



**Swimming Pool Audit
for the
City of Oak Ridge, Tennessee**



Counsleman • Hunsaker
AQUATICS FOR LIFE

March - 2016

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A. EXECUTIVE SUMMARY

Kimley-Horn and Associates commissioned Counsilman / Hunsaker to provide a swimming pool audit in January of 2016. The swimming pool in Oak Ridge, Tennessee had a major renovation in 1993. As to the original construction date, no one is certain as to when this facility was constructed. In 1993, changes were made to the pool structure, filtration and recirculation system and chemical feed system. Since then, repairs/replacements have been made on an as-needed basis. Kimley-Horn commissioned this audit to assist in identifying items that are substandard or not operating as designed. Providing a safe and sanitary environment for the users of the pools is the highest priority for the City of Oak Ridge.

Many of the comments within this report are relative to current Tennessee State Health Codes and their affiliation to the current pool conditions at the Municipal Pool Complex. While many of these related code issues have existed for many years and perhaps have been grandfathered by the local or state health inspector. It is recommended to provide this document to these inspectors for review and comment. In the event that this facility or specific items within this facility are considered acceptable via a grandfather clause, Counsilman Hunsaker still recommends that all items listed within this report be addressed and/or remediated.

Respectfully,

A handwritten signature in cursive script, appearing to read 'Cary A. Dennis'.

Cary A. Dennis M.E.
Counsilman Hunsaker

B. POOL INFORMATION

1. Design Information for Pools

- a. Main Pool & Separate Kiddy Pool
- b. One mechanical system for each pool
- c. Turnover Rate Main Pool – 6 hours (Design)
- d. Turnover Rate Kiddy Pool – 43 min (Design)
- e. Design Flow Rate Main Pool– 5,800 gpm (Design)
- f. Design Flow Rate Kiddy Pool– 125 gpm (Design)

2. Main Pool

- a. Surface Area – 58,815 square feet (Design)
- b. Depth – Zero Entry to 13’-6” feet at the diving area. (Design)
- c. Volume – 1,998,590 gallons (Design)
- d. Perimeter – 920 Lineal Feet (Design)
- e. Diving – 1-meter and 3-meter diving boards

3. Kiddy pool

- a. Dimensions – 18 feet by 32 feet
- b. Surface Area – 576 square feet surface area (Design)
- c. Depth – Zero Entry to 12 inches (Design)
- d. Volume – 5.400 gallons (Design)
- e. Perimeter – 100 Lineal Feet (Design)

Dimensions and volumes not confirmed but taken from data provided.

C. POOL ITEMS

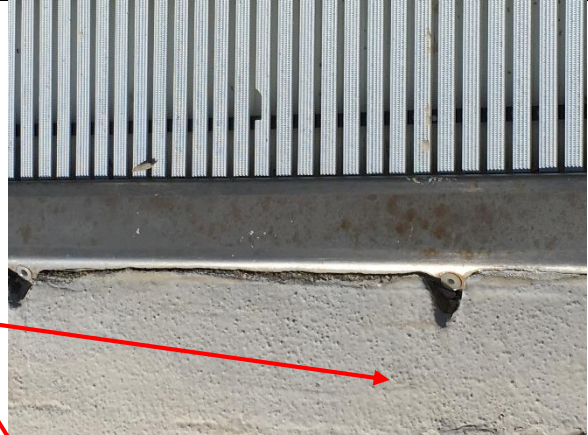
- 1. Structure and Finish**
- 2. Perimeter Overflow System**
- 3. Main Drains**
- 4. Inlets**
- 5. Ingress and Egress**
- 6. Markings and Anchors**

Councilman Hunsaker Observations, Comments and Recommendations:

1. Structure and Finish

At the time of my visit and review both pools were full of water and a majority of the pool surfaces could not be observed. However, it was relayed to me that 1/3 of the Main Pool is painted each year.

Important Note: Staff relayed that they had no knowledge of the pool surface ever being sandblasted prior to re-coating.



Typically, stainless steel gutters have a 1" to 2" grout joint between the bottom of the stainless steel and the concrete wall. This is utilized for leveling the gutter during installation. It appears the gutter is resting directly on concrete which does not provide proper seal. The area shown on the picture to the right indicates separation and likely a primary leak source for the pool.



