

SENIOR CAPSTONE/ SENIOR DESIGN EXPERIENCE

2024

Ocala Ave Storm Sewer

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¹Environmental and Natural Resources Engineering

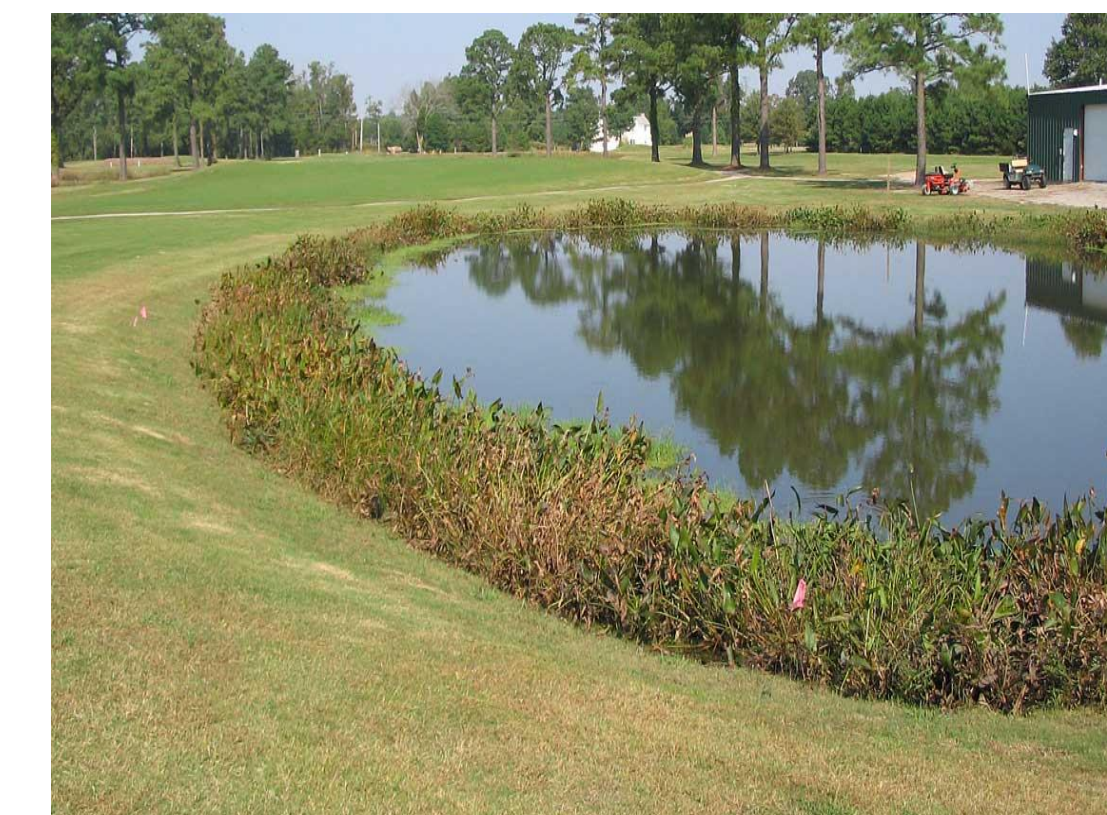


Agricultural and Biological Engineering

Objective

An Ocala Ave homeowner identified a sink hole forming near the edge of their garage. After inspection, it was determined to be from stormflow through a corroded pipe that no longer had a bottom. If this were to continue, it would put the home at risk of foundation scour. The objective of this project is to design a solution to help the homeowner, but ultimately the City of Lafayette through Lafayette Renew (the City's wastewater and stormwater utility). The design presented in this poster replaces the current pipe and outdated manhole to meet specifications set by the City of Lafayette.

Alternative Solutions



Pipe Lining (left)⁴ and Retention Pond (right)⁵

Constraints	Criteria
<ul style="list-style-type: none"> Less than \$250,000 Convey Flows of 10-minute, 10-year frequency Meet all standards set by the City 	<ul style="list-style-type: none"> Less than \$75,000 to avoid bidding Not extend outside of current easement Utilize infrastructure present

Impact and Sustainability

This project was designed with the homeowner, neighborhood, City of Lafayette, and the environment in mind. In order to maximize impact, the solution was designed:

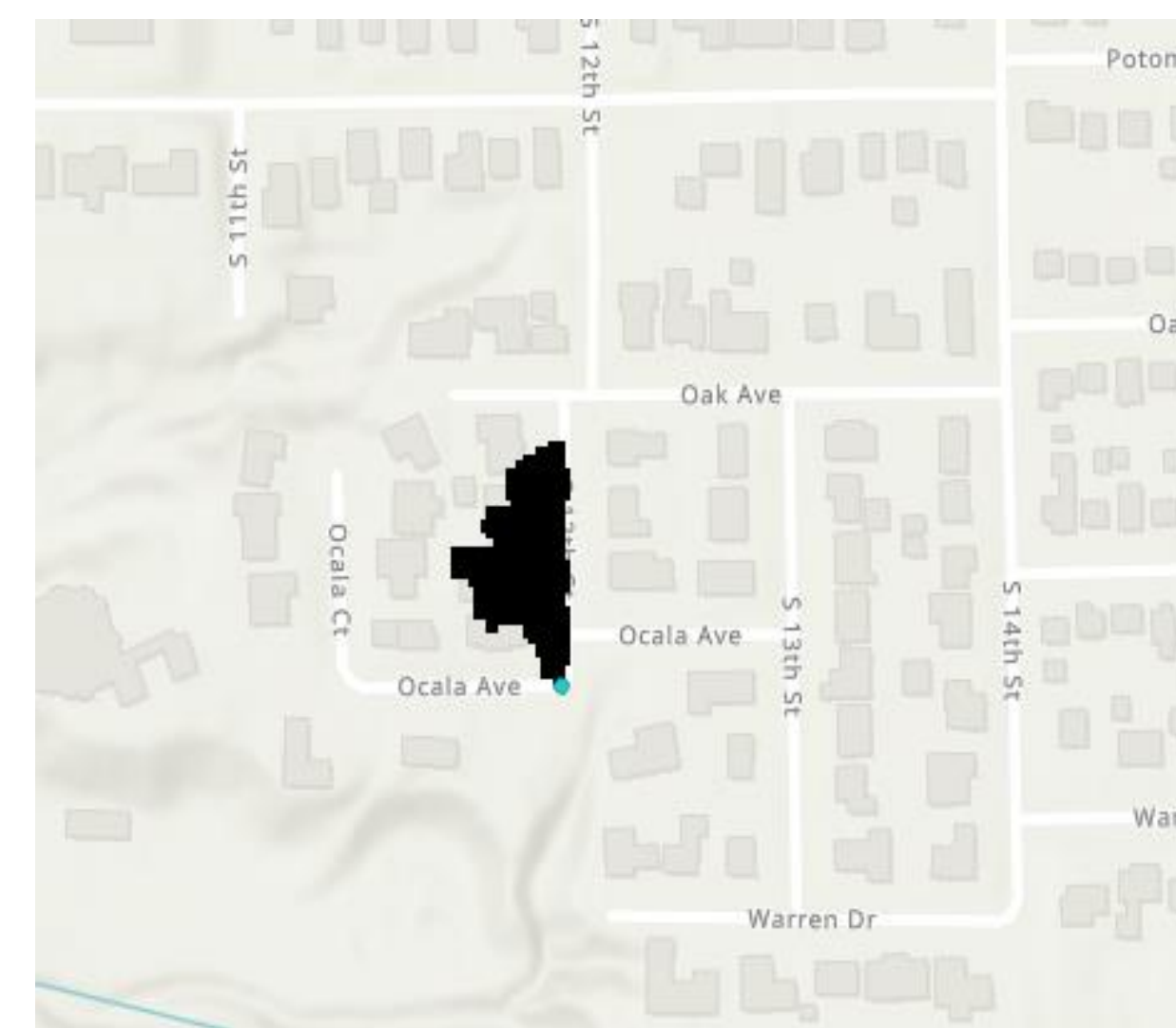
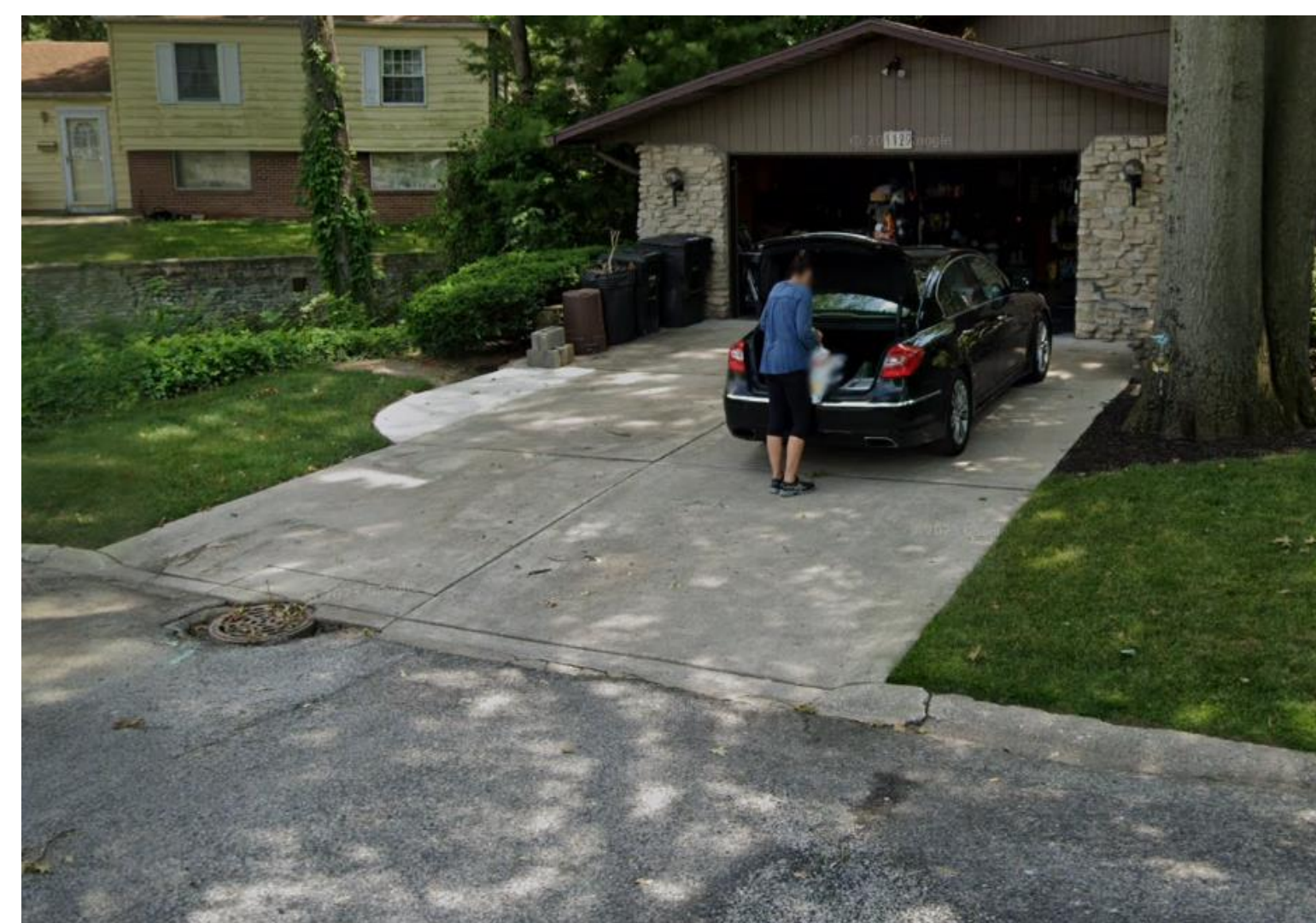
- To reduce erosion occurring near the pipe.
- To prevent foundation scour from occurring.
- To prevent flooding at the inlet protecting nearby houses.
- To prevent the City of Lafayette from being sued by the homeowners.
- To improve public health by reducing sediment and pollutant loads in downstream waterbodies.

Economic Analysis

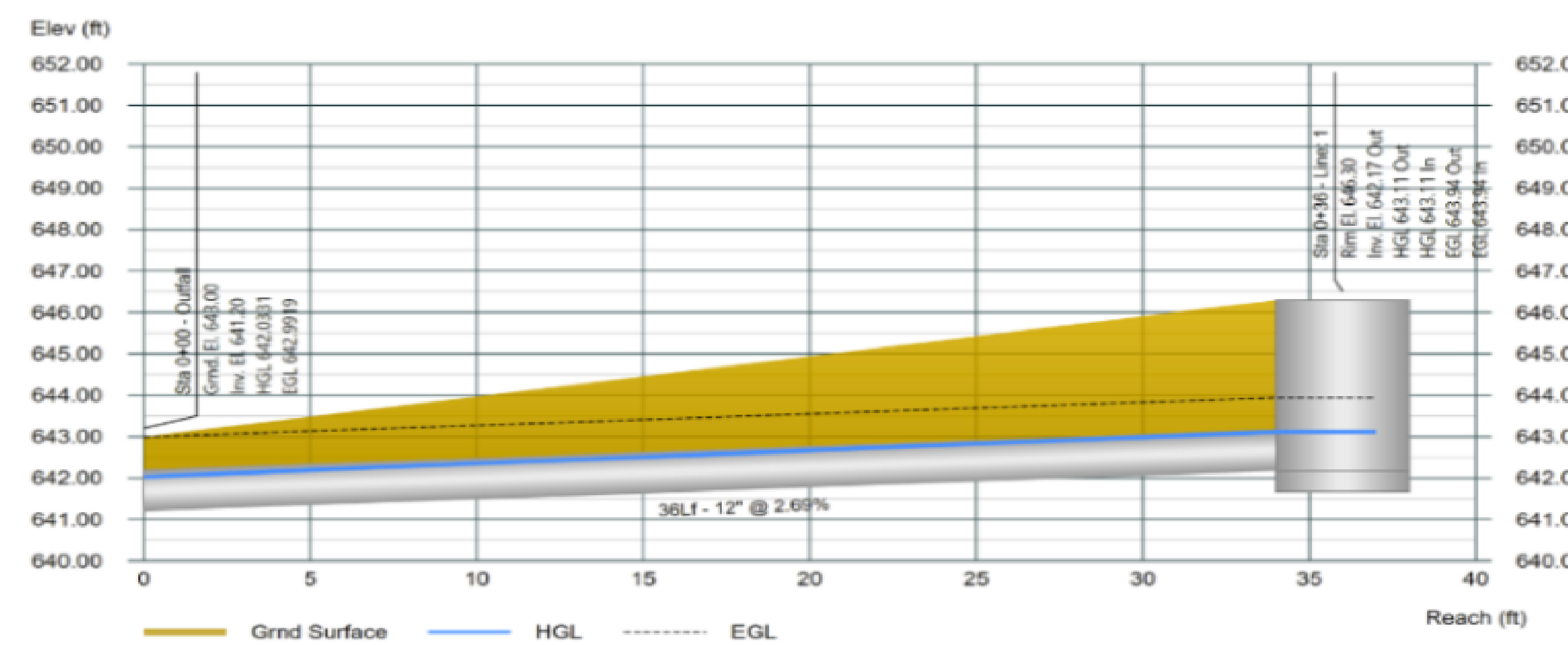
The primary costs associated with the project are from the manhole and the 36 ft of 12" reinforced Concrete Pipe. Since the design is simple and relatively inexpensive, Lafayette Renew would be able to do the work themselves. This helps to greatly reduce costs associated with contractors.

The expected total cost is estimated to be **\$17,900**.

Tools and Principles



Final Solution



Pipe Profile View

Specification	Value
Material	Reinforced Concrete
Length	36 feet
Diameter	12 inch
Slope	2.7%
Flow Rate (10-year)	5.9 cfs

The pipe is to be connected to the existing stormwater inlet on the upstream end. This solution was verified to be able to handle a 100-year storm.

Results and Recommendations

The final solution works to convey the expected flows while also meeting all of the standards set by the City of Lafayette. Lafayette Renew should be able to install the pipe and manhole themselves without getting into a bidding process. This design solves every issue identified by the homeowner and Lafayette Renew. To maximize the project impact, monitoring of the pipe should be done to avoid having a similar situation in the future. Additionally, this could be used as a case study for similar projects that may be encountered in the future. Moving forward, this design should be signed by a professional engineer and given to Lafayette Renew so they can install it.

Software Used

- ArcGIS Pro:** Watershed Delineation
- Stormwater Studios:** Flow Calculations and Pipe Profile View
- NOAA PFDS:** Precipitation Data

Standards and Technical References

- City of Lafayette Stormwater Technical Standards Manual:** Runoff Rate Determination Methods
- City of Lafayette Construction Specifications:** Manhole Specifications