



**BOLTON  
& MENK**

Real People. Real Solutions.

1960 Premier Drive  
Mankato, MN 56001-5900

Ph: (507) 625-4171  
Fax: (507) 625-4177  
Bolton-Menk.com

## MEMORANDUM

**Date:** May 21, 2019  
**To:** Glenn Olson, Public Works Director  
Bob VanMoer Wastewater Supt.  
**From:** Jon D. Peterson, P.E., Project Engineer  
**Subject:** Wastewater Treatment Facility Project  
City of Marshall, Minnesota  
Project No.: M25.110580

### INTRODUCTION

The intent of this memo is to summarize the design intent of the Wastewater Treatment Improvement project, and provide evaluation of the project costs based on the bids received April 16, 2019.

### PLANNING AND DESIGN PHASE BACKGROUND

Facility planning for the wastewater treatment facility was developed in 2016-2017. The facility plan recommendation included implementation of improvements in two phases. The first phase was intended to address immediate biosolids treatment /storage concerns, and process equipment replacement. The second phase would follow within 3 to 5 years based on permit requirements, and would include biological process upgrades and any remaining equipment replacement items. Biological treatment processes will require substantial upgrade to meet anticipated future permit requirements. The future permit requirements are dependent on the results of the facilities whole effluent toxicity (WET) testing.

Design work began on first phase improvements in December 2017. During design phase, evaluation of a number of key planning concepts were reviewed and updated based on current information. These impacted the final design package significantly, and are summarized as follows:

1. Due to some uncertainty in industrial customer loadings, the timing of the need for biosolids treatment capacity was modified. Industrial loading will be impacted by the industries own discharge permit, which is currently under review by the Minnesota Pollution Control Agency (MPCA). With this uncertainty, the timing of any treatment capacity upgrade was delayed until the industry permit situation is established. Storage for biosolids was still required under current conditions to provide capacity and operational redundancy and flexibility.
2. The results of the WET testing were based on the anticipated water quality following completion of the water treatment plant upgrade to reduce salty discharges to the wastewater system. The testing results were inconclusive as to the degree of nitrogen removal the wastewater treatment facility would need to be designed to remove. MPCA accepted our proposal to delay permit requirements for nitrogen removal until the water treatment facility improvements were complete, and WET testing could be conducted on the water being received at the wastewater treatment facility. This will delay the phase 2 projects for 8-10 years. With this development, a number of smaller improvements which were intended to be picked up in phase 2 migrated into the phase 1 project.

To accommodate these modifications, design documents were modified from the initial design developed in spring 2018. The decision to delay significant biosolids treatment improvements and the delay of phase 2 work were made in the summer of 2018. Following these decisions, the project components were redesigned and prepared for bid in early 2019, with bids being taken on April 16, 2019.

### **PROJECT VALUE EVALUATION**

Bids received on April 16 resulted in three bids being received, with the low bid of \$14,074,300. This cost is significantly higher than the original engineer's estimates. The three bids received were within 2.5% of each other. Evaluation of the project costs shows a number of issues which impacted the project costs:

1. Increases in project costs over the 2 years since the facility plan was completed have been significant, primarily due to fluctuations in steel and material pricing. Steel price fluctuations impact process equipment as well as concrete reinforcement and other metals.
2. The electrical control package impact on overall project costs was significantly more than estimated. The bid submittals included an overall electrical cost that was 80% greater than originally estimated. This cost increase is due to identification of additional work replacing motor control centers during design phase, significant cost increase due to steel and materials pricing over the past two years, and additional cost required to replace existing panels while keeping the facility on line.
3. During design, the configuration of the biosolids storage system was modified to provide not only the storage required, but to provide operational redundancy and efficiency. Currently, staff have difficulty in obtaining proper mixing in the existing round, above-grade tanks after decanting liquid to thicken the biosolids. Decanting of liquid reduces the amount of biosolids storage required, and saves the facility \$50,000 per year in biosolids disposal. To provide additional operational flexibility and the required storage, a rectangular storage facility was designed. This facility is similar to storage/decanting facilities used at other facilities. To provide the appropriate access for decanting liquid, and to provide a structure which is more durable in the long term, the design includes operation platforms and a precast structure housing the decanting portion of the facility. These design accommodations do result in a higher cost than simply implementing a "storage" tank without the decanting operations.
4. The original design intent of the trickling filter upgrade included replacement of the trickling filter pumps with similar units. During design, it was determined that the existing style of pumping units is problematic, and a different style of pump would provide more reliable and efficient service. Reconfiguring of the trickling filter pump station to accommodate this change resulted in an estimated additional \$250,000 in project costs.
5. The project package included a modified aeration system control and blower package. This package will result in lower energy costs for operation of the aeration basins, but did result in a project cost increase of \$365,000.
6. Attached for reference are exhibits showing the biosolids storage and decanting structure, and the new final clarifier with control structures. These structures were modeled utilizing three-dimensional (3D) modeling software. Plan sheets for bidding and construction were then developed from the model.

