



U.S. Department of Transportation
Federal Highway Administration

Office of Safety Research and Development

FHWA Motorcycle Crash Causation Study

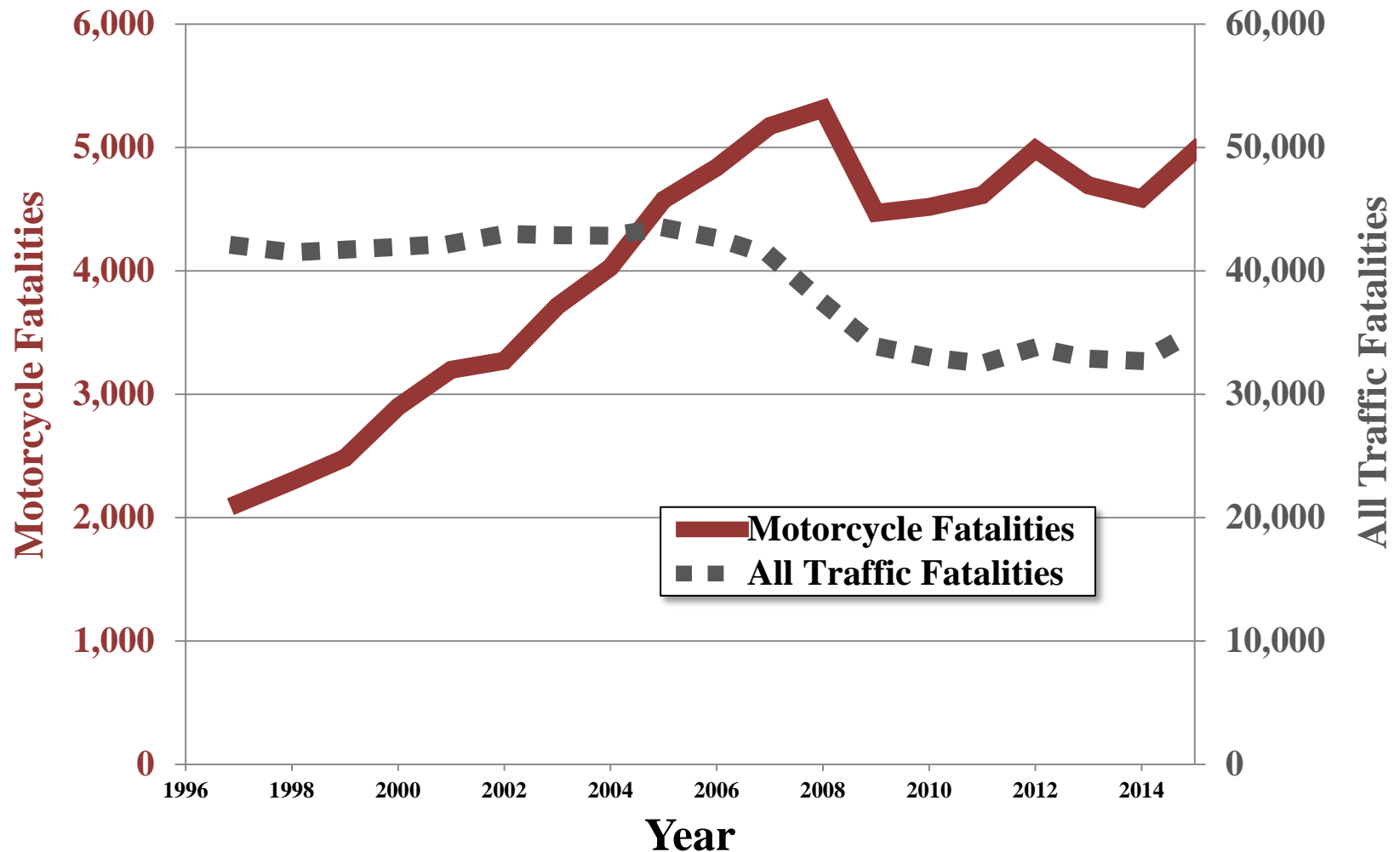
Carol H. Tan, Ph.D

2017 Lifesavers
March 25, 2017

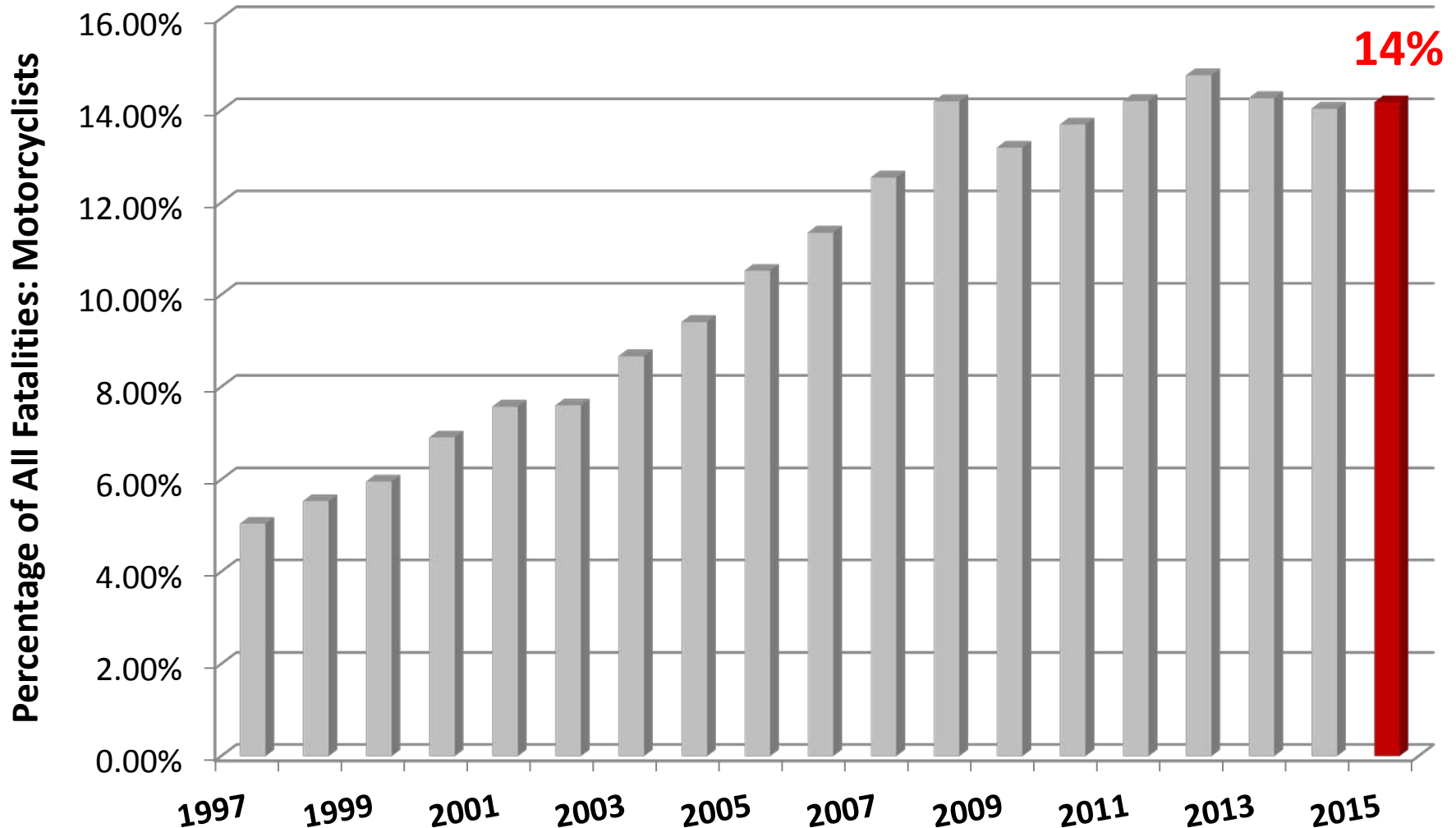
Presentation Overview

- Background
- Data Collection
- Preliminary Results

Why Study Motorcycles Crashes?



Why Study Motorcycles Crashes?

