ARTERIAL COLLECTOR DESIGN & FEASIBILITY STUDY
Project ID: CEEn_2016CPST_008

by

Sic Parvis Magna Engineering
Shaun Hilton
Joseph Browning/ Data Collection
Jordan Arrowchis/ Data Analysis
David Michelsen /Design & Drawings

A Capstone project submitted to

Dan Tracer
Bluffdale City Engineering

Department of Civil and Environmental Engineering
Brigham Young University

November 14, 2016

Introduction

PROJECT TITLE: Arterial Collector Design & Feasibility Study
PROJECT ID: CEEn-2016CPST-008
PROJECT SPONSOR: Bluffdale City Engineering
TEAM NAME: Sic Parvis Magna Engineering

The City of Bluffdale has asked for a feasibility study and preliminary design for a roadway which is to be considered for connecting Loomis Parkway and The Bluffs Apartments. The current emergency roadway connecting the apartment complex to Loomis parkway has been the site of several accidents, and this project has been commissioned to improve the safety of and provide convenient access to the residents of The Bluffs Apartments.

The tasks to be performed include a traffic study which is to be completed by December 12, an accident report by January 16, preliminary roadway design by January 30, a cost analysis by February 6, a construction feasibility study by February 13, a signal warrant study by February 27, and a feasibility study by March 13. The combined efforts performed in these tasks should lead to a decreased rate of accidents and reduce travel time.

Deliverables for the project will include the aforementioned feasibility study and roadway design, regular status reports, and a presentation.

Proposed Work Plan

Traffic Study – A traffic study will be performed along Loumis Parkway in Bluffdale to determined annual average daily traffic (AADT).

Accident Report Study – Study of accident data in the area of proposed study.

Signal Warrant Study – From the data collected in the traffic study, signal warrant study will be performed for each of the roadway designs to see if a signalized intersection is warranted.

Cost Analysis – Based on 2016 prices, the cost for each roadway design will be estimated using a unit cost.

Construction Feasibility Study – Comparing the feasibility of construction of the proposed designs.

Preliminary Roadway Design – Using the provided LIDAR data, 3 new roadways will be designed for analysis. These designs will include a plan and profile views as part of the preliminary design.

Feasibility Study Report – A compilation of the data collected from the studies performed, and an analysis of feasibility.

Deliverables

1. Feasibility Study: A report recommending an alignment alternative based on total project cost, vehicle and pedestrian safety, and construction feasibility.
2. Preliminary Design of Roadway: Drawings showing the design of roadway.
3. Bi-weekly status reports documenting challenges, solutions & progress of the project.
4. Presentation

Schedule

Date	Work to be Completed	Project Work
November 14, 2016	Proposal	
November 21, 2016		Group Meeting, Progress Report
November 28, 2016		
December 5, 2016	Status Report	Group Meeting, Progress Report
December 12, 2016	Traffic Study	Group Meeting
December 19, 2016		Group Meeting, Progress Report
December 26, 2016		
January 2, 2017		Group Meeting, Progress Report
January 9, 2017		Group Meeting
January 16, 2017	Accident Report	Group Meeting, Progress Report
January 23, 2017		Group Meeting
January 30, 2017	Preliminary Roadway Design	Group Meeting, Progress Report
February 6, 2017	Cost Analysis	Group Meeting, Progress Report
February 13, 2017	Construction Feasibility Study	
February 20, 2017		Group Meeting, Progress Report
February 27, 2017	Signal Warrant	
March 6, 2017		Group Meeting, Progress Report
March 13, 2017	Feasibility Study	Group Meeting, Progress Report

