2015

Adaptive Response Modeling Using GIS, Blog 5

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UCI Bike Race Adaptive Response Map

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HOME

The Final Assignment

🛈 STICKY   SEPTEMBER 29, 2015   LEAVE A REPLY

September 25th, 2015 – The Race Day Event

September 25th, 2015 was the second class meeting and the day the Men's Under 23 Road Circuit took place. As everyone started to settle in their seats in room 103 in the Trani Life Sciences Building, we began to discuss the maps we made as a homework assignment to be used for this day. The goal of this class meeting was to make a new and better map by looking and discussing about the maps made by everyone in the class. We started to list out datasets that would be important to include in the map such as fan zones, twitter, bike routes, traffic road block/closures, course crossing, fire departments, police, hospitals, and handicapped accessibility areas. We then discussed the accuracy of these datasets, any limitations that should be noted, when this map would be the most useful, and setbacks. By the time we finished this discussion, the race had already begun, and we were able to go and watch some of it. Once we got back in the class, we started to build our own individual maps given the knowledge we had learn over the past few weeks. I logged onto ArcGis Online and clicked on create a new map and started building my map form the ground up. I first added the

shapefile of the UCI race courses. Then, I added the different layers. From making my previous map, I knew that putting "uci" in the search box would be able to give me most of the layers I needed such as the fan zones, road block/closures, course crossing, and accessibility areas. Then, I added the traffic layer. A challenge arrived when I tried to search for fire departments and police stations. I could not find those datasets. Then, I tried searching for hospitals. The best I could do was find a layer for healthcare sites. This was something I discovered about using ArcGis Online, not all the layers I wanted can be easily found. Next, I created the eco-stations locations, something new and simple I learned in this class meeting. After finding all the datasets I possibly could and tweaking it to my liking, it was time to create a web app using the Public Information template. By doing so, the tweets from Twitter could be added and used to determine population hotspots.

This task was fun and interactive. Having a setting where everyone could interact and talk to each other made the experience better. Any time one of us had any difficulties, we were able to help each other in finding the datasets, knowing what keywords should be searched, adding the eco-stations, and verifying that the maps we working on were fine. There was a lot of comparing and contrasting our individual maps and learning new things and features that ArcGis Online can do along the way. Furthermore, Dr. Ciminelli and Wyatt were always there to assist us. The whole process of making this map and the overall class meeting was really enjoyable.

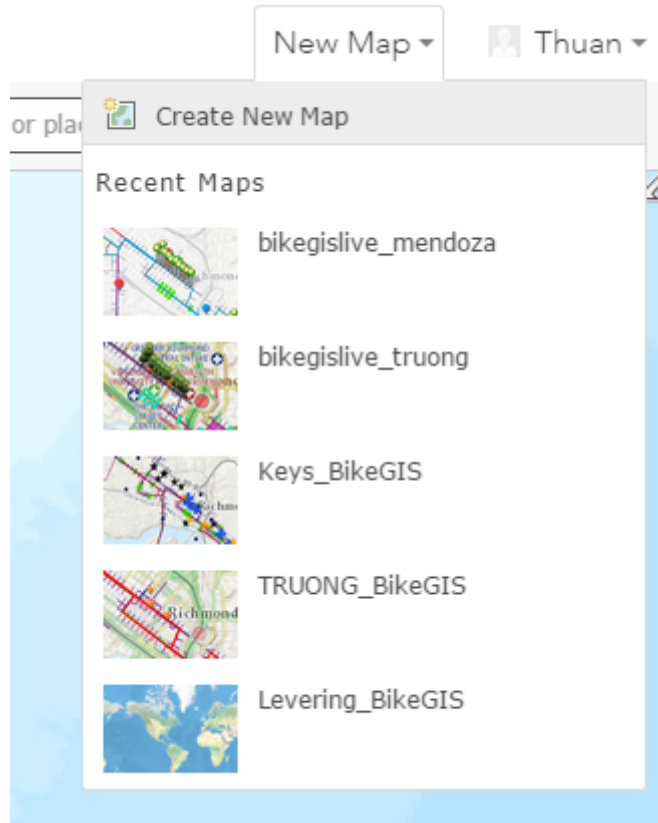Below are the steps that I took to create the map. Following these figures is the final product of the map.

