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Working with the Nebraska Department of Transportation (NDOT) over the summer has given me not only the opportunity to continue my education in transportation engineering through on-the-job experience, but also an opportunity to take part in meaningful projects that will impact the future of transportation in the state of Nebraska in both safety and efficiency.

The first project I began working on was a comprehensive inventory of all the roundabouts in the State of Nebraska which contains the location, annual average daily traffic (AADT), approach speed limits, number of lanes, crash rate, etc. for each roundabout. To do this I received a few separate lists containing roundabout locations from the metropolitan planning organizations (MPO's) in the state such as the Metropolitan Area Planning Agency (MAPA) in Omaha and Lincoln Metropolitan Planning as well as various lists from the western and rural districts of the state. With these, I was able to use various NDOT databases and Google Earth to obtain all of the previously mentioned information and calculate crash rates and vehicle volumes for each roundabout which enabled me to generate numerous figures and statistics similar to those in the State of Nebraska Annual Traffic Crash Facts Report. This information will likely be used in future projects to predict the effectiveness of roundabouts in various locations around the state. One of the most interesting things I learned while working at NDOT, was the fact that over the last three years there have been no fatality crashes on any Nebraska roundabouts that came out of this project.

Additionally, I was given the opportunity to learn about crash modification factors (CMF's) and safety performance functions (SPF's) discussed in the American Association of State Highway and Transportation Official's (AASHTO) Highway Safety Manual (HSM). The aforementioned CMF's and SPF's are used to predict the amount of and severity of crashes that will occur on a

given roadway or at a given intersection based on geometry, lighting, and many other factors. This enables roadway design engineers to have a better understanding of the safety of new roadways and intersections being constructed and assists engineers working in highway safety to select safety improvement projects that are statistically proven to be effective at reducing various crash types. The first thing I learned by scanning through the HSM was the depth and volume of the data that is required to calculate a CMF or SPF for a section of roadway or an intersection. After I processed that, I was able to use the knowledge that I had gained through researching the various CMF's, SPF's and their fundamental equations to put together a compendium of information detailing precisely what data would be needed to calculate each one and whether NDOT had that data or not. This information was then summarized in an easily read table as an attachment to the full document. At this point I was challenged to come up with a method to fill in the missing data. Through this final part of the project I had the opportunity to explore how data was actually collected, something seldom discussed in a formal classroom setting.

Another aspect of NDOT and a fundamental element of engineering that I was exposed to was post completion project safety evaluations. These evaluations determine the effectiveness in terms of safety and financial cost of projects that have been built in order to determine if similar projects will be completed in the future. I typically had significant freedom in how I completed projects that had been assigned to me, however, I feel I exercised that freedom the most when working on the safety evaluations. When handed the project, I was given instructions on how these analyses had been conducted in the past, which were presumably written before computers were as common in the workplace as they are now. A major part of the process included counting, by hand, all crashes that occurred at each study site over a three year period before the project was started and a three year period after the project was completed and sorting them by

severity level and crash type. For a typical evaluation with 5-50 crashes in each time period this was a satisfactory method. However, the second or third project I worked on consisted of upwards of 2,000 crashes in each time period. The counting and sorting for that evaluation alone took nearly three work days to tally by hand in addition to a few hours to track down minor errors. With other similarly large projects on the horizon, I began to develop a new method which involved exporting crash data to an excel sheet which automatically counted and sorted all of the crashes. This took a few tries to create due to the volume of data and minor variations in labeling, but once completed I was able to count and sort the same amount of crashes in a matter of about 30 minutes (roughly the same amount of time it took strictly to export and print the data previously).

Over the course of just over two months I have been given an exceptional opportunity to learn about and experience different aspects of transportation engineering from a vastly different perspective than offered in a classroom. Furthermore, not only was I able to take in the information presented to me, but I was given the liberty to contribute my ideas and the freedom to be creative in my methods. With only about two weeks remaining at NDOT, I have no doubt I will continue to learn and expand my knowledge in that time and carry those lessons and the ones already learned through my career regardless of where I land following graduation.