



Hammerstone Haul Roads

Aggregate solutions for the long term economic and environmental sustainability of Alberta's oil sands



Limestone Advantage

- 100% crushed
- Sized for performance
- Quality ensured

Strong, durable haul roads

- Lower road maintenance
- Improved truck productivity
- Reduced truck frame stresses
- Lower fuel consumption
- Economical road design
- Lower emissions
- Smooth, safe ride

WHY HAMMERSTONE HAUL ROADS?

Mine haul roads in Alberta's oil sands take a beating like no other place on earth. Incorporating the largest mining trucks in the world, Alberta's oil sands mines need to safely and efficiently move over half a billion tonnes of oil sands per year in the toughest conditions imaginable.

Road quality is paramount for an efficiently run mine. Without good road quality, millions of dollars can be spent maintaining roads, repairing damaged truck frames, and replacing tires. Moreover, a poor mine haul road results in low productivity, high fuel costs and increased greenhouse gas emissions. A good quality haul road results in a safe, productive mine operation that minimizes the impact to the environment.

With our 100% crushed limestone aggregates, Hammerstone provides a unique solution to Alberta's oil sands. Our aggregates are made from quarried limestone that is crushed and precisely graded, producing aggregate particles with rough, jagged edges that tightly interlock. The result is a strong, durable haul road that outperforms gravel roads.



The Hammerstone Advantage

With over 750 million tonnes of limestone reserves and a central location in Alberta's oil sands, Hammerstone Corporation is positioned to provide quality material for decades to come.

Key features of our haul road products:

- **Unique Products**

Working in cooperation with mine operators has led to the development of unique products specifically tailored for haul roads.

- **High Strength**

100% crushed material creates high friction and interlocking between particles, giving the road a strength unknown to alluvial gravels.

- **Economical Road Design**

With the strength of our 100% crushed materials, the same structure can be built using 15 – 30% less material.*

- **Sheds Water**

Precise gradation allows for tight compaction and high density, creating a surface that sheds water to protect lower layers and prevent ruts from forming.

- **Quality Ensured**

Our internal QA/QC team regularly tests material to ensure our customers receive only the best product.

- **High Production Capability**

With a production capacity in excess of 20,000 tonnes per day, we can meet large volume requirements.

*Actual results will vary depending on engineering, road design and construction methods and conditions.

Hammerstone Haul Roads

A smooth ride that lasts!



HIGH PERFORMING HAUL ROADS

A strong, smooth road is essential to a productive and safe mining operation. The superior interlocking qualities of our products provide a high degree of resistance to road deterioration, resulting in roads that deliver to the bottom line.

Improved truck cycle times

Smooth, flat road surfaces that do not deteriorate under stresses and changing weather conditions keeps trucks moving – year round

- Reduced rolling resistance promotes productive speeds.
- Minimized hauling disruptions due to less frequent grading.

Lower road maintenance costs

Haul roads properly constructed with Hammerstone road crush last longer and require less grading or repairs.

Lower truck maintenance

Truck frames and tires last longer as they are subjected to reduced twisting and bouncing.

Better fuel economy

A reduced rolling resistance significantly reduces haul truck fuel consumption.

Lower emissions

Reduced fuel consumption by haul trucks results in lower greenhouse gas emissions, such as CO₂.

Enjoy a smooth, safe ride

Operator driving comfort and road responsiveness are key to mine safety.

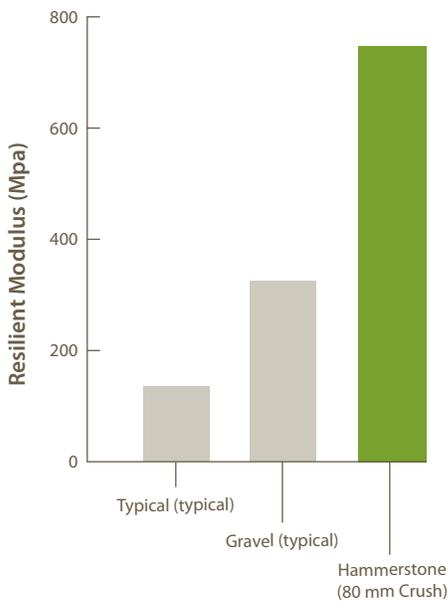
A better bottom line

When you add it all up, Hammerstone's aggregates can have a multi-million dollar impact on an oil sands mine.

