

Case Study

Underground Leak Detection Survey Using Infrared and
Ultrasound Technologies Saves Time and Repair Costs



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By Drew Walts, SME and Training Manager at IRISS, Inc.

Overview:

The Five Towns Complex in Clearwater Florida was experiencing an observable leak around one of their swimming pools in the complex. The maintenance manager, Chad Moises, hired a pool leak detection company that guaranteed they could find the source of the problem. The inspectors used various test methods such as dye testing, the bucket test method and a specialized leak detector in the 300-5000 Hz range, that is designed to amplify sound waves in this range to try to find the leak. After several days without finding the source of the leak, the company left and stopped responding to the maintenance manager's calls for help. However, they did, before giving up, shut off the pool's auto fill system and, oddly, the pool water level never dropped! This observation clearly highlighted that this was not actually a pool leak, but rather a water or irrigation line leak.



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Figure 1 – Specialized Water Leak Detector 300-5000Hz in Use

Chad then contacted Drew Walts of IRISS Inc. and asked if IRISS had any technology that could look at the area and locate the leak. The best approach was to observe the area in the evening when the solar heating ended so the concrete temperature would be cooler. Upon arrival, Drew saw a noticeable stream of water in the street coming from the base of the pool's patio area. There was a noticeable bubbling from a seam where the pad met the sidewalk. Drew's hypothesis for visiting in the evening was to first use an Infrared Camera to locate the target area and then zoom in on the location using an ultrasound device to locate the leak. .



Figure 2 – Water Seepage Observed at the Site



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Step 1: Using Infrared Technology to Locate the General Area of the Leak

Using the IR Camera, the area around the south east corner was the coolest area and the moisture in the sidewalk was cooling further out than the visible stream of water. Recently, a new section of concrete sidewalk had been poured around this corner. After scanning the entire pool area, the only noticeable area of concern was at the pool entrance area where the stream of water was originating. The area where the first visible signs of a leak were coming from was visually warmer than the surrounding area. This just happened to be in the same area where the newest concrete had been poured. The general location of the leak had been found.

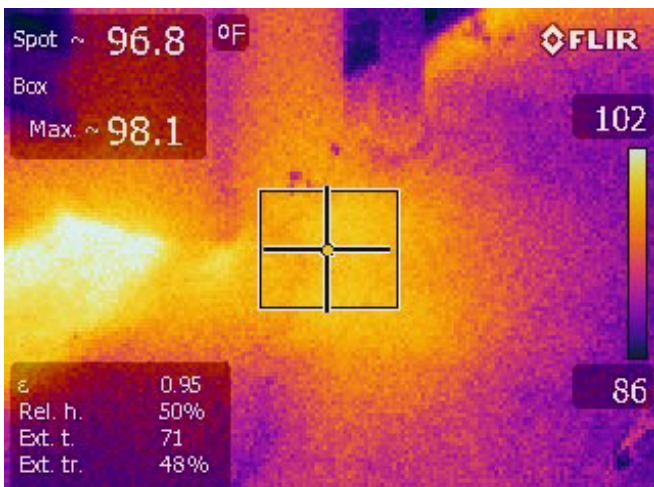
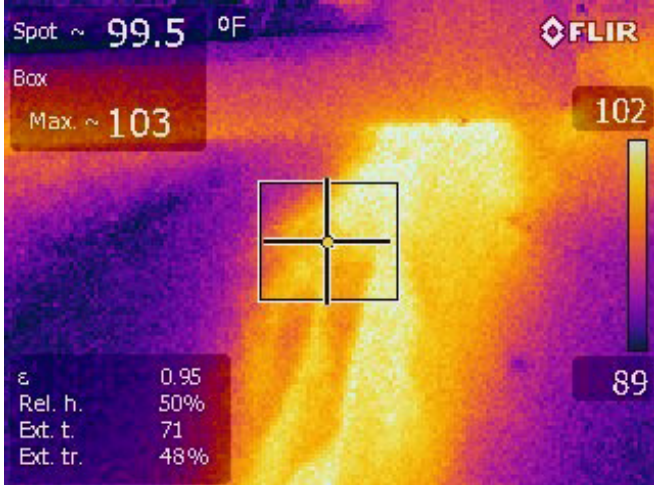
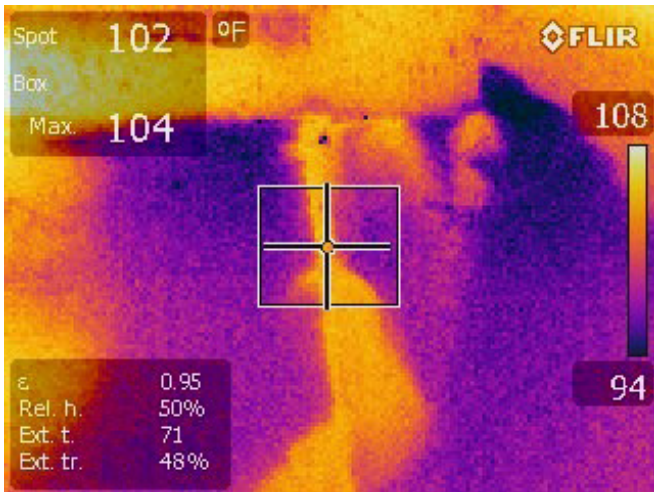


