

**RIVERTON RE-PURPOSING SEWER TRUNK LINE TO GROUND
WATER SUB-DRAIN
Project ID: CEEEn_2018CPST_011**

by

**BKAT Engineering
Tanner Hales
Bryce Terry
Kristi Garate
Alex Fisher**

A Capstone Statement of Work

Submitted to

**Trace Robinson
Riverton City**

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

October 8, 2018

Introduction

PROJECT TITLE: Riverton Re-purposing Sewer Trunk Line to Groundwater Sub-drain
PROJECT ID: CEEEn_2018CPST_011
PROJECT SPONSOR: Riverton City
TEAM NAME: BKAT Engineering

The scope of this project consists of repurposing an existing abandoned sanitary sewer trunk line and converting it to a groundwater sub-drain to be used to dewater an unstable hillside along the river bottoms in Riverton, Utah. The project will include methods of perforating the existing pipe and boxes, the addition of critical side drains, and design of a discharge structure to the Jordan River. The ultimate goal of the project is to provide a efficient method of properly draining the site and distributing the groundwater to the Jordan River.

Our objective for this project is to provide the best possible solution to drain the groundwater from the site. This will include reviewing and researching different options to drain the site. At the conclusion of this project, the team we recommend a preferred solution to Riverton City.

The timeline for this project consists of a weekly team meeting and a monthly status report. Members of the team will make a site visit by November 10, 2018. The team has a planned to have at least three viable options for draining the site by December 10, 2018. Furthermore, a 30% completion report will indicate the direction and process the team will choose for the upcoming winter semester. This 30% completion report will be include all options considered and be completed at the same date of December 10, 2018. The following semester (Winter 2019) will be when analysis, ranking, and recommendations are finished. The final report, recommendation, and design drawings shall be completed by April 2019.

Proposed Work Plan

Objective(s)

1. To create a design for the most efficient method of repurposing the sanitary sewer pipe to discharge excess groundwater, for the city of Riverton.
2. Review all viable options for draining the groundwater at the site of the project.
3. Provide all information that allows Riverton City with enough information to decide on which method they would prefer to implement.

Key Action Step(s)

1. To create a design for the most efficient method of repurposing the sanitary sewer pipe to discharge excess groundwater, for the city of Riverton.
2. Review all viable options for draining the groundwater at the site of the project.
3. Provide all information that allows Riverton City with enough information to decide on which method they would like to implement.

Expected Outcome(s)

1. Provide analysis and additional supplemental information that ranks and discusses the possible solutions.
2. Final Recommendations to Riverton City
3. Drawings and plans for top ranked solution for Riverton City.

Specific Methods of Accomplishing Outcomes

1. Meet as a team weekly to continually be on the same page, and work on team goals.
2. Maintain regular contact with Trace Robinson (Riverton City), to coordinate project details.
3. Complete all assignments related to the project in a professional and timely manner.
4. Gather all relevant information for possible solutions. This may include faculty discussions, research, professional opinions, and receiving reports for the site of the project.

Schedule

Each week, the team will meet and discuss the progress that was achieved. After which, the team will then re-adjust our tasks in order to meet our goals. Each member of the group will be assigned a task each week, which may vary depending on what needs to be completed. In general, for the project, Tanner and Bryce will tag-team in keeping in contact with representative Trace Robinson, as well as keeping him updated with our progress on the project. Alex and Kristi will help with the calculations using their hydraulic engineering knowledge, and assist in project tasks. Every month, the team will produce a monthly status report, which will update all parties involved of the progress that has been made on the project.

Currently, the team has not been requested to have any meetings with Riverton City, but if any are requested, the team will meet and present our ideas and progress at that time requested. By December 10, 2018, the team will have established at least 3 different possible solutions, to project. The team will also have a 30% completion report ready by that date of December 10, 2018. The following semester the team will continue to meet weekly and work on a design and recommendation for the project. The final report for this project will be completed and submitted by April 2019.

Facilities, Tools, Data and Equipment

There are many features, tools, data and equipment that may be needed for this project. Faculty advisors and Trace Robinson from Riverton City will aid in supplying and directing the team to what may be needed for used during the project. The following list applies some of the materials needed for this project:

- Riverton sewer abandoned pipeline line as-builts and system drawings, which contain data about the sewer system and location of pipes for Riverton including the relevant abandoned pipeline.
- Existing Riverton ground water pipes and drains, which will contain data about the current groundwater pipes and drainage systems in place for the area of interest.
- Plans for water collection and distribution in the area.
- Geotechnical Reports of the soil and groundwater at the site, in which stability and groundwater are discussed.
- Design drawing software such as AutoCad Civil 3D.
- Site description, and limits of construction.
- All applicable city and state standards and specifications.

Project Budget

Oct. 1-December 31st, 2018: Budgeted time will consist of approximately three to four hours per week, per group member. Those hours will include two hours class time, one hour of group meeting time, and approximately one hour spent on individual tasks and assignments. Time will be focused on gathering needed information to generate and brainstorm ideas on potential solutions for the project, with the goal to have those ideas narrowed down to three potential solutions, by December 10. This information will be submitted on our 30% completion report.

