CRYSTAL BEACH POOL RENOVATION

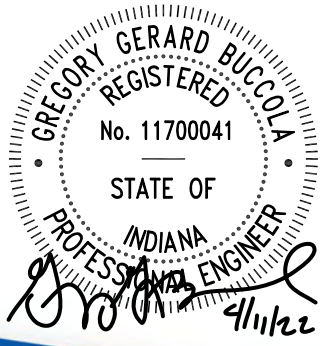
400 W Vaughn Drive, Madison, IN

Condition Summary & Recommendations

April 11, 2022

Prepared For:

C. Edward Curtin, FASLA
CWC Latitudes
193 E 925 N
Seymour, IN 47274



Prepared By:

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A. BACKGROUND AND PURPOSE

The City of Madison, Indiana has engaged the KPFF-led design team and contractor to renovate the historic pool and pool house built in 1938. The project went to bid in summer 2021, and Poole Group was the successful general contractor. The bid included a schematic drawing set for the pool upgrades, based on an audit performed by Counsilman Hunsaker in August 2020. This audit was performed while the pool was still in operation, with the liner on and without the ability to stress-test the pool equipment systems. The Counsilman Hunsaker report is attached herein as *Appendix 1*.

Once work began, the pool subcontractor, PSS, was able to pressure-test the pipes and remove the liner. This exposed several issues that were not apparent or visible during the design phase. The PSS report is attached herein as *Appendix 2*.

To assess the specific structural issues, KPFF was called to visit the site and observe a concrete retaining wall along the North edge of the pool. This wall forms part of the basement and retaining foundation system supporting the pool house. The site visit was performed on March 1, 2022 and KPFF documented the conditions which are outlined in this report.

B. STRUCTURAL FINDINGS

Below is a series of visual structural observations that were documented during our visit. For information pertaining to the pool systems, code compliance, or maintenance, please see the attached appendices by the pool consultant and contractor. The photo tile explains the structural concern noted in the field.

Issue 1: *Cracks and spalling at North wall of pool indicate potential loss of integrity.*

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Issue 2: *Spalled concrete top layer indicates freeze-thaw damage and moisture intrusion into basin structure.*

Issue 3: *Damaged curb at curved zero-entry edge of pool*

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C. RECOMMENDATIONS

KPFF discussed the concrete conditions with the pool consultant, pool contractor, general contractor, and Owner. Based on the totality of input from all parties, for all systems (not just structural), we have summarized the following actions be taken in order to re-open the pool. These align with "Option 3" below. Note that Option 3 is not a full-scale restoration or replacement, but will address code-compliance, safety, and functionality items that were identified by Counsilman Hunsaker and PSS:

1. Demolish and re-build the North wall. The concrete has reached the end of its useful and reliable service life; a retrofit would not ensure that the proper strength is provided *and* be less expensive or completed sooner. Potentially, a new wall could be poured in front of the existing, abandoning the current wall in place. This could be supported by a new retaining wall foundation system, or anchored with soil nails back to solid grade behind the wall.
    a. A scheme for this would need to be developed in concert with Poole and PSS.
2. Add plumbing drains of the correct size so they are spaced evenly throughout floor. This likely includes adding concrete to the deep end of the pool for adequate drain installation, resulting in the pool being 12" - 16" less deep than it is today.
3. Add adequate surge tank(s), located behind curved wall section with former portholes.
4. Replace curb, perimeter deck, and gutter for proper zero-edge and drainage.
5. Ensure adequate distribution of filtered water, targeting an approximately 4-hour turnover for entire pool volume.

Option	Scope Summary	Cost Estimate	Schedule
1. Complete replacement	Demolish existing pool and replace in-kind with same footprint, general layout, etc.	$5 -$6 Million	Complete within 12 months of authorization to proceed
2. Upgrade all systems	Bring the pool into compliance and full functionality where feasible, leaving some original components in place	$3.8 - $4.5 Million	Complete within 12 months of authorization to proceed
3. Short-term upgrade to restore basic functionality	Address issues that pose a safety or functionality risk. Add 5-7 years to the service life of the current pool.	$1.8 Million	Possible in August 2022 with fast-track scheduling, Realistically by 2023 pool season

D. SUMMARY

The design and construction team believe that for less than $2 million, the Owner can make targeted repairs that will keep the pool operable during the new liner's entire service life. This allows the Owner to plan funding for a major upgrade or replacement beyond 5-7 years. The Owner could then evaluate the options presented to them by the design and construction team and follow up with their preferred direction. As always, we are available to talk through the status of the pool restoration project, and available options, at any time.

The opinions and conclusions developed by this investigation are based on engineering judgment constrained by the limited scope of the investigation noted above, consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. No other representation, expressed or implied, and no warranty or guarantee is included or intended. Please contact KPFF with any further questions or concerns.

END OF REPORT

Crystal Beach Pool
City of Madison, Indiana
Swimming Pool Assessment

Counsilman-Hunsaker
AQUATICS FOR LIFE

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AQUATICS FOR LIFE

AUDIT REPORT
CRYSTAL BEACH POOL
MADISON, IN

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EXECUTIVE SUMMARY

On August 28, 2020, Counsilman-Hunsaker performed a swimming pool audit for the City of Madison, Indiana, at the Crystal Beach Pool. At the time of my review, all pool was full of water with filtration and treatment systems were in operation. This report is based on the visual observation during the site visit and conversations with and information provided by facility personnel. The purpose of a swimming pool audit is to identify items that are substandard in the pools, identify items not meeting current industry swimming pool design standards, or equipment not operating as designed and to assist in defining a course of action regarding the future of the pools. Also, an opinion of probable construction cost is provided for recommended repairs, which will bring the pools up to current industry swimming pool design standards.

This report references the Indiana Public and Semi-Public Swimming Pools Rule 410 IAC 6-2.1 and Indiana Swimming Pool Code — 675 IAC 20, ANSI/APSP/ICC-16 2017, and ANSI/APSP-16 2011. Also referenced is the Model Aquatic Health Code, 2nd Edition (MAHC). Where a governing body does not address specific items, reference will be made to the industry standard

Crystal Beach Community Swimming Pool

The Crystal Beach Pool has a 19,868 sq. ft. pool with depths ranging from 0'-0" to 7'-6". Original construction began in 1938 and was completed in 1939. The pool opened to the public on May 28, 1939. The pool and bathhouse underwent a major renovation in 2006. The maximum pool depth was decreased to 7'- 6" with the addition of new main drains to assist with the draining of the pool during the off-season. A new filtration system along with new pumps, a chlorine treatment system, and above grade piping was also part of this renovation. Finally, new 150 ft long open flume slide was the primary recreational add to this renovation. The pools are used for recreational swimming, swim lessons, therapeutic exercise, and leisure aquatic play used by the community.

In addition to the structural concerns with the pool, the major problem with the pool was the amount of water loss. While on-site, a two (2") water line was opened to fill the pool. The line was opened for 75 minutes. This calculates to approximately 9,750 gallons. A small portion of that loss can be attributed to evaporation. However, the majority is leakage. A recommended water tightness testing and piping pressure testing to help determine the source of the water loss is included within this report. Depending on the source of the water loss, the extent of repair may have a significant cost impact. Measurement of this cost compared to additional suggested and required repairs can often lead to complete pool replacement.

