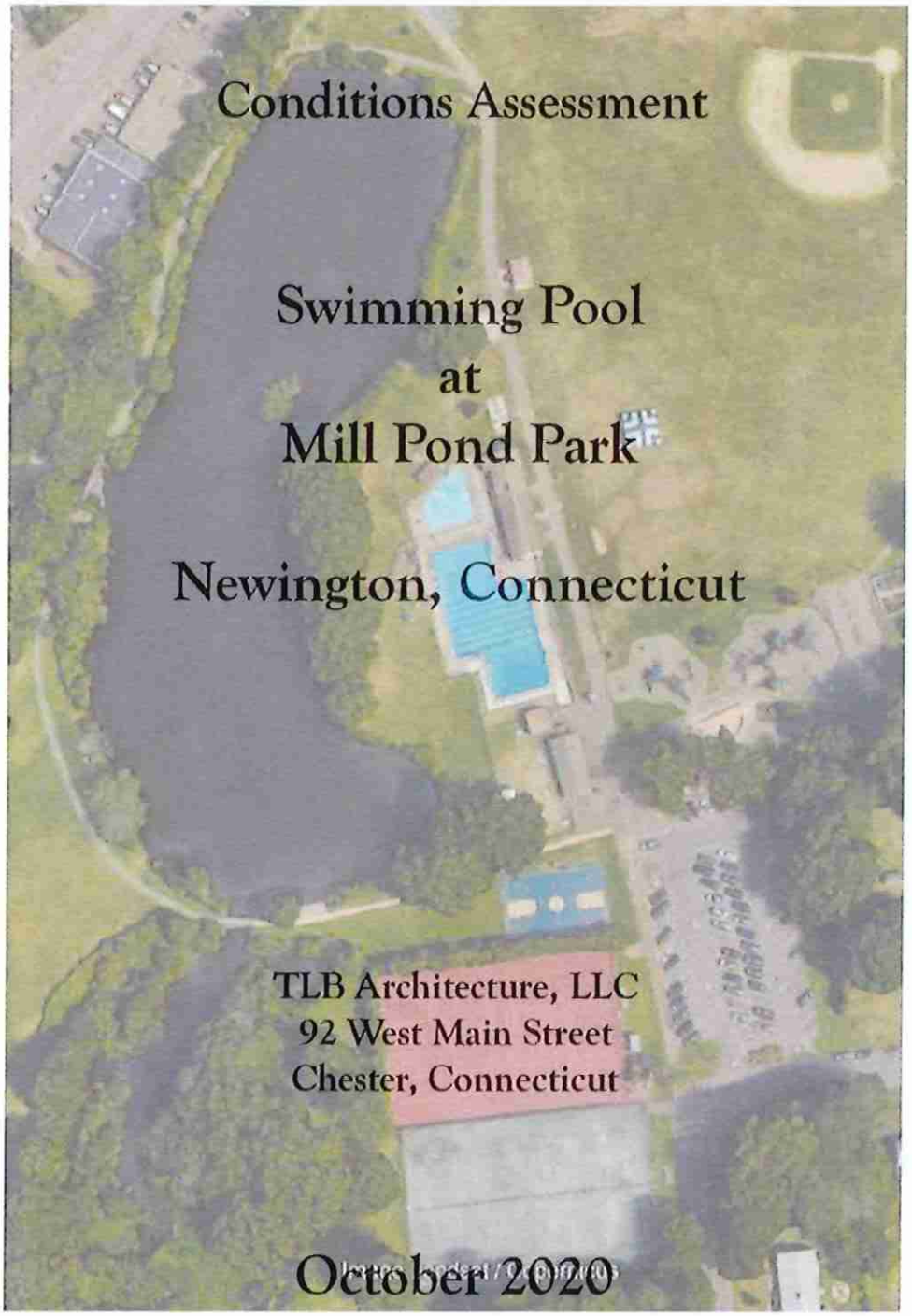
Conditions Assessment
Swimming Pool
at
Mill Pond Park
Newington, Connecticut
TLB Architecture, LLC
92 West Main Street
Chester, Connecticut
October 2020

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I. Introduction

Owens Realty Services has been retained to provide consulting services to provide a conditions assessment, inclusive of a visual inspection and Code compliance review of the outdoor swimming pools at Mill Pond Park.

The assessment includes an outdoor 'zee'-shaped swimming pool and an outdoor wading pool, decks and fencing, as well as swimming pool recirculation, filtration and chemical control systems.

Random soundings of suspect areas were completed, but a complete program of soundings and invasive structural analysis was not done for this analysis.

The piping and equipment was reviewed where accessible, but camera assessment of buried piping was not provided, nor was SCUBA diving for dye-testing to find leaks. As such, information regarding leaks is based on discussions with Parks and Recreation staff and investigations done by others.

The pool was evaluated for compliance with the CT State Building Code, State of CT Department of Public Health Requirements, the Virginia Graeme Baker Pool and Spa Safety Act and the ADAAG.

The goal of this effort is to identify potential concerns related to the following:

System operation and compliance with applicable Codes, including DPH
Condition of existing equipment
Condition of pool shell and deck
Condition of fencing

We also reviewed earlier reports provided by the Town of Newington and included such additional information as deemed pertinent.

Since the swimming pool was not opened this year due to the Covid 19 Pandemic the systems were not reviewed in an operating condition. As such we could not fully assess operation of all systems.

II. Executive Summary

Mill Pond Pool was constructed in 19?59 and, as with any pool of 60 years old it has a number of issues as a result of a harsh New England environment, heavy use, wear and tear. Mill Pond is further impacted by it's location adjacent to the Pond and the resultant high ground water which imparts hydrostatic pressure on the pool walls and floor.

As a result of these factors, the swimming pool is in generally poor condition with significant deterioration of concrete, cracking and leaks. Several repairs have been completed over the years, with varying degrees of success.

The pool recirculation, filtration and chemical control systems for the pool were replaced in 1999 and consist of a series of five 36" dia. high rate sand filters. While this system is rated for commercial use, it is uncommon on a pool of this size and, as installed does not comply with DPH regulations for pipe sizes and velocities.

The wading pool is in better condition than the main pool, but also suffers from damaged concrete.

Pool decks are in very poor condition and many areas exceed allowable slope for ADA compliance.

Perimeter fencing is in poor condition, with many areas having displaced posts and mesh creating a hazard, as well as openings exceeding allowed limits per DPH regulations.

