# Examination of Streetlight Data

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### Introduction

Web based data analysis sites could have a very large impact on transportation planning and data development. Estimates can be performance data such as volumes and speeds, but also travel demand information since trip estimates going into and out of various land uses can be produced. Streetlight and products like it are very promising and could change the way we get transportation information. The big question is how close to reality estimates might be. An excellent application of the traffic and travel demand data compiled in this project is the evaluation of Streetlight data, where streetlight data can be compared to other measures. A first look at the Streetlight estimates is discussed below.

### Initial impressions

Streetlight estimates are provided as daily sums or averages or arrayed by hour of the day and day of the week. The time extent of the data used for the estimates can be specified. For this study the time extent was from September 2021 thru April 30 2022 excluding December and January. Road segments are selected and directional or bidirectional estimates for volume and speed are produced and structured in comma delimited files. Confidence intervals (95%) are provided, though are sometimes large. There seems to be a consistency in estimates from hour to hour and day to day.

Programs were written to tabulate data files and link them to GIS representations of the road segments selected. The more road features selected, the longer processing at the Streetlight site takes, which could be several minutes or several hours. With the variation of location and selections, time of day, day of week, month, time extent, direction and other factors, it's very important to have an organized approach to manage the results.

The travel network segments used in Streetlight are from Open Streets Map though other GIS road files can be imported. Often road network GIS files are segmented from intersection to intersection but there are always variations.The use of DelDOT Centerline based road segments is preferred in this research since Delaware traffic data sources are typically based on DelDOT Centerline. Results vary somewhat depending on the road network used as shown in the pictures below comparing volume estimates using Open Streets Map segments and CADSR Delaware Linear Referencing System based segments.

