



Making new roads out of old with recycled concrete



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BY CHRIS LORENC

Winnipeggers tossed 50,000 tonnes of household materials into their blue bins in 2019, an act of faith and environmental responsibility.

Many recyclable materials have no markets. Locally and globally, municipalities are grappling with the economics of recycling are in flux – broken some have said. Supply far outstrips demand as we await the technology, political will and public policy key to turning our millions of tonnes of throw-aways into marketable products in a truly circular economy.

Yet Winnipeggers consider the city's blue-bin program a necessary municipal service, because trashing just seems wrong.

The same recycle-for-reuse sensibility is at work on a much larger scale in road, street, sidewalk and laneway construction. For decades some of the concrete pulled up from streets and roads under construction has been hauled to recycling depots of another kind. Crushed, sieved and sorted, recycled concrete aggregates are re-used on rebuilt or new streets, lanes and sidewalks in Winnipeg and surrounding municipalities.

Hundreds of thousands of tonnes of demolished concrete are taken up from city street, sewer and water projects, and also in utilities work and private residential and commercial work.

Contractors take some of that material to processing yards,

where concrete aggregate is extracted and sieved for reuse as road base and sub-base structure materials. More is recovered for use in surrounding municipalities and private-sector uses, such as parking lots.

“Our industry for more than two decades has diverted hundreds of thousands of tonnes of waste concrete every year from the landfill, where it otherwise would have been dumped,” MHCA President Chris Lorenc says. “Recycling of demolished concrete is an environmental imperative and an economic opportunity.”

Recycling in road construction has spawned a sub-industry, creating new businesses and jobs.

Numerous jurisdictions in Canada, the United States and globally recover and write into the road construction specifications how recycled concrete aggregate can be used.

Edmonton, for example, has reused crushed concrete since 1978, having developed an aggressive policy for recycling waste construction materials. The city operates crushing and recycling facilities to recover concrete and actively encourages households to bring concrete removed during construction or renovations to these processing depots.

“In the early 1980s, based on ever increasing aggregate costs, the City determined that old asphalt, concrete and granular materials being removed from capital construction projects were too valuable a commodity to be landfilled,” according to the city’s website.

It also notes more than 99% of all aggregate rubble in Edmonton is recycled.

The progress in Edmonton came about by necessity. Aggregates are the foundation of all built infrastructure. While Winnipeg is blessed with access to high-quality aggregate deposits in the Capital Region, Edmonton is not and was running out of supply. Gravel is expensive.

But the imperative for recycling reflects the need to minimize environmental impact wherever possible, and responsible resource management demands reusing materials. Recycling concrete minimizes the carbon footprint at all stages – at the pits and quarries and on our roads, avoiding the greenhouse gas emissions that accompany the extraction, milling and transportation of sand, gravel and rock.

Other municipalities in Canada are working to increase the tonnage of recoverable concrete used on infrastructure projects. Higher levels of government are encouraging sub-levels to adopt policies and

instruments such as higher landfill tipping fees that promote the practice.

The City of Winnipeg this year introduced new road building specifications. The new specs are intended to lengthen the life of roads, with more durable structures.

But the new specs are making it difficult to incorporate recycled concrete in roads.

Through the construction season – regarded as a test year, to work with local recycled aggregate operators to refine and adjust their processes to meet the updated standards – not one supplier to city roads was able to consistently meet the new specs. The city and the suppliers have worked together, through the adjustment period to refine the material to meet spec, at significant cost to the companies.

But, as of mid-August, some halted deliveries of waste concrete to their yards, which means they are potentially destined for the dump. It also means that those businesses – around for 20 years – may soon be out of business with consequential lost investment and jobs.

This is an untenable situation. If old concrete cannot be recycled, the only option is to extract from finite aggregate deposits more tonnage of virgin limestone, every year. Add to that impact the carbon cost of crushing, processing and transporting the material – including the wear on our roads – from pit to customer. (Other municipalities and the private sector copy Winnipeg’s specs, meaning they too will likely follow suit on effectively eliminating recycled concrete.)

The heavy construction industry doesn’t want that, nor do Winnipeggers, we think.

We all want roads that last, and we can achieve that and use recycled concrete in street renewal projects. The solution is a political one, backed by public policy that recognizes a broader, realistic cost-benefit analysis representing the public’s best interest.

We have asked City Council to develop a formal public policy which leads the development of construction designs, allowing for the re-use of recycled concrete aggregates in roads – meeting equivalent objectives required from virgin aggregate. It should quantify the cost, and economic, environmental and resource-management benefits of using recycled concrete aggregates along with policy instruments and measures related to the collection and disposal of construction debris (including demolished street surface concrete).

The heavy construction industry is trying to be greener. We need the city’s support to succeed.

Environmentally, it’s the only solution.

RECYCLING IN HEAVY CONSTRUCTION

Asphalt – pulled up from streets being renewed, asphalt is crushed to recover the oil to add at the end of the production process of new asphalt, for paving roads; the City permits 15% of recycled asphalt product (RAP) in pavements.

Roofing shingles – old roofing shingles are recycled to recover oil product for use, as well, in asphalt used for paving roads. Shingles are shredded and reduced to a dust-like product called RAS, which is also added at the end of the production process of new asphalt; the City permits pavements to have 3% RAS.

Water – water pumped during dredging of pits and quarries (gravel, rock and sand) is returned to a settling pond, where sediment separates. The water is then used to wash the aggregates for concrete and is again recovered. About 2% of the water is lost in the process in stock piles, etc.

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– Rather than recycling concrete aggregates, much of the concrete aggregate is used in place when roads and highways are renewed. This is done through rubblizing – breaking up the old road into small pieces – with heavy equipment the concrete pavement, compacting it and laying new bituminous pavement over top. The result is a smoother pavement surface than would be obtained if a layer of asphalt were to be applied to the unbroken concrete surface. From 2017-20, approximately 884,000 m² of rubblized concrete pavement was used.

– MI permits the use of RAP, but not RAS

POTENTIAL FOR RECYCLING IN HEAVY CONSTRUCTION

Recycling cement from demolished concrete construction materials for use in infrastructure projects is practiced in some jurisdictions (not Manitoba). Recycling cement is valuable as it is cement production that creates the greatest greenhouse gas emissions, notes University of Manitoba Prof. Asia Shvarzman, who also leads the research and innovation division at Antex Western/ACM Technologies.

Recycled glass is also used in some provinces, including Ontario and Quebec, in roadbuilding, with glass powder replacing 30-40% of cementitious materials to produce concrete. Shvarzman is optimistic for the potential, given the economic advantages, in Manitoba for recycled glass in concrete, but it would need a pilot project and producers would require new equipment in their plants.

Recycled plastic is in development around the world as a road-building material, but still in early stages.

Old carpets are also finding a place as a road-building material, in use in the United States, including in North Dakota



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