



## CMF / CRF Details

CMF ID: 4846

Change in average vertical curve grade from X to Y (% grade)

Description: Change in average vertical curve grade on rural two-lane highways from X to Y (% grade)

Prior Condition: average vertical curve grade of X (% grade)

Category: Alignment

Study: [Efficacies of roadway safety improvements across functional subclasses of rural two-lane highways, Labi, 2011](#)

Star Quality Rating:

[\[View score details\]](#)

### Crash Modification Factor (CMF)

Value:

$$CMF = e^{(0.0541(Y-X))}$$

Adjusted Standard Error:

Unadjusted Standard Error:

### Crash Reduction Factor (CRF)

Value:

$$CRF = 100 \times (1 - e^{(0.0541(Y-X))})$$

Adjusted  
Standard  
Error:

<b>Unadjusted Standard Error:</b>	
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<b>Applicability</b>	
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<b>Crash Type:</b>	All
<b>Crash Severity:</b>	K (fatal),A (serious injury),B (minor injury),C (possible injury)
<b>Roadway Types:</b>	Major Collector
<b>Number of Lanes:</b>	2
<b>Road Division Type:</b>	Undivided
<b>Speed Limit:</b>	
<b>Area Type:</b>	Rural
<b>Traffic Volume:</b>	
<b>Time of Day:</b>	All

<i><b>If countermeasure is intersection-based</b></i>	
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<b>Intersection Type:</b>	
<b>Intersection Geometry:</b>	
<b>Traffic Control:</b>	
<b>Major Road Traffic Volume:</b>	
<b>Minor Road Traffic Volume:</b>	

<b>Development Details</b>	
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<b>Date Range of Data Used:</b>	1997 to 2000
<b>Municipality:</b>	
<b>State:</b>	IN
<b>Country:</b>	
<b>Type of Methodology Used:</b>	7

<b>Sample Size Used:</b>	2160 Site-years
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### Other Details

<b>Included in Highway Safety Manual?</b>	No
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<b>Date Added to Clearinghouse:</b>	May-01-2013
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<b>Comments:</b>	There is no indication of statistical significance in the paper. As such, the star rating does not reflect the level of significance. Also, there is no indication of sample size in terms of number of crashes. The star rating reflects a moderate sample based on the number of site-years.
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