

LOOK OUT BELOW

The most ambitious avalanche mitigation project in the western hemisphere is being constructed by Local 68 members

By Lisa Pranger





STANDING 1,800 FEET ABOVE THE Trans Canada Highway, one can't help but feel awe. All around stretch the Rocky Mountains—one of North America's natural wonders. Below stretch rows and rows of intricate snow nets—engineering wonders designed to keep the ribbon of road clear and safe for travellers from the awesome power of the mountain snow.

A nanny goat and her kids scamper nearby, seemingly oblivious to the fact that one misstep could lead to death. Beside them, Local 68 members employed by BAT Construction Ltd. clamber up and down the slope, drilling holes and setting anchors for more snow nets. They're installing an avalanche snow net system in the Rogers Pass Area of Glacier National Park near Revelstoke, BC. It's one of the largest avalanche mitigation projects in the western hemisphere—and one of the most amazing job sites in Canada.

A HELICOPTER WHIRS BY, WHIPPING up dust and gravel and hurling it back as it transports equipment back and forth from one end of the site to the other. The site is accessible only by helicopter and the conditions on the slopes are extreme.

Few companies have the resources and know-how to tackle such a project. But BAT Construction Ltd., a drilling and shoring company based in southern BC, does.

Members employed by BAT are no stranger to challenging tasks, having worked on

high-angle projects throughout western Canada and Ontario. "I've been a driller since I was 18," says Mike Coulter, a grizzled veteran of the trade. "I've been on a lot of jobs, but this project is the most challenging. It's one of the most difficult ones in the world. That's why I came here, actually. It sounded interesting. The area we need to cover is steep. It's two kilometres wide, and one kilometre high."

The mountains near Revelstoke get some of the deepest snow in Canada, making them a hotspot for skiers looking for adventure. But deep snow packs on the side of shear slopes are the perfect recipe for avalanches. And the slopes on the sides of this part of the Rockies are particularly bad.

For six decades, Parks Canada controlled avalanches by calling in the military to pummel the slopes with 105 millimetre howitzers. This created controlled slides and prevented catastrophic avalanches, which could have blocked the Trans Canada Highway and nearby railway lines.

But constantly shooting the rock weakens it, making it even more prone to avalanche. So Parks Canada looked to Europe to find a better solution. Manufacturers in the alpine nations of Switzerland, Italy, and Austria fabricate specially engineered snow nets designed to break up the snow pack and prevent it from getting enough momentum to slide.

BAT hired Geobrug, based in Switzerland, to design and fabricate the snow nets, and Alpine Solutions Avalanche Services to design

the layout of the nets in compliance with Swiss guidelines; the governing legislation for avalanche snow net installation.

Since the angle of the slope and the density of the snow packs are both greater than typically seen in Europe, the Canadian project has pushed Swiss practices and guidelines to their limit. The Rogers Pass snow net system is one of the most complex in the world. By the winter of 2017, 2,000 metres of netting will be installed on three separate snow paths—known as Cougar Corner 6, 7, and 8.

WHEN BAT EMPLOYEES FIRST ARRIVED at the mountain site, there was no place to land the helicopter. Workers practiced hovering exits and entries for the first few days while the helipads were constructed.

“The helicopter would hover above the ground and we would crawl out of it with all our gear on,” says Brad Sandry.

Due to the terrain and trees, the closest place to perform hovering exits and entries was on a ridgeline farther up the mountain.

“We would have to climb up a 600-foot rope and then hike for two hours to get out of

“The helicopter would hover above the ground and we would crawl out of it with all our gear on.”

there at the end of the day,” says Mike.

Workers first needed to clear an area on the mountain slope to construct two helipads and three equipment pads on the side of the slope.

They also carved a steep path—fit more for goats than people—down the side of the slope so that they could walk the 250 metres from the top helipad to the lower helipad.

BAT also employed Canadian Rescue Services to supply equipment and certified experts to look for unexploded ordinance within the construction area. Local 68 members assisted to ensure the search area was free of hazardous rocks while CRS performed their technical sweep.

“It was like a weird Easter egg hunt,” says Brad.





Mike Coulter



Mathieu Robitaille



Brad Sandry

“We found a lot of shrapnel and tips, but we didn’t find any unexploded rounds,” adds Mike. “They’ve been shooting the slopes since the 1950s, and they said there were only three unexploded shells on record. They probably slipped to the bottom.”

