



All photos source: FHWA.

OFFICE OF RESEARCH,
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FEDERAL HIGHWAY ADMINISTRATION (FHWA) MOTORCYCLE SAFETY PROGRAM

Texas Motorcycle Safety Forum

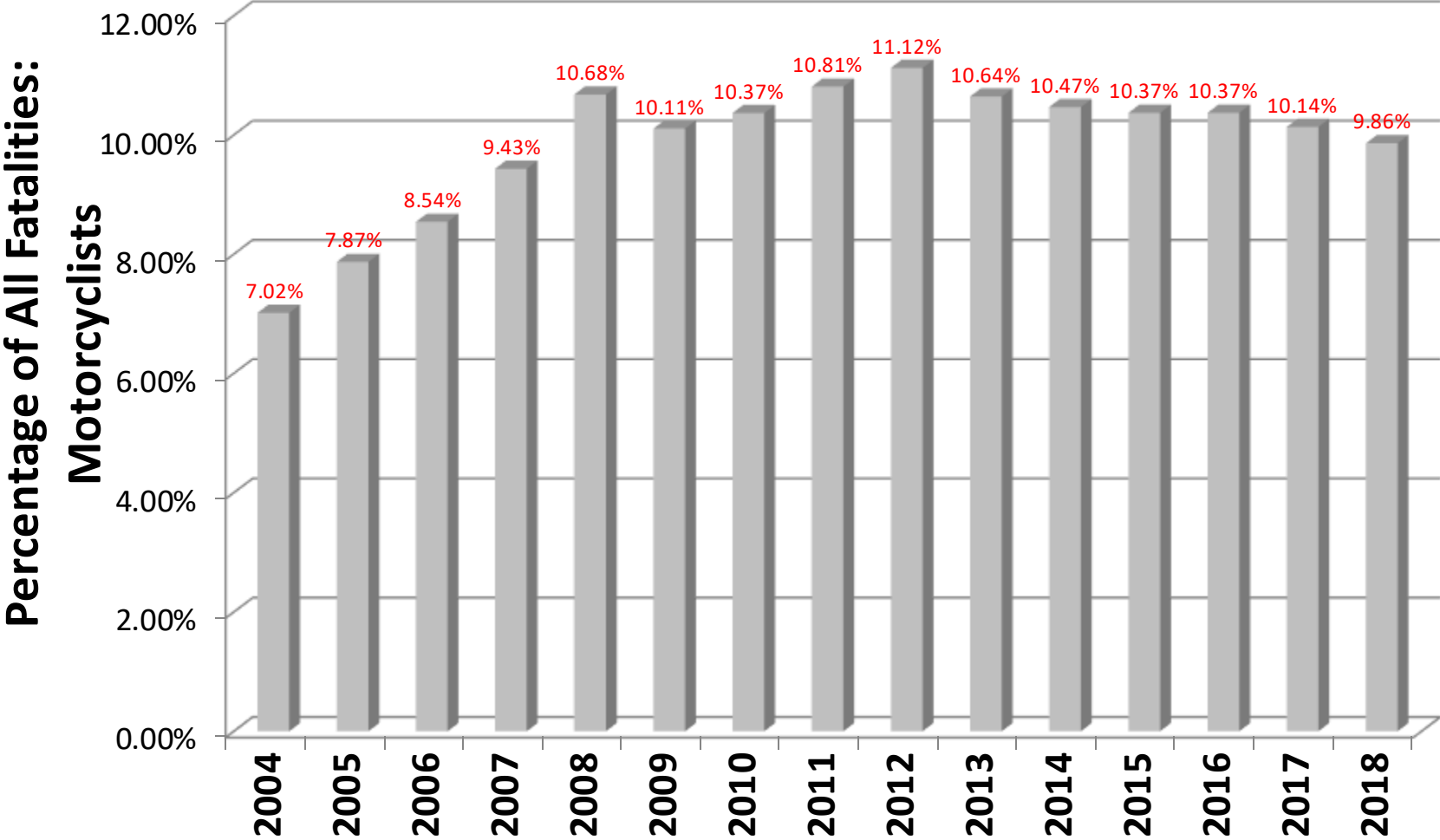
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PRESENTATION OUTLINE

- Motorcycle Fatalities.
- Motorcycle Crash Causation Study (MCCS) Database.
- Countermeasures Project Phase I.
- New/Novel Signs Human Factors Study.
- Motorcycle Community Input.
- Prioritized Signs List.
- Implementation Plan.
- Questions.

