Sustainable, High-Performing, and Cost-Effective:
Use of Recycled Crushed Aggregates for Municipal Infrastructure

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Demand

- Ontario's population is projected to increase by **41.7% per cent**, or over 6.5 million by 2051.
- Ontario municipal roads represent the largest share of the infrastructure SOGR backlog at **$21.1 billion**.
- Increasing shortage of close to market licensed high-quality sand and stone suitable for making asphalt and concrete products will result in **higher construction costs**.

Supply

- Every year, tens of millions of tonnes of asphalt and concrete are removed from construction sites across Ontario as roads are repaired, bridges are maintained, and other critical infrastructure is replaced or expanded.
- If not recycled and reused, these valuable materials will end up in landfills.

Recycled Aggregate Materials

Asphalt and concrete are 100% recyclable and can be reused as valuable construction material:

- **Reclaimed Asphalt Pavement (RAP)** is processed hot mix asphalt material that is recovered by partial or full depth removal.
- **Reclaimed Concrete Material (RCM)** is removed or processed old hydraulic cement concrete.
- **Recycled Crushed Aggregate (RCA)** is reclaimed asphalt pavement and/or concrete.

Recycled Crushed Aggregate (RCA1010)

- **Sustainable** product that offers some of the greatest environmental benefits at a low cost.
- Subject to rigorous **quality control** and best practice processes – fine material is not a by-product of recycled aggregates.
- Proven as a **high-performance** material for an increasing number of applications, with numerous studies concluding that its geotechnical properties are equal or superior to primary aggregates.

OPSS.PROV 1010 & OPSS.MUNI 1010

- The Ontario Provincial Standard Specifications *(jointly administered by the Ontario Ministry of Transportation and the Municipal Engineers Association)* set the standards for road construction and materials in the province.
- OPSS1010 allows aggregate used in road bases, shoulders and backfill to be composed of **up to 100% recycled concrete** and **up to 30% recycled asphalt**. Hot mix asphalt can also contain up to 30% recycled asphalt pavement.
- Municipal discretion in the implementation of these standards results in varying practices.

Industry-wide support

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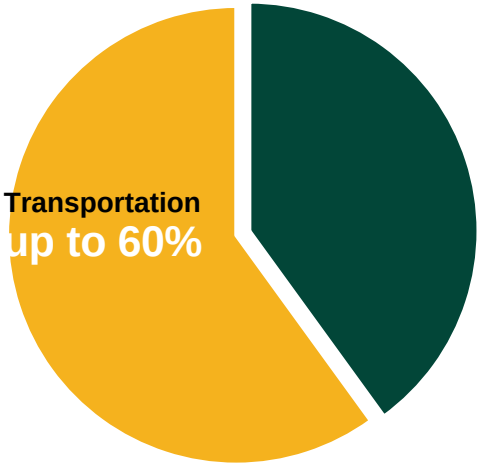
Environmental & Economic Benefits

- ☑ Lowers carbon emission and pollution
- ☑ Cost-effective and high-performing material
- ☑ Reduces landfill use
- ☑ Preserves non-renewable resources
- ☑ Extends life of pits and quarries
- ☑ Reduces traffic congestion and wear and tear on roads
- ☑ Readily available from construction and demolition activities at a closer proximity to market

Transportation of Aggregates

Aggregates Cost



Daily and Annual Fuel Consumption and GHG Emissions by Distance*			
	Distance	**Per Year (All Truckloads)**	**Per Day (All Truckloads)**
Fuel Consumption (Litres of Diesel Fuel)	Per km 35 km 75 km 110 km	437,500 15,312,500 32,812,500 48,125,000	1,989 69,602 148,148 218,750
	Distance	**Per Year (All Truckloads)**	**Per Day (All Truckloads)**
Greenhouse Gas Emissions (Metric Tonnes of CO2)	Per km 35 km 75 km 110 km	1,189 41,344 88,594 129,938	5 188 403 591