Before they could begin installing the nets, BAT brought in a subcontractor to clear trees from the slopes.

In certain areas, shrapnel from the shells was embedded in some of the trees, making it more difficult to cut through them.

Finally, workers needed to scale the loose rocks off the side of the mountain.

“Some of the rocks up here were the size of houses,” says Mike. “We had to put air bags behind them and pump them up to 30 tonnes to move these massive rocks.”

Due to the difficult terrain and poor weather, it took longer than anticipated to get the site ready to start drilling.

“The design and the timelines were based on data from a 3D scan of everything,” says Jenna Zdunich, a geotechnical engineer on the site. “Once you get there, you just realize how much different it is.”

But certain aspects of the project had to be finished before winter.

“It’s all or nothing for each slide area,” says Darren Wiebe, the project manager with BAT.

The goal had been to complete all three slide paths in one season. But the weather did not cooperate. Work often had to halt due to rain and high winds, so while Cougar Corner 7 and 8 are completed, the final anchors and all the nets on Cougar Corner 6 will be installed next year. Parks Canada will continue their controlled blasting of 6 this winter.

EVEN WITH THE PRESSURE OF impending weather, this isn’t a job that can be rushed. Everything must be done thoughtfully and carefully. One misstep and you could die—or kill someone beneath you.

“We work a 12-hour day and you’ve got to be on all day long,” says Mike. “It’s that type of environment.”

For the workers on the slope, each day brings a series of challenges. The first is the terrain. The slope is so steep that in many areas the workers and their tools are on ropes. Even when a rope isn’t needed, the men clamber laboriously up and down the site, hauling packs that weigh up to 40 pounds and tools that weigh up to 55 pounds.

“We’ve all lost weight, that’s for sure,” laughs Mike. “You’ve got to be in shape for this job.”

The first team to go in to each area is the layout team.

“Layout is the measurement of everything we want to set up—all the points for the drillers,” says Mathieu Robitaille, a rope access technician from Montreal. “It’s also making sure that everything is at the proper

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Jenna Zdunich



One of three equipment pads

measurement. The measurements we get are on paper but the paper is flat, and the mountain is a whole mess of nature. We work with the engineer and get pre-measured cable that gives us an idea of the structure, and then we play with the level of the mountain.”

Sometimes, changes need to be made to the plans when paper doesn't line up with reality.

Once the area is planned out, drillers go in and drill holes that are 6 to 21 feet long.

The drills, weighing 1,100 pounds each, must be hung on winches. The drillers need to operate the drill while at some awkward angles. When you drill straight into the ground, gravity is working with you. Here, it is working against you. And if a worker or a drill isn't secured properly, it's a long way to the bottom.

After a series of holes is drilled, anchors are installed into them and grouted in place. Each anchor is made of wire cable, is 14- to 16-feet long on average, and weighs over 100 pounds.

WHILE THE DRILLERS, INSTALLERS, and layout team work on the slope, Nick Power makes grout from a small perch half way up the site. On this tiny pad he mans a 1,200 pound grout plant. Nick takes samples of each batch of grout so that it can be tested to ensure that it is the required strength and will hold the anchors.

To make grout, you need cement and water—both of which have to be flown up by the helicopter and carefully placed on an area of the pad the size of a pallet. The loads of water weigh 2,500 pounds, and Nick must guide the pilot in placing the load in the correct place.



PROJECT STATS

Overview

- Flight hours: 375
- Crew loads/ passenger flights: 670
- External loads/ long line: 695
- Busiest flight day: 8.9 hours, with 10 passenger loads and 48 external loads
- Approximate weight flown externally: 1,531,000 lbs
- Tailgate/safety meetings: 135
- Pre-job safety inspections: 267
- Site safety orientations: 115

Cougar Corner

The area of Glacier National Park where the avalanche mitigation system was installed is called Cougar Corner, and it overlooks Cougar Valley. The project was completed in three separate snow paths known as Cougar Corner 6, 7, and 8.

Cougar Corner 6

- 718 anchors will be drilled and installed
- 977 metres of nets will be installed

Cougar Corner 7

- 554 anchors drilled and installed
- 540.5 metres of nets installed

Cougar Corner 8

- 259 anchors drilled and installed
- 419.5 metres of nets installed

In addition, 96 rock bolts will be installed to pin large rock masses that could compromise the nets in the future.

