

**ARROWHEAD CENTER - TRANSPORTATION &
URBAN PLANNING DESIGN DATA REVIEW &
ASSESSMENT**

Project ID: CEEEn_2017CPST_003

by

**GSM Engineers
Josh Gibbons
Gabrielle Jones
Shanna Carroll
Mitchell Hadfield**

A Capstone project submitted to

**Bob Tandler
Fritzi Realty**

**Department of Civil and Environmental Engineering
Brigham Young University**

October 30, 2017

Introduction

PROJECT TITLE: Arrowhead Center - Transportation & Urban Planning Design Data Review & Assessment
PROJECT ID: CEEEn-2017CPST-003
PROJECT SPONSOR: Fritzi Realty
TEAM NAME: GSM Engineers

This project will focus on transportation and urban planning design located at Arrowhead Center in Spanish Fork, Utah. Design will be dependent upon the new developments planned for the four parcels of land provided for the project. Based on this information, Trip Generation Manuals provided by the Institute of Transportation Engineering (ITE), and growth rates for the area will be used to project traffic patterns using a design year of 2040 in accordance with the current Spanish Fork Transportation Master Plan. This information will be used to create a traffic impact study and site plan layout. The Team will produce the Traffic Study or Traffic Report required by Spanish Fork city to support an application for a Master Plan, PUD or Redevelopment Plan which will likely be coordinated with a Traffic Study Firm. .

To create the traffic impact study, a traffic count will likely be performed in January at five intersections surrounding the property during weekday peak hours from 7 to 9 am and 4 to 6 pm which satisfy Spanish Fork requirements. Volumes will be projected using information from the ITE Trip Generation Manuals, and modeled in Synchro software. Recommendations and discussion for intersection and/or roadway changes will be provided with corresponding Level of Service (LOS) analysis. During this process, the project team will consult with the project manager and BYU transportation engineering professors. Monthly status reports will also allow the team to implement any changes from client feedback.

In January, site visits and traffic counts will occur. Software modeling for current conditions will begin during February, and the traffic impact study for the new development will follow. Near the end of February, software modeling for future conditions and compilation of the final report will begin. The final report will be finished during the beginning of March. Final presentation materials will be prepared and finished during March, as well.

Deliverables will include monthly status reports sent to the client, a traffic impact study report sufficient in form and content to satisfy Spanish Fork city requirements and site plan layout considering current traffic patterns and projections, a poster, and a final team powerpoint presentation to the sponsor upon completion of the project.

Proposed Work Plan

The following tasks will be performed to complete the requirements of the project:

- Discuss the project scope of work with the client as well as the graduate mentor, Josh Gibbons, during September and October.
- Traffic count data will be collected on site during January, likely at five intersection locations surrounding the Arrowhead Center property during the morning peak hours from 7 to 9 am and evening peak hours from 4 to 6 pm. The data will then be processed through Synchro, traffic analysis software. Traffic data will likely be collected at the following intersection locations:
 1. Del Monte Road and SR-164 Arrowhead Trail Road
 2. Calpac Avenue and SR-164 Arrowhead Trail Road
 3. Woodland Hills Drive and SR-198
 4. South Mill Road and Arrowhead Trail Road
 5. Arrowhead and Main street

The locations selected for traffic data analysis were chosen because they surround the property location.

- The team will review the previous traffic impact study from 2006 - 2007 and other documents sent by Fritz Realty. The team will also review the Spanish Fork Transportation Master Plan to ensure that any recommendations made by the team will be compliant with already existing planned transportation projects.
- A complete traffic impact study report will be created in February and March in accordance with the format and required guidelines set forth by UDOT as well as a site plan displaying proposed layout of roads, considering current traffic patterns and projections. This will be completed using resources in the CAEDM computer lab at BYU.
- The team will consult with BYU transportation engineering and planning experts, Dr. Grant Schultz and Dr. Mitsuru Saito. The team will also discuss possible site recommendations with the graduate mentor for the project, Josh Gibbons.
- The final recommendations for the project site and other project deliverables will be presented in a meeting at the end of March with the client along with a complete report.

If there is to be a commercial plat pursuant to a partial subdivision of Parcel B, there needs to be coordination with UDOT for ingress and egress.