*Based on 25M tonnes – estimated amount of aggregate used in the GTHA

Lifecycle Analysis: Estimated Savings

	Pit/Quarry Locations	Average Distance from Pit/Quarry to Project Location (km)	Average Distance from Closest Crusher of Gran A RAP to Project Location (km)	Total Tonnes per Project (approx.)	Savings (Gran A – RAP Vs. Gran A – Native)		Transportation of Finished Product to site GHG Emissions (MTCO2e)	
					$/tonne Average	$/Project	Gran A - Native	Gran A – RCA
Parking Lot	Brechin	80.5	18 (Mt. Albert)	11,000	**$7**	**$77,000**	**38.74**	**8.66**
Store Distribution Centre	Orillia	115	6 (Vaughan)	100,000	**$9**	**$900,000**	**503.13**	**26.25**
Industrial Building	Milton	52	10 (Brampton)	7,000	**$8.5**	**$59,500**	**15.93**	**3.06**
Bombardier Project	Flamboro	70	14 (Mississauga)	50,000	**$8**	**$400,000**	**153.13**	**30.63**
				Total Savings for four Projects		**$1,436,500**		**642.33**

Case Study: Hwy 400

- In 2017, began the highway widening including center barrier wall replacement from Major Mackenzie Dr to King Rd, using RCA as unbound base and subbase.
- 300,000 tonnes of RCA was used as part of the total project generating $1.2 million in cost savings.
- The RCA source was less than 10km to the project, demonstrating significant reductions in the overall carbon footprint.
- Pavement condition remains excellent, with no distress

Highway 400- NB – Before King Road Bridge – No Distresses (September 2024)

MTO: Up to 20% of materials used for 400-series highways are recycled content, 10-12 million tonnes annually.

Pearson Airport Old Terminal 1

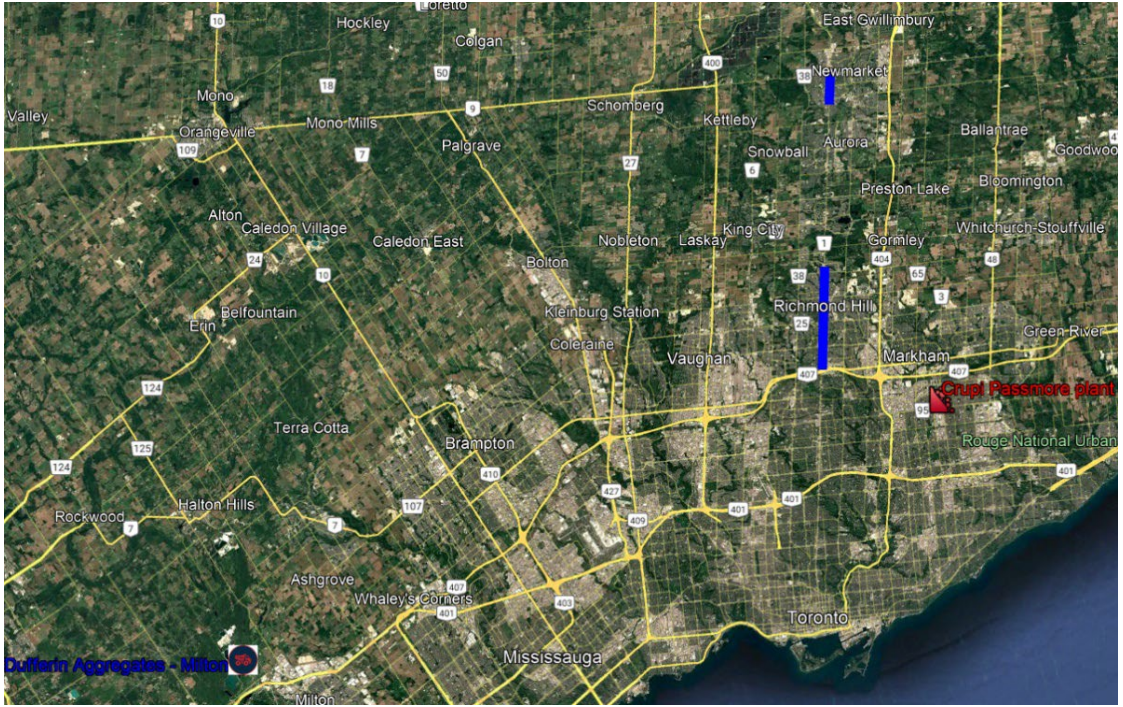
- In 2006, Greater Toronto Airports Authority set an example of material reuse, recycling and remediation with the demolition of old Terminal One, Canada's largest demolition contract up to that point.
- The concrete rubble from the demolition of T1 structure amounted to a total quantity of 253,000 tonnes, all of which was processed and recycled on site.
- The processed concrete was used as the apron's subbase holding up the final concrete and HMAC apron structure. The subbase use was a GTAA's requirement.