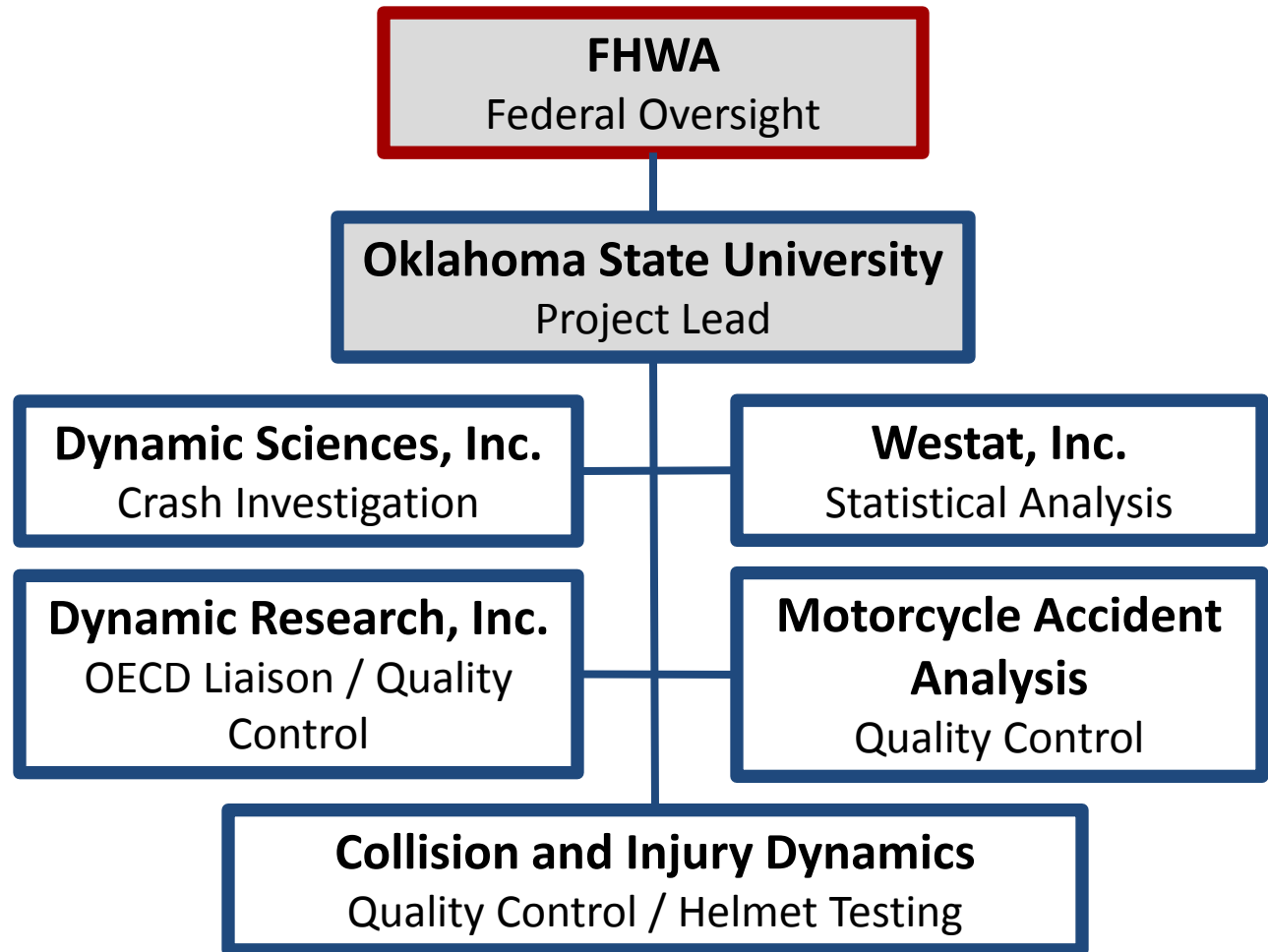


Congressional Response



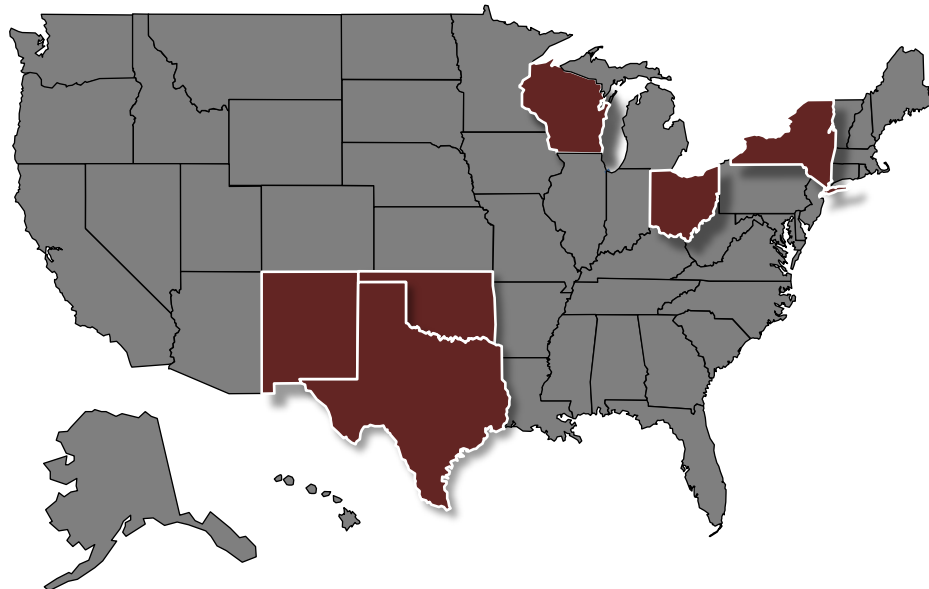
- **Congress mandated the Motorcycle Crash Causation Study (MCCS)**
 - OECD Data Collection Protocol
 - Oklahoma State University
- **NHTSA Pilot Study**
 - FHWA and NHTSA worked to develop data collection program
 - Final Report: June, 2010

FHWA MCCS Team



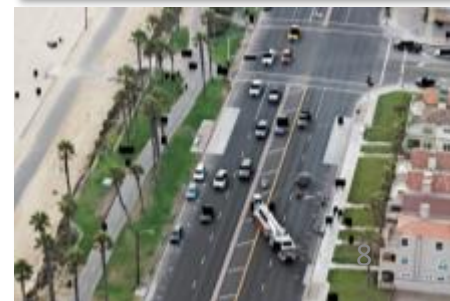
MCCS Budget

- \$3.5 Million
 - Financial Partners
 - USDOT
 - FHWA
 - NHTSA
 - Six State DOTs
 - New Mexico
 - New York
 - Ohio
 - Oklahoma
 - Texas
 - Wisconsin
 - American Motorcyclist Association (AMA)
- Sample Size
 - 351 Crash Investigations
 - 702 Control Rider Interviews



MCCS Data Collection

- Orange County, California
 - Urban
 - Rural
 - Commuters
 - Leisure Riders
- 3 Crash Investigators
 - 2 re-hired from the NHTSA Pilot
 - Experienced Crash Investigators
 - On call 24/7



OECD Methodology

- **Organisation for Economic Co-operative Development (OECD)**

- On-Scene Investigation
- Vehicle Inspection
- Rider Interviews
- Injury Data
- Control Rider Interviews
 - 2 Controls/Crash
- 1,600+ Data Elements



MCCS On-Scene Data Collection



Crash Investigation Process

Respond On-Scene

- Scene / Evidence Documentation
- Interview participants / Witnesses
- Take initial measurements



Scene Diagram



- **Detailed Measurements**

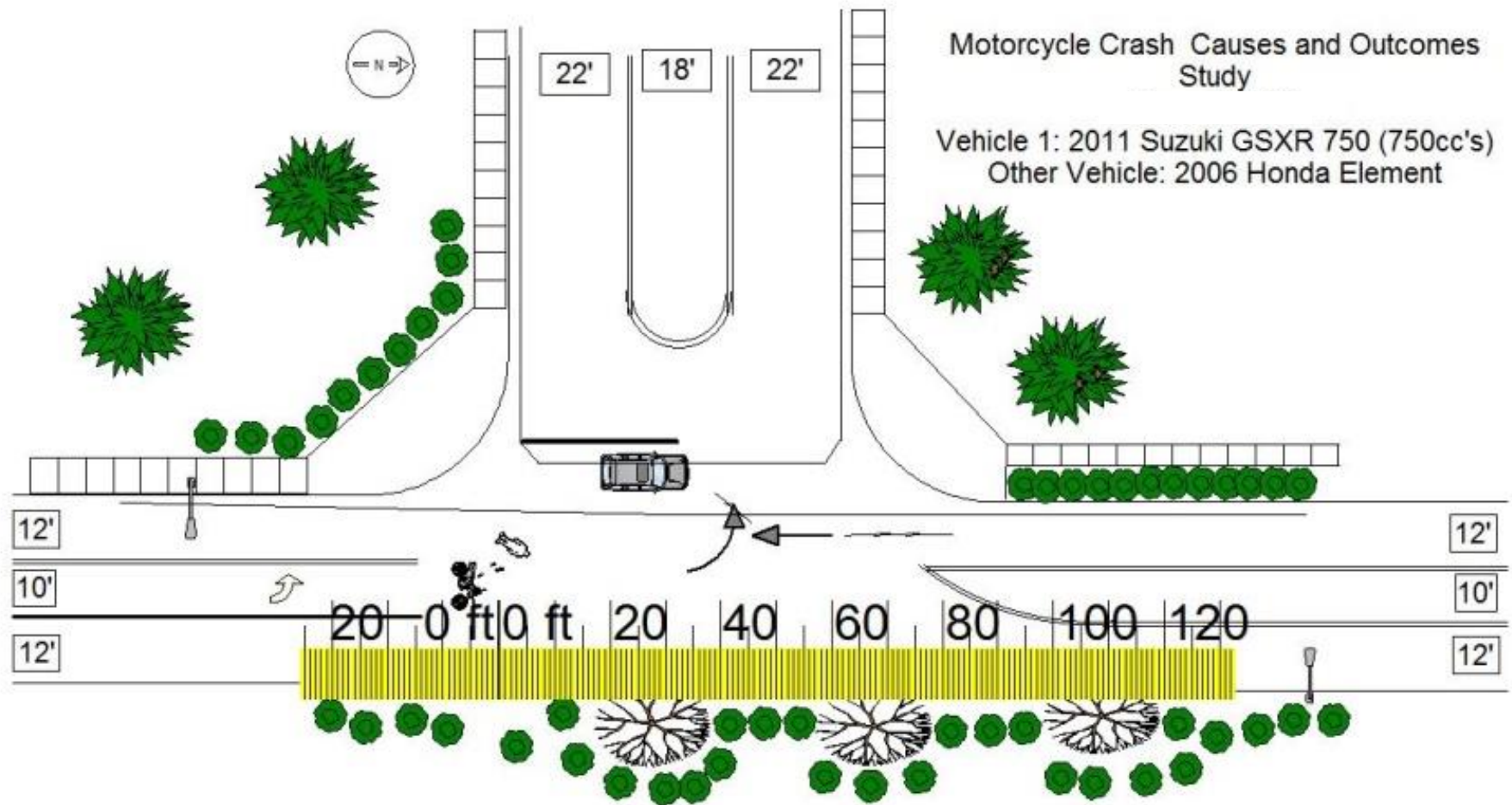
- Lane width
- Curb height
- Point of Final Rest

