

rainwater harvesting

The two-year effort to bring rainwater harvesting to CHS Field

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Rainwater harvesting has a long history, dating back to 1002 AD, when the foundation was laid at the Brihadeeswara Temple in ancient Tamil Nadu (India) for what would become an impressive water storage structure. An ancient emperor led his village to build the Viranam tank at the temple to store water for drinking and irrigation. The Viranam tank, which took 25 years to complete, is 16 kilometers (9.9 miles) long and has an enormous storage capacity of 1.465 billion cubic feet (more than 10 billion gallons).

While it did not take a quarter century, it did take the same kind of combined “village effort” to include a rainwater harvesting system in the creation of CHS Field. Owned by the City of Saint Paul and operated by the Saint Paul Saints, the 7,200-seat ballpark in the Lowertown neighborhood is situated on a 13-acre site, which was a brownfield (now a greenfield). Since the beginning of the project, the City of Saint Paul, the Saint Paul Saints and the entire project team shared a vision: make CHS Field the “Greenest Ballpark in America” by incorporating various innovative and sustainable features. The ballpark was projected to host more than 500,000 visitors annually, so the facility had the potential to provide an exceptional opportunity to showcase sustainable development on a regular basis.

Solution Blue was the engineering firm responsible for the design of the stormwater management systems at the ballpark. The stormwater management practices that include tree trenches, rain gardens, bio-swales and underground filtration basins.



Saints baseball players practice on the first day at CHS Field, 2015.

Photo credit: www.thinglink.com

As Tom Whaley, co-owner of the Saint Paul Saints, once observed, “Ballparks are notorious water hogs, and our project team’s consensus was that water waste was a prime target for attack.” Indeed, the typical professional baseball field uses 2 million gallons annually, and reducing potable water use was one of the requirements of state funding for CHS Field.

Given the commitment to green building, the acknowledgement of water use as a problem for ballparks, and the state mandate to decrease water use, it may come as a surprise that rainwater harvesting was not featured early in the design process. That is why “it took a village.”

Promoting Rainwater Harvesting

In 2013, the Minnesota Plumbing Code did not address rainwater harvesting for indoor use. The lack of relevant codes was the stumbling block. Without regulatory guidance, there was too much uncertainty. Nonetheless, a small group of project team members chose to pursue a rainwater harvesting system because it would help to achieve the project’s sustainability goals, make an educational impact, and help conserve water into the future. This rainwater harvesting team was led by John Hink, president of Solution Blue and Wes Saunders-Pearce, water resources coordinator for the City of Saint Paul. Saunders-Pearce began by speaking with all potential regulators that could become involved with such a system. They included the City of Saint Paul, the Minnesota Department of Health, the Capitol Region Watershed District, and the Metropolitan Council. Saunders-Pearce noted, “As a capital city, we hoped to increase awareness about water reuse, remove barriers to sustainability - real or perceived - and inspire other communities.”

In addition, Solution Blue searched for precedent projects in Minnesota to learn what others have done to implement rainwater harvesting for indoor uses. The only sample project the team discovered is at the 17th Avenue Residence Hall at the University of Minnesota. The university gave the design team a tour of the residence hall and shared insights and lessons learned from their design process, internal approvals, and system implementation. Since the university operates independently, their project did not involve all the various governmental approvals that CHS Field was to likely require. However, the tour did help the

team gain confidence that creating a rainwater harvesting system for indoor use was possible.

Time and Money

Despite confidence that rainwater harvesting would be feasible as well as beneficial, it would take more time and more money than were available given the project schedule and budget. Solution Blue volunteered to provide a series of concept designs and cost estimates at no added cost to the project. The team also engaged Stark Rainwater Harvesting to provide support with schematic plans and cost estimating. Together, they created three preferred alternatives that included rainwater harvesting for both indoor and outdoor uses with a range of water capacities.

Saunders-Pearce continued discussions with the Metropolitan Council and the Capitol Region Watershed District about possible grant funding. The Metropolitan Council was interested because their light rail Operations and Maintenance Facility (OMF) shares a wall with CHS Field, which provided a great opportunity for partnership on the project. Saunders-Pearce and John Hink also had several meetings and extensive conversations with the Minnesota Department of Labor and Industry and City of Saint Paul about the technical details, public health concerns, construction estimates and design coordination – all part of the “village effort” to move the project forward.

After months of design, meetings and technical correspondence, the Metropolitan Council and the Capitol Region Watershed District offered to provide \$425,000 of grant funding to support the rainwater harvesting system because of their commitment to sustainable water management practices and the innovative nature of the project. As Mark Doneux, administrator of the Capitol Region Watershed District, explained: “Capitol Region Watershed District provided funding for the water re-use system at CHS Field because it was another great partnership with the City of Saint Paul with very high visibility. We especially like supporting projects that include innovative practices that can provide public education and outreach.”

The support and added funding allowed the City of Saint Paul, Solution Blue and other team members to proceed with more detailed design plans and regulatory review to move the system closer to construction. Critically, given the absence of standards in the state Plumbing Code, the design team also continued working with the plumbing regulators to create acceptable engineering and public health rules that were eventually agreed upon by the city and state regulators.

Good Results

Based on the location of the OMF’s roof, the available funding and the water demands for irrigating the field and flushing toilets/urinals, the team designed a system that includes a 27,000-gallon storage tank, which captures rainwater from a 33,000 square foot portion of the adjacent OMF roof. The system also includes filters for cleaning

the water to potable standards before being used for irrigating the field and flushing toilets/urinals in the public outfield restrooms.

The rainwater harvesting system includes a combination of vortex filters, bag filters and UV light for effective treatment and disinfection. It also includes a “smart” controller for monitoring the ongoing water levels and water usage, which also has the capacity to display the current conditions on the interactive kiosks. The total cost of the rainwater harvesting system was covered by the grant funds of \$425,000. The system is estimated to save more than 450,000 gallons of potable water each year, which represents a 16 percent reduction in total potable water use at the ballpark. Harvested rainwater provides over 10 percent of the water needed for the toilets/urinals and over 20 percent of that needed for turf irrigation.

In the end, creating the rainwater harvesting system at CHS Field took more than two years and involved 24 companies and agencies across the fields of civil engineering, water resources, mechanical engineering, architecture, electrical engineering, public finance, public health, plumbing, landscape architecture, public art and public policy. The team learned valuable lessons, including how challenging it is to influence changes to state codes and how to optimize the tank size

based on water demands and rainfall patterns. On behalf of the City of Saint Paul, Saunders-Pearce stated, “A key lesson learned was that a high level of treatment for reusing water was not unreasonably expensive, both in terms of upfront cost and after one year of operation.”

The CHS Field Rainwater Re-use Team won the “Water Conservation Award” in the 2016 Sustainable Saint Paul Awards and CHS Field won the “Clean Water Champion” Award from the Freshwater Society in 2015. Significantly, the project accelerated the refinement of state and local codes for rainwater harvesting. Minnesota

adopted amendments to its Plumbing Code to include rainwater harvesting for non-potable indoor uses in 2016.

In Minnesota, potable water is undervalued as a resource. The successful incorporation of rainwater harvesting in the construction of CHS Field demonstrates that it is feasible, beneficial and cost-effective.



Group tour of rainwater harvesting system. Photo credit: Mitchell Cookas



Mitchell Cookas, Co-founder and Vice President of Solution Blue, is a landscape designer and project manager with over 12 years of experience in sustainable site design, water resources, landscape design and the creation of multi-functional green spaces.

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