



August 10, 2021

Mr. Fred Preuss
Oak Park River Forest High School
201 North Scoville Avenue
Oak Park, IL 60302

Re: Oak Park and River Forest High School
2021 Visual Observation
East & West Pool
Oak Park, IL 60302
LEI Project No: 21210579.000

Dear Mr. Preuss:

Pursuant to your request, Larson Engineering, Inc. (LEI) visited the captioned site on July 19, 2021, to observe the east and west pool framing. The purpose of the visit was to perform a visual observation and render an opinion regarding the structural integrity of the existing floor deck surrounding the pools and the existing walls of the pools. In 2013 and 2015, LEI conducted similar observations and provided reports with recommendations for repairs. It is our understanding that some repairs were completed after the 2013 observation, but that no repairs have been implemented since that last visit in 2015. The pools were constructed as part of the 1928 school addition.

The East Pool:

The pool deck framing consists of concrete beams and pan joists on the south, east and north sides. The deck on the west side of the pool is a one-way slab. On three sides of the pool, south, north and west, the floor deck concrete framing had undergone significant repair work after the time of our observation in 2013. The previous repair work appears to be in good condition, but as stated in our last report, there are still a few areas of spalled concrete and exposed rebar [Photos 1&2]. At a few locations, such as the northwest corner of the pool, exposed and corroded reinforcement is visible in areas previously patched, indicating that some of the patch material has spalled. This was noted in our previous report and the condition appears nearly the same. [Photo 3].

The walls of the east pool were primarily dry with a few areas of water seepage, although there were numerous stains indicating previous water leakage [Photos 4,5,6,7,8, & 9] Many of these stains were present at the time of our last observation, but it is likely that some have developed in the last seven years. As noted in our last report, some cracks in the walls of the pool have been filled with an injected epoxy. Also noted in our last report, some cracks have not been repaired and the concrete is delaminating and deteriorating. [Photos 10-15] Some seepage stains appear that they may be at concrete joints between separate concrete pours when the pool was first constructed. [Photos 16-19].

August 10, 2021

Mr. Fred Preuss
Oak Park River Forest High School

At numerous locations along the walls, the surface of the wall has notable efflorescence. Photos 20-29] Efflorescence is caused by moisture migrating through concrete bringing soluble salts to the surface.

Also, most penetrations through the pool walls and decks for pipes or equipment lines appear to have been sealed with an epoxy or epoxy-like material.

The West Pool:

The framing at the west pool is very similar to the east pool, with the deck framed by concrete beams and pan joists on the south, east and north sides and a one-way slab on the west side. The walls of the pool are cast-in-place flat plates.

The deck around the west pool had a few locations of notably exposed and corroded reinforcement [Photos 30-32].

The walls of the west pool each had several areas of water seeping through cracks in the walls or at joints of pipes penetrating the wall at the time of our observation [Photos 33-38]. The east wall had the most significant seepage as well as stains from seepage, some of which were very dark rust stains. Most of the areas with dark rust stains continued to seep water during our visit [Photos 39-42] There were large areas of standing water on the floor at the time of our observation [Photos 43-44] At numerous locations along the walls, there is notable efflorescence. [Photo 45]. As previously noted, the south end of the east wall has an outward bow (with outward being away from the water side); however, it could not be determined if the degree of bow has increased since this characteristic was first observed in 2013.

The columns directly east of the pool walls are showing signs of deterioration. The concrete near the bases has spalled at several locations and there is efflorescence on the column surfaces [Photos 46-48]. Two of the columns on the west side of the pool, which are integral with the foundation wall, have cracks with water seepage and some deterioration [Photos 49-53].

Conclusions and Recommendations:

It is LEI's understanding that the school has previously considered replacing the existing pools, but there is no such plan in place at this time. The recommendations below are based on keeping and utilizing the pools until they can be replaced.

The Pool Floor Deck Framing:

With the repairs that were implemented after our observation in 2013, we feel the pool decks are in fair condition. The areas of exposed reinforcement and spalled concrete are relatively limited and as such do not indicate a need for immediate repair. However, the corrosion and deterioration will likely worsen. Ongoing repairs will be necessary because it will not be possible to remove all steel that has begun to corrode, and new cracks are likely to develop. Steel that has begun to corrode will continue to corrode from water and chlorine wicking through the concrete.