Schedule

Weekly work schedule

	Mon	Tue	Wed	Thu	Fri
7:00 AM	S, G, M		S, G, M		S
8:00 AM	S, G, M		S, G, M		
9:00 AM					
10:00 AM	S, M		S		S
11:00 AM	M	G			S
12:00 PM	M	G			
1:00 PM		G			
2:00 PM	S, G	G	S, G		S, G
3:00 PM	S, G, M	G	S, G, M	G	S, G, M
4:00 PM	S, G, M		S, G, M	G	S, G, M
5:00 PM	S, G, M	G	S, G, M	G	S, G, M
6:00 PM	M	G	M	G	M

Available Work Hours:

S: Shanna

G: Gabrielle

M: Mitch

Project timeline

Dates	Task
Last Day of each month from Jan 2018 to April 2018	Monthly reports
1/8/2018	Kickoff Team meeting
1/8/2018	Identify Locations for Traffic Counts
1/8/2018-1/27/2018	Traffic Counts
1/29/2018-2/3/2018	Software Modeling (Current Conditions)
2/5/2018-2/17/2018	New Development Impact Study
2/19/2018-2/24/2018	Software Modeling (Future Conditions)
2/26/2018-3/17/2018	Traffic Impact Study
3/19/2018-3/24/2018	Poster
3/26/2018-3/31/2018	Presentation

Facilities, Tools, Data and Equipment

Facilities:

The facilities necessary to complete project tasks include the Clyde Building computer laboratory on campus.

Tools/Equipment:

Traffic count devices for data collection and Trip Generation Manuals for traffic projection have been provided by the Civil Engineering Department. Synchro, AutoCAD, and signal timing and analysis software to be used for modeling and traffic analysis is also provided by the Civil Engineering college.

Data:

Scanned documents including a subdivision preliminary plan, 2006-2007 traffic impact study, and information regarding the project location have been provided by the client, and will be used as a reference for project completion. The necessary traffic impact and urban planning data will be obtained by the team.

Project Budget

Dates	Task	Estimated Hours
Last Day of each month from Jan 2018 to April 2018	Monthly reports	8
1/8/2018	Kickoff Team meeting	3
1/8/2018	Identify Locations for Traffic Counts	2
1/8/2018-1/27/2018	Traffic Counts	44
1/29/2018-2/3/2018	Software Modeling (Current Conditions)	8
2/5/2018-2/17/2018	New Development Impact Study	10
2/19/2018-2/24/2018	Software Modeling (Future Conditions)	8
2/26/2018-3/17/2018	Traffic Impact Study	30
3/19/2018-3/24/2018	Poster	5
3/26/2018-3/31/2018	Presentation	5
Total Budgeted Hours		123

Deliverables

- **Monthly status reports** from the project team to Fritzi Realty documenting progress and solutions to challenges encountered during the project lifespan. Any corresponding delays will be documented and plans for resuming the original schedule will be provided. Reports will also include progress updates according to the schedule provided earlier in the proposal. Reports will be delivered via email in the form of pdf documents.
- A **final report** with a **Traffic Impact Study** and **Site Plan** displaying proposed layout of roads, considering current traffic patterns, projects and the proposed buildings. The site plan will also address the potential use at the intersection of Arrowhead and Main Street which might require a partial subdivision and working with UDOT for ingress and egress. Utah Department of Transportation (UDOT) guidelines for Traffic Impact Studies will be followed. AM and PM peak hour traffic counts will be taken at prominent intersections likely to be impacted by proposed developments. Volumes will be projected using information from the ITE Trip Generation Manuals, and modeled in Synchro software. Recommendations and discussion for intersection and/or roadway changes will be provided with corresponding LOS analysis. The final report will be delivered via email in the form of a pdf document.
- A **poster** summarizing the project and results of analysis, to be used in presentations to Brigham Young University (BYU) students and staff and other interested individuals, and for display in the BYU Civil Engineering Department.
- A **Powerpoint presentation** summarizing the project and results of analysis to be presented to the client upon completion of the project

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

Josh Gibbons - Project Manager

Josh is a graduate student at BYU. He graduated with his Bachelor's in Civil Engineering in April 2017. He is currently working as a transportation engineer at Hales Engineering in Lehi, Utah. He primarily works on traffic impact studies, transportation master plans, and other traffic-related studies. He plans to complete a Master's degree at BYU in April 2018. The topic of his thesis is roadway intersection safety. He is doing this research for UDOT and is being advised by Dr. Grant Schultz.

Josh is the Project Manager for this project and will oversee the project and provide guidance for the remaining team members.

Gabrielle Jones - Team Lead

Gabrielle is a senior undergraduate student at BYU scheduled to graduate in December 2018. She plans to take the FE Exam this spring and the GRE this summer. Gabrielle has experience working as a structural engineering intern in the department of transportation for King County Metro in Seattle, Washington.

Gabrielle is the Team Lead for this project. Her responsibilities will include coordinating team meetings, and ensuring quality and timely completion of deliverables. She will assign tasks to team members to complete the deliverables, and participate in traffic counts, analysis, and report creation.