- **Record any crash-related evidence**

- Tire marks
- Remaining debris
- Damage to roadside objects



Scene Diagram

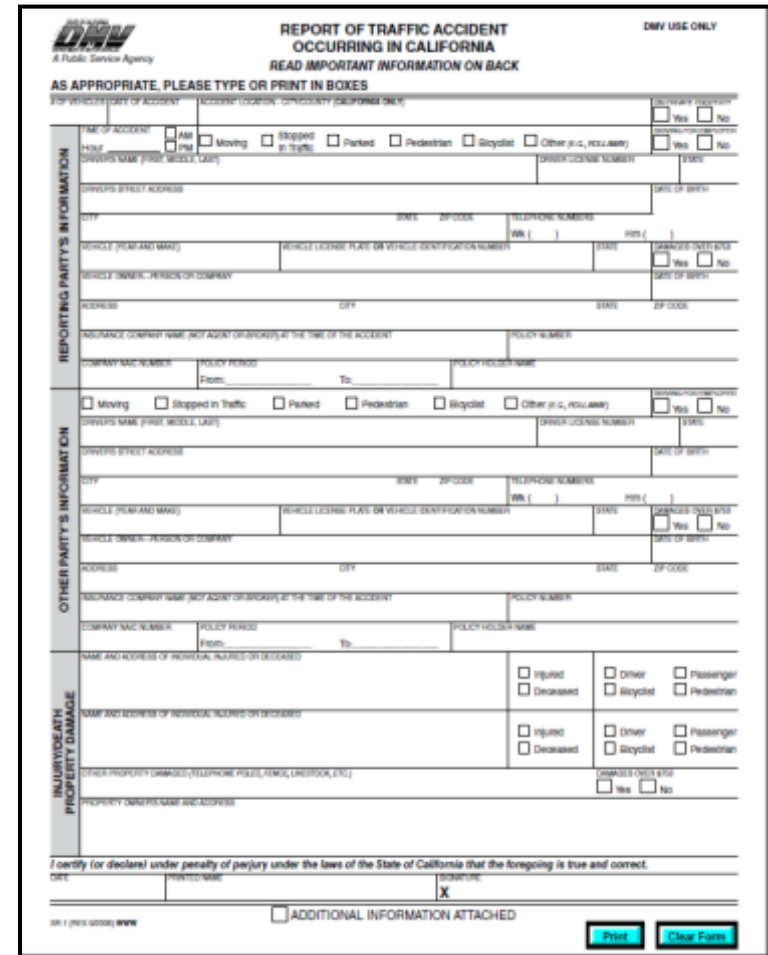


Motorcycle Investigation



Other Information Resources

- **Police Accident Report**
 - Description of crash event
 - BAC measurements
- **Rider Interviews**
 - Crash account
 - Riding history
 - Licensing status
 - Rider training
 - Emotional state



The image shows a "Report of Traffic Accident Occurring in California" form, which is a DMV form. The form is titled "REPORT OF TRAFFIC ACCIDENT OCCURRING IN CALIFORNIA" and includes the instruction "READ IMPORTANT INFORMATION ON BACK". It is labeled "DMV USE ONLY" in the top right corner. The form is divided into several sections: "AS APPROPRIATE, PLEASE TYPE OR PRINT IN BOXES", "REPORTING PARTY'S INFORMATION", "OTHER PARTY'S INFORMATION", and "INJURED PARTY PROPERTY DAMAGE". The "REPORTING PARTY'S INFORMATION" section includes fields for the driver's name, address, date of birth, and vehicle information. The "OTHER PARTY'S INFORMATION" section includes fields for the other party's name, address, date of birth, and vehicle information. The "INJURED PARTY PROPERTY DAMAGE" section includes fields for the names and addresses of injured parties and property damage. The form also includes a section for "ADDITIONAL INFORMATION ATTACHED" and a "Print" button.

- **Obtain Medical Records from Hospital**
 - Code all injuries using Abbreviated Injury Scale (AIS)
 - Identify location and description of all injuries
- **Obtain coroner's report**
 - Injury details
 - Toxicology results

[illegible]

Helmet Reconstruction



- **Documentation**
 - Helmet certification
 - Manufacture date
 - Chin strap



- **Helmet recovery**
 - Offer \$100 gift card for replacement helmet
 - Used for reconstruction (~10%)

Helmet Reconstruction



**Identify Impact Zones
and Direction of Force**

**Recreate Crash Forces on
Exemplar Helmet**

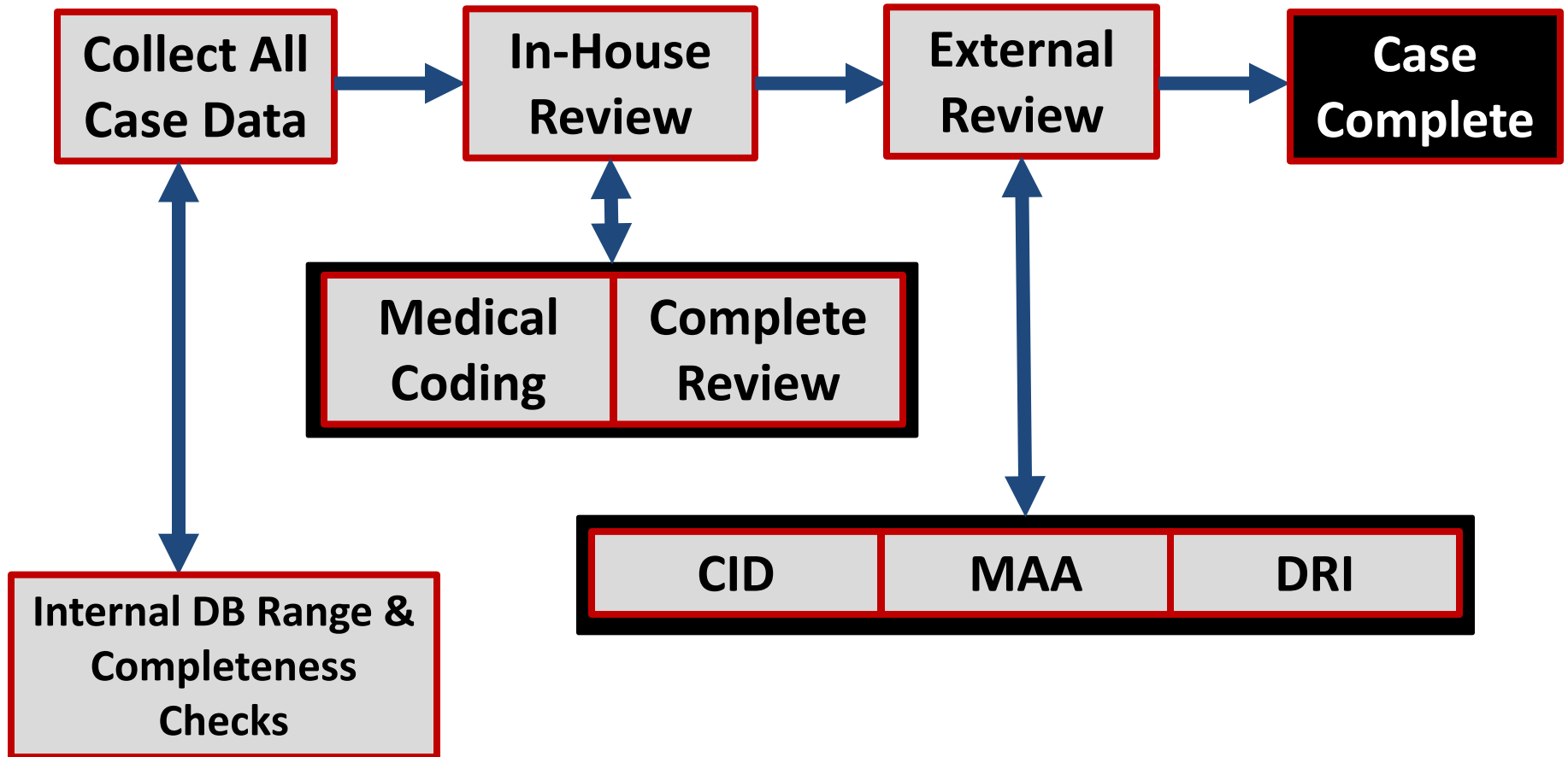


Control Interviews



- **Serve as Control Population**
- **Detailed data collection**
 - Rider history
 - Motorcycle detail
 - Protective equipment
 - Trip purpose
- **\$40 Gas Card**

