SALT CREEK ESTATES

2023 PRELIMINARY ENGINEERING REPORT
WASTEWATER SYSTEM

DECEMBER 2023

Prepared by:
RQAW Corporation
Engineering Consultants
8770 North St, Suite 110
Fishers, IN 46038

RQAW

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INTRODUCTION / EXECUTIVE SUMMARY

PLANNING PURPOSE

Salt Creek Services, Inc. (SCSI) commissioned a preliminary engineering report of its water and wastewater systems in 2023. This report focuses exclusively on the wastewater system. Salt Creek Estates is in Salt Creek Township in Monroe County, Indiana. The objectives of this planning study are to gather an understanding and document the components and condition of the existing system, the current and projected needs for the system, alternatives and proposed recommendations, and the final recommendations for the wastewater utility of Salt Creek Estates.

This plan was developed by following the guidelines of the Indiana Finance Authority's (IFA) Small Systems Grant Application (SSG) as well as the State Revolving Fund (SRF) Loan Program. This plan also complies with the United States Department of Agriculture's (USDA) Rural Utilities Service Bulletin 1780-2.

The SCSI commissioned RQAW Corporation (RQAW) as the engineering consultant to complete this report. Several meetings and conversations took place between May and July of 2023 to gather the necessary data and information from the utility to determine the recommended alternatives.

HOW TO USE THIS PLANNING STUDY

Included in the wastewater system Preliminary Engineering Report (PER) is a detailed evaluation and list of recommendations for Salt Creek Estate's wastewater utility. These recommendations are for the upcoming twenty-year planning period.

Wastewater Plan

The SCSI owns and operates its own wastewater collection utility consisting of three (3) lift stations, an extended-aeration package wastewater treatment plant, and a sanitary sewer collection system. The system was originally constructed in 1969. Since that time, the collections system has had one complete renovation in 2004 to replace failing gravity sewer. No significant upgrades have been made to the lift stations or wastewater treatment plant since original construction. The following planning document details the components of the existing system, the current and projected needs for the system, alternatives, and proposed recommendations for the wastewater utility.

FUTURE GROWTH

Anticipated future growth for the SCSI includes the potential for new single-family homes in unoccupied parcels as well as additions to existing homes. Currently, the utility services 46 homes on 73 lots. All proposed projects have been sized to meet twice that of the current demand, as to ensure that the utility meets the projected future needs of the community.

NEED FOR PROJECT

The SCSI's sanitary sewer system needs significant repairs. Treatment issues are prevalent and there are significant operations and maintenance concerns, indicated by the SCSI's contracted operator, Bynum Fanyo Utility, as well as IDEM inspection reports and previous studies collected for this report. Although 80% of the sanitary sewer collection lines were replaced in 2004, the lift stations and WWTP have far surpassed their anticipated useful life and are in great need of repair or replacement.

PLANNING PROCESS

Salt Creek Estates and RQAW discussed avenues to evaluate opportunities to remediate difficulties within the sanitary sewer system, and ultimately allow for safer and more reliable service for customers. Information from the SCSI was used to come up with several alternatives to improve the wastewater system. This plan should be used by the SCSI to help in the planning process of upgrading utility infrastructure to ensure proper function for the future.

A meeting was conducted on June 7th, 2023, between RQAW and Indiana Department of Environmental Management (IDEM) to discuss a high-level overview of the current conditions at Salt Creek Estates and the potential upgrades and replacement options that could be made. IDEM expressed that this area would be a good candidate for regionalization, and the implications are discussed further in Chapter 4.

ALTERNATIVE EVALUATION

Three (3) design alternatives were considered to improve the wastewater system for the SCSI. These alternatives include:

0. Alternative #0 - No Action
1. Alternative #1 - Lift Station Rehabilitation and Upgrades
2. Alternative #2 - Full Wastewater Treatment Plant Replacement
3. Alternative #3 - Regionalization

SELECTED PLAN

It is recommended that the Salt Creek Estates SCSI pursue Alternatives 1 and 2, described in Chapter 5, in the immediate future. The total cost for these alternatives is **$2,558,563** which is broken down in Chapter 5.

CHAPTER 1: PROJECT PLANNING

1.1 Introduction

Salt Creek Estates is a community on the Northeast shore of Lake Monroe that has an IDEM licensed wastewater treatment plant (WWTP). Operation of the Salt Creek WWTP and governance of homes in Salt Creek Estates is authorized by collective ownership of a not-for-profit corporation, Salt Creek Services Inc. This corporation has an elected Board of Directors that are responsible for ensuring that the community has potable water and sewage treatment.

This preliminary engineering report (PER) presents different options for the replacement of a 54-year-old WWTP servicing Salt Creek Estates that is at the end of its useful life. This report will also cover the environmental impact of the existing facility and proposed upgrade options that can mitigate the discharge of nitrogen (N) and phosphorous (P) into Lake Monroe.

Figure 1-1: Salt Creek Estates General Location

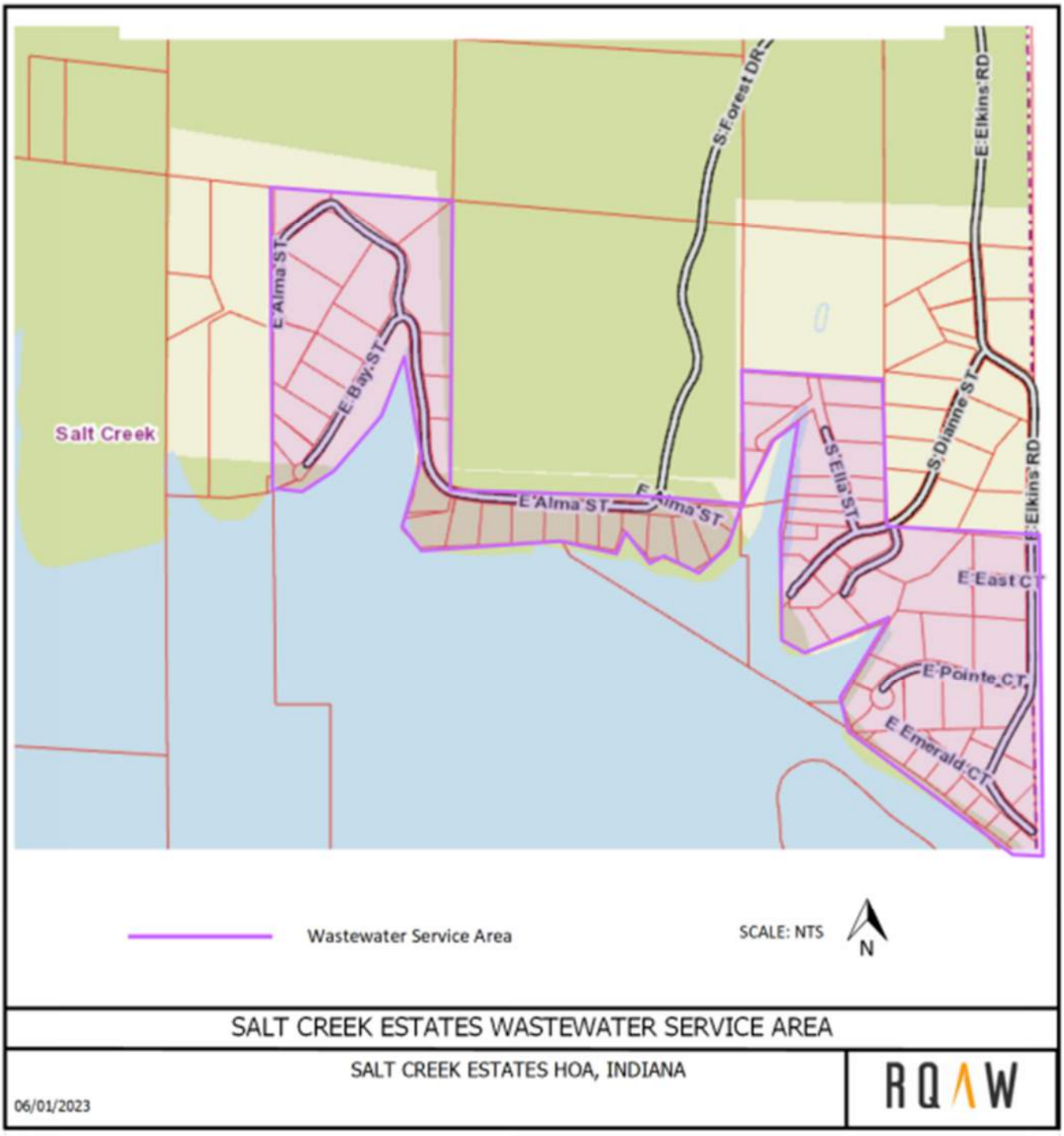


Figure 1-2: Map of Wastewater Service Area Boundaries

Table 1-1:Salt Creek Estates Location Information

LOCATION INFORMATION					
Description	**USGS Quad Map Name**	**Civil Township**	**Township**	**Range**	**Section(s)**
Wastewater Service Area Boundaries	Allens Creek	Salt Creek	8N	1E	35
	Elkinsville	Salt Creek	8N	1E	35

1.2 Community Engagement

Salt Creek Estates is governed by a not-for-profit corporation called Salt Creek Services Inc. Each lot owner is a co-owner of the corporation with each lot owner holding one vote on matters that require a vote. The corporation has an elected Board of Directors comprised of a President, Vice President, Secretary, Treasurer and seven additional Directors.

The Board of Directors have the responsibility of assuring proper operation and maintenance of a community WTP that pulls and purifies water from Lake Monroe to provide potable water, and a WWTP that processes sewage and discharges processed effluent back into Lake Monroe. The Board of Directors hires a commercial utility operator, currently Bynum Fanyo (BF) Utilities based in Bloomington, that has IDEM licensed employees.

Funding of the water and wastewater treatment plants involves two sources. One source of funding is the monthly Homeowner's Association (HOA) dues paid by each lot owner. The monthly HOA fees are set by the Board of Directors yearly to balance income with projected operating expenses. A second means of funding involves the Board of Directors' power to levy assessments for the repair or replacement of these utilities. Failure to pay assessments can result in liens placed on properties to recover unpaid debt. In extreme cases, the Board also has the ability to undertake legal foreclosure of properties from owners that fail to pay outstanding debt.

While the Board of Directors has the sole voting authority to levy and set HOA dues and assessments, it is customary for the Board to discuss funding issues with lot owners at an annual community meeting before major financial decisions are made. Furthermore, while some members of the community can handle an assessment well into the five-figure price range, there are others in the community that are retired or on fixed incomes. The latter would be significantly affected by the levy of a large assessment, which is why the Board is pursuing alternate funding options, such as that offered by the Small Systems Program administered by the Indiana Finance Authority.

Regarding community engagement, the Board of Directors maintains a Salt Creek HOA web site where lot owners can download minutes of quarterly board meeting, quarterly reports that discuss the status of water and wastewater treatment plants, treasurer's reports that itemizes utility expenses, and other relevant information. The President also writes a quarterly letter to each lot owner that highlights pressing issues to the community and actions taken by the Board to address such issues. Recent President's letters have stressed the need to replace the aging WWTP and efforts by the Board to address funding options, such as low interest loans and grants administrated by the Indiana Finance Authority. Consequently, the community is well informed on the status of the aging utilities that are owned and operated by Salt Creek Services Inc., and the need to have these utilities replaced or significantly upgraded.

CHAPTER 2: EXISTING FACILITIES

2.1 Location and History

2.1. WWTP LOCATION

Lake Monroe is a reservoir formed by the construction of a dam across Salt Creek in 1965. It is the largest reservoir in Indiana holding from 77 to 114 trillion gallons of freshwater, depending on the lake water level. Lake Monroe is the source of water for the city of Bloomington and surrounding communities and is also heavily used recreationally for boating, fishing, and swimming. Recreational activity associated with Lake Monroe generates approximately 40 million dollars annually to this region of Southern Indiana. Only a few select areas have housing along Lake Monroe as most of the shoreline is part of the Hoosier National Forest.

Salt Creek Estates is a community on the Northeast shore of Lake Monroe, along the border of Brown County and Monroe County, approximately equidistant between the cities of Bloomington and Nashville. It was incorporated and developed in 1967 with a WWTP installed early during its development. Land access to Salt Creek Estates requires driving on rural roads, many that are gravel, through the Hoosier National Forest.

Figure 2-1. Salt Creek community with a star indicating the location of the WWTP

The existing WWTP (red star in Figure 2-1) is located within the Salt Creek community at the end of Ella Street, a community-owned road that contains six houses. The WWTP resides in a ravine containing a wet creek bed that drains into a bay on the shore of Lake Monroe that also harbors a community boat dock. Effluent from the WWTP drains into this creek with children and adults frequently swimming in the bay where the creek discharges.

2.2. WWTP HISTORY

The existing WWTP, sewer lines, and three sewer lift stations were initially installed in 1969 during the development of Salt Creek Estates. The originally installed clay sewer lines (as well as most manholes) were

replaced with modern Acrylonitrile Butadiene Styrene (ABS) sewer lines in 2004. Thus, the existing lift stations and WWTP are original equipment with 54 years of service. The pumps in the lift stations have been replaced as they wear out, so they are not original equipment.

There are 73 lots in Salt Creek Estates with houses developed on 46 of these lots. With just a few exceptions, houses have been built on lots along the shoreline or within one lot of the shoreline. Given its shore front location, coupled with steep terrain in the area, there is no capability of using septic systems for wastewater treatment. The remote rural location also provides no option to hook into the Bloomington municipal sewer lines, as addressed further in Alternative 3. A well-run WWTP for the community is thus critical as it discharges processed wastewater into Lake Monroe.

In addition to the advanced WWTP age, there is another notable issue. When the existing WWTP was installed, Salt Creek Estates was a community that had small "weekend cabins" that contained just a few bedrooms and one or two bathrooms. Over the past two decades, many of the originally built, small weekend cabins have been replaced by large, year-round homes with four to five bedrooms and three to four bathrooms. There are also many full-time residents now living at Salt Creek. During summer boating weekends, these newer, larger homes support large gatherings of extended family and friends unlike the original, small cabins. The original sewer plant was not designed to handle the volume of sewage that is currently generated from much larger groups of individuals that are typically present in the Salt Creek Estates community during summer weekends and holidays.

2.3. CONDITION OF EXISTING FACILITY

As discussed above, the existing WWTP is now more than 50 years old and not designed to handle large surges of inflow that occur during summer holiday weekends. There is also storm water infiltration that creates surges of inflow into the sewer plant during heavy rains. Additionally, Salt Creek is surrounded by the heavily forested Hoosier National Forest through which aerial power lines reside that provide power to the community. Power to Salt Creek is frequently disrupted (typically one to two times a month) during storms where uprooted trees have pulled down power lines. These power interruptions cause the accumulation of large volumes of sewage in the sewer lines because the WWTP and lift stations have no back up power. When power resumes (often after being disrupted for 12-24 hours) there is a surge of inflow into the WWTP resulting in passage of partially processed effluent out of the treatment plant. These surge events (caused either by busy holiday weekends, heavy rains or power outages) can lead to violations of IDEM licensed discharge limits for Nitrogen, Phosphorous, and other effluents. Discharge violations are of particular concern given that Lake Monroe is used for swimming recreationally and is also the source of drinking water for Salt Creek Estates and the City of Bloomington.

Given the small size of the community and its remote location, the sewer plant has on-site operators present only 2-3 times a week. At all other times, the sewer plant operates without any monitoring. Furthermore, there is no SCADA control, no remote monitoring of discharge during periods when an operator is not present, no capability to access whether the WWTP has power and the blower is, or is not, functioning. The inability to monitor discharge, and overall status of the WWTP during periods when no plant operator is present, is a noted concern of IDEM.

While the current condition of the more than 50-year-old in ground WWTP holding/processing tank is unknown, there is information on its condition as of fall of 2011 (Fig 2-2). At that time the holding/processing tank was drained, visually inspected, sandblasted, repaired by welding steel plates over several extensively

corroded areas, and then painted with an epoxy-based paint. The company that did this repair/maintenance work noted that there were areas of extensive corrosion leading to thinning of the tank walls. They estimated in 2011 that the tank "may last another 10 years". The integrity of the tank walls has not been tested during the 12 years since that 2011 analysis.

Figure 2-2. Sewer plant tank inspection and repair in Fall 2011

CHAPTER 3: NEED FOR PROJECT

3.1 Health, Sanitation, and Security

BF Utilities has operated the Salt Creek WWTP for several decades and also operates eight additional WWTPs in surrounding communities and towns in Southern Indiana. BF Utilities thus has extensive experience in WWTP operation. A recent detailed analysis of the status of the WWTP led BF Utilities to conclude that the Salt Creek WWTP is at its end of life and needs replacement. They also noted that the existing lift stations that push sewage into the WWTP have very poor volume control leading to surges that result in too frequent effluent discharge violations (Appendix E).

The conclusion that the WWTP is at its end of useful life is also supported by recent IDEM reports from annual inspections of the WWTP. These IDEM reports indicate that they want:

(i) SCADA remote monitoring of plant effluent to allow plant operators to monitor effluent Nitrogen, Phosphorous, and Biological Oxygen Demand while off site.
(ii) input surge control
(iii) lift station upgrades
(iv) blower redundancy
(v) backup power

Input surge control could be immediately addressed by modifying the existing plant through the installation of an equalization tank and updating the lift station pumps and electronics. However, it would not be a cost-effective use of funds as there is likely very limited life remaining in the more than 50-year-old rusted basin.

In summary, the WWTP at Salt Creek is now more than 50 years old and having difficulty remaining compliant regarding discharge levels of N and P during periods when there are large input surges. Lake Monroe is an area of environmental concern as it has an important role as a drinking water reservoir for Salt Creek Estates and the City of Bloomington. Lake Monroe also has an important role in providing recreational activity to the State of Indiana. Consequently, there is a critical need for a new WWTP that will help protect the health of the lake and surrounding communities.

CHAPTER 4: IMPLEMENTATION OF ALTERNATIVES

4.1 Alternative #0: No Action

Under the "No Action" alternative, Salt Creek Estates' Utilities would continue to perform daily operations of their lift stations, wastewater treatment plant and collection system without any improvements or replacements.

This "No Action" alternative does not have environmental impacts due to construction and does not have an initial capital cost. However, long-term operation and maintenance costs are expected to be high due to frequent and consistent labor and deliveries required to continue to properly treat wastewater. Because the existing package treatment plant is undersized, there is often problems with solids wash-through and maintaining a consistent food to mass ratio, often leading to operators trucking in additional bacteria or food to "seed" the plant continually. The current system also lacks any kind of automatic controls. Without any updates, the risk of undertreated water being discharged into Lake Monroe in violation of the utility's NPDES permit would remain very high.

The "No Action" alternative is not a viable option for the SCSI. In order to maintain reliable and efficient sanitary service to the customers, steps must be taken. Therefore, the "No Action" alternative will not be further considered.

4.2 Alternative #1: Lift Station Rehabilitation

A. Introduction

The wastewater collections system for Salt Creek Estates has three (3) existing lift stations. These lift stations were originally installed in the 1960's when the WWTP was constructed. Each lift station utilizes two pumps: lift station 1 is 3 Horsepower, and lift station 2 and 3 are 1.5 Horsepower each. The lift stations serve the purpose of moving waste throughout the system where means of gravity cannot be used.

Since their installation, pump and float replacements at the lift stations have been periodically completed as necessary. In the past, the utility has been cited during IDEM inspections for lack of preventative maintenance and rust damage. All pumps are straight-line, with no variable frequency drives (VFDs). VFDs would allow for smoother transitions in WWTP start-up and provide the added benefit of protecting the existing force mains from breaks due to start-up pressures. Additionally, none of the lift stations have backup power in the event of an outage. Adding one automatic transfer switch (ATS) and backup generator to the WWTP would provide the entire system with power in a power outage scenario.

In order to ensure the lift stations work properly well into the future, rehabilitation is recommended as well as the addition of the backup generator. During construction of the recommended lift stations, bypass pumping will be required in order to reroute waste to the WWTP and provide continuous service to the community during any down time. Rehabilitation of the lift stations would require controls updates, new concrete top plates, replacing Lift Station #1's pump, and variable frequency drives for two lift stations. Controls updates would be necessary at all three lift stations in order to bring them up to date with current technology and best practices. These rehabilitations to the lift stations would aid SCSI in meeting all IDEM inspection requirements and provide reliable a more reliable wastewater treatment process to the community.

B. Design Criteria

It is recommended that all three lift stations in the Salt Creek wastewater system be repaired in the ways described in Section 4.2.A. This work would include the construction of new top slabs and hatches with fall protection for each of the three wet wells, as well as new access ladders to remediate all rusting concerns. Rehabilitation would also include the installation of VFDs for the main WWTP Lift Station along with 3-phase cutter pumps. A backup generator that will supply power to Lift Station #1 and the WWTP would be installed near the power source at Lift Station #1 or at the WWTP. This cost is grouped in with Alternative #2 but could be recommended in the case that only this alternative is completed. Finally, SCADA controls for all lift stations will need to be upgraded and integrated into a new system for the wastewater utility.

C. Map

Figure 2-1 shows the locations of all three lift stations and all major components of the wastewater system. Appendix B also contains drawings of the collections system.

D. Environmental Impacts

No impacts to historic structures, wetlands, waterways, floodplains, or forested areas are anticipated for this alternative.

E. Land Requirements

All work is expected to occur within SCSI property. The utility does not anticipate needing any additional property for this project.

F. Construction Considerations

The proposed project will not require the construction of any significant new structures. Special considerations should be made to ensure there are no disruptions in service during installation of new Lift Station items. Construction considerations should be made for access to lift stations under construction. Construction equipment will access these lift stations while driving on steep gravel roads and necessary precautions should be made.

G. Sustainability Considerations

a) Water and Energy Efficiency

A portion of the proposed project would help to promote better energy efficiency. The installation of VFDs on the WWTP influent lift station allows only required energy to be used.

b) Green Infrastructure

The proposed project does not include green infrastructure.

H. Advantages and Disadvantages

a) Advantages

Rehabilitating the existing lift stations as described would alleviate the rusting and corrosion concerns with hatches. Repairs would increase safety by installing fall protection. Additional operations advantages would be observed by integrating new VFDs, generator, and SCADA. These items would prevent system backups in the event of power outages as well as prevent surges through the WWTP when the main lift station pumps begin pumping.

b) Disadvantages

The project may lead to temporary inconvenience of customers with the presence of contractors.

I. Cost Estimate

The preliminary opinion of probable construction cost for this project can be found in Table 4-1.

Table 4-1: Preliminary Opinion of Probable Construction Cost for Alternative #1

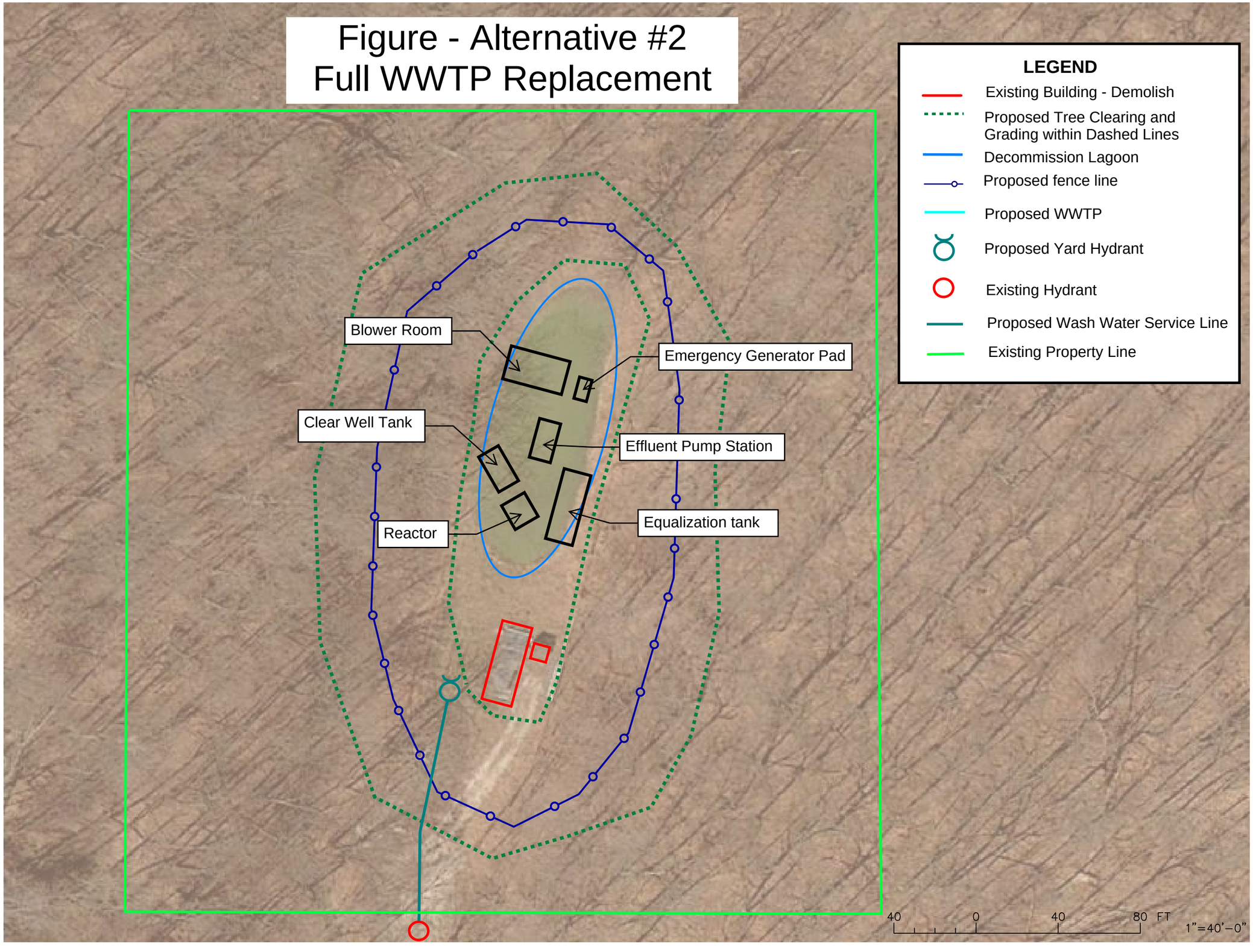
ALTERNATIVE #1 COST ESTIMATE - LIFT STATION REHABILITATION					
Item No.	**Description**	**Quantity**	**Unit**	**Unit Price**	**Total Amount**
1	MOBILIZATION AND DEMOBILIZATION	1	LS	$2,800	$2,800
2	MAINTENANCE OF TRAFFIC	1	LS	$1,000	$1,000
3	CONSTRUCTION ENGINEERING	1	LS	$2,800	$2,800
4	EROSION AND SEDIMENTATION CONTROL	1	LS	$1,000	$1,000
5	BYPASS PUMPING	1	LS	$3,000	$3,000
6	REPLACE LIFT STATION #1 (WWTP) PUMP WITH 3-PHASE CUTTER PUMP	2	EA	$6,000	$12,000
7	VARIABLE FREQUENCY DRIVE FOR LS PUMP, COMPLETE	2	EA	$1,500	$3,000
8	NEW 4' DIAMETER CONCRETE TOP PLATE WITH ALUMINUM HATCH PROTECTION, COMPLETE	2	EA	$4,000	$8,000
9	NEW 6' DIAMETER CONCRETE TOP PLATE WITH ALUMINUM HATCH PROTECTION, COMPLETE	1	EA	$6,000	$6,000
10	CONTROLS UPDATES AND INTEGRATION LIFT STATION #1 (WWTP LS)	1	LS	$27,500	$27,500
11	CONTROLS UPDATES AND INTEGRATION AUXILIARY LS	2	EA	$17,500	$35,000
12	NEW STEEL LADDER FOR LS ACCESS	3	EA	$1,600	$4,800
Estimated Construction Cost Subtotal					**$107,300**

4.3 Alternative #2: Full WWTP Replacement

A. Introduction

The current WWTP is not sized to handle the current peak demands or future demands. It has also surpassed its useful life. Significant maintenance and operations must be performed at this time just to keep the plant functional. Full replacement is recommended to create a wastewater treatment solution that will have the flexibility to work with the wide range of flows received and function as the community grows in their treatment needs. See Figure 4-1 for proposed preliminary site plan.

Figure - Alternative #2
Full WWTP Replacement



RQAW
INTENTIONAL INNOVATION

EXHIBIT

SALT CREEK ESTATES
UTILITIES
WWTP REPLACEMENT
SALT CREEK ESTATES, NASHVILLE, IN 47448

#	Revision	Date

Project #: 23-400-188-1
Designed By: GLP
Drawn By: GLP
Checked By: ALC
Date: 07/31/2023

One challenge in finding a replacement treatment plant solution is the range of daily flows to the WWTP. Due to substantial variability in the amount of people staying in the neighborhood at any point in time, there are higher flows during summers due to recreation and larger numbers of people staying at each property, and flows are lower during off-season when primarily permanent residents utilize the community.

Based on the existing conditions with the current WWTP, it is recommended that a full replacement be made to account for all current and future flows. Although several manufacturers were considered for the new WWTP, DPI Solutions and Amphidrome were the two selected to compare and determine which would be the recommended solution for a new WWTP.

	Peak (GPD)	Average (GPD)
Current	29,800	3,700
Future	60,000	8,000

B. Design Criteria

When finding options for a WWTP solution, a multitude of design criteria had to be considered. Based on the MRO data from the past three years, it is apparent that the WWTP receives a considerable variation in inflow. The recommended replacement plant needs to account for this variation efficiently and effectively.

Special considerations also had to be considered as the terrain to enter the community is more rugged with tight turns, many hills, and some gravel paths as well, making construction more challenging.

A backup generator with an automatic transfer switch (ATS) is recommended to be implemented in the design in order to keep continuous treatment during the event of any power outage. Natural gas is not available within Salt Creek Estates; therefore a liquid petroleum tank would be needed to fuel the new generator.

The SCSI has shared a preference of the new WWTP having a peak capacity of 60,000 GPD for many reasons. Based on the summarized MRO data from the past three years, the average flow rate is 3,700 GPD with a peak flow of 29,800 GPD. An increase in the number of full-time residents as current homeowners enter retirement is anticipated. This change would increase flow rates into the WWTP. Additionally, if more boat slots to the community in the future, this could encourage further growth and development to some of the empty lots, of which there are no more than 20. Because of these reasons, the proposed WWTP has double the capacity of the current plant.

The current NPDES permit is 15,000 GPD and the intent is to keep this permit and renew accordingly, as average future flows are approximately half of this value. Due to the wide range of flows as shown by the comparison of peak versus average daily flows, flow equalization capability should be considered in choosing a recommended package WWTP.

C. Environmental Impacts

The SCSI has expressed that they would prefer a larger buffer to be around the new WWTP to prevent falling trees from damaging the plant. The current plant has trees very close to the building equipment and this poses a risk of damage during high wind events. Tree clearing can have negative environmental impacts, but being that this is minimal clearing, there should be minimal impact.

Replacement of the WWTP will ensure that the effluent water being discharged into Lake Monroe is clean and meets IDEM standards.

No impacts on historic structures, wetlands, waterways, or floodplains are anticipated. Forested areas will be impacted as mentioned above.

D. Land Requirements

All work is expected to occur within SCSI property. The utility does not anticipate needing any additional property for this project. Some tree clearing around the WWTP site will be required to create additional room around the exterior. This land is within the current property line of the existing WWTP.

E. Construction Considerations

Special considerations should be made to ensure there are no disruptions in service during installation of the new WWTP. The proposed project will require construction of an entirely new WWTP, demolishing the existing shed, and constructing an onsite building for chemical storage. The existing lagoon will be dredged and decommissioned as it will no longer be utilized for this proposed solution. Traffic control and maintenance will be an additional cost of this project due to the access of Salt Creek Estates being primarily narrow roads with steep hills and not many access routes into the neighborhood.

F. Sustainability Considerations

a) Water and Energy Efficiency

Effective replacements would lead to marginal energy efficiency improvements at the WWTP due to the improved efficiency of having a new and effective system in place. A portion of the proposed project would help to promote better energy efficiency. The installation of VFDs on the WWTP influent lift station allows only required energy to be used.

b) Green Infrastructure

The proposed project does not include green infrastructure.

G. Advantages and Disadvantages

a) Advantages

Full replacement of the WWTP will provide:

- Reliably clean water returned to lake Monroe
- Less maintenance in order to keep the new WWTP functional or operational
- New lifespan, able to keep up with current and future demands
- Ability to handle wide range of inflow without major maintenance due to flow rate changes
- Full SCADA control allowing plant operators to remotely monitor plant operations and compliance items

b) Disadvantages

Disadvantages of this recommendation include cost; however, the investment of this recommendation will be worthwhile to provide a sustainable wastewater treatment solution well into the future for the community.

The project could require temporarily interrupted services of sewer systems. Construction work will need to be completed in a time-effective manner to limit potential downtime of services to customers. Bypass pumping may be required during construction to ensure service to all customers can be maintained.

Due to the terrain of the road leading into the Salt Creek Estates, challenges are expected during delivery of large equipment for the WWTP. It may be very difficult and require additional maintenance of traffic or traffic rerouting as well as additional clearing of trees on the side of the roads leading into the estates. Navigating this road may be challenging when bringing in large equipment on a truck. This process may be inconvenient to the residents and visitors during transport.

H. DPI Water Solutions

DPI gave a budgetary cost estimate and overview of the recommended system that best meets the current and future conditions of expected wastewater treatment. Because of the significant range of inflows, it was recommended that the plant be undersized and be given an expansion in the future. DPI recommended a 10,000 gallons per day (GPD) extended aeration plant with a tertiary filter. In order to have steady state flows, a sludge holding tank of about 5,000 gallons was recommended. Although this solution would work, the SCSI has expressed wanting all upgrades for the foreseeable future to be completed all at once to not incur a similar problem in the future of having an undersized plant. The SCSI would prefer the new system to be sized for up to 60,000 GPD peak daily flow in order to properly treat on their current peak day and handle treatment appropriately as the population grows in the future. This solution was also more costly both upfront and in the long run, being that it would need an expansion in the future. Operation and maintenance costs for this plant manufacturer would be similar to what is currently being paid by the utility. A preliminary cost breakdown was compared between DPI Solutions and Amphidrome, proving that DPI solutions was neither cost effective in the short term or long term (Appendix E). The DPI representative expressed that this system may require additional chemicals and maintenance in order for the system to effectively treat the given wastewater constraints. However, the details of this additional labor would need to be investigated further to get a full understanding of the implications of operation and maintenance.

I. Amphidrome

Amphidrome provided a budgetary cost estimate and overview of their recommended system for the conditions of Salt Creek Estates. The system includes a below grade package treatment plant handling up to the peak daily flow of 60,000 GPD. A separate building would need to be provided to house the blower and chemical storage, and all other components can fit within the provided area onsite. UV disinfection is included in the treatment plant. Amphidrome's system is able to handle both current flows, including the range of flows, as well as future demands of up to 60,000 GPD as requested by the SCSI. A service line is not required for backwash of this system, however it is recommended to have a water line onsite for any other utility use. Operations and maintenance costs of this system are around $4800 per year in current dollars. This cost is for sludge disposal once or twice a year, chemical feed costs, and electrical costs, as estimated by Amphidrome. The sand media within the system,

according to Amphidrome, should last upwards of 20 years before the need for replacement. Control paneling may need to be updated in approximately 10 years as technology changes.

This system proves to be cost effective and efficient in handling the needs of the community. Some additional costs for this system not included in the package treatment plant cost are concrete, site piping, and a building for the blower and chemical storage. Being that the Amphidrome system is able to handle current and future anticipated flows in a cost-effective manner, this is the recommended package treatment plant for Salt Creek Estates.

J. Cost Estimate

The preliminary opinion of probable construction cost for this project can be found in Table 4-2.

Table 4-2: Preliminary Opinion of Probable Construction Cost for Alternative #2

ALTERNATIVE #2 COST ESTIMATE – WWTP FULL REPLACEMENT - AMPHIDROME					
Item No.	**Description**	**Quantity**	**Unit**	**Unit Price**	**Total Amount**
1	MOBILIZATION AND DEMOBILIZATION	1	LS	$44,500	$44,500
2	MAINTENANCE OF TRAFFIC	1	LS	$14,900	$14,900
3	CONSTRUCTION ENGINEERING	1	LS	$44,500	$44,500
4	EROSION AND SEDIMENTATION CONTROL	1	LS	$14,900	$14,900
5	TREE CLEARING	1	LS	$70,000	$70,000
6	DEMOLITION OF EXISTING FACILITIES	1	LS	$50,000	$50,000
7	SITE GRADING	1	LS	$80,000	$80,000
8	STANDBY GENERATOR AND AUTOMATIC TRANSFER SWITCH	1	LS	$100,000	$100,000
9	FENCING	675	LFT	$90	$60,750
10	WASH WATER SERVICE LINE AND YARD HYDRANT	1	LS	$30,000	$30,000
11	PACKAGE TREATMENT PLANT AND INSTALLATION (EQUALIZATION TANK, REACTOR, CLEARWELL TANK, EFFLUENT PUMP STATION, BLOWERS, UV DISINFECTION, SCADA REMOTE MONITORING)	1	LS	$570,000	$570,000
12	BUILDING FOR BLOWER AND CHEMICAL STORAGE	1	LS	$100,000	$100,000
13	SITE PIPING	1	LS	$90,000	$90,000
14	CONCRETE	100	CYD	$1,600	$160,000
15	EXISTING DRIVEWAY IMPROVEMENTS	1	LS	$10,000	$10,000
16	SITE LIGHTING	1	LS	$10,000	$10,000
17	SITE ELECTRICAL	1	LS	$50,000	$50,000

18	DREDGING AND DECOMMISSION LAGOON	1	LS	$50,000	$50,000
19	TEMPORARY STORAGE DURING CONSTRUCTION	1	LS	$50,000	$50,000
				Estimated Construction Cost Subtotal	**$1,599,550**

A direct comparison of DPI Solutions and Amphidrome is attached in Appendix E. This shows the detailed cost estimates for both treatment plant options. While Amphidrome requires a few additional line items due to costs not being included in the package treatment cost, DPI Solutions still proves to be more costly due to the high cost of the treatment plant.

4.4 Alternative #3: Regionalization

A. Description

Salt Creek Estates has a unique location that creates challenges when regionalizing utilities. The neighborhood is located on Lake Monroe, within Monroe County, but is technically within Nashville, IN for mailing purposes. However, Salt Creek Estates is located over 10 miles from the downtown area of Nashville, and all other services such as fire, police, and ambulance services are served out of Bloomington, IN, located about 10 miles away. Additionally, Salt Creek Estates sits within a less populated area with many gravel roads and hilly areas surrounding it. Regionalization of Salt Creek Estates' sewage to a neighboring community would require a system of lift stations, as well as approximately 10-11 miles of sewer main to Nashville. This unreasonably long main would need to be force main, as the two towns have an elevation difference of about 30 feet. The terrain in between the two areas is heavily wooded and hilly, posing logistical challenges for construction and design of such a system. Similar is true for Bloomington: being approximately 10 miles away with rough terrain in between could necessitate a costly and high maintenance system. Because of the location of Salt Creek Estates to Lake Monroe, regionalization of the sewer utility to Bloomington would also require going either under or around Lake Monroe. This project would be unfeasibly expensive, and any repairs or replacements of this regionalized system would be a major undertaking, especially with a main going under or all the way around Lake Monroe.

The benefits of regionalization would be having more systems of wastewater connected and possibly saving money on operations. These cost savings, however, would be greatly outweighed by the extreme capital cost.

CHAPTER 5: RECOMMENDED ALTERNATIVE

5.1 General

The proposed wastewater system improvements projects consist of the following alternatives. These alternatives were developed with input from SCSI.

The following immediate alternatives are recommended for the Salt Creek Estates:

1. Alternative #1 – Lift Station Rehabilitation
2. Alternative #2 – WWTP Full Replacement

All advantages and disadvantages were discussed and addressed to provide a recommendation that best fits the needs of the community. The combined benefits of having both improvements will ensure that the wastewater treatment system is adequate for the community now and as it continues to grow.

5.2 Preliminary Project Design

LIFT STATION REHABILITATION

Anticipated design includes:

1. Mobilization and demobilization, maintenance of traffic, erosion control and construction engineering
2. Bypass pumping
3. Replacement of lift station pump
4. Addition of variable frequency drive for lift station pump
5. Control integration updates
6. New generator
7. New top plates

The preliminary opinion of probable cost for this project is **$107,300** and can be found in Table 4-1 previously in this report.

FULL WWTP REPLACEMENT

Anticipated design includes:

1. Mobilization and demobilization, maintenance of traffic, erosion control and construction engineering
2. Clearing of trees to create a large space surrounding the system
3. Demolition and site grading of existing system
4. Standby generator
5. Fencing to surround the entire system and buildings
6. Wash water service line and yard hydrant installation
7. Package treatment plant and installation
8. Building to store blower and chemicals
9. Dredging and decommissioning of existing lagoon

The preliminary opinion of probable cost for the proposed project is **$1,559,550**. Table 4-2 above shows the cost breakdown as a portion of Alternative #2.

5.3 Permit Requirements

The proposed projects may require the following permits:

1. Indiana Department of Environmental Management (IDEM) Construction Permit
2. Indiana Department of Environmental Management (IDEM) approval to decommission lagoon
3. Indiana Department of Environmental Management (IDEM) Construction Stormwater General Permit
4. Indiana Department of Environmental Management (IDEM) Potential Construction in a Floodway Permit
5. Indiana Department of Environmental Management (IDEM) National Pollutant Discharge Elimination System (NPDES) Permit (replacing the existing permit)
6. Monroe County Construction Permit

5.4 Project Workforce

The SCSI does not have their own workforce. Contractors will be required for the construction and repairs proposed. The SCSI will provide operation and maintenance once the construction is complete.

5.5 Ordinances and Easements

The proposed projects are located within the footprint of the existing facilities. No impacts to historical structures, wetlands, or floodplains are expected. Some impact to forested areas are expected, as the SCSI requests that a larger area be cleared of trees surrounding the new WWTP facility to protect the structures from significant tree related damage and debris.

5.6 Sustainability Considerations

WATER AND ENERGY EFFICIENCY

The proposed project is anticipated to increase energy efficiency of the lift stations. The replacement of the WWTP should have increased energy efficiency being a new mechanical system. The SCSI may have decreased energy usage from these systems due to increased efficiency but may incur higher operating costs as the community grows and sends more wastewater to be treated over time. This is an expected cost of operating under the anticipated growth.

GREEN INFRASTRUCTURE

The proposed projects do not include any green infrastructure initiatives.

5.7 Total Project Cost Estimate

The preliminary opinion of probable total project cost is **$2,558,563.** This includes construction contingency and non-construction costs. Table 5-1 below provides a detailed summary of costs.

Table 5-1: Preliminary Opinion of Probable Project Costs

PRELIMINARY OPINION OF PROBABLE PROJECT COSTS		
No.	**Project**	**Cost**
1	Alternative #1 – Lift Station Rehabilitation	$107,300
2	Alternative #2 – WWTP Full Replacement	$1,559,550
3	25% Construction Contingency	$416,713
Total Estimated Construction Cost		**$2,083,563**
Engineering Fee (Survey, Design, Permitting, Bidding & Construction Admin and Inspection)		$460,000
Labor Standards Administration		$15,000
Total Estimated Project Cost		**$2,558,563**

5.8 Annual Operating Budget

GENERAL INCOME

The SCSI is in stable financial condition. The residents are required to pay fees relating to all operations and maintenance of systems that provide the community with basic needs such as wastewater treatment. A new wastewater fee would be calculated by the SCSI per household so that this cost is covered on a monthly basis.

DEBT REPAYMENT

The SCSI has no remaining long-term debt for the wastewater utility as of 2023.

5.9 Project Funding

The total estimated project cost for the recommended improvements is **$2,558,563**.

CHAPTER 6: CONCLUSIONS

The SCSI is committed to providing efficient wastewater treatment for the community. For the utility to achieve this, it is important that they replace their WWTP with a more sizable and effective solution, as well as update the lift stations on site. In order to have an effective treatment system, the entirety of the system must be maintained. The system has several operations concerns, with the lift stations requiring repairs and upgrades as well as the current WWTP being at its end of life.

The following immediate alternatives are recommended for the Salt Creek Estates:

1. Alternative #1 – Lift Station Rehabilitation
2. Alternative #2 – WWTP Full Replacement

These projects will aid the SCSI in continuing to provide safe, reliable wastewater collection and treatment for their neighbors.

The Salt Creek Estates SCSI and BF Utilities were heavily involved in the production of this plan in coordination with RQAW. The SCSI prioritized the alternatives by discussing RQAW's recommendations and the funding needed for each alternative.

