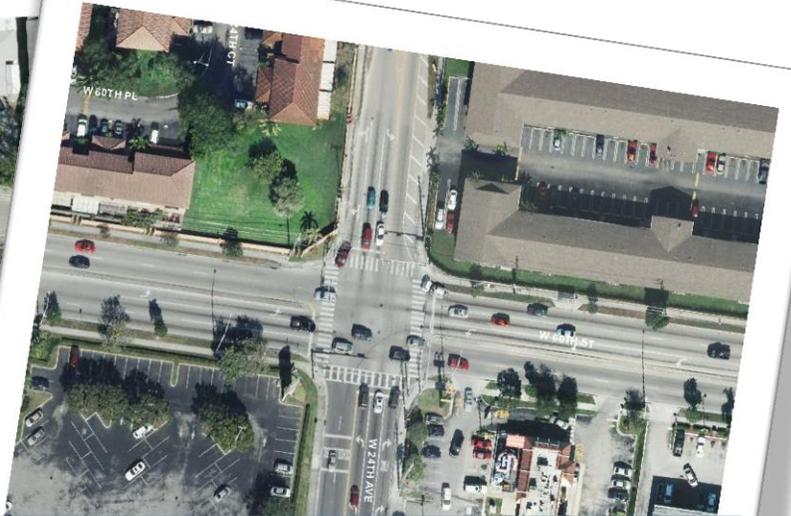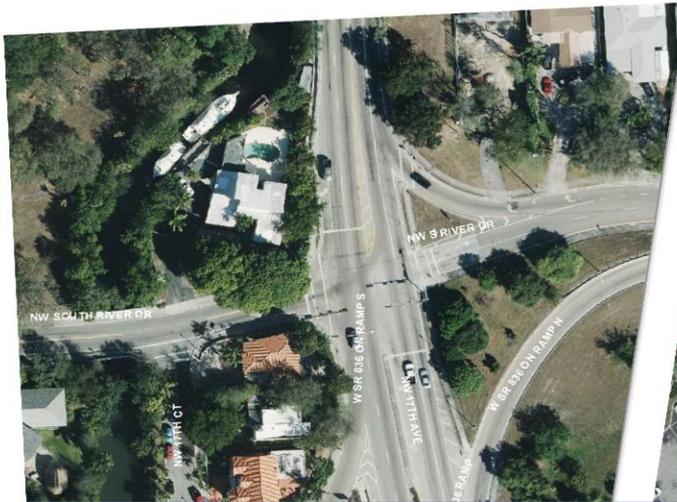# Miami Dade County
Public Works Department

INTERNSHIP REPORT

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My name is Katherine Marquez, a Civil Engineering Major at Florida International University. I am an undergraduate student looking forward to graduating in Summer 2015. In spring of 2014 I had the opportunity to work with the Miami-Dade County Public Works and Waste Management Department as an intern during spring. I worked with Ayman Elbermawy, manager of the Public Safety Program in the Traffic Engineering Division, whose director is Dr. Joan Shen.

The Traffic Engineering Division of the Department at MDC makes studies about public safety every year in order to improve the design of roads within the county, so it is easier and safer for users (vehicle drivers and pedestrians) to take the most advantage of the traffic system in Miami-Dade County. This study is the result of a contract with the Metropolitan Planning Organization (MPO) and the Florida Department of Transportation (FDOT). The objectives are the following:

- Acquiring and Processing of Data
- Identifying High Crash Locations
- Conducting Field Studies
- Intersection Safety Assessment
- Countermeasures and Potential Improvements
- Preparation and Submission of Final Report

The procedure of these studies is prepared as follows:

1. Obtaining data about the number of accidents on intersections. All the locations evaluated need to be regulated by Miami-Dade County; this means that important roads such as interstates that are regulated by the Florida Department of Transportation (FDOT) do not need to be taken into account.

2. Choosing the 25 locations with the highest crash rate for further analysis.

3. Analyzing the design of intersection to determine parameters such as type of intersection, number of lanes, whether it is urban, rural, or suburban, and if it is an arterial or a collector.

4. Getting information regarding the accidents occurred on each intersection and draw crash diagrams to have a better sense of the way each accident happened. This would help identify any pattern that may need to be improved.

5. Comparing this data with the instructed by the Florida Department of Transportation. This way we can obtain a sense of what should be expected to occur on certain class of intersection so anomalies can be established.

6. Conducting field studies to have a better idea of what is really happening one each specific intersection. This is one of the most important steps in this safety study;

having a sense of how the intersection looks physically is vital to this analysis.

