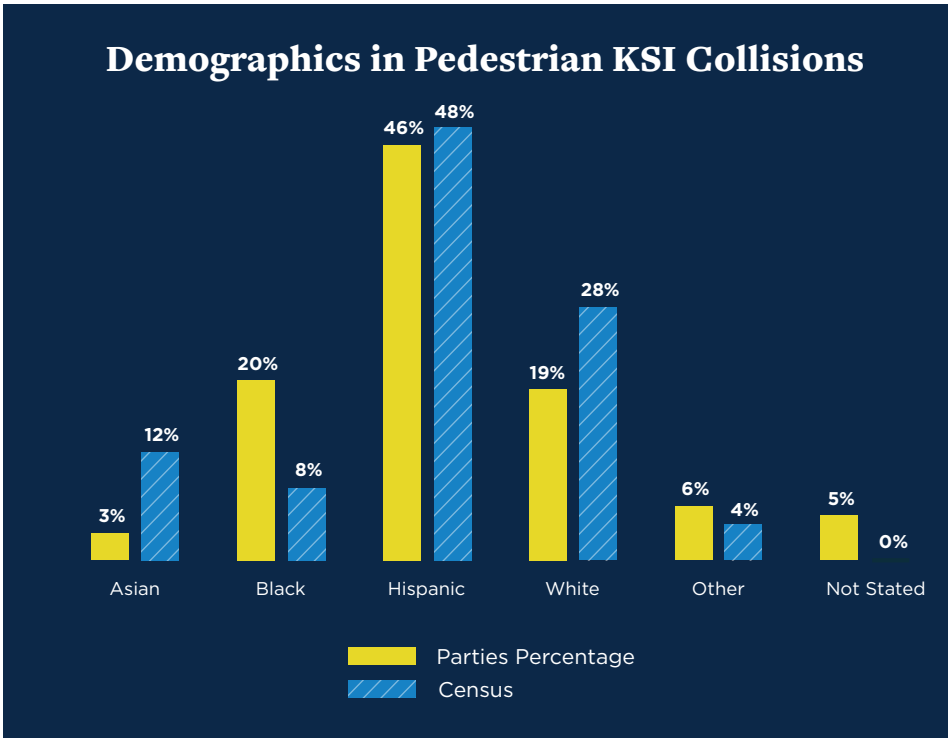
The analysis included examination of several equity considerations in roadway safety, including demographics of collision parties, disproportionality of collisions and HIN relative to equity emphasis areas and geographic distribution of demographic factors, and examination of equity factors during COVID-19.

Equity was also a key factor in the methodology for HIN development and location prioritization.

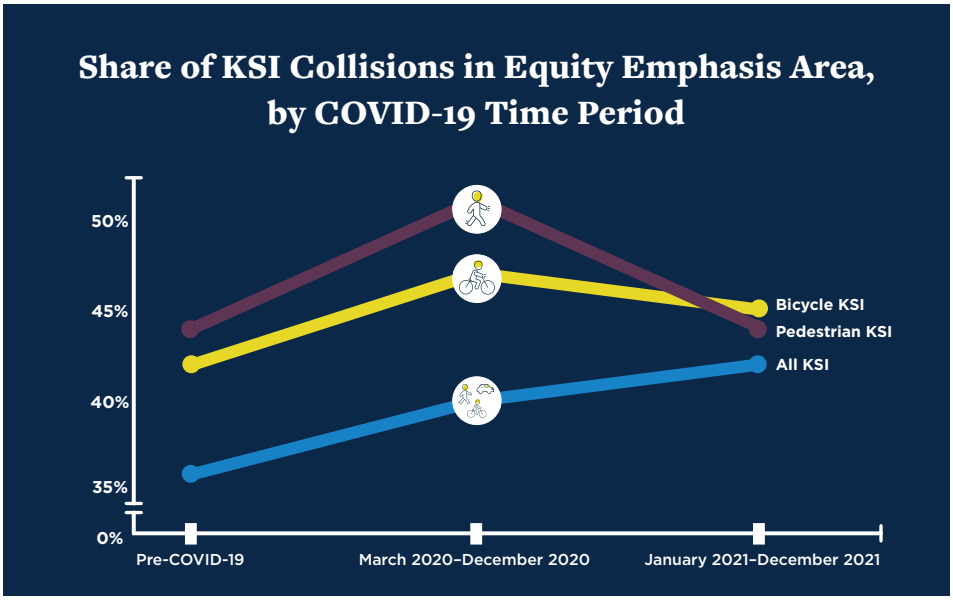
Key Findings

Black pedestrians and bicyclists are disproportionately represented in collisions, compared with City of Los Angeles census data. Hispanic bicyclists are also slightly disproportionately involved in collisions relative to their Census representation.

Geographic patterns of KSI collisions shifted during the pandemic. While the number of monthly KSI collisions declined in the first several months of the pandemic, compared to the pre-COVID-19 level, these collisions were occurring more frequently in equity emphasis areas of the City (the Top Quintile of Census Tracts for the Community Health and Equity Index).



Note: Current reporting practices include reporting race and ethnicity at the party level, but not for individual victims. For this reason, bicyclist and pedestrian collisions by race and ethnicity are evaluated at the party level with the assumption that each bicyclist or pedestrian party is an individual.



Council District Summary

The analysis summarized the HIN and KSI collisions by Council District (CD) boundaries to provide further insight into the geographical distribution of collisions.

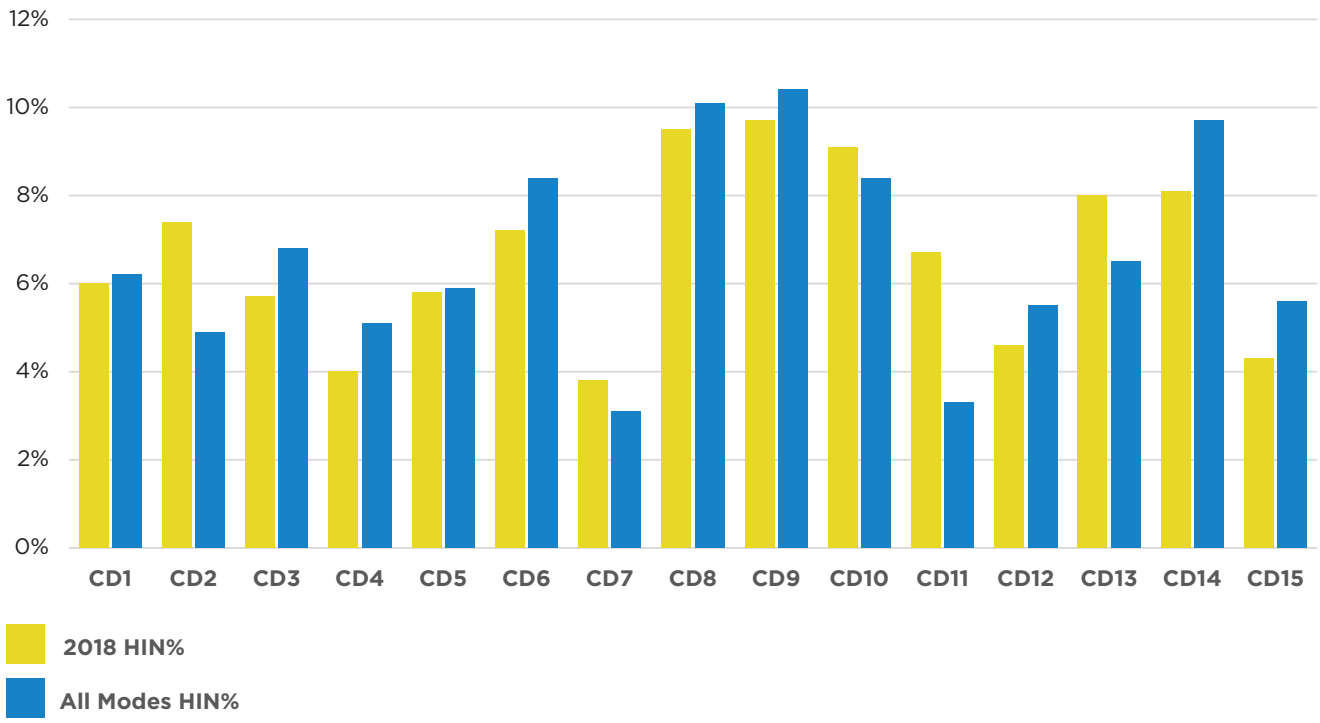
HIN by Council District

As noted previously, by applying a new methodology and evaluating new data, the updated All HIN accounts for approximately 40 more miles of roadway than the previous HIN, representing 7.5% of the citywide roadway network. The chart below illustrates the share of the All Modes HIN present within each Council District, compared with the 2018 HIN.

The share of the HIN falling within CD 11 has decreased by 50% relative to the 2018 HIN – the largest percentage decrease for all Council Districts. The share of the HIN in CD 15 increased by 30% - the largest increase for all Council Districts.