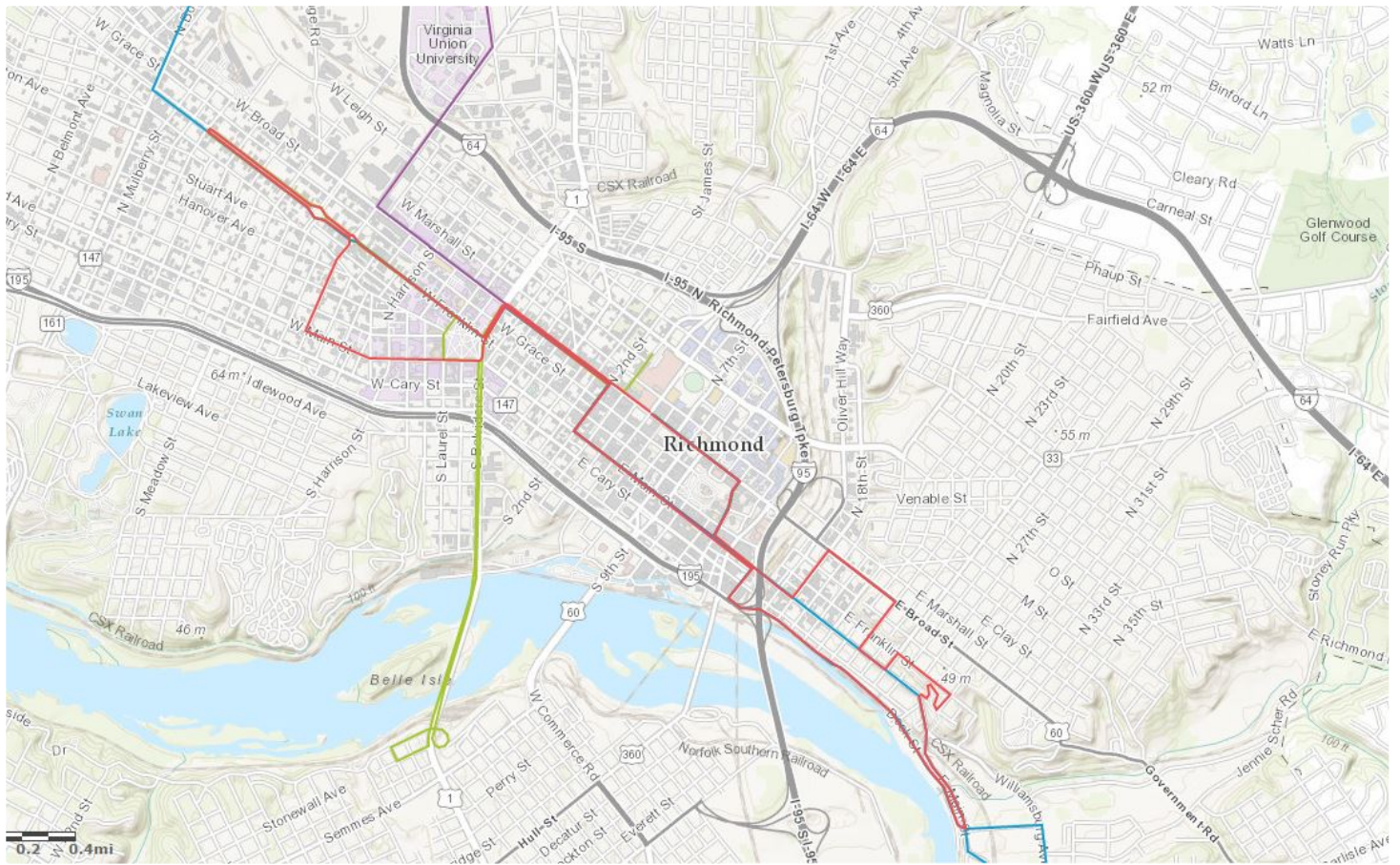Figure 1: How to create a new map

Figure 2: Adding the first layer – UCI Courses from the shapefile
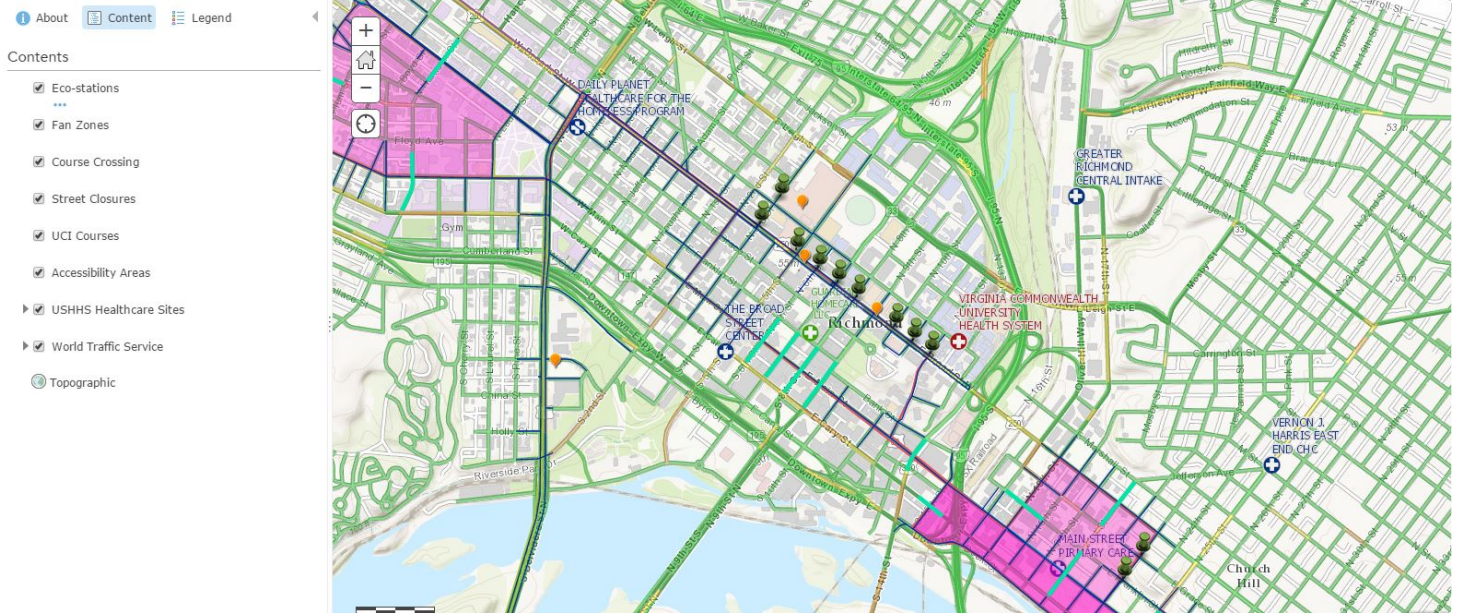
Figure 3: Searching for the other layers

Figure 4: The rest of the layers added

Figure 5: Creating the web map

––––––––THE FINAL PRODUCT––––––––

Unable to create map: Item does not exist or is inaccessible.

But first, determining the accuracy and limitations of the map. How could it be better?

Something that is extremely important to talk about when making a map is knowing the accuracy and limitations of the map. So how accurate is this map? For the most, it is fairly accurate. In terms of the locations of the fan zones, the road blocks/closures, the course crossings, and the accessibility areas—these layers were made by the City of Richmond GIS Team, and specifically for the UCI Bike Race. Therefore, it would be safe to assume that these datasets are accurate as possible. The shapefile of the UCI courses and the locations of the eco-stations were provided for us. The traffic layer was created by ESRI using world traffic data from a company called HERE that tries to provide the most accurate data as possible. Since the traffic layer provides real time