APPENDIX A: ENVIRONMENTAL FIGURES


86° 23' 3" W
86° 21' 59" W
553300
553500
553700
553900
554100
554300
554500
554700
39° 5' 41" N
39° 4' 35" N
4327400
4327200
4327000
4326800
4326600
4326400
4326200
4326000
4325800
4325600
WyqD
BkF
BcrAW
BkF
BgF
TIB
BkF
WyqD
Alma St
BcrAW
BkF
Diane Ct
BgF
W
WaD
BgF
Map Scale: 1:9,880 if printed on A portrait (8.5" x 11") sheet.
N
Meters
0 100 200 400 600
Feet
0 450 900 1800 2700
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Brown County, Indiana
Survey Area Data: Version 24, Sep 3, 2022

Soil Survey Area: Monroe County, Indiana
Survey Area Data: Version 29, Sep 2, 2022

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 15, 2022—Jul 21, 2022

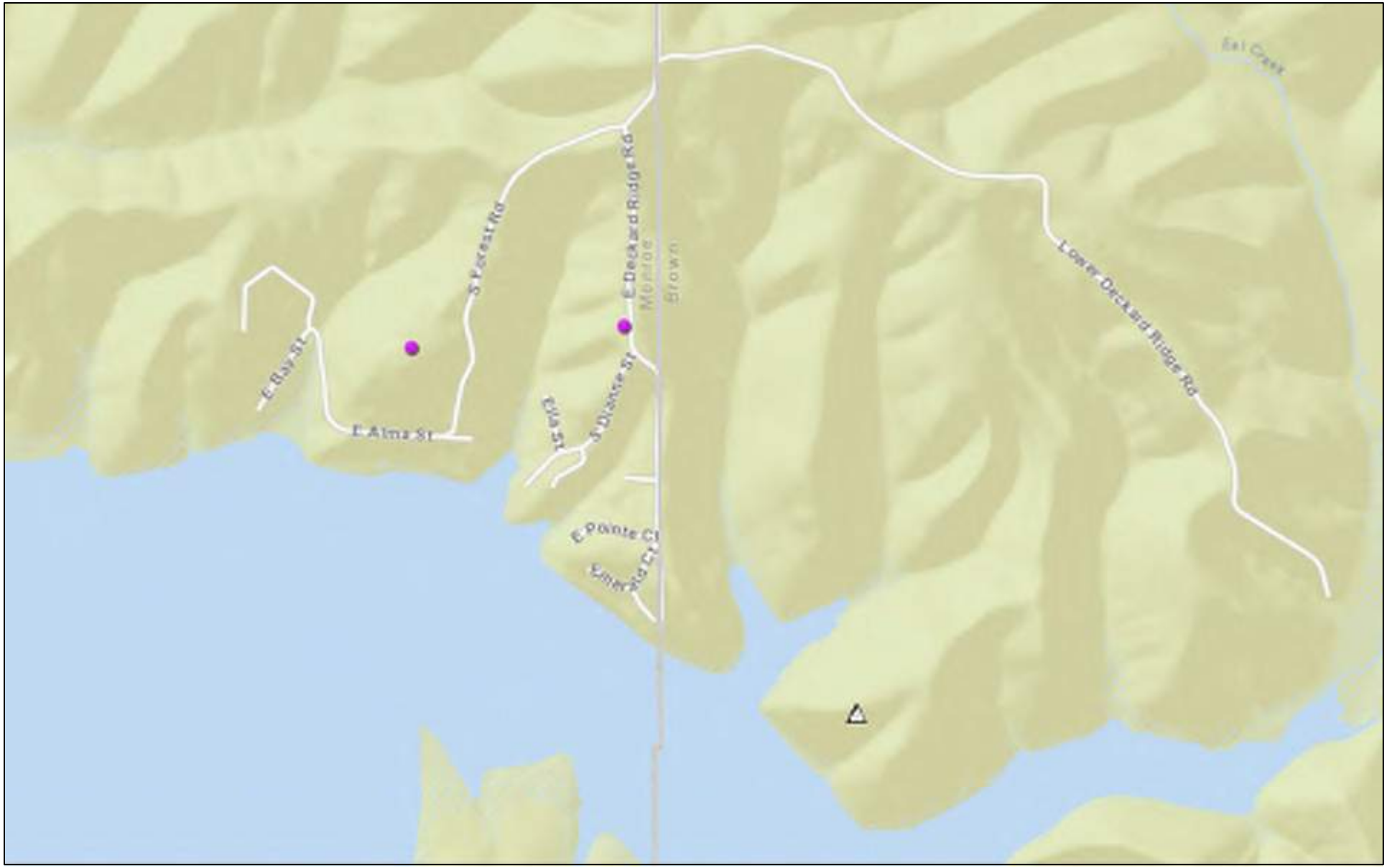
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BgF	Berks-Trevlac-Wellston complex, 20 to 70 percent slopes	17.8	3.9%
WaD	Wellston-Berks-Trevlac complex, 6 to 20 percent slopes	17.8	3.9%
Subtotals for Soil Survey Area		**35.6**	**7.9%**
Totals for Area of Interest		**452.7**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BcrAW	Beanblossom silt loam, 0 to 3 percent slopes, occasionally flooded, very brief duration	10.9	2.4%
BkF	Brownstown-Gilwood silt loams, 25 to 75 percent slopes	175.0	38.7%
TlB	Zanesville silt loam, 2 to 6 percent slopes	8.5	1.9%
W	Water	99.6	22.0%
WyqD	Wrays-Gilwood silt loams, 6 to 20 percent slopes	123.1	27.2%
Subtotals for Soil Survey Area		**417.1**	**92.1%**
Totals for Area of Interest		**452.7**	**100.0%**

Historic Buildings, Bridges, and Cemeteries Map



6/5/2023, 12:30:43 PM

△ Cemeteries

County Survey Sites

● Contributing

1:17,539

0 0.15 0.3 0.6 mi

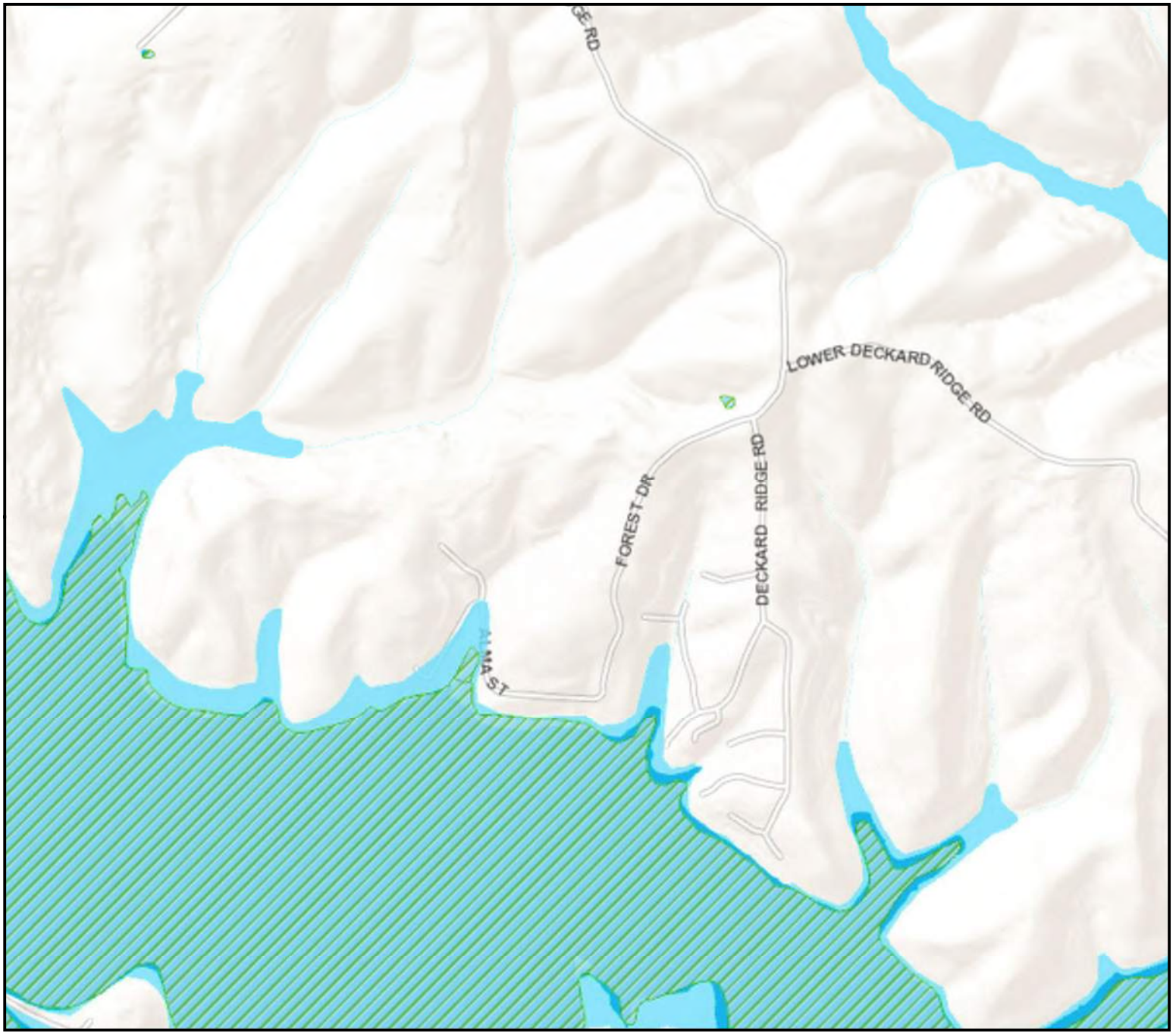
0 0.225 0.45 0.9 km

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand),

Indiana DNR DHPA

Salt Creek Estates

Date: 6/5/2023



Legend

- Wetlands NWI (USFWS)
- Wetlands Project Metadata NWI (U

Lakes (Local-Resolution NHD)

- Estuary
- Ice Mass
- LakePond
- Playa
- Reservoir
- SwampMarsh

Floodplains - FIRM (Mar 2020)

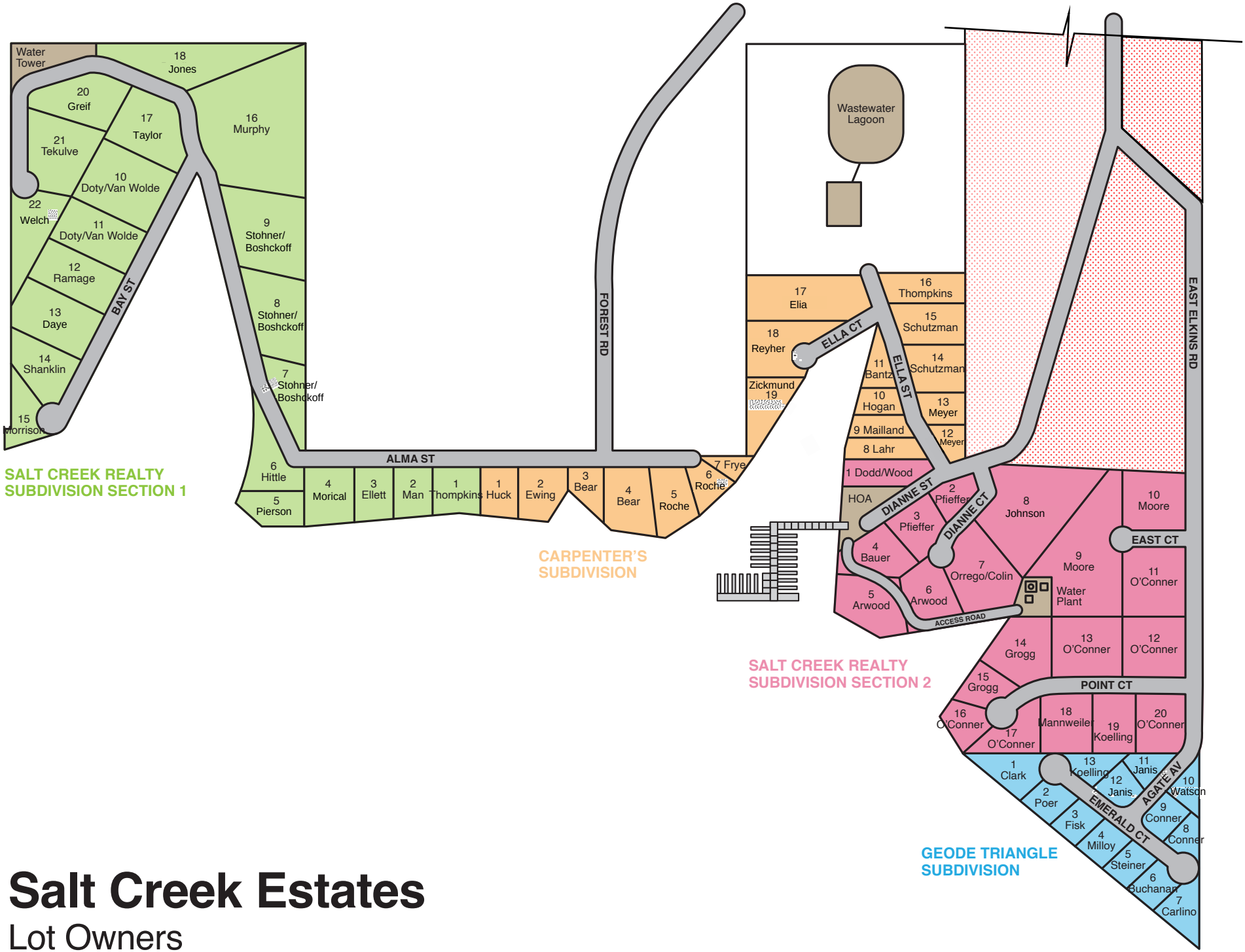
- Floodway
- 1% Annual Chance Flood Hazard
- 0.2% Annual Chance, Protected by
- 0.2% Annual Chance Flood Hazard

Author: Whitney Weidenbenner

0 0.5 mi

IndianaMAP

APPENDIX B: WASTEWATER SYSTEM MAPS



Salt Creek Estates

Lot Owners

June 1, 2023

SET NO.

SALT CREEK SERVICES, INC.

WASTEWATER IMPROVEMENTS PROJECT

SANITARY SEWER REHABILITATION

APRIL, 2004

BOARD OF DIRECTORS

EDWARD KOPECKY	PRESIDENT
CARL BAUER	VICE PRESIDENT
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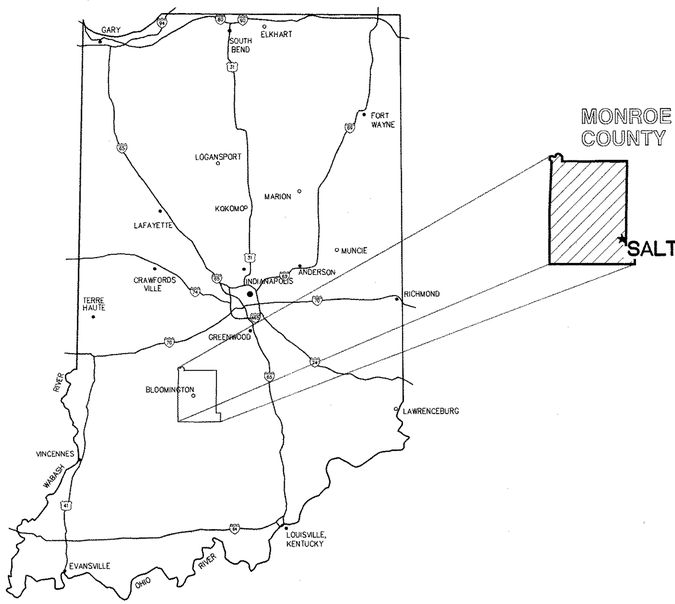
BETTY DODD	SECRETARY
STEVE HOGAN	MEMBER
GARY RAMAGE	MEMBER
TOM CARLINO	MEMBER
PAUL MANNWEILER	MEMBER
TOM SLAIN	MEMBER
GENE ZINK	MEMBER
ANTHONY MOORE	MEMBER



GENERAL LOCATION MAP

NO SCALE

COMMONWEALTH ENGINEERS, INC.

APPROVED BY : _____ DATE: _____

JEFFREY B. PONIST
INDIANA P.E. NO. 20741

CERTIFIED BY : _____ DATE: _____

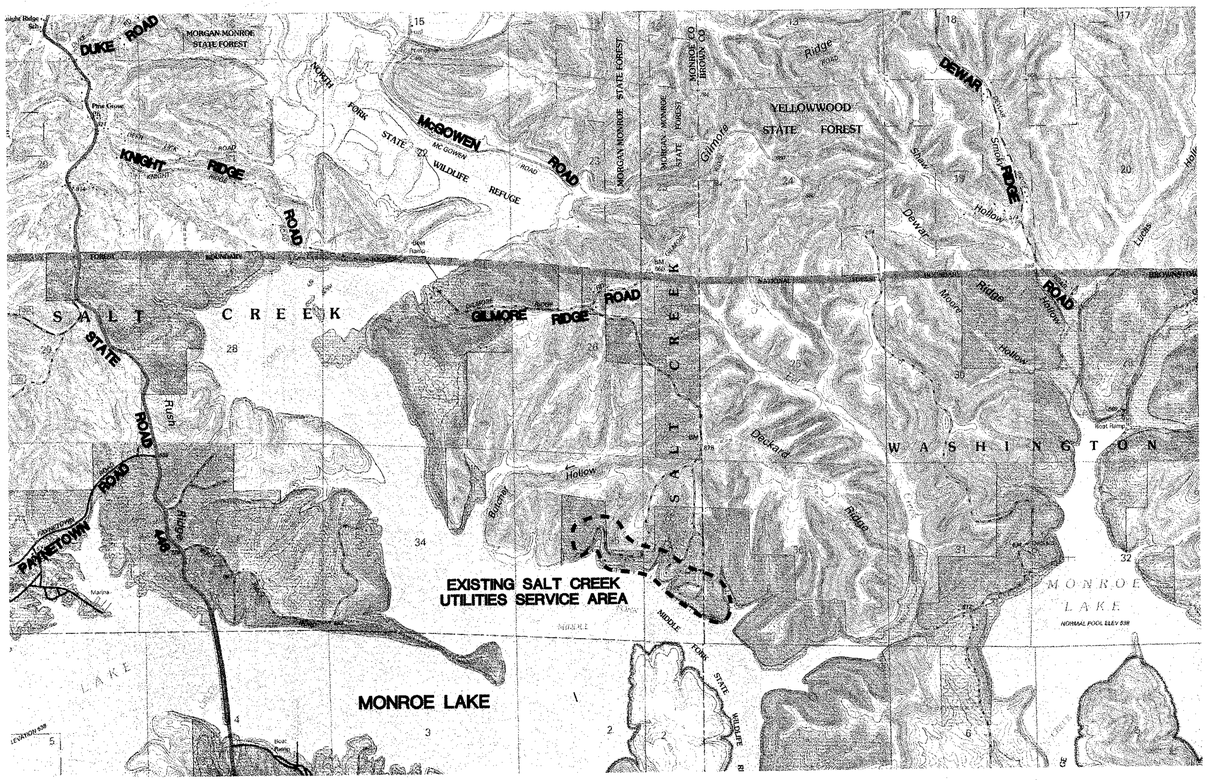
M. DAVID MOHLER II
INDIANA P.E. NO. 10403238

CONTRACT NO. : 04015-01

JEFFREY B. PONIST REGISTERED No. 20741 STATE OF INDIANA PROFESSIONAL ENGINEER

M. DAVID MOHLER II REGISTERED No. 10403238 STATE OF INDIANA PROFESSIONAL ENGINEER

Jun 21, 2004 - 2:07pm



PROJECT LOCATION MAP ⚠

DRAWING INDEX

DRAWING No.	DRAWING DESCRIPTION
1	TITLE SHEET
2	DRAWING INDEX AND PROJECT SITE MAP
3	OVERALL LOCATION MAP
4	SANITARY SEWER – PLAN VIEW
5	SANITARY SEWER – PROFILE
6–9	SANITARY SEWER – PLAN AND PROFILE
10	SANITARY SEWER – PLAN VIEW
11	SANITARY SEWER – PROFILE
12	SANITARY SEWER – PLAN AND PROFILE
13–14	MISCELLANEOUS DETAILS

002-LOC-INDEX.dwg 24000

⚠ ADDENDUM 06/04

M. DAVID MOHLER II REGISTERED No. 10403238 STATE OF INDIANA PROFESSIONAL ENGINEER

COMMONWEALTH ENGINEERS, INC.

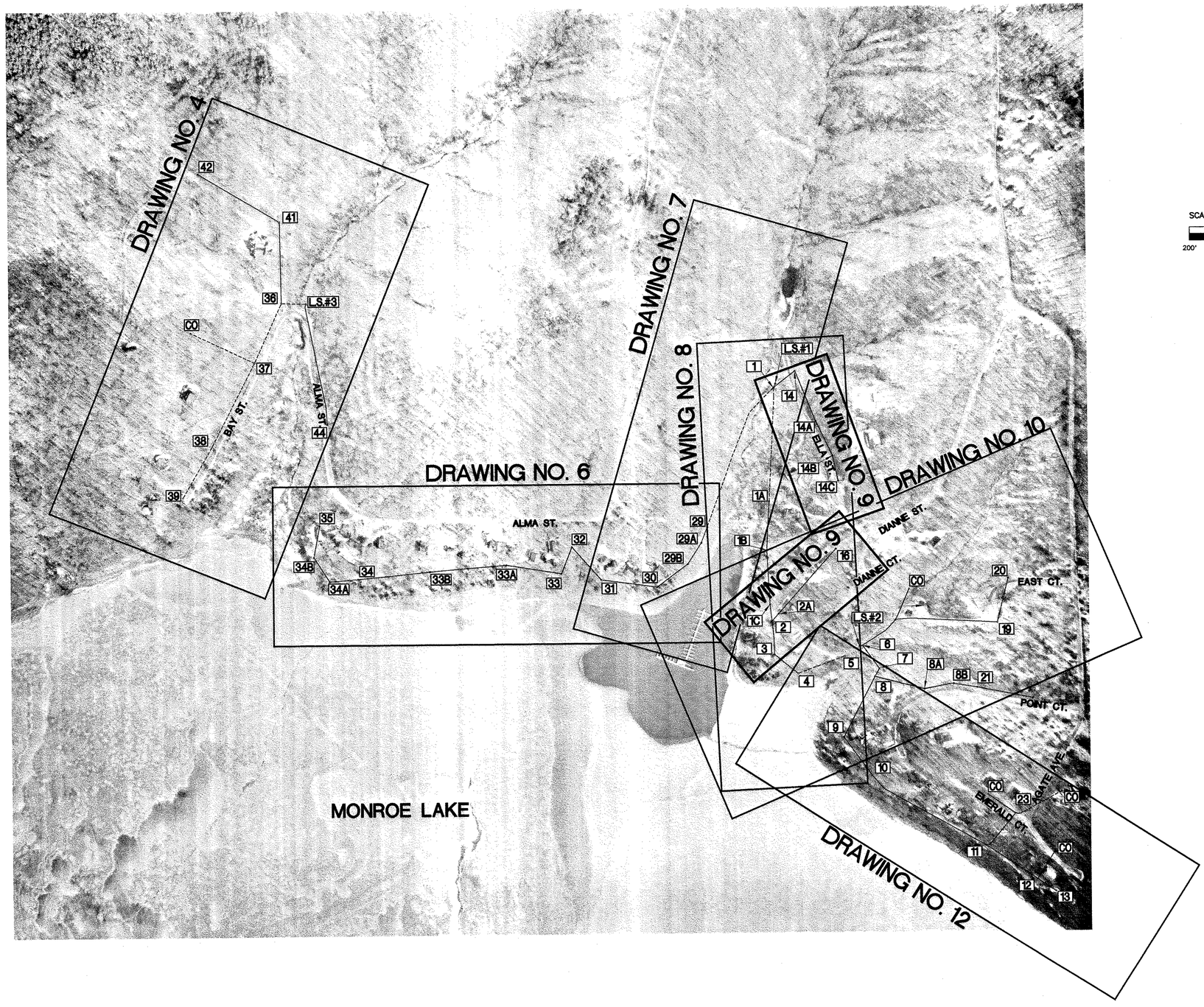
DRAWN BY:	CB
DESIGNED BY:	MDM
CHECKED BY:	MDM
DATE:	3/04
JOB NO:	04015-01
SCALE:	AS NOTED

SALT CREEK SERVICES, INC.
WASTEWATER IMPROVEMENTS PROJECT
SANITARY SEWER REHABILITATION
DRAWING INDEX AND PROJECT LOCATION MAP

DRAWING NO. 2

2 OF 14

Jun 21, 2004 - 2:14pm



SCALE: 1"=200'

200' 0 200'

03AERIALdwg.dwg 200

DRAWN BY:	CB
DESIGNED BY:	MDM
CHECKED BY:	MDM
DATE:	3/04
JOB NO:	04015-01
SCALE:	AS NOTED

W. DAVID MOHLER II REGISTERED No. 10403238 STATE OF INDIANA PROFESSIONAL ENGINEER

COMMONWEALTH ENGINEERS, INC.

SALT CREEK SERVICES, INC.
WASTEWATER IMPROVEMENTS PROJECT

SANITARY SEWER REHABILITATION

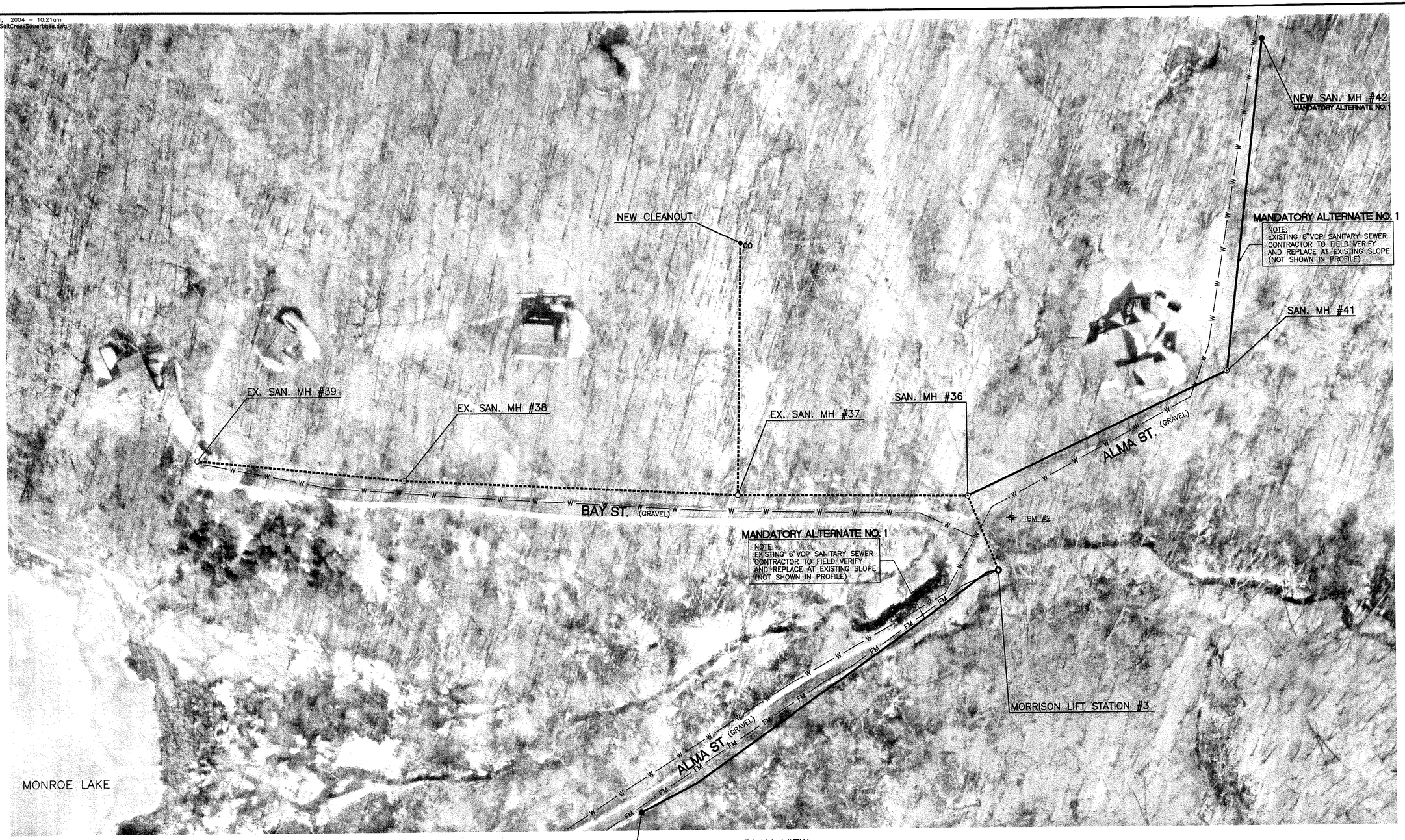
OVERALL LOCATION MAP

DRAWING NO. 3

3 OF 14

⚠ ADDENDUM 06/04

May 11, 2004 - 10:21am
XREF: SaltCreekSewerbase.dwg



PLAN VIEW
SCALE: 1"=50'

NOTE:
PROFILE IS SHOWN ON DRAWING NO. 5

NOTE:
ALL ELEVATIONS SHOWN ARE RELATIVE FOR THIS PROJECT ONLY.

HOLEY MOLEY SAYS
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CALL 2 WORKING DAYS BEFORE YOU DIG
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(IT'S THE LAW)

04PROFILE.dwg 50

LEGEND

- SANITARY SEWER TO BE REPLACED
- NEW SANITARY MANHOLE
- CO NEW SANITARY CLEANOUT
- SANITARY MANHOLE TO BE REPLACED
- EXISTING SANITARY LIFT STATION TO REMAIN IN PLACE
- EXISTING SANITARY MANHOLE TO REMAIN IN PLACE
- EXISTING SANITARY SEWER TO REMAIN IN PLACE
- W — W — EXISTING WATER MAIN
- FM — EXISTING FORCE MAIN

THE ROUTE OF THE EXISTING SANITARY SEWERS HAVE BEEN MAPPED PER ORIGINAL AS-BUILTS WHERE POSSIBLE LOCATION OF MANHOLES WERE FIELD VERIFIED.

TBM #2
SURVEY SPIKE ON NORTH SIDE OF PWP LOCATED ON N.E. CORNER OF INTERSECTION OF BAY ST. AND ALMA ST.
EL.= 506.86

M. DAVID MOHLER II
REGISTERED
No. 10403238
STATE OF INDIANA
PROFESSIONAL ENGINEER

COMMONWEALTH ENGINEERS, INC.

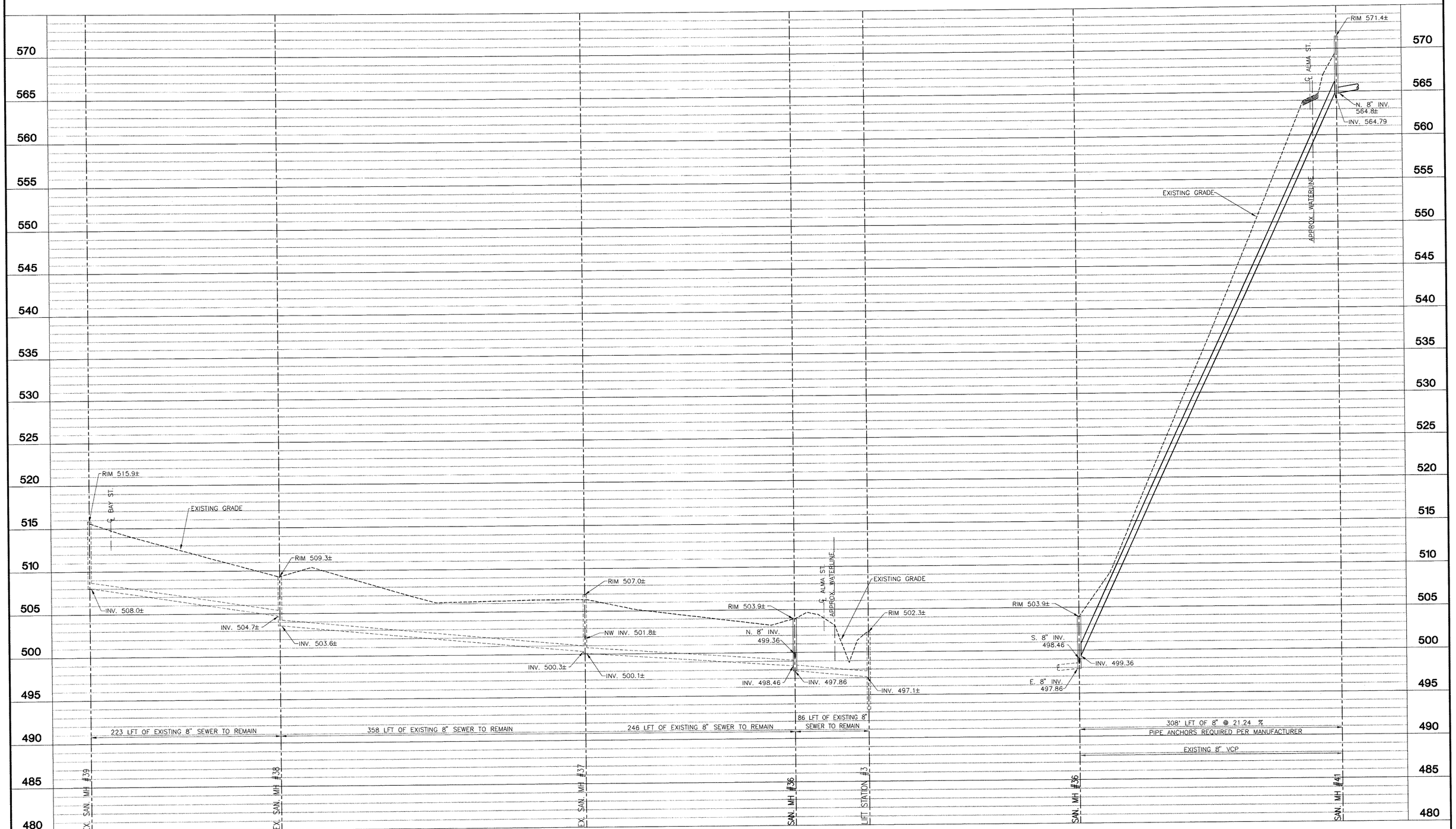
DRAWN BY:	CB
DESIGNED BY:	MDM
CHECKED BY:	MDM
DATE:	3/04
JOB NO:	04015-01
SCALE:	AS NOTED

SALT CREEK SERVICES, INC.
WASTEWATER IMPROVEMENTS PROJECT
SANITARY SEWER REHABILITATION
SANITARY SEWER - PLAN VIEW

DRAWING NO. 4

4 OF 14

Aug 20, 2004 - 3:59pm



NOTE:
ALL ELEVATIONS SHOWN ARE RELATIVE FOR THIS PROJECT ONLY.

PROFILE VIEW
SCALE:
HORIZONTAL: 1"=50'
VERTICAL: 1"=5'

05PROFILE.dwg 50

M. DAVID MOHLER II REGISTERED No. 10403238 STATE OF INDIANA PROFESSIONAL ENGINEER

COMMONWEALTH ENGINEERS, INC.

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DESIGNED BY:	MDM
CHECKED BY:	MDM
DATE:	3/04
JOB NO:	04015-01
SCALE:	AS NOTED

SALT CREEK SERVICES, INC.
WASTEWATER IMPROVEMENTS PROJECT
SANITARY SEWER REHABILITATION
SANITARY SEWER – PROFILE

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Aug 18, 2004 – 11:05am
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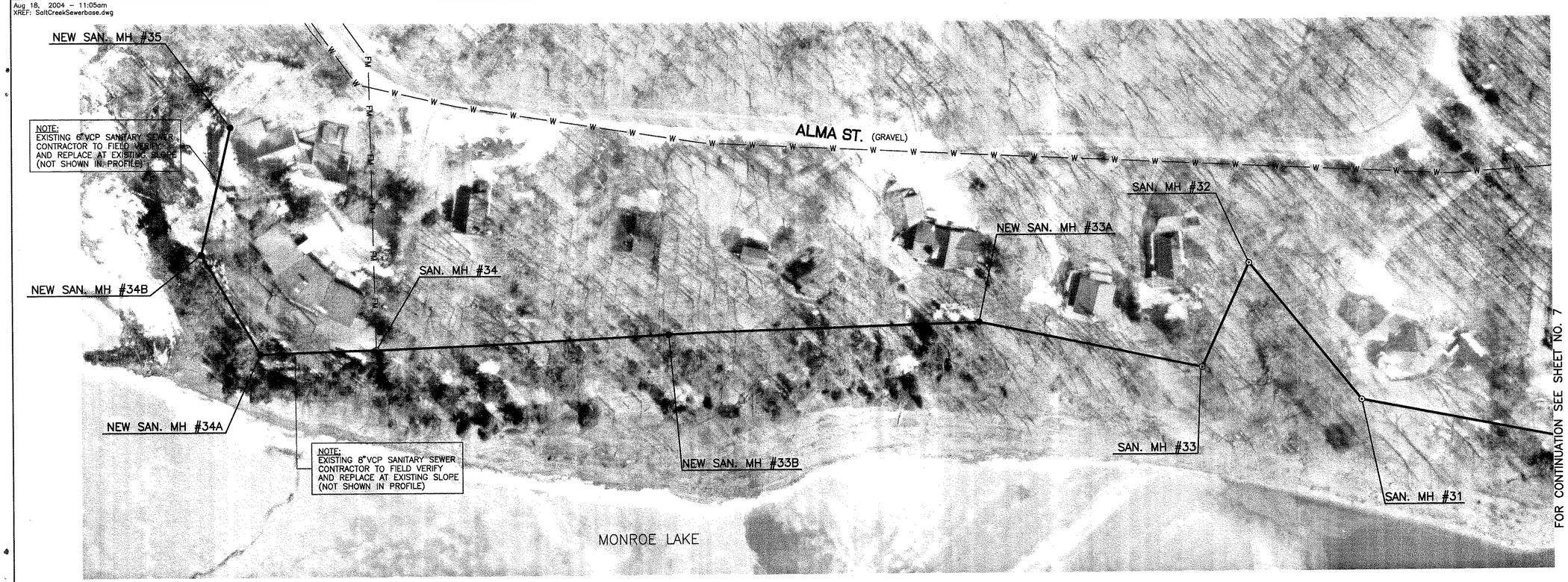

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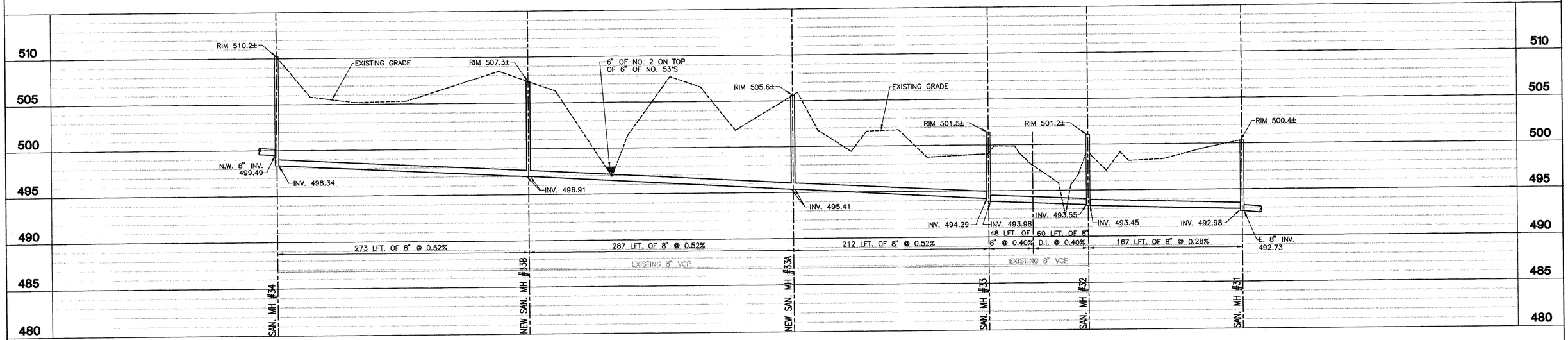
SCALE: 1"=50'



PROFILE VIEW
SCALE:
HORIZONTAL: 1"=50'
VERTICAL: 1"=5'

06PROFILE.dwg 50

LEGEND

- SANITARY SEWER TO BE REPLACED
- NEW SANITARY MANHOLE
- CO NEW SANITARY CLEANOUT
- SANITARY MANHOLE TO BE REPLACED
- EXISTING SANITARY LIFT STATION TO REMAIN IN PLACE
- EXISTING SANITARY MANHOLE TO REMAIN IN PLACE
- EXISTING SANITARY SEWER TO REMAIN IN PLACE
- W — W — EXISTING WATER MAIN
- FM — EXISTING FORCE MAIN

THE ROUTE OF THE EXISTING SANITARY SEWERS HAVE BEEN MAPPED PER ORIGINAL AS-BUILTS WHERE POSSIBLE LOCATION OF MANHOLES WERE FIELD VERIFIED.

NOTE:
ALL ELEVATIONS SHOWN ARE RELATIVE FOR THIS PROJECT ONLY.

M. DAVID MOHLER II REGISTERED No. 10403238 STATE OF INDIANA PROFESSIONAL ENGINEER

COMMONWEALTH ENGINEERS, INC.

DRAWN BY:	CB
DESIGNED BY:	MDM
CHECKED BY:	MDM
DATE:	3/04
JOB NO:	04015-01
SCALE:	AS NOTED

SALT CREEK SERVICES, INC.
WASTEWATER IMPROVEMENTS PROJECT
SANITARY SEWER REHABILITATION
SANITARY SEWER – PLAN AND PROFILE

DRAWING NO. 6
6 OF 14

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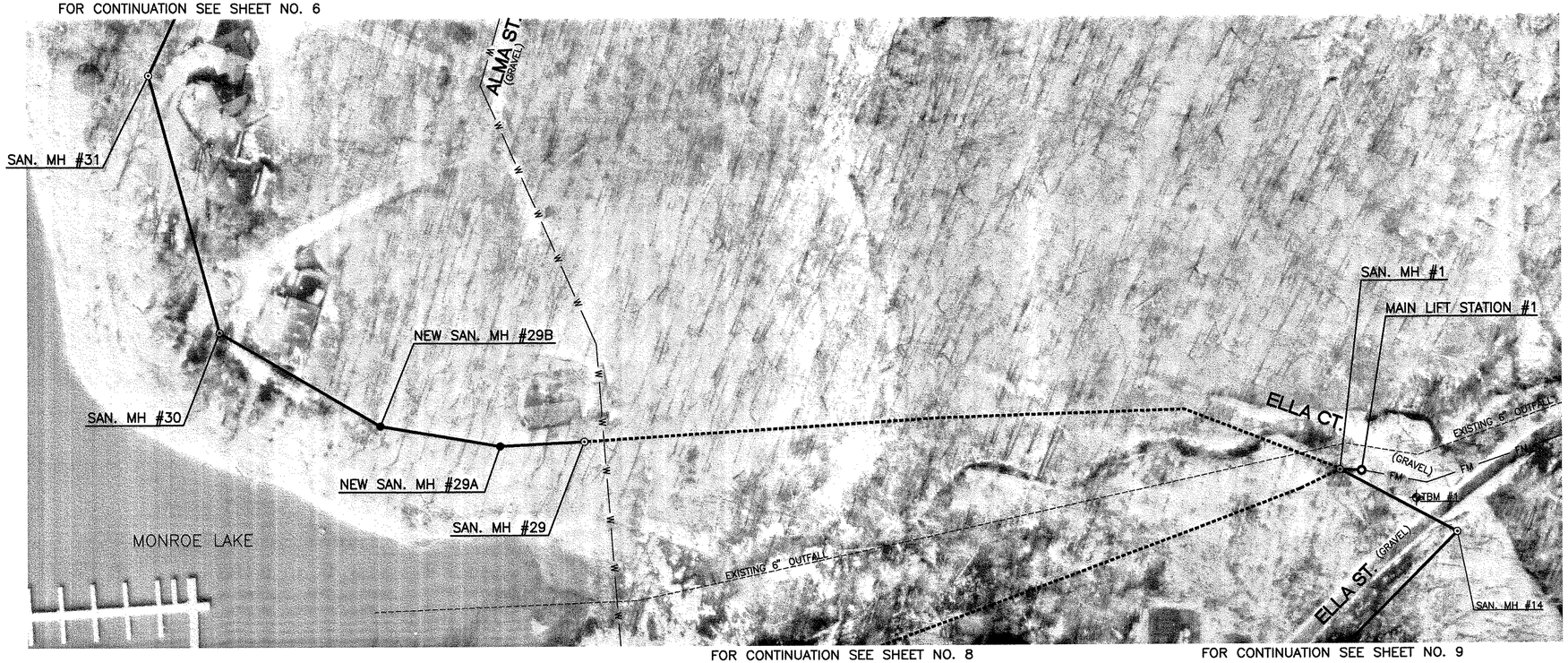
Aug 18, 2004 – 11:06am
XREF: SaltCreekSewerbase.dwg

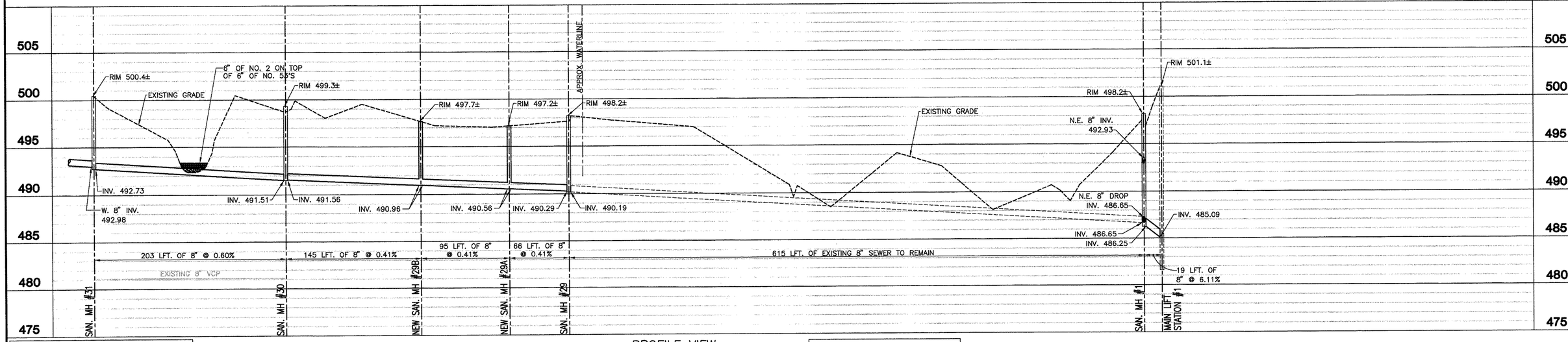
FOR CONTINUATION SEE SHEET NO. 6



FOR CONTINUATION SEE SHEET NO. 8

FOR CONTINUATION SEE SHEET NO. 9

PLAN VIEW
SCALE: 1" =50'



PROFILE VIEW
SCALE:
HORIZONTAL: 1" =50'
VERTICAL: 1" =5'

THE ROUTE OF THE EXISTING SANITARY SEWERS HAVE BEEN MAPPED PER ORIGINAL AS-BUILTS WHERE POSSIBLE LOCATION OF MANHOLES WERE FIELD VERIFIED.

