

# How infrastructure distribution influence the vehicle-pedestrian crashes?

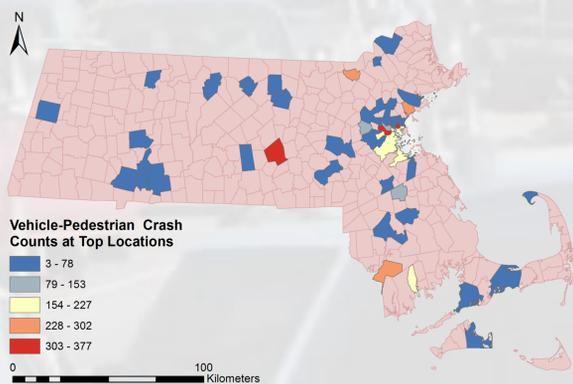


## Introduction

Traffic crashes are common in daily life. Directly or indirectly, they do harm to our life, property and the public order. Vehicle-pedestrian crashes cause much higher amount of injury than other type of collisions.

HSIP (Highway Safety Improvement Program) published the Pedestrian Crash Clusters data this year. The top locations where reported vehicle-pedestrian crashes were identified and merged to clusters, with a search distance of 100 meters (328ft). Because of the small number of reported pedestrian crashes every year, this data employed ten-year data from 2005 to 2014.

Therefore, vehicle-pedestrian crash counts in these top location clusters at each town in Massachusetts can be calculated. Chelsea, Cambridge and Worcester are the top 3 towns. Pedestrian-vehicle crashes are influenced by many factors, such as features of population and environment. This project aims at investigating the impact of infrastructure including bus stops, crosswalks and roads on pedestrian-vehicle crash distribution in these top 3 towns.



## Methods

- Create raster layers to show the density of bus stops and crosswalks distribution. Reclassify the density to 6 levels with Quantile method, which gives the same number of features for each class.

- Buffer all roads with a 12-meter width, which is about 3 lanes.

- According to the functional classification and access, Mass DOT classifies roads to 6 classes. In this project, indexes are designated to the classes to represent the possibility of vehicle-pedestrian crashes.

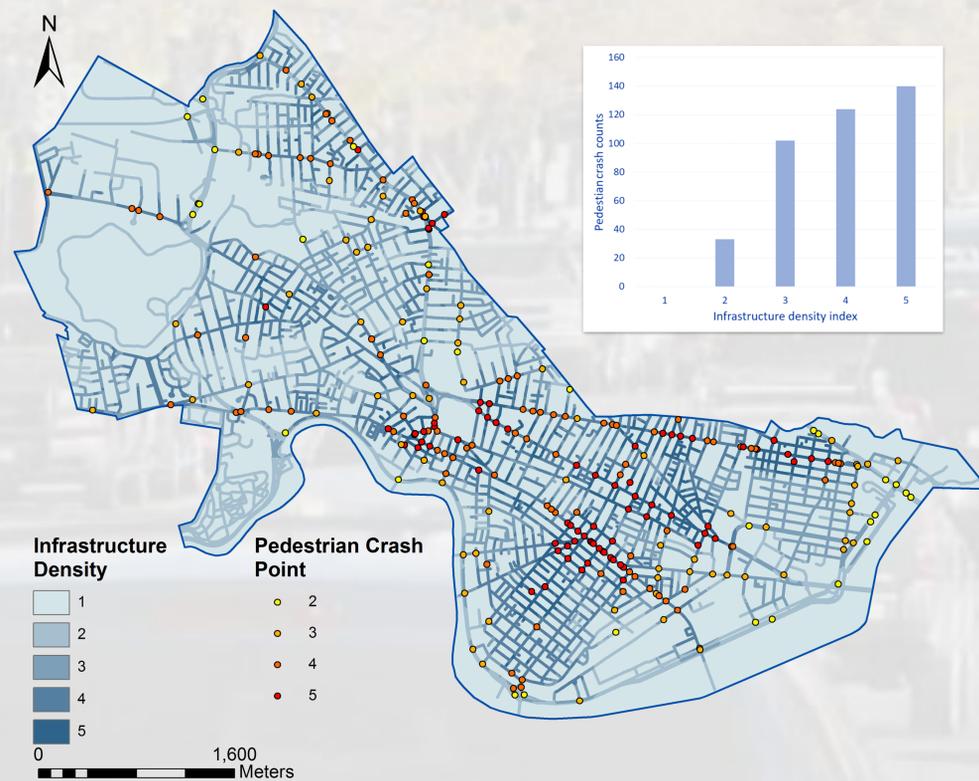
- Perform the equation of the 3 features:  $I=(B+C)*R$

- I: The impact of infrastructure on the spatial distribution of vehicle-pedestrian crashes.

- B: Bus stop density index

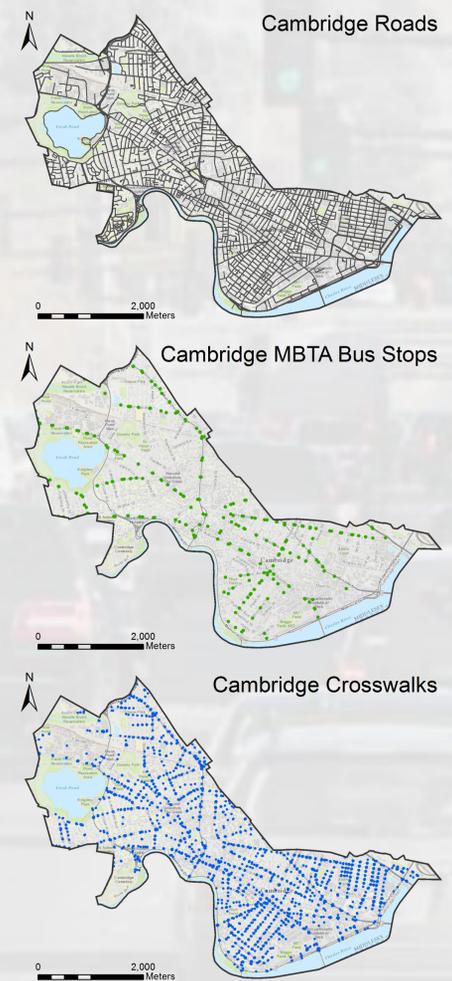
- C: Crosswalk density index

- R: Index of the possibility when vehicles and pedestrian are simultaneous



- Reclassify the map to 5 classes according to “I” value. Give them indexes from 1 to 5, called infrastructure distribution index.

- Assign the infrastructure index to all pedestrian crash points. Create tables to show the amount of crashes in each group.



## Results

The results show that the higher infrastructure density index, the more crashes. This relationship exist not only in Cambridge, but also in Worcester and Chelsea. Therefore, we can say that vehicle-pedestrian crashes are more likely occur at a section of major roads with dense bus stops and crosswalks.

In addition, no crashes for index 1 in Cambridge and Chelsea, where the value “I” is zero. It is reasonable, because basically there are impossible for vehicle-pedestrian crashes. In Worcester, several crashes are in the area of index 1. There may be some special reasons for the crashes, and it can also because of the data deviation.



## Data

Name	Source
HSIP Pedestrian Crash Clusters	Mass DOT
Standard Crash Reports	Mass DOT
Roads	Mass DOT Roads, Mass.gov
Crosswalks	USGS Color Ortho Imagery (2013/2014) , Mass.gov
MBTA Bus Stops	MBTA, Mass.gov
WRTA Bus Stops	WRTA
Community Boundaries (Towns)	Political/Administrative Boundaries, Mass.gov