traffic, it is able to provide updates every 1 minute and is supposed to be accurate to 10 meters. More information about how they collect their data can be found on their website. Furthermore, the data for the healthcare facilities came from the U.S. Department of Health & Human Services. Where the problem of accuracy arises is the Twitter tweets. The Twitter tweets are used to determine the population hotspots. However, not everyone uses Twitter, and it is also not guaranteed that the people who have Twitter will tweet during the race. Another thing that should be noted is how Twitter determines the locations of where the tweets were tweeted. If the location is enabled on a mobile device, then Twitter uses GPS and cell tower signals. If the location is disabled on a mobile device, then SSID, MAC address, frequency, and signal strength are used. As a result, the data for population hotspots may not provide an accurate representation of everyone and their locations during the bike race. Furthermore, since GPS is used, some errors such clock error, ephemeris error, atmospheric error, etc. are possible when trying to determine locations of the tweets. In addition, the tweets that are displayed on the map may not always be relevant. For example, restaurants and shops located near the race would tweet using the hashtags for advertisement purposes, instead of about the race. Also, some tweets that previously existed could be removed from Twitter if the user decides to delete them. However, since the main objective of this course is determining how well the eco-stations were placed in relations to the population hotspots, it is okay that our population hotspots may not be as accurate as we want it to be. Furthermore, since the eco-stations have a stationary location and people may be moving around, these people are bound to bump into one of the eco-stations despite the question of the accuracy level. Therefore, not having highly accurate data for population hotspots is acceptable. Being able to have some sort of knowledge and general information of these populations hotspots is enough to achieve our objective.

ArcGIS Online is a fantastic tool in many ways, but may also be not helpful in certain situations. ArcGIS Online is great in many ways because of how convenient is. I can log in on different computers and still work on my map. It can be used with the collector app to collect data using a mobile device and then that data could be imported and shared for others to used. It is great for sharing with multiple people by creating a link or sharing with your organization. Limitations may exist though because the map was made and displayed online. For example, if there was a power

outage or if the server were to go down, the map would not be able to be accessed. It is also possible that since the layers are from a server online, that could go down too. Then, we would be missing information from our map. Regarding this map, ArcGIS Online provided us a way to collect live data from Twitter tweets from the public. However, the data may be constantly updated and changing but we only want the information during the bike race event. I would be cautious to only rely on this data for the map as it may be no longer relevant to our timeframe . Therefore, it would be best if this map was not used too far down the line in the future. Overall, it would be best to have some sort of back up or have solutions to overcome these limitations.

There are many ways in which this map could be better. One way is having datasets for the fire department and police stations. Knowing these locations are important in cause of an emergency at the race or nearby the race. Then, the map would be able to provide guidance to the emergency responders for the best and safest path to take in order to avoid the people and traffic from the race. In addition, having a way to filter the tweets from Twitter so that only days that the bike race took place would have been useful and make the map more accurate. Another way is collecting the data for the population hotspots. This could be improved if there was an announcement to the people attending the race to tweet something when they were there to provide more accurate results. If people were aware that their data could be used for something beneficial for the community, more data may have been collected. Having this information could make the map better if a race were to be held in the future given the same objectives.

How well were the eco-stations placed in relation to the population hotspots?

