



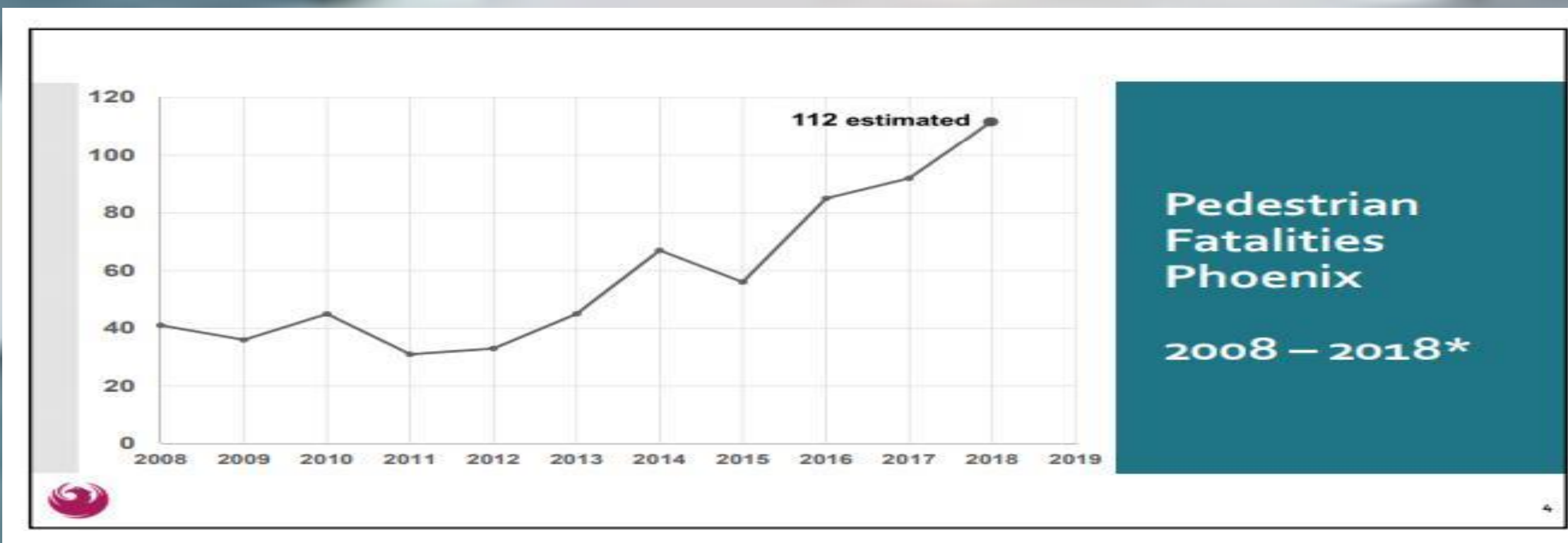
Dangerous Urban Designs:

Examining the effect of Land Use on Pedestrian Safety

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Motivation



Vision Zero embraces the idea that all humans are liable to make mistakes, but through effective planning the built environment can be designed to factor in possible human error while ensuring safety.

Presently, only about 6% of all trips are made by foot, yet 17% of traffic deaths involve pedestrians. (Loukaitou-Sideris, et al.)

Existent research has demonstrated a powerful association between the built environment and the volume of pedestrian activity in the proximity of an intersection. (Miranda Moreno, et al.)