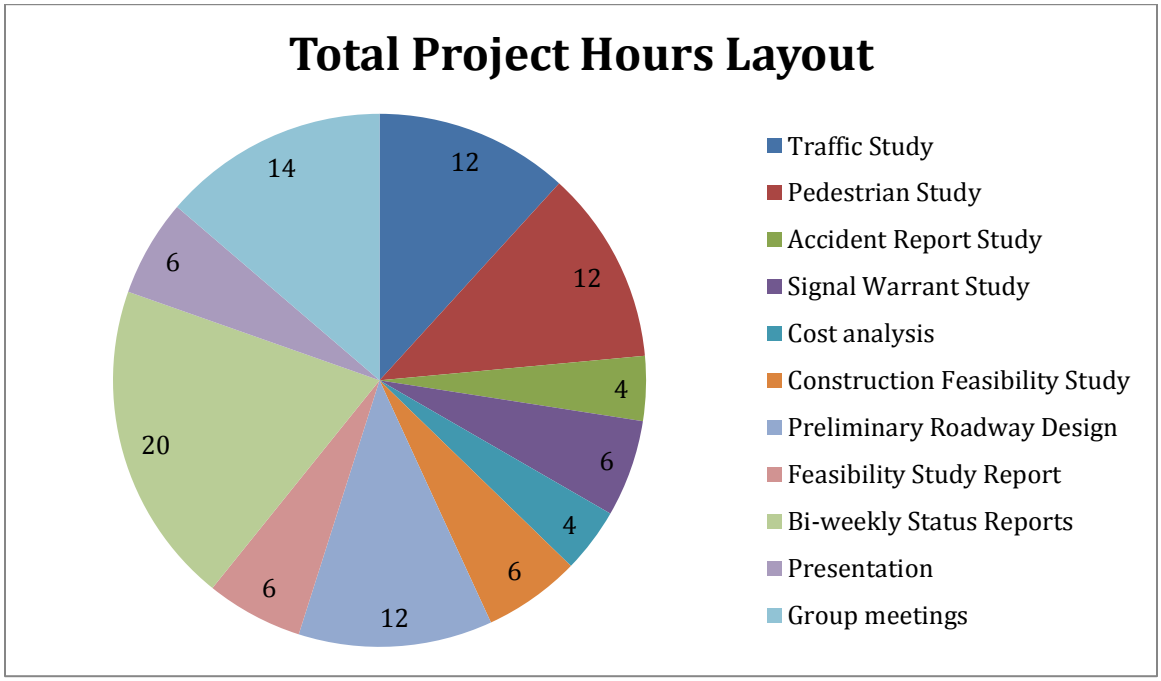
Facilities, Tools, Data and Equipment

The facilities, tools, data, and equipment necessary to complete the project are as follows:

- Survey data of the surrounding area
- Property maps
- ArcGIS
- Civil 3D
- HCS 2010
- Synchro 9
- BYU faculty

Project Budget

- Roughly about 102 hours total for the project
- About 3 hours/week per group member
- Traffic Study – 12 hours
- Pedestrian Study – 12 hours
- Accident Report Study – 4 hours
- Signal Warrant Study – 6 hours
- Cost Analysis – 4 hours
- Construction Feasibility Study – 6 hours
- Preliminary Roadway Design – 12 hours
- Feasibility Study Report – 6 hours
- Bi-weekly status reports – 2 hours every two weeks. 20 hours total
- Presentation – 6 hours
- Group Meeting – 1 hour/week. 14 hours total



Deliverables

- Feasibility Study: A report recommending an alignment alternative based on total project cost, vehicle and pedestrian safety, and construction feasibility. Within these parameters listed above the economic and environmental impacts will be considered. This report will be presented in a PDF format.

- Preliminary Design of Roadway: Drawings showing the design of roadway. These designs will be compiled in a PDF document.

- Short biweekly status reports documenting challenges, solutions & progress. Status reports will be in PDF format.
    - What challenges have your team encountered in your Capstone project?
    - What actions did your team decided to do to overcome these challenges?
    - Any progress in overcoming these challenges?
    - Is project on schedule?
        - Summarize the progress and current status of your Capstone Project
        - Did challenges negatively impact the progress of your project? If so, briefly describe team plan to get back on schedule

- A poster reflecting a summary of your project to be presented to student, faculty and other interested individuals in the final undergraduate seminar

- A presentation summarizing the project to be presented to Bluffdale Engineering.