Most of the population hotspots were actually near or around the locations of the eco-stations. However, there were some that were a little bit further away, but the distance is close enough to walk there as seen from below.
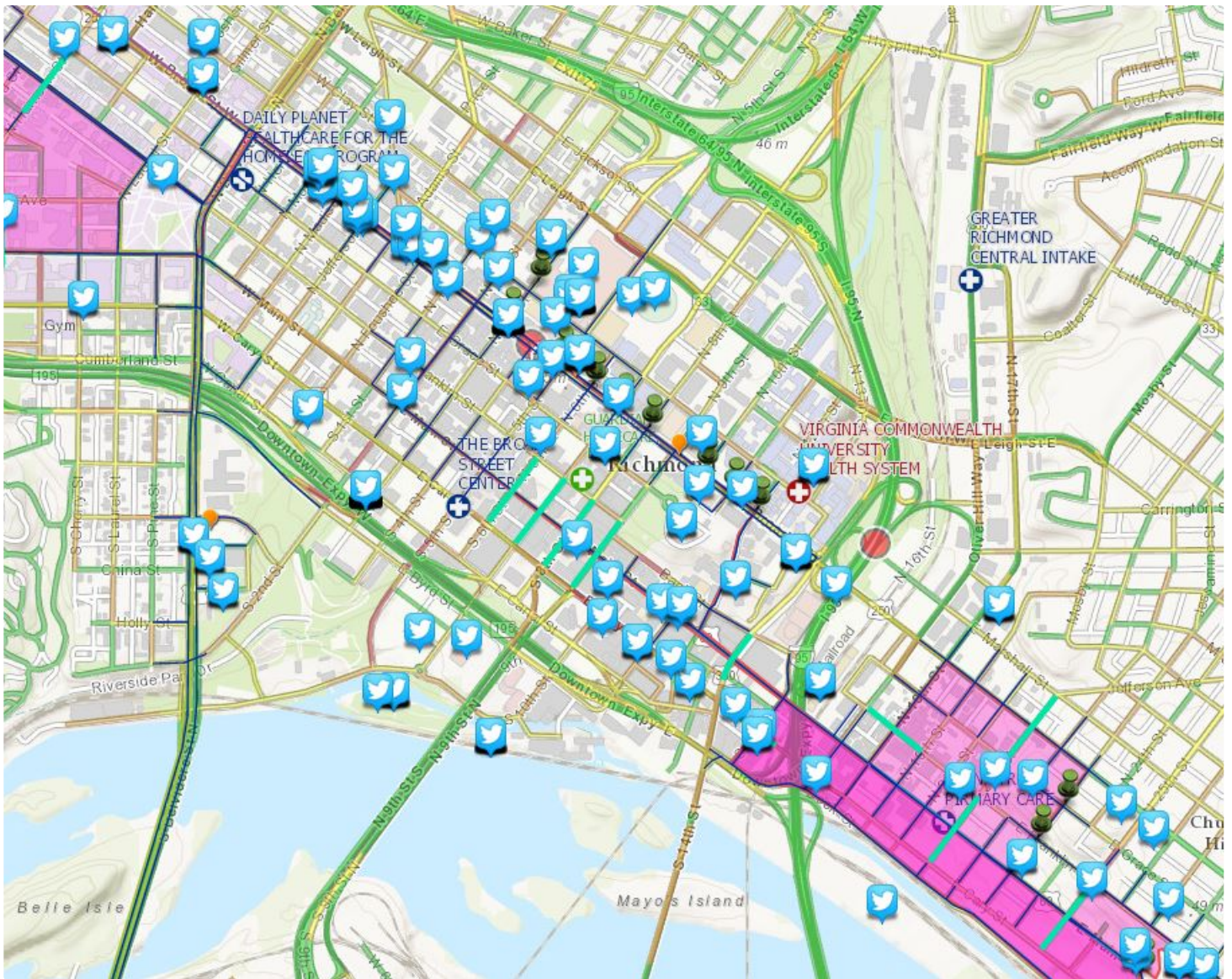
From 9/25/15 – Most the populations hotspots were located near or around the eco-stations as depicted as a green pinpoint symbol. There were some populations hotspots that were a little further out from the eco-stations. A lot of individuals were on Broad St. with the clustered around the Greater Richmond Convention Center, the finish line for the races and also a fan zone. One great thing about this map is that it can be used to provide the safest route to guide these people to their closest eco-stations. An example of how is displayed below.
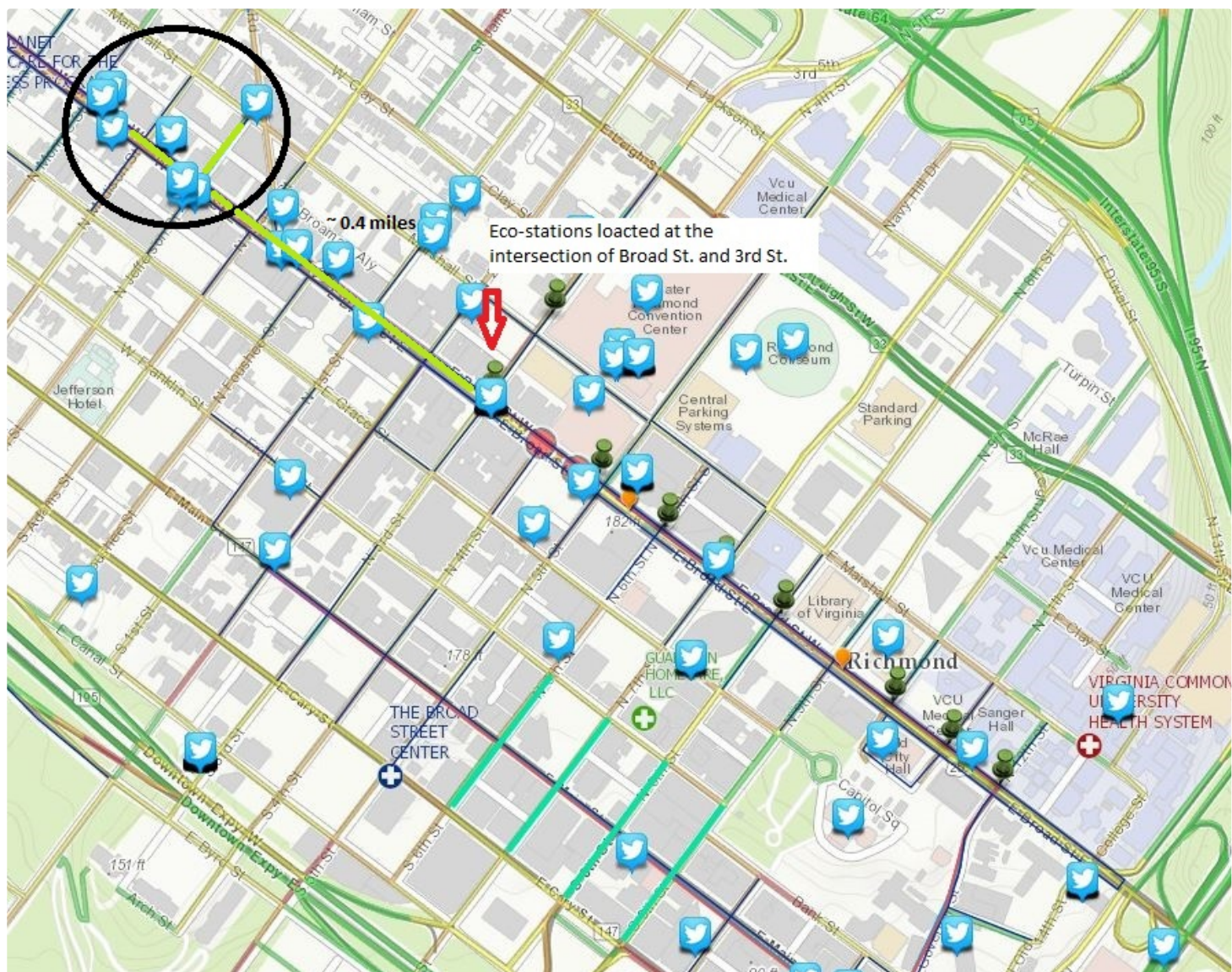
From 9/25/15 – A population hotspot is circled in the picture. From Broad St., starting at 3rd St. to 12th St., each green pinpoint represents 3 eco-stations that are located on each side of Broad St. Therefore, the nearest eco-stations for this group would be located around the intersection of Broad St. and 3rd St. To get to these locations, individuals that are not at E. Broad St. should walk there. Then, all they have to do is walk down the sidewalks of E. Broad St. until they encounter 3rd St., and the eco-stations should be located there. Since a part of the race course involves E. Broad St., individuals walking to these eco-stations would still be able to watch the cyclists race by.