August 10, 2021

Mr. Fred Preuss
Oak Park River Forest High School

The Pool Wall Repair:

The dark stains at leaks in the walls of the west pool indicate ongoing corrosion and deterioration of the steel reinforcement in the walls. The presence of efflorescence on the pool walls of both pools indicates continued movement of water into the walls. Leaks and cracks in the pool walls indicate that the capacity of the walls to support the fluid pressure of the water has been compromised by the steel corrosion and concrete deterioration. The corrosion of steel reinforcement within the walls that had begun some time ago has most likely continued to develop and further weaken the flexural and shear capacities of the pool walls.

Repairs and reinforcement of the concrete walls are necessary to provide strength to the walls to replace the strength loss of the reinforcement compromised by corrosion and the concrete deterioration. We have previously recommended reinforcing the pool walls with a system of carbon fiber reinforcement polymer. Carbon fiber reinforcement polymer (CFRP) can be utilized by bonding sheets of carbon fibers to the non-water side of the pool walls (the tension faces). The process requires sand-blasting the pool walls to remove all loose particles and deleterious materials, and bonding carbon fibers to the cleaned surfaces of the walls. This will strengthen the walls some, but ongoing seepage will make implementing this difficult and likely cause it to become de-bonded as concrete delaminates or salts leach through. In light of the current condition of the pool walls, CFRP may not be effective unless the interior of the pool is treated to prevent water entering the concrete. This would require removal of the tile lining, installation of some type of waterproof membrane and then reinstalling tile. This process should be done in combination with epoxy injecting to seal cracks in the walls wherever possible. All sides of both pools should be reinforced, although repair to the walls of the west pool should be a priority. It is our understanding that a contractor specializing in CFRP systems was consulted prior to 2015. Although it was verified at that time that CFRP could be applied to the pools, the condition of the pool walls has deteriorated since that time so a consultant specializing in CFRP should again be consulted to verify the feasibility applying it to the pool walls in their current state.

We described in our previous report that each time the pools are emptied and refilled, the existing deterioration is likely worsened. Emptying and re-filling the pool results in flexure of the pool walls. The resulting movement opens and closes existing cracks and allows chlorinated water to enter the cracks and exacerbate the deterioration of the concrete and steel reinforcement of the pool walls. It is our understanding that completely emptying and refilling the pools is necessary to properly sanitize them. The CFRP described above may reduce the amount that the walls move during this procedure, but it will not eliminate all movement and it is our opinion that it will not stop the deterioration that has already begun from continuing as described above.

Since no repairs have been implemented in the last seven years, the condition of the walls of the pools will likely continue to degrade. Much of the degradation is within the walls and is not able to be observed. As such, it is not possible to provide a definitive value for the strength of the pool walls. The repairs outlined above, if feasible, will strengthen the walls around the pools. However, with the degree of deterioration that has already developed, it is LEI's opinion that in addition to the repairs outlined above, plans for reinforcement of the walls of the pools should include permanent bracing to support the lateral forces imposed by the water. This bracing should be designed by a licensed Structural Engineer and implemented in a manner that will reduce stresses and properly transfer loads to surrounding structure that have the capacity to support the bracing loads.

August 10, 2021

Mr. Fred Preuss
Oak Park River Forest High School

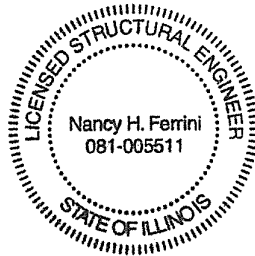
Until repairs are made and the pool walls reinforced, temporary bracing of the walls should be installed. We recommend that the temporary bracing be installed within the next 3 months. Like the permanent bracing describe above, the temporary bracing should be designed by a licensed Structural Engineer and implemented in a manner that will reduce stresses and properly transfer loads to surrounding structure that have the capacity to support the bracing loads.

The opinions stated in this report are based on limited visual observations only. No physical testing was performed and no calculations have been made to determine the adequacy of the structural system or its compliance with accepted building code requirements.

If you have any further questions regarding this matter, please feel free to contact our office.

Sincerely,
Larson Engineering, Inc.

