

**DRAFT FINDINGS
WATER'S EDGE AQUATIC DESIGN
MARCH 24, 2014**

TABLE OF CONTENTS

Introduction.....

History.....

Population Summary.....

Standards and Guidelines Summary.....

Summary of Findings and Recommendations.....

Findings.....

 General.....

 Operational Expense/Revenue.....

 Swimming Pool Basin and Structure.....

 Pool Deck and Surrounding.....

 Water Loss.....

 Recirculation System.....

 Pool Features.....

 Pool Deck and Surrounding Area.....

 Pool Area Accessibility.....

 Building Structures.....

Recommendations.....

 Immediate Safety Issues.....

 Basic Renovations.....

 Enhanced Renovations.....

 Complete Replacement.....

INTRODUCTION

The City of Monett has an outdoor pool in Monett South Park, which is located south of Highway 60 along South Lincoln Avenue. The City of Monett maintains the outdoor pool and utilizes the YMCA to operate the pool each summer.

Jeff Bartley, engineer with Water's Edge Aquatic Design, performed a review August 01, 2013, while the facility was operating, and again on October 10, 2013, after the facility was drained for the season. The inspection involved a site visit walk-through, observations and discussions with the pool staff. Field notes, measurements, existing plans, and photographs were utilized to prepare the assessment and preliminary recommendations, which can be found herein.

What follows is a report that focuses on suggestions and recommendations for improving the facility. As such, the general tone of the report will appear to focus only on negative issues. However, the purpose of this report is not to fully describe the positive, well-maintained, aspects of the pool, but to assist the City with identifying improvements needs and for future planning purposes.

A brief history of the pool is provided in the History section. An explanation of the standards and guidelines Water's Edge Aquatic Design utilized in the evaluation are summarized in the Standards and Guidelines Summary. The Summary of Findings and Recommendations section outlines what was observed and what is suggested for improvements. A detailed discussion of the findings is outlined in the Findings section. A detailed discussion of the recommendations based on the findings follows in the Recommendations section.

HISTORY

The pool was originally constructed in 1964. It has undergone various improvements over the years with the most notable renovation occurring in 1999, and shortly thereafter. These improvements included modifications as follows

- Reconstruction of the filter area
- Expansion of the bathhouse to include a new admissions area
- Addition of a water slide
- Addition of a bulkhead divider in the lap area, creating a short-course lap lane area.

STANDARDS AND GUIDELINES SUMMARY

This report focuses on the physical condition of facility, but also compares the existing facilities to current state, federal and international design standards, guidelines, and building codes where necessary. Following is a list of the major regulations, codes, and standards that are of consideration in this report.

- Great Lakes – Upper Mississippi River Board of State and Provincial Public Health and Environmental Mangers; Recommended Standards for Swimming Pool Design and Operation.
- Federal Virginia Graeme Baker Pool and Spa Safety Act (VBGA)
- United States Swimming (formerly AAU)
- United States Diving
- Federation Internationale de Natation Amateur (FINA)
- National Spa and Pool Institute (NSPI)
- National Recreation and Park Association (NRPA)
- The Americans with Disabilities Act (ADA)
- International Code Council (ICC)

The most applicable swimming pool health department standard is from the Great Lakes – Upper Mississippi River Board of State and Provincial Public Health and Environmental Mangers, also known as the Ten States Standards, for which Missouri is member. However, this standard is relatively dated as it was published approximately 20 years ago- back to the mid 1990's

United States Swimming, United States Diving, and FINA are organizations that publish standards for competitive swimming and diving. We refer to these standards for swimming and diving dimensions and clearances.

ADA requirements were originally passed in 1990; however, recreations facilities, such as swimming pools, were not specifically addressed. In 2004, guidelines addressing recreational venues were published. In 2010, the 2004 guidelines were officially signed into law by the U.S. Department of Justice.

SUMMARY OF FINDINGS AND RECOMMENDATIONS

Intro to Recommendations.....

Recommendations Yet to Come.

FINDINGS

GENERAL

The pool is 50 years old, and provides approximately 11,550 s.f. of water surface from the main pool and adjacent wading pool. The two pools hold an estimated 466,000 gallons of water. Primarily, modest improvements have been made through the years. The most significant improvements included an expansion of the bathhouse, the replacement of the filter system, and the addition of a water slide- which occurred approximately 15 years ago. The Main Swimming Pool provides open water recreation and diving areas. In addition to the water slide, a handful of floatable-type play elements have been added.

