LEHI CITY IRRIGATION ASIAN CLAM ERADICATION
Project ID: CEEn_2018CPST_010

by

Los Hermanos
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A Capstone Statement of Work

Submitted to

Dave Norman
City of Lehi

Department of Civil and Environmental Engineering
Brigham Young University

October 8, 2018

Introduction

PROJECT TITLE: LEHI CITY IRRIGATION ASIAN CLAM ERADICATION
PROJECT ID: CEEn_2018CPST_0
PROJECT SPONSOR: City of Lehi
TEAM NAME: Los Hermanos

Executive Summary

The Lehi City Asian Clam Eradication project will propose a plan to manage the asian clam population found in Lehi's irrigation water distribution system. The objective is to find the most effective method or a combination of methods to limit the damage done in the system and control the spread of the Asian clam population while maintaining system operation. Furthermore, a plan to periodically flush out deceased and disabled clams will be a part of the proposal.

Through an empirical model as well as a mathematical model, the BYU capstone team will observe, record and predict the effects of different methods on sample Asian Clam Populations in the long term.

The final proposal report is expected to be complete by April 2019. It is anticipated that thirty percent of the project will be completed by the end of the December 2018. This first part includes designing a computational model to predict the population growth, locating where the clams are most concentrated in the system, building an empirical model to simulate Lehi's Irrigation system, and identifying and testing the different methods to control the population of clams.

The second part of the project will be completed by April 2019. This will include an analysis of cost, practicality and effectiveness of the chosen method.

Proposed Work Plan

The objective being to develop a plan to control the Asian Clam Population while operating the system year-round, the work will consist of testing different methods to achieve this goal. Ideas to accomplish this goal includes adding a new chemical, designing a physical structure, installing easy to maintain filters, increasing or lowering temperature.

Two team members will be the primary empirical testers and the other 2 will be working on the mathematical model and will be mainly responsible for communication with Lehi City.

A more detailed work plan can be found below:

1. Secure a tour of the irrigation system
    a. Coordinate specific date to go to Lehi and see the actual problem.

2. Collect data
    a. Collect data from past researchers (solutions proposed, problems encountered etc.)
    b. Collect information about the system (flow, size of pipes, location of sources etc.)
    c. Generate or obtain a model determine where the population is densest.

3. Experiment with Different Control Methods
    a. Create a controlled environment
    b. Gather sample Asian Clam populations from the City
    c. Safely experiment and observe the effects of different methods
    d. Develop a model to predict population decrease over time

4. Analyze different Methods
    a. Consider cost, practicality, effectiveness, and impact on the environment

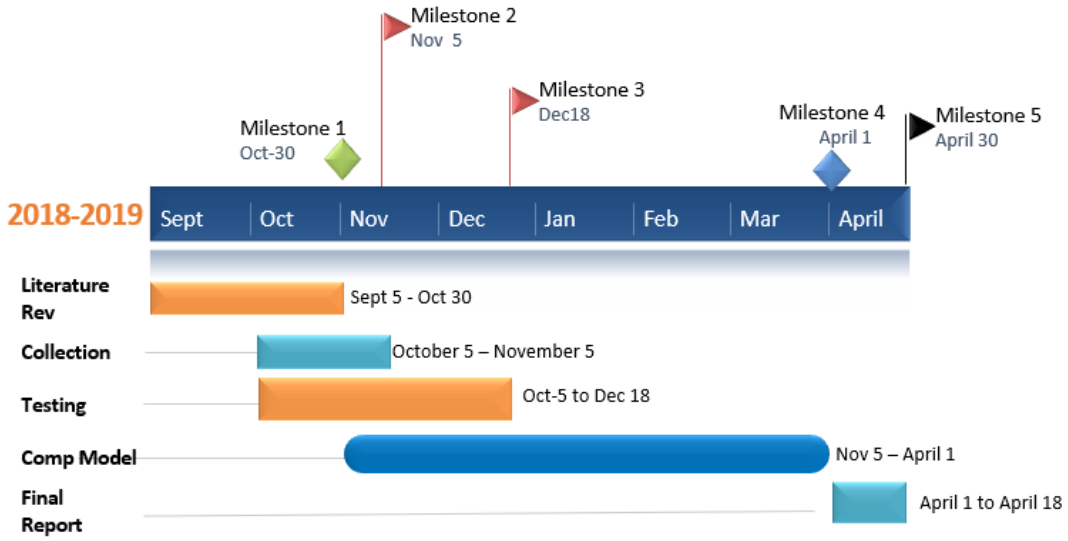
5. Write a Proposal
    a. Describe pros and cons of proposed solution
    b. Mention alternatives

