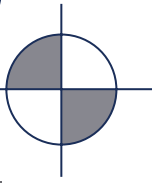


KILDUFF

UNDERGROUND
ENGINEERING, INC.



535 16th Street, Ste. 605
Denver, CO 80202
www.kilduffunderground.com



About KUE

Kilduff Underground Engineering (KUE) was established in 2014 by Todd Kilduff, PE, to support contractors, A/E firms and owners. The firm specializes in underground design with a specific focus in the design, inspection and rehabilitation of tunnels with sizes ranging from 12-inches up to 60-feet in diameter. KUE is capable of designing tunnels utilizing all available technologies to excavate and support the proposed opening. Additionally, the firm provides standard geotechnical design services, deep excavation support designs (SOE), claims support, construction management services, as well as designs, installs and monitors geotechnical instrumentation.

KUE's strength lies in its ability to be equally familiar with both the design and construction aspects of underground projects. Our staffs intimate understanding of both sides of the business allows for clean and consistent deliverables that are vetted through an extensive QA/QC review. With over 130 years of combined experience among its senior staff, KUE is able to offer a complete service to its clients that is unmatched in the industry.

Located in Downtown Denver, KUE consists of a technical staff of three PE's, one PG, four EIT's and a survey crew. The firm is currently licensed in CO, TX, WY, MT, NV, UT, ID, OR, WA, NM, NE, MD, VA, FL, WV, NY, NJ, PA and MA, is insured, and provides services throughout North America.



DESIGN SERVICES



FIELD SERVICES



COST & MANAGEMENT



CLAIMS ANALYSIS

Support of Excavation

KUE has extensive experience in regard to the construction and design of excavation support systems. Each project requires its own type of support structure, and the firms senior staff have decades of on-the-project experience that lends itself to a complete understanding of the excavation utilizations and structural properties of each available system. The firm specializes in a number of methods that have been in practice for decades, as well as new technologies.



Edison Pump Station, NJ



Tarrytown Force Main, NY



Catskill Aquaduct, NY



Conduit 16 Highway 58, CO

DESIGN SERVICES

- Design Calculations
- Numerical Modeling
- Shop Drawings
- Instrumentation & Monitoring
- Load Testing
- Construction Oversight

EXCAVATION SUPPORT METHODS

- Soldier Piles & Lagging
- Sheeted Excavations
- Braced Excavations
- Diaphragm Walls
- Jet Grout Shafts
- MSE Walls
- Tie Back Walls
- Secant/Tangent Pile Excavations

KEY PROJECTS

- 9th Street Storm & Sewer - Brooklyn, NY
Design of 3 shafts for installation of a 42" RCP Sanitary Sewer
- Upgrades to Edison Pump Station - Edison, NJ
55' Deep Excavation w/ Sheet piling and Tie-Backs
- Tarrytown Force Main - Tarrytown, NY
Design of Trench Excavation Support
- 7-Line Extension - New York, NY
Design of 40' x 40' Shaft - 100' deep
- NYCDEP Gowanus Facility Upgrades - Brooklyn, NY
Design of 30' OD MTBM Launch Shaft
- Conduit 16 Highway 58 Shafts - Golden, CO
Design of multiple 40' x 16' shafts, 30' to 55' deep

KUE senior staff have over 130 years of combined experience in the design and construction of large diameter tunnels. Our staff are members of the Underground Construction Association (UCA), the Society of Mining Engineers (SME) and are also members of the International Society of Explosive Engineers (ISEE). Mr. Kilduff has authored several publications on the topic of large diameter tunnel construction.

On the Construction side, Mr. Kilduff has worked as a Project Manager and Estimator for some of the largest general contractors in the industry. During this time, he has managed Tunneling Contracts ranging in diameter from 8 to 58-feet with contract values from \$5M to \$65M. With Todd at helm, KUE senior staff have extensive experience constructing various means and methods of tunnel excavation and support systems. He has developed and managed schedules and budgets as well as been responsible for the safety aspects on tunneling projects.

On the design side, KUE has extensive experience in ground characterization and predicting ground behavior with the performance of proposed tunneling methodologies in mind. The firm has designed tunnel support systems utilizing rock bolts, shotcrete, steel sets and cast-in-place concrete linings.