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Recommendations:

- a) To clearly identify the structural integrity of the pool shell, it is recommended to have the pool surface sandblasted and cleared of all finishes and coatings. This would reveal imperfections, cracks and deteriorated concrete allowing for a clearer analysis of the structure. It is recommended to contact a structural engineer to perform this additional analysis.
- b) All pool construction joints should be cleaned and cleared of all old caulk and foreign materials. This joint should be properly prepped and re-caulked with a chlorine resistant sealant.
- c) Pool depth marker tiles are to be placed at intervals no greater than 20 ft. There are many locations where depth marker need to be added to meet this requirement.
- d) Vertical Depth Markers: Tennessee Department of Health requires both horizontal and “vertical” depth markers as noted below. Currently both the main pool and kiddy pool are deficient of vertical depth markers and the kiddy pool has no depth markers. New vertical depth markers should be added to the stainless gutter system on the main pool per the requirements below.
 - (d) Depth markers. Depth markers shall be required at all Type A, B, and E pools. The depth of the water shall be plainly marked in feet on both sides and at each end at or above the water surface on the vertical pool wall and on the coping or deck next to the pool, and at maximum and minimum depths of the pool. Depth markers shall be spaced at intervals no greater than twenty (20) feet with numerals of at least four (4) inches in height and of a color contrasting with the background. Where depth markings are required, they shall be in whole foot increments of depth, except across the shallow area and corresponding deck area. The depth shall be marked to the nearest one half (1/2) foot increment of water depth.
- e) It is recommended to test the main pool shell for leakage. All piping must be plugged and tested separately. Please follow the procedure noted below.

WATER TIGHTNESS TEST

- A. This test applies to the pool shell only. The water tightness test shall be completed with the pool as-is or prior to the placement of new pool paint.
- B. Water Tightness Test Procedure

1. Preparation

- a. Once the pool outlets and inlets have been securely sealed, the pool shall be filled with water.
2. Fill: Fill and then isolate the pool. The water tightness test shall begin after the vessel has been filled for a minimum of three (3) days. During the filling, all outlets shall be monitored for water tightness and all concrete joints shall be monitored for any visible leakage. If any visible leakage from the vessel is observed, the condition shall be corrected prior to the start of the test.
 - a. After the initial fill, all ground water shall be removed from the pool sight sump or the pool location de-watering system. This shall be completed prior to the start of the water tightness test. De-watering of the pool sight sump shall be maintained during the entire duration of the test.

3. Evaporation/Precipitation Measurement Procedure

- a. Fill a floating, restrained, partially filled, calibrated, open container with water and allow the container to float within the pool during the testing period. This will be used to measure evaporation and precipitation.

4. 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 operator shall check the pool for water loss with the Owner's representative every 12 hours.

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

5. Total Loss = 7.481 x Structure Surface Area (SF) x Total Water Loss per Day (FT) – Evaporation per Day (FT) + Precipitation per Day (FT)

- a. Day #1 =

b. Day #2 =

c. Day #3 =

6. 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: $0.001 \times 200,000$ gallon pool = 200 gallons per 24 hour period.) This excludes the loss/addition of evaporation/precipitation.


7. If leaks are detected, repair the vessel and make water tight in accordance with these requirements.

2. Perimeter Overflow System

The stainless steel gutter is showing signs of its age. Mild corrosion exists but is to be expected. However, there are areas of the gutter where movement and separation have taken place. It appears there have been attempts to weld the gutter to limit future movement, but gaps have opened limiting the design purpose and effectiveness of the gutter system.

Other than the zero entry area, there is no gutter grating in place. I suspect when the gutter was installed grating was provided for the entire perimeter of the gutter system.



| | |
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| <p>Where gutter grating does exist, there are numerous locations where the gutter grating is fractured and splintered. There are other areas where the grating is not properly mounted to the gutter making it loose and vulnerable to additional damage.</p> |  |
|---|--|

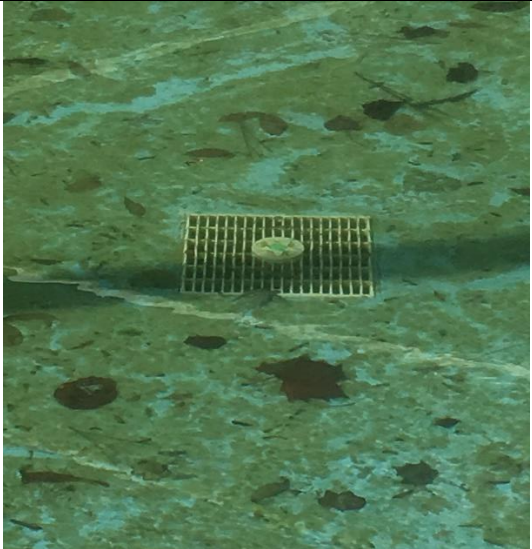
Recommendations:

- a) New gutter grating should be installed on the entire gutter system. Although Tennessee State Health Code does not dictate this requirement, it is highly recommended due to safety concerns.
- b) The stainless steel gutter system needs to be isolated and pressure tested. There are numerous locations where joints have opened and attempts at welding have taken place. It is likely that this process will need to be performed by a representative of the manufacturer.
- c) The bottom of the stainless steel gutter that rest upon the concrete needs to be sealed. This is noted in the “Structure and Finish” portion of this report.
- d) Decks draining into pool gutter system: Tennessee State Health Code does not allow decks to drain into the pool (See Code Below). Pool decks will need to either drain “away” from the pool edge or into deck drains. Deck drains can consist of area drains or trench drains. NOTE: This requirement may be grandfathered by the health dept. Please confirm.