Condition Codes	
Excellent	16-20 years useful life
Good	Good at present (11-15 years)
Fair	Minor / cosmetic repairs needed to maintain condition (6-10 years)
Poor	Immediate repairs needed to prevent deterioration (0-5 years)

Conditions

System	Condition	Comments
Pool Structure	Poor	Extensive Deterioration and Cracking
Pool Decks	Poor	Damaged, misaligned and areas non-compliant
Wading Pool	Fair	Concrete is reparable
Wading Pool Decks	Poor	Damaged and misaligned
Perimeter Fencing	Poor	Damaged and non-compliant
Pool Systems	Fair	Condition is fair but all piping, including buried is undersized
Wading Pool Systems	Good	Not rated for commercial use

III. Existing Conditions Analysis

A. OVERVIEW

Main Pool:

The swimming pool was constructed in 1959 adjacent to Mill Pond, within Mill Pond Park. The pool provides aquatic programming to the community for both competitive and recreational activities. The pool is a 'Zee' shaped with the main body of water providing a 7-lane, 25-yard lap pool with a shallow wing to the north and a deeper wing to the south. Pool depth of the shallow wing is 3-feet to 4-feet. The lap lanes slope from 4-feet to 6-feet across the lanes, and then transitions to 12-feet deep at the deep wing.

The pool shell is in generally poor condition with extensive cracking, spalling and delamination of concrete. A 2014 study that extracted a concrete core indicated concrete strength (presumably taken at an area without delamination) was of sufficient compressive strength. However it also noted that sub-soil is clayish gravel. This material is not free-draining and traps water. Given the high ground-water adjacent to the pond, excessive hydrostatic pressure is damaging the pool structure. As this damage is initiated from the back of walls and below the floor, permanent repairs are nearly impossible. As such, continued deterioration is to be anticipated.

The pool has skimmers to convey pool water to the filtration and chemical control systems. Filtered and treated water is returned to the pool by means of wall inlets distributed around the pool perimeter. Pool coping is integral with the concrete decks. Pool finish is paint, directly on the cast-in-place concrete.

There does not appear to have been any significant renovations to the pool since the original construction, except for recirculation, filtration and chemical control systems replacement in 1999. These systems are located in an outbuilding to the south of the pool and include high-rate sand filters and automatic chemical control systems. Other work to the facility has been maintenance and repair related.

In the 1999 systems replacement, original cast-iron pool piping within the Filter Room was replaced with PVC. Underground piping below the deck was also replaced with PVC, though the extent of replacement between the deck and the Filter Room is unknown, as there is a PVC to cast-iron transition as the filtered water return exits the building. Skimmers were presumably also replaced in 1999, though are showing signs of stress cracking and separation from the concrete.

The recirculation system is by means of direct suction from skimmers and bottom drains to the recirculation pump. The deep end of the pool was full of water during the site visit, and as such drain covers were not visible. However, it has been reported that the covers were replaced with 24" square, VGB compliant covers. Given the 6-inch diameter piping, the pool is not VGB or DPH compliant, as the pipe velocity, even at a Code minimum 8-hour turnover exceeds allowable velocity. There is no vacuum release system on the pool pump, and as such the pool presents an entrapment risk.

III. Existing Conditions Analysis

A. OVERVIEW

Main Pool (cont.)

Pool water is conveyed to the filtration system by a 10 HP pump, which is located on the building floor, above pool water level. Filtration is accomplished by means of a series of five, 36" TRC sand filters with multi-port valves. The flow rates and pipe velocities for the system are non-compliant. Refer to hydraulic analysis for calculations of flow rate, filtration rate and velocity. These systems backwash to sanitary sewer through an air gap and pit in the corner of the building. The outlet of the backwash line is below the flood rim of the pit and as such, does not provide a compliant air-gap and presents a risk of contaminating the pool water with wastewater.

Pool chemistry is maintained by means of a calcium hypochlorite feeder for sanitizer and liquid acid for pH correction. These systems appear relatively new and suitable for continued use. The pool chemistry is controlled by means of an Aquasol water chemistry controller.

The concrete decks surrounding the pool are in generally poor condition, having suffered frost damage, settlement and misalignment. Sealant joints are deteriorated allowing water to penetrate the soils below the decks, exacerbating the frost damage. The deck immediately surrounding the pool was replaced as part of the 1999 systems and piping replacement. This zone of deck, approximately 5-feet wide, is sound, though areas exceed the 1:48 cross pitch as defined for ADA accessibility. Regrading the decks for compliance will require replacement of deck drainage as well.

Wading Pool:

The wading pool is a trapezoidal shape approximately 45-feet x 40-feet and 6–12-inches deep. There are a number of cracks in the pool, but the concrete seemed generally sound. Hollow areas were observed around penetrations in the floors, as well as around the skimmers. The coping is integral with the pool wall and is cracked in a number of locations.

Pool decks surrounding the wading pool are in poor condition and have settled adjacent to the pool, creating a trip hazard. Joints are open and allowing water to penetrate to soils below the deck, creating freeze/thaw damage.

