BICYCLE INFRASTRUCTURE RECOMMENDATIONS

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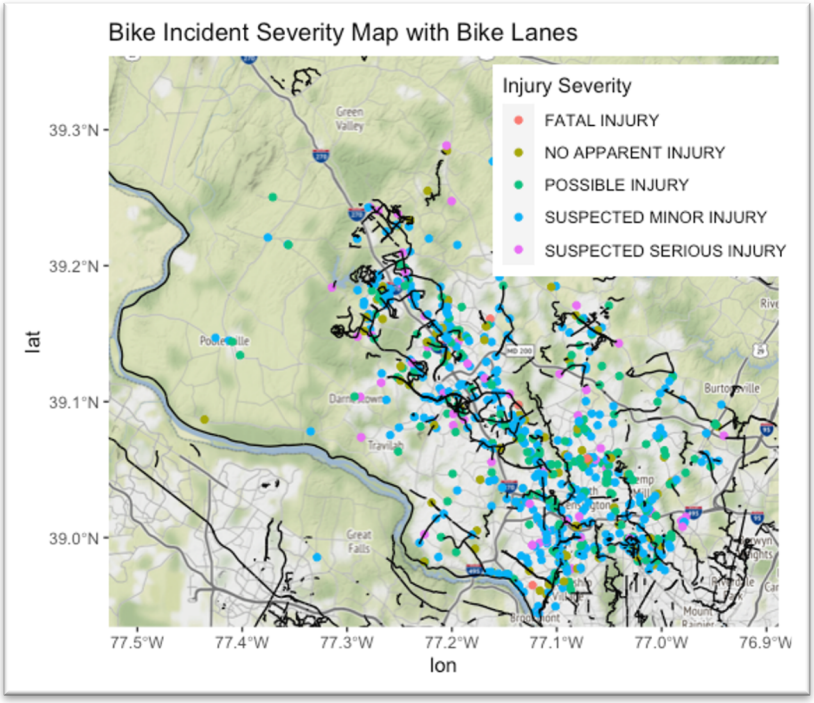
DATA 205 – SPRING 2021

OBJECTIVES

The goal of this project is to provide a list of suggestions for the highest impact roads or road segments to install new bike lanes in Montgomery County, MD. Bike lanes have been shown to reduce the rate of accidents - even those not involving a bicyclist - along arterial roadways (Marshall, 2019).

Montgomery County has already developed a comprehensive Bicycle Master Plan (Montgomery County, MD, 2018) that categorizes every road in the county by the Level of Traffic Stress (LTS), a metric that quantifies how stressful a street is to bicyclists sharing the road (Mekuria et al, 2012). The Bicycle Master Plan recommends types and locations of new bicycle infrastructure, such as trails or breezeways, separated bike lanes, or painted bike lanes. The plan identifies broad priority tiers based on a model of bicycle demand.

This report aims to refine the priorities for most impactful new bike infrastructure by incorporating Non-Motorist Collision data from dataMontgomery to identify streets or intersections that have had the highest number of reported bicyclist incidents. Providing additional infrastructure allowing bicyclists to use these streets in safer conditions, or providing an alternative route such as a breezeway, could move the county closer to achieving the Vision Zero goal of eliminating traffic fatalities and serious injuries.



DATA SOURCES

CRASH REPORTING - NON-MOTORISTS DATA

Bicyclist incident and injury information was drawn from the dataMontgomery database Crash Reporting - Non-Motorists Data database. Incidents that did not occur on a street, e.g. incidents in parking lots, were excluded. Key data from this database includes the location of each incident, street and cross street, and injury severity.

This report assumes that for every bicyclist-involved incident reported to the police, there are a number of minor incidents and near-misses that go unreported.

STREET DATA - OPENSTREETMAP

OpenStreetMap data was used to find road characteristics, such as the presence or absence of a bike lane, to calculate street lengths and characteristics, and to provide map tiles for graphical representations.

BICYCLE MASTER PLAN

The Bicycle Master Plan includes a comprehensive look at the characteristics of Montgomery County Roads. For this analysis, the key data element was a Revised Level of Traffic Stress developed for the Montgomery County Bicycle Master Plan to provide additional granularity. The locations from the non-motorists incidents data were combined with this data to find the Revised LTS of the street segment where each incident occurred.