One fixed ADA pool lift is in place near the southwest corner of the pool. The lift is currently non-operational. ADA requires at least two (2) primary means of access for a pool with over 300 linear feet. The primary means of access is either a permanently affixed pool lift or a correctly sloped ramp with rails.

Swimming Pool – Deficiencies

· The swimming pool is losing water. However, the full extent of the daily loss is currently unknown.

- Structural concerns with the pool.
- Pool chemical treatment and monitoring do not meet current Indiana Health Code requirements.
- Flow rates are unknown for the pool recirculation, backwash flow, and slide water supply.
- Pool liner is at the end of its life cycle.
- Depth markers do not accurately depict water depths.
- Pool access does not meet current Indiana Health Code requirements.
- Pool does not meet ADA accessibility requirements.

GENERAL POOL INFORMATION

Leisure Pool

Built: 1938 & 1939

Length: Varies

Width: Varies

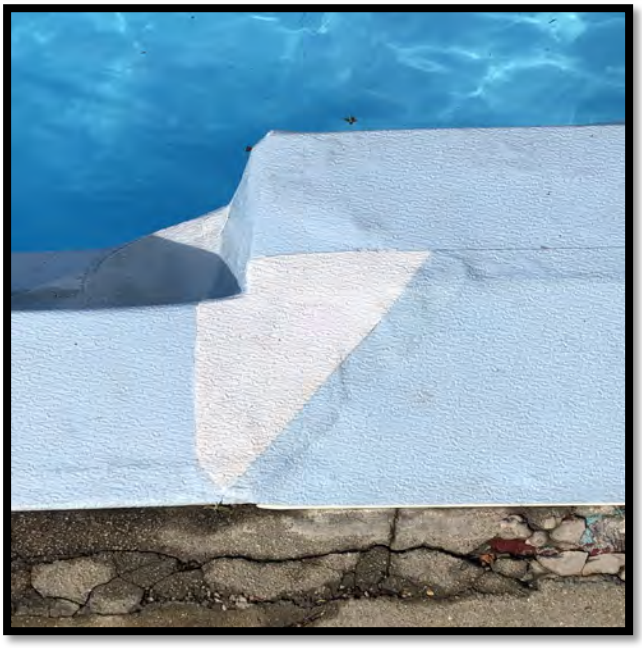
Surface Area: 19,868 sq. ft

Perimeter: 622 ft. (approx.)

Water Depths: 0’-0” to 7’-6”

Pool Volume: 587,344 gal.

SWIMMING POOL CONDITIIONS AND RECOMMENDATIONS



LEISURE POOL FINISH

At the time of my review, the leisure pool was full of water, and a surface inspection was impossible. Observations from the pool edge along with conversations with the pool operator are the basis of the findings noted below.

The leisure pool is currently lined with an EPDM rubber liner typically of a 60-mil thickness that encompasses the entire pool surface and approximately 12" to 16" of the pool/deck edge. The liner was installed in 2006 as part of a renovation project. Typically, pool liners installed on an outdoor seasonal pool in a climate susceptible to cold weather last approximately 10 to 15 years. As shown in the pictures to the left, the current pool liner has reached the end of its lifecycle.

The exposed pool wall located on the south side of the pool within the lower level of the bathhouse had clear signs of the pool leaking. Cracks in the concrete pool wall has water weeping through the cracks. This could be contributed to a fractured pipe, but until the piping is pressure tested, it is unclear where the water is coming from. With the age of the liner and the current condition seen during my inspection, some or all of the leakage can likely be contributed to a failing liner.

Depth markers and warning signs are slightly worn but located as required by local and state health codes.

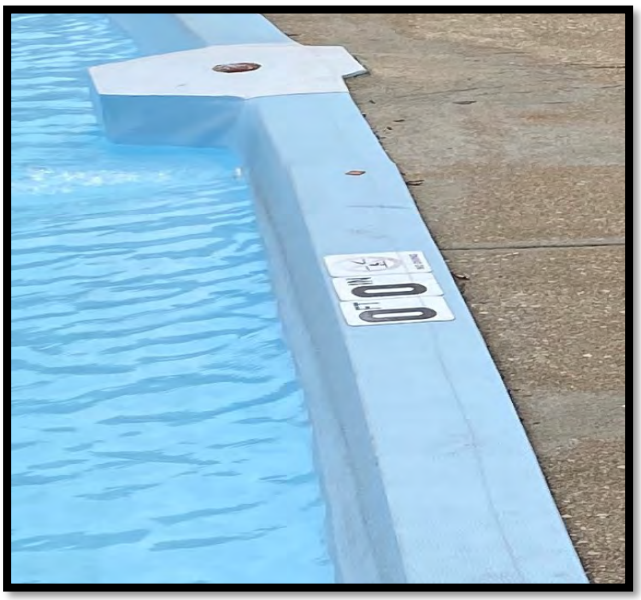
A water tightness test is recommended to verify the amount of daily water loss currently being experienced at the Crystal Beach Pool. An outline of this test is provided on pages 19 & 20 of this document.

RECOMMENDATION—IMMEDIATE

Replace the current pool liner with a new liner installed by a qualified contractor.
Estimated Cost: $185,000

RECOMMENDATION—FUTURE

Replace the current pool with a new pool or pools.
Estimated Cost: See the following page.



LEISURE POOL FLOOR SLOPES & DEPTHS

The arc portion of the pool does not have an actual "Zero Entry Pool" as defined by aquatic and health code terms, except for the ramped entryways with rails. The remainder of the arc requires a 6" to 8" step down to enter the water. A proper zero entry is a sloped entry (at a 1:12 slope) where the deck meets the water without a step/ stair riser. There are portions of the arc where the step-down lands in 2" of water and other areas where the depth truly is 0'-0".

No original construction of as-built drawings are available. Drawings from the 2006 renovation do not define actual dimensional slopes of the pool floor. However, based upon the current depth markers on the south side of the pool, the pool floor exceeds the allowable slope per current Indiana Code requirements (see code below).

