CEEn-2019CPST-006

Coleman Sewer Collection System Optimization

UCR Engineering

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Introduction

This project was conducted to allow a team of BYU students to assist in a marketing outreach to the Ironhouse Sanitary District by Coleman Engineering.

There are two parts to the outreach effort:
1. Identify any pump stations in the District sewer system that have potential for retirement.
2. Produce a CAD file modeling the sewer system.

Project Tasks and Deliverables

Objectives:

- **Create a report detailing which have the potential to be replaced with gravity systems by April 2020**
- **Submit an AutoCAD file that accurately represents the sewer system by April 2020**

Key Tasks:

- **Complete an analysis of individual pump stations based on elevation data and engineering judgment**
- **Identify means of creating a detailed map through AutoCAD**

Design and Analysis

Assumptions:

- Factors such as energy, cost, maintenance, profitability, and environmental impact were not considered in the following analysis
- All pump station recommendations were based upon available elevation data and engineering judgement

Initial Challenges:

- Lack of prior experience in water resources engineering
- Limited access to data
- Lack of prior experience of some team members in AutoCAD

Design and Analysis Cont'd

Key Project Milestones

- Project was assigned September 2019
- Met with local engineer to discuss optimization approach October 2019
- Met with CAD professor to discuss digitization process November 2019
- Confirmed no base map file was available from Contra Costa County December 2019
- Completed tabulation of elevation data January 2020
- Determined to digitize pdf pages directly January 2020
- Completed pump station recommendation report March 2020
- Completed AutoCAD digitized collection system map April 2020

Discussion of Results

Pump Station Optimization Recommendations

- **Approach**
  - **Tabulate all available elevation data given in provided Collection System Map**
  - **Tabulate surface elevation data using Google Earth**
  - **Make recommendations using collected data in conjunction with development status of the area as determined by Google Earth and engineering judgement**
- **Results**
  - **Stations that have most potential to be removed**
    - BIP
    - MPS
    - Summer Lakes 3
    - Willow Park Marina

Discussion of Results Cont'd

Collection System Map Digitization

- The main challenge faced was the lack of available base map file for use, which interfered with the initial goal of creating a georeferenced CAD file
- Instead of creating a new map. the team decided to import the existing pdf pages into AutoCAD
- Recreating the District map allows for the retention of provided information

Conclusions

There are several pump stations that have the potential to be removed, but further analysis should be performed to confirm the given recommendations. The pump stations with the highest potential still may be difficult to remove due to the current layout of the system.

The AutoCAD file is ready to be added upon with current and future development not reflected in the provided Collection System map.

Recommendations

Further analysis is recommended to be performed concerning the BIP, MPS, Summer Lakes 3, and Willow Park Marina stations to determine if they can be replaced by gravity systems. Proper analysis will evaluate pressure and flow in the force mains and adjacent pipes, energy efficiency, and costs, among other factors.

The AutoCAD file can be shared with the Ironhouse Sanitary District.

The End

Any Questions?