CD 8, 9, and 14 account for among the highest shares of the HIN - approximately 10% each. CD 7 and 11 account for among the lowest shares of the HIN – approximately 3% each.

Share of Current All Modes HIN by Council District (Compared with 2018 HIN)

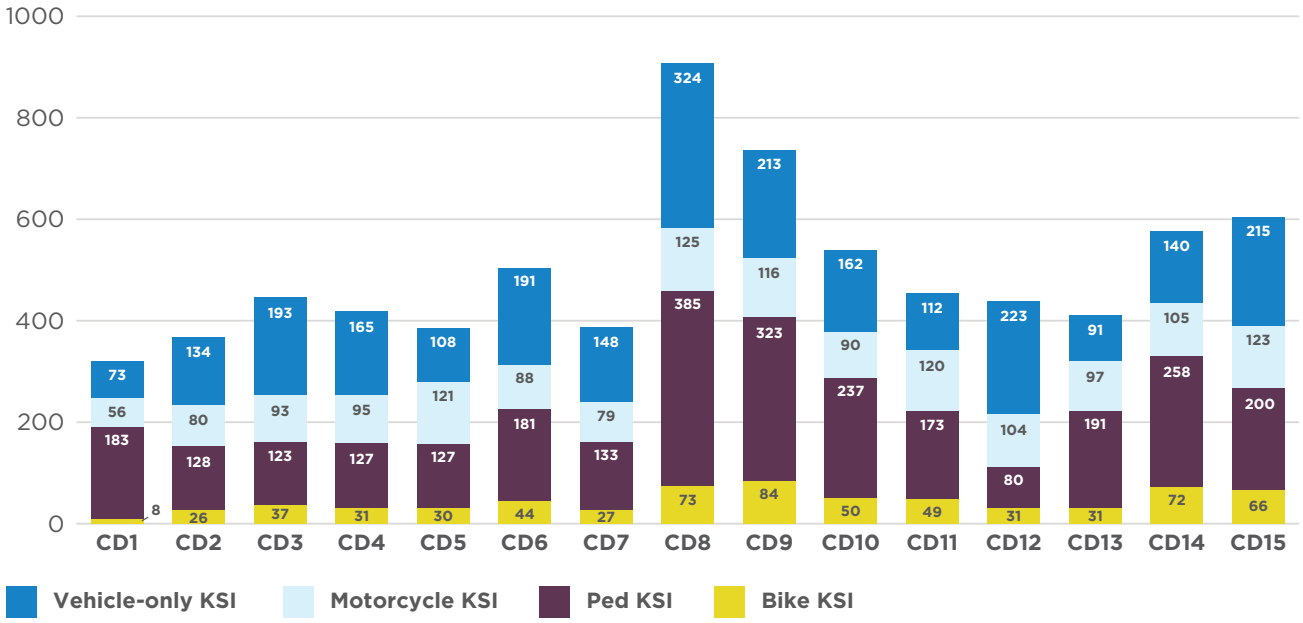


KSI Collisions by Council District

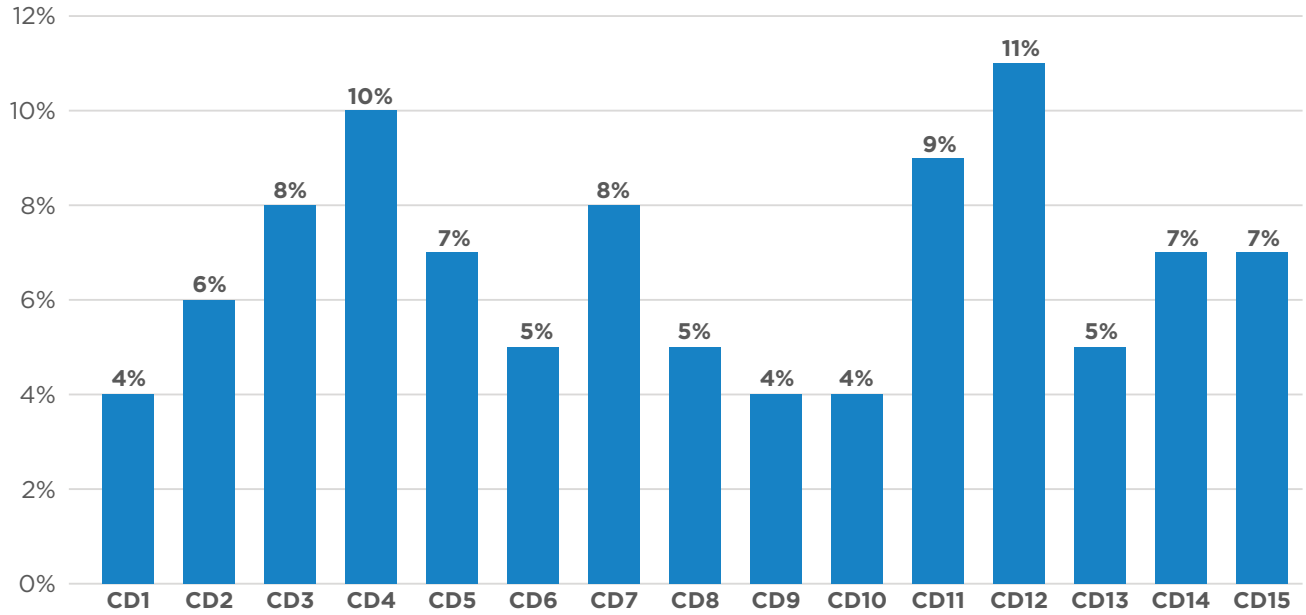
Council Districts 8 and 9 have the highest amount of KSI collisions relative to their share of the roadway network. While each district represents approximately 3% of the roadway network, they account for 12% and 10% of all KSI parties, respectively.

Council District 8 accounts for the highest number of pedestrian-involved KSI collisions and vehicle-only KSI collisions in the City. Council District 9 accounts for the highest number of bike KSI collisions in the City.

KSI Collisions by Council District, 2017-2021



Share of Citywide Streets by Council District



Note: Mode-specific KSI will not sum to KSI total because a small number of collisions involve multiple modes (i.e. bicyclist, pedestrian, and/or motorcycle).

COVID-19 Analysis Summary

The COVID-19 Analysis explored the potential relationship between key public health orders, changes in travel patterns, and roadway safety outcomes during the COVID-19 pandemic. This Analysis explores the change in injury collision trends in pre- and post-COVID periods, geographic patterns in collision location changes, and includes systemic analysis of key roadway and contextual factors (i.e., 85th percentile speed, weekday ADT, intersection control, roadway classification, etc.). This analysis uses the same subset of collision data used for the Collision Landscape Summary and Systemic Analysis Summary, which includes all injury collisions for which there was sufficient data for geocoding and analysis.

The maps on the following pages show the corridor and intersection locations that experienced the largest change in KSI collisions between the pre-COVID-19 and COVID-19 data periods.

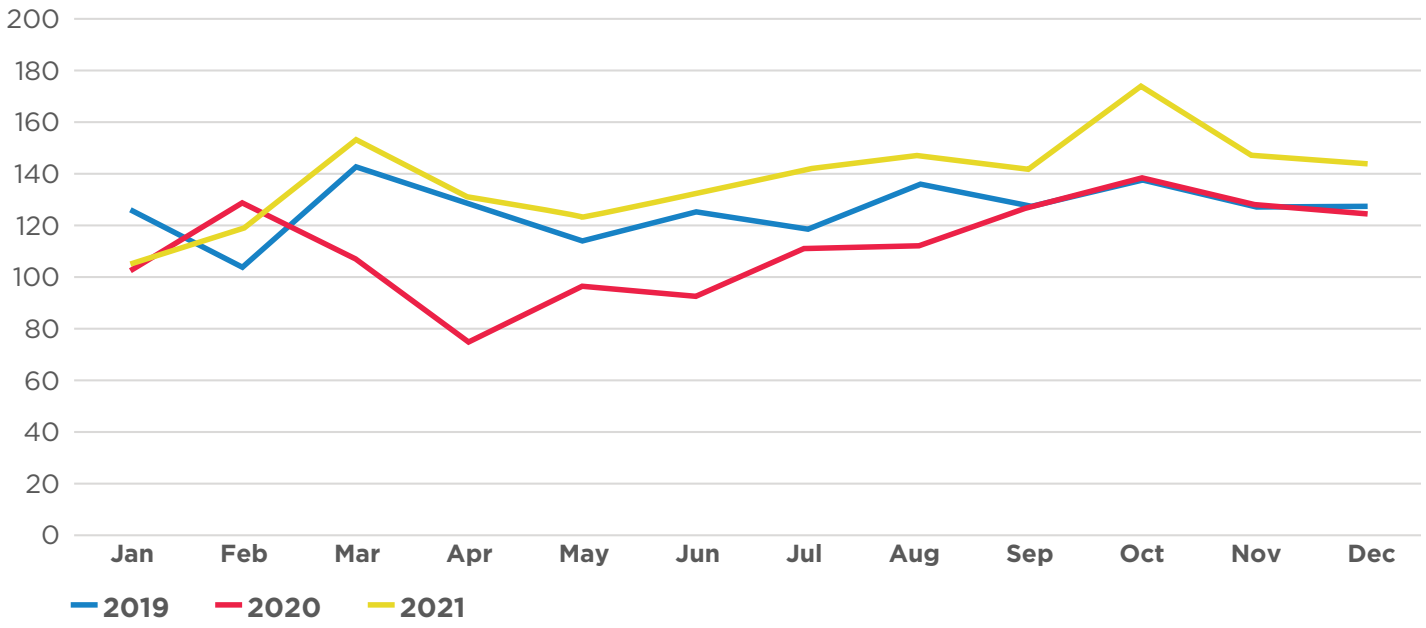
Key Findings

KSI collisions dropped significantly between March and April 2020 compared to the same period in 2019, but rose steadily between April and September 2020, when KSI collisions matched what was seen pre-COVID-19 in September 2019. For the remainder of 2020 (Oct-Dec), KSI collisions tracked closely with 2019 data. Starting in March 2021 and continuing through the remainder of the year, monthly KSI collision numbers were above pre-COVID-19 levels.

