



KYTC Crash Modification Factor Recommendation List Online Tool

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Kentucky Transportation Center
College of Engineering, University of Kentucky, Lexington, Kentucky

in cooperation with
Kentucky Transportation Cabinet
Commonwealth of Kentucky

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KTC Research Report
KTC-26-31

KYTC Crash Modification Factor Recommendation List Online Tool

William Staats, M.S., P.E.
Research Engineer

Reginald Souleyrette, Ph.D., P.E.
Program Manager

Teng Alex Wang, Ph.D., P.E.
Research Engineer

and

Mohammad Zana Majidi
Graduate Research Assistant

Kentucky Transportation Center
College of Engineering
University of Kentucky
Lexington, Kentucky

In Cooperation With
Kentucky Transportation Cabinet
Commonwealth of Kentucky

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16. Abstract Transportation practitioners use crash modification factors/functions (CMFs) to calculate the number of crashes expected once a countermeasure has been implemented. When evaluating design alternatives, CMFs can be used in conjunction with safety performance functions (SPFs) to derive crash predictions. The Federal Highway Administration (FHWA) maintains the CMF Clearinghouse as a repository for CMFs. Contributions are submitted by researchers across the U.S., Canada, and throughout the world. Typically, individual countermeasures are associated with multiple CMFs. Some CMFs only apply to a specific facility or crash types. CMF quality varies, and some only apply to a specific facility and/or crash types, regions, or times. One drawback of the CMF Clearinghouse is that practitioners must devote considerable time and have significant expertise to identify an appropriate CMF. To streamline the process of selecting CMFs, Kentucky Transportation Center (KTC) researchers updated a web-based CMF tool they originally developed in 2020. Kentucky Transportation Cabinet staff and design consultants can use the refreshed tool to select CMFs most appropriate for the state's highways and conditions. The updated tool contains significant enhancements. In addition to having a more intuitive user interface layout and better aesthetics, the new tool incorporates more than 6,000 additional CMFs that have been added to the CMF Clearinghouse. Researchers also optimized the tool for viewing on mobile devices.				
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Section 1 Background

Transportation practitioners use crash modification factors/functions (CMFs) to estimate the number of crashes that would occur on a roadway if a countermeasure were implemented. A primary source of CMFs is the Federal Highway Administration's (FHWA) [CMF Clearinghouse](#). It includes contributions from researchers located in the U.S., Canada, and throughout the world.

Individual countermeasures are typically associated with multiple CMFs. CMF quality varies, and some CMFs only apply to specific facility and/or crash types, regions, lighting and weather conditions, or times of day and/or year. Because of these complexities, identifying an appropriate CMF through the Clearinghouse demands considerable time and significant expertise.

Souleyrette et al. (2020) developed an Excel-based tool that Kentucky Transportation Cabinet (KYTC) staff, consultants, and other highway safety partners can use to identify the CMFs most appropriate for a project. To streamline the search for CMFs, researchers eventually developed an online version of the tool. Since the publication of Souleyrette et al.'s report, FHWA has added new CMFs to the CMF Clearinghouse and adopted new methods of assigning star quality ratings to CMFs.

In light of these updates, this project had four goals:

1. Update Kentucky's CMF search tool to include all CMFs in the CMF Clearinghouse.
2. Expand upon the previously identified 40 most common Kentucky Countermeasure Groups, which the tool uses as filters.
3. Enhance the tool's user interface based on feedback from the Study Advisory Committee (SAC).
4. Evaluate changes to CMF star ratings for impacts on CMF selection.

Section 2 Updated CMF Star Ratings

FHWA has modified the star rating system used to evaluate the quality of CMFs published in the CMF Clearinghouse based on the work of Srinivasan et al. (2023). Previously, only two factors were used to rate the quality of a CMF — adjusted standard error and statistical significance (Table 2.1).