7. Countermeasures and recommendations would be given by designers based on the observations made from the field studies and the comparison made with the data from FDOT.

In order to do this, the division does the pertinent research to determine what intersections need to be improved due to the high number of crashes that occur on them. Then, the patterns of the different types of crashes are analyzed deeply to make recommendations about the design of each intersection; therefore, the number of crashes can be diminished in the near future.

The result of this extensive work is a report that evaluates the following items for each candidate location:

- Site Description
- Safety Conditions and Analysis
- Traffic Operation Conditions and Analysis
- Recommendations
- Conceptual plan

I was responsible for the "Safety Conditions and Analysis" Section of the Safety Studies Report concerning years 2011, 2012, and 2013. Even though I knew there were other engineers and designers responsible for the other sections on the report, I was involved in all the aspects of the study because of the relevance of my task. The first part of my job was determining which locations were candidates for further analysis from a database I was provided with. As I mentioned before, the county does not get involved in analyzing roads that belong to the state because they are FDOT's concern; therefore, I had to classify whether the intersections where state roads or roads that belonged to the county from a list that I was presented with.

From that list, I was able to select the 25 locations with the highest crash rate. Since not all the intersections are designed the same way, they cannot be analyzed the same way either. Hence, I had to analyze the design of each intersection determining their number of lanes, the type (T-intersection of Four-legged intersection), and whether they had turn lanes.

One of the new things I learned is how they obtain information from The Police Department about all the accidents occurred on each of the intersections; aspects such as type of crash, condition of road, lighting condition, alcohol involvement, time, and date were presented on the crash reports found. Also, I learned to draw crash diagrams, which is basically a graphic representation of the accidents. Even though I learned how to do this, it was not my responsibility to draw the cash diagrams from the crash reports obtained; the important part I had to know was how to interpret them.

When all the crash reports (including diagrams) were handed to me, I was responsible for tabulating the information presented on them in the format that they wanted to be seen on the report; that way it would be easier to evaluate. I had to compare this information with the one stipulated by the Florida Department of Transportation. For the different types of intersection and different types of road (urban, suburban, and rural), the FDOT has already predetermined the number of accidents that is likely to occur on that intersection, depending on the design of the intersection and the type of accident. Based on that data, it could be determined what types of accident were relevant for further analysis.

I was presented with an enormous challenge when accepting the internship because I have not taken any transportation classes yet. I know that I am a fast learner, but it is different when you have a huge responsibility like this report on your hands. I remember I did not know how to count the lanes approaching an intersection, so I had to read the manuals and taught myself how to determine that in order to analyze each intersection accurately. In addition to that, there were a few term that I didn't understand; however, I was provided with all the information. I learned many concepts before taking my first transportation class the following semester.

The tables that I created contained basic aspects of the crashes on each intersection such as number of crashed per year, and statistic terms like average number of crashes, 90th percentile, and 95th percentile. Also in this tables, the Average Daily Traffic and the Florida Average Crash rate were indicated. By providing this numbers, the safety ratio was found. I did not need to dig too much into learning how they use this method since they use a template format and I just had to make sure that the ADT and the Average Crash Rate were accurate.

Another table was created for each intersection called "Abnormal Crash Details and Countermeasures". In this tables, the information about the types of crashes that showed abnormal crash patterns that exceed the threshold limits for the 95th percentile confidence level (obtained from the first tables created). In order to finish creating this second part, I worked with engineers to determine the recommendations and countermeasures for the design of the intersection.

When all the tables were completed for each one of the 25 candidate locations, a ranking was performed. This would allow narrowing the list from 25 to 20 locations. Three aspects were used for this ranking: total number of crashes, safety ratio, and crash severity index. This last one is obtained using the Equivalent Property Damage Only method (EPDO) that again I did not have to learn. In order to do this, a three-phased ranking scheme is used as the basis to determine the high crash locations. Intersections were then ranked by the aspects I mentioned before, and then they were ranked by a combination of these factors. With the new list of only 20 locations, field studies were conducted; I did not participate in this part of the study.

I had one last task to perform: putting everything together. Although I sound boring, I really enjoyed this part. It was really comforting to see how something that I had been working for a long time was finally taking its shape. In addition to the report, I also had

to organize to Appendix, which contained all the sources where the information used in the report was taken from.

The main reason why I was looking for an internship was to be able to decide what path I want to follow when I get my degree. My internship with the Public Works Department at MDC was an amazing experience and it definitely helped me grow both personally and professionally. I want to thank Dr. Albert Gan, Dr. Joan Shen, and Ayman Elbermawy for trusting me and giving me this amazing opportunity.