Schedule

One of the team's quintessential goal is to perform within the allotted time frame. One way to make sure deadlines are met is by establishing "soft" deadlines. Thus, every week, at 5pm on Fridays, the team evaluates the collective work that has to be turned in on Monday. This also encourages a weekly team meeting and accounting.

Also, every month the team evaluates progress. This helps keep team members on track for achieving the goal of 40% completion by the December 16, 2018.

Below is a projected timeline for the whole project.



Facilities, Tools, Data and Equipment

We will need to be able to see many data and research on the nature of the Asian clams. We will need to know what are the usage and location of water pipe present in Lehi to understand where clams would most likely appear. Later on we will need the assistance of lab equipment to experiment the lifespan of clams under various living conditions in hopes of finding a cost-effective method.

We as a team will also be using the knowledge of Dr. Miller's research and articles to further understand the nature of Asian clams and how to minimize their impact on Lehi's waterways. Diverse chemical will be tested on the clams to make sure that they are safe to human, but lethal to asian Clams. In addition, a computational model will be used to estimate how the population of clams change with respect to each treatment. Data will be taken from each experiment. this data will consist of the clams response to the chemical treatment. LEHI CITY FACILITIES WILL BE USED TO HELP SOME EXPERIMENTS.

Project Budget

Each team member is expected to spend 2 hours weekly on preparation and research during the first semester. Once the second semester starts, members will need to dedicate approximately 10 hours weekly in research, talking with experts, experimenting and developing a solution to the problem. Overall the expected amount of hour needed to accomplish would require 100 man hours in the first semester and 750 man hours in the second semester.

Deliverables

- Long-term Predictions of Proposed treatment
- Provide different alternatives with analyses for cost, effectiveness and environmental impact.

Challenges

- Lack of Data about Clam Populations
- Lack of knowledge about locations where clams are spread
- No data so far about the research done by Hansen and Al.

Actions

- Email Hansen and Al to see if we can get their Intermediate data
- Collect data by doing experiments in a controlled environment
- Go visit site in Lehi in 2 weeks
- Put together a model similar to Lehi City's system to experiment different method
    - In Particular, find a way to simulate flow.

Progress

- Emailed Dave Norman and received Report from Hansen and Al. Engineering
- Received Dr. Miller's research report

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

The Project will be completed with the assistance of the following individuals:

Wood Miller. He has done extensive research and is considered a Civil Engineering expert.

Dave Norman. He is the Liaison between the Capstone team and the City of Lehi.

Every member of the capstone team will contribute in order to improve Lehi's problem with clam in their irrigation system. Each member is highly motivated to produce the best work possible.

Edbert Bourdeau

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ekbourdeau@gmail.com
678-497-7719

Senior level Civil Engineering student seeking position which requires a meaningful contribution while simultaneously acquiring new skills and gaining experience.

Education

Civil Engineering — April 2019
Brigham Young University — Provo, UT

Skills

- AutoCAD Civil3D
- Trimble GPS Survey
- ArcGIS Pro
- Microsoft Office
- Fluency in English, French and Haitian Creole

Engineering Experience

Civil Engineering Intern — Jan – Aug 2018
City of Orem — Orem, UT

- Collaborated with the city's engineering, design and construction team to manage over 20 projects with responsibilities ranging from conception to construction of roads, sewer and storm drain systems etc.
- Prepared maps and technical designs using AutoCAD Civil3D
- Surveyed sites throughout the city with a Trimble GPS and a Rod
- Performed documentation, coordinated meetings, kept track of reports, contracts and agreements, and inspected projects for adherence to specifications

Other Experience

Technical Support Agent — July 2018 – Present
ModusLink — Orem, UT

- Troubleshoot cell phone issues for Republic Wireless
- Manage 100+ email correspondences weekly to provide information and address concerns
- Adapt communication style to each customer and have won 2 awards for excellent customer support ratings