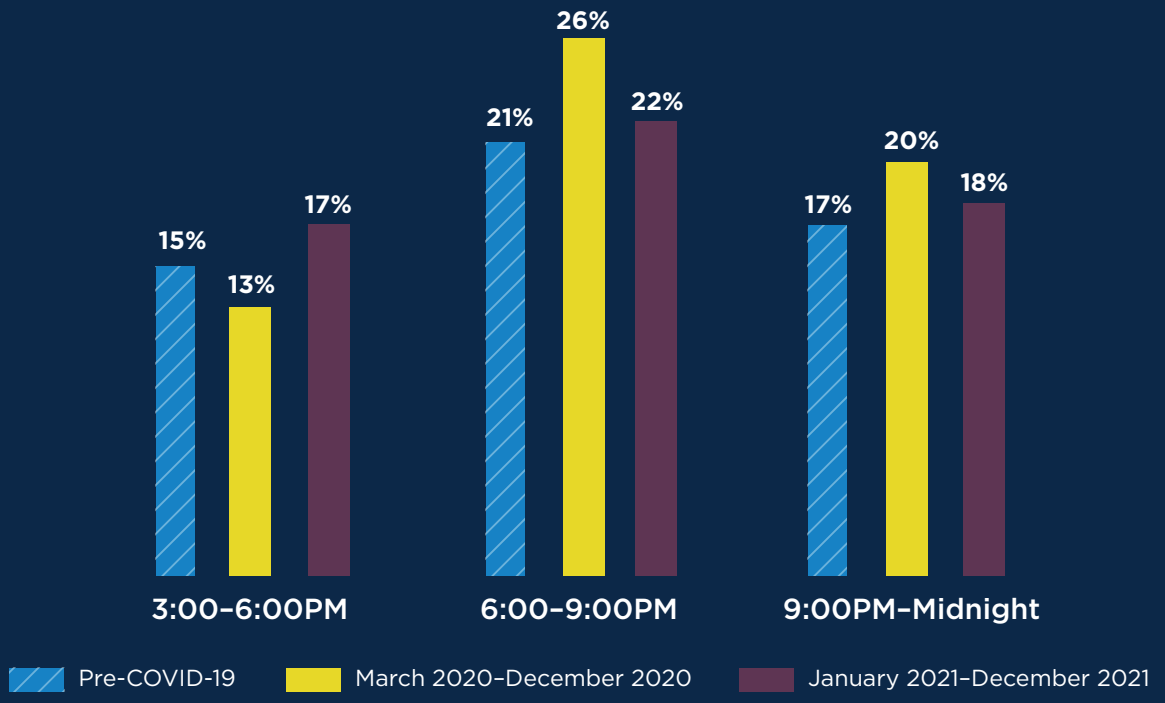
The share of citywide KSI collisions with Unsafe Speed as the primary violation rose from 16% pre-COVID-19 to 19% for the time period between March and December 2020.

KSI collisions occurred more frequently in the Evening (6 to 9 pm) and Night (9 pm to midnight) time periods in the 2020 COVID-19 data period, compared to the pre-COVID-19 data period. Though the share of KSI collisions in those time periods decreased in 2021, they remained higher than pre-COVID-19 levels.