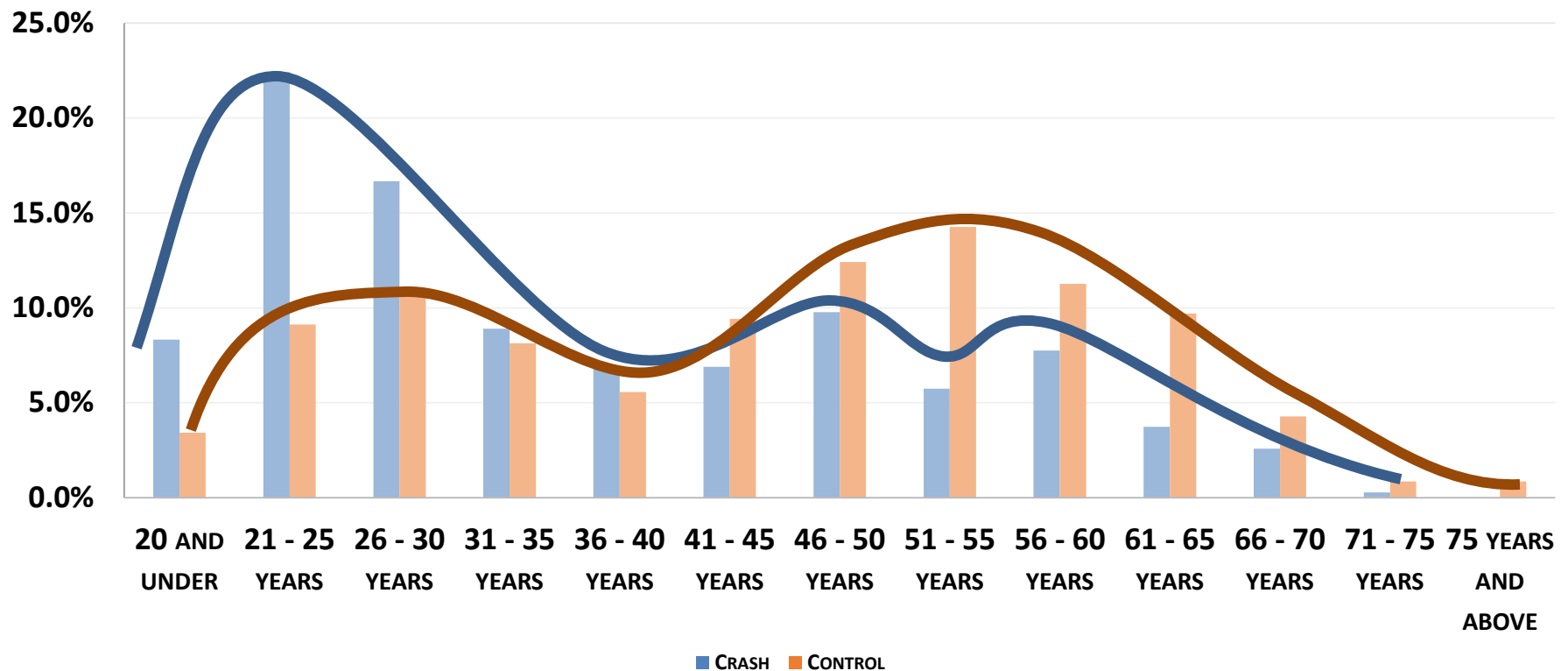
Quality Control



Preliminary Results

Preliminary Results

AGE OF RIDER IN CRASH AND CONTROL



Preliminary Results (Crash)

- **95%** of crashed riders were male
- **98.9%** of crashed riders were wearing helmets
 - **74%** were wearing full-face helmets
- **19%** of crashed riders did not have a MC license
 - 5% had no license at all

Preliminary Results

Type of Motorcycle Training	Crashes	Controls
None *	24%	15%
State Recognized, Entry-Level Motorcycle Course	50%	45%
Experienced Rider Course	8%	10%
High Performance/ Competitive Track Course	5%	5%
Self Taught*	6%	18%
Taught By Family and/or Friends	6%	7%

Preliminary Results

Age When Rider Began To Ride	Crashes	Controls
Never Rode Before, Or Rarely Ever Ride*	1%	0 %
Under The Age Of 17*	27%	40%
Age Between 17 - 25 Years*	51%	42%
Age Between 26-35 Years	13%	9%
Age Between 36-45 Years	5%	5%
Age Between 46-55 Years	2%	3%
Age More Than 55 Years	1%	1%

Preliminary Results (Crash)

- **11% of crashes resulted in a fatality to the rider**
 - 22% of single vehicle crashes resulted in a fatality
 - 62% of the fatalities involved a collision with a fixed object
- **77% coded as multiple vehicle**
 - 63% involved a collision with another vehicle
 - 48% of multi-vehicle crashes were the result of a turn by the MC or OV
 - 41% of single vehicle crashes involved a rider leaving the roadway
- **10% crashes occurred between 10pm-6am**
 - 13% of fatalities
 - 12% of single vehicle crashes

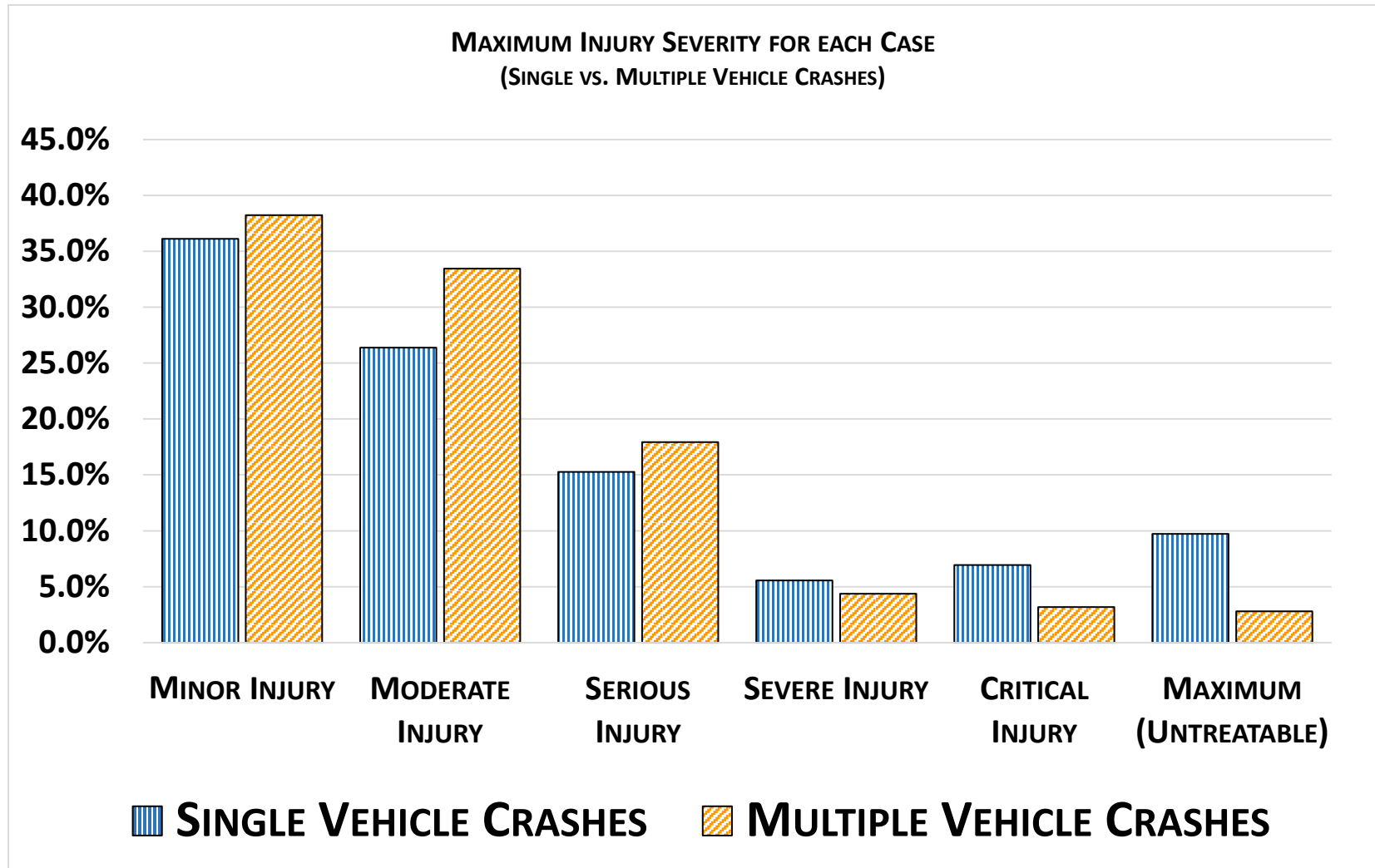
Preliminary Data (Environment)