NATIONAL MOTORCYCLE FATALITIES



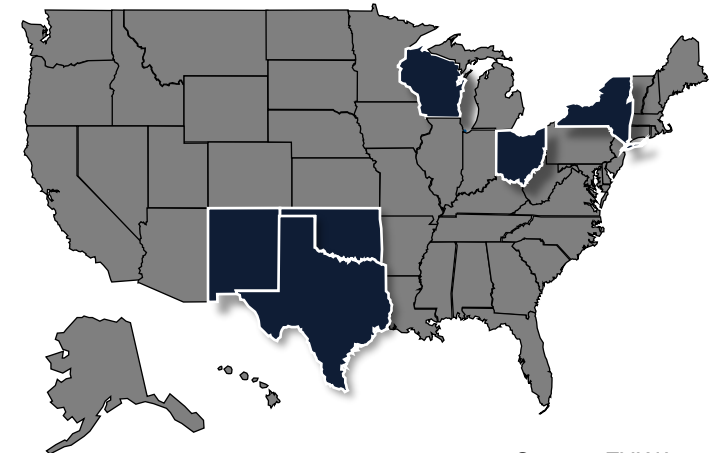
Source: FHWA.

Data Source: National Highway Traffic Safety Administration (NHTSA).*

* U.S. Department of Transportation (USDOT) NHTSA. (2019). "Fatality Analysis Reporting System (FARS)" [database]. <https://www.nhtsa.gov/research-data/fatality-analysis-reporting-system-fars>.

MCCS

- Project funding: \$3.5 Million.
 - United States Department of Transportation (USDOT): Federal Highway Administration (FHWA), National Highway Traffic Safety Administration (NHTSA).
 - Six State departments of transportation (DOTs): New Mexico, New York, Ohio, Oklahoma, Texas, and Wisconsin.
 - American Motorcyclist Association (AMA).
- Data collected in Orange County, CA (completed in 2017).
- Sample size:
 - Crash investigations: 351.
 - Control rider interviews: 702.



Source: FHWA.

MCCS REPORTS

Three reports published online:

Motorcycle Crash Causation Study: Final Report (FHWA-HRT-18-064).

<https://www.fhwa.dot.gov/publications/research/safety/18064/>

Motorcycle Crash Causation Study: Volume 1—Data Collection and Variable Naming (FHWA-HRT-18-040).

<https://www.fhwa.dot.gov/publications/research/safety/18040/>

Motorcycle Crash Causation Study: Volume 2—Coding Manual (FHWA-HRT-18-039).

<https://www.fhwa.dot.gov/publications/research/safety/18039/>



IDENTIFYING INFRASTRUCTURE-BASED MOTORCYCLE CRASH COUNTERMEASURES

- Phase I completed in 2018.
- MCCS data analyzed, and literature review conducted.
- Five infrastructure-based countermeasures identified to reduce motorcycle crashes on U.S. highways.

RECOMMENDED COUNTERMEASURES

FHWA Ranking	Workshop Ranking	Countermeasure	MCCS Analysis Alignment
1	1	High Friction Surface Treatment (HFST)	-
2	3	Limited Sight Distance Warning Signs	Sight Distance Segment; Sight Distance Intersection
3	4	Pavement Change Warning Sign	-
4	5	Curve Speed Warning Sign	Curve Speed Warning Signs
5	11	Prohibitive Signs	Stop Sign; No Left Turn Sign

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Source: FHWA.

NEW/NOVEL HIGHWAY SIGNS HUMAN FACTORS STUDY

- Project awarded to Vanasse Hangen Brustlin, Inc. (VHB)[®] and Leidos[®].
- Project duration was 24 months.
- Comprehension and legibility testing of the signs conducted.
- At least 50 percent of subjects were motorcyclists.
- A prioritized list of highway sign alternatives that can serve as effective motorcycle crash countermeasures was developed.




















NEW/NOVEL HIGHWAY SIGNS HUMAN FACTORS STUDY PROCESS

- Conducted literature review of existing practices.
- Created preliminary set of novel signs.
- Received input on signs from motorcycle riders.
- Refined set of signs.
- Administered sign comprehension and legibility testing.
- Prioritized list of five novel signs.
- Published final report and technical brief.

INPUT FROM MOTORCYCLE COMMUNITY

- Responses received from 1,025 motorcyclists.
- Age groups ranged from 18 to 76 years of age or older.
- Motorcycle riding experience ranged from greater than 1 year to 65 years.
- Respondents were 24 percent female and 76 percent male.

FINAL LIST OF SIGNS FOR HUMAN FACTORS STUDY

Motorcycle Awareness	   
Advanced Curve	     
Pavement Change	   
Limited Sight Distance	    

Source: FHWA.

