

**LEHI CITY WATER- HOW MUCH WATER SHOULD  
WE USE?**

**PROJECT ID: CEEN-2019CPST-009**

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**A Capstone Project Final Report**

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## **Executive Summary**

**PROJECT TITLE:** LEHI CITY WATER- HOW MUCH WATER SHOULD WE USE?  
**PROJECT ID:** CEEEn-2019CPST-009  
**PROJECT SPONSOR:** Lehi City  
**TEAM NAME:** DUO Engineering

Lehi City has approximately 1500 pressurized irrigation meters in their water system. Currently it is unknown how many square feet of landscaping is being watered from each metered service as well as what volume of water each location consumes. The goal of this project is to develop a system to determine how much area is being watered and then determine how many gallons of water per year the customer needs to be using by comparing standard statistical usage rates. This will help with water conservation by raising awareness of their usage.

The Weber Basin Water Conservancy District also does currently meter the usage of their customers, and recently implemented this method. They have experienced a water usage decrease ranging between 30% and 40% due to this raised awareness. The goal is to have similar results in Lehi.

The DUO Engineering team has produced the following deliverables:

- A final report with design alternatives for the project that include economic and environmental considerations.
- A poster reflecting a summary of the 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 the sponsor.
- Information based on lot area, landscaped area, metered water used, and the type of land usage

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## **Introduction**

Lehi City currently uses more secondary water than expected for the area and more than they have the right to provide. This requires the city to spend taxpayer money to buy secondary water to supplement their supply. Many cities along the Wasatch Front have faced similar problems and have found solutions by metering secondary water and educating their citizens about their usage. This project provides the acreage of watered area for each pressurized irrigation meter in the system as of April 2020. This will allow the city of Lehi to compute the expected necessary usage for each lot. This value will be compared to the actual measured usage to aid in water conservation efforts. The expected usage can be calculated using landscaped area, and weather data.

Generally, it is difficult for people to determine how much water they should be using for their lawn or gardens. Currently, home and business owners in Lehi have no way to know if the amount of water they are using is normal or necessary. Providing a baseline to compare against will allow people in the city to be more aware of their PI usage and use less water. Secondary water meters became standard on new residential construction projects after 2016 in Lehi City and a project is underway to install meters on all existing lots.

Weber Basin Water Conservancy District has already implemented this system for a number of years and found that by informing the homeowners about their usage, the water consumption has dropped 30-40%. Weber Basin Water Conservancy District has become the model for multiple other cities on the Wasatch Front to lower their overall water consumption and all have seen similar results. Lehi City hopes to continue this trend in their own jurisdiction. Eventually, they plan to implement a tiered billing system based on usage as well.

## Assumptions & Limitations

While mapping landscaped areas, DOU Engineering has assumed that the full area of the lot minus the area of the building and driveway constitute the possible watered area (green space). This includes possible small paved areas in the rear of homes and landscaping that does not require water (gravel). This assumption has been made because homeowners often change their landscaping. Engineering judgement was used on a case by case basis for lots with pool, sheds, or other unique features. In neighborhoods with Homeowners Associations or in the case of condominiums some meters measure usage for more than one residence or building. In these situations all the green-space was included in a single polygon for the entire neighborhood or complex. Some meters/lots were unable to be cataloged due to outdated or unclear aerial images. These will be resolved by Lehi in the future by surveying, drone imagery, or waiting until new Google Maps aerials are available. Other questions were answered on a case-by-case basis during regular meetings with our liaisons at Lehi City. Figure 1 shows a complete map of Lehi. Green lines are the mapped area. Blue dots represent water meters that have been mapped and red dots represent those that still need to be completed.