**Volume Estimate From Segments Taken From CADSR DelDOT Centerline Based Network**


**Volume Estimate From Segments Taken From Open Streets Map**

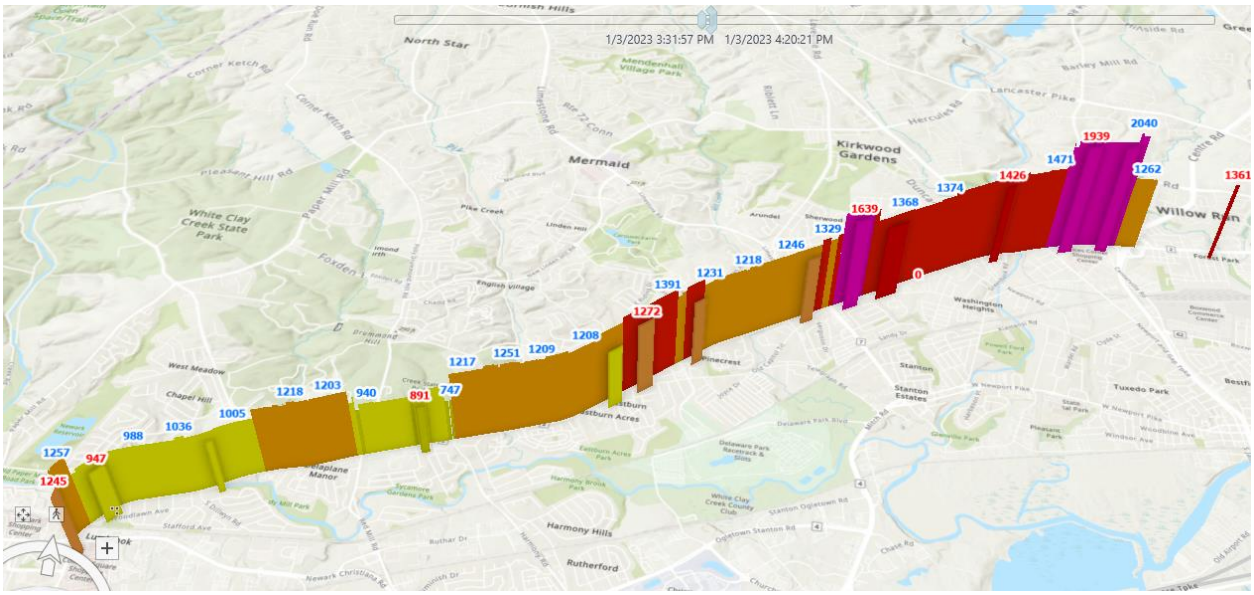

**Some example views**

*Volumes*

Below is a Eastbound Kirkwood highway at 4pm hour on a Tuesday with data taken from September 2021 thru April 30 2022 excluding December and January. Blue numbers are Streetlight estimates, Red are TMC intersection loop counter measures at same time and day of week. There is definitely a high correlation. The road segmentation is a bit different between Open Streets Map and the Deldot Centerline based network that CADSR uses to reference Delaware traffic data so there can be differences from that.

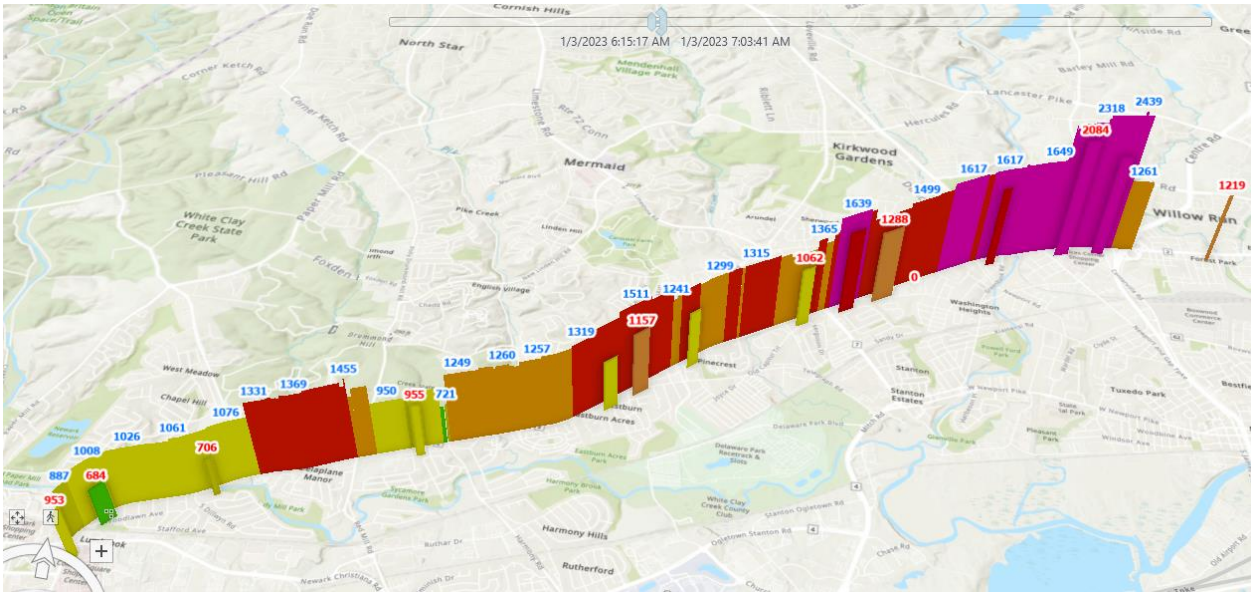
**Streetlight Volume Estimate Compared with TMC Loop Measures, Kirkwood Highway,**