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The helicopter, flown by the highly-skilled pilots of Coldstream Helicopters, is key to the project. It picks up tools, supplies, and hoses on one end of the site and brings them to where they will be used. The pilot is 150 feet above the load, and has to constantly manoeuvre the helicopter to keep it straight and steady.

The crew members attaching and unhooking loads do so with speed and efficiency—in spite of being pelted with dirt and fighting the chopper’s strong air currents.

Once the anchors are installed, pre-assembled sections of snow nets are flown into place via helicopter. Once they are secured, they are checked to ensure they meet the specifications. The installed snow nets project over the slope in long shimmering rows—ready to meet

the first snowfall.

With all of the crews (scaling, layout, drilling, anchor installation, anchor testing, snow net installation, quality control inspection) working concurrently, ensuring that the teams don’t dislodge rocks onto each other is a top safety priority. Daily meetings are held to coordinate activities to avoid having crews working above each other. Throughout the day, continued coordination takes place.

“We constantly shift activities to avoid having people work above each other,” says Darren Wiebe. “This is one of the primary challenges; having all phases happening at the same time without workers working above each other.”

As an extra precaution, spotters, equipped with radios and air horns, watch closely and sound the alarm when rocks begin to fall.

“People on the top of the hill have just as much stress as the people





Drillers on Cougar Corner 6

on the bottom,” says Brad. “From 300 feet up, rocks the size of a small plum can kill you or cause serious damage.”

THE CHALLENGES ON THE HILL

couldn't be faced without the hard work of those who spend more of their time on the ground.

Jenna, a geotechnical engineer, is the quality control manager. She ensures every aspect of the work on the slope is correct. That means ensuring every one of the 1,500 anchors are installed correctly, keeping inventory, and consulting with the engineers at Geobrugg when the needs of the project exceed their guidelines.

Alfie Pyle is a member of the lay-down team. He's the main mechanic and handyman and oversees the modifications, repairs, and even the design of all the gear.

“I've been in the drilling business most of my life, so there's not too much about drilling that I don't understand,” says Alfie. “I value the tools as though I have to use them myself. And as long as the guys who are working with them are happy, the tool does what they want it to do without them fighting it, that's good.”

He often modifies the gear to make it more user friendly, including the drills, which he installed wheels on

so that the drillers can haul them up and down more easily.

Simon Hall, employed by BAT's parent company A.L. Sims & Sons Ltd., is the site safety manager. He ensures workers remain safe and that the site follows the stringent environmental rules set out by Parks Canada. While this site is challenging, he has a long background in remote, difficult sites to draw on.

“I've worked with helicopters in far more remote areas,” says Simon. “I've worked in the Arctic for two years, with far worse weather conditions, but the fact that these guys are on rope all the time, that's something different. That and trying to mitigate rock fall hazards or guys working above each other.

“The other thing that I think is challenging is that it doesn't tend to be the obvious hazards that hurt people. It's the small things—sunburns and the dust in the eye and that sort of stuff. It's also a challenge to fight complacency.”

When you are in such a high-risk environment, the safety meetings can become very repetitive. But Simon and Al Haines, the superintendent with BAT, work to ensure that the crew stays on their toes.

The other wrinkle in the project is that it is within a park. There

ABOUT AVALANCHES

Avalanches are usually caused by heavy snowfalls, wind, human activity, vibrations or movement, steep slopes, layers of snow, and warm temperatures. Loose snow and slab are two of the main types of avalanches.

Loose Snow Avalanches

Occur when unpacked snow begins sliding down the hill, fanning out as it moves downhill. They rarely cause significant property damage.

Slab Avalanches

Are responsible for 90 percent of deaths. They often occur when a strong layer of snow sits above a weak layer. Cracks begin to form in the weak layer of snow, chunks begin to break away, and the avalanche begins.



is a long list of rules to follow, and Simon helps ensure they do so. The crew must use compressed air rather than dynamite to move rocks. They also must ensure they don't leave any garbage on the hill, avoid harming specific endangered trees, get off the hill by seven p.m., and avoid disrupting the traffic on the highway below.

Simon must report all animal sightings—a daily occurrence—to Parks Canada. In addition to the goats on the hill, there is also a neighbourhood bear to keep an eye on.

