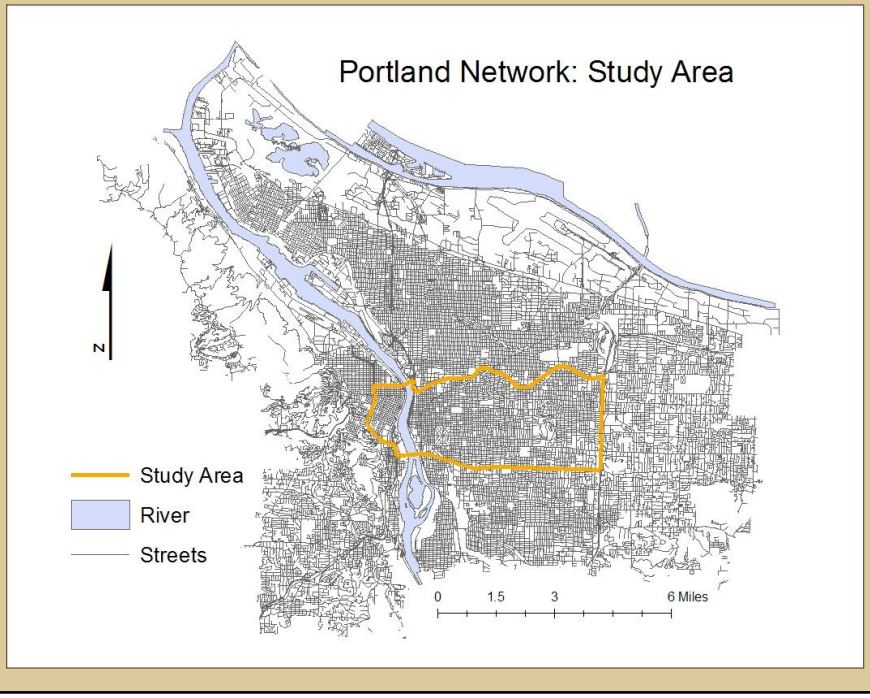
Introduction

- In the last three months there have been 21 bicycle collisions reported to Bike Portland.org and 33 close calls
- Portland is 6th in the nation for biking cities
- The number of bicyclist in Portland will continue to grow in the coming years

Project Information

- Our goal was to create the safest routes as possible, ideally for recreation rides. For commuting rides bikers often make a trade off between safety and distance (OTREC 2008)
- Our Study area is West of 205, South of I-84, East of 405 and North of Powell



Factors

- Street type
- Difficult intersections
- Roads that parallel Max and Streetcar lines
- Direction of street

Layers

- RLIS: Streets, bike routes, river, city boundary, max and streetcar lines
- Created: Locations, dangerous intersections form PDOT information

Network Geodatabase

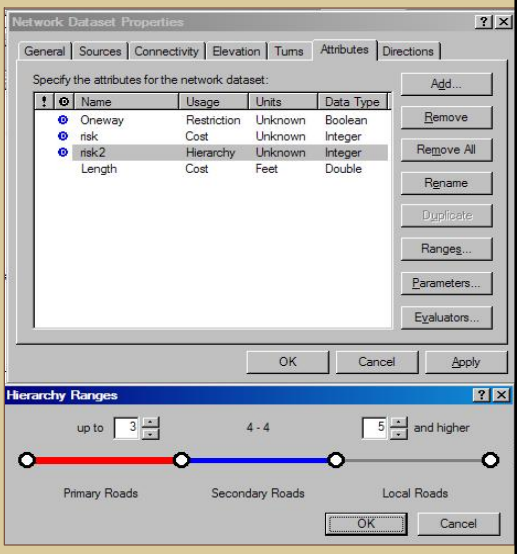
- ArcMap and ArcCatalog both have an extension known as “Network Analyst”
- Finds the shortest route which takes the user’s specifications into account
- Designed to work specifically with street maps.
- Must be built in ArcCatalog

