This is a business meeting of the governing body for the City of Herington. There is no implied or expressed right for persons outside the governing body to speak or voice their opinion unless specifically recognized by the chair.

Regular Meeting
June 21, 2022
6:00 p.m.

1. Pledge of Allegiance

2. Call to Order

3. Consider the Minutes of the Regular City Commission Meeting on June 7, 2022

   Motion _____ Seconded _____ Action _____
   Commissioner Castleberry, Commissioner Bell, Commissioner Urbanek,
   Commissioner Donahue, Mayor Gares

4. Public Forum

5. Additional Agenda Items

6. Approval of Agenda

   Motion _____ Seconded _____ Action _____
   Commissioner Castleberry, Commissioner Bell, Commissioner Urbanek,
   Commissioner Donahue, Mayor Gares

7. Presentation and Discussion of the Wastewater Treatment Plant Preliminary Engineering Report for Phase 2

8. Presentation and Discussion on the Pool Preliminary Engineering Report

9. Discuss and Action on Revisions to the CVB By-Laws

   Motion _____ Seconded _____ Action _____
   Commissioner Castleberry, Commissioner Bell, Commissioner Urbanek,
   Commissioner Donahue, Mayor Gares

10. Discuss and Action on Budget Workshop Dates

    Motion _____ Seconded _____ Action _____
    Commissioner Castleberry, Commissioner Bell, Commissioner Urbanek,
    Commissioner Donahue, Mayor Gares

11. Discuss and Action on Revenue Neutral Rate Hearing and Budget Hearing Date

    Motion _____ Seconded _____ Action _____
    Commissioner Castleberry, Commissioner Bell, Commissioner Urbanek,
    Commissioner Donahue, Mayor Gares

12. City Manager Comments

13. Commissioner Comments

14. Adjourn

Motion _____ Seconded _____ Action _____
Commissioner Castleberry, Commissioner Bell, Commissioner Urbanek,
Commissioner Donahue, Mayor Gares

To join the City Commission meetings from your computer, tablet, or smartphone, go to:
https://www.youtube.com/channel/UBbvSBw614w85XQHSX0S1BXg
Public Forum Comments can be dropped in the deposit box or email to
cityoffice@cityofherington.com

City of Herington Kansas

PRELIMINARY ENGINEERING REPORT

Wastewater Treatment Facility

Herington, Kansas

Prepared June 2022 By:

SMH CONSULTANTS

City of Herington Kansas

PRELIMINARY ENGINEERING REPORT

Wastewater Treatment Facility

Herington, Kansas

City Council
Eric Gares, Mayor
Robbin Bell, Commissioner
Ben Castleberry, Commissioner
Vance Donahue II, Commissioner
Debra Urbanek, Commissioner

City Manager
Branden Dross

Wastewater Treatment Plant Operators
Dennis Albrecht
Jason Alt

Submitted June 2022
SMH Consultants
2017 Vanesta Place, Suite 110
Manhattan, KS 66503
785-776-0541
SMH File No. 2110-0433

TODD J. ANDERSON LICENSED 13692 6/8/22 KANSAS PROFESSIONAL ENGINEER

SECTION 1 - INTRODUCTION AND INFORMATION

Introduction

Upgraded in 1979-1980 to its current configuration, the City of Herington's wastewater treatment facility (WWTF) has been in service over 40 years. Increasingly, the City is experiencing operational and maintenance issues described more fully later in this report. Additionally, the aging plant will struggle to achieve the anticipated effluent discharge permit limits without appreciable upgrades to the facility. To significantly reduce the annual expenditures on addressing these issues and to provide a plan for meeting the future discharge limits, the City has hired SMH Consultants to prepare a preliminary engineering report detailing the issues with the WWTF, explore alternatives for addressing the problems, develop cost estimates for the various alternatives, and make recommendations as to the most cost-effective alternative.

Pertinent Information

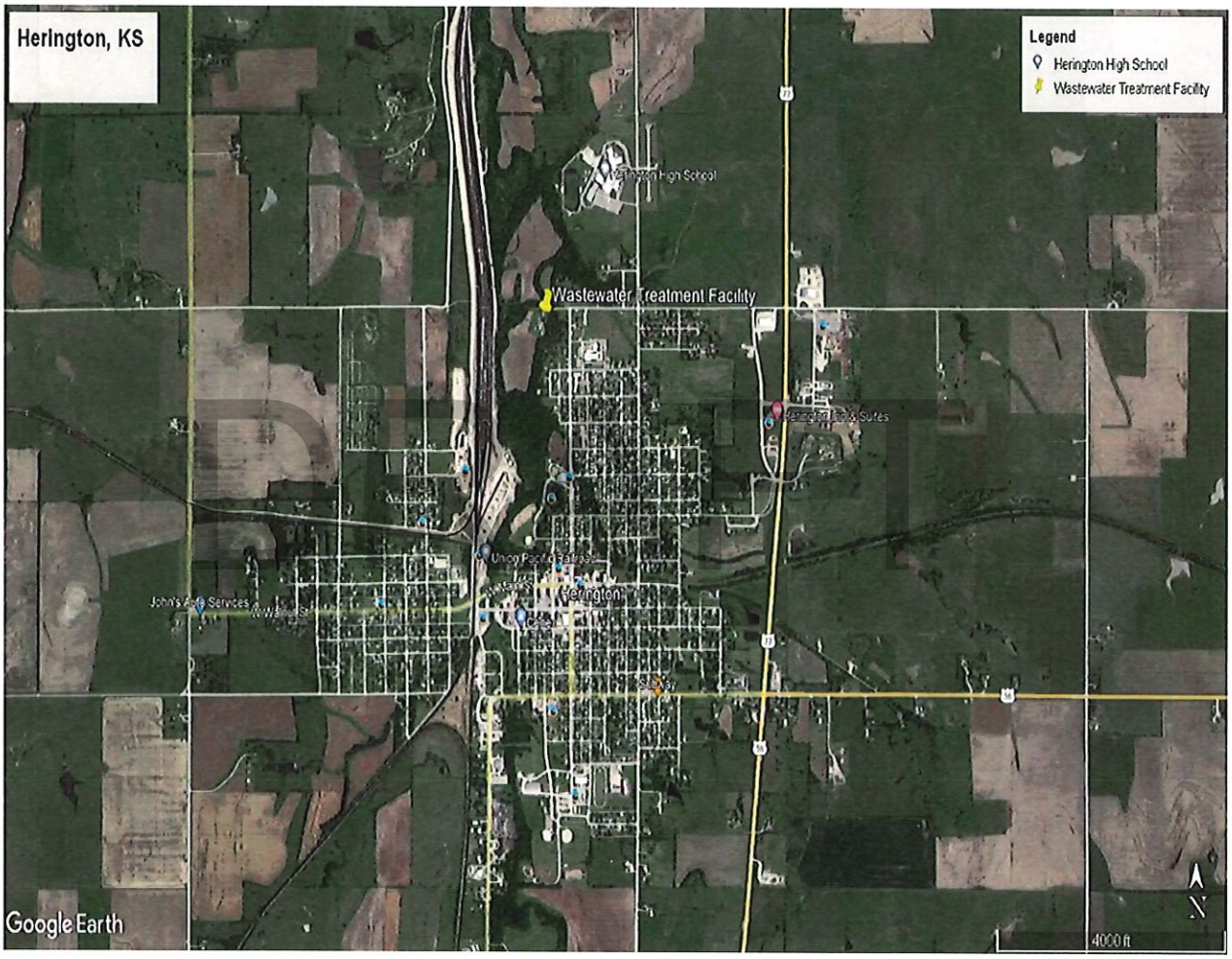
Owner: The City of Herington, Kansas
Attn: Branden Dross, City Manager
PO Box 31
17 N Broadway
Herington, KS 67449
Ph: 785-258-2271

Engineer: SMH Consultants
Attn: Todd Anderson, PE
2017 Vanesta Place, Suite 110
Manhattan, KS 66503
Ph: 785-776-0541

Date: June 2022

SECTION 2 - PROJECT LOCATION

The City of Herington is primarily located in parts of Sections 1, 11, 12, and 13, Township 16 South, Range 4 East and Section 7, Township 16 South, Range 5 East, Dickinson County, Kansas. An aerial photograph of Herington is shown below. The project will consist of improvements to, and contained entirely within, the existing wastewater treatment facility grounds. No additional land requirements are anticipated with the associated improvements. The WWTF location is also depicted in the photograph below.



SECTION 3 - TREATMENT PLANT COMPONENT DESCRIPTIONS, PROBLEMS, DOCUMENTATION, and CAUSES

With the exception of the ultraviolet disinfection process and the recently added sludge press, the City of Herington's existing wastewater treatment facility was last upgraded and placed into service in 1979-1980. The major components of the facility currently operating include three (3) influent screw pumps, a manual bar screen, and a Parshall flume – all within the headworks area; an aeration basin comprised of four (4) separate cells where the biological aspects of the treatment process occur; two (2) final clarifiers; a liquid sludge aerobic digester; the recently added sludge press and sludge storage pad; two (2) return sludge pumps; one (1) waste sludge pump; two (2) aeration basin/aerobic digester blowers; an ultraviolet disinfection system; and a standby generator that can provide power to only a small portion of the plant. Additionally, an administration building on site houses office space, laboratory space, and various plant monitoring and operational controls and equipment. The primary issues facing the City of Herington regarding the WWTF are the age and physical condition of the components and the limited ability the components currently possess to achieve modern discharge requirements. The following is an evaluation of the existing treatment plant components.

Treatment Plant Headworks. As indicated above, currently operating headworks components consist of the three influent pumps, the manual bar screen, and the Parshall flume. When the WWTF was designed in 1978 and subsequently constructed in 1979-1980, a grit removal system and a comminuter were parts of the treatment facility. The current plant operator has been operating the facility since 1990 and the grit removal system and comminuter have not been operative during his employment.

The three influent pumps are the original pumps from 1980. The bearings and motors on these have been replaced/rebuilt numerous times as necessary. The screw pump flights and shafts are more than 40 years old and the remaining life of these is unknown. Furthermore, replacement parts for these pumps are very difficult to obtain and, upon failure, will likely have to be custom built - if a builder of such components can be located. Furthermore, these pumps are not equipped with variable frequency drives, are not energy efficient, and are more costly to operate as such. Finally regarding the influent pumps, the bracketing, bracing, cages, etc. are all original components and are rapidly approaching the end of their useful lives.

The grit removal system originally consisted of an air lift grit chamber and a grit dewatering conveyor. These have not been operative since at least 1990. A comminutor was originally located in one of the available influent channels, but has not been in place since before 1990 as well. Sanitary sewer flow is delivered directly to the manual bar screen as a result. In short, the remaining, operating headworks items are the manual bar screen and the Parshall flume. The manual bar screen is merely a grate placed in the wastewater plant flow channel to collect large debris items such as rags, sticks, and large grease balls. The operator must remove this debris with a rake daily. During periods of increased flow such as after a rainfall event, the

operator must rake the debris from the grate many times a day, frequently as often as every fifteen (15) minutes. The Parshall flume is a precisely designed channel of strictly specified geometry used for measuring the flow into the treatment plant. A flow "meter" sits atop the end of the Parshall flume and sends the measurement to the administration building where the incoming flow is recorded on virtually a continual basis. Upon leaving the Parshall flume, flow enters the aeration basin division box and then on to the aeration basin.

Aeration Basin. The aeration basin is compartmentalized into four separate "cells". Three cells were in place when the wastewater plant was upgraded in 1980. During the 1980 upgrade, a fourth cell was added. All of the associated aeration basin piping and diffusers were installed in 1980. Only a few segments of piping above the water level have been replaced since then. The condition of the submerged diffusers and piping is unknown. However given the age, material type of these items, and the environment in which they reside, the end of their useful life is rapidly approaching. Overall, the basin's exposed concrete is in good condition. There isn't any indication that the concrete below the water level is in poor condition and historically, based on other wastewater treatment facilities, concrete submerged under these conditions remains in good shape for decades. The blowers that supply the air to the aeration basin were installed in 1980 as well. The blower bearings have been replaced and the blowers' electric motor bearings have been replaced at least three times since 1990 when the current treatment plant operator began working at the facility. However, most of the remaining blower components are original and are over 40 years in age.

Air from the blowers is not only supplied to the aeration basin, but to the liquid sludge aerobic digester as well. The underground piping between the blower building and both the aeration basin and digester is the original piping and its condition is largely unknown. There has been a history of leaks in this piping and there are minor leaks in this piping currently. Some gaskets in the piping have been replaced, but the majority of the gaskets are the original gaskets.

As the aeration basin is the heart of the biological process in wastewater treatment and where considerable activity takes place necessary to meet nutrient removal, such as meeting the anticipated future limits on total nitrogen and total phosphorus, a more detailed discussion of the basin is included later in this report under the heading ***'Nutrient Removal'***.

Final Clarifiers. The working components of both final clarifiers were completely rebuilt within the last 10-11years. Both clarifiers are operating well and the concrete of each is in good condition. It is anticipated that few, if any, repairs or upgrades will be needed on the clarifiers for several years.

Return and Waste Sludge Pumps. There are two return sludge pumps and one waste sludge pump housed in the sludge pump station. Both return sludge pumps are approximately 16-20 years old. The waste sludge pump is less than 10 years old. All three pumps are currently

operating well. However, a widely accepted rule of thumb is that they will need rebuilt or replaced after about 10 to 15 years of use.

Liquid Sludge Aerobic Digester and Sludge Storage Basin. Waste activated liquid sludge is pumped from the sludge pump station to the aerobic digester and sludge storage basin located near the southeast corner of the wastewater treatment plant. Contained within this basin are considerable feet of piping, both submerged and above the liquid level, that serve to convey sludge and air. Additionally submerged are diffusers near the bottom of the basin which serve to distribute and disseminate air for the vital function of sludge digestion.

Over the years, several of the vertical drop segments of the piping had become so severely corroded that they were replaced. Currently, many segments of the exposed piping are corroded and are rapidly approaching the point where they will need to be replaced. The condition of the basin's diffusers and submerged piping – both air piping and sludge transporting piping – is unknown. Given the harsh, corrosive environment inherent in this basin and the physical condition of the exposed piping, it is reasonable to infer that the submerged components are in need of replacement or will need replaced in the very near future. What can be seen of the exposed concrete appears to be in fairly good condition and no concrete-related issues have been reported with this basin. Finally, the blowers supplying the air to the basin were installed in 1980 and are approaching the end of their useful life. Furthermore, these blowers are not equipped with variable frequency drives, are energy inefficient, and costly to operate. Modern blowers operated with variable frequency drives are capable of delivering the air required to meet the varying conditions within the treatment process in a considerably more efficient manner.

Sludge Press and Sludge Storage Pad. In 2021, a sludge dewatering press and a covered, dewatered sludge storage pad were added to the wastewater treatment facility. Prior to this addition, the only manner sludge could be stored was to allow liquid sludge to build up in the aerobic digester and clarifiers until such time as the agricultural disposal fields were available to the operator for hauling the liquid sludge and sludge disposal. The buildup of the sludge in the treatment plant led to difficulties in maintaining a consistent environment within the plant and resulted in more difficulty in operating the facility and meeting the discharge permit limits. The City of Herington elected to add the sludge press and storage pad and these improvements have resulted in a more consistent treatment process.

Ultraviolet Disinfection Facility. Ultraviolet light disinfection capabilities were added to the treatment plant in 2001 and the system is operating quite well. The ultraviolet light bulbs are routinely cleaned and replaced as necessary. The building and components of the disinfection process are in good physical condition and replacement parts for the operating components are currently readily available. It is anticipated that little, if any, improvements will be necessary to this portion of the treatment plant for the foreseeable future.