The deck shall be constructed of slip resistant material and have a finish that will be of no hazard to bare feet. It shall have a slope of not less than one-fourth (1/4) inch nor more than three-eighths (3/8) inch to the foot and shall be so designed as to conduct drainage away from the pool area in a manner not to create or maintain standing water. All deck drainage shall be “to waste.” Deck drains shall be installed where necessary to prevent standing water.

3. Main Drains

Observations and Comments:



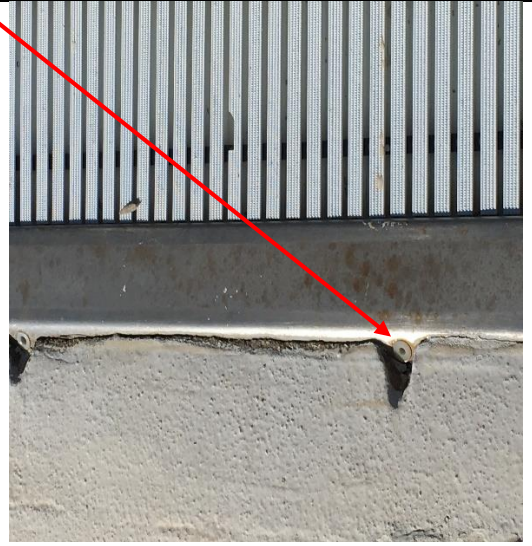
| | |
|--|--|
| <p>At the time of my visit the main pool and the kiddy pool were both full of water. The kiddy pool drains were viable but a physical inspection could not be performed. Staff relayed that the main drains had been retrofitted to meet federal and state guidelines pertaining to VGB (Virginia Graeme Baker Act).</p> <p>Under the law, all public pools must have ANSI/ASME A112.19.8 performance standard, or the successor standard ANSI/APSP-16 2011 compliant drain covers installed and a second anti-entrapment system installed, when there is a single main drain other than an unblockable drain.</p> |  |
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Recommendations:

- a) Pool main drain sump VGB compliance documentation must be kept on file and readily available.
- b) Verify that all main drains screws, grates/covers are secure and in place before filling the pools. If any of the above noted items are missing or damaged they must be replaced with original VGB compliant parts.

4. Inlets

Observations and Comments:



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| <p>Main pool utilizes a pressure tube built into the stainless steel gutter system. Filtered and chemical treated water is returned to the pool through this pressure tube roughly 10 to 12” inches below the water surface. The as-built drawings do not indicate any further inlets.</p> <p>It has been noted that the deep water into pool often times becomes cloudy. The lack of filtered water being introduced to the deeper water can contribute to this issue.</p> |  |
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Recommendations:

- The stainless steel gutter pressure tube and pressure piping needs to be pressure tested to verify there are no obstructions or leaks keeping the recirculation system from functioning as originally designed. If leaks are found they need to be repaired and then retested.

5. Ingress and Egress

Observations and Comments:

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| <p>To meet ADA requirments the main pool should have two means to access. The first means provided is a pool lift. At the time of my visit the lift had been stored for the winter season.</p> <p>The second means (zero entry) does not meet ADA guidelines. To meet ADA there should be two hand rails no nore than 38" appart and extend no futher than 24 inches (min.) to 30 inches (max.) below normal operating waterlevel.</p> |  |
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Recommendations:

- The following noting the requirements for handrails in a sloped entry.

Handrails

Sloped entries must have handrails on both sides regardless of the slope. Handrail extensions are required at the top landing but not at the bottom. The clear width between handrails must be between 33 and 38 inches. The handrail height must be between 34 and 38 inches to the top of the gripping surface. This provision does not require the handrails to be below the stationary water level, which could be considered an underwater obstruction. No minimum width is required between handrails provided on sloped entries that serve wave action pools, leisure rivers, sand bottom pools, and other pools where people can enter only in one place. Handrails are required to comply with ADAAG provisions (diameter, non-rotating, and height).



INDIVIDUAL USING A SLOPED ENTRY

NATIONAL CENTER ON ACCESSIBILITY

6. Markings and Anchors

The main pool tile depth markings on the pool deck appear to be spaced beyond the Tennessee State Health Dept. requirements,

No diving markings should be placed in all areas were water depth is 5 feet or shallower.



Recommendations:

- a) Below is the current Tennessee State Dept. of Health Code requirements for depth markers and warning signs. The depth markings and warning signs on the main pool need to be updated to meet state code requirements.
- b) Depth Markers: Tennessee Department of Health requires both “horizontal” and vertical depth markers as noted below. Currently the main pool is deficient of vertical

depth markers and many deck depth markers and warning signs. New vertical depth markers should be added to the stainless gutter system per the requirements below. The kiddy pool has no depth markers at all. Both vertical and horizontal depth marking need to be added.




