

**ON LOCATION**
**DIRECTIONAL DRILLING**
**GRUNDODRILL 4X**

## Compact Directional Drilling Pulling Its Weight for Q3 Contracting

As part of its system maintenance program in Colorado, Xcel Energy is in the process of replacing a significant portion of its existing underground electrical conductor and conduit. In addition, the utility is also upgrading and replacing existing gas service line infrastructure in Denver and surrounding areas. Minnesota-headquartered Q3 Contracting has been utilizing compact directional drilling to install those electrical conduits, conductor and gas services throughout Colorado.

Q3 Contracting General Manager Jaeson Osborn says the use of compact HDD units has been very successful for these installations. He said, “The compact drill works very well in these backyard and rear easement installations. They helped us save time on projects and reduced restoration costs.”

Q3 Contracting has been in business for 20 years and has offices in Minnesota, Colorado, Iowa, North Dakota and Wisconsin. Q3 provides comprehensive services to various utility companies, including gas and electric distribution, directional drilling, streetlight construction, subsurface utility engineering, hard and soft surface restoration, right-of-way restoration, stormwater management, temporary traffic control, permanent sign installation and oil and gas transmission installation and repair. Its labor force totals over 600 employees nationwide.

For portions of the electrical and gas installation program, Q3 Contracting is utilizing Grundodrill 4X compact directional drills from trenchless equipment manufacturer TT Technologies, Aurora, Ill.

### Safety and Training

Q3 Contracting is committed to creating a safe work environment on every project. That

begins by establishing standards of performance consistent with the company’s commitment to continuously improve its processes of operation.



The Grundodrill 4X offers 9,800 lbs. of pullback and thrust.

Osborn said, “As a company, we constantly strive to achieve a higher standard for the benefit of our employees, customers and communities. Safety and training play a huge roll in that. We try to incorporate mechanisms or routines that improve safety at every level whether it’s daily jobsite safety evaluations, ongoing employee qualification and safety training, or weekly safety meetings. Safety is part of the culture at Q3.”

Q3 Contracting’s Employee Training and Development Program takes that one step further. The program is designed to assist the educational and skill development of employees; with the objective of being a safer more productive work environment.

### PROJECT PROFILE:

**Contractor:** Q3 Contracting

**Location:** Colorado

**Equipment Used:** Grundodrill 4X compact directional drills

**Specifications:** The Grundodrill 4X is being used for electrical distribution conduit and conductor installation, as well as gas service line installation.



Crews are mainly replacing existing steel and PVC services. Typical installations average 40 to 50 feet in length and ¾ inches in diameter.

Osborn said, “We want each employee to meet or exceed our customer’s requirements and expectations. We also want to be sure that all employees have the tools they need, in terms of training, to be safe, as well as efficient in their jobs. Individual accountability is the main component in all training.”

#### Compact HDD

According to compact HDD specialist Bill Brennan, TT Technologies, while compact style drills have been around for the better part of 15 years, much progress has been made in the function and capability of these machines. Brennan said, “The technology itself has been refined over the years and the machines have a smaller footprint and more power. On the 4X, we’ve developed what we call SmartVice™ technology that simplifies the drilling process by performing different aspects of the vice cycling routine automatically, all under the control of the operator.”

Typically compact rigs are defined by their size. They are relatively lightweight and smaller than standard sized drill rigs. They can work in tight, residential areas. They also tend to be about 36 inches in width so they can fit through a standard yard gate. Portability is another factor. Most compact drills can be legally towed behind a 1-ton truck.

According to Brennan, what the drills are used for also can help define compact HDD. He said, “They are usually doing service installations or FTTH projects. For the most part, compact drills are used for pulling in pipe under 6 inches in diameter at lengths under 500 feet. Finally, they can be categorized by power as well. Some consider drills under 20,000 lbs. of pullback to be in that compact category, for others it’s under 10,000 lbs. You can even take that a step further and sub-categorize compact

drills that offer 5,000 lbs. of pullback and less. The Grundodrill 4X offers 9,800 lbs. of pullback and thrust.

