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The Ground Beneath Our Feet: Our Love/Hate Relationship with Asphalt

by Jack Parkinson



Building Roads (Photo credit: user 06photo via Shutterstock)

I am lucky to live close enough to AJ's offices that I can walk there in less than 10 minutes each day and still have access to the downtown core. In late May 2016, the City of Kitchener closed a section of Duke Street just outside AJ's offices – there needed to be some new blacktop laid as part of a larger construction project. While I could still get to work just fine, my options for buying lunch and moving around downtown were severely limited.

This wasn't a big problem to my work duties, and it only lasted for a few days, but the road closure illustrated a point which has been gnawing at me lately: asphalt is extremely important. So why do we never think about it?

Asphalt is unavoidable. No matter where you live, from the smallest country town to Yonge Street in Toronto, you will see asphalt once you walk out your door. Built and maintained by government contractors, asphalt roads allow traffic (and, by extension, economically vital goods and services) to be transported across the country.

Of course, we all know what roads do. But do we know what they're made of?

Some recent findings by the Hesp Research Group (HRG), and field tests performed by them in conjunction with the Ontario Ministry of Transportation (MTO), suggest not. The HRG and MTO took video footage in 2011 of 33 sections of Ontario highways to record their condition, and what they saw was not encouraging. The highways were still functional at that point, having been laid only eight years prior, but there were more cracks than there should have been for asphalt of that age. It was also too hard and quite brittle, two factors which make asphalt concrete more likely to crack when exposed to freezing and thawing temperatures.



County Road 49 in Prince Edward County, ON was voted the Worst Road in Ontario 2016. (Photo credit: CAA)

“Roads should last 15-20 years with no cracking whatsoever – we’re now seeing roads crack during the first winter before the warranty even starts,” said Simon Hesp, a professor of chemical engineering at Queen’s University and the head of the HRG, in an interview with The Globe and Mail earlier this year.

“Asphalt” is an umbrella term which can mean either the finished product used in road construction - asphalt concrete - or a black and highly viscous form of petroleum also known as bitumen. Bitumen can be found in natural deposits like the Athabasca Oil Sands or the La Brea Tar Pits, or made as a byproduct of the oil refining process. The second part of asphalt concrete is construction aggregate, which is gravel that has been ground so each stone is within a particular size range. Asphalt concrete is more than 95% aggregate, with the bitumen gluing the pieces of rock together. A close look at any road will reveal the blacktop as tightly packed and tightly glued gravel, not a contiguous surface like regular concrete used in parts of the 400 series highways.

To the average environmentalist, asphalt may be just a symptom of the larger problem of North America's dependence on cars, and the emissions they produce - a necessary evil, which could be reduced greatly in an ideal world, or even done away with entirely. Everyone knows Canada, like the United States, is a country obsessed with cars, so if people just rode bicycles to work and ate locally grown food, then our roads simply wouldn't have as much stress placed on them and wouldn't need as much maintenance.

Aggregate mining, too, often damages the environment around the mine pit itself. Vegetation, local fauna, and aquifers are all affected by aggregate mining, which is often open pit.

It's true that fewer cars would reduce the need for road repair because any given road will be used less, and it might even be possible to have some low-use roads reduced from paved surfaces to gravel, which wouldn't use bitumen at all. However, as nice as a future full of electric cars would be, any society as large as Canada will need a strong, reliable network of transportation infrastructure. Even the Roman Empire made use of paved roads to connect their city centres, and all they had to accommodate was foot traffic, livestock and wagons. Elizabethan cobblestone and sett paving was also necessary, and more of a product of the time than any effort to make streets quaint - shod horse hooves get a better grip on those than other paving surfaces available at the time.