**Tuesday 4Pm hour Eastbound**




**Streetlight Volume Estimate Compared with TMC Loop Measures, Kirkwood Highway,**

**Tuesday 7am hour Eastbound**



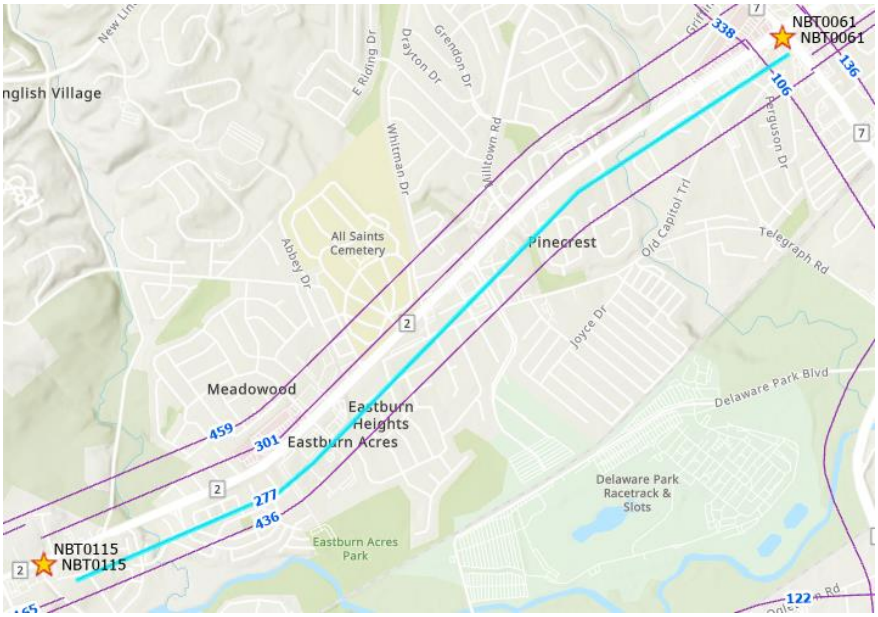

*Travel Time*

Another type of estimate available from Streetlight is travel speed. In the example below travel times estimated from Streetlight are compared to travel times as determined by Bluetooth sensors.

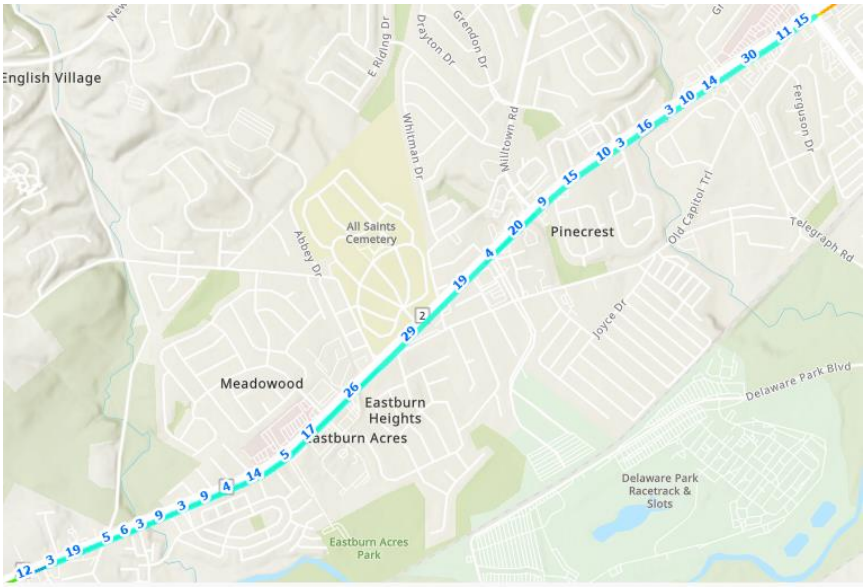
Comparisons of speeds is expected to be more difficult as the method used to calculate time waiting at intersections is could be different. The difference in this example is only a bit more than a minute which could easily be due to the intersection wait.

