Potable Water Rehabilitation with a Pre-Sprayed Composite Panel Lining System: The Manalapan Experience

Over three million gallons per day of water are provided to a small suburban community near the Atlantic Coast of New Jersey. This water sustains the community's needs throughout the year. The historical township is known for its involvement during the Revolutionary War. Although, not a town at the time, Manalapan served as the site for the Battle of Monmouth, which is reenacted annually for the community in June. One of the last battles to take place in the northern theatre, Monmouth served as a transitioning period for General George Washington from Valley Forge to the larger Franco-American assault on British troops in New York State. Although the battle ended in a draw Summer 1778, it serves as a reminder of the influence a small community can have in a much broader scope. It would not be until 1848 when the Manalapan Township was formally established and served as a Civil War training camp for a few years. As time progressed, the town grew slowly, mostly relying on its agricultural base until post-World War II when exponential growth was seen during the transition from a farming community to a suburban one because of area developers purchasing lands.

As growth continued, a more reliable and high-quality water supply was necessary to sustain the newly developed community; therefore, the Suez Matchaponix Water Treatment Facility was built and completed in 1988. Relying on wells and surface water in the town's vicinity, such as the Matchaponix Brook, the facility has a treatment capacity up towards 5.5 million gallons per day for a 30-mile distribution system. Providing high-quality water through settling and filtration processes over its 30-year life thus far, the facility began experiencing challenges with its existing lining system for its water settlement basins. Since 2013, Suez has invested $128 million in water infrastructure maintenance and projects in northern New Jersey. The Manalapan facility is a public-private partnership with the township owning the water system and Suez being responsible for the operation and maintenance of water services in the area. The town sits less than 20 miles from the Jersey Shore and less than 50 miles from New York City, illustrating its transition to a more suburban community.

One of the facility's water treatment settlement basins was experiencing leaking due to failure of the original 30-year-old 100 mil thickness HDPE liner, resulting in seam splits, bulging and tears. Taking place in late Spring 2018, the project required a solution within a limited budget and a quick return to service to limit system disruptions to the facility and customers. This was imperative in the solution design for the liner rehabilitation because water demands increase during the summer months. VersaFlex and their applicator, Island Pavement Cutting Co. from New York, were awarded the project after meeting and discussing options with Suez engineers at a tradeshow. The owners, Suez Energy, required the total installation cost not to exceed their budget, be installed within 30 days, and the liner needed to be a proven NSF certified system with at least a 30-year design life. Based on these requirements, the system all parties agreed upon included a composite panel lining system that offered better toughness, strength & performance in the long-term.

The original proposed solution and budget was based upon removing and replacing the HDPE liner with a newer version. This however was not selected due to the extended service disruption to the facility and a timeframe longer than 30 days. Additionally, this option would have been more expensive and limited in its ability to achieve a monolithic liner across the entire basin. The initial alternative proposed was to install a spray-applied polyurea lining system directly over the existing HDPE liner to create a monolithic containment. This type of rehabilitation system has been successfully used for over 20 years for various containment applications in many different markets.

After on-site inspections and better understanding the project needs, the VersaFlex technical team recommended installing an AquaVers™ 405 NSF ANSI 61 certified FlexTain 80™ composite panel system to ensure the structure's long-term protection and performance. The system is built by laying a pre-sprayed, composite liner on top of the existing HDPE liner. The FlexTain 80™ liner is manufactured by robotically spraying the AquaVers™ 405 over a 10-ounce geotextile fabric. The panels would be bonded together with the AquaVers™ 405 to create a tough and flexible monolithic liner.

The combination of the pre-sprayed panels and spray-applied polyurea incorporates the benefits of having a liner system produced in a controlled environment, in an ISO9001:2008, certified CMS factory, with the versatility and proven performance over a wide variety of substrates and environments of a spray-applied polyurea membrane. The FlexTain 80™ is robotically spray-applied onto the panels in a controlled environment. This provides an added benefit of consistent film thickness and quality throughout the system in order to help achieve the longest design life possible.

The FlexTain 80™ panels were first positioned into place. Due to limited access, and difficult terrain, many of the panels were handled manually. The 15' x 40' panels were the ideal size for the project since larger panels would have been too heavy and cumbersome for a small team to maneuver. As one team positioned and aligned the panels, a second began adhering the panels together. The two panels are fused together over a 6" lap using a two-step process that ensures added strength and a monolithic finished product. The proprietary formulations of the FlexTain 80™ panels and AquaVers™ 405 allow for a fully chemically bonded finished liner system, with no distinguishable difference in performance between the manufactured FlexTain 80™ panels and the seams. This eliminates the need for pressure testing of the welds, as is required for thermoplastic liners such as

From the Client

"This project was my first experience with a polyurea liner system. It was also the first Pre-Sprayed Geotextile Panels application that the contractor installed. The contractor and manufacturer were very diligent in working out the specific details of installation to our stringent requirements.

The installation had many obstacles that were overcome collectively. We ultimately had the panels installed along with direct spray application to concrete and metal. The final product met our criteria and appears that it will endure a lifetime of use.

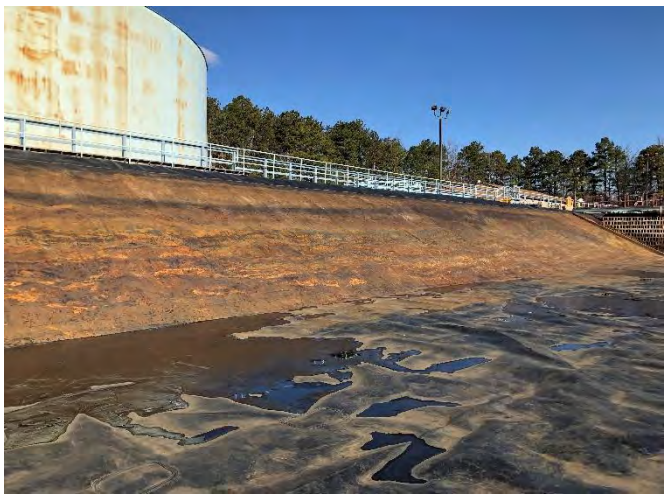
The vendor and contractor were excellent advocates of the product used and work performed, I would recommend both for similar applications."

- **Fred Austin**
Suez Construction Project Manager
Toms River Engineering

HDPE. Along the perimeter berm, the panels were mechanically fastened to the existing HDPE liner and the earthen berm and then backfilled.

Because of the proven versatility and performance of the spray-applied AquaVers™ 405 polyurea system, existing structures such as pipes, plinths, baffle walls, piers, and other protrusions that would be a challenge for other manufactured liner systems, were a simple fix. The transition from manufactured FlexTain 80™ panels to a fully adhered AquaVers™ 405 membrane was seamless and provides monolithic protection of the existing steel and concrete structures.

The Manalapan project experience highlights the adaptability and serviceability of VersaFlex, Inc. lining systems solutions, providing customized solutions to specific and individual challenges. Although it can appear that facility owners and operators are limited to costly and time-consuming removal and replacement of existing lining systems, the pre-sprayed composite panel lining system by VersaFlex and their applicator, Island Pavement Cutting Co offers a better solution at a competitive price. The high-quality solution installed at Manalapan focused on providing the most beneficial results that met project requirements in the short and long-term. Contributing to the facility's longevity, the rehabilitation of the basin with this system enhances its structural integrity at a rapid return to service.



Before

After

Before Condition

Panel Positioning

Panel Anchoring

Adhering the Panel Overlaps/Seams

Completed Application