

Water and wastewater infrastructure

# Tunneling and trenchless technology



AECOM's experience encompasses more than 1,000 miles of tunneling and trenchless technology projects delivered by 400 experts. Teams work seamlessly to make our infrastructure better for communities around the world.



From left:  
**Lai Chi Kok Drainage Tunnel, The Government of the Hong Kong Special Administrative Region, Drainage Services Department**  
Hong Kong, China

**Government Cut Force Main Replacement, Miami Dade Water & Sewer**  
Miami, Florida, USA

**Upper Northwest Interceptor Sections 1 & 2, Sacramento Regional County Sanitation District**  
Sacramento, California, USA

**York Durham Sewage System Interceptor Sewer Tunnel**  
Toronto, Ontario, Canada

# Our practice delivers integrated tunneling and trenchless projects



As demands for infrastructure continue to increase, aging water, wastewater and stormwater systems are decaying in many cities across North America. Not only are these systems in need of rehabilitation, it is also critical that we plan future systems to accommodate population growth.

AECOM's technical expertise and creative excellence spring from the institutional knowledge and collective history of the industry's finest engineering, environmental, planning and design companies. We offer comprehensive services for all types of water and wastewater facilities involving tunnels or trenchless technology, from planning and design through to construction management.

Our experience covers all areas of water infrastructure including tunnels and conveyance pipelines for wastewater facilities, combined sewer overflow (CSO) control, stormwater runoff and water supply, as well as water intakes and outfalls.

Our tunneling experts combine global resources and local knowledge to deliver full life cycle solutions to complex projects. Our integrated service capabilities include:

- Feasibility assessments
- Program management
- Design-build procurement
- Detailed design of all types of tunnels
- Trenchless technology design
- Pump station design
- Hydrologic and hydraulic modeling
- Surge/transient modeling and mitigation design
- Odor control and air management
- Consolidation conduit sizing and design
- Inlet flow control design and operation
- Drop shaft design
- Tunnel system corrosion analysis and mitigation design
- Subaqueous outfall design
- Sediment deposition analysis and mitigation
- Real-time control for tunnel inflows
- Tunnel safety

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We provide a full package of interconnected services to design and construct the world's most important tunnel and pipeline projects on time and budget.

What sets AECOM apart is our broad experience in tunnel design, supported by our complementary capabilities in specialty areas like hydraulics, flow control and overall tunnel system operating strategies.

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Cover:  
**Combined Sewer Overflow Program Deep Rock Tunnel Connector and Pump Station, Citizens Energy Group**  
Indianapolis, Indiana, USA

**By maintaining a collaborative approach to project team communications, AECOM is better able to mitigate subsurface risk in all types of conditions and geographies.**

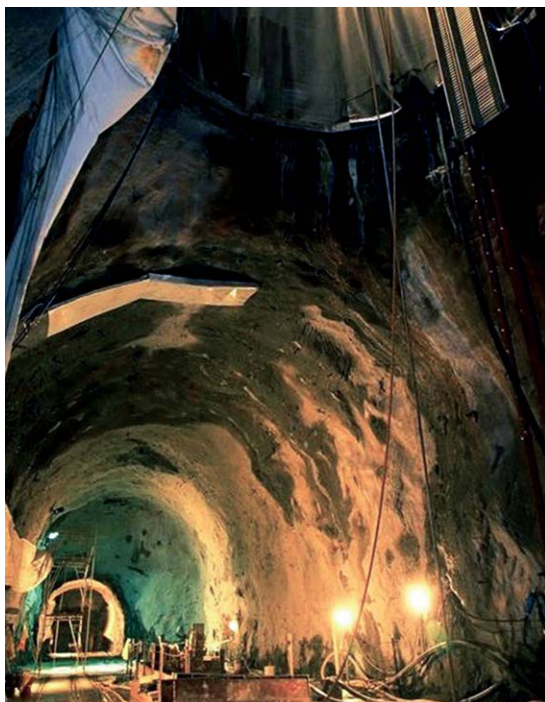


## **Client Testimonial: Homestead Avenue Interceptor Extension**

The Metropolitan District, Hartford, Connecticut, USA

*"The project faced many challenges, including tunneling in soft ground, minimizing ground settlement, avoiding damage to historic buildings and buried utilities, crossings of a critical Amtrak corridor and an elevated section on I-84. All of this had to be accomplished in the congested urban setting of downtown Hartford with minimal disruption to the traveling public. We are especially grateful for the collaboration and teamwork exhibited during construction among the final design engineer (AECOM), the contractor (NorthEast Remsco), and District staff to overcome these challenges. Overall, this project successfully delivered an environment benefit to the State of Connecticut and laid a strong foundation for future trenchless sewer projects as part of the District's CSO control program."*

# Our people solve complex tunneling and trenchless technology challenges



Tunnel projects in today's world are more complex than ever, with interrelated technical, financial, social and environmental challenges in all types of ground conditions, from soft ground to rock, and from mixed face to subaqueous. Project requirements frequently require the construction of tunnels under rivers, harbors, roads and railroads.