NOTE:
ALL ELEVATIONS SHOWN ARE RELATIVE FOR THIS PROJECT ONLY.

07PROFILE.dwg 50

TBM #1
SURVEY SPIKE ON NORTH SIDE OF PWP LOCATED ON SIDE OF ELLA ST. SOUTH OF WWTP AND EAST OF LIFT STATION #1
EL.= 511.64

LEGEND

- SANITARY SEWER TO BE REPLACED
- NEW SANITARY MANHOLE
- NEW SANITARY CLEANOUT
- SANITARY MANHOLE TO BE REPLACED
- EXISTING SANITARY LIFT STATION TO REMAIN IN PLACE
- EXISTING SANITARY MANHOLE TO REMAIN IN PLACE
- EXISTING SANITARY SEWER TO REMAIN IN PLACE
- W — W — EXISTING WATER MAIN
- FM — FM — EXISTING FORCE MAIN

DAVID MOHLER II REGISTERED No. 10403238 STATE OF INDIANA PROFESSIONAL ENGINEER 7/21/04

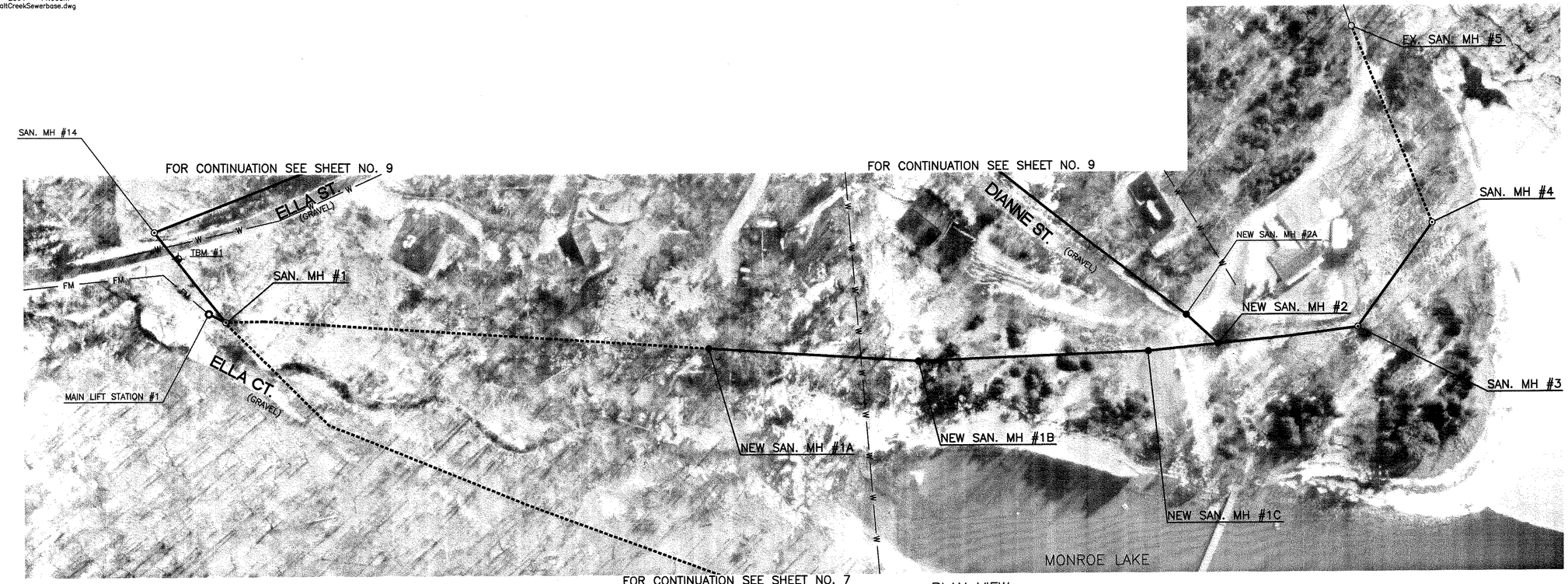
COMMONWEALTH ENGINEERS, INC.

DRAWN BY:	CB
DESIGNED BY:	MDM
CHECKED BY:	MDM
DATE:	3/04
JOB NO:	04015-01
SCALE:	AS NOTED

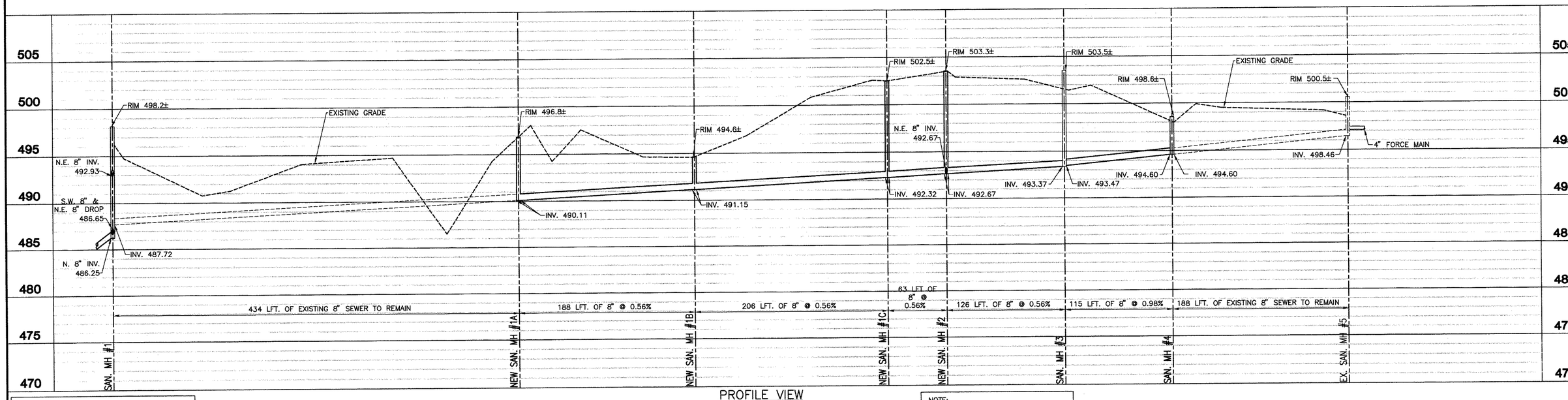
SALT CREEK SERVICES, INC.
WASTEWATER IMPROVEMENTS PROJECT
SANITARY SEWER REHABILITATION
SANITARY SEWER – PLAN AND PROFILE

DRAWING NO. 7
7 OF 14

HOLEY MOLEY SAYS
"DON'T DIG BLIND"
CALL 2 WORKING DAYS BEFORE YOU DIG
1-800-382-5544
(IT'S THE LAW)



PLAN VIEW
SCALE: 1"=50'



PROFILE VIEW
SCALE:
HORIZONTAL: 1"=50'
VERTICAL: 1"=5'

NOTE:
ALL ELEVATIONS SHOWN ARE RELATIVE FOR THIS PROJECT ONLY.

08PROFILE.dwg 50

THE ROUTE OF THE EXISTING SANITARY SEWERS HAVE BEEN MAPPED PER ORIGINAL AS-BUILTS WHERE POSSIBLE LOCATION OF MANHOLES WERE FIELD VERIFIED.

TBM #1
SURVEY SPIKE ON NORTH SIDE OF PWP LOCATED ON SIDE OF ELLA ST. SOUTH OF WWTP AND EAST OF LIFT STATION #1
EL.= 511.64

LEGEND

- SANITARY SEWER TO BE REPLACED
- NEW SANITARY MANHOLE
- NEW SANITARY CLEANOUT
- SANITARY MANHOLE TO BE REPLACED
- EXISTING SANITARY LIFT STATION TO REMAIN IN PLACE
- EXISTING SANITARY MANHOLE TO REMAIN IN PLACE
- EXISTING SANITARY SEWER TO REMAIN IN PLACE
- W — W — EXISTING WATER MAIN
- FM — FM — EXISTING FORCE MAIN

M. DAVID MOHLER II
REGISTERED
No. 10403238
STATE OF INDIANA
PROFESSIONAL ENGINEER

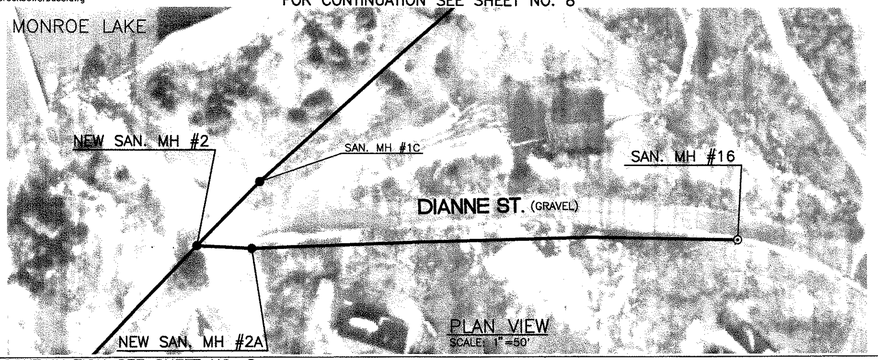
COMMONWEALTH ENGINEERS, INC.

DRAWN BY:	CB
DESIGNED BY:	MDM
CHECKED BY:	MDM
DATE:	3/04
JOB NO:	04015-01
SCALE:	AS NOTED

SALT CREEK SERVICES, INC.
WASTEWATER IMPROVEMENTS PROJECT
SANITARY SEWER REHABILITATION
SANITARY SEWER – PLAN AND PROFILE

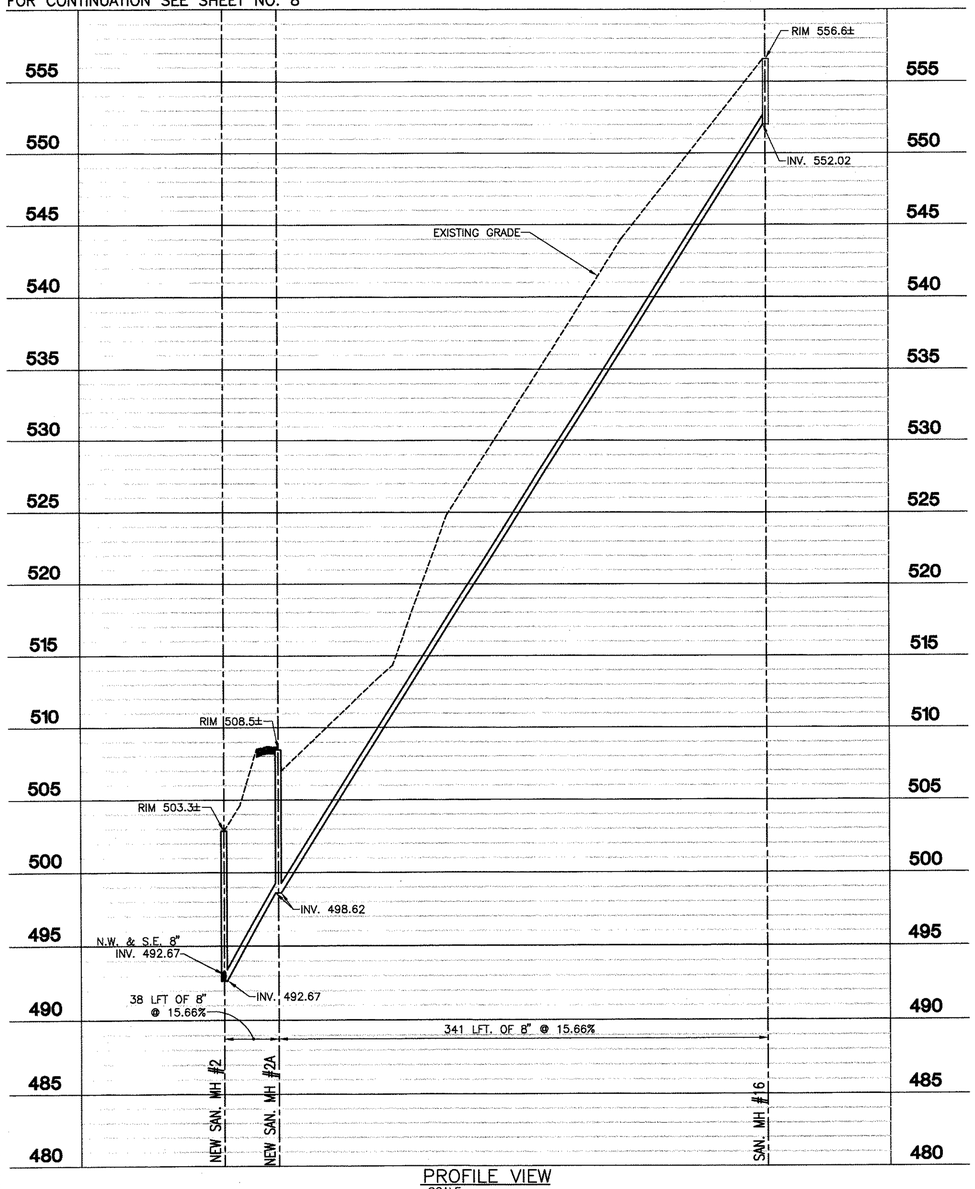
DRAWING NO. 8

FOR CONTINUATION SEE SHEET NO. 8

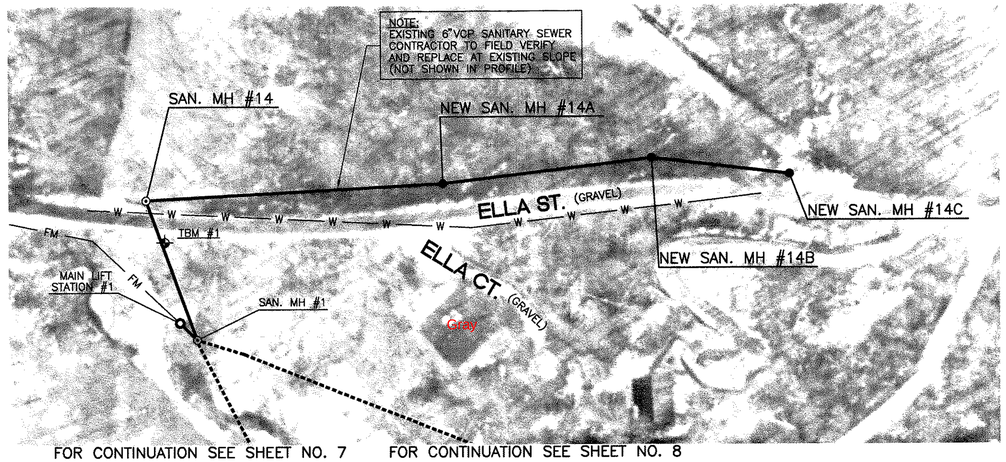


PLAN VIEW
SCALE: 1"=50'

FOR CONTINUATION SEE SHEET NO. 8



PROFILE VIEW
SCALE:
HORIZONTAL: 1"=50'
VERTICAL: 1"=5'



FOR CONTINUATION SEE SHEET NO. 7

FOR CONTINUATION SEE SHEET NO. 8

PLAN VIEW
SCALE: 1"=50'

LEGEND

- SANITARY SEWER TO BE REPLACED
- NEW SANITARY MANHOLE
- CO NEW SANITARY CLEANOUT
- SANITARY MANHOLE TO BE REPLACED
- EXISTING SANITARY LIFT STATION TO REMAIN IN PLACE
- EXISTING SANITARY MANHOLE TO REMAIN IN PLACE
- EXISTING SANITARY SEWER TO REMAIN IN PLACE
- W — W — EXISTING WATER MAIN
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THE ROUTE OF THE EXISTING SANITARY SEWERS HAVE BEEN MAPPED PER ORIGINAL AS–BUILTS WHERE POSSIBLE LOCATION OF MANHOLES WERE FIELD VERIFIED.

TBM #1

SURVEY SPIKE ON NORTH SIDE OF PWP LOCATED ON SIDE OF ELLA ST. SOUTH OF WWTP AND EAST OF LIFT STATION #1

EL.= 511.64

NOTE:
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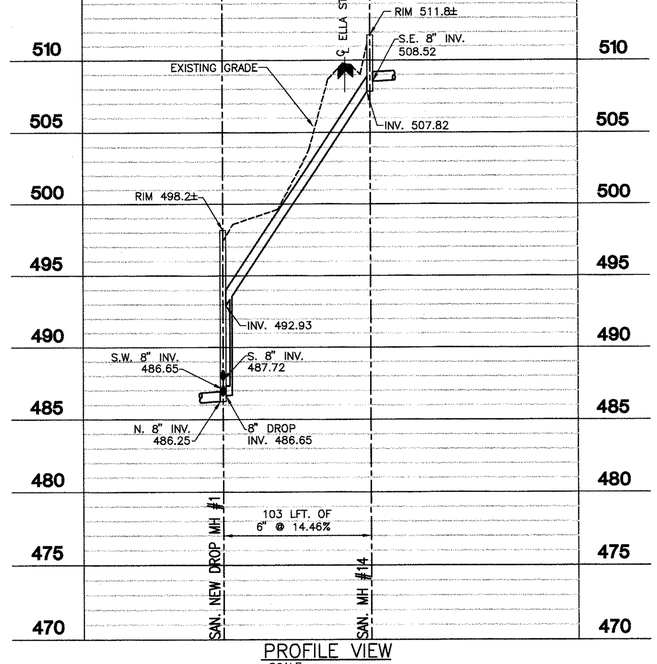

PROFILE VIEW
SCALE:
HORIZONTAL: 1"=50'
VERTICAL: 1"=5'

HOLEY MOLEY SAYS
"DON'T DIG BLIND"

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09PROFILE.dwg 50

M. DAVID MOHLER REGISTERED No. 10403238 STATE OF INDIANA PROFESSIONAL ENGINEER

COMMONWEALTH ENGINEERS, INC.

DRAWN BY:	CB
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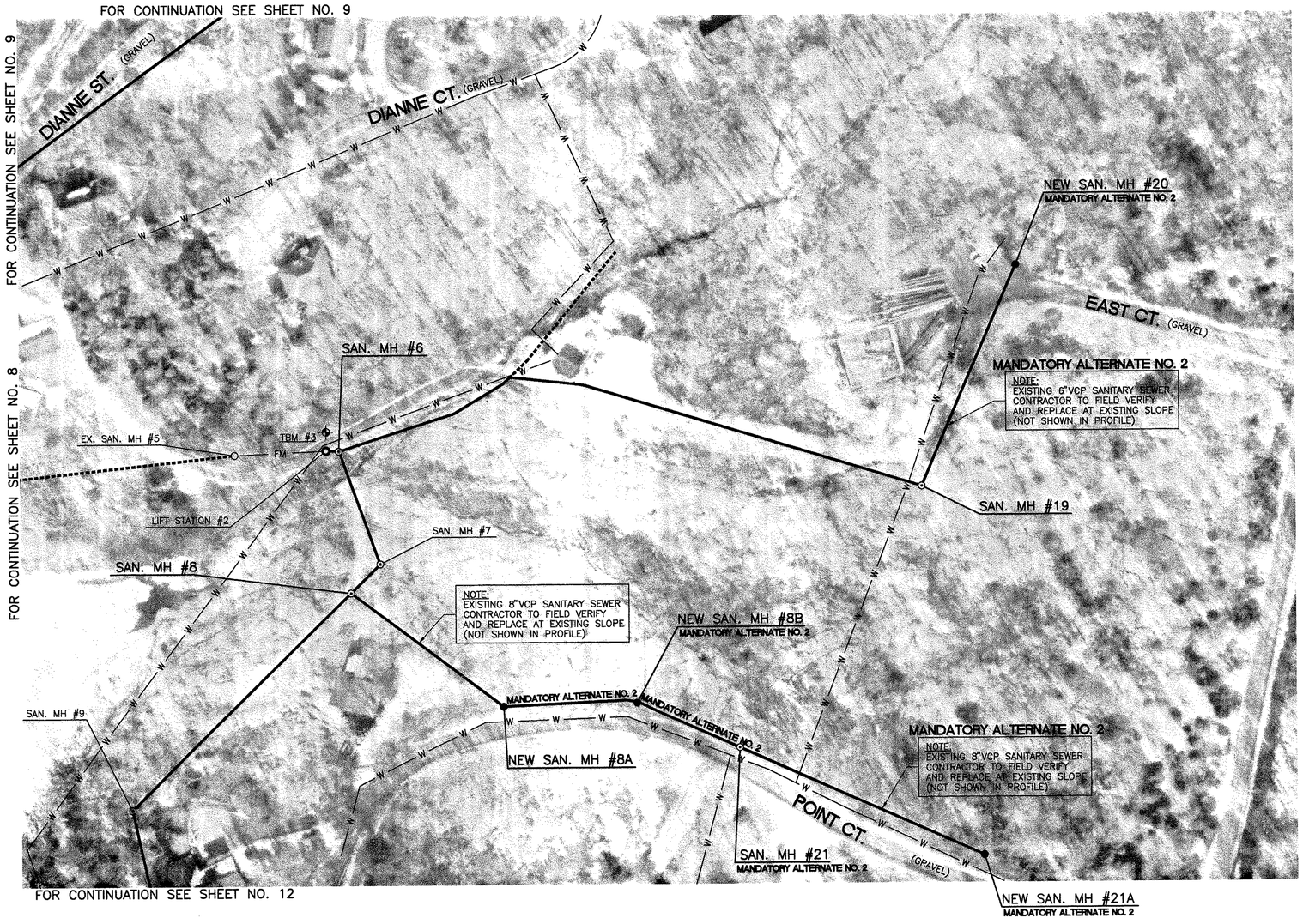
DATE:	3/04
JOB NO:	04015–01
SCALE:	AS NOTED

SALT CREEK SERVICES, INC.
WASTEWATER IMPROVEMENTS PROJECT
SANITARY SEWER REHABILITATION
SANITARY SEWER – PLAN AND PROFILE

DRAWING NO. 9

9 OF 14

Aug 18, 2004 - 11:08am
XREF: SaltCreekSewerbase.dwg



PLAN VIEW
SCALE: 1"=50'

TBM #3
SURVEY SPIKE ON
NORTH SIDE OF PWP
LOCATED ON SIDE OF ELLA ST.
SOUTH OF WWTP AND EAST OF
LIFT STATION #3

EL.= 492.40

THE ROUTE OF THE EXISTING SANITARY SEWERS HAVE BEEN MAPPED PER ORIGINAL AS-BUILTS WHERE POSSIBLE LOCATION OF MANHOLES WERE FIELD VERIFIED.

LEGEND

- SANITARY SEWER TO BE REPLACED
- NEW SANITARY MANHOLE
- CO NEW SANITARY CLEANOUT
- SANITARY MANHOLE TO BE REPLACED
- EXISTING SANITARY LIFT STATION TO REMAIN IN PLACE
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- EXISTING SANITARY SEWER TO REMAIN IN PLACE
- W EXISTING WATER MAIN
- FM EXISTING FORCE MAIN

NOTE:
ALL ELEVATIONS SHOWN ARE RELATIVE FOR THIS PROJECT ONLY.

NOTE:
PROFILE IS SHOWN ON DRAWING NO. 11

HOLEY MOLEY SAYS
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(IT'S THE LAW)

10PROFILE.dwg 50

W. DAVID MOHLER II
REGISTERED
No. 10403238
STATE OF INDIANA
PROFESSIONAL ENGINEER

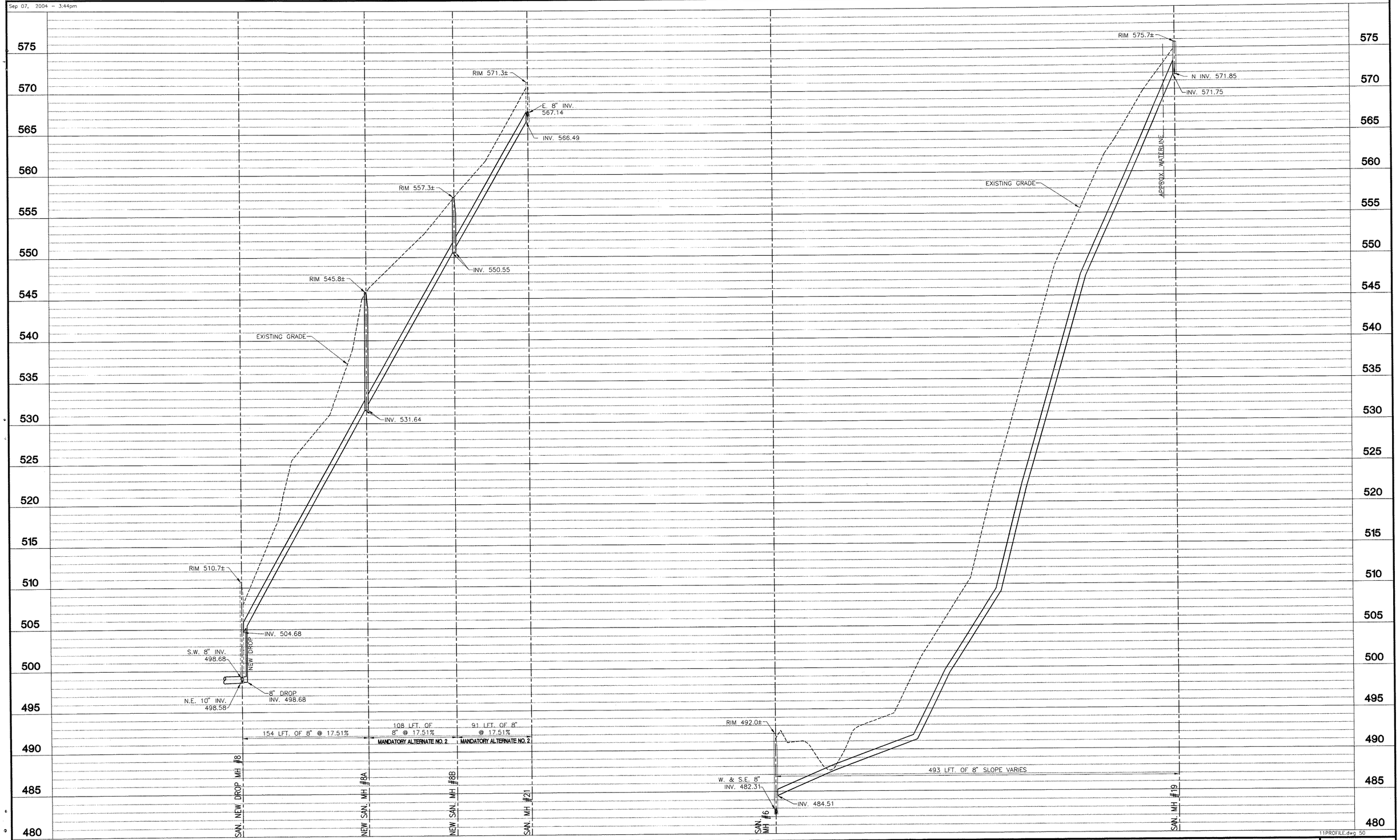
COMMONWEALTH ENGINEERS, INC.

DRAWN BY:	CB
DESIGNED BY:	MDM
CHECKED BY:	MDM
DATE:	3/04
JOB NO:	04015-01
SCALE:	AS NOTED

SALT CREEK SERVICES, INC.
WASTEWATER IMPROVEMENTS PROJECT
SANITARY SEWER REHABILITATION
SANITARY SEWER - PLAN VIEW

DRAWING NO. 10
10 OF 14

Sep 07, 2004 - 3:44pm



11PROFILE.dwg 50

NOTE:
ALL ELEVATIONS SHOWN ARE RELATIVE FOR THIS PROJECT ONLY.

PROFILE VIEW
SCALE:
HORIZONTAL: 1"=50'
VERTICAL: 1"=5'

M. DAVID MOHLER II REGISTERED No. 10403238 STATE OF INDIANA PROFESSIONAL ENGINEER

COMMONWEALTH ENGINEERS, INC.

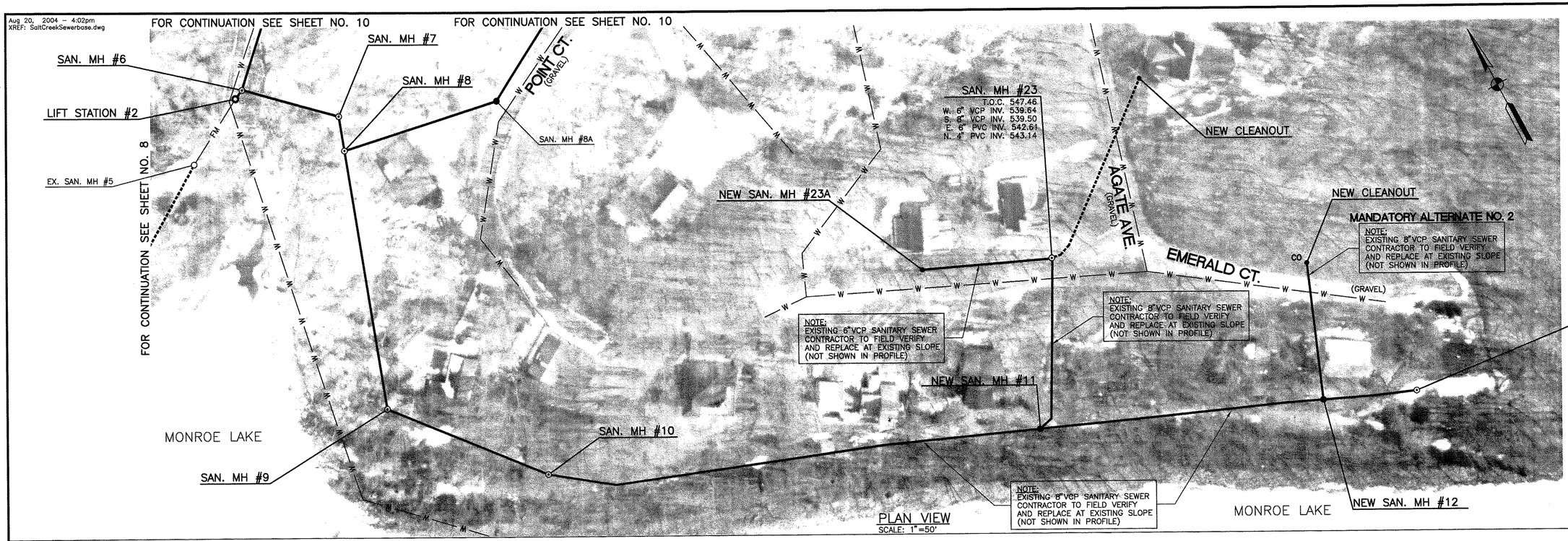
DRAWN BY:	CB
DESIGNED BY:	MDM
CHECKED BY:	MDM
DATE:	3/04
JOB NO:	04015-01
SCALE:	AS NOTED

SALT CREEK SERVICES, INC.
WASTEWATER IMPROVEMENTS PROJECT
SANITARY SEWER REHABILITATION
SANITARY SEWER – PROFILE

DRAWING NO. 11

11 OF 14

Aug 20, 2004 – 4:02pm
XREF: SaltCreekSewerbase.dwg



PLAN VIEW
SCALE: 1"=50'

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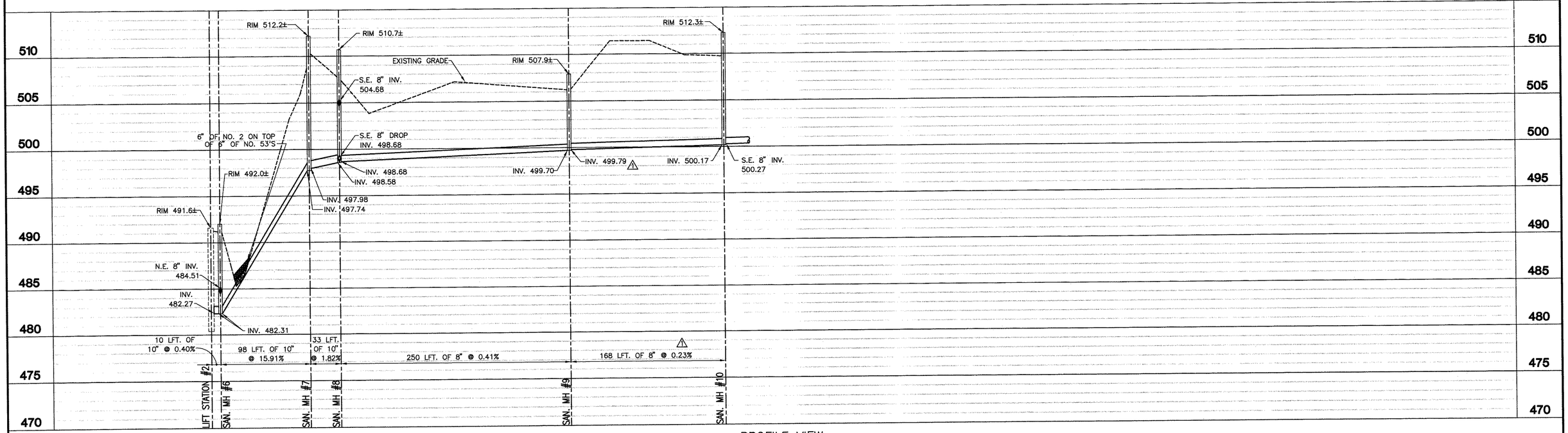

PROFILE VIEW
SCALE:
HORIZONTAL: 1"=50'
VERTICAL: 1"=5'

12PROFILE.dwg 50

THE ROUTE OF THE EXISTING SANITARY SEWERS HAVE BEEN MAPPED PER ORIGINAL AS-BUILTS WHERE POSSIBLE LOCATION OF MANHOLES WERE FIELD VERIFIED.

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- FM — EXISTING FORCE MAIN
- ⚠ ADDENDUM 06/04

M. DAVID MOHLER II REGISTERED No. 10403238 STATE OF INDIANA PROFESSIONAL ENGINEER

COMMONWEALTH ENGINEERS, INC.

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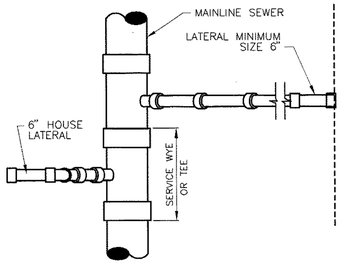
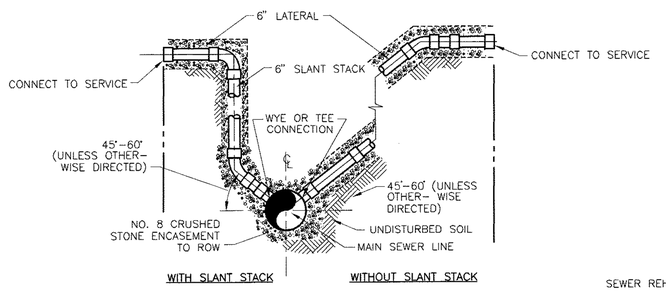
SALT CREEK SERVICES, INC.
WASTEWATER IMPROVEMENTS PROJECT
SANITARY SEWER REHABILITATION
SANITARY SEWER – PLAN AND PROFILE

DRAWING NO. 12

12 OF 14



PLAN VIEW



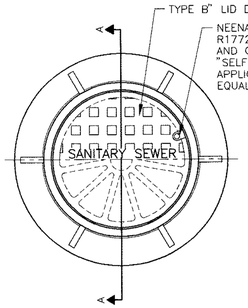
ELEVATION

SERVICE CONNECTION

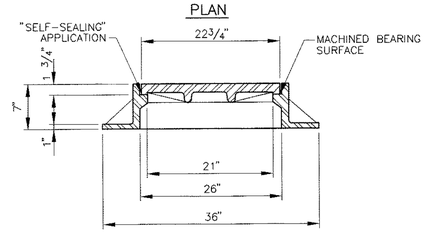
NO SCALE

CONTRACTOR SHALL PROVIDE "AS-BUILT" SERVICE CONNECTION TIES TO THE OWNER, ENGINEER, AND PROPERTY OWNER

SEWER REHABILITATION PROJECT



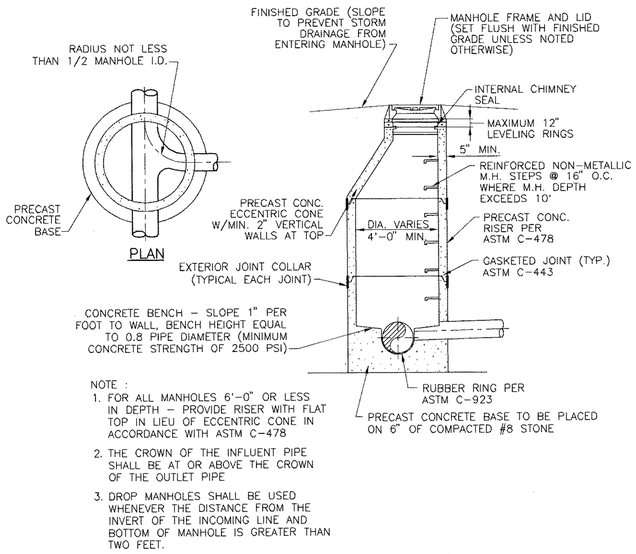
PLAN



SECTION "A-A"

SANITARY SEWER MANHOLE FRAME AND COVER - STANDARD MANHOLE

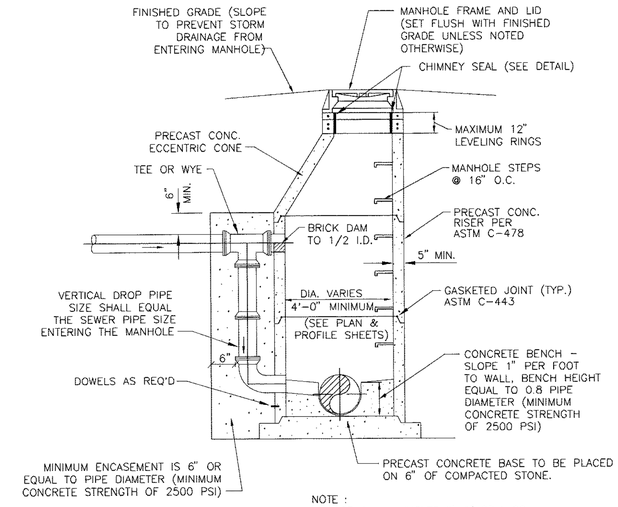
SCALE: N.T.S.



NOTE :
1. FOR ALL MANHOLES 6'-0" OR LESS IN DEPTH - PROVIDE RISER WITH FLAT TOP IN LIEU OF ECCENTRIC CONE IN ACCORDANCE WITH ASTM C-478
2. THE CROWN OF THE INFLUENT PIPE SHALL BE AT OR ABOVE THE CROWN OF THE OUTLET PIPE
3. DROP MANHOLES SHALL BE USED WHENEVER THE DISTANCE FROM THE INVERT OF THE INCOMING LINE AND BOTTOM OF MANHOLE IS GREATER THAN TWO FEET.

STANDARD SANITARY MANHOLE DETAIL

NO SCALE



NOTE :
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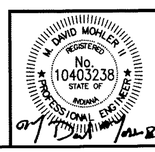
PRECAST DROP MANHOLE DETAIL

NO SCALE

13DETAILS1.dwg 12



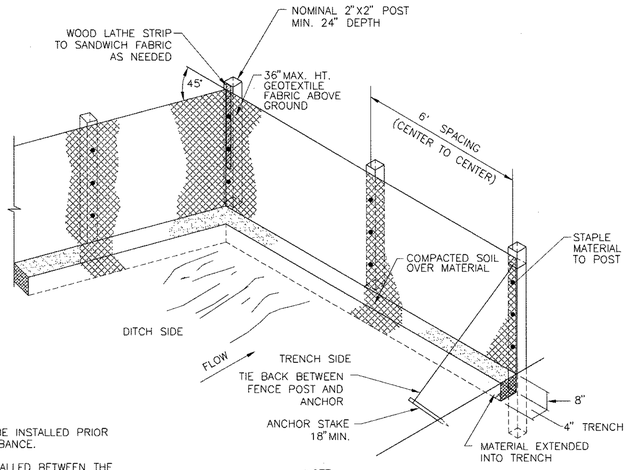
COMMONWEALTH ENGINEERS, INC.

DRAWN BY:	CB
DESIGNED BY:	MDM
CHECKED BY:	MDM
DATE:	3/04
JOB NO:	04015-01
SCALE:	AS NOTED

SALT CREEK SERVICES, INC.
WASTEWATER IMPROVEMENTS PROJECT
SANITARY SEWER REHABILITATION
MISCELLANEOUS DETAILS

DRAWING NO. 13

13 OF 14



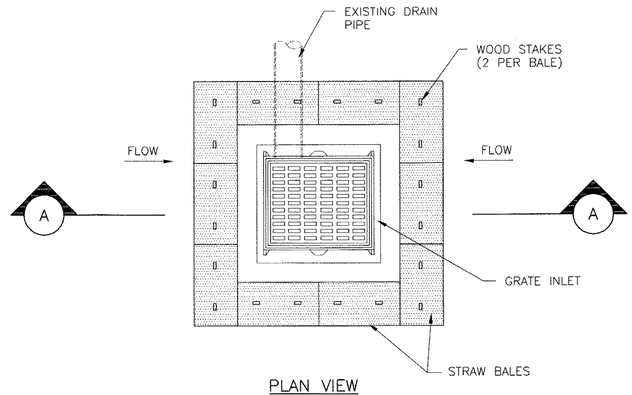
NOTE:
TIE BACKS SHOULD BE PLACED AS REQUIRED.