Table 2.1 Previous CMF Clearinghouse Star Rating Method

Adjusted Standard Error	Statistically Significant at the 95% Confidence Level?	Star Rating
0 – 0.05	Yes	5
0.05 – 0.2	Yes	4
0.2 – 0.4	Yes	3
> 0.4	Yes	2
0 – 0.4	No	3
0.4 – 0.5	No	2
> 0.5	No	1

Instead of relying on adjusted standard error and statistical significance alone, the new star rating method is more nuanced and uses different combinations of rating factors based on the type of study. Different rating methods have been established for before-after and cross-sectional studies, meta-analysis studies, and meta-regression studies. The factors considered for each study type are shown in Tables 2.2 – 2.4. Each factor is assigned a number of points based on the rating schema for the study type.

Table 2.2 Before-After and Cross-Sectional Study Rating Considerations

Factors	Subcategories	Total Points
Data	Number of miles/sites and number of crashes for reference/comparison and treatment groups	55
Study Design and Statistical Methodology	Potential biases, accounting for trends, and appropriateness of statistical procedures	75
Statistical Significance	Statistical significance of CMF	20

Table 2.3 Meta-Analysis Study Rating Considerations

Factors	Subcategories	Total Points
Methodology and Data	Consistent methodology and crash type and severity definitions across included studies	55
Individual CMF Quality	Quality of studies used and standard errors of the individual CMFs.	35
Appropriateness of Combining	Use of appropriate methods to estimate the combined CMF	40
Statistical Significance	Overall statistical significance of the combined CMF	20

Table 2.4 Meta-Regression Study Rating Considerations

Factors	Subcategories	Total Points
Methodology and Data	Consistent methodology and crash type and severity definitions across included studies	55
Individual CMF Quality	Quality of studies used and standard errors of the individual CMFs.	35
Appropriateness of Statistical Analysis	Use of appropriate statistical methods to estimate crash modification function including use of appropriate model and functional forms	60

Readers can review detailed descriptions and criteria for each factor can on the [CMF Clearinghouse website](#). Once factors are scored, the points are summed. Each CMF can receive up to 150 points, regardless of study type. Star ratings are assigned as shown in Table 2.5.

Table 2.5 New CMF Clearinghouse Star Rating Scoring Rubric

Total Score	Star Rating
135 – 150	5 Star
110 – 134	4 Star
75 – 109	3 Star
35 – 74	2 Star
0 – 34	1 Star

When FHWA introduced the new star rating system, about 52% of CMFs maintained their existing ratings. Roughly 16% of CMFs previously rated as 3 stars or better had their ratings downgraded to 2 stars or lower. Changes in star ratings can be attributed to multiple factors, but the most significant adjustments resulted from the total number of crashes and number of miles/sites used for CMF development not being reported, which is a metric used to assess star ratings for all study types. Table 2.6 summarizes the relationship between star ratings under the old and new rating systems.

Table 2.6 CMF Clearinghouse Star Rating Comparison

New Star Rating	Original CMF Clearinghouse Star Rating				
	5 Star	4 Star	3 Star	2 Star	1 Star
1 Star (0 – 34)	3	21	116	341	215
2 Star (35 – 74)	1	89	639	666	59
3 Star (75 – 109)	67	485	1903	264	25
4 Star (110 – 134)	91	954	988	11	4
5 Star (135 – 150)	137	210	56	0	0

While star ratings changed noticeably, the research team’s general philosophy on CMF selection places greater emphasis on how well study parameters match a countermeasure’s intended application and less on a CMF’s rating. The *CMF Tool User Guide* (Section 6) provides additional details factoring star ratings into CMF selection.

Section 3 Kentucky Countermeasure Group Updates

For the previous iteration of Kentucky’s CMF tool, the research team worked with the SAC to develop a list of safety countermeasures commonly implemented on the state’s highways and ranked them in terms of importance. This let researchers associate specific CMFs with each general countermeasure applied in Kentucky. Souleyrette et al. (2020) identified and assessed 40 Kentucky Countermeasure Groups, however, the original CMF tool included only 36 groups because no relevant CMFs were available at the time for four groups.