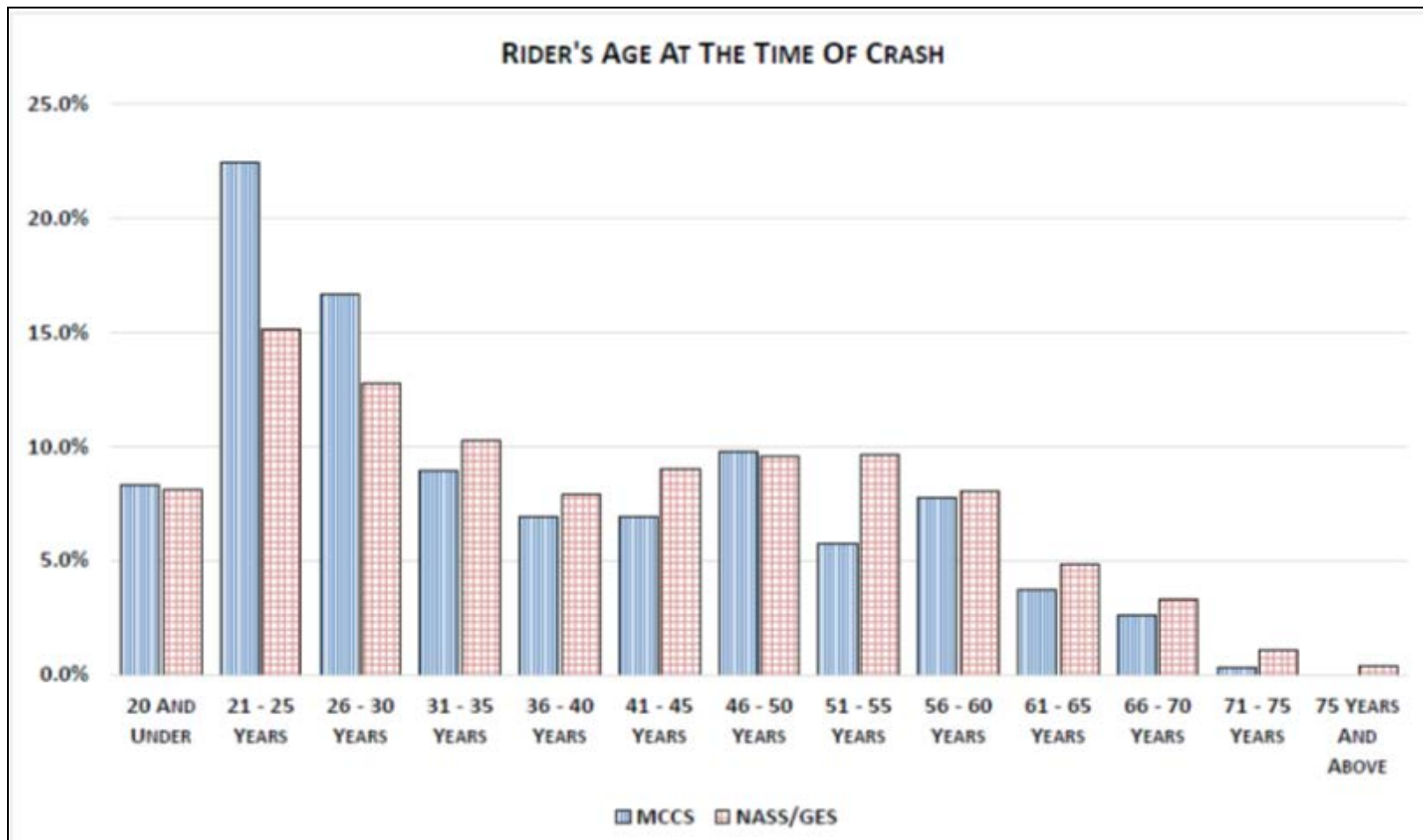
- **66.7% of crashes** occurred at an intersection
 - **50% of fatal crashes** occurred at intersections compared to **28% of non-fatal**
 - **17% of crashes** occurred at driveways
- **34% of crashes** occurred on curves
 - **48% of fatal crashes** occurred on curves as compared to **32% of non-fatal crashes**
- **74% of crashes** occurred on principal or minor arterials

Preliminary Data (Causation)

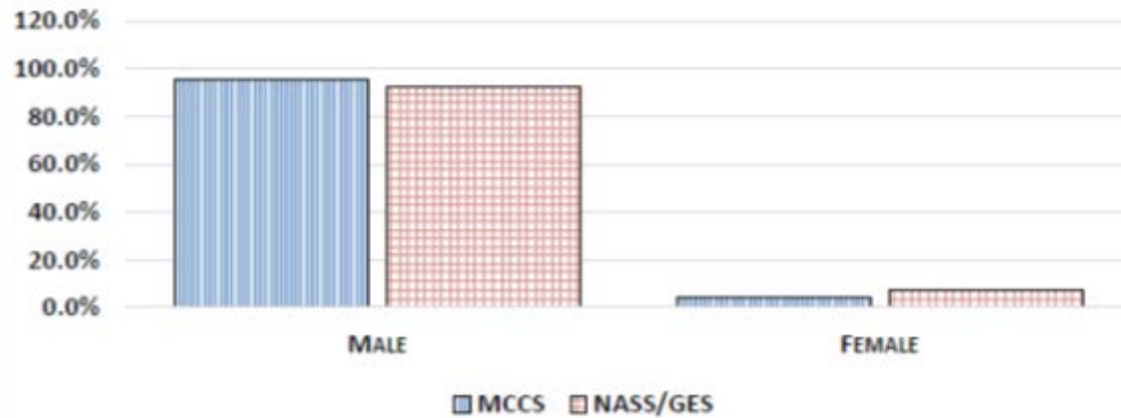
- A failure by the rider was deemed the primary contributing factor in **44.3% of crashes** and a failure by the other vehicle driver was attributed to **51% of crashes**
 - **Unsafe acts by the rider** were deemed to be related to **50% of crashes**
 - **Traffic Scanning errors** by the other vehicle driver contributed to **70% of crashes**
 - **Inadequate control skills of the rider** contributed to **26% of crashes**

Preliminary Data (Injuries)