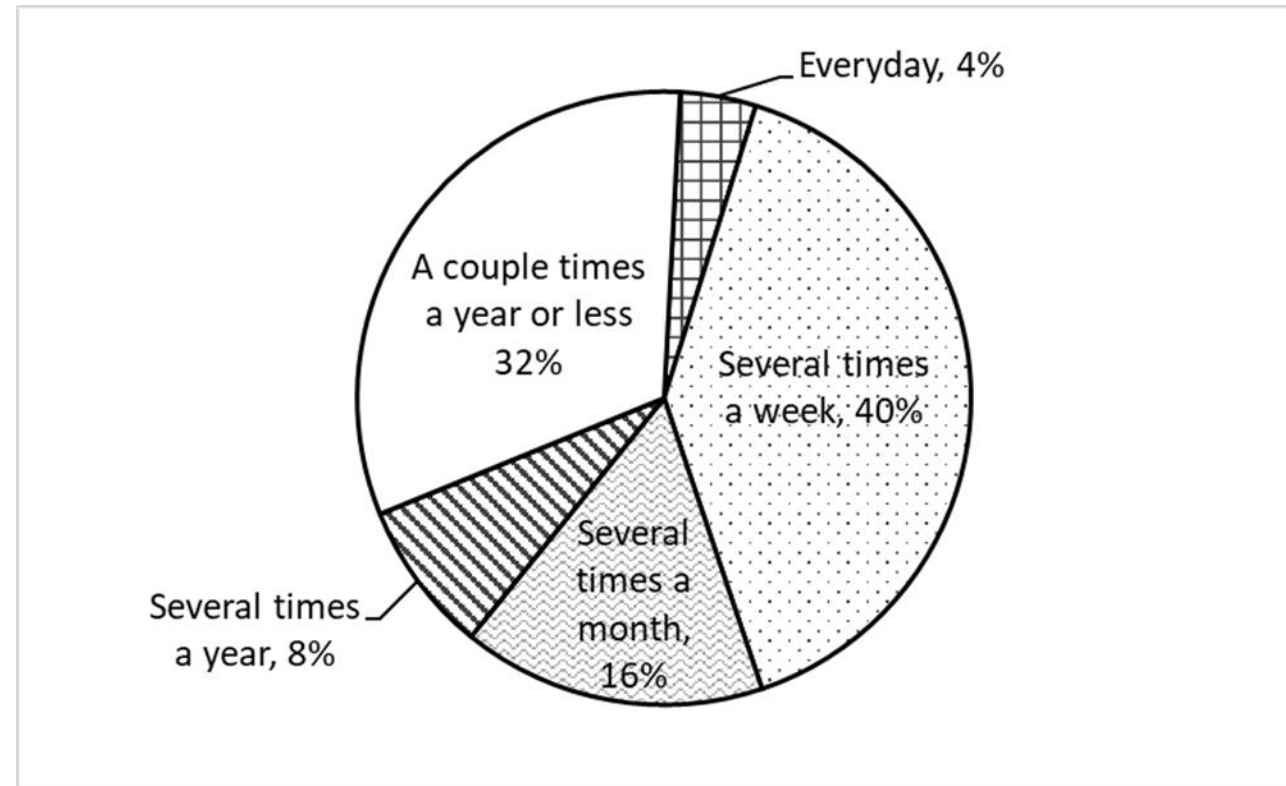
Reference: FHWA. (2012). *Manual on Uniform Traffic Control Devices*. Washington, DC: Federal Highway Administration. https://mutcd.fhwa.dot.gov/kno_2009r1r2.htm.

HUMAN FACTORS STUDY PARTICIPANTS

- Number of motorcycle riders: 25.
- Number of nonriders: 25.
- Ages: 24 to 79 years.
- Percentage of motorcycle riders:
 - Female: 20 percent.
 - Male: 80 percent.
- Years of motorcycle riding experience: 2 to 56 years.

HUMAN FACTORS STUDY PARTICIPANTS

Percentages of rider responses for riding frequency.



Source: FHWA.