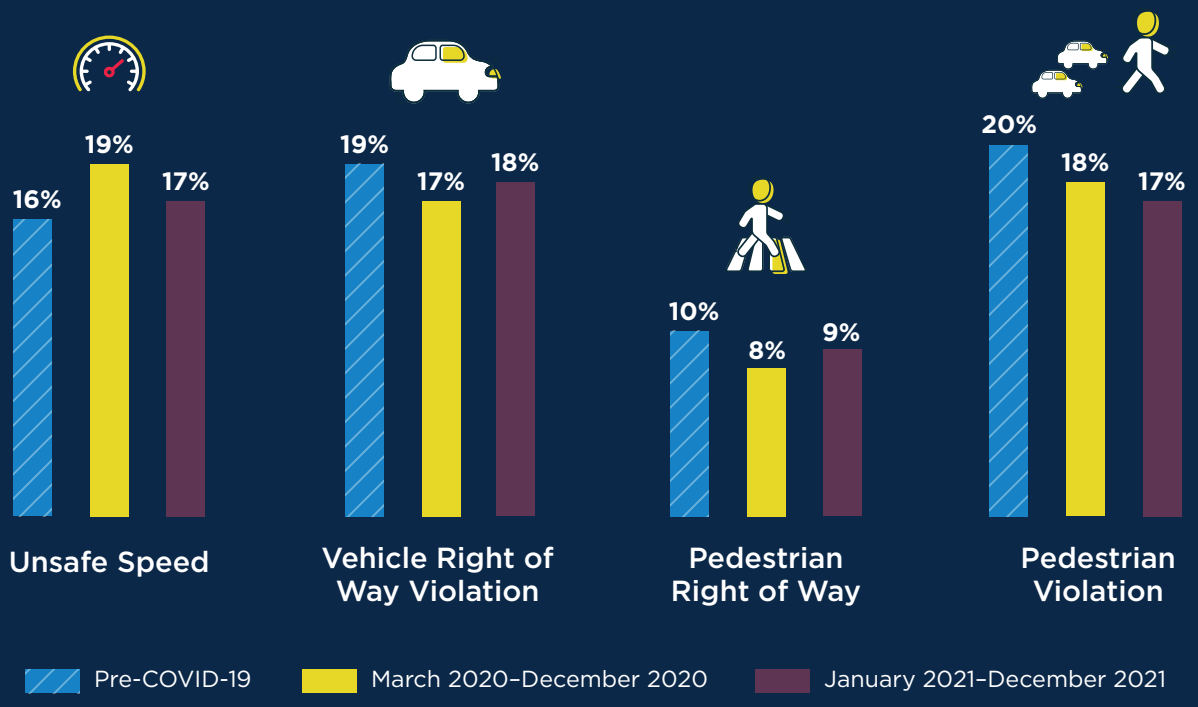
KSI Collisions by Month, 2019-2021



Share of KSI Collisions by Time of Day, by COVID-19 Time Period



Share of KSI Collisions by Violation Type, by COVID-19 Time Period



PRIORITY CORRIDORS

Change in KSI

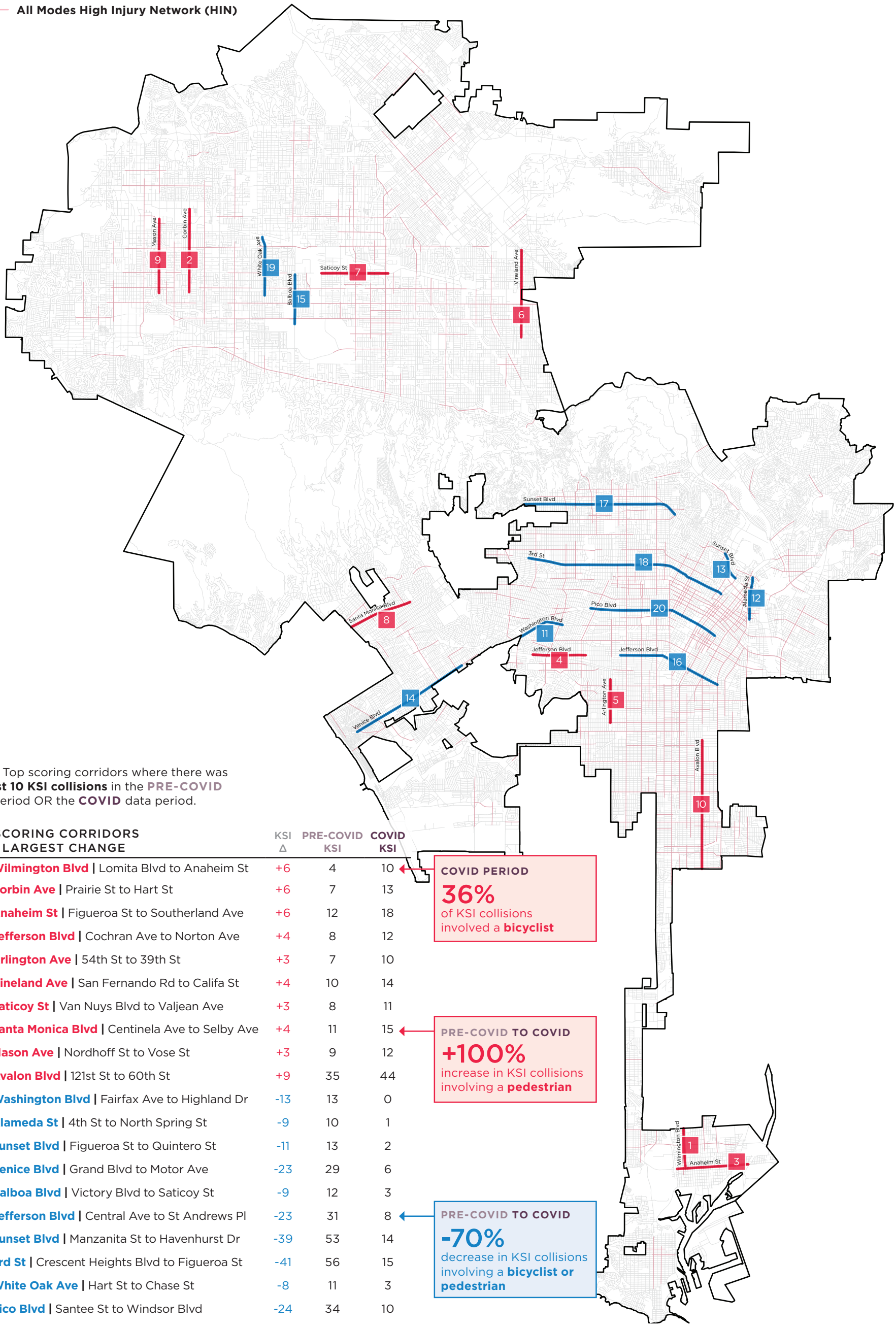
PRE-COVID
Jan 1, 2017 - Feb 29, 2020

COVID
Mar 1, 2020 - Dec 31, 2021

2017 2018 2019 2020 2021 2022

CHANGE FROM **PRE-COVID** TO **COVID**

- **Increase in KSI Collisions**
- **Decrease in KSI Collisions**
- **All Modes High Injury Network (HIN)**



*Note: Top scoring corridors where there was **at least 10 KSI collisions** in the **PRE-COVID** data period OR the **COVID** data period.

	TOP SCORING CORRIDORS WITH LARGEST CHANGE	KSI Δ	PRE-COVID KSI	COVID KSI
1	**Wilmington Blvd** | Lomita Blvd to Anaheim St	+6	4	10
2	**Corbin Ave** | Prairie St to Hart St	+6	7	13
3	**Anaheim St** | Figueroa St to Southerland Ave	+6	12	18
4	**Jefferson Blvd** | Cochran Ave to Norton Ave	+4	8	12
5	**Arlington Ave** | 54th St to 39th St	+3	7	10
6	**Vineland Ave** | San Fernando Rd to Califa St	+4	10	14
7	**Saticoy St** | Van Nuys Blvd to Valjean Ave	+3	8	11
8	**Santa Monica Blvd** | Centinela Ave to Selby Ave	+4	11	15
9	**Mason Ave** | Nordhoff St to Vose St	+3	9	12
10	**Avalon Blvd** | 121st St to 60th St	+9	35	44
11	**Washington Blvd** | Fairfax Ave to Highland Dr	-13	13	0
12	**Alameda St** | 4th St to North Spring St	-9	10	1
13	**Sunset Blvd** | Figueroa St to Quintero St	-11	13	2
14	**Venice Blvd** | Grand Blvd to Motor Ave	-23	29	6
15	**Balboa Blvd** | Victory Blvd to Saticoy St	-9	12	3
16	**Jefferson Blvd** | Central Ave to St Andrews Pl	-23	31	8
17	**Sunset Blvd** | Manzanita St to Havenhurst Dr	-39	53	14
18	**3rd St** | Crescent Heights Blvd to Figueroa St	-41	56	15
19	**White Oak Ave** | Hart St to Chase St	-8	11	3
20	**Pico Blvd** | Santee St to Windsor Blvd	-24	34	10

COVID PERIOD
36%
of KSI collisions involved a **bicyclist**

PRE-COVID TO COVID
+100%
increase in KSI collisions involving a **pedestrian**

PRE-COVID TO COVID
-70%
decrease in KSI collisions involving a **bicyclist or pedestrian**

PRIORITY INTERSECTIONS

Change in KSI

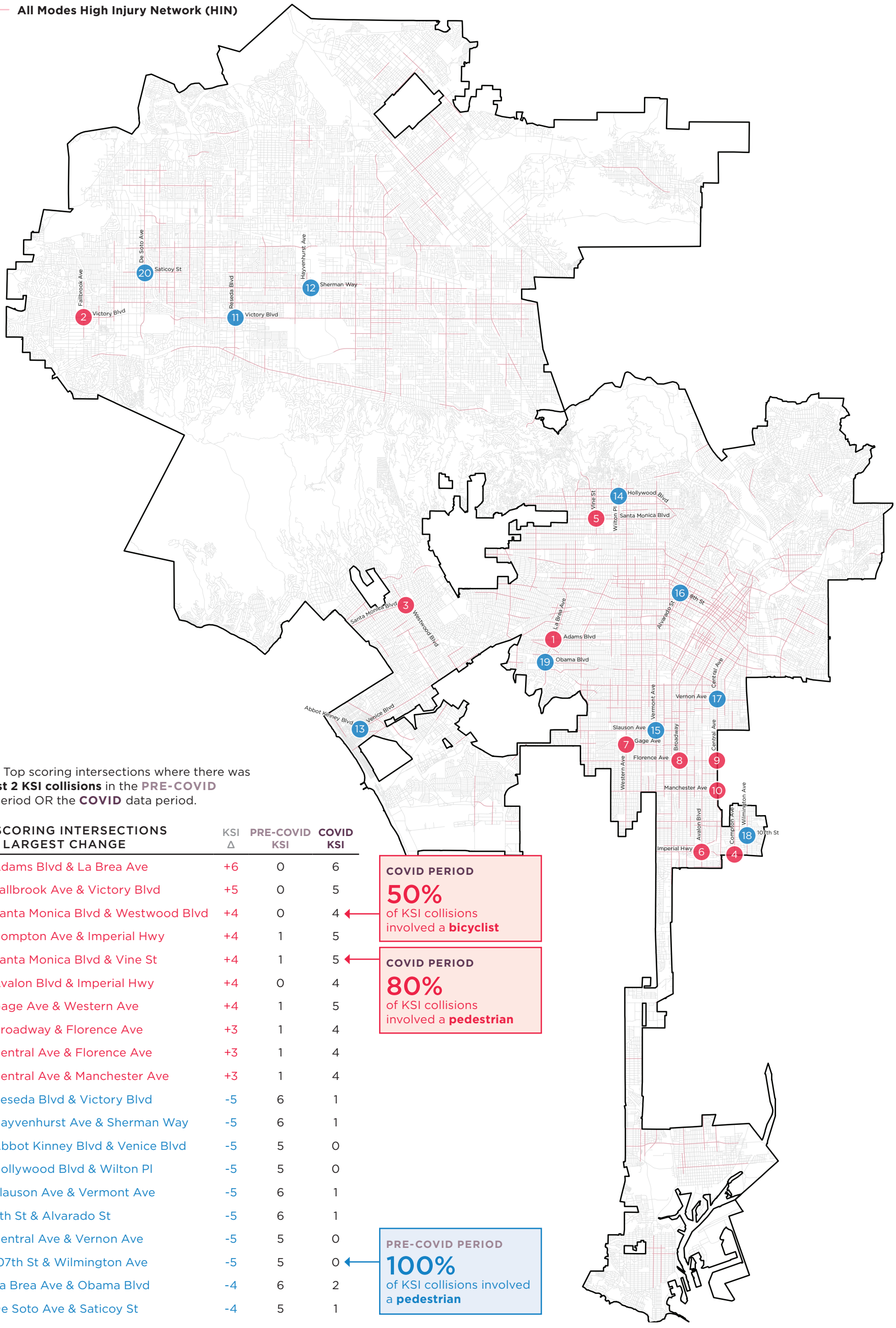
PRE-COVID
Jan 1, 2017 - Feb 29, 2020

COVID
Mar 1, 2020 - Dec 31, 2021

2017 2018 2019 2020 2021 2022

CHANGE FROM **PRE-COVID** TO **COVID**

- **Increase in KSI Collisions**
- **Decrease in KSI Collisions**
- **All Modes High Injury Network (HIN)**



