January 5, 2022

David William Hotel Condominium Association, Inc.
Holger Lutz, Community Association Manager
700 Biltmore Way
Coral Gables, FL 33134

RE: David William Hotel Condominium
Pool Restoration Report
RHEG Project #2162

Dear Mr. Lutz,

We have completed our structural assessment and analysis of the existing conditions of the pool structure at the David William Hotel Condominium located in Coral Gables, FL. The following report provides our analysis results and repair recommendations of the pool structure.

Pool Structure

1. The pool is a concrete structure that is located at the penthouse level of the building. The pool is surrounded by an open terrace deck.
2. The pool is rectangular in shape with an approximate size of 22'-0" x 44'-0".
3. The depth of the pool varies from approximately 3'-4" at the shallow portion to 8'-6" at the deepest part of the pool.
4. The pool concrete structure encompasses 4 perimeter beams forming the walls of the pool, a midspan beam support and a concrete slab forming the bottom surface of the pool.
5. The perimeter beams vary in size due to the shape of the pool from 8"x 36" to 8"x 92". Midspan beam is 24"x 36". Slab varies in thickness from 6 ½" at the shallow to 8 ½" at the deepest portion.
6. The pool structure is integrated into the overall building structural frame as perimeter concrete joists that form the surrounding terrace slab frame into and are supported by the pool beams which are intern supported by building columns.
7. The underside of the pool is an enclosed storage area that houses the pool equipment room. This enclosed area is located at the eleventh floor of the building.

Original 1964 Construction Drawings

1. Review of the original construction drawings of the building, which includes the pool, dated from 1964 was completed.
2. The pool is a concrete reinforced structural frame.

3. The concrete compressive strength required for the pool to be 3,000 psi. This concrete was specified to be semi-light weight concrete using 'Solite" for coarse aggregate with a minimum dry weight density of 110 lbs./cubic feet.
4. The concrete specifications also required for "Anti-hydro" integral waterproofing admixture to be used in the swimming pool concrete slabs and walls. The intent of this admixture was to provide the waterproofing component needed for the pool.
5. The pool design included a continuous gutter system along its perimeter where the edge coping was placed. The gutter had a 4" minimum width and depth. Also of note is a continuous plastic water stop insert between the gutter and pool beam support below where a construction joint is located.
6. Based on the size of the pool there is approximately 38,470 gallons of water in the pool which equates to a weight of 320,840 lbs.
7. See attached copies of drawings with pertinent highlighted information regarding the pool structure.

Remodeling 2010 Construction Drawings

1. Review of the pool remodeling construction drawings dated from 2010 was completed.
2. The remodeling work completed in 2010 is the present existing conditions of the pool today.
3. Perimeter shape of the pool was not modified as part of the remodeling work, but existing steps in the pool were removed and new seat benches created along two sides of the pool.
4. Drawings do not indicate any work required along the perimeter gutter system of the pool. But current gutter conditions are different from the 1964 detail. It is unknown what work was done to the gutter and when as no remodeling construction detail was found.
5. Remodeling adds a new 110-gallon collector tank and piping system in the pool.
6. Installation of a white PVC membrane liner throughout the entire pool is completed in the remodeling. Purpose of the membrane is to act as a waterproofing liner for the pool.
7. See attached copies of drawings with pertinent highlighted information regarding the pool remodeling.

Pool Structural Assessment

1. Structural assessment of existing pool conditions was completed on August 30, 2021.
2. Per previous RH Engineering Group direction, the pool had been emptied of water prior to our assessment. The pool is currently still empty of water.
3. Observations under the pool through the storage area located on the eleventh floor and inside the pool at the penthouse level were completed.
4. Extensive concrete damage to the pool beams and slab was noted as numerous cracks and concrete spalls were observed throughout all structural members that comprise the pool structure.
5. The pool slab underside has numerous cracks throughout that would appear to indicate high stress conditions in the concrete.
6. There are numerous areas were water filtration through cracks and spalls had been occurring which are obvious by the formation of extensive stalactites underneath the concrete.

7. Damage to the entire pool structure was noted and quantified. Based on the results of the assessment we estimate that a minimum of 65% of the entire pool structure requires concrete repair. See attached chart with concrete damage estimate quantities.
8. There are also extensive concrete damages that include cracks and spalls to surrounding terrace concrete joists, slab and columns that require repair.
9. See attached structural assessment photos of the pool structure.
10. As the damage to the pool structure is extensive, we recommended that a testing program of the existing pool structure concrete be undertaken to determine microscopic details of the concrete condition through laboratory tests. We must determine all possible deleterious conditions contained within so that we fully understand the impact of the deficient conditions that have been noted. Core samples of the concrete were taken, so that a petrographic analysis can be completed.

Pool Concrete Testing

1. Coring of existing pool concrete members was completed on October 18, 2021.
2. There were 4 random samples taken for testing.
3. Cores were taken from inside the emptied pool.
4. PVC membrane was cut out to expose the concrete surface.
5. Ground penetrating radar scans of the concrete were completed to locate reinforcing rebars within each of the testing areas so that core samples taken are free of any rebar and purely a 100% concrete only sample.
6. Core sample locations and their designations:
   F-1 Slab Lower (shallow part of pool).
   F-2 Slab Deep (deep part of pool)
   W-1 North Wall Deep (beam north elevation, deep part of pool).
   W-2 West Wall Lower (beam west elevation, shallow part of pool)
7. Laboratory petrographic analysis will be made of 2 of the samples while the other samples will be tested for compressive concrete strength and chloride ion content.
8. See attached core testing photos of the pool structure.

