Applause

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How we do free traffic studies with Waze data (and how you can too)

Screenshot of Waze Power BI template

In 2015, we started our partnership with Waze's Connected Citizens Program by signing a data-sharing agreement and publishing road closure information to our open data website. Instantly, we could share real-time information about road closures with our public though apps like Waze, Google, and Apple Maps providing significant value to drivers in our community. Additionally, we received real-time data feeds from Waze to help understand more about mobility issues in our city including things like congestion, locations of potholes, and traffic lights not working. This provided us with the first city-wide real time, ground truth data that could tell us what was happening across our transportation network at any moment.

Exploring the different use cases for how we can use this data set in our daily work, we found, while the real time information was useful,

historical analysis of congestion related to traffic mitigation projects or new land use development was even more valuable.

With that use case in mind, we built a tool that allows Metro employees to do a quick and easy, traffic study on-demand.

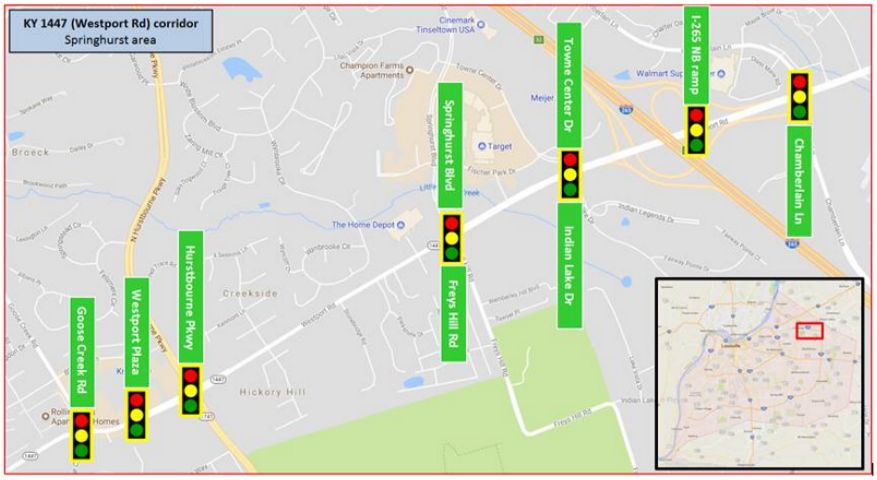
All it takes is a latitude and longitude bounding box and some dates, and we can validate the impact mitigation and new construction projects have on congestion in our community.

Real World Example

But, we know telling you how it works isn't enough, so here is an example of how we used the template to validate a project, and help our traffic team communicate with elected officials about their project.

A growing suburban corridor & an engineer with a plan

Louisville is growing, and it is growing particularly fast in the eastern portion of our community where there are new, large-scale commercial and residential builds happening all of the time. With this rapid expansion, drivers in eastern Louisville have seen a significant increase in drive times along key arterials.



Westport Rd by I-265 in Louisville

For example, the Westport road corridor, between Goose Creek and Chamberlin, carries up to 40,000 cars per day, and has seen a 15% increase in Average Daily Traffic counts over the past decade. Knowing

this, Brandon Shelley, a Traffic Engineer with Louisville Metro, created a coordinated traffic signal timing plan that accounted for the new reality of congestion on the corridor. And, once implemented, it appeared that the plan worked.

They received fewer complaints from citizens about traveling the corridor. Driving the corridor, it felt smoother, but anecdotal evidence isn't enough. They needed data to verify what they were hearing and seeing, but paying a contractor thousands of dollars to verify their impact wasn't a good use of their limited resources.

This is where our Waze tool came in. Brandon sent us the evaluation criteria (bounding box and date range) and the particular times of day of interest. And, within five minutes, we were able to pull data from our Waze database into our Power BI template to show him the impact of his work. The results spoke for themselves.

Comparing pre and post implementation of his timing plan, Westport road saw a 30% drop in the overall number of Waze jams, their metric for congestion, for all times of day. For the hours between 4 and 6 pm, as known as the PM peak, the Waze data showed a 38% reduction in jams during the Fall and Holiday months, which are particularly congested due to retail activity. So, in five minutes, we were able to validate the intuitive feelings they had about the corridor with data.

As a next step, we packaged the data up into a two-page evaluation report that could be easily shared with partners, interested parties or elected officials. In fact, at a meeting with elected officials, they were able to reference their work on the corridor, sharing the Waze data as validation of the improvements they made. In the past, their work could have been dismissed, but with verifiable data, they can back up their assertions that they made the corridor less congested.

