

Highway Safety Manual Project Applications

Project Type	Highway Safety Manual Project Application	
Alternatives Evaluation Stage 0 – Planning Stage 1 – Environmental	Predictive Method Part C – Chapters 10-12^a	As alternative cross-sections are considered and evaluated, the associated impact to crash frequency or severity can be calculated with the predictive method. There are methods for two-lane rural highways, rural multilane highways, and urban and suburban arterials – freeways will be available soon.
	Crash Modification Factors Part D – Chapters 13-17^b	Crash modification factors (CMF) can also be used in an alternatives evaluation to evaluate the safety impacts (changes in crash frequency or severity) of various countermeasures. Impacts to safety can then be considered alongside other performance measures such as mobility, accessibility, or environmental impacts.
	Benefit-Cost Analysis Part B – Chapters 7-8	The change in expected crash frequency or severity (safety impact) of various alternatives determined using the predictive method or CMFs can be converted to monetary costs and benefits and incorporated into a benefit-cost analysis.
Locations with Potential for Safety Improvement	Diagnosis and Countermeasure Selection Part B – Chapters 5 and 6	Chapter 5 of the HSM outlines the diagnosis process which can be used to provide an understanding of crash patterns and physical characteristics of sites listed in the abnormal location listing. Chapter 6 then provides information to help identify potential contributing factors to the crashes and outlines steps for selecting countermeasures.
	Crash Modification Factors Part D – Chapters 13-17^b	The Part D CMFs provide an indication of the effectiveness of various countermeasures in reducing crash frequency. CMFs also provide a quantitative estimate of the safety benefits (crash reduction) to use in a benefit-cost analysis.
	Benefit-Cost Analysis Part B – Chapters 7-8	The estimated change in crash frequency or severity of different roadway modification concepts can be converted to dollars and incorporated into a benefit-cost analysis. Chapter 7 of the HSM outlines methods to do this. The project prioritization methods in Chapter 8 can be used to prioritize projects for implementation.
Access Management Studies	Diagnosis and Countermeasure Selection Part B – Chapters 5 and 6	When conducting an access management study, the diagnosis process in Chapter 5 can be used to identify existing crash patterns and assess the site conditions. Chapter 6 can be used to identify potential contributing crash factors and outlines steps for selecting countermeasures.
	Predictive Method Part C – Chapters 10-12^a	Depending on the type of road being evaluated, the Part C predictive method can be used to compare the expected safety performance of different access management alternatives.
	Crash Modification Factors Part D – Chapters 13-17^b	Part D CMFs can also be used to identify and assess the effectiveness of potential countermeasures.

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Corridor Studies	Diagnosis and Countermeasure Selection Part B – Chapters 5 and 6	The Chapter 5 diagnosis process can be used when conducting a corridor study to identify crash trends and assess site conditions to identify potential safety needs. Chapter 6 provides guidance for identifying contributing factors and for selecting treatments to address the observed crash trends.
	Predictive Method Part C – Chapters 10-12^a	For a corridor study, the Part C predictive method can be used to provide a quantitative assessment of the expected safety (crash frequency or severity) of various alternatives under consideration.
	Crash Modification Factors Part D – Chapters 13-17^b	CMFs can be used in a corridor study to estimate the change in crash frequency due to potential countermeasures.
Design and Design Exceptions – Stage 3	Predictive Method Part C – Chapters 10-12^a	During the design stage (including design exceptions), the predictive method can be used to compare the expected crash frequency of different design alternatives to aide in the alternatives selection process. The predictive method results also provide documentation for a design exception.
	Crash Modification Factors Part D – Chapters 13-17^b	If the predictive method is not applicable, CMFs from Part D can be used to evaluate the safety impact of different design features under consideration. CMFs also provide documentation for a design exception.
	Benefit-Cost Analysis Part B – Chapters 7-8	Chapters 7 and 8 can be used to conduct an economic evaluation of different design alternatives and to determine the recommended alternative. The change in crash frequency or severity estimated in using the predictive method or CMFs can be converted to a dollar value.
Interchange Justification/Modification Reports	Diagnosis and Countermeasure Selection Part B – Chapters 5 and 6	During the preparation of an interchange justification/modification report, the Chapter 5 diagnosis procedure can be used to examine the existing crash trends on the facility, and Chapter 6 can be used to identify potential contributing factors.
	Predictive Method Part C – Forthcoming Freeway Chapters¹	The forthcoming chapters on the predictive method for freeways can be used to evaluate the different alternatives under consideration.
Intersection Operations Studies	Diagnosis and Countermeasure Selection Part B – Chapters 5 and 6	Chapters 5 and 6 can be used in an intersection operations study to identify existing crash patterns, contributing factors, and potential countermeasures to implement at the intersection to improve safety.
	Crash Modification Factors Part D – Chapters 13-17^b	CMFs can be used to assess the effectiveness of potential countermeasures in terms of crash reduction and aide in the selection process.