(d) Depth markers. Depth markers shall be required at all Type A, B, and E pools. The depth of the water shall be plainly marked in feet on both sides and at each end at or above the water surface on the vertical pool wall and on the coping or deck next to the pool, and at maximum and minimum depths of the pool. Depth markers shall be spaced at intervals no greater than twenty (20) feet with numerals of at least four (4) inches in height and of a color contrasting with the background. Where depth markings are required, they shall be in whole foot increments of depth, except across the shallow area and corresponding deck area. The depth shall be marked to the nearest one half (1/2) foot increment of water depth.

D. DECK ITEMS

- 1. Deck**
- 2. Diving Boards**

CH Observations, Comments and Recommendations:

1. Deck

| | |
|---|---|
| <p>The pool decks appear to be in good shape. No significant cracking, heaving or skinning has taken place.</p> <p>There are numerous areas where the deck caulking has failed and needs to be removed and replaced.</p> <p>There are areas where the stainless gutter meets the concrete deck that caulking is absent.</p> <p>Per Tennessee State Health Code pool decks are required to slope “away” from the pool.</p> |  |
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Recommendations:

- a) The pool decks should have all dilapidated caulk joints removed, cleaned and replaced. This will drastically decrease the ability of water the penetrate the pool deck area and potentially undermine the deck sub base.

- c) Pool decks are not allowed to drain into the pool. A deck drainage system is required unless the deck is properly sloped “away” from the pool edge. As noted previously in this report. Tennessee State Health Dept. may wave this requirement considering the age of the facility.

2. Diving Boards

Currently there is one 1-meter dive stand and one 3-Meter dive stand located in the deep portion of the main pool. The spring boards have been removed as part of the winterization process. The durafirm stands appear to be in good working condition. Although signs of wear are visible.

Pool “depths” do meet Tennessee State Health Code “minimum” requirements. However, state code also “recommends” that that pools with diving facilities be designed in accordance with standards promulgated by FINA, NCAA, or U.S. Diving, Inc.

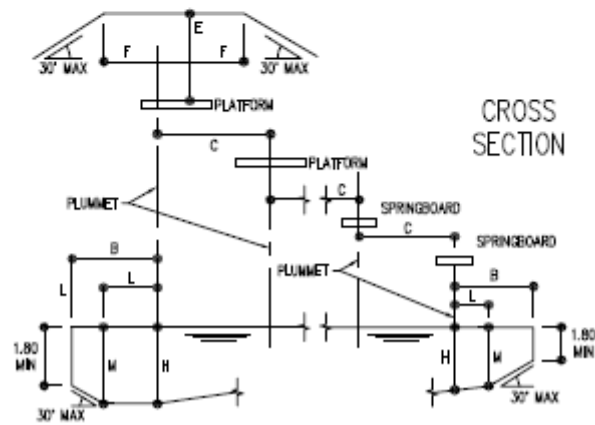
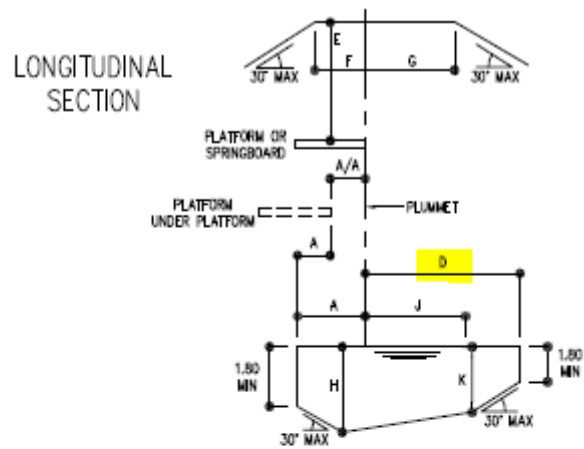


Recommendations:

- a) Per current industry standards and national regulatory diving standards, there are portions of the main pool dive area that do not meet required pool slopes for 3 meter diving. Please refer to the charts shown below listing the dimensional national

standards for 1 & 3-meter dive stands. Dimension “D” shown below is noted as 33’-0” per As-built drawings. Regulatory standards require this dimension to be 33’-8”.

