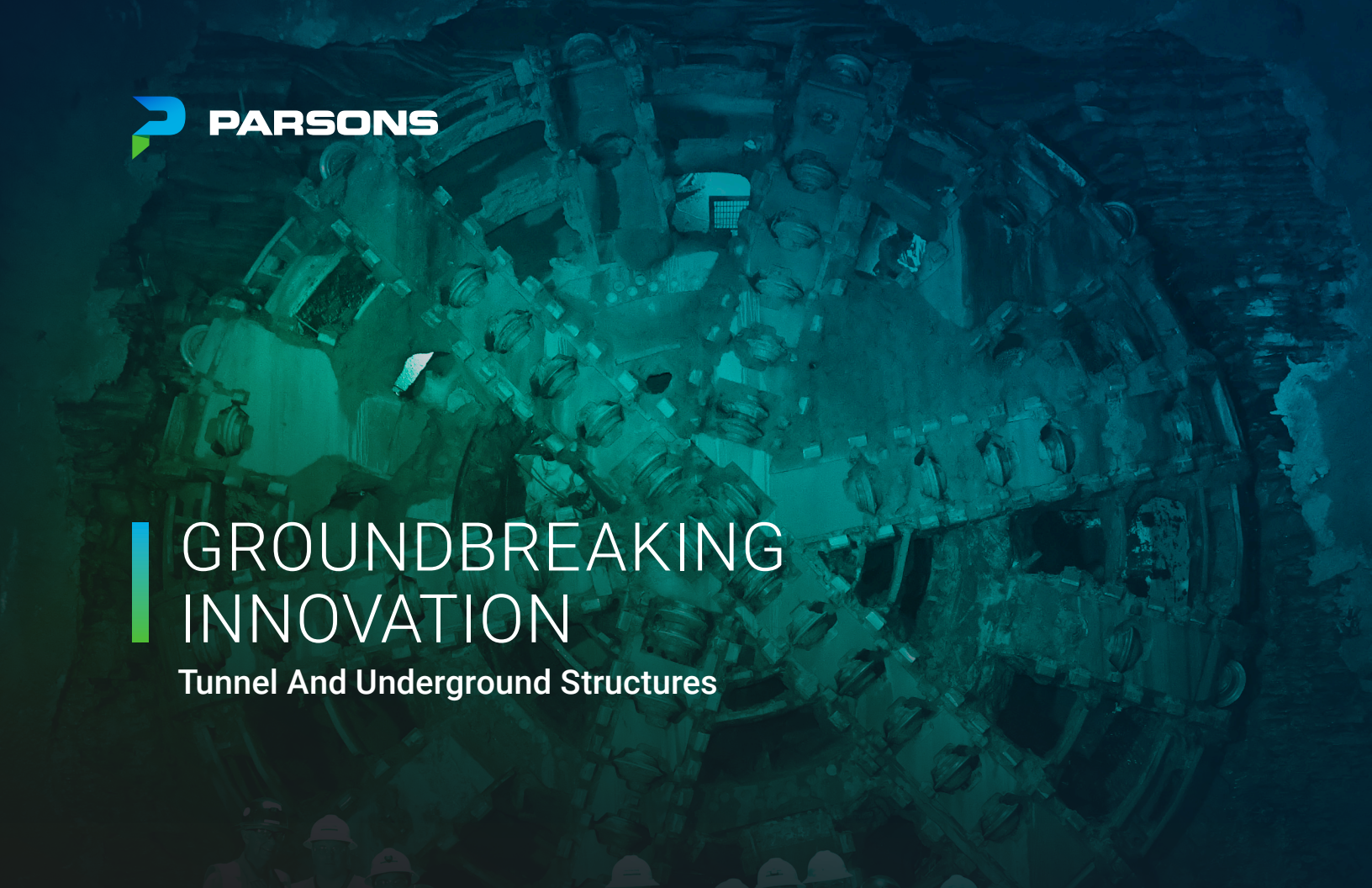

PARSONS
GROUNDBREAKING
INNOVATION
Tunnel And Underground Structures

A SOLUTIONS PROVIDER WITH DEPTH

We provide innovative solutions to some of the largest, most complex tunnel, and underground construction projects in the world. Our experts are dedicated to overcoming the toughest challenges to help our customers move safely under or through any obstacle.

