
CONSTRUCTION DRILLING

# Reverse Flood Drilling


# REVERSE FLOOD DRILLING

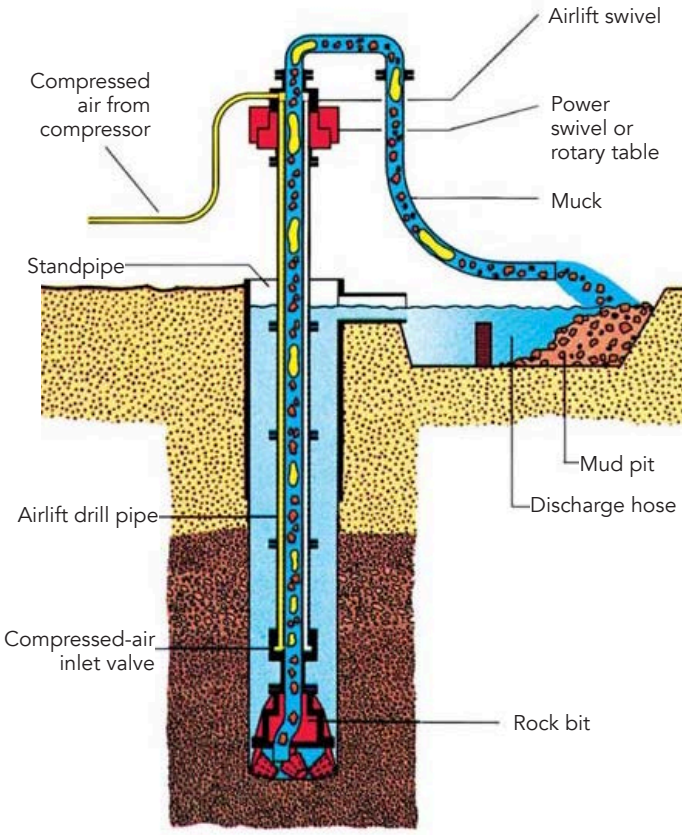
**The reverse flood drilling method with rotary head is a straightforward and effective way to drill large-diameter deep holes, on land and off shore. Because the hole remains flooded it is a very stable method in unforgiving rock formations.**

Compressed air is injected into the drill pipe below water level into an air chamber at the cutter head. As the air rises and expands within the drill pipe, the density in the internal liquid column is reduced.

The higher density of the water column outside the drill pipe causes the overburden and drill tailings to pass from the shaft, through the cutter head and rise up through the drill pipe. The tailings are lifted to the surface with the help of the rising air.

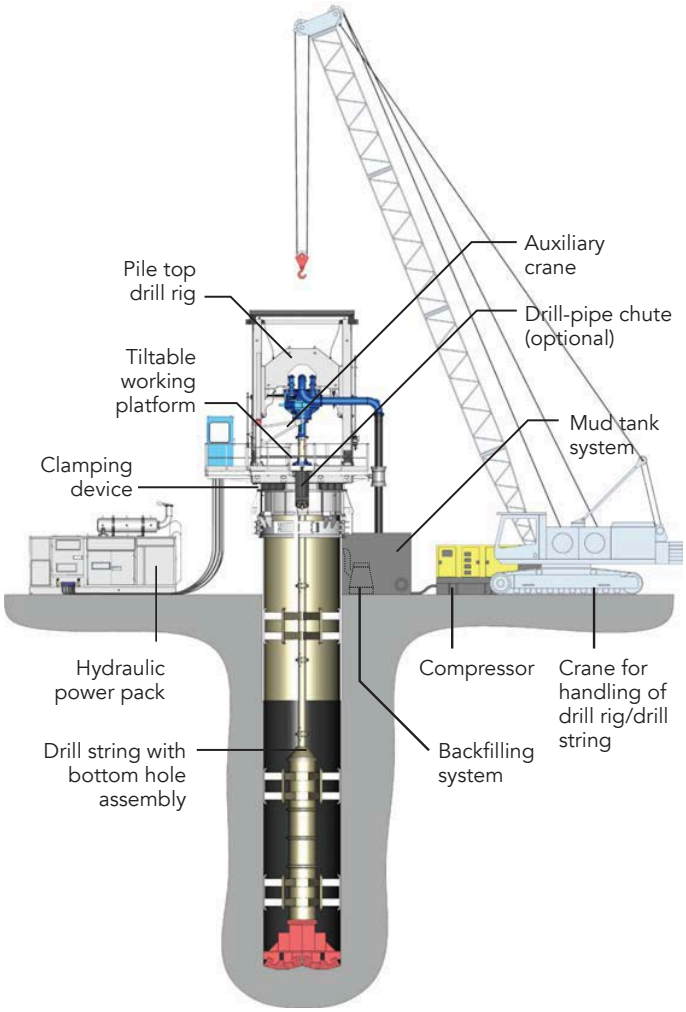
Construction Drilling utilizes a Wirth PBA 612 pile top drill rig when reverse flood drilling. We have been successful installing shafts from 50" to 72" in diameter, up to 300' deep.