Standby Generator. The existing 1978 GM Bedford diesel standby generator located to the north of the administration building is undersized and is in poor to fair condition. The existing generator can only provide power to the influent pumps and the return sludge pumps. The Kansas Department of Health and Environment (KDHE) *Minimum Standards of Design for Water Pollution Control Facilities*, which govern wastewater treatment facilities, require that sufficient standby power be provided to allow for a minimum of primary treatment at all times. Primary treatment is considered to include all treatment within a treatment facility prior to the biological treatment of the wastewater stream. In the case of Herington's WWTP, this would include the influent pumps and any headworks equipment. The existing generator currently can provide power to the influent pumps and return pumps as mentioned previously, however no additional treatment plant components can be supplied with power from this generator. Finally, the generator was made in England and replacement parts are becoming very difficult to locate.

Nutrient Removal. The upgrades constructed in 1979-1980 were designed to meet what is regarded today as conventional wastewater treatment. Specifically, the improvements were designed to meet discharge requirements for biochemical oxygen demand (BOD), total suspended solids (TSS), ammonia, and pH. Effluent discharge requirements were not in place for total nitrogen and total phosphorus at the time of these upgrades. The reduction of nitrogen and phosphorus from the treatment plant effluent is regarded as nutrient removal in the treatment process.

The City's current discharge permit will expire on August 31, 2024. A copy of this permit is included in Appendix A of this report. Within this permit are total nitrogen and total phosphorus goals or target values the Kansas Department of Health and Environment (KDHE) has directed the City to work toward achieving. KDHE has required the City to monitor total nitrogen and total phosphorus and report those findings to KDHE as a part of the current permit. Recognize that these goals are not currently limits, but may become effluent discharge limits upon the issuance of the new permit in September 2024. If limits are not included in the 2024 discharge permit, it is a virtual certainty that limits will be set for nutrient removal in the very near future.

In the last few years, Herington's WWTF has received assistance toward achieving the nutrient removal goals outlined in the discharge permit. Assistance was provided by an Environmental Trainer from Fort Scott Community College through a contract with KDHE. This trainer provided Herington WWTF staff with technical assistance in analyzing the facility, reviewing past treatment plant performance and past records, evaluating the facilities, and making recommendations to assist the plant in achieving the nutrient reduction goals and likely future limits identified in the discharge permit. Appendix B contains two reports from the Environmental Training summarizing the nutrient removal project.

Herington's aeration basin is compartmentalized in such a way as to be very conducive to nutrient removal. Zones of varying amounts of air (dissolved oxygen) supplied by the blowers

can readily be attained due to the existing aeration basin's configuration and the placement of the submerged diffusers. SMH Consultants is in agreement with the KDHE contracted Environmental Trainer in the belief that the total nitrogen goals can be met by changes in the aeration cycling within the plant. With the additional of new blowers on variable frequency drives, dissolved oxygen controls (probes) that monitor the oxygen levels in the various zones, and the addition of new diffusers, the facility is likely to meet the goals and the likely future limits for total nitrogen.

Attaining the goals for reduction in total phosphorus is more difficult to achieve, but may be possible with the changes made to the aeration system and the development of the differing aeration zones discussed previously. When compared to total nitrogen reduction, biological removal of phosphorus is influenced more by the specific characteristics and composition of the wastewater than by changes in the plant's aeration. An ample "food source" within the wastewater composition must be available to achieve certain levels of phosphorus removal. Many wastewater facilities have to add a chemical such as ferric chloride, ferrous sulfate, alum, or others to supplement the necessary "food source" to achieve the specified limit. Upgrades for the addition of a chemical for phosphorus reduction is typically very simple and consist of the chemical, a small metering pump whereby to add the chemical to the wastewater process, and minor amounts of piping and/or tubing to deliver the chemical.

In summation of the aeration basin and nutrient removal aspects of the facility, we agree with the conclusions of the nutrient reduction project. As stated in the February 12, 2017 letter from Mr. Gerald Grant, PE, Environmental Trainer, (included in Appendix B), *"The plant is very old and has served the City well for many years. It continues to meet all requirements for conventional pollutants such as BOD, TSS, ammonia reduction and disinfection but cannot, as equipped, meet future nutrient reduction requirements nor current permit goals on a consistent basis."*

SECTION 4 - SOLUTION ALTERNATIVES AND RECOMMENDATIONS

Upon a thorough review of the wastewater treatment facility over the last 3-5 years, the WWTF operators, in conjunction with SMH Consultants, have identified the most critical needs for improving the treatment plant and rendering it capable of meeting the pending discharge permit limits. Those critical needs and associated alternatives are discussed below.

Treatment Plant Headworks. Other than the influent pumps necessary to deliver the incoming wastewater stream to the rest of the treatment plant and the required flow measuring device (the Parshall flume), there are essentially no operative headworks components. The previously mentioned manual bar screen is nothing more than a grate collecting the larger items floating in the wastewater stream. Typically, a wastewater treatment facility's headworks, at a minimum, would include some type of mechanical screening capabilities in addition to the existing manual bar screen and some grit removal process. Grit removal is generally considered less significant than screening unless a community has a tremendous grit problem and that would likely be manifested in issues at the WWTF. While it appears there may be an issue with inflow and infiltration within Herington, there hasn't been a recognized problem with grit at the WWTF.

The existing manual bar screen collects only large items in the wastewater stream such as sticks, rags, and large grease balls. As indicated earlier in this report, the operator must physically and manually remove these collected items from the grate by raking them off the bar screen and/or remove them by hand. If the operator fails to do this, the wastewater stream may become virtually blocked at the manual bar screen by the collected debris and the wastewater stream will overflow the channel and spill onto the treatment plant grounds. This is a violation of the treatment plant's operating permit and the operator is required to notify KDHE of this unauthorized discharge. When constructed, the WWTP headworks included a comminutor which may be thought of as a large grinder that grinds debris into much smaller pieces allowing the pieces to travel downstream and ultimately settle out and deposit in the sludge and occasionally become lodged in other downstream components, such as pumps. One alternative would be to merely insert a new comminutor in the location of the previous one. However, better, more modern techniques for removing such debris include the alternative use of a mechanical bar screen instead of a comminutor. Again, the comminutor grinds the debris into smaller factions and allows these smaller pieces to continue downstream. Downstream components within the WWTF will still be impacted by this debris, albeit in a less significant manner than if they were large pieces. It is better, and therefore recommended, to remove this debris from the wastewater stream rather than grind it into pieces. A mechanical bar screen of some type will collect this larger debris (sticks, rags, other larger items) as well as a significant amount of smaller debris (lollipop sticks, feminine hygiene products, and other items that are flushed down toilets) and remove these from the flow. A mechanical screen is designed with an automated "rake" that is timer controlled and/or float controlled that removes the collected debris from the channel and deposits it into a receiving receptacle – typically a trash dumpster.

The operator does not need to be present during the operation of a mechanical screen. Various types of mechanical bar screens are available and it is recommended that a bar screen be installed as an integral part of the next phase of improvements. A cost estimate for the installation of a mechanical bar screen is included in Section 6.

Grit removal may be added to Herington's wastewater treatment facility at some point in the future, but is not recommended at this time. Given the configuration of Herington's plant, it will be costly to properly locate and add grit removal to the headworks. The original headworks did include a grit removal process, however, it was located in a curious location. Typically, in modern wastewater plant headworks design, the grit removal component lies downstream from the screening process. This enables the sticks, rags, etc. to be collected and removed from the stream by the screen prior to the grit removal process. In Herington, the grit removal process is located before the screening process and reportedly would become constantly clogged with rags and other debris. Thus, the grit removal process was bypassed and hasn't been used in over 32 years.

Recall, the influent pumps are inclined screw pumps that are over 40 years old and are rapidly deteriorating. Alternatives for upgrading these pumps include replacing the existing inclined screw pumps with new, inclined screw pumps or constructing a completely new influent pump station equipped with submersible pumps. Either option will include the incorporation of variable frequency drives on the pumps to significantly improve energy efficiency. The existing influent pumps are not equipped with these drives. If a new pump station is constructed, it will be necessary to incorporate a valve vault structure along with the pump station to allow for the maintenance and removal of the submersible pumps as well as allow for the cleaning or "pigging" of the force main piping between the submersible pumps and the receiving channel of the headworks area. Included in Section 6 of this report are preliminary cost estimates for these two options.

Aeration System and Aeration Basin. Alternatives for improvements to the aeration system and basin include: 1). The entire replacement of the basin, including the concrete structure, diffusers, piping, valves, blowers, and aeration control system. 2). Replacement of the diffusers, piping, valves, blowers, and aeration control system within the existing concrete structure. Once again, the improvements are necessary as the components date back to the 1979-1980 upgrade to the WWFT and they are very old, energy inefficient (blowers and diffusers), and physically deteriorating due to age and constant exposure to the elements. As the concrete structure is in good condition, replacement of the concrete basin has been dismissed as an option. Included later in this report is a cost estimate for alternative 2 as listed above.

Inherent in the controls of the proposed screws pumps and aeration basin improvements will be a monitoring system allowing the treatment plant operator(s) to remotely monitor and control various components of the treatment facility. Components monitored and capable of being

controlled remotely will likely include the influent screw pumps and the aeration basin at a minimum. For example, the monitoring system will send alarm signals to the operator's mobile phone if there is a screw pump failure or if they overheat; if the influent level becomes too high; if the aeration basin blowers fail or overheat; etc. Numerous treatment plant components can be monitored and controlled and the status of those items will be relayed via a SCADA system to the operator.

Liquid Sludge Aerobic Digester. There is virtually no alternative to rehabilitating the existing aerobic digester other than completely replacing it. As the existing, exposed concrete of the aerobic digester is in fairly good condition, the option of completely replacing the concrete structure with a new one is unwarranted. The needed improvements at the aerobic digester include new diffusers, new blowers, new piping and valves, and the reconstruction of the supernatant decant weir box. This is due to the age of these components being in excess of 42 years and the physical condition. With very few exceptions, the components are the original components and are nearing the end of their useful lives. Anticipated costs for these improvements are included later in the report.

Standby Generator. As previously discussed, the existing 45 kW standby generator dates back to 1978, was made in England making replacement parts extremely difficult to secure, and is capable of powering only the influent pumps and return sludge pumps. With the addition of a mechanical bar screen, upgraded blowers, and other associated improvements comes the need for additional power. A wastewater treatment facility is required to have a secondary power source *"to allow for a minimum of primary treatment at all times." (From the KDHE 'Minimum Standards of Design for Water Pollution Control Facilities'.)* Primary treatment includes pumping, screening, and the removal of settleable solids. No alternative exists to meet the auxiliary power demands of the treatment plant other than the installation of a larger capacity generator. Costs associated with replacing the standby generator are included in Section 6.

SECTION 5 – IMPACT OF THE IMPROVEMENTS ON OPERATION, MAINTENANCE, and REPLACEMENT BUDGET

The improvements planned for the next phase in the upgrade of the Herington WWTF have been identified in the previous Sections. To summarize, the improvements broadly consist of:

- Headworks Improvements to include three new screw pumps with variable frequency drives and the addition of a mechanical bar screen.
- Aeration Basin Improvements to include new blowers with variable frequency drives; new diffusers; new piping and valves.
- Aerobic Digester Improvements to include new blowers with variable frequency drives; new diffusers; new piping and valves.
- Standby Generator Improvements consisting of the complete replacement of the existing generator with a new, larger capacity generator and associated electrical work.

Regarding the headworks improvements and the impact on operation, maintenance, and replacement budgets, the proposed new pumps equipped with variable frequency drives (VFDs) will be significantly more energy efficient. The current pumps constantly operate at full capacity. The pumps are either on or off. With the upgrade to pumps with VFDs, the pumps will operate at speeds necessary only to meet the pumping demand of the incoming influent flow. At times when the flow is low, the pumps will operate more slowly using less energy. As flow necessitates, the pumping capacity will increase with an increase in pump speed. With more influent flow, the second and perhaps third pumps will begin operating to accommodate the increased flow. Conversely, as flow subsides, the number of pumps utilized and the pump speeds will be reduced, again resulting in less energy use. And this will be an automated function. Presently, the operator must manually start a second and, if necessary, third pump as demand warrants. The addition of the new pumps and controls will thereby lead to a reduction in labor costs as the operator will not have to be constantly present at the plant during increased flow events.

Furthermore, as the pumps will be new, the maintenance on them will be reduced. Currently, the treatment plant operator frequently replaces bearings on the three pumps due to their age and physical condition. With increasing frequency, the pumps have to be removed from the facility and taken to a custom metal shop where the metal flights and other metal components of the pumps are rebuilt. Finally, as the pumps will be new, the City may begin budgeting for the replacement of the pumps over a 20-25 year time period.

The addition of the mechanical bar screen will result in a slight increase in energy cost as there is currently no mechanical screen using power. However, the overall cost to the treatment facility will go down as a result of the addition of the mechanical screen and the relocation of the manual bar screen. This is due to the savings realized in labor costs. During high flow events, the treatment plant operator must be on site to ensure that the manual bar screen

remains clear. As discussed earlier, the operator must continually clean the manual bar screen (grate) to ensure the flow does not become blocked resulting in the raw wastewater overflowing the channel and spilling onto the ground. During high flow events, the operator is currently on site full-time until the flow subsides. Adding the mechanical screen in conjunction with relocating the manual bar screen will greatly reduce the need for the operator to be present at these times.

The Herington WWTF originally had a comminutor in the headworks area of the facility, but it was eliminated prior to 1990. As such, adding a mechanical screen to the treatment process will mean that the City will need to budget for the replacement of this screen in approximately 20 years.

The impact on the operation, maintenance, and replacement budgets due to the proposed improvements to the aeration basin will be positive. The aeration basin improvements will result in a net cost savings overall. The new VFD equipped blowers and more efficient diffusers will yield significant energy savings. Unlike the manner in which the existing blowers operate at full capacity all the time, the new blowers will be controlled by probes in the basin that signal when additional or less air is needed for the treatment process. The VFD equipped blowers will then increase or decrease speed delivering the appropriate amount of air to the system. Additionally, with the new piping from the blowers to the basin and within the basin, air leaks and the inherent loss in efficiency with those leaks will be virtually eliminated. And maintenance will be reduced as the frequent air leaks will no longer require repairs. The City of Herington currently budgets for replacement of wastewater treatment equipment and the proposed changes to the aeration basin will not increase the replacement costs currently budgeted. The existing aeration basin and aeration system consists of the same components as the proposed system. However, the proposed system components will obviously be new and more energy efficient.

Impacts to the budgets associated with the planned aerobic digester improvements essentially mirror those impacts associated with the aeration basin improvements. Higher efficiency diffusers and VFD controlled blowers are proposed in the digester as was done with the aeration basin. New piping is planned resulting in the reduction of air leaks leading to the same types of savings and impacts as those identified with the aeration basin improvements.

Regarding the standby generator improvements and the impact on operation, maintenance, and replacement budgets, the proposed replacement of the existing generator will lead to a very modest increase in budgeting needs. The operation budget will increase slightly due to the new generator having a larger capacity, however the generator will operate infrequently and thus, only impact the operating budget very marginally. Maintenance costs will remain essentially unchanged. Due to the larger size of the new generator, budgeting for replacement costs will need to increase slightly as well.

SECTION 6 – COST ESTIMATES

The following is an opinion of total probable costs for the identified improvements to the wastewater treatment facility.

Treatment Plant Headworks Improvements – Mechanical Bar Screen Addition

	Mechanical Bar Screen				
No.	**Item**	**Quantity**	**Unit**	**Unit Price**	**Total Price**
1	Mobilization	1	LS	$16,000.00	$16,000.00
2	Channel Preparation	1	LS	$5,000.00	$5,000.00
3	Manual Bar Screen	3	EA	$4,000.00	$12,000.00
4	Mechanical Bar Screen	1	LS	$90,000.00	$90,000.00
5	Installation of Screen	1	LS	$30,000.00	$30,000.00
6	Site Electrical	1	LS	$12,000.00	$12,000.00
7	Potable Water Supply	1	LS	$2,500.00	$2,500.00
8	Concrete Dumpster Pad	1	LS	$2,000.00	$2,000.00
	Subtotal Construction Cost Estimate				$169,500.00
	20% Construction Contingencies				$33,900.00
	Total Construction Cost Estimate				$203,400.00

The cost estimate above indicates the anticipated construction costs associated with the addition of a mechanical bar screen to the Herington WWTF. The costs are based on 2022 pricing. Cost estimates for the engineering design services, project bidding services, construction related services, and construction observation costs are included in the final total project cost estimate included later in this report.