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Project Purpose and Need	Network Screening Part B – Chapter 4	LADOTD Highway Safety Staff use Chapter 4: Network Screening to develop the Abnormal Site List. Sites on this list should also be given consideration in the purpose and need assessment.
	Diagnosis Part B – Chapter 5	The diagnosis procedures provided in Chapter 5 can be used to identify any existing crash trends and determine if safety should be included in the project purpose and need.
Resurfacing Projects	Diagnosis and Countermeasure Selection Part B – Chapters 5 and 6	Chapters 5 and 6 can be used on resurfacing projects to identify existing crash patterns, contributing factors, and potential countermeasures to integrate into the resurfacing project.
	Predictive Method Part C – Chapters 10-12 ^a	The predictive method can be used for resurfacing projects to evaluate the impact on safety in terms of changes in expected crash frequency or severity associated with potential changes in roadway cross-section.
	Crash Modification Factors Part D – Chapters 13-17 ^b	CMFS can be used to estimate the impact on crash frequency or severity of various safety treatments being considered in a resurfacing project.
	Benefit-Cost Analysis Part B – Chapters 7-8	Chapters 7 and 8 can be used to evaluate the monetary impacts of changes in crash frequency or severity and relate to project costs to prioritize roadway segments for resurfacing based on the associated return on investment in terms of safety.
Traffic Impact Studies	Diagnosis and Countermeasure Selection Part B – Chapters 5 and 6	During a traffic impact study, the diagnosis procedures outlined in Chapter 5 can be used to identify existing crash patterns at the sites under consideration. Chapter 6 can be used to identify potential contributing crash factors and alternative countermeasures.
	Predictive Method Part C – Chapters 10-12 ^a	For a large development with a significant trip generation, the predictive method could be used to evaluate the estimated changes in expected crash frequency or severity associated with the development or changes in roadway configuration to accommodate the additional traffic.
	Crash Modification Factors Part D – Chapters 13-17	CMFs can be used to assess the safety impact of roadway modifications recommended to accommodate additional traffic volumes associated with the proposed development.

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Transportation Management Plans	Diagnosis and Countermeasure Selection Part B – Chapters 5 and 6	When preparing transportation management plans, Chapter 5 can be used to identify existing crash patterns, and Chapter 6 can be used to identify potential contributing crash factors and countermeasures to incorporate into the plans.
	Crash Modification Factors Part D – Chapters 13-17^b	CMFs can be used to evaluate the effectiveness of potential countermeasures or treatments being considered.

- ^a It is most desirable to use the predictive method with calibration factors. If the method is applied without calibration factors, the results of the analysis are applicable only for conducting a relative comparison of facilities. For example, if comparing the performance of two different multilane rural highway cross-sections, the analysis results could be reported as the percent difference in the number of crashes of one alternative over the other but not the actual difference in the number of crashes. Note that comparing the predicted safety of two different facility types, such as comparing a rural two-lane alternative to a rural multilane alternative cannot be made without calibration factors.
- ^b When using CMFs it is important to make sure the site conditions of the site under investigation are similar to the site conditions in the study from which the CMF was developed. Additionally, the CMF star rating in the CMF Clearinghouse or the CMF standard error in the HSM should be considered to determine the quality or confidence in the results of using the CMF. Additional information on using CMFs can be found in the Guidance for Using Crash Modification Factors (CMFs) document on the DOTD website.