

November 14, 2017

Serial Letter #001

Jeff Grover, Director, Parks & Recreation
City of Fircrest
555 Contra Costa Avenue
Fircrest, WA 98466

RE. Fircrest Community Pool Evaluation

Mr. Grover,

Per our investigation and evaluation of the Community Pool we have found some issues. During our investigation we used Applied Professional Services, Inc. (APS) as a sub-consultant to utilize two different technologies to search for possible issues with the pool. One is the Ground Penetrating Radar (GPR) that was used to “view” the sub grades in and around the pool. The other was the video inspection of existing drain pipes for the pool. The GPR showed some pockets of what appear to be ground water but it was inconclusive as to large voids. The GPR does show some minor voids under the deck near the pool surface that should be addressed. This is over the areas of currently broken concrete. The push camera APS used to video the drain lines was more conclusive and we did see two areas of concern. One area is at the bottom of the pool (deep end) near the drain structures. The 90 degree fitting has broken and there is infiltration of sediment and we believe this is an area water is leaving the pool during the summer. Also there is another 90 degree fitting up by the pool equipment room that appears to be broken and has so much sediment and rock in it the camera could not penetrate any further. With two breaks in the drain pipe this is most likely where a large part of the water is leaving in the summer and infiltrating in the winter when the ground water table rises. To summarize the areas of concern:

- 1) Lower 90 degree fitting broken
 - a. Remove concrete at deck level
 - b. Cut pipe and install a cleanout at upper 90 degree fitting. Approximately 30” to 36” deep.
 - i. This will allow a crew to jet down the pipe to the drainage structures to clean the debris from the pipe
 - ii. This will also allow (if feasible) access for a slip lining company to perform their work to patch the pipe
 - c. Jet the pipe down to the catch basins at the bottom of the pool. The catch basins will allow the debris to be collected and removed.
 - d. Video the line again in order to determine if slip lining the broken area of pipe will be feasible.
 - e. If slip lining will work proceed with slip lining
- 2) Upper blockage near pool equipment room
 - a. Remove concrete deck.
 - b. Dig down and find pipe. Approximately 30” to 36” deep.
 - c. Fix pipe
 - d. Replace concrete deck.
- 3) Broken concrete deck near pool
 - a. Remove existing broken concrete
 - b. Investigate sub-grade for any possible clues/ extent of void
 - c. Fill and compact grades
 - d. Pour back concrete deck

4) Water supply line testing

- a. With broken drain lines confirmed beneath the pool it is our opinion the water supply lines may be compromised as well. The supply line for water into the pool could have breaks in them at or near the pool. This could be part of the reason so much water is needed to fill the pool. Some of the water is not making it into the pool and is being wasted into the surrounding sub-grades. It would be prudent to do some low impact testing to confirm the water being delivered to the pool is making it all the way to the pool. Low pressure air testing or even an evaluation of how much water is pumped in is actually in the pool could be done.

With our investigation into the City's concern about the existing pool it is our opinion the above items are fixes the City should pursue immediately at a minimum in order to keep the pool in use for the short term. This will fix two broken areas of pipe that are currently draining the pool in the summer months when the ground water table is low and also help prevent any more movement of sediment from under the pool. Andy with the City explained each summer they do see dirty water coming into the pool and it takes a while to clear up. This dirty water is sediment leaving the sub-grade below the pool and does raise a red flag as to the structural integrity of the pool. With these fixes the City should keep in mind there is already damage done beneath the pool that most likely we cannot see and we cannot guarantee the stability of the pool bottom without major demolition and excavation to physically see the conditions of the underlying sub-grade. The above mentioned fixes and further investigation would only give the City a Band-Aid if you will of the existing conditions until the City can actually build a new pool.

The above mentioned fixes and investigation should not be considered long term solutions to the problems identified. Further evaluation and monitoring of existing conditions should be done after the fixes are implemented in order to gain better understanding of the structural stability of the pool. It would be our recommendation after the fixes are implemented this winter that the pool be filled and evaluated prior to the summer opening.

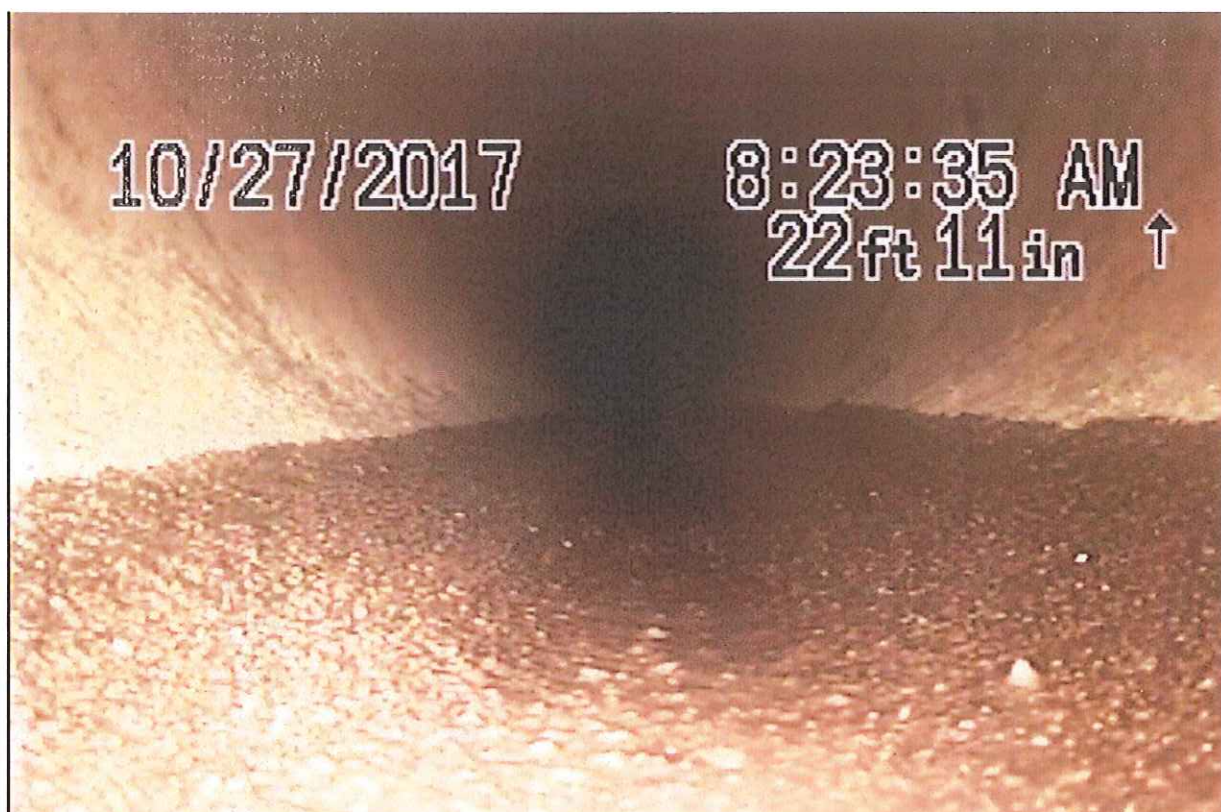
If the City can supply us with Contractors that are on approved small works roster for the City KPG can facilitate meetings with them in order to get a few cost estimates for the work. Rough order of magnitude for the above mentioned work could range from approximately \$10,000.00 to \$15,000.00.