- A presentation summarizing the project will be presented to Bluffdale City Council.

- Before the end of winter semester both a presentation to sponsors and poster session for students, faculty and other interested people will be organized.

Performance Standards

Team will provide work for this Capstone project "as is" using best practices and with best effort. Project results cannot be construed as work performed by licensed professionals and cannot be used as "stamped deliverables" without first being reviewed, approved and stamped by a qualified and relevant license professional engineer.

Statement of Qualification

David Michelsen is currently working for Provo City Engineering as the lead student intern. In this position David has designed right-of-way improvements for existing roadways using AutoCAD. These designs include the creation of alignments, existing and proposed surfaces, and corridors using assemblies, plan and profile views, and utility layouts using Pipe Networks. In correlation to the designs, David has estimated qualities for bid costs for removal of the existing roadway and construction of the proposed design. For Provo City, David has also helped in stop sign and signal warrants. This has included traffic counts, pedestrian counts, and speed data collection. David has participated in classes for transportation, traffic engineering, and pavement design, and will be enrolled in geometric design of highways during the next semester.

Joseph Browning is working as a research assistant at BYU, designing a complex intersection to be used as a guide for a final project for an upcoming class. This design includes merging and diverging ramps, turning lanes, and accounting for terrain data. Previously, Joseph has worked as a research assistant for BYU on a bicycle infrastructure study, in which he collected data at 15+ locations throughout the state of Utah. Joseph will be responsible for data collection.

Jordan Arrowchis is currently in his senior year at BYU as a Civil Engineer. He is currently enrolled in CE EN 361, Introduction to Transportation Engineering and will be taking CE EN 461, Geometric Design of Highways, winter semester.

As a team we have designated Joseph as team leader over Data Collection, Jordan over Data Analysis, and David over Design and Drawings. The other members will be actively engaged with the tasks for each of the three designations that are required for the completion of the project. Each week we will hold a team meeting to discuss the progress of the project and to report on the completion of tasks that are assigned to each of us. We will work together to organize the tasks and complete them on time.

Appendix A

David Michelsen

dpmichelsen@gmail.com • 801-360-0313 • 700 N Valley Dr. Spanish Fork, Utah 84660

Education

Bachelor of Civil Engineering

April 2017

Brigham Young University - GPA 3.22

- Emphasis in Transportation

Associate of Science

August 2011

Utah Valley University - GPA 3.39

- Earned during High School
- Studied natural and life sciences, communication, and math

Professional Experience

Civil Engineering Student Intern

May 2015-Present

Public Works Department, Provo City

- Designed existing road improvements, curb and gutter, and pipe layout,
- Prepared quantity estimates, traffic control plans, work orders, bond estimates, bid documents, and plan/profile sheets.
- Carried out speed studies, traffic counts, and pedestrian counts.
- Oversaw the planning of the $150,000 2016 Sidewalk Replacement Project

SWPPP Inspector/Civil Engineering Intern

Dec 2014-May 2015

Engineering Department, Spanish Fork City

- Approved SWPP Plans submitted
- Enforced SWPP Plans submitted for new development
- Inspected all active construction sites for compliance
- Designed SWPPP Best Management Practices Standards for Spanish Fork.

Student Scholarship Processor

June 2014-Dec 2014

Brigham Young University Off-Campus Scholarships

- Process off-campus scholarships for enrolled students.
- Detailed work using Excel, and Brigham Young University software

Voluntary Service Leader

Full Time Volunteer

The Church of Jesus Christ of Latter-day Saints, Eugene, Oregon Jul 2012-Jun 2014

- Led a group of 20-24 volunteers, conducted weekly training meetings, followed up on goals, and sent weekly progress reports to the service leader.
- Consistently worked 10-12 hour days for two years.
- Increased volunteer effectiveness by providing training in individual communication, problem solving, organization, and working strategy skills.