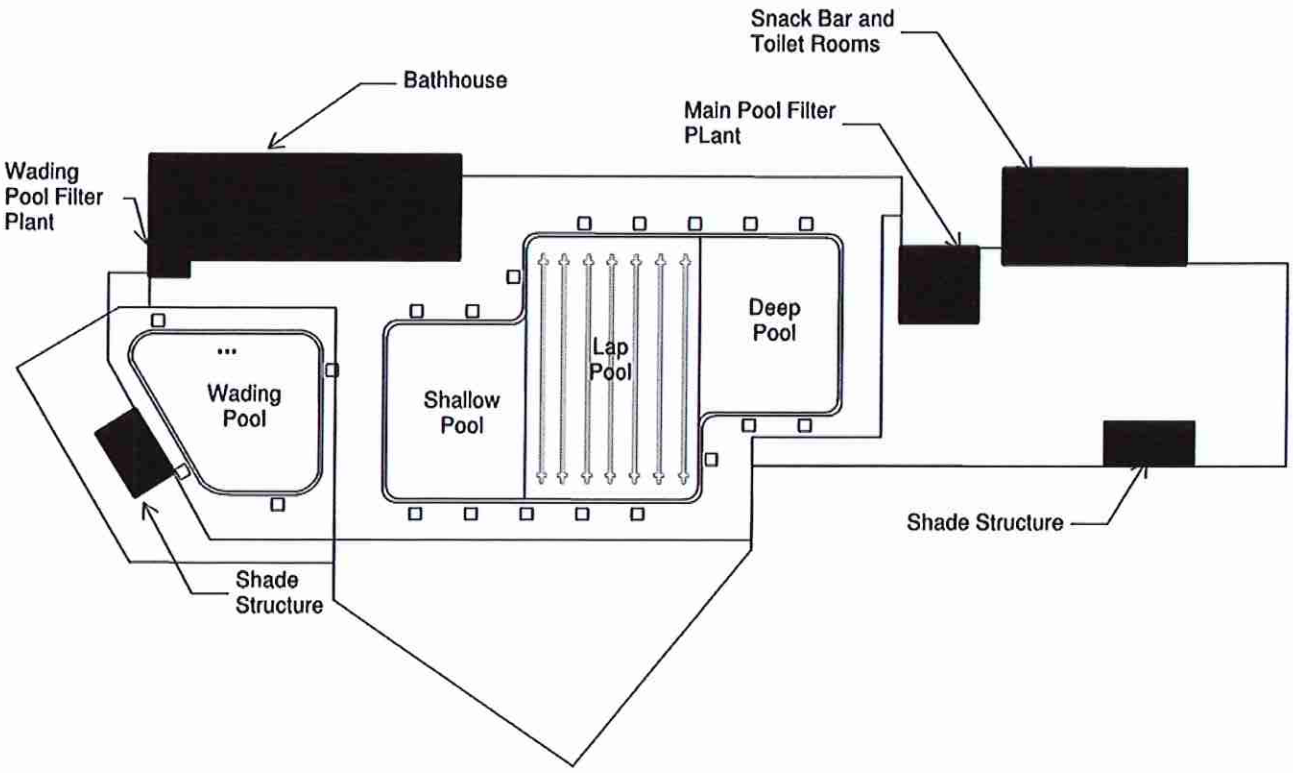
The wading pool recirculation, filtration and chemical control system is adequately sized, though the filter is a residential filter, not rated for commercial use. The main drains are not VGB compliant and there is no vacuum release system present. If wading pool use is to resume, this issue should be remedied as there is risk of entrapment.

III. Existing Conditions Analysis

A. OVERVIEW

Fencing:

The pool perimeter is surrounded by a six-feet high, galvanized chain-link fence, with the portion separating the wading pool from the main pool standing 4-feet high. This outer perimeter fence provides a complete enclosure, using the bathhouse and filter building as a portion of the enclosure. It is in poor condition with significant rusting, misalignment and gaps exceeding allowable dimensions, both between posts and to grade below the fencing.



III. Existing Conditions Analysis

B. CODE ANALYSIS

1. *General Information*

The swimming pool was evaluated for Code compliance with the State of Connecticut Building and Fire Codes, CT Department of Health Requirements, the Federal Americans with Disabilities Act (ADA) and Virginia Graeme Baker Pool and Spa Safety Act (VGB) . The Scope of this report is limited to the Pools and Decks, but building compliance is also required, and is addressed by others.

Note: Red text indicates areas of hydraulic non-compliance

Basic Information:

Pool Area:	7,750 sf
Pool Perimeter:	410 lf
Pool Water Volume:	295,000 gallons
Occupant Load of Pool: (7,750 sf / 25 sf/person):	310 bathers

2. *Department of Health Requirements:*

a. Turnover Rate: Required- 8 hours max. (6-hour recommended)
b. Filtration Rate: Required- 15 GPM/sf max. (12 gpm/sf recommended)
c. Allowable Velocities:

Suction:	*Max 6 fps*
Discharge:	*Max 10 fps*
Gravity:	*Max 4 fps*

c. Actual Flow and Pipe Velocities at 8-hour turnover:

Calculated Flow Rate: 615 GPM

Suction:

	Pipe	100% Flow
Main Drains:	6":	6.8 fps
Skimmer Pipe:	6"	6.8 fps
Pump Suction:	6":	8.42 fps
Discharge:		
	2" (ea. Filter):	12.56 fps
	6":	6.8 fps

III. Existing Conditions Analysis

B. CODE ANALYSIS

2. *Department of Health Requirements (continued):*

The piping is undersized between the main drains and the pump, even if the pipe is flowing at full diameter. In actuality, the pipes are likely calcified after years of use, and as the pipe diameter decreases, velocity increases, bringing the piping further out of compliance.

The 6" piping reduces to 2-inch at each filter. There are five filters so the flow at each is 123 GPM, which places the velocity at this pipe out of compliance as well. The filtration rate is also out of compliance at 17.6 GPM/sf.

d. Depth Markings:

Depth markers are required to be in numerals of four inches minimum height and a color contrasting with the background, placed on the vertical walls above the water level or another method to be plainly visible to persons in and out of the swimming pool. Depth of water shall be plainly marked near the water surface on the vertical wall and on the edge of the deck next to the pool. Depth markers shall be placed at the following locations:

1. At the points of maximum and minimum depths.
2. At any change of pool floor slope, including the point of change of slope between the deep and shallow portions of the pool, that is the breakpoint;
3. At intermediate one-foot increments of water depth in the shallow end; and,
4. If the pool is designed for diving, at appropriate points to denote the water depths in the diving area.
5. If the pool is of constant depth, at appropriate points that will satisfactorily denote the water depth.

Currently, depth and 'No Diving' markings are not present on the pool walls, except in a couple of locations and are insufficient at the deck.

III. Existing Conditions Analysis

B. CODE ANALYSIS

2. *Department of Health Requirements (continued):*

f. Safety Requirements–Lifesaving Equipment:

Lifesaving equipment and first-aid equipment needs to be inventoried and properly located around the pool. With a pool perimeter of 410 lf, at least four stations are required, each unit including a ring buoy, life pole or shepherd's crook. As the pool was not operational at the time of the visit, an inventory was not completed, but it appears there are only three guard stations on the deck. They are portable however, and one may have been stored.

Every swimming pool shall have a readily accessible room or area designated and equipped for emergency care, which shall include a telephone. There is no such dedicated room or area currently identified at the pool.

g. Pool signage was not compliant. A sign should be visible from the pool indicating the following:

STATE POOL REGULATIONS

1. NO DIVING IS PERMITTED OFF THE DECK INTO SHALLOW AREAS OF THE POOL.
2. All Persons Shall Bathe With Warm Water and Soap Before Entering the Pool
3. Any Persons Known Or Suspected of Having a Communicable Disease Shall Not Use The Pool.
4. Spitting or Blowing the Nose in the Pool is Prohibited.

   Running, Boisterous or Rough Play is Prohibited.

