

Saving money, reducing GHGs, improving service delivery on your municipality's roads

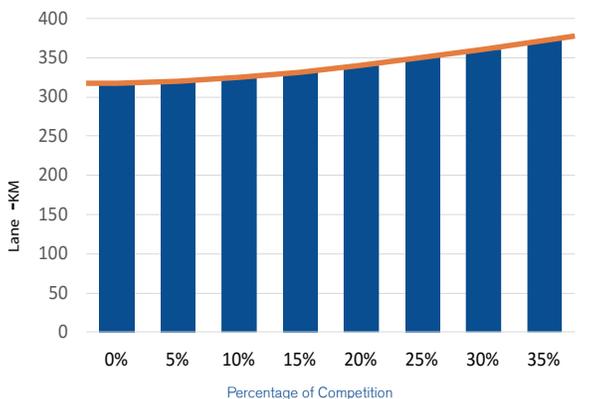
Tight budgets, aging infrastructure, and the added pressures to reduce carbon emissions and adapt to climate change are making municipal infrastructure projects more complex than ever. Transportation projects are no exception — and so the most effective management of your municipality's investments in its roadway infrastructure is now even more essential.

There is no quick fix to addressing this challenge. But there are “best practices” approaches and solutions to help ensure optimal value from your roadway investments. Concrete, the world's most reliable, durable and versatile building material — and a local product — is part of the broader solution.

01 Competitive pavement bidding extends your purchasing power

Many transportation departments specify their roads in asphalt simply because that is the way it has always been done. But research and real-world data show that a procurement process that encourages competition between paving materials lowers prices, spurs innovation and improves quality.

A recent study¹ showed that a municipality could pave **15% more road** with the same budget by introducing alternative concrete and asphalt pavement design bids.



As competition increases, paved lane - kms for same investment increase & unit costs decrease

Today, the impact of increased competition between paving industries represents the most significant opportunity for agencies looking to extend the purchasing power of their infrastructure dollars.

02 A lifecycle approach reduces long-term costs and environmental impact

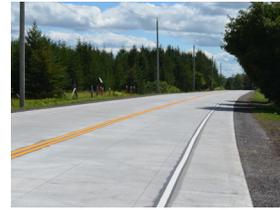
Traditionally, governments have used a “lowest initial cost” approach to infrastructure projects, roadways included. We now know better.

Research at leading institutions like MIT and the Athena Sustainable Materials Institute demonstrate that the cost of maintenance and rehabilitation can represent as much as 45% of the lifecycle cost of a pavement. Similarly, the “use” phase of the pavement can account for 25% to nearly 60% of its lifecycle GHG emissions, depending on traffic type and volume.

This work shows how critical it is to integrate lifecycle thinking into roadway design and procurement decisions to save money, reduce GHGs and deliver top-notch public services. To be most effective, decisions should be subject to three simple but critical planning criteria:

- A full economic lifecycle cost assessment rather than the initial cost framework that has traditionally been used;
- A full carbon cost assessment, including embodied carbon, operational carbon, end of life carbon and sequestered carbon impacts; and
- A “Best Available Solutions” assessment that considers whether the need associated with a given infrastructure project can be met using new approaches, technologies or designs that perform better under one or both of the first two criteria.

Fortunately, free and easy-to-use integrated LCA and LCCA tools such as Athena Sustainable Materials Institute's PavementLCA.com are available to help transportation engineers understand the full cost and carbon impacts of competing design and material combinations for a given pavement project. Training and assistance are also available at no cost.



03 Concrete roads: Part of the solution

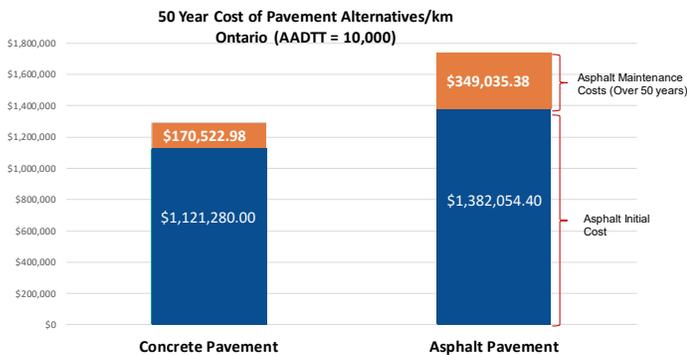
Cost-effective

Today, contrary to popular belief, concrete roads are competitive with asphalt pavement on first cost — and actually often less expensive — and almost always less expensive when lifecycle costs are considered.