For large-diameter deep drilled shafts, we primarily use rotary bits as we find the rotary method to be the most stable, non-aggressive way to install drilled shafts. With the rotary head reverse flood method, no air is introduced to the rock formation.



# EXPERTS AT YOUR DISPOSAL

**Construction Drilling is your first choice for reliable pile top systems for onshore and offshore applications. Cost efficiency and outstanding performance are the key factors that make us stand out from the competition. Our experienced specialists provide comprehensive advice on selecting the correct equipment for the individual site conditions – from the tender phase right the way through to project execution.**




Construction Drillings pile top drill rigs provide the most efficient solution when it comes to setting up deep and large-diameter foundations in hard rock. They have been successfully deployed in various applications, both onshore and offshore.

- Superstructures and buildings
- Drilling platforms, barges and jack-ups
- Harbours, jetties, dry docks and dolphins
- Bridges, piers and causeways
- Offshore wind farms
- Dam rehabilitation

The Construction Drilling PBA with the high torque power swivel is the ideal machine for hard rock drilling, applying the follow special methods:

- Pile rock socketing
- Hard rock drilling
- Anchor drilling
- Secant wall
- Overreaming
- Bell-out of the rock socket

PILING PROJECT:

# JOHNSONS ST BRIDGE REPLACEMENT PROJECT

Construction of a new Bascule draw bridge and related street and utility works, and the demolition of the existing bridge.


| | |
|---|---|
| Owner: | City of Victoria |
| Client: | PCL Civil Constructors Inc. |
| Contact: | Mark Donahue |
| Contract Value: | $7,500,000 |
| Duration: | 2014 |

**DRILLED CONCRETE PILES:**
1830mm diameter: 16 piles
1220mm diamter: 18 piles

**DRILLED FALSEWORK PILES:**
610mm diameter: 42 piles

## Installation of 4′ – 6′ diameter Piling / Caissons for the Johnsons Street Bridge and Promenade Retaining Wall.

Project is a design build based on indicative tender documents. The Bascule pier is supported on 1830mm Ø x 25mm wall casings up to 33m long installed through 18m of overburden and seated into 340mPa granite rock. A 7m deep open rock socket was completed below the casing tip. The bedrock profile is extremely undulating with grade differences of 2.2m across the diameter of the casings. Pipe piles were fabricated on site with cutting teeth installed on the tips. The 44 ton pipes were passed off to the 160 ton crane positioned on the work platform installed at the pier location. The cut-off elevation of the pier piles is 3m below low water. A specially designed reinforcing cage suspension bracket was utilized to support the reinforcing cage splicing and support during the concrete pour. All concrete was 45 mPa and tremie poured.

A Leffer LKG1-180 Spherical grab was employed to excavate the overburden and dumped directly into trucks for disposal.

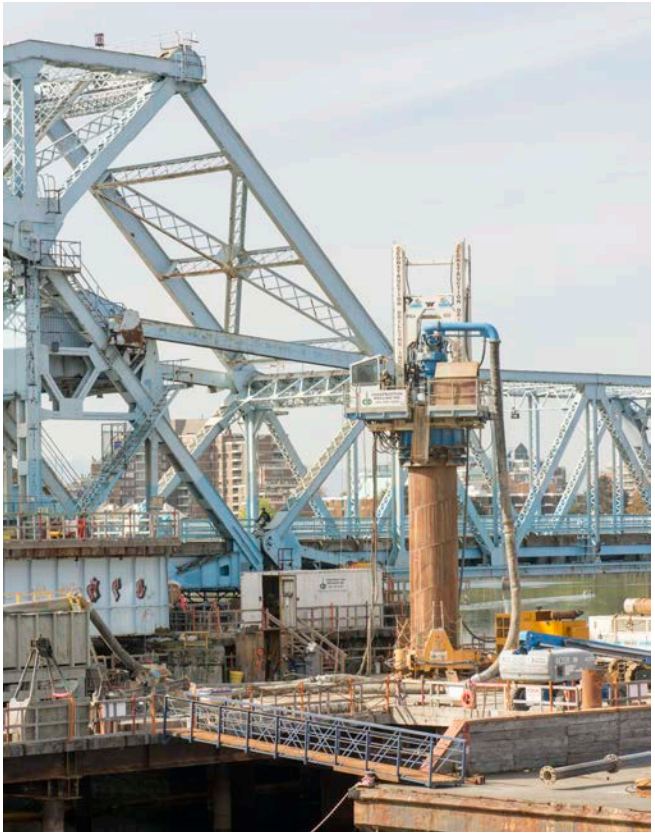
A Wirth PBA 612 Pile Top drill wvas utilized to seat the steel casing into bedrock and complete the 7m deep sockets. This is a reverse-flood drilling system with a closed loop discharge of the tailings into containment tanks. The tailings dropped out of suspension and the water was recycled back into the pile.