3. *ADA:*

a. Pool Access:

Because the pool is greater than 300 linear feet, ADAAG requires two means of HCA access/egress for the pool. One means must be a lift complying with 1009.2 or a sloped entry complying with 1009.3. A compliant lift is reportedly available. The second means has been provided as steps, complying with 1009.6. The steps are removable and must be in place during operation to ensure compliance.

b. Pool Deck Access:

The accessible route from the locker rooms, onto the pool deck and to accessible lift and stairs should have cross-pitch limited to a maximum of 1:48 (1/4" per foot slope) The decks adjacent to the pool have not been surveyed but appear to exceed this cross-pitch limitation.

III. Existing Conditions Analysis

B. CODE ANALYSIS

4. *Virginia Graeme Baker Pool and Spa Safety Act:*

The existing main drain system was submerged and not visible at the time of the visit. It has been reported that VGB-compliant drain covers have been provided. The expiration date should be verified.

It should be noted, however, that the drains are direct suction and the 6-inch diameter piping has a velocity exceeding the allowable limit. It is also likely that the pool drain sumps are not compliant and, since there is no vacuum release system the pool drains are not VGB-compliant, even if covers are ANSI/ASME A112.19.8 certified.

If the pool is operated with the existing drains and piping in place, a secondary anti-entrapment system such as a supplemental vacuum release system interlocked with the pump should be installed.

The velocity through the drain grates should also be verified to ensure that flow is limited to a maximum of 1 1/2 fps to avoid both entrapment and entanglement issues.

C. ISSUES and DEFICIENCIES

This section identifies issues and deficiencies based on physical condition of systems and assemblies.

While the scope of this report is limited, it should be reviewed in the context of the overall design goals for the park Facility, as the architecture, structural components, mechanical and electrical systems all play a significant role in the overall quality, function and long-term viability of the facility.

This section identifies issues and deficiencies based on the following:

- System operation and compliance with applicable Codes, including DPH
- Condition of existing equipment
- Condition of pool shell and deck
- Condition of fencing

III. Existing Conditions Analysis

C. ISSUES and DEFICIENCIES - Main Pool

Pool concrete has numerous cracks, spalls and delaminated areas. The photos to the right and below and on the following pages depict typical conditions. Many of these have been patched and repaired with both cementitious repair materials and soft repair materials. As the pool shell is being impacted from hydrostatic pressure from behind the walls and below the floor, all patches will eventually fail and additional deterioration can be anticipated. Paint finish is worn and peeling throughout pool.

Typical crack in pool floor

Delamination adjacent to construction joint

Previously repaired crack in pool floor with failure of repair materials

III. Existing Conditions Analysis

C. ISSUES and DEFICIENCIES–Main Pool

Multiple delaminations along the edge of crack

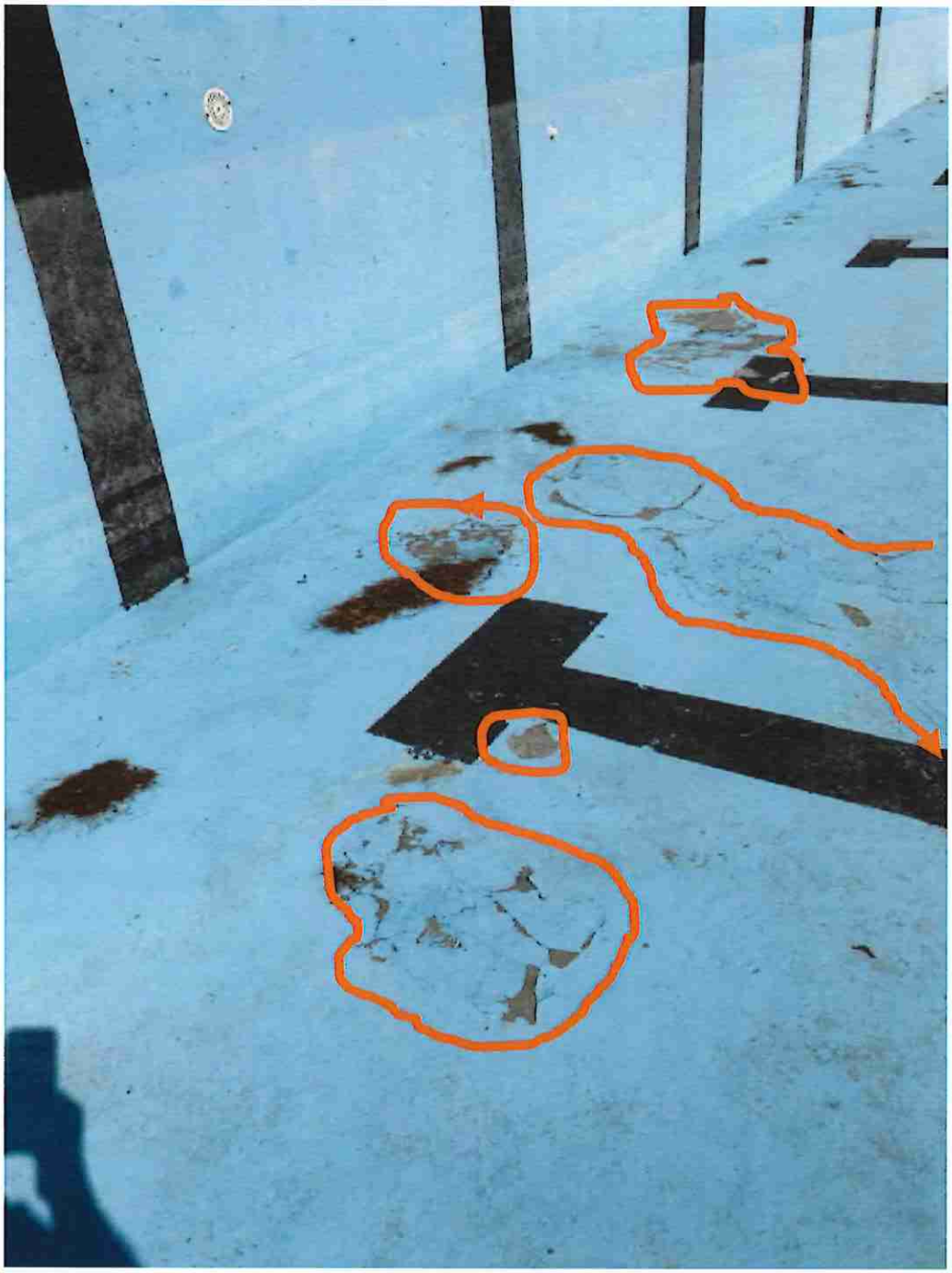
Significant spall of approximately 4-inches deep

Previously repaired areas in pool floor with failure of repair materials

Many of the spalled areas and delaminated areas occur along cracks, which means water penetration is prevalent. In this pool, particularly in the deeper end, water is leaking out of the pool, but groundwater is pushing into the pool. This limits water loss as pressures are equalized, but saturates concrete and cause the deterioration seen throughout the pool.