For more than 70 years, we have planned, designed, engineered, built, and managed complex tunnel projects ranging from transit systems to sewers and pipelines, in challenging geologic environments. Our unparalleled experience includes more than 250 tunnels around the globe.

We offer a host of cutting-edge tunneling techniques and technologies to minimize the risks associated with underground structures of all sizes and levels of complexity.

100 +
Subject Matter Experts

250+
Tunnels

27+
Average Years Of Experience

$25B+
Construction Value

Cover Photo: Ohio Canal Interceptor Tunnel (OCIT), Akron, OH

DRILLING DOWN

What we do.

Services

- Construction
- Construction management (CM)
- Design
- Design-build/APD
- Geotechnical engineering
- Inspection and rehabilitation
- MEP and systems
- Planning
- Program management (PM)
- Risk management and resilience analysis

Systems

- Water
- Sewer/wastewater
- Hydroeletric
- Road and highway
- Rail and transit
- Power, oil, gas, and utilities outfalls

Strategies

- Tunnel boring machine (TBM)
- Immersed tube
- Sequential excavation method (SEM/NATM)
- Drill and blast
- Roadheader
- Hand mining/conventional mining
- Cut and cover
- Microtunneling
- Jacked box
- Horizontal directional drilling (HDD)

Eglinton Crosstown – East Tunnels, Toronto, Canada

KEY SERVICES

Design/Design-Build And Planning

- Alternative analysis
- Project planning
- Feasibility study
- Detailed design
- System design
- Design management
- Design-build

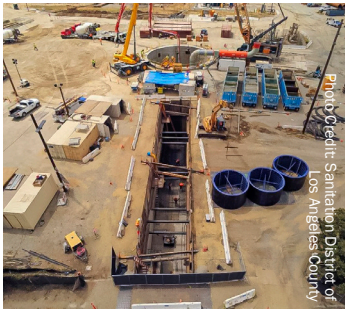
Geotechnical Services

- Geotechnical design
- Numerical modeling
- Investigation
- Instrumentation and monitoring
- Ground improvement
- SOE design
- Seismic response analysis
- Foundation design
- Groundwater control and dewatering

Anacostia River Tunnel

California High-Speed Rail, CP1

Deer Creek Sanitary Tunnel



JWPCP Sewer Tunnel Outfall Project

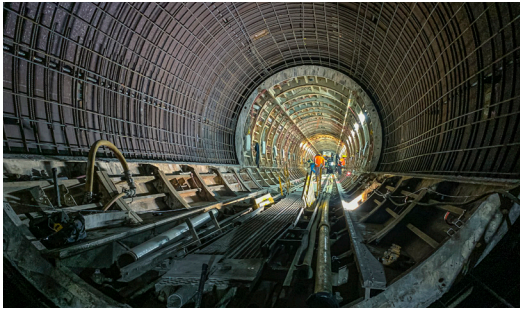
LA Metro Purple Line Extension

* The picture was taken prior to February 2020 before Safer At Home Orders and social distancing mandates were in place.

Program Management/ Construction Management

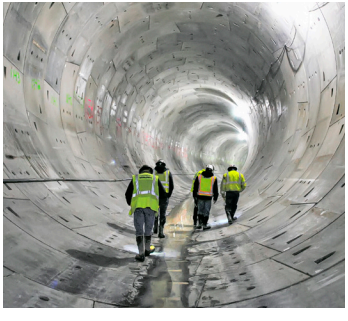
- Program management
- Construction management
- Construction support
- Constructability reviews/ value engineering
- Quality assurance/quality control
- Testing/inspections
- Commissioning and startup
- Risk management

Tunnel Stabilization And Sewer Pipeline Replacement



Delaware Aqueduct Bypass Tunnel

Dubai Metro Route 2020: Red Line Extension To Expo 2020



Ohio Canal Interceptor Tunnel

Low Lake Level Pumping Station

Inspection And Rehabilitation

- Tunnel inspection
- Tunnel evaluation
- Tunnel inventory
- Structural assessment
- Repair and rehabilitation

