

# Crash reductions seen at Austin's major intersection safety locations

## Summary

New analysis shows that intersections that received engineering treatments as part of Vision Zero's Transportation Safety Improvement Program since the program formed in 2016 have seen a substantial reduction in crashes following project implementation. This includes a 31% reduction in the annual number of serious injury or fatal crashes across these locations. Vision Zero is utilizing the results from this analysis to help inform future intersection safety improvements to most effectively reduce injuries at Austin's top crash intersections.

## Problem Statement

Between 2017 and 2021 approximately 30% of crashes and 37% of serious injury or fatal crashes occurred at signalized intersections in Austin. The concentration of potential conflicts between road users, and thus crashes, at major intersections presents an opportunity to significantly reduce injuries at individual locations by focusing engineering countermeasures on documented crash patterns and risks.

## The Solution

In response to the rising number of people injured or killed in traffic crashes in Austin, City Council allocated \$3.8 million in the 2016 City budget for safety improvements at five of Austin's top crash intersections. That same year, Austin voters approved \$15 million for Vision Zero intersection safety projects as part of the 2016 Mobility Bond. Voters also approved funding for safety investments in Bond referendums in 2018 and 2020.

Austin Transportation Department (ATD) staff developed a methodology to prioritize locations to study for potential safety treatments based on historical crash frequency, crash severity, and prevalence of specific crash patterns that can be addressed through proven safety countermeasures. The methodology has evolved over time and now gives additional weight to locations with more crashes involving pedestrians or bicyclists as well as intersections located in historically underserved communities<sup>1</sup>.

ATD engineers reviewed historical crash data and performed site visits to recommended safety improvements at selected locations. Typical treatments involve a combination of both lower cost interventions such as changes to traffic signal timing or refreshing crosswalk markings, and more substantial treatments such as concrete medians or shared-use paths. As of July 2022, 19 major intersection safety projects have been completed, of which 13 have at least one year of crash data following project completion. Vision Zero staff took a deep dive into the before and after crash data at these 13 locations to better understand how the safety improvements have performed.

**Table 1. Completed intersection safety projects**

Location	Completion date
IH-35 and Martin Luther King, Jr. Blvd	November 2016
US 183 and Cameron Rd. (NE & EB)	December 2016
N. Lamar Blvd.- Rutland Dr. to Rundberg Ln.	June 2017
N. Lamar Blvd. and Parmer Ln.	July 2017
S. Pleasant Valley Rd. and Elmont Dr.	June 2018
S. Congress Ave. and Oltorf St.	July 2018
45th St. and Red River St.	October 2018
Slaughter Ln. and Menchaca Rd.	January 2019
Slaughter Ln. and Cullen Ln.	January 2019
IH-35 and Braker Ln.	July 2019
Slaughter Ln. and S. 1 <sup>st</sup> St.	October 2019
N. Lamar Blvd. and Payton Gin Rd.	January 2021
Lakeline Blvd. and US 183	April 2021
N. Lamar Blvd. and Morrow St.	July 2021
N. Lamar Blvd. and St Johns Ave.	August 2021
Braker Ln. and Stonelake Blvd.	September 2021
Oltorf St. and Parker Ln.	October 2021
Rundberg Ln. and IH-35	January 2022
Cameron Rd. and Ferguson Ln.	May 2022

Austin Transportation Department has completed 19 major intersection safety projects since 2016

<sup>1</sup>Learn how Vision Zero is incorporating equity into project prioritization in our ["Safe for All" \["Seguro para Todos"\]](#) StoryMap

## Results

For each location staff compared five years of crash data prior to project construction with all crashes following project completion. Crashes were converted to annualized numbers to allow for more direct comparisons across locations given their different completion dates. Annualized crashes were also calculated for a control group comprised of hundreds of intersections across the city with similar [Street Level](#) classifications as the treated locations to better contextualize broader crash trends in Austin over the same time period.

The data showed a **combined 30% reduction in the crashes per year following project completion** at the 13 study intersections (going from 326 crashes/year to 229 crashes/year) and a **31% reduction in serious injury or fatal crashes** (going from 12 to 8.3 per year). Over the same time period, combined annual crashes among the citywide control group decreased only 4% and serious injury or fatal crashes *increased* 8%.

