

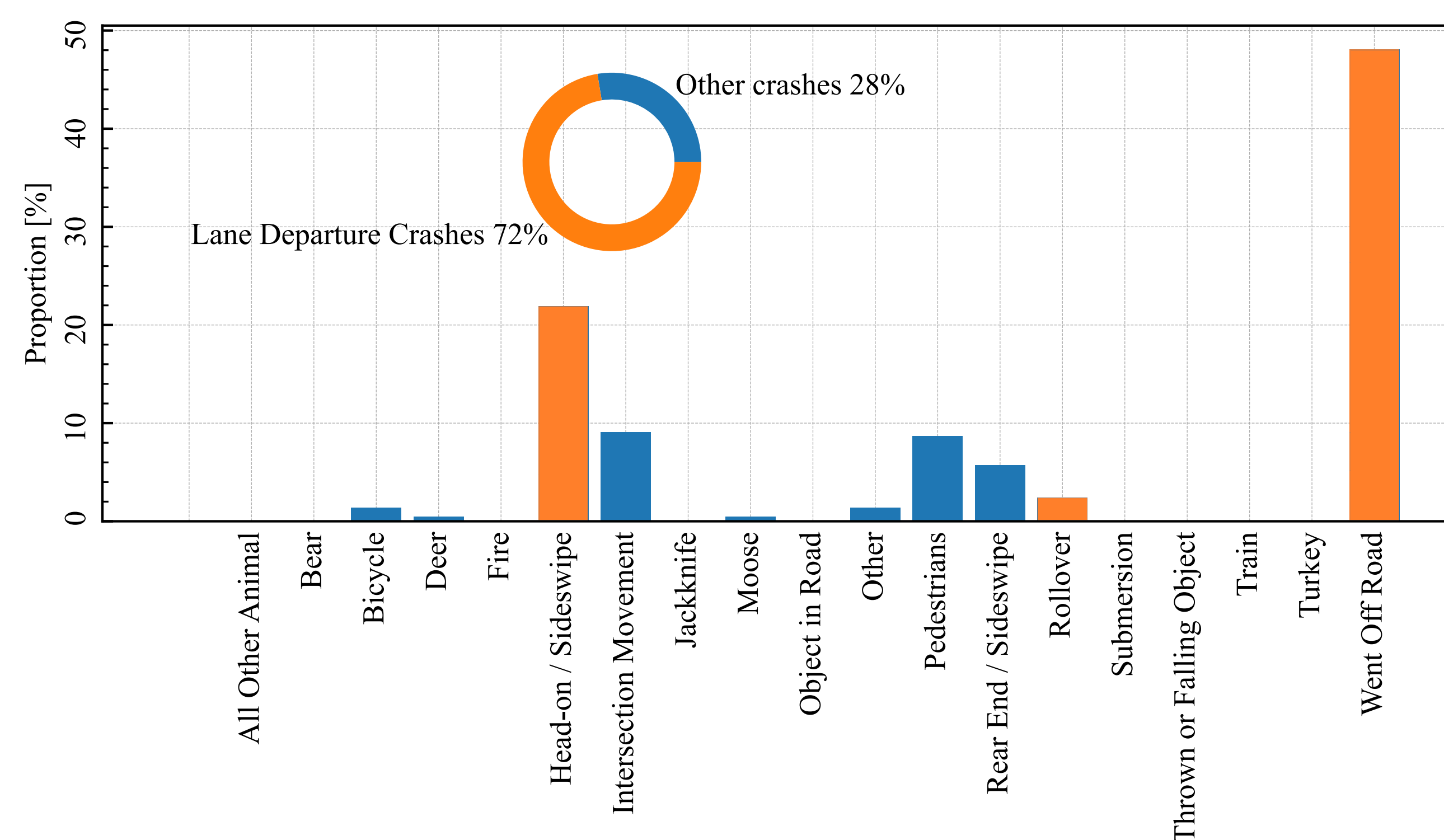
Examining the impact of rumble strip installation in prevention of lane departure crashes in Maine

Jhan Kevin Gil-Marin, Department of Civil and Environmental Engineering, University of Maine.

Advisor: Ali Shirazi, PhD.

Introduction

- ❖ Lane departure crashes (LDC) compose ~72% of the total fatalities, and ~30% of the total crashes in Maine roadways.
- ❖ Maine DOT has installed 1661 miles of rumble strips (RS) as a measure to prevent LDC.
- ❖ This study explores the safety impact of the Maine's installed RS in preventing LDC.



Type of crashes proportion of the total crash fatalities in Maine.

Summary of installed rumble strips.

ROAD FUNCTIONAL CLASS	TYPE OF RUMBLE STRIP	CLASSIFICATION	LENGTH [MILES]
Interstate	Standard	Edge	966.9
Major Collector	Standard	Centerline	7.2
Minor Arterial	Sinusoidal	Centerline	41.5
	Standard	Centerline	146.0
Other Principal Arterial	Sinusoidal	Centerline	146.7
		Edge	17.1
	Standard	Centerline	335.0
		Edge	0.8

Data collection

- ❖ Crash records and rumble strip segments were obtained from the Maine DOT Public Map Viewer online resource, and the Public Road Network from the Maine Office of GIS online catalog.
- ❖ Crash records from 2012 to 2021 were collected.
- ❖ Crash records include information such as type of crash, date of crash, location, road surface condition, type or road, road element identification, number of injuries, type of injuries.
- ❖ Rumble strip data includes variables as: type of rumble strip (standard or sinusoidal), classification (center, edge or both), year of installation, road element identifier.
- ❖ Public road network includes information as: AADT, speed limit, road element identifier, number of lanes, mileage points.

Summary of LDC count before/after the installation of rumble strips.

TYPE OF LDC	BEFORE/AFTER 3 YEARS	COUNT
Head-on / Sideswipe	After	240
	Before	320
Rollover	After	46
	Before	45
Went Off Road	After	1496
	Before	1590

Summary of LDC count by road class before/after the installation of rumble strips.

ROADWAY FUNCTIONAL CLASS	BEFORE/AFTER 3 YEARS	COUNT
Major Collector	After	35
	Before	42
Minor Arterial	After	509
	Before	611
Other Principal Arterial	After	1238
	Before	1302

Contacts

jhan.gil@maine.edu
shirazi@maine.edu

Methodology

- ❖ Before-After study is performed with the Empirical Bayes approach to estimate the safety improvement of rumble strips installations.
- ❖ Road elements and crashes were aggregated by the element identifier, AADT, and speed limit.
- ❖ Safety Performance Functions (SPF) are developed using the Negative Binomial (NB) model.
- ❖ Crash modification factors for different types of facilities are calculated.

Preliminary Results

- ❖ Standard center rumble strips improved the safety of Other Principal Arterial with two lanes.
- ❖ Only AADT, and surface state were significant for this specific scenario.

Summary of some crash modification factors.

ROAD SURFACE	CRASH MODIFICATION FACTOR	REDUCTION
Ice / Frost	0.8	20%

Remaining Work

- ❖ Extend the analysis for other grouped of roadways.
- ❖ Analyze the effect of sinusoidal rumble strips.

Acknowledgements: Funding for this research is provided by the Transportation Infrastructure Durability Center at the University of Maine under grant 69A3551847101 from the U.S. Department of Transportation's University Transportation Centers Program.