The following is an opinion of total project costs if a new, submersible influent pump station is constructed. These costs include the anticipated engineering design costs in order to illustrate the total project costs of this option, not just the estimated construction costs. This is done as a means of comparison between the total project costs of a new submersible pump station versus the total project costs associated with replacing the screw pumps in the existing location.

Treatment Plant Headworks Improvements – Submersible Pump Station

	Submersible Pump Station - Includes 3 submersible pumps				
No.	**Item**	**Quantity**	**Unit**	**Unit Price**	**Total Price**
1	Mobilization	1	LS	$150,000.00	$150,000.00
	Wet Well - Complete				
2	Excavation	1	LS	$3,500.00	$3,500.00
3	Compaction of Earthwork (Backfill)	1	LS	$8,000.00	$8,000.00
4	Concrete	90	CY	$750.00	$67,500.00
5	Reinforcing Steel	19000	Lbs	$2.00	$38,000.00
6	Pumps & Controls	1	LS	$150,000.00	$150,000.00
7	Guiderails & other hardware	1	LS	$18,000.00	$18,000.00
8	Aluminum Access Hatches	1	LS	$20,000.00	$20,000.00
9	Pipe, Valves, Fittings	1	LS	$30,000.00	$30,000.00
10	PVC Liner	1	LS	$30,000.00	$30,000.00
11	Site Electrical	1	LS	$25,000.00	$25,000.00
	Valve Vault - Complete				
12	Excavation	1	LS	$1,600.00	$1,600.00
13	Compaction of Earthwork (Backfill)	1	LS	$4,000.00	$4,000.00
14	Concrete	70	CY	$750.00	$52,500.00
15	Reinforcing Steel	6000	Lbs	$2.00	$12,000.00
16	Pipe, Valves, Fittings	1	LS	$81,000.00	$81,000.00
17	Aluminum Access Hatches	1	LS	$8,000.00	$8,000.00
18	Misc. Metals, Hangers, etc.	1	LS	$15,000.00	$15,000.00
19	Sump Pump System	1	LS	$5,000.00	$5,000.00
20	Air Release Assembly System	1	LS	$12,000.00	$12,000.00
21	Fiberglass Control Building	1	LS	$90,000.00	$90,000.00
22	Site Electrical/Mechanical	1	LS	$75,000.00	$75,000.00
	Subtotal Construction Cost Estimate				$896,100.00
	20% Construction Contingencies				$179,220.00
	Total Construction Cost Estimate				$1,075,320.00
	Geotechnical Engineering & Investigation	1	LS	$10,000.00	$10,000.00
	Engineering Design, Bidding, & Constr. Related Services	1	LS	$168,500.00	$168,500.00
	Total Estimated Project Cost - Submersible Pump Station				$1,253,820.00

By comparison, the following is an estimate of total project costs if the influent screw pumps are replaced in the current location with new screw pumps. The costs are based on 2022 pricing, as are all costs in this report.

Treatment Plant Headworks Improvements – Replacement of Screw Pumps

	Replacement of Inclined Screw Pumps with New Inclined Screw Pumps - Includes 3 screw pumps				
No.	**Item**	**Quantity**	**Unit**	**Unit Price**	**Total Price**
1	Mobilization	1	LS	$81,000.00	$81,000.00
2	Pumps & Controls	1	LS	$280,000.00	$280,000.00
3	Installation of Pumps, Complete	1	LS	$180,000.00	$180,000.00
4	Site Electrical	1	LS	$25,000.00	$25,000.00
	Subtotal Construction Cost Estimate				$566,000.00
	20% Construction Contingencies				$113,200.00
	Total Construction Cost Estimate				$679,200.00
	Engineering Design, Bidding, & Constr. Related Services	1	LS	$38,000.00	$38,000.00
	Total Estimated Project Cost - Submersible Pump Station				$717,200.00

As the two cost estimates above illustrate, the estimated total project cost for a submersible pump station is $1,253,820 and the estimated total project cost for replacing the influent screw pumps is $717,200. Again, these total project costs include anticipated engineering design fees in addition to construction costs.

The following is a construction cost estimate for the identified improvements to the treatment facility's aeration system and aeration basin.

Aeration System and Aeration Basin Improvements

	Aeration System and Aeration Basin Improvements				
No.	**Item**	**Quantity**	**Unit**	**Unit Price**	**Total Price**
1	Mobilization	1	LS	$60,000.00	$60,000.00
2	Blowers, Diffusers, Controls - Complete	1	LS	$450,000.00	$450,000.00
3	Piping & Valves	1	LS	$25,000.00	$25,000.00
4	Site Electrical	1	LS	$25,000.00	$25,000.00
	Subtotal Construction Cost Estimate				$560,000.00
	20% Construction Contingencies				$112,000.00
	Total Construction Cost Estimate				$672,000.00

Below is a construction cost estimate for the identified improvements to the treatment facility's liquid sludge aerobic digester.

Liquid Sludge Aerobic Digester Improvements

	Liquid Sludge Aerobic Digester Improvements				
No.	**Item**	**Quantity**	**Unit**	**Unit Price**	**Total Price**
1	Mobilization	1	LS	$12,000.00	$12,000.00
2	Blowers, Diffusers, Controls - Complete	1	LS	$75,000.00	$75,000.00
3	Piping & Valves	1	LS	$20,000.00	$20,000.00
4	Site Electrical	1	LS	$5,000.00	$5,000.00
	Subtotal Construction Cost Estimate				$112,000.00
	20% Construction Contingencies				$22,400.00
	Total Construction Cost Estimate				$134,400.00

The following is a construction cost estimate for the replacement of the standby generator with a new generator.

Standby Generator Replacement

	Standby Generator Replacement				
No.	**Item**	**Quantity**	**Unit**	**Unit Price**	**Total Price**
1	Mobilization	1	LS	$20,000.00	$20,000.00
2	Replace Standby Generator	1	LS	$150,000.00	$150,000.00
3	Site Electrical	1	LS	$25,000.00	$25,000.00
	Subtotal Construction Cost Estimate				$195,000.00
	20% Construction Contingencies				$39,000.00
	Total Construction Cost Estimate				$234,000.00

Herington Wastewater Treatment Facility Improvements - Total Project

The selected alternatives for improvements to Herington's WWTF can be summarized as follows.

- The addition of a mechanical bar screen to the headworks portion of the treatment plant.
- The replacement of the existing influent screw pumps with new screw pumps.
- Complete replacement of the aeration system in the aeration basin to include new blowers; new diffusers in the basin; new probes in the basin and computerized control system to monitor the aeration basin environment and control the blowers; new piping and valves.
- Complete replacement of the aeration system in the liquid sludge aerobic digester to include blowers; new diffusers in the digester; reconstruction of the supernatant decant weir box; new piping and valves.
- Replacement of the standby generator.
- The incorporation of a remote monitoring system of the treatment plant. This would be included with the headworks controls and the aeration basin controls and included in the costs of those controls.

The following page contains an estimate of the total project cost for these improvements. Construction cost estimates for the various improvements as well as anticipated engineering costs are included in the total project cost.

Total Project Cost - Herington Wastewater Treatment Facility Improvements

	TOTAL PROJECT COST ESTIMATE				
No.	**Item**	**Quantity**	**Unit**	**Unit Price**	**Total Price**
	Construction Costs				
1	Mechanical Bar Screen	1	LS	$169,500.00	$169,500.00
2	Replacement of Screw Pumps	1	LS	$566,000.00	$566,000.00
3	Aeration System and Aeration Basin Improvements	1	LS	$560,000.00	$560,000.00
4	Liquid Sludge Aerobic Digester Improvements	1	LS	$112,000.00	$112,000.00
5	Standby Generator Replacement	1	LS	$195,000.00	$195,000.00
	Subtotal Construction Cost Estimate				$1,602,500.00
	20% Construction Contingencies				$320,500.00
	Total Construction Cost Estimate				$1,923,000.00
	Engineering Design, Bidding, & Constr. Related Services	1	LS	$182,500.00	$182,500.00
	TOTAL ESTIMATED PROJECT COST				$2,105,500.00

At this time, the City of Herington intends to pursue a Community Development Block Grant (CDBG) through the Kansas Department of Commerce as a portion of the funding. Additionally, Herington intends to apply for a loan through the Kansas Department of Health & Environment Revolving Loan Fund to cover the costs associated with the necessary improvements.

Appendix A

Current NPDES Permit

New ~~Extent~~ Start 9-1-19

Kansas Permit No.: M-SH17-0001

Federal Permit No.: KS0022811

KANSAS WATER POLLUTION CONTROL PERMIT AND
AUTHORIZATION TO DISCHARGE UNDER
THE NATIONAL POLLUTANT DISCHARGE
ELIMINATION SYSTEM

Pursuant to the Provisions of Kansas Statutes Annotated 65-164 and 65-165, the Federal Water Pollution Control Act as amended, (33 U.S.C. 1251 et seq; the "Act"),

Owner:	Herington, City of
Owner's Address:	17 North Broadway P.O. Box 31 Herington, Kansas 67449
Facility Name:	Herington Municipal Wastewater Treatment Plant
Facility Location:	NE¼, NW¼, NW¼ Section 12, Township 16S, Range 4E Dickinson County, Kansas Latitude: 38.68127 Longitude: -96.94579
Outfall:	Latitude: 38.68169 Longitude: -94.94618
Receiving Stream & Basin:	Lyon Creek via Lime Creek Smoky Hill River Basin

is authorized to discharge from the wastewater treatment facility described herein, in accordance with effluent limits and monitoring requirements as set forth herein.

This permit is effective September 1, 2019, supersedes the previously issued Kansas Water Pollution Control permit M-SH17-0001, and expires August 31, 2024.

FACILITY DESCRIPTION:

1. Bar Screen
2. Activated Sludge
3. Final Sedimentation
4. Aerobic Digestion
5. UV Disinfection
6. Design Flow = 0.9 MGD

Lee A. Norman MD

Secretary, Kansas Department of Health and Environment

August 8, 2019
Date

A. EFFLUENT LIMITS AND MONITORING REQUIREMENTS

The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in this permit. The effluent limits shall become effective on the dates specified herein. Such discharges shall be controlled, limited, and monitored by the permittee as specified. There shall be no discharge of floating solids or visible foam in other than trace amounts.

In the event no discharge occurs through the effluent outfall to the receiving stream during the entire monitoring period, no sampling or testing of the influent or effluent is required but notification of a No Discharge event is still required.

Parameter	Final Limits	Measurement Frequency	Sample Type
Monitoring Location 001AG (EDMR Code: INF001AG)- Influent to Treatment Plant			
Biochemical Oxygen Demand (5-Day)- mg/l	Monitor	Once Monthly	Grab
Total Suspended Solids - mg/l	Monitor	Once Monthly	Grab
Total Phosphorus (as P)- mg/l	Monitor	Once Monthly	Grab
Total Kjeldahl Nitrogen (as N)-mg/l	Monitor	Once Monthly	Grab
Outfall 001A1 (EDMR Code: EFF001A1)- Effluent at Discharge Structure			
Biochemical Oxygen Demand (5-Day)[1]		Once Monthly	Grab
Weekly Average-mg/l	30		
Monthly Average-mg/l	20		
Total Suspended Solids[1]		Once Monthly	Grab
Weekly Average-mg/l	45		
Monthly Average-mg/l	30		
pH - Standard Units	6.0-9.0	Once Monthly	Grab
Ammonia (as N) - mg/l		Once Monthly	Grab
November thru February			
Daily Maximum	8.8		
Monthly Average	1.9		
March			
Daily Maximum	8.8		
Monthly Average	1.8		
April			
Daily Maximum	6.4		
Monthly Average	1.2		
May			
Daily Maximum	4.5		
Monthly Average	0.9		
June			
Daily Maximum	3.1		
Monthly Average	0.7		

A. EFFLUENT LIMITS AND MONITORING REQUIREMENTS (continued)

Ammonia (as N) - mg/l (continued)		Once Monthly	Grab
July			
Daily Maximum	2.5		
Monthly Average	0.6		
August			
Daily Maximum	2.6		
Monthly Average	0.6		
September			
Daily Maximum	4.1		
Monthly Average	0.9		
October			
Daily Maximum	7.1		
Monthly Average	1.3		
E. coli - colonies /100 ml		Once Monthly	Grab
April through October			
Monthly Geometric Average	427		
November through March			
Monthly Geometric Average	3843		
Total Phosphorus (as P)[4]	Monitor	Once Monthly	Grab
Monthly Avg. Concentration - mg/l			
Monthly Avg. Load - lbs/day			Calculated[3]
Nitrate (NO_3)+ Nitrite (NO_2)as N-mg/l[2]	Monitor	Once Monthly	Grab
Total Kjeldahl Nitrogen (as N)-mg/l[2]	Monitor	Once Monthly	Grab
Total Nitrogen (as N)- (TKN + NO_3 + NO_2)[2,4]	Monitor	Once Monthly	Calculated[3]
Monthly Avg. Concentration - mg/l			
Monthly Avg. Load - lbs/day			
Flow - MGD	Monitor	Daily	Meter

Annual Rolling Average 001TT (EDMR code: 001TT) - Annual Rolling Average Calculations at Effluent

Total Phosphorus (as P)[4]	Monitor	Once Monthly	Calculated[3]
Annual Avg. Concentration - mg/l			
Annual Avg. Load - lbs/day			
Total Nitrogen (as N)[2,4]	Monitor	Once Monthly	Calculated[3]
Annual Avg. Concentration - mg/l			
Annual Avg. Load - lbs/day			

1 Minimum removal of 85% required for Total Suspended Solids and Biochemical Oxygen Demand (5-Day). If inhibited Biochemical Oxygen Demand (5-Day) test is used, limits are 5 mg/l less than shown.

A. EFFLUENT LIMITS AND MONITORING REQUIREMENTS (continued)

2 Permittee shall sample for these tests on the same day. The Minimum Reportable Limit (MRL) for TKN is 1 mg/l and for nitrate + nitrite is 0.1 mg/l. Values less than the MRL shall be reported using the less than sign (<) with the MRL value but for purposes of calculating and reporting the total nitrogen result, less than values shall be defaulted to zero.

3 The values for parameters shown as "Calculated" will be calculated by the on-line eDMR program. The values cannot be entered into the on-line eDMR program by the permittee. In addition to these calculated values, for parameters with Annual Daily Mass reporting requirements, the permittee will see monthly average values calculated by the eDMR program and displayed in the raw data tables. The monthly average parameter short name and (parameter code) for total phosphorus is T-P MA (KS665) and for total nitrogen is T.N2 MA (KS600) in mg/l and lbs/day. The monthly averages are required intermediary calculated values used for purposes of calculating the annual averages and are shown for purposes of checking those calculations. The annual average calculations are for a rolling 12-month time period calculated on a monthly basis.

4 See Supplemental Conditions

B. STANDARD CONDITIONS

In addition to the specified conditions stated herein, the permittee shall comply with the attached Standard Conditions dated March 1, 2018.

C. SCHEDULE OF COMPLIANCE

None

D. SLUDGE DISPOSAL AND RE-USE

Sludge disposal shall be in accordance with the 40 CFR Part 503 Sludge Regulations.

E. SUPPLEMENTAL CONDITIONS

Nutrient Removal: Although this wastewater treatment facility is not designed for nutrient removal, the permittee may be able to change mechanical plant operations to maximize the level of nutrient removal with the intent of achieving either of the following goals as annual average target effluent levels from the mechanical plant:

a. Total Nitrogen (as N) - mg/l ≤ 10.0 as an annual average goal
b. Total Phosphorus (as P) - mg/l ≤ 1.0 as an annual average goal

These target values are not to be considered as effluent limits for this permit. KDHE reserves the right to re-open this permit to impose limits for nutrients pursuant to Kansas law after such criteria or a TMDL limiting nutrients is adopted in the Kansas Surface Water Quality Standards.