Figure 3 – Infrared Images of the Sidewalk and Pool Deck

Step 2: Using Ultrasound Technology to Locate the Actual Leak

Five test points were drilled into the seams of the pavers and down into the concrete pad. Using the Sonaphone III, the BS20 contact probe and a 15 mm contact rod was inserted into each hole listening for sound. No sounds were heard in these holes thereby eliminating the pool as the source of the leak. Two additional holes were drilled where the water was bubbling out of the ground. Again, no sounds were detected by the Sonaphone III.

Next, two holes were drilled at the base of the pad and the sidewalk. No noticeable sounds were observed; however, the dirt that came up with the drill was moist. Another hole was drilled to the right and the dirt was also moist and, a small amount of water started trickling from this new hole. When the Sonaphone III rod was placed into the hole, a slight decibel indication of 1-3 decibels was present as well as a small noise that sounded like little baby bird tweeting. Another hole was made at the base of the pillar and the new sidewalk where the dirt was moist, and, within a few seconds, a very noticeable flow of water started to appear. The flow of water through this new hole caused the water flowing from the other two locations to slow down. The Sonaphone III rod was inserted into this latest hole and the decibels immediately jumped up to 15-18 decibels and a distinct sound of bubbling was heard. The exact location of the leak had been found.



Figure 4 – Using the Sonaphone Ultrasound Tester to Pinpoint the Leak

The General Manager of the Five Towns Complex, Ken Chancey, came to observe the progress of the testing. Drew informed Ken that the leak was originating from under the new concrete sidewalk based on the results of the ultrasound test. Ken decided to order workers to dig up the new concrete to see what was going on.

Upon removing the new concrete, brown muddy water immediately started flowing. When Chad felt inside the pool of water, he found a split in a PVC irrigation line.

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Figure 5 – Brown Muddy Water Quickly Filled the Concrete Excavation

The photos below were taken during the full excavation and extraction of the water. The leak originated from the bottom of the PVC elbow. This leak could have been a result of over-pressurization, water hammer, defective pipe or human error during installation of the new concrete pad.



Figure 6 – Burst PVC Irrigation Pipe Elbow

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Conclusion

The use of Infrared and Ultrasound technologies goes hand in hand when trying to locate faults and can be used in many applications. The Infrared Camera helped map out the area of concern to a ten-foot space. The Ultrasound device helped zoom in on the exact location of the leak. The source of the leak was within 6 inches of one of the test holes used for the Ultrasound testing. By using the combination of infrared and ultrasound technologies, a minimal amount of time was used to locate the problem and the repair cost was minimized since the entire pool patio area did not have to be excavated.



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