



January 29, 2016

Attn.: Shannon Keleher, Recreation Manager
City of Gainesville Parks, Recreation and Cultural Affairs Department
P.O. Box 490
Station 24
Gainesville, FL 32627

Re: Northeast Pool Liner Issues

As requested by the City, I traveled to Gainesville on January 11, 2016 and participated in a review of the City's problems with the pool liner at Northeast pool. In the late morning we met you and your staff at the pool. Several representatives of Natare, the liner installer, were also present. Markey and Associates, Inc. (and its affiliated engineering firm, Markey-Consult, LLC) is an independent aquatics planning and consulting firm. The following summarizes my observations.

First, we understand that the history of the problem includes evidence of the problems after only a few years after installation. Natare made repairs a few years ago, but the current issues are said to be similar in nature. The pool liner is made of flexible PVC sheeting, reportedly of Italian manufacture, that is used to seal the complete interior pool surface and provide a smooth and bather-friendly finish. It is supposed to stay flush with the pool structure floor and walls. The liner should stay flexible and in-place reliably for 10 to 15 years. The record seems to reflect that there are many swimming pools that have used this type of liner successfully. Indeed, your City has another pool with the same brand of liner that has not exhibited the same problems as experienced at the Northeast Pool. At the Northeast Pool, the liner material appears to have lost its elasticity in many areas of the pool. The liner appears to have shrunk, stretching the material to the point of pulling away from the corners and tearing where it is otherwise restrained. As it pull loose from the surfaces, the liner can balloon up into the pool proper. These problems represent a substantial failure of the system; and given the apparent loss of the material properties, additional repairs would not be appropriate in our opinion. A total resurfacing of the pool is required. On the 11th, the Natare representatives participated in discussions at the pool and, later, at City Hall. The Natare representatives agreed with and even suggested the above conclusions.

Accepting some of the assertions by Natare as to the possible causes of the liner failure, a persistent chemical imbalance in the pool water would be immediately suspect. However, Natare readily acknowledged receipt of operating records that reportedly show that the city operated the pool well within the norms of swimming pool operation. It was suggested that the old fiberglass liner substrate could have caused a chemical reaction, but they observed that there was no field evidence of that cause. No other peculiarities of this particular pool could be identified. The fact that the same liner is installed at the City's sister pool and operations are very similar, yet the other pool has not experienced failures, suggests that the operations and the pool chemistry are not a cause of the Northeast pool's failures. The Natare representatives stated that they agreed with this. The Natare representatives were unwavering in their assertions that they had checked their project records and determined that the PVC sheet materials and the felt under-mat were of the same production run and lot at both of the pools. However, I can surmise no explanation for the liner failure other than faulty materials as manufactured and installed.


As part of my background discussions with staff, I explored the early history of the pool. It started as a formed concrete pool with a concrete gutter and plaster (or possibly painted) finish. In an effort to minimize the ongoing renovations of the pool finishes, the City chose to have a fiberglass shell installed over the pool's interior. Over time, that fiberglass finish proved to be unsatisfactory [Side note: Many pools around the southeast that were re-finished around that same time period with the same kind of fiberglass system also experienced similar problems, almost universally]. The staff, having observed successful installations of the Natare liner system at other pools in Florida, decided to use it on the City's two pools. At the Northeast Pool, the City also elected to have Natare replace the concrete gutter with a competition-friendly, full-trough stainless steel gutter system. The timeline of this history is a matter of record.

I discussed the generic repair options with the City staff, including stripping all surfaces down to bare concrete and installing a plaster finish with tile markings or replacing the liner in like-kind with Natare's system or the similar system by their competitor, Renosys. The Parks staff is not favorable to the plaster option, and I have to agree that the need to completely strip all of the old surfaces presents many uncertainties and even risks that could result in higher than expected costs. Even with no problems, the work would cost approximately \$150,000. As indicated below, this is close to our estimate of the cost of a new PVC liner which is the City's preferred finish (if it is not failing of course).

The Natare staff gathered several samples of the installed liner material with the intent of sending it off for analysis. I made some effort to identify an appropriate testing agency for the City to obtain parallel testing. I have been unable to identify anyone specific, but a general materials testing laboratory may be able to provide some guidance, at least in testing for the loss of plasticizers in the product. Otherwise, it is a very specialized and customizable product, and the manufacturer's response may have to be accepted. I have not received the results of Natare's testing.

Based on projects with other Markey clients that include similar liners, we have completed an estimate of the probable cost to replace the liner completely with a new PVC liner system. We roughly estimate the surface area at 21,000 square feet. At that quantity, the cost should be in the range of \$120,000 to \$140,000 plus approximately \$25,000 for removal and disposal of the existing materials. This is with no consideration of cost sharing or warranty considerations from Natare.

Sincerely,
Markey and Associates, Inc. and Markey-Consult, LLC



David N. Markey, P.E.
President