One thing that I thought would be interesting to see were the Twitter tweets after September 27th. During the weekend, the Men's Junior Road Circuit, the Women's Elite Road Circuit, and the Men's Elite Road Circuit took place. I had a feeling that the population hotspots would change, since more people would watch the race as well as it was the weekend and the final days of UCI Road World Championships. Therefore, there would be more data to determine the population hotspots and provide a better
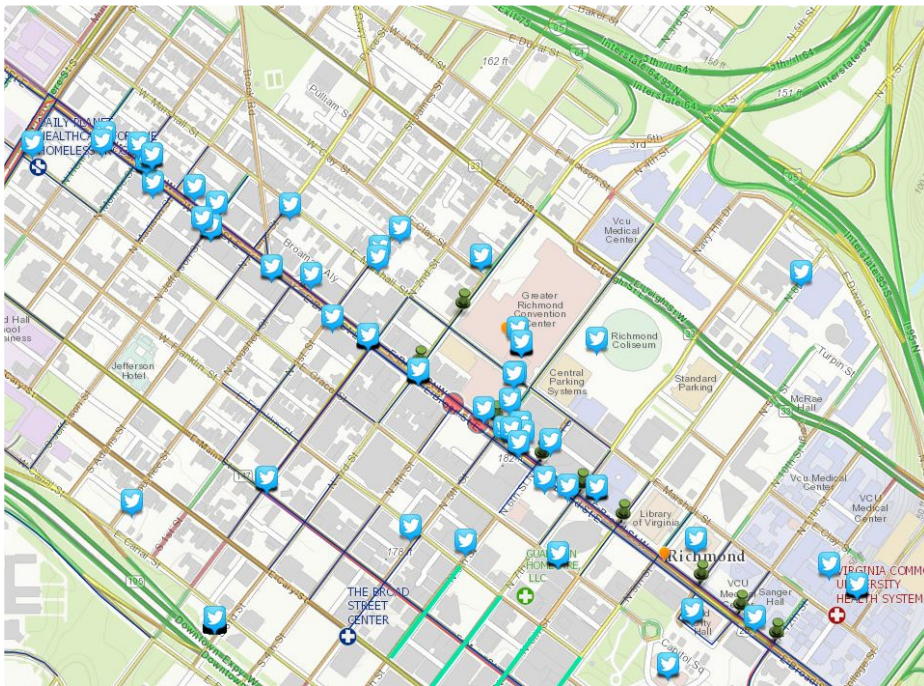
representation of everyone that attended and tweeted about the bike race. Below are screenshots from 9/29/15.
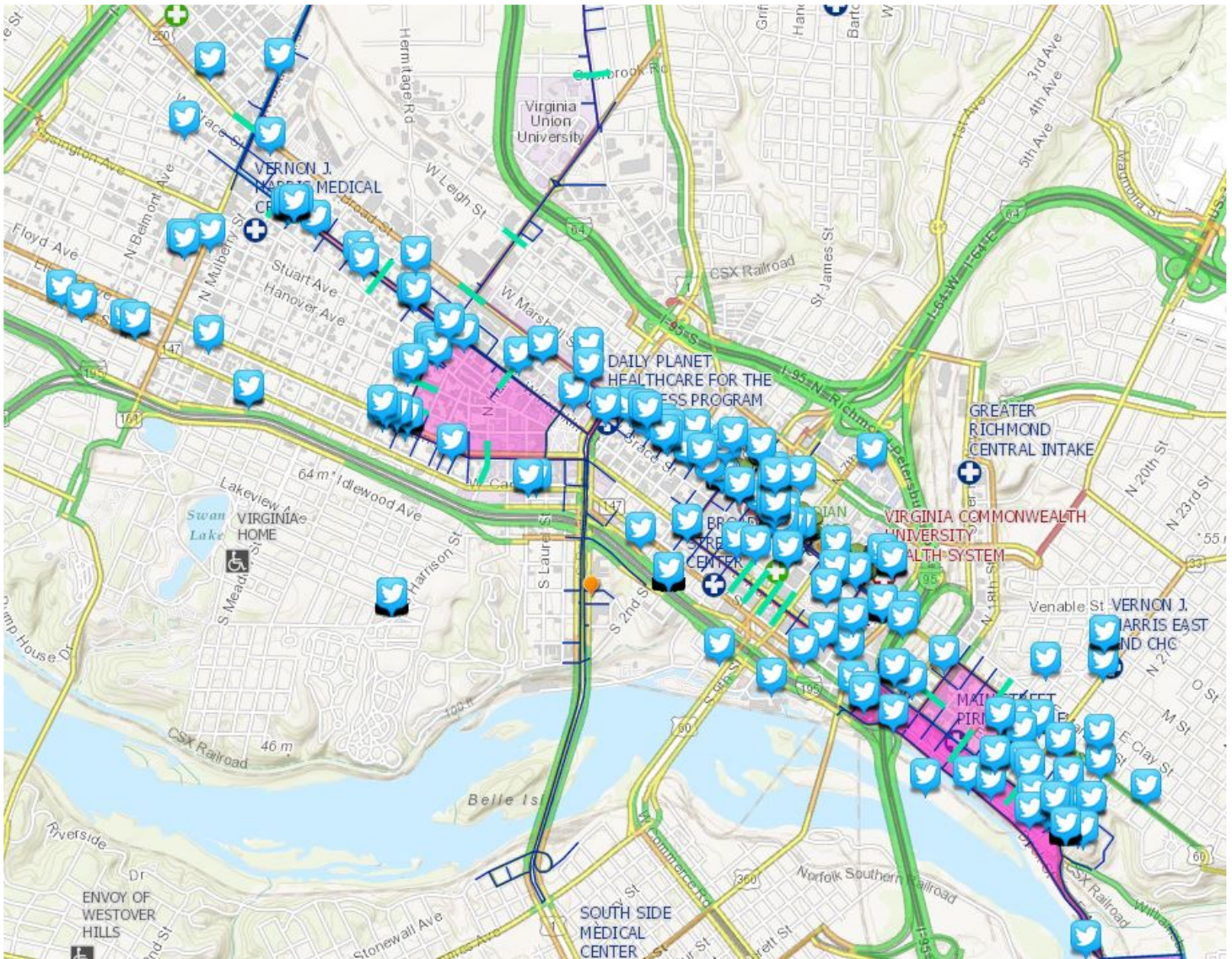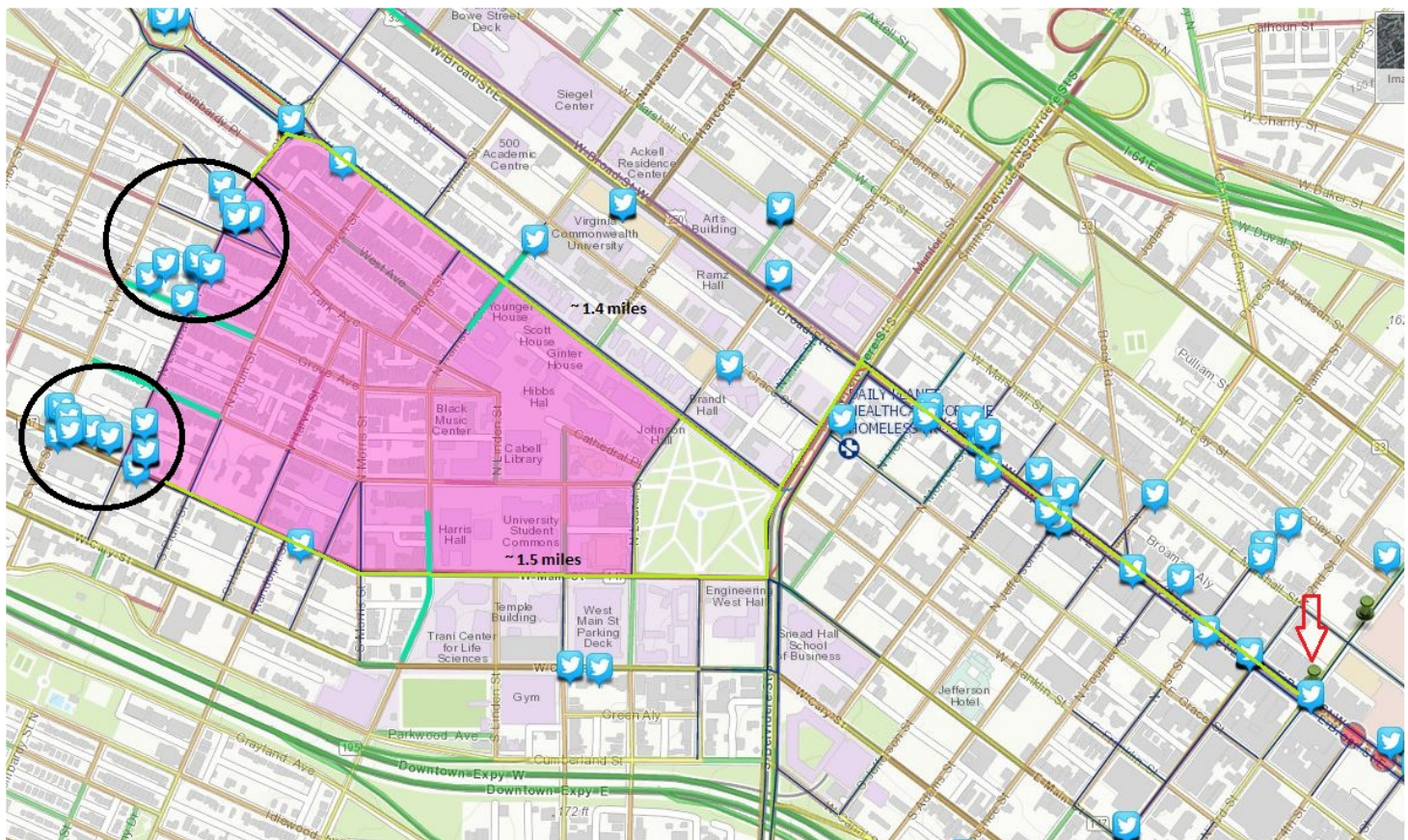