Risk Management And Resilience Analysis

- Qualitative/quantitative risk analysis
- Operation risk assessment
- Construction impact assessment
- Vulnerability analysis
- Resilience analysis
- Activity hazard analysis

Catskill Aqueduct Repair And Rehabilitation (CAT-RR)

Tunnel Stabilization And Sewer Pipeline Replacement

Delaware Aqueduct Bypass Tunnel

Dubai Strategic Sewerage Tunnels

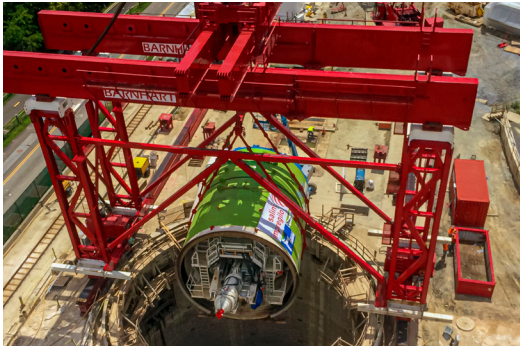
Construction

- Alternative project delivery
- Heavy civil and transportation
- Site development
- Water and wastewater

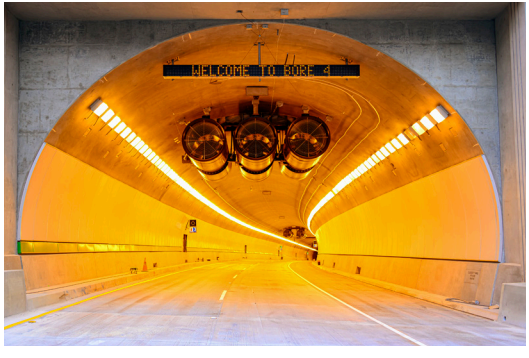
MEP And System

- Electrical design
- Ventilation
- Mechanical design/plumbing
- Fire and safety design

California High-Speed Rail, CP1



Anacostia River Tunnel



Caldecott Tunnel New Fourth Bore

Ohio River Bridges East End Crossing Tunnel

DELAWARE AQUEDUCT BYPASS TUNNEL

Newburgh, New York

Owner: New York City Department of Environmental Protection (NYC DEP)
Project Value: USD $808 Million (BT-1 and BT-2)

Project Details

Parsons has provided comprehensive CM services for Delaware Aqueduct Bypass Tunnel project since January 2013. The Bypass Tunnel project is the most significant repair project in the history of the largest water supply in the United States. The new tunnel will bypass the Delaware Aqueduct under the Hudson River, thereby improving the reliability of the City's water supply system.

Parsons received an Excellence Award in Construction Management from the NYCDEP in 2017. The project continues to be ahead of schedule.

Parsons' Services

- Preconstruction services
- Construction management
- Environmental health and safety
- Quality assurance/quality control
- Risk management
- Community outreach
- Commissioning and startup

Project Details

- 12,500-foot-long 21.5-foot-diameter bypass tunnel with 14-foot-diameter in hard rock
- Hard rock TBM designed to withstand 30 bars of water pressure
- Shaft 5B (900 feet deep with a diameter of 34 feet)/Shaft 6B (750 feet deep with a diameter of 37 feet)

OHIO CANAL INTERCEPTOR TUNNEL

Akron, Ohio

Owner: City of Akron
Project Value: USD $185 Million

Project Details

Parsons provided comprehensive CM services for the OCIT as part of a consent decree to reduce sewer overflows. During the preconstruction phase, we provided an independent review of the project design, contract documents, construction schedule, and engineer's cost estimates. We provided full construction management services. During the design phase, we recommended an alternative to eliminate a storage basin by increasing the tunnel diameter, resulting in significant cost savings and eliminating risks associated with the basin foundation. The project is in the closeout phase and has been operational since June 2020.