F. ADDITIONAL INFORMATION

EPA has promulgated a final rule requiring regulated entities to report DMR data electronically. Also, KAR 28-16-63 requires permittees to report NPDES data in a form required by KDHE. KDHE has developed electronic reporting tools to assist permittees in complying with the EPA electronic reporting rule and KAR 28-61-63. Unless a waiver has been approved by KDHE, permittees are required to submit reports electronically.

STANDARD CONDITIONS FOR
KANSAS WATER POLLUTION CONTROL AND
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMITS

1. Representative Sampling and Discharge Monitoring Report Submittals:

A. Samples and measurements taken as required herein shall be representative of the quality and quantity of the monitored discharge. Test results shall be recorded for the day the samples were taken. If sampling for a parameter was conducted across more than one calendar day, the test results may be recorded for the day sampling was started or ended. All samples shall be taken at the locations designated in this permit, and unless specified, at the outfall/monitoring location(s) before the wastewater joins or is diluted by any other water or substance.

B. Monitoring results shall be recorded and reported on forms acceptable to the Division and submitted no later than the 28th day of the month following the completed reporting period. Signed and certified copies of other reports, required herein, prepared in accordance with KAR 28-16-59, may be faxed to 785.559.4257, e-mailed as scanned attachments to kdhe.dmr4kdhe@ks.gov , or sent by U.S. mail to:

Kansas Department of Health & Environment
Bureau of Water-Technical Services Section
1000 SW Jackson Street, Suite 420
Topeka, KS 66612-1367

2. Definitions:

A. Unless otherwise specifically defined in this permit, the following definitions apply:

1. The "Daily Maximum" is the total discharge by weight or average concentration, measurement taken, or value calculated during a 24-hour period. The parameter, pH, is limited as a range between and including the values shown.

2. The "Weekly Average" is the arithmetic mean of the value of test results from samples collected, measurements taken, or values calculated during four monitoring periods in each month consisting of calendar days 1-7, 8-14, 15-21 and 22 through the end of the month.

3. The "Monthly Average", other than for E. coli bacteria, is the arithmetic mean of the value of test results from samples collected, measurements taken, or values calculated during a calendar month. The monthly average is determined by the summation of all calculated values or measured test results divided by the number of calculated values or test results reported for that parameter during the calendar month. The monthly average for E. coli bacteria is the geometric average of the value of the test results from samples collected in a calendar month. The geometric average can be calculated by using a scientific calculator to multiply all the E. coli test results together and then taking the nth root of the product where n is the number of test results. Non-detect values shall be reported using the less than symbol (<) and the minimum detection or reportable value. To calculate average values, non-detects shall be defaulted to zero (or one for geometric averages). Greater than values shall be reported using the greater than symbol (>) and the reported value. To calculate average values, the greater than reported value shall be used in the averaging calculation.

B. A "grab sample" is an individual sample collected in less than 15 minutes. A "composite sample" is a combination of individual samples in which the volume of each individual sample is proportional to the flow, or the sample frequency is proportioned to the flow rate over the sample period, or the sample frequency is proportional to time.

C. The terms "Director", "Division", and "Department" refer to the Director, Division of Environment, Kansas Department of Health, and Environment, respectively.

D. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of an in-plant diversion. Severe property damage does not mean economic loss caused by delays in production.

E. "Bypass" means the intentional diversion of waste streams from any portion of the treatment facility.

3. Schedule of Compliance: No later than 14 calendar days following each date identified in the "Schedule of Compliance," the permittee shall submit via mail, e-mail or fax per paragraph 1.B above, either a report of progress or, in the case of specific action being required by identified dates, a written notice of compliance or noncompliance. In the latter case, the notice shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirements, or, if there are no more scheduled requirements, when such noncompliance will be corrected.

4. Test Procedures: All analyses required by this permit shall conform to the requirements of 40 CFR Part 136, unless otherwise specified, and shall be conducted in a laboratory accredited by the Department. For each measurement or sample, the permittee shall record the exact place, date, and time of measuring/sampling; the date and time of the analyses, the analytical techniques or methods used, minimum detection or reportable level, and the individual(s) who performed the measuring/sampling and analysis and, the results. If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved procedures, the results shall be included in the Discharge Monitoring Report form required in 1.B. above. Such increased frequencies shall also be indicated.

5. Change in Discharge: All discharges authorized herein shall be consistent with the permit requirements. The discharge of any pollutant not authorized by this permit or of any pollutant identified in this permit more frequently than or at a level in excess of that authorized shall constitute a violation of this permit. Any anticipated facility expansions, production or flow increases, or production or wastewater treatment system modifications which result in a new, different, or increased discharge of pollutants shall be reported to the Division at least one hundred eighty (180) days before such change.

6. Facilities Operation: The permittee shall always properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the requirements of this permit and Kansas and Federal law. Proper operation and maintenance also include adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the requirements of this permit. The permittee shall take all necessary steps to minimize or prevent any adverse impact to human health or the environment resulting from noncompliance with any effluent limits specified in this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge. When necessary to maintain compliance with the permit requirements, the permittee shall halt or reduce those activities under its control which generate wastewater routed to this facility.

7. Incidents:

"Collection System Diversion" means the diversion of wastewater from any portion of the collection system.

"In-Plant Diversion" means routing the wastewater around any treatment unit in the treatment facility through which it would normally flow.

"In-Plant Flow Through" means an incident in which the wastewater continues to be routed through the equipment even though full treatment is not being accomplished because of equipment failure for any reason.

"Spill" means any discharge of wastewater, sludge or other materials from the treatment facility other than effluent or as more specifically described by other "Incidents" terms.

"Upset" means an exceptional incident in which there is unintentional and temporary noncompliance or anticipated noncompliance with permit effluent limits because of factors beyond the reasonable control of the permittee, as described by 40 C.F.R. 122.41(n).

8. Diversions not Exceeding Limits: The permittee may allow any diversion to occur which does not cause effluent limits to be exceeded, but only if it also is for essential maintenance to assure efficient operation. Such diversions are not subject to the Incident Reporting requirements shown below.

9. Prohibition of an In-Plant Diversion: Any in-plant diversion from facilities necessary to maintain compliance with this permit is prohibited, except: (a) where the in-plant diversion was unavoidable to prevent loss of life, personal injury, or severe property damage; (b) where there were no feasible alternatives to the in-plant diversion, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime and (c) the permittee submitted a notice as required in the Incident Reporting paragraph below. The Director may approve an anticipated in-plant diversion, after considering its adverse effects, if the Director determines that it will meet the three conditions listed above.

10. Incident Reporting: The permittee shall report any unanticipated collection system diversion, in-plant diversion, in-plant flow through occurrences, spill, upset, or any violation of a permitted daily maximum limit within 24 hours from the time the permittee became aware of the incident. A written submission shall be provided within 5 days of the time the permittee became aware of the incident. The written submission shall contain a description of the noncompliance and its cause, the period of noncompliance, including exact dates and times; and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance. An Incident Report form is available at www.kdheks.gov/water/tech.html.

    For an anticipated incident or any planned changes or activities in the permitted facility that may result in noncompliance with the permit requirements, the permittee shall submit written notice, if possible, at least ten days before the date of the event.

    For other noncompliance, the above information shall be provided with the next Discharge Monitoring Report.

11. Removed Substances: Solids, sludges, filter backwash, or other pollutants removed in the course of treatment of water shall be utilized or disposed of in a manner acceptable to the Division.

12. Power Failures: The permittee shall provide an alternative power source sufficient to operate the wastewater control facilities or otherwise control pollution and all discharges upon the loss of the primary source of power to the wastewater control facilities.

13. Right of Entry: The permittee shall allow authorized representatives of the Division of Environment or the Environmental Protection Agency upon the presentation of credentials, to enter upon the permittee's premises where an effluent source is located, or in which are located any records required by this permit, and at reasonable times, to have access to and copy any records required by this permit, to inspect any facilities, monitoring equipment or monitoring method required in this permit, and to sample any influents to, discharges from or materials in the wastewater facilities.

14. Transfer of Ownership: The permittee shall notify the succeeding owner or controlling person of the existence of this permit by certified letter, a copy of which shall be forwarded to the Division. The succeeding owner shall secure a new permit. This permit is not transferable to any person except after notice and approval by the Director. The Director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary.

15. Records Retention: Unless otherwise specified, all records and information resulting from the monitoring activities required by this permit, including all records of analyses and calibration and maintenance of instruments and recordings from continuous monitoring instruments, shall be retained for a minimum of 3 years, or longer if requested by the Division. Biosolids/sludge records and information are required to be kept for a minimum of 5 years, or longer if requested by the Division. Groundwater monitoring data, including background samples results, shall be kept for the life of the facility regardless of ownership.

16. Availability of Records: Except for data determined to be confidential under 33 USC Section 1318, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Department. Effluent data shall not be considered confidential. Knowingly making any false statement on any such report or tampering with equipment to falsify data may result in the imposition of criminal penalties as provided for in 33 USC Section 1319 and KSA 65-170c.

17. Permit Modifications and Terminations: As provided by KAR 28-16-62, after notice and opportunity for a hearing, this permit may be modified, suspended or revoked or terminated in whole or in part during its term for cause as provided, but not limited to those set forth in KAR 28-16-62 and KAR 28-16-28b through g. The permittee shall furnish to the Director, within a reasonable amount of time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish upon request, copies of all records required to be kept by this permit. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

18. Toxic Pollutants: Notwithstanding paragraph 17 above, if a toxic effluent standard or prohibition (including any schedule of compliance specified at such effluent standards) is established under 33 USC Section 1317(a) for a toxic pollutant which is present in the discharge and such standard or prohibition is more stringent than any limitation for such pollutant in this permit, this permit shall be revised or modified in accordance with the toxic effluent standard or prohibition. Nothing in this permit relieves the permittee from complying with federal toxic effluent standards as promulgated pursuant to 33 USC Section 1317.

19. Administrative, Civil and Criminal Liability: The permittee shall comply with all requirements of this permit. Except as authorized in paragraph 9 above, nothing in this permit shall be construed to relieve the permittee from administrative, civil or criminal penalties for noncompliance as provided for in KSA 65-161 et seq., and 33 USC Section 1319.

20. Oil and Hazardous Substance Liability: Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities or penalties to which the permittee is or may be subject to under 33 USC Section 1321 or KSA 65-164 et seq. A municipal permittee shall promptly notify the Division by telephone upon discovering crude oil or any petroleum derivative in its sewer system or wastewater treatment facilities.

21. Industrial Users: A municipal permittee shall require any industrial user of the treatment works to comply with 33 USC Section 1317, 1318 and any industrial user of storm sewers to comply with 33 USC Section 1308.

22. Property Rights: The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights nor any infringements of or violation of federal, state, or local laws or regulations.

23. Operator Certification: The permittee shall, if required, ensure the wastewater facilities are under the supervision of an operator certified by the Department. If the permittee does not have a certified operator or loses its certified operator, appropriate steps shall be taken to obtain a certified operator as required by KAR 28-16-30 et seq.

24. Severability: The provisions of this permit are severable. If any provision of this permit or any circumstance is held invalid, the application of such provision to other circumstances and the remainder of the permit shall not be affected thereby.

25. Removal from Service: The permittee shall inform the Division at least three months before a pumping station, treatment unit, or any other part of the treatment facility permitted by this permit is to be removed from service and shall make arrangements acceptable to the Division to decommission the facility or part of the facility being removed from service such that the public health and waters of the state are protected.

26. Duty to Reapply: A permit holder wishing to continue any activity regulated by this permit after the expiration date, must apply for a new permit at least 180 days prior to expiration of the permit.

27. Publicly owned treatment works (POTWs): All POTWs shall provide adequate notice to the Director of the following per 40 CFR 122.42(b):

    A. Any new introduction of pollutants into the POTW from a non-domestic source which would be subject to section 301 or 306 of the CWA ; and

    B. Any substantial change in the volume or character of pollutants being introduced into a POTW by a non-domestic source.

    C. For purposes of this paragraph, adequate notice shall mean within 30 days of the POTW being aware of the introduction of pollutants and shall include information on the quality and quantity of influent introduced into the POTW, and any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

28. POTW regulated pretreatment program requirements: For POTWs with an approved pretreatment program, the POTW shall:

    A. Identify, in terms of character and volume of pollutants, any Significant Industrial Users discharging into the POTW subject to Pretreatment Standards under section 307(b) of CWA and 40 CFR part 403.

    B. Provide to KDHE and EPA a written technical evaluation of the need to develop new local limits or revise existing local limits under 40 CFR 403.5(c)(1).

29. This permit may be reopened and modified if KDHE and/or EPA determines the permittee shall develop and approved pretreatment program that complies with 40 CFR, Part 403.

Appendix B

Nutrient Reduction Project Reports

December 9, 2015

Chuck Miller, Mayor
City of Herington
17 North Broadway
Herington, KS 67449

Dear Mayor Miller:

The discharge of nutrients such as nitrogen and phosphorus into the streams and lakes of the nation has become a critical issue. These nutrients cause eutrophication of these water bodies, causing problems due to excessive algal blooms. The eutrophication can cause low dissolved oxygen concentrations, turbidity, and a number of other problems.

In a response to the problems of many wastewater treatment plants in reducing these nutrients, technical assistance for wastewater treatment plant operators has been provided through a contract between KDHE and Fort Scott Community College. The project was funded by the Kansas Water Pollution Control Revolving Loan Fund for the purpose of providing technical assistance in reducing the nutrients (nitrogen and phosphorus) in the wastewater treatment plant effluents. Your plant was selected for assistance.

The report is a preliminary assessment of the plant, the plant loadings, status of nutrient discharges and the possibilities for reduction of the nutrients in the effluent. Please review the report carefully. If there are questions or comments please contact me.

Sincerely,

Gerald Grant

Gerald Grant PE
Environmental Trainer
Fort Scott Community College

C: Richard Rockel
Darlene Wood
Dennis Albrecht

Initial Report

Nutrient Reduction Project

City of Herington, KS

BACKGROUND

The project is to provide technical assistance to plant operational personnel in reducing total nitrogen and total phosphorus in the plant effluent. This technical assistance consists of: Review of permit requirements; review of past compliance records with particular emphasis on total nitrogen and total phosphorus effluent concentrations; and on-site evaluations of plant facilities, aeration control methods available and laboratory equipment needed for control. The theory of nutrient reduction is discussed with the operators and possible application of the theories to treatment plant operation are discussed.

Nutrient reduction has only in the past few years began to be an issue and this project will help operators become familiar with the latest technology as well as provide recommendations for plant changes that will be necessary.

REQUIREMENTS FOR NITROGEN AND PHOSPHORUS REDUCTION

Nitrogen reduction. Conditions within the plant aeration basins needed for nitrogen reduction are first, a condition of positive aeration where free dissolved oxygen exists within the mixed liquor. This is an aerobic condition. And secondly, a condition without free dissolved oxygen, the oxygen existing only within nitrate molecules. This is termed an anoxic condition.
Aeration with free dissolved oxygen is needed by the portion of bacteria in the mixed liquor known as nitrifiers. The nitrifying bacteria convert ammonia, in the presence of free dissolved oxygen, to nitrates. This process is called nitrification. Without the free dissolved oxygen this step will not happen.

When the anoxic condition exists, the nitrates produced (when aerobic conditions prevail) provide the only source of oxygen available to the bacteria which break down the organic wastes, forcing the bacteria to break the nitrate radicals apart for the oxygen they need. The liberated nitrogen is then released to the atmosphere as a gas. At the Herington plant the anoxic condition may be created by intermittent operation of the blowers, first aerating to achieve nitrification (conversion of ammonia to nitrates), then a period of operation with no aeration, forcing the bacteria to break down the nitrates for the oxygen needed and thus liberating nitrogen gas to the atmosphere. In summary, an aeration zone (or time period) providing free DO, followed by an anoxic zone (or time period) having plenty of organics for food with only nitrates for the oxygen source, is needed to reduce total nitrogen.