**Bluetooth Travel Time (Seconds)Estimate From Harmony Road to limestone road Eastbound Tuesday 9am hour**

**277 seconds for 3.44 miles = 44mph average**

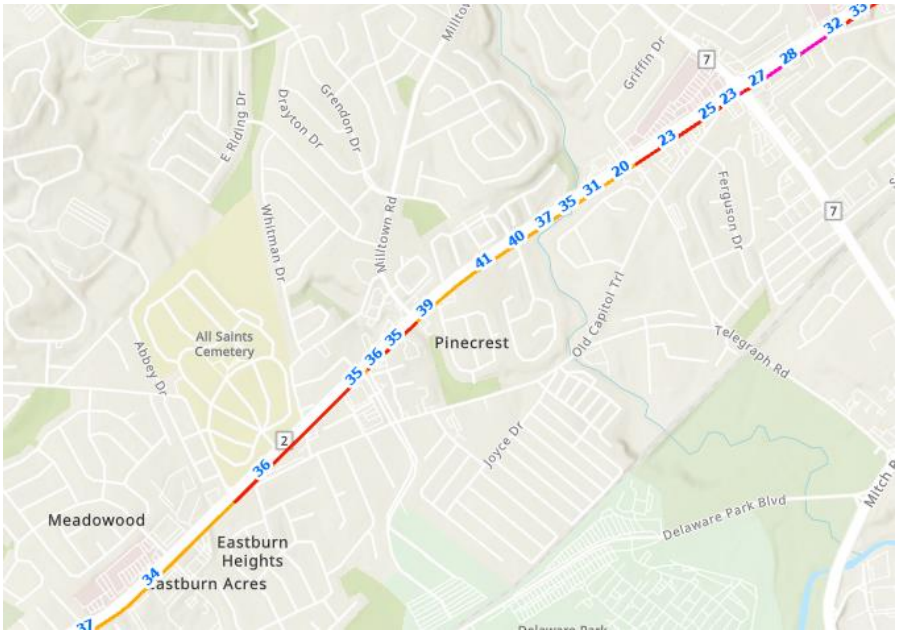



**Street Light Travel Time (Seconds) Estimate, Harmony Road to Limestone Road Eastbound Tuesday 9am hour**
**344 seconds for 3.44 length = 36mph**

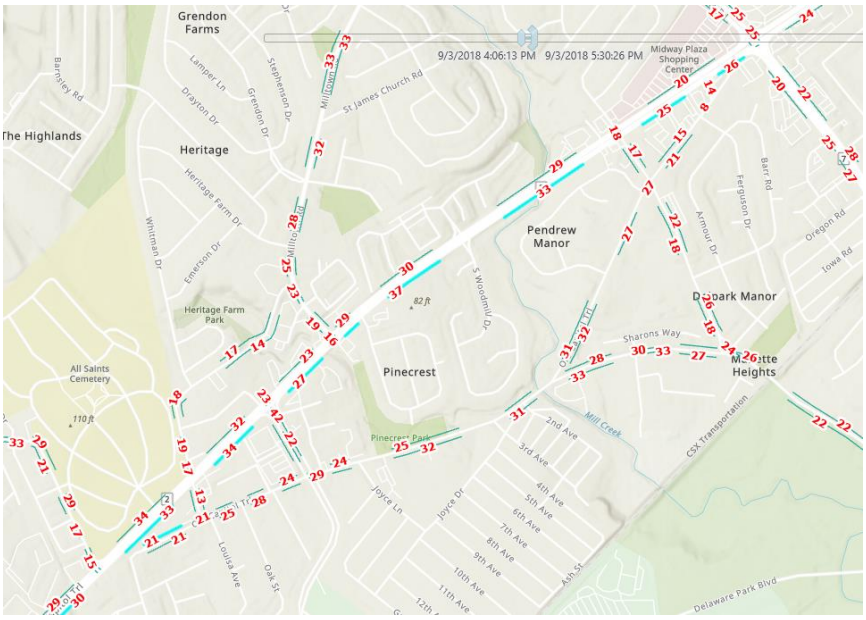


As another example, below is Streetlight estimates could be compared to a speed survey derived from State Vehicle GPS that is more segmented. Comparisons could be made with other datasets, such as the National Performance Management Research Data Set (NPMRDS) that is available.