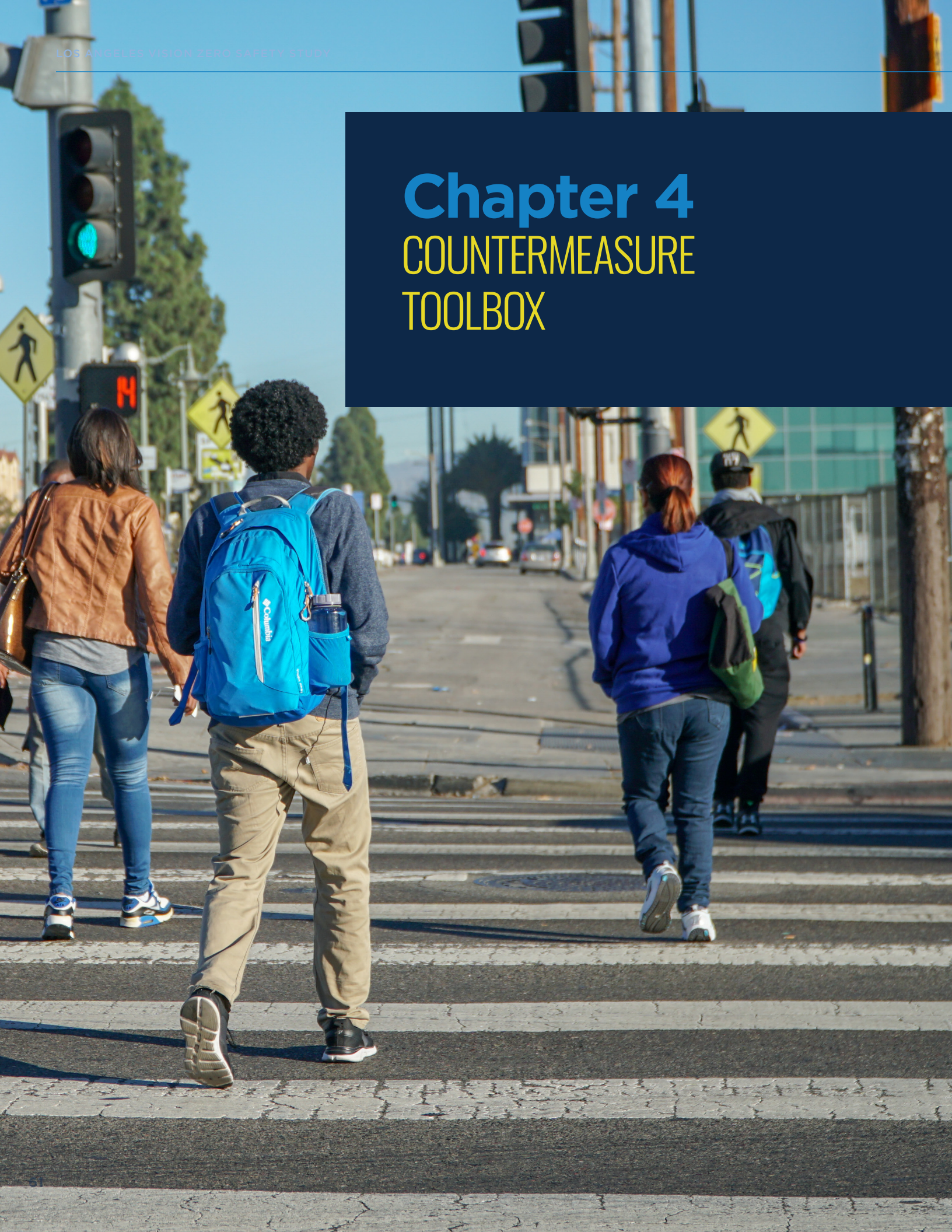
*Note: Top scoring intersections where there was **at least 2 KSI collisions** in the **PRE-COVID** data period OR the **COVID** data period.

	TOP SCORING INTERSECTIONS WITH LARGEST CHANGE	KSI Δ	PRE-COVID KSI	COVID KSI
1	Adams Blvd & La Brea Ave	+6	0	6
2	Fallbrook Ave & Victory Blvd	+5	0	5
3	Santa Monica Blvd & Westwood Blvd	+4	0	4
4	Compton Ave & Imperial Hwy	+4	1	5
5	Santa Monica Blvd & Vine St	+4	1	5
6	Avalon Blvd & Imperial Hwy	+4	0	4
7	Gage Ave & Western Ave	+4	1	5
8	Broadway & Florence Ave	+3	1	4
9	Central Ave & Florence Ave	+3	1	4
10	Central Ave & Manchester Ave	+3	1	4
11	Reseda Blvd & Victory Blvd	-5	6	1
12	Hayvenhurst Ave & Sherman Way	-5	6	1
13	Abbot Kinney Blvd & Venice Blvd	-5	5	0
14	Hollywood Blvd & Wilton Pl	-5	5	0
15	Slauson Ave & Vermont Ave	-5	6	1
16	8th St & Alvarado St	-5	6	1
17	Central Ave & Vernon Ave	-5	5	0
18	107th St & Wilmington Ave	-5	5	0
19	La Brea Ave & Obama Blvd	-4	6	2
20	De Soto Ave & Saticoy St	-4	5	1

COVID PERIOD
50%
of KSI collisions involved a **bicyclist**

COVID PERIOD
80%
of KSI collisions involved a **pedestrian**

PRE-COVID PERIOD
100%
of KSI collisions involved a **pedestrian**



Chapter 4
COUNTERMEASURE TOOLBOX

This analysis identified key collision and contextual factors that contribute to an outsized share of severe and fatal collisions in the City of Los Angeles. This chapter summarizes work completed to pair these factors with roadway design and other engineering safety strategies that have been shown to improve roadway safety outcomes. Many of these strategies are already part of LADOT's roadway safety toolbox, but this chapter introduces new strategy options as well.

Safety Countermeasures

Pairing Countermeasures

Countermeasures are safety strategies that can be implemented to address specific crash trends, high-risk factors, or other identified deficiencies. This report focuses on engineering or roadway design countermeasure options for LADOT. For each Collision Profile, we identified a number of countermeasure solutions specifically aimed at the collision or roadway and built environment factors present within that Collision Profile. The table on the following page provides a summary of the countermeasure pairing exercise.

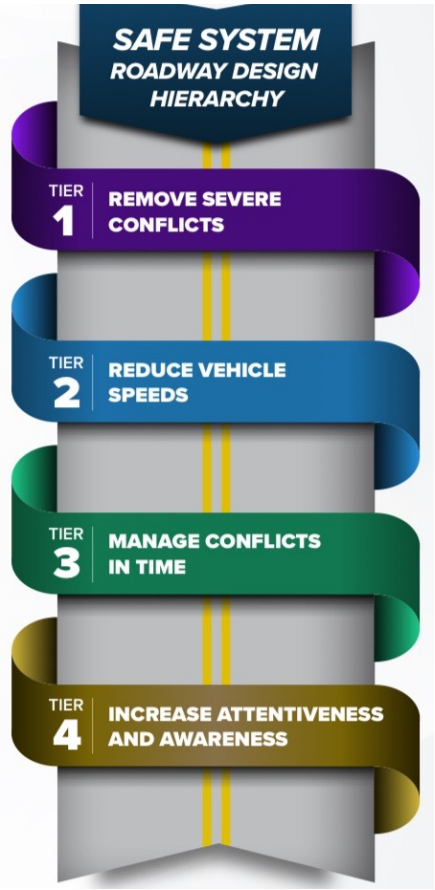
Countermeasures that are not currently part of LADOT's existing toolbox, or countermeasures where updated information was available, are included in this chapter. Each countermeasure includes a description, as well as a summary of efficacy research and high-level cost considerations. These strategies are intended to supplement LADOT's existing toolbox.

Efficacy Research and Local Evaluation

In addition to a review of national research on safety efficacy of countermeasures, this analysis also included an evaluation of projects previously installed by LADOT, to understand the impact of countermeasures on roadway safety in Los Angeles. The findings from that evaluation helped to inform the countermeasure recommendations in this chapter.

Incorporating the Safe System Approach

FHWA recently released their Safe System Design Hierarchy report, which outlines the four tiers of countermeasure strategies that LADOT can apply to top scoring locations and Collision Profiles. The countermeasures outlined in the Countermeasure Pairing Matrix apply these principles.