| SPRINGBOARD DIMENSION REQUIREMENTS | | GOVERNING BODY | NCAA (2014) | | | | FINA & USA (2013-2017) | | | |
|--|---|--------------------------------|-------------|-------------------|---------------------|----------|------------------------|----------|------------|----------|
| | | LAST DATE UPDATED | 03/25/14 | | | | 06/05/14 | | | |
| | | | 1 METER | | 3 METER | | 1 METER | | 3 METER | |
| | | BOARD | LENGTH | 16'-0" | 18'-0" | | 4.80 M | | 4.80 M | |
| | | | WIDTH | 1'-8" | 1'-8" | | 0.50 M | | 0.50 M | |
| | | | HEIGHT | 5'-4" (5'-3 3/8") | 9'-10" (9'-10 1/8") | | 1.00 M | | 3.00 M | |
| A | FROM PLUNNET BACK TO POOL WALL FOR CONCRETE PLATFORM | DESIGNATION | HORIZONTAL | VERTICAL | HORIZONTAL | VERTICAL | HORIZONTAL | VERTICAL | HORIZONTAL | VERTICAL |
| | | MINIMUM | N/A | N/A | N/A | N/A | A-1 | N/A | A-3 | N/A |
| | | PREFERRED | N/A | N/A | N/A | N/A | 2.22 M | N/A | 2.22 M | N/A |
| | FROM PLUNNET BACK TO POOL WALL FOR PEDESTALS AND METAL STANDS | DESIGNATION | A-1 | N/A | A-3 | N/A | A-1 | N/A | A-1 | N/A |
| | | MINIMUM | 5'-0" | N/A | 5'-0" | N/A | 1.50 M | N/A | 1.50 M | N/A |
| | | PREFERRED | 6'-1" | N/A | 6'-1" | N/A | 1.80 M | N/A | 1.80 M | N/A |
| | B FROM PLUNNET TO POOL WALL AT SIDE | DESIGNATION | B-1 | N/A | B-3 | N/A | B-1 | N/A | B-3 | N/A |
| | | MINIMUM | 8'-3" | N/A | 11'-6" | N/A | 2.50 M | N/A | 3.50 M | N/A |
| | | PREFERRED | 8'-3" | N/A | 11'-6" | N/A | 2.50 M | N/A | 3.50 M | N/A |
| C | FROM PLUNNET TO ADJACENT PLUNNET | DESIGNATION | C-1 | N/A | C-3-3, 3-1 | N/A | C-1-1 pl | | C3-3pl 1pl | |
| | | MINIMUM | 6'-7" | N/A | 7'-3" | N/A | 2.00 M | N/A | 2.20 M | N/A |
| | | PREFERRED | 7'-1" | N/A | 8'-3" | N/A | 2.00 M | N/A | 2.60 M | N/A |
| D | FROM PLUNNET TO POOL WALL AHEAD | DESIGNATION | D-1 | N/A | D-3 | N/A | D-1 | N/A | D-3 | N/A |
| | | MINIMUM | 29'-7" | N/A | 33'-8" | N/A | 9.00 M | N/A | 10.25 M | N/A |
| | | PREFERRED | 29'-7" | N/A | 33'-8" | N/A | 9.00 M | N/A | 10.25 M | N/A |
| E | ON PLUNNET FROM BOARD TO CEILING | DESIGNATION | N/A | E-1 | N/A | E-3 | N/A | E-1 | N/A | E-3 |
| | | MINIMUM | N/A | 16'-5" | N/A | 16'-5" | N/A | 5.00 M | N/A | 5.00 M |
| | | PREFERRED | N/A | 16'-5" | N/A | 16'-5" | N/A | 5.00 M | N/A | 5.00 M |
| F | CLEAR OVERHEAD BEHIND AND EACH SIDE OF PLUNNET | DESIGNATION | F-1 | E-1 | F-3 | E-3 | F-1 | E-1 | F-3 | E-3 |
| | | MINIMUM | 8'-3" | 16'-5" | 8'-3" | 16'-5" | 2.50 M | 5.00 M | 2.50 M | 5.00 M |
| | | PREFERRED | 8'-3" | 16'-5" | 8'-3" | 16'-5" | 2.50 M | 5.00 M | 2.50 M | 5.00 M |
| G | CLEAR OVERHEAD AHEAD OF PLUNNET | DESIGNATION | G-1 | E-1 | G-3 | E-3 | G-1 | E-1 | G-3 | E-3 |
| | | MINIMUM | 16'-5" | 16'-5" | 16'-5" | 16'-5" | 5.00 M | 5.00 M | 5.00 M | 5.00 M |
| | | PREFERRED | 16'-5" | 16'-5" | 16'-5" | 16'-5" | 5.00 M | 5.00 M | 5.00 M | 5.00 M |
| H | DEPTH OF WATER AT PLUNNET | DESIGNATION | N/A | H-1 | N/A | H-3 | N/A | H-1 | N/A | H-3 |
| | | MINIMUM | N/A | 11'-2" | N/A | 12'-2" | N/A | 3.40 M | N/A | 3.70 M |
| | | PREFERRED | N/A | 11'-6" | N/A | 12'-6" | N/A | 3.50 M | N/A | 3.80 M |
| J-K | DISTANCE AND DEPTH AHEAD OF PLUNNET | DESIGNATION | J-1 | K-1 | J-3 | K-3 | J-1 | K-1 | J-3 | K-3 |
| | | MINIMUM | 21'-4" | 10'-10" | 24'-8" | 11'-10" | 5.00 M | 3.30 M | 6.00 M | 3.60 M |
| | | PREFERRED | 22'-4" | 11'-2" | 25'-7" | 12'-2" | 5.00 M | 3.40 M | 6.00 M | 3.70 M |
| L-M | DISTANCE AND DEPTH EACH SIDE OF PLUNNET | DESIGNATION | L-1 | M-1 | L-3 | M-3 | L-1 | M-1 | L-3 | M-3 |
| | | MINIMUM | 5'-0" | 10'-10" | 6'-7" | 11'-10" | 1.50 M | 3.30 M | 2.00 M | 3.60 M |
| | | PREFERRED | 6'-7" | 11'-2" | 8'-3" | 12'-2" | 2.00 M | 3.40 M | 2.50 M | 3.70 M |
| N | MAXIMUM SLOPE TO REDUCE DIMENSIONS BEYOND FULL REQUIREMENTS | POOL DEPTH & CEILING HEIGHT | 30 DEGREES | | | | 30 DEGREE | | | |



