

Back River Wastewater Treatment Plant

- Facility opened in 1911
- Serves 1.3 million residents in 140 mi² area of Baltimore City and County
- Entire site is 466 acres with a 35 foot elevation change from influent to outfall
- Average Daily Flow is 180 MGD
- Peak Hourly Flow is 450 MGD
- Current projects being built simultaneously at Back River totaling nearly \$1 billion of improvements:
 - Contract 877- Enhanced Nutrient Removal Process Project 1 – Denitrification Facility
 - \$263M
 - Engineer-Whitman, Requardt & Associates
 - Contractor- Archer Western Contractors
 - Contract 882- Enhanced Nutrient Removal Process, Project 2- Activated Sludge Plant No. 4
 - \$285M
 - Engineer- KCI Technologies, Inc.
 - Contractor- Archer Western Contractors
 - Contract 918- Improvements to Headworks and Wet Weather Flow Equalization
 - \$429M
 - Engineer- Johnson, Mirmiran & Thompson, Inc.
 - Contractor- Joint Venture: Clark Construction & Ulliman Schutte Construction

Enhanced Nutrient Removal, Project 2 - Activated Sludge Plant No. 4

- Project Start Date: October 27, 2014 Project Completion Date: May 23, 2017
- Contractor's Current Projected Completion Date: March 19, 2019 (662 days late)

Purpose of Project

- MDE Chesapeake Bay Restoration Program
- Add 86 MGD treatment capacity
- Reduce nitrogen concentration from 7-8 mg/L to 3-4 mg/L
- Maintain current phosphorus concentration at 0.2 mg/L

About the SC882 Project

- Disturbed area = 1,588,286 SF / 35.77 acres
 - Cut= 491, 696 CY

- Fill= 205, 988 CY
- Cut/Fill Ratio= 1.96:1
- 7,500 auger-cast concrete piles (depths ranging from 60 to 85 FT)
- 107,000 CY of concrete
- The design Won “Top Project” Award at the Water Environment Federation’s Annual Technical Exhibition and Conference (WEFTEC)

Scope of Work

- 6 Reactors / 1 contiguous structure
 - Total Area = 475 FT x 740 FT
 - Total Volume = 40 MG
 - 12 treatment zones per reactor (multiple anoxic, swing and oxic zones)
 - Reactor structure includes an integral Reactor Gallery and 3 Stair Houses
 - Approx. 3000 piles in main structure 75’ long and 430 piles 85’ long in the Pipe Gallery
 - Elevations: Walkways el. 42.0; Slabs el. 19.0; Gallery slab el. 4.0
 - Reactor slabs vary from min. 2’ thick to 6’ thick at walls with drain piping, most walls are 2’ thick
 - Reactor reinforcing consists of mostly double mats of #9 bars in all slabs and walls
 - Some wall dowels are #11 bars
- Air Supply System (Blower Building)
 - 14 Blowers each with air supply capacity of 5,700 SCFM
 - Approx. 200 piles 45’ long
 - Slab is 2’ thick with a 4’ thick perimeter grade beam
- 6 Flow Distribution Boxes
 - Total area = 9,088 SF
- 12 Final Clarifiers
 - Diameter = 120 FT
 - Volume = 1.5 MG each
 - Approx. 235 piles 60’ long per clarifier
 - Slabs vary from 3’ thick at the center to 2’ thick at the perimeter (floor slopes from center to walls)
 - Slabs were poured in one continuous operation by starting at a bulkhead with a waterstop and removing the bulkhead when the pour was halfway completed to . First pour took 14 hours, last pour only took 10 hours.

- Walls are “only” 1’-4” thick
- Elevations: Slab el. 15.0; TOC el. 40.5; Bridge Walkway el. 37.0
- 3 Sludge Pumping Stations (SPS)
 - Total Area = 31, 268 SF
 - SPS #6 includes centralized Seal Water distribution system and Polymer Feed & Sodium Hypochlorite Systems for all ASP-4 injection points
 - Approx. 200 piles 70’ long per pump station
 - Elevations: Upper level slab el. 37.0; Lower level slab el. 7.0
 - Lower level slabs vary from 4’-9” in the center to 4’ at the outside walls
 - Below-grade walls are 3’ thick
 - Cast-in-place elevated slab is only 8” thick but has integral concrete beams up to 7’ deep
- 2 New Junction Chambers (JC-10 & JC-11)
- Rehabilitation of Existing 78” Conduit – over ¼ mile long
- Re-construction of Junction Box 4 (JB-4) to receive combined effluent from all ASP-4 Clarifiers
- Flushing Water Pump Station (FWPS)
 - Elevated slab located across top of existing Chlorine Contact Tanks Walls
 - 2 Vertical turbine pumps each with capacity of 5,250 GPM
- Transfer Pad
 - Total Area = 1,230 SF
 - Includes drain pump station
 - Used to drain liquids from grit
- Structural Rehabilitation of Existing Chlorine Contact Tanks (crack injection, spall repair, bearing pad replacement, epoxy coatings and joint sealant)
- Process Control and Instrumentation to enable full automation of entire process