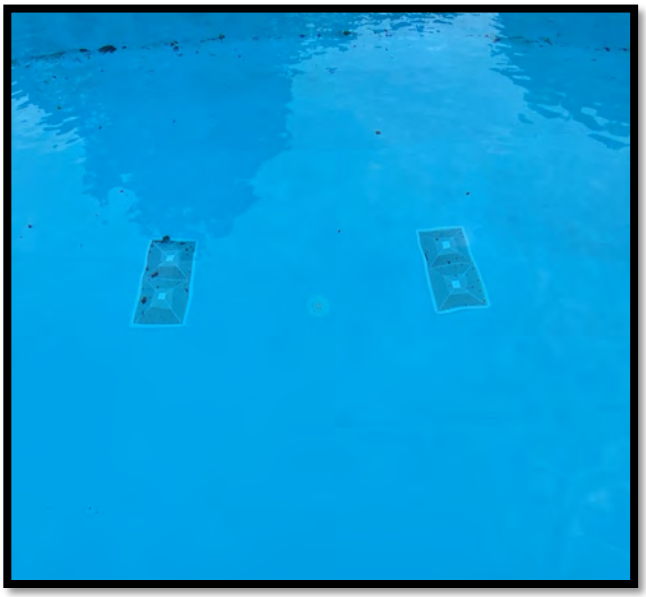
> 675 IAC 20-2-5 Floor
> (b) The slope of the floor from the shallow end wall towards the deep end shall not exceed one (1) foot in twelve (12) feet to the point of the first slope change for Class A and B pools or one (1) foot in ten (10) feet for Class C pools.
>
> (c) The point of the first slope change shall be defined as the point at which the floor slope exceeds one (1) foot in twelve (12) feet for Class A and B pools or one (1) foot in ten (10) feet for Class C pool

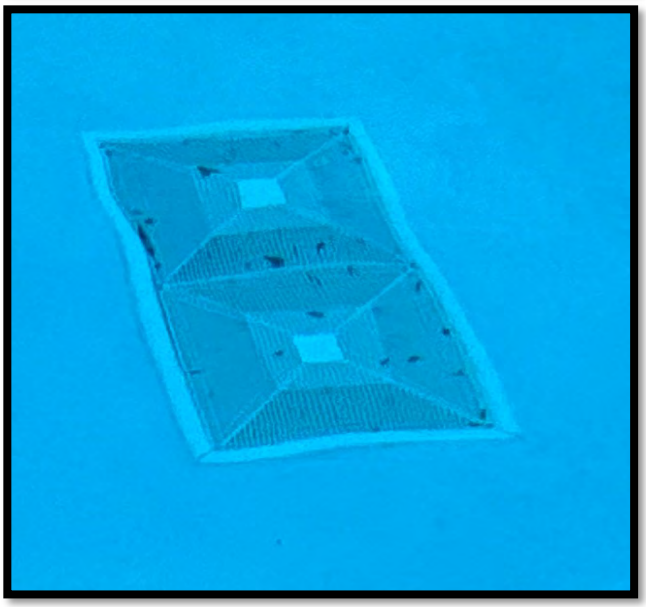
Please Note: The Crystal Beach Pool is a Class B Pool.

Due to its age and historical value, it is unlikely that floor slope changes would be required by code. Often, health departments allow older pools that are still operational to function under a grandfather clause.

RECOMMENDATION

N/A



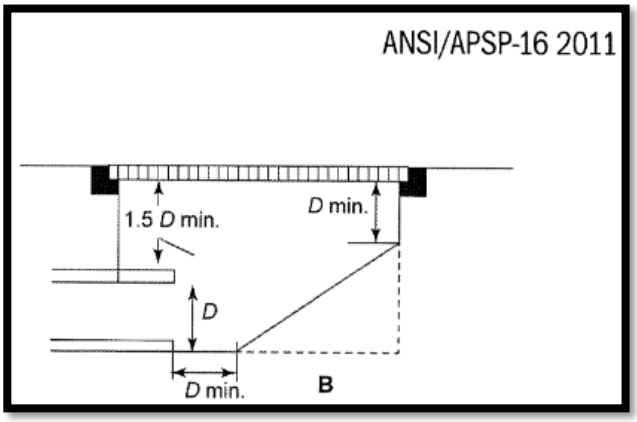


LEISURE POOL MAIN DRAINS & INLETS

At the time of my review, the pool was full of water; therefore, a detailed review of the main drains was impossible. It appears the main drains are 24" x 48" with two covers installed on each main drain. Confirmation of VGB (Virginia Graeme Baker) compliance could not be verified. All main drains installed in public swimming pools in the United States must be VGB compliant by law. Additionally, compliance must be documented, and the paperwork must be on file at the designated facility.

"New" VGB compliance regulations are soon to be enacted (Nov. 2020) for all pools. Law requires all main drains of existing facilities must meet the regulations noted below. Verification of the 1.5 D could not be verified. Additionally, date stamps on the existing sump covers also could not be verified. This verification is also required.

Per ANSI/APSP/ICC-16 2017
1.1.2 Existing product compliance. SOFA (Suction Outlet Fitting Assemblies) components that were manufactured or installed before the effective date of this standard, and that meet APSP-16 2011, shall be considered in compliance with this standard. See the required sump compliance below.

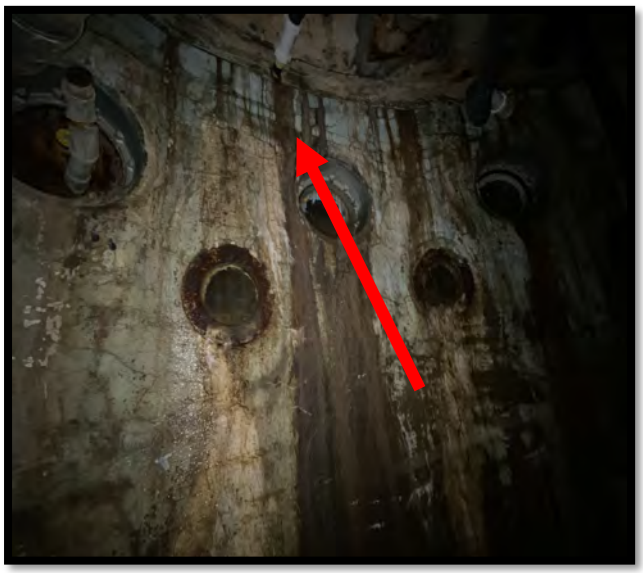


As noted previously in this report, the current quantity of pool inlets do not meet current local or national health code requirements. Indiana Health Codes require a pool of this size (19,868 sq. ft.) to have a minimum of 40 inlets with a maximum allowable flow of 40 GPM per inlet. Current design standards allow 20 to 30 GPM per inlet, which would result in a total of 55 inlets. During my review, I counted less than 35 inlets.

RECOMMENDATION—IMMEDIATE

Update main drain covers.
Estimated Cost: $3,500

Engineering Certification of Main Drains
Estimated Cost: $6,500 (if required)



LEISURE POOL STRUCTURE

The pool facility was constructed in 1938 and 1939 as part of the Works Progress Administration (WPA) Project. Across America, WPA laborers built 805 new swimming pools and also engaged in 339 projects to repair or improve existing swimming pools. At the time of their construction, WPA pools were examples of state-of-the-art engineering and design. While few remain in operation, most have outlived their lifecycle and usefulness. New aquatic programs and hundreds of current innovative pool recreational options have driven communities to rethink their aquatic needs.