ESL and Haitian Creole Teacher — Feb – Dec 2017
Missionary Training Center — Provo, UT

- Mentored young men and women from all over the world while teaching them a new language in 6 weeks
- Created daily lesson plans based on the needs and progress of a small group of individuals
- Coordinated plans and progress with a co-teacher to efficiently manage time and to design individualized plans and support for struggling individuals

Volunteer

Full-Time Representative — Jan 2013 – Dec 2015
Church of Jesus Christ of Latter Day Saints — Boston, MA

- Led a group of 30-35 volunteers and provided monthly trainings
- Recorded a book of over 400 pages into an audio book making it accessible to illiterate individuals in the community
- Planned, organized and held a weekly English Class for a group of approximately 25 individuals

Eduardo Helam Hernandez

|316-288-0881 | Helam.hernandez93@gmail.com |

Education

BS, Civil Engineering, *Graduation 2019*
Brigham Young University,
GPA: 3.40.

AA, Pre-Professional Engineering, *2012 - 2014*
Hutchinson Community College,
GPA: 3.45.

Related Course Work

Surveying and GIS, CAD Design, VBA Coding, Sustainability, Transpiration Engineering, Dynamics, Statics, Calculus, and Differential Equations.

Work Experience

Civil Engineering Internship; Spanish Fork City, *6/1/2018 - Present*
Work under the direction of the city engineer to meet deadlines. Communicate and work with different city departments.

Server; Applebee's, *8/1/2017 – Present*
Communicate with guests and co-workers to give the best service. Work in a team environment to meet restaurant standards.

Assembler; Excel Industries, *6/1/2014 – 1/15/2015*
Assembled the main gear box for the Hustler Raptor lawn mower. Read and followed blueprints to ensure parts were properly assembled and placed.

Assistant Manager; Comfort Inn and Suites, *6/1/2012 – 1/15/2015*
Planned and oversaw the daily work for housekeepers. Calculated payroll for both housekeepers and front desk clerks. Planned weekly schedule for front desk clerks.

Leadership Experience

Missionary; The Church of Jesus Christ of Latter-Day Saints, *2015-2017*
Oklahoma City, Oklahoma,
Worked with missionaries to develop teaching, organization, and commination skills.

Collegian Track Athlete; Hutchinson Community College *2012-2014*
Hutchinson, Ks,
Led the 4by8 Team to a third-place finish at the NJCAA Nationals.

Isaac Gomez

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EDUCATION

Brigham Young University - Provo

AUG 2015 - JUN 2019

B.S. in Civil and Environmental Engineering

GPA 3.12

RESEARCH PROJECTS

Lehi CIty Irrigation Asian Clam Eradication

AUG 2018 - APR 2019

Working with the City of Lehi to minimize the clam population found in Lehi's piping system. Being in charge of communicating with Lehi city officials and BYU professors. The purpose is to make an economically-feasible solution to manage the damaging population of Asian clams

ASCE Steel Bridge Competition

AUG 2017- JUN 2019

Allowing freedom to construct a steel bridge under the ASCE rulebook and being able to place 1st in Rocky Mountain. Being able to organize the team and delegate the responsibility to each of the members. Other notable roles is designing and testing loading factors on the bridge with spreadsheets and structural software.

WORK EXPERIENCE

Water Resource Technician- *Aquaveo,* Provo, UT

2017 - 2018

Helping clients understanding using the water modeling software. Being in charge of ensuring quality customer service by providing adequate knowledge of the softwares. Replicating the client's model and addressing their issues. Providing technical knowledge of both the physics of water and software modeling.

Electrician - *The Premier Group* Midvale, UT

2011 - Present

Providing craftsmanship and learning national regulation in electrical components. Working hard to give power sources to many infrastructure in Utah County. Most notably, this includes: BYU Engineering Building, Tanner's Building and Richard's Building, UVU Woodbury School Of Business, Orem High School Seminary Building and Springville LIbrary

SPECIAL MEETING

Meeting the President of Mexico for my exceptional ability in playing chess.