“The benchmark is 500 feet. That’s usually the maximum distance. Although a lot depends on soil conditions and pipe diameter, so distances may vary. The depth also varies depending on the requirements of the application and what area of the country you’re in and the conditions you’re dealing with”

For Q3, one of the biggest benefits of the compact drill on utility projects is the ability to operate in tight working conditions. The drill has a small footprint and a low environmental impact. Plus it’s a trenchless application and that further reduces the impact on lawns, sidewalks and roadways.

#### Electric and Gas

Q3 Contracting’s work with Xcel Energy in Colorado includes electrical distribution conduit and conductor installation, as well as gas service line installation. According to Osborn, utilizing the compact directional drill for these utility installations has been very productive and efficient.

Osborn said, “Basically we have to go in between transformers and replace the span between the transformers and switch cabinets. The conductor that was put in 30-40 years ago has started to come to the end of its functional life cycle and we’ve been contracted to replace it. The conductor was originally installed underground and its remaining that way. The lines are usually in backyards, rear easements.

The installations Q3 Contracting are performing vary between direct bury and conduit. In either case, crews utilize a compact directional drill to either pull in the conduit or directly install the conductor in the ground. For projects that include installing the conductor inside the conduit, crews will blow in a string after the conduit is installed, pull in a line and then pullback the conductor with a cable puller. For these projects, Q3 utilizes a two-man crew for drilling operations. A pothole crew works ahead of the drill crew to excavate pits and pothole adjacent utilities.

Conduit sizes range between 2 and 4 inches in diameter with typical pull lengths of 300 feet. Osborn said, “Span lengths are closer to 500 or 600 feet, so the 300-ft pull cuts that in half. We’ll set up in the middle of the span, drill out to transformer and pull back. Then we’ll turn the machine around and drill out to the other and pull back. That allows us to minimize the number of pits. If we’re pulling 2-inch conduit we’ll use a 4-inch reamer. For 4-inch conduit, a 6-inch reamer is used. Total pulling time for one 300-ft pull ranges between 3-4 hours.”

On the gas side, Q3 is using compact drills for service line installations. According to Osborn, crews are mainly

replacing existing steel and PVC services. Typical installations average 40 to 50 feet in length and ¾ inches in diameter. Like the electric work, Q3 uses two-man drill crews to install the new service. Once the new service is installed, the drill crew moves on to the next installation. Another crew follows and completes the service tie-in.

Ground conditions can significantly affect machine operations. Osborn said, "Soil conditions can vary greatly for our projects. We see sand, clay mixture, cobble. The clay is horrible; we have to use a lot of drilling fluid. We use the onboard 225 gallon bentonite system and carry another 500 gallons of fresh water."

Brennan said, "Despite some of the challenging conditions they face in the Denver area, Q3 crews are really demonstrating the efficiency and effectiveness of compact directional drilling. The crews are well trained and safety and productivity oriented. They are great to work with, bottom line."



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## What to Look For In a Compact HDD:

According to compact HDD specialist Bill Brennan, there can be quite a few differences between compact directional drills and contractors should look at a variety of things before purchasing or renting these units. Brennan said, "Some undercarriages are not as strong as others. The undercarriage can be considered the frame of the machine. And without a sturdy frame, you're obviously not going to have a sturdy drill."

"Thrust power and carriage speed determine the amount of work that can be performed in a given amount of time. In some cases the thrust power of the machine may determine whether or not the drill may even complete the job. And rotation speed needs to be 200 rpm or greater for the machine to do an adequate job of effectively backreaming. In addition rotational torque should be in excess of 1,000 ft. lbs. in order to have enough power to turn the reamers typically used with compact drills."

Brennan also said that the drill system should be small enough to tow behind a 1-ton truck and should be small enough to work in tight spaces, on lawns and between structures, without doing damage to turf or pavement. And an appropriate anchor system is essential.

He said, "Power is not of any benefit if it cannot be delivered to the drill head. Lightweight drill frames must be secured to the ground even more so than larger, heavier drills since their power to weight ratio may be greater than the bigger machines. Without being adequately anchored to the ground the machine tends to push itself back instead of thrusting the drill head forward when redirecting the drill."



2020 E New York Street • Aurora, IL 60502 • 1-800-533-2078 • 1-630-851-8200 • FAX 1-630-851-8299

www.tttechnologies.com • E-mail [info@tttechnologies.com](mailto:info@tttechnologies.com)

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