THE NATURE OF THE WORK and the tight timeframes mean that workers who are away from their families rarely get a chance to go home. Nick, whose wife just had a baby girl, finds this the hardest part of the project.

“A lot of guys have families,” he says. “Being away on these jobs, no matter what you're doing, you're going to miss a lot of things when your kids grow up—birthdays, first words, or when they start walking. But you got to do what you got to do. It's tough to see them grow up from pictures and videos because you can't always be there.”

Whether they're on the ground or on the hill, the close-knit team members rely on each other. As a relatively small group in a high-risk environment, far away from their families, they trust each other with their lives.

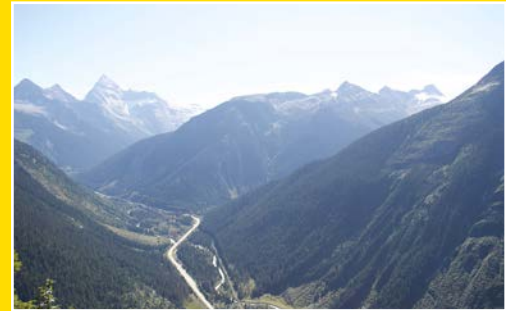
“The team that I'm working with right now are all highly skilled people with a lot of gumption and a lot of forward drive,” says Brad.

Al Haines and Lisa Pranger check out a completed snow net



AVALANCHE ALLEY

The section of Trans Canada highway that runs between Revelstoke and Golden through Rogers Pass is called avalanche alley for a reason. With 134 avalanche paths and 2,000 avalanche events per year, it's one of the most dangerous sections of highway in the country.



Every year, approximately 10 Canadians die in avalanches—most of them in BC. The most deadly avalanche in Rogers Pass in recent memory took the lives of seven Calgary teens who were backcountry skiing in a school trip in 2003. This tragedy pales in comparison to the deadliest avalanche in Canadian history, which also occurred in Rogers Pass. In 1910, 58 men who were clearing railway tracks from an earlier avalanche were killed when a second avalanche came roaring through.

Cougar Corner, where Local 68 members are working, is right in the middle of avalanche alley. The snow nets they are installing will prevent avalanches on three of the 134 paths.

They work hard and remain intensely focussed while on the hill—conscious of the lives of those around them. But there is always time for a smart remark or a joke.

At the end of the day, Alfie and another member of the laydown crew stay camped in trailers, while most of the other members of the crew stay in Revelstoke—half an hour away. Rather than taking their own vehicles, BAT provides a bus, which Brad drives.

“That’s probably the best part—driving that bus at the end of the day,” says Brad. “Because everyone gets on the bus and everyone lets that one breath out and can relax and laugh about the day.”

The magnitude, difficulty, and importance of the project are what drew many of the members to the site. It’s a large part of what makes the project worth the long days, the weeks away from family, and the discomfort and danger they face each day.

“This is a tremendous project, one that’s hard not to take pride in,” says Brad. “You can see for hundreds of miles around you. For me, it’s like freedom—you’re stepping where no one has ever stepped before.”

“At the end of the job, we’re going to see all the nets and all the hard work put into it,” agrees Nick. “It’s going to be awesome just to know that we were a part of it. You can see it from the road when you drive by, and it’s going to be here for a long time.” 🍁



HEAT, BUGS, AND... GOATS?

On top of the dangers of working on such a challenging site, Local 68 members working on the avalanche mitigation project have to contend with the normal annoyances of working outside in Canada—heat and bugs.

“When you get up there, it seems like you’re as close to the sun as anyone can be,” says Brad Sandry. “It’s hot up there, and there are a lot of bugs.”

Water jugs are flown up to the pads so that workers don’t get dehydrated—a real danger when working in such extreme conditions. Workers also are kept well-supplied with insect repellent.

As if dehydration and bugs aren’t enough to contend with, workers also have to deal with mountain goats. These cute creatures are not overly pleased with the work occurring on their slope.

“The goats kick stones down on the workers,” says Simon Hall, who is in charge of safety and environmental protection on site. “They are extremely sure-footed creatures. We know they can walk without kicking stones down, so it seems that they are doing it on purpose.”

The goats sometimes take up residence on the helipads and will even charge at those who get too close.