Newton Willows, UK



CDOT Twin Tunnels, CO



NYCT 7-Line Extension, NYC



Drummanard Tunnel, KY

DESIGN SERVICES

- Pre-Bid Planning
- Blast Plans & Vibrations
- Initial Support Systems
- Ground Behavior Prediction
- Settlement Analysis
- Schedule & Costing

KEY PROJECTS

- Colorado Springs Utilities, Stanley Canyon Tunnel Rehabilitation - Colorado Springs, CO
- SFPUC, Hetch Hetchy Mountain Tunnel Inspection & Rehabilitation - Tuolumne, CA
- CDOT Twin Tunnels East & Westbound - Idaho Springs, CO
- 7-Line Extension Site J, Declined Tunnels - New York, NY
- East Side Access - New York, NY
- Second Avenue Subway - New York, NY

Trenchless Technologies

KUE has been involved with the design, construction and management of Trenchless Projects for a combined 130+ years. Our Microtunneling expert, Paul Wilkinson, was the former General Manager of EURO Iseki and has over 35 years experience with microtunnel projects. Tim Coss joins KUE in 2020 as an in-house advisor and autonomously, has managed hundreds of microtunnel projects over the past 35 years. Together with the wealth of experience of Mr. Kilduff, KUE stands alone as an industry leader in Microtunneling in the North American market.

As a team, KUE has been involved in the design and/or direct construction of over 200 trenchless projects with varying methodologies. The firm has also been involved in over a dozen claims providing analysis and expert testimony. All senior staff are current members of NUCA & NASTT, with Todd and Tim each having authored several papers on various topics within Trenchless Design & Construction.



The Foundry, CO



40th & Blake, CO



30th Street Rock Tunnel, NYC



Southern Delivery, CO



Meadowmere P.S., NYC

Geotechnical Instrumentation & Monitoring

Senior staff of KUE have nearly 50 years' combined experience with the planning, installation, implementation, interpretation and reporting on instrumentation and performance monitoring programs for underground projects. The firm is familiar with the installation of various types of instruments including observation wells, vibrating wire piezometers, inclinometers, extensometers, convergence, geophone vibration sensors and survey prisms measured by traditional surveying methods and/or with an automated mechanical total station (AMTS). KUE is capable of providing a turnkey service from design to implementation for geotechnical instrumentation programs.

RELEVANT PROJECTS

- 39th Ave Greenway - Park Hill Phase VI - Denver, CO (2019 - Present)
- Central 70 - Denver, CO (2019 - Present)
- Globeville 3 Outfall Project - Denver, CO (2018)
- Canal Interceptor Project - El Paso, TX (2018)
- Conduit 16 Raw Water Pipeline - Golden-Lakewood, CO (2017-2018)
- Little Dry Creek - Westminster, CO (2017-2018)
- Orange Zone Pipeline - Lafayette, CO (2017)
- Catskill Aqueduct Project - Highlands, NY (2015-2016)
- Twin Tunnels West Bound - Idaho Springs, CO (2014)

SERVICES PROVIDED

- Instrumentation Plans
- Installation
- Measurement & Reporting
- Settlement
- Lateral Deformation
- Convergence
- Vibration Monitoring



Geotechnical Drilling



Surveying



Geotechnical Instrumentation



Construction Monitoring

Dewatering System Design

KUE has more than 20 years' experience with the planning, design and implementation of dewatering systems for underground projects. In regard to design, the firm has performed geotechnical investigations for site characterization including hydrogeological evaluations for dewatering purposes and he has designed dewatering systems for shafts, tunnels and deep excavations. Our staff is experienced in performing calculations to estimate hydraulic conductivity (k), total and partial system flow (q), drawdown (h), and radius of influence (r).

Additionally, KUE has evaluated project sites for potential settlement as a result of dewatering the ground. System designs have been performed with anticipating the use of deep wells, well points and jet educator systems as well as sump pumping. In regard to construction, our staff has worked with reputable dewatering contractors, helped facilitate dewatering system installations and oversaw the construction, maintenance and decommissioning of various dewatering systems.

RELEVANT PROJECTS

- Weld County - Mead, CO (2019)
- Adobe Creek Dam - Pueblo, CO (2018)
- Bellvue WTP - Greeley, CO (2018)
- Conduit 16 Replacement Pipeline, Denver Water - Golden, CO (2017-2018)
- Ridgegate Pipeline, Happy Canyon Trenchless Crossing - Parker, CO (2017)
- Catskill Aqueduct Project - Highlands, NY (2015-2016)
- Tarrytown Force Main - Tarrytown, NY (2015)
- Poseidon Desalination Plant, Faraday Launch Shaft - Carlsbad, CA (2014)



Conduit 16, CO



Weld County, CO