Skills

- AutoCAD Civil 3D – surfaces, alignments, assemblies, corridors, profiles view, and pipe network.
- Autodesk Design Review – quantity take off sheets.
- Microsoft Office

Joseph Browning

737 N 600 E Apt. 101
Provo, UT 84606
801-821-3198
jbrowning789@gmail.com

Education

- Brigham Young University
  - Major: Civil Engineering
  - Expected Graduation: December 2017
  - GPA: 3.7
  - Applicable Courses:
    - CEEn 361
    - CEEn 270
    - ENGL 316

Work Experience

- Research Assistant – Brigham Young University
  - June 2015 – December 2015
  - Collected bicycle research data at 15+ locations throughout the state of Utah to determine the effectiveness of existing bicycle infrastructure
  - Proofread reports to UDOT for spelling and grammatical errors
  - Wrote a computer program to ensure 400+ data points had been transferred correctly between Excel spreadsheets
- Research Assistant – Brigham Young University
  - September 2016 – Present
  - Designed a complex intersection including on and off-ramps as a guide for an upcoming class
- Full-Time Missionary – The Church of Jesus Christ of Latter-Day Saints
  - July 2012 – July 2014
  - Tacoma, WA
  - Organized missionary efforts in various cities throughout Western Washington

Skills

- AutoCAD
- WMS
- Excel VBA
- Civil 3D

Jordan Arrowchis
737 N 600 E Apt #101, Provo, UT 84606 [residence]
(949) 878-0726, JordanArrowchis@gmail.com

Career Objective

To obtain a position as a Civil Engineer, specializing in the field of transportation.

Work History

Brick Oven Pizza, Provo, UT — July 2016 to Present

- **Pizza Delivery Driver**
  - Managed all phone calls received by the restaurant and provided timely support.
  - Helped around the restaurant during slow times to positions that were in need of assistance.

DealerSocket, Provo, UT — July 2015 to Jan 2016

- **Hands On Lab Trainer**
  - Conducted daily online training classes to all customers using Dealer Socket's marketing software.
  - Helped establish and make correction to the scripts followed when teaching each specific class.

iPayables, Orem, UT — June 2014 to Jan 2015

- **Data Entry**
  - Provided invoice processing for all clients.
  - Prepared, compiled, and sorted documents for data entry; used scanning equipment for imaging; entered invoice data using in-house software system; reviewed documents for accuracy and made adjustments.

BYU Creamery on the 9th, Provo, UT — Jan 2014 to May 2014

- **Stock Clerk**
  - Worked part time early-morning shift to stock dairy, grocery, and cafeteria locations.
  - Provided janitorial services as needed prior to store opening.

Church of Jesus Christ of Latter-Day Saints, Pocatello, ID — Jan 2012 to Dec 2013

- **Volunteer Missionary**
  - Served full time as church representative planning, teaching, training, and supervising up to 10 other volunteers.

Professional Community Management, Laguna Woods, CA — May 2011 to Dec 2011

- **Clubhouse Aide**
  - Worked 24-36 hours per week preparing events at a retirement community with 18,000 residents.
  - Responsible for opening or closing clubhouse facility, setting up tables and chairs for events including sound equipment, helping residents plan event layouts.

Education

Brigham Young University, Provo, UT

- Expected Graduation 2017, Civil Engineering Major

Aliso Niguel High School, Aliso Viejo, CA

- Graduated 2010, Valedictorian GPA: 4.2

Extracurricular Activities

Eagle Scout, Marching Band, Volleyball Team, Tennis

Computer Skills

Word, Excel, PowerPoint, Basic Programming in C++ and VBA, Revit, HydroDesktop, ArcGIS