GENERAL NOTES:

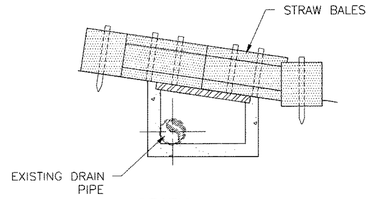
1. SILT FENCES SHOULD BE INSTALLED PRIOR TO MAJOR SOIL DISTURBANCE.
2. FENCES SHALL BE INSTALLED BETWEEN THE TRENCH AND ANY DRAINAGE DITCHES OR SWALES.
3. FENCES SHALL ALSO BE INSTALLED AROUND THE STOCKPILED SOILS.
4. THE GEOTEXTILE SHALL BE FREE FROM DEFECTS, TEARS, PUNCTURES, FLAWS, DETERIORATION OR DAMAGE INCURRED DURING MANUFACTURE, TRANSPORTATION, STORAGE, OR INSTALLATION.

SILT FENCE

NO SCALE



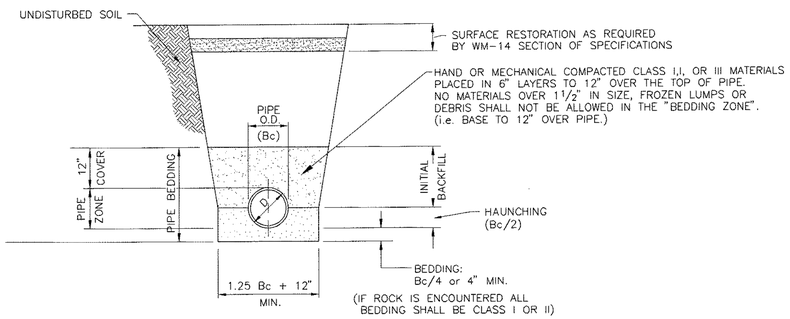
PLAN VIEW



SECTION A-A

STORM INLET IN TURFED AREAS PROTECTION DETAILS

NO SCALE



D = PIPE DIAMETER (INTERNAL)

BC = PIPE DIAMETER (EXTERNAL)

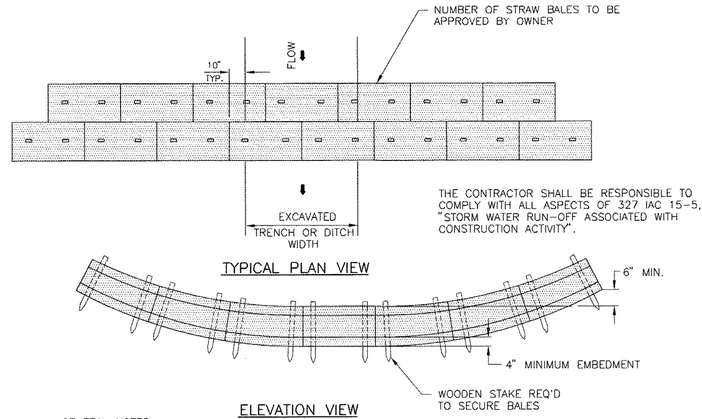
APPLICATION	BEDDING & HAUNCHING INITIAL BACKFILL	FINAL BACKFILL
GRASSY AREA OR NEW PAVED AREAS	CLASS I, II, OR III MATERIAL (REFER TO WORKMANSHIP & MATERIALS SPECIFICATIONS	SELECTED EXCAVATED MATERIAL
PAVEMENT AREA OR ANY AREA SUBJECT TO VEHICULAR TRAFFIC	CLASS I OR II MATERIAL (REFER TO WORKMANSHIP & MATERIALS SPECIFICATIONS	COMPACTED GRANULAR MATERIAL

NOTES:

1. INITIAL BACKFILL STOPS AT A POINT 12" ABOVE THE TOP OF THE PIPE. BACKFILLING ABOVE THIS POINT SHALL BE IN ACCORDING WITH THE SPECIFICATIONS AND AS REQUIRED BY NOTES 3 AND 4 BELOW.
2. BEDDING, HAUNCHING AND INITIAL BACKFILL SHALL BE CLASS I,II, OR III MATERIALS ACCORDING TO THE WORKMANSHIP AND MATERIALS SPECIFICATIONS.
3. WORK FALLING UNDER THE JURISDICTION OF THE INDIANA DEPARTMENT OF TRANSPORTATION SHALL UTILIZE COMPACTED GRANULAR BACKFILL MATERIAL FOR INITIAL AND FINAL BACKFILL ANYWHERE WITHIN 12 FEET OF THE EDGE OF PAVEMENT.
4. WORK NOT FALLING UNDER THE JURISDICTION OF INDIANA DEPARTMENT OF TRANSPORTATION SHALL UTILIZE COMPACTED GRANULAR BACKFILL MATERIAL FOR INITIAL AND FINAL BACKFILL ANYWHERE WITHIN 5 FEET OF THE EDGE OF PAVEMENT.

OPEN TRENCH METHOD

NO SCALE



TYPICAL PLAN VIEW

ELEVATION VIEW

GENERAL NOTES:

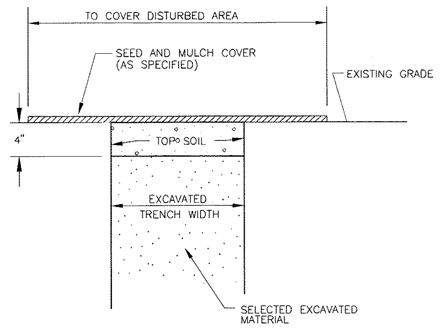
1. TO BE INSTALLED DOWNSTREAM OF ALL EXCAVATIONS ACROSS DITCHES.
2. STRAW BALES SHALL BE EMBEDDED AND STAKED AS SHOWN ON THE PLANS.
3. ADJACENT BALES SHALL BE CHINKED TO ELIMINATE GAPS BETWEEN THE BALES.
4. BALES SHALL BE PLACED SUCH THAT THE BINDINGS ARE PARALLEL TO AND NOT IN CONTACT WITH THE GROUND.

NOTE:
AFTER COMPLETION OF THE CONTRACT, OR AS REQUESTED BY THE OWNER, THE CONTRACTOR SHALL REMOVE ALL TEMPORARY EROSION CONTROL ITEMS, REMOVE ALL ACCUMULATED DEPOSITS AND, AS REQUIRED, SEED AND MULCH OR SOD SO AS TO ESTABLISH THE AREA TO THE CONDITION PRIOR TO CONSTRUCTION.

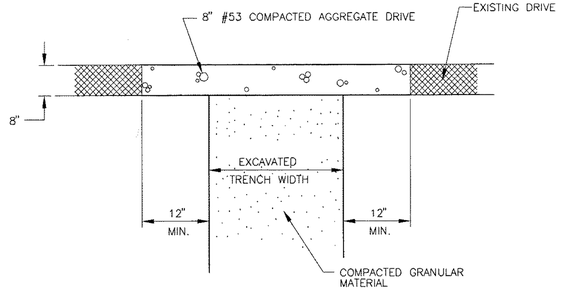
STRAW BALE DAM

TEMPORARY EROSION CONTROL

NO SCALE



GRASSY AREA



GRAVEL - ROAD/DRIVE

SURFACE REPLACEMENT DETAILS

NO SCALE

14DETAILS2.dwg 12

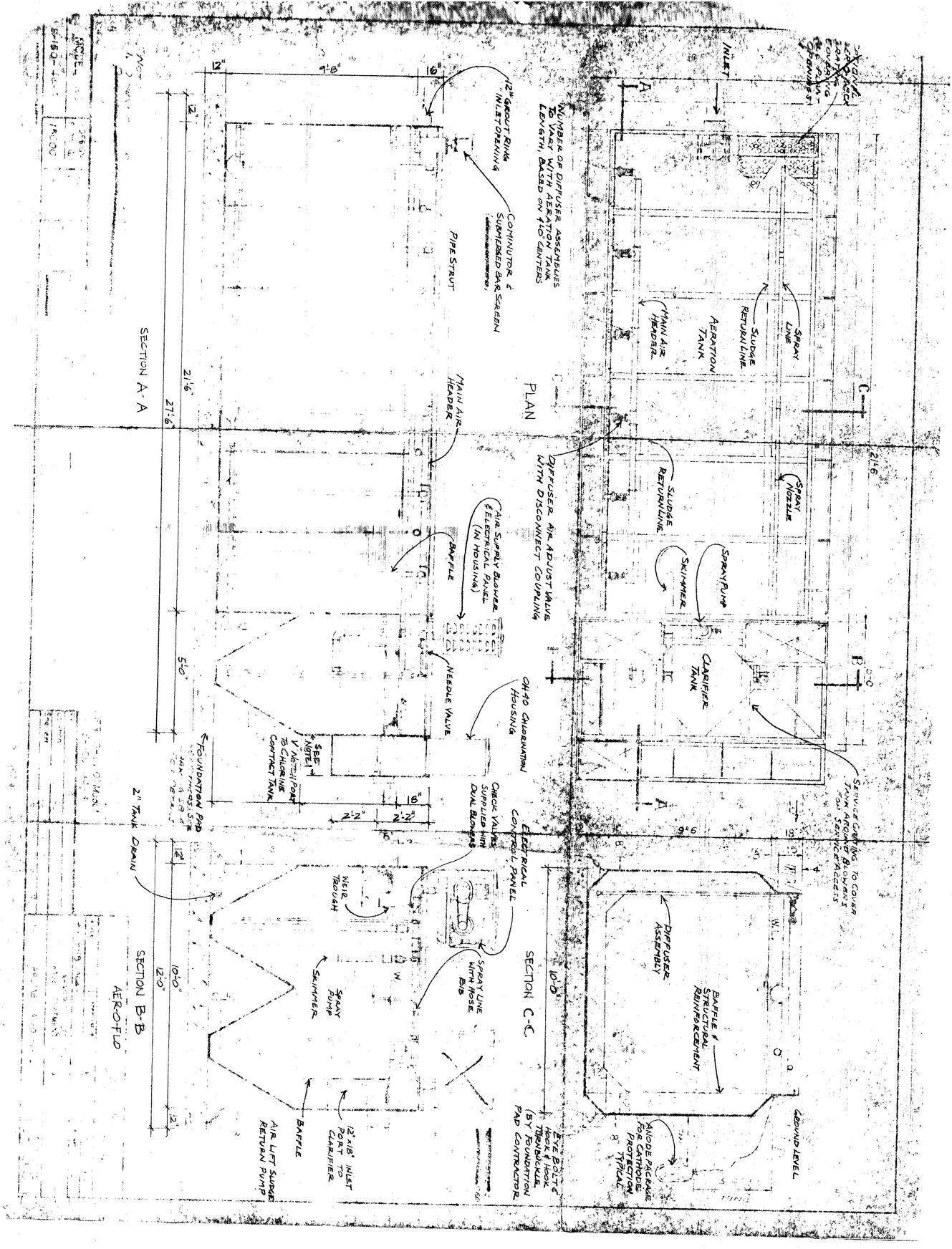
M. DAVID MOHLER II REGISTERED No. 10403238 STATE OF INDIANA PROFESSIONAL ENGINEER

COMMONWEALTH ENGINEERS, INC.

DRAWN BY:	CB
DESIGNED BY:	MDM
CHECKED BY:	MDM
DATE:	3/04
JOB NO:	04015-01
SCALE:	AS NOTED

SALT CREEK SERVICES, INC.
WASTEWATER IMPROVEMENTS PROJECT
SANITARY SEWER REHABILITATION
MISCELLANEOUS DETAILS

DRAWING NO. 14



SPECIFICATIONS
Yeomans Single Screenless Ejector
Series 8000

NAME OF JOB SALT CREEK DEVELOPMENT

LOCATION: BLOOMINGTON, INDIANA

EQUIPMENT: NO. 8000 SINGLE SCREENLESS EJECTOR

DUTY: 50 G.P.M. AGAINST 38 FT. TOTAL HEAD (INCL. FRICTION)

EJECTOR NO. S-3 SIZE DISCHARGE: 4 "ø SIZE SOLIDS 2½ "ø

SHAFT & BEARINGS: Shaft is ground and polished piston steel, tested in lathe for true running, and provided with stuffing box at cover. Sealed adjustable ball thrust bearing located 9" above cover plate, carries mechanical and hydraulic thrust.

ENCLOSED IMPELLER CAST IRON INTERMEDIATE GUIDE BEARINGS: FOUR REQUIRED

LUBRICATION: Grease COUPLING: Flexible

BASIN OR PIT DEPTH: 21'-2" OPENING AT FLOOR: 18"ø

CURB RING: NONE

MAIN COVER: 20"ø STEEL DRILLED 4-1/2"ø HOLES ON 19"ø B.C. STRAD. ℄

213T FR. 5 HP. 1750 R.P.M. A.C. CURRENT 230 VOLTS 1 PHASE 60 CYCLE

Motor provided with drip cover over top head, and mounted on rigid combination motor support and ball thrust bearing housing. OPEN DRIP PROOF

CONTROL: ~~Mercury float switch, explosion proof, mounted on motor~~

ALL CONTROLS: BY OTHERS

EXTRA EQUIPMENT:
RIGID COUPLINGS - FOR TWO (2) SECTION PUMPS.
BRONZE BACKED BABBITT LINED GUIDE BEARINGS WITH VISIBALL LUBRICATION FOR BOTTOM TWO BEARINGS ON EACH PUMP.

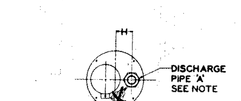
NOTES:
TWO (2) UNITS FURNISHED.

BULLETIN NO. TEST CURVE NO. CROSS SECTION DWG. NO.

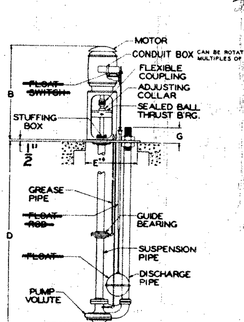
YEOMANS Brothers Company - 1999 N. Ruby St. Melrose Park, Ill.

YEOMANS SINGLE SCREENLESS EJECTORS

Ike Carlisle



21'-2"
1
20'-2"



PUMP NO.	A	B	COVER & SUMP DIMENSIONS D	E	F	LOCATION OF PUMP DISCHARGE G	H
S-3	4"	34"	21'-2"	18"ø	20"ø	4"	5 5/8"

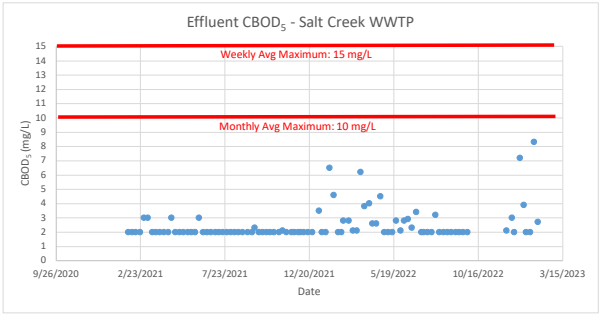
S.O. 64702 | CERTIFIED BY J.A.T. | DATE OCT. 16, '68 | DWG. NO. 32861

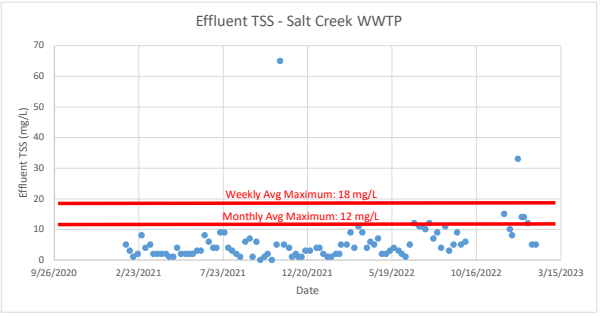
APPENDIX C: MROs and Calculations

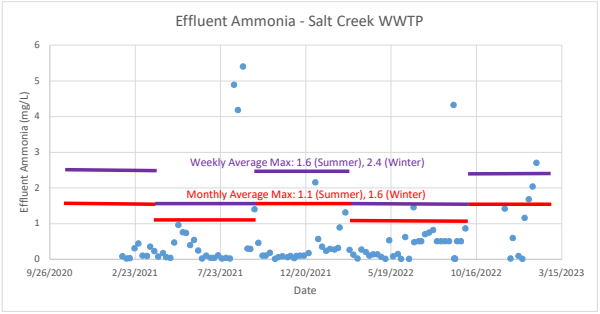
						Raw Water					Final Effluent					
Month	Day	Year	Date	Precipitation (in)	Effluent Flow Rate (MGD)	pH	CBOD5 (mg/L)	Susp Solids (mg/L)	Phosphorus (mg/L)	Ammonia (mg/L)	pH	Dissolv. Oxygen (mg/L)	Phosphorus (mg/L)	CBOD5 (mg/L)	Susp Solids (mg/L)	Ammonia (mg/L)
2	1	2021	2/1/2021		0.0084	8.3	15	26	0.41	2	8	10.2	0.43	2	5	0.083
2	2	2021	2/2/2021		0.0052											
2	3	2021	2/3/2021		0.0052											
2	4	2021	2/4/2021		0.0092											
2	5	2021	2/5/2021		0.0062	8					8.3	11.1				
2	6	2021	2/6/2021		0.0047											
2	7	2021	2/7/2021		0.0038											
2	8	2021	2/8/2021		0.0024	8.1	185	22	1.21	7.06	8.3	11.1	0.361	2	3	0.02
2	9	2021	2/9/2021		0.0038											
2	10	2021	2/10/2021		0.0039											
2	11	2021	2/11/2021		0.0034											
2	12	2021	2/12/2021		0.0036	8					8.6	11.1				
2	13	2021	2/13/2021		0.0034											
2	14	2021	2/14/2021		0.0034	7.8	33	43	2.42	13.8	8.1	11.1	0.482	2	1	0.033
2	15	2021	2/15/2021		0.0045	7.8					8.1	11.1				
2	16	2021	2/16/2021		0.0031											
2	17	2021	2/17/2021		0.0044											
2	18	2021	2/18/2021		0.0028											
2	19	2021	2/19/2021		0.0036											
2	20	2021	2/20/2021		0.0031											
2	21	2021	2/21/2021		0.0067											
2	22	2021	2/22/2021		0.0111	8.2	18	96	0.76	4.81	8.4	11.3	0.615	2	2	0.309
2	23	2021	2/23/2021		0.015											
2	24	2021	2/24/2021		0.0094											
2	25	2021	2/25/2021		0.0063											
2	26	2021	2/26/2021		0.007	8.4					8.9	11.2				
2	27	2021	2/27/2021		0.0126											
2	28	2021	2/28/2021		0.023											
3	1	2021	3/1/2021		0.00861	8.3	39	36	0.397	1.52	8.3	10.7	0.237	3	8	0.442
3	2	2021	3/2/2021		0.00574											
3	3	2021	3/3/2021		0.00478	8.3					8.3	11.1				
3	4	2021	3/4/2021		0.00381											
3	5	2021	3/5/2021		0.00509											
3	6	2021	3/6/2021		0.00446											
3	7	2021	3/7/2021		0.00407											
3	8	2021	3/8/2021		0.00407	8.5	57	37	1.24	10.4	8.8	10.2	0.482	3	4	0.103
3	9	2021	3/9/2021		0.00385											
3	10	2021	3/10/2021		0.01319											
3	11	2021	3/11/2021		0.00939											
3	12	2021	3/12/2021		0.00543	8.5					8.8	10.2				
3	13	2021	3/13/2021		0.00525											
3	14	2021	3/14/2021		0.00825											
3	15	2021	3/15/2021		0.00549											
3	16	2021	3/16/2021		0.00731	8.4	24		0.56	1.93	8.9	9.1	0.518	2	5	0.091
3	17	2021	3/17/2021		0.02179											
3	18	2021	3/18/2021		0.00904											
3	19	2021	3/19/2021		0.00686	8.3					8.7	10				
3	20	2021	3/20/2021		0.00552											
3	21	2021	3/21/2021		0.00552											
3	22	2021	3/22/2021		0.00521	7.8	66	20	0.707	4.21	7.6	10.4	0.439	2	2	0.349
3	23	2021	3/23/2021		0.00506											
3	24	2021	3/24/2021		0.00392											
3	25	2021	3/25/2021		0.00959											
3	26	2021	3/26/2021		0.00703	7.7					7.6	10				
3	27	2021	3/27/2021		0.00998											
3	28	2021	3/28/2021		0.0094											
3	29	2021	3/29/2021		0.00731	7.8	30	40	0.7	2.45	8	9.1	0.46	2	2	0.222
3	30	2021	3/30/2021		0.00734											
3	31	2021	3/31/2021		0.00579											
4	1	2021	4/1/2021		0.0059											
4	2	2021	4/2/2021		0.00484	7.7					7.5	9.9				
4	3	2021	4/3/2021		0.00505											
4	4	2021	4/4/2021		0.00491											
4	5	2021	4/5/2021		0.00345	8.1	100	33	2.02	12.8	8.5	10	0.557	2	2	0.071
4	6	2021	4/6/2021		0.00332											
4	7	2021	4/7/2021		0.00878											
4	8	2021	4/8/2021		0.00755	7.9					8.6	9.9				
4	9	2021	4/9/2021		0.00642											
4	10	2021	4/10/2021		0.01589											
4	11	2021	4/11/2021		0.0119											
4	12	2021	4/12/2021		0.00962											
4	13	2021	4/13/2021		0.0064	8	15	47	0.525	2.29	8.4	8.9	0.347	2	2	0.172
4	14	2021	4/14/2021		0.00556	8					8.4	8.9				
4	15	2021	4/15/2021		0.00442											
4	16	2021	4/16/2021		0.00476											
4	17	2021	4/17/2021		0.00421											

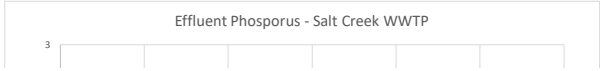
STANDARDS

	Monthly Avg	Weekly Avg	
CBOD5	10	15	mg/L
TSS	12	18	mg/L
Ammonia-Summe	1.1	1.6	mg/L
Ammonia-Winter	1.6	2.4	mg/L
Phosphorus	1		mg/L
pH	6 to 9		
Dissolved O2	6	min daily	mg/L

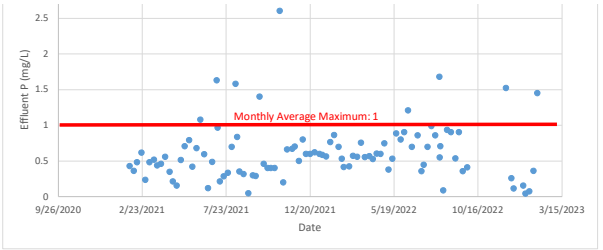


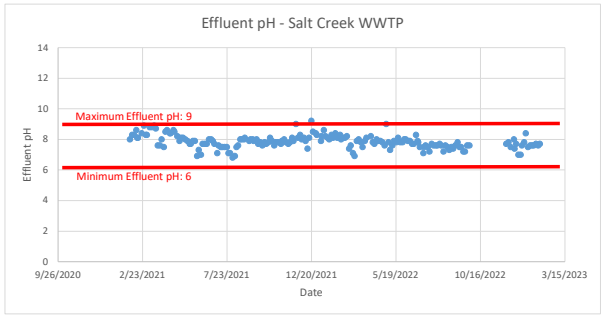


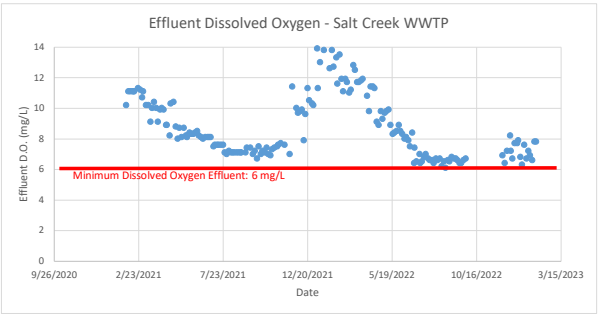




4	18	2021	4/18/2021		0.00352												
4	19	2021	4/19/2021		0.00352	7.9	42	22	1.22	7.67	8.6	8.2	0.214	3	1	0.058
4	20	2021	4/20/2021		0.00504											
4	21	2021	4/21/2021		0.00296	8.4					8.5	10.3				
4	22	2021	4/22/2021		0.00314											
4	23	2021	4/23/2021		0.00312											
4	24	2021	4/24/2021		0.00338											
4	25	2021	4/25/2021		0.0035											
4	26	2021	4/26/2021		0.00307	7.7	24	168	2.46	10.7	8.2	10.4	0.156	2	1	0.038
4	27	2021	4/27/2021		0.00291											
4	28	2021	4/28/2021		0.0049											
4	29	2021	4/29/2021		0.008											
4	30	2021	4/30/2021		0.00519	7.5					7.9	8.8				
5	1	2021	5/1/2021		0.00444											
5	2	2021	5/2/2021		0.00414											
5	3	2021	5/3/2021		0.00381	7.5	57	177	2.12	10.1	8.1	8	0.512	2	4	0.468
5	4	2021	5/4/2021		0.00819											
5	5	2021	5/5/2021		0.00616											
5	6	2021	5/6/2021		0.00405	7.6					8.1	8.7				
5	7	2021	5/7/2021		0.00387											
5	8	2021	5/8/2021		0.00408											
5	9	2021	5/9/2021		0.00567											
5	10	2021	5/10/2021		0.0036	7.6	35	99	1.31	7.24	8	8.1	0.704	2	2	0.962
5	11	2021	5/11/2021		0.00377											
5	12	2021	5/12/2021		0.00353											
5	13	2021	5/13/2021		0.00307											
5	14	2021	5/14/2021		0.00352	7.6					7.9	8.7				
5	15	2021	5/15/2021		0.00386											
5	16	2021	5/16/2021		0.00344											
5	17	2021	5/17/2021		0.00267											
5	18	2021	5/18/2021		0.00246	7.5	21	76	2.16	11.4	7.7	8.2	0.791	2	2	0.754
5	19	2021	5/19/2021		0.00236											
5	20	2021	5/20/2021		0.00226	7.4					7.7	8.1				
5	21	2021	5/21/2021		0.00274											
5	22	2021	5/22/2021		0.00304											
5	23	2021	5/23/2021		0.00265											
5	24	2021	5/24/2021		0.00245	7.5	35	86	4.68	30.1	7.9	8.4	0.419	2	2	0.736
5	25	2021	5/25/2021		0.00156											
5	26	2021	5/26/2021		0.00157											
5	27	2021	5/27/2021		0.00266	7.4					7.9	8.3				
5	28	2021	5/28/2021		0.00396											
5	29	2021	5/29/2021		0.00244											
5	30	2021	5/30/2021		0.00193											
5	31	2021	5/31/2021		0.00216	7.7	64	87	4.61	31.9	6.9	8.3	0.677	2	2	0.397
6	1	2021	6/1/2021		0.00207											
6	2	2021	6/2/2021		0.00666											
6	3	2021	6/3/2021		0.00988	7.5					7.3	8.4				
6	4	2021	6/4/2021		0.00451											
6	5	2021	6/5/2021		0.00403											
6	6	2021	6/6/2021		0.00236											
6	7	2021	6/7/2021		0.00396	7.7	51	117	2.69	16.9	7	8.5	1.08	3	3	0.536
6	8	2021	6/8/2021		0.00317											
6	9	2021	6/9/2021		0.00343											
6	10	2021	6/10/2021		0.00241	7.2					7.7	8.2				
6	11	2021	6/11/2021		0.00284											
6	12	2021	6/12/2021		0.00277											
6	13	2021	6/13/2021		0.00178											
6	14	2021	6/14/2021		0.001	8	144	59	4.62	32.6	7.7	8.1	0.593	2	3	0.247
6	15	2021	6/15/2021		0.00136											
6	16	2021	6/16/2021		0.0015											
6	17	2021	6/17/2021		0.00069	8					7.7	8				
6	18	2021	6/18/2021		0.00368											
6	19	2021	6/19/2021		0.00813											
6	20	2021	6/20/2021		0.00484											
6	21	2021	6/21/2021		0.00267	7.4	51	90	2.34	12.7	8	8.1	0.117	2	8	0.02
6	22	2021	6/22/2021		0.00239											
6	23	2021	6/23/2021		0.00208											
6	24	2021	6/24/2021		0.00208											
6	25	2021	6/25/2021		0.003376	7.4					8	8.1				
6	26	2021	6/26/2021		0.0024											
6	27	2021	6/27/2021		0.00243											
6	28	2021	6/28/2021		0.00339	7.3	144	146	4.86	36.7	7.9	8.1	0.486	2	6	0.101
6	29	2021	6/29/2021		0.00252											
6	30	2021	6/30/2021		0.00369											
7	1	2021	7/1/2021		0.00627	7.3					7.7	8.1				
7	2	2021	7/2/2021		0.00434											
7	3	2021	7/3/2021		0.00443											
7	4	2021	7/4/2021		0.00477											
7	5	2021	7/5/2021		0.0023											
7	6	2021	7/6/2021		0.00136	7.3	217	148	5.91	34.7	7.1	7.5	1.63	2	4	0.041







7	7	2021	7/7/2021		0.00135											
7	8	2021	7/8/2021		0.00191	7.3					7.6	7.6	0.964			
7	9	2021	7/9/2021		0.00322											
7	10	2021	7/10/2021		0.00986											
7	11	2021	7/11/2021		0.00576											
7	12	2021	7/12/2021		0.00393	7.4	20	166	2.04	11.3	7.5	7.6	0.212	2	4	0.037
7	13	2021	7/13/2021		0.00312											
7	14	2021	7/14/2021		0.00234											
7	15	2021	7/15/2021		0.00279	7.3					7.5	7.6				
7	16	2021	7/16/2021		0.01338											
7	17	2021	7/17/2021		0.00842											
7	18	2021	7/18/2021		0.00501											
7	19	2021	7/19/2021		0.0027	7.4	42	124	1.66	10.1	7.5	7.6	0.283	2	9	0.11
7	20	2021	7/20/2021		0.00366											
7	21	2021	7/21/2021		0.00303											
7	22	2021	7/22/2021		0.00221											
7	23	2021	7/23/2021		0.00285	7.4					7.5	7.6				
7	24	2021	7/24/2021		0.00388											
7	25	2021	7/25/2021		0.00333											
7	26	2021	7/26/2021		0.00205	7	141	228	4.87	30	7.1	7.1	0.335	2	9	0.016
7	27	2021	7/27/2021		0.00184											
7	28	2021	7/28/2021		0.00153											
7	29	2021	7/29/2021		0.00285	7					7.1	7				
7	30	2021	7/30/2021		0.00284											
7	31	2021	7/31/2021		0.00286											
8	1	2021	8/1/2021		0.00194											
8	2	2021	8/2/2021		0.00132	7	195	224	5.67	47	6.8	7.2	0.698	2	4	0.042
8	3	2021	8/3/2021		0.00092											
8	4	2021	8/4/2021		0.00151											
8	5	2021	8/5/2021		0.00099											
8	6	2021	8/6/2021		0.00118	7.1					6.9	7.1				
8	7	2021	8/7/2021		0.00132											
8	8	2021	8/8/2021		0.00165											
8	9	2021	8/9/2021		0.00195	7.2	77	178	6.37	44.3	7.5	7.1	1.58	2	3	0.016
8	10	2021	8/10/2021		0.00083											
8	11	2021	8/11/2021		0.00099											
8	12	2021	8/12/2021		0.00186	7.2					7.6	7.1	0.837			
8	13	2021	8/13/2021		0.00155											
8	14	2021	8/14/2021		0.00154											
8	15	2021	8/15/2021		0.00206											
8	16	2021	8/16/2021		0.00137	7.6	180	187	5.76	37.9	8	7.1	0.353	2	2	4.89
8	17	2021	8/17/2021		0.00118											
8	18	2021	8/18/2021		0.00138											
8	19	2021	8/19/2021		0.00207	7.6					8	7.1				
8	20	2021	8/20/2021		0.00168											
8	21	2021	8/21/2021		0.00165											
8	22	2021	8/22/2021		0.00153											
8	23	2021	8/23/2021		0.00135	7.6	30	788	1.33	7.24	8	7.1	0.317	2	1	4.18
8	24	2021	8/24/2021		0.00097	7.6					8.1	7.1				
8	25	2021	8/25/2021		0.00292											
8	26	2021	8/26/2021		0.00311											
8	27	2021	8/27/2021		0.00192											
8	28	2021	8/28/2021		0.00258											
8	29	2021	8/29/2021		0.00297											
8	30	2021	8/30/2021		0.00468											
8	31	2021	8/31/2021		0.00497											
9	1	2021	9/1/2021		0.002	7.5	17	216	0.12	13.4	7.9	7.1	0.048	2	6	5.4
9	2	2021	9/2/2021		0.002											
9	3	2021	9/3/2021		0.002	7.6					8	7.4				
9	4	2021	9/4/2021		0.002											
9	5	2021	9/5/2021		0.002											
9	6	2021	9/6/2021		0.002											
9	7	2021	9/7/2021		0.002	7.7					8					
9	8	2021	9/8/2021		0.002											
9	9	2021	9/9/2021		0.002	7.5	30	90	2	12.1	7.9	7.4	0.3	2	7	0.3
9	10	2021	9/10/2021		0.002											
9	11	2021	9/11/2021		0.002											
9	12	2021	9/12/2021		0.002											
9	13	2021	9/13/2021		0.002											
9	14	2021	9/14/2021		0.002	7.6	78	75	3.5	24.3	8	7	0.29	2.3	1	0.29
9	15	2021	9/15/2021		0.002											
9	16	2021	9/16/2021		0.002											
9	17	2021	9/17/2021		0.002	7.4					7.7	7.2				
9	18	2021	9/18/2021		0.002											
9	19	2021	9/19/2021		0.002											
9	20	2021	9/20/2021		0.002											
9	21	2021	9/21/2021		0.002	7.5	6	32	1.6	8.9	7.8	6.7	1.4	2	6	1.4
9	22	2021	9/22/2021		0.002											
9	23	2021	9/23/2021		0.002											
9	24	2021	9/24/2021		0.002	7.3					7.6	7.5				

9	25	2021	9/25/2021		0.002											
9	26	2021	9/26/2021		0.002											
9	27	2021	9/27/2021		0.002											
9	28	2021	9/28/2021		0.002	7.4	9	370	4.7	2	7.8	7	0.46	2	0	0.46
9	29	2021	9/29/2021		0.002											
9	30	2021	9/30/2021		0.002											
10	1	2021	10/1/2021		0.002	7.5					7.7	7.2				
10	2	2021	10/2/2021		0.002											
10	3	2021	10/3/2021		0.002											
10	4	2021	10/4/2021		0.002											
10	5	2021	10/5/2021		0.002	7.3	15	445	8.7	2	7.8	7.1	0.4	2	1	0.1
10	6	2021	10/6/2021		0.002											
10	7	2021	10/7/2021		0.002											
10	8	2021	10/8/2021		0.002	7.6					8.1	7.4				
10	9	2021	10/9/2021		0.002											
10	10	2021	10/10/2021		0.002											
10	11	2021	10/11/2021		0.002	7.4	11	309	2	2	7.9	7	0.4	2	2	0.1
10	12	2021	10/12/2021		0.002											
10	13	2021	10/13/2021		0.002											
10	14	2021	10/14/2021		0.002											
10	15	2021	10/15/2021		0.002	7.3					7.6	6.9				
10	16	2021	10/16/2021		0.002											
10	17	2021	10/17/2021		0.002											
10	18	2021	10/18/2021		0.002	7.4	30	73	4.3	2	7.8	7.3	0.4	2	0	0.18
10	19	2021	10/19/2021		0.002											
10	20	2021	10/20/2021		0.002											
10	21	2021	10/21/2021		0.002											
10	22	2021	10/22/2021		0.002	7.5					7.8	7.4				
10	23	2021	10/23/2021		0.002											
10	24	2021	10/24/2021		0.002											
10	25	2021	10/25/2021		0.002											
10	26	2021	10/26/2021		0.002											
10	27	2021	10/27/2021		0.002	7.3	119	82	5	20.9	7.7	7.5	2.6	2	5	0.01
10	28	2021	10/28/2021		0.002											
10	29	2021	10/29/2021		0.002	7.4					7.9	7.6				
10	30	2021	10/30/2021		0.002											
10	31	2021	10/31/2021		0.002											
11	1	2021	11/1/2021		0.002											
11	2	2021	11/2/2021		0.002	7.6	82.5	173	6.6	0.0334	8	7.7	0.2	2.1	65	0.06
11	3	2021	11/3/2021		0.002											
11	4	2021	11/4/2021		0.002											
11	5	2021	11/5/2021		0.002	7.4					7.8					
11	6	2021	11/6/2021		0.002											
11	7	2021	11/7/2021		0.002											
11	8	2021	11/8/2021		0.002											
11	9	2021	11/9/2021		0.002	7.3	15	176	6.2	0.0334	7.7	7.6	0.66	2	5	0.08
11	10	2021	11/10/2021		0.002											
11	11	2021	11/11/2021		0.002											
11	12	2021	11/12/2021		0.002	7.5					7.8					
11	13	2021	11/13/2021		0.002											
11	14	2021	11/14/2021		0.002											
11	15	2021	11/15/2021		0.002											
11	16	2021	11/16/2021		0.002	7.6					8.1					
11	17	2021	11/17/2021		0.002											
11	18	2021	11/18/2021		0.003	7.7	45.5	474	1.65	0.0501	7.9	7	0.67	2	4	0.06
11	19	2021	11/19/2021		0.002											
11	20	2021	11/20/2021		0.002											
11	21	2021	11/21/2021		0.003											
11	22	2021	11/22/2021		0.004											
11	23	2021	11/23/2021		0.002	7.7	246	105	18.4	0.5908	9	11.4	0.7	2	1	0.09
11	24	2021	11/24/2021		0.003											
11	25	2021	11/25/2021		0.002											
11	26	2021	11/26/2021		0.003	7.5					8.1					
11	27	2021	11/27/2021		0.0036											
11	28	2021	11/28/2021		0.003											
11	29	2021	11/29/2021		0.003											
11	30	2021	11/30/2021		0.003	7.7	12	229	5	0.0501	8.3	10	0.5	2	2	0.025
12	1	2021	12/1/2021		0.0045											
12	2	2021	12/2/2021		0.0043											
12	3	2021	12/3/2021		0.0044	7.5					8	9.7				
12	4	2021	12/4/2021		0.005									2	1	0.09
12	5	2021	12/5/2021		0.0049											
12	6	2021	12/6/2021		0.0045											
12	7	2021	12/7/2021		0.0043	7.6	18	456	5	2	8.1	9.8	0.8			
12	8	2021	12/8/2021		0.0031											
12	9	2021	12/9/2021		0.0045											
12	10	2021	12/10/2021		0.0042	7.4					7.9	9.9		2	1	0.1
12	11	2021	12/11/2021		0.0046											
12	12	2021	12/12/2021		0.0045											
12	13	2021	12/13/2021		0.0044	7.6	36	39	2	5.24	7.4	7.9	0.6			

12	14	2021	12/14/2021		0.0043												
12	15	2021	12/15/2021		0.0041												
12	16	2021	12/16/2021		0.0042	7.5					8.1	9.6					
12	17	2021	12/17/2021		0.0045									2	3	0.1
12	18	2021	12/18/2021		0.0044												
12	19	2021	12/19/2021		0.0049												
12	20	2021	12/20/2021		0.0046	7.9	28.5	66	2.16	9.9	9.2	11.3	0.6				
12	21	2021	12/21/2021		0.0047												
12	22	2021	12/22/2021		0.0048												
12	23	2021	12/23/2021		0.0045	7.7					8.5	10.5					
12	24	2021	12/24/2021		0.0045												
12	25	2021	12/25/2021		0.005									2	3	0.173	
12	26	2021	12/26/2021		0.0043												
12	27	2021	12/27/2021		0.0041												
12	28	2021	12/28/2021		0.0044	8	81	67	2.63	15.8	8.4	10.3	0.622				
12	29	2021	12/29/2021		0.0045												
12	30	2021	12/30/2021		0.0048	8.1					8.3	10.2					
12	31	2021	12/31/2021		0.0047												
1	1	2022	1/1/2022		0.0048												
1	2	2022	1/2/2022		0.0044												
1	3	2022	1/3/2022		0.0043												
1	4	2022	1/4/2022		0.0051												
1	5	2022	1/5/2022		0.0031												
1	6	2022	1/6/2022		0.0051	7.6	27	30	0.9	3.62	7.9	13.9	0.6	3.5	4	2.15	
1	7	2022	1/7/2022		0.0036	8.3					8.2	11.3					
1	8	2022	1/8/2022		0.0059												
1	9	2022	1/9/2022		0.0112												
1	10	2022	1/10/2022		0.0046												
1	11	2022	1/11/2022		0.0045	8.1	13.5	17	1.77	2	8.6	13	0.583	2	4	0.564	
1	12	2022	1/12/2022		0.0042												
1	13	2022	1/13/2022		0.0032												
1	14	2022	1/14/2022		0.0038	8.2					8.2	15					
1	15	2022	1/15/2022		0.0038												
1	16	2022	1/16/2022		0.0039												
1	17	2022	1/17/2022		0.003												
1	18	2022	1/18/2022		0.0023	8.3	15	144	1.12	2	8.1	13.8	0.564	2	2	0.35	
1	19	2022	1/19/2022		0.0024												
1	20	2022	1/20/2022		0.003												
1	21	2022	1/21/2022		0.003	7.8					8	14.5					
1	22	2022	1/22/2022		0.0035												
1	23	2022	1/23/2022		0.0028												
1	24	2022	1/24/2022		0.0024												
1	25	2022	1/25/2022		0.003	8.1	48.75	136	1.76	2	8.3	15	0.766	6.5	1	0.233	
1	26	2022	1/26/2022		0.0025												
1	27	2022	1/27/2022		0.0001												
1	28	2022	1/28/2022		0.003	8					8.1	12.6					
1	29	2022	1/29/2022		0.0025												
1	30	2022	1/30/2022		0.0018												
1	31	2022	1/31/2022		0.0024												
2	1	2022	2/1/2022		0.0032	7.4	72	97	3.38	18.6	8.4	13.8	0.862	4.6	1	0.286	
2	2	2022	2/2/2022		0.0062												
2	3	2022	2/3/2022		0.0072												
2	4	2022	2/4/2022		0.0066	8.3					8.1	12.7					
2	5	2022	2/5/2022		0.0034												
2	6	2022	2/6/2022		0.0046												
2	7	2022	2/7/2022		0.004												
2	8	2022	2/8/2022		0.0057												
2	9	2022	2/9/2022		0.0112	8.5	18	435	0.59	3.88	8.3	13.3	0.696	2	2	0.268	
2	10	2022	2/10/2022		0.0073												
2	11	2022	2/11/2022		0.0052	8.1					8	11.6					
2	12	2022	2/12/2022		0.0066												
2	13	2022	2/13/2022		0.0037												
2	14	2022	2/14/2022		0.0034												
2	15	2022	2/15/2022		0.0031	8.3	66.75	231	1.47	0.39	8.1	13.5	0.533	2	2	0.313	
2	16	2022	2/16/2022		0.0062												
2	17	2022	2/17/2022		0.0028												
2	18	2022	2/18/2022		0.0079	8.2					8.1	11.9	0.413	2.8	5	0.891	
2	19	2022	2/19/2022		0.0054												
2	20	2022	2/20/2022		0.005												
2	21	2022	2/21/2022		0.0237	8	19.5	43	1.1	0.89	8.2	11.1					
2	22	2022	2/22/2022		0.0078												
2	23	2022	2/23/2022		0.0098												
2	24	2022	2/24/2022		0.0298												
2	25	2022	2/25/2022		0.0112	8.1					7.4	11.9					
2	26	2022	2/26/2022		0.0078												
2	27	2022	2/27/2022		0.006												
2	28	2022	2/28/2022		0.0072	8.2	24	26	0.84	5.43	7.6	11.7	0.422	2.8	5	1.31	
3	1	2022	3/1/2022		0.00474												
3	2	2022	3/2/2022		0.00403												
3	3	2022	3/3/2022		0.00313												