Shanna Carroll - Synchro Designer

Shanna is a senior undergraduate student at BYU scheduled to graduate in April 2018. She plans to take the FE Exam before graduation. She is currently working as a transportation engineering intern at AECOM in Murray, Utah. She has assisted with Bus Rapid Transit (BRT) projects, crash and traffic analyses, quality assurance, and intersection design. She has experience working in ArcMap, AutoCAD, Civil 3D, Microsoft Excel, MicroStation, SignCAD, and Synchro.

Shanna will be responsible for applying her previous experience with Synchro to input data into a Synchro model to analyze LOS and traffic patterns. She will participate in traffic counts, analysis, and report creation.

Mitchell Hadfield - Traffic Analyzer

Mitchell is a senior undergraduate student at BYU scheduled to graduate in December of 2018. He plans to take the FE exam during the 2018 winter semester. He is currently working for American Fork City as an engineering intern. He has participated in various traffic studies for the city taking traffic counts manually and with road tubes and running

the data collected with road tubes using TraxPro. He has experience working in AutoCAD, Microsoft Excel, and ArcMap.

Mitchell will be responsible for applying his previous experience with traffic studies to lead the effort in analyzing the collected traffic data. He will participate in traffic counts and report creation.

Dr. Grant Schultz and/or **Dr. Mitsuru Saito**, professors in transportation engineering at BYU, will be consulted for this project.

Appendix A

Josh Gibbons

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Provo, UT 84604

801-889-4218
jdgibbons19@gmail.com

EDUCATION

Master of Science, Brigham Young University; Provo, UT – April 2018

- Performing research with Utah DOT regarding intersection safety
- Serving as President of BYU ITE student chapter

Bachelor of Science, Brigham Young University; Provo, UT – April 2017

- 3.77 GPA
- Civil Engineering; ACTFL Spanish Certificate
- Member of ASCE and ITE

WORK EXPERIENCE

Transportation Engineer Intern, Hales Engineering; Lehi, UT – April 2016-Present

- Complete traffic impact studies, parking studies, and safety studies for clients in both the private and public sector
- Assist in the development of transportation master plans and estimating travel demand using QRS II modeling software
- Create a new company website to improve marketing efforts

Research Assistant, Brigham Young University; Provo, UT – July 2015-Present

- Work with a team of students and faculty researching traffic and safety for the Utah Department of Transportation
- Use VBA code in Microsoft Excel to automate data manipulation processes to save client several hours of time
- Write a manual with clear instructions of how to use the Excel spreadsheets

Project Engineer Intern, Okland Construction; Lehi, UT – August 2014-August 2015

- Managed the digital plans of over 10 projects on site including hyperlinks, revision updates, and historical plan sets
- Lead a structural and architectural takeoff worth over \$250,000

SKILLS & ABILITIES

Proficient in Synchro/SimTraffic, AutoCAD, Microstation, and Bluebeam Revu

Highly skilled in VBA coding in Microsoft Excel

Trained in Cube and QRS II travel demand modeling software

Strong problem-solving and analytical skills

Spanish Language – Read, write, and speak fluently

OTHER EXPERIENCE

BYU ITE Student Chapter Officer

- Secretary: April 2016 – April 2017
- Chapter President: April 2017 – Present

LDS Church Mission to Oaxaca, Mexico – March 2011-April 2013

- Led up to 20 other missionaries at a time in leadership positions
- Worked in mission office organizing dozens of new member records

Extra-curricular Activities

- Team captain of high school cross country team
- Taught piano lessons to 10 students and performed in several piano concerts

Gabrielle Jones

761 East 820 North Apt #212

Provo, Utah 84606

(206) 718-5149

gabriellejones06@gmail.com**EDUCATION****Brigham Young University, Provo, UT**

2014 – (graduation December 2018)

- Civil Engineering major, Mathematics minor
- (Planning to take the FE Exam in 2018 and GRE 2018)

EXPERIENCE**Structural Engineering Intern** – King County Metro Transit, Seattle, WA

June 2017 – August 28, 2017

- Designed a luminaire attachment to an existing jersey barrier
- Calculated seismic loads on a fluid filled tank and determined anchor embedment depth using Hilti Profis Anchor software
- Determined total length of overhead trolley wire assets in AutoCAD
- Plotted architectural CAD drawings for a bus driver comfort station project
- Attended construction site inspections and meetings with contractors/consultants

Executive Council Service Representative – Tribe of Many Feathers Club BYU, Provo, Utah

September 2017 – present

- Initiate and supervise all service projects and requests
- Work with other council members to incorporate events into the schedule
- Document all service projects and attend weekly council meetings

Lifeguard/Swim Instructor – Mary Wayte Pool, Mercer Island, WA

March 2014 – August 2016

- Lifeguard/Swim instructor, cashier, facility preparation, and merchandise sales.

