

Hot in Place Recycling Cuts Rehab Costs in Whistler/Blackcomb, British Columbia



Highway rutting and subsequent deterioration of asphalt pavement are a continual problem in Whistler, British Columbia. Repair methods have varied from rehabilitative efforts to expensive full reconstruction. Recently, the municipality discovered the economic advantages of *reprofiling*, which uses hot-in-place recycling to return distressed pavement to like new condition, at the same time restoring a level profile from centerline to edge.

John Nelson, P.E., Whistler's Director of Public Works, worked on the details of this technique with John S. Kupskey, P.E., of Delcan Corporation, engineering consultant to the municipality. "It was important," says Nelson, "that the roadway be 100% recycled to a depth of at least 2 in. Otherwise, the effect would be merely cosmetic, especially on roads with uneven baselines and other below the surface defects.

The specific project was Alta Lake Road, a 5-mi., two-lane roadway circling around a portion of Alta Lake and the Village of Whistler. The Province of British Columbia's Ministry of Transportation and Highways turned this road over to the municipality, offering to fund its rehabilitation to the extent of \$250,000. Nelson and Delcan agreed that the job had to be performed economically and effectively to gain maximum benefit from these dollars.

The existing two-lane surface constructed in 1977 was badly alligator cracked. There was edge cracking and edge breaking, along with narrow shoulders alternating with steep shoulder and embankment slopes. The terrain of the 25-ft.-wide roadway was typical of a mountain road, having steep vertical grades and many horizontal curves.

In view of the road's varied problems, Delcan suggested that reprofiling, involving hot-in-place recycling with the use of a recycling agent, would provide the most value for each available dollar.

Variable baseline

The engineers took into account a further problem with the road: the varying depths of the base material - in some places less than 2-in. "We realized," says Nelson, "that this might give us variable results in the quality of the recycled surface, a situation we would have to address when the job was done. Therefore, recycling costs had to be kept to a minimum so that there would be a fiscal *cushion* for a [mal treatment after the reprofiling."

R.W. Blacktop, Ltd. won the bid and was assigned the contract. A newly developed hot-in-place recycling train was selected because of its ability to attain the full 2- in. recycling depth required. The Pyropaver 300 system was also capable of recycling effectively at low ambient temperatures such as the subfreezing conditions that were anticipated.

The first element in the Pyropaver train was a radiant heat preheater to soften the pavement and remove excess moisture. Following that were two heater-milling units and a conventional paver for paving of the recycled material. Both units were equipped with infrared heater banks and hydraulically operated floating milling heads that could be adjusted to clear manholes and other in-place obstructions.

The first milling unit following the preheater further heated the material and milled it to a depth of 1 in., then moved the milled material into a windrow.

Recycling agent introduced

A recycling agent was added to the material during the milling of the first windrow. **Cyclogen L**, manufactured by Golden Bear Oil, was selected as the agent because of its history of successful use in other projects by British Columbia's Ministry of Transportation and Highways to rejuvenate, restore, and bond with aged asphalt mix.

The treated material was conveyed over the top of the second unit, which heated and milled another 1 in. of asphalt, windrowing it with the first. The combined windrows were thoroughly mixed and the recycled asphalt was laid at a temperature of 220 degrees F behind the paver screed. The final mat was compacted to the original surface height using two rubber-tired rollers.

The recycled roadway achieved the level profile that was desired. The ability of the Pyrotech preheater to provide sturdy edges made it unnecessary to provide edge work. The job went well in spite of an ambient temperature of 26 degrees F.

Restorative seal

As Kupskey predicted, because of the road's varying depth in some areas, base aggregate was picked up by the milling heads and mixed with the recycled material. This, along with the various coarse mixes often encountered in the asphalt itself, created an open surface that had to be sealed.

Funds for this were limited because of the \$250,000 ceiling on the money granted for the work by the Ministry. A chip-seal bond was considered, but ruled out by its cost.

Golden Bears's Jim Brownridge suggested the use of a less-costly bonding agent, CRF restorative seal, a cold-water emulsion of petroleum oils and additives used to strengthen asphalt surfaces and extend their life spans by at least five years.

The seal, diluted 2: 1 (agent to water) was applied at a rate that varied between 0.10 and 0.15 gal./sq. yd. Sanding followed using an unwashed sand at 2.9 lbs./sq.yd. The pavement was then opened to traffic. The seal provided the wearing course needed to bond the open surface at a cost of only \$17,000.

"The seal not only closed the surface, but has maintained flexibility under weather extremes," says Nelson. As a result of this collaborative effort and dual approach - hot-in-place recycling with surface treatment - Alta Lake Road was given increased life within budget and with low projected maintenance costs.

“The job went well in spite of an ambient temperature of 26 degrees F at startup”