Since the initial tool’s development, Kentucky has adopted more safety countermeasures and identified additional areas of focus for safety improvement. Through feedback from the SAC, as well as an analysis of recent KYTC publications, including the *2025-2029 Kentucky Strategic Highway Safety Plan and Vulnerable Road User Assessment*, researchers added 10 new countermeasure groups. Table 3.1 lists the original 40 countermeasure groups in the order they were ranked by the SAC as well as the 10 new countermeasure groups (cells highlighted light blue) identified during this project.

Table 3.1 Kentucky Countermeasure Group Update

Rank	Countermeasure	Rating	Rank	Countermeasure	Rating
1	Intersection Improvement	1.27	26	Interchange improvement	2.90
2	Striping	1.36	27	RCUTs	2.91
3	Guardrail	1.40	28	Bike Lanes	3.00
4	Signing	1.50	29	Drainage structure improvements	3.00
5	Shoulder widening (paved)	1.60	30	Lighting	3.10
6	Rumble strips	1.60	31	Convert intersection to roundabout	3.18
7	Pavement markers	1.91	32	High friction intersection*	3.20
8	Cable median barrier and median barrier	2.00	33	Displaced LT turn intersection*	3.30
9	Curve Widening	2.09	34	Gates/Signals at Railroad Crossing	3.30
10	Superelevation Improvements	2.09	35	Roadway Reconfiguration (aka Road diet)	3.40
11	Dedicated left turn lane	2.10	36	2 + 1	3.50
12	Lane widening/narrowing	2.10	37	Shared Use Path	3.60
13	Sight distance improvements	2.18	38	Transit turnouts*	3.80
14	Shoulder widening (earth)	2.20	39	Intersection grade separation	3.80
15	Add turn lane	2.20	40	Improve passing opportunities	4.00
16	High friction	2.30	41	Winter weather treatments	
17	Improve clear zone	2.30	42	Transit	
18	Culvert extensions*	2.50	43	On-Street parking	
19	Curve Flattening	2.55	44	Work Zone	
20	Improve access management	2.55	45	Lane restrictions	
21	High friction Curves	2.60	46	Advanced technology and ITS	
22	Sidewalk	2.60	47	Vulnerable road users	
23	Positive turn lane offsets	2.64	48	Enforcement	
24	High friction interchange ramps	2.70	49	Turn Hardening	
25	Slope improvements	2.70	50	Centerline Buffer	

The research team identified relevant CMFs for all but four countermeasure groups. These are indicated with an asterisk in Table 3.1. Table 3.2 lists alternative recommendations for the four countermeasures not included in the CMF tool.

Table 3.2 Comments on CMFs Unavailable in the CMF Clearinghouse

Countermeasure	Suggested Spreadsheets/Comments
High friction intersections	See “High friction” (#16)
Culvert extensions	See “Improve clear zone (#17)
Transit turnouts	Unavailable in CMF Clearinghouse
Displaced LT turn intersection	Unavailable (in CMF Clearinghouse’s most wanted list)

Section 4 Assignment of CMFs to Kentucky Countermeasure Groups

When developing the original CMF tool, researchers identified the most appropriate CMFs for each countermeasure group. This did not encompass all CMFs in the CMF Clearinghouse at that time. Consequently, the original CMF tool included 3,315 CMFs, each of which were assigned to only one countermeasure group. However, for this project, KYTC asked researchers to include all CMFs from the Clearinghouse in the updated CMF tool and to allow for CMFs to be associated with multiple countermeasure groups where relevant. To do this, researchers downloaded the latest CMF Clearinghouse data extract, which included 9,777 CMFs. The data extract contained all data points relevant to each CMFs development, including the abstracts of published reports (where available).

The research team used a machine learning technique to score CMF data descriptors based on an expanded description of each of the 50 countermeasure groups. Analysis generated 81,059 matches of CMFs to the countermeasure groups, meaning these were deemed relevant to multiple countermeasure groups. Researchers manually reviewed all matches to identify and correct potential errors or mismatches, resulting in a final set of 24,000 valid matches.