Nancy H. Ferrini, S.E.
Senior Project Manager
nferrini@larsonengr.com



Expires
11/30/2022

NHF:mdg

Attachment:
1) Photos



01



03



02



04

VISUAL OBSERVATION OF THE
OAK PARK AND RIVER FOREST HIGH SCHOOL
EAST AND WEST POOL
OAK PARK, IL 60302

LEI PROJECT NO. 21210579:000

JULY 19, 2021



05



06



07



08

VISUAL OBSERVATION OF THE
OAK PARK AND RIVER FOREST HIGH SCHOOL
EAST AND WEST POOL
OAK PARK, IL 60302

LEI PROJECT NO. 21210579.000

JULY 19, 2021



09



10



11



12

VISUAL OBSERVATION OF THE
OAK PARK AND RIVER FOREST HIGH SCHOOL
EAST AND WEST POOL
OAK PARK, IL 60302

LEI PROJECT NO. 21210579.000

JULY 19, 2021



13



14



15



16

VISUAL OBSERVATION OF THE
OAK PARK AND RIVER FOREST HIGH SCHOOL
EAST AND WEST POOL
OAK PARK, IL 60302

LEI PROJECT NO. 21210579:000

JULY 19, 2021



17



18



19



20

VISUAL OBSERVATION OF THE
OAK PARK AND RIVER FOREST HIGH SCHOOL
EAST AND WEST POOL
OAK PARK, IL 60302

LEI PROJECT NO. 21210579.000

JULY 19, 2021



21



22



23



24

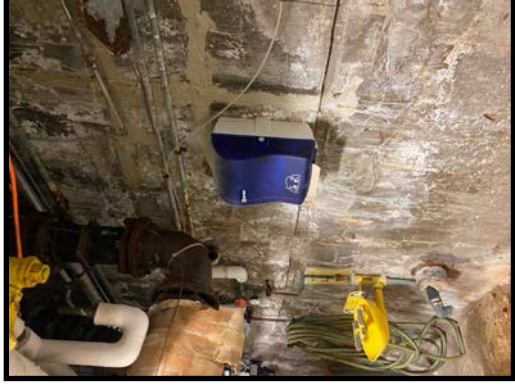
VISUAL OBSERVATION OF THE
OAK PARK AND RIVER FOREST HIGH SCHOOL
EAST AND WEST POOL
OAK PARK, IL 60302

LEI PROJECT NO. 21210579:000

JULY 19, 2021



25



26



27



28

VISUAL OBSERVATION OF THE
OAK PARK AND RIVER FOREST HIGH SCHOOL
EAST AND WEST POOL
OAK PARK, IL 60302

LEI PROJECT NO. 21210579:000

JULY 19, 2021



29



30



31



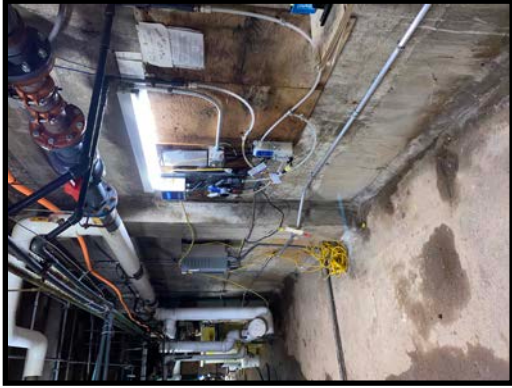
32



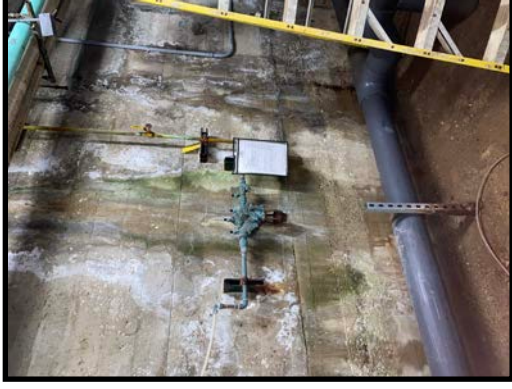
33



34



35



36

VISUAL OBSERVATION OF THE
OAK PARK AND RIVER FOREST HIGH SCHOOL
EAST AND WEST POOL
OAK PARK, IL 60302

LEI PROJECT NO. 21210579:000

JULY 19, 2021



37



38



39



40

VISUAL OBSERVATION OF THE
OAK PARK AND RIVER FOREST HIGH SCHOOL
EAST AND WEST POOL
OAK PARK, IL 60302

LEI PROJECT NO. 21210579:000

JULY 19, 2021



41



42



43



44

VISUAL OBSERVATION OF THE
OAK PARK AND RIVER FOREST HIGH SCHOOL
EAST AND WEST POOL
OAK PARK, IL 60302

LEI PROJECT NO. 21210579:000

JULY 19, 2021



45



46



47



48

VISUAL OBSERVATION OF THE
OAK PARK AND RIVER FOREST HIGH SCHOOL
EAST AND WEST POOL
OAK PARK, IL 60302

LEI PROJECT NO. 21210579:000

JULY 19, 2021



49



50



51



52

VISUAL OBSERVATION OF THE
OAK PARK AND RIVER FOREST HIGH SCHOOL
EAST AND WEST POOL
OAK PARK, IL 60302

LEI PROJECT NO. 21210579:000

JULY 19, 2021