You cannot, for instance, replace an 18-wheeler transport truck with a bicycle, and that truck will weigh almost the same and travel the same distance whether it uses a diesel engine or an electric one. Local manufacturing can help to alleviate some of the need for transport of this nature, but that risks overbalancing to the other end of the spectrum: having a manufacturing sector in every city would make production more local, but then the delivery of raw materials to the factories would be inefficient, and so on. As long as the earth has different biomes, this will be a problem.

In the modern age, asphalt concrete has proven itself the go-to choice for large-scale road work due to how easy it is to produce using what would otherwise be waste from oil refining (bitumen). Asphalt concrete is also highly recyclable, which governments enjoy because it saves money and looks good in the news.

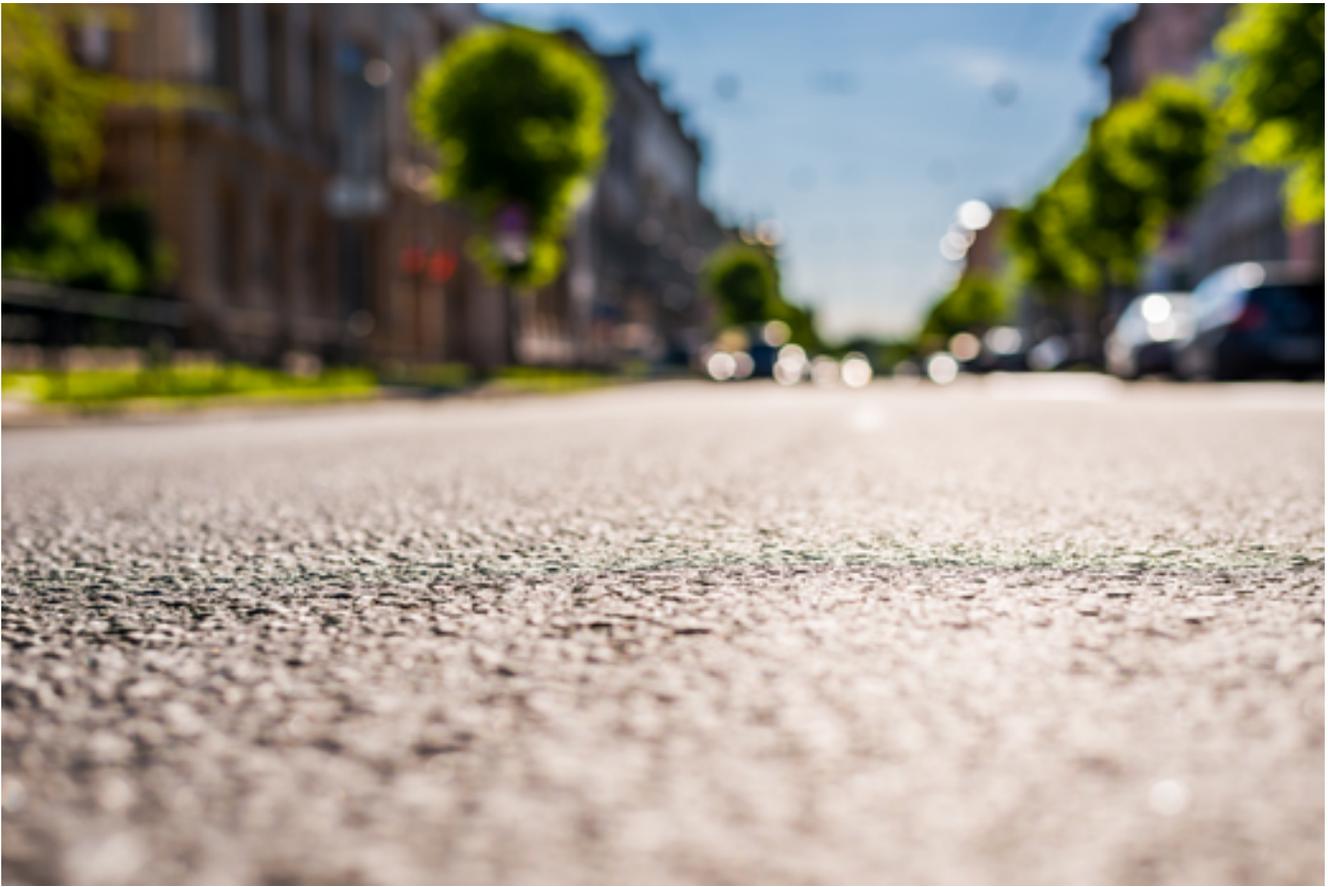
But what if asphalt concrete wasn't cost-effective?