Staff also wanted to understand how different safety treatments performed in reducing specific crash types. To do so, they came up with six categories of treatments that were commonly implemented to address documented crash types. This analysis yielded the following findings (all numbers represent annualized crashes):

- Locations with treatments to address **left turn across path crashes** saw a 56% reduction in crashes and a 55% reduction in injury or fatal crashes of this crash type.
- Locations with treatments to address **red light running crashes** saw a 9% reduction in both total and injury or fatal red light running crashes.
- Locations with treatments to address **rear end crashes** saw a 20% reduction in rear end crashes and a 6% reduction in injury or fatal rear end crashes.
- Locations with treatments to address **bicycle-involved crashes** saw a 33% and 57% reduction in total crashes and injury or fatal crashes involving bicycles, respectively.
- Locations with treatments to address **pedestrian-involved crashes** saw a 19% reduction in crashes and a 23% reduction in injury or fatal crashes involving pedestrians.
- Driveways at locations which received treatments to address **access management-related crashes** saw an 84% decrease in access-related crashes and a 100% reduction in injury or fatal crashes of this type.

Appendix A provides more detail on these six crash types and Table 2 at the end of this report shows the change in crashes before and after project completion for each of the 13 study locations.

## Future Work

At a time when cities across the country are experiencing [a substantial increase](#) in traffic-related serious injuries and fatalities, the crash reductions seen at Austin's completed intersection safety projects provide evidence to support the idea that changing the design of our streets is the most effective strategy for reducing severe crashes over time. Early results are demonstrating that these investments have already led to real benefits for our community, as on an annualized basis these locations are seeing nearly 100 fewer crashes, and, more importantly, 4 fewer of our friends, family members, and neighbors are being seriously injured or killed. These crash reductions translate to monetary benefits for the community as well, equating to over \$23 million in annual savings from avoided wage and productivity losses, medical expenses, administrative expenses, motor vehicle damage, and employers' uninsured costs<sup>2</sup>.

The Vision Zero program is utilizing these results to help inform the types of treatments we implement as part of future intersection safety improvement projects. Currently design is under way at 11 other locations and ATD staff expect to complete at least 6 more major intersection projects by 2023. You can learn more about completed and planned work at the [Transportation Safety Improvement Program web page](#).

<sup>2</sup>Values based on methodology adapted from the National Safety Council's "[Average Comprehensive Cost by Injury Severity](#)" (2020); includes reported CR-3 crashes from 2011-2022

## Appendix A: Information on individual crash types

The following describes how six of the most common crash types seen at major intersections changed following implementation of specific safety countermeasures.

### *Left turn across path crashes*

Nine of the 13 study locations received treatments to address crashes involving one motor vehicle going straight and one turning left, including converting signals to exclusive left turn phasing or flashing yellow arrows. Following implementation these locations saw a 56% reduction in the annual number of left turn across path crashes and a 55% reduction in injury or fatal crashes of this crash type. This is compared with a 1% and 5% reduction, respectively, for the citywide control group over the same time period.

### *Red light running crashes*

Three of the 13 study locations had a high prevalence of red light running crashes and received treatments such as adjusting yellow or red clearance times, installing advanced warning flashers or adding retroreflective backplates to address this crash type. These locations saw a 9% reduction in both crashes and injury or fatal red light running crashes, while the citywide control group saw crashes of this type *increase* by 6% over the same time period. Interestingly, the 9 study locations that did not receive treatments to specifically address this crash type saw a 31% reduction in crashes following project completion.

### *Rear end crashes*

Three intersections received treatments to address rear end crashes, such as additional left turn storage, right turn lanes or pockets, continuous center turn lanes, driveway modifications, and advance warning flashers. These locations saw a 20% reduction in rear end crashes and a 6% reduction in injury or fatal rear end crashes, compared with a 16% and 17% reduction, respectively, for the citywide control group over the same time period. The remaining 9 study locations actually saw a greater reduction in rear end crashes and severe rear end crashes— -29% and -19%, respectively—than both the treated intersections and the control group.



