

Bicycling as a mode of transportation is becoming a popular mode sustainable mode of transportation. Although it is a very safe mode of transportation, altercations between bicyclists and cars can be life threatening. In the years 2000-2005, bike/car crashes injured an average of 175 people and killed 2 people per year in the city of Portland. As more people choose bicycling as a mode of transportation, the number of accidents will also rise. In an effort to increase the overall safety for bicycle commuters, our hope is that an analysis of the "hotspots" of high risk areas can call attention areas in need of improved safety and the factors that increase safety on the roads.

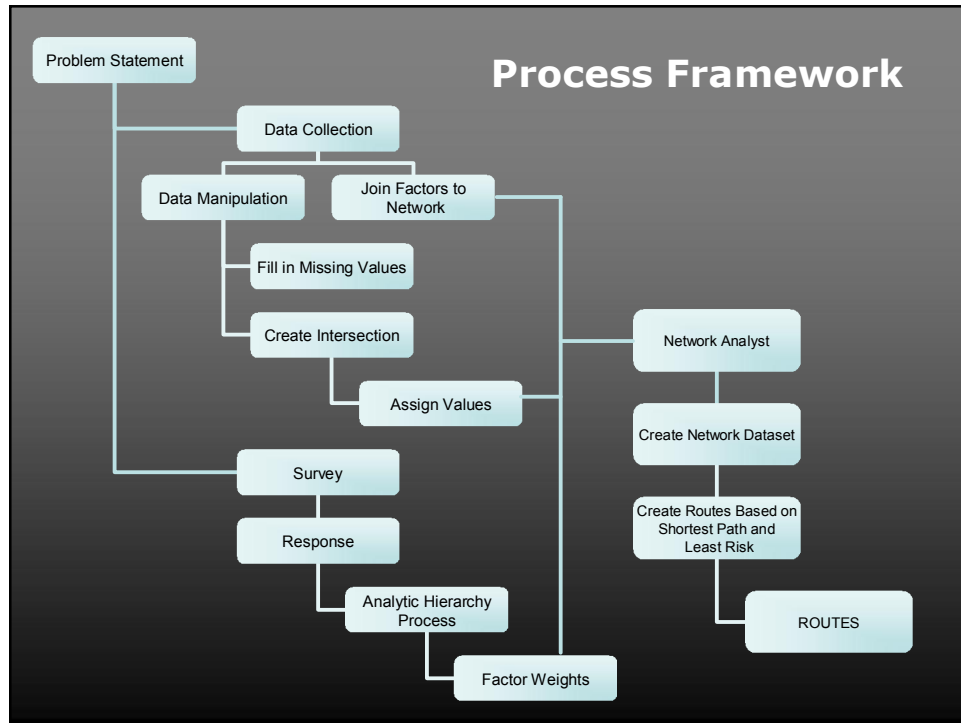
Problem Statement

Identify Safe Routes for Bicyclists
in Portland: A Comparison
Between the Shortest Routes
and the Safest Routes Based on
MCE of Bicycle Road Hazards



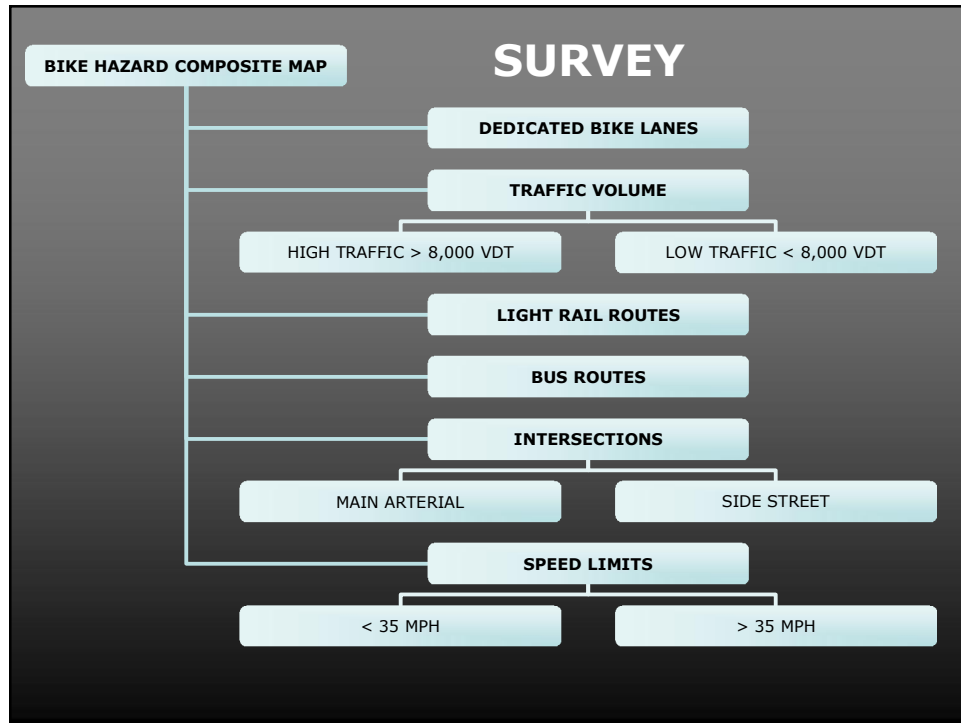
Data Sources

- RLIS 2007 Street Network
- RLIS 2007 Bike Network
- RLIS 2007 Portland Boundary
- PDOT 2007 Car/Bike Crash Data
- PDOT 2007 Traffic Volume
- BTA Survey
- Oregon Transportation Research and Education Consortium



Factors Expected to Increase Risk

- High Traffic Streets
- Proximity to Intersections
- High Posted Speed Limits
- Lack of Dedicated Bike Lanes / Boulevards
- Areas Where Bike Lanes End in Shared Roadway
- Streetcar / MAX Tracks
- Pavement Quality



Survey Results

<i>Survey Questions</i>	<i>Pairwise Code</i>	<i>Mean Response</i>
Dedicated bike lanes	A	3
Side streets (Low traffic volumes)	B	3
Main arterial (High traffic volumes)	C	7
Streets shared with buses	D	6.33
Streets shared with rail (Max/Streetcar)	E	8.67
Intersections with main arterials	F	9.33
Intersections with side streets	G	6
Streets w/ high posted speed limits (>35 mph)	H	8.67
Streets w/ low posted speed limits (<35 mph)	I	3

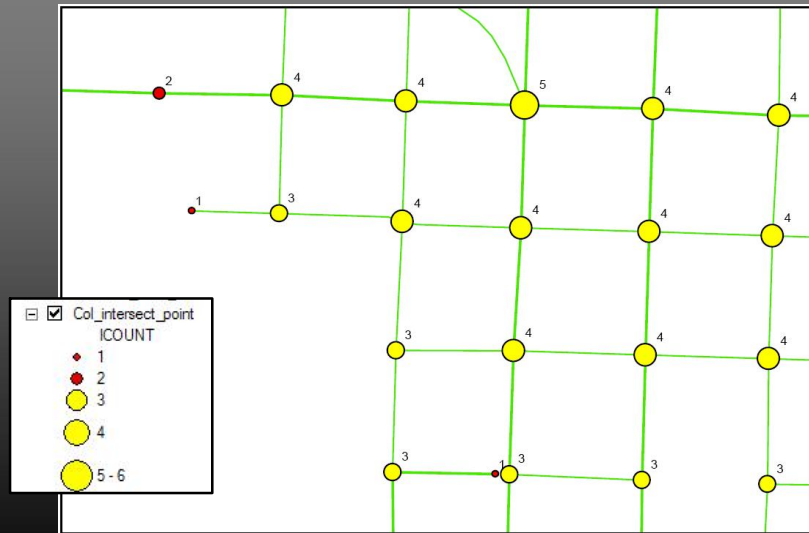
Analytic Hierarchy Process

	A	B	C	D	E	F	G	H	I	MEAN	WEIGHT
A	1	1/3	1/9	1/7	1/7	1/9	1/5	1/9	1/3	0.204376	0.01158
B	5	1	9	7	7	9	3	1/7	3	3.087763	0.17498
C	9	9	1	5	5	3	9	5	9	5.129928	0.29071
D	9	9	1/5	1	1	1/5	1/3	1/5	5	1.008588	0.05716
E	9	9	1/5	1	1	1/5	1/3	1/5	5	1.008588	0.05716
F	9	9	5	3	3	1	3	3	5	3.796946	0.21517
G	5	3	1/5	1/3	1/3	1/5	1	1/5	3	0.699316	0.03963
H	9	7	1/3	3	3	1/3	3	1	9	2.285426	0.12951
I	3	3	1/9	1/3	1/3	1/9	1/3	1/9	1	0.425506	0.02411
SUM TOTALS										17.64644	1

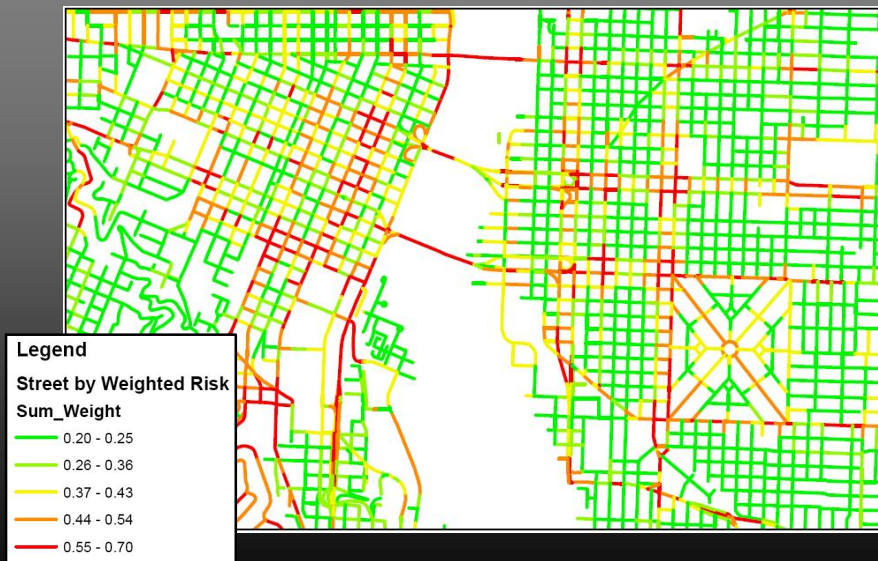
Methodology

- Clip METRO Street Layer and Bicycle Route Layers to Portland Boundary
- Separate Layers for Street, Arterial, Bus Lines, Rail, Bike Routes
- Dissolve Street Layer, Convert to ArcInfo Coverage, Vertices to Points, Collect Event to Classify Intersection, Near Tool
- Interpolate Missing Values in Network
- Analytical Hierarchy Process
- Join Weights and Factors to Network
- Network Analyst

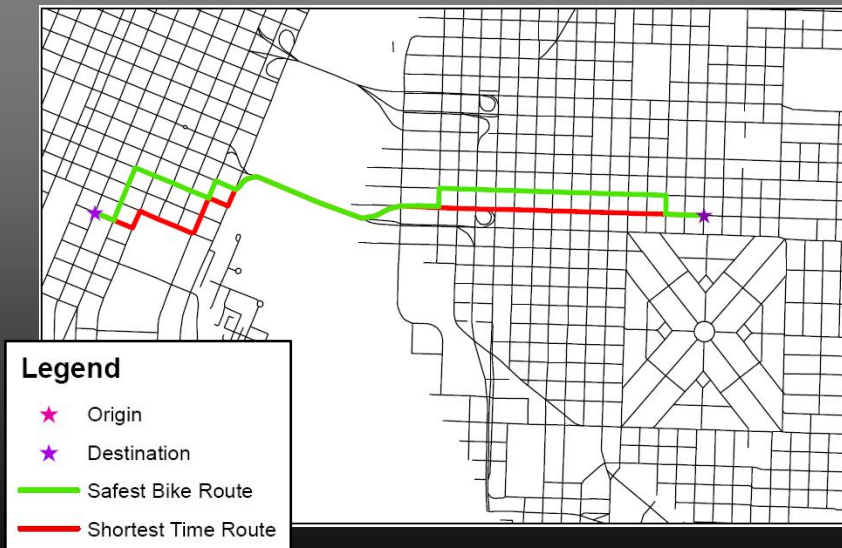
Intersection Analysis



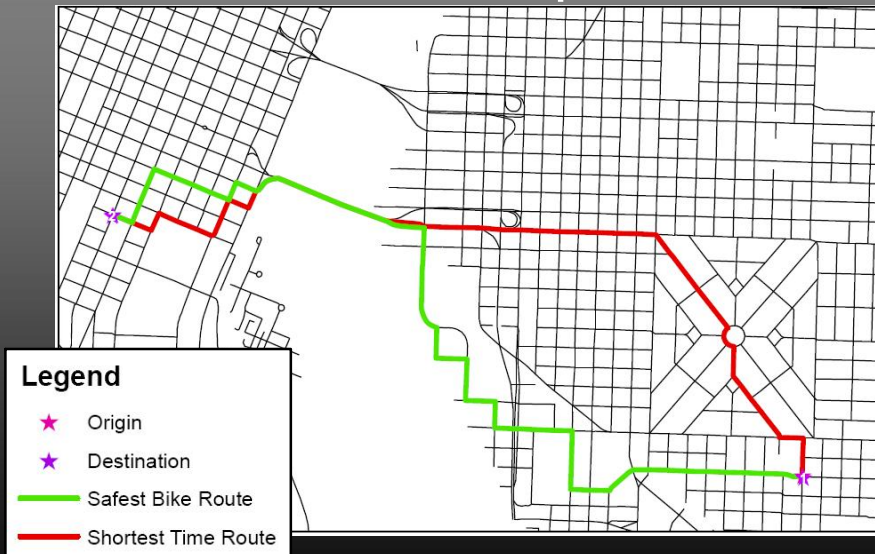
Network Map



Route Example 1



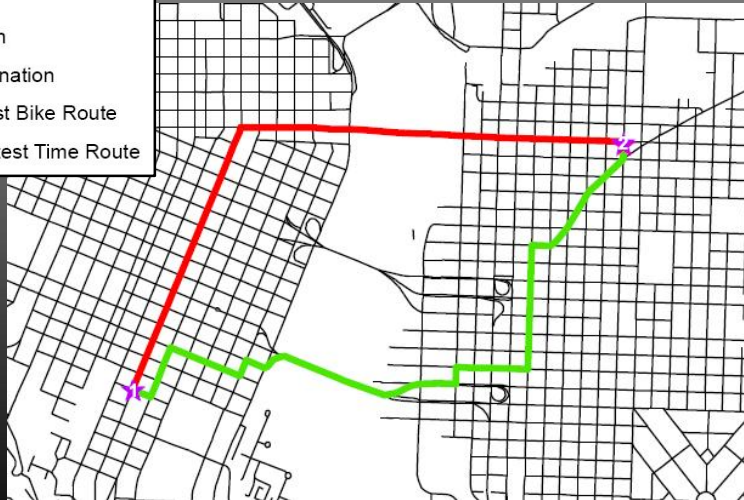
Route Example 2



Route Example 3

Legend

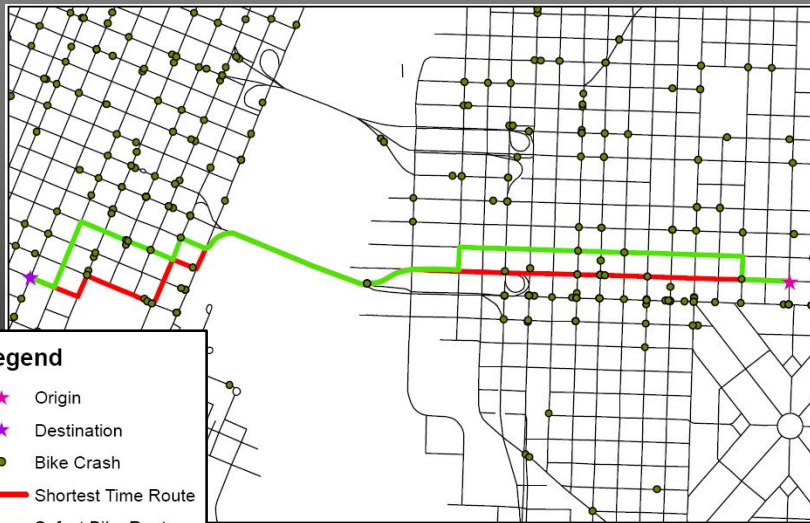
- ★ Origin
- ★ Destination
- Safest Bike Route
- Shortest Time Route



Route 1 With Crash Points

Legend

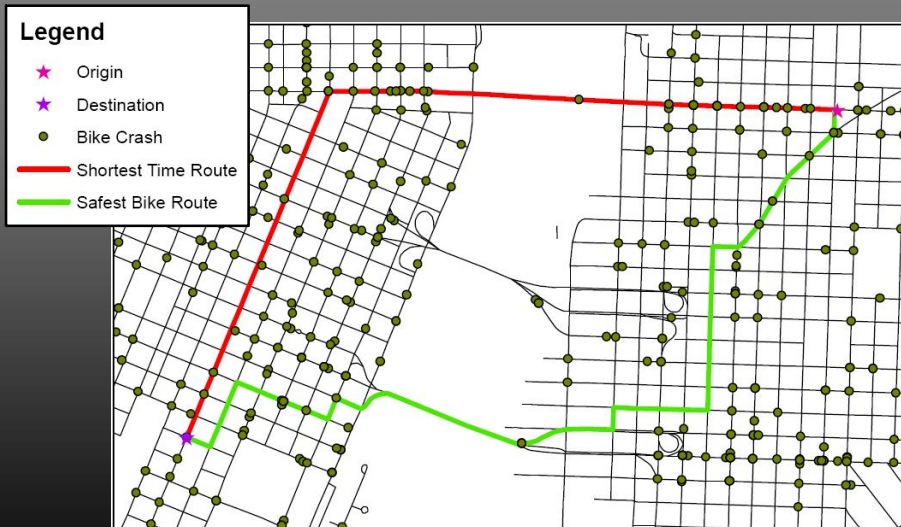
- ★ Origin
- ★ Destination
- Bike Crash
- Shortest Time Route
- Safest Bike Route



Route 2 With Crash Points



Route 3 With Crash Points



Limitations With the Data

- Missing Values for Traffic Volume / Speed Limits on Some Street Segments
- Negative Correlation with High-Speed Roads
- Study Timeframe
- New Infrastructure
- Take into account street directionality



Potential Applications

- Interactive Maps for Bicycle Riders
- Identification of Hazardous Bike Streets for Safety Improvements
- Integration with BTA's 'Safe Routes to School'



QUESTIONS?