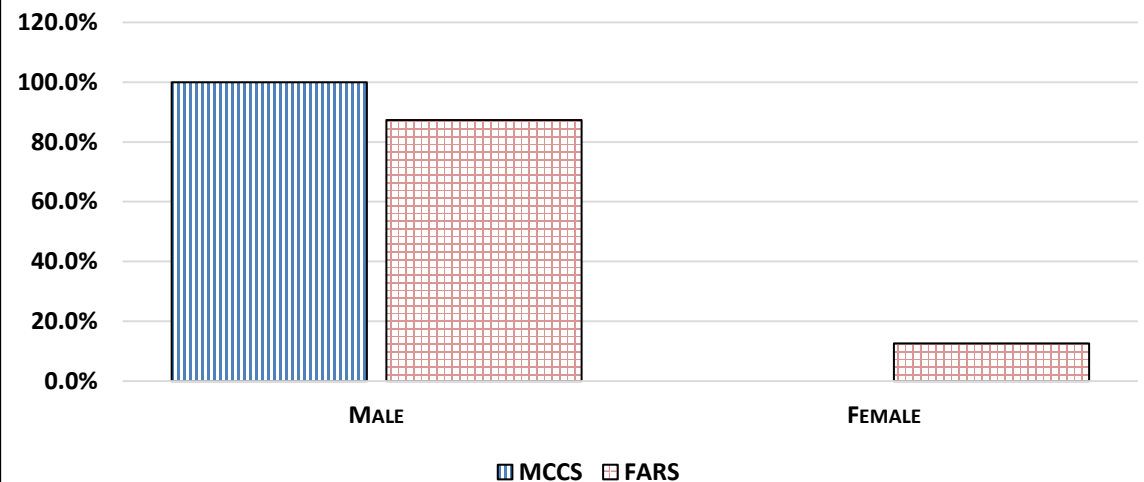




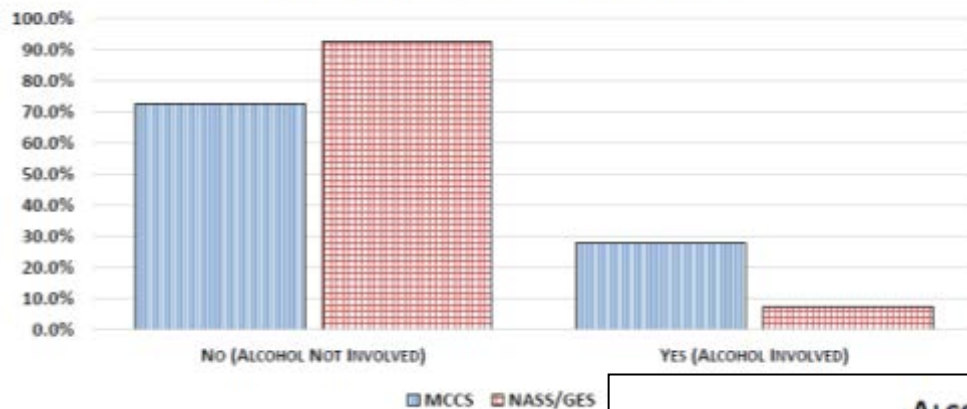
GENDER OF RIDER INVOLVED IN CRASH



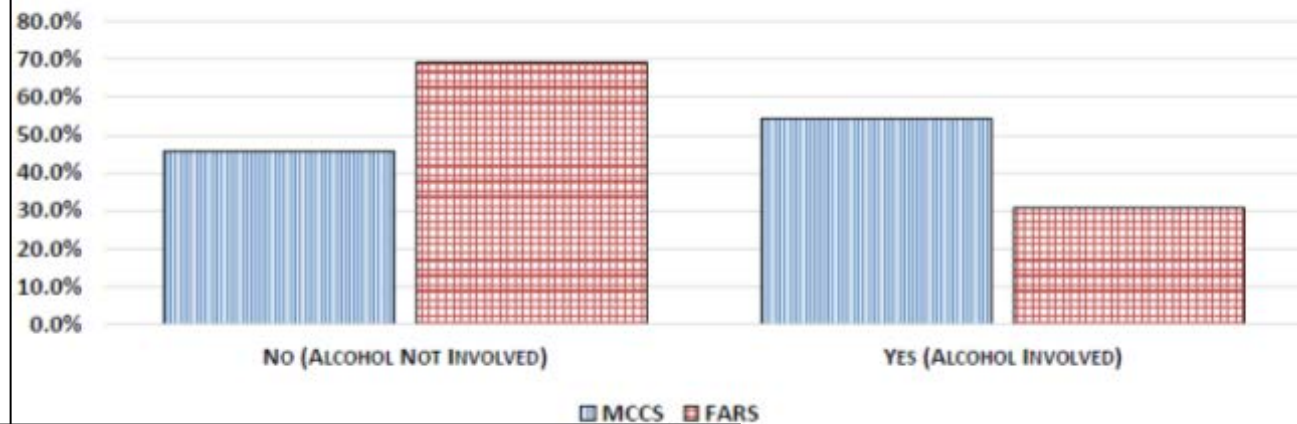
GENDER OF INDIVIDUAL FARTALLY INJURED IN CRASH



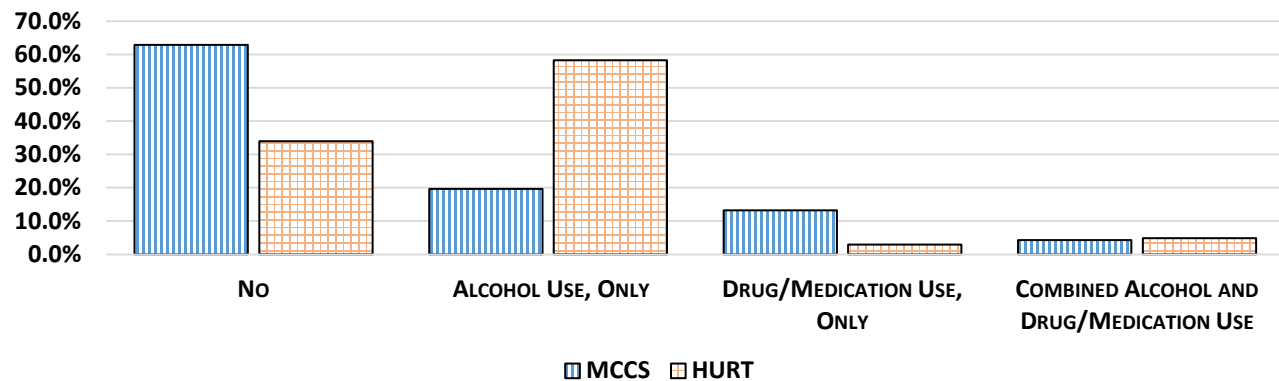
ALCOHOL USAGE OF RIDERS INJURED IN CRASH



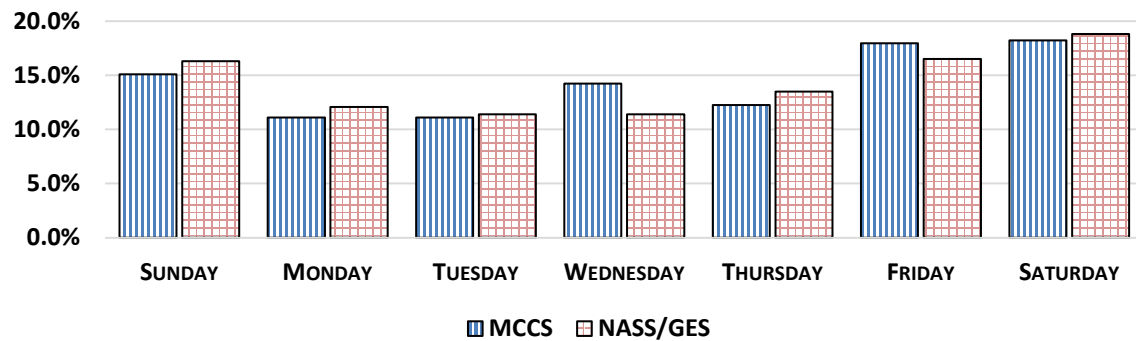
ALCOHOL USAGE OF RIDERS FATALLY INJURED IN CRASH