3	4	2022	3/4/2022		0.00353	7.9					7.1	11					
3	5	2022	3/5/2022		0.00393												
3	6	2022	3/6/2022		0.01062												
3	7	2022	3/7/2022		0.00385	7.2	18	27	0.5	0.664	6.9	11.2	0.573	2.1	9	0.26	
3	8	2022	3/8/2022		0.00789												
3	9	2022	3/9/2022		0.0067												
3	10	2022	3/10/2022		0.00458												
3	11	2022	3/11/2022		0.00486	8.2					7.9	12.8					
3	12	2022	3/12/2022		0.00505												
3	13	2022	3/13/2022		0.00331												
3	14	2022	3/14/2022		0.00385	8.3	16.5	69	1.79	0.054	8	12.5	0.56	2.1	4	0.131	
3	15	2022	3/15/2022		0.00333												
3	16	2022	3/16/2022		0.00312												
3	17	2022	3/17/2022		0.00264												
3	18	2022	3/18/2022		0.00384	8					7.8	11.7					
3	19	2022	3/19/2022		0.00294												
3	20	2022	3/20/2022		0.00412												
3	21	2022	3/21/2022		0.00514	7.7	48	22	1.27	0.036	7.5	11.7	0.755	6.2	11	0.02	
3	22	2022	3/22/2022		0.00691												
3	23	2022	3/23/2022		0.00735												
3	24	2022	3/24/2022		0.00687												
3	25	2022	3/25/2022		0.00735	8.2					7.9	11.8					
3	26	2022	3/26/2022		0.0057												
3	27	2022	3/27/2022		0.0097												
3	28	2022	3/28/2022		0.00549	8.3	25.5	9	0.879	5.78	8.1	11.9	0.553	3.8	9	0.274	
3	29	2022	3/29/2022		0.00351												
3	30	2022	3/30/2022		0.0048												
3	31	2022	3/31/2022		0.00478												
4	1	2022	4/1/2022		0.00433												
4	2	2022	4/2/2022		0.00389												
4	3	2022	4/3/2022		0.00567												
4	4	2022	4/4/2022		0.00613												
4	5	2022	4/5/2022		0.00563	7.6	26	149	0.697	2.35	8.2	10.8	0.567	4	4	0.203	
4	6	2022	4/6/2022		0.00463												
4	7	2022	4/7/2022		0.00585												
4	8	2022	4/8/2022		0.00376	7.9					7.8	9.8					
4	9	2022	4/9/2022		0.00614												
4	10	2022	4/10/2022		0.00563												
4	11	2022	4/11/2022		0.00608	7.9	41	103	2.34	13.6	7.7	11.4	0.527	2.6	6	0.097	
4	12	2022	4/12/2022		0.00611												
4	13	2022	4/13/2022		0.00814												
4	14	2022	4/14/2022		0.00542												
4	15	2022	4/15/2022		0.0073	8.1					8	11.4					
4	16	2022	4/16/2022		0.00404												
4	17	2022	4/17/2022		0.00347												
4	18	2022	4/18/2022		0.00377	8.1	26	246	1.14	6.38	7.9	11.3	0.605	2.6	5	0.134	
4	19	2022	4/19/2022		0.0036												
4	20	2022	4/20/2022		0.00357												
4	21	2022	4/21/2022		0.00369												
4	22	2022	4/22/2022		0.00371	8					7.9	9.1					
4	23	2022	4/23/2022		0.00357												
4	24	2022	4/24/2022		0.0036												
4	25	2022	4/25/2022		0.00429	7.9	59	23	2.14	15.5	7.8	8.9	0.599	4.5	7	0.133	
4	26	2022	4/26/2022		0.00379												
4	27	2022	4/27/2022		0.00441												
4	28	2022	4/28/2022		0.00394												
4	29	2022	4/29/2022		0.00417	7.9					7.6	9.8					
4	30	2022	4/30/2022		0.00386												
5	1	2022	5/1/2022		0.00386												
5	2	2022	5/2/2022		0.0039	8.2	27	176	1.39	0.18	9	9.3	0.746	2	2	0.066	
5	3	2022	5/3/2022		0.00471												
5	4	2022	5/4/2022		0.0049												
5	5	2022	5/5/2022		0.0063												
5	6	2022	5/6/2022		0.0036	7.9					7.8	9.7					
5	7	2022	5/7/2022		0.0056												
5	8	2022	5/8/2022		0.0048												
5	9	2022	5/9/2022		0.00421	7.3	48	340	2.33	10	7.3	9.8	0.378	2	2	0.015	
5	10	2022	5/10/2022		0.0027												
5	11	2022	5/11/2022		0.00233												
5	12	2022	5/12/2022		0.0026												
5	13	2022	5/13/2022		0.0034	7.8					7.6	9.9					
5	14	2022	5/14/2022		0.0035												
5	15	2022	5/15/2022		0.0025												
5	16	2022	5/16/2022		0.0028	7.7	17	36	0.979	0.53	7.9	8.9	0.53	2	3	0.527	
5	17	2022	5/17/2022		0.0013												
5	18	2022	5/18/2022		0.0039												
5	19	2022	5/19/2022		0.0045												
5	20	2022	5/20/2022		0.0027	7.5					7.8	8.3					
5	21	2022	5/21/2022		0.0012												
5	22	2022	5/22/2022		0.0044												

5	23	2022	5/23/2022		0.00126	7.5	36	29	1.24	0.6	8.1	8.4	0.885	2.8	4	0.082
5	24	2022	5/24/2022		0.00277											
5	25	2022	5/25/2022		0.0028											
5	26	2022	5/26/2022		0.005											
5	27	2022	5/27/2022		0.00985	8					7.8	8.5				
5	28	2022	5/28/2022		0.00451											
5	29	2022	5/29/2022		0.00574											
5	30	2022	5/30/2022		0.00309											
5	31	2022	5/31/2022		0.00253	7.9	15	64	1.07	2	7.8	8.9	0.8	2.1	3	0.142
6	1	2022	6/1/2022		0.00286											
6	2	2022	6/2/2022		0.0026											
6	3	2022	6/3/2022		0.00459	8.1					8	8.5				
6	4	2022	6/4/2022		0.00286											
6	5	2022	6/5/2022		0.00309											
6	6	2022	6/6/2022		0.00328	8.2	23	95	1.97	2	8	8.3	0.902	2.8	2	0.015
6	7	2022	6/7/2022		0.00242											
6	8	2022	6/8/2022		0.00195											
6	9	2022	6/9/2022		0.00183											
6	10	2022	6/10/2022		0.00288	8					7.9	8				
6	11	2022	6/11/2022		0.00304											
6	12	2022	6/12/2022		0.00286											
6	13	2022	6/13/2022		0.00264	8.1	30	113	2.57	13.2	7.9	8.1	1.21	2.9	1	0.62
6	14	2022	6/14/2022		0.00129											
6	15	2022	6/15/2022		0.00186											
6	16	2022	6/16/2022		0.00234											
6	17	2022	6/17/2022		0.00124	7.9					7.7	7.9				
6	18	2022	6/18/2022		0.00105											
6	19	2022	6/19/2022		0.00236											
6	20	2022	6/20/2022		0.00146	7.9	123	164	5	33.9	7.7	7.5	0.698	2.3	5	0.015
6	21	2022	6/21/2022		0.00117											
6	22	2022	6/22/2022		0.00173											
6	23	2022	6/23/2022		0.00149											
6	24	2022	6/24/2022		0.00251	7.8					8.3	8.4				
6	25	2022	6/25/2022		0.00154											
6	26	2022	6/26/2022		0.00125											
6	27	2022	6/27/2022		0.00253	8.3					7.9	6.4				
6	28	2022	6/28/2022		0.00218	8.2	200	217	4.59	28.4	7.8	7.4		3.4	12	1.45
6	29	2022	6/29/2022		0.00244											0.476
6	30	2022	6/30/2022		0.00218								0.857			
7	1	2022	7/1/2022		0.00199	7.9					7.5	6.5				
7	2	2022	7/2/2022		0.00252											
7	3	2022	7/3/2022		0.00255											
7	4	2022	7/4/2022		0.00435											
7	5	2022	7/5/2022		0.00142											
7	6	2022	7/6/2022		0.00022											
7	7	2022	7/7/2022		0.00322	7.3	135	594	4	22	7.1	7	0.357	2	11	0.5
7	8	2022	7/8/2022		0.00616	7.8					7.5	6.4				
7	9	2022	7/9/2022		0.00347											
7	10	2022	7/10/2022		0.00331											
7	11	2022	7/11/2022		0.0012	7.8	84	108	1.09	14.4	7.6	6.5	0.448	2	11	0.5
7	12	2022	7/12/2022		0.00123											
7	13	2022	7/13/2022		0.00471											
7	14	2022	7/14/2022		0.00112											
7	15	2022	7/15/2022		0.00262	7.6					7.5	6.8				
7	16	2022	7/16/2022		0.00247											
7	17	2022	7/17/2022		0.00283											
7	18	2022	7/18/2022		0.00227	7.6	23	210	6.64	7.87	7.2	7	0.698	2	10	0.7
7	19	2022	7/19/2022		0.00109											
7	20	2022	7/20/2022		0.00197											
7	21	2022	7/21/2022		0.00193											
7	22	2022	7/22/2022		0.00195	7.6					7.7	6.7				
7	23	2022	7/23/2022		0.00114											
7	24	2022	7/24/2022		0.00186											
7	25	2022	7/25/2022		0.00228	7.8	18	45	2.56	5.63	7.6	6.6	0.988	2	12	0.744
7	26	2022	7/26/2022		0.00286											
7	27	2022	7/27/2022		0.00257											
7	28	2022	7/28/2022		0.00366											
7	29	2022	7/29/2022		0.0031	7.7					7.6	6.6				
7	30	2022	7/30/2022		0.00213											
7	31	2022	7/31/2022		0.002											
8	1	2022	8/1/2022		0.0031	7.8	30	96	1.39	3.19	7.6	6.4	0.857	3.2	7	0.819
8	2	2022	8/2/2022		0.0021											
8	3	2022	8/3/2022		0.00146											
8	4	2022	8/4/2022		0.00174											
8	5	2022	8/5/2022		0.00306	7.9					7.7	6.7				
8	6	2022	8/6/2022		0.00347											
8	7	2022	8/7/2022		0.00268											
8	8	2022	8/8/2022		0.00252	7.8	78	954	1.97	1.71	7.6	6.6	1.68	2	9	0.5
8	9	2022	8/9/2022		0.00189								0.549			
8	10	2022	8/10/2022		0.00126								0.707			

8	11	2022	8/11/2022		0.00173												
8	12	2022	8/12/2022		0.0041	7.4					7.2	6.7					
8	13	2022	8/13/2022		0.00511												
8	14	2022	8/14/2022		0.00187												
8	15	2022	8/15/2022		0.00113	7.8	159	68	4.23	35	7.6	6.2	0.087	2	4	0.5	
8	16	2022	8/16/2022		0.0028												
8	17	2022	8/17/2022		0.00263												
8	18	2022	8/18/2022		0.00363												
8	19	2022	8/19/2022		0.00373	7.6					7.5	6.5					
8	20	2022	8/20/2022		0.00563												
8	21	2022	8/21/2022		0.00545												
8	22	2022	8/22/2022		0.00342	7.5	78	47	4.45	24.1	7.3	6.1	0.936	2	11	0.5	
8	23	2022	8/23/2022		0.00292												
8	24	2022	8/24/2022		0.00311												
8	25	2022	8/25/2022		0.00153												
8	26	2022	8/26/2022		0.00201	7.4					7.5	6.6					
8	27	2022	8/27/2022		0.00106												
8	28	2022	8/28/2022		0.00232												
8	29	2022	8/29/2022		0.00163	7.3	113	509	3.98	31.3	7.4	6.5	0.901	2	3	0.5	
8	30	2022	8/30/2022		0.00081												
8	31	2022	8/31/2022		0.00225												
9	1	2022	9/1/2022		0.00134												
9	2	2022	9/2/2022		0.00265	7.8					7.6	6.8					
9	3	2022	9/3/2022		0.00436												
9	4	2022	9/4/2022		0.00268												
9	5	2022	9/5/2022		0.00338												
9	6	2022	9/6/2022		0.00177	7.9	83	100	3.8	20.1	7.8	6.7	0.535	2	5	4.32	
9	7	2022	9/7/2022		0.00218											0.018	
9	8	2022	9/8/2022		0.00133											0.024	
9	9	2022	9/9/2022		0.003	7.3					7.5	6.7				0.015	
9	10	2022	9/10/2022		0.00346												
9	11	2022	9/11/2022		0.00323												
9	12	2022	9/12/2022		0.00173	7.4	51	111	2.1	16	7.5	6.6	0.905	2	9	0.5	
9	13	2022	9/13/2022		0.00182												
9	14	2022	9/14/2022		0.00145												
9	15	2022	9/15/2022		0.00126												
9	16	2022	9/16/2022		0.00087	7.3					7.2	6.4					
9	17	2022	9/17/2022		0.00199												
9	18	2022	9/18/2022		0.00171												
9	19	2022	9/19/2022		0.00086	7.3	71	325	4.99	31.2	7.2	6.4	0.357	2	5	0.5	
9	20	2022	9/20/2022		0.00113												
9	21	2022	9/21/2022		0.00117												
9	22	2022	9/22/2022		0.00142												
9	23	2022	9/23/2022		0.0009	7.8					7.6	6.6					
9	24	2022	9/24/2022		0.00171												
9	25	2022	9/25/2022		0.00077												
9	26	2022	9/26/2022		0.0008												
9	27	2022	9/27/2022		0.0008	7.8	89	98	6.55	46.8	7.6	6.7	0.411	2	6	0.861	
9	28	2022	9/28/2022		0												
9	29	2022	9/29/2022		0												
9	30	2022	9/30/2022		0												
10	1	2022	10/1/2022														
10	2	2022	10/2/2022														
10	3	2022	10/3/2022														
10	4	2022	10/4/2022														
10	5	2022	10/5/2022														
10	6	2022	10/6/2022														
10	7	2022	10/7/2022														
10	8	2022	10/8/2022														
10	9	2022	10/9/2022														
10	10	2022	10/10/2022														
10	11	2022	10/11/2022														
10	12	2022	10/12/2022														
10	13	2022	10/13/2022														
10	14	2022	10/14/2022														
10	15	2022	10/15/2022														
10	16	2022	10/16/2022														
10	17	2022	10/17/2022														
10	18	2022	10/18/2022														
10	19	2022	10/19/2022														
10	20	2022	10/20/2022														
10	21	2022	10/21/2022														
10	22	2022	10/22/2022														
10	23	2022	10/23/2022														
10	24	2022	10/24/2022														
10	25	2022	10/25/2022														
10	26	2022	10/26/2022														
10	27	2022	10/27/2022														
10	28	2022	10/28/2022														
10	29	2022	10/29/2022														

10	30	2022	10/30/2022														
10	31	2022	10/31/2022														
11	1	2022	11/1/2022														
11	2	2022	11/2/2022														
11	3	2022	11/3/2022														
11	4	2022	11/4/2022														
11	5	2022	11/5/2022														
11	6	2022	11/6/2022														
11	7	2022	11/7/2022														
11	8	2022	11/8/2022														
11	9	2022	11/9/2022														
11	10	2022	11/10/2022														
11	11	2022	11/11/2022														
11	12	2022	11/12/2022														
11	13	2022	11/13/2022														
11	14	2022	11/14/2022														
11	15	2022	11/15/2022														
11	16	2022	11/16/2022														
11	17	2022	11/17/2022														
11	18	2022	11/18/2022														
11	19	2022	11/19/2022														
11	20	2022	11/20/2022														
11	21	2022	11/21/2022														
11	22	2022	11/22/2022														
11	23	2022	11/23/2022														
11	24	2022	11/24/2022														
11	25	2022	11/25/2022														
11	26	2022	11/26/2022														
11	27	2022	11/27/2022														
11	28	2022	11/28/2022														
11	29	2022	11/29/2022														
11	30	2022	11/30/2022														
12	1	2022	12/1/2022		0.00175	7.8					7.7	6.9					
12	2	2022	12/2/2022		0.00175												
12	3	2022	12/3/2022		0.00167												
12	4	2022	12/4/2022		0.00146												
12	5	2022	12/5/2022		0.00401	7.7	21	135	1.23	6.72	7.8	6.4	1.52	2.1	15	1.42	
12	6	2022	12/6/2022		0.00175												
12	7	2022	12/7/2022		0.00152												
12	8	2022	12/8/2022		0.00172												
12	9	2022	12/9/2022		0.00175	7.7					7.5	7.2					
12	10	2022	12/10/2022		0.00152												
12	11	2022	12/11/2022		0.00471												
12	12	2022	12/12/2022		0.00175												
12	13	2022	12/13/2022		0.00127												
12	14	2022	12/14/2022		0.00267												
12	15	2022	12/15/2022		0.00172	7.9	120	41	1.13	8.45	8	8.2	0.259	3	10	0.016	
12	16	2022	12/16/2022		0.00267	7.6					7.4	7.2					
12	17	2022	12/17/2022		0.00124												
12	18	2022	12/18/2022		0.00127												
12	19	2022	12/19/2022		0.00181	7.5	34.5	52	3.17	23.8	7.7	6.7	0.113	2	8	0.598	
12	20	2022	12/20/2022		0.00095												
12	21	2022	12/21/2022		0.00211												
12	22	2022	12/22/2022		0.00156												
12	23	2022	12/23/2022		0.00155	7.4					7	7.7					
12	24	2022	12/24/2022		0.0016												
12	25	2022	12/25/2022		0.00158												
12	26	2022	12/26/2022		0.00112												
12	27	2022	12/27/2022		0.00115	7.4					7	7.7					
12	28	2022	12/28/2022		0.00246												
12	29	2022	12/29/2022		0.00175	7.9	102	167	6.19	27.3	7.6	7.9		7.2	33	0.096	
12	30	2022	12/30/2022		0.00152												
12	31	2022	12/31/2022		0.00439												
1	1	2023	1/1/2023		0.00387												
1	2	2023	1/2/2023		0.00288	7.7					7.8	6.8					
1	3	2023	1/3/2023		0.00422												
1	4	2023	1/4/2023		0.00393												
1	5	2023	1/5/2023		0.0013	8	36	922	2.59	2.38	8.4	6.3	0.154	3.9	14	0.015	
1	6	2023	1/6/2023		0.00186												
1	7	2023	1/7/2023		0.00213												
1	8	2023	1/8/2023		0.00187												
1	9	2023	1/9/2023		0.00253	7.8	198.5	30	3.78	31.8	7.5	7.6	0.041	2	14	1.16	
1	10	2023	1/10/2023		0.00393												
1	11	2023	1/11/2023		0.0035												
1	12	2023	1/12/2023		0.00293												
1	13	2023	1/13/2023		0.00377	7.7					7.6	6.7					
1	14	2023	1/14/2023		0.00259												
1	15	2023	1/15/2023		0.00239												
1	16	2023	1/16/2023		0.00393	7.6	240	51	2.94	27.2	7.6	7.2	0.076	2	12	1.68	
1	17	2023	1/17/2023		0.0035												

1	18	2023	1/18/2023		0.00293											
1	19	2023	1/19/2023		0.00393	7.6					7.6	6.9				
1	20	2023	1/20/2023		0.00393											
1	21	2023	1/21/2023		0.0035											
1	22	2023	1/22/2023		0.00293											
1	23	2023	1/23/2023		0.00259	7.8	78	159	2.49	17.1	7.7	6.6	0.359	8.3	5	2.04
1	24	2023	1/24/2023		0.00221											
1	25	2023	1/25/2023		0.01012											
1	26	2023	1/26/2023		0.00456											
1	27	2023	1/27/2023		0.00577	7.8					7.6	7.8				
1	28	2023	1/28/2023		0.00476											
1	29	2023	1/29/2023		0.00474											
1	30	2023	1/30/2023		0.00318	7.8	31.5	321	1.68	13.9	7.7	7.8	1.45	2.7	5	2.7
MAXIMUM					0.0298	8.5	246	954	18.4	47	9.2	15	2.6	8.3	65	5.4
MINIMUM					0	7	6	9	0.12	0.0334	6.8	6.1	0.041	2	0	0.01
AVERAGE					0.003682629	7.73508	62.38021	160.326316	2.88504167	12.57346	7.84712	8.793548387	0.61725253	2.491667	5.7604167	0.56813

Month	Day	Year	Gallons Treated	Cl (gallons used)	NaOH (gallons used)	Alum (gallons used)
7	1	2020	10300	0.5		
7	2	2020				
7	3	2020	8500	0.7		
7	4	2020				
7	5	2020	4700	0.3		
7	6	2020	9600	0.2		
7	7	2020				
7	8	2020	10300	0.3		
7	9	2020				
7	10	2020	5200	0.2		
7	11	2020				
7	12	2020				
7	13	2020	7500	0.5		
7	14	2020				
7	15	2020	7400	0.6		
7	16	2020				
7	17	2020	6500	0.5		
7	18	2020				
7	19	2020				
7	20	2020	10000	0.8		
7	21	2020				
7	22	2020	8000	0.5		
7	23	2020				
7	24	2020	5500	0.3		
7	25	2020				
7	26	2020				
7	27	2020	12000	0.5		
7	28	2020				
7	29	2020	10800	0.4		
7	30	2020				
7	31	2020	7600	0.4		
7	1	2021				
7	2	2021	6800	0.255	0	4.2
7	3	2021				
7	4	2021	3300	0.18	1.6	1.4
7	5	2021			1.6	2.8
7	6	2021	6800	0.54	1.6	2.8
7	7	2021	4400	0.21	1.6	1.4
7	8	2021				
7	9	2021	7700	0.195	2.56	5.6
7	10	2021				
7	11	2021				
7	12	2021	9000	0.42	1.28	5.6
7	13	2021				
7	14	2021	7800	0.54	2.24	4.2
7	15	2021				
7	16	2021	9500	0.315	2.56	5.6
7	17	2021				

7	18	2021				
7	19	2021	6700	0.255	2.56	5.36
7	20	2021				
7	21	2021	6500	0.3	1.28	2.8
7	22	2021				
7	23	2021	8500	0.225	2.56	2.8
7	24	2021				
7	25	2021				
7	26	2021	8800	0.375	2.56	2.8
7	27	2021				
7	28	2021				
7	29	2021	6900	0.315	2.56	2.8
7	30	2021	5600	0.33	2.24	4.2
7	31	2021				
		AVERAGE	7662.068966	0.384655172	1.92	3.624
		gallons used in July		11.92431034	59.52	112.344
or 1/2 current backwash rate (if media fixes)				10.22083744	51.01714286	96.29485714
Purchased amount (per photos)				15 gallon drum	50 gallon drum	50 gallon drum

NaOH and Alum not adequately sized as far as tanks onsite.

PROJECT:	Salt Creek Estates PER	DESIGNED BY:	WMW
LOCATION:	Nashville, IN	DATE:	6/7/2023
RQAW #:	23-400-188-1	CHECKED BY:	
DESCRIPTION:	WWTP LS Flow Calculations	DATE:	

	Source of Proposed Flows	#	Unit	Flow Calculation Factor		Total Average Flow (gpd)	Total Average Flow (gpm)	Equivalent Population (# of people)	Total Peak Flow (gpd)	Total Peak Flow (gpm)
327 IAC Flows[1]	Not Used	0	0	0	0	0	0.0	0	0	0
	Not Used	0	0	0	0	0	0.0	0	0	0
	Not Used	0	0	0	0	0	0.0	0	0	0
	Not Used	0	0	0	0	0	0.0	0	0	0
	Not Used	0	0	0	0	0	0.0	0	0	0.0
Undeveloped Land[2]	Not Used	0	0	0	0	0	0.0	0	0	0.0
	Not Used	0	0	0	0	0	0.0	0	0	0
	Not Used	0	0	0	0	0	0.0	0	0	0
User Input[3]	SCE Average Home	73	Home	105	GPD/Home	7,665	5.3	77	60,247	42
						0	0.0	0	0	0

Peaking Factor from 10 State Standards $PF = \frac{18 + \sqrt{P}}{4 + \sqrt{P}}$

TOTALS	ADF (gpd)	(gpm)	Equivalent Population	PF	PDF (gpd)	(gpm)
	7,665	5.3	77	7.86000	60,247	41.8

Design Average Flow =	5	**gpm**
Design Peak Flow =	50	**gpm**
Equivalent Dwelling Units (EDUs) =	25	**EDUs**

What LS pump is rated at per drawings.

NOTES:

1 Flow factors from 327 IAC 3-6-11 (2019)

2 Flows for undeveloped land based on various studies done in Hendricks County, Indiana

3 May require submitting an Alternate Technical Standard to IDEM

Legend

Example	= User Input
Example	= Calculation
Example	= Output
Example	= Explanatory Text
Example	= Check
Example	= Note

Derfinitions

ADF	= Average Daily Flow
P	= Equivalent Polution in Thousands
PF	= Peak Factor
PDF	= Peak Daily Flow

PROJECT:	Salt Creek Estates PER	DESIGNED BY:	WMW
LOCATION:	Nashville, IN	DATE:	6/7/2023
RQAW #:	23-400-188-1	CHECKED BY:	
DESCRIPTION:	WWTP LS Flow Calculations	DATE:	

Legend

Example	= User Input
Example	= Calculation
Example	= Output
Example	= Explanatory Text
Example	= Check
Example	= Note

WET WELL ELEVATIONS

Top of Structure =	563.08	ft	Total Lift Station Depth =	19.08	ft		
Lowest Invert into Wet Well =	547.00	ft	Alarm Elevation below Invert =	1.00	ft		
Alarm Level 2 =	546.50	ft	Lag Pump ON below Alarm Elevation =	0.50	ft		
Alarm Level 1 =	546.00	ft	Lead Pump ON below Lag Pump ON =	1.00	ft		
Lag Pump On =	545.50	ft	Pump Submersible Depth (OFF - Bottom) =	0.00	ft		
Lead Pump On =	544.50	ft	Working Depth (Pump ON-OFF) =	0.50	ft	Adequate	
Pump Off =	544.00	ft	Working Volume (Pump ON-OFF) =	105.7	gal	Volume?	
Top of Pump Volute =	544.00	ft	Effective Volume Check =	159.7	gal	OK	
Bottom of Wet Well =	544.00	ft	Alarm Differential =	2.50	ft		

PUMP CYCLE CALCULATIONS

Circular Wet Well Diameter =	6	ft	
Influent Flow (avg daily rate)=	5	gpm	Influent Flow (peak rate)= 42 gpm
Pumping Rate - first pump =	50	gpm	
(second pump is standby)	50	gpm	
Total Pumping Rate =	45	gpm	

Cycle Time during Average Flows:				Cycle Time during Peak Flows:			
Wet Well Storage =	211.5	gal/ft		Wet Well Storage =	211.5	gal/ft	
Wet Well Fill Time (avg flow) =	19.9	min		Wet Well Fill Time (peak flow) =	2.5	min	
Pump Run Time =	2.7	min		Pump Run Time =	13.0	min	
Total Cycle Time =	22.6	min	Single Pump On	Total Cycle Time (peak flows)=	15.5	min	Single Pump On
Max Cycle Time =	45.1	min	Switching Lead/Lag	Max Cycle Time =	31.0	min	Switching Lead/Lag

CAPACITY VERIFICATION

Allowable Pump Starts per Hour =	15			Per Manufacturer
Allowable Cycle Time =			O.K.	
Minimum Diameter =	6	ft	O.K.	(Per municipality specifications)
Minimum Working Volume =	0	gal	O.K.	(15 times the rated pump capacity divided by 4)
Maximum Cycle Time =	30.0	min	O.K.	(30 minutes - Ten State Standards maximum recommended)

*New VFDs or float adjustments can be done to reduce max cycle time.

NOTES:

Design guidelines per La Porte Public Work Design Criteria 2004

Cycle times are shown for both average and peak flows. The station is duplex with each pump sized for the peak influent.

PROJECT:	Salt Creek Estates PER	DESIGNED BY:	WMW
LOCATION:	Nashville, IN	DATE:	6/7/2023
RQAW #:	23-400-188-1	CHECKED BY:	
DESCRIPTION:	WTP LS (2) Flow Calculations	DATE:	

	Source of Proposed Flows	#	Unit	Flow Calculation Factor		Total Average Flow (gpd)	Total Average Flow (gpm)	Equivalent Population (# of people)	Total Peak Flow (gpd)	Total Peak Flow (gpm)
327 IAC Flows[1]	Not Used	0	0	0	0	0	0.0	0	0	0
	Not Used	0	0	0	0	0	0.0	0	0	0
	Not Used	0	0	0	0	0	0.0	0	0	0
	Not Used	0	0	0	0	0	0.0	0	0	0
	Not Used	0	0	0	0	0	0.0	0	0	0.0
Undeveloped Land[2]	Not Used	0	0	0	0	0	0.0	0	0	0.0
	Not Used	0	0	0	0	0	0.0	0	0	0
	Not Used	0	0	0	0	0	0.0	0	0	0
User Input[3]	SCE Average Home	28	Home	105	GPD/Home	2,940	2.0	29	23,108	16
						0	0.0	0	0	0

Peaking Factor from 10 State Standards $PF = \frac{18 + \sqrt{P}}{4 + \sqrt{P}}$

TOTALS	ADF (gpd)	(gpm)	Equivalent Population	PF	PDF (gpd)	(gpm)
	2,940	2.0	29	7.86000	23,108	16.0

Design Average Flow =	2	**gpm**
Design Peak Flow =	50	**gpm**
Equivalent Dwelling Units (EDUs) =	10	**EDUs**

What LS pump is rated at per drawings.

NOTES:

1 Flow factors from 327 IAC 3-6-11 (2019)

2 Flows for undeveloped land based on various studies done in Hendricks County, Indiana

3 May require submitting an Alternate Technical Standard to IDEM

Legend

Example	= User Input
Example	= Calculation
Example	= Output
Example	= Explanatory Text
Example	= Check
Example	= Note

Derfinitions

ADF	= Average Daily Flow
P	= Equivalent Polution in Thousands
PF	= Peak Factor
PDF	= Peak Daily Flow

PROJECT:	Salt Creek Estates PER	DESIGNED BY:	WMW
LOCATION:	Nashville, IN	DATE:	6/7/2023
RQAW #:	23-400-188-1	CHECKED BY:	
DESCRIPTION:	WTP LS (2) Flow Calculations	DATE:	

Legend

Example	= User Input
Example	= Calculation
Example	= Output
Example	= Explanatory Text
Example	= Check
Example	= Note

WET WELL ELEVATIONS

Top of Structure =	602.00	ft	Total Lift Station Depth =	10.00	ft
Lowest Invert into Wet Well =	597.00	ft	Alarm Elevation below Invert =	1.00	ft
Alarm Level 2 =	596.50	ft	Lag Pump ON below Alarm Elevation =	1.00	ft
Alarm Level 1 =	596.00	ft	Lead Pump ON below Lag Pump ON =	1.00	ft
Lag Pump On =	595.00	ft	Pump Submersible Depth (OFF - Bottom) =	1.60	ft
Lead Pump On =	594.00	ft	Working Depth (Pump ON-OFF) =	0.40	ft
Pump Off =	593.60	ft	Working Volume (Pump ON-OFF) =	37.6	gal
Top of Pump Volute =	593.60	ft	Effective Volume Check =	61.3	gal
Bottom of Wet Well =	592.00	ft	Alarm Differential =	2.90	ft

Adequate Volume?: OK

PUMP CYCLE CALCULATIONS

Circular Wet Well Diameter =	4	ft			
Influent Flow (avg daily rate)=	2	gpm	Influent Flow (peak rate)=	16	gpm
Pumping Rate - first pump =	50	gpm			
(second pump is standby)	50	gpm			
Total Pumping Rate =	48	gpm			

Cycle Time during Average Flows:				Cycle Time during Peak Flows:			
Wet Well Storage =	94.0	$^{gal}/_{ft}$		Wet Well Storage =	94.0	$^{gal}/_{ft}$	
Wet Well Fill Time (avg flow) =	18.4	min		Wet Well Fill Time (peak flow) =	2.3	min	
Pump Run Time =	0.8	min		Pump Run Time =	1.1	min	
Total Cycle Time =	19.2	min	Single Pump On	Total Cycle Time (peak flows)=	3.5	min	Single Pump On
Max Cycle Time =	38.5	min	Switching Lead/Lag	Max Cycle Time =	6.9	min	Switching Lead/Lag

CAPACITY VERIFICATION

Allowable Pump Starts per Hour =	15			Per Manufacturer
Allowable Cycle Time =			O.K.	
Minimum Diameter =	4	ft	O.K.	
Minimum Working Volume =	0	gal	O.K.	(15 times the rated pump capacity divided by 4)
Maximum Cycle Time =	30.0	min	O.K.	(30 minutes - Ten State Standards maximum recommended)

*New VFDs or float adjustments can be done to reduce max cycle time.

NOTES:

Design guidelines per La Porte Public Work Design Criteria 2004

Cycle times are shown for both average and peak flows. The station is duplex with each pump sized for the peak influent.

PROJECT:	Salt Creek Estates PER	DESIGNED BY:	WMW
LOCATION:	Nashville, IN	DATE:	6/7/2023
RQAW #:	23-400-188-1	CHECKED BY:	
DESCRIPTION:	LS (3) Flow Calculations	DATE:	

	Source of Proposed Flows	#	Unit	Flow Calculation Factor		Total Average Flow (gpd)	Total Average Flow (gpm)	Equivalent Population (# of people)	Total Peak Flow (gpd)	Total Peak Flow (gpm)
327 IAC Flows[1]	Not Used	0	0	0	0	0	0.0	0	0	0
	Not Used	0	0	0	0	0	0.0	0	0	0
	Not Used	0	0	0	0	0	0.0	0	0	0
	Not Used	0	0	0	0	0	0.0	0	0	0
	Not Used	0	0	0	0	0	0.0	0	0	0.0
Undeveloped Land[2]	Not Used	0	0	0	0	0	0.0	0	0	0.0
	Not Used	0	0	0	0	0	0.0	0	0	0
	Not Used	0	0	0	0	0	0.0	0	0	0
User Input[3]	SCE Average Home	12	Home	105	GPD/Home	1,260	0.9	13	9,904	7
						0	0.0	0	0	0

Peaking Factor from 10 State Standards $PF = \frac{18 + \sqrt{P}}{4 + \sqrt{P}}$

	ADF (gpd)	(gpm)	Equivalent Population	PF	PDF (gpd)	(gpm)
TOTALS	1,260	0.9	13	7.86000	9,904	6.9

Design Average Flow =	1	**gpm**
Design Peak Flow =	20	**gpm**
Equivalent Dwelling Units (EDUs) =	5	**EDUs**

What LS pump is rated at per drawings.

NOTES:

1 Flow factors from 327 IAC 3-6-11 (2019)

2 Flows for undeveloped land based on various studies done in Hendricks County, Indiana

3 May require submitting an Alternate Technical Standard to IDEM

Legend

Example	= User Input
Example	= Calculation
Example	= Output
Example	= Explanatory Text
Example	= Check
Example	= Note

Derfinitions

ADF	= Average Daily Flow
P	= Equivalent Polution in Thousands
PF	= Peak Factor
PDF	= Peak Daily Flow

PROJECT:	Salt Creek Estates PER	DESIGNED BY:	WMW
LOCATION:	Nashville, IN	DATE:	6/7/2023
RQAW #:	23-400-188-1	CHECKED BY:	
DESCRIPTION:	LS (3) Flow Calculations	DATE:	

Legend

Example	= User Input
Example	= Calculation
Example	= Output
Example	= Explanatory Text
Example	= Check
Example	= Note

WET WELL ELEVATIONS

Top of Structure =	564.00	ft	Total Lift Station Depth =	10.00	ft	
Lowest Invert into Wet Well =	559.60	ft	Alarm Elevation below Invert =	1.00	ft	
Alarm Level 2 =	559.10	ft	Lag Pump ON below Alarm Elevation =	1.00	ft	
Alarm Level 1 =	558.60	ft	Lead Pump ON below Lag Pump ON =	1.00	ft	
Lag Pump On =	557.60	ft	Pump Submersible Depth (OFF - Bottom) =	2.40	ft	
Lead Pump On =	556.60	ft	Working Depth (Pump ON-OFF) =	0.20	ft	Adequate
Pump Off =	556.40	ft	Working Volume (Pump ON-OFF) =	18.8	gal	Volume?
Top of Pump Volute =	556.40	ft	Effective Volume Check =	26.3	gal	OK
Bottom of Wet Well =	554.00	ft	Alarm Differential =	2.70	ft	

PUMP CYCLE CALCULATIONS

Circular Wet Well Diameter =	4	ft			
Influent Flow (avg daily rate)=	1	gpm	Influent Flow (peak rate)=	7	gpm
Pumping Rate - first pump =	20	gpm			
(second pump is standby)	20	gpm			
Total Pumping Rate =	19	gpm			

Cycle Time during Average Flows:				Cycle Time during Peak Flows:			
Wet Well Storage =	94.0	$^{gal}/_{ft}$		Wet Well Storage =	94.0	$^{gal}/_{ft}$	
Wet Well Fill Time (avg flow) =	21.5	min		Wet Well Fill Time (peak flow) =	2.7	min	
Pump Run Time =	1.0	min		Pump Run Time =	1.4	min	
Total Cycle Time =	22.5	min	Single Pump On	Total Cycle Time (peak flows)=	4.2	min	Single Pump On
Max Cycle Time =	45.0	min	Switching Lead/Lag	Max Cycle Time =	8.3	min	Switching Lead/Lag

CAPACITY VERIFICATION

Allowable Pump Starts per Hour =	15			Per Manufacturer
Allowable Cycle Time =			O.K.	
Minimum Diameter =	4	ft	O.K.	(Per municipality specifications)
Minimum Working Volume =	0	gal	O.K.	(15 times the rated pump capacity divided by 4)
Maximum Cycle Time =	30.0	min	O.K.	(30 minutes - Ten State Standards maximum recommended)

*New VFDs or float adjustments can be done to reduce max cycle time.

NOTES:

Design guidelines per La Porte Public Work Design Criteria 2004

Cycle times are shown for both average and peak flows. The station is duplex with each pump sized for the peak influent.

Material	Hazen-Williams Coefficient
	- *C* -
ABS - Acrylonite Butadiene Styrene	130
Aluminum	140
Asbestos Cement	140
Asphalt Lining	135
Brass	135
Brick sewer	95
Cast-Iron - new unlined (CIP)	130
Cast-Iron 10 years old	110
Cast-Iron 20 years old	95
Cast-Iron 30 years old	83
Cast-Iron 40 years old	74
Cast-Iron, asphalt coated	100
Cast-Iron, cement lined	140
Cast-Iron, bituminous lined	140
Cast-Iron, sea-coated	120
Cast-Iron, wrought plain	100
Cement lining	35
Concrete	120
Concrete lined, steel forms	140
Concrete lined, wooden forms	120
Concrete, old	105
Copper	135
Corrugated Metal	60
Ductile Iron Pipe (DIP)	140
Ductile Iron, cement lined	120
Fiber	140
Fiber Glass Pipe - FRP	150
Galvanized iron	120
Glass	130
Lead	135
Metal Pipes - Very to extremely smooth	135
Plastic	140
Polyethylene, PE, PEH	140
Polyvinyl chloride, PVC, CPVC	150
Smooth Pipes	140
Steel new unlined	145
Steel, corrugated	60
Steel, welded and seamless	100
Steel, interior riveted, no projecting rivets	110
Steel, projecting girth and horizontal rivets	100
Steel, vitrified, spiral-riveted	95
Steel, welded and seamless	100

Tin	130
Vitrified Clay	110
Wrought iron, plain	100
Wooden or Masonry Pipe - Smooth	120
Wood Stave	115
Not Used	0

Plastic (PVC, ABS)	0.00006
Copper & Brass	0.00006
Steel	0.0024
Plain Cast Iron	0.0096
Concrete	0.048
Drawn Tubing (glass, Brass, Plastic)	0.00006
Commercial Steel or Wrought Iron (New)	0.0018
Commercial Steel of Wrought Iron (Existing)	0.006
Cast Iron (Asphalt Dipped)	0.0048
Galvanized Iron	0.006
Cast Iron (Uncoated)	0.0102
Wood Stave	0.0054
Riveted Steel	0.198

Service Connection	Flow Calculation Factor	Unit	Flow Unit
Agricultural Labor Camp	50	GPD/Occupant	Occupant
Not Used	0	0	0
Airport, Passenger	3	GPD/Person	Person
Airport, Employee	20	GPD/Person	Person
Assembly Hall	3	GPD/Seat	Seat
Athletic Field (baseball, soccer, football, etc.)	1	GPD/Participant or Spectator	Particpant or Spectator
Auction and Flea Market with Full	5	GPD/Customer	Customer
Auction and Flea Market with Warming Kitchen	4	GPD/Customer	Customer
Auction and Flea Market without	3	GPD/Customer	Customer
Automatic Self-Cleaning Bathroom	20	GPD/Cycle	Cycle
Banquet Caterer	10	GPD/Person	Person
Bar (Without Food)	10	GPD/Seat	Seat
Beauty Salon with Perm or Color Changes	35	GPD/Customer	Customer
Beauty Salon Cut with Wash	10	GPD/Customer	Customer
Beauty Salon Cut Without Wash	5	GPD/Customer	Customer
Bed and Breakfast	150	GPD/Bedroom	Bedroom
Bowling Alley (with Bar and/or Food)	125	GPD/Lane	Lane
Bowling Alley (Without Food)	75	GPD/Lane	Lane
Bus Station	3	GPD/Passenger	Passenger
Campground (Organizational) with Flush Toilets, Showers, Central Kitchen	40	GPD/Camper	Camper
Campground (Organizational) without Flush Toilets, Privy Use, Central Dining Hall, No Showers, Handwashing	20	GPD/Camper	Camper
Campground (Recreational) with Individual Sewer Connection	100	GPD/Campsite	Campsite
Campground (Recreational) without Individual Sewer Connection	50	GPD/Campsite	Campsite
Church with Full Kitchen	5	GPD/Sanctuary Seat	Sanctuary Seat
Church with Warming Kitchen	4	GPD/Sanctuary Seat	Sanctuary Seat
Church Without Kitchen	3	GPD/Sanctuary Seat	Sanctuary Seat
Condominium, Multi-Family Dwelling, One Bedroom	200	GPD/Unit	Unit
Condominium, Multi-Family Dwelling, Two Bedroom	300	GPD/Unit	Unit
Condominium, Multi-Family Dwelling, Three Bedroom	350	GPD/Unit	Unit
Condominium, One and Two Family Dwelling	150	GPD/Bedroom	Bedroom
Conferences	10	GPD/Attendee	Attendee
Correctional Facilities	120	GPD/Inmate	Inmate
Day Care Center	20	GPD/Person	Person
Dentist, Patient	200	GPD/Chair	Chair
Dentist, Employee	75	GPD/Chair	Chair
Doctor's Office, Doctor	75	GPD/Person	Person
Doctor's Office, Nurse	75	GPD/Person	Person
Doctor's Office, Support Staff	20	GPD/Person	Person
Factory with Showers	35	GPD/Employee	Employee
Factory without Showers	20	GPD/Employee	Employee
Fire Station, Manned	75	GPD/Firefighter	Firefighter
Fire Station, Unmanned	35	GPD/Firefighter	Firefighter
Food Service Operations, Cocktail Lounge or Tavern	35	GPD/Seat	Seat
Food Service Operations, Restaurant (not open 24 hours)	35	GPD/Seat	Seat
Food Service Operations, Restaurant (open 24 hours)	50	GPD/Seat	Seat
Food Service Operations, Restaurant (not open 24 hours but located along an interstate)	50	GPD/Seat	Seat
Food Service Operations, Restaurant (open 24 hours and located along an interstate)	70	GPD/Seat	Seat
Food Service Operations, Tavern	35	GPD/Seat	Seat

Food Service Operations, Curb Service (drive-in)	50	GPD/Car Space	Car Space
Golf Comfort Station	3	GPD/50% of Max No. of Golfers	50% of Max No. of Golfers
Golf Main Clubhouse	5	GPD/Golfer	Golfer
Hospital, Medical Facility	200	GPD/Bed	Bed
Hotel	100	GPD/Room	Room
Kennels and Vet Clinics: Cages	5	GPD/Cage	Cage
Kennels and Vet Clinics: Inside Runs	10	GPD/Run	Run
Kennels and Vet Clinics: Outside Runs	20	GPD/Run	Run
Kennels and Vet Clinics: Grooming	10	GPD/Animal	Animal
Kennels and Vet Clinics: Surgery, Plus	50	GPD/Surgery Room	Surgery Room
Kennels and Vet Clinics: Veterinary Doctor	75	GPD/Person	Person
Kennels and Vet Clinics:Veterinary Assistant	75	GPD/Person	Person
Kennels and Vet Clinics: Support Staff	20	GPD/Person	Person
Mental Health Facility	100	GPD/Patient	Patient
Mobile Home Park	200	GPD/Lot	Lot
Motel	100	GPD/Room	Room
Nursing Home	100	GPD/Bed	Bed
Office Building without Showers	20	GPD/Employee	Employee
Office Building with Showers	35	GPD/Employee	Employee
Outpatient Surgical Center	50	GPD/Patient	Patient
Picnic Area	5	GPD/Visitor	Visitor
Race Tracks, Attendee	5	GPD/Person	Person
Race Tracks, Staff	20	GPD/Person	Person
School, Elementary	15	GPD/Pupil	Pupil
School, Secondary	25	GPD/Pupil	Pupil
School with Dormitory	100	GPD/Bed	Bed
Service Station, Convenience Store/Service Center	1000	GPD	N/A
Service Station with Only 2 Restrooms	400	GPD/Restroom	Restroom
Service Station with Only Unisex Restroom	600	GPD/Restroom	Restroom
Service Station, Authomatic Self-Cleaning Bathroom	60	GPD	N/A
Shopping Center, Space	0.1	GPD/Square Foot	Square Foot
Shopping Center, Employees	20	GPD/Person	Person
Swimming Pool Bathhouse	10	GPD/Swimmer	Swimmer
Theater, Drive-In	5	GPD/Car Space	Car Space
Theater, Inside Building	5	GPD/Seat	Seat
Low Density Residential	155	GPD/Acre	Acre
Not Used	0	0	0
Medium Density Residential	210	GPD/Acre	Acre
High Density Residential	465	GPD/Acre	Acre
Multi-Family Residential	1240	GPD/Acre	Acre
Warehouse (0-35k sf)	1437.48	GPD/Acre	Acre
Warehouse (35-75k sf)	1219.68	GPD/Acre	Acre
Warehouse (75-150k sf)	1001.88	GPD/Acre	Acre
Warehouse (150-300k sf)	609.84	GPD/Acre	Acre
Warehouse (300-500k sf)	479.16	GPD/Acre	Acre
Warehouse (>500k sf)	392.04	GPD/Acre	Acre
Flex Space	1437.48	GPD/Acre	Acre
Hospitality	1240	GPD/Acre	Acre
Commercial	750	GPD/Acre	Acre
Park (w/bathrooms only)	5	GPD/Visitor	Visitor
Institution/ Office/ School Campus	930	GPD/Acre	Acre
Light Industrial	1000	GPD/Acre	Acre
Heavy Industrial	1500	GPD/Acre	Acre
Not Used	0	0	0

APPENDIX D: UTILITY FEES AND FINANCIAL INFORMATION

Whitney Weidenbenner

From: Aaron Crow
Sent: Friday, June 16, 2023 4:20 PM
To: Whitney Weidenbenner
Subject: FW: Water production and Waste water treatment fees

Follow Up Flag: Follow up
Flag Status: Flagged

Categories: Purple Category

Aaron Crow, PE
Senior Project Manager - Water/ Wastewater

RQAW | DCCM
317-588-1772 p 260-443-5527 c

From: Carl Bauer <bauers@mac.com>
Sent: Friday, June 16, 2023 4:17 PM
To: Aaron Crow <acrow@rqaw.com>
Cc: Kevin P. Ewing <kevin.ewing2@comcast.net>
Subject: Water production and Waste water treatment fees

Hi Aaron,

Below is a the result of an e-mail exchange that I had with our treasurer Kevin Ewing who I'm cc-ing about how much it costs us to make water and to process sewer. Kevin has a good handle on our expenses so you should contact him directly if you have any questions.