Section 5 CMF Tool Enhancements

Project goals included enhancing the CMF data that underpin the CMF tool as well as the tool's interface. To achieve those goals, the research team worked with the SAC to identify improvements that would make the CMF tool more effective for use in Kentucky. Enhancements to the CMF database included in the updated CMF tool are summarized below:

- The updated CMF tool includes 9,777 CMFs (all CMFs in the CMF Clearinghouse at the time of the update).
- The number of countermeasure groups increased from 36 to 46. Table 5.1 shows additional groups.
- Researchers added flags in the tool to indicate each CMF's relevance to the Safe System Approach and Kentucky's *Strategic Highway Safety Plan* (SHSP) Emphasis Areas. A team of engineers reviewed each countermeasure group to flag relevant SHSP Emphasis Areas, Safe Systems Categories, and Safe System Hierarchies. Each CMF assigned to a countermeasure group was assigned those flags by proxy. This eliminated the need to manually review each CMF from the Clearinghouse. Table 3.1 shows additional flags (rows shaded light blue) in the updated CMF Tool. Appendix A includes a complete matrix of flags assigned to each countermeasure group.

Table 5.1 Safe System and Strategic Highway Safety Plan Emphasis Area Flags

Safe System Category	Users
	Vehicles
	Speeds
	Roads
	Post Crash Care
	N/A
Safe System Hierarchy	Remove Severe Conflicts
	Reduce Speeds
	Manage Conflicts in Time
	Increase Attentiveness and Awareness
	N/A
SHSP Emphasis Area	Aggressive Driving
	Distracted Driving
	Impaired Driving
	Occupant Protection
	Roadway Departure
	Vulnerable Road Users
	Motorcyclists
	Commercial Motor Vehicles
	Older Drivers
	Teen Drivers
	N/A

The research team made the following enhancements to the CMF tool's user interface:

- Organized CMF filters into five groups — Roadway, Intersection, Crash, Countermeasures, Other — to help users identify the most filter(s) best suited to their project.
- Embedded links to guidance within the tool that direct users to resources that will help them understand CMFs and let them contact KYTC and KTC personnel if they have questions about applying CMFs.
- Corrected or condensed errors in the CMF Clearinghouse data extract to minimize data options under each filter. Shortening dropdown menu length makes it easier for users to apply filters.
- Moved the output table of CMFs identified based on the user's filters to a separate page. This increased room for filters as well as for data columns in the output table.
- Added an option to search for keywords in the abstract of the report from which a CMF was developed. This provides another filtering opportunity if predefined filters do not provide the desired results.

To avoid merely recreating CMF Clearinghouse under a different name, the research team took great care to ensure the CMF tool enhances the quality of and improves access to CMFs for Kentucky practitioners. The CMF tool differs from the CMF Clearinghouse in several ways:

- Users can select filters when they first open the tool. The CMF Clearinghouse requires users to search by keyword before accessing additional filters.
- The tool can be used to brainstorm countermeasures by filtering based on a location's roadway and/or crash characteristics to create a list of potential countermeasures. Conversely, the CMF Clearinghouse requires that users search for a specific countermeasure just to find an appropriate CMF. This adjustment will help practitioners be more expansive in their thinking about design ideas and identify applicable safety countermeasures for a given location.
- Additional flags are included to group countermeasures based on common project types used in Kentucky.
- There are flags for each CMF specific to relevant Kentucky's SHSP emphasis areas.
- There are flags for each CMF specific to relevant Safe System categories and hierarchies.

Section 6 CMF Tool Users Guide

This tool is built around a data extract from the CMF Clearinghouse. As such, inconsistencies or errors in data formats stem directly from the CMF Clearinghouse database. Researchers post-processed several data elements, such as the crash severity filter, to condense data attribute options and correct formatting errors. However, they limited their efforts to modifying raw data from what is contained in the CMF Clearinghouse to minimize variances from FHWA's standardized CMF database. The guidelines below can help users choose project-appropriate CMFs.

