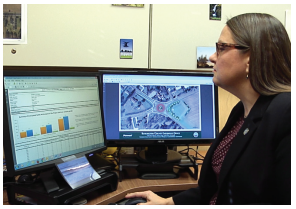
Take Action Before a Crash Occurs: Use a Systemic Approach to Safety






Have you ever known of a road segment that warranted improvement but lacked the requisite crash history to acquire funding for needed countermeasures? By using the systemic safety approach, agencies can identify, estimate, and plan for current and future safety concerns without relying on location-specific crash data. This approach allows managers to effectively plan safety improvements and allocate resources proactively rather than waiting for crashes to occur and then reactively responding to public calls for action.

Since severe crashes are random events that rarely occur in the same location twice, it is difficult to predict where the next one will occur. While severe crashes may occur at random **locations**, severe crash **types** are predictable, as can be seen in Figure 1. This figures illustrates that the number and location of fatal crashes changes from year to year, while the circumstances that most commonly contribute to severe traffic crashes are consistent over time.

WHAT IS THE SYSTEMIC SAFETY APPROACH?

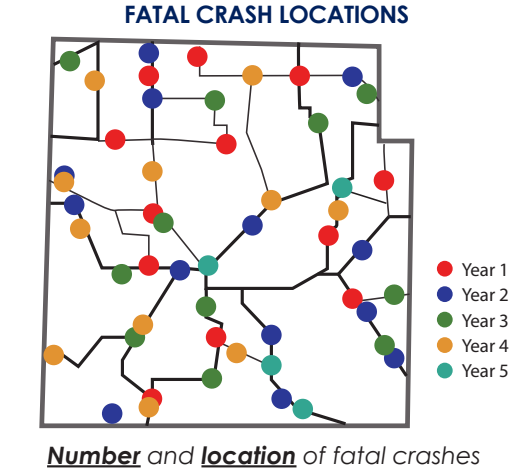
To understand the concept behind systemic safety, consider the analogy of contracting the flu. A childcare worker has a **greater potential** of contracting the flu than most people due to her above average exposure to children. The childcare worker can either wait until she contracts the flu to treat the virus or she can **proactively** get a flu shot. These options represent the thought process behind the reactive method of addressing crashes and the systemic approach to safety, respectively.

In the world of traffic safety, crashes are similar to contracting the flu. The roadway factors associated with fatal and serious injury crashes can be identified and addressed. Roadway factors represent the roadway and traffic characteristics present at locations experiencing higher than expected frequencies of the target crash type. Rather than treating the whole system, you can focus on locations with the highest potential for future crashes.

"We cannot reach zero deaths if we wait for crashes to occur. The systemic safety approach proactively addresses serious injuries and fatalities before they occur."

Scott Davis, Thurston County Public Works

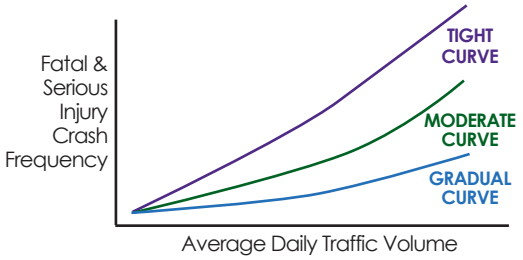
Figure 1. Fatal Crash Locations within Hypothetical County.



Number *and* ***location*** *of fatal crashes change from year to year.*

Fatal crash types are consistent from year to year.

Figure 2. Relationship between Traffic Volume, Curve Radii, and Fatal and Serious Injury Crashes.



Known roadway factors like high average daily traffic (ADT) and tight curve radii contribute to increases in fatal and serious injury crashes. By targeting locations with known roadway factors, agencies can focus on treating locations with the greatest potential for future crashes rather than the whole system.

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CRASH-BASED VS. SYSTEMIC SAFETY ANALYSIS

Systemic safety analysis complements the traditional crash-based analysis. A comprehensive safety management program will include investments to address opportunities identified through both crash-based and systemic safety analysis.

Benefits of the Systemic Approach to Safety

Prevents crashes before they occur.
Rather than waiting for crashes to occur, the systemic approach uses roadway factors to treat potential future crash locations now.

Leverages in-house resources.
Since systemic improvements are low cost, agencies may already have needed materials in their inventories and can install them using maintenance staff.

Optimizes safety benefit.
Low-cost systemic improvements can be deployed widely across the system, yielding a greater overall safety benefit.

Improves future planning.
A better understanding of roadway factors that contribute to crashes will improve future design, operations, and maintenance practices.

Systemic Safety Approach In Practice

A roadway departure crash caught the attention of the media when a school bus overturned at a horizontal curve. Elected officials pressured the DOT to ensure that this would not happen again. The agency contemplated two responses: (1) use a large portion of their safety funds to straighten the single curve, or (2) identify many curves with similar roadway factors and apply low-cost treatments (i.e., tree trimming, chevrons, delineators).

The agency examined all school bus routes and observed the following roadway factors that could contribute to crashes:

- Large changes in grade.
- Sharp curves with advisory speeds less than 35 miles per hour.
- Poor/limited sight distance.
- Frequency of pick-up and drop off points.
- Narrow lanes (10 ft. or less) with little to no shoulder.

The agency used this list to identify 20 locations that exhibited three or more of these characteristics. By treating numerous locations, the agency estimated that the combined safety benefit will be greater than if they applied a higher cost treatment at a single location.

For more information on the systemic approach to safety, visit https://safety.fhwa.dot.gov/systemic.

The agency could treat one high-cost curve location for $500,000, or it could treat 20 locations with low-cost countermeasures for an average cost of $25,000 per project. By treating numerous high-risk locations, the agency will reduce more fatal and serious injury crashes, yielding a greater benefit-to-cost ratio.

For additional information, please contact:

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Every Day Counts (EDC), a State-based initiative of FHWA's *Center for Accelerating Innovation*, works with State, local and private sector partners to encourage the adoption of proven technologies and innovations aimed at shortening and enhancing project delivery.