CASE STUDY

How GHD used Video-Based Conflict Analysis to Diagnose Speeding & Inform Interchange Design in Rural California

Study Objective

Video-based conflict analysis was completed at two intersections located at approximately 1,075 feet apart along US-101 in the City of Salinas, located in Monterey County, California. Results were used to identify contributing crash factors and potential safety problems to better inform interchange design options to CALTRANS and the County. Vehicle movements were analyzed using TrafxSAFE Plus (previously BriskLUMINA) – Transoft's fully automated conflict (near-miss), surrogate safety analysis. This case study will look at the automated road safety study results from one of the high-risk intersections along US-101.

Study Area

This section of US-101 offers two lanes in the northbound and southbound directions. Near the intersection, an extra two lanes are provided in each direction for northbound and southbound left and right turns. To the right of the intersection is some commercial activity including an equipment supplier and a restaurant. The left of the intersection is very low in activity, with some trucks and palette storage.

Figure 1. Drone view of US-101 courtesy of GHD

Background

A collision analysis between 2014 and 2018 found a total of 165 fatal and injury crashes (**figure 2**). A higher proportion of collisions occurred at one particular intersection compared to other intersections along the corridor (**figure 3**).

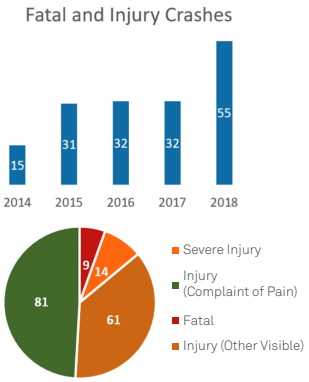

Figure 2.
Fatal and injury crashes between 2014 and 2018 by year and severity

Figure 3.
Fatal and injury crashes by location along US-101

Following this information, the Transportation Agency for Monterey County organized virtual town halls and set up a website for citizens to share information about challenges and "near-misses" they had encountered along this stretch of road. This gave further information to the County about what might need to be done to improve the safety of the stretch of road and led to the emergence of the idea to design an interchange at the high-risk intersections along US-101. GHD Engineering, who was leading the design, requested the automated surrogate road safety services of Transoft Solutions to provide safety and traffic metrics about the intersections that would inform the design.

"The near miss and speed data played a big part in validating the need to close the existing 101 left turns and the subsequent optimal location for the proposed improvements needed to offset the impacts of the restricted turning movements. The data furthermore helped with determining the specific alternative options and geometrics at this stage."

Methodology

1. A total of 34 non-consecutive hours of video was collected at the intersection via drone. The video was uploaded to Transoft via the TrafxSAFE online video processing platform.
2. The Transoft team completed the camera calibration (undistortion, spatial mapping, identification of camera location) and defined the movements of interest. Tests were run to give information about the quality of the calibration and movement definition.
3. Once calibration and movements were validated, the video was automatically processed using the TrafxSAFE surrogate safety suite to obtain several safety indicators including Post-Encroachment-Time (PET), vehicle speed, road user type, and road user arrival patterns.
4. Finally, the output results were quality-controlled by the Transoft team and made available on Transoft's online **Safety Dashboard** for easy access and export.

Study Findings

Peak Hour Counts by Movement

For vehicle movements, the AM peak occurred between 7:30 a.m. and 8:30 a.m. and the PM peak occurred between 4:00 p.m. and 5:00 p.m. Northbound and southbound through volumes were very high at the peak hours and throughout the day, while other movement hourly volumes were quite low. It is also important to point out the significant difference in northbound and southbound left turn volumes.

Time of Day	Northbound			Sounthbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
AM Peak (7:30-8:30am)	1	1375	41	108	1104	7	1	0	4	8	0	91
PM Peak (4-5pm)	1	1917	34	67	2360	6	12	0	12	38	0	88

Table 1. Peak hour counts, vehicle movements

Speeds

The 85th percentile speed for northbound and southbound through movements were both approximately 75 mph. Given that the posted speed limit is 65 mph, this indicates that road users tend to over-speed at this location.

	NB Through	SB Through
85th Percentile Speed (MPH)	74.7	74.7

Table 2. 85th percentile speeds, northbound and southbound through movements

Conflicts

Figure 4 below shows the number of conflicts for the two scenarios with the largest number of interactions. Conflicts between other movements were not statistically significant and were therefore not included in this analysis. It is apparent that the movement pair with the highest frequency of conflicts is between southbound left turning vehicles and northbound through vehicles, as seen in Figure 5

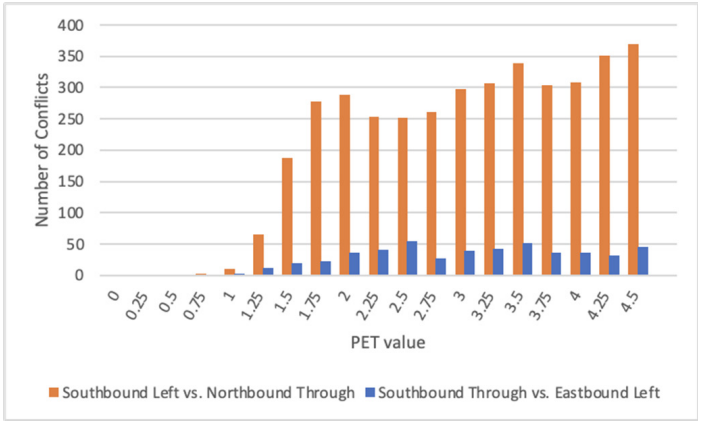

Figure 4. Number of conflicts observed by PET threshold value.

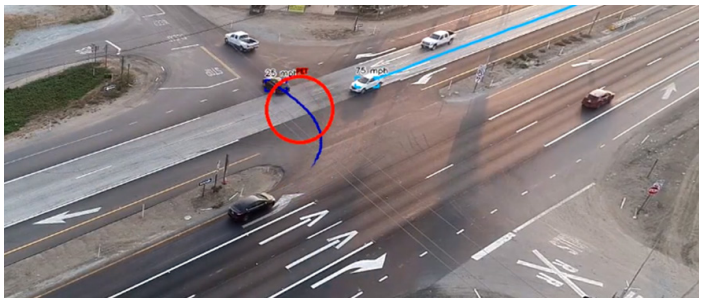

Figure 5. Conflict video of a close interaction between a southbound left turning vehicle and northbound through vehicle.

How did GHD use this Data?

GHD's role in this project was to design layouts for preliminary interchange options. According to GHD's Transportation Engineer Rashod Gibson, "The near miss and speed data played a big part in validating the need to close the existing 101 left turns and the subsequent optimal location for the proposed improvements needed to offset the impacts of the restricted turning movements. The data furthermore helped with determining the specific alternative options and geometrics at this stage."