Construction & Geotechnical Services
When Thomas Moore relocated his trenching business from New York to New Jersey in 1918 and began manufacturing his proprietary conveying excavator from premises in Rockaway, he could not have foreseen that his Moore Trench Machine Company would one day become one of North America’s foremost geotechnical contracting specialists.

The change of direction began in 1925, when Moore leased a machine to a trenching contractor and then assumed the contract when work was stalled after “quick sand” was encountered. He designed, built and installed the first practical wellpoint dewatering system in the United States to stabilize the troublesome material.

Moore capitalized on the success of his invention and the company steadily flourished, transitioning over the years from wellpoint manufacturer to dewatering contractor to full-service geotechnical specialist, and from a family-owned business to a 100% ESOP company.

Moretrench has certainly changed since 1918. One thing, though, has stayed the same. Like Thomas Moore all those years ago, we are first and foremost problem solvers. We are committed to finding the right solution for every client…and we look forward to doing that for many years to come.

Arthur B. Corwin, P.E.
President and CEO
At Moretrench, we specialize in design/build solutions for challenging subsurface conditions. Often, those conditions present two or more distinct problems, but because Moretrench can marshal diverse engineering, technology and equipment resources from within its own organization, the complete solution needed can be delivered under one, carefully scheduled contract. This translates to savings in both time and money.

And while time and money are always important considerations on any project, they become critical issues in the event of an unanticipated geotechnical problem. Moretrench’s design/build and emergency response capability can expedite the time it takes to resolve unexpected issues that might otherwise lead to significant schedule over-runs and even liquidated damages.

With more tools in the toolbox than any other specialty geotechnical contractor, and engineering expertise across the board, Moretrench can provide the optimum solution for your geotechnical challenge, whether it’s a matter of a single technology or a multi-faceted approach. Our reputation has been earned through quality, commitment and service. That’s a reputation you can build on.
From Lock & Dam 26 in Missouri, still the single greatest dewatering effort ever accomplished in the United States, to urban renewal and revitalization projects in major cities, and to subsurface metro rail and utility construction coast to coast, Moretrench has been a nationally recognized presence in construction dewatering and groundwater control for more than 80 years and is recognized as an innovator and industry leader.

PREDRAINAGE DEWATERING
Predrainage is often a requirement to allow deep excavation, soft ground tunneling operations or dam rehabilitation and construction to be accomplished in the dry. Deep wells, wellpoint systems, and/or ejector systems are the primary tools of predrainage.

GROUNDWATER CUT-OFF
Temporary or permanent cut-off or exclusion of groundwater may be necessary with new construction below the water table, for environmental containment, or for seepage control into existing underground structures. Moretrench’s range of groundwater control options includes both vertical physical barriers and geotechnical methods.

Vertical barriers, including slurry trenches, slurry walls or sheet piling, are typically excavated or keyed into a soil or rock stratum to provide a complete barrier to vertical and horizontal groundwater flow. Geotechnical methods such as grouting or ground freezing modify the characteristics of the ground in order to reduce the hydraulic conductivity and/or improve the strength of the soil and may be used to create horizontal cut-offs such as bottom seals and in situations where access is obstructed.
ARTIFICIAL RECHARGE
Artificial recharge is the return of water to the ground using deep wells, wellpoints, and recharge trenches. This method can be used to minimize the potential side effects of dewatering such as consolidation of compressible soils, deterioration of timber piles, impact to water supply wells, saltwater intrusion, or migration of contaminant plumes.

1. 100,000-gpm, multi-stage wellpoint dewatering, Lock & Dam 26, MO
2. Predrainage deep wells and eductors and anchored beam and lagging excavation support for dam rehabilitation, Russellville, AL
3. Soil-bentonite trench installation for contaminated groundwater cut-off, Kearny, NJ
4. Deep well installation using jetting techniques for new construction, Atlantic City, NJ
5. Groundwater control and treatment for contaminated soil excavation, Egg Harbor, NJ
6. Dewatering of limestone geology to unprecedented depths for excavation of a secant pile-supported tunnel access shaft, Tampa, FL
Ground freezing is cost-effective where both support of excavation and groundwater cut-off are required and ground improvement must be provided at significant depth or in difficult, disturbed, or sensitive ground. In recent years, ground freezing has emerged as a useful environmental remediation tool.

FREEZING AGENTS
Brine is the most typical cooling agent for ground freezing. However, liquid nitrogen may be used for smaller or shorter duration projects, or in emergency situations where rapid freezing is required.

