

# Rock Boring in REMOTE BRITISH COLUMBIA

By Laura Anderson



**R**emote Ormond Creek runs just north of Fraser Lake in British Columbia. The surrounding region is valued as an ecologically sensitive and premier recreation area connected by Yellowhead Highway 16.

Part of a large natural gas pipeline project, a crucial 90 m, 1,200 mm crossing under Ormond Creek was designed for guided pipe ramming as the most suitable method that adhered to the project's stringent environmental standards. After the borehole was established and casing installed, a fusion bonded epoxy coated 1,200 mm carrier pipe would be slick bored through the ground using an auger boring machine (ABM).

Subcontractor The Tunneling Company, a division of The Crossing Group head-

quartered in Kamloops, was responsible for pipe installation on this crossing. The Tunneling Company, formerly Kamloops Augering & Boring Ltd., has over 40 years of expertise in tunneling, auger boring, and pipe ramming.

Unexpectedly, bedrock was revealed on both sides of Ormond Creek when the subcontractor embarked on pit construction. Evident that the project scope had changed, an alternative methodology needed to be pursued.

Elliott Brown, vice president of operations at The Tunneling Company, explains, "The bedrock ground conditions were unknown during the design phase of the crossing, and to consider any other methods, a new design would be necessary to increase the cover between pipe crown and creek bed."

All parties viewed a project redesign and rerouting of the existing pipeline on both sides of the creek as unfavorable.

The pipeline contractor, project owner, and The Tunneling Company put their heads together to explore other method-

ologies to maintain the existing design. Horizontal down-the-hole hammering and microtunneling were considered technically feasible.

"Approaching the crossing using horizontal down-the-hole hammering ran the risk of creek disturbance through air loss if the rock formation tapered off under the creek," Brown said.

A microtunneling system equipped with a disc cutter head could excavate and process the rock, but a short run in a remote area was cost prohibitive and required a much more invasive construction footprint. In addition, "The annular lubrication used to reduce jacking forces and aid in the excavation in a microtunneling operation has the potential to frac out if the bedrock contained fissures or cracks that could seep into the creek," said Brown.

In the end, both options were inconsistent with the project's environmental requirements because of the likelihood of disruption to the circulation in the water body.



Rock boring is a trenchless technique to install steel casing that uses the same means and methods of auger boring; however, the cutter head and tooling are purpose-built for rock and mixed ground

applications. Rock and mixed ground cutter heads are available and capable of up to 25,000 psi UCS rock conditions.

#### RBU Key Advantages

- Use any auger boring machine to install up to 24, 30, 36, 42, and 48-in. steel casing
- Robust design with high-capacity thrust load disc cutters to aggressively fracture rock into cuttings
- Cutter head rock scrapers assist in transferring cuttings away from the face to the inlet cavity, to the augers for removal

- Fluid connection ports for cooling the bearing assembly for longer life and cleaning the disc cutters in clay/silt ground conditions.
- RBUs are inventoried and available for global sales with rental options in North America

**Outside Diameter** 24, 30, 36, 42, 48-in.  
**Ø of Disc Cutters** 6.5-in.  
**No. of Stabilizers** 4  
**Water Jetting** Standard  
**Length** 36.5-50.38-in.  
**Weight** 2,200-7,380 lbs.

#### FAR LEFT:

The Tunneling Company's RBU 48 completes a 90m (295-ft.) crossing under Ormond Creek in bedrock.

#### CENTER:

Despite a change in conditions, the chosen methodology allowed the subcontractor to pursue installation with the original design without disrupting Ormond Creek.



As a longtime Akkerman customer, The Tunneling Company turned to Akkerman to explore their auger boring rock solutions and narrowed in on the Rock Boring Unit (RBU). It's available in a range of common steel casing diameters for pipeline and infrastructure work. When paired with any manufacturer's auger bore rig, the RBU 48 utilizes 18, 165 mm roller disc cutters on its cutter head, a high-capacity main bearing, water-jetting, and muck scrapers to excavate uniaxial rock strength up to 25,000 psi UCS.

Viewed as the most advantageous and cost-effective method to proceed with the original project design and still mitigate risk to Ormond Creek and its ecology, the RBU was selected as the prevailing choice. "The RBU was chosen for its ability to core through solid rock conditions without introducing the potential for a release of foreign contaminants into the water body," Brown explained.

The paired auger boring system could deliver the necessary torque to advance the RBU in rock conditions for 90 m

(295 ft.) without fatiguing or damaging the drive train when rotation was disengaged. The contractor selected their Michael Byrne Mfg. 72/84-2.4 ABM.

If required, the pipeline contractor had dewatering pumps and treatments on standby as a contingency for water ingress.

After launch pit construction was complete, crews set up their ABM in early August 2022. They welded the outer casing of the RBU to the lead section of the sacrificial steel casing and connected the RBU to the auger string.

The RBU was advanced using thrust provided by the auger boring machine to penetrate the rock. The RBU's outermost disc cutter excavated a minimal overcut, and the innermost created microfractures between the disc cutter paths. Scoops on the cutter head periphery transfer up to 150 mm particles from the inlets on the cutter head into the auger string for removal. Stabilizer pads on the outside of the RBU maintain a concentric cutter path and provide the ability to make minor steering corrections along

the bore path.

The RBU design allows the operator to introduce jetting water to cool the main bearing and assist with material transfer from the RBU cutter head to the auger string. The feature results in extended performance and reduced cutter head wear.

Casing installation production rates varied, but the most productive shift installed 12 m of pipe in eight hours.

After all lengths of the sacrificial casing were welded and installed, the final step was to slip-bore the coated carrier pipe through the cored rock.

"The RBU provided a clean borehole, so when the final carrier pipe was slick bored, no coating damage occurred, ensuring the long-term reliability and integrity of the gas line," Brown asserted.

Construction on the crossing using the original design was completed safely, efficiently, and effectively on Aug. 22, 2022, without adverse environmental impacts.

**Laura Anderson is internal communications director for Akkerman Inc.**