Laboratory Testing Results

1. Laboratory testing results were received on November 30, 2021.
2. Petrographic testing was completed in samples F-1 Slab Lower and W-2 West Wall.
3. Chloride ion testing was completed in samples F-1 Slab Lower, F-2 Slab Deep and W-2 West wall Lower.
4. Compressive strength testing was completed in samples F-2 Slab Deep, W-1 North Wall Deep, and W-2 West Wall Lower.
5. Pertinent results and *our commentary* of the petrographic analysis, compressive strength and chloride ion testing include the following:
   a. Water cement ratio for both samples were moderately high. *Higher water cement ratios indicate higher water content in the concrete. The higher amount of water will reduce the compressive strength of the concrete and create an increase in air voids within the concrete itself.*
   b. Both samples were both Portland cement only concrete mixes. Cement paste was moderately soft. *Cement paste that is soft will result in weaker concrete that affect compressive, tensile, and flexural strengths.*

c. Concrete mixture for the 2 samples tested were not consistent with each other. Core sample W-2 contained lightweight slag coarse aggregate while F-1 sample contained crushed carbonate coarse aggregate. *Original 1964 construction drawings required for the concrete in the pool to be made of semi-light weight concrete using 'Solite" for coarse aggregate which would be consistent with the W-2 sample only. The F-1 sample is comprised of regular coarse aggregate that would result in higher weight density of concrete in the order of 145 lbs./cubic feet. The original 1964 specifications required the concrete to be minimum dry weight density of 110 lbs./cubic feet. This change results in additional load being placed on the structural components of the building than originally designed.*

d. Both concrete samples were well consolidated and appeared to be in good condition with no evidence of mass deterioration such as alkali-silica reactivity or freeze-thaw deterioration. *This is good that no mass deterioration was found as it was a concern.*

e. No internal microcracking of the concrete. *This is good that no internal microcracking of the concrete was found.*

f. Both samples contain an air-void system which is not consistent with current American Concrete Institute (ACI) recommendations. *Higher air void content results in reduced strength of the concrete.*

g. *Neither sample had any evidence of the "Anti-hydro" integral waterproofing admixture required in the specifications for the swimming pool concrete slabs and walls. Therefore, the original pool construction lacks the waterproofing component that is critical for a pool structure. All concrete will absorb water as it is porous. In this case chlorinated pool water being absorbed freely in the concrete will result in an increase in rebar corrosion and concrete deterioration as seen in the numerous concrete spalls and cracks observed.*

h. Compressive strength results were 2,059 psi (F-2 sample), 2,960 psi (W-1 sample), and 2,505 psi (W-2 sample). *The concrete compressive strength required for the pool in the 1964 specifications was 3,000 psi. No test result reached the required value with result of F-2 Slab Deep particularly concerning at only 2,059 psi. The average strength between the 3 tested samples is 2,508 psi. For a building of this age, this is a concerning result that the concrete strength is deficient.*

i. Chloride ion results were 0.0993% (F-1 sample), 0.0702% (F-2 sample), and 0.1254% (W-2 sample). *For concrete exposed to wet conditions as is the case of the pool structure, American Concrete Institute (ACI) recommends maximum chloride ion limit of 0.08%. Anything above this limit would result in induced corrosion of the reinforcing steel within the structure. We believe there is visual proof of this increase in rebar corrosion within the pool structure as evidenced by the substantial amount of concrete spalling that has been observed.*

6. See attached laboratory testing results from Wingerter Laboratories, Inc., and American Engineering Testing.

Repair Recommendations

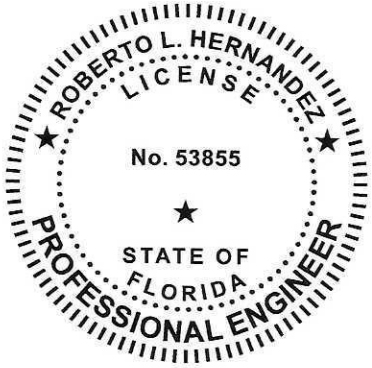
1. Concrete repair to surrounding structural members associated with the terrace area joists, slab, and columns is required.
2. Concrete repair to the pool structure is clearly required.

3. But there are concerning results from this in-depth analysis of the pool existing conditions which are:
   a. Existing concrete strength is deficient.
   b. Chloride ion content in the concrete is high.
   c. No waterproofing admixture in the concrete.
   d. Membrane liner has failed as evidenced by the large number of water leaks below the pool surface structure.
   e. Existing concrete damage to pool is estimated to exceed 50% of the pool structure with approximately 65% of the pool requiring repair.
   f. The depth of the pool and associated weight is large. Increasing the weight concern for the building structure is an inconsistent concrete mix used for the pool that varied from the original specifications.
   g. Pool concrete is now approximately 57 years old and with the constant exposure to chlorinated pool water and lack of waterproofing it may have reached its life expectancy.
4. We recommend that the structure associated with (only) the pool - beams/walls and slab be completely 100% removed and replaced with a newly designed waterproofed structure. This would also allow for the possible reconfiguration of the pool size/depth allowing for reduced weight on the structure.

If after you review the report there are any questions, please let me know.

Sincerely,

Roberto L. Hernandez, P.E.



Roberto L Hernandez

Digitally signed by Roberto L Hernandez
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Reason: This item has been digitally signed and sealed by Roberto L. Hernandez, PE using a Digital Signature.
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