From 9/29/15 – There were definitely more tweets. Below is a comparison.
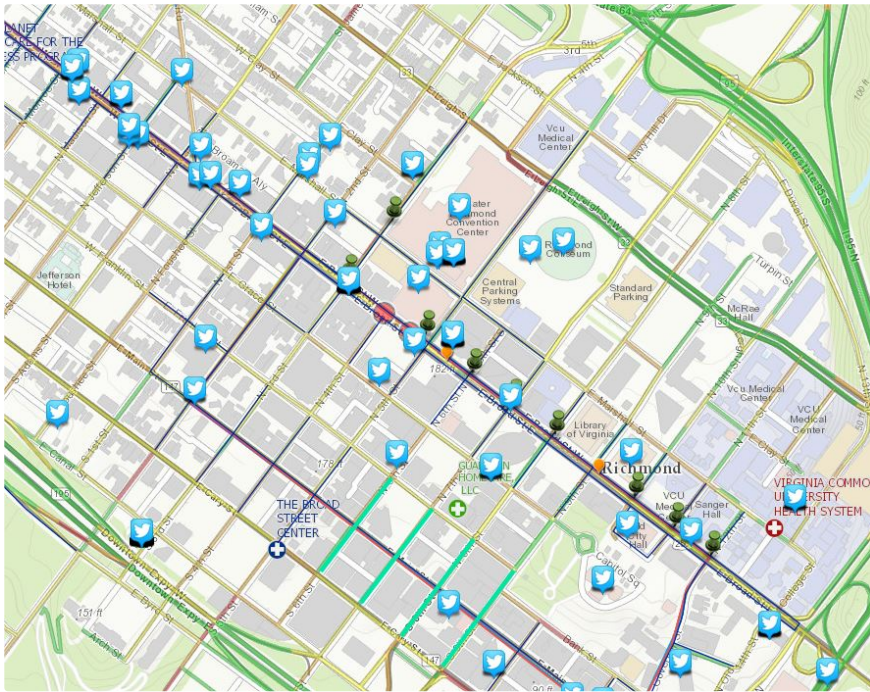
Left Picture: 9/25/15 In the left picture, individual tweets were scattered around the area.

Right Picture: 9/29/15 In the right picture, population hotspots can be identified near the eco-stations.

