INNOVATION / TECHNOLOGY DEPLOYMENT SUMMARY

Safety Project Before/After Analysis with Connected Vehicle Data

CHALLENGE

Current methods for evaluating safety improvement project outcomes rely on analysis of several years of crash data. Connected vehicle (CV) data may offer a shorter timeframe for outcome evaluation.

The Odessa District recently completed a cable barrier project along a 40-mile stretch of a four-lane divided roadway south of Odessa (Figure 1). Due to the topography and soil conditions, area residents regularly used several "informal" median openings to access properties in the corridor (Figure 2). The district needed a way to analyze the impact of closing many of these unofficial median openings and utilized CV data to perform a rapid assessment. This approach also helped the district identify locations where construction of left-turn lanes should be prioritized.

SOLUTION

The Odessa District analyzed CV data as well as crash data to determine safety impacts. Looking at both non-traditional and traditional data helped expedite:

- **Prioritization of Median Openings and Turn Lanes:** Identification of where to locate high-demand median openings along the installed cable barrier and where to prioritize left-turn lanes.
- **Assessment of Cable Barrier Effectiveness:** Confirmation of attainment of the project's primary goal, which was to prevent head-on collisions.

PROACTIVE APPROACH

This innovation, which has the potential to significantly improve TxDOT's ability to evaluate safety projects and optimize resource allocation, demonstrates the use of CV data to:

- Understand relative turning movements to prioritize critical median openings, installation of turn lanes, and potential for increased concentration of turning movements.

Figure 1. Installed median cable barrier.

Figure 2. Roadway before installation of the cable barrier.

TxDOT GOALS

- Deliver the right projects
- Focus on the customer
- Foster stewardship
- Optimize system performance
- Preserve our assets
- Promote safety
- Value our employees

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- Analyze crossover incidents in the “before” condition to prioritize cable barrier projects.
- Calculate harsh deceleration to provide consistent results in data from different vehicle manufacturers.

BENEFITS

Incorporating CV data into the Odessa District project before/after safety analysis produced these benefits:

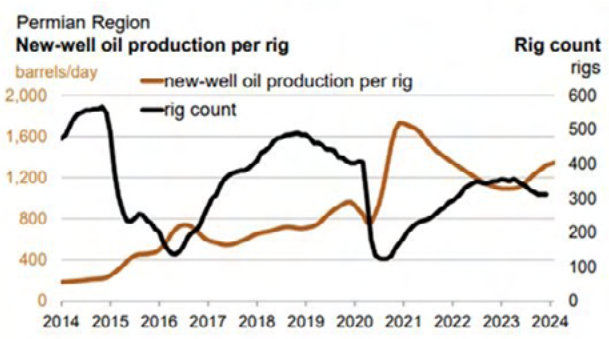

Figure 3. Rig count data.

- **Rapid Assessment:** Compared to traditional methods, CV data analysis provides near real-time insights, enabling rapid assessment and location prioritization.
- **Improved Safety:** Informed safety decision-making during project planning and design. After installation, CRIS crash data analysis showed the cable barrier project successfully met its goal of preventing head-on collisions (Figure 3).
- **Optimized Investment:** Identify and prioritize critical safety needs can help optimize funding allocation and infrastructure investment.

KEY TASKS

- **Crash Analysis:** Ongoing monitoring and analysis of crash data for nine months before and after construction provided a complete picture.
- **Turning Movement Analysis:** TxDOT’s CV data set was used to analyze left-turn and U-turn volumes at all median openings.
- **Crossover Violation Identification:** CV data analysis identified potential median crossings where no crashes occurred before cable barrier installation.
- **Harsh Deceleration Analysis:** A methodology was developed to standardize “hard braking” events across different vehicle manufacturers, using data from journeys.
- **Field Observations and Map Analysis:** Field observations and map analysis helped verify turn lane locations and final “formal” median openings.

DATA SOURCES

Data sources for this project include TxDOT’s Crash Records Information System (CRIS) and CV data.

Resources

Odessa District (txdot.gov)

Crash Data and Analysis: CRIS Query Tool (txdot.gov)

Proven Safety Countermeasures: Reduced Left-turn Conflict Intersections (dot.gov)

Expanding Connected Vehicle Data Framework (CVDF) Data Sources to Increase Applications and Use on Texas Roadways (utexas.edu)

Contact

Saul Romero, P.E.,
Director of Construction

Ph: (432) 498-4697

Send an email from our Contact Us page.