The bulk of the swimming pool structure, pool deck, and below grade piping are original and have issues typical of their age. The pool structure is in fair condition for the most part, but has areas that are deteriorating- including stress cracks and erosion of the concrete surface in areas. The pool deck slopes into the swimming pool, which is not allowed in most current codes. Its condition ranges from average to poor condition in various locations. Based upon the appearance of the pool deck, we assume that neither the pool deck nor the pool piping have been replaced for some time- if at all.

The bathhouse is structurally in sound condition, and also has good natural ventilation. However, portions of the bathhouse are old and are in need of replacement- such as the toilet partitions and the lighting. The floor does not have much texture left and also has many flat areas, which do not drain- creating a slip hazard.

A major concern is that the pool facility has been experiencing significant water loss, which is increasing over time.

OPERATIONS EXPENSES, REVENUE AND ATTENDANCE

(Yet to Come)

SWIMMING POOL BASIN AND STRUCTURE

- **Pool bottom and walls**

The pool structure was constructed originally in 1964, and the top portion of the wall and gutter lip was reconstructed as part of the 1999 renovation. The top portion of the wall may have been added to replace areas of bad concrete, but also to convert the pool to a deck level gutter pool. In the process, the swimming pool would have been made deeper by several inches.

A dividing bulkhead wall was also added at the same time, or shortly thereafter. The vast majority of the structure consists of the original concrete, which is approximately 50 years old at the time of this report.

Structurally, the pool floor appears to be in very good condition and walls are in fair condition overall. There are only a few cracks or delaminated areas of concrete in the structure. Areas noted during the visit include

- Crack and soft area in diving basin floor
- A single location along the west wall of the lap lanes
- Stress cracks at the corners of the walls for the stair structure

The area of greatest concern includes areas of the walls where the surface has eroded, exposing the aggregates in the concrete- creating a rough texture on the walls. There are areas on the south wall where a surface patch was applied, but is peeling off. A surface patch can be reapplied. However, any surface patch will run the risk of peeling, as the existing patch has done.

A hammer test of the walls and floor was performed, where the surface was struck with a hammer- listening to the resulting sound tone. Solid concrete and backfill will produce a solid “ping” sound, while delaminated or soft concrete will produce a dull “thud”. The hammer test did not reveal areas of concern within the structure, outside of the areas where the surface has eroded.

If a renovation alternative is considered, we would recommend that cores be taken from the structure to get a sample through the concrete. Core samples through the concrete would better assess the full condition of the concrete structure.

- **Perimeter Gutter**

The swimming pool contains a perimeter gutter that surrounds the pool, which is intended to skim the surface of the water by forcing water over the perimeter gutter lip into the gutter channel and out periodic drains. The gutter lip is in good condition as it appears it was reconstructed during the 1999 renovation. The pool deck forms the back wall of the gutter. This area appears to be older and showing its age- in the form of stress cracks and deteriorating areas.

The gutter system was flooded during our two visits while the swimming pool water operating. A flooded gutter reduces the effectiveness of the skimming, and it is preferred to keep the water level such that it is barely skimming water over the lip. This produces a better result as contaminants are more effectively drawn from the surface and removed from the pool. However, we understand that there are issues with the swimming pool recirculation that causing the gutters to be flooded, and it may be currently impossible to operate it in a better manner.

- **Diving Clearances**

Standards for diving have been updated throughout the years, since the time of the original construction. The swimming pool currently has a one-meter board. While the original pool had a three-meter board, it was removed presumably because the basin dimensions did not meet the minimum standards for three-meter spring boards published by FINA and US Diving. While there are many standards published for diving clearances, FINA and US Diving are the most widely accepted.

- **Pool Finish**

The pool coating material is epoxy paint, which appears to be fading. The coating will degrade over time, requiring repainting once every four or five years, approximately. The pool basin should be repainted in the near future.

WATER LOSS

Water loss has been reported as a significant issue by the city staff. During the summer of 2013, water was observed to continuously drain out of the drain pipes along the west side of the facility into the storm drain channel.

At the end of the summer, the city staff reported that they observed the water level drop approximately 35" (5" per day) in a week's time period, with the recirculating pump operating. The pool water level was also observed with the recirculating pump turned off. It was determined that the swimming pool lost less water (24") in a week's time with the pump off- 24". This indicates a high possibility that there are leaks in the piping on the discharge side of the recirculation pump.

At the rate of 5" per day, the swimming pool would lose approximately 3,250,000 gallons for a summer season. When the swimming was left alone without filling, the water level dropped a total of approximately 7 feet below the normal water level and then stabilized.