III. Existing Conditions Analysis

C. ISSUES and DEFICIENCIES - Main Pool



Broad areas of spalling and delamination

III. Existing Conditions Analysis

C. ISSUES and DEFICIENCIES - Main Pool Systems

10 HP pool recirculation pump draws water in direct suction from skimmers and main drains.

- Piping is undersized and not in compliance with DPH Regulations.
- Pump should be on housekeeping pad and bolted down to limit vibration that could break fittings and damage pump.
- System is in direct suction without an anti-entrapment device. At calculated velocities, the drains are not VGB compliant, even if covers are certified.

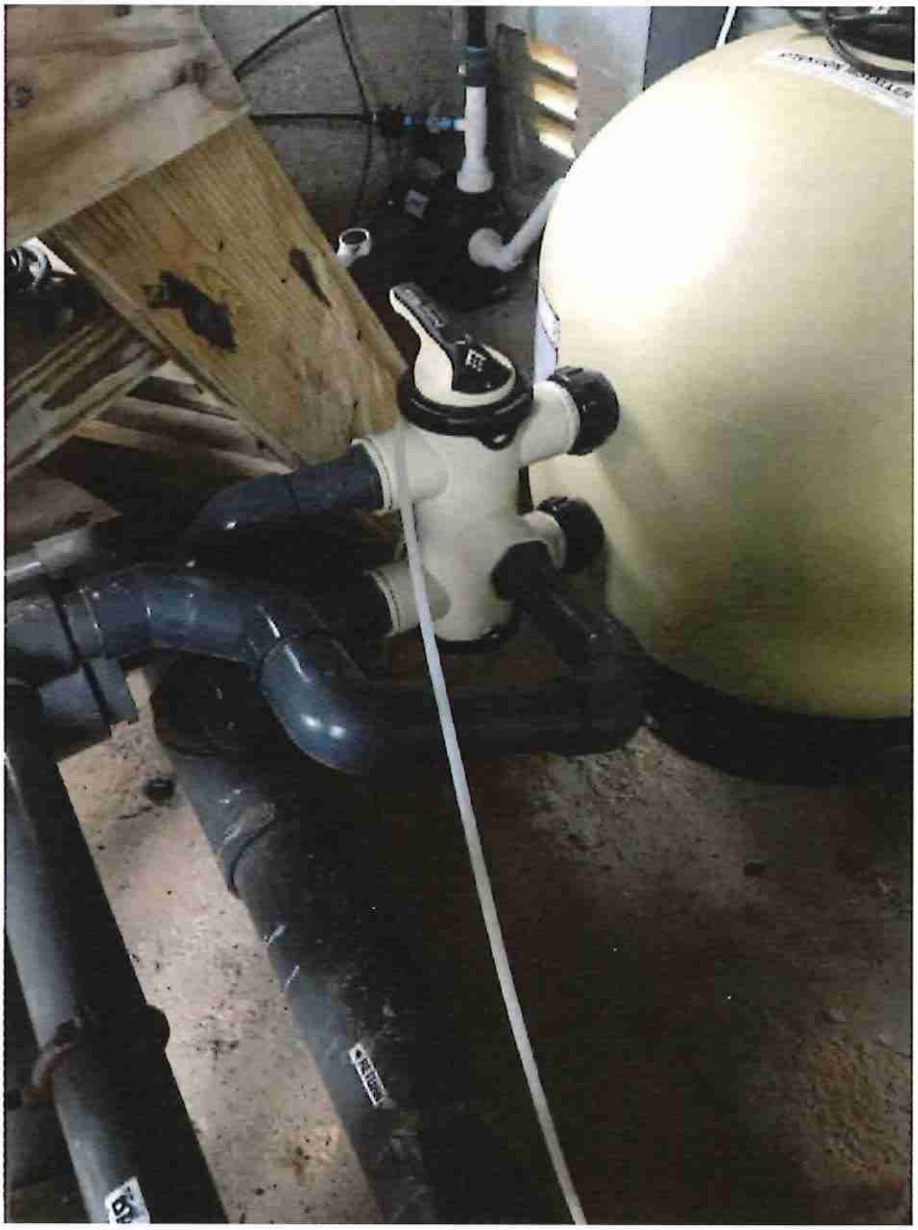
Above: 10 HP recirculation pump.
Below Right: Main drain and skimmer suction piping.
Below Left: Pump discharge to Filters

III. Existing Conditions Analysis

C. ISSUES and DEFICIENCIES - Main Pool Systems

Filtration is accomplished by means of five, Pentair TRC 140 high rate sand filters. Each is fed from a 2-inch pipe, connected to the main 6-inch supply and return.

- Piping is undersized and not in compliance with DPH Regulations.
- There are no throttling valves or flow meters at each filter to confirm that each are flowing at the same rate.