What if, in order to save money, manufacturers began making asphalt concrete using recycled motor oil? Recycled elements like these can weaken the overall product, resulting in a shorter lifespan, more need for maintenance and greater vulnerability to southern Ontario's climate.

Sadly, this may be the case right now: the maintenance, construction and repair of Ontario's roads cost the province \$3 billion from 2015-2016.

According to Hesp, there is money to be saved - "50 to 60 bucks a tonne," to be precise - by using recycled motor oil in asphalt concrete, and given that the Ontario government uses roughly a million tonnes of asphalt concrete each year, even small savings add up.

With the bitumen being less pure, it is easier for moisture like rain and snow to slip through the surface of the road, then freeze and expand when the temperature dips below zero. Southern Ontario's climate only exacerbates the issue, since there is often freezing, thawing and refreezing during the fall, winter and spring months.



Asphalt in the city (Photo credit: Georgii Shipin via Shutterstock)

“Up north, it turns cold and then stays cold most of the winter,” said Tim Bilton, lab manager at Cruickshank, in an interview. Cruickshank is an asphalt concrete supplier and construction company headquartered in Kingston, Ont.

Suppliers like Cruickshank are aware of the unique challenges which face Ontario’s roads. Highways, for instance, are made with a very slight slope away from the centre line, so that any water and precipitation rolls off the blacktop more often than it soaks in.

“Compaction of asphalt is key in ensuring you don’t get any more moisture than necessary entering the asphalt,” said Bilton. There are also many different grades of PGAC (Performance Graded Asphalt Cement) designated for different areas of the province, all of which are held to a tight standard by the MTO.

If asphalt is big enough to warrant government regulation, environmentalists should care.

The issue hits close to home for many people, too. It is odd to think of construction emotionally, but bear with me.

Several years ago, the Region of Waterloo announced a new project designed to connect Kitchener and Waterloo’s city centres through light rail transit. Shortly after construction began, the project’s budget ballooned from less than \$1 billion to more than \$2 billion. The light rail lines are being laid down the middle of King Street (the main artery of traffic in K-W), which has led to the on-and-off closure of

different parts of that street for over a year. The affected area is several kilometres long and side streets can become inaccessible or accessible overnight.

This has led many people, both in cars and on foot, to avoid the city centre entirely, and several businesses along King Street have closed due to the sharp downturn in activity. The Region has plans for a transit hub in downtown Kitchener which would connect light rail to the local VIA Rail station, but given how much taxpayers and business owners have paid already, many citizens are keeping a tight watch on the project.

So once the torn-up roads are rebuilt, you had better believe people will expect them to last as long as they possibly can. Road repairs for potholes and cracks cause traffic jams, which means more emissions from cars. Depending on how densely packed traffic is, there can also be an increased risk to the safety of the workers and of any jaywalking pedestrians.

In the coming weeks, as I walk to and from work and see the effects my city's roads can have on its people, I am reminded that environmentalism is about all types of environments: urban, rural, and everything they're made of.

Jack Parkinson is a 2015 graduate of Conestoga College's print journalism program. During Jack's time at Conestoga, he contributed print and video stories to the school's newspaper, Spoke, and worked behind the scenes liaising with advertising clients.

Jack brings a grounded, realistic, and easy-to-understand perspective to environmental journalism, and he always aims to make his writing relatable to the common man.