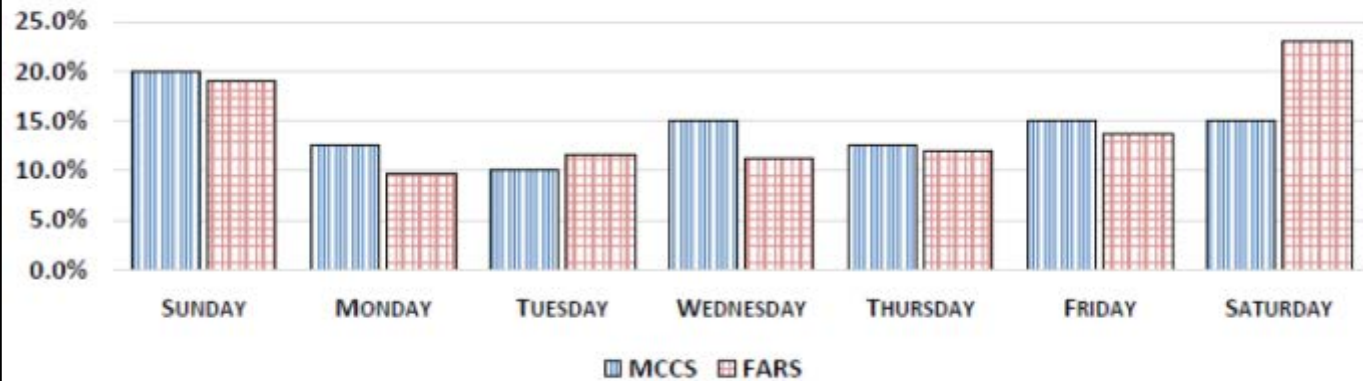
ALCOHOL OR DRUG CONSUMPTION OF RIDERS



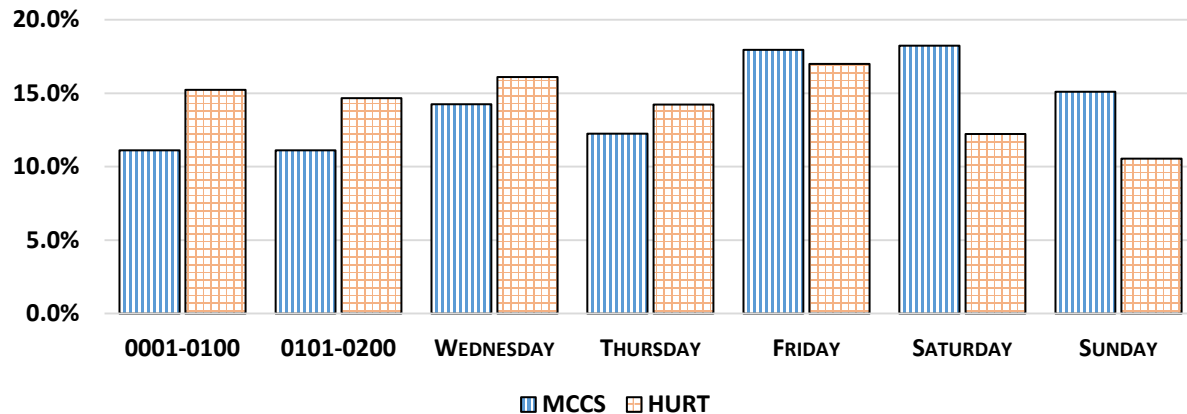
DAY OF WEEK CRASH OCCURRENCES

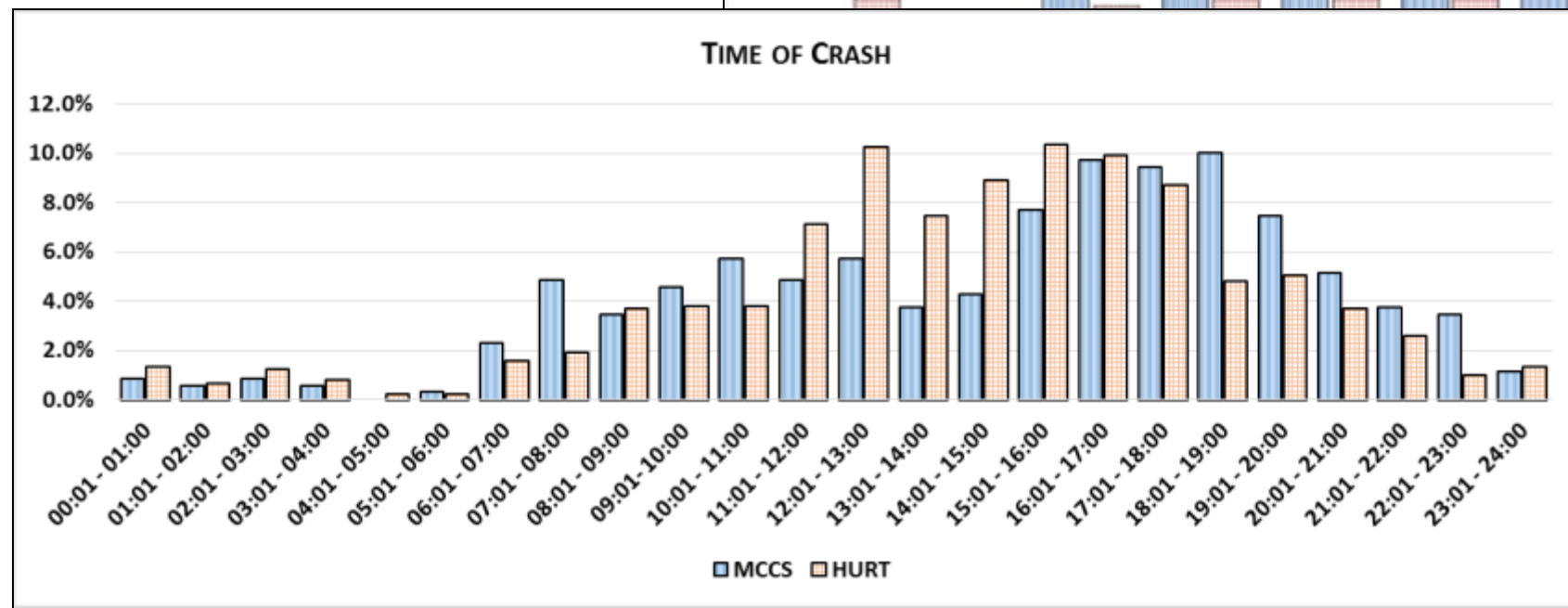
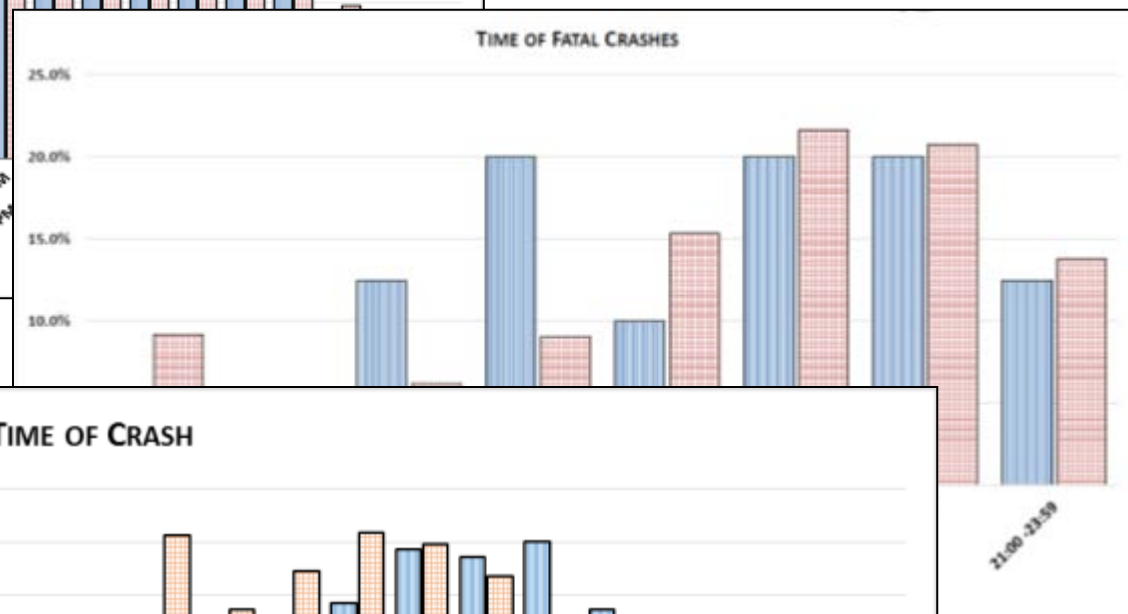
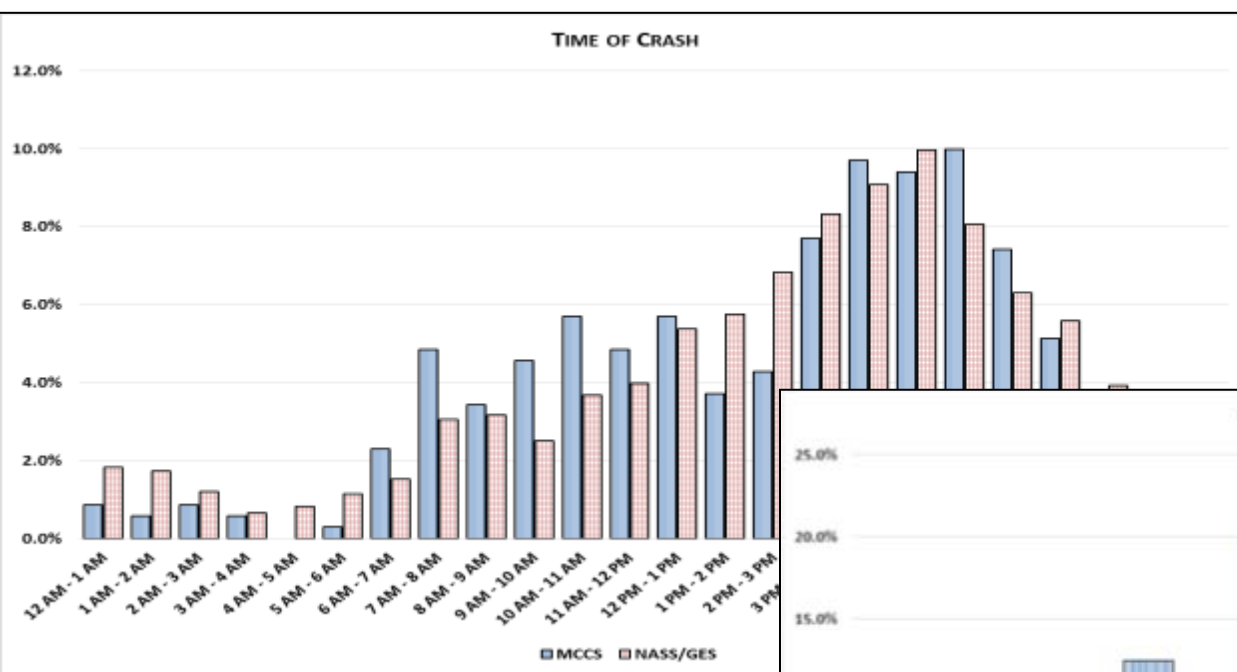