Parsons' Services

- Construction management
- Constructability review
- Cost estimating
- Procurement document development
- Project controls
- Inspection services
- Quality management

Project Details

- 6,200-foot-long tunnel with 30.5-foot-diameter through soft ground
- Five drop shafts with finished diameters from 18 to 45 feet and up to 125 feet in depth
- One large tunnel diversion structure and several smaller diversion structures

TUNNEL STABILIZATION AND SEWER PIPELINE REPLACEMENT

Laguna Beach, California

Owner: South Coast Water District
Project Value: USD $100 Million

Project Details

Parsons began working for the district in 2015, performing value engineering and risk assessments in preparation for this project. We have been providing CM and design review since the project began in 2016, and PM since December 2017. Our complete suite of PM/CM services includes design reviews, seismic stability analyses, geotechnical and environmental monitoring, construction reviews, and construction inspection services.

Parsons' Services

- Construction management
- Constructability reviews
- Value engineering
- Design review
- Environmental and geotechnical monitoring
- Quality management
- Risk management

Project Details

- Excavation and support of approximately 100-foot-deep, 20-foot-diameter tunnel access shaft
- Excavation of approximately 10,000 feet, 8-foot-wide by 8-foot-high tunnel including 400 feet of SEM tunnel through a historical fault zone
- Installation of new 24-inch PVC pipe and connection to existing laterals

DEER CREEK SANITARY TUNNEL

St. Louis, Missouri

Owner: Metropolitan St. Louis Sewer District
Project Value: USD $148 Million

Project Details

Parsons has been working with the Metropolitan St. Louis Sewer District since 2011. The tunnel system has the capacity to store more than 38 million gallons during wet-weather events and is pumped dry after high flows have subsided and the downstream treatment plant capacity is available.

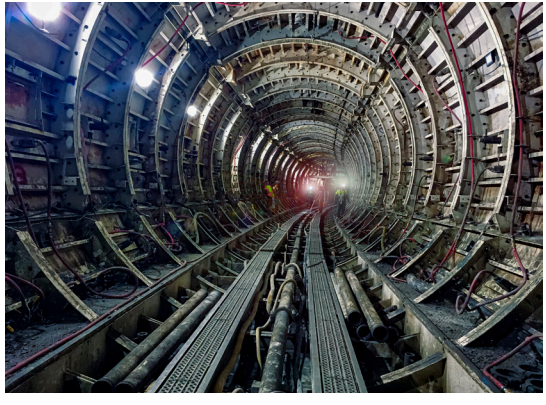
The project includes eight shafts that are required to provide tunnel access for collection sewers and the pump station. Diversion structures were designed to divert flow to the tunnel once the flow in the existing sanitary sewer system has reached a critical depth. Gates are utilized to control the flow in the existing sewer and prevent sewer surcharging.

Parsons' Services

- Final design and specifications
- Environmental site assessments
- Permitting
- Cost estimate/value engineering
- Constructability reviews
- Quality assurance/quality control
- Post design services

Project Details

- 20,500-foot-long tunnel with 19-foot-diameter and 175 feet deep in solid rock in a highly urbanized area of St. Louis
- Eight shafts with diameters ranging 5-feet to 49-feet



JWPCP SEWER TUNNEL OUTFALL PROJECT

Carson, California

Owner: Sanitation Districts of Los Angeles County
Project Value: USD $630 Million

Project Details

Parsons has completed the final design and bidding phases for the Joint Water Pollution Control Plant (JWPCP) Effluent Outfall Tunnel project and is entering into the engineering services phase during construction.

The new effluent outfall tunnel will be approximately 7 miles long, have an 18-foot internal diameter, and include 1,350 feet of 16-foot-diameter steel liner at crossings of the Palos Verdes Fault.

Tunneling is scheduled to start in May 2021 and the project is estimated to be completed in 2026.