PERIPHERAL FREEZING
Shafts, open excavations, horizontal tunnels and small connections between structures are typical candidates for peripheral freezes. Vertical shafts are the most common application and the technique offers several advantages unique to their construction. The frozen ground provides the dual functions of groundwater control and earth support, eliminating the need for internal bracing and sheeting during excavation. The freeze can be implemented through the soil/rock interface, which is often the most difficult geology in which to create a groundwater cut-off by other methods.

Since frozen ground can be created with any freeze pipe orientation, ground freezing is a very effective stabilization tool for non-vertical and difficult access applications.
MASS FREEZING
Under certain circumstances, it may be desirable to freeze massive volumes of soil to facilitate excavation within the frozen stabilized ground. Mass freezing may be justified where ground control in difficult subsurface conditions is crucial to the success of a project, where an excavation must be completely stabilized, to create a bottom seal where no geologic cut-off is present within reasonable depth, or where there is concern about the overall safety of the operation.

1. Mass freezing for the mining of three, jacked-box tunnels, the Big Dig, Boston, MA
2. Tunnel access shaft excavation support and groundwater cut-off, City Water Tunnel No. 3, New York, NY
3. Soil stabilization and groundwater control for connector tunnel mining, Portland, OR
4. Deep shaft excavation support and groundwater cut-off for tunnel access shaft, King County, WA
Earth Retention & Anchors

On sites where deep excavation is required, temporary earth retention is the first stage of construction. Moretrench’s wide range of techniques allows us to offer the optimum solution tailored to project requirements and subsurface conditions and restraints. And where more than one geotechnical approach, such as dewatering or underpinning, is required, we have the in-house resources to offer economical turnkey solutions.

STRUCTURAL METHODS
Driven steel sheetpiling and drilled soldier beam and lagging walls are both extensively used for earth retention and excavation support. In granular soils where the groundwater is below proposed subgrade or can be economically drawn down by dewatering, a soldier beam and lagging system remains the most widely used approach.

Soil nailing is an economic, in situ method of reinforcing and increasing the overall shear strength of unsupported or unstable soil/rock excavations or slopes. Soil nail walls can be a temporary measure for support of excavation or structural underpinning, or they can function as permanent retaining walls or slope stabilization systems.

Secant and Tangent pile walls can be used for temporary support of deep excavations or to form permanent earth retention systems. Since pile installation creates minimal disturbance and the final product is a rigid wall, this technique is suited for dense, urban environments.

ANCHORS & ROCK BOLTS
For deep excavations, temporary soil and rock tieback anchors are also frequently installed in conjunction with sheetpiling and soldier beam and lagging walls. Permanent tiebacks are used extensively in marine bulkhead construction or upgrade and are effective in increasing the factor of safety against overturning for structures subject to wind, seismic or buoyant forces.
ROCK PROTECTION

Rock bolts, together with a durable, protective wire mesh cover, provide a cost-effective approach to stabilizing existing, exposed weathered rock faces and deep open cuts made to facilitate new construction in limited space. The rock bolts serve the dual purpose of stabilizing large blocks of rock on the face by transferring loads to the stronger interior mass while providing anchorage for the wire mesh cover.

GROUND MODIFICATION METHODS

Permeation and jet grouting can be viable alternatives, or supplements, to traditional earth retention techniques for sites that are not amenable to other installation methods or the support is required in a restricted space.

Ground freezing is an effective means of excavation support in the sinking of deep shafts. The peripheral frozen cylinder performs the dual functions of groundwater control and earth support, allowing shaft excavation without the need for internal bracing and sheeting.

The Moretrench Advantage

- Multi-system capability
- Economic turnkey solutions
- On-line construction capability
- Design-build capability

Site-specific Solutions for

Support of Excavation

- Temporary & Permanent Earth Retention
- Slope Stabilization
- Increased Lateral Restraint of Excavation Support
- Stabilization of Exposed Weathered Rock

1. Anchored beam and lagging excavation support to protect existing spillway and sluice during dam rehabilitation, Russellville, AL
2. Secant pile wall excavation support, Boston, MA
3. Post-tensioned rock anchor installation through soldier pile and cast-in-place concrete wall for interchange reconstruction, Boulevard of the Allies, Pittsburgh, PA
4. Anchor installation for new bulkhead, Sheepshead Bay, Brooklyn, NY
5. Permanent soil nail wall for support of deep excavation in tight, irregular space, New Brunswick, NJ
Deep foundations are required for new, heavily loaded structures to be located where poor bearing soils are present at shallow depth, for existing shallow foundations subject to increased loading due to structural upgrade or heavy machinery installation, and for structures subject to uplift forces or seismic loading. Moretrench offers a variety of deep foundation options to meet project design and construction requirements.