E. POOL MECHANICAL ITEMS

- 1. Piping**
- 2. Pump**
- 3. Filtration**
- 4. Valves**
- 5. Chemical Treatment**
- 6. Mechanical Room**

1. Piping

Very little of the pool piping is exposed for observation. It appears all of the pool piping is all Sch. 40 PVC.

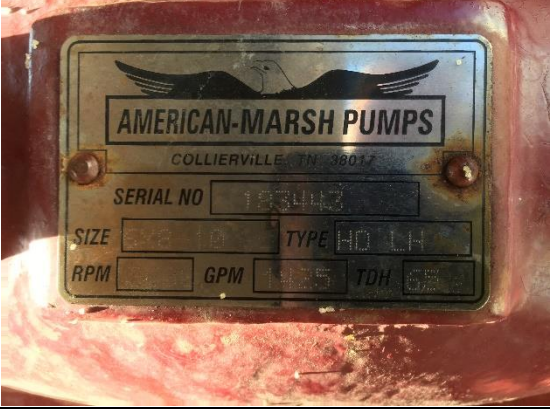

Pool staff relayed that they are not certain if the main pool is losing any water due to the water replacement by the natural spring.



Recommendations:

- a) Pressure test all pressure and suction pool piping. It is recommended to use a testing method utilizing helium as the tracer gas. To Locate a Leak, pipes are pressurised with helium and the operator uses a Sniffer Probe connected to the inlet of the leak detector. If the pipes lose pressure the probe is inserted into the soil at or near the underground pipe locations pinpointing the location of the leak.
- b) If piping leaks are found it is imperative that they are repaired and that the piping is re-tested to assure that all leaks are addressed. Excessive loss of water can result in undermining of the pool structure and/or surrounding decks. Additionally, chemical costs can spiral out of control.

2. Pumps




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| <p>Pool staff relayed that all pool recirculation pumps were replaced in 2011.</p> <p>New pool pumps meet flow, TDH and RPM requirements of the original pumps shown on as-built drawings.</p> |  |
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Recommendations:

- a) The pump and motor should be lubricated and oiled per manufactures recommendations. Typically at the end of each swim season the pump and motor is serviced and lubricated. At least once a month it is wise to bump the motor for a second or two to lubricate the internal components to avoid seizing.

- b) All Recirc. Pumps should to have a compound gage on the suction side and a pressure gage on the discharge side of the pump. This is utilized to determine if the pump with running within its designed parameters

3. Filtration



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| <p>At the time of my review the filters were full of water, therefore my inspection was limited. Pool staff relayed that filter sand was replaced in 2007.</p> <p>It appears the filter are slightly deformed. This can be contributed to a number of potential causes. The likely cause is keeping water within the filters during the winter months.</p> <p>Filter sand bed depths should be verified. Refer to manufacturers recommendations.</p> |  |
|  |  |

Recommendations:

- a) It is recommended to confirm the filter gravel and sand bed depths. Commonly there is first a layer of gravel then a layer of sand 18" to 24"thk. Confirm required thicknesses with manufacturer prior to replacement.

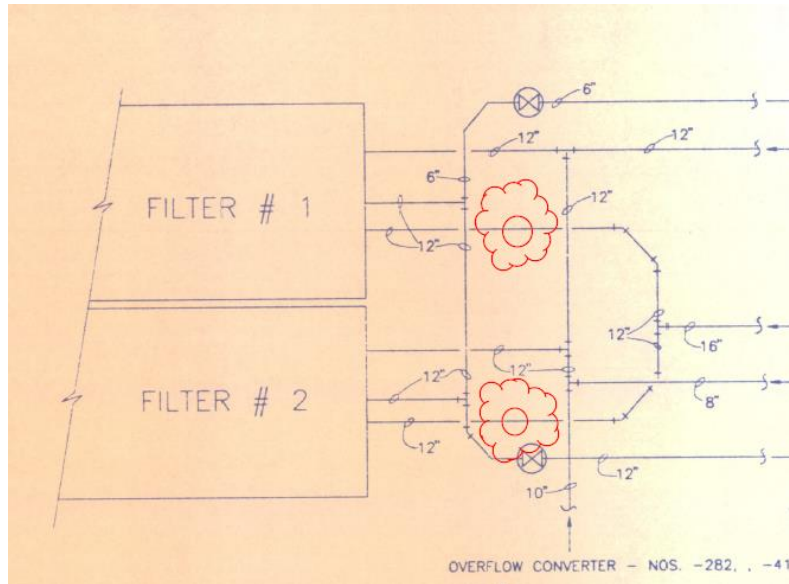
- b) The filter sand was replaced in 2007. As we approach the 10-years with year round exposure, it is suggested to replace the sand and gravel. This would simplify valve replacement also.
- c) Once the filter sand and gravel is removed, careful inspection of the filter structure is needed. It is suggested to have the manufacture review the tanks and verify if any remediation is needed.

