

RAP POND 4 – REPAIR OF OUTLET STRUCTURE LEAK

AUGUST 20-21, 2022

During his monthly inspection on June 8th RAP's pond consultant, Ed Osterhuber of Coon Hollow Lawn & Pond Services, discovered a leak in Pond 4's concrete outlet structure. The extended dry weather had dropped the pond level below the overflow weir but he could still hear water flowing into the structure's interior. Upon further inspection he observed water spraying into the structure from a portion of the seam between the top pre-cast concrete section and the one beneath it. By observing the outfall to the east of earthen dam, the writer estimated the leak at 1 -2 gallons per minute, which increased to about 3 gpm two months later.

Three alternative paths for addressing the problem were considered:

- Attempt to stem the leak with underwater epoxy
- Engage an engineer to assess the condition of the outlet structure and recommend a repair
- Utilize Coon Hollow to lower the pond level and re-grout the entire seam.

Ed had successfully made a similar repair for another pond client so it was decided to use Coon Hollow to seal the leaking structure.

To take advantage of the very dry weather that had contributed to a lower pond level, the work was begun early morning on August 20th by further pumping down the level to below the leaking horizontal seam; the pond's well pump had been set to OFF weeks earlier. Uncapping the pond drain line was considered but the idea was rejected due to concerns of safety and the chance of creating yet another leak if the cap did not reseal properly.

On the morning of the 21st the entire periphery of the seam was prepared with the following steps:

- wire brushed to remove debris and algae
- rinsed with clear water
- cleaned out with an angle grinder to provide a cavity to receive the grout
- acid washed with dilute hydrochloric (muriatic) acid
- rinsed
- neutralized with ammonium hydroxide
- final rinsed

The dry hydraulic cement had been weighed and pre-packaged in small batches to account for its rapid curing time. Each batch was then hand mixed with a measured amount of clear water and quickly applied to the prepped seam. Each handful was rammed into the cavity to pack the seam and minimize voids, then smoothed over to form a lasting, structurally sound seal. While this work was underway the writer examined the endwall outlet in the woods to the east of the pond's earthen dam. The area was (for the first time in months) bone dry, indicating that there was no leak other than the seam that was being repaired.

The work site was then cleared, cleaned and the pond well pump placed back in AUTO mode (4 hours per day) to help restore pond level. The invoiced cost of the repair was \$815 for labor and materials.

It is worth noting that the top pre-cast section of the structure is not perfectly aligned with the section beneath it, creating a slight over-hang on one side and under-hang on the opposite side. The receding water level also revealed that the entire structure is not quite level, possibly from settlement. Neither of these minor conditions should effect structural integrity, but could have contributed to initiating the leak.

The following photographs may better explain the various steps of the repair.



The pond level was lowered using a gasoline-powered, 2" trash pump rated at 130 gallons per minute. It was discharged (blue hose) into the drainage easement north of the pond.



After wire brushing the joint, an angle grinder was used to clean out old grout and provide a cavity for the hydraulic cement.



The ground-out joint was flushed with clear water from a backpack sprayer.



Acid etching the joint with dilute hydrochloric acid dissolved contaminants, creating a better bonding surface.



After rinsing out the acid, neutralizing the surface with ammonia and a final water rinse, all four sides of the joint were ready for grouting. Note the misalignment of the stacked sections evident at the left hand corner of the structure.



The hydraulic cement is a rapid setting, high strength repair material designed to plug leaks in concrete and masonry.



After hand mixing the cement with water Ed worked quickly to stuff the joint before the material set up. The first pre-weighted packet of grout was enough to cover the area shown.



With the repair project complete the pond will gradually refill from precipitation as well as operation of the well pump.

Bruce Sieving
Ponds & Irrigation Committee