January 1-April 2018: Budgeted time will consist of approximately five to six hours per week. These hours will include class time, two hours of group meeting time, and two hours of work done on individual tasks and assignments. The goal of this time will be focused on two things. First, we will narrow down our three potential project solutions to one solution. Second, our goal is to turn that solution into a viable project and generate our final report on said solution, completing a comprehensive review of all potential issues and variables.

Deliverables

The following is a list of deliverables the team will produce during the project:

- Short regular (i.e. monthly) status reports documenting challenges, solutions & progress
- A final report discussing all the drainage options considered, and a final recommendation to the city of Riverton.
- Possible design concepts and/or drawings to supplement the final recommendation.
- A poster reflecting a summary of the project to be presented to various entities.
- A powerpoint presentation summarizing the process of the coming to a final recommendation for Riverton City.
- Any other additional reports as proposed and agreed upon between BKAT Engineering and Riverton City.

Performance Standards

BKAT Engineering 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.

BKAT Engineering will also put full effort in producing a final product that simulates that of a professional consulting service. Work shall be coordinated with Trace Robinson at Riverton City, any alterations or changes in project objectives will be confirmed with him, before implementation.

Statement of Qualification

List of Contributors and Advisors for the Projects:

Dr. Brett Borup - Capstone Advisor
Dr. Rollin Hotchkiss - Capstone Advisor
Dr. Wayne Lee - Capstone Advisor
Trace Robinson - Capstone Sponsor
Tanner Hales - Team Member (Focal)
Bryce Terry - Team Member
Kristi Garate - Team Member
Alex Fisher - Team Member

Our team is uniquely qualified for this project given the relevant backgrounds in technical subjects and work experience of all team members. Bryce Terry has worked with the city of Herriman and has relevant experience working with city projects. Alex and Kristi have experience working with the technical aspects of hydraulic engineering. Tanner has experience in the field working with utilities, grounds projects, and construction sites. All team members involved in the project are currently working towards a B.S. in Civil Engineering, and will apply tools and knowledge learned in the related classes.

Appendix A

TANNER HALES

Provo, Utah | 801-791-3512 | tannerhales1994@gmail.com |

EDUCATION

- **B.S. Civil and Environmental Engineering • April 2020 • Brigham Young University**
 - **High School Diploma • May 2013 • Morgan High School**
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WORK EXPERIENCE

Project Engineer Intern • WW Clyde & Co. • May 2018-Current

Field engineer intern position, assigned to Bangerter 4-Interchanges Joint Venture Project project, responsible for carrying out and managing daily construction tasks, both in the field, as well as office tasks.

▪Responsibilities included:

- Managing and tracking production of up to 4 crews of approximately 5-6 laborers and craftsmen by coordinating with superintendents, and foremen. This included planning and scheduling work, tracking timecards, ordering supplies and materials, conducting on-screen and in-field quantity take-offs, and tracking production.
- Providing cost analysis reports for all crews operating within the joint venture project on a daily basis using HeavyJob and Excel.

Equipment Operator • Center Point Construction • May 2007- September 2017 (Summer Position)

Site development and excavation position responsible for carrying out and managing tasks such as; setting elevations, laying out and excavating footings for buildings, laying utilities, constructing rock walls, landscaping, demolition, and site preparation for projects often in excess of 50,000 square feet in size.

▪Responsibilities included:

- Managing often high-pressure site development and excavation projects at locations such as data centers, oil refineries, distribution warehouses, and large-scale concrete tilt-up buildings, while overseeing crews of 5+ additional laborers, and coordinating project logistics with other subcontractors on a tight budget and timeline.
- Utilizing various types of surveying equipment to conduct field measurements and material take-offs.
- Safely operating and maintaining fleets of vehicles and heavy equipment including (among others) large excavators, front-end and skid loaders, dump trucks, and telescoping forklifts.
- Maintaining various daily and weekly reports pertinent to projects such as daily vehicle inspection reports, daily labor reports, project status updates, SWPP inspection reports, and daily safety meeting records.

Site Development Lead (Part-Time) • Brigham Young University • September 2017-Current

Site Development position responsible for carrying out and managing tasks, mainly in the area of landscaping, under the direction of Project Manager. These projects mainly consisted of removing old landscaping, including sod, trees, shrubbery, sidewalks, curbs, and drains, to install new landscaping.

