A rocky-road so

By Correspondent Tonia Jurbin

Stabilizing slopes wherever there's a threat of "falling rocks" presents a number of challenges to many highway and transportation departments across Canada. In most cases, the remedies range from stabilizing a few hundred metres of a rock face using minor trim blasting (including disposal), shotcrete, drain installation, rock bolting, rock scaling or slope meshing.

On a higher level of technology, however, is the "Rockfall Hazard Rating System" that was developed in 1994 by the Oregon Department of Highways. The system, used primarily on major, higher-risk routes, rates all rock cuts, assesses them for stability, and subsequently recommends maintenance and preventive-maintenance work.

"The goal of the program is not to prevent rockfall from ever occurring. Rather, it is to minimize the rockfall and reduce the risk to the travelling public," says David Gerraghty, Senior Rockwork Engineer for the B.C. Ministry of Highways.

"We have to schedule the work around the province to minimize the risk of a rockfall on all main highways. We establish our priorities and work to meet them. Some years we are able to coordinate with other maintenance work that helps minimize the disruption and other years, scheduled work is preempted by rockfall reaching the road in another area."

A sand pad and protective mats are used during rock removal on a dangerous stretch of road.

lution

The challenges of scheduling the work on the slopes are weather, traffic and avoiding conflicts with other road maintenance. Work is scheduled to minimize disruption during the busy summer months but, moreover, it is also safer than working in the winter.

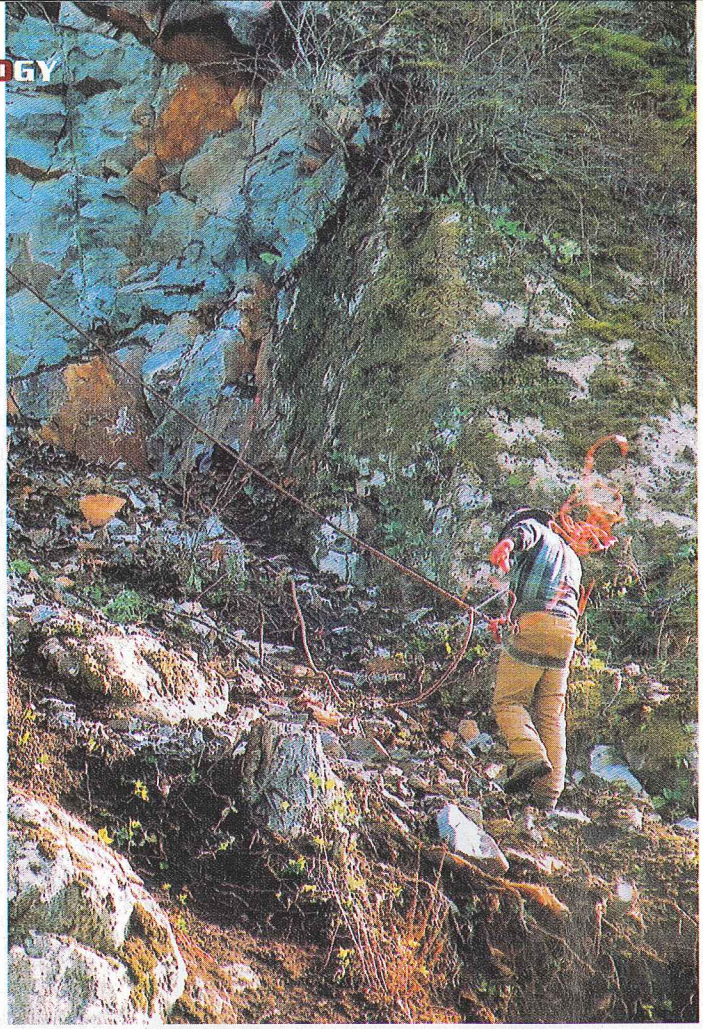
The Sea to Sky Highway is the main highway to Whistler, site of one of the province's major ski resorts. It is one of the busier highways in the province with about 12,000 to 15,000 vehicles traveling it daily. The slopes on this highway require considerable attention to rockwork.