For example, a recent study by Applied Research Associates (ARA) found that the average cost of an asphalt road in Ontario was \$1.38 million per lane kilometer (new construction) plus \$350,000 per lane kilometer for maintenance over a 50-year period.

The same study found that the average cost of a concrete road in Ontario was \$1.1 million per lane kilometer (new construction) plus \$170,000 per lane kilometer for maintenance over a 50-year period.

Both scenarios are illustrated in this graph:



In other words, a road made of concrete instead of asphalt can save municipalities over **15% on initial costs** (\$200,000 per lane kilometer) and a whopping **51% on maintenance costs** (\$180,000 per lane kilometer).

In addition, because concrete is more reflective than asphalt and has a higher albedo, concrete roads can reduce the need for lighting by up to 24%² and help meet municipal requirements for cool pavements, two other significant cost-saving opportunities for your community.

Low maintenance

Concrete roads aren't just economical, they're reliable too. Year after year, road crews spend countless hours filling potholes, often disrupting traffic in the process. Concrete is resilient to extreme weather and harsh conditions, meaning virtually zero potholes.

All pavement eventually needs to be resurfaced, repaired or replaced, but the durability of concrete means there are longer intervals between these activities.

Over a 50-year period, a concrete road requires only **a third of the maintenance** of an asphalt road. This saves money and helps spread out maintenance dollars more efficiently.

Innovative approaches like the use of concrete overlays can help preserve and rehabilitate existing roads, extending the life of existing asphalt, concrete or composite pavements by 15 years or more, while precast road panels dramatically cut construction time.

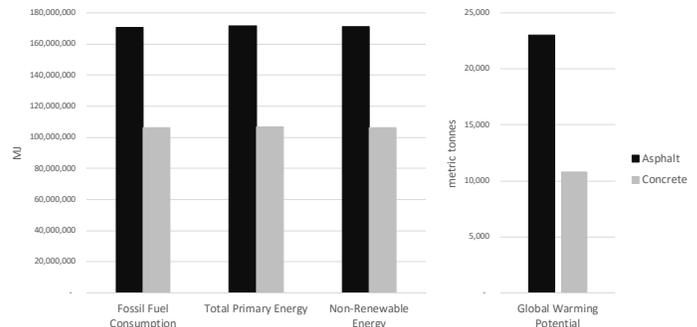
Altogether this means more choice, lower costs, less traffic congestion and disruption, and less danger to road crews and drivers alike.

Environmentally “best-in-class”

Concrete pavements require 66% less energy and 73% less base material (stone, sand and gravel) than asphalt pavements. They produce zero VOCs, which means less air pollution, and concrete's light color and natural reflectance brighten roadways, parking areas and sidewalks, while keeping communities cool by reducing the urban heat island effect.

Concrete roads also improve the fuel efficiency of traffic by up to 7%, yielding potentially significant reductions in carbon emissions – up to 12,000 metric tonnes per lane kilometer, equivalent to avoiding the consumption of over 5 million liters of gas when the life cycle of the pavement is considered.

As this AthenaPavementLCA graph shows, the Global Warming Potential for concrete pavement is nearly **48% lower** than for asphalt pavement.



Your partner in building a better tomorrow

The concrete industry shares responsibility for shaping prosperous, low carbon, climate resilient communities. We are part of the solution and, present in virtually every community in Ontario, we are by your side to build a better tomorrow.

^[1] Oman Systems Inc., <http://omanco.com>

^[2] ACPA Green Highways publications (SR385P) - October 2017



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