▪Responsibilities included:

- Overseeing crews of 2-5 other laborers and operators to perform tasks.
 - Safely operating and maintaining various types of equipment and vehicles such as small excavators, front end and skid-steer loaders, forklifts, and Class A CDL dump trucks.
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ADDITIONAL SKILLS, EXPERIENCE, AND ACKNOWLEDGEMENTS

- OSHA 10 Certified as of July 2017
- Eagle Scout as of December 2010
- August 2015-Present: Member of American Society of Civil Engineers
- July 2013-July 2015: Served as a full-time proselyting missionary for The Church of Jesus Christ of Latter-Day Saints

Bryce C. Terry

5927 Genoa Lane, Stansbury Park, UT 84074
435-243-0411 | bryce.terry@live.com

EDUCATION

Brigham Young University

Provo, UT

Bachelor of Science in Civil Engineering

June 2019

- BYU GPA 3.3/4.00
- National and Local ASCE member, ITE member
- Passed FE Exam, August 2018

EXPERIENCE

Herriman City

Herriman, UT

Engineering Intern

Dec 2016-Current

- Assist City Engineer in preparing for meetings, attend meetings with City Engineer, assist Project Engineer with managing capital improvement projects.
- Use AutoCAD Civil 3D to design construction drawings for storm drain installation project, create striping plans, and design roadways.
- Prepare and submit applications for various state and county permits.
- Review traffic impact studies, and respond to traffic concerns from citizens.
- Gather and calculate information within Excel to develop water model for the city.

Jeffrey B. Terry

Stansbury Park, UT

Assistant Manager of Business

April 2013 - May 2014, May – Sept 2016

- Oversaw researching, examining and listing items for sale online.
- Was responsible for marketing items and making them easier to find and understand.
- Traveled and helped make decisions on which items to acquire to later sell online.
- Organized, tracked and packed items that are sold and ship them out.

SKILLS AND INTERESTS

- Experience in using AutoCAD Civil 3D, Esri ArcMap and ArcGIS Pro
- Experience in designing construction drawings
- Experience in using hydrologic software such as HEC-HMS
- Earned Eagle Scout at age 14.
- Varsity Soccer Team Captain for 3 years in high school.

KRISTI GARATE

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kristi.garate@gmail.com

EDUCATION

CIVIL ENGINEERING BS, BRIGHAM YOUNG UNIVERSITY (PROVO, UT)

AUGUST 2014 - DECEMBER 2019

- ❖ 3.0 GPa
- ❖ Emphasis: Structural
- ❖ Senior Capstone:
 - Worked with Riverton City to Repurpose Sewer Line
- ❖ Relevant Courses taken:
 - Structural Analysis
 - Elementary Soil Mechanics
 - Hydraulic Engineering
 - Reinforced Concrete Design

HIGH SCHOOL GRADUATE, EDWARD C. REED HIGH SCHOOL (SPARKS, NV)

AUGUST 2010 - JUNE 2014

- ❖ 4.0 GPa
- ❖ School Athletics: Tennis & Skiing
- ❖ Leadership: Judicial Board
- ❖ Other Activities: Musicals and Show Choir

EXPERIENCE

ACCOUNTING CLERK, FAST GLASS INC (SPARKS, NV & OREM, UT)

AUGUST 2009 – CURRENT

- ❖ Transferred Inventory
- ❖ Supplied Warranties
- ❖ Balanced Books
- ❖ Processed Lien Releases
- ❖ Filed/Faxed/Emailed/Called

NIGHT CUSTODIAN, MISSIONARY TRAINING CENTER (PROVO, UT)

AUGUST 2014 – APRIL 2016

- ❖ Trained 30+ Employees
- ❖ Worked as Secondary Supervisor
- ❖ Required to Troubleshoot Problems
- ❖ Coordinated with 15 other Employees
- ❖ Reviewed the Work of others

SKILLS

- Able to perform Civil Engineering analysis tests
- Can effectively use excel
- Able to learn quickly
- Experience with surveying equipment
- Experience with AutoCad and REVIT
- Experience with SAP2000
- Effectively able to work with others
- Visual Basic (VBA) capable

ALEX FISHER

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84606



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407-607-2398

OBJECTIVE

Seeking an engineering position where I can apply and enhance my technical and engineering skills, carrying out my work efficiently and professionally.

EDUCATION

AP Scholar Graduate

Apopka High School 2007 - 2011

B.S. Degree in Civil Engineering

Brigham Young University 2012 - 2019

EXPERIENCE

DRAFTING INSTRUCTOR

2018 - 2019

Brigham Young University

- Taught and developed course curriculum for an entry level CAD drafting class. Developed assignments and tests for students.

TEACHING ASSISTANT

2017 - 2018

Brigham Young University

- Acted as an aide to students in learning drafting programs like AutoCAD and Revit. Reviewed and graded assignments and work.

SPECIAL EVENTS TECHNICIAN

2015 - 2017

Brigham Young University

- Worked independently or in small groups to setup and facilitate various activities and events. Instructed other employees in the proper procedure and use of equipment.

VOLUNTEER

2012 - 2014

The Church of Jesus Christ of Latter-Day Saints

- Spent 2-years as a church volunteer in Wisconsin providing service for the community, leading and instructing other groups of volunteers and aiding outreach goals. Minimal Supervision working 60+ hour weeks.
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SKILLS

Languages

- English & Spanish

Programming Languages

- VBA, C++, Python, HTML

Engineering Skills

- Some experience Surveying
- Some experience with various soil tests

Software Proficiency

- CAD: AutoCAD, Revit and Catia
 - ArcGIS software
 - MS office programs: Word, Excel, PowerPoint, OneNote
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