Whatever the need and at whatever stage of system development—from new facilities and systems to the renovation and rehabilitation of aging infrastructure—AECOM is committed to working in partnership with our clients to find the most practical and cost-effective solutions to your particular needs.

With more than 100 tunneling professionals in North America and 400 worldwide, we are capable of drawing from a dedicated cadre of diversified subject matter experts with extensive knowledge of new trends and developments. This combination is a hallmark of our approach to successful project delivery.

To deliver maximum value to our clients, AECOM's professionals provide the commitment, ingenuity, resources and expertise in:

- Tunnel route selection
- Geotechnical site investigations
- Geophysical investigations
- Environmental site assessments/spoil disposal evaluations
- Geotechnical data and baseline reports
- Tunnel risk registers
- Soft ground, hard rock and mixed face ground characterization
- Tunnel and shaft initial and permanent support design
- Tunnel lining condition assessment and rehabilitation design
- Drill and blast/mechanical excavation technologies
- Microtunneling and horizontal directional drilling design
- TBM evaluation, selection and performance evaluation
- Grouting design
- Underground construction impact assessments
- Engineering cost estimates for construction
- Tunnel inspection, geologic mapping and resident engineering
- Full program and construction management services
- Dispute avoidance and resolution

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AECOM provided integrated services on the Boston Harbor Cleanup project for the Massachusetts Water Resources Authority to upgrade and expand the Deer Island Wastewater Treatment Plant in Boston, Massachusetts, USA.

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Our broad range of services included:

- Lead geotechnical engineer for subsurface program
- Conceptual design for more than 15-miles of tunnel including the 9.5-mile effluent outfall tunnel and bedrock diffuser system
- Lead design manager, overseeing 20 design packages and 41 construction contracts
- Lead construction manager for all tunnels



Multiple world records were broken during construction, including:

- Most feet mined in one day
- Most feet mined in one week
- Most feet mined in one month



# Innovative tunnels

In the last 10 years, AECOM has managed more than \$30 billion in construction of large-diameter tunnels globally for water and wastewater, transit, highway and energy related projects. We have a long history of bringing innovations and cost-savings ideas to the tunnel community and clients.

## Deep Rock Tunnel Connector and Dewatering Pump Station, Indianapolis, Indiana, USA

*Client: Citizens Energy Group*

The TBM successfully mined more than seven miles of the tunnel ahead of schedule. As an add-on to the contract, the TBM was backed up in the tunnel for almost two miles to complete an additional 9,200-foot branch tunnel at the Owner's request. AECOM performed fast-tracked design during TBM remobilization to facilitate the change order.

Hard rock, 10-mile long, 18-foot finished diameter tunnel and 90-mgd pump station in a cavern.

## Big Walnut Tunnel Systems, Columbus, Ohio, USA

*Client: City of Columbus*

First Earth Pressure Balance TBM-mined tunnel in Columbus.

Successfully met accelerated 23-month schedule while staying on budget.

Soft ground, 6-mile long, 12- to 14-foot finished diameter tunnel.



## New Irvington Water Supply Tunnel, Sunol Valley and Fremont, California, USA

*Client: San Francisco Public Utilities Commission*

Drill and blast tunnel successfully mined through difficult geology with numerous fault zones and squeezing ground.

Hard rock/soft ground, 3.5-mile long, 8.5-foot finished diameter.



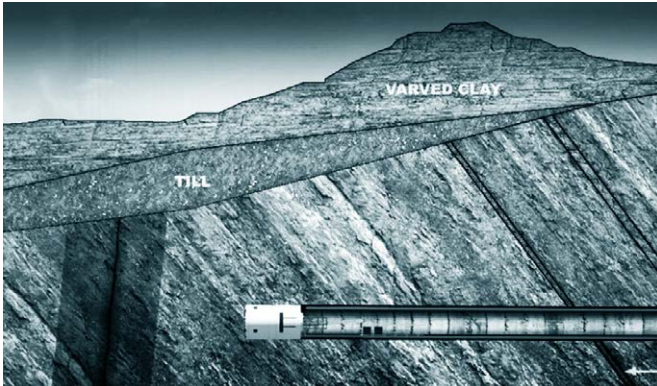


**North Dorchester Bay CSO Tunnel, Boston, Massachusetts, USA**

*Client: Massachusetts Water Resources Authority*

Largest and longest soft ground, TBM-mined tunnel in Boston. Constructed ahead of schedule with less than two percent in change orders. Recipient of the Operations and Environmental Performance Award from the National Association of Clean Water Agencies' National Environmental Achievement Awards program.

Soft ground, 2-mile long, 17-foot finished diameter tunnel and 15-mgd pump station.



**South Hartford Conveyance and Storage Tunnel, Hartford, Connecticut, USA**

*Client: The Metropolitan District*

Optimized deep rock alignment to reduce surface disruption and minimize construction risk.

Hard rock, 4.1-mile long, 18-foot finished diameter tunnel and 50-mgd pump station.



**Minne Lusa Stormwater Conveyance Combined Sewer Overflow Project, Omaha, Nebraska, USA**

*Client: City of Omaha*

Extensive hydraulic transient and physical modeling were conducted to develop an innovative pressurized tunnel design to handle significant stormwater flows and to down-size the tunnel diameter.