**Bluetooth Travel Time (Seconds)Estimate From Harmony Road to Limestone Road Eastbound Tuesday 5pm hour**



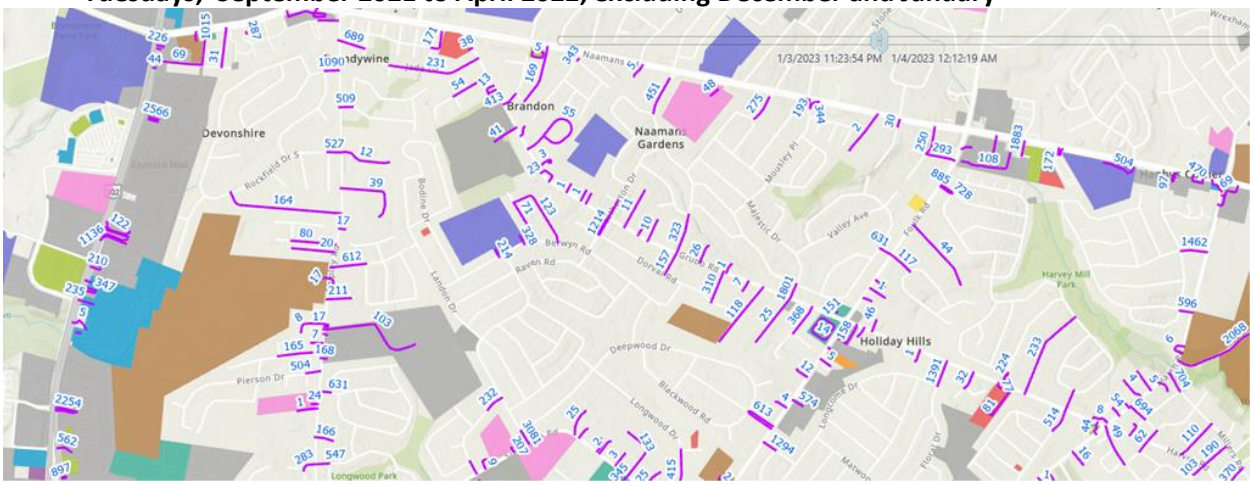

**State Vehicle GPS Speed (mph) Estimate From Harmony Road to Limestone Road, Tuesday 9am hour**



*Trip Generation*

A very interesting application of Streetlight data is in the estimation of trip generation. Access roads to residential housing, shopping centers, employment centers, and other land use can be selected and estimates for total daily trips or trips by time of day in and out can be estimated. Below is an example in the North Wilmington area.

**Daily total trip into and out of access to land use**
**Tuesdays, September 2021 to April 2022, excluding December and January**




*Other Streetlight Estimates*

Streetlight also provides estimates on turning movements and estimates origin to destination flows which will be presented in another document.

**Going forward**

There was very limited time in the past year to examine the Streetlight data. At first view, estimates seem to be highly correlated to available measures. A more systematic, statistical study is suggested. If estimates can be verified with various measures, Streetlight and big data sites like it could prove highly valuable to transportation planners. Further study could include:

- Further study of system and review of documentation, organization of data, data policies and procedures, and white papers
- Examination of "Zones": Identify useful origin/destination geographies, examine streetlight road network, how turning movements are expressed, examine custom zones in particular, substitution of a deldot centerline version. E
- Further comparison of volume and speed estimates with available measures.
- Comparison of turning movement estimates with available measures
- Comparison of origin-destination estimates with available measures
- Further examination of how Streetlight can offer trip generation estimates

- Investigate estimates as they are affected by geographic resolution and time extent. Generally get an idea of limits of the SL data and find analysis approaches that are expected to have suitable validity.
- Directional analysis: efforts have recently been made to express travel flow in terms of directional probability or tendency. This could be done with turning movement queries .
- Specifying some “Typical” views:  (e.g. Hourly volume by day of week on non summer days). Examining what a comprehensive picture of transportation system performance would involve and the extent that it could be developed using Streetlight data and analys