As part of the Slaughter Ln. / Menchaca Rd. intersection safety project, left turning vehicles are now required to turn on a protected phase, indicated by the green arrows, to reduce the risk of left turn across path crashes.



The intersection safety project at 45th St. and Red River St. reconfigured travel lanes to include a new dedicated left turn lane to separate queuing vehicles from through traffic to reduce rear end collisions.



### Crashes involving bicycles

Shared use paths, enhanced bicycle roadway markings, or bicycle detection and signals were installed at 5 study locations to improve safety for people on bikes. These locations saw a 33% and 57% reduction in total crashes and injury or fatal crashes involving bicycles, respectively, following project implementation. This is compared with a 27% and 35% reduction, respectively, for the citywide control group over the same time period.

### Crashes involving pedestrians

Nine of the 13 study locations received treatments to address crash risks for pedestrians, including new high visibility crosswalks, ADA curb ramp upgrades, new sidewalks or smart right turns. Pedestrian crashes at these locations fell 19% and injury or fatal crashes involving pedestrians fell 23% after implementation, compared with a 1% *increase* in pedestrian crashes for the citywide control group. The remaining three study locations, which already had standard pedestrian facilities and therefore did to receive additional treatments, saw a 55% increase in pedestrian crashes following project implementation. This represents a very small number of total crashes, however, going from 1.2 pedestrian crashes per year to 1.9 per year across those three locations.

### Access management-related crashes

Poor driveway placement can lead to unpredictable movements between road users and increase crash risk. Seven of the study locations received countermeasures to better manage driveway access, including installing/extending raised medians or closing/relocating driveways. In total, these locations saw a 36% decrease in crashes commonly associated with access management<sup>3</sup>, including a 46% reduction in injury or fatal crashes of this type. However, *when looking only at the specific driveways where access was improved*, access management-related crashes fell 84%, going from 21 crashes per year to 3 crashes per year following project completion. Similarly, there has not been a single access management-related crash resulting in a injury or fatality at these driveways, whereas there were 6 per year prior to project implementation.



The intersection safety project at South Congress Ave. and Oltorf St., completed in 2018, included separated bike facilities, bike signals, high-visibility markings, and other treatments to improve safety and comfort for vulnerable users.



A new concrete median was installed as part of the IH-35 and Braker Ln. intersection safety project (2019) to reduce conflict between vehicles entering and exiting adjacent driveways.

<sup>3</sup>For this analysis access management –related crash types include Left-Turn Across Path and Angle (Left or Right Turn) crash types.

### *Additional considerations*

While the early results are positive, there are a few caveats that are worth considering as Austin Transportation continues to ramp up safety investments across the city. The first is the effect of regression-to-the-mean, whereby random fluctuations in crash numbers and a relatively small number of crash events overall lead to a situation where crash reductions may occur at high crash locations even if no safety countermeasures are implemented. These effects can be accounted for through statistical techniques, but also become less impactful over time as more “after” data is collected. ATD typically relies on at least 3-5 years of crash data to understand crash patterns at a particular location, and we plan to revisit this analysis in a few years once we have more data to make stronger conclusions about the effectiveness of these interventions. Similarly, much of the post-implementation data used in this analysis was collected during the COVID-19 pandemic, which was a period that saw substantial travel pattern changes and other factors that will take time to fully quantify. In other words, the results presented in this report should be interpreted as early, but promising, findings.

A second caveat concerns the effects of *combinations* of different safety countermeasures. Each location received multiple safety treatments to address multiple different crash types, and we did not attempt to quantify the ways in which these different treatments interacted with one another to impact the various crash types. The results from this analysis seem to indicate that there may be safety benefits associated with certain treatments or combinations of treatments even if they weren’t specifically implemented to address a particular crash type (e.g. red light running crashes fell by 31% at locations where red light running wasn’t a crash type we specifically sought to address). Future analysis should seek to better understand these dynamics.

