Video 1:

Washington, DC – our Nation’s Capital is a relatively small city of half a million souls – until the daily commuters swell the population to 1.05 million, with commuters from MD and VA.

And if you’re coming from Virginia, you have to cross a river. On one of 5 vehicle bridges, or one of two crossings by subway.

Video 2:

So we got to wondering:

* What is the capacity of all these river crossings?
* Is there an optimal traffic flow?
* And how long would it take to evacuate the city?

Video 3:

And we also wondered – what factors could affect the capacity and traffic flow?

What is the impact of various events, such as rain, fog, or snow? And what about glare? How about the impact of holidays or other special events? And what is the impact of alternate modes of transportation?

Video 4:

So we collected a year’s worth of data, including:

* Traffic speed data for 5 bridge crossings
* Traffic density data from traffic sensors
* Weather data
* Sunrise and sunset data for day-night comparisons and to calculate glare
* And information on holidays and government shutdowns

This data was then standardized and converted as needed in python – using primarily ephem, numpy, and pandas.

The relevant data was loaded to PostgreSQL database for further study and analyses.

DB slide:

PostgreSQL used to standardize data and create datasets for further analyses.

As the traffic data was available in 10 minute segments for the entire year, we chose this 10 minute to standardize on. The weather data was originally roughly once per hour, and we created a weather measure to map to each traffic time.

The traffic incidents had a start time and duration, so these were converted so that each 10 minute time increment in the duration would be marked as having a relevant incident.

[sizes of tables]

Other data collected:

Not all data was at the level of granularity we sought, particularly the metro data. We were able to get information on basic capacity and throughput of metro to add to our capacity calculations. Similarly, while we could collect Bikeshare information, the majority of people commuting by bike have their own bike. This data was also collected from general.

[we excluded VRE]

We also obtained the commuter-adjusted population of Washington, DC, and a generalized evacuation plan.

Traffic density data

During data exploration, we collected sensor data over 2 days of 15-minute segments of data on 14th Street Bridge (I-395) river crossing. Unfortunately, this source disappeared. We used the data we had saved to plug into our van Aerde flow model (more on that from Dave). For the rest of the analyses we used speed alone as a surrogate measure for traffic flow in most analyses.

Exploration of data – tools

We used visualization tools – tableau (student license, thanks Rebecca), matplotlib, excel pivot tables and charts. We also did some basic statistics exploration using R.

In the next section, Eni will discuss the results of some of those exploratory analyses, then Dave will follow with discussion of the model.

Summary

So, back to our original questions:

We calculated a maximum capacity for dry and wet conditions

We have a model of optimum vehicle traffic flow

So… how long would it take to evacuate the city, assuming about 35% head south to VA?

6 hours?