From 9/29/15 – There are two population hotspots located near the accessibility areas shown as a pink, transparent polygon. However, no eco-stations are located there and the closest one is located at the intersection of Broad St. and 3rd St, which is quite a distance to walk. Putting a eco-station there would have been a good decision.
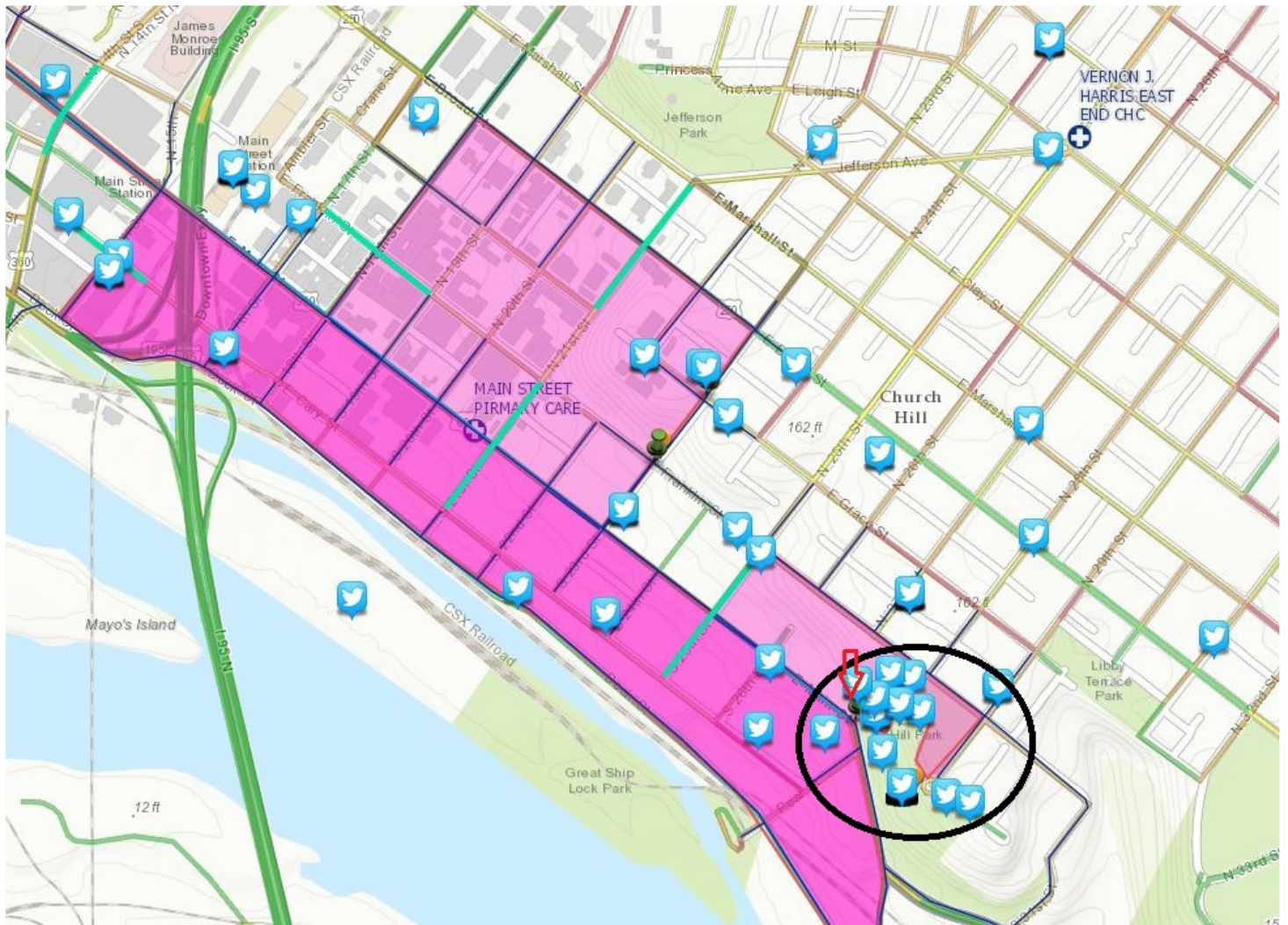
From 9/29/15 – A population hotspot is located very close to the eco-station at Libby Hill which is also a fan zone.

The Journey and Final Thoughts

During the first week of this course, we learned about GIS and spatial thinking. GIS (geographic information systems) is a system that stores, analyzes, and uses data from locations on the surface of the Earth in a convenient and efficient way. Spatial thinking is a more complex way of thinking that allows people to think critically from using knowledge that they know, looking for patterns, and how something exists in space. There are three elements: the concepts of space, the tools of representation, and the processes of reasoning, which are fundamental parts of spatial thinking.

During the second week, we learned about map scale, shapefiles, the difference between precision and accuracy, and got our first introduction into using ArcGIS Online. Knowing whether a map is a small scale map or a large scale map is important because this can affect resolution and accuracy. Small scale maps show a large area with objects that are small. This results in low resolution and it less accurate. Large scale maps show a small area with objects that are large. This results in high resolution and is more accurate. Precision is the degree to which the repeated measurements show the same results. Accuracy is how close the measured value is to the actual value. A part of our assignment was to make an account on ArcGIS Online and complete a tutorial. The tutorial laid out step-by-step how to create a map and turn it into a web app.

During the third week, this was our first class meeting. Dr. Ciminelli gave a great overview of the things we previously learned and introduced map projections and how GPS works. Furthermore, Wyatt showed us some features of ArcGIS Online. Then, we were given our third assignment.

For our third assignment, we had to create our very own bike race adaptive response map. I started my map by clicking on the create new map button and added the shapefiles. I knew I wanted to add some of datasets we discussed in class such as road closures and population hotspots. However, it was a challenge in the beginning to try to find these datasets. I tried using "road closures" as the keyword in the search box, but that did not work. I tried to "traffic" next. This provided real time data which was great, but I was looking for something that was specific just for the UCI Bike Race. I tried "uci" next and finally I found it. I added the layer and then pondered on what other datasets would be needed. The best way to figure this out was to research more about the bike race. I went to the UCI World Road Championship website and started reading more about the race, what locations the race were in, the attractions at the race, and etc. Eventually, I was able to add course crossing, fan zones, and current wind and weather conditions. It is important to know where people can cross safety during a bike race. Fan zones were supposed to be areas that where a majority of the people would watch the race according the the website. Wind and weather are important for both the cyclists and people attending the race. Finally, I was able to make the web app and add the Twitter tweets. Trying to figure out how to do this took