The expected seasonal water usage for this pool should not be more than 650,000 gallons, given a maximum of 1" of water loss per day due to evaporation and swimmer splash.

We believe that the below-deck piping is likely a large contributor to the water loss. See the narrative below for below-grade piping.

POOL INLETS, DRAINS, AND BELOW DECK RECIRCULATION PIPING

According to the 1964 plans, the original below-deck piping system consisted of two different piping materials- cast iron for the larger pipes (main drain, gutter drains, and inlet header), and copper pipe for the smaller inlet branches. While the 1999 renovation plan shows an alternate for replacing the inlet piping, we are certain it did not occur. Our certainty lies with the observation that the pool deck was not replaced in 1994, which would be been required in order to replace the piping located below.

Thin-wall copper piping was a common material choice for swimming pool piping during this era. Our experience is that this piping is often the weak link to the piping systems and can begin leaking as soon as 15 years after put into service. The copper piping has exceeded with life expectancy.

POOL FEATURES

The major play features at the pool include one-meter diving, which was part of the original 1964 design, and a large water slide that was installed shortly before the renovation in 1999. There are also several other play features, which are air-inflated floatables- which are not considered permanent play structures for the swimming pool.

The water slide, in particular, has worn significantly since its addition. The slide has a galvanized steel tower and support structure, and has fiberglass flume ride surface. The galvanized steel structure appears to be in fair condition, but the fiberglass surfaces exposed to direct sunlight are in poor condition. The protective coatings on the exterior have deteriorated from UV exposure, and should be either replaced or recoated. The interior ride surface is also degraded and showing signs of wear. The surface could benefit from buffing and waxing, but likely needs to be re- gel coated.

In addition, two other notes of interest include- the treads on the concrete steps leading are slippery and could be a slip hazard, and the slide tower could benefit from a shade canopy at the top to shade the staff and guests.

The water for the slide structure is drawn from the pool, though a pipe that is run along the deck and turned down into the pool basin. A stainless steel screen with plastic/fiberglass structure creates a screen for the pump suction. The pump is located at the base of the slide tower, at an elevation approximately 8 or 9 feet above the water surface. This elevation above the water surface makes it difficult to prime the pump, and also may cause issues with cavitation on the pump.

The diving board may include the original stand, but it appears to be in fair condition. The diving board has worn, including areas on the side where the board has repeatedly rubbed against the frame. The board needs to be replaced.

POOL DECK AND SURROUNDING

- **Pool Deck**

The concrete deck has the appearance that it has not been replaced in quite some time, and may be the original pool deck constructed in 1964. Overall, the deck is in poor to fair condition. The following lists concerns with the pool deck

- The surface texture has worn smooth in many areas, and presents a slip hazard.
- Each corner shows stress cracks from movement in the pool deck, relative to the pool structure.
- There are several patched locations, particularly on the west near the bathhouse. We presume this was done when below-deck piping was broken and had to be repaired.
- The pool deck slopes toward the swimming pool and gutter, washing all of the contaminants on deck into the swimming pool. Current health department standard generally don't allow having the deck slope into the pool.

- **Fence**

The fence surrounding the entire facility is a galvanized chain link that is 6 feet tall. The selvage is barbed, leaving sharp ends on both the top and bottom. This can be particularly hazardous for guests in bare feet. The galvanized coating is fairly worn throughout.

- **Lifeguard Chairs**

The lifeguard chairs consist of a post frame, platform, seat, and ladder. The platforms are in need of replacement. Many of the seats were removed for storage. Also, the ladder treads seemed to be particularly slippery and could use a non-skid treatment.

Before operating each season, the hardware, platform, and seats should be inspected to make sure they are intact.

- **Pool Ladders**

There are several stainless steel pool ladders, and handrails at the stairs. Many of them were loose during our visit. Each of the ladders and rails anchor into wedge anchors in the pool deck. The ladders and rails should be tightened down.

- **Bridge Over Water Slide Flume**

There is a galvanized bridge structure that allows guests to pass over the water slide flume as it blocks off the deck, before discharging into the swimming pool. The structure appears to be in fair condition. However, it is not secured or braced well and moves laterally.

RECIRCULATION SYSTEM

- **General**

In addition to the piping located below the pool deck, the recirculation system is comprised of a recirculation pump, wall inlets, filters, main drains, and valves.

- **Recirculation pump and flow meter**

The existing pump is vertically mounted centrifugal sump styled pump, where the volute and impeller are located in the wet pit and motor mounted on a frame above the water. A shaft connecting the motor to the impeller, and discharge pipe extend down into the water.