COMPREHENSION TESTING: SIGN EFFECTIVENESS RATINGS

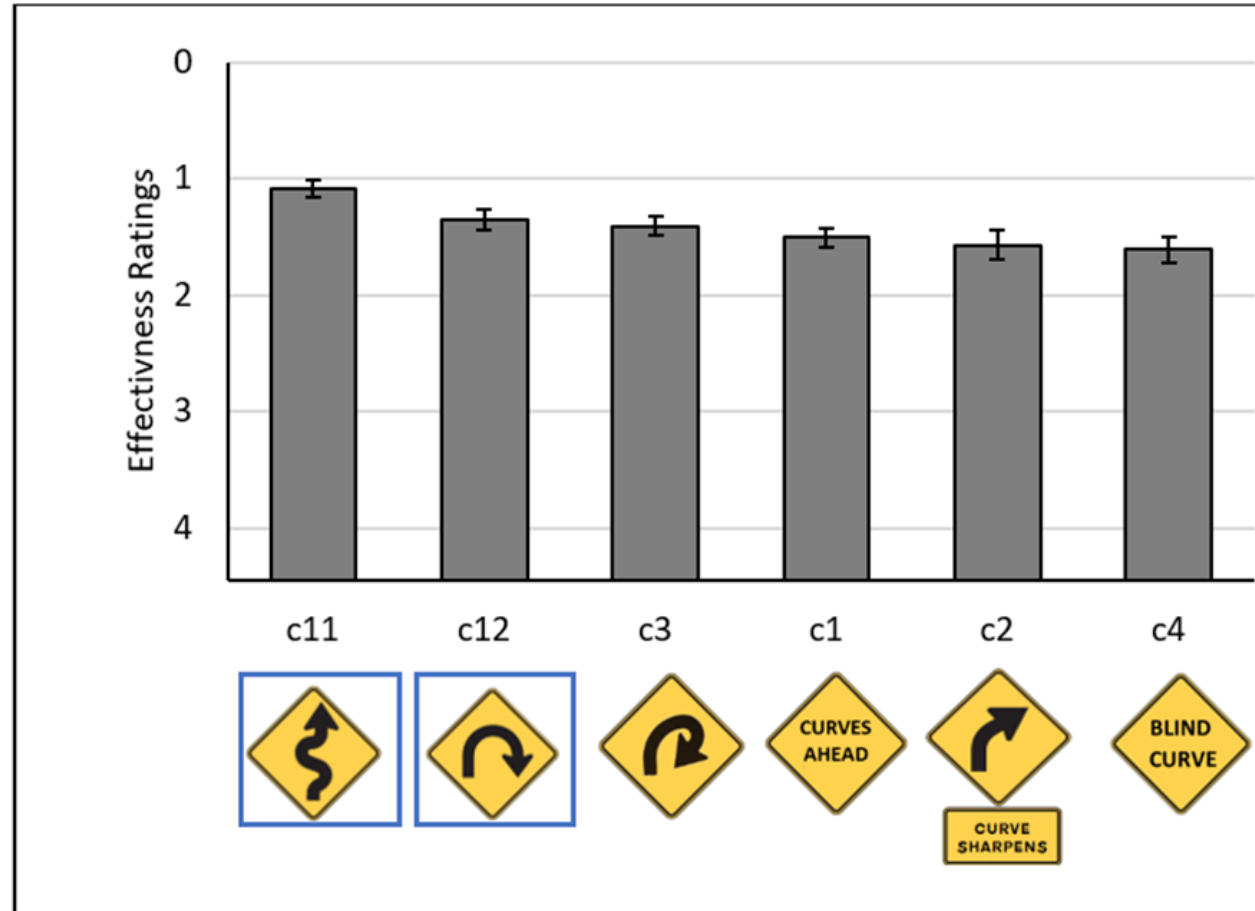
How effective is this sign at providing advanced warning about an unseen curve in the road ahead?

- 1- Very effective
- 2- Somewhat effective
- 3- Somewhat ineffective
- 4- Not at all effective








Source: FHWA.

SIGN EFFECTIVENESS RATINGS: ADVANCED CURVE WARNING



Source: FHWA.

PRIORITIZED SIGN LIST

Sign Type	Novel Signs
Advanced Curve Warning	c3 
Limited Sight Distance	s1 s2  
Motorcycle Awareness	m2 m3  

Source: FHWA.

IMPLEMENTATION PLAN

- Results can be used by State DOTs.
- Implementation Steps:
 - Identify a list of sites with high motorcycle crashes.
 - Obtain permission from the *Manual on Uniform Traffic Control Devices* committee to temporarily install the signs.
 - Obtain motorcycle crash history (at least 5 years) for the sites.
 - Collect motorcycle crash data for at least 3 years after sign installation.
 - Conduct before/after analysis to determine effectiveness of each sign.

MORE INFORMATION

- **MCCS Website:**

<http://www.fhwa.dot.gov/research/tfhrc/projects/safety/motorcycles/MCCS/index.cfm>

- **Sign Study Reports:**

- Technical Brief:

<https://www.fhwa.dot.gov/publications/research/safety/21009/index.cfm>

- Full Report:

<https://www.fhwa.dot.gov/publications/research/safety/21010/index.cfm>


Quick Response (QR) Code
for the MCCS Website



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Source: FHWA.

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