

# Safety Performance Evaluation of Converging Chevron Pavement Markings

Prabha Pratyaksa, Michael P. Hunter, and Michael O. Rodgers



## Introduction

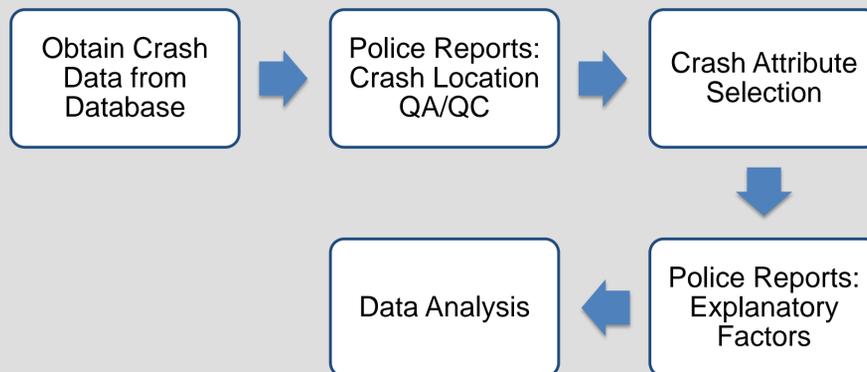
Chevron pavement markings have seen rising interest in the U.S. as a means to reduce speeds at high-speed locations and improve safety performance. In Atlanta, there are two freeway-to-freeway ramps where chevron markings are being used. A previous study analyzed before-and-after speed data at these ramps and found only a modest reduction on overall vehicle speeds. However, a cursory crash analysis indicated that the ramps had crash reductions of over 60%. This suggests that safety benefits exist even though vehicle speeds are not significantly affected.

## Study Objectives

This research aims to evaluate the safety performance of chevron markings on the two ramps in Atlanta, GA in order to quantify the potential impact of the treatment on safety and to understand the mechanism by which the treatment influences safety.

## Methodology

➤ Conducted an in-depth before and after analysis of crash data from crash databases and police reports through the following steps:



## Selected Crash Attributes

- Ramp Section
- Crash Type
- Day of Week
- Time of Day
- Surface Conditions
- Vehicle Type
- Driver Age
- Driver Gender
- Driver Familiarity
- Explanatory Factors



**Before** July 23, 2006 – April 8, 2008 (626 days)  
**After** April 15, 2008 – December 31, 2009 (626 days)

## Results

### Overall Before-and-After Crash Frequencies

Ramp	Before	After	Change
I-75 to I-85 Ramp	73 crashes	20 crashes	-73%
I-75 to I-285 Ramp	23 crashes	9 crashes	-61%

### Crash Data Analysis For I-75 to I-85 Ramp

**Note:** Trends in I-75 to I-285 Ramp are not discussed in the following table due to small sample size

Crash Attribute	Findings from Before Period	Reductions seen in After Period
Ramp Section	Section 1: 15% Section 2: 77% Section 3: 8%	Section 1: -82% Section 2: -68% Section 3: -100%
Crash Type	Single-vehicle: 53% Sideswipe: 19% Angle: 15% Rear End: 11%	Single-vehicle: -67% Sideswipe: -79% Angle: -82% Rear End: -75%
Day of Week	Weekend: 55% Weekday: 45%	Weekend: -73% Weekday: -73%
Time of Day	Midnight-6am: 33% 6am-Noon: 19% Noon-6pm: 22% 6pm-Midnight: 26%	Midnight-6am: -75% 6am-Noon: -93% Noon-6pm: -75% 6pm-Midnight: -53%
Surface Conditions	Dry: 52% Wet: 48%	Dry: -68% Wet: -77%
Vehicle Type	Passenger Veh: 96%	Passenger Veh: -76%
Driver Age	Resembles ordinary age distribution	16-20 years: -15% Average of other age groups: -75%
Driver Gender	Male: 60% Female: 40%	Male: -72% Female: -80%
Driver Familiarity*	Familiar: 62% Unfamiliar: 31% Unknown: 7%	Familiar: -76% Unfamiliar: -71% Unknown: -88%
Explanatory Factors	Excess speeds: 31% Failure to maintain lane: 32% Lost control: 66%	Excess speeds: -84% Failure to maintain lane: -70% Lost control: -68%

\*Driver Familiarity is based on whether or not driver resides in 13-county Atlanta.



I-75 to I-85 Ramp Before



I-75 to I-85 Ramp After



I-75 to I-285 Ramp Before



I-75 to I-285 Ramp After

### Legend:

- Blue** Angle
- Purple** Head On
- Green** Rear End
- Yellow** Sideswipe
- Red** Single-vehicle

## Conclusions:

- Chevron markings appear to have benefitted all types of crashes.
- Chevron markings are possibly warning drivers of potential hazards.
- Unavailability of a number of police reports and errors in crash database were limitations.
- New sites should be selected carefully and further studies need to be performed to better understand the treatment's benefits.

This research was sponsored by the Georgia Department of Transportation under contracts 12-02. Opinions expressed here are those of the authors and not necessarily those of the Georgia Department of Transportation.