The water production costs are based on the costs we incurred in 2022 to produce 1,259,000 gallons (the number of gallons that was made in 2022 were obtained from BF Utilities).

The wast water processing costs are based on the monthly MRO's that show the amount processed each month. Note that there is no value for the amount of sewage processed in the month of October as we were cleaning the clarification lagoon during that period so waste was trucked out. The total for the other 11 months in 2022 was 1,096,800 gallons. If we assume Oct should have been 1/12 of this amount we are missing 93,0000 gains for October. So the 2022 waste water processing amount should be about 1,188,200.

Let me know if this makes sense

Carl

PS Kevin I adjusted your sewer numbers based on these above number for the amount we processed.

Begin forwarded message:

From: "Kevin P. Ewing" <kevin.ewing2@comcast.net>
Subject: Re: RFQ meeting with Tina at IFA
Date: April 28, 2023 at 2:29:55 PM EDT
To: bdodd1552@gmail.com
Cc: Carl Bauer <bauers@mac.com>

I apologize for the delayed response on this, but I wanted to look at the numbers a little more closely. If we don't know already, we could probably use some input on what should included with the "cost" to make water. As an example, we have $29,795 budgeted for repairs and maintenance for 2023 that should be applied to all lots since it's for infrastructure. If we can use IFA grant and loan funds for water lines, then maybe this is ok to include in the water cost calculation. It's definitely a variable cost, but not necessarily tied to the cost of making or using water (eg lines break whether we are using or making water or not). Similarly, we have a $864 insurance expense that's not really related to water making, but is probably a fair fixed cost. We also have budgeted a cushion of $4,701 that is supposed to be additional reserve, but I suspect we'll go through this and then some with operations.

I also looked at the cost to make water based on expenses rather than revenues since, as Bette noted, the revenues cover both variable and fixed costs. Plus, the budget includes additional reserves/contingencies for capital replacements that may not necessarily equate to water making cost.

The budgeted expenses I am generally comfortable are variable (mostly) and directly applicable to the cost of making water include:

Electricity - $6535
Chemicals - $1685
Lab Fees/Tests - $5941
Subcontract (Bynum Fanyo) - $61,940 (I suspect a lot of this is hourly labor for water making, but this likely also includes r&m related costs, work on fixed cost items, etc)
Dues and Fees - $386
Office Supplies / Misc - $844

Total Guesstimated Variable Cost - $77,331 / 1,259,000 gallons * 4,000 = $245.69

Based on the above number (assuming they are reasonably accurate), I suspect our revenues allocated for homeowners with homes may be low.

Insurance (fixed) - $864 / 1,259,000 * 4,000 gallons = an additional $2.75

Repairs and Maintenance (if we can consider this a water cost) - $29,795 / 1,259,000 * 4,000 = an additional $94.66

Cushion / Contingency - $4,701 / 1,259,000 * 4,000 = an additional $14.94

The above covers all of our budgeted water expenses and contingency of $112,692, or $358.04 per 4,000 gallons. It does not include $4375 for asset purchases, but I am not sure these should be included.

My similar but simplified analysis for sewer cost is as follows:

Total Expenses - $31,317 / 1,188,200 * 4000 = $105.42

Cushion / Contingency - $4599 / 1,188,200 * 4,000 = an additional $15.48

One consideration for sewage is I recall we likely process much more waste water due to infiltration of ground water into the system. I know there is no way to determine this and it would only reduce our per 4,000 cost but it is something to keep in mind too.

We also have purchases of assets that are paid for through dues, but I'm not sure if these would be included.

Kevin
Sent from my iPad

APPENDIX E: ZIPTILITY ASSET MANAGEMENT PLAN

Salt Creek Services, Inc.

Water and Wastewater System

Capital Improvement Plan

Developed by Bynum Fanyo Utilities & *Ziptility*

Introduction

“Capital improvements” refer to major, non-recurring physical expenditures for items such as equipment, tanks, structures, and distribution/collection system infrastructure. An asset criticality report and Capital Improvement Plan (CIP) have been developed for Salt Creek to serve as planning tools for determining the prioritization and timing of capital improvements needed over the next 20-year period. With input from Bynum Fanyo Utilities, a recommended annual schedule is provided along with a brief explanation of each proposed improvement project and estimated costs.

Methodology

A field inventory and condition assessment inspection have been completed for all water and sewer assets at Salt Creek (excluding sewer manholes and mains). These inspection inputs have been logged in Ziptility (GIS system) where each asset also receives a unique criticality rating. Criticality ratings serve as the primary factor in prioritizing your Capital Improvement Plan schedule. The information below is intended to help you understand how a criticality rating was calculated for each asset.

Each asset in your system received a Consequence of Failure (CoF) score and a Probability of Failure (PoF) score. Multiplying these scores together results in a ***Criticality Rating***. The more likely an asset is to fail, and the more consequential that failure would be to your operations and residents, the higher the criticality rating. This rating is also referred to as “Business Risk Exposure”.

Consequence of Failure (CoF)

CoF scoring is calculated by Ziptility with weighted consideration of the following areas:

- Service, Public Health, Safety and Security
- Financial Impact
- Regulatory Compliance
- Redundancy/Vulnerability

One of the final CoF scores below is applied to each asset’s Ziptility profile.

Consequence of Failure	Score
Insignificant Disruption	1
Minor Disruption	2
Moderate Disruption	3
Major Disruption	4

Catastrophic Disruption	5

Probability of Failure (PoF)

PoF is calculated as a weighted average of an asset's condition assessment score and remaining useful life. The asset's Condition Assessment score accounts for 70% of the final PoF rating and the percentage of useful life remaining accounts for 30%. Assets with an unknown installation date received estimated remaining useful life with input from Bynum Fanyo Utilities.

Asset Condition Input	**Score**
New/Excellent - Only normal maintenance required	1
Minor Deterioration - Requires minor maintenance	2
Moderate Deterioration - 10-20% requires significant maintenance	3
Significant Deterioration - 20-40% requires renewal/upgrade	4
Unserviceable/End of Useful Life - Over 50% requires replacement	5

Useful Life Remaining Input	**Score**
80 - 100%	1
60 - 79%	2
40 - 59%	3
20 - 39%	4
0 - 19%	5

Findings Summary by Jeff Farmer BFU, INC.

Water System:

1. Water Treatment Plant: There are three components that need to be addressed in the next 12 months. We feel these items are significant due to the age and instability of the structures. IDEM has identified these items on several inspections over the last few years.

    - Chemical feed building and mixing basin. The current building and mixing chamber is the weakest and most critical link of the water treatment plant. The piping from the lake pumps into the mixing chamber has a temporary repair that could fail at any moment. The mixing chamber is over 50 years old. The electric mixer is no longer in use or available. The exit from the mixer to the Clarifier will not allow flow rates over 25 gpm. I would suggest that a new building, mixer, and chemical feed system be installed. This

building could also house a small office, testing lab, and a restroom. With the proper design, it could house chemicals and have enough square footage for a “Waterboy” treatment system and filter. The overall condition of the building has been brought to our attention by IDEM.

- Remote sampling site within the distribution system. This has been required by IDEM.

- SCADA system automation of the water treatment plant controls. The well pumps, clear well pumps, and High service pumps should be able to work in harmony with each other. This would simplify the operation of making water and better serve the operations of the water plant. In addition to these pumps, the chemical feed system can be automated to start and stop with these pumps as well. This SCADA system can log run times, chlorine analyzer results, and tank levels as well.

2. Water Distribution System: We have essentially broken down your distribution system into three parts. Water mains/hydrants, water meters, and storage tanks. Recent inspections have shown the water storage tanks are currently in good working condition and sufficient for your needs. The following bullet points are what we suggest for upgrade/replacement:

    - We would suggest Main #2 (Emerald Ct.), and Main #3 (Eastgate Dr.) be replaced. We have had several main breaks on these lines in the past and have found that the materials used for this portion of the distribution system was not meant for water distribution. The material appears similar to electrical conduit, very thin and brittle and will continue to cause problems in the future. Even small water leaks in the system put a large strain on your supply. Leaks also bring unplanned costs in the form of leak detection and leak repair services.

    - Water meters: The current metering system is very antiquated. The industry average for meter replacement/rebuilds is between 10-15 years. Your meters are significantly older. As meters age, they lose their ability to accurately track the gallons of water passing through it. We suggest you start a meter replacement program that includes radio read meters. This would allow faster leak detection for each home and accurate system water consumption which is needed to calculate total water loss (an IDEM requirement).

Wastewater System:

1. Collection System: The gravity collection system is relatively new and in good working condition. The collection system has three lift stations. We feel the lift stations are in need of upgrades per the last IDEM inspection.

    - Lift station #2 pumps directly into the WWTP. This Lift station’s control panel needs to be replaced first. Of the three, it is in the worst shape and it receives all the flow from the collection system prior to pumping into the WWTP. I would suggest adding Variable Frequency Drives (VFDs) to this lift station panel. This would allow for three phase pumps

to be installed. The VFDs would also give us the ability to adjust the flow into the WWTP and help alleviate solids washouts into the polishing pond in the future.

- Lift station #1 is located near the water plant. This LS's wet well was recently repaired per IDEM instructions. This LS currently has only one working pump and the control panel needs to be replaced.

- Lift station #3 is on Alma St. and currently has only one working pump. The control panel should be replaced on this LS as well.

2. Wastewater Treatment Plant: The WWTP has been cleaned and inspected. The current WWTP lacks an equalization basin. This basin is meant to help equalize incoming flows during peak usage. The lack of an equalization basin is why your polishing pond was full of sludge/solids. Upgrading Lift Station #2 to VFDs will help with washouts. Cleaning the polishing pond on a five year interval is recommended. This is what IDEM required at the time of last inspection. The following items still need attention:

    - The WWTP currently does not have a back-up blower in place or on site.

    - The current blower and chemical feed building need to be upgraded.

    - The flow meter needs to be replaced and moved to the outfall by the receiving stream for proper flow measuring per IDEM's request.

    - The current WWTP does not include a sludge storage digester.

    - A water hydrant needs to be installed next to the WWTP to allow proper cleaning and routine maintenance.

Commentary from Jeff Farmer BFU, INC.

Not exactly sure where to start! I know there is an ongoing debate about which projects are the most important. This is why a "Capital Improvement Plan" was requested. Treating water at Salt Creek is very time consuming and currently requires approximately 1300 to 1400 man hours per year. Our current rate per man hour on a normal basis is $125 per hour. If you take 1400 x $125 that would equal $175,000 dollars annually. That is close to $100,000 dollars more than we currently charge. Reducing man hours at SC is obviously beneficial to all of us. The best way to reduce man hours is to upgrade your water treatment plant.

The current status of the WWTP is this: we have cleaned the polishing pond and WWTP. The lagoon should be cleaned no less than every five years. The collection system, excluding the lift stations, is in good condition. All three lift stations need upgrades in terms of control panels, and the addition of pumps to meet the IDEM requirement of two pumps per lift station.

Both treatment plants are at the end of useful life. The attached Spreadsheet shows the recommended order of operations for repairing, upgrading and replacing your equipment.

Salt Creek Services - Water and Sewer Capital Improvement Plan

Location of asset maintenance history: Records stored physically in water treatment plant, sewer lift stations, and backed-up digitally on Bynum Fanyo Utilities' server.

Planning Period: 20 Years

Growth Related Considerations: Few lots remain for possible development. The accompanying increase in water and sewer system demands is considered small.

	Asset	Replacement Year	Replacement Cost	Project Notes/Description
Years 1-5	WWTP Lagoon (completed)	2022	$23,000	Lagoon sludge removal was badly needed - completed 9/2022
	Lift station #2 pump 4	2022	$6,500	Replace pump with new Tsurumi cutter style pump. This pump is not currently functioning
	Lift station #3 pump 6	2022	$6,500	Replace pump with new Tsurumi cutter style pump. This pump is not currently functioning
	Sample site (IDEM proposed)	2022	$2,700	Required by IDEM inspector on most recent inspection
	Water Plant SCADA (BFU proposed)	2022	$15,000	This system would automate water operations for more effecient production during plant visits
	Annual Total	***2022***	***$53,700***	
	LS Electric controls 2	2023	$10,000	This control panel has lived out its useful life. We continus to replace parts regularly
	LS Electric controls 1	2023	$10,000	This control panel has lived out its useful life. We continus to replace parts regularly
	LS Electric controls 3	2023	$10,000	This control panel has lived out its useful life. We continus to replace parts regularly
	Water meters	2027	$17,500	These meters are 20 plus years old. New meters would allow SC to accurately monitor water loss in the future
	Chemical Building/Mixing Basin	2023	$200,000	The piping in this building is temporarily patched and could become inoperable at any moment. The building walls are cracked badly and building electrical is severely corroded.
	High Service Pump #2	2023	$7,500	This high service pump is in need of replacement due to being inoperable except for short-term emergency situtations
	Annual Total	***2023***	***$255,000***	
	WWTP Blower	2024	$4,500	This Blower should be purchased and put on a shelf for backup at the WWTP.
	Water mains # 2 & 3 (1/3 of project)	2024	$20,000	These mains are inferior material and have been a source of water leaks in the past.
	Filter building	2024	$150,000	The Water Treatment plant filter building needs replaced or upgraded. It also has foundatuion iisues as well
	Annual Total	***2024***	***$174,500***	
	Water mains # 2 & 3 (2/3 of project)	2025	$20,000	These mains are inferior material and have been a source of water leaks in the past
	Annual Total	***2025***	***$20,000***	
	Water mains # 2 & 3 (3/3 of project)	2026	$20,000	These mains are inferior material and have been a source of water leaks in the past
	Annual Total	***2026***	***$20,000***	
	Annual Total	***2027***		
Years 6-20	Wastewater plant	2028	$550,000	The WWTP is near end of useful life and in obvious need of replacement.

Salt Creek - Critical Water & Sewer Assets

Asset	Asset type	Year installed	Total expected life	Remaining useful life	Estimated Replacement cost	Condition assessment	Probability of failure	Consequence of failure	Criticality factor (POF x COF)	Criticality rating	Redundancy in place?
High Service Pump 2	Water distribution system	1996	20	-6	$7,500	4 - Poor condition	5	4	20	17+ (Critical)	Yes
Wastewater plant	Wastewater treatment	1976	50	-4	$550,000	4 - Poor condition	4	5	20	17+ (Critical)	No
WWTP Blower	Wastewater treatment	1998	15	-9	$4,500	4 - Poor condition	4	5	20	17+ (Critical)	No
Chemical building/Mixing Basin	Building	1976	40	-6	$200,000	4 - Poor condition	4	5	20	17+ (Critical)	No
Filter building	Building	1976	40	-6	$150,000	4 - Poor condition	4	5	20	17+ (Critical)	No
LS Electric controls 1	Wastewater collection system	1998	20	-4	$10,000	4 - Poor condition	4	5	20	17+ (Critical)	No
LS Electric controls 3	Wastewater collection system	1998	20	-4	$10,000	4 - Poor condition	4	5	20	17+ (Critical)	No
Lift station #2 pump 4	Wastewater collection system	1998	20	-4	$6,500	4 - Poor condition	5	4	20	17+ (Critical)	Yes
Lift station #3 pump 6	Wastewater collection system	1998	20	-4	$6,500	4 - Poor condition	5	4	20	17+ (Critical)	Yes
LS Electric controls 2	Wastewater collection system	1998	20	-4	$10,000	4 - Poor condition	4	5	17	17+ (Critical)	No
Water mains 2 & 3	Water distribution system	Unknown	50	Unknown	$60,000	4-Poor condition	4	4	16	9-16 (Important)	No
Water meters	Water distribution system	2000	15	-7	$17,500	4-Poor condition	4	4	16	9-16 (Important)	No
Sample site (Proposed)	Proposed (Water Distribution)	N/A	40	N/A	$2,700	N/A	N/A	N/A	N/A	N/A	N/A
Water Plant SCADA (proposed)	Proposed (Fleet/Equipment)	N/A	10	N/A	$15,000	N/A	N/A	N/A	N/A	N/A	N/A
Lagoon Sludge Removal (completed)	Wastewater treatment	2022	5	5	$23,000	1 - New Condition	1	4	4	1-8 (Not critical)	No

Asset Criticality Key
Critical
Important
Not Critical
Proposed

Salt Creek Services - Water and Wastewater Asset Inventory

Asset Type	Asset Detail	Asset category	Year installed	Total expected life	Remaining useful life	Replacement cost	Condition assessment	Probability of failure	Consequence of failure	Criticality factor (POF x COF)	Criticality rating	Redundancy in place?
Water treatment	Influent Intake Line 2	Water treatment	2019	35	32	$25,000	3 - Fair condition	3	5	15	9-16 (Important)	No
	Sand Filter 2	Water treatment	1976	50	4	15,000	3 - Fair condition	3	4	12	9-16 (Important)	Yes
	Sand Filter 1	Water treatment	1976	50	4	$500	3 - Fair condition	3	4	12	9-16 (Important)	Yes
	Chemical pump 1 (chemical room)	Water treatment	2014	10	1	$500	3 - Fair condition	4	4	16	9-16 (Important)	No
	Chemical pump 3 (chemical room)	Water treatment	2014	10	1	$500	3 - Fair condition	4	4	16	9-16 (Important)	No
	Chemical pump 2 (chemical room)	Water treatment	2014	10	1	$500	3 - Fair condition	4	4	16	9-16 (Important)	No
	Chemical pump (Filter Room)	Water treatment	2014	10	1	$500	3 - Fair condition	3	5	15	9-16 (Important)	Yes
	Pump House Electric Controls 5	Water treatment	2012	12	2	$5,000	4 - Poor condition	3	5	15	9-16 (Important)	No
	Sump Pump Basin 1	Water treatment	2022	1	1	$4,000	4 - Poor condition	3	4	12	9-16 (Important)	No
	Settling Basin	Water treatment	1995	75	48	$75,000	2 - Good condition	1	5	5	1-8 (Not critical)	No
	Influent Intake Pump 2	Water treatment	2019	15	17	$4,200	1 - New/Excellent condition	1	3	3	1-8 (Not critical)	Yes
	Influent Intake Pump 1	Water treatment	2019	15	17	$4,200	1 - New/Excellent condition	1	3	3	1-8 (Not critical)	Yes
	Influent Intake Line 1	Water treatment	2019	35	32	$5,500	1 - New/Excellent condition	1	3	3	1-8 (Not critical)	Yes
	Sump pump 2 (filter room)	Water treatment	2021	10	9	$500	2 - Good condition	2	3	6	1-8 (Not critical)	Yes
	Sump pump 1 (filter room)	Water treatment	2021	10	9	$500	2 - Good condition	2	3	6	1-8 (Not critical)	Yes
Water distribution	High Service Pump 2	Water distribution system	1996	20	-6	$7,500	4 - Poor condition	5	4	20	17+ (Critical)	Yes
	Water main 2	Water distribution system	1970	35	-17	$30,000	4 - Poor condition	4	4	16	9-16 (Important)	No
	Water main 3	Water distribution system	1970	35	-17	$30,000	4 - Poor condition	4	4	16	9-16 (Important)	No
	Water main 5	Water distribution system	1970	35	-17	$20,000	4 - Poor condition	4	3	12	9-16 (Important)	No
	Water main 4	Water distribution system	1970	35	-17	TBD	3 - Fair condition	3	4	12	9-16 (Important)	No
	Water main 1	Water distribution system	1970	35	-17	TBD	3 - Fair condition	3	4	12	9-16 (Important)	No
	High Service Pump 1	Water distribution system	1996	20	-6	$7,500	3 - Fair condition	3	4	12	9-16 (Important)	Yes
	Water main 10	Water distribution system	1970	35	-17	TBD	4 - Poor condition	3	3	9	9-16 (Important)	
	Water main 8	Water distribution system	1970	35	-17	TBD	3 - Fair condition	3	3	9	9-16 (Important)	No
	Water main 9	Water distribution system	1970	35	-17	TBD	3 - Fair condition	3	3	9	9-16 (Important)	No
	Water main 11	Water distribution system	1970	35	-17	TBD	3 - Fair condition	3	3	9	9-16 (Important)	No
	Water main 7	Water distribution system	1970	35	-17	TBD	3 - Fair condition	3	3	9	9-16 (Important)	No
	Water main 6	Water distribution system	1970	35	-17	TBD	3 - Fair condition	3	3	9	9-16 (Important)	No
	Hydrant 1	Water distribution system	1976	40	-6	$4,200	3 - Fair condition	3	3	9	9-16 (Important)	No
	Hydrant 2	Water distribution system	1976	40	-6	$4,200	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 1	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 2	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 3	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 4	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 5	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 6	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 7	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 8	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 9	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 10	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 11	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 12	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 13	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 14	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 15	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 16	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 17	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 18	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 19	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 20	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 21	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 22	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 23	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 24	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 25	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 26	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 27	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 28	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 29	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 30	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No

	Meter 31	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 32	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 33	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 34	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 35	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 36	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 37	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 38	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 39	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 40	Water distribution system	2000	15	-7	$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Sample site (Proposed)		N/A	N/A	N/A	$2,700	N/A	N/A	N/A	N/A	N/A	N/A
Wastewater treatment	Wastewater plant	Wastewater treatment	1976	50	4	$550,000	4 - Poor condition	4	5	20	17+ (Critical)	No
	WWTP Blower	Wastewater treatment	1998	15	-9	$4,500	4 - Poor condition	4	5	20	17+ (Critical)	No
	WWTP Lagoon	Wastewater treatment	2022	5	5	$23,000	1 - New/Excellent condition	1	4	4	1-8 (Not critical)	No
Tanks/Storage	Clear well tank	Tank/Storage	1976	75	29	$100,000	2 - Good condition	2	5	10	9-16 (Important)	No
	Storage tank	Tank/Storage	1976	40	10	$200,000	3 - Fair condition	2	5	10	9-16 (Important)	No
Buildings	Chemical building/Mixing Basin	Building	1976	40	-6	$300,000	4 - Poor condition	4	5	20	17+ (Critical)	No
	Filter building	Building	1976	40	-6	$150,000	4 - Poor condition	4	5	20	17+ (Critical)	No
	WWTP Blower Building	Building	1992	40	-10	$15,000	4 - Poor condition	4	4	16	9-16 (Important)	No
	Lake pump building	Building	1976	40	-6	$12,000	3 - Fair condition	3	3	9	9-16 (Important)	No
	Settling basin building	Building	1976	40	10	$25,000	2 - Good condition	2	3	6	1-8 (Not critical)	No
Wastewater collection	LS Electric controls 1	Wastewater collection system	1998	20	-4	$10,000	4 - Poor condition	4	5	20	17+ (Critical)	No
	LS Electric controls 3	Wastewater collection system	1998	20	-4	$10,000	4 - Poor condition	4	5	20	17+ (Critical)	No
	Lift station #2 pump 4	Wastewater collection system	1998	20	-4	$6,500	4 - Poor condition	5	4	20	17+ (Critical)	Yes
	Lift station #3 pump 6	Wastewater collection system	1998	20	-4	$6,500	4 - Poor condition	5	4	20	17+ (Critical)	Yes
	LS Electric controls 2	Wastewater collection system	1998	20	-4	$10,000	4 - Poor condition	4	5	17	17+ (Critical)	No
	Lift station 1	Wastewater collection system	1976	35	-11	TBD	3 - Fair condition	3	4	12	9-16 (Important)	No
	Lift station 2	Wastewater collection system	1976	35	-11	TBD	3 - Fair condition	3	4	12	9-16 (Important)	No
	Lift station 3	Wastewater collection system	1976	35	-11	TBD	4 - Poor condition	3	4	12	9-16 (Important)	No
	Lift station pump 1	Wastewater collection system	1998	20	-4	$6,500	3 - Fair condition	3	4	12	9-16 (Important)	No
	Lift station pump 3	Wastewater collection system	1998	20	-4	$6,500	3 - Fair condition	3	4	12	9-16 (Important)	No
	Lift station pump 5	Wastewater collection system	1998	20	-4	$6,500	3 - Fair condition	3	4	12	9-16 (Important)	No
	Manhole 1	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 2	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 3	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 4	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 5	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 6	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 7	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 8	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 9	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 10	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 11	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 12	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 13	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 14	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 15	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 16	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 17	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 18	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 19	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 20	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 21	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 22	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 23	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 24	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 25	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 26	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 27	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 28	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 29	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No

	Manhole 30	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 31	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 32	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 33	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 33	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 34	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 35	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 36	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Force main 1	Wastewater collection system	1976	50	4	TBD	3 - Fair condition	3	3	9	9-16 (Important)	No
	Force main 2	Wastewater collection system	1976	50	4	TBD	3 - Fair condition	3	3	9	9-16 (Important)	No
	Force main 3	Wastewater collection system	1976	50	4	TBD	3 - Fair condition	3	3	9	9-16 (Important)	No
	Force main 4	Wastewater collection system	1976	50	4	TBD	3 - Fair condition	3	3	9	9-16 (Important)	No
	Gravity main 1	Wastewater collection system	2014	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 2	Wastewater collection system	2014	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 3	Wastewater collection system	2014	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 4	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 5	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 6	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 7	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 8	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 9	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 10	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 11	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 12	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 13	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 14	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 15	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 16	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 17	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 19	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 18	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	3	6	1-8 (Not critical)	No
	Lift station #1 pump 2	Wastewater collection system	2022	20	20	TBD	2 - Good condition	1	4	4	1-8 (Not critical)	Yes
Fleet/Equipment	Water Tank Level Indicator	Fleet/Equipment	2019	10	7	$1,200	2 - Good condition	2	3	6	1-8 (Not critical)	No
	Water Plant SCADA (BFU proposed)					$15,000						

APPENDIX F: PACKAGE PLANT INFORMATION

F.R. MAHONY & ASSOC.

frma

A Division Of

CUMMINS-WAGNER

100% Employee Owned

AMPHIDROME®

ADVANCED TREATMENT SOLUTIONS

Wastewater Treatment System
Preliminary Budget Proposal

PROJECT: Salt Creek Estates WWTP

LOCATION: Nashville, IN

PREPARED FOR: Sam Jacobi - Covalen

REVISION: 1

DATE: 7/6/23

*Manufactured under license from De Nora Water Technologies

Sam Jacobi
Covalen

SUBJECT: Salt Creek Estates WWTP Project

Dear Sam,

We are pleased to present this preliminary design and budget proposal for an Amphidrome® Wastewater Treatment System for the Salt Creek Estates WWTP Project.

The Design Parameters we have used for the facility are summarized below*

Table 1

Design Summary

Constituent	Influent	Effluent Requirements
Design Seasonal Flow (Average Daily Flow)	7,600 gpd	
Peak Daily Flow	60,000 gpd	
Biological Oxygen Demand (BOD)	190 mg/L	≤ 10 mg/L
Total Suspended Solids (TSS)	160.3 mg/L	≤ 12 mg/L
Total Kjeldahl Nitrogen (TKN)	35 mg/L	≤ 1.1 mg/L – Summer ≤ 1.6 mg/L – Winter
Total Phosphorus (TP)	7 mg/L	≤ 1 mg/L

*If these design parameters are inaccurate or change in any way, please contact us and we will adjust this preliminary design and budget accordingly
NP = not provided, NA = not applicable

The Amphidrome® system has been used successfully for over **20** years in over **200** applications, from single family installations to larger systems with flows in excess of 360,000 gallons per day and can be customized to fit site requirements. The Amphidrome® system has been implemented in states with strict regulatory permits, and is compatible with 10 States Standards, TR-16, Title V Standards, etc.

System Benefits

Low Visual Site Impact

- System below grade

Low Audible Site Impact

- Kaeser premium sound enclosed blowers

Easy to Operate

- Touch screen with SCADA like equipment screens, data trending and built in troubleshooting guide
- Remote access provided for BOTH control and monitoring

Energy Efficient

- Intermittent aeration - Process air runs 3-5 hours per day at 20-30 Hz
- Backwash blowers run 10 min per day
- Primary and waste solids are digested in anoxic tank – no aeration required

Low Chemical Costs

- Anoxic environment created to denitrify and reclaim alkalinity required for nitrification
- Intermittent aeration provides simultaneous nitrification-denitrification
- No requirement for bacterial seeding or supplemental food even following low load seasons

Consistent Treatment

- Fixed film reactor with high biomass responds well to low and shock loads
- Anoxic tank equalizes flow, mixes returns, and dilutes incoming shock loads of chemicals dumped into the system
- Demonstrated ability to perform with high levels of Oil & Grease (See Chili's Data Appendix A)

Filtered Effluent

- Effluent is filtered through our deep media bed filter

Prefabricated Control Building Available

- See Appendix A for more details

Design and Operations Overview

The process utilizes a biologically active filter (BAF) operating as a sequencing batch reactor. It may also be categorized as a submerged attached growth bioreactor (SAGB) because the media is always submerged in the process flow. The two primary advantages of SAGBs are the high biomass concentrations equivalent to 8,000 – 15,000 mg-VS/l that may be achieved and the short hydraulic retention time (HRT), which result when media with a high specific surface area is used. The short HRTs result in compact reactors, which are advantageous when land area is limited. The media also provides physical filtration and therefore, the need for solids separation after the biological treatment process is eliminated.

The system operates as a sequencing batch reactor in which the waste water is cycled back and forth through the filter. The Amphidrome® reactor is intermittently aerated to achieve both the aerobic environment required for the oxidation of organics and nitrification and the anoxic environment required for denitrification.

The system consists of an anoxic/equalization tank, one clear well, and one Amphidrome® reactor. The Amphidrome® system is typically installed underground. The only structure required is a small building for the blowers, control panel, and any ancillary equipment.

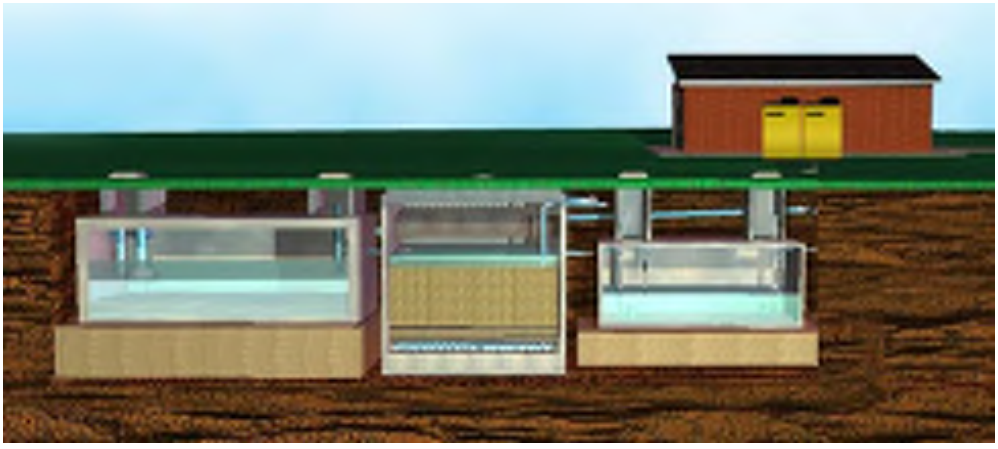


Figure 1. Section View of Amphidrome® System

The Amphidrome® reactor consists of: 1) an underdrain, 2) support gravel, 3) filter media, and 4) a backwash trough. The underdrain, located at the bottom of the reactor, can be constructed of concrete blocks encased with high-density polyethylene with stainless-steel piping or entirely out of stainless steel. It provides support for the media and even distribution of air and water into the reactor. The underdrain includes a manifold and laterals to distribute the air evenly over the entire filter bottom. The design allows for both the air and water to be delivered either simultaneously--or separately--via individual pathways to the bottom of the reactor.

Concrete Block Underdrain

Stainless Steel Underdrain

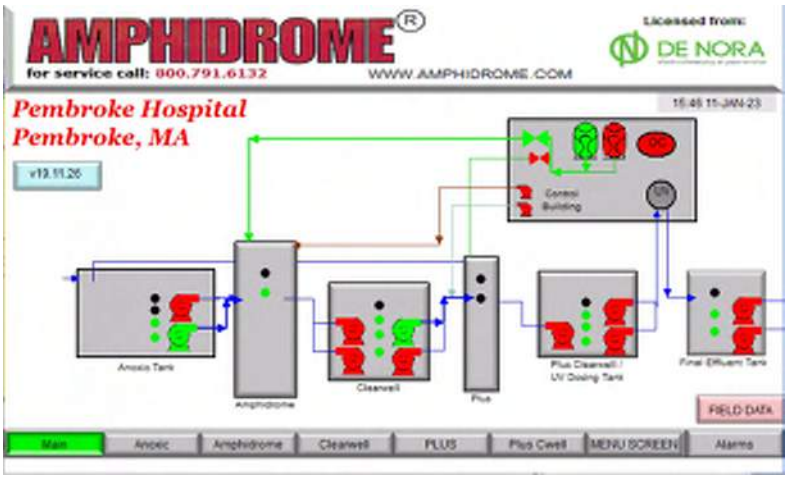
On top of the underdrain is eighteen inches (five layers) of four different sizes of gravel. Above the gravel is a deep bed of high grade monomedia silica sand. The media functions as a filter, reducing suspended solids while providing the surface area on which an attached growth biomass can be maintained. The media specific surface area of 250 $ft.^2/ft.^3$ results in a high concentration of biomass within the reactor, which means that the hydraulic retention time (HRT) is short; therefore, the reactor requires a significantly smaller volume to treat a given waste strength than would be required by some other reactors.

Reactor Quiescent Flow

Reactor During Aeration

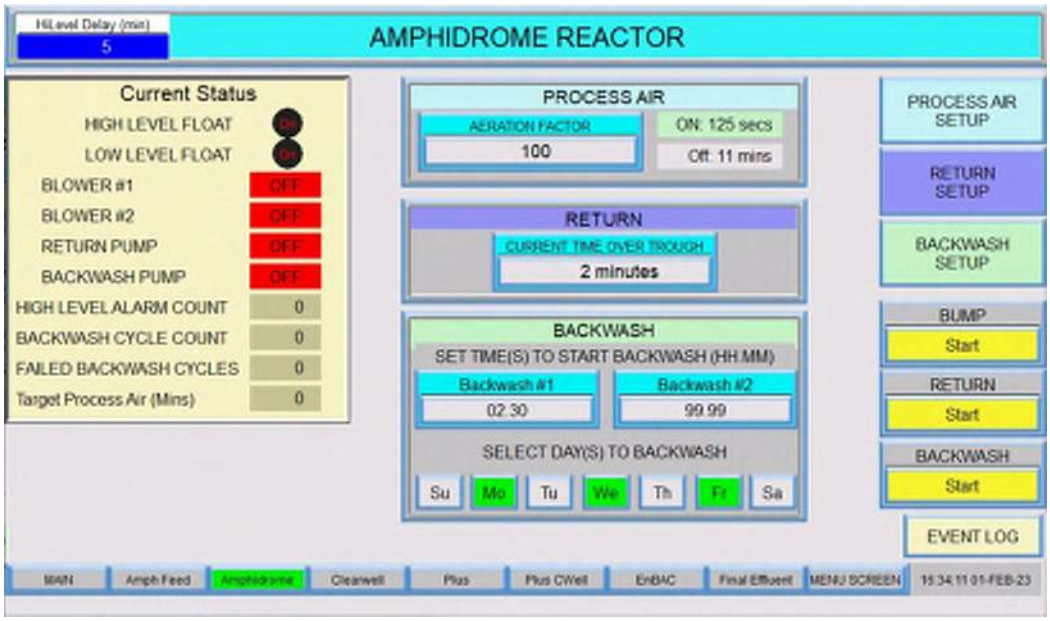
The influent wastewater enters the system through the anoxic/equalization tank, which has an equalization zone, a settling zone, and a sludge storage zone and serves as a primary clarifier for the SAGB. The wastewater then flows by gravity into the reactor. The driving force of the forward flow is the hydrostatic pressure created by the differential liquid levels within the tanks. Operation of the SAGB alternates between down-flow (forward flow) and up-flow (reverse flow) modes. The up-flow is accomplished by pumping from the clear well back up through the filter. To achieve the required aerobic and anoxic conditions within the biofilm, process air to the reactor is supplied intermittently *-via* the underdrain at the bottom of the reactor and is independent of the return flow cycles. The cyclical forward and reverse flow of the waste stream and the intermittent aeration of the filter provides the hydraulic retention time and creates the necessary aerobic and anoxic conditions required to achieve the designed level of biological nitrogen removal.

Controls:
The control system is PLC based with a user-friendly operator touch screen interface



Wireless Process Control Access (WPCA)

The system will be supplied with a Stridelinx VPN Router that will allow the operator and FRMA to securely log into the system. This router must be active (connected to the Internet) during the warranty period. This can be accomplished by providing a wired internet connection to the unit or providing a cell phone data only plan. This allows real time control and observation of the system remotely via the internet. Remote access to stored system trending data, alarm history etc. provides valuable insight on system operation and allows for adjustments to be made to optimize performance. These adjustments can be made remotely in real time.



Proposed Design

Amphidrome® Design

The most cost-effective design for this facility is one (1) 6 ft. diameter reactor. The main reactor will have a 5.5 ft. bed depth and an overall height of 15 feet.

See Tables 2-3 For Design Information and Tank Capacities.

Process Flow Schematic

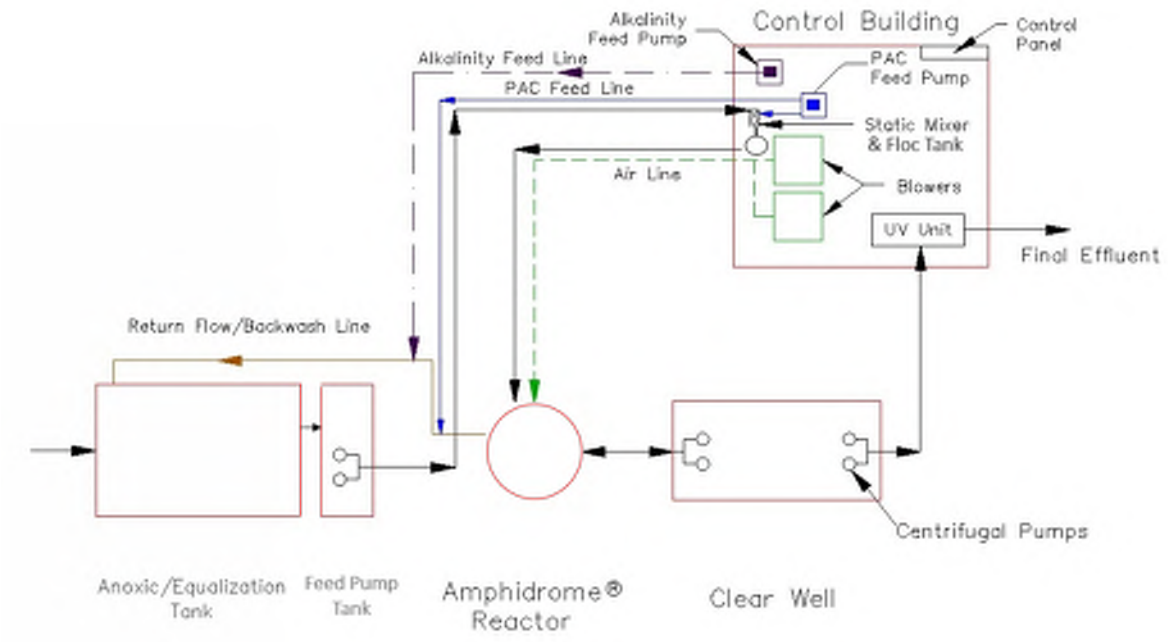


Table 2

Tank and Reactor Sizing

Tank	Capacity/Size
Anoxic/Equalization*	12,000 gallons
Feed Pump Tank*	850 gallons
Amphidrome® Reactor	6 ft. diameter with 5.5 ft. media (Overall height 17.5 ft.)
Amphidrome® Clear Well/Final Discharge*	3,000 gallons

***These represent the minimum tank volumes required for the treatment process flow and may be upsized depending on site constraints, tankage availability, etc.**

Table 3

Scope of Supply

MAJOR COMPONENTS	QUANTITY	MANUFACTURER
Amphidrome® Reactor Internals	One (1)	DNWT
Backwash Flow Dampener for Anoxic Tank	One (1)	FRMA
Amphidrome® Feed Pumps	Two (2)	HOMA
Return Flow and Backwash Pumps	Two (2)	HOMA
Final Discharge / UV Feed Pumps	Two (2)	HOMA
Base elbows and guide brackets for all pumps		HOMA
50-foot cord length for pumps and floats		HOMA
Required Float switches and stainless brackets		CSI/Anchor
Kaeser Sound attenuated blowers	Two (2)	Kaeser
Static Mixer/Floc Tank for Coagulation	Two (2)	AK
Mixer for Floc Tank	One (1)	Lightnin
Variable Frequency Drives for blowers	Two (2)	Durapulse
Variable Frequency Drives for floc mixers	One (1)	Durapulse
Control Panel with Touch screen And Remote Wireless Access	One (1)	FRMA
Disconnect junction boxes for all pumps and floats	As required	FRMA
Alkalinity Feed Pump with Tank & Agitator	One (1)	Stenner/LMI
Coagulant Feed Pump with mixing wand	Two (2)	Stenner/LMI
UV Disinfection Unit	One (1)	Aqua Azul
Flow Meter	One (1)	Seametrics

EXCEPTIONS AND CLARIFICATIONS

EXCEPTIONS:

1. Items not provided (unless specifically listed in this proposal) are: anchor bolts, discharge tubing, piping, check valves, gate valves, air release valves, slide rails, chain, access covers, concrete chambers, access manholes, and installation.

BUDGET PRICE

$226,000

Inclusive of startup assistance and *exclusive of any applicable taxes*

See appendix C – payment terms

Patrick Compton

Patrick Compton
FRMA Engineering Manager
pcompton@frmahony.com
781-982-9300 (Ext. x133)

Appendix A

PREFABRICATED BUILDING AVAILABLE

Prefabricated buildings are now available with all equipment and controls installed.