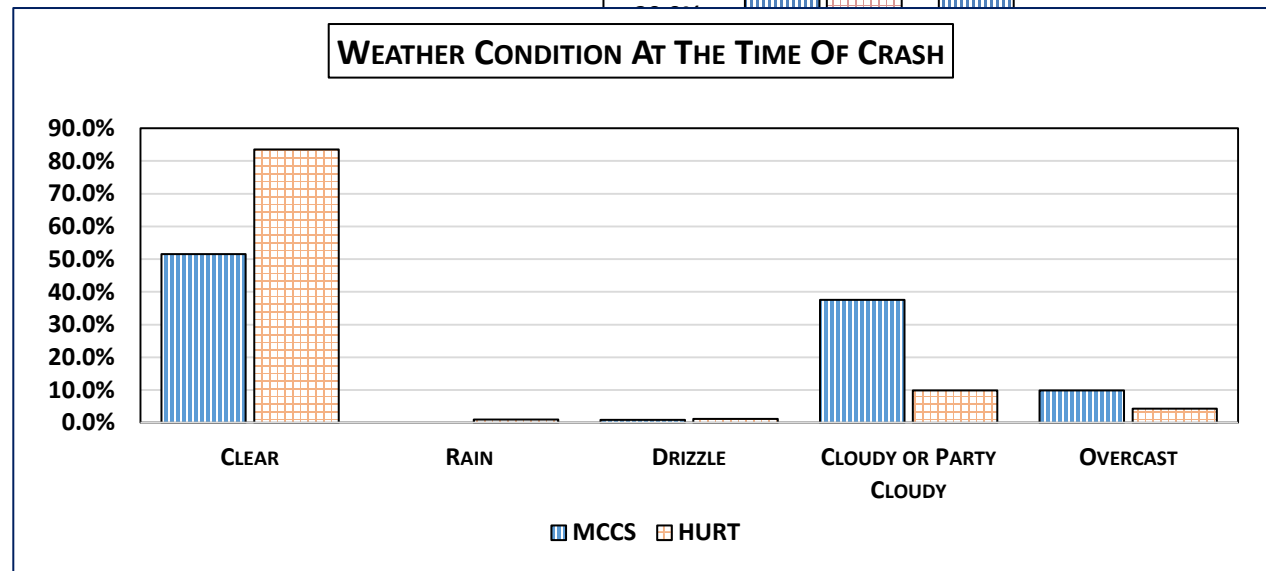
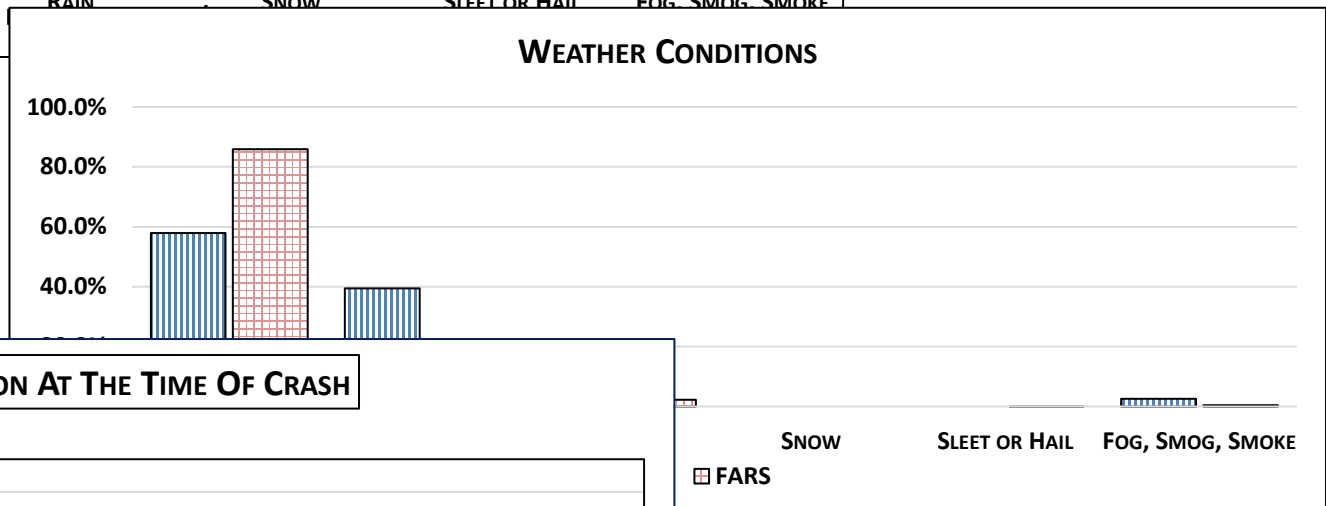
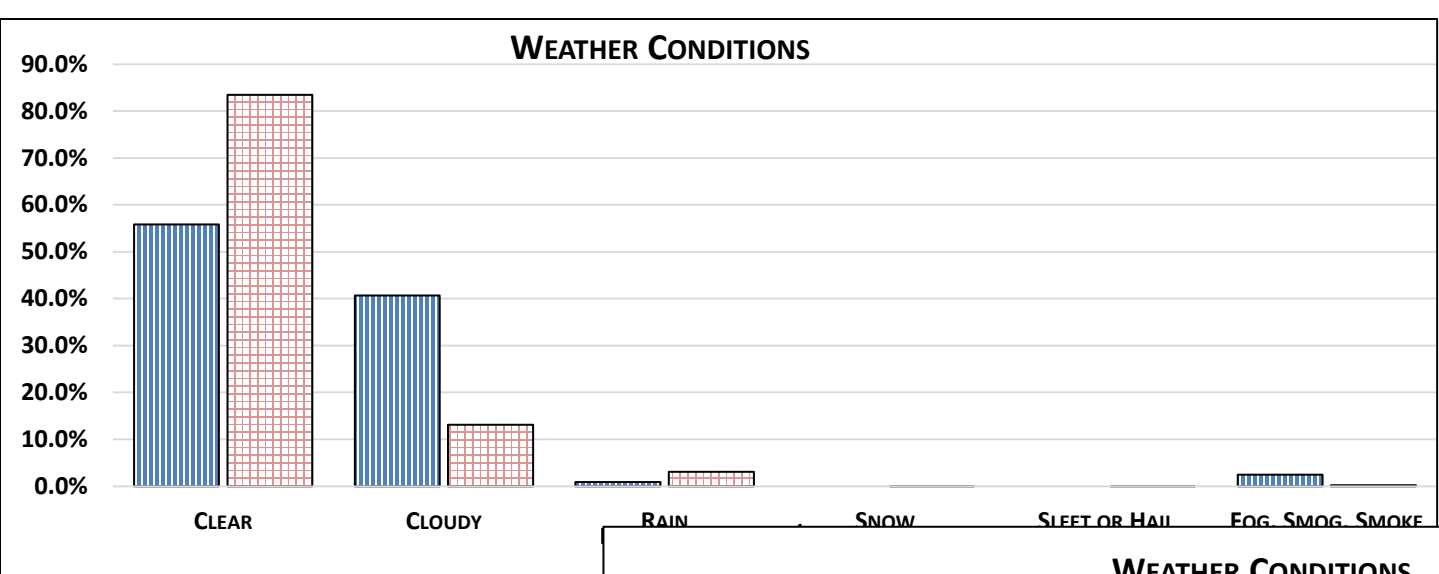
DAY OF WEEK CRASH OCCURRENCES



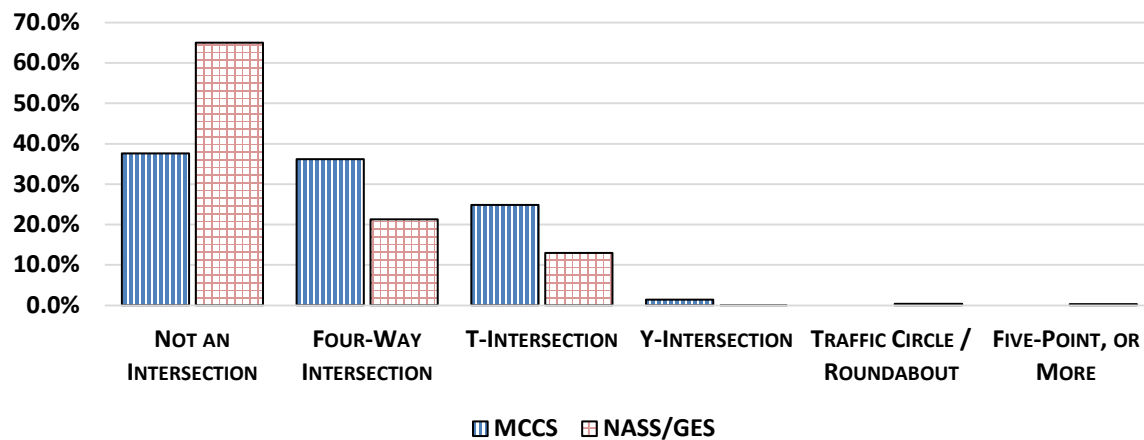
DAY OF THE WEEK THE CRASH OCCURED



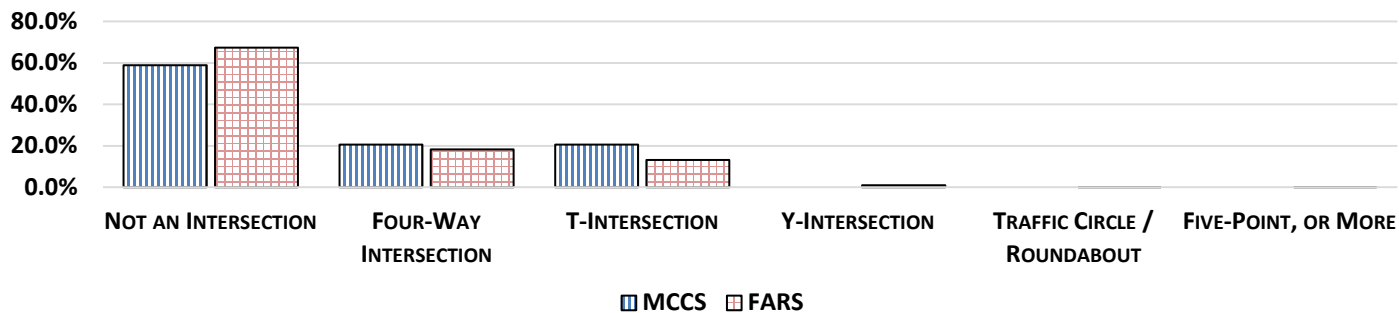




TYPE OF INTERSECTIONS



TYPE OF INTERSECTIONS



Data Access

- Finished Data Collection in January, 2016
- Data access administered by the FHWA Highway Safety Information System (HSIS) Program: www.hsisinfo.org



More Information

- **Contact Information**

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- **MCCS Website**

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

Questions?



Thank You