Source: FHWA *Safe System Roadway Design Hierarchy* Report

Collision Profile & Countermeasure Pairing Summary

	Enhanced Crossing, Mid-Block	Enhanced Crossing, Non-Signalized Intersection	Enhanced Crossing, Signal	Reduce Vehicle Speeds	Neighbor-hood Traffic Calming	Protected Bicycle Facility, segment	Protected Bicycle Facility, intersection	Improve Access Management	Improve Turns at Non-Signalized Locations	Improve Turns at Signals	Improved Transit Facilities	Improved Pedestrian Facilities	Roadway Improve-ments	Improved Non-Signalized Locations
Profile 1: Roads with 40-50 MPH Speeds in Dark Conditions (Street Lights Present)	■	■		■										
Profile 2: Bicyclists Hit by Drivers Proceeding Straight on Streets with ADT between 10k and 20k						■								
Profile 3: Bicyclists Hit by Drivers Proceeding Straight at Major Unsignalized Intersections							■							
Profile 4: Bicyclists Hit by Drivers Proceeding Straight On Roadways with 40-50 MPH Speeds				■		■								
Profile 5: Bicyclists Hit Broadside Adjacent to Residential Land Use					■									
Profile 6: Motorcyclists Hit Broadside On Roadways With 40-50 MPH Speeds				■				■						
Profile 7: Motorcyclists Hit by Drivers Turning Left at Major Signals with No Fully Protected Lefts										■				
Profile 8: Motorcyclists Hit by Drivers Turning Left at Major Unsignalized Intersections									■					
Profile 9: Pedestrians Hit between the Hours of 9 PM and 6 AM with No Marked Crosswalk	■													
Profile 10: Pedestrians Hit When Crossing Not in a Crosswalk at Major Unsignalized Intersections		■												
Profile 11: Pedestrians Hit When Crossing Not in a Crosswalk at Major Signals with No Fully Protected Lefts			■							■				
Profile 12: Pedestrians Hit Near Transit Stops between 9 PM and Midnight	■										■			
Profile 13: Pedestrians Age 65+ Hit on Streets Designated as Pedestrian Enhanced Districts	■	■	■									■		
Profile 14: Pedestrians Hit by Drivers Proceeding Straight Near Schools				■								■		
Profile 15: Pedestrians Hit Near Parks in Dark Conditions (Street Lights Present)												■		
Profile 16: Head-On Vehicle Collisions Along Roadways in CA Disadvantaged Communities													■	
Profile 17: Vehicle Collisions Along Truck Routes that Result from Unsafe Speed Violations				■										
Profile 18: Vehicles Collisions at Major Unsignalized Intersections in Dark Conditions (Street Lights Present)														■
Profile 19: Bicycles Collisions with Wrong Side of the Road Violations on Streets with No Bicycle Facilities						■								
Profile 20: Pedestrians Hit by Drivers Turning Right at Major Signals			■											
Profile 21: Unsafe Speed Violation Collisions on Streets Designated as Neighborhood Enhanced Network					■									
Profile 22: Unsafe Speed Violation Collisions Near Schools				■		■						■		
Profile 23: Vehicles Hitting Objects at Major Unsignalized Intersections				■										■
Profile 24: Pedestrians Hit while Crossing in Crosswalks on Roads Classified as Avenue I or II			■	■										

Countermeasure Toolbox Additions

The following countermeasures represents a series of additions to the established LADOT Vision Zero Toolkit of countermeasures. In many instances countermeasures have already been in use in recent Vision Zero projects, while others reflect potential additions to future safety projects. In several instances, additional detail is provided for countermeasures already in the toolkit, per staff request.

Matching Collision Profiles have been provided for each countermeasure, reflecting the citation of each item in the Countermeasure Pairing Matrix, where they have been paired with other improvements in the existing Vision Zero Toolkit. Crash Reduction Factors have been cited from the CA Local Roadway Safety Manual (LRSM) where possible and supplemented from the FHWA CMF Clearinghouse where unavailable.

Due to fluctuating countermeasure costs and cost escalations, costs are presented according to the approximate ranges listed below.

- *Low*: Typically $50,000 dollars or less
- *Moderate*: Typically $50,000 to $100,000
- *Medium*: Typically $100,000 to $250,000
- *High*: Typically $250,000 or more

Countermeasures included in the LRSM and used in the HSIP Analyzer tool are designated with this icon.

Speed & Traffic Management

Access Control/Diverter

Saint Paul, MN

DESCRIPTION

An island placed at a neighborhood street intersection that discourages or prevents drivers from cutting through neighborhood streets, to decrease traffic and promote street use for other road user types. Diverters still allow access for people walking or bicycling.

Relevant Collision Profiles:

- Bicyclists hit by drivers proceeding straight at major unsignalized intersections
- Bicyclists hit broadside adjacent to residential land use
- Motorcyclists hit broadside on roadways with 40-50 mph speeds
- All collisions that result from unsafe speeds along roadways designated as Neighborhood Enhanced Network

Contexts:

Applicable where a neighborhood or local street intersects a collector or arterial street and through and/or turning movement must be restricted due to multiple turning collisions.

COMPONENTS

- Raised curb island

EFFECTIVENESS

Not yet determined

COST

Medium

Speed & Traffic Management

Adjust Speed Limit

Relevant Collision Profiles:

- Roads with 40-50 mph speeds where street lights are present during dark hours
- Bicyclists hit by drivers proceeding straight on roadways with 40-50 mph speeds
- Motorcyclists hit broadside on roadways with 40-50 mph speeds
- Pedestrians hit by drivers proceeding straight along roadways near schools
- Vehicle collisions along truck routes that result from unsafe speeds
- All collisions that result from unsafe speeds along roadways near schools
- Vehicle collisions where an object was hit at major unsignalized intersections
- Pedestrians hit when crossing in crosswalks on roads classified as Avenue I or II

Contexts:

Reductions of 5 mph allowed per AB43 in areas designated "Safety Corridors" or areas with high bicyclist and pedestrian activity. Limits of 20/25 may be established in business districts.

DESCRIPTION

Adjustments made to existing speed limits to lower a corridor's marked speed and better match land use and safety contexts.

COMPONENTS

- Updated speed limit signage

EFFECTIVENESS

Expected reduction in all crashes by 14% (.86 CMF)

Source: Seung-Oh et al, 2022

COST

Low

Speed & Traffic Management

Automated Speed Cameras

Relevant Collision Profiles:

- Roads with 40-50 mph speeds where streetlights are present during dark hours
- Vehicle collisions along truck routes that result from unsafe speeds
- Bicyclists hit by drivers proceeding straight on roadways with 40-50 mph speeds
- Motorcyclists hit broadside on roadways with 40-50 mph speeds
- Pedestrians hit by drivers proceeding straight along roadways near schools
- All collisions that result from unsafe speeds along roadways near schools
- Vehicle collisions where an object was hit at major unsignalized intersections
- Pedestrians hit when crossing in crosswalks on roads classified as Avenue I or II

Contexts:

Applicable on local, collector, and arterial roads where speeding is a concern, especially near high pedestrian, bicyclist, and transit land uses like schools, parks, and transit centers. System is provisional in LA through 2032 via AB 645.

DESCRIPTION

Automated cameras increase road safety and reduce speeding behaviors through enforcement of speed limits.

COMPONENTS

- Mounted camera
- Advance signage recommended near first camera in corridor

EFFECTIVENESS

Expected reduction in all crashes on arterial roadways by 54% (.56 CMF)

Source: Shin, et al, 2009

COST

Medium

Speed & Traffic Management

Chicane

Seattle, WA

DESCRIPTION

A curve introduced to a local road made of curb extensions or islands, reducing traffic speeds through horizontal deflection.

Relevant Collision Profiles:

- Bicyclists hit broadside adjacent to residential land use
- All collisions that result from unsafe speeds along roadways designated as Neighborhood Enhanced Network

Contexts:

Chicanes are applicable on neighborhood or local streets with speed limits of 25 mph or below, where speeding is a concern. They are typically applied in a midblock location.

COMPONENTS

- Concrete curb extension, or island
- Landscaping (optional, low to maintain visibility)

EFFECTIVENESS

Exact effectiveness not yet determined, though research indicates chicanes may reduce pedestrian injury crashes by 40%

Source: Distefano and Leonardi, 2019

COST

Moderate

Speed & Traffic Management

Mini Roundabout

DESCRIPTION

A smaller roundabout treatment with single-lane traffic and splitter islands for uncontrolled intersections.

Relevant Collision Profiles:

- Roads with 40-50 mph speeds where streetlights are present during dark hours
- Bicyclists hit by drivers proceeding straight on roadways with 40-50 mph speeds
- Motorcyclists hit broadside on roadways with 40-50 mph speeds
- Pedestrians hit by drivers proceeding straight along roadways near schools
- Vehicle collisions along truck routes that result from unsafe speeds
- Vehicle collisions along truck routes that result from unsafe speeds
- All modes and unsafe speeds near schools
- Vehicle collisions where an object was hit at major unsignalized intersections
- Pedestrians hit when crossing in crosswalks on roads classified as Avenue I or II

Contexts:

Applicable on local street intersections where speeding is a concern, and where a full-sized roundabout is not appropriate due to roadway design.