We are currently working to replicate this work for all of the traffic mitigation efforts implemented over the last couple of years. This will allow us to show the value of the work of our traffic engineering team, and help make cases for increased support for their work and expansion of their budget in coming fiscal years.

How it works

To store and process the data, we originally built an internal Microsoft SQL Server database, which itself was a time consuming and arduous process. We have since re-created this as an open source project in the cloud so any Connected Citizens Platform partner can do the same analysis easily for free and build on our successes.

To make accessing the data more user-friendly, we created a template with Power BI, a free Microsoft product anyone in our city government can use, that pulls the data from our database into a dashboard without people needing to know SQL or any other advanced querying language.

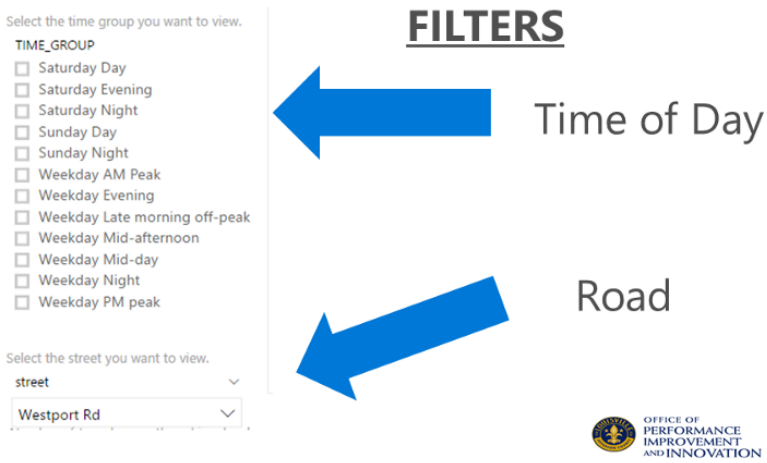
Analysis Procedure

- Select a bounding box (just need two catty-corner lat-long points to box it in)
- Select date ranges you want to analyze
- Two comparable time frames (eg, Dec ’16 compared to Dec ‘17)
- Update the SQL query in the “advanced editor”
- Apply the changes, wait for the data to update (usually only takes two to three minutes to get the data)

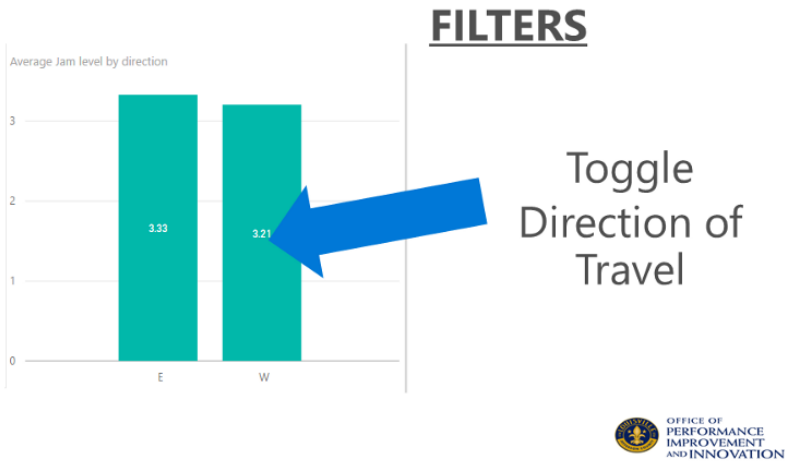
Filters

These visualizations can now be filtered down to get a more granular analysis. This allows you to target specific road segments, time of day, and direction of travel that you want to investigate within the area.