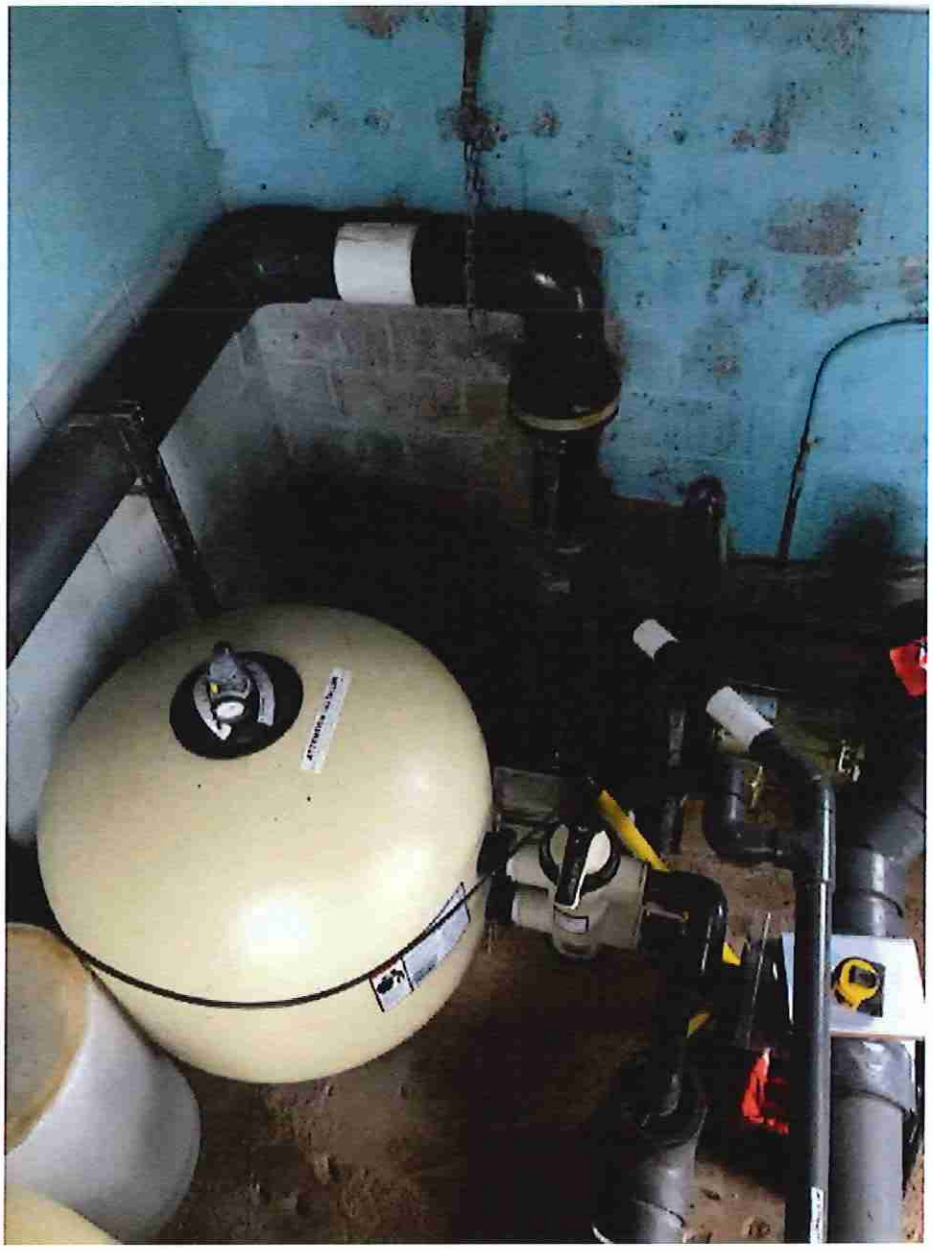
Typical filter piping and multi-port valve. Position of the valve determines filter mode –vs– backwash mode.

III. Existing Conditions Analysis

C. ISSUES and DEFICIENCIES - Main Pool Systems

When the filter is in backwash mode, it discharges dirty filter water to a collector pipe that connects to cast-iron waste piping in the pit.

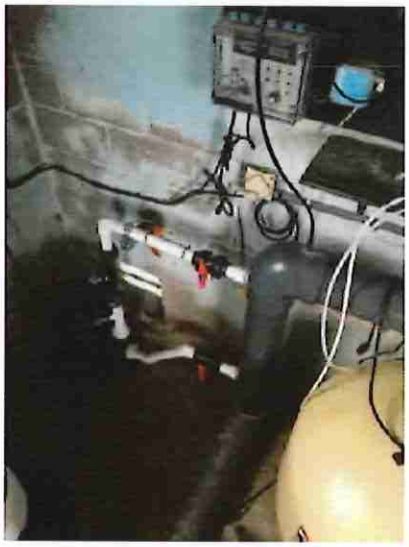
- It appears the backwash discharge is a direct connection to sewer, which is not DPH compliant, as an air-gap is required. The current arrangement could allow waste water to siphon back into the pool system.

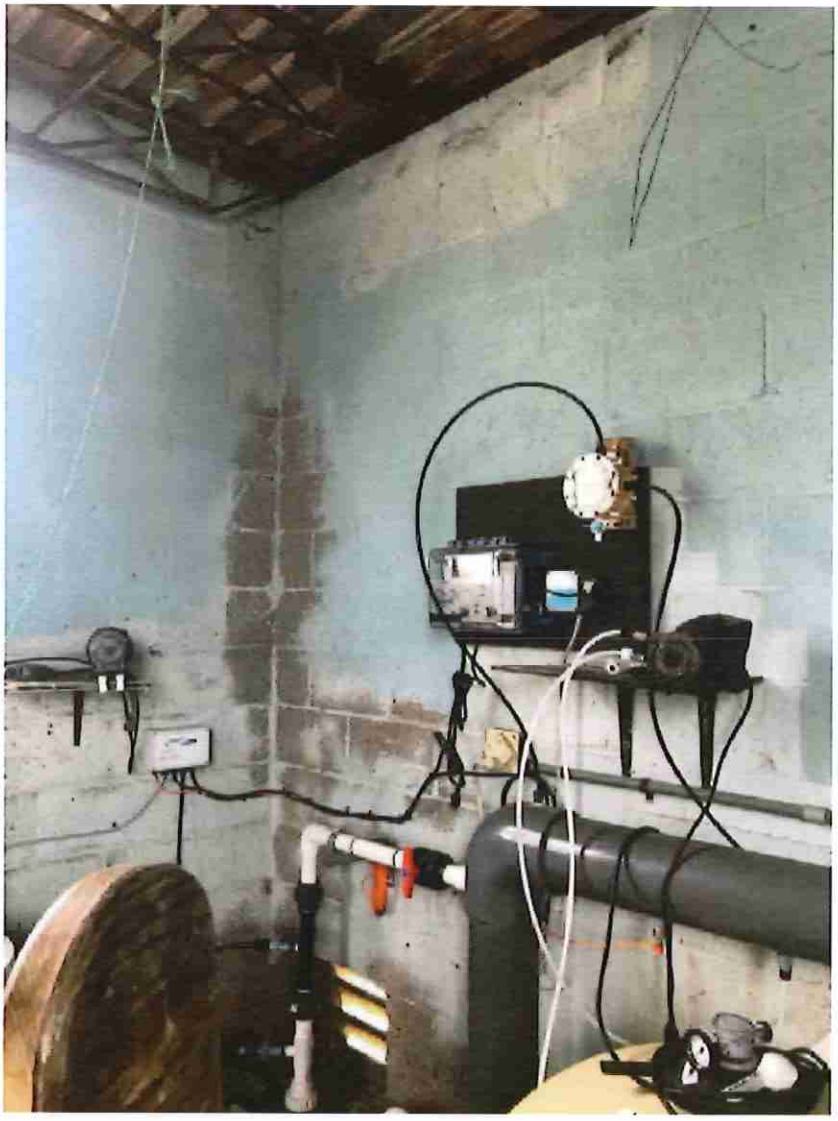


Typical filter piping and multi-port valve. Position of the valve determines filter mode –vs– backwash mode.