COMPONENTS

- Raised roundabout island with traversable curb
- Curb or painted splitter islands on approaches
- Yield markings
- Continental crosswalk offset from intersection

EFFECTIVENESS

Effectiveness varies: Expected to reduce crashes by 12-78% when converting an intersection from all-way stop (.88 - .22 CMF). ‘

Source: CA LRSM 2020/FHWA CMF Clearinghouse

COST

Medium - High

Speed & Traffic Management

Neighborhood Traffic Circle

Relevant Collision Profiles:

- Bicyclists hit broadside adjacent to residential land use
- Vehicles collisions at major unsignalized intersections where streetlights are present during dark hours
- All collisions that result from unsafe speeds along roadways designated as Neighborhood Enhanced Network
- Vehicle collisions where an object was hit at major unsignalized intersections

Contexts:

Applicable on neighborhood streets where a full-size or mini roundabout is not appropriate.

DESCRIPTION

A concrete raised circle island placed within an unsignalized intersection that reduces vehicle speeds in residential areas through horizontal deflection.

COMPONENTS

- Concrete curb circle with mountable apron
- Directional signage
- Bollards and signage (interim treatment)

EFFECTIVENESS

Not yet determined

COST

Medium

Speed & Traffic Management

Roundabout

Seattle, WA

Relevant Collision Profiles:

- Roads with 40-50 mph speeds where streetlights are present during dark hours
- Bicyclists hit by drivers proceeding straight on roadways with 40-50 mph speeds
- Motorcyclists hit broadside on roadways with 40-50 mph speeds
- Pedestrians hit by drivers proceeding straight along roadways near schools
- Vehicle collisions along truck routes that result from unsafe speeds
- Vehicles collisions at major unsignalized intersections where streetlights are present during dark hours
- All collisions that result from unsafe speeds along roadways near schools
- Vehicle collisions where an object was hit at major unsignalized intersections
- Pedestrians hit when crossing in crosswalks on roads classified as Avenue I or II

Contexts:

Applicable on collector and arterial intersections where speeding is a concern and/or there is a high volume of pedestrians and bicyclists. A roundabout can be used in place of traffic signals.

DESCRIPTION

A roundabout reduces speeds and the number of conflict points at intersections while maintaining efficient traffic operations.

COMPONENTS

- Concrete island
- Guidance signage
- Splitter islands at approaches

EFFECTIVENESS

Effectiveness varies: Roundabouts are expected to reduce crashes by 12-78% when converting an intersection from all-way stop (.88 – .22 CMF). They are expected to reduce all crash types by 35-67% when converting an intersection from a signal (.65-.33 CMF).

Source: CA LRSM 2020 / FHWA CMF Clearinghouse

COST

High

Speed & Traffic Management

Speed Cushions

Relevant Collision Profiles:

- Bicyclists hit broadside adjacent to residential land use
- All collisions that result from unsafe speeds along roadways designated as Neighborhood Enhanced Network

Contexts:

The treatment is best applied on local streets, where vehicle speeds are lower (25 miles per hour or lower), and along bicycle routes.

DESCRIPTION

Speed cushions are a variation of speed humps, where wheel cutouts are used to allow wider vehicles such as buses and emergency vehicles to pass through without slowing.

COMPONENTS

- Raised asphalt
- Chevron markings

EFFECTIVENESS

A definitive measure of effectiveness for speed cushions has not been determined. Research indicates speed cushions, humps, and tables reduce crash severity.

Source: Elvik et al, 2004

COST

Moderate

Speed & Traffic Management

Speed Humps

Relevant Collision Profiles:

- Bicyclists hit broadside adjacent to residential land use
- All collisions that result from unsafe speeds along roadways designated as Neighborhood Enhanced Network

Contexts:

The treatment is best applied on local streets, where vehicle speeds are lower (25 miles per hour or lower).

DESCRIPTION

Speed humps are raised sections of asphalt that create vertical deflection to slow vehicles.

COMPONENTS

- Raised asphalt humps
- Advance chevrons
- Signage

EFFECTIVENESS

A definitive measure of effectiveness for speed cushions has not been determined. Research indicates speed humps, cushions, and tables reduce crash severity.

Source: Elvik et al., 2004;

COST

Moderate

Bicycle Facilities

Contraflow Bike Lane

Relevant Collision Profiles:

- Bicyclists hit by drivers proceeding straight on streets with ADT between 10K and 20K
- Bicyclists hit by drivers proceeding straight on roadways with 40-50 mph speeds
- Bicycles hit on roadways where there are no on-street bike facilities and traveling on the wrong side of the road
- All collisions that result from unsafe speeds along roadways near schools

Contexts:

Contraflow lanes are applicable on one-way local or collector streets that have additional space, either from a road diet or removal of parking, where the addition of a contraflow lane would benefit the bicycle network and reduce wrong-direction bicycling. Buffer space and/or vertical protection is recommended.

DESCRIPTION

Striped bike lane provides dedicated, on-road space for opposite direction bicycle travel on one-way streets.

COMPONENTS

- Striping
- Directional signage
- Intersection controls (bicycle signal)
- Buffer or vertical separation (recommended)

EFFECTIVENESS

Bike lane installation is expected to reduce bicyclist and pedestrian crashes by 35% (.65 CMF). Contraflow treatment is not specified in the LRSM.

Source: CA LRSM 2020

COST

Low – Moderate, varies due to resurfacing requirements

Bicycle Facilities

Green Bicycle Conflict Striping

Relevant Collision Profiles:

- Bicyclists hit by drivers proceeding straight on streets with ADT between 10K and 20K
- Bicyclists hit by drivers proceeding straight at major unsignalized intersections
- Bicyclists hit by drivers proceeding straight on roadways with 40-50 mph speeds
- Bicycles hit on roadways where there are no on-street bike facilities and traveling on the wrong side of the road
- All collisions that result from unsafe speeds along roadways near schools

Contexts:

Applicable on mid- to high-volume streets, with speed limits of 25 mph or above, where a bicycle facility crosses an intersection or driveway where there may be a conflict with vehicles.

DESCRIPTION

Green pavement markings placed at specific locations such as bicycle boxes, intersection crossings, driveways, and other potential conflict areas on bike facilities, supplementing existing on-street bike lanes.

COMPONENTS

- Linear dashed or solid green striping

EFFECTIVENESS

Expected to reduce crashes at intersections by 10% (.90 CMF)

Source: Fehr and Peers Efficacy Guide, 2018

COST

Low

Protected Bike Lane-Material Treatments

The below treatment supplement the Class IV Protected Bike Lane treatment, providing additional treatment options for the manner at which separation between bicyclists and vehicle traffic is created.

Relevant Collision Profiles:

- Bicyclists hit by drivers proceeding straight on streets with ADT between 10K and 20K
- Bicyclists hit by drivers proceeding straight on roadways with 40-50 mph speeds
- Bicycles hit on roadways where there are no on-street bike facilities and traveling on the wrong side of the road
- All collisions that result from unsafe speeds along roadways near schools

Contexts:

Applicable for high-volume, high-speed streets, and/or locations with multiple bicycle-involved collisions.

Bicycle Facilities *Protected Bike Lane-Material Treatments*

Raised Lane

Santa Monica, CA

DESCRIPTION

A Class IV bike lane raised to sidewalk level, or to a half-level between the street and sidewalk grades, to separate bicyclists from vehicular traffic. A raised protected bike lane is typically located between the sidewalk and curb.

COMPONENTS

- Raised concrete or asphalt path
- Pavement markings
- Advisory signage

EFFECTIVENESS

Not yet determined.

COST

High

Bicycle Facilities *Protected Bike Lane-Material Treatments*

Concrete Curb

Santa Monica, CA

DESCRIPTION

Concrete curb used to provide physical separation between the bicycle lane and travel lane.

COMPONENTS

- Raised concrete curb or pre-cast concrete barriers (cost may vary by type)
- Pavement markings
- Advisory signage

EFFECTIVENESS

Not yet determined.

COST

Medium - High

Bicycle Facilities *Protected Bike Lane-Material Treatments*

Flexible Delineator Posts

DESCRIPTION

Plastic delineator posts used to create vertical separation between the bicycle lane and travel lane. Recommended as an interim treatment or in locations where vehicle intrusion into the bicycle lane is not likely.

COMPONENTS

- Flexible plastic bollards
- Pavement markings
- Advisory signage

EFFECTIVENESS

Expected to reduce vehicle-bicycle crashes by 22-50% when converting a traditional bike lane to flexible posts (.78 - .50 CMF).

Source: Dixon et al, 2023

COST

Medium

Protected Intersection - Composite Elements

Protected intersections slow turning vehicles and reduce conflicts between pedestrians, bicyclists, and other vehicles. Bikeways are offset from the general purpose lanes to make people biking more visible and provide them the right-of-way over vehicles. A number of discrete elements work together to support protected intersections.

