

Introduction-

Cities in the United States are becoming increasingly congested due to years of urban growth, growing traffic volumes, and decreasing public transit usage. Compared to other cities, these trends hit Philadelphia, PA especially hard. As one of the poorest major cities in the United States, Philadelphia is one of the most transit dependent cities in the US with majority of its transit riders using the bus. Notably, buses in Philadelphia have been undergoing a steady decline in both speeds and ridership in the past several years.

Amid declining bus ridership and declining bus speeds, several cities, including Philadelphia, have introduced bus/ bike lanes as a low-cost solution to combat this problem and to introduce bike infrastructure on old, narrow streets. Combined with enforcement of these lanes, bus/bike lanes are increasingly seen as being successful in increasing bus speeds and bike ridership. Given their success at improving bus service and biking in Philadelphia at a low cost, I wish to consider: what other streets in Philadelphia should be prioritized when adding additional bus/bike lanes?





Bang for Your Bus Bus/Bike Lane Prioritization and Suitability in Philadelphia, PA

Methods and Criteria

Given the relatively new introduction of bus/bike lanes, there is little evidence for what factors must be present to install a bus/bike lane. However, using Philadelphia's existing Chestnut St. bus/bike lane as an example, streets with the following attributes were selected:

- Road width at least 26 ft.
- Two travel lanes or more

After selecting streets with these attributes, streets were joined with overlapping bus routes using Spatial Join with a 5 ft. search radius. Using SEPTA bus route schedules, SQL selection was used to clean up data to include only major streets with bus routes on them. This join resulted in a layer named "PhiladelphiaPotentialStreets" from which Boolean suitability was conducted for following prioritization factors:

- 1: Streets in block groups with high bus ridership
- 2: Streets in block groups with high bike ridership
- riders face commutes over 35 minutes (city avg. in 2018)
- 4: Streets with high ridership bus routes
- 5: Streets with low performing bus routes
- 6: Streets with low speeds

Factors 1-3 were selected by using select by location and intersect with 2017 Census block group means of transportation and average commute time data. Factors 4-5 were chosen running SQL selections for 2018 SEPTA bus route data. Factor 6 was used by selecting streets by speed limit. Factors were assigned a value (seen below in suitability maps) by adding a field, selecting streets with these attributes, and calculating.

Top Three Priority Streets				
Street Name	Begin Street	End Street	Bus Route	Score
Grays Ferry Ave.	48th St.	34th St.	12	21
57th St.	Market St.	Baltimore Ave.	21	19
Greene St.	Ritten- house St.	Manheim St.	26	19



Factor 1: Bike Ridership, where <1.8% = 1, 1.8%-5% = 2, and <5% = 3 (2018 city avg. = 1.8%)



Class 2 and 3 roadway Speed Limit Under 45 mph

3: Streets in block groups where high percentages of bus



Final Suitability & Prioritization Map

To create the final map, I added a field to the "potential streets" shapefile and used Field Calculator to add up all suitability criteria. This field, "COUNTUP" was symbolized, with low numbers indicating low priority streets and high numbers indicating high priority streets.



Factor 4: Bus Rt. On Time Performance (OTP) where 50-60% = 1, 61-70% = 2, 71-79% = 3







Through my suitability selection, several streets emerged as potential "priority" corridors for installing bus/bike lanes. These include sections of Grays Ferry Ave in South Philadelphia, Greene St in Northwest Philadelphia, and 57th St. in West Philadelphia. However, some context may be necessary to choose what constitutes the "best" street. For example, this section of Grays Ferry Ave carries significant traffic volumes , is on a bridge with limited visibility for bikers, and is adjacent to a future dedicated bike bridge, which might mean it need not be prioritized for bus/bike lane installation. Further, while 26 ft. may be sufficient for the example bus/bike lane on one-way Chestnut



St, it may not be sufficient space for installing a bus/bike lane on Greene St. due to two-way traffic on the street. Given this context, 57th St, a low-speed street with parking and bus lanes on both sides, may be the most suitable street for bus/bike lanes and therefore should be prioritized. Moreover, for future research on bus/bike lanes, analysis should consider the differing width context of one-way and two-way roads for bus/bike lane installation.

Data Sources & Citations

Data: OpenDataPhilly, SEPTA GIS Portal, American Community Survey 2017, PASDA, OpenStreetMap Icons: Bus and city icons created by Freepik on Flaticon.com; Bike icon created by NikiaGolubex on Flaticon.com

Pictures: Philadelphia Bicycle Coalition; Google StreetView, 2019.

Cartographer: Paul Henjes UEP 235: Advanced Geospatial Modeling, Fall 2019 **Projection**: NAD_1983_StatePlane_Pennsylvania_South_FIPS_3702_Feet

Legend **Potential Streets** Top 5 Bus Routes Top 6-10 Bus Routes Top 11-15 Bus Routes Philadelphia City Limits 0 0.5 1 2 3 4



Factor 5: Top Bus Routes by Ridership, where Top 11-15 = 1, Top 5-10 = 2, and Top 5 = 3

