

PAVEMENT MANAGEMENT RESEARCH PROJECT
Project ID: CEEEn_2017CPST_008

by

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A Capstone project submitted to

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Department of Civil and Environmental Engineering
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Introduction

PROJECT TITLE: Pavement Management Research Project
PROJECT ID: CEEEn-2017CPST-008
PROJECT SPONSOR: J-U-B Engineers, Inc.
TEAM NAME: DTR Engineering

Executive Summary

J-U-B Engineers, Inc. would like us to conduct a Research of literature and local pavement managers to gather data on pavement treatments and PCI ranges in which they are appropriate and effective as well as how long they last. J-U-B Engineers, Inc. is specifically interested in pavement management in Utah Valley. As well as research in pavement treatments and preventative measures, they are interested in pavement deterioration rates considering the condition of the pavement as well as the subgrade.

The desired outcome of the project is as follows:

- a. PCI ranges in which treatments are appropriate and effective
- b. How various treatments can increase the PCI
- c. How the PCI decreases as time passes after treatment
- d. Database of costs of treatments, with variations in time, quantity and location
- e. Relationship of pavement deterioration rates in Utah Valley with physical characteristics of pavement and subgrade

DTR Engineering has reviewed the requirements of J-U-B Engineers, Inc. We are committed to providing J-U-B Engineers, Inc. with the necessary information and data to meet their needs.

Key Deliverables:

A poster presentation and a final report with the tables and information requested by J-U-B Engineers, Inc. (See deliverables section for more detail).

List of Figures

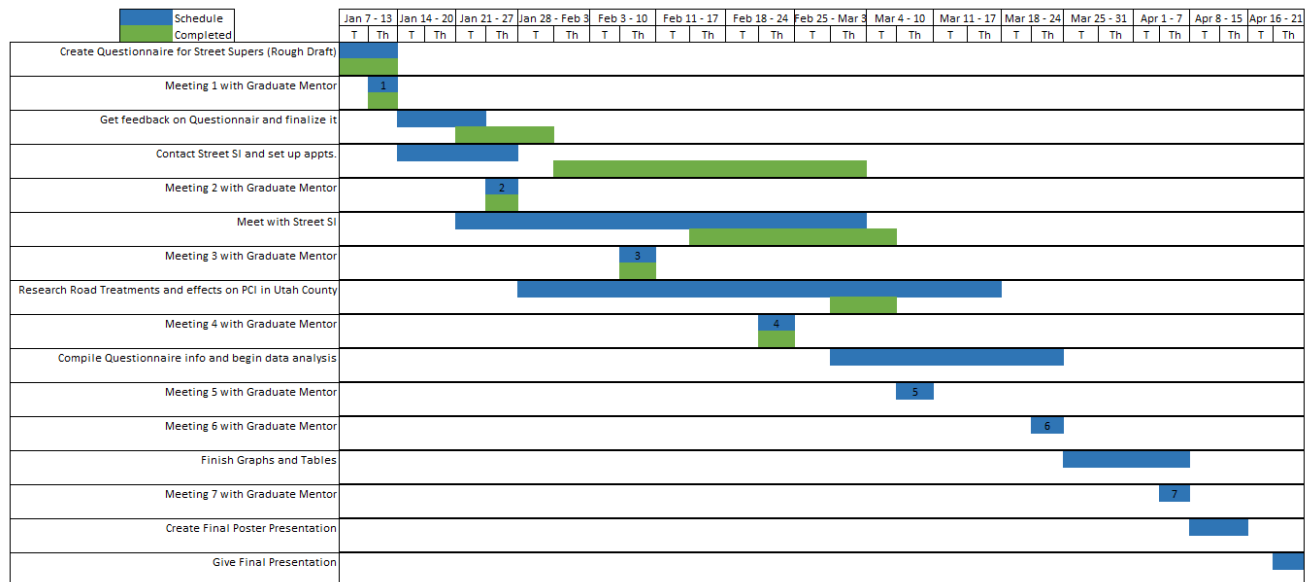
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Schedule

Team members meet weekly at the designated class period, every Tuesday and Thursday, for a three-hour time period. The team meetings are held during this class period in order to establish weekly goals and deadlines. Team members use these meetings to discuss any challenges to their work.

Figure 1: Capstone Project Schedule



Assumptions & Limitations

For our capstone project, we are assuming that all of the municipalities use PCI to rate the quality of their roads. This may cause small amounts of confusion initially, but our survey explains what PCI is and how we use it to determine the quality of roads.

Design, Analysis & Results

Figure 2: Survey for Street Superintendents

	Which of the following treatment types do you use?	How much does this treatment cost per square foot?	How long before re-treatment is needed?	Which types of distresses does this treat?											
	Select all that apply	Enter a dollar value	Enter a time in months	Fatigue Cracking	Alligator Cracking	Edge Cracking	Block Cracking	Transverse Cracking	Longitudinal Cracking	Potholes	Patch Deterioration	Rutting	Shoving	Raveling/Weathering	Bleeding
Spot Repairs	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Crack Seal	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Minor Patching	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rejuvenators	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chip Seal	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cape Seal	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Slurry Seal	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
High Density Mineral Bond	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Microsurface	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Major Patching	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overlay	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mill and Overlay	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pulverize Asphalt and Repave	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Replace Asphalt and Base	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other <input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The survey that we made was the primary source of obtaining our information. Our survey was a compilation of questions asking about certain road treatments and costs of said treatments. We did our best to include treatment options used in the Utah Valley area, but we provided additional blank spots that could be filled in with additional treatment options that we may have missed. We also made an easier way for comparing PCI values to the various methods used by other city governments in the survey. We have contacted Alpine, American Fork, Cedar Hills, Eagle Mountain, Lehi, Orem, and Provo. We were able to get a lot of good feedback from Provo City that will help us in the analysis of our other data. Once all the data is together, we will compare and analyze the data we received. Not shown in the picture, our survey also helps determine how the treatments effect the PCI of the road.

Lessons Learned

While creating the survey to distribute to the street superintendents, we were having a rough time of trying to use language that would communicate our ideas and questions. This was an integral part of converting our data into something that street superintendents and engineers would understand. In order to get user friendly questions to ask, we made a prototype survey and presented it to our sponsors, student mentor and our faculty advisor. After we received feedback, we updated our survey and set up a meeting with the Provo street superintendent. He was able to discuss from a street superintendent perspective of what he understood and where he struggled. By getting the perspectives of both sides and reviewing with many parties, we have been able to produce a very good finished product. This will allow us to minimize the time of taking the survey and gain better information from Utah County street superintendents.

Conclusion

The project is going well so far. We are still collecting our data from the Street Superintendents. We anticipate the collection of the data being the most difficult and time consuming aspect of our project. From now until the time of the completion of our project, we will begin to compile our data and graph the results that we are collecting.