Phosphorus reduction Phosphorus reduction in a biological process is done by a select group of bacteria which develop in the mixed liquor when a zone or area of anaerobic conditions (no free oxygen or nitrates) exists on a consistent basis. At the Herington plant it *may* be possible to achieve conditions necessary for biological phosphorus reduction. If not, chemical precipitation will be necessary unless the plant is upgraded to provide an anaerobic basin ahead of the other treatment processes or if other modifications are provided.

Following is a summary of past influent and effluent records for the required parameters:

PERMIT

Issued	12/1/15
Expires	8/31/19
Design PE	
Design Flow	
Maximum Flow	0.9 MGD
Comments:	

Influent and Effluent Compliance Record: 1/1/13 to 8/31/15

Influent	Average	Maximum	(Mg/l)	(milligrams per liter)
BOD	97.2	214		(Biochemical Oxygen Demand)
TSS	114			(Total Suspended Solids)
TKN	28.9			(Total Kjeldahl Nitrogen)
TP	4.2			(Total Phosphorus)

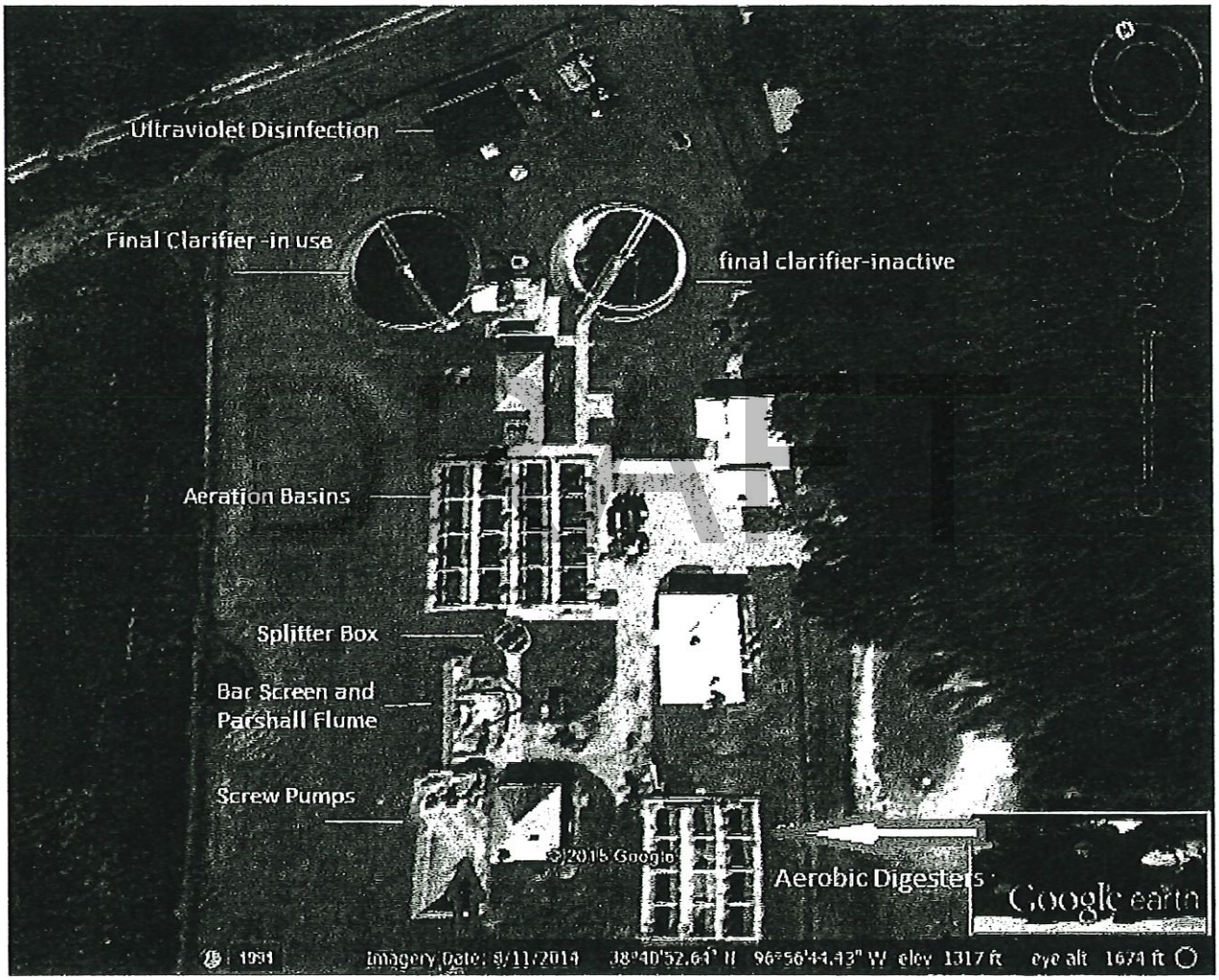
Effluent

BOD	<5		
TSS	3.4		
NH3	1.07		(ammonia)
TKN	2.5		
NO3/NO2	6.3		(Nitrate plus Nitrite)
TN	8.8		(Total Nitrogen--TKN + NO3/NO2)
TP	2.03		

Flow Record	Ave.	Max.	(Million Gallons Per Day)
MGD	.338	1.73	

THE PLANT

The plant has the following units in sequence: raw sewage screw pumps, comminutor (inoperable), hand cleaned bar screen to remove rags and other solid material, a Parshall flume for flow measurement, a splitter box which directs flow to four rectangular step feed aeration basins, another splitter box which directs flow from the aeration basins to two circular final clarifiers. Water from the final clarifiers flows to the ultraviolet disinfection unit where bacteria are killed or disabled before discharge to the receiving stream or to the golf course irrigation system. Activated sludge is pumped from the bottom of the clarifiers to the first splitter box for distribution to the four aeration basins. Aeration is provided by two 50 hp Lamson centrifugal blowers, one of which is used at a time.



Above is an aerial photo of the plant. The red arrow represents incoming wastewater. Flow through the plant is generally from the lower part of the picture to the upper. Sludge from the final clarifier is recirculated to the splitter box.

The aerobic digesters at the east side of the plant receive excess solids from the treatment process. Under aeration, volatile solids are reduced prior to land application.

NUTRIENT REDUCTION GOALS

The city's new permit states: *Although this wastewater treatment facility is not designed for nutrient removal, the permittee may be able to change mechanical plant operations to maximize the level of nutrient removal with the intent of achieving either of the following goals as annual average target effluent levels from the mechanical plant:*

	Goal 1	Goal 2
Total Nitrogen (as N) – mg/l	10.0	8.0
Total Phosphorus (as P) – mg/l	1.0	1.5

This activity shall be completed and the results provided to KDHE within 30 months of the effective date of this permit.

These target values are not to be considered as effluent limits for this permit. KDHE reserves the right to re-open this permit to impose limits for nutrients pursuant to Kansas law after such criteria or a TMDL limiting nutrients is adopted in the Kansas Surface Water Quality Standards.

OBSERVATIONS AND COMMENTS

1. The plant serves a 2013 Herington population of 2449.
2. Centrifugal blowers provide aeration for the plant. One blower is operated at a time. Blowers are alternated monthly.
3. Aeration basin capacity is 242,000 gallons total. Assuming a 1:1 return activated sludge rate (RAS), the detention time in the aeration basins is 8.6 hours.
4. The average flow of 0.338 MGD for a population of 2449 calculates to 138 gallons per capita. Values for influent BOD, TSS, and TKN are lower than average suggesting sources of inflow or possible infiltration.
5. Effluent records (see tabulations above) show the facility is probably meeting the nutrient reduction goal for total nitrogen. But the records show the effluent phosphorus levels are above goal levels.
6. The ball valves controlling aeration diffusers were partially closed as part of normal operation. The reduced DO is likely the reason for the very good total nitrogen reduction.
7. There were no field laboratory test procedures needed for control of the nutrient reduction process.

CONCLUSIONS

1. The total nitrogen goals can be met by aeration cycling of the entire plant. Although the plant currently appears to meet the total nitrogen (TN) goal as currently operated, the effluent total nitrogen can be reduced further with adequate control of the process. For instance, operating the blowers for a given time period, two to three hours for instance, then operating with blowers off for another given time period. During the time the blowers are on ammonia is

converted to nitrate; with the blowers off the nitrates are used as an oxygen source by the bacteria as they assimilate the wastes.

2. The total phosphorus goals may be met with the same on/off operation of the aeration blowers. Control of the aeration on and off periods is critical in reducing phosphorus. Good phosphorus reduction is being accomplished at Concordia and Belleville with this on/off method.
3. When adjusting aeration periods to achieve anoxic conditions, monitoring ammonia is essential. Over-doing the anoxic period could lead to a rise in effluent ammonia concentrations and possible permit violations.

RECOMMENDATIONS

1. Time clock controls are needed for the aeration blowers. The use of time clocks will allow the blowers to be operated with controlled on and off periods, as needed for nutrient reduction. You may wish to briefly operate the blowers manually for a trial of the process.
2. The following field laboratory test kits are needed for control of the nutrient reduction process: a hand-held dissolved oxygen meter such as a YSI 550A or a Hach LDO meter; an ammonia colorimeter using Nessler reagent such as a LaMotte 1200 or Hach equivalent; a nitrate test kit (color comparator) to check effluent nitrate concentrations; and a color comparator for phosphorus.

February 12, 2017

Ed Patton, City Manager
City of Herington
17 N. Broadway
P.O. Box 31
Herington, KS 67449

Dear Mr. Patton:

Recently wastewater treatment plant operator Dennis Albrecht participated in a nutrient reduction project, the purpose of which was to reduce total nitrogen and total phosphorus in the wastewater treatment plant effluent. The project was funded through a contract with Fort Scott Community College and the state revolving loan fund. The report accompanying this letter is the final report for the project.

Mr. Albrecht is well versed in the theory and application of nutrient reduction and has the necessary test equipment for in-house laboratory analyses. The plant is very close to meeting the specified nutrient reduction goals and does so frequently. Yet the annual average for the past year shows the total nitrogen and total phosphorus effluent concentrations slightly above goal levels. This report contains recommendations which would help the plant achieve the nutrient reduction goals and future limits on a more consistent basis while also reducing energy costs.

Please review the report for the status of the project and recommendations. If there are questions please contact me.

Sincerely,

Gerald Grant

Gerald Grant PE
Environmental Trainer
Fort Scott Community College

C: Nick Reams
Darlene Wood
Dennis Albrecht

Final Report

Nutrient Reduction Project

City of Herington

PROJECT OBJECTIVES

The objectives of this project were to work with the operator to reduce the total phosphorus (TP) and total nitrogen (TN) in the effluent and to provide training in the principles of nutrient reduction. Records prior to the project showed that biochemical oxygen demand (BOD), total suspended solids (TSS), and ammonia effluent concentrations have been within permit limits for a long time. However, prior to this project total phosphorus concentrations in the effluent averaged 2.03 mg/l and total nitrogen concentrations averaged 8.8 mg/l in a 2-year period prior to the project beginning. The nutrient reduction goals specified in the Supplemental Conditions section of the city's NPDES permit is as follows:

	Goal 1	or	Goal 2
Total Nitrogen (TN)	$\leq$ 8 mg/l as N		$\leq$ 10 mg/l as N
Total Phosphorus (TP)	$\leq$ 1.5 mg/l as P		$\leq$ 1 mg/l as P

These goals are annual averages and are not permit limits at this time. The previous plant record did not indicate the plant was meeting the nutrient reduction goals although the plant effluent was very good otherwise and met all permit requirements.

From April 1, 2016 to April 31, 2017 the following influent and effluent average concentrations (mg/l) were reported:

Influent	BOD	TSS	TKN	TP	Flow
	92	81	21.7	3.22	.385 MGD

Effluent	BOD	TSS	TKN	TP	NO3NO2	TN	Ammonia
	LT 5	LT 5	0.96	1.62	7.7	8.65	0.07

BOD *Biochemical oxygen demand, a measure of the organic strength of the wastewater.*

TSS *Total Suspended Solids*

TKN *Total Kjeldahl Nitrogen. The sum of ammonia and organic nitrogen*

TP *Total Phosphorus*

NO3NO2 The sum of effluent nitrates and nitrites

TN *Total Nitrogen. The sum of NO3NO2 and TKN*

LT *Less than.*

These figures show a very weak influent wastewater due to infiltration and inflow of rainwater into the sewers. The figures also show the plant is likely capable (with modifications) of reducing total nitrogen and total phosphorus to goal levels. Recent in-house samples after a significant amount of sludge was hauled from the system showed ammonia levels to be approximately 0.22 mg/l; nitrate levels, 4 mg/l; and phosphorus concentrations of 1.6 and 0.73 for a two-day period.

OBSERVATIONS AND COMMENTS

1. The average influent flow for the past year averaged 385,000 gallons per day. Nationwide, the average per capita flow is approximately 100 gallons per person per day. This is a rule of thumb used by designers when flow information is not available. The wastewater flow at Herington is about 1.6 times the "rule of thumb" figure which would be 239,000 gallons. The excess water dilutes the wastewater entering the plant and results in low concentrations of nutrients entering the plant. The number of pounds of nutrients would be the same as any other comparably sized city.

2. The plant aeration basin volume is approximately 242,000 gallons. With the sludge return from the clarifier of about 200,000 gallons per day, the detention time in the basins is about 10 hours at normal influent flow.

3. There are four parallel aeration basins of the conventional configuration. Each basin has three aeration headers and four openings for step feed of raw wastewater at various points in the basins. The basins are "plug flow". Wastewater organic strength is high at the entry end and becomes progressively lower the farther along the basin it goes. Therefore it is typical that dissolved oxygen concentrations are too low at the front of the basin, creating anoxic conditions needed for reduction of nutrients.

Farther along in the basins the organic strength of the wastewater is nearly all gone and excess air is available, creating good conditions for conversion of ammonia to nitrates. The return sludge from the clarifier to the influent end of the aeration basins has lots of nitrates which are reduced in the first part of the aeration basins. Heterotrophic bacteria use the nitrates as an oxygen source releasing nitrogen molecules to the atmosphere.

4. The plug flow basins combined with weak influent concentrations of pollutants make it very likely the nutrient reduction goals are achievable as far as effluent concentrations are concerned. At times in-house plant tests have shown the plant meeting these goals on a day to day basis.

5. Plant operator Dennis Albrecht has the necessary test equipment to monitor ammonia, nitrates, dissolved oxygen and phosphorus.

6. Years ago the centrifugal blowers were alternated daily. The operators found that this practice shortened the bearing life considerably. Current practice is to alternate the blowers monthly. Due to the 30 year age of these blowers and the likelihood of bearing failures the operator does not wish to practice on/off operation of the blowers to create anoxic periods.

7. The low average influent total phosphorus concentration of 3.22 mg/l is about half what is normally seen in wastewater influents. Normal reduction of phosphorus in the activated sludge process without additional nutrient removal operations changes is about 50% in any mechanical wastewater treatment plant. Low effluent phosphorus concentrations seen at Herington are likely due to this normal

attrition rather that to biological activity by phosphorus accumulating organisms (PAOs). While the existing system could meet total nitrogen reduction goals and future limits, it is expected the city will need to build chemical feed equipment to further reduce phosphorus to meet total phosphorus goals and future limits.

RECOMMENDATIONS

1. From an operational standpoint, anoxic conditions should be maintained at the influent end of each aeration basin. Dissolved oxygen concentrations in this area should not exceed 0.2 mg/l. Maintaining anoxic conditions in this part of the basins will lower the total nitrogen in the effluent, likely to a level below the goal of 8.5 mg/l or less.

2. Good control of the treatment process depends on several factors the first of which is dissolved oxygen (DO) control. The DO must be low enough at the front of the plant, or during a specific time period, to force the heterotrophic bacteria to utilize nitrates for their oxygen source, yet high enough at the end of the plant, or in a given time period, to enable nitrifying bacteria to convert ammonia to nitrates.

I recommend replacing the old centrifugal blowers with positive displacement blowers with variable frequency drives (VFD). The motor speed of these blowers would be controlled by DO probes mounted in the basins with the set point determined by the operator. At high organic loading rates the dissolved oxygen in the aeration basins would drop; the DO probe would signal the controller and the blower motor would speed up to meet the oxygen demand. At night when flow and organic loads are low the blowers would ramp down eliminating excess aeration. Excess aeration uses up the food source the bacteria need for denitrification (conversion of nitrates to nitrogen gas).