The recirculation pump is rated for 1380 gallons per minute (gpm) at a pumping head of 60 feet, according to the 1999 specifications. This rate exceeds a minimum requirement of a six-hour turnover period for the swimming pool. However, it is not known if this rate is achieved during operation as the flow meter has quit working. We recommend that the flow meter be replaced with one that is operational.

The staff reports no significant issues with the recirculation pump. However, we've experienced maintenance difficulties with this style of pump. The pumps generally use the water it is pumping to flush the packing on the shaft. They are not particularly suited for pumping chlorinated water and then setting dry for an extended period of time, as the shafts seize during the off season.

- **Suction Fittings**

The diving basin has two main drains that are covered with Virginia Graeme Baker Act VGBA certified covers. The VGBA requires that all submerged outlets from a pool must meet minimum safety standards, including that all manufactured covers must be tested and certified to meet those standards.

The main drains appear to have certified covers. You should keep records of the drain covers (cut sheets and invoices from purchase) on site in the event you are inspected by health department officials or by the Consumer Products Safety commission (CPSC)- who regulate enforcement of the VGBA.

There is also a submerged outlet in the form of a suction screen for the water slide. It is not apparent that the screen structure meets the VGBA. The screen must either have a stamped cover (indicating testing performed by the manufacturer), or it must be certified by a professional that it is field fabricated to meet the same standard.

This screen must be certified, or replaced with one that is. We also recommend that you consider placing the pump at a lower elevation to improve its operation.

- **Filtration System**

The filtration system was replaced as part of the 1999 renovation project. It now includes three vertically standing pressure sand filters- 8'- 6" diameter each. The filters are carbon steel with a protective rubber coating. The coating is fading on the exterior due to exposure to the sun. With this coating, we would expect the filters to have a 30 to 40 year life expectancy. Each filter tank has approximately 57 square feet of filter surface. The total surface for two filters is approximately 170 square feet.

The loading rate for the filters at 1380 gpm is approximately 8 gpm per square feet of surface area. This is well within the capacity of the filters, which is generally considered 15 gpm per square feet. Having large enough filters to run at a loading rate less than the 15 gpm per square feet capacity is a real benefit as it allows you to have longer filter runs and more effective filtering.

The pressure gages for the filters were not working during our visit. The pool staff backwashes the filters every three to four days, based upon a schedule. We recommend that the pressure gauges be replaced with ones that are working. The filters should be backwashed on "as needed" basis, which is when the difference between the influent and effluent gauges is 8 to 10 psi. The staff may find that they don't have to backwash as frequently. They will also find that extended filter runs will likely provide more effective filtering, as filters become more effective as they collect debris on the surface.

- **Surge Tank and Screens**

A surge tank was constructed as part of the 1999 renovation, in order to help maintain a continuous water skimming elevation over the gutter lip- by providing a means to store water temporarily displaced when the pool is filled with swimmers. Without a surge tank, the water level would simply raise and flood the gutter system when swimmers fill the pool.

During both summer visits, the surge tank and gutter system were flooded. It was assumed during these visits that there was simply too much water in the swimming pool causing the gutter to flood. However during the follow up visit, we discovered that there is an issue with the main drain and gutter piping.

When we started filling the deep end of the swimming pool, water started coming out of the gutter drain pipe (larger pipe without the float valve) in the surge tank- and not out of the smaller pipe with the float valve. In addition, when water was poured into the gutter drains- it came out of the main drain (smaller pipe with the float valve).

Given this limited information, we believe that the original gutter and main drain pipes coming from the swimming pool were connected backwards as they were extended to the surge tank. The result is that the float valve should have been

connected to modulate flow from the main drain, but was instead connected to the pipes coming from the gutter system. And the main drain is connected to the surge tank with no float valve to modulate. This would explain the operational difficulties with keeping the gutter system from flooding.

Prior to being pumped from the surge tank, the water is run through a trash screen to collect debris. The trash screen is stainless basket, and appears to be suitable for providing the necessary screening. However, the structure holding the basket is constructed redwood. The wood is deteriorating- we recommend using a more durable material for being submerged, such as stainless steel or fiber-reinforced plastic (FRP).