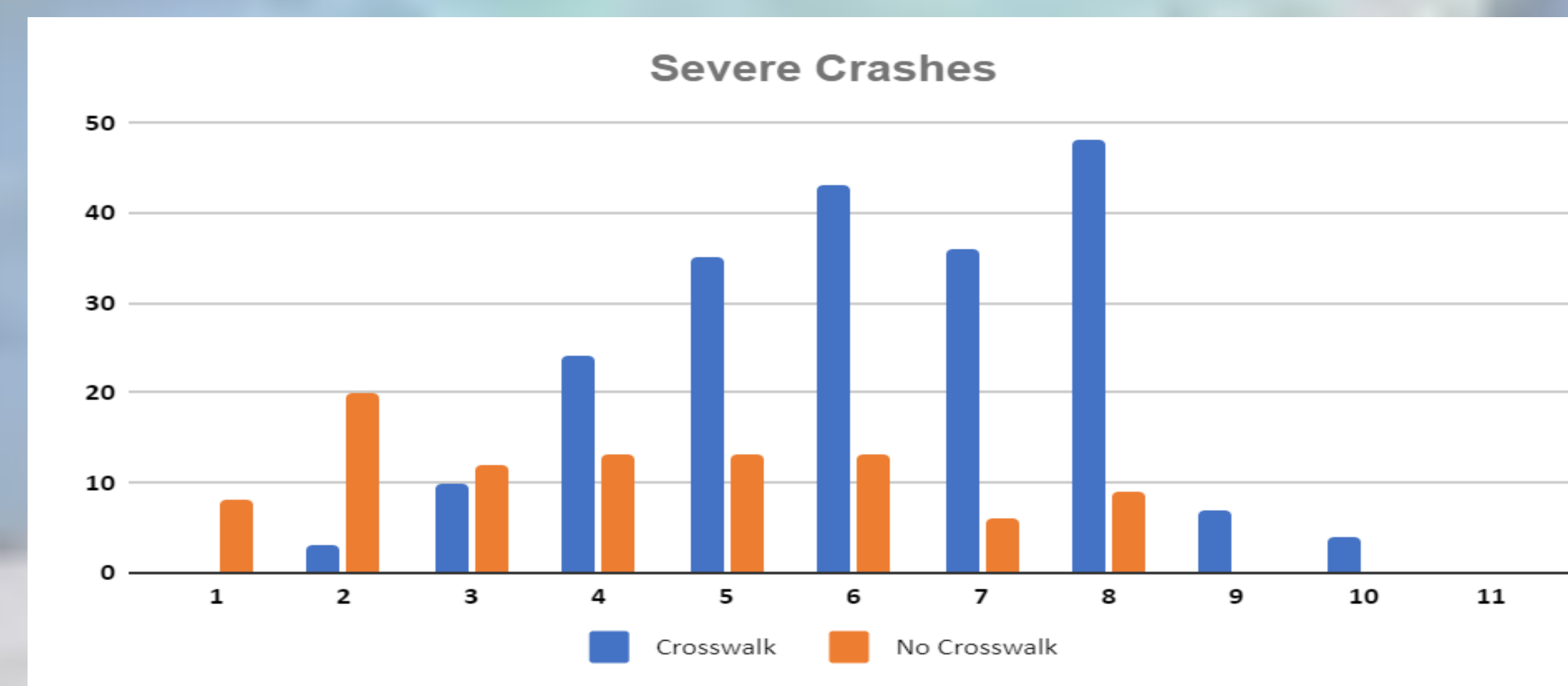
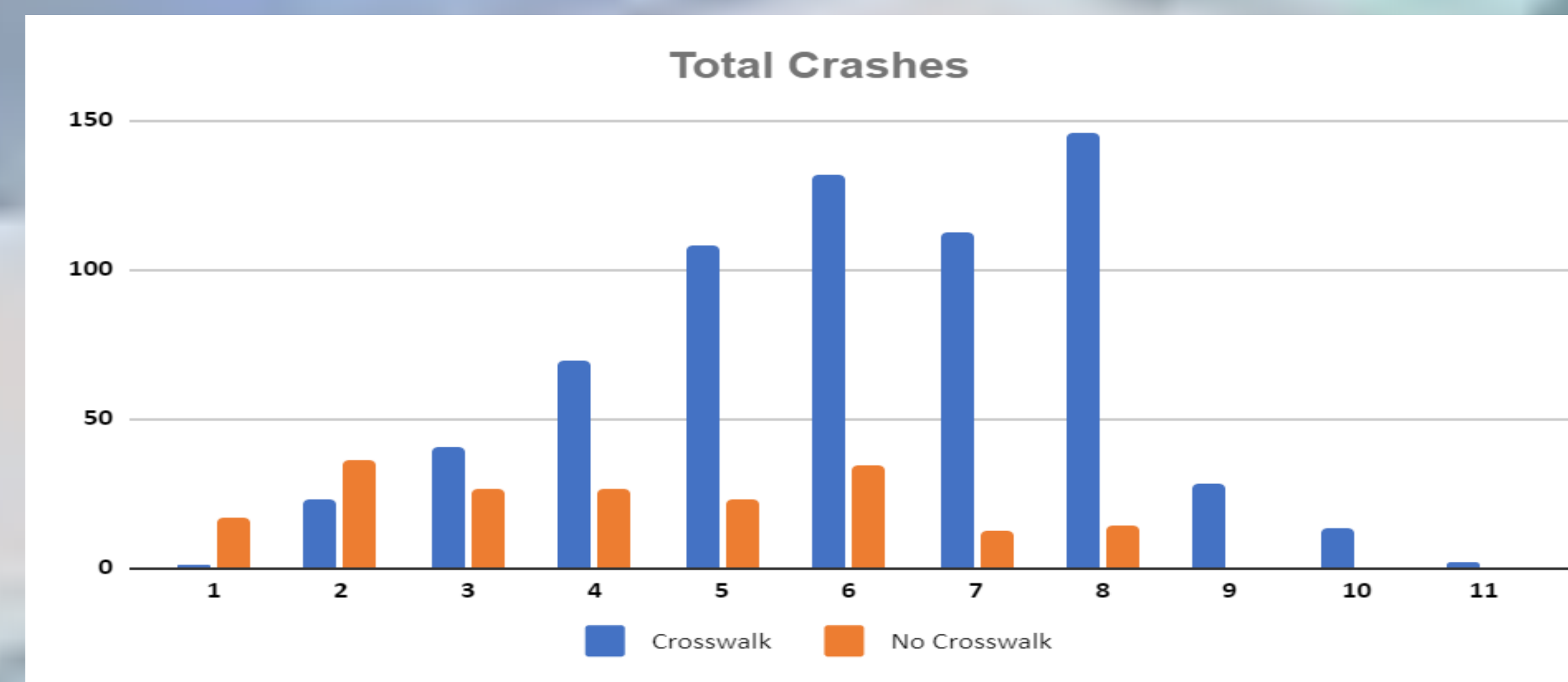
According to NHTSA data, in 2019 most pedestrian traffic deaths occurred in urban settings (82%), on the open road (73%) versus intersections (26%)



