West Park Wet-Weather Storage Facility

The West Park Wet-Weather Storage Facility is a 5.5 million gallon, concrete, underground storage tank located below a multi-use public recreation facility on the west side of the Village of Wilmette, Illinois. The tank, which provides needed collection system capacity during wet-weather events, was designed and constructed under a joint-venture design-build partnership between RJN Group, Inc. (RJN) and Boller Construction Company (Boller) in just over a year. The project was funded and led by the Village of Wilmette in partnership with the Wilmette Park District and Metropolitan Water Reclamation District (MWRD).

Problem ASSESSMENT

The Village of Wilmette is a Chicago suburb located on Lake Michigan’s western shore home to approximately 27,000 residents. It is defined by its beautiful homes, dense urban forest, top notch schools, plentiful parks and community diversity. Underneath the surface, however, Wilmette’s aging separate sanitary sewer system presented a different story. The western third of the Village was prone to sewer surcharging and frequent basement sanitary backups, during even moderate rain evens. The residents in this drainage basin were rightfully frustrated and eager for the Village to provide some relief.

The Village of Wilmette had experienced a significant number of basement backups during major rain events in 2008, 2011, and 2013, and was looking for a solution to prevent these recurring issues. The Village contracted with RJN to develop a hydraulic model of their separate sewer system, and later on, flow monitoring to collect better data to study the potential downstream control issues. Flow monitoring was completed in 2013 and did identify extended (17 hours at one point) reverse flow conditions—flow backing up into the Wilmette system from the Metropolitan MWRD interceptor connections—during several large storms. The Village needed to find a solution to prevent flows traveling in the MWRD interceptor from entering its system and also handle its flows when they could not track normally into the MWRD system.

After review of various alternatives including localized storage and inflow/infiltration (I/I) reduction measures, it was determined that backflow prevention measures at the two MWRD connections and a detention storage basin for the Harms Road tributary area would provide the most economical long-term solution, and provide the highest level of protection for homeowners in the area.

This solution was presented to the Wilmette Village Board in July of 2013 marking the beginning of a complex project that was completed using an alternate design-build delivery method. It required extensive communication, public outreach, and coordination with multiple stakeholders as well as regulators.

Implementation and costs

When the idea of building a detention basin was presented, there was no Village property that provided a viable location for the facility. It was critical to find a site that was located in close proximity to the MWRD interceptor and was large enough to facilitate an underground storage tank. Four sites showed potential — park, golf course, a private school athletic field, and an entrance/exit ramp areas for the Edens Expressway.

Due to elevations, access constraints during construction, and ongoing maintenance and operations (O&M), West Park, an existing grass baseball field and playground owned by the Wilmette Park District, provided the best option for construction of the tank. A presentation was made to the Park District outlining the goals of the project and the benefits that the storage facility would provide for the community. The Park District Board was aware of the ongoing backup issues and since the Village and the Park District share the same constituents, they quickly agreed to work toward a mutually beneficial solution. A key point in gaining the Park District “buy in” was also that the tank facility would be constructed to coexist with the park facilities; once the tank was constructed, it would be invisible to park users. After the initial presentation, the Park District and the Village Board members negotiated an agreement to move forward with a detailed plan for construction of the tank, and established an formal Intergovernmental Agreement to facilitate the management of the project.

Construction Summary

The constructed West Park Wet-Weather Storage Facility consists of a 5.5 MG underground concrete storage tank; a three-pump lift station that pumps flow back into the system, recirculates flow in the tank, and flushes and cleans the tank; and an odor control system. This unique system uses a single set of pumps to complete all three O&M processes providing savings during construction as well as ease and efficiencies for ongoing maintenance. The environmentally-friendly solution also uses system water for mixing and the initial cleaning steps minimizing potable water usage. Potable water connections were provided to facilitate adding clean water to complete the flushing cycle.

The tank fills by gravity flow and does not require mechanical or electrical services. All system controls are automated and include a backup generator and a carbon scrubber for odor control. System controls are housed in a control building at the West Park site that was designed to match the neighboring Park District building. All facilities are underground or located on the periphery of the park and do not impact usable Park District field space.

The project was completed on time (November 20, 2015) and within budget (original estimate $15 million; actual cost: $14.5 million). The project was made possible through a partnership with between the Village and the Wilmette Park District, which worked with the Village to develop an intergovernmental agreement by which, in addition to an important flood control project, residents would also benefit from a greatly enhanced West Park. The Village provided funding that permitted the Park District to proceed with its construction of major improvements to West Park, including the addition of a new engineered synthetic surface field that greatly enhances the Park’s usability for multiple sports and improve its playability year-round.

RESULTS

On July 23, 2016, the project received its first major test. The west side of Wilmette received 6.05 inches of rainfall in approximately 8 hours, which is categorized as a 100-year event. During the storm, the West Park reservoir filled to 13 feet and held approximately 5 million gallons. Even more importantly, the backflow valve closed preventing MWRD’s water from backing up into Wilmette’s system. The pump-over lift station that pushes water “over” the valve was in operation for 18 hours.

The benefits of this watershed project cannot be overstated. The nearly 5 million gallons of captured sanitary water is certainly quantifiable. This volume does not, however, account for the hundreds of thousands of gallons of water that was prevented from back-flowing into Wilmette’s system. Prior to the installation of the backflow valve, Wilmette sewer and resident’s basements, were not only storing excess flow from Wilmette, they were serving as detention basins for MWRD, which serves our neighbors to the north and south.

The West Park Project worked as advertised. The resident surveys collected after the July storm showed an over 70% reduction in basement sewer backups compared to lesser storms in 2013. Every drop of the 5 million gallons that was held under West Park is a drop of water that did not end up in someone’s basement.

Lessons Learned

While the design-build project delivery required significant planning to develop partnerships early in the project, it proved to be very effective in meeting the project requirements. The tight time frames were met, and the project was delivered early and under budget. Design-build benefited the Village and the IGA through cost certainty, lower risk, and selection of sub-contractors to maintain a level of competition and keep costs under control.

Promoting a strong working relationship among government agencies early in the project was critical. Close coordination and a cooperative working relationship between the Village, the Park District, and MWRD was key to the success of the project.

AWARENESS OF CONTRIBUTIONS OF LOCAL GOVERNMENT MANAGERS

The success of the program can be directly linked to the professionalism and experience of the Village staff, led by Village Manager Timothy J. Frenzer. Mr. Frenzer was an advocate and leader for the project in public meetings, including Capital Improvement Planning, Budget Planning, Village Board meetings, and public information meetings. Furthermore, Mr. Frenzer led negotiations on intergovernmental agreements and partnerships between the Village of Wilmette, the Wilmette Park District, and the Metropolitan Water Reclamation District. Such partnerships are greatly benefited by having a professional local government manager play a key role.