There should also be the capability of using on/off aeration if necessary for better denitrification.

These process revisions and investments in new equipment should also reduce electricity use, and therefore also operations costs.

3. Another factor is controlling plant processes is control of the solids concentrations in the aeration basin. The mixed liquor suspended solids concentration (MLSS) must be high enough to get good BOD reduction as well as good conversion of ammonia to nitrates, yet low enough so that an excess of solids doesn't exert a high dissolved oxygen demand. Typically MLSS concentrations in activated sludge plants range from 2500 mg/l to 3500 mg/l with higher concentrations in the winter for good ammonia reduction.

At Herington waste activated sludge is pumped to the aerobic digester for further stabilization then hauled as a liquid to farm fields. The digested sludge is hauled to cropland. In the summer it is likely necessary to wait for the corn crop or soybeans to be harvested before sludge can be hauled. This results in a buildup of MLSS in the aeration basins to very high levels, requiring additional dissolved oxygen for adequate BOD removal and nitrification. As a result, effluent ammonia concentrations in the summer are very close to permit limits. Prolonged rainy periods or weeks of heavy snow cover have the same effect.

As the operator tries to "catch up" and haul many loads when conditions are favorable, the biomass in the plant must adapt once more to changing conditions. The wide variation in mixed liquor suspended solids concentrations is not conducive to good nutrient reduction on a consistent basis.

For these reasons I recommend obtaining a belt press, centrifuge or other dewatering equipment for sludge dewatering with covered storage for dewatered sludge. With storage the operator gains flexibility as to when hauling is necessary. The sludge would be applied to the fields as a solid rather than a liquid. The number of loads to be hauled would be greatly reduced.

4. The city should continue to eliminate sources of infiltration and inflow to the collection system. It takes lots of energy to handle all the extra water and all the excess water reduces treatment detention time in the activated sludge basins.

CONCLUSIONS

The plant is very old and has served the city well for many years. It continues to meet all requirements for conventional pollutants such as BOD, TSS, ammonia reduction and disinfection but cannot, as equipped, meet future nutrient reduction requirements nor current permit goals on a consistent basis.

PRELIMINARY ENGINEERING REPORT
Pool Project

City of Herington, Kansas
EEI Project 22-09

CITY OF
HERINGTON

By:
Peter W. Earles, P.E.
Earles Engineering & Inspection, Inc
116 N Augustus St
McPherson, KS 67460

PRELIMINARY ENGINEERING REPORT
City of Herington Pool Project

OWNER OF FACILITY AND APPLICANT -

City of Herington, KS

LOCATION MAP -

Attached is a copy of the city map indicating the project location. The project consists of replacement of existing pool with a pool large enough for swim meets, with diving and zero entry features. Additionally the City would like a splash pool, additional parking and to renovate the historic dressing room and shower building.

ENGINEER-

Earles Engineering & Inspection, Inc.
116 N Augustus St
McPherson, Kansas 67460
Peter W. Earles, P.E. - CEO

DATE OF REVIEW – February 2022

DESCRIPTION OF PROBLEM -

The City currently has a pool and pool house that where built in the WPA days. The pool is leaking and has leaked for several years. The City has tried various solutions to solve the problem, all to no avail, The pool has swimming lanes, a diving board and has been retrofitted for zero entry, however the swimming lanes are too small for competition swimming. It also has a tiny-tots pool, but it is too small and has no activities for the kids. The pool pumps and sand filters are located next to the pool and are open to the environment. The pool is located in the flood plain, however the pool is elevated out of the flood plan. Parking is limited and requires better configuration. The old skate park in the rear is seldom used and could be removed to allow for pool expansion and parking

CONSIDERED ALTERNATIVES -

- Do nothing - this would not help the situation, and something must be done or the pool will continue to leak and eventually fail
- Renovate the existing pool, building and tiny-tots pool in place
- Remove the existing pool and build a new pool in the same location and renovate the existing building. Removing the tiny-tot pool and replacing it with a splash pad. Add parking by removing the skate park.
- Build a new pool and changing building/ concession stand with new splash pad at a new location at the existing park on the south end of town

PROPOSED PROJECT -

City would like a pool that is 25 meters (82 Feet) wide with 8 lanes. Lane widths will be 2.5 meters (8.2 feet). Minimum depth through the swimming lanes will be 2 meters (6.6 feet). The pool will have a depth of 11.5 feet on one end for diving and zero entry on the other end.

New Pool

New Splash Pad

Concession Stand

Remodeled bathrooms

COST ESTIMATES -

Earles Engineering & Inspection, Inc.

Civil & Structural Engineers · Construction Inspectors
McPherson, Kansas

EEI Project No. 22-009
6/2/22

Herington Pool – Site # 1 –Existing site

Herington, Kansas

Item	*Estimated Materials*			ENGINEER'S ESTIMATE	
No.	*Item*	*Quantity*	*Unit*	*Unit Cost*	*Extension*
1	Contractor Construction Staking	1	L.S.	$7,500	$ 7,500
2	Mobilization	1	L.S.	$10,000	$ 10,000
3	Site Demolition	1	L.S.	$25,000	$ 25,000
4	Site Grading	1	L.S.	$30,000	$ 30,000
5	Splash Pad (Complete)	1	L.S.	$300,000	$ 300,000
6	8 Lane Pool (Complete)($175/sf+$15/sf deck)	1	L.S.	$2,300,000	$2,300,000
7	Remodel Existing Pool House	1	L.S.	$40,000	$ 40,000
8	Pool / Splash Pad Equip Storage BLDG. 20'x40'	1	L.S.	$80,000	$ 80,000
9	Concession Stand w/ Patio 20'x30'	1	L.S.	$50,000	$ 50,000
10	Curb and Gutter	2,500	L.F.	$45	$ 112,500
11	Concrete Pavement (6" Uniform)(AE)(NRDJ)	5,000	S.Y.	$80	$ 400,000
12	Aggregate Base (AB-3)(6")	5,500	S.Y.	$18	$ 99,000
13	Erosion Control	1	L.S.	$5,000	$ 5,000
14	Landscaping, Seeding, & Mulching	1	L.S.	$15,000	$ 15,000
				Subtotal Construction Cost	***$ 3,474,000***
				Contingency (15%)	*$ 521,100*
				Total Construction Cost	***$ 3,995,100***
				Engineering (Survey, Design, and Permits)	*$ 239,706*
				Total Estimated Project Cost	***$4,234,806***

Earles Engineering & Inspection, Inc.

Civil & Structural Engineers · Construction Inspectors
McPherson, Kansas

EEI Project No. 22-009
6/2/22

Herington Pool - Site #2

Herington, Kansas

Item	*Estimated Materials*			ENGINEER'S ESTIMATE	
No.	*Item*	*Quantity*	*Unit*	*Unit Cost*	*Extension*
1	Contractor Construction Staking	1	L.S.	$7,500	$ 7,500
2	Mobilization	1	L.S.	$10,000	$ 10,000
3	Site Grubbing	1	L.S.	$8,000	$ 8,000
4	Site Grading	1	L.S.	$110,000	$ 110,000
5	Splash Pad (Complete)	1	L.S.	$300,000	$ 300,000
6	8 Lane Pool (Complete)($175/sf+$15/sf deck)	1	L.S.	$2,300,000	$2,300,000
7	New Pool House/ Concession Stand 100x40	1	L.S.	$680,000	$ 680,000
8	Curb and Gutter	2,500	L.F.	$45	$ 112,500
9	Concrete Pavement (6" Uniform)(AE)(NRDJ)	5,000	S.Y.	$80	$ 400,000
10	Aggregate Base (AB-3)(6")	5,500	S.Y.	$18	$ 99,000
11	Erosion Control	1	L.S.	$5,000	$ 5,000
12	Landscaping, Seeding, & Mulching	1	L.S.	$15,000.00	$ 15,000
				Subtotal Construction Cost	***$ 4,047,000***
				Contingency (15%)	*$ 607,050*
				Total Construction Cost	***$ 4,654,050***
				Engineering (Survey, Design, and Permits)	*$ 279,243*
				Total Estimated Project Cost	***$ 4,933,293***

ANNUAL OPERATING BUDGET -

The City currently takes care of the pool now, so replacing it will not significantly change its current operating budget, but should reduce the yearly maintenance required for the first 5-years.

OPERATION AND MAINTENANCE COST (O&M)

The Pool Complex should last 50 years.

O&M Budget

Item	Cost	Life	Cost/year
Pool Complex	$4,700,000	50	$94,000
Chemicals	$500	1	$500
TOTAL ESTIMATED COSTS/YEAR			***$94,500***

LAND REQUIREMENTS -

All property for the project is in the City owned parks is currently controlled by the City.

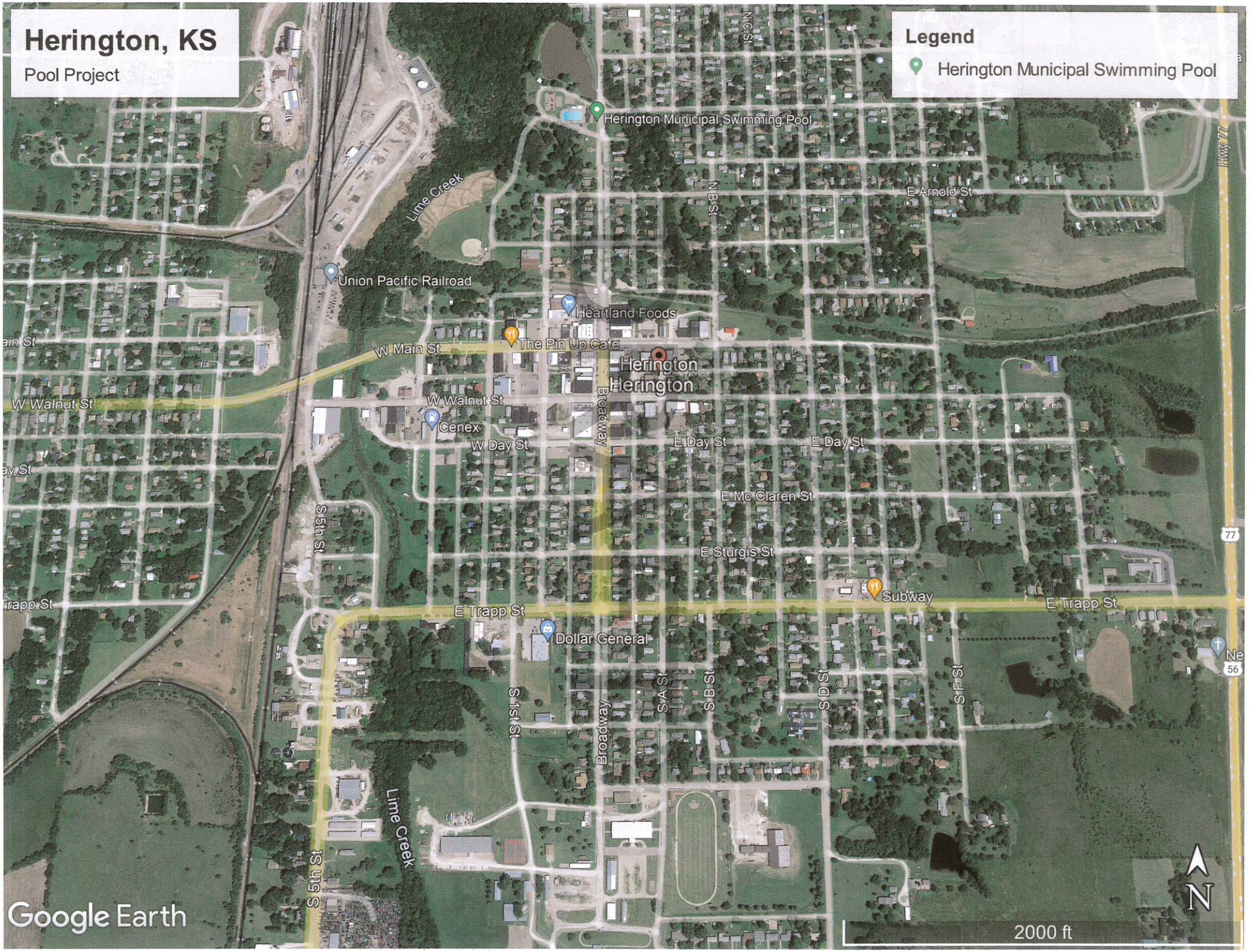
CONCLUSION AND RECOMMENDATIONS -

It is recommended that the City of Herington complete the new pool at the existing pool location. This allows for the reuse of the existing pool house and reduces the amount of filed required.

Both sites are in the flood plain and will require over 3 feet of fill. The site on the south is totally in the flood plain and will require over 4,500 cubic yards of fill, while the existing site has much of the fill already in place.

By using the existing site, the City renovates the area and creates a beautiful park out of an existing out-of-date park. It continues to be an attraction to the down town area and truly enhances the City setting.