more researching and a bit of frustration. The tweets would not showed up, and there were multiple attempts of trying to make the web app again just to get this one, important feature to work. A good night sleep and another try at it, and it finally worked. Below is the map that I came up with.
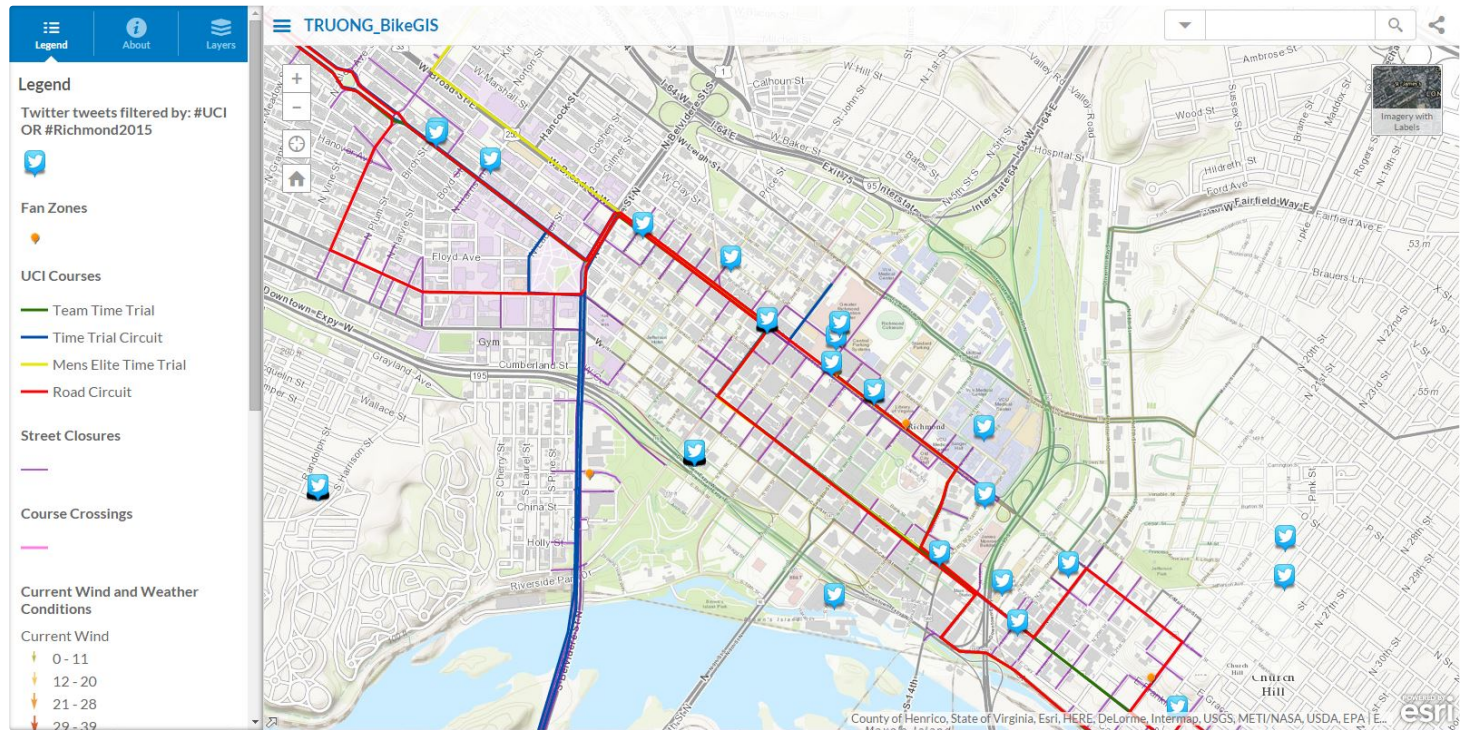
Map created for assignment 3

And then it was September 25th.

As I reflect back on this class, I have come to realize many things. Spatial thinking and its three elements played a huge role in this course. The purpose of the map was to determine population hotspots and how well the eco-stations were placed in order to promote sustainable trash management. The first element, the concept of space, was fulfilled when thinking about what datasets would be important to have. The second element, tools of representation, was fulfilled when we created the web app which displayed the map with the datasets. The third element, the process of reasoning, was fulfilled when we looked at the population hotspots and eco-stations and why some of the population hotspots were located in those areas and how it related to the locations of the eco-stations. Overall, the class was challenging in some aspects. Coming into the class, I had heard of GIS before, but I did not know what it actually was. Trying to map by myself was difficult at first because it was my first time actually

doing it. Looking at my previous map and the map I made on race day, I feel proud of it. Throughout the course, I was always learning something new and being able to actually apply what I learned made this course so beneficial. These 7 weeks went by really fast, and the class overall has been an amazing experience.
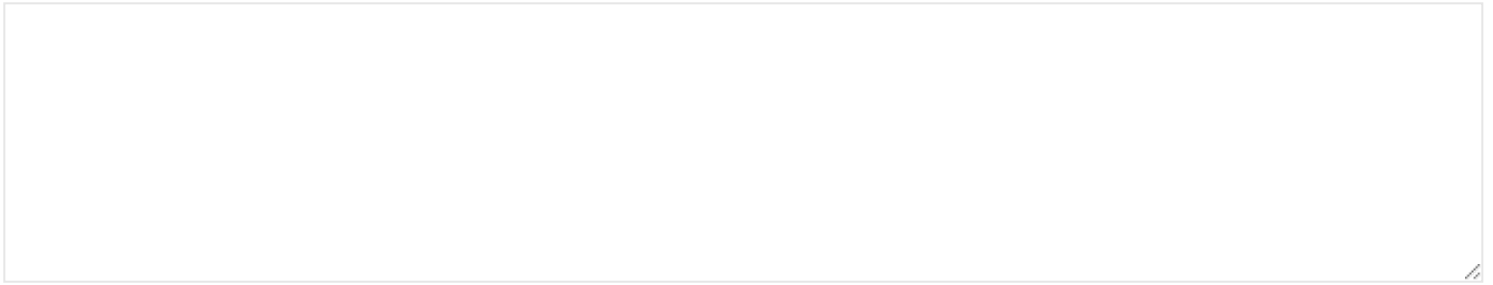

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