Soft ground, 1.2-mile long, 14-foot finished diameter tunnel.



# Advanced trenchless technology

The use of trenchless technology for installation of water infrastructure continues to gain popularity as more owners recognize its inherent benefits in minimizing public impact during construction. In addition, new technological advances make this type of construction more and more attractive due to lowered cost and risk. AECOM has extensive experience with trenchless technology, with experts who are leaders in the field and know industry trends.

## Homestead Avenue Interceptor Extension, Hartford, Connecticut, USA

*Client: The Metropolitan District Commission*

First curved microtunnel constructed in the United States. This landmark project, built in clay soils beneath an interstate and four rail lines, involved the trenchless installation of large diameter PVC-lined RCP pipe in downtown Hartford. AECOM was the lead permitter, geotechnical engineer, trenchless designer and construction manager.

Soft ground, 4,000-lineal-feet of 72-inch RCP microtunnel.



## Pearl Harbor Water Main and Force Main Crossings, Oahu, Hawaii, USA

*Client: United States Navy*

Innovative design features included horizontal directional drilling for water main that utilized high-density polyethylene pipe and incorporated a mid-harbor connection which required coordination with harbor traffic during construction.

Soft ground, 3,000- to 6,000-lineal-feet of 20- to 32-inch HDPE pipe.



## Woodrow Wilson Bridge Microtunnel Crossing, Alexandria, Virginia, USA

*Client: Virginia Department of Transportation*

Engineering of six microtunneling projects as part of the stormwater, sewer and utility improvements to the 7.5-mile project corridor. This project has received more than 70 major awards as part of the new bridge construction project.

Soft ground, 1,700-lineal-feet of 60-inch RCP, 42-inch VCP and 30-inch steel casing.



### Twin Force Main Relocation HDD Harbor Crossing, New Haven, Connecticut, USA

*Client: Greater New Haven Water Pollution Control Authority*

Risk management, risk sharing and contingency planning were implemented to successfully permit and construct this force main project through a severely congested and active harbor corridor using horizontal directional drilling.

Soft ground, twin 48-inch HDPE pipe, each 1,800 feet in length.



### Fort Kamehameha Ocean Outfall, Honolulu, Hawaii, USA

*Client: United States Navy*

Complex microtunnel project with connections to 150-foot deep ocean outfall discharge structure. This project received five awards: two ACEC Honors Awards, NASTT New Trenchless Construction Project Runner-up, APWA National Build America Award and NAVFAC Design Award.

Soft ground, 2,700-lineal-feet of 48-inch microtunnel.



### Dugway West Relief Interceptor Sewer, Cleveland, Ohio, USA

*Client: Northeast Ohio Regional Sewer District*

Successful Microtunneling construction was used to successfully minimize neighborhood impact and protect large infrastructure that paralleled much of the alignment.

Soft ground, 6,200-lineal-feet of 72-inch RCP and 4,000 lineal feet 36- to 48-inch pipe.

# AECOM utilizes state of practice procedures in risk evaluation and management

Underground projects for civil infrastructure continue to become more complex. Engineers and contractors are increasingly being asked to design and construct projects that expand the operating envelope in terms of tunnel and pipe diameters, project lengths, ground conditions and other complexities that have not been encountered. This translates to increased risks that require the latest tools to properly identify and assess.

Risks related to technical, financial, contractual and third-party nature should be determined. Decisions made early in the process have the most ability to influence project objectives by avoiding problems or mitigating risks at a reasonable cost. The project team needs to assess who is the best party (e.g., owner, engineer, contractor or insurance provider) for assigning and then managing the risk. As the project progresses, decisions made later in the project life cycle have less ability to influence the final project cost and implementation becomes more expensive.

There are three major stages of risk management:

1. Risk identification
2. Risk analysis
3. Risk management and mitigation


Owners, engineers and contractors need to establish equitable methods for allocating risk for projects to be successfully constructed at an appropriate price.

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Risk management should be part of the planning, design and bidding process. It should occur early in the project life cycle to maximize the ability to successfully influence the project's outcome.

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A photograph of two workers in orange safety gear and hard hats standing inside a large, circular tunnel. The worker on the right is pointing upwards towards the ceiling of the tunnel. The tunnel is illuminated by a series of lights along the side, creating a strong perspective effect. The floor is wet and reflects the workers and the lights. The overall atmosphere is industrial and focused.

Informed and timely decision-making is an essential part of every project's success. AECOM's approach to risk management leads to responsible and responsive decisions.

**Thames Water Lee Tunnel Project**  
London, England, U.K.

## **About AECOM**

AECOM is the global infrastructure leader, committed to delivering a better world. As a trusted professional services firm powered by deep technical abilities, we solve our clients' complex challenges in water, environment, energy, transportation and buildings. Our teams partner with public- and private-sector clients to create innovative, sustainable and resilient solutions throughout the project lifecycle — from advisory, planning, design and engineering to program and construction management. AECOM is a Fortune 500 firm that had revenue of \$16.1 billion in fiscal year 2025. Learn more at [aecom.com](https://www.aecom.com).