4. Valves

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| <p>Many of the filtration valves are difficult to operate or move too freely resulting in the uncertainty of proper operation. This can result in improper filtration or backwash operation.</p> |  |
| <p>Currently the filters cannot be isolated in the event of needed maintenance due to the lack of isolation valves.</p> |  |

Recommendations:

- a) It is recommended to replace “all” filtration and backwash valving for all 4 filter systems. This includes the addition of “isolation” valves as clouded blow. The isolation valves will allow bypass of a particular filter for maintenance purposes.

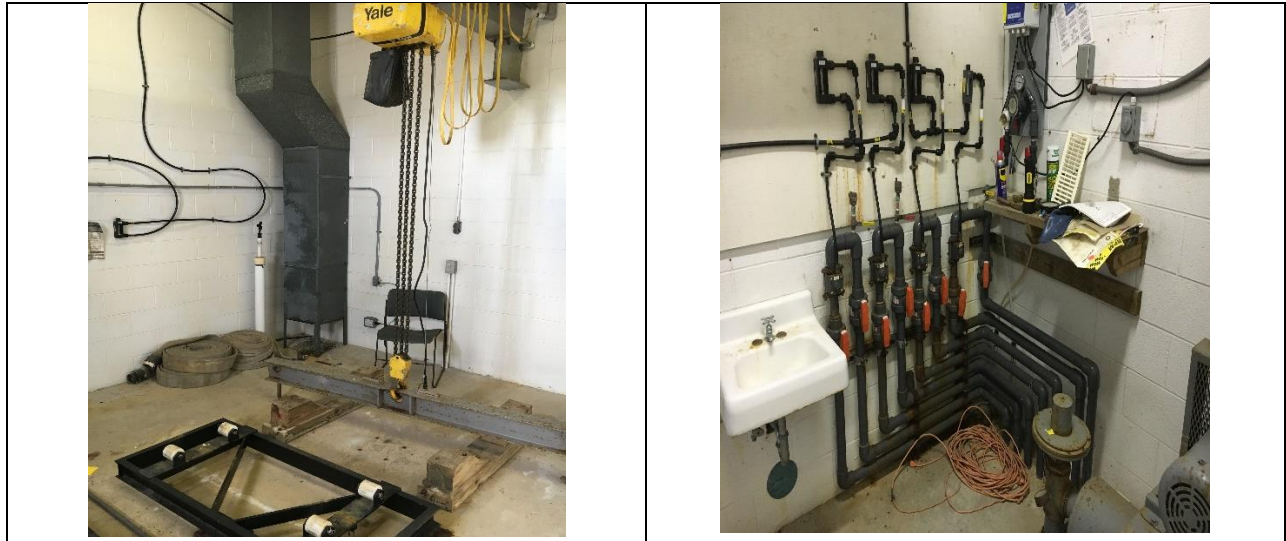


5. Chemical Treatment

The current chemical treatment system is chlorine gas. While it is acceptable per Tennessee State Health Code, it is a very dangerous chemical and not recommended by Counsilman Hunsaker.

The chemical controller should have a “y” strainer on the intake side of the flow cell. This keeps particulate from obstructing the flow cell operation.





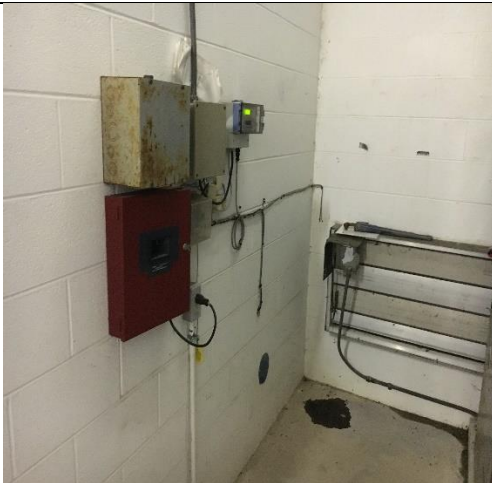
Recommendations:

- a) It is highly recommended to replace the chlorine gas system with a sodium hypochlorite system. This will eliminate the potential hazards of working with such a volatile chemical creating a safer work environment for pool employees. However, I understand that the chemical cost increase would be significant.
- b) Pool staff reported a dramatic increase in chemical usage over the past 2 or three years. This can be contributed to a number of issues. However, typically we see chemical numbers jump when the pool is losing water. By testing the pool piping and gutter systems we can pinpoint a potential cause to the increased chemical usage.
- c) Install “Y” Strainers on the intake line prior to the flow cell on each chemical controller.