PILING SYSTEMS

Micropiles are small diameter, reinforced, load transfer elements capable of supporting design loads in excess of 200 tons. Micropile foundation systems can be installed through almost any type of subsurface condition and through water. Low vibratory drilling techniques and sectional casing installation make micropiles well-suited to sensitive or congested sites with overhead restrictions.

Hollow bar micropiles are particularly suited to collapsible soils. The pile is formed by the high-pressure injection of cementitious grout through the hollow bar, which also serves as the drill string.

Helical piles are rotated into a stable bearing stratum until the necessary load capacity has been achieved. The pile is attached via a bracket to the base of the foundation wall to transfer the structural load to the pile.

Continuous Flight Auger (CFA) piles, also commonly called Augered Cast in Place (ACIP) piles, offer a number of scheduling and economic advantages over other deep foundation options under the right conditions. Installation is rapid, vibration-free, and can be accomplished in low headroom situations if required.
DRILLED SHAFTS (CAISSONS)

Drilled shafts, also known as caissons or drilled piers, are often the deep foundations of choice for buildings with high or concentrated column loads.

Mini-caissons are essentially large-diameter (12 to 24-inch casing), drilled micropiles, either rock-socketed or bearing on rock. In dense urban environments where the foundation system design must take into account the presence of underground structures within the building footprint, restricted or congested site access, and noise or vibration limitations, mini-caissons offer a viable alternative to drilled shafts.

The Moretrench Advantage

Wide range of systems for optimal foundations selection

Foundation solutions for all subsurface conditions

Minimal-vibration systems for sensitive sites

Low-headroom options for congested sites

Design-build capability

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Site-specific Solutions for

New, Heavily-loaded Buildings

Parking Decks

Bridges & Overpasses

Sound Barriers

Upgrade of Structures on Shallow Footings

Heavy Machinery Installation

Towers Subject to Uplift Loads

1. Augercast piling for new power plant construction, Queens, NY

2. Micropile foundations for denitrification facility, Ward’s Island, NY

3. Drilled shaft foundation installation for transmission line upgrade, New England

4. Large-diameter drilling for caisson foundations, New Stanton, PA

5. Micropile installation for transmission tower foundations, Queens, NY
Underpinning may be required to provide the additional foundation support needed to withstand increased loading, to halt ongoing settlement, to support existing shallow foundations prior to adjacent new construction, and for seismic retrofit. Moretrench offers several methods of structural and geotechnical underpinning. Selection of the most appropriate system is a function of the subsurface conditions and project requirements and constraints.

**STRUCTURAL METHODS**

Conventional concrete (pit) underpinning is accomplished from small, sheeted and braced pits constructed beneath the foundation to be supported. Although design engineers can choose from a number of above-grade underpinning techniques, there are circumstances—such as when new construction abuts tight against an existing building—where the conventional concrete underpinning method is often the best or only viable option.

Micropiles for underpinning can be installed through almost any type of subsurface condition, in confined space and low headroom situations, and through existing footings. Low-vibratory drilling techniques offer an advantage when working around sensitive installations.

Bracket piles are typically used in conjunction with earth retention work to support and/or stabilize existing foundations adjacent to a proposed excavation.

Soil nailing, while primarily used as an economic method of excavation support, can also fulfill an underpinning requirement and is advantageous when the excavation depth requires the underpinning system to be laterally supported.
GROUND MODIFICATION METHODS
Ground freezing offers a significant advantage for temporary underpinning of sensitive structures since the minimally intrusive pipe installation technique means that foundation soils, and thus the foundations themselves, remain largely undisturbed.

Permeation grouting and jet grouting offer viable alternatives to conventional structural underpinning in congested urban environments or restricted access and/or low headroom situations.

The Moretrench Advantage
Wide range of options to cater to any site requirement or project objective
Emergency response capability for control of structural settlement
Low-headroom installation capability
Design-build capability

Site-specific Solutions for
Structural Settlement Control
Additional Foundation Support to Withstand Increased Loading
Protection of Existing Shallow Foundations During Adjacent Excavation
Seismic Retrofit

1. Soil nail underpinning and excavation support for hospital expansion, Princeton, NJ
2. Post tensioned beam underpinning, Philadelphia, PA
3. Jet grout underpinning and excavation support for new construction, Morristown, NJ
4. Micropiles installed as bracket piles to underpin existing structure, West Nyack, NY
From sinkhole remediation to the mitigation of liquefaction potential, the field of grouting and ground improvement encompasses a diverse range of subsurface conditions and an equally diverse range of treatment methodology. With more tools in its toolbox, state-of-the-art equipment and in-depth expertise, Moretrench has the capability to handle any project from emergency response water control grouting to large-scale foundation soil treatment.

