

PEIRCE ISLAND WASTEWATER TREATMENT PLANT



PROJECT
INDUSTRY
LOCATION
PRODUCTS

Peirce Island Wastewater Treatment Plant
Water Treatment & Storage
Portsmouth, New Hampshire, USA
PENETRON ADMIX SB

PEIRCE ISLAND WASTEWATER TREATMENT PLANT

CASE SUMMARY

The expansion and upgrade of the Peirce Island wastewater treatment plant was the largest single construction project ever undertaken by the City of Portsmouth. Penetron crystalline products were specified as a concrete waterproofing and protection solution for the massive concrete structures.

The \$92-million upgrade project was designed by AECOM, an engineering consultancy. The upgraded Peirce Island facility now provides an advanced secondary treatment process that removes organics and nitrogen from wastewater to meet stricter federal environmental standards. The upgrades, added to the 50-year-old plant by Methuen Construction, the general contractor, include a new filter building with a biologically aerated/anoxic (BAF) filter, a new headworks building with a garage, electrical room, IT room and control room, and a new solids building with the existing solids building repurposed as an operations/lab building.

Originally constructed in 1965 to treat an average daily flow of 1.5 million gallons of wastewater per day (later expanded to 4.8 million gallons of wastewater), the upgraded Peirce Island WWTP can now handle an average daily flow of 6.1 million gallons of wastewater. The treated effluent is discharged to the Piscataqua River through a 24-inch-diameter single port outfall.

Better Protection for Local Water Quality

While some structural components from the original plant layout were retained, the scope of the completed upgrade work was significant. The new plant's expanded capacity to remove organics and nitrogen from wastewater (with the new BAF filter system) and treat previously untreated stormwater run-off was essential in order to avoid discharging wastewater with E. coli and coliform bacteria into the Piscataqua River and South Mill Pond. The new wastewater treatment plant now releases only treated effluent into the Piscataqua River, resulting in a more environmentally friendly operation.

AECOM specified PENETRON ADMIX for the new concrete structures, primarily the new BAF building, which is approximately 25 feet above the existing grade with another 15 feet of the structure below grade. The walls of the building are massive 2-foot-thick concrete structures measuring about 40 feet tall, with the longest wall over 200 feet in length. J.G. MacLellan Concrete Co., the ready-mix supplier, added PENETRON ADMIX SB to about 17,000 yds³ of concrete mix, which was mostly used for the BAF building's key structural elements.

Keeping Water and Chemicals Out of Concrete

When added to the concrete mix during batching, the active ingredients in PENETRON ADMIX SB react in a catalytic reaction with moisture in fresh concrete and by-products of cement hydration. This chemical reaction

generates a non-soluble crystalline formation throughout the pores and capillary tracts of the concrete. This prevents water and water-borne chemicals from entering the concrete structures, even under high hydrostatic pressure. In addition, any cracks that may develop during the lifetime of the concrete automatically self-heal, resulting in waterproof and durable concrete for the lifespan of the structure.

The \$92-million Peirce Island wastewater treatment plant upgrade was the largest single construction project ever completed by the City of Portsmouth, NH.

With increased treatment capacity that delivers a cleaner effluent, construction of the new Peirce Island facility is now completed. Looking to the future, the Penetron-treated concrete will substantially reduce the concrete related maintenance requirements – saving the City of Portsmouth money and preventing potential downtime.



Meets strict EPA standards: This perspective gives an idea of the massive dimensions of one of the Peirce Island treatment tanks that now help treat an average of 6.1 million gallons of wastewater daily.