Oil sands mine operators have reported more than a **30% improvement** in productivity after switching to Hammerstone Road Crush



Stiffness (Resilient Modulus) of Road Materials



Hammerstone's superior strength enables engineers to design high performing roads with less material:

- 15% to 30% profile reduction*
- Lower construction costs
- Faster installation

GEOTECHNICAL TESTING

Testing conducted by Dr. Tim Joseph (recognized by the industry as a leading mining and geotechnical researcher) identified several key benefits of using Hammerstone surface aggregates in mine haul roads utilizing ultra-class heavy haul trucks, including:

- Decrease in rolling resistance of 55%
- Fuel cost savings of 24% (240 T truck) and 40% (380 T truck)
- Reduced emissions by 24% (240 T truck) and 40% (380 T truck)
- Increased tire life by 37% (average)
- Tripled life of truck frame
- Improved safety

"It is clear that neither pit-run nor sand caps are appropriate materials capable of reducing the rolling resistance of oil sand roads. Only the limestone cap provided a clear and substantial reduction in oil sand rolling resistance..."

Dr. Tim Joseph.



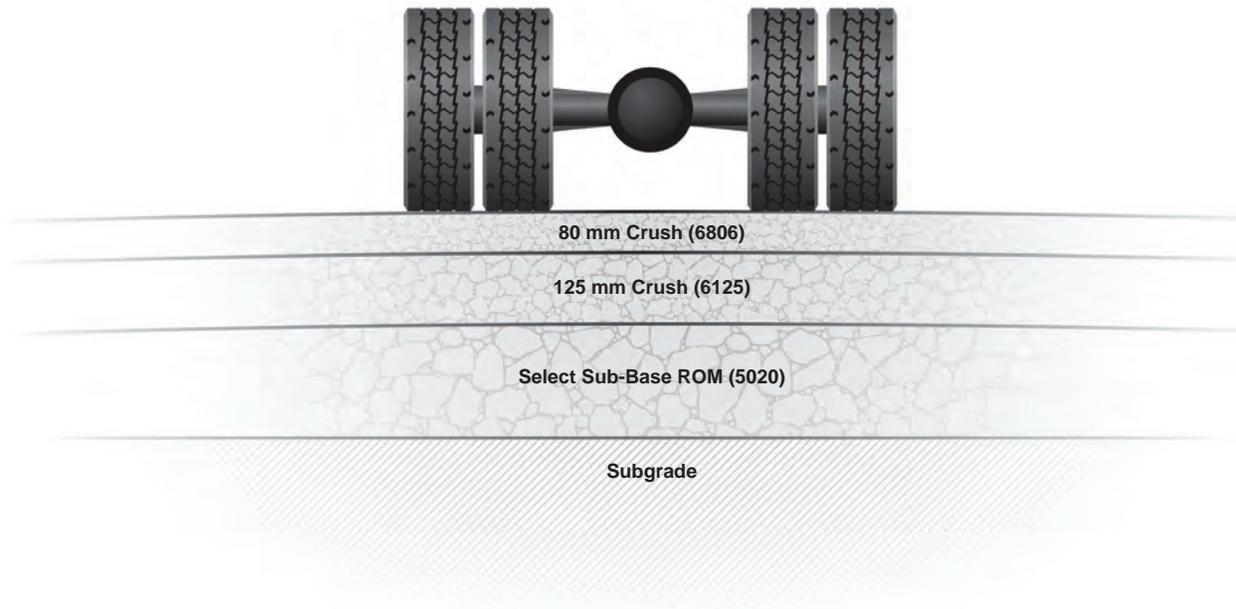
Unique products tailored for mine haul roads

Mine haul roads constructed from Hammerstone's 100% crushed limestone aggregates are available in a variety of sizes. Using large aggregates that are well-graded provides strength and volume while the jagged edges interlock and are bound by finer limestone particles.

Hammerstone's *Select Sub-base ROM* is an economical choice for heavy haul road sub-base and base courses — providing a solid foundation for your haul road.

A core sample taken from a Hammerstone road *Select Sub-base* that yielded a compressive strength of 1000 kPa.

Mine Haul Road Product Selection



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Hammerstone Products Ltd.
A joint venture between Fort McKay First Nation and Hammerstone Corp