RESULTS

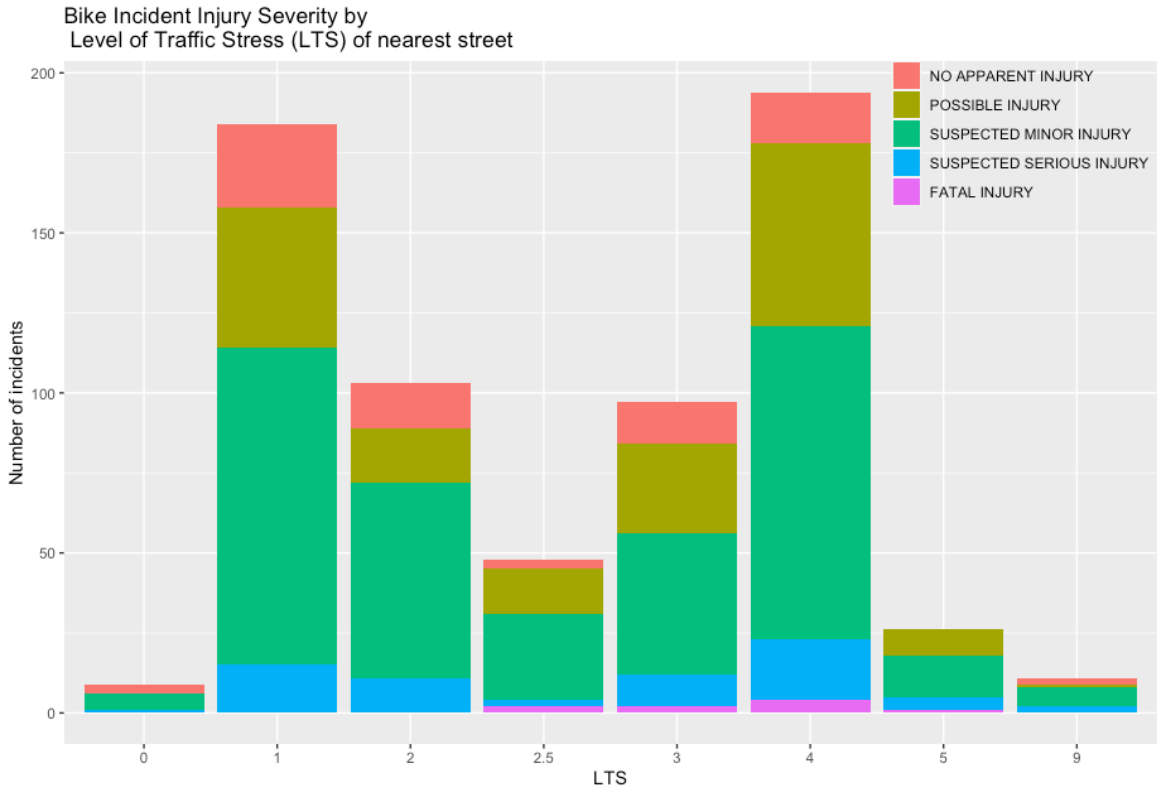
INCIDENT CORRELATIONS

A statistical analysis found a correlation between LTS and Injury Severity among bicyclist incidents. Notably, no fatal injuries occurred on roads with a LTS of 2 or lower. Injury Severity is also correlated with the road speed limit, which is a component of the LTS calculation. No correlation was found for Injury Severity when examining weather, road conditions, daylight, or road slope.

This affirms that reducing the LTS of roads or diverting bicyclists to lower LTS routes will likely reduce both the rate and severity of bicyclist injuries.

The chart below shows the distribution of injury severity by the LTS of the road where the incident occurred; this shows that more injuries occur on LTS 4 – High streets than any other

LTS level, including 1 – Very Low. It is commonly assumed that fewer people will ride their bikes on a LTS 4 street than an LTS 1 street. Given the similar rate of incidents with the assumed substantial difference in bicycle traffic, it can be assumed that LTS 4 streets are simply that much more dangerous than smaller residential streets. However, without actual bicycle traffic data to normalize the incident rate, that cannot be known for certain.



INCIDENT HOTSPOTS

The incidents map was overlayed on the LTS street map and visually scanned for hotspots, or areas where many incidents occurred along a street segment or at an intersection. One example of such a hotspot is the downtown Bethesda area, an area that has a high density of incidents particularly along Old Georgetown Road, pictured at right.

Other potential hotspots are:

- Georgia Ave between Ralph Rd and Heathfield Rd, particularly around the entrance to the Home Depot and the Aspen Manor shopping area
- Downtown Silver Spring Area

- Little Falls Parkway, where the Capital Crescent Trail Crosses
- University Blvd – area near Colesville Rd

INCIDENTS PER MILE

An incidents-per-mile rate was calculated for each street where an incident has occurred in the analysis timeframe. Streets with 2 or fewer incidents were excluded. The streets with the highest incident rates are listed in the table to the right.

Surprisingly, none of these are major streets such as Georgia Ave or Rockville Pike, which presumably attract fewer riders due to the more challenging conditions and have their many incidents averaged out over many miles of roadway. Excluding Little Falls Parkway (7 of the 8 recorded incidents happened at the Capital Crescent Trail crossing), these four roads represent short but vital connections:

Road Name	# Reported Incidents	Road Length (miles)	Incidents per mile
DORSET AVENUE	7	1.25	5.59
STEDWICK ROAD	5	1.50	3.33
FENTON STREET	4	1.25	3.21
LITTLE FALLS PARKWAY	8	2.50	3.20
ARDENNES AVENUE	3	0.95	3.16

- Dorset Ave connects Wisconsin Ave and River Rd
- Stedwick Rd loops through Montgomery Village, including two schools and a community center
- Fenton St cuts through the core of downtown Silver Spring
- Ardennes Ave connects Veirs Mill Rd to Twinbrook Pkwy

These relatively short segments of road could be prioritized for quick addition of signage, painted bike lanes, or other lower cost solutions, while more permanent solutions such as separated bike lanes or off-road trails are considered.