The Engineered Process Solutions group (EPS), a division of Cummins-Wagner, is able to design and fabricate custom treatment control structures tailored to your requirements. EPS manages the fabrication, internal piping/electrical assembly, equipment installation, and final packaging of the building utilizing their in-house team of experienced system engineers. With exceptional continuity of service, the prefabricated treatment system control buildings we offer include benefits not seen with traditional stick-build approaches.

In contrast to treatment control buildings constructed on-site where each component is installed individually and joined after everything is in place, packaged systems utilizing modular prefabricated buildings are assembled offsite. All components, including the building structure and process connections, are fabricated and installed on a frame. After complete testing of the assembly, the entire structured package is shipped to location where it can be tied into the treatment system. Benefits of this particular packaged system include:

- **A single point of contact for the management of the treatment control system structure eliminates coordination with separate individual designers, building**

installers, and electrical/mechanical contractors

- **Communication is streamlined with regards to the design, procurement, manufacturing, testing, and startup of system, allowing for design changes to be made easily with high confidence that nothing will slip through the cracks**

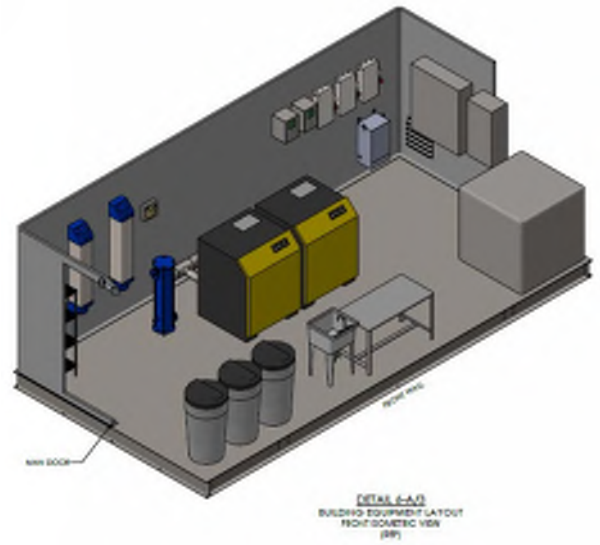
- **The packaged system allows for reduced liability concerns, and the ability for customers to utilize a central entity with full knowledge and documentation of the system should any service questions arise**

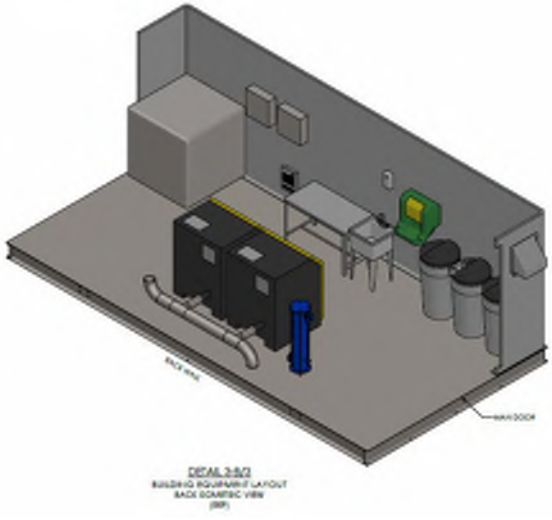
- **Significantly reduced administrative costs, as a single comprehensive design submittal eliminates design/coordination with multiple system components as well as reducing administrative accounts- payable costs**

- **Considerably faster project-completion times as fabrication and component assemblage/testing can take place simultaneously, as well as streamlining schedule changes and reducing construction scheduling conflicts on-site**

- **Full design and controlled fabrication ensure proper system and components sizing, smaller footprints compared to on-site construction as the packaged system are skid-mounted and must be transportable, and assembly conducted under ideal shop conditions with efficient use of equipment and personnel**

- **Offsite testing ensures the entire system will operate as required upon arrival, reducing installation time as the packaged building need only to be tied into the constructed treatment system**





Amphidrome® Prefabricated Building Preliminary Scope

Equipment

- Main Control Panel
- Autodialer
- Blowers
- UV treatment
- Chem tanks
- Chem feed Pumps
- VFDs
- Phosphorous removal equipment
- Flow meter w/ Flow Computer
- Floc Tank and mixer

Building Structure

- Fiberglass Building
- Double Door
- Load Center, Lights, 8 GFCI Outlets. (Galvanized Conduit)
- Inlet Louvre
- Room Fan
- Room heater – electric
- Insulation
- Job specific drawing for bldg.

Building Components (heating/ventilation/lighting/electrical)

Building Inside Electrical Components

- Desk/Workbench
- Tankless Water heater
- Backflow Preventer
- Eyewash station + shower combo
- Free standing sink
- Building Wire and Conduit
- Wires and Conduit - Galvanized
- Single Point Electrical Connection
- ATS Automatic Transfer Switch - NOT INCLUDED IN BASE PRICE
- Distribution panel
- Nonfusible disconnect - heavy duty - for blowers
- transformer, 480/120, 25KVA, copper coils, NEMA 3R
- 240/120V Load center

Pipe Valves Fittings

- Air PF
- Blower Piping - PVC - 6"
- Water Piping - Copper
- Water piping and valves for UV and flow meter - PVC / CPVC
- Pipe and Fittings - misc.
- Drain PF
- Room drain and equipment drains
- Valves

Steel Base

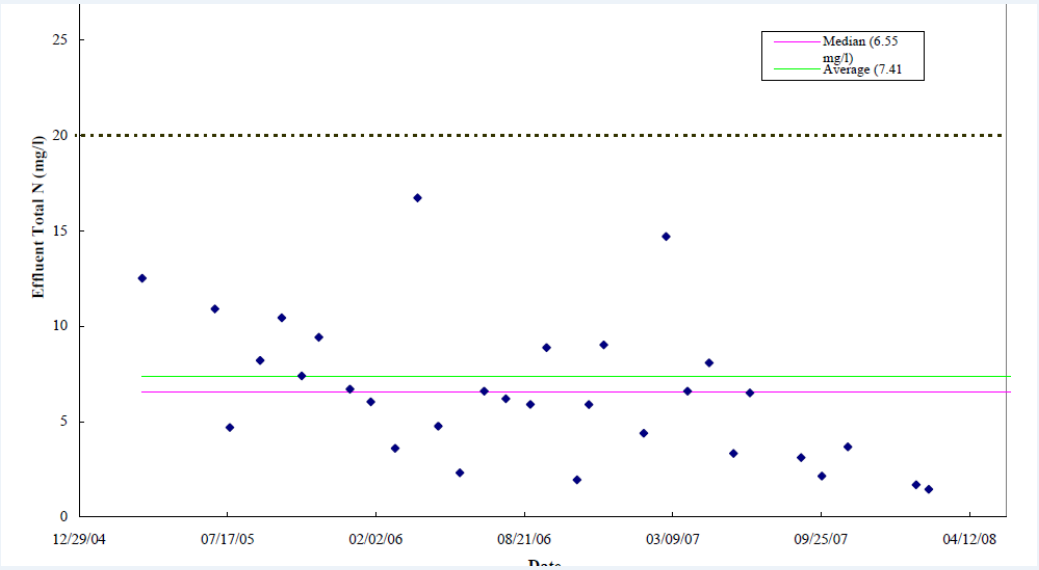
- Steel - Base/floor Building
- Steel - Base Floor AL Plate
- Lifting Lugs
- Steel - Supports

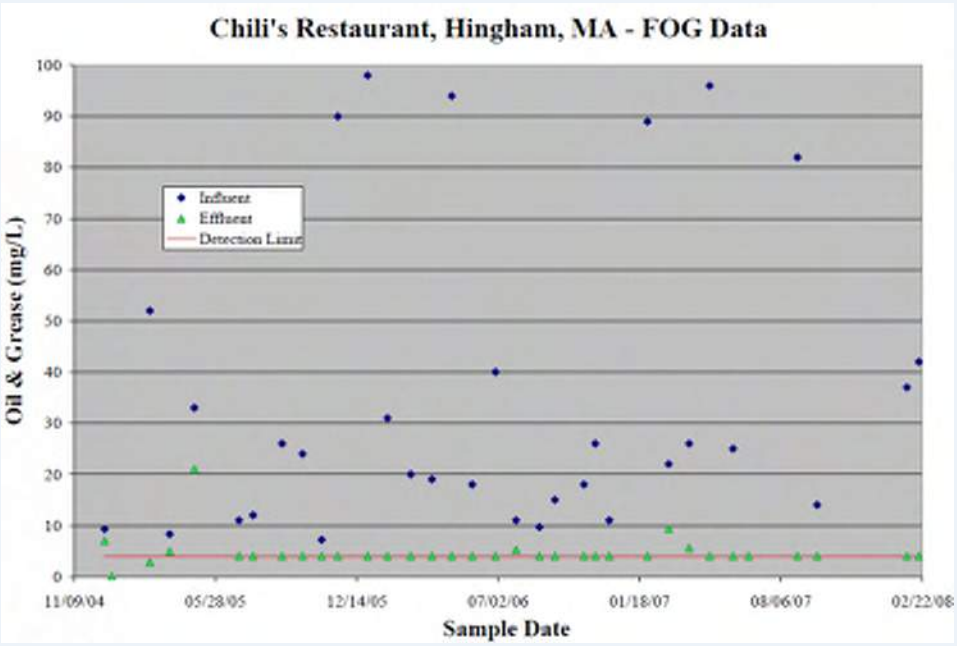
Chili's Restaurant

Hingham, MA

Design Flow 8,000 gpd

This single reactor Amphidrome® system provided exceptional treatment with high concentrations of Fats, Oils, and Grease





Appendix B

EQUIPMENT WARRANTY

F. R. Mahony and Associates (FRMA) warrants to the original purchaser and the end user all new equipment manufactured by it to be free from defects in material and workmanship, and at the election of FRMA will repair or replace, f.o.b. its factories or other locations designated, and as determined by FRMA any part or parts returned to it, transportation/freight prepaid, which examination shall show to have failed under normal use and service by the original user within one (1) year following start-up or (18) months from shipment, whichever occurs first. Such repair or replacement shall be free of charge except for freight and those parts such as media, chemicals, oil, grease, belts and like that are consumable under normal use. FRMA's obligation under this warranty is conditioned upon it receiving prompt written notice within 30 days of claimed defects during the one year warranty period. Discovery thereof during the one year warranty period is limited to repair or replacement as aforesaid. No allowance will be made for labor, transportation, or other charges incurred in the replacement of repaired defective parts and/or equipment furnished.

THIS WARRANTY, INCLUDING THE STATED REMEDIES, IS EXPRESSLY MADE BY FRMA AND IS ACCEPTED BY ORIGINAL PURCHASER IN LIEU OF ALL OTHER WARRANTIES, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE, WHETHER WRITTEN, ORAL, EXPRESS, IMPLIED OR STATUTORY. FRMA NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME IT FOR ANY OTHER LIABILITIES WITH RESPECT TO ITS EQUIPMENT. FRMA SHALL NOT BE LIABLE FOR NORMAL WEAR AND TEAR, NOR FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGE DUE TO INOPERABILITY OF ITS EQUIPMENT FOR ANY REASON NOR ON ANY CLAIM THAT ITS EQUIPMENT WAS NEGLIGENTLY DESIGNED OR MANUFACTURED.

This warranty shall not apply to equipment or parts thereof which have been altered or repaired outside of FRMA factory or damaged by improper installation, storage, application, erosion, or corrosion of any sort, or subjected to misuse, abuse, neglect, or accident. This warranty is null and void if payment is delayed, not made, or if not in accordance with the terms and conditions of FRMA equipment proposal.

FRMA makes no warranty with respect to parts, accessories, or components manufactured by others. The warranty applicable to such items is that offered by their respective manufacturers.

TERMS AND CONDITIONS

Terms and Conditions for the equipment supplied by F.R. Mahony are stated below and attached.

ANY RESULTANT PURCHASE ORDER MUST REFLECT AND INCOROPORATE THESE TERMS & CONDIDIONS

Unless indicated, the quoted price does not include any local, state or federal taxes, permits or other fees. Any taxes or fees that may apply must be added to the quoted price and paid by the buyer.

If the project is tax exempt a tax exemption certificate must be included with a purchase order.

TERMS OF PROGRESS PAYMENTS

Payment of all invoices is due within 10 days of invoice date. Payment must be received prior to next manufacturing step as follows**:**

- 10% of purchase price with purchase order to FRMA.
- 15% of the purchase price with return of approved shop drawings.
- 50% upon completion of manufacture.
- 20% upon delivery.
- 5% upon successful operation of the equipment.

If payment for steps two (2) and three (3) is precluded without a schedule of values, a schedule of values will be established and invoiced based on the above payment terms. Prior written notice must be received by FRMA.

If payment is withheld because of failure of the equipment to perform or to comply with the order, a written statement describing such failure shall be made within 10 days of date on which equipment is declared by the owner or engineer not to perform and/or comply with the order.

Unless indicated, the quoted price does not include any local, state or federal taxes, permits or other fees. Any taxes or fees that may apply must be added to the quoted price and paid by the buyer.

PURCHASER ACKNOWLEDGEMENT

Company Name_____

Signed By_____Date_____
Title_____

"A 100% Employee Owned Company"

Terms and Conditions

1. **PRODUCTS:** Products (parts, components, items, materials, assemblies) herein are of the Manufacturer's standard or available construction and specifications. It is Buyer's final responsibility to determine if these products satisfactorily meet Buyer's or Buyer's customer's plans, specifications and requirements. Weights and dimensions when given are approximate unless certified in writing by the Manufacturer.
2. **SELECTION AND END USE:** Seller is not in any way liable for selection, application, or suitability of products herein for any particular use or for any installation or operational costs incurred with these products, all of the aforesaid being the final responsibility of Buyer.
3. **QUOTATIONS:** Seller as a service to Buyer may quote orally or in writing from time to time current prices then in effect for products or services offered for sale by Seller; however, such prices are subject to change without notice. Quotations may be withdrawn at any time prior to actual receipt by Seller of a written purchase order and release from Buyer to manufacture and/or ship the products or perform the services described herein. Quotations shall become null and voidupon the elapse of thirty (30) days from the date of quotation unless earlier withdrawn. Seller does not assume any responsibility for any variation in quantity or omission of any item in any quotation that may be required by any plan or specification or otherwise. Seller is not responsible for any typographical errors orreproduction deficiencies. Quotations for the Quantities, Products and Services described herein are subject to these Terms and Conditions only; Seller will only accept orders on these exact Terms, Conditions and Provisions and no inconsistent terms, conditions, provisions or modifications will be agreed to unless specifically approved in writing by an officer of Seller.
4. **PURCHASE ORDERS AND ACCEPTANCE:** Purchase orders of Buyer resulting from oral or written quotations of Seller shall be subject to the Quantities, Products and Services herein, these Terms and Conditions, and the written approval signed by an authorized representative of Seller in the Seller's acknowledgement. Any term(s), condition(s) or provision(s) of Buyer's purchase order which are inconsistent with these stated herein, shall not be binding on Seller and shall not be considered applicable to the sale or shipment of the products or performance of the services described herein. Unless Buyer shall notify Seller in writing to the contrary as soon as practical after receipt of Seller's acknowledgement, acceptance of Seller's Terms and Conditions hereof by Buyer shall be presumed and, in the absence of such notification, Buyer's oral or written release to manufacture and/or ship the products or perform the services described herein, shall be conclusively deemed as Buyer's acceptance of these Quantities, Products, Services, Terms and Conditions herein. If Buyer notifies Seller in writing of his objections to any of the Terms, Conditions and Provisions described herein, such objections are not accepted by Seller unless specificallyaccepted in writing signed by an officer of Seller. Seller's responsibility is limited solely to the furnishing of the products or services described herein and assumes no responsibility for any other or further requirements or conditions expressed in any plan, specification, purchase order or other document.
5. **SUBMITTAL:** If Specifically requested in writing by Buyer at the time of purchase order, Seller will prepare submittal data (product bulletins, descriptive data, curves, diagrams, each independently as required) for written approval, corrections, or rejection by Buyer, Buyer's customer or Buyer's customer's authorized representative. Any changes in the submitted products required by the approving authority will be at the Buyer's expense and supported by a writtenchange order in accordance with Sellers Terms and Conditions. In case of dispute between Buyer and Seller of required changes or rejection of the products herein, either Buyer or Seller may cancel this contract in writing to the other without penalty, unless Buyer has previously released to manufacture and/or ship the products in question, which in such case Buyer will be fully responsible for the products and all payments as if a submittal had not been requested. In no case will Seller be obligated to offer for sale or furnish any modified or alternate products to those described herein.
6. **TIME OF SHIPMENT:** Stated shipping dates are approximate. Seller shall not be liable or subject to any special or consequential damages for failure to deliver or delays in delivery occasioned by causes beyond Seller's control, including, but not limited to, strikes, lockouts, fires, inability to obtain materials or shipping space, breakdowns, delays of carriers or suppliers and governmental acts and regulations.
7. **DELIVERY AND FREIGHT:** Delivery of these products shall be F.O.B. the place of shipment to Buyer. Thereafter Buyer assumes full responsibility for any damage or loss irrespective of Seller's prepayment of freight charges. Buyer shall furnish at Buyer's expense, labor and equipment necessary to expeditiously unload products delivered by Seller. Any expenses incurred by Seller due to the delay in unloading shall be reimbursed to Seller by Buyer.
8. **STORAGE:** A product held in storage for the convenience of Buyer will be invoiced to Buyer as if the products were shipped and Buyer agrees to pay for same plus additional reasonable storage charges in accordance with the following payment terms.
9. **PAYMENT:** Buyer agrees to pay Seller within thirty (30) days of invoice date. If Seller has not received payment within these thirty (30) day terms, Seller may add and receive payment from Buyer interest charges at the rate of 1½% per month on unpaid balance plus such other reasonable collection costs and expenses incurred including attorney's fees, collections fees, court costs and otherwise. Cash or anticipation discounts are not offered unless specifically stated on Seller's invoice, no discounts are allowed on freight, shipping, taxes or interest charges. Cash discounts offered for early payment are earned only when payment is received in the office of Seller on or before the specified discount terms or date. Seller reserves the right to make partial invoices(s) for storage, shipments or services performed and receive payment in accordance with the above terms. Buyer agrees not to make any deductions for taxes, freight, retainages, alleged damages or otherwise from any payments due herein. Payment by credit card may incur a 4% fee.
10. **TAXES:** Buyer shall pay in addition to the purchase price and other charges herein, all excise, sales, privilege, use or other taxes, Federal, State, Local or Foreign, payable by Seller because of the execution of this contract.
11. **CREDIT AND DEFAULT:** If financial responsibility of Buyer becomes impaired or unsatisfactorily in the sole judgment of Seller under this or any other contract between the parties, advance cash payments or satisfactory security shall be given by Buyer upon demand by Seller and any shipments due under this or any contract may be withheld until all payments due are received in full and Buyer's credit has been re-established satisfactorily in the sole judgment of Seller. In addition to all other remedies, in the event of default by Buyer under the terms of this agreement, Seller shall have the right to take exclusive possession of the products sold herein wherever found and to remove same without legal process, any payments having been made on account thereof to be retained by Seller as liquidated damages; or Seller may, in addition to all other remedies available to it, if it deems said products are not readily removable or resalable, sue for and collect any unpaid payments including interest charges, plus such other costs and expenses as Seller has incurred or may incur which

shall become immediately due and payable upon Buyer's default of any of the terms of this contract, said remedies to be cumulative.

12. **WARRANTIES:** There is NO WARRANTY, representation or condition OF ANY KIND, EXPRESS OR IMPLIED (INCLUDING NO WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR ANY PARTICULAR PURPOSE) by Seller regarding the products herein; Buyer is solely limited to the Manufacturer's express written warranty, copies of which will be furnished to Buyer upon request. No warranty conditions will be considered until payment of this contract has been made in full.
13. **SELLER'S LIABILITY:** Seller's liability shall be limited to the stated selling price of any defective product and in no event shall Seller be liable for prospective profits or special, direct, indirect or consequential damages of any kind caused by a product, component or part failure. Buyer assumes all risk and liability for loss, damage or injury to persons or property of Buyer or others arising out of the use or possession of any product, component or part herein.
14. **RETURNS:** Products purchased herein may not be returned without the express written permission of Seller, as evidenced by Seller's or Manufacturer's properly authorized return material form, of which a copy must accompany the returned material. Authorized returns shall be shipped at the expense and liability of Buyer to the destination specified by Seller. Such returns are accepted by Seller or Manufacturer for inspection only; any allowance or credit originates with the Manufacturer subject to charges for freight, handling, inspection, repair, restocking and otherwise. Damaged, installed, used or special orderproducts are not returnable. Seller or Manufacturer will not accept debit charges from Buyer for returned products.
15. **SERVICE:** Seller does not include any field or shop labor or service equipment and/or materials for the products herein unless specifically stated as an item in the body of this contract. Any service requested in addition to that not included in the body of this contract will be considered a separate contract and require a separate purchase order from Buyer. No service requests will be accepted or performed when Buyer's account is past due according to the payment terms herein.
16. **CHANGE, MODIFICATION, CANCELLATION:** This contract cannot be changed, modified or cancelled except by written agreement executed by Buyer and an officer of Seller.
17. **JURISDICTION:** This agreement shall be governed and construed in accordance with the laws of the State of Maryland.

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F.R. Mahony & Associates
A Division of Cummins-Wagner
273 Weymouth St. Rockland, MA 02370

Date: 14 July 2023

MEMORANDUM FOR RQAW

SUBJECT: Amphidrome Site Layouts and Control Building Designs

FROM: Patrick Compton, Engineering Manager
TO: Gretta Preston, Staff Engineer

1. PURPOSE:

   Provide more in-depth information to RQAW regarding possible Amphidrome® site layouts and control building designs.

2. SUMMARY:

   The Amphidrome® system has been used successfully for over 15 years in over 125 applications, from single family installations to small systems with flows in excess of 600,000 gallons per day and can be customized to fit site requirements. For this application of 7,600 gallons a day average design flow, influent strength, and effluent requirements, the tankage required is as follows:
   One (1) Anoxic/Equalization Tank – 12,000 gallons
   One (1) Feed Pump Tank – 850 gallons
   One (1) Amphidrome® Reactor Tank – 6’ diameter, 17.5’ overall height
   One (1) Clearwell/Discharge Tank – 3,000 gallons

   Additionally, the control building will house:
   Two (2) Kaeser sound attenuated blowers to provide process and backwash air
   One (1) AK static mixer, one (1) AK floc tank, and one (1) mixer for coagulation
   Two (2) Variable frequency drives (VFDs) for blowers and One (1) VFD for mixer
   One (1) Aqua Azul disinfection unit
   One (1) Stenner alkalinity feed pump with tank and agitator
   Two (2) Stenner coagulant feed pumps
   One (1) FRMA control panel with touchscreen interface

   FRMA’s previously installed Amphidrome® systems vary in requirements and site contstraints, though many have similar layouts with regards to the treatment system tankage and control building designs. The following list a number of currently operating systems and their layouts to provide context to how the Amphidrome® system can be configured to meet site requirements

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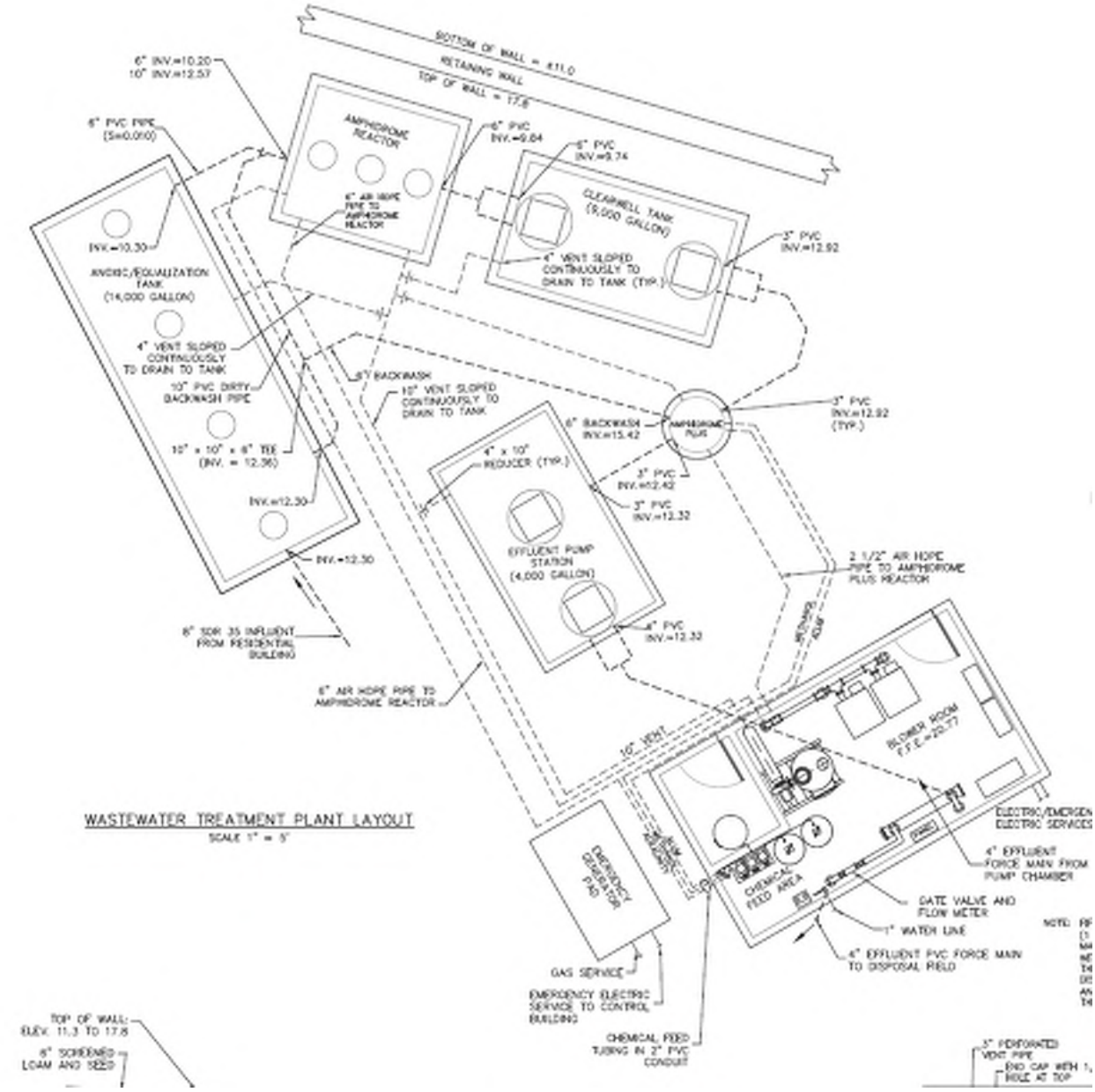
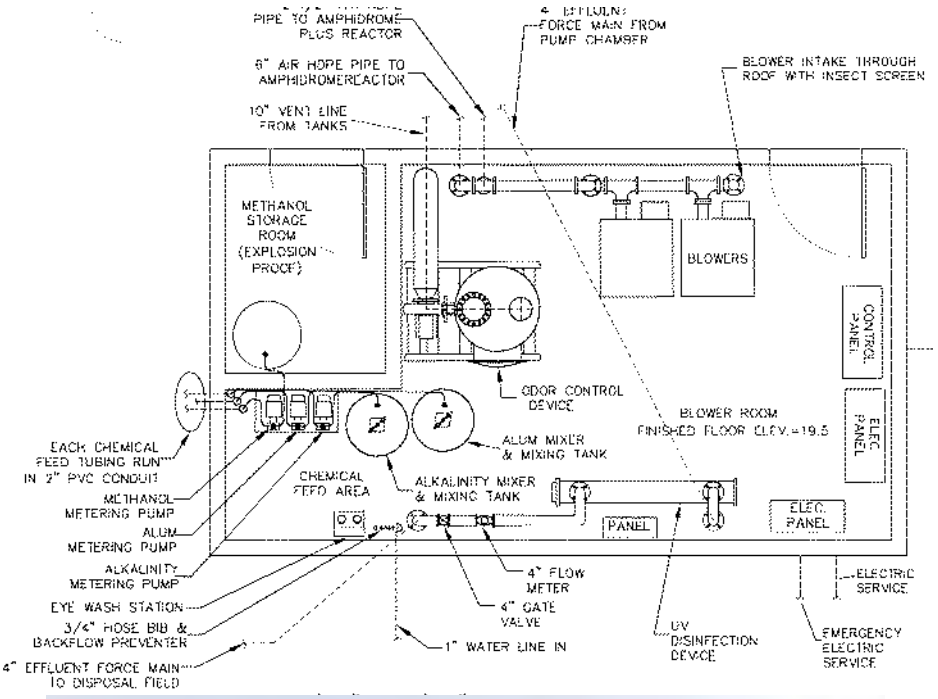
3. HERRING BROOK MEADOW – SCITUATE, MA:

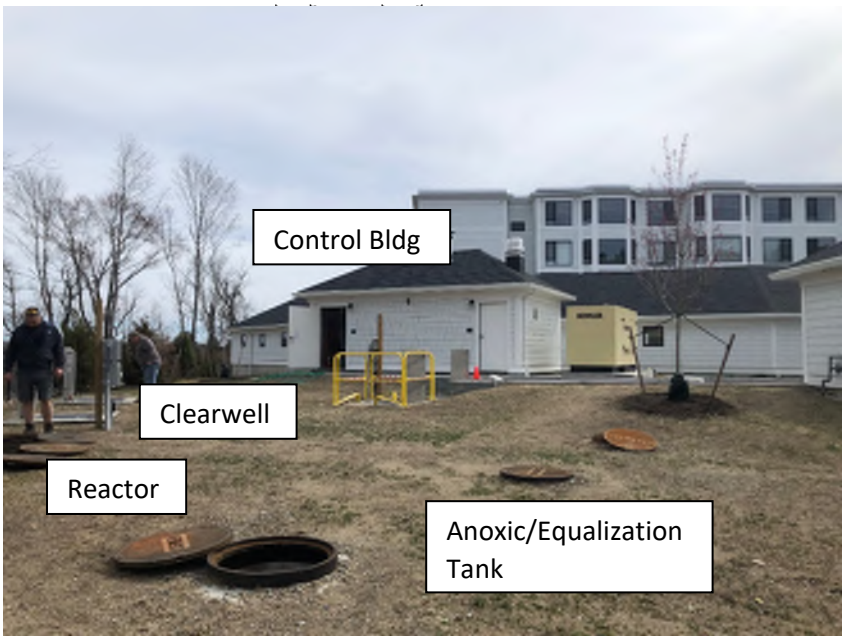
Herring Brook Meadow is a condominium complex located in Scituate, MA located directly adjacent to a protected wetland. The design flow of this system is 14,000 gpd, twice that of the Salt Creek Estates design flow. Additionally, there are total nitrogen limits at this site, requiring the use of a secondary denitrification reactor (Amphidrome Plus™) and effluent pump station. These additional treatment steps would not be needed at the Salt Creek Estates plant. The following shows the plant layout including the control building internals.



To meet the tight site constraints, the larger anoxic tank was constructed at an angle to the main reactor allowing for a small site layout. Additionally, the control building contains an odor control unit and protected methanol storage closet, which would not be

needed at the Salt Creek site. This would reduce the control building size by nearly 1/3. Below is a more detailed layout of the control building and a few additional pictures of this site.





4. THE COVE – WATAB TOWNSHIP, MN
   The Cove in Watab Township, MN is a residential complex with a wet weather design flow of 16,000 gpd. This site contains a sludge tank and anoxic/feed pump tank that feeds wastewater into the control building through a static mixer/floc tank and into dual Amphidrome reactors to meet a TP limit of <1. The following are a few images of the rectangular site layout and control building configurations.

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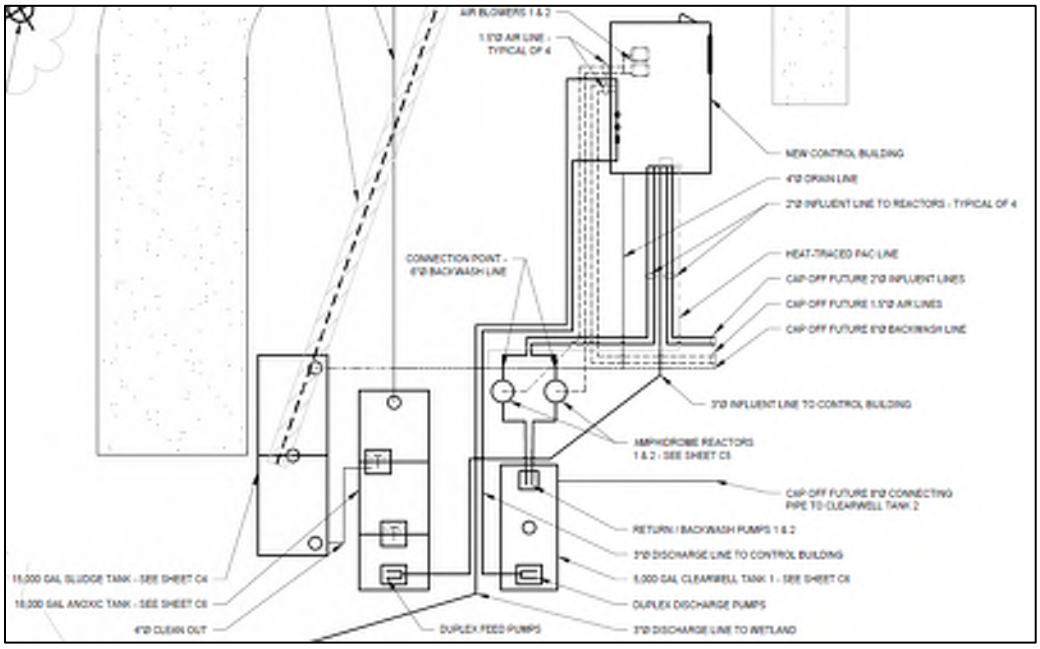

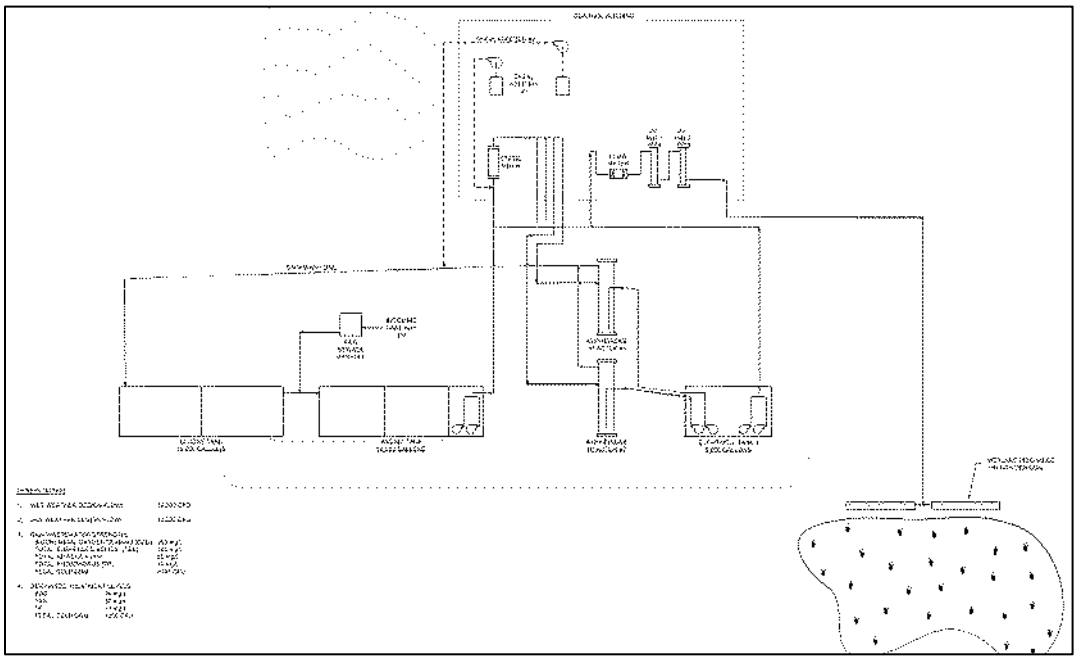

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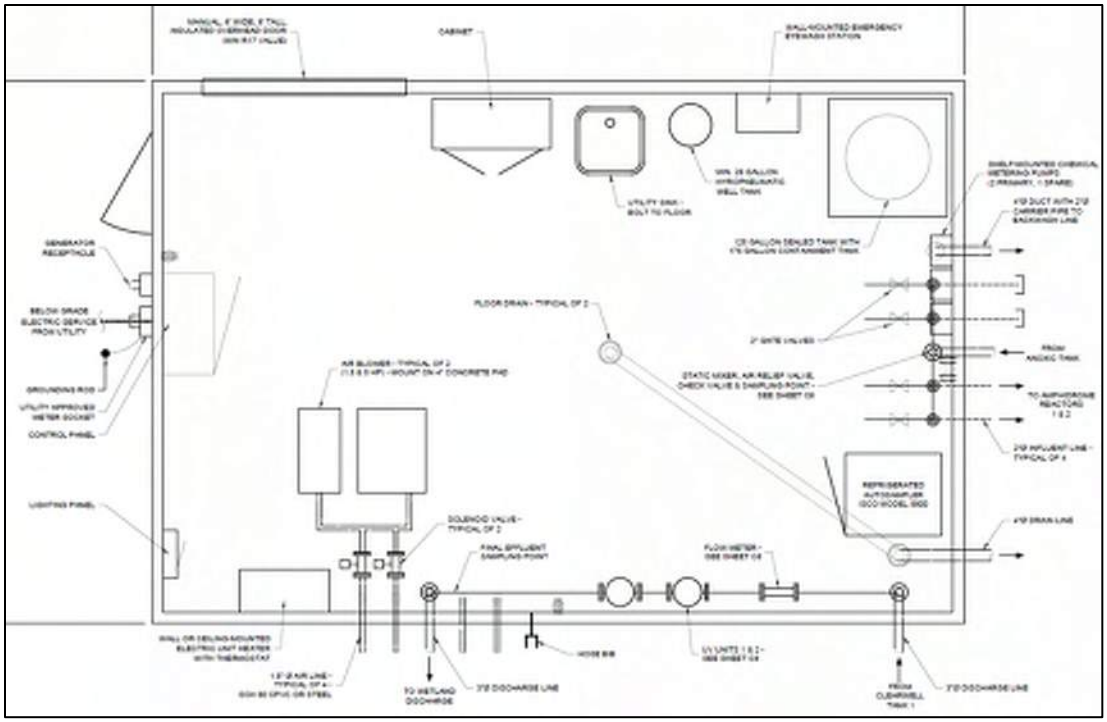
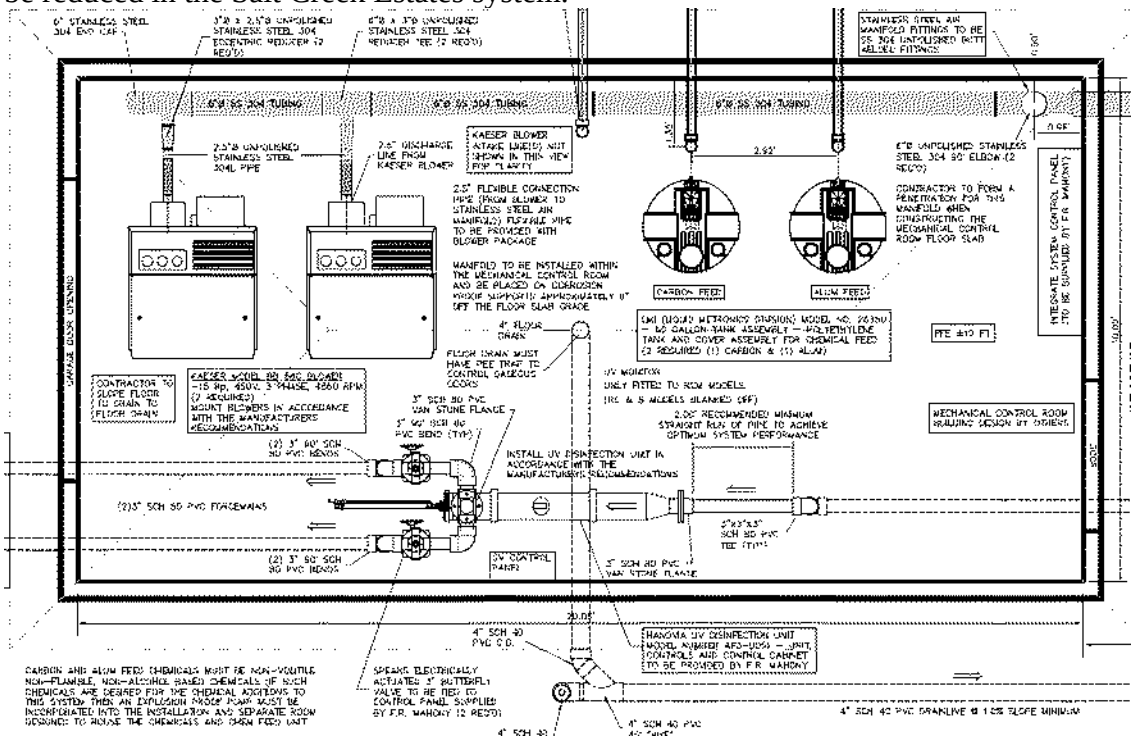


This control building is roughly 16’ x 24’, though this building is designed for a second phase of construction that includes two additional reactors and there is quite a bit of empty space that is not utilized.

5. THE SHOPPES AT 10.5 – NAG’S HEAD, NC

The following is a more detailed control building drawing, one in which the footprint could be reduced in the Salt Creek Estates system.



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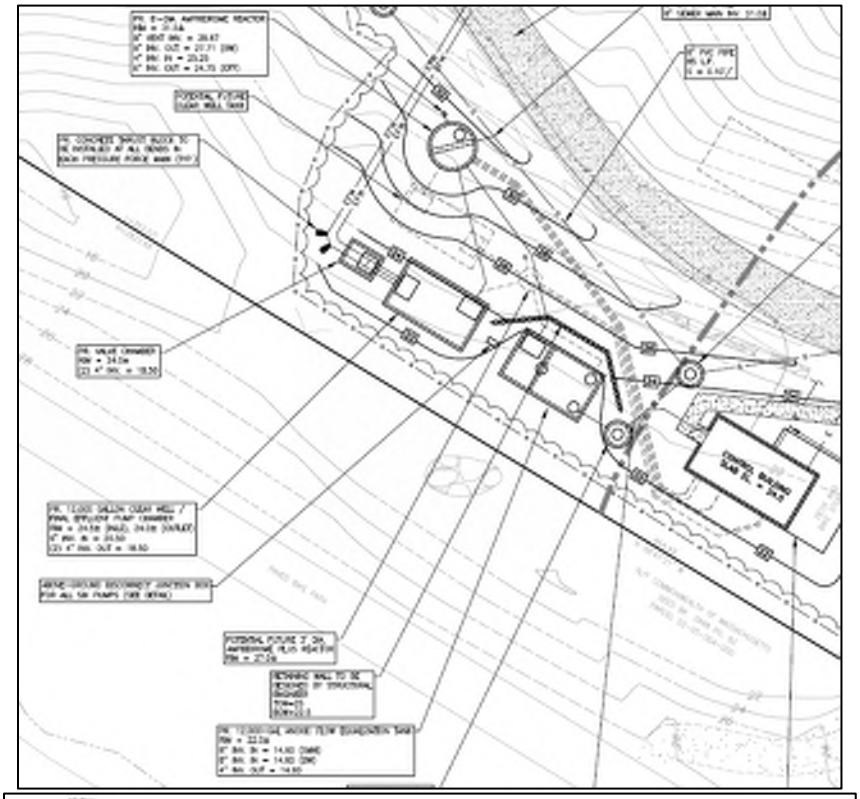
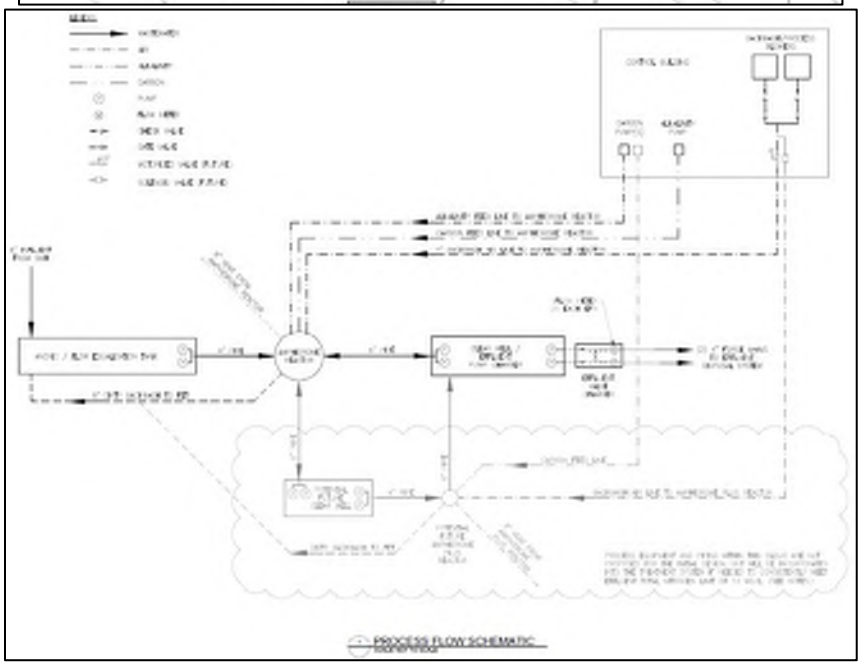
6. AUTOCAMP CAMPGROUND – FALMOUTH, MA

The following is a site layout for the Autocamp Campground in the Falmouth, MA. This layout is unique due to the site elevations and future considerations for additional denitrification reactors. Bottom line is the tight site constraints and the ability for the Amphidrome® system to accommodate these requirements.





