



VIA EMAIL

March 5, 2025

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Public Utilities - Utilities Engineering
City of Clearwater
1650 N. Arcturas Avenue
Clearwater, FL 33765

Subject: Technical Memo
Weston Dr. and S MLK Jr. Ave. Elevated Water Tanks
Weston Dr. - 27.9857° N, 82.7778° W
S MLK Jr. - 27.9449° N, 82.7908°W
Clearwater, Florida

City Project No. 21-0020-UT
BillerReinhart Project No. 21-396

Introduction

Biller Reinhart Engineering Group, Inc. (BillerReinhart) understands The City of Clearwater (City) would like to evaluate two scenarios regarding the elevated water tanks referenced above. First, demolition and removal of the south and/or north elevated water tank. Second, restoration and maintenance of the south and/or north elevated water tank.

To assist the City in making a decision regarding what scenario to proceed with, this project involved a comprehensive evaluation of the two elevated water tanks, referred to as the North Tank and South Tank. The evaluation focused on the condition assessment of both tanks, finite element analysis of the tanks, design of drawings and specifications to produce the necessary documentation for the safe demolition/removal and/or restoration of the subject water tanks. Finally, a cost analysis was obtained from a 3rd party consultant for restoring or maintaining the tanks versus demolishing them.

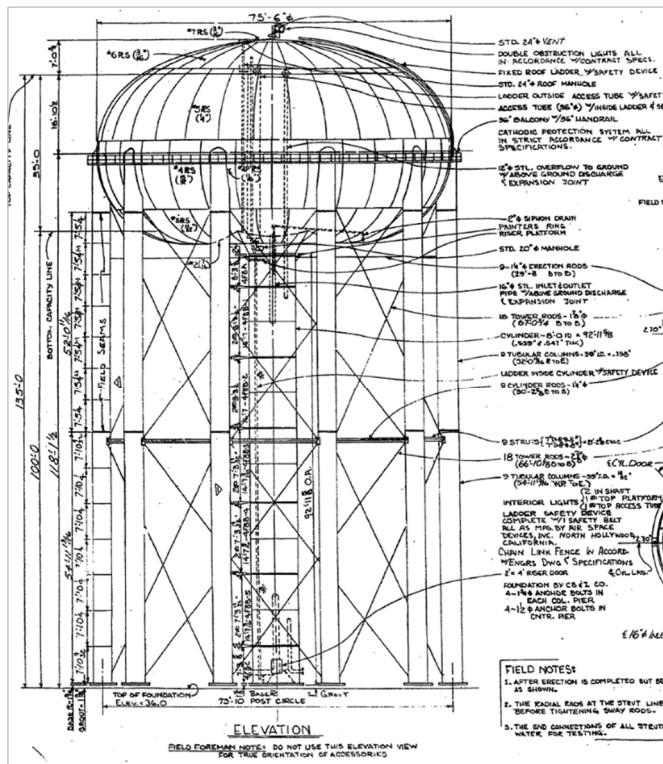
Additionally, the project included a financial analysis comparing the cost of restoration and maintenance with potential revenue from leasing space for cellular antenna installations. The ongoing annual maintenance costs for both tanks were also considered.

Methodology and Findings

Condition Survey Phase Summary

BillerReinhart completed visual condition surveys of elevated water tanks for the subject project. The first tank located at 27.9857° N, 82.7778° W, is referred to as the north tank and the tank second located at 27.9449° N, 82.7908° W is referred to as the south tank. The visual condition surveys by BillerReinhart were completed over three site visits, completed on April 4, April 12, and June 1, 2022. During the April 12 site visit, an independent drone operation company was also present and provided drone surveys of the exterior of both tanks.

The purpose of the survey was to evaluate the existing conditions of the tanks, identify the different structures and site features that affect the removal of the tanks, and identify member sizes, where accessible. The visual survey by BillerReinhart was limited to the line of site and access to safely accessible areas. BillerReinhart's survey did not involve destructive activity to view inaccessible areas; neither an analysis of electrical systems, plumbing systems or other utilities present at the sites.



Based on the results of the condition surveys, BillerReinhart believes that the tank structures can be described to be in fair to good condition. BillerReinhart provided recommendations for repairs and preventative maintenance to be performed for the safe use of the tanks if they were to remain.