Parsons' Services

- Feasibility studies
- Conceptual, preliminary, and detailed design
- Geotechnical investigations
- Engineering services during construction

Project Details

- 7-mile long, 18-foot-diameter tunnel with 1,350 feet of steel liner at fault crossing
- A new manifold structure
- One shaft (55-foot-diameter x 115-foot-depth)

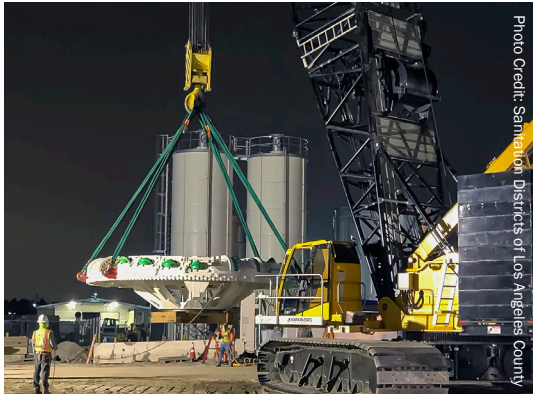


Photo Credit: Sanitation Districts of Los Angeles County

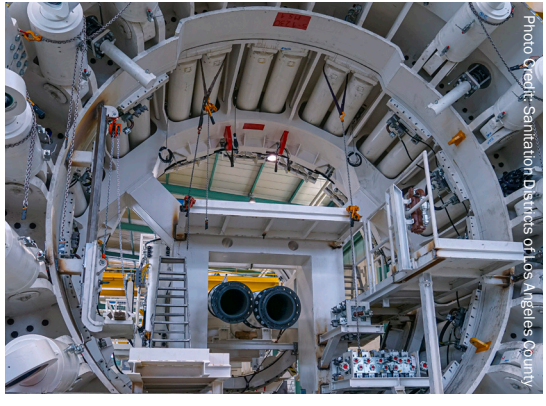


Photo Credit: Sanitation Districts of Los Angeles County

Photo Credit: Mike Cowan Photography

SNWA LOW LAKE LEVEL PUMPING STATION

Las Vegas, Nevada

Owner: Southern Nevada Water Authority
Project Value: USD $333 Million

Project Details

Parsons has been retained by the Southern Nevada Water Authority to provide design management and construction management services. The project will secure a reliable water supply for the Las Vegas area, even in the event of extremely low lake levels in Lake Mead. The underground portion of the work includes an access shaft, pump well shafts, and a forebay. The surface portion includes the installation of 34 pumps, discharge headers, electrical controls and starting equipment, an open topped reservoir, a hydro-pneumatic tank, a 220-ton gantry crane, final grading, and an access road to pumping station site.

Parsons' Services

- Program management
- Construction management
- Contract management
- Design and constructability reviews
- Quality assurance/quality control inspections
- Procurement

Project Details

- 527-foot-deep, 26-foot-diameter access shaft
- 34-6-foot-diameter pump well shafts
- Forebay (377 feet long, 36 feet high, and 33 feet wide)

LA METRO WESTSIDE SUBWAY - EXTENSION SECTION 1

Los Angeles, California

Owner: Los Angeles County Metropolitan Transportation Authority (Metro)
Project Value: USD $1.6 Billion

Project Details

Parsons is the lead designer and is performing design management and the final design of the Westside Subway Extension Project, Section 1, extending the existing Purple Line from the current terminus at Wilshire/Western in the city of Los Angeles to Beverly Hills. The extension includes three new underground stations.

Our role in the project continues as the prime designer for the design-build team and design engineer of record for the project providing design services for multiple contracts.

Parsons' Services

- Final design
- Design management
- Station architecture
- Engineering services during construction

Project Details

- Three new underground stations, each approximately 1,000 feet long, 70 feet wide and 80 feet deep
- 3.4-mile twin subway tunnels, each with an inside diameter of 18 feet, and 10 inches
- 23 cross passages


Photo Credit: LA Metro*


Photo Credit: LA Metro*

* The picture was taken prior to February 2020 before Safer At Home Orders and social distancing mandates were in place.

LOUIS-HIPPOLYTE-LA FONTAINE TUNNEL

Quebec, Canada

Owner: Ministère des Transports du Québec (Ministry Of Transportation Of Quebec)

Project Details

The Louis-Hippolyte-La Fontaine tunnel is the largest underwater tunnel in Canada. The MTQ is currently realizing a major rehabilitation project for the Louis-Hippolyte-La Fontaine tunnel to ensure the sustainability of this infrastructure and to ensure that it can continue to play its key role in the mobility of people and goods along Highways 20 and 25. Parsons, in a Joint Venture with TetraTech, is acting as the owner's engineer since 2018. The rehabilitation work includes twin tube tunnel structural rehabilitation, ventilation and fire life safety modernization, and A25 roadway reconstruction.