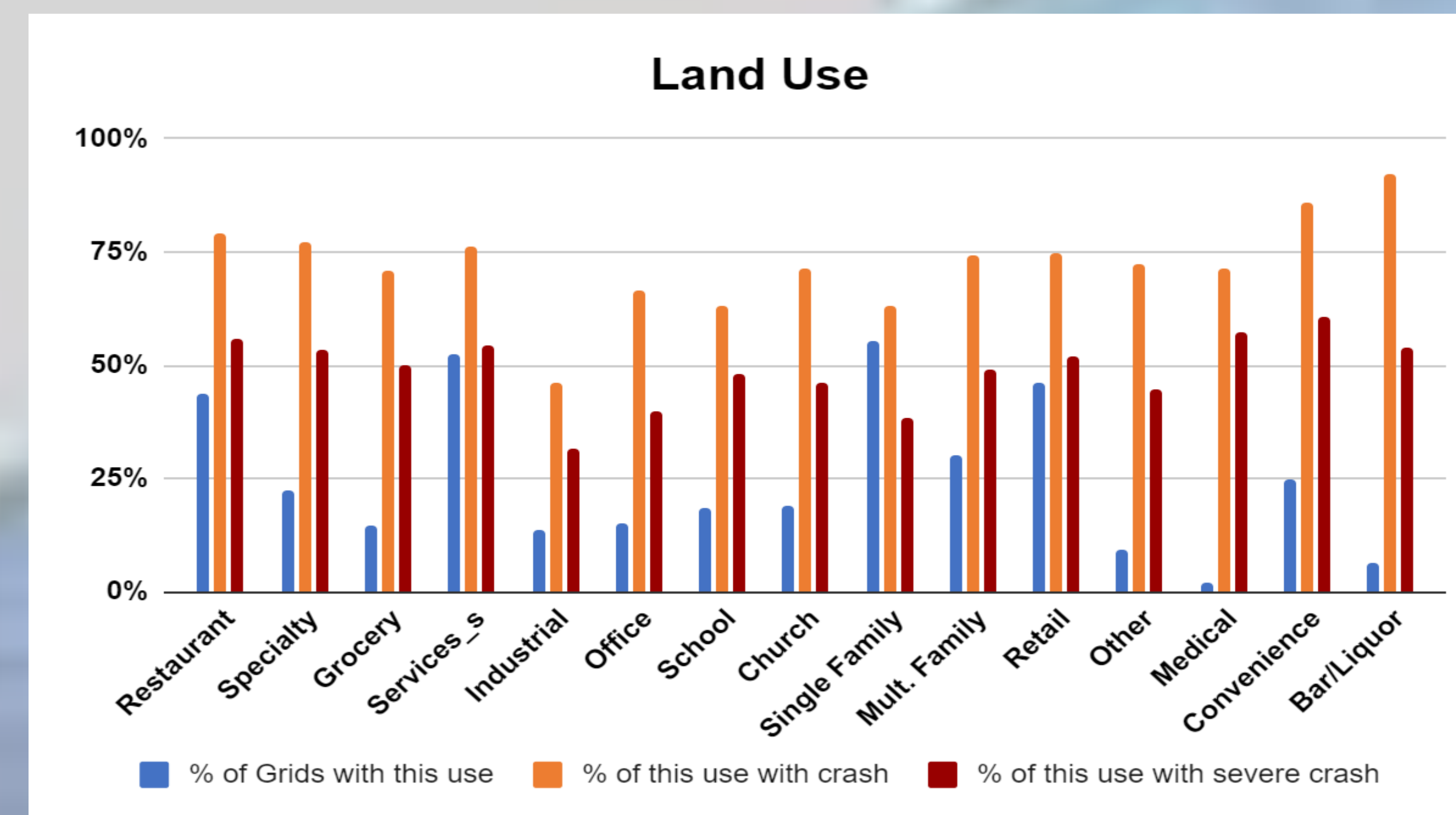
Methodology

- Acquired GIS crash Data from Phoenix Transportation Department
- Selected roadways with high Occurrences of Pedestrian Crashes
- Established 13 Categories of Land uses: Restaurant, Specialty Restaurant, Bar/Liquor Stores, Grocery, Convenience Stores, Services, Industrial, Office, Church, School, Single Family Residential, Multi Family Residential, Non- Grocery Retail, and Other for any uses that do not fit in the previous categories.
- Used Google Streetview to investigate each corridor block by block
- Employed GIS to create layer of shapes that contained crosswalk and land use data.
- Created a series of 1000x1000 ft single column grids over each corridor
- Utilized Spatial Joins in QGIS to combine crash, land use, and sidewalk data into each grid.
- Resultant data is then examined for patterns

Data



Crosswalks in the sample area showing strong correlation to high occurrence of pedestrian involved crashes, severe or otherwise.

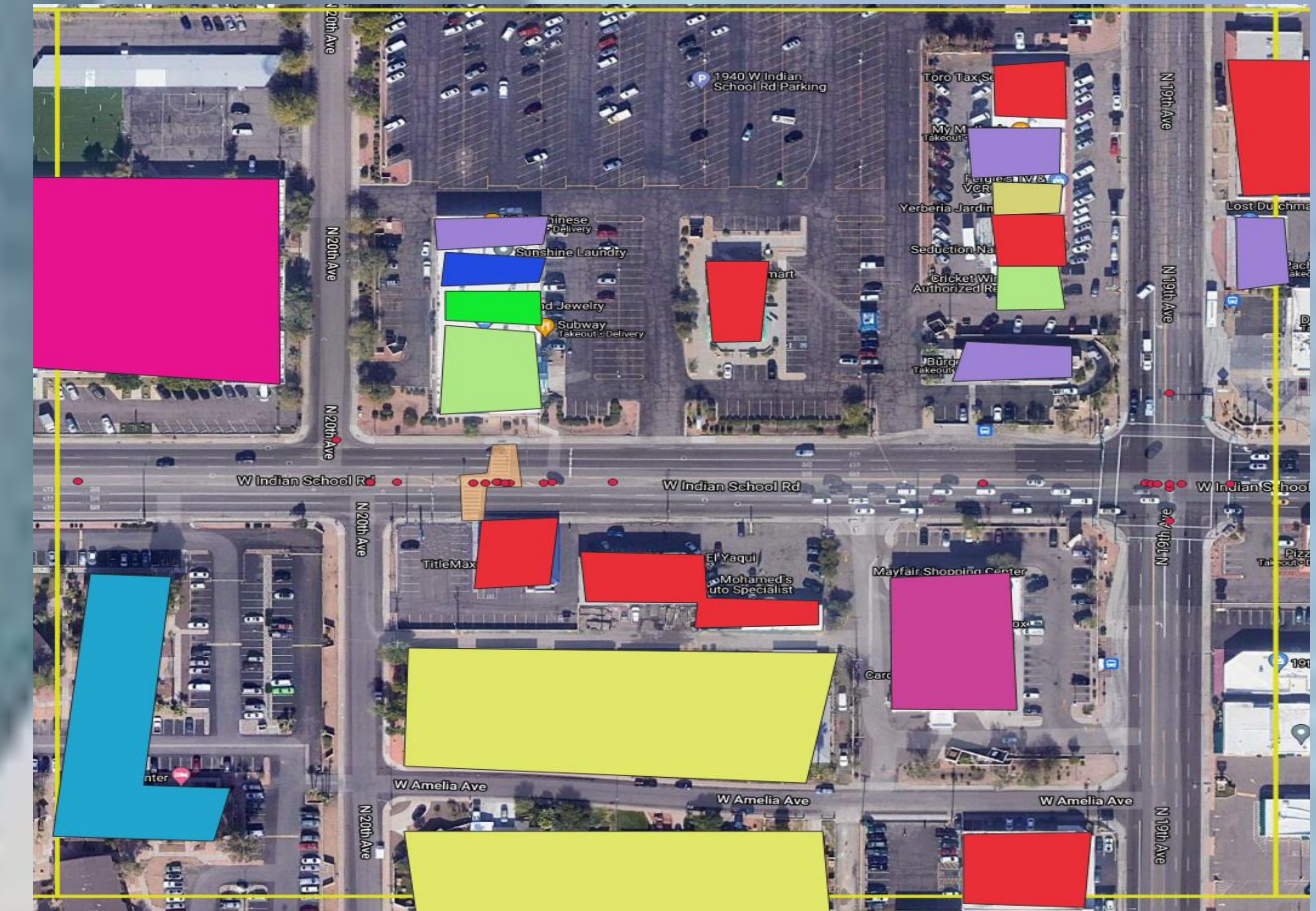


Land Uses with Highest probability of at least one crash or SEVERE crash nearby: Bar/Liquor, Convenience, Restaurant, Specialty, Services

All uses besides services are potential alcohol vendors

Bar/Liquor use appears in only 7% of the cells analyzed, yet crashes were found in 91% of the cells possessing it, while severe crashes were found in 54%.

Case Study



Grid located just west of intersection at 18th Ave. and Indian School Road

Highest number of pedestrian crashes in study

10 crashes clustered around Unsignalized mid-block crossing in addition to more common intersection crashes

6 Lanes of Traffic

A mixture of 7 different land uses identified: including 4/5 of the Land Uses with highest chance to be found near a crash

Conclusions/Next Step

The wide disparity found between expected results and actual results regarding frequency of crashes within crosswalks is noteworthy and bears further examination.

Possible factors include length of crosswalk, the speed of traffic, visibility, and the need for signalized crosswalk.

The linkages found in vendors of alcohol and crashes may warrant the review of pedestrian infrastructure during the process of awarding liquor licensing.

Due to the scope of data being handled, additional insights can be gained through refinement of techniques and integration of additional analysis methods