SKILLS

- Familiarity with IBC, ACI 318-14, ASCE 7-10, USGS, and Hilti Profis Anchor Software
- Taken an AutoCAD and Revit class; completed a team Revit project
- Proficient in Microsoft Word, Excel, Outlook, PowerPoint, and can type 70 words/minute
- Certified Lifeguard/AED/CPR/First Aid – expires 2/20/2018

ACHIEVEMENTS

- Regional Concrete Canoe Competition, 2nd place Women Sprint; 2016 & 2017
- Materials Class Concrete Design Competition 3rd place; December 2016
- Engineering group team leader - China study abroad; Spring semester 2016
- High School National Honor Society; 2011 – 2014

INTERESTS/ACTIVITIES

Structural Engineers Association of Washington Student Member

2017 – present

Women in Engineering Peer Mentor

2016 – present

Concrete Canoe Club

2015 – present

Tribe of Many Feathers Club

2014 – present

American Society of Civil Engineers National/Local Student Member

2014 – present

Other Interests include swimming, tennis, painting, and ceramics

VOLUNTEER EXPERIENCE

Tribe of Many Feathers Club

2014 – present

The Church of Jesus Christ of Latter-day Saints

2008 – present

Rural Housing Development

2014 – 2015

Shannadeen Carroll

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EDUCATION**Bachelor of Science**

Expected Graduation April 2018

Brigham Young University, Provo, UT

- **Major:** Civil Engineering with Structural or Transportation Emphasis
- **Honors:** Full and Half Scholarship Recipient, GPA: 3.76/4.00
- **Course Highlights:**
 - Computational Methods
 - Required use of Excel and Word
 - Drafting with CAD Applications
 - Structural Analysis
 - Elementary Soil Mechanics
 - Geometric Design of Highways
 - Required use of Civil 3D and HCS
 - Reinforced Concrete Design (Currently enrolled)

PROFESSIONAL EXPERIENCE**Transportation Engineering Intern**

June 2017 – Present

AECOM, Murray, UT

- Wrote crash analyses and turn lane warrant memos for areas along US-40 and in Nampa, ID
- Assisted in BRT design and/or quality assurance for Phoenix, AZ, Omaha, NE, and Provo, UT
- Performed design and/or analysis in ArcMap, AutoCAD, Civil 3D, Microsoft Excel, MicroStation, SignCAD, and Synchro

Supervisor on the Floor

June 2015 – January 2017

dōTERRA International, Pleasant Grove, UT

- Applied Excel experience in assistance of the Shipping Department's reporting
- Trained a team of 8-10 people on weekly company updates
- Mentored 10-12 newly trained international agents to improve confidence and knowledge
- Employed appropriate language and tact to calm upset customers
- Predicted possible problems customers may encounter and resolved them before they occurred
- Interacted with coworkers to find the best solutions for each individual customer

General Laundry Specialist

August 2014 – April 2015

BYU Laundry, Provo, UT

- Worked in an efficient, detail-oriented fashion and quickly learned skills for specific tasks
- Provided quality, individualized service to customers and fulfilled last minute requests
- Managed cleaning services to ensure timely completion of orders/products

ACTIVITIES AND VOLUNTEER EXPERIENCE

- Member of American Society of Civil Engineers and Local Member of BYU ASCE
- Habitat for Humanity Volunteer
- Collected data for research in transportation engineering department

Mitchell G. Hadfield

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Education

- *Brigham Young University – Provo, Utah* Class of 2018
Major: Civil Engineering GPA 3.6
- *Brigham Young University-Idaho– Rexburg, Idaho* December 2014
Graduated with an Associate's Degree of Science - GPA 3.8

Work Experience

Engineering Intern for American Fork City Public Works Department July 2016 -Present

- Collected traffic information manually and using road tubes for the city engineer
- Used AutoCAD to accomplish design projects from the city engineer
- Collected GPS data

Supervisor at the Missionary Training Center December 2014 - Present

- Oversaw training of 15,000 residents in proper care for buildings and facilities and oversaw resident's cleaning of buildings and facilities.
- Supervised a team of six other college students as lead student.

Signature Greens Landscaping March 2011 – September 2011

- Mowed and watered lawns, fed and trimmed shrubs, tended flower beds and regularly inspected assigned work areas to insure proper standards were maintained.
- Operated lawn and grounds equipment to include power mowers, tillers, and other power equipment.

Service

October 2012 September 2014

- Served a full time church mission in Ukraine.

Computer Skills

- Proficient with Microsoft Word, PowerPoint, Excel
 - Working knowledge of AutoCad and ArcMap
-