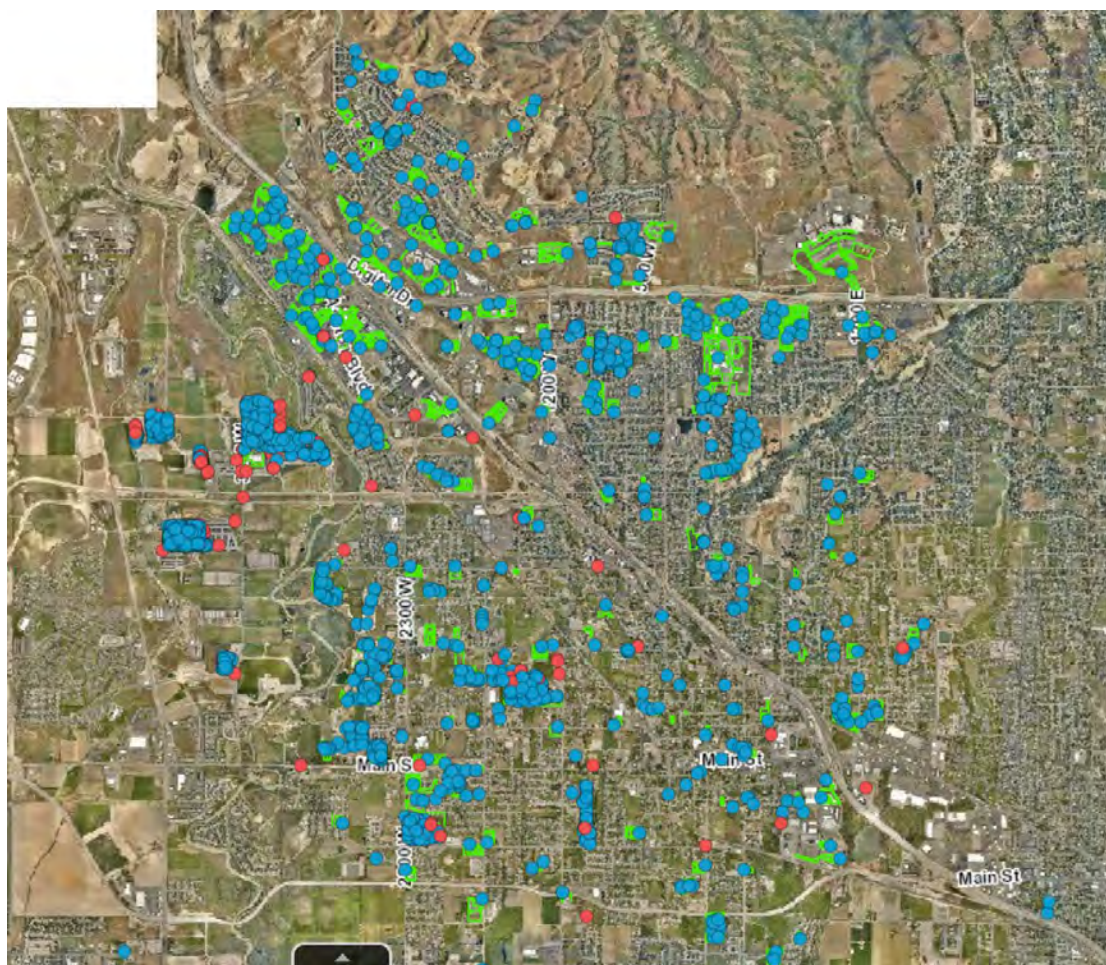


Figure 1: Map of Lehi City

## **Design, Analysis & Results**

The green space was defined for about 1400 pressurized irrigation meters connected to individual homes, multi-unit residences, and commercial buildings. This represents all the pressurized irrigation meters that were possible to evaluate as of March 2020. During the course of our work some supplemental aerial images and driveway points were added, which opened up several areas to be defined.

Figure 2 shows a typical lot with the mapped landscaped area. The green line is the polygon that represents the landscaped area. The area of the building and driveway are excluded while the grass, flower beds, sidewalks between the lawn and park strip, and the small paved area in the rear were included. This is the pattern followed by the DUO Engineering team on all lots.



*Figure 2: Polygon of Landscaped Area Example*

## **Lessons Learned**

Coordination and communication are extremely important. During the course of this project, the team has had to coordinate not only with each other, but with faculty, Lehi City, and Weber Basin Water District. With these events, we have grown to understand the importance of defining the scope of projects and understanding expectations.

The team has also learned the importance of being on the same page with procedures and final product production.

## **Conclusions**

This project has opened the eyes to not only the process of working with a client but how seemingly simple government decisions can have a huge impact on society. Though this project requires little technical expertise, few of our classes have helped to prepare us for this project and is cheaper than a typical engineering project to revamp a water system, it has the potential to reduce the secondary water usage in Lehi City by 30-40%. This result would save taxpayers millions of dollars and create a more sustainable future.

## **Recommendations**

DUO Engineering recommends that Lehi City hire an intern to continue to install and determine green space for pressurized irrigation meters in the city. We also recommend they continue work with Weber Basin Water Conservancy District and follow the system they have already set forth. They have achieved proven results and the best plan of action is to repeat what they did.