BAT Construction Limited of Kamloops, BC, recently stabilized a 600-m stretch of the Sea to Sky Highway about 20 kms north of the Horseshoe Bay ferry terminals at 'Windy Point.' Value of the 'split contract' was about $210,000 with the bulk of the preparation work including rock scaling, tree clearing, rock bolting and drilling for blasting.

Rock blasting requires three-hour road closures that are stipulated in the contract and it is up to the contractor to decide how to use the closures. Even after a typical 20 minute closure, there could be up to 190 vehicles stopped at the north end (traveling south) and up to 140 vehi-

A dramatic photo showing pieces of airborne rock.

Contractors (right) carefully monitor rock stability on steep highway cuts.



A rock scaler checks a potentially dangerous rock slope near the highway.

cles stopped at the south end (traveling north).

"By the time all of the backed-up traffic is cleared, I've lost about 35 minutes, says Bruce Thomson, owner of BAT Construction.

"Over the course of an eight-hour day, when we're blasting, my crews are working about four hours. The rest of the time we're just managing traffic. We use a sub contractor for traffic control, (J Cat Flagging Services) and work as efficiently as we can, but the crew has a lot of down time."

Room is also a big problem on this highway. There is no laydown area, nor is there a nearby disposal site. The sand padding that is used to protect the road is hauled in from Porteau Cove about 4 kms away. The padding and blast rock is stored there temporarily. After the closures, all of the material is hauled about 25 minutes north to Squamish.

For this contract, the plan was to remove about 500 m^3 in eight blasts ranging in size from five to 300 m^3. They used almost 300 sticks of dynamite, easy dets, B-Line and electric ignition detonation.

About 5000 m^2 of rock was scaled and about 80 linear metres of rock bolts installed. The crew is made up of six high scalers, a general foreman, two equipment operators, three truck drivers and eight flag people. Four of the crew have blasting tickets.

While Thomson and his foreman prepared the blasting patterns, a government regulation passed in 1998, required a blasting consultant approve them. Following that approval, the pattern was laid out and drilled. Often during this stage, it is modified because a hole could be lost or a slope can change during preparation so an as-built is prepared.

Thomson explains that for this contract, he was granted three, three-hour closures for blasting, all of which were widely advertised.

Blast day. The crews start preparing at about 7:00 am. At 9:00 am sharp, one lane was closed so that the road padding and heavy equipment could be brought in. At about 10:30, BC Rail pulls its traffic and maintenance personal off of the tracks at the base of the slope.

On this project there was a lot of co-operation between BAT and BC Rail. They protect their own tracks while BAT Construction provides the blasting pads and traffic control for blasts that benefit both parties.

At 11:00 am, two sets of flag crews at each end of the job stop the traffic. First the outer vehicles are stopped and the ones caught in between are moved through the site. After all the traffic leaves the area, the padding was moved to the lane that was left opened and the highway starts to look like a construction site.

The blast goes off at about 11:45 am. After the blast, the rock scalers scramble up the slopes to pry off all of the loose rock while the loaders work to get the debris and the padding off one lane as fast as they can to accommodate emergency vehicles. By 2:00 pm, both lanes were re-opened.

"We do our best to meet closure times, but we will extend it if there is any risk to the public. We are not penalized for extending closures because the public safety has to come first," says Thomson.

At about 1:50 pm, minutes before the road opened, the back-up seemed kilometres long, there were dozens of people waiting outside of their cars taking in the view of Howe Sound. It was at least 52 minutes before the last vehicle cleared the blast site.

Traffic delays are a common occurence with most construction projects, but unlike delays caused by traditional highways jobs, slope stabilization work and the brief incoveniences they cause are worth it because of the magnitude of the alternatives... being swept off the road by falling rocks.

Only through conscientious efforts by highway departments across the country, and the use of advanced technology systems to detect and prevent "falling rock" disasters, will the traveling public be safe. ◆