Appendix A
Site Map


Herington, KS
Pool Project
Legend
Herington Municipal Swimming Pool
Herington Municipal Swimming Pool
Union Pacific Railroad
Heartland Foods
The Pin Up Cafe
Herington
Herington
Cenex
Subway
Dollar General
Lime Creek
Lime Creek
W Main St
W Walnut St
W Walnut St
W Day St
E Day St
E Day St
E Mc Claren St
E Sturgis St
E Trapp St
E Trapp St
E Arnold St
Broadway
Broadway
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77
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Google Earth
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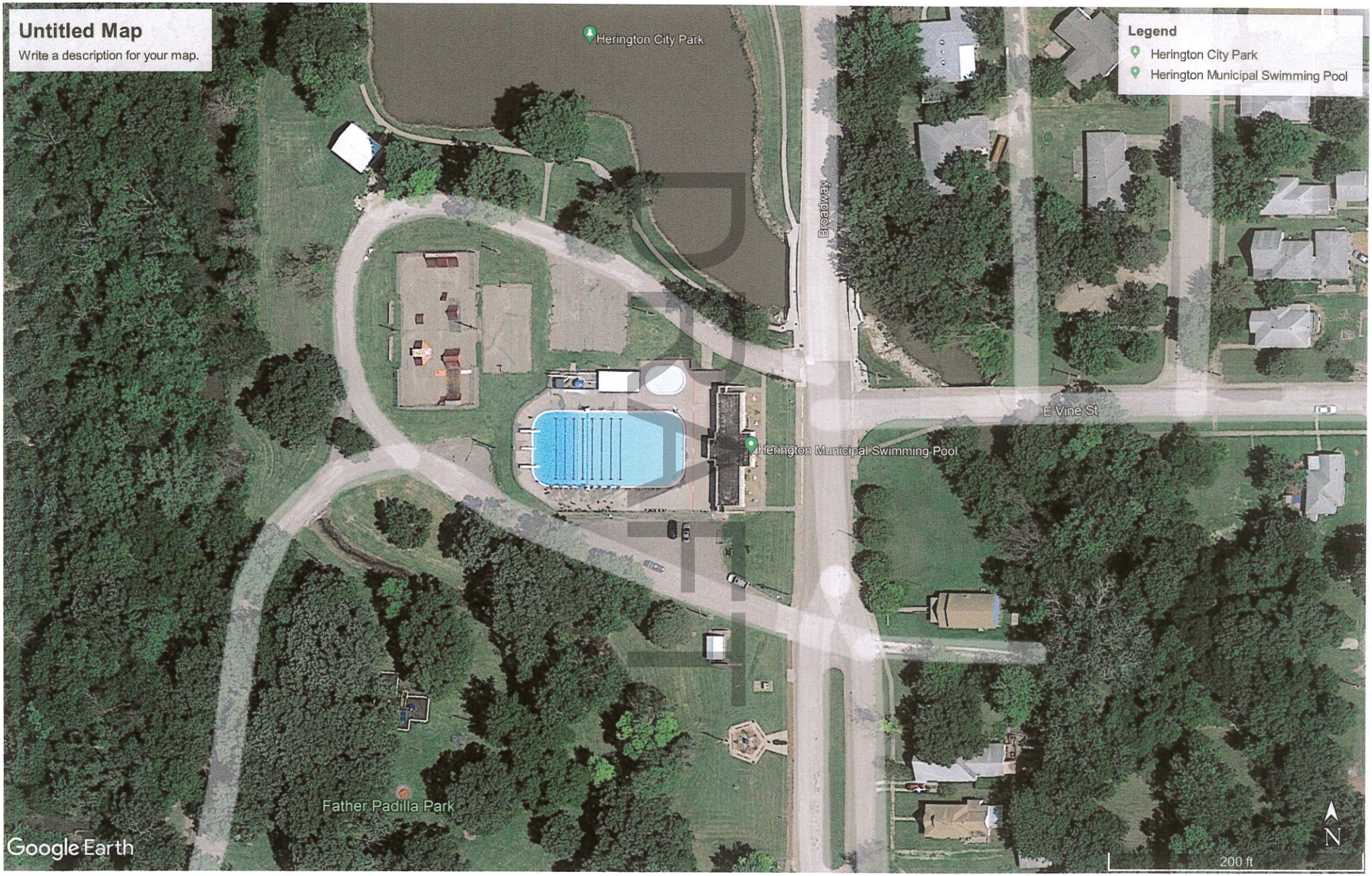
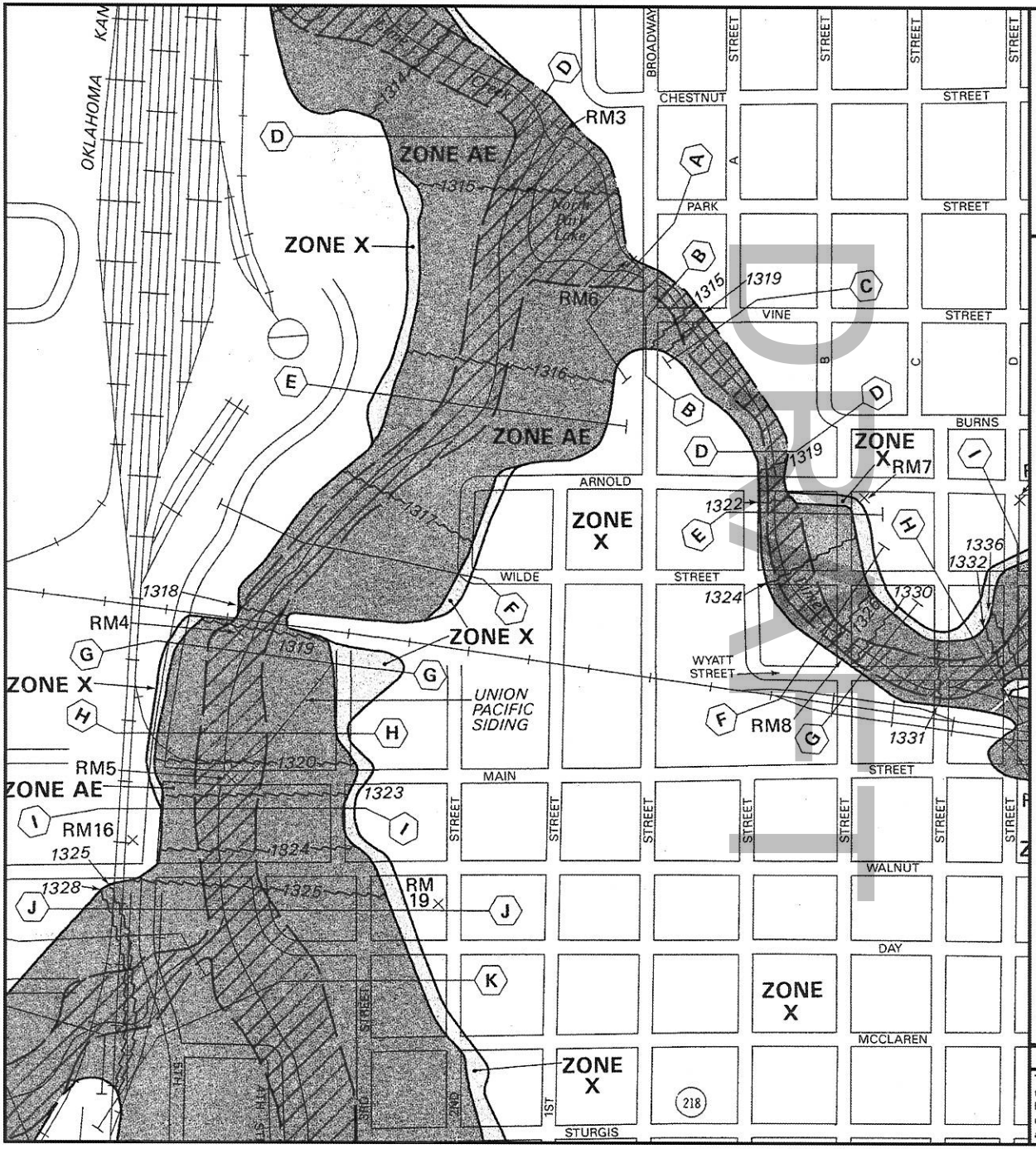

Untitled Map
Write a description for your map.
Herington City Park
Broadway
E Vine St
Herington Municipal Swimming Pool
Father Padilla Park
Legend
Herington City Park
Herington Municipal Swimming Pool
Google Earth
200 ft
N


Herington, KS
Possible Future Pool Location
S 1st St
Young Termite & Pest Control
Legend
N
300 ft
Google Earth

Appendix B
Flood Plain Map



APPROXIMATE SCALE IN
500 0

NATIONAL FLOOD INSURANCE PROGRAM

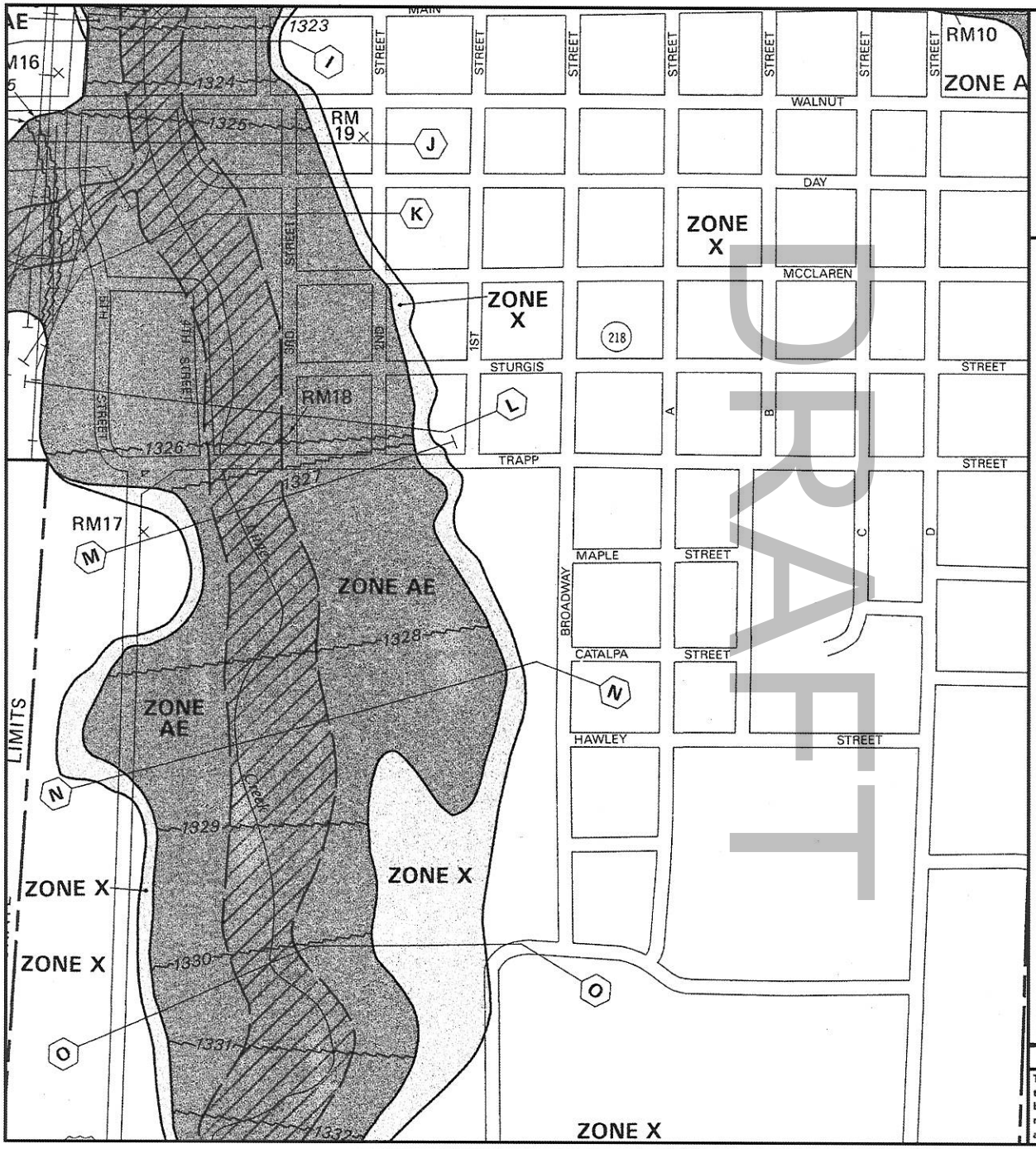
FIRM
FLOOD INSURANCE RATE MAP

CITY OF
HERINGTON,
KANSAS
DICKINSON AND
MORRIS COUNTIES

(ONLY PANEL PRINTED)

COMMUNITY-PANEL NUMBER
200076 0001 B
EFFECTIVE DATE:
AUGUST 4, 1988

Federal Emergency Management Agency



APPROXIMATE SCALE IN
500 0

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

CITY OF
HERINGTON,
KANSAS
DICKINSON AND
MORRIS COUNTIES

(ONLY PANEL PRINTED)

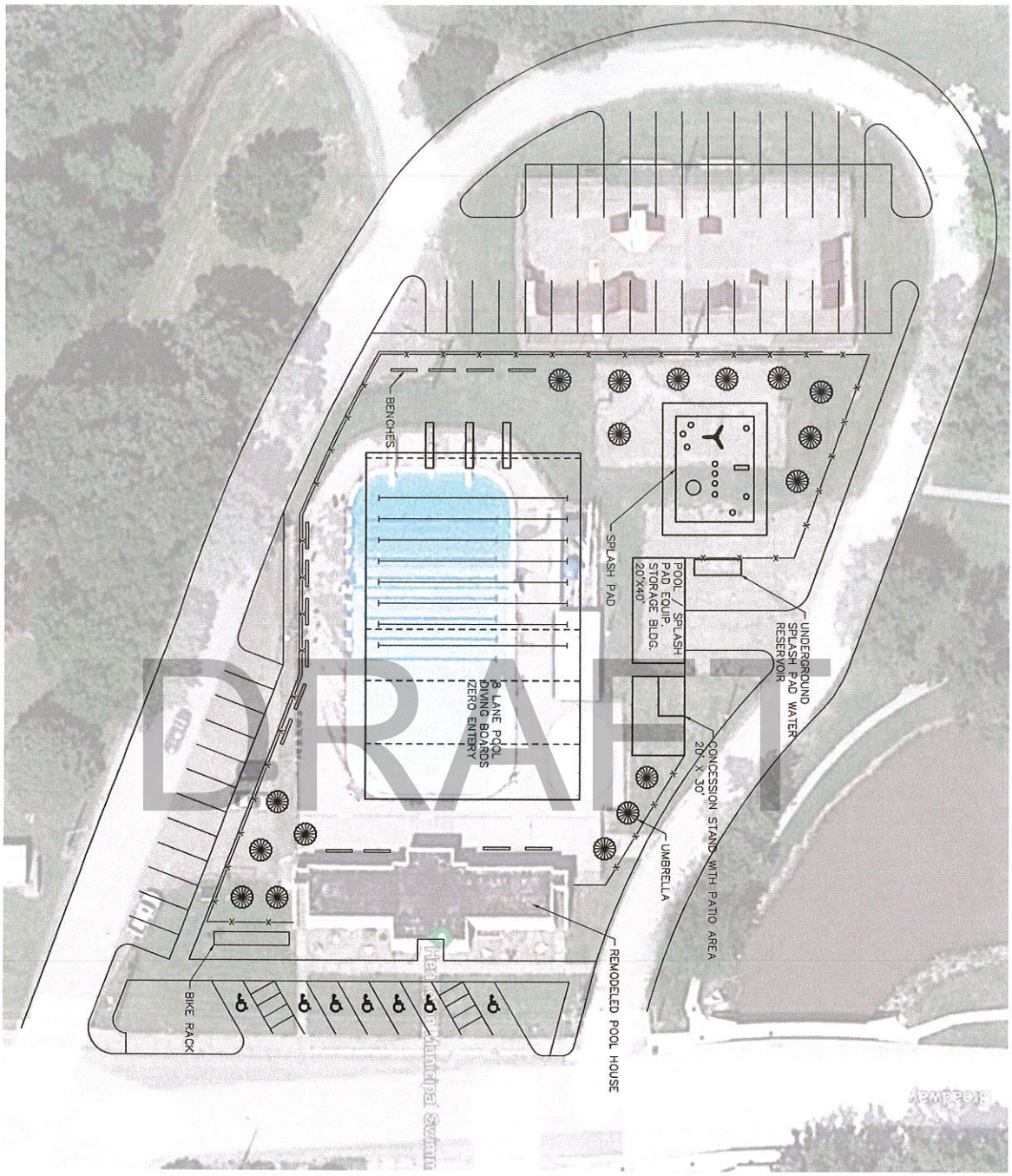
COMMUNITY-PANEL NUMBER
200076 0001 B
EFFECTIVE DATE:
AUGUST 4, 1988

Federal Emergency Management Agency

Appendix C
New Pool Layout

Filename: PER LAYOUT.DWG
File Location: F:\F-Drive\2022\22-09 -Herington Pool\DWG

Revised By: JSMILLS
Plotted: 6/2/2022 12:19 PM



ENGINEER:	JSM
CHECKED BY:	X
DRAWN BY:	X
DATE:	5/24/2022
PROJECT NO:	22-09
SHEET:	1 of 1

PRELIMINARY DRAWING

HERINGTON POOL

CONCEPT

CITY OF HERINGTON *KANSAS*

EARLES ENGINEERING & INSPECTION, INC.
Civil & Structural Engineers
Construction Inspectors–Surveyors
Email: earlesinc@earleseng.com