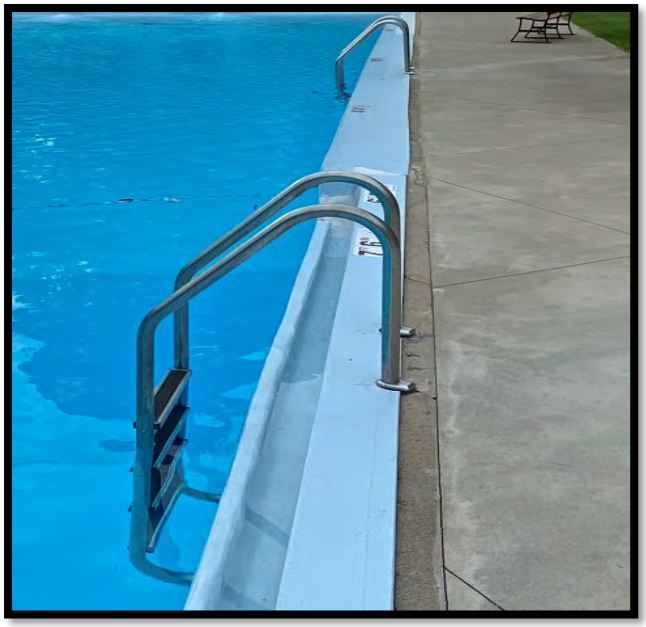
The Crystal Beach Pool structure has numerous issues and concerns. As seen by the pictures to the left, the pool is leaking water extensively, and this is just in the visible area, which is only about 10% of the pool wall. While on-site, the 2" fill line was on for more than an hour. The current pool liner has issues related to its age, as noted on the previous page, so leaks can certainly be contributed to the liners needed replacement. Still, the pool structure is undoubtedly a significant concern. When water weeps through structural cracks in the concrete, the rebar expands, flakes, and ultimately fails. This compromises the pool's structural integrity, thus causing additional cracking and leakage. An assessment by a structural engineer can undoubtedly lend more detailed insight into the structural concerns. Still, ultimately, lateral loads on the pool walls are a concern and a potential safety issue.

Pool liners are defined as a patch or a band-aid to extend a pool's life an additional few years until it is conducive to discuss pool replacement. Typically, this is predicated on budgets and the ability to gauge the public temperament regarding the replacement of an iconic local facility such as the Crystal Beach Pool

RECOMMENDATION

Replace the pool structure with new, code-compliant swimming pools and/or spray pad(s).

Estimated Cost: Currently, pools are being constructed between $250 and $300 a square foot of water surface. This includes the pool structure, pool finishes, piping, pumps, filters, and chemical treatment.



LEISURE POOL ACCESS & ADA COMPLIANCE

Indiana pool code requires a means of entry into a pool of this size every 75 ft. (675 IAC 20-2-14). The arc portion of the Crystal Beach Pool is marked as a zero-entry pool based upon the existing depth markers. This is not a zero-entry pool by aquatic definition. A proper sloped zero-entry pool does not have a step-down and water depth at the landing of that step. Therefore, additional entry rails are warranted on the arc portion of this pool. The vertical pool walls on the south side of the pool have four (4) pool ladders appropriately placed and meet code requirements.

Currently, there is one ADA compatible pool lift (see picture, left-center). At the time of my review, this lift was not operational and appeared to be out of commission for quite some time. The ADA requires pools over 300 lineal feet to have two (2) primary means of access. This would require a second operational lift or the construction of an ADA compliant pool ramp with rails.

RECOMMENDATION—IMMEDIATE

Add a second battery-powered pool lift to meet ADA accessibility requirements.
Estimated Cost: $9,000

RECOMMENDATION—FUTURE

Add three (3) additional stair and rail locations on the arc section of the pool to meet Indiana code compliance.
Estimated Cost: $15,000

SWIMMING POOL - WATER SLIDE

The Splashtacular waterslide was part of the 2006 renovation.

The painted surfaces of the steel support columns, extension arms and spokes, and stair treads are severely faded, but fictionally in good condition. The slide platform is starting to show corrosion at the support beams on the underside of the platform (see picture, lower left). Although this is currently a minor concern, repairs are justified to prevent further corrosion.

The slide handrail, gate, and signage is in good condition with no noticeable issues.

Slide hardware (washers, nuts, bolts) show no minor signs of corrosion, but nothing that warrants replacement at this time. The slide owners manual notes that slide hardware needs to be on a maintenance schedule to confirm all hardware is tight to the designed torque requirements.

The water slide riding surface requires attention. The flange joints where the slide flume pieces are interconnected are all missing the caulk fill within the seam surface. Typically, the caulk needs to be replaced every 2 to 3 years. Additionally, the riddi surface is severely faded and rough in spots. The slide owners manual notes that the slide surface needs to be waxed at the beginning and end of each swim season.

RECOMMENDATIONS — IMMEDIATE

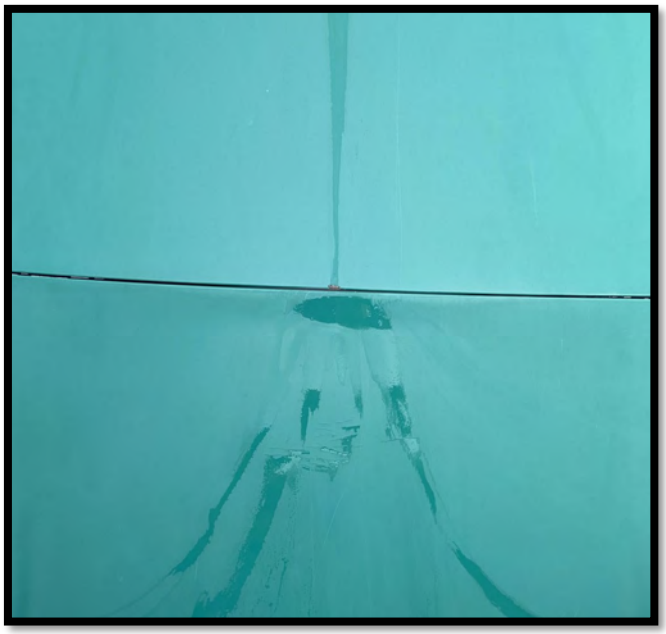
Repair Slide Platform Corrosion
Estimated Cost: $3,500