GROUTING METHODS

Jet grouting has a number of construction-related applications, including structural underpinning, groundwater control or cut-off, utility support, excavation support, soft soil stabilization, slope stabilization, and hazardous waste containment.

Compaction or low mobility grouting is commonly used for increasing bearing capacity, arresting or reducing foundation settlements, mitigation of liquefaction potential, sinkhole pretreatment or remediation, and stabilization of karstic formations.

Permeation grouting may be used to increase the strength and cohesion of granular soils or to decrease permeability (watertightening). Primary applications include soil stabilization for excavation support, utility and footing support, increasing stand-up time for soft ground tunneling, water cut-off, exclusion or containment of contamination, closure of windows in “bathtub” excavations, and sealing off of high permeability backfill.

Fracture grouting involves the intentional fracturing of the ground by high-pressure injection of cement-based grout to provide reinforcement and stiffening of the soil. When performed concurrently with underground construction
such as soft ground tunneling, fracture grouting has the specific design intent of providing a controlled ground heave to compensate for potential structural settlement. This application is referred to as compensation grouting.

Rock curtain grouting is the filling of fractures and fissures in rock to reduce permeability, strengthen or stabilize the rock, or both. The most common applications are to reduce water seepage and pressure beneath a dam, vertical cut-off, and to limit water inflow/stabilization of rock in tunnels or shafts.

Structural seepage grouting is the sealing off of flowpaths by grouting directly into defects (cracks, joints or open separations) in the floors, walls or roof of a structure.

Hot bitumen grouting is the injection of a fluid bitumen grout to plug high-volume water flow paths through rock formations. Candidates for hot bitumen grouting are quarries and dams.

GROUND IMPROVEMENT METHODS
Vibro-Compaction and Vibro-Replacement (stone columns) are effective methods of site improvement to allow spread footing and other shallow foundation construction, reduce settlement under individual or large areal loads, and mitigate liquefaction potential. Stone columns are also frequently used to permit rapid construction of large MSE retaining walls and highway embankment fills and to stabilize weak soils in waterfront areas to permit new marine construction.

Ground freezing can provide temporary or short-term ground improvement where site access, the presence of sensitive structures, or a complex subsurface profile precludes other techniques.

The Moretrench Advantage
Wide range of options to cater to any site requirement or project objective
Emergency response capability for control of structural settlement
Low-headroom installation capability
Design-build capability

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Site-specific Solutions for
Structural Settlement Control
Increased Loading
Protection of Existing Shallow Foundations During Adjacent Excavation
Utility & Footing Support
Rock Stabilization
Seepage Control
Water Cut-off
Sinkhole Remediation
Ground Improvement
Shallow Footing Construction
Soil Stabilization
Seismic Retrofit

1. Low mobility grouting for sinkhole remediation, Central Florida
2. Pressure testing of jet grouting equipment
3. Permeation grouting for groundwater cut-off, tunnel access shafts, New York City
4. Urethane grouting of slurry wall joints and tieback penetrations, World Trade Center, Manhattan, NY
The presence of man-made and naturally occurring contaminants continues to pose a significant challenge on chemical, industrial, municipal, landfill and civil sites across the country. While some contaminants can be treated relatively inexpensively, others may require a more labor-intensive approach. Together, Moretrench and its subsidiary Ground/Water Treatment & Technology (GWTT) provide a full range of environmental remediation services customized to the contaminant(s) encountered.

**Environmental Remediation**

**IN SITU SOIL & GROUNDWATER TREATMENT**

In situ treatment is used to resolve a variety of contaminant problems. **Air sparging**, often used in conjunction with **soil vapor extraction (SVE)**, enables hydrocarbons to transfer from a dissolved state to vapor which is then vented through the unsaturated zone. **Permeable reactive walls** are passive systems that allow groundwater to flow through specified treatment media. Contaminants in the groundwater react with the medium and are degraded, precipitated or absorbed. **Chemical oxidation** is a process by which oxidants introduced into the contaminated medium through a well or other method act to either destroy the contaminants or convert them to inert compounds.

**RECOVERY & TREATMENT**

Dual Phase Extraction (DPE) systems apply a strong vacuum to the subsurface through screened recovery wells. The technique simultaneously removes groundwater and free-phase petroleum hydrocarbons, which are then collected and treated.