Finally, it should be noted that the major intersection safety improvements described in this report are just one aspect of Vision Zero’s approach to safe street design. This “hot spot” approach to traffic safety, whereby safety investments are focused on addressing historical safety issues at individual high crash locations, complements the more proactive, [systemic strategies](#) which are at the core of Vision Zero’s “Safe System” philosophy. We are continuing to apply both approaches and will seek to strike the right balance to most effectively reduce severe crashes over time.

**Table 2. Intersection safety performance**

Annualized crashes before and after project implementation

Select crash types and severity levels

K = Fatal crash, A = Serious Injury crash, B = Non-Incapacitating Injury crash

Project location construction dates vary	Total Crashes Fatal + Injury Crashes (K+A+B) Fatal + Serious Injury Crashes (K+A) Left Turn Across Path Left Turn Across Path K+A+B Angle (Red Light Running) Angle (Red Light Running) K+A+B Rear Ends Rear Ends K+A+B Pedestrian-involved Pedestrian-involved K+A+B Bicycle-involved Bicycle-involved K+A+B Access management Access management K+A+B															
IH-35 at Martin Luther King, Jr. Blvd.	-41%	-55%	-81%	-90%	-100%	-24%	-63%	-42%	-18%	-7%	-7%	87%	-7%	-79%	-88%	
annual crashes before	18.4	5.8	1	3.8	1.6	3.2	1	5.8	1.6	0.2	0.2	0.2	0.2	4.4	1.6	
annual crashes after	10.8	2.6	0.2	0.4	0.0	2.4	0.4	3.4	1.3	0.2	0.2	0.4	0.2	0.9	0.2	
N. Lamar Blvd. Rutland Dr. to Rundberg Ln.	-20%	-19%	-13%	-18%	-35%	-16%	-21%	-19%	-20%	-3%	-4%	-58%	-65%	-30%	-37%	
annual crashes before	48	13	1.2	6.4	2.6	7.2	1.6	15.6	3.4	2.8	2.4	1	0.6	12.8	4	
annual crashes after	38.4	10.5	1.0	5.2	1.7	6.1	1.3	12.6	2.7	2.7	2.3	0.4	0.2	9.0	2.5	
N. Lamar Blvd. at Parmer Ln.	-38%	-39%	28%	-18%	-70%	-31%	-73%	-49%	-43%	60%	7%	n/a	n/a	1%	-54%	
annual crashes before	32.2	9.4	1	2.6	1.4	3.4	1.6	16.8	5.2	0.4	0.4	0	0	4	1.4	
annual crashes after	20.1	5.8	1.3	2.1	0.4	2.3	0.4	8.5	3.0	0.6	0.4	0.0	0.0	4.1	0.6	
S. Pleasant Valley Rd. at Elmont Dr.	-38%	-72%	-78%	-59%	-90%	14%	-67%	-50%	-60%	-34%	-34%	-73%	-67%	-46%	-91%	
annual crashes before	18	7.6	1.2	7.2	2.6	1.4	0.8	4.8	2.0	0.4	0.4	1	0.8	7.8	3	
annual crashes after	11.1	2.1	0.3	2.9	0.3	1.6	0.3	2.4	0.8	0.3	0.3	0.3	0.3	4.2	0.3	
S. Congress Ave. at Oltorf St.	5%	-29%	-100%	-27%	9%	16%	-100%	10%	36%	-77%	-77%	-55%	-66%	6%	36%	
annual crashes before	15.2	3.8	0.4	5.6	1	1.4	0.2	3.2	0.4	1.2	1.2	1.2	0.8	6.4	1	