III. Existing Conditions Analysis

C. ISSUES and DEFICIENCIES - Main Pool Systems



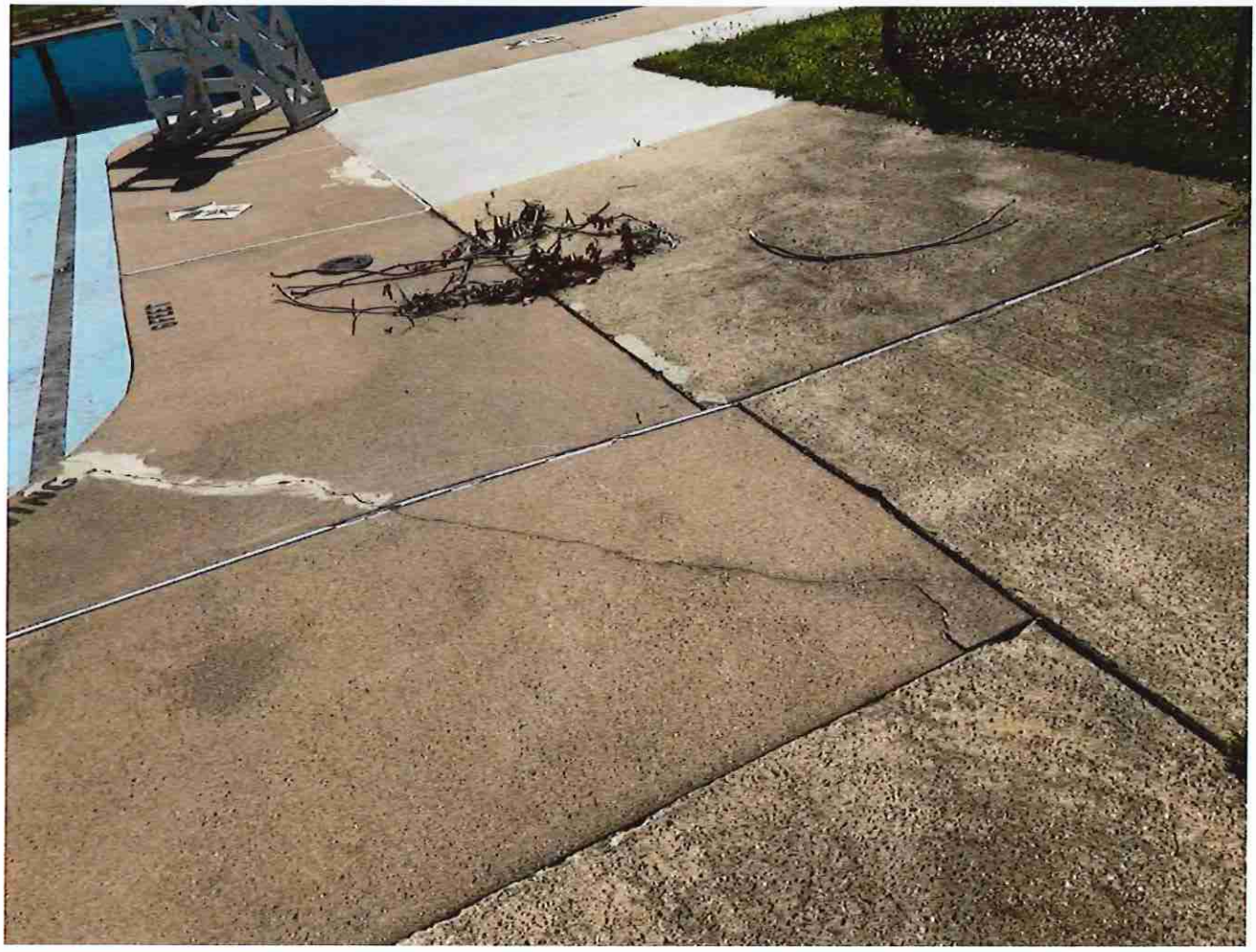


Pool water chemistry is maintained through an automatic water chemistry controller (Aquasol). This system includes a flow-cell that monitors pool water conditions and adds chlorine for sanitizing and corrects pH by introduction of acid. This occurs continuously.

Water sanitizer is a calcium hypochlorite erosion feeder (Pulsar). pH correction is liquid acid, fed into the system through a peristaltic pump (Stenner). This system is appropriate and, pending verification that all components are operable, suitable for continued use.