Applying Filters

1. Figure 6.1 shows the Filters page user interface.

The screenshot shows the 'Kentucky Crash Modification Factor Recommendation List' interface. It includes logos for TEAM KENTUCKY, KTC, and KTSDS. The title is 'Kentucky Crash Modification Factor Recommendation List (Updated on 06/04/2026)'. There are 'Reset all filters' and 'Show results' buttons. The filters are organized into four columns: Roadway Characteristics, Intersection Characteristics, Crash Characteristics, and Other CMF Filters. Each column has several dropdown menus. A search bar for abstracts is present. A box on the right shows 'Total Number of CMFs Meet Requirements 9777'.

Figure 6.1 Updated Kentucky CMF Tool Filters Page

2. The tool groups CMF filters, making it convenient for users to interact with the tool for multiple use cases:
 - a. Users with a specific crash countermeasure in mind can find applicable CMFs by focusing on the *Countermeasures* subset of filters.
 - b. Users with a defined project area looking for ideas on applicable countermeasures can use the *Roadway Characteristics* or *Intersection Characteristics* subsets to search for potential countermeasures and CMFs based on the project's roadway conditions.
 - c. Users with a known crash type problem can use the *Crash Characteristics* subset of filters to find effective countermeasures and CMFs.
 - d. Users targeting a specific SHSP emphasis area or Safe System category can also use the *Countermeasures* filter to locate effective countermeasures and CMFs.
 - e. Additional search options include CMF star ratings, locations where the CMF was developed, and keyword searches of CMF report abstracts.
3. Before starting a new search, click the *Reset all filters* button in the top-left corner of the interface. This clears all filters. Within a filter group, users can select single, multiple, or all items from dropdown lists. The default setting is that all items under each filter are selected.

Results

CMFs identified by the search are displayed on both the inputs page and results page. The lower right corner of the *Filters* page shows how many CMFs match the filters which have been applied. After clicking the *Show results* button, the Results page appears. It provides more details on each CMF. Results are updated dynamically every time a filter is adjusted.

Clicking on the CMF ID number in the left column opens the CMF Clearinghouse website and shows users details for the selected CMF. In some cases CMFs are not a single number; they are derived from an equation. The CMF Clearinghouse webpage includes equations, parameters, and variable definitions.

To inform decision making, the results section provides the star rating, state or country of origin, and study abstract. Clicking the *Back to all filters* button returns users to the Filters page.