Parsons' Services

- Owner's engineer
- Technical support
- Preparation of technical specifications and performance criteria

Project Details

- Tunnel (1.5 km long, 36.7 m wide and 7.85 m high)
- Highway rehabilitation work ± 4 km
- Traffic mitigation measures over 12 km

Photo Credit: Ministère des Transports du Québec

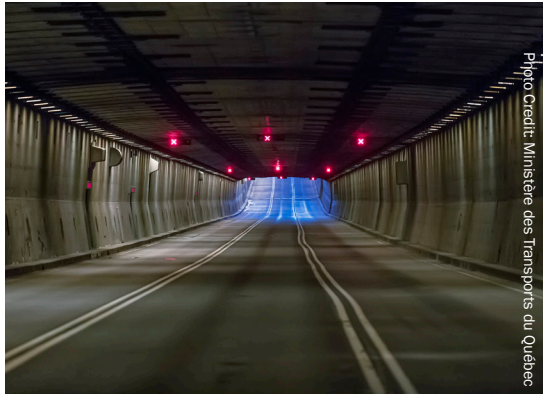


Photo Credit: Ministère des Transports du Québec

CATSKILL AQUEDUCT REPAIR AND REHABILITATION

Newburgh, New York

Owner: New York City Department of Environmental Protection (NYC DEP)
Project Value: USD $175 Million

Project Details

Parsons continues provide construction management services for multiple contracts related to the repair and rehabilitation of the upper Catskill Aqueduct (CAT-RR) between the Ashokan and Kensico Reservoirs for the NYCDEP.

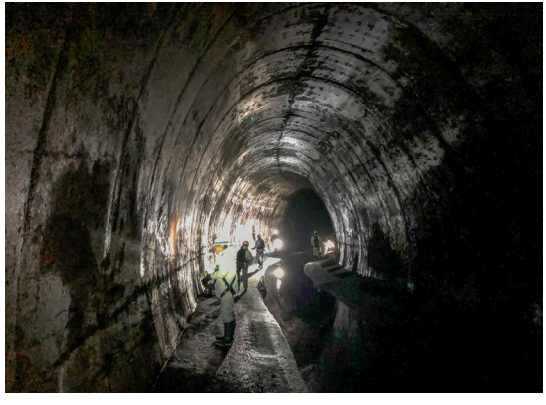
The goal of the CAT-RR projects is to restore the capacity of the Catskill Aqueduct, which has been lost over time due primarily to the accumulation of biofilm along the aqueduct's interior surface. The proposed rehabilitation will include a full inspection of the aqueduct, repair of leaks, repair of valves and other mechanical equipment, and the addition of air vents to facilitate the flow of the water through the system.

Parsons' Services

- Construction management
- Design assistance
- Change order management
- Risk management

Project Details

- 74-mile-long, 19-foot-diameter aqueduct consisting of rock tunnels, cut-and-cover tunnels, pressure tunnels, and steel siphons
- Two saturation dives for leak repair



DUBAI METRO ROUTE 2020: RED LINE EXTENSION TO EXPO 2020

Dubai, United Arab Emirates (UAE)

Owner: Roads and Transport Authority
Project Value: Dh10.6 Billion

Project Details

This five-stage project extends the existing Dubai Metro Red Line to the Expo 2020 site, which will connect participants, innovators, and policymakers from around the world. The Route 2020 project is the first major rail expansion of the highly successful Dubai Metro Red Line and Green Line projects. A Parsons-led JV is providing preliminary engineering and project management consultancy services to the Dubai Roads and Transport Authority for the Route 2020 project.

Parsons' Services

- Concept and preliminary engineering
- Program management
- Construction management
- Design review
- Site supervision
- Contract management
- Quality assurance/quality control
- Value engineering

Project Details

- A 15-km-long alignment consisting of 11.8 km of elevated guideways and a 3.2 km of tunnel
- Seven LEED Gold stations consisting of one interchange station, three elevated stations, two underground stations, and the special-event Expo Iconic Station
- Fifty additional trainsets

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