III. Existing Conditions Analysis

C. ISSUES and DEFICIENCIES Main Pool Decks

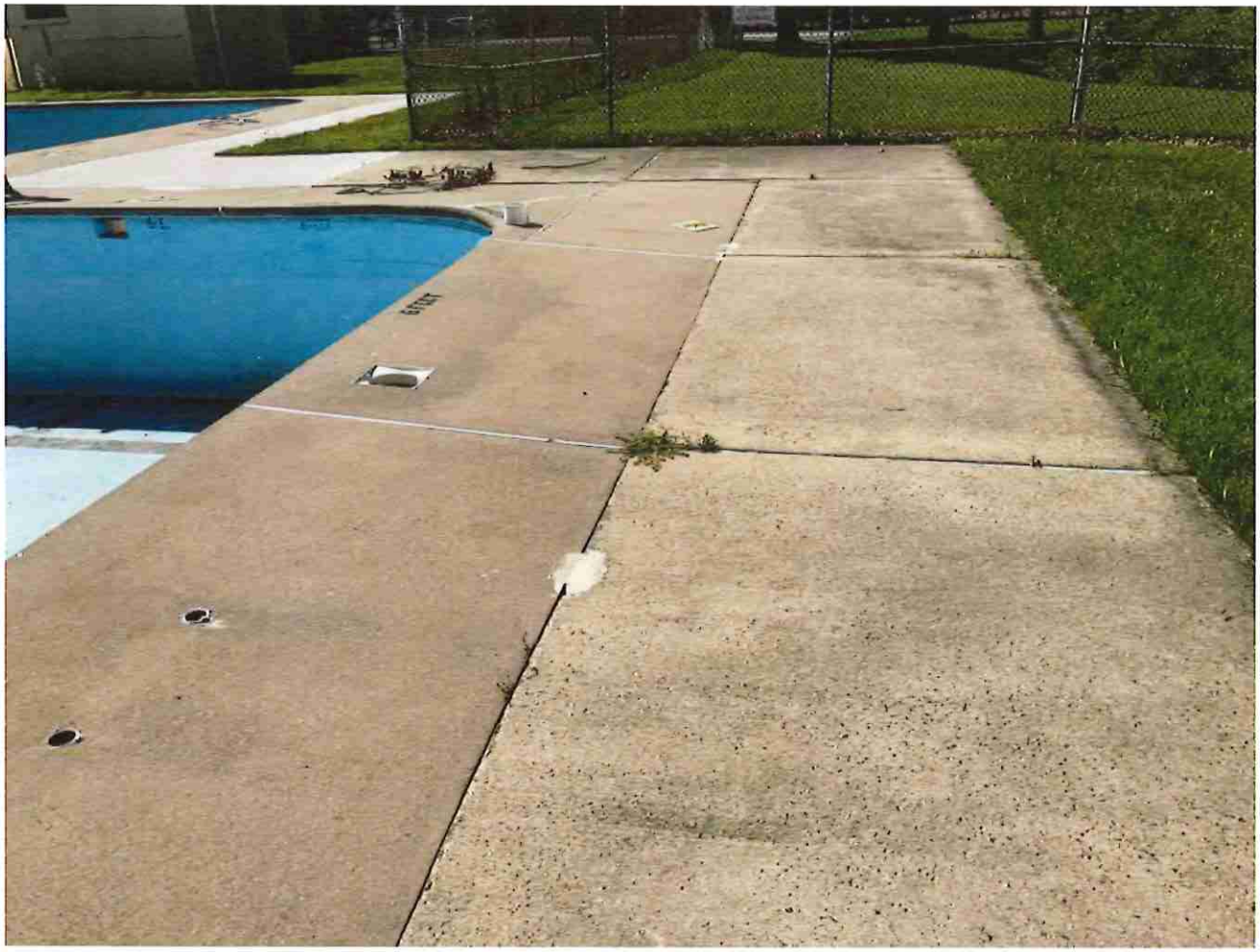


Typical deck conditions. Note 1990's vintage decking closest to pool, original decking in foreground and recently replaced decks toward the back of the photo.

1990's vintage decking is generally in good condition, though there are some significant cracks and areas of damage. Differential settlement has also caused misalignments and failed sealant joints excacerbates freeze/thaw damage.

III. Existing Conditions Analysis

C. ISSUES and DEFICIENCIES - Main Pool Decks

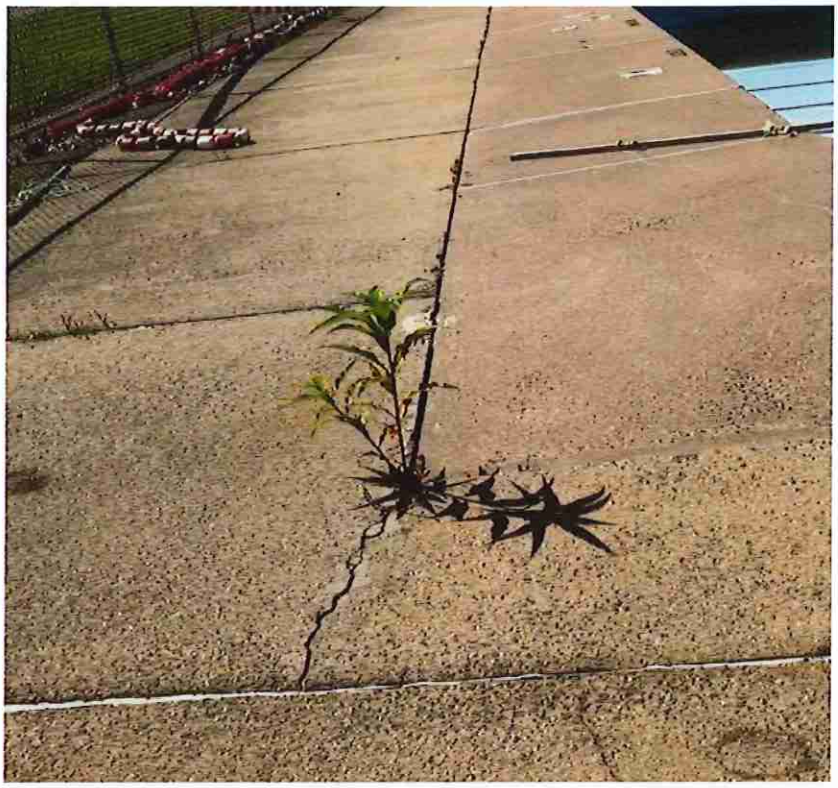


Deck pitch at the slab adjacent to the pool exceeds the ADA allowable cross pitch of 1:48. This maximum slope must be maintained for an accessible route from the bathhouse to the HCA Lift Chair and the Steps.

III. Existing Conditions Analysis

C. ISSUES and DEFICIENCIES - Main Pool Decks

Failed sealant joints and cracks allow water penetration.



Miscellaneous cracking

III. Existing Conditions Analysis

C. ISSUES and DEFICIENCIES - Wading Pool

Right: Cracked and damaged concrete at skimmer boxes.

Below: Crack across pool, and vertically at inlet fitting and skimmer.

III. Existing Conditions Analysis

C. ISSUES and DEFICIENCIES - Wading Pool Systems

Right: High rate sand filter, not rated for commercial use.

Piping and equipment is sized properly for flow, but drains are not VGB compliant and a vacuum release system should be installed.

Air gap at backwash is insufficient.

Below: 1 1/2 HP pool recirculation pump.

III. Existing Conditions Analysis

C. ISSUES and DEFICIENCIES - Wading Pool–Decks

Right and Below:

Cracked deck, repaired areas and failed sealant joints in deck allow water infiltration.

III. Existing Conditions Analysis

C. ISSUES and DEFICIENCIES - Fencing

Rusted and bent fencing presents a hazard and results in gaps and openings in excess of the allowable 2-inch spacing.

Missing caps and end plugs allow water infiltration leading to further rusting. It also allows wasps to nest, creating additional risk.