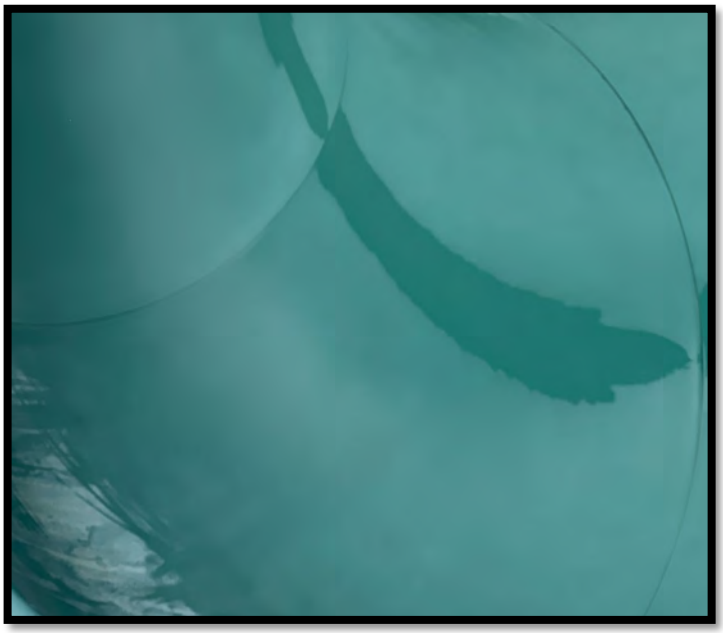
RECOMMENDATIONS — FUTURE

Re-Gelcoat or epoxy paint the water slide riding surface
Estimated Cost: $25,000

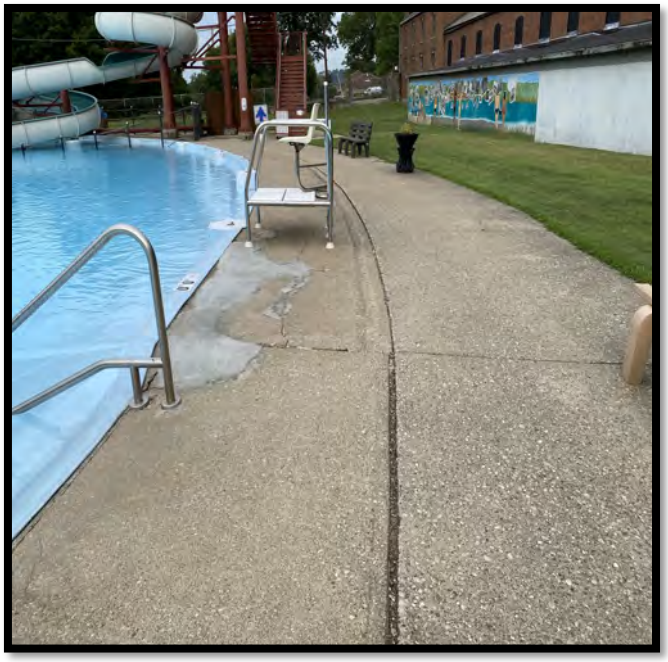
Epoxy paint the water slide exterior surface
Estimated Cost: $16,000

Epoxy paint the water slide structural steel
Estimated Cost: $28,000






WATERSLIDE RULES
1. FOLLOW LIFEGUARD'S INSTRUCTIONS.
2. ALL RIDERS MUST BE 48" TALL.
3. RIDERS MUST LIE ON THEIR BACKS AT ALL TIMES.
NO SITTING UP WHILE RIDING THE SLIDE IS PERMITTED.
4. MAXIMUM RIDER WEIGHT 300 POUNDS.
5. DO NOT PULL OR PROPEL YOURSELF INTO THE RIDE.
WARNING



POOL DECKS

The pool deck directly in front of the entryway from the bathhouse and the walkway headed eastward in front of the bathhouse, along with the pool deck around the water slide, is new from the 2006 renovation. The remainder of the pool deck is original to the 1939 construction.

The original pool decks are in very poor condition. A majority of the original pool deck has uneven delaminated surfaces, structural cracks, and failed patchwork. Additionally, the pool deck surrounding the ark portion of the pool has an open gutter trench as part of the concrete surface (see picture lower-left). At entry locations, the open concrete trench drains into the pool, which conflicts with current local (675 IAC 20-3-4 (b) (4)) and national pool codes and design standards. Pool decks are required to drain away from the pool deck.

RECOMMENDATIONS—IMMEDIATE

Replace the original pool deck around the perimeter of the pool. Add code required deck drainage.
Estimated Cost: $135,000

RECOMMENDATIONS—FUTURE

N/A

MECHANICAL CONDITIIONS AND RECOMMENDATIONS

LEISURE POOL ABOVE GRADE—FILTER ROOM LOWER LEVEL EXPOSED PIPING

Above grade sch. 80 pool piping and valves are original to the 2006 renovation. There appear to be a few minor adaptations, but no leaks or piping concerns are present.

Pipe hangers in the basement show surface rust and corrosion. Currently, there is no need for replacement, but it is important to lubricate the pipe hangers to prevent the advancement of corrosion. If the basement of the building is to be renovated, pipe hanger renovation is recommended.

Pool piping pressure and suction valves were throttled to confirm free moment and flow resistance. Hardware on all butterfly valves shows signs of surface rust and minor corrosion.

The check valves located on the discharge side of the concentric reducers are incorrectly placed. Check valves are required to be located post throttling valve and require to have at least five pipe diameters before and ten pipe diameters after the check valve before any fittings or valves. This is a manufacturer's recommendation.

All piping supports and hangers are in moderate condition. Replacement at this time is not needed.

The Blue-White digital flowmeter is currently showing 0 flow. This needs to be repaired or replaced to provide flow monitoring per code. Additionally, the flowmeter needs to be relocated before the tee splitting the feed east and west. If a new chemical controller is added to the system, it is suggested to tie the flowmeter to the chemical controller so that flow can be monitored from the main level of the building.

RECOMMENDATION - IMMEDIATE

Under the current conditions, budget pipe hanger/support replacement in the basement within the next 2 to 3 years.
Estimated Cost: $4,500

Replace Blue-White Digital Flowmeter with a Signet Magmeter with a Remote Digital Readout
Estimated Cost: $1,800

RECOMMENDATION - FUTURE

Relocate the check valves as required by the manufacturer.
Estimated Cost: $1,500

LEISURE POOL BELOW GRADE PIPING

Pool return piping is routed downward from the pool filters through an opening on the first floor into the basement. The piping branches at a tee directing the water east and west, leaving the basement at open spaces as shown in the picture on the top left. Piping transitions from sch. 80 to 40 at the tee in the basement. As the piping exits the basement, it is routed underground behind the pool deck on the south side of the pool. As the return piping extends east and west, it turns north and extends around the circumference of the pool. The pool deck on the east, west, and north sides of the pool is original; therefore, I assume most, or all of the piping in these areas is original. No drawings exist indicating the replacement of this piping.

The pool piping embedded in the pool concrete is cast-iron. There is a likelihood that the below-grade piping on the east, west, and north sides of the pool is also cast-iron, which is suspect due to its age (80 years) and tendency to fail due to the corrosive nature of chlorinated water.

As noted previously in this report, the current quantity of pool inlets does not meet current local or national health code requirements. Indiana Health Codes require a pool of this size (19,868 sq. ft.) to have a minimum of 40 inlets with a maximum allowable flow of 40 GPM per inlet. Current design standards require 20 to 30 GPM per inlet, which would result in a total of 55 inlets. During my review, I counted less than 35.

RECOMMENDATION - IMMEDIATE

Pressure (hydrostatic) test all below-grade pool piping. Piping should withstand a min pressure of 25 to 30 psi.
Estimated Cost: $7,500

RECOMMENDATION - FUTURE

Replace below grade pool piping on the east, west, and north sides of the pool. Add additional inlets to meet current health code requirements.
Estimated Cost: $125,000 (Deck Replacement not Included)

LEISURE POOL PUMPS AND MOTORS

There are two (2) 20 HP –1,770 rpm — 820 GPM, end suction pumps utilized for pool recirculation. The pumps work in unison with a combined flow of 1,632 GPM. With a pool volume of 587,340 gallons, this results in less than a 6 hr. turnover. Indiana Pool Code requires a turnover of 8 hrs or less for a pool built before September 13, 1989.

The motors and pumps were replaced as part of the 2006 renovation. Currently, the motors and pumps appear to be in good running condition. Compound and pressure gage readings indicate the pumps are currently running within their designed curve.