Road & Time of Day



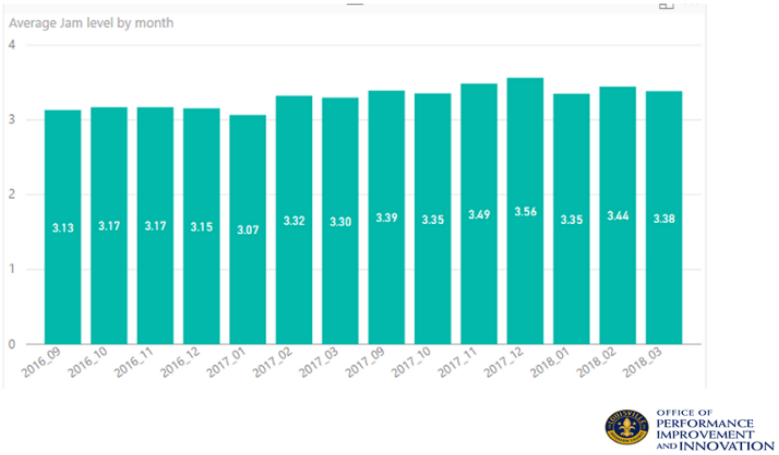
Direction of Travel



Data Analysis

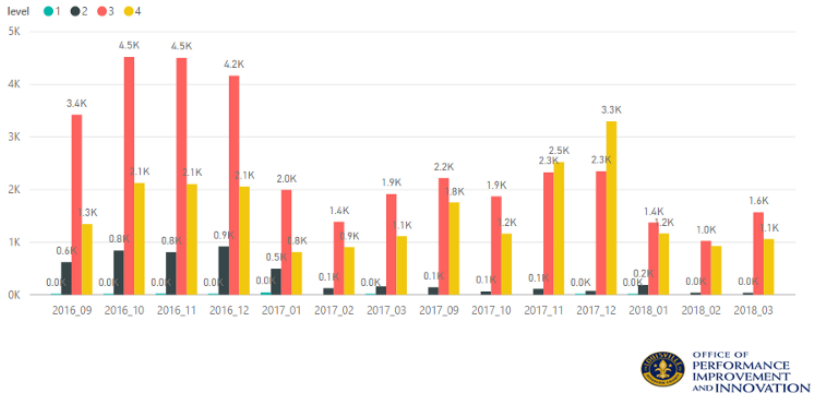
For the bounding box selected you see the following visualizations:

- ***Average Waze Jam Level***



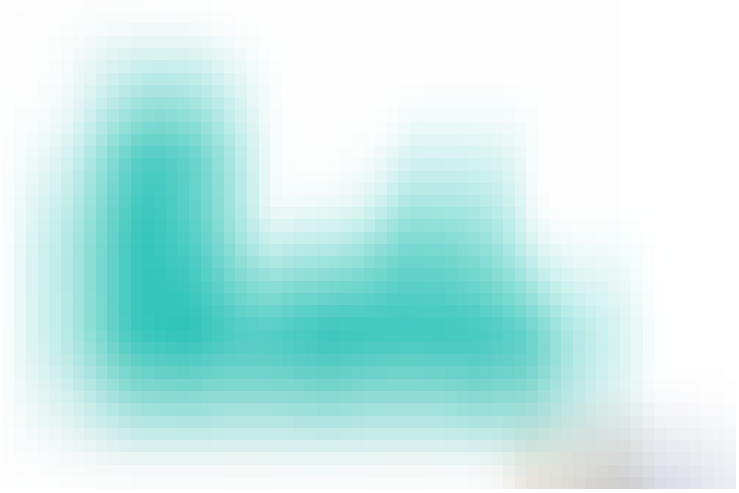
Average Jam Level

- Number of Jams by Waze Jam Level



Number of Waze Jams by sorted by magnitude

- Total number of Waze Jams



Total number of Waze Jams

Other Current Use Cases

Faulty Equipment

When detection equipment at intersections fails, it can dramatically increase congestion. Using Waze data, we can monitor for corridors for significant spikes in congestion. If we see a spike, we can send crews out to see if there is an issue with the equipment. After setting up this template, we caught a problem corridor with in a week.

Collision Prediction

Working with Grad Students from UPenn, we used Waze data, along with other factors to see how traffic congestion, speed, and other roadway conditions impacts collisions on our roadways.

Future Use Cases

We are currently working on a way to conduct intersection level analysis with Waze Jams data. This will allow to dive in deeper on our corridors to understand where there may be even more opportunity improve congestion in problem areas.

And, most excitingly, we are also going to use it for doing a system-wide analysis to find areas that need more congestion mitigation work. One of our partner's ideas is to pair Waze data up with our Average Daily Traffic counts to find where we have high amounts of congestion with

lower ADTs, meaning it could be a signal timing issue and not a roadway capacity issue.

How to use Waze for traffic optimization in your organization

- Sign up for the Waze Connected Citizens Program
- Implement the open-source Waze CCP Processor for your community
- Use our templates, or
- Build your own (and share them with us!)

Reach out to me at ed.blayney@louisvilleky.gov or on Twitter