Creating the Network

- Specify attributes
- Assign risk as cost
- Hierarchy Risk

Network Properties

- Set Usage, Units, Data and Type
- Select Restriction
  - One-way streets
- Select Cost
  - Risk
  - Length
- Select Usage
  - Hierarchy



Network Analysis

- Three main components
  - Route
    - User creates route by specifying starting and ending points
  - Stops
    - User specifies points the route must cover
  - Barrier
    - User specifies points the route must avoid

Bike Route Layer

- Metro has a "bikemode" and a risk value to each street type

Street Type

- Multi-Use path
  - Separated from motor vehicle traffic; used by only bicyclists, pedestrians etc.
- Bike Lane
  - Designated as a bicycle lane; one way traffic only
- Low traffic through street
  - <3,000 vehicles, <25 mph speed limit

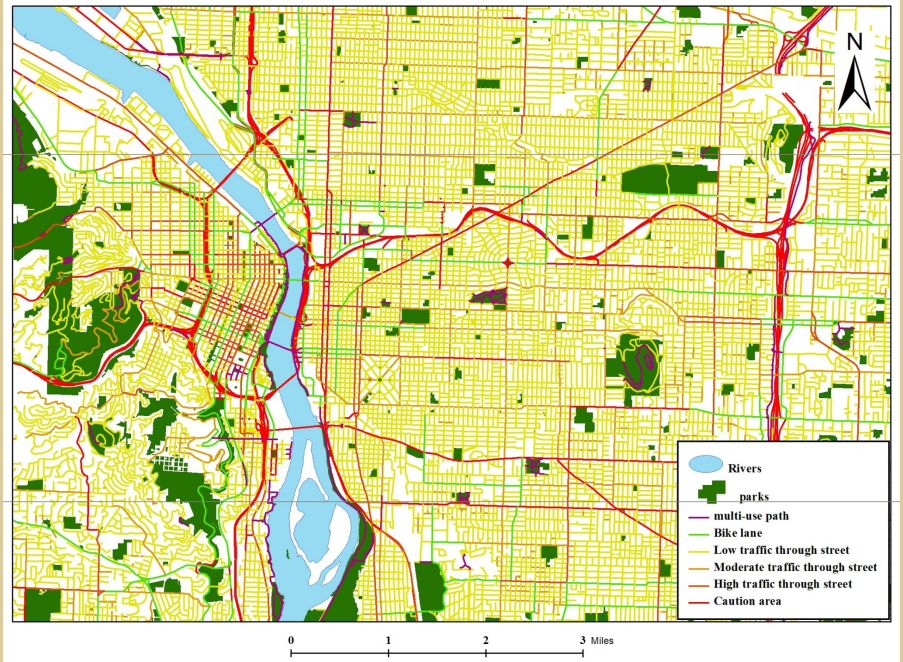
Street Type

- Moderate traffic through street
  - Between 3,000 and 10,000 vehicles per day
  - Speed limit about 35 mph
- High traffic through streets
  - >10,000 cars per day
  - Speed limit> 35mph
- Caution Area
  - Sharp curves, high traffic volumes, narrow lanes etc.

Street Type

- Assign a risk value to each street type
- The risk range is 1-6. With 1 being the safest to 6 the most dangerous.
  - Highways are at a risk level of 6
  - Local streets are at a risk level of 3

Type	Risk	Street classification.
1110	6	Freeway
1120	6	Ramps; interchanges & feeders
1121-1123	6	On- and off-ramps
1200	6	Highway
1221-1223	6	On/Off ramps to highway
1300	5	Primary arterial
1400	4	Secondary arterial
1450	4	Other arterial
1500	3	Minor streets
1521	3	Local street to local street connector
5101	6	Freeway with rapid transit
5201	6	Highway with rapid transit
5301	6	Primary arterial with rapid transit
5401	5	Secondary with rapid transit
5500	5	Minor with railroad
5501	5	Minor with rapid transit

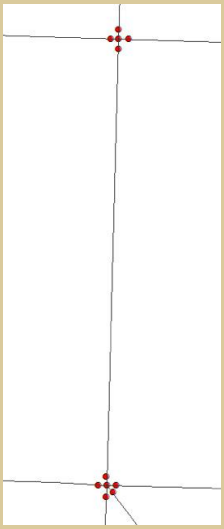


One-way streets

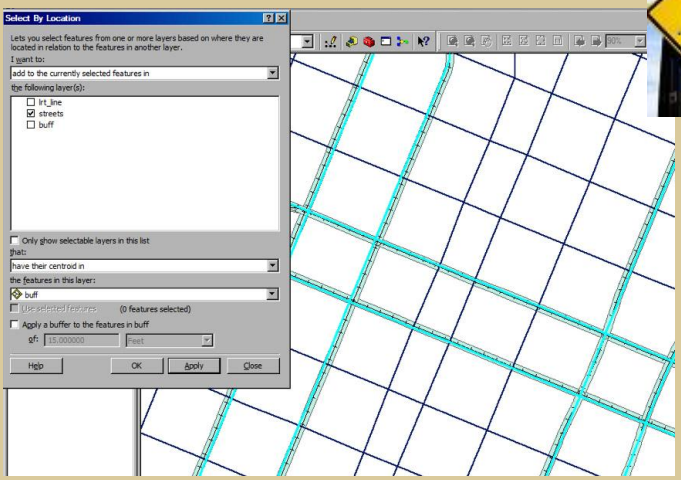
- Flipped the direction of streets and bike route segments with the wrong direction
- Created new text field “oneway”
- Selected all one-way segments and assigned “F” to them
- Now when creating the network all streets with F will only allow traffic from origin to end direction

Difficult Intersections

- PDOT has maps available identifying difficult intersections
- We created point features to represent each dangerous intersection
- These points were then used as barriers in the network
- They have a risk value of 6



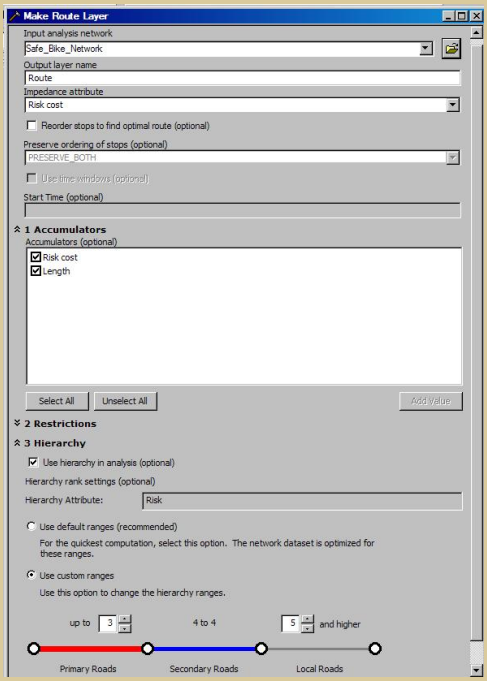
Parallel Max/ Streetcar Roads



- Selected parallel roads by select by location
- Raised the risk value of parallel roads to a 5 if not already at a level 5 or higher

Creating Routes with Network Analysis

- Use ArcToolbox to Create a new Route Layer
- We used our bike safety network for the input analysis
- Selected impedance attribute
  - Risk
  - Length



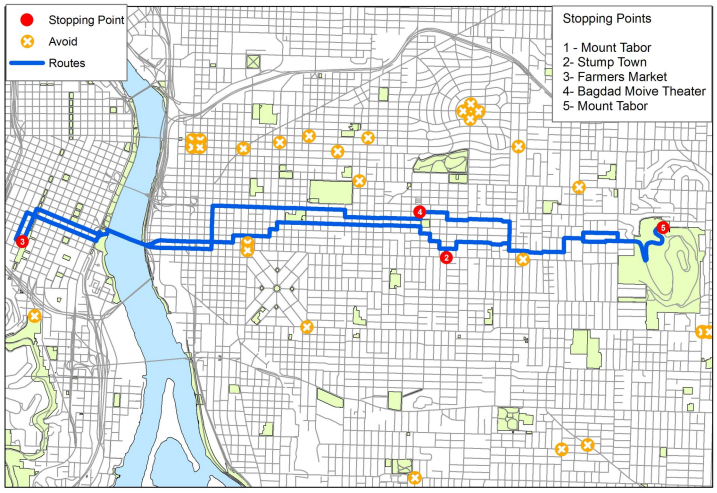
Create Routes

- Add location points
- Add Barriers
- Solve Route

Locations

- Laurelhurst Park
- McMenamins Bagdad Theater
- Mt Tabor Park
- Stumptown Coffee
- Ankeny Square Saturday Market
- PSU Farmers Market

Safest Route 1



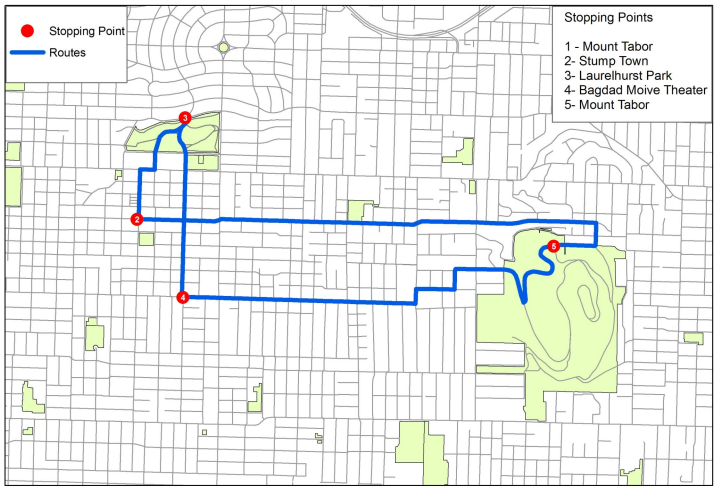
N

0 0.5 1 2 Miles

Total

Risk = 511.94
Miles = 11.38
Risk per mile is 44.96

Shortest Route 2



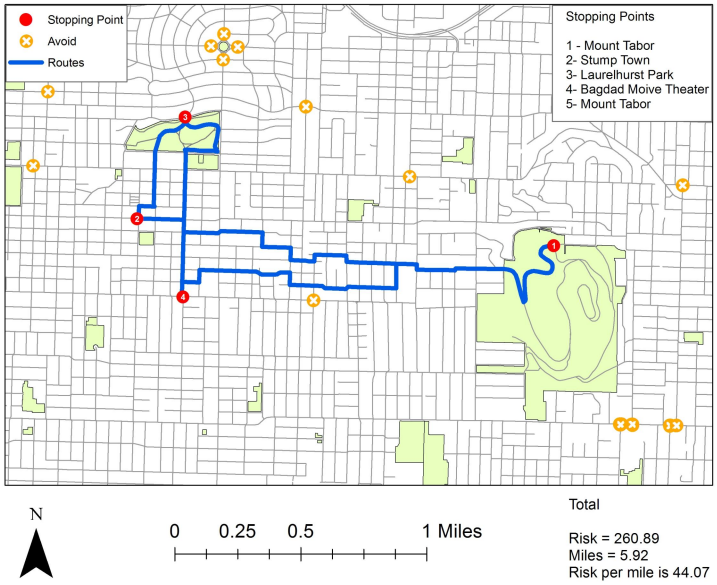
N

0 0.25 0.5 1 Miles

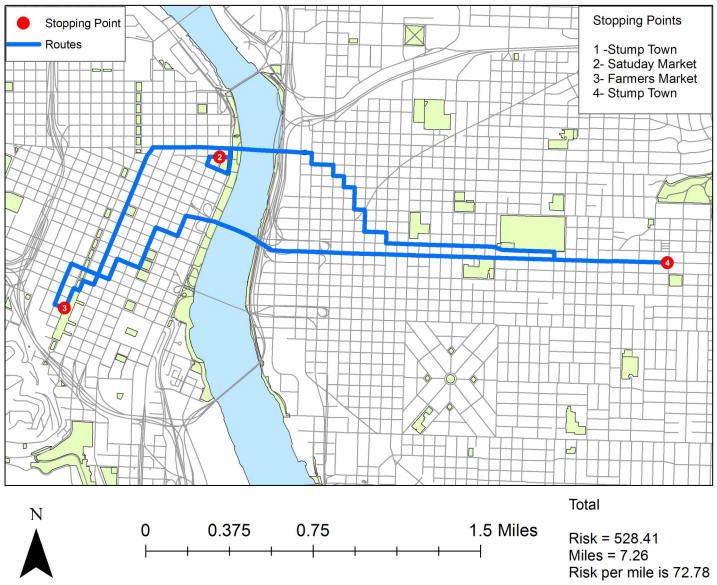
Total

Risk = 337.57
Miles = 5.32
Risk per mile is 63.45

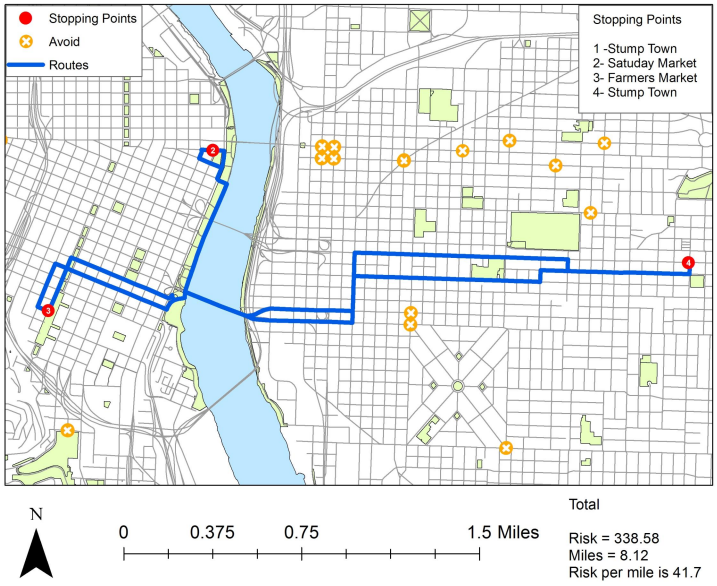
Safest Route 2



Shortest Route 3



Safest Route 3



How Much Safer Per Mile?

Route	Shortest	Safest	Difference	X safer
1	63.45	44.96	18.49	1.41
2	63.45	44.07	19.31	1.44
3	72.78	41.7	30.98	1.75
Total	199.68	130.73	68.78	1.55

Units are in Risk Per Mile

On average our safe routes were 1.55 x safer than the shortest routes

Conclusions

- We were able to crate safer routes
- Distance is sacrificed for safety
- Our Routes differed from ByCycle.org's because we took in additional factors into account.
- Our route can create complex directions
- For further study: We would expand the network, take crash data into account

References

- Geoffrey Duh
- ByCycle.org
- 'Bike there" map
- ArcHelp Desktop
- BikePortland.org
- Americasbestonline.net
- Dill, J., & Gliebe, J. (2008). *Understanding and measuring bicycling behavior: A focus on travel time and route choice* (OTREC-RR-08-03). Portland, OR: Oregon Transportation Research and Education Consortium Final Report.

Questions?