Two Tanks in One
San Diego, California

Although initially considering other material types for their tank project, including bolted steel and welded steel, the Naval Facilities Engineering Command (NAVFAC) elected to build a 1.0 MG prestressed concrete water storage tank for their fire protection tank project at the Marine Corps Air Station (MCAS) Miramar in San Diego, California. The tank was designed to not only meet but exceed current construction codes and standards, including ACI 350, ACI 372R and AWWA D110 Type I with a cast-in-place corewall. The tank was designed and constructed as a “tank-within-a-tank,” a unique feature, consisting of two operationally independent cells; one interior circular chamber with conventionally reinforced concrete walls and one exterior circular cell with cast-in-place prestressed concrete walls. Each cell has its own hatch, vent, inlet and outlet allowing the two to operate independently based on the needs of the water network. NAVFAC elected to use the tank-within-a-tank design to allow for potable water storage as well as a reliable fire suppression supply at all times.

It was paramount that tank construction did not interrupt the Navy’s operations since the tank site was located adjacent to the airport runway at MCAS Miramar. Construction activities were closely coordinated with the military to ensure there were no impacts on the Navy’s activities and construction of the reservoir remained on schedule. Both operations were able to coincide simultaneously without any issues.

The prestressed concrete tank was constructed with an economical 6” thick monolithic membrane floor slab, utilizing special shrinkage reducing admixtures and a unique concrete specification to eliminate microcracking. The design strength of the floor concrete was 4000 psi and 205 cubic yards were required for the floor and wall footing pour. A total of 525 cubic yards of concrete were placed in constructing the interior and exterior walls of the tank-within-a-tank. The cast-in-place exterior cell wall incorporated circumferential and vertical prestressing to provide bi-axial compression.

A prestressed concrete tank eliminates the need for protective coatings or linings, reduces future maintenance expenses and provides the highest value tank over the 100+ year design life. Concrete acts as an insulator, ultimately reducing the amount of disinfectant required in the distribution network. The dual basin reservoir was an innovative way to reduce site footprint and incorporate two separate storage structures into one total tank. MCAS Miramar will have a dependable water and fire suppression source for years to come.