

HRC Traffic Tips

Summary

The Crash Reduction Factors (CRFs) provide an estimate of the crash reduction that might be expected if a specific countermeasure or group of countermeasures is implemented at an intersection. This data is available for engineers to aid in identifying the potential effectiveness of an improvement on the safety at an intersection. Along with the CRFs, engineers must use their own judgment and knowledge to determine which countermeasures will be most effective at improving safety for their specific intersections.

Changes in the roadway geometry can have a positive impact on traffic safety. The table below shows expected benefits from Roadway Geometry Improvements.

Crash Reduction Factors		
Geometric Countermeasures	Crash Type	Crash Reduction Factor
Create Directional Median Openings to allow Left Turns & U-Turns	All	51%
Install Left Turn Lane	All	25%
Install Right Turn Lane	All	35%



Use of the Tabular Data

The potential effectiveness values, for example percentage reduction in crashes, represent order-of-magnitude estimates only. Traffic engineers need to consider site-specific environmental, geometric and operational conditions before making a judgment regarding those countermeasures that will be applied to an intersection. The tables can help engineers estimate the benefits of proposed safety improvements.

Safer Intersections By Design



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Introduction

Research by governmental entities has produced estimates of crash reductions that might be expected if a specified improvement or group of improvements are implemented. The transportation engineering discipline is developing a base of statistically sound before-and-after studies for extended periods of time to demonstrate countermeasure effectiveness data.

These studies allow traffic engineers to estimate the benefits that can reasonably be expected from specific traffic safety improvements. The improvements may be in the form of roadway geometry, traffic signal hardware, or traffic signal operations.



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Safer Intersections by Design has been brought to you courtesy of Hubbell, Roth & Clark, Inc. - Consulting Engineers since 1915 and adapted from The Federal Highway Administration *Desktop Reference for Crash Reduction Factors*.

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Crash Reduction Factors

A Crash Reduction Factor (CRF) is the percentage crash reduction that might be expected after implementing a given countermeasure. A CRF should be regarded as a generic estimate of the effectiveness of a countermeasure. The estimate is a useful guide, but it remains necessary to apply engineering judgment and to consider site-specific environmental, traffic volume, traffic mix, geometric, and operational conditions which will affect the safety impact of a countermeasure. The user must ensure that a countermeasure applies to the particular conditions being considered. The reader is also encouraged to obtain and review the original source documents for more detailed information, and to search databases such as the National Transportation Library.

Traffic engineers and other transportation professionals can use the information in the following tables when asking the following types of question: *Which countermeasures might be considered*



at the signalized intersection of Maple and Elm Streets, an intersection experiencing a high number of total crashes and left-turn crashes? What change in the number of total crashes and left-turn crashes can be expected with the implementation of the various countermeasures?

Changes in traffic signal operations have shown a potential to reduce traffic crashes. The table below shows expected benefits from Traffic Signal Operations Improvements.

Crash Reduction Factors		
Signal Operations Countermeasures	Crash Type	Crash Reduction Factor
Add All-Red Traffic Signal Clearance Interval	All	15%
	Right-Angle	30%
Add Exclusive Pedestrian Phasing	Pedestrian	7-60%
Convert Protected/Permissive Left-Turn Phase to Permissive/Protected	All	13%
	Left-Turn	33%
Improve Traffic Signal Timing Intervals	All	18%
Increase Yellow Change Interval	All	15%
	Right-Angle	30%
Install Pedestrian Countdown Signal Heads	Pedestrian	25%
Provide Actuated Signals	Left-Turn	80%
	Right-Angle	10%
Provide Protected Left-Turn Phase	All	25%
Provide Signal Coordination	All	15%
Provide Split Phases	All	25%
Remove Flash Mode (late night/early morning)	All	29%



Improvements to traffic signal hardware have resulted in reductions in traffic crash experience. The table below shows expected benefits from Traffic Signal Hardware Improvements.

Crash Reduction Factors		
Signal Hardware Countermeasures	Crash Type	Crash Reduction Factor
Add Additional Signal & Upgrade to 12 Inch Lenses	Older Driver	31%
	Younger Driver	17%
Add Additional Primary Signal Head	All	10%
Convert Signal from Pedestal - Mounted to Mast Arm	All	49%
Install Larger Signal Lenses (12 Inch)	All	10%