Relevant Collision Profiles:

- Bicyclists hit by drivers proceeding straight at major unsignalized intersections

Contexts:

Applicable for high-volume, high-speed streets, and/or locations with multiple bicycle-involved collisions.

Bicycle Facilities *Protected Intersection Elements*

Bicycle Queue/Setback Area

Vancouver, BC, Canada

DESCRIPTION

A designated area for bicyclists to queue ahead of the travel lane stop line, improving the visibility of bicyclists at the intersection to drivers.

COMPONENTS

- Green paint/striping
- Stop bar

EFFECTIVENESS

Not yet determined.

COST

Low

Bicycle Facilities *Protected Intersection Elements*

Corner Island

Santa Monica, CA

DESCRIPTION

A raised concrete curb that reduces the turning radius for vehicles at the intersection and provides a physical barrier between the bicycle and pedestrian queuing areas.

COMPONENTS

- Concrete raised curb
- Can be combined with a truck apron

EFFECTIVENESS

Not yet determined.

City of LA evaluation for concrete curb extensions found a 45% reduction in pedestrian injury crashes and 41% in pedestrian KSI crashes (note: KSI data was limited).

COST

Medium

Pedestrian Facilities

All-Pedestrian Signal Phase

(non-scramble)

Relevant Collision Profiles:

- Pedestrians hit when not crossing in crosswalks at major signals with no protected lefts
- Pedestrians 65+ hit along roadway segments designated as Pedestrian Enhanced Districts
- Pedestrians hit by drivers turning right at major signals
- Pedestrians hit when crossing in crosswalks on roads classified as Avenue I or II

Contexts:

Applicable in areas with heavy pedestrian volumes and low vehicle speeds and volumes.

DESCRIPTION

A pedestrian walk phase on all legs of an intersection allowing pedestrian crossings without vehicular conflicts, but not including diagonal crossings.

COMPONENTS

- Signal phasing
- Pedestrian signals, all legs

EFFECTIVENESS

Expected to reduce crashes of all types by 5% (.95 CMF), and by 35% for vehicle/pedestrian crashes (.65 CMF)

Source: Chen et al, 2013

COST

Low

Pedestrian Facilities

Sidewalk / Repair Sidewalk

Relevant Collision Profiles:

- Pedestrians 65+ hit along roadway segments designated as Pedestrian Enhanced Districts
- Pedestrians hit by drivers proceeding straight along roadways near schools
- Pedestrian-involved crashes on dark streets near a park
- Crashes involving all modes and unsafe speeds near schools

Contexts:

Applicable on all streets. Prioritize implementation where there are high pedestrian-generating land use contexts like schools, offices, and transit centers.

DESCRIPTION

Installation or repair of sidewalk allows pedestrians a space along the roadway separate from vehicles.

COMPONENTS

- Sidewalk installation, repair
- Curb ramps, truncated domes

EFFECTIVENESS

Installation of new sidewalk where none exist previously is expected to reduce pedestrian- and bicyclist-involved crashes by 80% (.20 CMF)

Source: CA LRSM 2020

COST

Moderate - Medium

Transit Facilities

Bus Stop Street Lighting

Minneapolis, MN

DESCRIPTION

Pedestrian-level lighting near transit stops increases visibility for transit users as well as drivers' ability to see them.

Relevant Collision Profiles:

- Pedestrians hit near transit stops between 9 pm-midnight
- Pedestrians 65+ hit along roadway segments designated as Pedestrian Enhanced Districts
- Pedestrians hit by drivers proceeding straight along roadways near schools
- Pedestrians hit along roadways near parks where streetlights are present during dark hours
- All collisions that result from unsafe speeds along roadways near schools

Contexts:

Applicable at bus stops that do not already have pedestrian-scale lighting, and stops with histories of night-time pedestrian-involved crashes.

COMPONENTS

- Pedestrian-level street lighting

EFFECTIVENESS

Installation of intersection lighting is expected to reduce night crashes by 40% (.60 CMF). Note: bus stop lighting is not specified in the LRSM and was not evaluated for crash reduction.

Source: CA LRSM 2020

COST

Medium

Crossings & Signals

Protected Right Turn Phase

DESCRIPTION

Reduces conflicts between pedestrian and turning vehicles by allowing drivers to make a right turn separate from the pedestrian walk phase.

Relevant Collision Profiles:

- Pedestrians hit by drivers turning right at major signals

Contexts:

Applicable at signalized intersections where pedestrian and right turning movements conflict.

COMPONENTS

- Signal phasing

EFFECTIVENESS

Not yet determined.

COST

Medium

Crossings & Signals

Retroreflective Signal Backplates

Relevant Collision Profiles:

- Roads with 40-50 mph speeds where streetlights are present during dark hours
- Pedestrians hit by drivers turning right at major signals
- Motorcyclists hit when a party turns left at major signals with no protected lefts
- Pedestrians hit when not crossing in crosswalks at major signals with no protected lefts

Contexts:

Apply at major signalized intersections, prioritizing Boulevards I/II and Avenues I/II, especially where lighting conditions may be poor.

DESCRIPTION

A retroreflective border added to traffic signals improves the visibility of the signal head to drivers during both the day and night. The yellow border, which may be 1-3 inches wide, enhances driver awareness of traffic signals.

COMPONENTS

- Replaced signal backplate
- Or: Retroreflective tape added to existing signal backplate

EFFECTIVENESS

Expected to reduce crashes by 15% (.85 CMF)

Source: CA LRSM 2020

COST

Low

Crossings & Signals

TOUCAN Signal

Denver, CO

Relevant Collision Profiles:

- Roads with 40-50 mph speeds where streetlights are present during dark hours
- Pedestrians hit between the hours of 9 pm-6 am where no crosswalk exists
- Pedestrians hit when not crossing in crosswalks at major unsignalized intersections
- Pedestrians hit near transit stops between 9 pm-midnight
- Pedestrians 65+ hit along roadway segments designated as Pedestrian Enhanced Districts
- Pedestrians hit along roadways near parks where streetlights are present during dark hours

Contexts:

TOUCAN signals are applicable for local/collector intersections at major roadways, where bicyclists and pedestrians are prioritized.

DESCRIPTION

A dedicated signal and intersection treatment that allows for pedestrian and bicyclist crossings only.

COMPONENTS

- Bicyclist queuing area, with curb protection
- Continental crosswalk
- Bicyclist detector loop
- Bicycle traffic signal heads
- Vehicle access restriction signage and striping (right turn only)

EFFECTIVENESS

Not yet determined.

COST

High

Other Road Design

Corridor Access Management

Relevant Collision Profiles:

- Motorcyclists hit broadside on roadways with 40-50 mph speeds
- Roads with 40-50 mph speeds where streetlights are present during dark hours
- Vehicle collisions along truck routes that result from unsafe speeds

Contexts:

Applicable on corridors where turning conflicts from multiple entry points and intersections are evident.

DESCRIPTION

Access management involves the regulation of conflict points and turns via restrictions on intersecting streets and turn lanes. Exact countermeasure types may vary per corridor context.

COMPONENTS

- Turn restriction signage
- Median islands restricting or allowing U-turns, left turns

EFFECTIVENESS

Depending on treatment type, expected to reduce crashes by 25 – 50% (.75-.50 CMF)

Source: CA LRSM 2020

COST

Varies by treatment type

Stop Sign / Stop Control

All-Way Stop Control

Relevant Collision Profiles:

- Vehicles collisions at major unsignalized intersections where streetlights are present during dark hours
- Vehicle collisions where an object was hit at major unsignalized intersections

Contexts:

Applicable at uncontrolled intersections of local and/or collector streets that do not meet a signal warrant, where multiple turning and/or head-on collisions have occurred.

DESCRIPTION

Installation of stop signs at all approaches of an intersection.

COMPONENTS

- Stop sign installation

EFFECTIVENESS

Expected to reduce crashes by 50% (.50 CMF) when converting a two-way stop control or yield control intersection.

Source: CA LRSM 2020

COST

Low

Stop Sign / Stop Control

Hardened Centerlines

Relevant Collision Profiles:

- Motorcyclists hit broadside on roadways with 40-50 mph speeds
- Head-on vehicle collisions along roadways in CalEnviroScreen disadvantaged communities
- Vehicles collisions at major unsignalized intersections where streetlights are present during dark hours
- Vehicle collisions where an object was hit at major unsignalized intersections

Contexts:

Hardened centerlines are applicable on collector and arterial roads where turning speeds are a concern and/or where multiple turning and/or head-on collisions have occurred.

DESCRIPTION

Raised curb bumps installed in the centerlines at the intersection reduce drivers turning speeds and guide them into correct lanes for more predictable turns.

COMPONENTS

- Raised plastic centerline humps
- Flexible delineator posts

EFFECTIVENESS

Raised medians are expected to reduce crashes by 46% (.54 CMF)

Source: Bahar et al, 2007

COST

Low

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