Installation accuracy during the pile installation was critical due to the installation method for the pier substructure. All piles were installed within 35mm of design position and within 0.5 degree of vertical.

The rest pier, intermediate pier and east abutment are supported on 1220mm diameter x 19mm wall piles drilled through overburden, seated into bedrock and completed with a 3-5m rock socket.  Reinforcing cages and tremie concrete completed each pile.

The 1220 diameter piles were installed with a Nissha RT150 rotator and Down-hole Hammer reverse-circulation drilling system. Tailings were dumped into water proof bins through the closed loop system. The rock sockets installed were reinforced as shown on the drawings.

Each pile was flushed with fresh water until clear and a complete video inspection was complete before permission was given to set reinforcing cages and tremie pour concrete.



PILING PROJECT:

# DAWSON CITY WASTEWATER TREATMENT PLANT

**A total of 4 – 2000mm diameter piles were required to support a new bridge structure for the Indian Sluice Bridge replacement project. Piles were installed with a Wirth pile-top drill and oscillator.**

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|---|---|
| Owner: | Dawson City |
| Client: | Corix |
| Contact: | Michael Baker |
| Contract Value: | $2,700,000 |
| Location: | Dawson City, Yukon |

**1270MM DIAMETER AERATION SHAFT C/W 965MM DIAMETER CASING:** 311 ft deep: 2 each


**The Dawson City Wastewater Treatment Plant (WWTP) project required the construction of two 95-meter-deep aeration shafts. Piles were 1270mm in diameter with a 965mm diameter casing, complete with a grouted annulus in between.**

Installation began with a 1372mm diameter oversized sleeve, 15 meters in length, installed to refusal with an APE Model 200 vibratory hammer. Once at refusal, the inside of the casing was excavated with a spherical hammer grab. Any boulders encountered were broken up with a churn bit to prevent obstructing the permanent pile installation.

The Wirth pile top drill was used to drill the rock socket the full depth of 95 meters. Great diligence and attention was required to ensure the shaft was installed perfectly vertical throughout its 311 foot depth. Verticality was measured the entire time with a hand level and every time a piece of drill steel was added with an inclinometer.

Once the drilled shaft was completed a 965mm diameter aeration casing was installed. The casing required meticulousness to be perfectly centralized the entire length of the shaft. The casing was pressure tested and then grouted into place.

PILING PROJECT:

# INDIAN SLUICE BRIDGE

**A total of 4 – 2000mm diameter piles were required to support a new bridge structure for the Indian Sluice Bridge replacement project. Piles were installed with a Wirth pile-top drill and oscillator.**

| | |
|---|---|
| Owner: | Nova Scotia Transportation and Infrastructure Renewal |
| Client: | Dexter Construction Company Ltd. |
| Contact: | Scott Orr |
| Contract Value: | $879,714 |
| Location: | Yarmouth, Nova Scotia |

**SUPPLY AND INSTALLATION OF 2000MM DIAMETER PERMANENT STEEL CASING PILES EMBEDDED 1M INTO BEDROCK:** 70m total

**1800MM DIAMETER ROCK SOCKET – 4M LONG EACH:** 16m total

**This project was initiated as an effort to replace an aging arterial bridge. Work consisted of installing 4 large-diameter pier piles, approximately 18m long each, into sound and competent bedrock, complete with a 4-meter-long rock socket. Piles were in an active riverway and required the construction of a temporary access berm to allow equipment within proximity.**

Casing was installed using a 2-meter casing oscillator, embedded a total of 1 meter into hard bedrock. A Wirth PBA 612 pile-top drill was then employed to drill a 4-meter-long rock socket using a reverse circulation downhole hammer system.

Since there were only 2 piles per pier, installation accuracy was of utmost importance. Piles were installed within 40mm of design position and under 1% deviation from vertical plumbness. Working in tandem with our client's field team, we were able to install reinforcing steel and concrete with no errors, ensuring a timely completion of the project.

# CONSTRUCTION DRILLING SPECIALIZES IN UNIQUE AND DIFFICULT DRILLING SOLUTIONS

Construction Drilling is a leading global provider of first-class drilling solutions and services designed to offer our valued clients with the safer, more efficient and reliable alternative. Our company vision is centered on an unparalleled commitment to quality and yielding economic advantages for our customers and stakeholders.


**www.condrill.ca**

**info@condrill.ca**

British Columbia
**250.746.4408**
2958 Boys Rd,
Duncan, BC V9L 6W4

Alberta
**780.955.9445**
1711-9 Street,
Nisku, AB T9E 0R3


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