REVISIONS		
NO.	DATE	DESCRIPTION

Filename: PLAN SECTION.DWG
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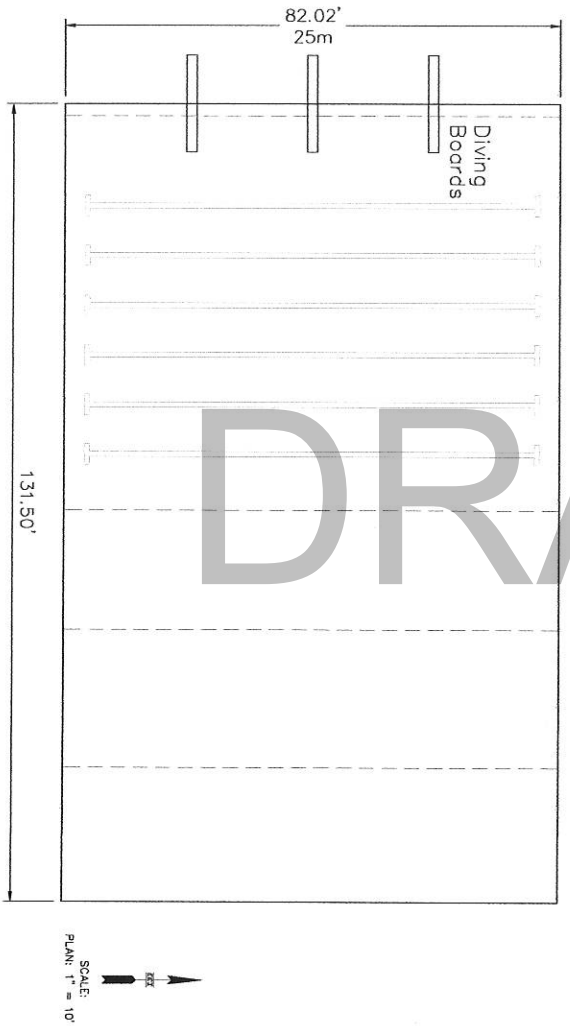
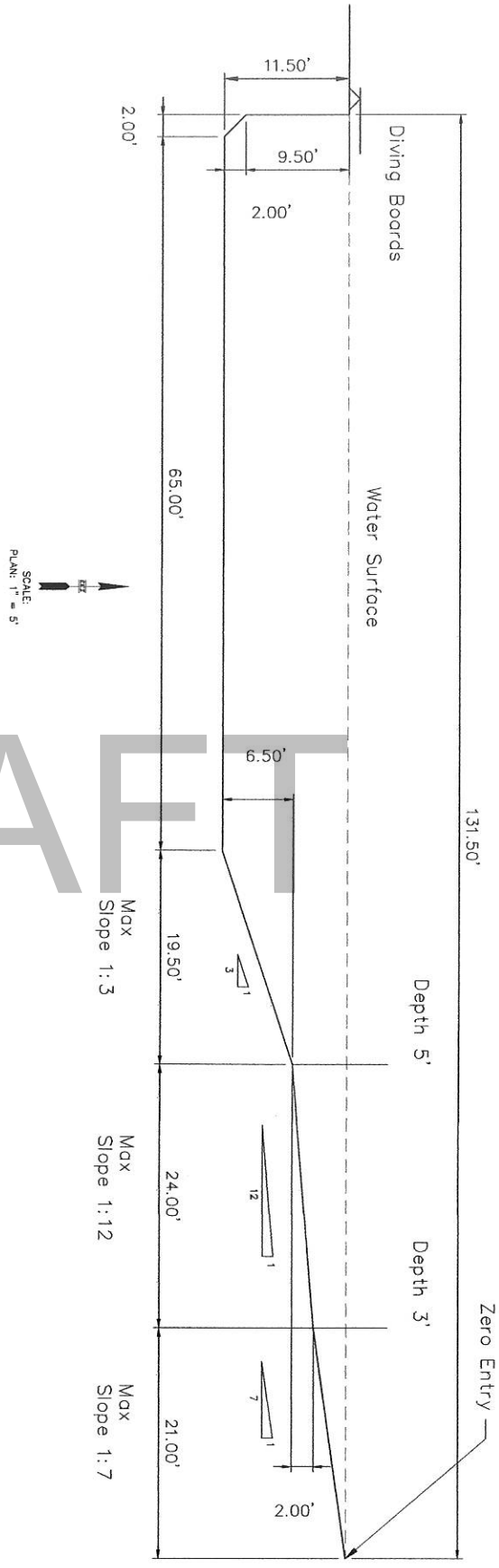
Revised By: TSTITHEM
Plotted: 5/27/2022 10:46 AM





ENGINEER:	PWE
CHECKED BY:	JSM
DRAWN BY:	TGS
DATE:	5/27/2022
PROJECT NO:	22-09
SHEET:	of

HERINGTON POOL

CROSS SECTION

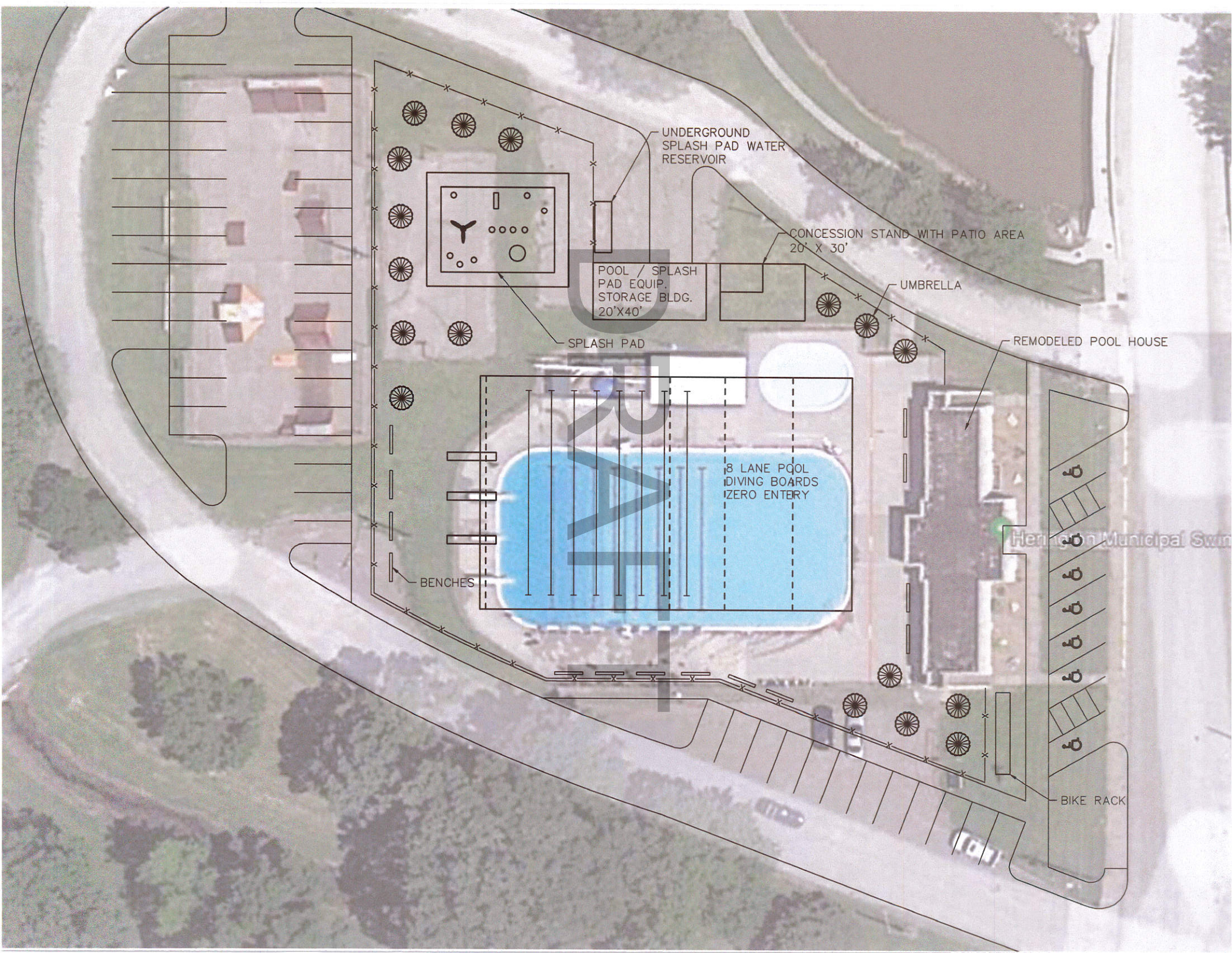
HERINGTON KANSAS

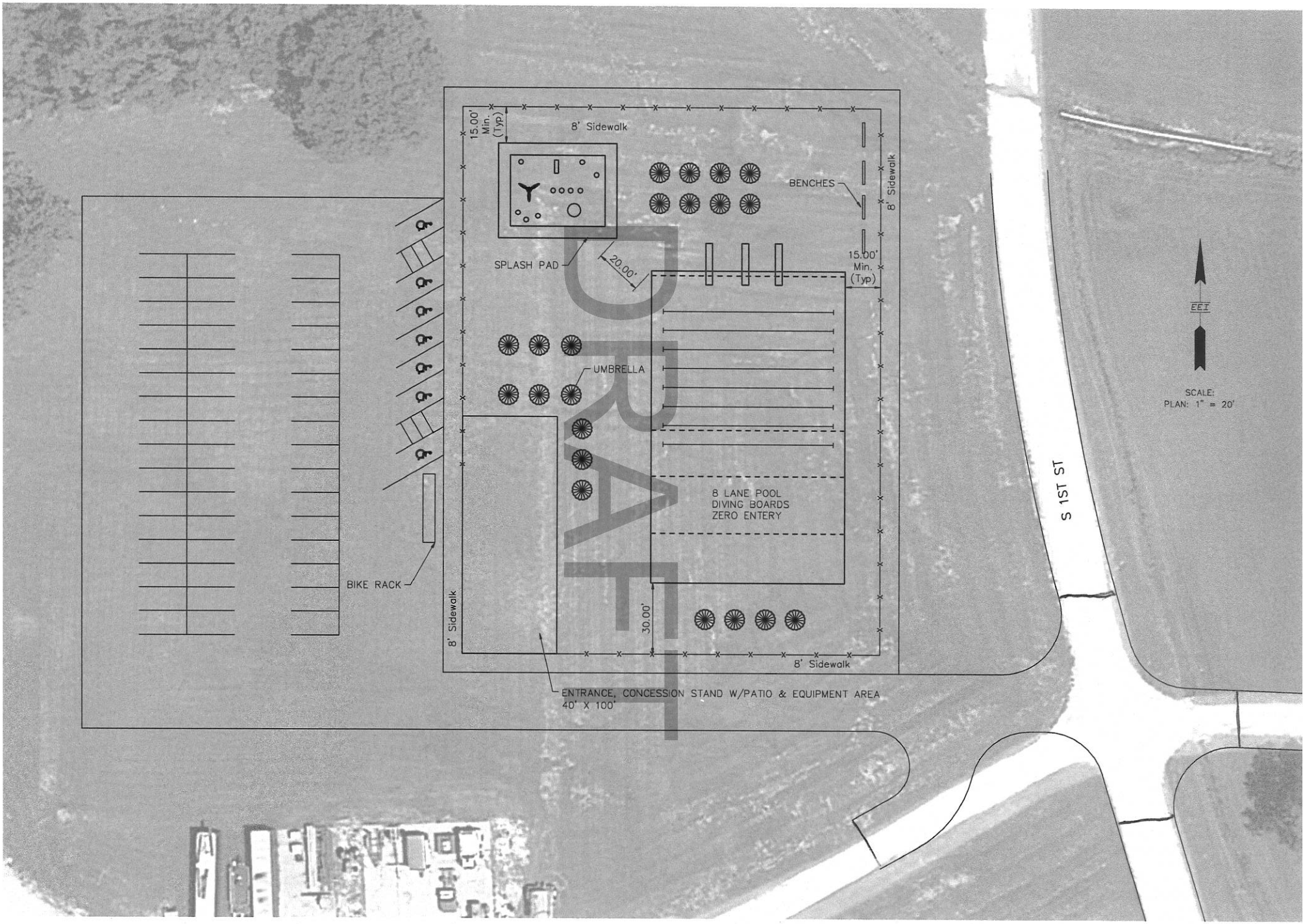
EARLES ENGINEERING & INSPECTION, INC.
Civil & Structural Engineers
Construction Inspectors–Surveyors
Email: earlesinc@earleseng.com

REVISIONS		
NO.	DATE	DESCRIPTION


DRAFT


DRAFT


UNDERGROUND
SPLASH PAD WATER
RESERVOIR
CONCESSION STAND WITH PATIO AREA
20' X 30'
POOL / SPLASH
PAD EQUIP.
STORAGE BLDG.
20'X40'
UMBRELLA
SPLASH PAD
REMODELED POOL HOUSE
8 LANE POOL
DIVING BOARDS
ZERO ENTERY
BENCHES
BIKE RACK
DRAFT



Revised By: TSMITHEM
Plotted: 6/14/2022 3:51 PM

Filename: PER LAYOUT #2.DWG
File Location: F:\V-Drive\2022\22-09 -Herington Pool\DWG

BY-LAWS
THE CITY OF HERINGTON CONVENTION AND VISITORS

BUREAU ARTICLE I: NAME

The name of this organization shall be the Herington Convention and Visitors Bureau (AKA Visit Herington.)

ARTICLE II: PURPOSE

The purpose of the Herington Convention and Visitors Bureau is to promote Herington; solicit groups, conventions, meetings, tradeshows, exhibits, and special events to convene in Herington. To develop civic interests to generally do things necessary or appropriate to carry out and thereby relieve burdens of the city.

ARTICLE III: ORGANIZATION AND MEMBERSHIP

Section 1- Membership: The membership of the Herington Convention and Visitors Bureau shall consist of nine (9) members. Applications for open board positions are to be available at the City office to be completed and submitted to the City office. Applications will then be reviewed by the City Commission for approval.

A. Each member of the Convention and Visitors Bureau shall be a representative of one of the following groups as specified in Charter Ordinance #19, passed by the City Commission on December 2, 2003.
    1. Owners, operators or employees of persons engaged in the hotel or motel business within the City, whether such members reside inside or outside of the City;
    2. Representatives from agencies or organizations actively engaged in promoting tourism or from facilities or organizations of historic or cultural attraction in the City or its environs;
    3. Members of the general public;
    4. A member representing the senior class at Herington High School
    5. Employees of the City or City Commissioners or appointed representatives for City;
    6. One member shall be a representative of the Chamber of Commerce.

Section 2- Executive Board

A. Chairperson/President
    1. Responsible for communications with the city manager
    2. Preside over meetings
    3. Signature on legal documents as required
    4. Does not have voting capability unless required for a tie-breaker

B. Treasurer
    1. Responsible for budget
    2. Keeping financial documents and receipts as required
    3. Audits
    4. Maintain signatures on bank accounts

C. Secretary
    a. Keep written minutes of meeting to include:
        1. Attendance
        2. Voting records
        3. Motions
        4. Resolutions
        5. Actions
        6. Committees with purpose and members
    b. In absence of the chair/president, will fulfill the duties of the President.

D. Board Members- All
    a. Attend meetings in person
        1. If unable to attend, contact a member of the executive board for guidance.
    b. Review the agenda before the meeting.
    c. Introduce ideas for consideration.
    d. Social accountability and responsibilities for written, oral, or electronic communications.

Section 3-Meetings: The bureau shall hold regular meetings at a time and place to be established by the board. All meetings shall be open to the public.

(a) Parliament Authority- Except as otherwise provided in its bylaws and standing rules. Roberts Rules of Order shall govern the Bureau in its proceedings.
(b) Meetings to be held at least quarterly.

Section 4- Organization:

(a} The board members shall elect the executive positions via a majority vote.
(b) Any member who Is absent for three (3) consecutive regular meetings shall be deemed to have resigned. Notification of open position will be then submitted to the City.
(c) Appoints by the City Commission are for two-year, unexpired terms. Any replacement of a member would complete the remainder of the term.
(d) Only Bureau members have voting rights at meetings. Any affirmative vote of the majority of the members present and voting shall decide any question brought before such meeting.
(e) A simple majority of the motions & votes shall constitute a quorum. Five (5) board members are required for a meeting.

(f) Any member desiring to resign from the Bureau shall submit their resignation in writing to the City Manager or City Clerk.

(g) Only the chairperson/president is authorized in making recommendations to the City Commission. Unless authorized to another board representative.

ARTICLE IV: AMENDMENTS AND REVISIONS

Recommendations for amendments to these bylaws may be considered and/or amended at any regular meeting of the Bureau by a two-thirds vote of those in attendance, provided that the amendment has been submitted in writing at the previous regular meeting.

Whenever the Bureau proposes to modify, amend, revise or otherwise change the bylaws of the Bureau, such modification, amendment, revision, or change shall be submitted to the City Commission for its approval. The City Commission shall consider the proposal and may approve the said proposal by an affirmative vote of the majority of the City Commission. No such modification, amendment, revision or change shall be effective until the City Commission approves it.

PASSED AND ADOPTED BY THE GOVERNING BODY OF THE CITY OF HERINGTON, KANSAS, THIS 7th DAY OF JUNE, 2022.

_____

Eric Gares, Mayor

ATTEST:

_____

Megan Lawrenz, City Clerk

SEAL: