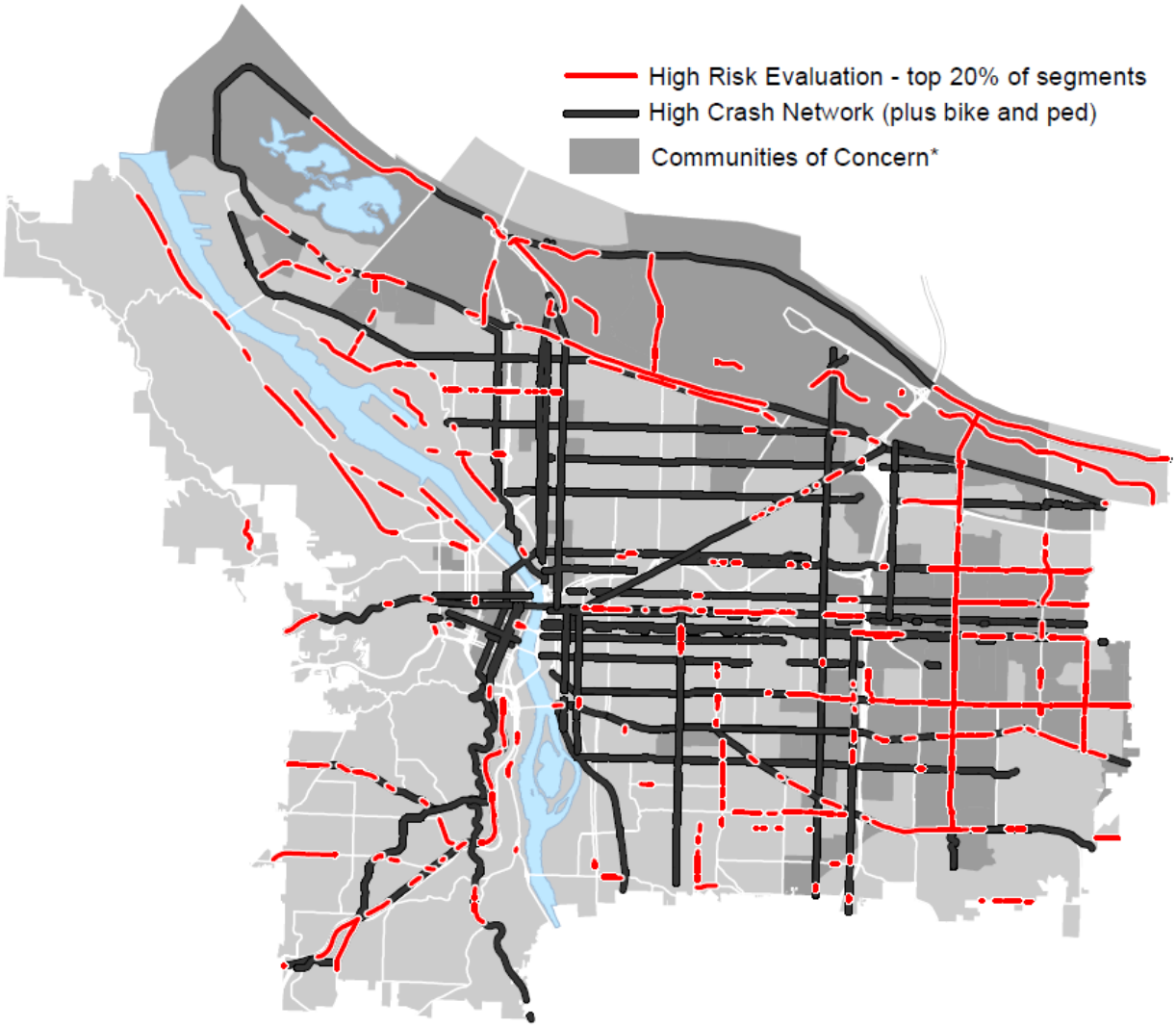
DKS Risk Analysis for PBOT Vision Zero project, by Ben Chaney. January 2016.



* Communities of Concern data from TriMet Equity Index.
Considers census blockgroups with high percentage of people of color, low-income households, low vehicle access, limited english proficiency, people with disabilities, older adults and youth. Also incorporates access to jobs, housing, and services.

Part 1: Data Setup

I used PBOT's "Location Hierarchy" database to assign all bike or pedestrian crashes from the last 10 years to a road segment. Segments generally are divided at every intersection.

Each segment has four crash values: bike crash frequency, bike crashes per centerline mile, ped crash frequency, and ped crashes per centerline mile. Note, "crashes per centerline mile" is the crash density on the individual segment.

Crashes occurring at intersections were fractionally distributed to every adjoining segment.

Segments were then all profiled using data on potential risk factors including: (bold = carried forward)

- Number of intersections per mile (ie, intersection density)
- **Number of traffic signals or signalized ped crossings per mile**
- The TSP Functional Classifications for Traffic, Bicycle, Pedestrian, and Street Design.
- The Pavement condition (ie, PCI rating)
- **Number of lanes**
- **The speed limit**
- **The bicycle network facility type**
- the number of sidewalks near the segment
- **the average width of sidewalks near the segment**

Note that the data sources all had slightly different geometries and naming conventions, so the general method for joining the risk data to the segments in GIS was to find the midpoint of each segment, then look for the risk data element closest to that point. Since some data sets are incomplete, the nearest join may be a different street far away. The distance between the point and the joined data is included, and can be used as a filter in the analysis. I'm currently using 10 feet as the tolerance for join distance.

We had also wanted to include enhanced midblock crossings, identified using a combination of median data and pavement marking data, but I was unable to get that GIS data to reliably join.

Part 2: Analysis of Risk Factors

In this section, we explore visualizations for each risk factor, to evaluate the relationship between the factor and crash outcomes. Risk factors are shown with the sum of bicycle or pedestrian collisions (all severities) for each category or histogram bin range.
For some risk factors, the crash density distribution is shown. This is the number of crashes per mile for each segment. For categorical risk factors, box and whisker plots show the distribution of crash density for each category. For continuous risk factors, a scatterplot and smoothed line is included.

Analysis only includes segments of Traffic Functional Classification "Neighborhood Collector" or higher. Note that segments with zero observed target crashes were not included in the summary graphics, as an attempt to make any patterns more visible.

Where appropriate, each section mentions results of risk factor scoring criteria from ODOT's Pedestrian and Bicycle Safety Implementation Plan. One element of the ODOT scoring criteria to consider is the inclusion of historical crash frequency as a risk factor. In the ODOT implementation, points are awarded for presence of severe injuries or fatalities, with additional points for each additional injury/fatality. Historical crash frequency was not included in the risk factor analysis, since it would always show perfect correlation. However, it may be valuable to include in the final framework.

Final Scoring Methodology

Signal Density

2 points for 0 signals per mile.
1 point for 5 or more signals per mile.

Number of Lanes

2 points for 4 of more lanes.

Speed Limit

1 point for 30 mph
2 points for 35 mph
3 points for 40+ mph

Bike Network

2 points for Separated In-Roadway facilities
1 point for local service Bikeways

Sidewalks

1 point for average width less than 6 feet.
2 points for average width less than 2 feet.

Sum the individual risk factor scores

Sum the individual scores, excluding NA scores.ie, NA are treated like 0. Locations with missing data will be lower risk. This scoring scheme would tend to result in higher scores for locations with better data quality. ie, locations are suppressed from the high-risk list if there is low data.