Stabilizing Unpaved Roads

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If you live near or use gravel roads, then you know the problem! These roads comprise weakly bound to unbound aggregate.

They generate choking and noxious dust clouds when dry, and quickly lose strength and degrade to mucky conditions when wet. Throughout much of northern and rural Canada, roads are constructed of unpaved aggregate. They are expensive to maintain, environmentally problematic and degrade rapidly.

Current mitigation relies on constant and expensive maintenance, and the local application of chloride salts, with only temporary results. Consequently, there is a critical need for low-cost and environmentally sustainable construction techniques for the stabilization of unpaved roads throughout rural and northern Manitoba and across Canada.

Dr. Mumin and his team quickly discovered how little information is available to help solve the problem, and that standard geotechnical engineering tests and solutions cannot be applied to much of our research and testing. Consequently, they had to develop their own methods and standards. The team is developing a solution by using local clay-rich materials.

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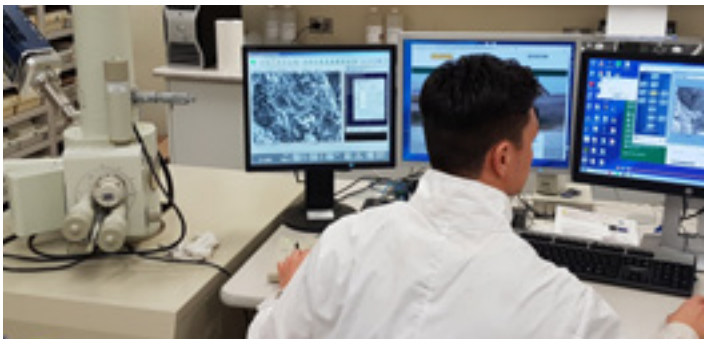
With the addition of catalysts and polymeric agents, they are manipulating the natural properties of clays, and causing them to act like a cementing agent. This produces a durable, low-cost road that requires minimal maintenance, and eliminates the detrimental aspects of current construction practice. Cypher Environmental has been applying this technique to mine haul-road construction elsewhere in the world, using non-engineered in situ materials on a near random basis with considerable success.

Dr. Mumin and his team are adapting the process for use on rural and municipal roads in Canada, and for the first time, have had the opportunity to engineer the materials and process from start to finish in order to maximize road strength and durability. Part of the research is carried out in the laboratory, and part is field-testing. The researchers test the binding and bearing strength of local materials comprised of varying clay-aggregate mixes, with varying catalyst and polymer applications, compaction energies, curing times and moisture content. They also test for maximum resistance to moisture reabsorption. Field-testing includes a series of roads built near Brandon using parameters determined by the lab work. Results indicate that strength and durability are highly

variable, depending on variations in the materials that are used, differences in catalysts and polymer addition, construction techniques, compaction, moisture, and curing. Importantly, however, the team has also discovered that excellent roads can be built in the Brandon area, in particular for heavy use traffic areas, using local clay-rich materials with specific design parameters.



Check out the one-mile test section of Curries Landing road, built in 2015 with this technology, that is used by approximately 150 loaded gravel trucks daily. These roads are monitored for strength, durability, drivability and dust production. Maintenance has been reduced from three times daily maintenance to once yearly, with the cost of construction within the pre-existing budget for normal reconstruction. All their research is carried out in close collaboration with Cypher Environmental of Winnipeg, the RM of Cornwallis Public Works, the City of Brandon Engineering Department, and local contractors.

This research can be applied to low-cost construction of durable and sustainable unpaved roads across the country and indeed worldwide. Already, industry and government delegations have come from China, Honduras, India, Alberta and Manitoba to examine the four test roads currently in use around Brandon. With the proper design and construction, there is almost limitless opportunity to solve some of the worst chronic road problems in a sustainable and very cost effective manner.

Principal funding and technical support for this research project come from Cypher Environmental of Winnipeg and a National Research Council-Industrial Research Assistance Program grant. In addition, RM of Cornwallis, City of Brandon Engineering, Bluestar Construction, Tri-Wave Construction and MIT provided generous and abundant support of this project. Support for research assistants, Riley Cram and Blake Tinkess, was provided by a MITACS Accelerate grant, and an NSERC IUSRA grant, respectively.