

Weholite Rainwater Harvest System

Los Angeles Federal Courthouse, United States



Project:

Los Angeles (LA) has experienced four years of statewide drought following which large scale rainwater harvest systems are being utilized to address growing water scarcity and to meet the LA Department of Water and Power's "Stormwater Capture Master Plan."

Challenge:

As a General Services Administration (GSA)

Design Excellence Project, sustainability was a key element of the project's design. The LA Federal Court House project sought to achieve Leadership in Energy and Environmental Design (LEED) platinum certification and lead the industry by providing an environmentally friendly project to address potentially severe water scarcity challenges.

Project Details

Location: Los Angeles, California

Owner: US Federal Government, GSA

Engineer: Jacobs Engineering

Contractor: Clark Construction

Specialty Sub-Contractor:

G.B.Cooke, Inc.

System Details:

106,000 Gallons of Rainwater Storage Cistern

150 LF of 11-foot Diameter Weholite

19-foot Deep Vertical Pump Station

Hydrodynamic Primary Pre-filtration

Integral Filtration Riser

100 Micron Post Filtration

Variable Frequency Drive Pump

Human Machine Interface Control Panel

The New Los Angeles Federal Courthouse is located at 107 South Broadway in the center of downtown Los Angeles. The new building occupies the majority of the available site and space for an underground rainwater storage system was limited to a 170-foot long by 60-foot wide area at the corner of Broadway and West First Street. Underground storage vessels are soil-structure interaction systems that rely upon uniform soil loading. Because the rainwater system was planned to be situated snugly between the building and the existing road, the system's layout needed to account for both the horizontal site constraints and the vertical zone of influence associated with the building's foundation loads.

Site logistics, staging, excavation and backfill considerations were also factored into the system's design. With the new building expected to be in place at time of delivery, there was extremely limited room to store excavated soil, select backfill, or the system itself.

Solution:

To solve these challenges, Infra Pipe developed a single barrel 11-foot diameter rainwater system that would fit within the horizontal limits of the site and outside of the building foundation's zone of influence. Infra Pipe also coordinated with the site sub-contractor responsible for the rainwater system, G.B. Cooke, to develop a phased installation sequence. The phased installation employed the use of bulkheads to limit excavation and installation to individual 50-foot sections of the 150-foot system. Infra Pipe further supported the project by providing preconstruction services and on-site support during each phase of installation.

Optimal Product Offering: Value engineered solution with 100-Year design life and lower installation time



In order to maximize the effective storage in the 11-foot horizontal storage vessel, Infra Pipe provided an independent 19-foot deep vertical pump station. Isolation of the pump within a standalone pump station removed the minimum pump submergence depth requirement from the vessel and reduced the overall footprint of the horizontal storage system. The pump station was hydraulically connected to the larger horizontal vessel through a 12-inch pipe at vessel invert. The combined system was designed such that the water surface elevation in the pump station and vessel

increase uniformly as the system fills. The vertical pump station wet well was fabricated from Weholite RSC250 profile wall polyethylene pipe and delivered to the project turn-key. Speed of installation was a critical element of this project and the pump station was set and backfilled in just one day.

Infra Pipe further supported the project by leveraging its successful history of polyethylene fabrication, welding and design experience. Combined with the versatility and strength of the Weholite system, Infra Pipe designed and fabricated a number of custom elements to improve the system's functionality.

Large scale Wehopanel polyethylene bulkheads were fabricated to support the structure's hydrostatic and soil loads without concrete or soil reinforcement. To ensure that the system's 100-year design life was maintained, the bulkheads were reinforced with structural steel fully encapsulated within the Wehopanel polyethylene profile. The inlet bay included an inflow energy dissipator to minimize the potential for re-suspension of settleable solids. As a secondary water quality measure, discharge from the inlet bay was improved by incorporating an 18-inch perforated High Density Polyethylene riser wrapped in geotextile filter fabric. Access was provided by 30-inch Weholite risers with 16-foot Fibre Reinforced Plastic ladders mounted to the riser and the vessel interior.

In addition to the Weholite polyethylene pump station and vessel, Infra Pipe provided a Control and Filtration Skid system designed to provide constant pressure and flow of recycled water to the project's irrigation system. The Weholite prefabricated pump station utilizes a submersible level transmitter to monitor the water surface elevation and storage within the vessel. Two mercury float switches provide redundant back up of the level transmitter. Pumping is accomplished through a variable frequency drive submersible pump and pressure tank designed to achieve constant pressure and flow. An actuated ball valve provides electronic flow control. System controls and operations are accomplished through an automated Human Machine Interface (HMI) control panel system with Programmable Logic Control (PLC). Recycled water is passed through a 100-micron filter prior to discharge to the irrigation system. When rainwater levels are low, a backflow preventer ensures that city make up water can be utilized.

In summary, Infra Pipe supported the New Los Angeles Federal Courthouse design LEED project by providing a comprehensive value engineered solution to meet the project's rainwater harvest needs within the available time frame. Infra Pipe worked with G.B. Cooke, Inc. to develop a value engineering alternative to the 106,000 gallon multi-barrel tank system originally specified. Infra Pipe's Weholite 11-foot diameter structural wall polyethylene vessel was chosen for its ability to minimize the system's footprint to a single barrel vessel while providing a water tight system with 100-Year design life.

Straight from the Project Partner:

"Infra Pipe provided tremendous value to this project by developing the right solution and delivering a superior quality system. Their support and service of our project has been exceptional." Brad Cooke - Project Manager/Owner, G.B. Cooke, Inc.