Pearson International Airport – On Site Concrete Crushing Plant and Processed Concrete Backfill (2004)

Case Study: VivaNext in York Region

Distance from project:

- RCA source: **19 km**
- Pit source: **64.5km**
- 5,500+ loads of concrete rubble were recycled
- 250,000+ tonnes of RCA used back in the project
- Loads ranged from 20 tonnes to 2,500 tonnes in a day
- After material was dumped, vehicle would usually backhaul material back to project.



Case Study: VivaNext in York Region

Photo taken March 2025 after six winters in operation shows **no structural issues** (e.g. no potholes, heaving) and has not required any additional maintenance.

Watch the full webinar at
youtube.com/@RoadBuilders

Case Study: East Gwillimbury

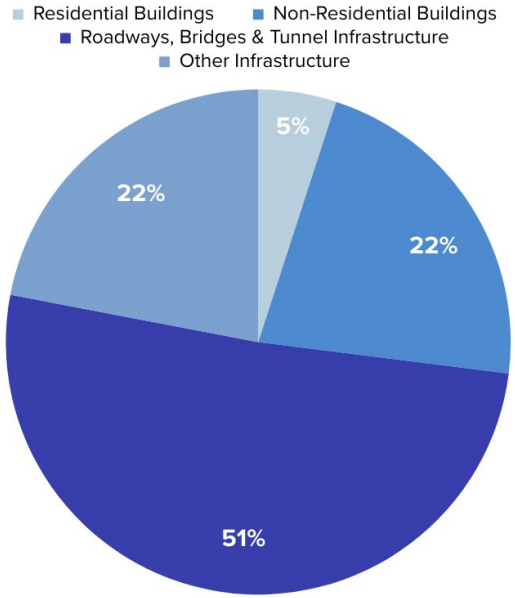
- Population of 35,000 people.
- The town's "Thinking Green! Development Standards" ***require*** 30% of recycled materials to be used.
- In 2021, the Queensville Subdivision Phase 6 used approximately 88% of recycled materials in its construction. The 13,230 tonnes used generated economic savings of $152,145 ($11.5/t).

Biggest Impact is at the Municipal Level

35% of all aggregates in Ontario are used by municipalities (**60-70M tonnes per year**), making them the largest consumers

50% of municipal budgets is spent on construction and infrastructure

500+ municipalities in Canada have declared a climate emergency



Aggregate Use in Ontario
(Stats Can)

RCA: Solution for Land Use Challenges

Solving Ontario's Landfill Capacity Crisis

Ontario is currently facing a crisis in landfill capacity and without immediate action we will run out of capacity within 10 years. The biggest obstacle to increasing capacity is Bill 197, which allows municipalities to veto developments outside of their boundary in an adjacent municipality.