Elkin G. Romero

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EDUCATION

Brigham Young University — Provo,
Undergraduate Student of Civil Engineering — September 2017 - Present

- GPA: 3.7/4.00
- Engineering Transportation Research Assistant
- Engineering Transportation Teaching Assistant

Brigham Young University-Idaho — Rexburg,
Undergraduate Student of Civil Engineering — Jan 2001 - Apr 2014

- Math Tutor volunteer
- Academic Scholarship

SKILLS

Used Software:

- SAP 2000
- GEOSLOPE 2012
- AUTOCAD 2014
- SOLIDWORKS 2012
- WMS (Watershed Solutions)
- C++
- VBA
- ADOBE ILLUSTRATOR CS6
- ADOBE PHOTOSHOP CS6
- ADOBE INDESIGN CS6
- ADOBE DREAMWEAVER CS6

ENGINEERING EXPERIENCE

Jordan Valley Water Conservancy District (JVWCD) — West Jordan, Utah
Engineer Assistant using Geo-technical Software — Jun 2017-August 2017

- Read and analyze engineering drawing weekly in order to present reports to the local city municipality.
- Hire and supervise contractors for maintenance and design in the different JVWCD facilities.
- Design modifications to existing pipe systems in deep wells and treatments water plants,
- Analyze data from the SCADA system for different levels of manganese in the treated water.

TAURO S.A, — La Paz, Bolivia
Engineer Assistant using Geotechnical Software — Jun 2017-August 2017

- Read and analyze engineering drawing weekly in order to present reports to the local city municipality.
- Apply the geotechnical software, Geoslope, for 10 hrs. weekly. to prevent failure in the building slope during construction.
- Organize different geotechnical studies in the proposed structure in order to find optimal reinforcements for the slope at failure such as anchors, pins, and geofabrics.
- Watch and supervise the volume of excavations for the footings to prevent any possibility of heaving for 5 hrs. every week

Naboo Constructions S.R.L — La Paz, Bolivia
Engineering Assistant at Different Tasks — October 2014-February 2015

- Develop the budget for a national project proposal that involved the construction of 500 houses in undeveloped rural areas.
- Submit proposals to the local entity for a single housing weekly for two months.
- Find suppliers for the different construction materials and negotiate the price for 500 houses.

- Survey the land of the proposed project and help the local people to understand the need of surveying before construction.
- Set up different meetings with the local population to explain the work schedule and their duties.

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RESEARCH EXPERIENCE

Brigham Young University — Provo, UT
Engineering Transportation Research Assistant — Jan 2018-Sep 2018

Research Involved:

- Driver Compliance at different types of Crosswalks (RGS)
  - Developing a methodology to determine the compliance rates after choosing four significant pedestrian crossing enhancements in Utah.
  - Read and analyze over 20 research journals by organizing the related data in tables in order to build a literary review.
  - Collect data by installing one video camera in each of the four selected intersections and determining the statistically significant sample size for the collected data.

- Pedestrian Walking Speed at Signalized Intersections
  - Determine four or more signalize crosswalks that have different types of pedestrian with a wide range of speeds for one month.
  - Read and analyze over 20 research journals by organizing the related data in tables in order to build a literary review.
  - Collect data by installing one video camera in each of the four selected intersections and determining and average pedestrian walking speed for signal timing design in Utah

GROUP MANAGEMENT EXPERIENCE

CECASEM (NGO) — La Paz, Bolivia
Consultant Project Manager — June 2017-September 2017

- Conduct and plan Meetings with the different area managers of the institution once a week to analyze the institutional results.
- Plan two capacitation meetings every month for each area of the institution to ensure monthly and quarterly planning requirements are met
- Develop and internal institutional strategic plan (IPS) for the 2017-2019 period that put emphasis in the alliances between NGO's and business for funding and the transition form the NGO to a social business that funds its project.

RESTAURANT "COME RICO" — La Paz, Bolivia
Manager — June 2017-September 2017

- Found the food catering service "Come Rico" with 14 people earning around $1000 in local currency in the first month.
- Manage and invest the amount of money that the company was earning in marketing and social networking.
- Use of social media for branding to increase the number of customers by 5% every week.
- Coordinate the food deliver schedule in order to meet the customer deadlines.

SERVICE

Volunteer Representative
March 2015 – March 2017
The Church of Jesus Christ of Latter Day Saints, Asuncion, Paraguay

- Conduct multiple large group trainings of 60+ representatives in setting and achieving higher goals of measured performance, resulting in increased goal reaching attitudes of 200 representatives
- Develop the annual capacitation plan for the entire number of volunteers.