Mid-America Transportation Center Internship

Summer 2019

Midwest Roadside Safety Facility

May 20, 2019 – August 9, 2019

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Starting on May, 20th 2019 I began working with Midwest Roadside Safety Facility (MwRSF) through the Mid-America Transportation Center (MATC) Internship Program. Through this internship I have, without a doubt, learned tremendously more about what it's like to do engineering work and what it actually means to be an engineer than I ever would have without being a part of the MATC Internship Program. While working for MwRSF I worked primarily on the NCHRP 22-34 project.

The objective of the NCHRP 22-34 project is to develop Zone-of-Intrusion (ZOI) under the *Manual for Assessing Safety Hardware, Second Edition*'s updated crash testing requirements. This was done in the past by MwRSF with National Cooperative Highway Research Program (NCHRP) Report 350 requirements but needed to be updated to the new crash testing requirements. ZOI is the measurement of how far an impacting vehicle comes over a barrier in the event of a crash.

Initially I started on this project by compiling a comprehensive database of states' standard plans and design details for rigid barriers. Rigid barriers include the New Jersey shape concrete barrier, f-shape concrete barrier, single slope concrete barrier, vertical shape concrete barrier, low profile concrete barriers and steel bridge rails. To do this I visited each state department of transportation's (DOT) website and collected the data for the rigid barrier systems that they had there. I found this task to be rather difficult as many state DOT websites are difficult to navigate and the data is often outdated or incomplete. If I was unable to find any data on the state DOT's website I had to use other means to find the standard plans and design details. After collecting all the plans and details I sorted it by state, barrier shape, height and test level. After compiling and sorting all the data that I had collected I began my work in AutoCAD. In

AutoCAD I drew cross sectional views for each of the unique barriers that I had collected from my previous work. I put each one in a separate layer on the same file starting at (0,0) so the barriers could easily be plotted over and be compared to one another.

I also worked on a literature review portion of this project. For this part of the project I searched through quite a few In Service Performance Evaluations (ISPE) that had been done and collected previously relating to rigid barriers. I put them all in an excel spreadsheet and looked for any information regarding ZOI or anything else that might be directly relevant to the NCHRP 22-34 project. I summarized each of the ISPEs in the excel spreadsheet and sorted them according to what they were evaluating. Though at the end of the search very little relevant information turned up as ZOI is an often overlooked element of barrier placement and usage.

My final contribution to this project was the measurement and plotting of ZOI from previous test videos. This took the most time out of anything else I did for the project. It involved looking at many test videos so that I could get several measurements for each barrier shape and height. To do this I used a program called Redlake MotionScope Media Player which allows a user to take measurements from a video. To do this the user needs to first calibrate the video by giving it two known points and telling the program the distance between those two points. This program allowed me to measure the intrusion over the barriers in several directions fairly accurately. After having collected the data from the videos I recorded all the measurements I took in a spreadsheet where I plotted the data. I used the plotted data to compare ZOI for

barriers of similar test level, height, and shape. I looked for any patterns such as ZOI being greater vertically for certain heights or shapes.

Over the course of this project I also worked intermittently on the report for the project. The sections of the report that I wrote were over the parts of the project that I worked on specifically. By working on this report I was able to gain a better understanding of technical language and how it applies to the field of engineering. I was able to learn and better understand the report writing process as well as the report reviewing process.

My work with MwRSF through the MATC internship program has allowed me to gain a far better understanding of what it actually means to work in the field of engineering. I think the experience and skills I have gained through both MwRSF and MATC will help me greatly in furthering my career in engineering. I am incredibly grateful to both MwRSF and MATC for my experiences this summer.