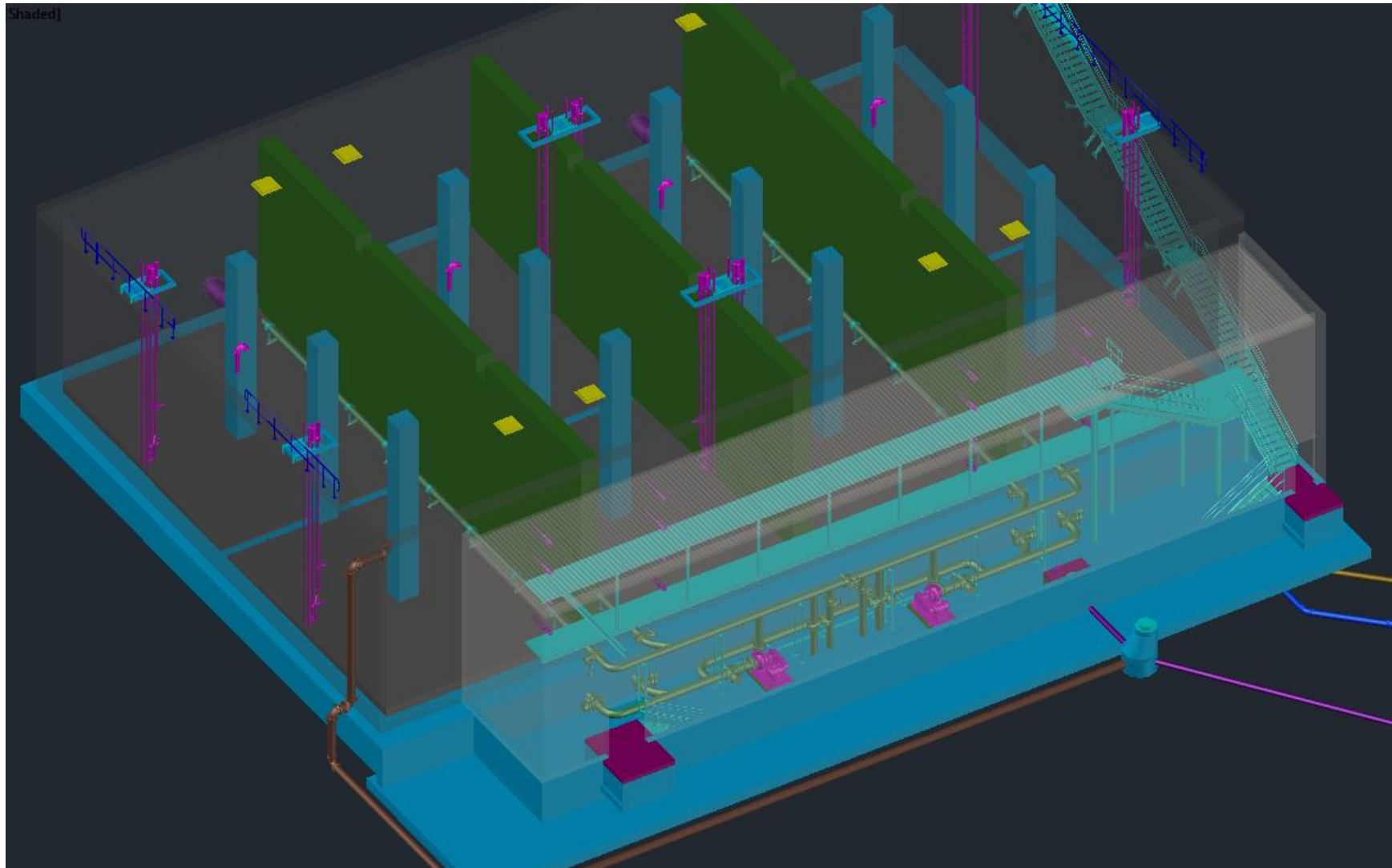
**PROJECT BID COST NOTES**

In addition to the above items, a number of other items were evaluated regarding the project bid costs and are as follows:

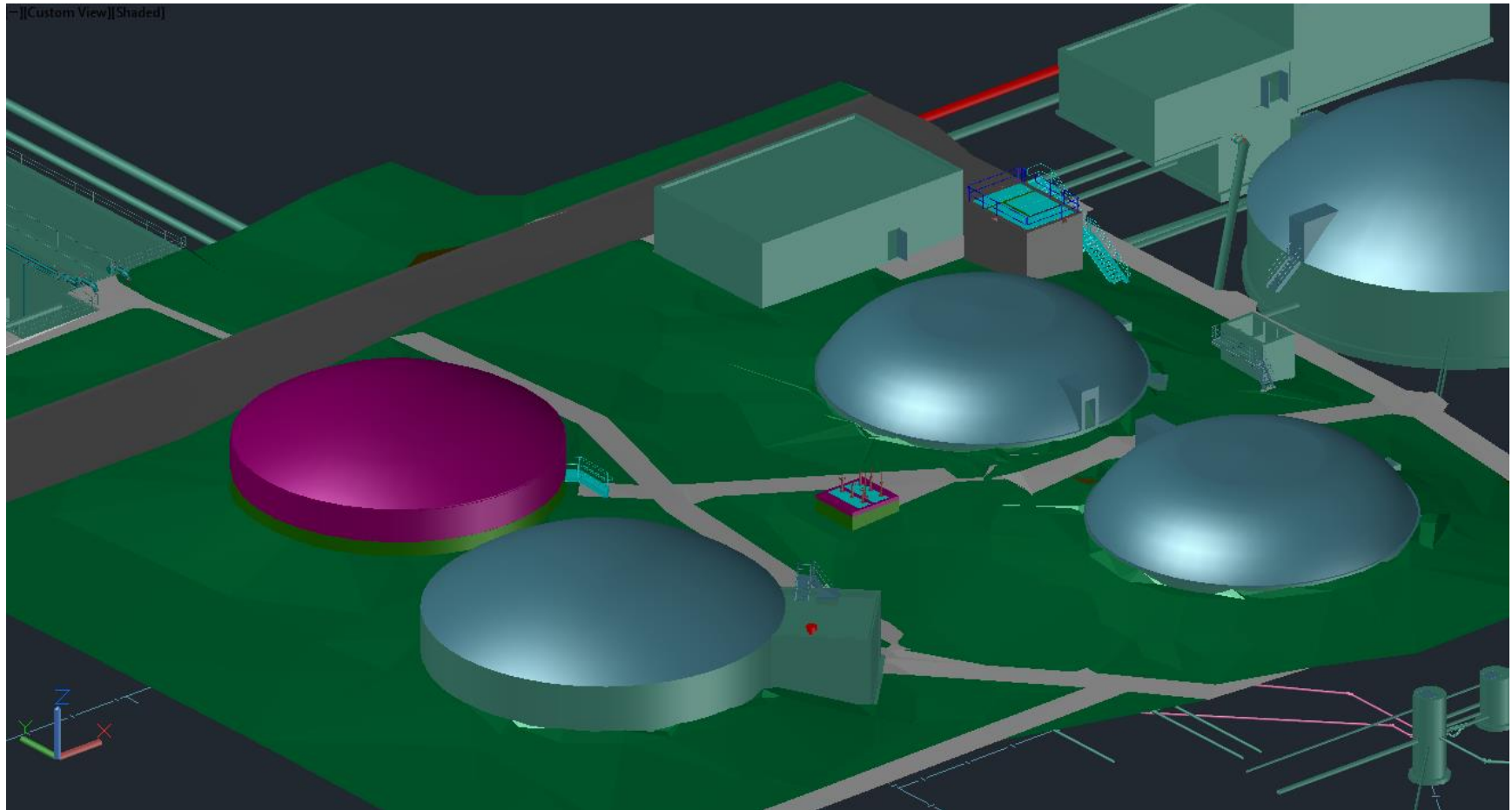
1. The low bidder, Magney Construction, has listed three local subcontractors. These include the following:
  - a. Meier Electric
  - b. Bisbee Plumbing and Heating
  - c. Buffalo Ridge Concrete-

These three subcontractors represent nearly 20 percent of the overall contract.

2. Magney Construction estimates that 20 percent of the overall project bid is labor cost. This represents \$2,800,000 in labor cost on the project.
3. Bolton & Menk has bid projects with options to use and not use federal and state wage rates. Results have shown that proposed cost reductions are 2% or less of the entire project if wage rates are not utilized. For this project, that would result in a cost reduction of \$280,000. If wage rates are not utilized, bonding would be required at an interest rate in the range of 3.5% instead of the 1% offered through Mn PFA. This would result in \$3.8 million more in interest costs over the 20-year life of the loan.



**Exhibit 1: Biosolids Storage Tank**



**Exhibit 2: Final Clarifier – Splitter**