Pool pump casings should also be supported via a concrete housekeeping pad. The red arrow in the picture on the upper left indicates where concrete support is required. This is typically a manufacturer's recommendation.

There are minor cosmetic issues with the outer coating of the motor and pump housing, which should not impact the function of the motor or pump. However, the interior wetted parts for pool pumps are typically fusion-bonded epoxy coating on all wetted parts to protect pump internals from corrosion, including pump volute interior and complete pump impeller. The thickness should be 8 to 12 mils (heavy film). Coat parts as recommended by the manufacturer. Provide primers if required to resist chlorinated water <10 ppm. Coating shall be Scotchkote 134 manufactured by Fusecote or approved equal. This coating often wears out over time and needs to be replaced. A clear indication of re-coating is rusty water draining from the volute housing during seasonal start-up.

RECOMMENDATION - IMMEDIATE

Install concrete pump volute housing supports.
Estimated Cost: $750

Epoxy coat or replace the concentric reducers on the discharge flange of each pump.
Estimated Cost: $2,500

RECOMMENDATION - FUTURE

LEISURE POOL FILTRATION SYSTEM

The two (2) Paddock 60" x 122" filters and face piping were installed in 2006 as part of the major renovation to the facility. Typically, coated stainless steel pool filters for seasonal pools have a life span of 20 to 30 years, if properly maintained.

The filters appear to be in good condition with minor cosmetic /surface blemishes. Minor surface rust along with corrosion and weeping trails around the filters indicate future maintenance will be required.

As noted above, the manways are showing the most significant wear. It is recommended to recoat or purchase new manway clamps. Recoating should comply with the manufacturer's recommendations. Further, the manway gaskets should also be replaced. Additionally, it is recommended to have extra manway gaskets on hand in the event the replacement need is immediate.

The automatic air relief valves for each filter are fully functional.

Filter sand is typically replaced every 12 to 15 years on seasonal pools. Over time, filter sand, which is angular, becomes rounded and less effective for smaller particulate.

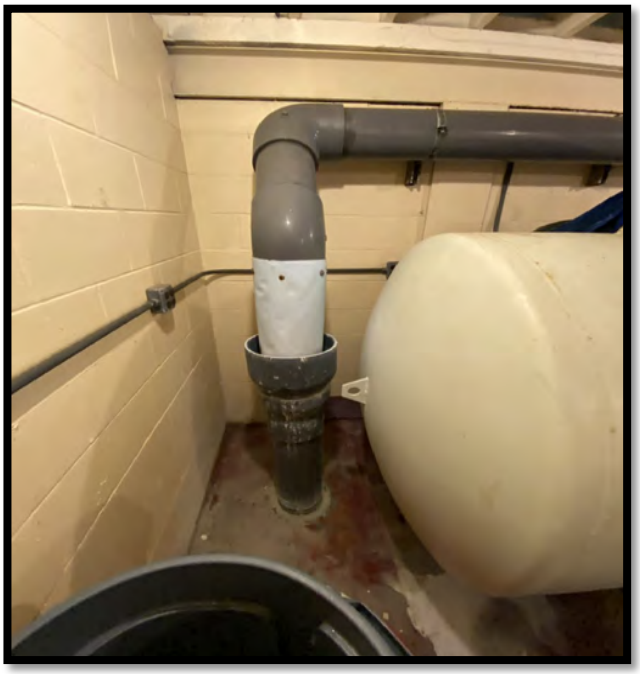
RECOMMENDATION - IMMEDIATE

Remove filter existing sand and install new filter sand.
Estimated Cost: $7,800

Install new manway gaskets and recoat manway pressure clamps.
Estimated Cost: $1,800

RECOMMENDATION - FUTURE

Recoat the exterior coating for each filter. Please follow manufactures recommendations for the coating material.
Estimated Cost: $16,000



LEISURE POOL BACKWASH SYSTEM

The current filter backwash system discharges into a from each filter individually. It discharges into the header pipe, which discharges into a funnel directly behind the west filter (right filter if facing the filters). The backwash flow rate is approximately 820 GPM. Currently, no flow meter is installed on the backwash line, which should be in place to verify flow.

From the discharge funnel receiver, the backwash wastewater is routed to the basement via a 10" discharge pipe. The pipe is routed to the west with a p-trap centrally located (center picture) to a manhole located on the west side of the building. The invert elevation of the back-wash discharge pipe in the manhole is "above" the invert elevation of the sewer discharge pipe from the building. To compound this issue, the manhole discharge pipe routed to the sewer main on Elm Street, and the pipe is only 8" in dia. Therefore, if the flow exceeds allowable flow for the 8" pipe leading to the sewer main (approx. 468 GPM @ 3 fps), the sewer header to the building backs up and overflows the toilets.

RECOMMENDATION - IMMEDIATE

Install a new impact flowmeter on the backwash header.
Estimated Cost: $200

RECOMMENDATION - FUTURE

Install a new sewer discharge line from the building to the sewer main that can handle the required flow without backflowing into the building.
Estimated Cost: $80,000

NOTE: Cost is estimated and may require adjustment if further infrastructure modifications are required,

LEISURE POOL CHEMICAL TREATMENT SYSTEMS

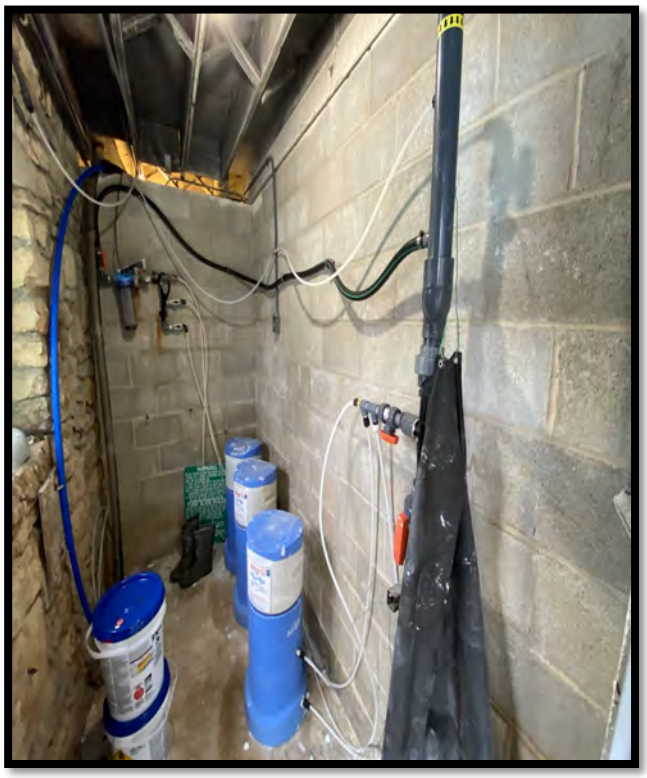
The current chemical feed system consists of three (3) Pulsar calcium hypochlorite feeders. The feeders are tied to a booster pump located next to the pool filters and re-circulation pumps and provide chlorine to the pool water via an erosion process.