annual crashes after	16.0	2.7	0.0	4.1	1.1	1.6	0.0	3.5	0.5	0.3	0.3	0.5	0.3	6.8	1.4	
45th St. at Red River St.	-71%	-13%	-100%	-91%	-71%	-77%	-27%	94%	n/a	n/a	n/a	-27%	-27%	-93%	-76%	
annual crashes before	10	2	0.2	3.2	1	3.8	0.4	0.6	0.0	0	0	0.4	0.4	4.4	1.2	
annual crashes after	2.9	1.7	0.0	0.3	0.3	0.9	0.3	1.2	0.9	0.0	0.0	0.3	0.3	0.3	0.3	
Slaughter Ln. at Menchaca Rd.	-44%	-57%	-48%	-50%	-69%	-6%	110%	-56%	-66%	-69%	-61%	n/a	n/a	-45%	-69%	
annual crashes before	35	10.2	1.2	10	3	3	0.6	9.2	2.8	1	0.8	0	0	12.6	4	
annual crashes after	19.5	4.4	0.6	5.0	0.9	2.8	1.3	4.1	0.9	0.3	0.3	0.9	0.3	6.9	1.3	
Slaughter Ln. at Cullen Ln.	-45%	-41%	-61%	-69%	-43%	-36%	-90%	-17%	-6%	n/a	n/a	57%	-21%	-65%	-40%	
annual crashes before	23	8	0.8	7	2.2	7.4	3	3.8	2.0	0	0	0.4	0.4	9	2.6	
annual crashes after	12.6	4.7	0.3	2.2	1.3	4.7	0.3	3.1	1.9	0.3	0.3	0.6	0.3	3.1	1.6	
IH-35 at Braker Ln.	-51%	-44%	-100%	-79%	-100%	-100%	-100%	-19%	148%	-7%	-100%	n/a	n/a	-100%	-100%	
annual crashes before	21.2	4	0.8	7	1.4	2.6	0.8	4.6	0.6	0.4	0.4	0	0	4.6	1	
annual crashes after	10.4	2.2	0.0	1.5	0.0	0.0	0.0	3.7	1.5	0.4	0.0	0.0	0.0	0.0	0.0	
Lakeline Blvd. at US 183	-12%	-21%	-100%	-30%	-46%	-14%	19%	17%	34%	-100%	-100%	-100%	n/a	-70%	-100%	
annual crashes before	29.2	8.2	1.2	12.2	4	5	1.8	4.6	0.8	0.2	0.2	0.2	0	3.6	1.2	
annual crashes after	25.8	6.4	0.0	8.6	2.1	4.3	2.1	5.4	1.1	0.0	0.0	0.0	0.0	1.1	0.0	
N. Lamar Blvd. at Payton Gin Rd.	-33%	18%	324%	41%	749%	-70%	-100%	-6%	41%	-47%	-15%	-100%	-100%	27%	324%	
annual crashes before	16.4	3.6	0.8	1.2	0.2	2.8	0.4	3.6	0.6	1.6	1	0.2	0.2	4	0.6	
annual crashes after	11.0	4.2	3.4	1.7	1.7	0.8	0.0	3.4	0.8	0.8	0.8	0.0	0.0	5.1	2.5	
Slaughter Ln. at S. 1st St.	-49%	-51%	-100%	-74%	-78%	-27%	-66%	-30%	-5%	517%	106%	-100%	-100%	-74%	-80%	
annual crashes before	26.8	9.2	1.4	11.2	3.8	3.4	1.2	7	2.6	0.2	0.2	0.2	0.2	12.8	4.2	
annual crashes after	13.6	4.5	0.0	2.9	0.8	2.5	0.4	4.9	2.5	1.2	0.4	0.0	0.0	3.3	0.8	
US 183 and Cameron Rd. (NE & EB)	11%	4%	42%	-5%	27%	58%	16%	-15%	2%	42%	58%	-100%	n/a	46%	14%	
annual crashes before	32.8	8.6	0.8	1.4	0.6	6.6	1.8	14.8	2.8	0.8	0.6	0.2	0	2.6	1	
annual crashes after	36.5	8.9	1.1	1.3	0.8	10.4	2.1	12.5	2.8	1.1	0.9	0.0	0.0	3.8	1.1	
All Locations	-30%	-35%	-31%	-51%	-55%	-21%	-42%	-27%	-16%	-10%	-19%	-31%	-49%	-45%	-53%	
annual crashes before	326.2	93.4	12	78.8	25.4	51.2	15.2	94.4	24.8	9.2	7.8	5	3.6	89	26.8	
annual crashes after	228.7	60.9	8.3	38.2	11.4	40.6	8.8	68.8	20.8	8.3	6.3	3.5	1.9	48.6	12.6	

Greater % crash reduction

Greater % crash increase

Greater %  
crash reduction



Greater %  
crash increase