Days Until Ontario Landfills Are Full:

2	9	8	6	2	0	5	8	3	8
Days				Hours		Minutes		Seconds	

GTHA Aggregate Deficit

25M tonnes PRODUCED

73M tonnes CONSUMED

1.5B tonnes CONSUMED by 2041

Quality Control over Exclusion

- Recycled aggregate is a valuable resource
- Engineers rank performance as the most important consideration, followed by sustainability
- When RCA conforms to OPSS1010, municipalities can be confident that these materials will meet all performance requirements and quality expectations
- Efforts should be directed to enforcing the quality of the product, rather than restricting its use

RCAontario.ca

The Case for Spec Standardization

When every municipality builds to the same proven standard, Ontario gets safer, greener, more cost-effective roads — faster.

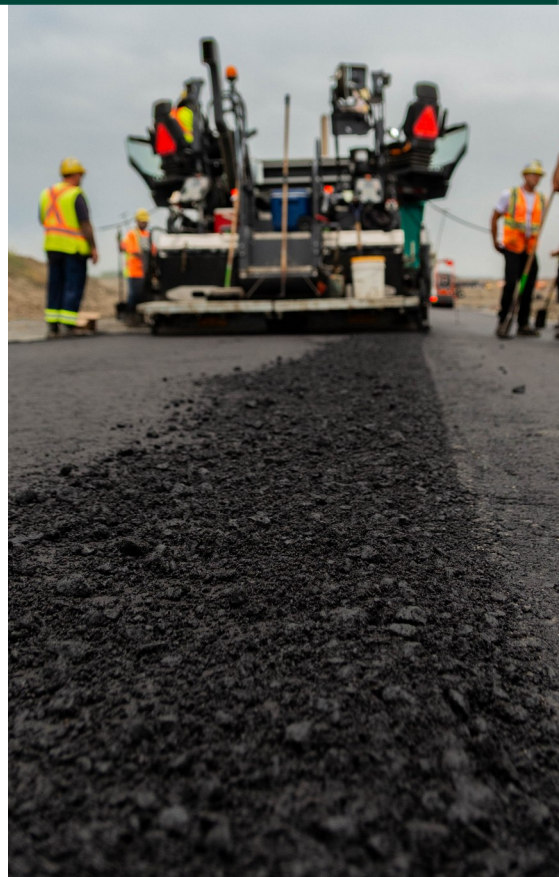
- **Cost savings for taxpayers:** With common standards, municipalities can leverage economies of scale, bulk procurement, and more competitive bidding.
- **Faster project delivery:** Clear, pre-vetted standards mean less time spent on drafting specs, back-and-forth reviews, and disputes.
- **Better quality and safety:** Uniform standards mean consistent pavement thickness, materials, and testing protocols. That means fewer potholes, less emergency repair work, and safer travel for everyone.
- **Sustainability:** OPSS 1010 standards already encourage practices like using recycled crushed aggregates.
- **Streamlined project management:** Clear, consistent specifications simplify project planning, contract administration, and oversight.

The Case for Spec Standardization

Standardization doesn’t take away local control. It ensures that innovation and quality improvements are shared across the province instead of staying siloed in individual municipalities, while delivering long-lasting infrastructure faster.

There are long-term benefits for every size municipalities and concerns can be addressed through strengthened governance.

- **Transition Costs**
- **Local Capacity**
- **Tiered Model**
- **Fixed, Recurring Review Schedule**
- **Formal Customization Process**



Unlocking RCA Benefits

Municipalities should **prioritize sustainability as part of the initial project design** of their linear infrastructure projects and:

✓ **Include RCA use as part of the tenders** for roads, bridges, sewer and watermains, subdivisions, and transit projects

✓ **Align municipal standards with OPSS1010** to reduce administrative burden, ensure quality and compliance, and encourage wider adoption

✓ **Collaborate with industry** to build internal capacity and confidence on quality control measures and wide variety of applications for RCA

Resources at RCAontario.ca

Using Recycled Crushed Aggregates Technical Seminar: *EXP Presentation*

Using Recycle Crushed Aggregates Technical Seminar: *MTO Presentation*

Using Recycled Crushed Aggregates Technical Seminar: *Supplier Presentation*

Questions?