Respectfully,

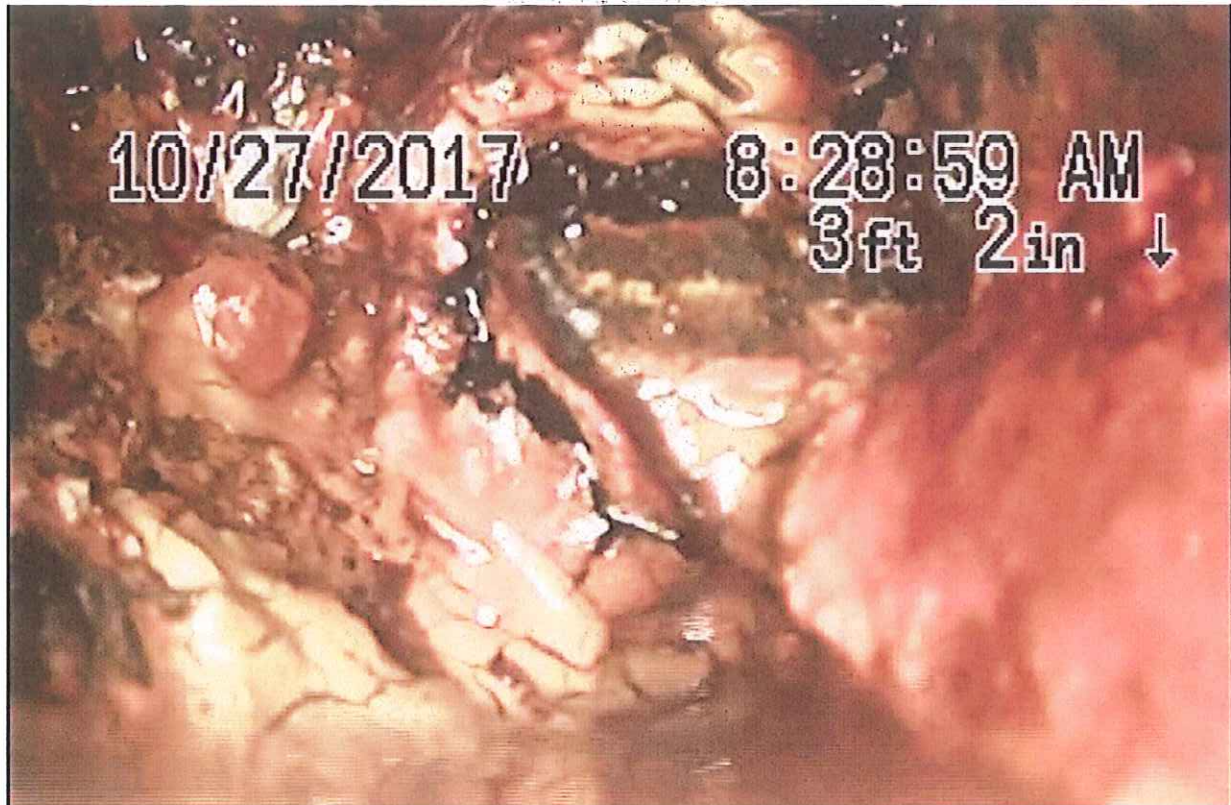


Daniel Clark
KPG Construction Services

Cc: Jerry Wakefield, City of Firecrest, Terry Wright, KPG



The above screen shot from the video is an example of a good section of pipe as a frame of reference for the next two screen shots which show blockages.



The above picture is the blockage at approximately 3 feet into the drain pipe from the bottom of the pool. The camera was able to be pushed up and over this blockage. The amount of debris in the pipe shows this is a significant break in the pipe that needs to be fixed. This area later in the video showed flowing water which leads us to believe the flowing water is actually ground water entering the pool system.



The above picture is a screen shot of the video at approximately 85 feet from the pool. This puts this obstruction at near the 90 degree fitting to the pool equipment room. You can see the rock and debris clogging the pipe. The camera was not able to get past this obstruction to finish the pipe run. This large amount of debris is only possible due to a large break in the pipe.

[illegible]