- **Chemical Feed Equipment**

The chemical feed system consists of chlorine gas for disinfection, which is stored in a separate chlorine room and is fed using a vacuum system for safety reasons. Chlorine gas is an efficient and effective form of disinfection, and once commonly used on a majority of facilities. It has become less common over the years for swimming pools due to concerns of handling safety. It is imperative for the City to keep the chlorine feed and safety equipment maintained and up to date, as well as, continue to use safe handling procedures by the staff.

As chlorine gas lowers the pH, chemicals are also required to balance the pH back to neutral. Soda ash is used to balance the pH. It is mixed and fed from a drum located in the original lower filter area to the west of the bathhouse.

POOL AREA ACCESSIBILITY

- **ADA Requirements for Pools**

Since the time of the last renovation in 1999, changes have been made to the Americans with Disabilities Act (ADA). New rules have been adopted by the Department of Justice that now provide specific requirements for swimming pools.

The City may have means for ADA entry into the swimming pool, in the form of a portable lift, but we did not see any during our visit. Since the pool has no sloped entry, it you are now required to have a lift in place and secured during open hours. This lift qualifies as an accepted primary method of entry into the pool.

In addition, since the pool also has over 300 linear feet of perimeter a second method of entry is also required, which could also be a lift or sloped entry. The second method of entry could also be a number of other options classified by the ADA as secondary methods of entry. The set of stairs on the west would qualify if the handrails are modified to be a clear width of 20 to 24 inches between.

BUILDING STRUCTURES

The bathhouse is a freestanding one-story building. It is constructed of concrete block wall with a wood roof and asphalt composite shingles. The majority of the structure is original from 1964, but a new extension was constructed on the north in 1999. There is also a small storage building located on the south, adjacent to the wading pool.

The newer portion of the bathhouse includes an admissions room and a family change room. The original bathhouse area includes the changing and bathroom area for the men and women, storage area, and concessions.

- **Condition**
The buildings are generally in good structural condition.
- **Ventilating**
The bathhouse appears to be well-ventilated with high ceilings and mechanical ventilation.
- **Bathrooms/Dressing Rooms**
The conditions within the dressing rooms are acceptable, including newer plumbing fixtures. There also seems to be sufficient lighting for the area, although the fixtures are older and could be replaced. The toilet stall doors are older and constructed of wood. They should be replaced.
- **Floors**
There seems to be insufficient drainage in the floors- due to limited number of floor drains in certain areas, and lack of positive slopes in the floor for draining ponded water. This is particularly true in hallways where floor drains are often not included in the original design. The result is ponding water that creates slippery conditions. In addition, the floor lacks a non-skid texture in the bulk of the floors.

OPTIONS/RECOMMENDATIONS

Options for improvements fall under various categories, which include the following.

- **Immediate Improvements-** items that should occur immediately to improve safety and operating conditions. They are either essential for the operation, or are more manageable as they come at a lesser cost.
- **Basic Improvements-** items that improve the longevity or durability of the facility. They also include items that improve the operation of the swimming pool- where the improvements are more expensive and not necessarily urgent enough to be considered a necessary immediate improvement. These

improvements also generally preserve the features and function of the pool facility, rather than add or modify them.

- **Enhancements-** are items that alter the features or function of the pool facility.

A preliminary list of options/recommendations being considered are as follows.

- **Immediate Improvements**
- Provide a VGBA screen for the water slide suction outlet
- Repair areas of previous wall patch that is peeling
- Replace the diving board
- Replace the platforms for the lifeguard stands
- Tighten all pool ladders and rails
- Laterally brace the bridge structure
- Install new pressure gauges and a flow meter for the recirculation and filtration system
- Provide and secure lift during open operation hours, and adjust handrails on stairs, to meet new ADA standards.
- Check for slippery spots on the pool deck and bathhouse

- **Basic Improvements**
- Repair cracks in pool basin
- Repair pool walls that have surface erosion
- Repaint pool structure
- Replace all below-deck pool piping, pool deck, and fencing
- Pressure test main drain pipe, provide liner if necessary
- Consider roof structure over filter area, to protect from constant exposure to sunlight
- Recondition fiberglass on water slide
- Provide non-skid surface on stairs leading to water slide tower
- Replace the wooden box structure holding the trash screen with an alternate material type
- Reconstruct the bathhouse floor to provide a nonskid surface, more drains, and positive slope
- Reconstruct the bathhouse lighting
- Replace the toilet stall doors

- **Enhancements?**
 - Provide a sunshade at the top of the water slide
 - Reconstruct all or part of the swimming pool

- Provide modern aquatic center amenities
 - Consider newer and more modern aquatic center amenities to spark interest in the pool and increase attendance?
- **Pool Replacement**