Figure 1 – Clip of Partial Record Drawings



Finite Element Tank Modeling and Analysis Summary

Following the condition surveys, BillerReinhart utilized finite element analysis software, and performed a 3D model with computational analyses of the North Tank to identify and evaluate those elements which are critical to structural integrity under wind loading conditions, with the tank in both an empty state and filled state. BillerReinhart also reviewed provided documents, as well as researched details of tanks of similar construction methods, timelines, and manufacturing. The results of our analyses determined that the structural framing members of the North Tank are resilient enough to support the necessary wind loading conditions while being empty. BillerReinhart believes that the North Tank would remain structurally stable in the event it was to remain in place and kept empty.

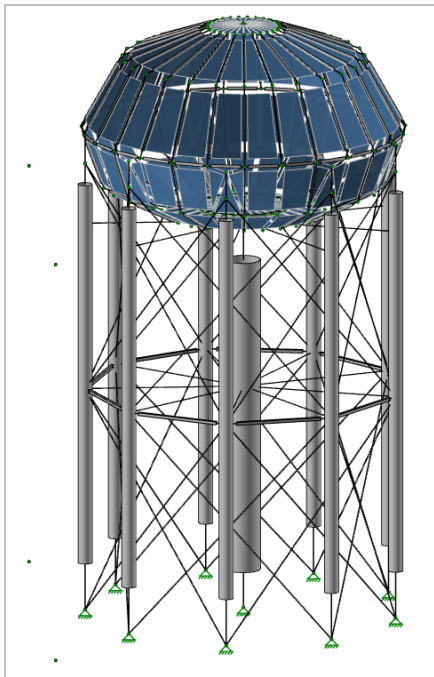


Figure 2: Tank Model – Risa 3D

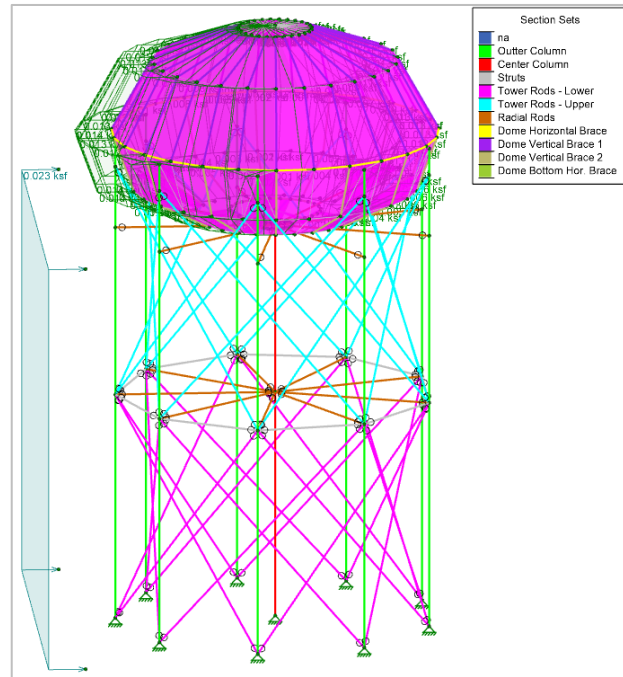


Figure 3: Wind load applied to the 3D model

Construction Documents Phase Summary

BillerReinhart prepared construction documents (drawings and specifications) for the restoration and demolition of the North and South tanks. With the assistance of a 3rd party civil engineer consultant, cap-off details for underground piping that will remain post demolition are included in the construction documents.

The following documents can be found in the appendices of this technical memo:

Appendix A – Demolition Specifications
Appendix B – Restoration Project Manual
Structural Drawings
Civil Drawings

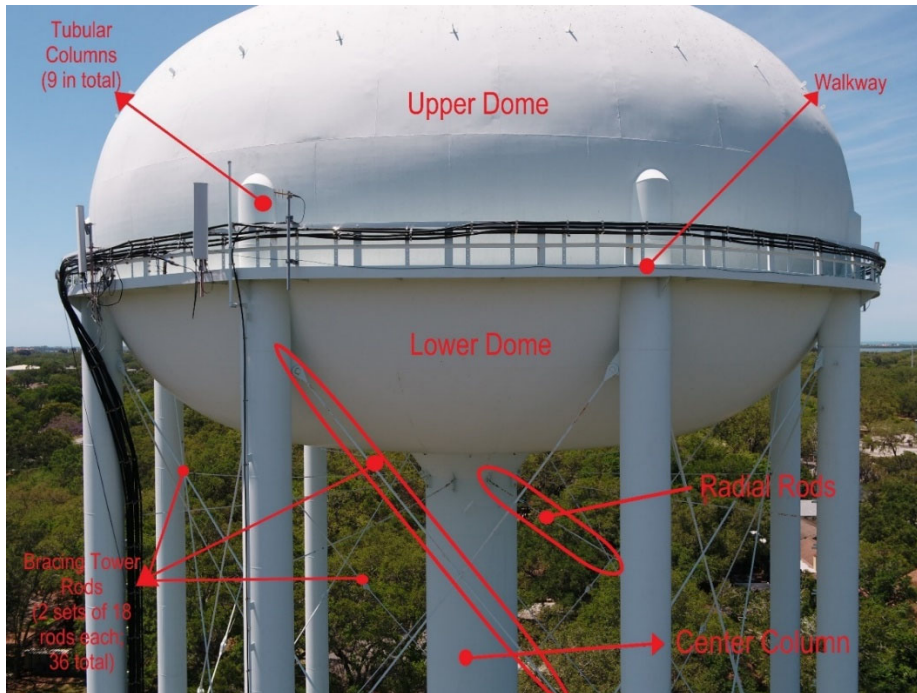


Figure 4 – Typical Elevated Tank Components

Cost Estimates

Finally, BillerReinhart obtained an estimate from a qualified 3rd party consultant for the restoration and demolition of the North and South tanks based on the construction documents we produced. In this technical memo, the cost estimates are compared with the revenue benefits from space rental to cellular companies on the North Tank's property, the annual cost to maintain the North and South tanks, and repair cost of the North and South tanks.

| Summary of Costs - Demolition | |
|---------------------------------------|------------------------|
| Item | Cost |
| <i>General Conditions</i> | \$ 112,000.00 |
| <i>North Tank</i> | \$ 1,303,991.91 |
| <i>South Tank</i> | \$ 1,280,590.00 |
| Total Tanks Demolition Project | \$ 2,696,581.91 |

| Summary of Costs - Restoration | | |
|---------------------------------------|------------------------|--------------------------|
| Item | Cost | Notes |
| <i>General Conditions</i> | \$ 801,100.00 | Contingency not included |
| <i>North Tank Restoration</i> | \$ 980,700.00 | |
| <i>South Tank Restoration</i> | \$ 963,100.00 | |
| Total Tank Restoration Project | \$ 2,744,900.00 | |

| Summary of Costs - Maintenance Schedule | | |
|--|-----------------|----------------|
| Item | Cost | Notes |
| Tanks Annual Maintenance | \$ 71,800.00 | Yearly Budget |
| Tanks Paint Project | \$ 1,872,000.00 | Every 10 Years |

| Cellular Antennas Revenue | |
|----------------------------------|---------------------|
| <i>FY 2020</i> | \$ 38,555.51 |
| <i>FY 2021</i> | \$ 38,469.38 |
| <i>FY 2022</i> | \$ 17,321.65 |
| Total Tanks Revenue | \$ 94,346.54 |

The decision to either keep or remove the tank is a decision of The City and will likely be based on the benefits of keeping the tank versus the cost of repairs, maintenance, and manpower for upkeeping the tank. As an alternative The City may want to consider the cost of erecting a new tower specifically for the purpose of supporting cellular equipment.



Closing

Neither the survey, nor this report is intended to cover hidden defects, mechanical, electrical, or architectural features, nor environmental concerns. Unauthorized use of this report, without the permission of BillerReinhart, shall not result in any liability or legal exposure to Biller Reinhart Engineering Group, Inc. Biller Reinhart Engineering Group, Inc. reserves the right to update the information contained in this letter if deemed necessary due to modified site conditions or the availability of new/additional information.

We look forward to providing our structural engineering services to you on future projects. If you have any questions, please contact our office at 813.908.7203.

Sincerely,

Biller Reinhart Engineering Group, Inc.
State of Florida Certificate of Authorization No. 9149

Brian E. Walter, PE
Principal Structural Engineer
Florida P.E. No. 66538