**BARRIER TECHNIQUES**

Subsurface barriers constructed by slurry trenching techniques, jet grout curtain wall installation, permeation grouting and ground freezing, inhibit the flow of groundwater. Jet and permeation grouting are effective in preventing the movement of contaminant plumes. Ground
freezing may be used to provide perimeter earth support and groundwater control for the excavation and disposal of contaminated soils or to isolate an area from the surrounding hydrological regime.

**LANDFILL GAS & LEACHATE SYSTEMS**
Moretrench offers a range of design, installation and maintenance services for both passive and active gas collection and condensate and leachate collection.

**ODOR & HAZARDOUS VAPOR CONTROL**
Sub-slab depressurization (SSD) systems are a primary means of controlling odor and vapor intrusion within commercial and, in some cases, residential structures.

**CONTAMINATED SOIL EXCAVATION & REMOVAL**
The excavation and disposal of contaminated soils may be required as part of an EPA-mandated site clean-up or in conjunction with new construction. Moretrench has the capability of accomplishing the project objectives using techniques such as ground freezing, slurry trenching, dewatering, and various earth support systems.
Moretrench has maintained an office in the Tampa area for more than 60 years. A significant portion of its business is focused around the specialized earthwork, concrete construction, and facility maintenance needs of the region’s power, mining and manufacturing industries. Primary among these are phosphate fertilizer plants, phosphate and non-phosphate mining operations, electric utility plants, chemical plants, food processing and manufacturing plants, and the citrus industry.

**EARTHWORK & EXCAVATION**
Moretrench maintains a comprehensive in-house heavy equipment fleet and an experienced workforce capable of undertaking a diverse range of earthwork and excavation projects, including site work, gypsum stack closure and process water pond construction. Additional earthwork and excavation projects undertaken by the Tampa office include mine reclamation and mine support; dam, dike, and levee construction and maintenance; drain installation; and drainage ditch construction and maintenance.

**INDUSTRIAL PIPING**
Moretrench offers piping fabrication, installation, maintenance and repair services to a range of industrial clients. Services include underground piping and utilities installation; circulating water line installation; above-ground process and transfer piping installation and repair; transmission conduits; pump stations and booster pump stations; code welding; and boiler repair.

A 24-hour emergency response network, maintained on standby alert, ensures rapid response and assistance to industrial and power company clients in maintaining critical round-the-clock operations.
CONCRETE WORK
Moretrench’s management and skilled craftsmen, along with onsite batching and mixing capability, allows the company to undertake a wide range of concrete work including poured and precast foundations; intricate concrete multi-surface pours with precision placement; multi-level pump stations and docks; elevated floors; trench, ditch and basin liner placement; retaining walls; vaults; and duct banks.

MECHANICAL WORK
Moretrench also offers a wide range of mechanical services. These include design, fabrication and installation of a variety of industrial and processing plant structures; demolition, relocation and refurbishment of existing structures; and custom welding and metal fabrication.

The Moretrench Advantage

Extensive Power & Mining Industry Experience

24-hour Emergency Response Capability

Design-build capability

Installation, Maintenance & Repair Services

On-site Batching & Mixing Capability for Concrete Work

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Site-specific Solutions for

Gypsum Stack Closure

Dam, Dike & Levee Construction

Large-scale Earthwork

Industrial Piping

Precast Foundations

Underground Concrete Structures

1. Installation of HDPE process pipe for phosphate plant upgrade

2. Power plant process piping installation

3. Installation of power plant circulation water piping

4. Site preparation for gypsum stack expansion

5. Permanent relief well system
As a geotechnical contractor, Moretrench specializes in a field unique among engineering disciplines. The results of our work rarely see the light of day, yet it is this work that paves the way for much of today’s new construction.

With the weight of the project sometimes literally bearing on what we do, experience is paramount. From engineers and project managers to shop personnel and field crews, Moretrench has the experience, and the expertise, that our clients not only need but have come to expect from us. And we meet those expectations on every jobsite—technically, safely and economically.

Moretrench is founded on an 85-year history of sustained growth, reliable performance, and product quality. Our full-service offices have access to a breadth of resources unparalleled in geotechnical construction. We promote a corporate philosophy that emphasizes safety as much as service. And we share a commitment to the future grounded on the values of the past.

Whatever, or wherever, the challenge may be, Moretrench has the technology and the people to deliver the optimum solution. Our reputation has been earned through quality and service. That’s a reputation you can build on.