TEAM

KENTUCKY

TRANSPORTATION CABINET

Total Number of CMFs Meet Requirements

9777

Back to all filters

Results

CMF ID	Star quality rating	Countermeasure name	Crash severity	Crash modification factor (CMF)	Standard error of the CMF	Crash reduction factor (CRF)	Standard error of the CRF	Average major road traffic	Average minor road traffic	Average traffic volume across the sites	Type of methodology used to produce the CMF	Country	State	Abstract
5294	1	Install shoulder rumble strips	All	1.12		-12					Simple before/after	WA		WSDOT began installing rumble strips on undivided highways in 1999 as a countermeasure on the shoulders were intended to reduce run-off-the-road crashes, while reductions in cross-centerline crashes. A March 2011 report detailed the performance Washington State highways. This study: - Examines the combined effects of centerline and shoulder rumble strips. - Details the performance of rumble strips on undivided highways in Washington State. - Explores various traffic volumes, geometric conditions, lane and shoulder widths, and compares various installation scenarios with shoulder and centerline rumble strip in simultaneous installation.
5296	1	Install shoulder rumble strips	All	1.05		-5					Simple before/after	WA		WSDOT began installing rumble strips on undivided highways in 1999 as a countermeasure on the shoulders were intended to reduce run-off-the-road crashes, while reductions in cross-centerline crashes. A March 2011 report detailed the performance Washington State highways. This study: - Examines the combined effects of centerline and shoulder rumble strips. - Details the performance of rumble strips on undivided highways in Washington State. - Explores various traffic volumes, geometric conditions, lane and shoulder widths, and compares various installation scenarios with shoulder and centerline rumble strip in simultaneous installation.
5298	1	Install shoulder rumble strips	All	1.40		-40					Simple before/after	WA		WSDOT began installing rumble strips on undivided highways in 1999 as a countermeasure on the shoulders were intended to reduce run-off-the-road crashes, while reductions in cross-centerline crashes. A March 2011 report detailed the performance Washington State highways. This study: - Examines the combined effects of centerline and shoulder rumble strips. - Details the performance of rumble strips on undivided highways in Washington State. - Explores various traffic volumes, geometric conditions, lane and shoulder widths, and compares various installation scenarios with shoulder and centerline rumble strip in simultaneous installation.
5300	2	Install centerline rumble strips on roads with existing shoulder rumble strips	All	0.55		45					Simple before/after	WA		WSDOT began installing rumble strips on undivided highways in 1999 as a countermeasure on the shoulders were intended to reduce run-off-the-road crashes, while reductions in cross-centerline crashes. A March 2011 report detailed the performance Washington State highways. This study: - Examines the combined effects of centerline and shoulder rumble strips. - Details the performance of rumble strips on undivided highways in Washington State. - Explores various traffic volumes, geometric conditions, lane and shoulder widths, and compares various installation scenarios with shoulder and centerline rumble strip in simultaneous installation.
5301	1	Install centerline rumble strips on roads with existing shoulder rumble strips	KA	0.76		24					Simple before/after	WA		WSDOT began installing rumble strips on undivided highways in 1999 as a countermeasure on the shoulders were intended to reduce run-off-the-road crashes, while reductions in cross-centerline crashes. A March 2011 report detailed the performance Washington State highways. This study: - Examines the combined effects of centerline and shoulder rumble strips. - Details the performance of rumble strips on undivided highways in Washington State. - Explores various traffic volumes, geometric conditions, lane and shoulder widths, and compares various installation scenarios with shoulder and centerline rumble strip in simultaneous installation.

Figure 6.2 Updated Kentucky CMF Tool Results Page

Guidance on CMF Selection

The research team recommends that users of the CMF tool prioritize selection of CMFs that are most relevant to the characteristics of the roadway and crash problem where the countermeasure is to be implemented. Star ratings may be used to decide between multiple CMFs with the same relevance to the intended application. Additionally, if there are concerns with selecting from multiple relevant CMFs, the research team recommends considering the difference in magnitude of the CMFs and choosing the CMF that will provide the most conservative estimate of crash savings.

New Searches

Because all filters are connected, before starting a new search click the *Reset all filters* button.

Additional Resources

When clicked, all logos on the heading of the *Filters* page direct users to supplemental resources:

1. KYTC logo — Links to KYTC’s website, which allows users to contact relevant KYTC divisions for assistance.
2. KTC logo — Links to KTC’s website, which allows users to contact the tool’s developers for assistance.
3. KTSDDS logo — Connects to the Kentucky Traffic Safety Data Service (KTSDDS) website, where users can submit data requests to KTC for help.
4. CMF logo — Links to the CMF Clearinghouse User Guide website. It introduces the CMF Clearinghouse database.
5. Information button (the circle with the letter i in the middle) — Links to the CMF Data Dictionary, which explains each data element used in the tool.

Mobile Version

Researchers developed a version of the web-based tool that is optimized for mobile devices; it functions identically to the version tailored to desktop browsers.

The image displays two mobile app screens for the Kentucky CMF Tool. The left screen shows the main interface with logos for TEAM KENTUCKY, KTC, KTSDDS, and CMF. It features a 'Data Dictionary' button and a title 'Kentucky Crash Modification Factor Recommendation List (Updated on 06/04/2026)'. Below the title are 'Show results' and 'Reset all filters' buttons. The 'Roadway Characteristics' section includes dropdowns for 'Area type' (set to 'All') and 'Speed limit unit' (set to 'All'). The right screen shows the results of a search, with a 'Back to all filters' button at the top. It displays a summary: 'Total Number of CMFs Meets Requirements 9777'. Below this is a table titled 'Results' with columns for 'CMF ID', 'Star quality rating', and 'Countermeasure name'.