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781-982-9300 • www.frmahony.com

Patrick Compton

//SIGNED//

Patrick Compton
FRMA Engineering Manager
pcompton@frmahony.com
781-982-9300 (Ext. x133)

APPENDIX H: IDEM Amphidrome Information

RQAW, SCSI, and IDEM have been in continued communication to work on preliminary approval of the Amphidrome system for the State of Indiana. This process began in August of 2023 and continues to move forward. After many discussions with IDEM, we are closer to an approval; however, some items are still needed in order to receive final preliminary "blessing."

Last Updated: 2/24/2024

Aaron Crow, PE
Senior Project Manager - Water/ Wastewater

RQAW | DCCM
317-588-1772 p 260-443-5527 c

From: Czerniakowski, Kevin <KCzernia@idem.IN.gov>
Sent: Monday, February 19, 2024 3:41 PM
To: Aaron Crow <acrow@rqaw.com>
Subject: RE: Salt Creek Wastewater Utilities - PER for Review

Aaron,

See below in red.

Thanks,
Kevin D. Czerniakowski, P.E.
Section Chief
Facility Construction & Engineering
Support Section
Office of Water Quality
IDEM
317-234-8226

From: Aaron Crow <acrow@rqaw.com>
Sent: Monday, February 19, 2024 2:48 PM
To: Czerniakowski, Kevin <KCzernia@idem.IN.gov>
Subject: RE: Salt Creek Wastewater Utilities - PER for Review

Hi Kevin,

Here are some notes from our phone call last week! Numbered responses line up with IDEM's comments in the email chain below.

Would you be able to let me know if I missed anything before I route this to the larger group?

1. Even though the facility is rated 15,000 gpd, you will see by their effluent flow rates that they only treat an average of 3682 gpd based on 2021 flows. They plan to double flows over the next 20 years through a combination of 1) part-time residents converting to full-time status and 2) empty lots being built on. IDEM okay with a 7,600 gpd as long as new NPDES permit matches. Correct. We will review based on a design flow of 7,600 gpd, and prior to start up of the new system the NPDES Permit will need to be modified to the new design flow
2. RQAW will get DO requirement and supporting information for blower sizing. Kevin will review 3rd party verification reports from EPA to confirm this information has not already been provided. I've quickly read through some of this, and plan to focus on it tomorrow. The technical paper "Single-Submerged Attached Growth Bioreactor for Simultaneous Removal of Organics and Nitrogen" from ASCE in particular seemed to have the most information we can use, particularly if the loading rates for that test match Amphidrome's design
3. P. 7 of the supplemental document provided by Gretta on 12/8/23 showed influent concentrations of BOD, TSS, and NH3. IDEM was wanting us to convert these concentrations into loadings and compare to Salt Creek's loadings. RQAW proposed that they overlay with Easton Crossing or with design schematics. How was the technology developed in the first place? IDEM is okay that we just look at one comparable system for the overlay exercise. Just to clarify, we would want to see the loading rates (lbs per gallon of tank volume, lbs per volume and/or surface area of media, etc.), not just loadings (lbs). Having a similar overlay to the pilot test from the paper mentioned above would also be useful. Much of the data in the paper is metric, so it's harder for me to compare.

Aaron Crow, PE
Senior Project Manager - Water/ Wastewater

RQAW | DCCM
317-588-1772 p 260-443-5527 c

From: Czerniakowski, Kevin <KCzernia@idem.IN.gov>
Sent: Thursday, February 15, 2024 4:23 PM
To: Gretta Preston <gpreston@rqaw.com>
Cc: Parikshak, Dharmendra <DPariksh2@idem.IN.gov>; Dudley, Charity <CDudley@idem.IN.gov>; Odonnell, Alissa <AOdonnel@idem.IN.gov>; Aaron Crow <acrow@rqaw.com>; Whitney Weidenbenner <wweidenbenner@rqaw.com>
Subject: RE: Salt Creek Wastewater Utilities - PER for Review

Gretta and all,

Sorry for the delayed response, it took me a bit of time to complete this, as I wanted to go back through all the correspondence we've had over the past several months to better understand what we have and have not received in order to approve this technology.

Below is copied my original comments on what we would need for this technology, taken from an email dated 8/25/2023. Text of that email is in blue, with new comments in red.

Thank you for forwarding the information on the Amphidrome system. At this point we have only been able to perform a cursory review of everything, but it seems that the information we require is not included. You have forwarded a great deal of information, and to be honest we just do not have the time/resources to fully go through all of it to make a determination as to whether or not this technology can be approved for this situation. It would be most helpful if you and/or the manufacturer could provide a summary/report which includes the following:

1. Detailed description of the treatment process, including a schematic and/or flow diagram A schematic was received, but appeared to be for a system rated for 7,600 gpd. As it is understood this system will maintain the facility's current 15,000 gpd rating, the system would need to be designed for that flow (i.e. – roughly twice as big as what was provided)
2. Description of the design parameters for the technology for flow, pollutant loading, and any other applicable parameters. Examples include:
    - Minimum volume/size of unit required to treat design flow (minimum HRT)
    - Maximum pollutant loading for the technology – generally expressed in lbs per volume and/or area
    - Blower sizing requirements, if aeration is provided Design parameters were presented, though it is unclear as to how these parameters were developed – what kind of testing, research, etc. was used to develop these parameters.
3. Demonstration of successful performance of the technology by providing data (ideally at least three years worth) from other facilities in operation.
    - At a minimum, data should include influent and effluent BOD, TSS, and NH_3 levels (or any other applicable pollutants to be treated) – ideally similar to the levels of the project that is requesting approval. Data should be summarized in an easy-to-read table and/or graph format, with raw data attached to the report for reference.
    - Ideally, facilities used should be operating at roughly 75% design load or greater and located in a similar or colder climate. While data has been provided that seems to show the system can meet the proposed effluent limits, no design information has been provided for the existing systems to verify the loadings to them. IDEM needs verification that the system will meet limits when fully loaded both hydraulically and pollutant loading. If the existing systems are loaded less that 50% of their design capacity, there is no way to know how they will perform when fully loaded.
    - Pilot testing of the technology is also a possibility, after discussion to determine what would be acceptable. Note: we would not necessarily require a new pilot test for this technology. Previous pilot testing at other sites or testing done by Amphidrome in the development of this system may be sufficient. Further discussion would be necessary to determine adequacy of those tests.

Based on the above, IDEM still does not feel there is enough information to warrant approval of the Amphidrome system. While some progress has been made, there are still too many questions and unsubmitted or incomplete information requested at the beginning of the process to make us comfortable with the system. While IDEM is open to new technologies for wastewater treatment, we cannot just blindly allow any new system. It is our duty to protect the environment and people of Indiana, and we cannot do that if we allow unproven technologies to use Indiana as a testing ground. If Amphidrome is able to gather more data and or information to fully support the technology and its design, we would be open to it, but at this time we are not at that point.

Kevin D. Czerniakowski, P.E.
Section Chief
Facility Construction & Engineering
Support Section
Office of Water Quality
IDEM
317-234-8226

From: Gretta Preston <gpreston@rqaw.com>
Sent: Friday, December 8, 2023 3:33 PM

To: Czerniakowski, Kevin <KCzernia@idem.IN.gov>
Cc: Parikshak, Dharmendra <DPariksh2@idem.IN.gov>; Dudley, Charity <CDudley@idem.IN.gov>; Odonnell, Alissa <AOdonnel@idem.IN.gov>; Aaron Crow <acrow@rqaw.com>; Whitney Weidenbenner <wweidenbenner@rqaw.com>
Subject: RE: Salt Creek Wastewater Utilities - PER for Review

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Hello,

We have received extensive information from Partick Compton answering questions regarding the Amphidrome System and its efficacy in treatment. Please see the attached document of supporting information and note the following information they have included:

1. The document includes two examples illustrating instances where the effluent limits for Salt Creek's NPDES have been clearly met. Graphs within the document display information where limits were temporarily exceeded, accompanied by notes indicating instances of operator error and maintenance issues leading to these exceedances.
2. The information also encompasses details pertinent to a state accepting 10 State Standards and other nationally recognized agencies, addressing the following:
    a. Efficacy of limits
    b. Documentation of Operator Intervention
    c. Documentation of state approval complying with 10 State Standards
3. The below chart shows a side-by-side comparison of the influent, effluents, and NPDES Permit requirements.
4. Please note that a majority of the pertinent information provided exists within the first three pages. The appendix is supplemental information.

	Indiana		
	Influent Salt Creek (avg) (mg/L)	Effluent NPDES Requirement (avg) (mg/L)	Influ Chillis/ (avg) (m
BOD	62.38	10	320.
TSS	160.32	12	297
NO3	12.57	1.1-1.6	13
TN	x	x	x

Please let us know what questions or concerns arise from this information and if you would prefer to have them addressed in another meeting with Amphidrome. We look forward to hearing from you! **Please confirm that you are able to view the document I have attached.**

Thanks,

Gretta Preston
Staff Engineer – Water/ Wastewater

RQAW | DCCM
317-588-1773 p

From: Czerniakowski, Kevin <KCzernia@idem.IN.gov>
Sent: Wednesday, November 1, 2023 9:12 AM
To: Gretta Preston <gpreston@rqaw.com>
Cc: Parikshak, Dharmendra <DPariksh2@idem.IN.gov>; Dudley, Charity <CDudley@idem.IN.gov>; Odonnell, Alissa

<AOdonnel@idem.IN.gov>; Aaron Crow <acrow@rqaw.com>
Subject: RE: Salt Creek Wastewater Utilities - PER for Review

Caution: This e-mail originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Let's do 2pm on the 9th……I'll send out a Teams invite.

Kevin D. Czerniakowski, P.E.
Section Chief
Facility Construction & Engineering
Support Section
Office of Water Quality
IDEM
317-234-8226

From: Gretta Preston <gpreston@rqaw.com>
Sent: Wednesday, November 1, 2023 8:37 AM
To: Czerniakowski, Kevin <KCzernia@idem.IN.gov>
Cc: Parikshak, Dharmendra <DPariksh2@idem.IN.gov>; Dudley, Charity <CDudley@idem.IN.gov>; Odonnell, Alissa <AOdonnel@idem.IN.gov>; Aaron Crow <acrow@rqaw.com>
Subject: RE: Salt Creek Wastewater Utilities - PER for Review

**** This is an EXTERNAL email. Exercise caution. DO NOT open attachments or click links from unknown senders or unexpected email. ****

Hello,

Here is a list of availability for a virtual meeting:

Tuesday Nov 7 at 11am, 2pm or later
Thursday Nov 9 at anytime

Please let me know if we need to accommodate additional availability.

Patrick Compton from Amphidrome is preparing a presentation catered to how the process works and how the design was determined. I sent him the information below that you requested, but please let me know if there is anything else more specifically you are looking for.

Thanks!

Gretta Preston
Staff Engineer – Water/ Wastewater

RQAW | DCCM
317-588-1773 p

From: Czerniakowski, Kevin <KCzernia@idem.IN.gov>
Sent: Friday, October 27, 2023 11:35 AM
To: Gretta Preston <gpreston@rqaw.com>
Cc: Whitney Weidenbenner <wweidenbenner@rqaw.com>; Parikshak, Dharmendra <DPariksh2@idem.IN.gov>; Dudley,

Charity <CDudley@idem.IN.gov>; Odonnell, Alissa <AOdonnel@idem.IN.gov>; Aaron Crow <acrow@rqaw.com>
Subject: RE: Salt Creek Wastewater Utilities - PER for Review

Gretta,

Thanks for the additional information. At this point I do think it is reasonable to set up a meeting with Amphidrome and their engineers so we can discuss and better understand their product. Ideally they can explain to us how the process works and how they have determined their basis of design.

Other questions/comments related to the most recent information:
The data provided for the 5 facilities all shows a single date for each month. Is this an average of multiple samples/dates for the month, or are these facilities only sampled monthly?
Can you provide a description/process diagram for the five facilities, as well as what is now proposed for Salt Creek? Preferably something similar to the attached. This will show how these facilities are actually being loaded and allow us to compare this to the proposed Salt Creek Design.

Please coordinate with Amphidrome and provide a few dates/times that would work for a meeting (can be done over Teams, unless you prefer in-person). I'll look at IDEM staff schedules to finalize.

Thanks,
Kevin D. Czerniakowski, P.E.
Section Chief
Facility Construction & Engineering
Support Section
Office of Water Quality
IDEM
317-234-8226

From: Gretta Preston <gpreston@rqaw.com>
Sent: Monday, October 2, 2023 3:46 PM
To: Czerniakowski, Kevin <KCzernia@idem.IN.gov>
Cc: Whitney Weidenbenner <wweidenbenner@rqaw.com>; Parikshak, Dharmendra <DPariksh2@idem.IN.gov>; Dudley, Charity <CDudley@idem.IN.gov>; Odonnell, Alissa <AOdonnel@idem.IN.gov>; Aaron Crow <acrow@rqaw.com>
Subject: RE: Salt Creek Wastewater Utilities - PER for Review

---

Hello,

We have received an additional report from Amphidrome. Please see the attached report and note the following information they have included. We have also included some of our own interpretations of the data as red markups within this document (specifically on graphic representations).

This data shows up to 20+ years of treatment, so the few outliers that exist do have an explanation attached in the details section. These are primarily instances in which treatment limits are not met due to human error, not necessarily a lack of treatment ability by the system.

The 'Details' section has an explanation of the background of each set of relevant data. The most noteworthy being 1. Blackrock due to the similar residential use, size of homes, natural setting of the neighborhood, and similarity in effluent limits. The other examples do show proof in our opinion that the system can meet effluent requirements, however, the other examples given have other factors that deem them less similar to the proposed system. We have noted percentage removal across all 5 example sites of BOD, TSS, and NH3 are 87%-98%. When comparing these percentage removals to the influent data collected at the existing Salt Creek WWTP, RQAW believes that there will be no issues with hitting the required effluent limitations set forth in the current Salt Creek WWTP NPDES Permit. See below table:

	BOD (mg/L)			TSS (mg/L)			NH3 (mg/L)		
	Influent	% Removal	Assumed Effluent	Influent	% Removal	Assumed Effluent	Influent	% Removal	Assumed Effluent
Salt Creek	62.38 avg	95%	3.12 avg	160.32 avg	95%	8.02 avg	12.57	95%	0.63 avg
NPDES Permit			10 mg/L			12 mg/L			1.1-1.6 mg/L

Please let us know what questions or concerns you have and if you would prefer to have them addressed in a meeting with Amphidrome. We look forward to hearing from you!

Gretta Preston
Staff Engineer – Water/ Wastewater

RQAW | DCCM
317-588-1773 p

From: Czerniakowski, Kevin <KCzernia@idem.IN.gov>
Sent: Tuesday, September 19, 2023 1:55 PM
To: Gretta Preston <gpreston@rqaw.com>
Cc: Whitney Weidenbenner <wweidenbenner@rqaw.com>; Parikshak, Dharmendra <DPariksh2@idem.IN.gov>; Dudley, Charity <CDudley@idem.IN.gov>; Odonnell, Alissa <AOdonnel@idem.IN.gov>
Subject: RE: Salt Creek Wastewater Utilities - PER for Review

Gretta,

Thank you for the report – the description/details of the Amphidrome system in particular was helpful to better understand the technology. However, the submitted information is still not sufficient for IDEM to feel comfortable approving this technology.

Of greatest concern, the data provided for the Amphidrome installation in Minnesota shows multiple months where the effluent BOD and TSS levels are greater than the effluent limits which are proposed for the Salt Creek facility (10 mg/l BOD; 12 mg/l TSS). And while no NH_3 data is available, many of the effluent TKN levels are high enough that it seems unlikely the facility would meet the proposed NH_3 limit of 1.1 mg/l (summer) and 1.6 mg/l (winter). Based on this alone

IDEM would not approve the technology, and unless data is found which shows the Amphidrome can be expected to meet the limits required for Salt Creek IDEM's position will not change.

Also of note, it appears the Salt Creek design was based on an average influent flow of 7,600 gpd. If the intent of the design is to keep the current rated capacity of 15,000 gpd, then the Amphidrome unit would need to be designed based on that flow, as the facility must be capable of treating flows up to its rated capacity. IDEM has other questions/comments, but until the above issues are addressed it does not seem reasonable to spend time addressing other issues.

Feel free to contact me if you have any questions.

Kevin D. Czerniakowski, P.E.
Section Chief
Facility Construction & Engineering
Support Section
Office of Water Quality
IDEM
317-234-8226

From: Gretta Preston <gpreston@rqaw.com>
Sent: Monday, September 11, 2023 2:26 PM
To: Czerniakowski, Kevin <KCzernia@idem.IN.gov>
Cc: Whitney Weidenbenner <wweidenbenner@rqaw.com>; Parikshak, Dharmendra <DPariksh2@idem.IN.gov>; Dudley, Charity <CDudley@idem.IN.gov>; Odonnell, Alissa <AOdonnel@idem.IN.gov>
Subject: RE: Salt Creek Wastewater Utilities - PER for Review

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Thank you for your patience as we worked to receive the necessary documents and information for this pre-approval request. I have attached the information from Amphidrome, which is a great overview of the information you requested.

Within the attachment you will find:

- A description of the treatment process
- Flow diagram
- Design Criteria
- Influent/Effluent data from a similar plant in Minnesota

This document is an efficient summary of the information requested, but please note the following. The system in Minnesota only has an effluent (no influent) monitor for nitrogen, however, we can see that the low levels of effluent nitrogen prove the efficacy of N removal. Please let us know what additional information you are looking for in order to secure a pre-approval of this system. We would also be happy to have a meeting with you to clarify any remaining questions or concerns if necessary.

Thank you.

Gretta Preston
Staff Engineer – Water/ Wastewater

RQAW | DCCM
317-588-1773 p

From: Czerniakowski, Kevin <KCzernia@idem.IN.gov>
Sent: Friday, August 25, 2023 12:16 PM
To: Gretta Preston <gpreston@rqaw.com>
Cc: Whitney Weidenbenner <wweidenbenner@rqaw.com>; Parikshak, Dharmendra <DPariksh2@idem.IN.gov>; Dudley, Charity <CDudley@idem.IN.gov>; Odonnell, Alissa <AOdonnel@idem.IN.gov>
Subject: RE: Salt Creek Wastewater Utilities - PER for Review

Gretta,

Thank you for forwarding the information on the Amphidrome system. At this point we have only been able to perform a cursory review of everything, but it seems that the information we require is not included. You have forwarded a great deal of information, and to be honest we just do not have the time/resources to fully go through all of it to make a determination as to whether or not this technology can be approved for this situation. It would be most helpful if you and/or the manufacturer could provide a summary/report which includes the following:

4. Detailed description of the treatment process, including a schematic and/or flow diagram
5. Description of the design parameters for the technology for flow, pollutant loading, and any other applicable parameters. Examples include:
    - Minimum volume/size of unit required to treat design flow (minimum HRT)
    - Maximum pollutant loading for the technology – generally expressed in lbs per volume and/or area
    - Blower sizing requirements, if aeration is provided
6. Demonstration of successful performance of the technology by providing data (ideally at least three years worth) from other facilities in operation.
    - At a minimum, data should include influent and effluent BOD, TSS, and NH_3 levels (or any other applicable pollutants to be treated) – ideally similar to the levels of the project that is requesting approval. Data should be summarized in an easy-to-read table and/or graph format, with raw data attached to the report for reference.
    - Ideally, facilities used should be operating at roughly 75% design load or greater and located in a similar or colder climate.
    - Pilot testing of the technology is also a possibility, after discussion to determine what would be acceptable.

Information similar to the above is necessary for us to make an evaluation of new technology to be used in the State of Indiana for wastewater treatment. However, the approval process is more efficient if it is a collaborative effort. I presume you have already done your own evaluation of the technology to be comfortable enough to recommend it to your client - if you could explain/share your process with us it could save some time as we would not necessarily need to do the same evaluation. If you have any questions feel free to contact me.

Kevin D. Czerniakowski, P.E.
Section Chief
Facility Construction & Engineering
Support Section
Office of Water Quality
IDEM
317-234-8226

From: Gretta Preston <gpreston@rqaw.com>
Sent: Tuesday, August 22, 2023 9:48 AM

To: Czerniakowski, Kevin <KCzernia@idem.IN.gov>
Cc: Whitney Weidenbenner <wweidenbenner@rqaw.com>; Parikshak, Dharmendra <DPariksh2@idem.IN.gov>; Dudley, Charity <CDudley@idem.IN.gov>; Odonnell, Alissa <AOdonnel@idem.IN.gov>
Subject: RE: Salt Creek Wastewater Utilities - PER for Review

---

No problem, thank you for letting us know!

Gretta Preston
Staff Engineer – Water/ Wastewater

RQAW | DCCM
317-588-1773 p

From: Czerniakowski, Kevin <KCzernia@idem.IN.gov>
Sent: Tuesday, August 22, 2023 8:33 AM
To: Gretta Preston <gpreston@rqaw.com>
Cc: Whitney Weidenbenner <wweidenbenner@rqaw.com>; Parikshak, Dharmendra <DPariksh2@idem.IN.gov>; Dudley, Charity <CDudley@idem.IN.gov>; Odonnell, Alissa <AOdonnel@idem.IN.gov>
Subject: RE: Salt Creek Wastewater Utilities - PER for Review

We'll try to get you something this week……we've got upcoming deadlines on some of our in-house permits that we are trying to meet.

Kevin D. Czerniakowski, P.E.
Section Chief
Facility Construction & Engineering
Support Section
Office of Water Quality
IDEM
317-234-8226

From: Gretta Preston <gpreston@rqaw.com>
Sent: Monday, August 21, 2023 2:32 PM
To: Czerniakowski, Kevin <KCzernia@idem.IN.gov>
Cc: Whitney Weidenbenner <wweidenbenner@rqaw.com>; Parikshak, Dharmendra <DPariksh2@idem.IN.gov>; Dudley, Charity <CDudley@idem.IN.gov>; Odonnell, Alissa <AOdonnel@idem.IN.gov>
Subject: RE: Salt Creek Wastewater Utilities - PER for Review

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Hello!

I am following up to see if you all have an estimation on when you will be done reviewing so that we may plan accordingly. Let me know if you have an approximate date and if you have any further questions.

Thank you!

Gretta Preston
Staff Engineer – Water/ Wastewater

RQAW | DCCM
317-588-1773 p

From: Czerniakowski, Kevin <KCzernia@idem.IN.gov>
Sent: Thursday, August 17, 2023 8:25 AM
To: Whitney Weidenbenner <wweidenbenner@rqaw.com>; Odonnell, Alissa <AOdonnel@idem.IN.gov>; Gretta Preston <gpreston@rqaw.com>; Aaron Crow <acrow@rqaw.com>
Cc: Parikshak, Dharmendra <DPariksh2@idem.IN.gov>; Dudley, Charity <CDudley@idem.IN.gov>
Subject: RE: Salt Creek Wastewater Utilities - PER for Review

Thanks Whitney and all – let us look through the Amphidrome info and we'll let you know if we have any questions.

Kevin D. Czerniakowski, P.E.
Section Chief
Facility Construction & Engineering
Support Section
Office of Water Quality
IDEM
317-234-8226

From: Whitney Weidenbenner <wweidenbenner@rqaw.com>
Sent: Wednesday, August 16, 2023 4:19 PM
To: Odonnell, Alissa <AOdonnel@idem.IN.gov>; Gretta Preston <gpreston@rqaw.com>; Aaron Crow <acrow@rqaw.com>
Cc: Czerniakowski, Kevin <KCzernia@idem.IN.gov>; Parikshak, Dharmendra <DPariksh2@idem.IN.gov>; Dudley, Charity <CDudley@idem.IN.gov>
Subject: RE: Salt Creek Wastewater Utilities - PER for Review

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Hello Alissa,

Please see the below responses in RED.

Link to OneDrive for Amphidrome Items: Amphidrome Data

Whitney Weidenbenner, PE
Project Engineer – Water/ Wastewater

RQAW | DCCM

From: Odonnell, Alissa <AOdonnel@idem.IN.gov>
Sent: Wednesday, August 9, 2023 5:26 PM
To: Gretta Preston <gpreston@rqaw.com>; Aaron Crow <acrow@rqaw.com>; Whitney Weidenbenner <wweidenbenner@rqaw.com>
Cc: Czerniakowski, Kevin <KCzernia@idem.IN.gov>; Parikshak, Dharmendra <DPariksh2@idem.IN.gov>; Dudley, Charity <CDudley@idem.IN.gov>
Subject: RE: Salt Creek Wastewater Utilities - PER for Review

Good Evening Gretta,

I was able to review the PER and discuss my findings with my coworkers. There appear to be various points raised in the PER that require clarification. Among the most important issues that need to be addressed are:

1. Flows and Loadings. To identify patterns, IDEM prefers to examine at least three years of MRO data to account for seasonal fluctuations. Based on the information you gave and further months of Monthly Reports of Operation (MRO) in IDEM's virtual filing cabinet, there were reservations about the plant's proposed capacity of 60,000 GPD.
    - The average flow into the plant looks to be less than 4,000 GPD, meaning that the peak design flow exceeds 15x the average design flow. IDEM is concerned about how the facility will run on a daily basis with such low incoming flows yet designed for high peaks.

      We downloaded and summarized data from the past 3 years of MROs to determine that the average flow rate currently is 3,700 gpd with a peak flow rate of 29,800 gpd.

      The new plant was conceptualized with the intent of doubling the current flow rates. This conclusion was made to safeguard the community's need for a new plant in the future once more homeowners retire to become full time residents and/or more lots are sold and built on. This meant an ADF of approximately 8,000 and a PDF of 60,000.

      We would plan to keep the existing NPDES permit of 15,000 GPD.

    - In addition, Ten State Standards 65.1 states "The use of flow equalization should be considered where significant variations in organic and hydraulic loadings are expected."
      Flow equalization is an inherent part of the Amphidrome system. The manufacturer has confirmed that the system would be able to treat the current average volumes as well as peak future volumes.

2. Flow Calculation Factor and Peaking Factor. The PER employs a "SCE Average Home" of 105 gpd/home as part of the lift station calculations and to justify the plant's total peak flow of 60,000 GPD. Please keep in mind that IDEM only permitted a lower flow calculation factor of 175 GPD/house for low-pressure sewer systems. Furthermore, IDEM is confused how the PF of 7.86 was determined.

Please see the above description that MROs were used to determine the average and peak flow rates.

- Not only is this plant's collection system gravity, but there is no supporting data for this SCE average home value. If the proposed unit serviced description differs from any of the flows listed in 327 IAC 3-6-11, a technical standard alternative demonstration in accordance with 327 IAC 3-6-32 must be submitted.

  The flow rate of 105 gallons per home was determined by MROs as well as the peaking factor. We have discussed this more with IDEM on a call and we are all now understanding!

- The peaking factor is 2.096 when using the reported equivalent population of 77 (which is also not explained anywhere) and the stated Ten States Standards PF equation. Even with the 105 GPD/house SEC average home value, the peak design flow would be 16,065 GPD rather than the stated 60,247 GPD.

3. Amphidrome. As of this date, the proposed Amphidrome system is a new technology / equipment that has not yet been presented to this Office, or no information about it could be found in our records. Please provide performance data from other comparable wastewater treatment facilities (flow capacity and waste strength concentrations), independent third-party evaluation, and/or pilot testing to demonstrate the efficacy of the proposed system.

   - The only comparable data offered in the PER is based on existing system layouts rather than flow / performance. While it is acknowledged that they have US EPA ETI and New Jersey Pinelands Commission Alternative Design Treatment Systems Pilot Program testing for their Single Family Systems, IDEM needs this same kind of information for the Large Systems.

     This has been requested. I have attached what Amphidrome sent us; however, it is all from MA. I have requested information from their nearest similar-sized facilities. We know they have installations in MO and IA. Please let us know if you have any trouble accessing the information provided, and if this is sufficient. Once we do receive more data from closer facilities, I will be sure to share it with you. Note that items included are: 3rd Party Verification Report Discussing the System and its Results (Sections on Mass Loading and Stress Tests Provided), Data from the 3rd Party Verification, and Data from 4 other similar units in Massachusetts.

Rather than writing a bunch of technical comments, I believe it would be more helpful to hold a Teams meeting regarding the aforementioned issues before moving further with the project. We are available between 10 a.m. and 2 p.m. on any day from August 14 to August 22. Only the 10 a.m. slot on August 23, 24, and 25th works for everyone. Please send an invitation to a Teams meeting that is convenient for your parties to myself and Kevin, Dharmen, and Charity (in the CC).

Please feel free to contact me if you have any further questions.

IDEM
INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
EST. 1986

Ms. Alissa O'Donnell | Project Engineer | Office of Water
Facility Construction and Engineering Support Section

T 317 232 8646 E aodonnel@idem.in.gov
A 100 N. Senate Ave, IGCN, Suite 1255 | Indianapolis, IN 46204

W https://www.in.gov/idem/cleanwater/2431.htm

Help us improve!
IDEM values your feedback

From: Gretta Preston <gpreston@rqaw.com>
Sent: Tuesday, August 1, 2023 12:32 PM
To: Odonnell, Alissa <AOdonnel@idem.IN.gov>; Aaron Crow <acrow@rqaw.com>; Whitney Weidenbenner <wweidenbenner@rqaw.com>
Cc: Nunnery, Malishia (Missy) <mnunnery@idem.IN.gov>; Czerniakowski, Kevin <KCzernia@idem.IN.gov>; Dudley, Charity <CDudley@idem.IN.gov>
Subject: RE: Salt Creek Wastewater Utilities - PER for Review

**** This is an EXTERNAL email. Exercise caution. DO NOT open attachments or click links from unknown senders or unexpected email. ****

Thank you! We look forward to receiving your feedback,

Gretta Preston
Staff Engineer – Water/ Wastewater

RQAW | DCCM
317-588-1773 p

From: Odonnell, Alissa <AOdonnel@idem.IN.gov>
Sent: Tuesday, August 1, 2023 12:22 PM
To: Gretta Preston <gpreston@rqaw.com>
Cc: Nunnery, Malishia (Missy) <mnunnery@idem.IN.gov>; Czerniakowski, Kevin <KCzernia@idem.IN.gov>; Dudley, Charity <CDudley@idem.IN.gov>
Subject: RE: Salt Creek Wastewater Utilities - PER for Review

Good Afternoon Gretta,

With Kevin on vacation and Charity unavailable, I will look into this for you. I'll look into this later today and get back to you by the 10th with any comments I have.

Please feel free to contact me if you have any further questions.

Ms. Alissa O'Donnell | Project Engineer | Office of Water
Facility Construction and Engineering Support Section

T 317 232 8646 **E** aodonnel@idem.in.gov
A 100 N. Senate Ave, IGCN, Suite 1255 | Indianapolis, IN 46204

W https://www.in.gov/idem/cleanwater/2431.htm

From: Gretta Preston <gpreston@rqaw.com>
Sent: Tuesday, August 1, 2023 9:42 AM
To: Dudley, Charity <CDudley@idem.IN.gov>; Odonnell, Alissa <AOdonnel@idem.IN.gov>
Cc: Nunnery, Malishia (Missy) <mnunnery@idem.IN.gov>
Subject: FW: Salt Creek Wastewater Utilities - PER for Review

Hello All,

I am forwarding this PER for our project in Salt Creek Estates located on Lake Monroe. With Kevin being OOO I wanted to ensure this gets to other members of the team.

For context of the situation and this project, IDEM agreed to preliminarily check over this PER as an early stage in our QAQC. The idea was to ensure that our proposed project would meet IDEM expectations for system updates. This report focuses exclusively on the wastewater aspects of the utility; a water report will be sent in the coming weeks.

Gretta Preston
Staff Engineer – Water/ Wastewater

RQAW | DCCM
317-588-1773 p

From: Gretta Preston
Sent: Tuesday, August 1, 2023 9:27 AM
To: Czerniakowski, Kevin <KCzernia@idem.IN.gov>
Cc: Aaron Crow <acrow@rqaw.com>; Whitney Weidenbenner <wweidenbenner@rqaw.com>
Subject: RE: Salt Creek Wastewater Utilities - PER for Review

Hello,

I have attached a smaller file size of the below email as it may not have reached your inbox. Please send confirmation of receipt.

Thank you,

Gretta Preston
Staff Engineer – Water/ Wastewater

RQAW | DCCM
317-588-1773 p

From: Gretta Preston
Sent: Monday, July 31, 2023 5:20 PM
To: Czerniakowski, Kevin <KCzernia@idem.IN.gov>
Cc: Aaron Crow <acrow@rqaw.com>; Whitney Weidenbenner <wweidenbenner@rqaw.com>
Subject: Salt Creek Wastewater Utilities - PER for Review

Attached is the Wastewater PER for Salt Creek Services, Inc. Please review and provide comments/approval back to us to incorporate by Thursday 08/10.

If it is more convenient, please let us know if you would like some time to review the document via Teams and we would be happy to begin coordinating a meeting with you.

Gretta Preston
Staff Engineer – Water/ Wastewater

RQAW | DCCM

A 8770 North Street, Suite 110, Fishers, IN 46038
P 317-588-1773
RQAW.com |

APPENDIX I: NET PRESENT WORTH

Wastewater Systems Net Present Worth Alternatives Compared to Selected			
	Selected Alternative 1-2	Alternative 1	Alternative 2
Captial Cost	$2,338,095.00	$146,590.00	$2,191,505.00
O&M Cost	$637,095.86	$51,478.97	$585,616.89
O&M Present Worth Cost	$623,404.05	$49,866.55	$573,537.49
Salvage Value	$543,666.67	$44,150.00	$499,516.67
Salvage Value Present Worth	$346,695.66	$29,711.68	$316,983.98
Net Present Worth	$2,850,495.19	$199,357.29	$2,651,137.91
NPW Compared to Selected Alternative	100.00%	6.99%	93.01%

The selected alternative does not have the lowest Net Present Worth (NPW) due to the recommended selection being of all alternatives. A no-action alternative was also considered; however, a Net Present Worth did not apply, as this alternative was not feasible given the condition of the system. Additionally, regionalization was not considered in this evaluation due to the strong recommendation against this choice, as explained in detail in Section 4.4 of this PER. In evaluating the NPW, construction cost as well as operations and maintenance cost were considered, as well as all capital improvements needed within the study period of 20 years. The combination of all alternatives is the costliest selection to make, however as explained within Chapter 5, each alternative plays a crucial part in the combined effort to improve the overall wastewater system. While each alternative individually improves the system, the best possible outcome is to utilize all identified alternatives in order to create a more complete and updated system that services the customers of Salt Creek well into the future. See the NPW evaluation of each alternative to follow.

Construction of Lift Station Rehabilitation
20-Year Life Cycle Cost Summary - Alternative 1

Year of Proposed Construction (Year):	2025
Study Period (years):	20
Yearly Power Cost Increase:	3.50%
Yearly Labor Cost Increase:	2.42%
Discount Rate Use:	2.00%

Notes:	
1	Construction based on today's costs using average inflation of 3% per year
2	Yearly power cost increase based on EIA 9-year Industrial Electric Power Rates for 2022: https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_3
3	Yearly Labor Cost increase based on BLS: Employment Cost Index: Total Compensation for Private Industry workers in Natural resources, construcation, and maintenance 2010-2020: https://fred.stlouisfed.org/series/CIU2010000400000I
4	Real Discount rate taken from Appendix C of OMB circular Dated December 2022

Construction of Lift Staion Rehabilitation	
Item	2024 Present Worth
Construction and Capital Costs	$146,590.00
Power Costs	$31,000.00
Yearly Electrical Maintenance Costs	$3,000.00
Capital Improvement Costs	$48,478.97
Salvage Value	$29,711.68
Total Year 2024 Net Present Worth:	$199,357.29

Notes:	
1	Costs in 2024 using the yearly increase rates for construction, power, and labor for construction, power and O&M respectively. Positive values indicate costs.

Alternative 1 - Lift Station Rehabilitation
Capital Improvements Costs
Replacement/Maintenance Schedule

Year after Construction	Work Done	2024 Cost	F/P_{2024} Factor 1	Future Dollars	P_{2024}/F Factor2	2024 Present Worth
1	Operations Labor	$1,100	1.02	$1,126.57	0.98	$1,104.48
2	Operations Labor	$1,100	1.05	$1,153.78	0.96	$1,108.98
3	Operations Labor	$1,100	1.07	$1,181.65	0.94	$1,113.49
4	Operations Labor	$1,100	1.10	$1,210.19	0.92	$1,118.03
5	Operations Labor	$1,100	1.13	$1,239.42	0.91	$1,122.58
6	Operations Labor	$1,100	1.15	$1,269.35	0.89	$1,127.15
7	Operations Labor	$1,100	1.18	$1,300.01	0.87	$1,131.74
8	Operations Labor	$1,100	1.21	$1,331.41	0.85	$1,136.35
9	Operations Labor	$1,100	1.24	$1,363.57	0.84	$1,140.97
10	Replace Cutter Pump	$12,000	1.27	$15,234.60	0.82	$12,497.67
10	Operations Labor	$1,100	1.27	$1,396.50	0.82	$1,145.62
11	Operations Labor	$1,100	1.30	$1,430.23	0.80	$1,150.28
12	Operations Labor	$1,100	1.33	$1,464.78	0.79	$1,154.97
13	Operations Labor	$1,100	1.36	$1,500.16	0.77	$1,159.67
14	Operations Labor	$1,100	1.40	$1,536.39	0.76	$1,164.39
15	Operations Labor	$1,100	1.43	$1,573.50	0.74	$1,169.13
16	Operations Labor	$1,100	1.47	$1,611.51	0.73	$1,173.90
17	Operations Labor	$1,100	1.50	$1,650.43	0.71	$1,178.68
18	Operations Labor	$1,100	1.54	$1,690.29	0.70	$1,183.47
19	Operations Labor	$1,100	1.57	$1,731.12	0.69	$1,188.29
20	Operations Labor	$1,100	1.61	$1,772.93	0.67	$1,193.13
20	Replace Cutter Pump	$12,000	1.61	$19,341.07	0.67	$13,015.99
Capital Improvements 2024 Present Worth:						**$48,478.97**

Construction of WWTP Replacement
20-Year Life Cycle Cost Summary - Alternative 1

Year of Proposed Construction (Year):	2025
Study Period (years):	20
Yearly Power Cost Increase:	0.10%
Yearly Labor Cost Increase:	2.42%
Discount Rate Use:	2.30%

Notes:	
1	Construction based on today's costs using average inflation of 3% per year
2	Yearly power cost increase based on EIA 9-year Industrial Electric Power Rates for 2022: https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_3
3	Yearly Labor Cost increase based on BLS: Employment Cost Index: Total Compensation for Private Industry workers in Natural resources, construcation, and maintenance 2010-2020: https://fred.stlouisfed.org/series/CIU2010000400000I
4	Real Discount rate taken from Appendix C of OMB circular Dated December 2022

Construction of WWTP Replacement	
Item	2024 Present Worth
Construction and Capital Costs	$2,191,505.00
Power Costs	$191,000.00
Yearly Electrical Maintenance Costs	$24,000.00
Capital Improvement Costs	$561,616.89
Salvage Value	$316,983.98
Total Year 2024 Net Present Worth:	$2,651,137.91

Notes:	
1	Costs in 2024 using the yearly increase rates for construction, power, and labor for construction, power and O&M respectively. Positive values indicate costs.

Alternative 2 WWTP Replacement
Capital Improvements Costs
Replacement/Maintenance Schedule

Year after Construction	Work Done	2024 Cost	F/P_{2024} Factor 1	Future Dollars	P_{2024}/F Factor2	2024 Present Worth
1	Operations Labor	$20,750	1.02	$21,251.18	0.98	$20,773.39
1	Sludge Disposal + Chemical Addition	$7,000	1.02	$7,169.07	0.98	$7,007.89
2	Operations Labor	$20,750	1.05	$21,764.47	0.96	$20,796.81
2	Sludge Disposal + Chemical Addition	$7,000	1.05	$7,342.23	0.96	$7,015.79
3	Operations Labor	$20,750	1.07	$22,290.15	0.93	$20,820.26
3	Sludge Disposal + Chemical Addition	$7,000	1.07	$7,519.57	0.93	$7,023.70
4	Operations Labor	$20,750	1.10	$22,828.53	0.91	$20,843.73
4	Sludge Disposal + Chemical Addition	$7,000	1.10	$7,701.19	0.91	$7,031.62
5	Operations Labor	$20,750	1.13	$23,379.92	0.89	$20,867.23
5	Sludge Disposal + Chemical Addition	$7,000	1.13	$7,887.20	0.89	$7,039.55
6	Operations Labor	$20,750	1.15	$23,944.62	0.87	$20,890.75
6	Sludge Disposal + Chemical Addition	$7,000	1.15	$8,077.70	0.87	$7,047.48
7	Operations Labor	$20,750	1.18	$24,522.96	0.85	$20,914.31
7	Sludge Disposal + Chemical Addition	$7,000	1.18	$8,272.81	0.85	$7,055.43
8	Operations Labor	$20,750	1.21	$25,115.27	0.83	$20,937.88
8	Sludge Disposal + Chemical Addition	$7,000	1.21	$8,472.62	0.83	$7,063.38
9	Operations Labor	$20,750	1.24	$25,721.89	0.81	$20,961.49
9	Sludge Disposal + Chemical Addition	$7,000	1.24	$8,677.26	0.81	$7,071.35
10	Operations Labor	$20,750	1.27	$26,343.15	0.80	$20,985.12
10	Sludge Disposal + Chemical Addition	$7,000	1.27	$8,886.85	0.80	$7,079.32
11	Operations Labor	$20,750	1.30	$26,979.43	0.78	$21,008.78
11	Sludge Disposal + Chemical Addition	$7,000	1.30	$9,101.49	0.78	$7,087.30
12	Operations Labor	$20,750	1.33	$27,631.07	0.76	$21,032.46
12	Sludge Disposal + Chemical Addition	$7,000	1.33	$9,321.33	0.76	$7,095.29
13	Operations Labor	$20,750	1.36	$28,298.45	0.74	$21,056.17
13	Sludge Disposal + Chemical Addition	$7,000	1.36	$9,546.47	0.74	$7,103.29
14	Operations Labor	$20,750	1.40	$28,981.95	0.73	$21,079.91
14	Sludge Disposal + Chemical Addition	$7,000	1.40	$9,777.04	0.73	$7,111.30
15	Operations Labor	$20,750	1.43	$29,681.96	0.71	$21,103.68
15	Sludge Disposal + Chemical Addition	$7,000	1.43	$10,013.19	0.71	$7,119.31
16	Operations Labor	$20,750	1.47	$30,398.88	0.70	$21,127.47
16	Sludge Disposal + Chemical Addition	$7,000	1.47	$10,255.04	0.70	$7,127.34
17	Operations Labor	$20,750	1.50	$31,133.11	0.68	$21,151.29
17	Sludge Disposal + Chemical Addition	$7,000	1.50	$10,502.74	0.68	$7,135.37
18	Operations Labor	$20,750	1.54	$31,885.08	0.66	$21,175.13
18	Sludge Disposal + Chemical Addition	$7,000	1.54	$10,756.41	0.66	$7,143.42
19	Operations Labor	$20,750	1.57	$32,655.21	0.65	$21,199.00
19	Sludge Disposal + Chemical Addition	$7,000	1.57	$11,016.22	0.65	$7,151.47
20	Operations Labor	$20,750	1.61	$33,443.94	0.63	$21,222.90
20	Sludge Disposal + Chemical Addition	$7,000	1.61	$11,282.29	0.63	$7,159.53
					Capital Improvements 2022 Present Worth:	**$561,616.89**