6. Mechanical Room

The two separate mechanical spaces house the chemical feeders, chemical controllers and the acid feed systems. Electrical panels and all metal components show minimum corrosion.

A ventilation fan was not present. However, both mechanical spaces appear to be in good condition with minimal corrosion.



Recommendations:

- a) Exhaust fans are recommended for these rooms to remove chemical fumes and moisture.

F. OPINION OF PROBABLE COST

The following cost estimate addresses the items identified in this report needing repair, replacement or renovation. The estimates address the physical obsolescence of a pool that was renovated in 1993, as well as safety, and addresses items that are required by the State of Tennessee Health Department.

Each cost estimate has a priority ranking, "A" being the highest priority items that need immediate attention, are safety issues, health department regulation issues, or tasks done in conjunction with another "A" item. Priority "B" items are items that are functioning presently but may need to be addressed in the near future or should be considered to be included with the renovation work at this time.

Opinion of Probable Cost

| Item | Item Cost | Priority | Unit | Unit Cost | Quantity |
|---|------------------------|----------|----------|--------------|----------|
| Sandblast entire main pool surface to remove layers of coatings | \$ 252,000.00 | A | Sq. Ft. | \$ 4.00 | 63,000 |
| Sandblast entire kiddy pool surface to remove layers of coatings | \$ 2,604.00 | A | Sq. Ft. | \$ 4.00 | 651 |
| Seal Gutter System/Concrete Joint | \$ 25,000.00 | A | Each | \$ 25,000.00 | 1 |
| Re-Paint kiddy pool with 3 Coats of Tnemec | \$ 3,580.00 | A | Ln. Ft. | \$ 5.50 | 651 |
| Re-Paint main pool with 3 Coats of Tnemec | \$ 346,500.00 | A | Ln. Ft. | \$ 5.50 | 63000 |
| Install New Gutter Grating in the Main Pool | \$ 16,200.00 | A | Ln. Ft. | \$ 18.00 | 900 |
| Install New Depth Markers - Main Pool & Kiddy Pool | \$ 3,500.00 | A | Lump Sum | \$ 3,500.00 | 1 |
| Replace expansion joint caulk in pool deck | \$ 4,000.00 | A | Lump Sum | \$ 4,000.00 | 1 |
| Replace expansion joint caulk in pool floor and walls | \$ 5,000.00 | A | Lump Sum | \$ 5,000.00 | 1 |
| Repair any cracks in the pool concrete | \$ 10,000.00 | A | Lump Sum | \$ 10,000.00 | 1 |
| Pressure test all pool related pressure/suction piping and Stainless Steel Gutter | \$ 10,000.00 | A | Lump Sum | \$ 10,000.00 | 1 |
| Repair piping leaks | \$ 30,000.00 | A | Lump Sum | \$ 30,000.00 | 1 |
| Install New Replacement Valves for Pool Filters | \$ 35,200.00 | A | Each | \$ 800.00 | 44 |
| Install New Filter Isolation Valves | \$ 9,600.00 | A | Each | \$ 1,200.00 | 8 |
| Install New Filter Gravel and Sand | \$ 25,000.00 | A | Lump Sum | \$ 25,000.00 | 1 |
| Install ADA Accessible Rails in the Zero Entry of the Main Pool | \$ 13,500.00 | A | Lump Sum | \$ 13,500.00 | 2 |
| Install new digital flowmeter on return piping | \$ 3,200.00 | B | Each | \$ 1,200.00 | 4 |
| Install new impact flowmeter on backwash piping | \$ 500.00 | A | Lump Sum | \$ 500.00 | 4 |
| Install Automated Sodium Hypochlorite Feed System for Main Pool | \$ 5,500.00 | A | Lump Sum | \$ 5,500.00 | 1 |
| Install Automated Sodium Hypochlorite Feed System for Kiddy Pool | \$ 2,300.00 | A | Lump Sum | \$ 2,300.00 | 1 |
| Subtotal | \$ 803,184.00 | | | | |
| 15% Contingency | \$ 120,477.60 | | | | |
| 25% Contractor O & P | \$ 230,915.40 | | | | |
| Total | \$ 1,154,577.00 | | | | |

G. FUTURE PLANNING

Councilman Hunsaker is very appreciative of this opportunity to work with the City of Oak Ridge. The results of this comprehensive audit indicate numerous areas of concerns and deficiencies that need to be addressed. Some these deficiencies will require the coordinated

efforts of an architect, civil engineer and/or a structural engineer. We highly recommend coordinating these efforts through our team members at Kimley Horn.

Kimley Horn
214 Oceanside Drive
Nashville, TN 37204