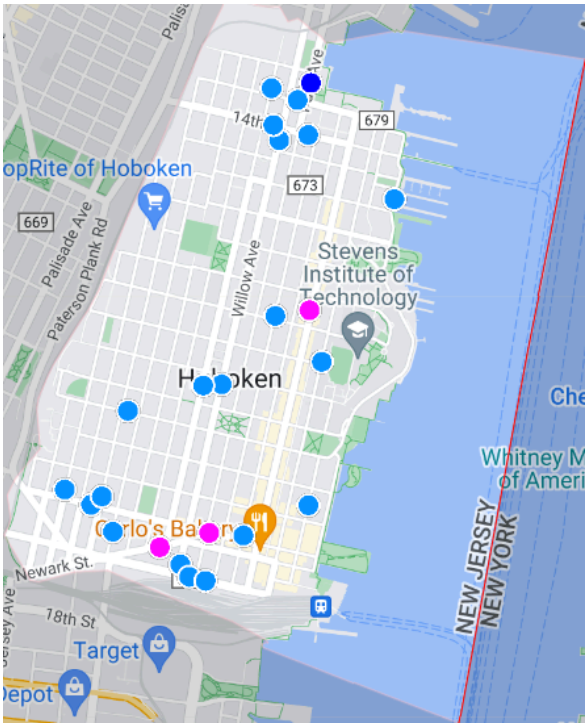
D6
Assignment 11.1
Zoe Casten, Victoria Beke,
Alexander Beke, Jason Pinga,
Alejandro Schnettler

Traffic and Tribulations: How Hoboken Traffic Laws Have Impacted Road Safety
Design Diagrams

Refine the system and process diagrams in Assignment 6 based on Assignments 7-10

System Model



The New Jersey Traffic Monitoring System collects Hoboken City traffic data at the points marked on the map above. The collected data shall be used to create graphs of traffic volume at each of the applicable locations. See the following page for an example.

Based on the relative traffic volumes at each traffic station, there shall be two heatmaps constructed for the City of Hoboken, where the “hot” values correspond to higher traffic volumes. The first map will be from before the implementation of the new speed limit, and the second map will be from after the implementation of the new speed limit. The heat values will be calculated based on the aggregated data for each respective traffic station.

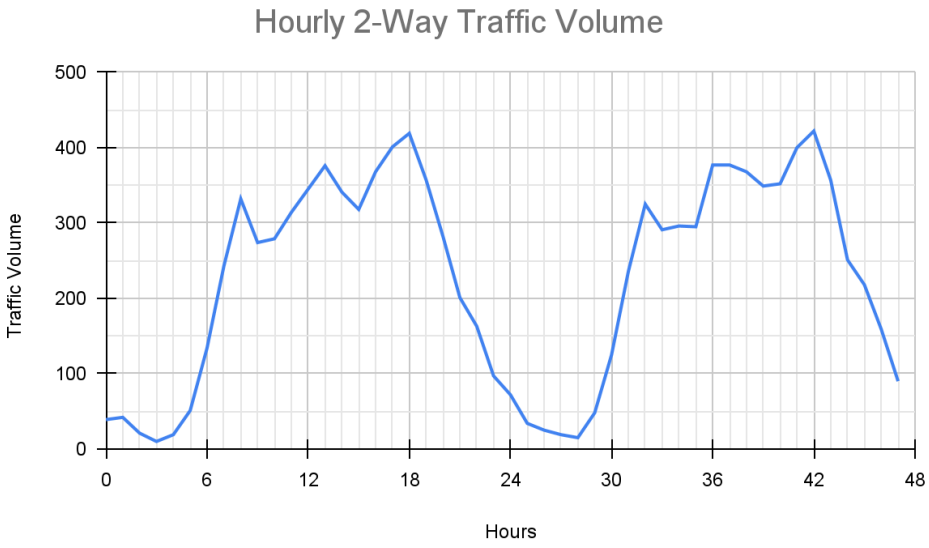


Fig. 1. Hourly 2-Way Traffic Volume at Station 110921 on Newark St between Grand St and Clinton St from July 29 through July 30, 2020
The horizontal axis denotes the number of hours elapsed since the beginning of the 48-hour period.

Further models shall contain larger sets of data from longer periods of time in order to establish traffic patterns from before and after the new speed limit law took effect.

For these line graphs, we shall be considering a short time period for maximum specificity to this particular policy decision. The pre-change time frame will be from January 1, 2022 through August 31, 2022. The post-change time frame will be from October 1, 2022 through May 31, 2023. Since the new speed limit was put in place on September 14, 2022, it may have taken a few weeks for drivers to get used to the new speed limit. By selecting our time frames as we have here, we will be able to control for this possibility.

The data from these time frames shall be aggregated for each traffic station. This will assist in both constructing the heatmap and preventing less volatile traffic intersections from obscuring trends at other intersections.

This empirical data can be used to predict trends in traffic patterns, but there will likely be some degree of error in the predictions–it is not possible to perfectly predict future traffic patterns, regardless of how much data has been collected previously. This makes our system model a stochastic model.

Process Model

We are using a prescriptive model to structure our investigation and evaluation of the traffic data as it relates to Vision Zero policies. As we go through the process outlined in our prescriptive model, we may make additional modifications to our guidelines to make them more descriptive. By the end of this investigation, this prescriptive model may be used as guidelines for future investigation on how policy decisions affect traffic patterns in a municipality. This model shall be specific to New Jersey, as this investigation relies on data from the NJ TMS.

1. Obtain all available City of Hoboken traffic data from January 2022 through August 2022, and October 2022 through May 2023.
2. Create visualizations for each traffic station for each time frame, similar to the graph shown above. For these visualizations, it may be helpful to simply create a multiple line graph. This will make it easier to compare data as well and visualize which traffic stations have higher traffic volumes than others.
3. Evaluate any changes between the overall traffic patterns for each time frame. If any changes exist, determine the magnitude of such changes.
4. Create before and after heatmaps of the City of Hoboken's traffic volumes.
5. Compile the graphs and findings in an evaluation report. Based on the magnitude of any change in the traffic patterns, determine whether or not the new policy (in this case, the 20 mph citywide speed limit) had any significant impact on the traffic patterns. In this report, include all relevant sources and references.
6. Obtain all available crash statistics from City of Hoboken's Vision Zero website for the ranges 2014 through 2018 and 2019 through 2023. The 2019-2023 crash statistics will be released after the end of the year 2023. Supplement these statistics with police reports where possible or necessary; identifying information shall be redacted from reports and all other references to these police reports shall be compliant with the police department's specified best practices.
7. Compare the number of injuries and number of deaths for both time frames. Similar to steps 3 and 4, evaluate any changes in these statistics and if any changes exist, determine the magnitude of such changes. Determine the overall trend in crash injuries and deaths. This trend shall be explicitly denoted as speculative and is intended to be used for advisory purposes only.
8. Based on the findings from steps 4 and 6, determine how effective the 20 mph citywide speed limit appears to be in reducing crash injuries and deaths. Also, determine any adverse effects this policy has on traffic patterns, and advise as to whether or not this policy should be kept or if the drawbacks outweigh the benefits of the new policy. In this report, include all relevant sources and references.
9. Final report shall be made available to the City of Hoboken local government, and published online if deemed necessary. This report shall be protected by a BY-NC Creative Commons License. This allows us to retain intellectual property rights over the report while also allowing others to cite or reference it, which is important for future researchers.