Chlorine feed lines are poly-tubing routed to Sch 80 PVC. A mazzei injector is installed in the bypass piping assist with injecting the chlorine into the pool recirculation system prior to returning water to the pool.

No pH control system was found during my review. The pool operator added muriatic acid to the pool water by adding acid directly to the pool water at the edge of the pool.

No automatic chemical controller was found. An automatic chemical controller is required by Indiana Public, and Semi-Public Swimming Pools Rule 410 IAC 6-2.1-30.

> *"All pools, when open for use, shall be continuously and automatically disinfected with a chemical that imparts an easily measured, free residual."*



RECOMMENDATIONS—IMMEDIATE

Install a new automatic chemical controller with a flow cell linked to the recirculation pumps and Sch 80 PVC bypass piping.
Estimated Cost: $18,500

Install a new pH feed system of Muriatic Acid or Co2 and link it to the new automatic chemical controller.
Estimated Cost: $5,000

Provide new 1/2" PVC chemical feed lines for muriatic acid or Co2 with ball valves and check valves. All valves should have viton seals.
Estimated Cost: $3,000

RECOMMENDATIONS—FUTURE

N/A

APPENDIX A

The below instructions outline the procedure for conducting a water tightness test on any water containing vessel. To improve the accuracy of the test, it is best to plug the piping penetrations, including floor inlets and main drains. Because the pool is already full of water, it is recommended that a SCUBA diver be hired to complete this task in lieu of draining and refilling the pool. Many swimming pool contractors have SCUBA divers on staff (or work with them on a regular basis) for making underwater repairs.

Following the water tightness test, if a leak has been detected, a SCUBA diver can then proceed with a dye test to help identify the specific leak sources. This test involves squirting a small amount of dye near any suspected leak areas (i.e. cracks, joints, penetrations through the shell). Any areas where dye is drawn into the shell is a leak location.

Commercial swimming pool contractors are familiar with both the water tightness test and dye test procedures and could be of assistance.

In addition to testing the pool shell(s) for leaks, it is also important to test the below-grade piping. A piping pressure test is recommended for this purpose. **CAUTION:** *It is important to note that pressure testing aged piping – which has been buried underground for many years – may lead to the failure of this piping. If the piping is already corroded, leaking, and/or at the end of is useable lifespan, applying pressure to this piping may exacerbate any existing issues.* It is recommended that a testing agency experienced with swimming pool piping be consulted for conducting the piping pressure test.

Understanding the existing conditions of the pool shell, gutter trough, surge tank, and below-grade piping systems will help identify the best course of action regarding future repairs or renovations to the facility.

WATER TIGHTNESS TEST

A. This test applies to the pool structure only. The water tightness test shall be completed prior to a pool liner replacement.

B. Water Tightness Test Procedure

1. Fill the pool to the normal operational level. Before testing the pool shell, all piping shall be plugged to prevent water from entering the piping systems.

2. Evaporation/Precipitation Measurement Procedure

3. Measurement

   a. On a separate sheet of paper draw a sketch of the pool. Measurements shall be taken at the pool. Multiple test points with averaging are recommended for vessels which will be exposed to wind. Document the separate findings on the chart below. Repeat the measurements and document every 12 hours for a total of three (3) days. The Owner / Contractor shall check each pool for water loss with the Owner's representative every 12 hours.

Total Allowable Water Loss:	Total Gallons:	_____	(0.1%) x 0.001 = _____	Allowa-ble Loss	Pan Depth Per 24 Hrs.
Pool Measurements	Swimming Pool				Pan Measurements
12 Hrs.					
24 Hrs.					
36 Hrs.					
48 Hrs.					
60 Hrs.					
72 Hrs.					

4. Total Loss = 7.481 x Structure Surface Area (SF) x Total Water Loss per Day (FT) – Evapo-ration per Day (FT) + Precipitation per Day (FT)

   Day #1 =

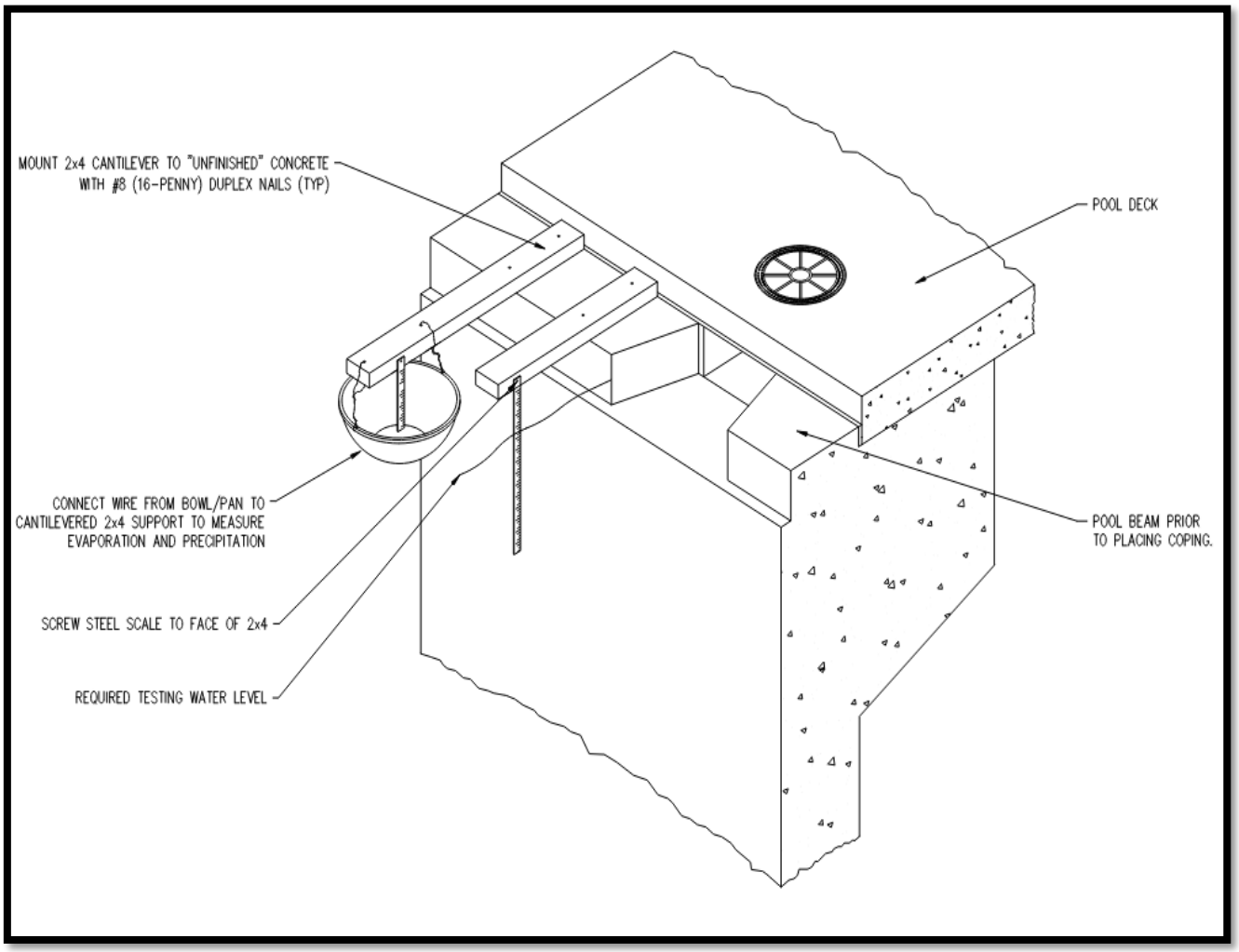
   Day #2 =

   Day #3 =

5. Repair

   a. The allowable leakage rate for an unlined pool structure shall not exceed 0.1 percent of the total water volume in a 24-hour period. (Example: 0.001 x 200,000 gallon pool = 200 gallons per 24 hour period.) This excludes the loss/addition of evaporation/precipitation.

