

# Introduction

*The traditional alternative for rehabilitating worn road surfaces is to replace lost material with pit-run gravel, blasted rock, or crushed material. However, this often involves costly transportation and does not reduce the use of this limited resource. To tackle this problem, equipment has been developed in Canada and Australia to convert accumulations of oversize roadside rock into usable resurfacing aggregate (Bennett and Provencher, 1995).*

*The Broonshire Rockbuster has been working extensively in Australia since 1970 and has just recently been bought into New Zealand for Taylors Contracting. The new BH - 1220 Series II Rockbuster was observed crushing road base gravels for Fletcher Challenge Forests in Nelson.*

## System Description

The Rockbuster is a mobile rock breaking unit to produce graded crushed aggregate from oversized rock and rubble of up to about 600 mm in size. Rock boulders are broken by a series of blows from hammers rotating on a high speed shaft in a steel compartment. Hammers can be set by hydraulic action to control the size of the crushed gravel output. The final result is a well graded crushed aggregate to form a compacted firm road base (Figure 1).

The machine is towed along a windrow of rock material (Figure 2) that has been retrieved from the roadside and the ditches using a grader. To complete the process the crushed material is then spread with a grader.

# TECHNICAL NOTE

TN - 31

## THE BH - 1220 SERIES II ROCKBUSTER



Figure 1 - Well compacted firm road base

Gravels that are available on site are used for crushing with the Rockbuster, in lieu of incurring the long haulage distance from the rivers in the valleys below. This also saves the royalty charge incurred when using the river metal.

In the Nelson/Marlborough area, Moutere gravels are in abundance and are easily removed from the batters and table drains and windrowed along the road for crushing with the Rockbuster. This provides a ready supply of crushed metal for road construction and maintenance on site.

**Liro**  
limited

PO BOX 2244, ROTORUA, NEW ZEALAND

TELEPHONE: 07 348 7168 FAX: 07 346 2886



# Productivity

The cost to hire the Rockbuster will vary from site to site and is dependent on the hardness of the rock to be crushed, which affects the crushing hammer life and the speed. Table 1 gives some hire rates for the Rockbuster.

Table 1 - Indicative costs of the Rockbuster (GST has been excluded)

ROCKBUSTER HIRE RATES		
DAILY	WEEKLY	MONTHLY
\$1,950/day	\$8,900/wk	\$29,665/mth
\$243.75/hr	\$222.50/hr	\$185.40/hr

Additional costs such as an operator (@ \$25 /hr), fuel (@ \$15.75 /hr) crushing hammers (@ \$2,350 /set), the use of a grader (@ \$80 /hr) and establishment costs (\$500) have been included to calculate unit costs (\$/m<sup>3</sup>) based on production shown in Table 2.

Table 2 - Unit costs based on production and hammer life for hiring the Rockbuster on a daily rate

PRODUCTION (m <sup>3</sup> /hr)	HAMMER LIFE	
	40Hrs	20Hrs
120	4.05 \$/m <sup>3</sup>	4.54 \$/m <sup>3</sup>
100	4.86 \$/m <sup>3</sup>	5.45 \$/m <sup>3</sup>
80	6.07 \$/m <sup>3</sup>	6.81 \$/m <sup>3</sup>
60	8.10 \$/m <sup>3</sup>	9.08 \$/m <sup>3</sup>
40	12.14 \$/m <sup>3</sup>	13.61 \$/m <sup>3</sup>

It should be noted that the costs shown above could be higher if other machinery were used to source metal, such as a bulldozer and/or gravel trucks.

For the Moutere gravels, the typical production was 60 m<sup>3</sup>/hr, while for the softer limestone, the production rate was as high as 120 m<sup>3</sup>/hr. Crushing hammers usually last 40 hours before replacement.



Figure 2 -BH- 1220 Series II Rockbuster

## Limitations

- The transport of additional rock material for crushing on site increases the cost.
- For emergency repairs, it is quicker and more convenient to use crushed rock from a stock pile, rather than use the Rockbuster.

## Conclusions

Unsealed roads should be constructed using a well graded crushed aggregate (with sufficient clay fines) compacted to a suitable crossfall. This provides a smooth and waterproof running surface. Vehicles can travel faster and maintenance is reduced as the aggregate is bound tightly together.

The use of the Rockbuster enables crushed rock to be used on forest roads at a cost from (\$4 to \$12) /m<sup>3</sup>. Rock from the ditches and batters can be graded to form a windrow on the road for crushing with the Rockbuster. This will reduce the use of valuable and limited rock material sourced from a quarry or river.

### Reference

Bennett, D. Provencher, Y. (1995) : "Using Mobile Rock-Crushing Equipment to Rehabilitate Unpaved Forest Road Surfaces: Recent Developments in Canada". Sixth International Conference on Low-Volume Roads. Minneapolis, Minnesota, June 25-29. Transportation Research Board.

Greg Arnold  
Greig Larcombe  
March 1997.