However, each situation must be considered in detail, examining factors such as suitability of various interventions, the frequency and severity of incidents, existing and planned infrastructure, and changes made to the road or road segment during the period being examined.

CASE STUDIES

LITTLE FALLS PKWY

Little Falls Parkway was identified as a high-incident street by both analysis methods. The incidents cluster around where the Capital Crescent Trail crosses Little Falls Parkway. While it appears as a dangerous hotspot on the map, there have been only 2 incidents at that location since temporary measures were implemented in 2017 compared to 5 in the two-year period prior to installation. These temporary interventions include additional signage and the reduction of Little Falls Pkwy to two traffic lanes at the point of the crossing. A permanent intervention was the addition of a speed table, an elongated speed bump with the trail crosswalk along the top. Since construction was finished in November 2020, no new incidents have been reported.

This clearly illustrates the effectiveness of both the temporary and permanent measures to improve the safety of the crossing at Little Falls Parkway. At this point, it appears that no futher improvements are neccesary.

OLD GEORGETOWN RD

There is a high number of incidents on the stretch of Old Georgetown Road from I-495 to Wisconsin Ave. Following a fatal collision in 2019, a separated bike lane has been added between the Beltway and Cedar lane (Pascale, 2020), and since then no new collisions have occurred along that stretch of road. However, the next segment of Old Georgetown Road, from Cedar Rd to Wisconsin Ave, has seen three new incidents in the last year, and is clearly still a hazardous road for bicyclists.

Extending the new bike lane to Wisconsin Ave could improve the safety for the rest of the road before another fatal accident occurs.

GEORGIA AVE (RALPH RD TO HEATHFIELD RD)

Another cluster of incidents is centered on the entrance to the Home Depot in Aspen Hill, along Georgia Ave. This intersection can be challenging even for a motorist, and has no bicycle infrastructure to speak of.

Likewise, just a few blocks away is the Aspen Manor shopping center, which has a similar cluster of incidents along Georgia Ave. It is reasonable to assume that both of these incident clusters involve people intending to visit the stores, or crossing the entrances to the parking lots and being hit by drivers visiting the stores.

The Bicycle Master Plan calls for a separated bike lane to be installed along Georgia Ave. In the short term, increased signage could be installed around the parking lot entrances, and the proposed bike lane could be prioritized for construction.

DORSET AVE

Dorset Ave was identified as a street with a high number of incidents per mile of roadway. Dorset Ave connects Wisconsin Ave and River Rd. There is also an entrance to the Capital Crescent Trail. The LTS of most of Dorset Ave is 1 – Very Low, and as a small residential road it should be fairly inviting to bicyclists. The high number of incidents distributed along the length of the road – all of which had no or minor injuries only – and the favorable bicycling conditions suggests that this may be a region where there is a high amount of overall bicycle traffic, and the incidents merely reflect the higher number of bicyclists using the road. However, without data on actual bike traffic, this cannot be confirmed.

The Bicycle Master Plan calls for a painted bicycle lane to be added to Dorset Ave, but given the narrow existing roadway and the low severity of injuries, this should not be among the top prioritized improvements.

FUTURE WORK

EVALUATION OF BICYCLE INTERVENTION EFFECTIVENESS

Having incident data for before and after installation of bicycle infrastructure allows for an evaluation of the effectiveness of the different types of interventions at reducing the number and severity of injuries. While a true randomized controlled trial would be neither possible nor ethical, cases studies like the Little Falls Parkway/Capital Crescent Trail crossing can still provide compelling evidence for the effectiveness of the infrastructure. Evaluators could consider the incidents that occurred along each highlighted segment of road in the context of the existing infrastructure and recent changes. Has bicycle infrastructure been installed in the last few years? If so, has there been a corresponding drop in incidents? From this kind of analysis, the most cost-effective interventions could be identified and prioritized, focused on reducing the number of injuries as quickly as possible, while plans for more expensive infrastructure with lengthy construction periods are made.

BICYCLE TRAFFIC DATA COLLECTION

The Bicycle Master Plan has a detailed model of potential bike route demand, but that model is based on population data and the location of nearby attractions such as libraries, schools, and shopping centers. It lacks data on actual bicycle traffic. If such data exists, it could be incorporated into the model. It could also be used to calculate an incident rate that could help

identify dangerous roads or intersections in the context of number of bicyclists using that route. If such data does not exist, then methods to begin collection of that data should be explored.

ACKNOWLEDGEMENTS

This report produced with thanks to Victoria Lewis, dataMontgomery, and the Montgomery County Planning Department. Additional thanks to Montgomery College professors, Michael Iapalucci, Rachael Saidi, and Abdirisak Mohamed.

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