Below is a suggested layout for correctly monitoring and measuring the pool and evaporation/ precipitation bowl. Minor adaptations may be required to accommodate the current pool liner and pool deck interface. The key to accurate measurements are affixing the scales so that no movement from their placement is possible.



PROPOSED COST OF REPAIRS

COUNSILMAN · HUNSAKER
The Ultimate Aquatic Advantage

Crystal Beach Pool - Opinion of Probable Cost

Item Description	Immediate Cost	Future Cost
Replace Pool Liner	$ 185,000	
Update Main Drain Covers to Meet VGB Requirements	$ 3,500	
Engineering Certification of Main Drain Sumps	$ 6,500	
Add Additional Inlets to Pool		$ 125,000
Replace Pool in its Entirety ($250 to $300 sq ft.)		
Add Additional ADA Pool Lift	$ 9,000	
Add Additional Stair Entry Locations		$ 15,000
Repair Slide Platform Corrosion	$ 3,500	
Re-Gelcoat or Epxoy Paint Slide Surface		$ 25,000
Epoxy Paint Water Slide Exterior Surface		$ 16,000
Expoxy Paint Water Slide Structural Steel		$ 28,000
Replace the original pool deck and add deck drainage	$ 135,000	
Replace Corroded Pipe Hangers	$ 4,500	
Replace Recirculation Flowmeter	$ 1,800	
Relocate Check Valves		$ 1,500
Pressure Test Below Grade Pool Piping	$ 7,500	
Add Concrete Pump Volute Housing Supports	$ 750	
Epoxy Coat Concentric Reducers	$ 2,500	
Re-Coat Wetted Parts on Pool Recirculation Pumps		$ 7,500
Replace Filter Sand	$ 7,800	
Install New Filter Manway Gaskets	$ 1,800	
Re-Coat Filter Exterior Surfaces		$ 16,000
Install Backwash Flowmeter	$ 200	
New Sewer Discharge to Meet Backwash Flow Requirments		$ 80,000
Install New Automatic Chemical Controller	$ 18,500	
Install Automatic pH Feed System	$ 5,000	
Install New PVC Chemical Feed Lines	$ 3,000	
Totals:	**$ 395,850**	**$ 314,000**

Repair Costs Clarifications

The opinion of probable construction costs is based on current 2020 costs. This report is based on information that was current as of September 2020.

The preceding opinion of probable construction costs is based on a protocol in which a general contractor or swimming pool contractor executes all the tasks with its own labor and that of qualified subcontractors.

It is recognized that the Consultant has no control over the cost of labor, materials, or equipment, over the Contractor's methods of determining bid prices, or over competitive bidding, market, or negotiating conditions. Accordingly, the Consultant cannot, and does not, warrant or represent that bids or negotiated prices will not vary from the Owner's project budget or form any opinion of probable construction cost or evaluation prepared or agreed to by the Consultant.

Respectfully,

Cary A. Dennis M.S.M.E
Counsilman Hunsaker

APPENDIX 2

PSS CONTRACTORS LLC
Commercial Swimming Pool Contractors

Tom Pool
Poole Group
3295 S. Farmer's Retreat Rd
Dillsboro IN 47018

2/19/2022

RE: Crystal Beach Swimming Pool Scope

The removal of the liner and the results of the pool pressure testing have made the condition of the pool more apparent. Below I have indicated he major issues with the pool. Where I have referenced current standards, this is based on the Model Aquatic Health Code and accepted industry standards for a pool of this size and shape.

1. Filtered water return plumbing
    a. The existing filtered water return piping does not hold pressure
    b. The current plumbing penetrations locations and sizing do not meet current standards
        i. The pool return inlets need to be increased and equally distributed throughout the pool floor
            1. The eventual pool capacity will determine the floor inlet quantity, it is currently assumed approximately forty are required
        ii. The original ferrous metal plumbing around the pool perimeter has failed
2. Pool gutter trough and associated plumbing
    a. The existing gutter trough plumbing does not hold pressure
    b. The existing gutter trough is not sized adequately; the trough should be around the entire pool perimeter to accomplish surface skimming action
        i. This would also present a termination point for the new membrane
        ii. The current trough only serves about 1/10th of the pool perimeter
3. Surge tank
    a. The pool has an incorrectly sized and non-functioning surge tank
        i. The surge tank is currently a fiberglass vessel in the mechanical room that is approximately 1/15th of the size that it should be
        ii. The undersized surge tank does not function correctly due to the under sizing, head pressure coming from the drains to this tank, and absence of a modulating float valve system
        iii. There is no provision for an overflow gutter trough to work with this system
4. Pool shell condition
    a. The pool shell is in extremely poor condition
    b. The perimeter curb edge is failing at approximately 80% of the pool perimeter
        i. The pool perimeter should not be a curb, the correct design is a trough
    c. The pool floor has the following failures observed
        i. The areas of 6" to 60" water depth has numerous areas of spalling, uneven floor slabs, existence of previous delamination patches, numerous areas of unintended cracking, poorly defined expansion joints

1. The condition of the concrete is what you would expect from a structure that was approximately 80 years old, had been constantly saturated and was exposed to a freeze / thaw condition

ii. The lowest area of the pool floor has exposed aggregate and total surface failure of the entire slab
    1. The floor had the appearance of compacted gravel, if this is any indication of the slab condition

d. The pool wall is delaminating and spalling everywhere in the pool
    i. It is unlikely that any part of the pool will receive fasteners required by the membrane
    ii. There were several attempts at patching in the deep end of the pool with galvanized sheet metal

5. Pool floor slope
    a. The pool floor slope is out compliance at the outer edge
    b. The floor should slope no more than 1:10 with a preferred slope of 1:12

The pool is functionally obsolete and would be considered beyond its intended lifespan by any reasonable person.

There are two options for the pool; removing and replacing the pool its entirety or renovating the pool to the minimum standards required. Either option entails a substantial investment by the owner.

Based on recent job cost data replacing the pool in its entirety would involve several million dollars. Renovating will likely be 40% to 60% of its replacement cost. For us to ascertain hard costs for this we would need to create rough drawings for estimating purposes.

I am assuming this document is a prelude to a much larger conversation that would be best served by an in-person meeting between the owner, Poole Group, PSS design staff and project design team.

Please let me know how you would like to proceed.

DAVID TAYLOR
MANAGING MEMBER

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