



DC Clean Rivers Project Blue Plains Tunnel

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Stakeholders List

Owner	District of Columbia Water and Sewer Authority (DC Water)
Contractor	Traylor, Skanska, Jay Dee Joint Venture
Engineer of Record	CH2M
Hydraulics and Program Management	Greeley and Hansen
Geotechnical Engineer	McMillen Jacobs Associates
Construction Manager	EPC Consultants
TBM Fabricator	Herrenknecht Tunneling Systems
Electrical	Leyden Electric
Slurry Wall	Bencor Corporation of America
Rebar	Bulldog Construction
Precast Tunnel Segments	ConSeg JV/Bay State Precast
Instrumentation	EMC ² Engineers
Waterproofing	WISKO America Incorporated
Environmental Controls	Kroner Environmental Services Incorporated





DC Water

- Provides
 - Drinking water
 - Wastewater collection and treatment for a population of 2.1 million
 - Stormwater collection and conveyance
- World's largest advanced wastewater treatment plant
 - 1.4 million m³/day
 - Peak of 3.8 million m³/day
- Area served = 1878 square kilometers





DC Clean Rivers Project

- \$2.7 billion
- 2005 to 2030
- Tunnels:
 - 29 kilometers
 - Primarily soft-ground
 - 5.5 to 7 meters in diameter
 - 30 meters deep
- 96% reduction in combined sewer overflows to Anacostia River, Potomac River and Rock Creek





Overview of Blue Plains Tunnel



- Highlights
 - Key component of Clean Rivers Project
 - First major tunnel in program
 - First design-build project for DC Water
- Capacities
 - 7 meter inside diameter
 - 7.4 kilometers long
 - 5 shafts: 15 40 meter diameter
 - 284,000 cubic meter storage
- Contract
 - \$330 M, \$319 M final
 - Award: May 2011
 - Substantial Completion: December 2015



"Lady Bird" Performance

- Earth Pressure Balance Machine
- Potomac Clay stiff and sticky
- Peak earth pressure = 3.6 bar
- Best day = 45.72 meters
- Average advancement = 17 m/day
- Mining completed in 726 days
- Bolted and gasketed precast concrete, steel-fiber reinforced segments
- Ground loss at shafts prevented by flooding to equalize pressure
- 0.25% ground loss was minimal
- No adverse impacts to adjacent structures (sensitive utilities and military installations)





Mucking System

 State-of-the-art mucking system with 100 tonne gantry crane and muck box carousel to meet the aggressive advance rate



Carousel bin hoisted with gantry crane to surface.



Gantry crane used for lifting muck bins from shaft carousel and lowering segments into the tunnel.



Dual Cell Diaphragm Wall Shaft

- Conceptual design based on interconnecting tunnel between screening and dewatering shafts
- Innovative figure-eight design of two shafts was constructed
 - Eliminated need for interconnector tunnel
 - Allowed the TBM to be assembled and launched within the one large space
 - Significant time savings





Dual Cell Shaft Pictures





Circular Deaeration at Shafts



- Eliminated separate drop shafts and deaeration tunnels
- Constructible solution for soft-ground
- Allows air to vent from tunnel system
- Provides space for hydraulic transients to overflow
- Provides a relief for flows that exceed the design diversion rate to avoid surcharging the existing collection system
- Mitigates potential for geysers



Other Innovations

- Specialized subaqueous tremie method for shafts 36 to 44 meters deep
- Un-intrusive soil mix columns used to protect infrastructure
- Slurry wall containment wall replaced jet grouting for watertight TBM launch
- 100 year design life →100 year Green Century bond
- Developed communication process to streamline review and approval processes, while safeguarding quality



water is life

Safety Record

- Completed more than 1.6 million person-hours without a lost time accident
- Maintained a recordable incident rate well below the Bureau of Labor Statistics national average for heavy civil construction:
 - Traylor, Skanska, Jay Dee JV = 1.82
 - U.S. Bureau of Labor Statistics national average = 3.0







This massive environmental undertaking was innovative in design and construction approaches; completed safely, on-time and under-budget, and is the first step to realizing the benefits of a tunnel system that will be enjoyed by Washington, DC residents and millions of visitors to the Anacostia River for generations.





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A Drop's Life