CMF ID	Star quality rating	Countermeasure name
<u>144</u>	3	10% reduction in mean speed
<u>145</u>	3	10% reduction in mean speed
<u>146</u>	3	10% reduction in mean speed
<u>4564</u>	5	10-ft to 100-ft conversion (median width)

Figure 6.3 Updated Kentucky CMF Tool Mobile Format

References

Souleyrette, R., Tanzen, R., Green, E., Staats, W., Lause, F. 2020. *Crash Modification Factor Recommendation List*. Kentucky Transportation Center. https://uknowledge.uky.edu/ktc_researchreports/1703/.

Srinivasan, R., Saleem, T., Gross, F., Le, T., Himes, S., Porter, R. J., Bonneson, J., Persaud, B., Lyon, C. 2023. *Crash Modification Factors in the Highway Safety Manual: Resources for Evaluation*. National Academy of Sciences. <https://www.nationalacademies.org/publications/27016>.

Appendix A Assignment of Additional Flags to Kentucky Countermeasure Groups

Kentucky Countermeasure Group	Safe System Category						Safe System Hierarchy					SHSP Emphasis Area										
	Users	Vehicles	Speeds	Roads	Post Crash Care	N/A	Remove Severe Conflicts	Reduce Speeds	Manage Conflicts in Time	Increase Attentiveness	N/A	Aggressive Driving	Distracted Driving	Impaired Driving	Occupant Protection	Roadway Departure	Vulnerable Road Users	Motorcyclists	Commercial Motor Vehicles	Older Drivers	Teen Drivers	N/A
Intersection Improvement	☐	☐	☐	☒	☐	☐	☒	☐	☒	☒	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐
Striping	☐	☐	☐	☒	☐	☐	☐	☐	☒	☒	☐	☐	☐	☐	☐	☒	☐	☐	☐	☒	☐	☐
Guardrails	☐	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
Signing	☒	☐	☒	☒	☐	☐	☐	☒	☒	☒	☐	☒	☐	☐	☐	☒	☒	☐	☐	☒	☒	☐
Shoulder Widening (Paved)	☐	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☒	☒	☐	☐	☐	☐	☐
Rumble Strips	☒	☐	☐	☒	☐	☐	☐	☐	☐	☒	☐	☐	☒	☐	☐	☒	☐	☐	☐	☒	☒	☐
Pavement Markers	☐	☐	☐	☒	☐	☐	☐	☐	☒	☒	☐	☐	☒	☐	☐	☒	☐	☐	☐	☒	☐	☐
Cable Median Barrier and Median Barrier	☐	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
Curve Widening and Flattening	☐	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
Superelevation Improvements	☐	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
Dedicated Left-Turn Lane	☐	☐	☐	☒	☐	☐	☒	☐	☒	☐	☐	☒	☒	☐	☐	☒	☐	☒	☐	☐	☐	☐
Lane Widening and Narrowing	☐	☐	☒	☒	☐	☐	☐	☒	☐	☒	☐	☒	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐
Sight Distance Improvements	☒	☐	☐	☒	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☒	☐	☐	☐	☒	☒	☐
Shoulder Widening (Earth)	☐	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐

Kentucky Countermeasure Group	Safe System Category						Safe System Hierarchy					SHSP Emphasis Area											
	Users	Vehicles	Speeds	Roads	Post Crash Care	N/A	Remove Severe Conflicts	Reduce Speeds	Manage Conflicts in Time	Increase Attentiveness	N/A	Aggressive Driving	Distracted Driving	Impaired Driving	Occupant Protection	Roadway Departure	Vulnerable Road Users	Motorcyclists	Commercial Motor Vehicles	Older Drivers	Teen Drivers	N/A	
Add Right-Turn Lane	☐	☐	☐	☒	☐	☐	☒	☐	☒	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	
High Friction	☐	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	
Clear Zone Improvements	☐	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	
Access Management	☒	☒	☐	☒	☐	☐	☒	☐	☐	☐	☐	☒	☒	☐	☐	☐	☒	☐	☒	☒	☒	☐	
High Friction Curves	☐	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	
Sidewalk	☒	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	
Positive Turn Lane Offsets	☒	☐	☐	☒	☐	☐	☒	☐	☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒	☒	☐	
High Friction Ramps	☐	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	
Roadside Slope Improvements	☐	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	
Interchange Improvements	☐	☐	☐	☒	☐	☐	☒	☐	☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒	
RCUTs	☒	☐	☐	☒	☐	☐	☒	☐	☒	☐	☐	☐	☒	☐	☐	☐	☒	☐	☐	☒	☒	☐	
Bike Lanes	☒	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	
Lighting	☒	☐	☐	☒	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☒	☐	☐	☒	☒	☐	
Convert Intersection to Roundabout	☒	☐	☒	☒	☐	☐	☒	☒	☒	☐	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	
Gates and Signals at Railroad Crossing	☒	☐	☐	☐	☐	☐	☒	☐	☒	☒	☐	☒	☒	☐	☐	☐	☐	☐	☐	☒	☒	☐	

Kentucky Countermeasure Group	Safe System Category						Safe System Hierarchy					SHSP Emphasis Area											
	Users	Vehicles	Speeds	Roads	Post Crash Care	N/A	Remove Severe Conflicts	Reduce Speeds	Manage Conflicts in Time	Increase Attentiveness	N/A	Aggressive Driving	Distracted Driving	Impaired Driving	Occupant Protection	Roadway Departure	Vulnerable Road Users	Motorcyclists	Commercial Motor Vehicles	Older Drivers	Teen Drivers	N/A	
Roadway Reconfiguration (Road Diet)	☒	☐	☒	☒	☐	☐	☐	☒	☐	☐	☐	☒	☒	☐	☐	☐	☒	☐	☐	☒	☒	☐	
2+1	☐	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	
Shared Use Path	☒	☐	☐	☒	☐	☐	☒	☐	☒	☐	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	
Intersection Grade Separation	☐	☐	☐	☒	☐	☐	☒	☐	☒	☐	☐	☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Passing	☒	☐	☐	☒	☐	☐	☒	☐	☒	☐	☐	☒	☐	☐	☐	☐	☒	☒	☐	☐	☐	☐	
Winter Weather Treatments	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	
Transit	☐	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	
On-Street Parking	☐	☐	☒	☒	☐	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Work Zone	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐	☒	☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Lane Restrictions	☒	☐	☐	☒	☐	☐	☒	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☒	☒	☐	☐	☐	
Advanced Technology and ITS	☒	☐	☒	☒	☐	☐	☒	☒	☒	☒	☐	☒	☐	☐	☐	☐	☒	☒	☒	☒	☒	☐	
Vulnerable Road Users	☒	☐	☐	☒	☐	☐	☒	☐	☒	☒	☐	☒	☐	☐	☐	☐	☒	☐	☐	☒	☐	☐	
Enforcement	☒	☐	☒	☐	☐	☐	☐	☒	☐	☒	☐	☒	☒	☒	☒	☐	☒	☐	☒	☒	☒	☐	
Drainage	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	
Turn Hardening	☒	☐	☒	☒	☐	☐	☐	☒	☐	☐	☐	☒	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	

Kentucky Countermeasure Group	Safe System Category						Safe System Hierarchy					SHSP Emphasis Area											
	Users	Vehicles	Speeds	Roads	Post Crash Care	N/A	Remove Severe Conflicts	Reduce Speeds	Manage Conflicts in Time	Increase Attentiveness	N/A	Aggressive Driving	Distracted Driving	Impaired Driving	Occupant Protection	Roadway Departure	Vulnerable Road Users	Motorcyclists	Commercial Motor Vehicles	Older Drivers	Teen Drivers	N/A	
Centerline Buffer	☐	☐	☐	☒	☐	☐	☒	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	
N/A	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒	