

PARIS PIT CAP

November 12th, 2013

Geology, Products and Quality Control



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Paris Pit Update

Permit to Take Water & ECA (isw)

- MOE is processing the application. Expect a decision by the end of 2013 or early 2014.
- Well survey will be completed by year end.

County of Brant

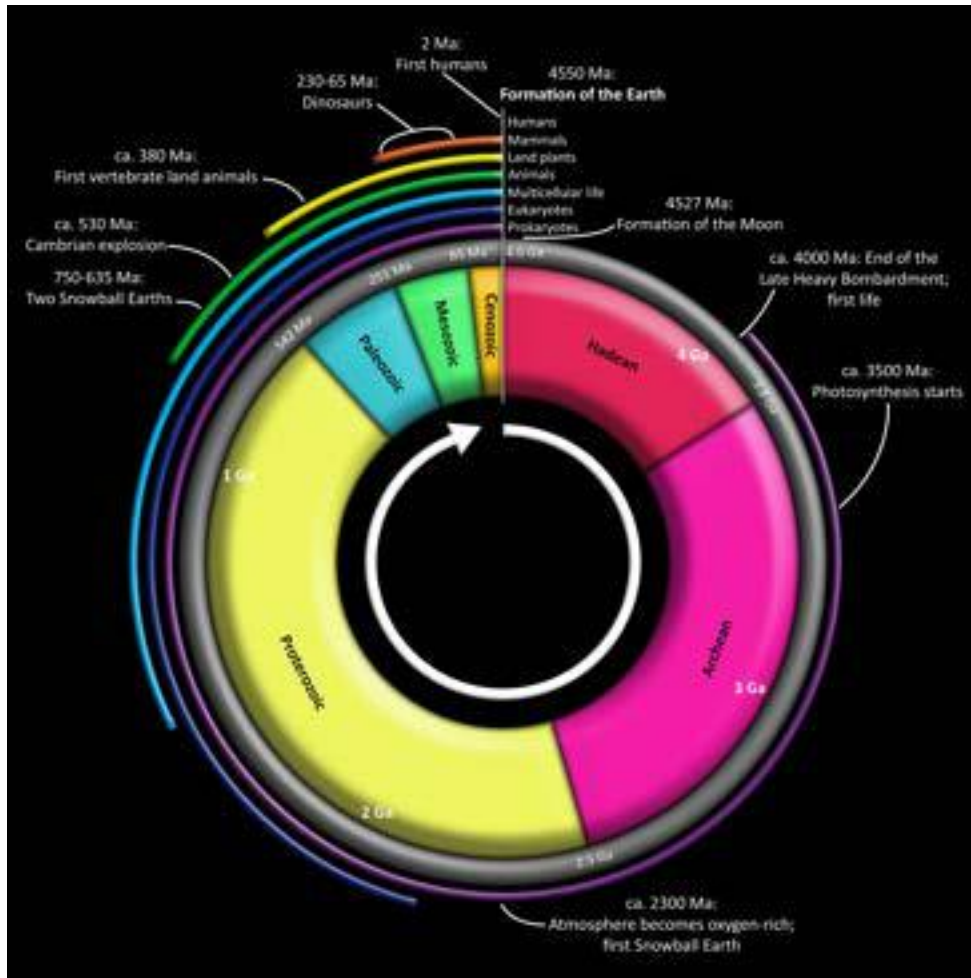
- Road design is underway. Significant amount of survey work has been completed. Road design will continue during the winter.

Paris Pit Update

Trespassing

- There has been a significant amount of trespassing.
- During the week of Nov 4 to 9 thirteen hunters were asked to leave the property
- We will be posting signs

Geology

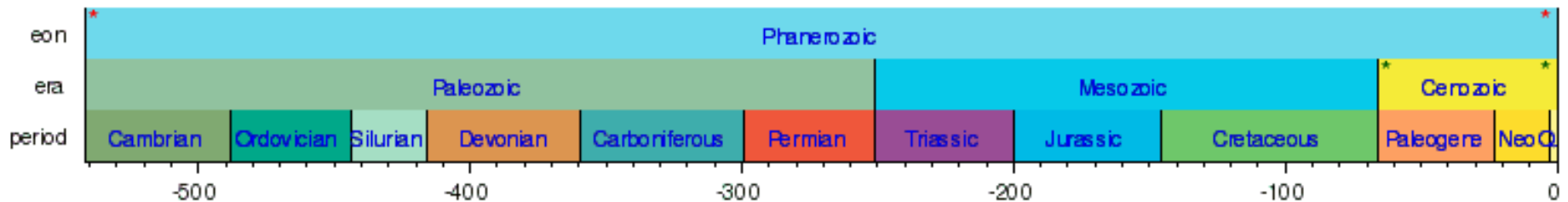


Source: en.wikipedia.org

- Physical and chemical properties of aggregates depend on the properties of the rock that forms the earth's crust.
- The bedrock in Brant County outcrop in the Grand River valley north and south of the town of Paris.
- Paleozoic rock underlie Brant County area.

Geology (*Continued*)

- The oldest rock in Brant County is Silurian rock of the Guelph formation.
- The rocks that outcrop at Paris are Upper Silurian grey-brown dolomites and grey and red shales, minor limestone, and in some areas salt, anhydrite and lenses of gypsum of the Salina formation.

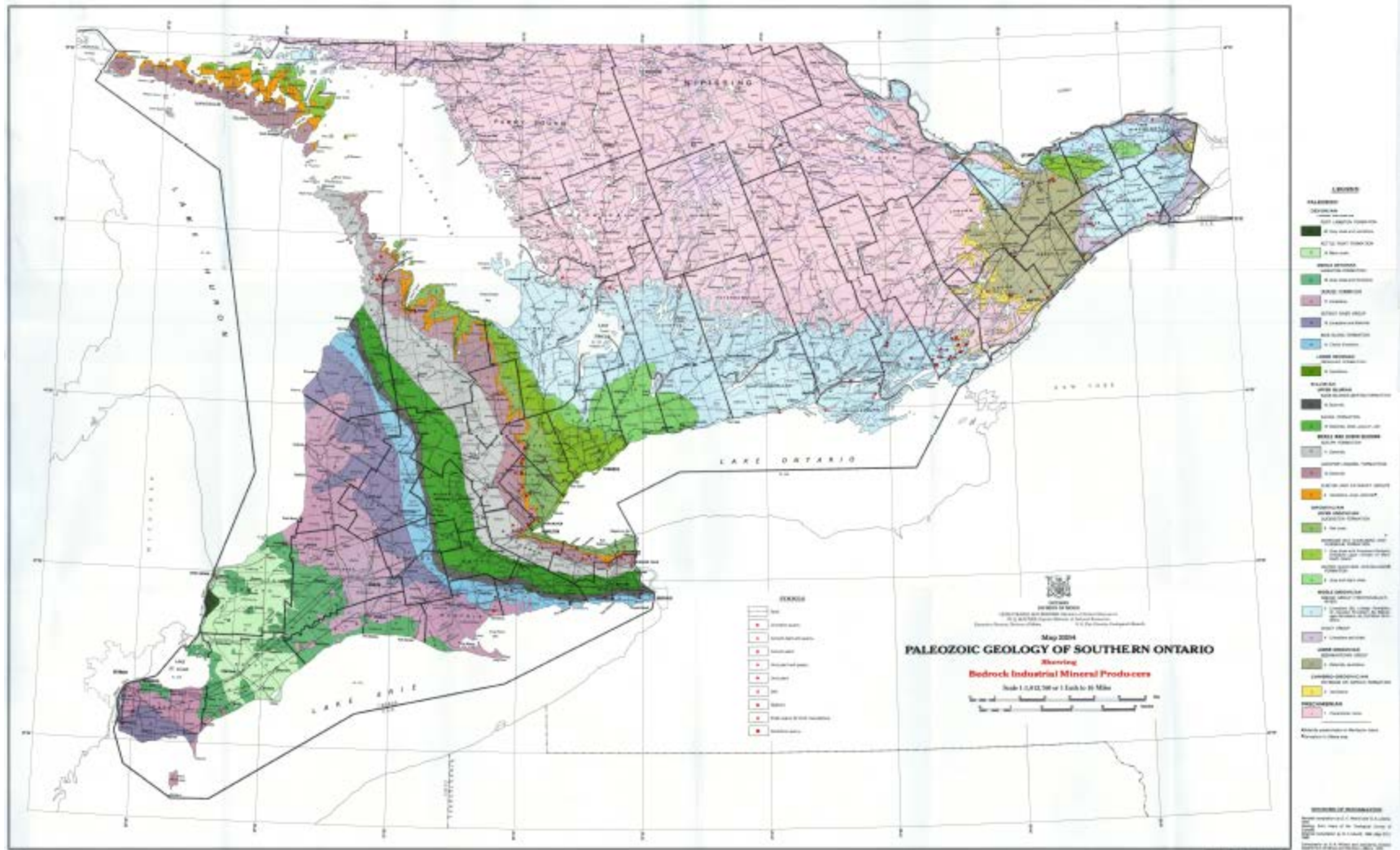


Source: en.wikipedia.org

Geology (*Continued*)

- The Salina formation is a thin-bedded, argillaceous dolostone, with bed and nodules of gypsum on the surface
- The Salina formation forms the bedrock (10-26 km wide) extending from the Niagara river, east of Welland, through Dunnville, Cayuga, Brantford, Paris, Kitchener, Elmira, Mount Forest, and Chesley to lake Huron, east of Southampton.

Geology (Continued)



Geology (*Continued*)

- A Paris moraine resulted from the retreat of a thin layer of ice, resulting in deposits of substantial amount of proglacial outwash gravel and gravelly sand.

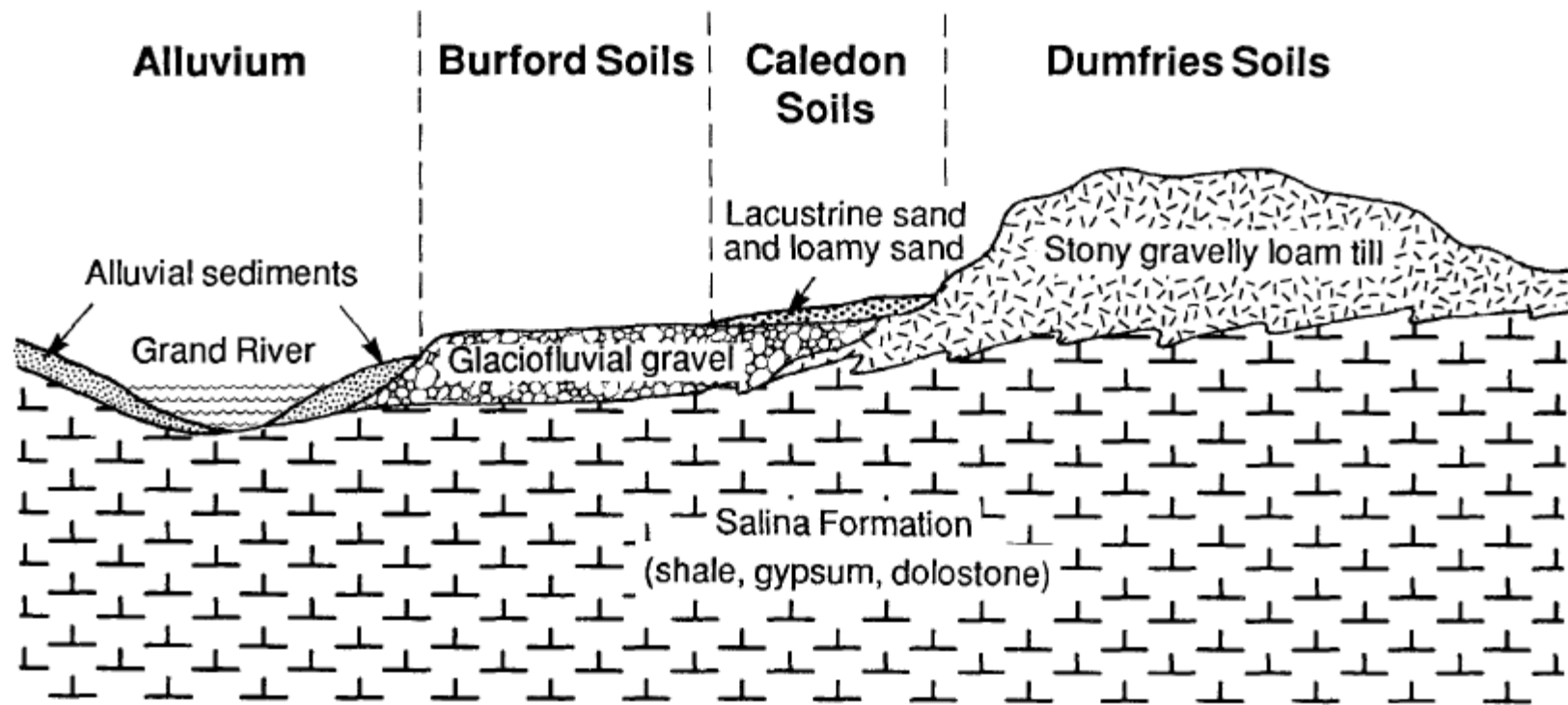
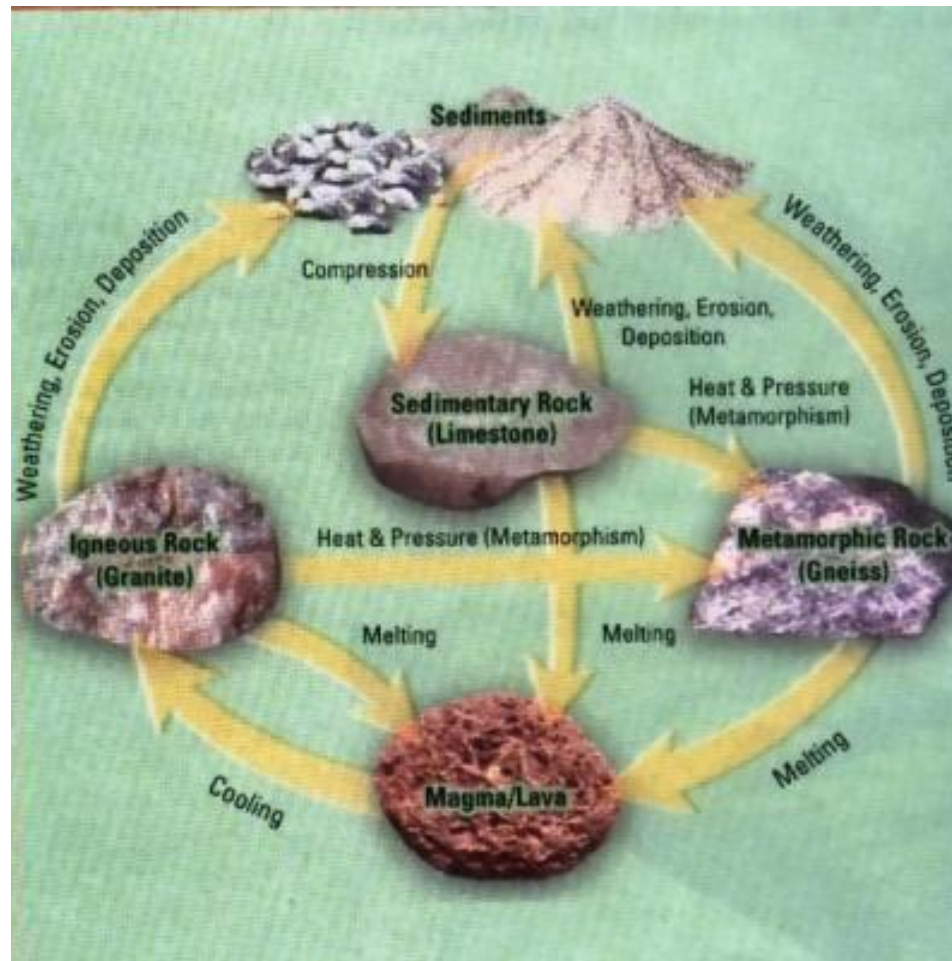


Figure 8. Schematic landscape cross-section showing soil parent materials associated with the Grand River and the Paris Moraine near Paris

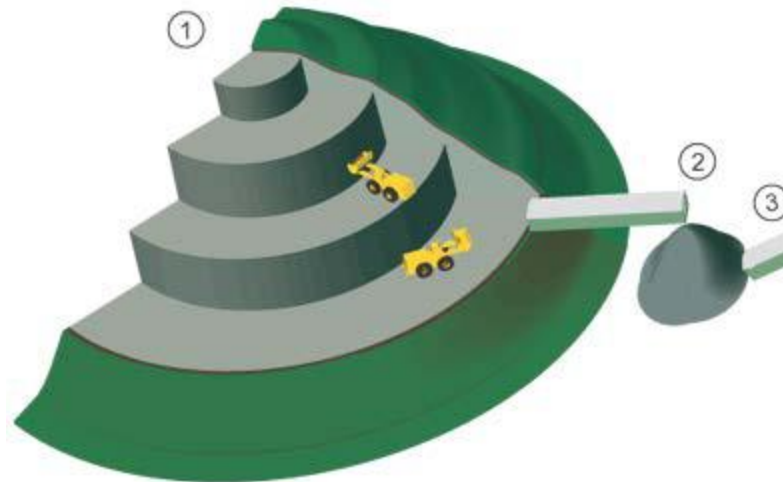
Gravel Pit

- Gravel and sand result from the natural weathering process of breaking large rocks by mechanical and chemical processes.



Aggregate Production

- **Stripping**: removal of overburden material from the deposit. Its thickness vary from 0.1 meter to more than 1.2 meters. This phase impacts the quality of the products.
- **Extraction**: sand and gravel deposits are extracted by loaders or shovels digging directly into the bank.
- **Loading & hauling**: transportation of bank material to the processing plant by feeding loader, trucks or conveyors.



Aggregate Production (*continued*)

- **Crushing:**
 - ▶ Primary crushing: reduction of large size gravel stone into smaller particles by either jaw, gyratory or impact crushers. Material is assorted in surge piles.
 - ▶ Secondary: final step in reducing the material to smaller product size by cone, roll or impact crushers.
- **Screening:** aggregate particles are sorted by sizes necessary for specification requirements of a product.
- **Stockpiling:** aggregate products are stored in separated stock piles. Cone (fixed conveyor), layered (clam shell crane), and radial stockpile (radial stacker), truck built piles.
- **Shipping:** transportation of products by trucks to customers. Rail could be also used.

Products and Applications

- Natural aggregate deposits consisting of sand and gravel also called pit-run gravel can be used to produce different products after minimal processing.
- Aggregate is divided into coarse aggregate (particles retained in the 4.75-mm screen) and fine aggregate, also called sand (particles passing the 4.75-mm screen).



Source: PCA 2009

Products and Applications (*continued*)

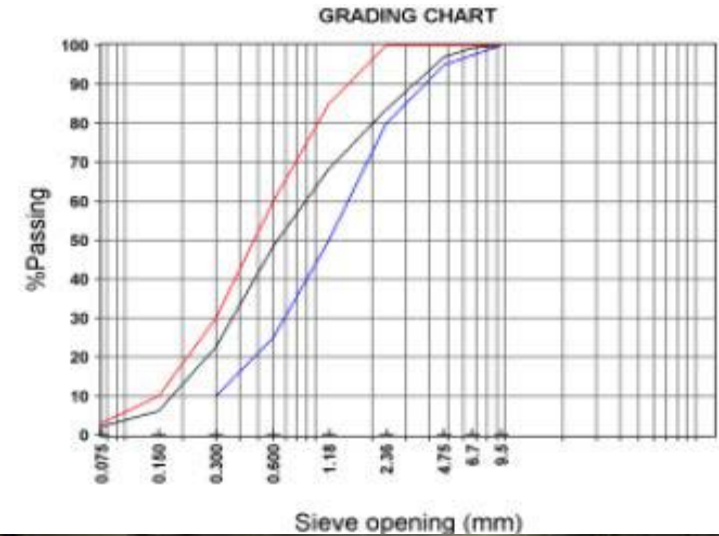
- **Granular A:** a graded mix of sand and gravel with particles smaller than 26.5 mm. It is a component of pavement roads as intended for use as granular base or as granular shouldering and back fill.
- **Granular B:** a mix of sand and gravel with particles smaller than 150 mm. It is used as granular subbase in pavement and granular backfill.
- **Clear stone:** a graded aggregate with different nominal maximum sizes (53, 19, 16, 13.2, and 9.5 mm). It is used in several applications (concrete and asphalt) such as drainage, bedding, and backfill.

Products and Applications (*continued*)

- **Concrete stone:** a well-graded aggregate with different nominal sizes (19, 16, 13.2, 9.5, and 6.7 mm). These products are used in the production of structural concrete, sidewalks, curbs and gutters.
- **Concrete sand:** particles of natural sand range typically between 4.75 mm and a lower limit of 75- μ m. In addition to the applications used for concrete stone, sand can be used as a base under interlocking paving stone.

Quality Control and Testing

- Gradation: the operation of dividing an aggregate sample into fractions of the same size.
- Fineness modulus: parameter that helps characterize a graded aggregate for use in concrete.



Quality Control and Testing (*Continued*)

- Physical properties:
 - ▶ Absorption and porosity
 - ▶ Density and specific gravity
 - ▶ Particle shape and texture
 - ▶ Strength, toughness, and hardness.
 - ▶ Attrition and abrasion
- Chemical properties:
 - ▶ Mineral and petrographic composition
 - ▶ Organic impurities
 - ▶ Soundness (shale, sulphate, iron pyrites)
 - ▶ Alkali-carbonate reaction
- Thermal properties:
 - ▶ Thermal expansion, specific heat, and conductivity

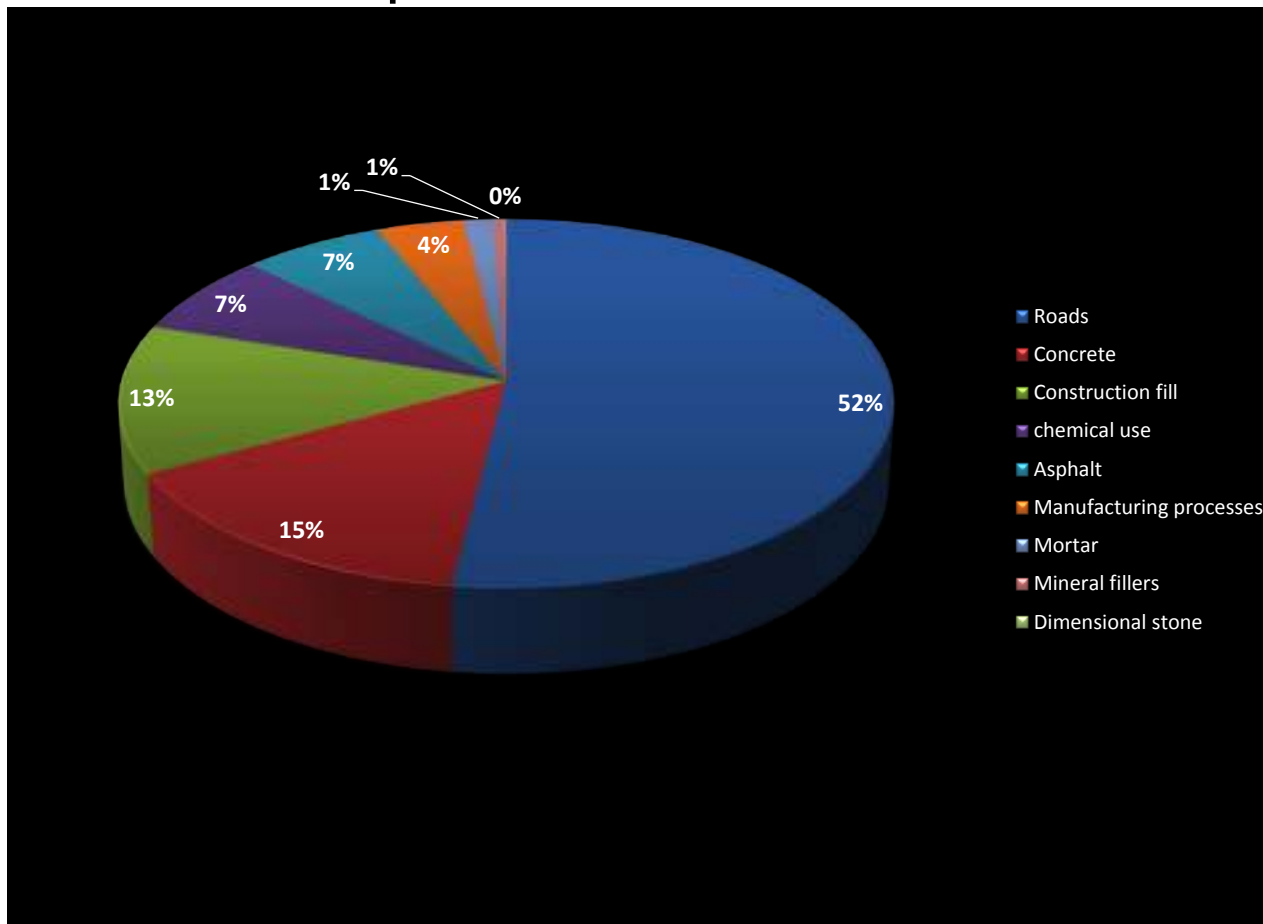


Specifications and requirements

- Aggregate used in Ontario have to meet Ministry of Transportation of Ontario (MTO) specifications (OPSS).
- Once products show compliance with specification or have demonstrated acceptable field performance, they are listed in the MTO Aggregate Source List (ASL).
- Quality Assurance (QA) is done by hiring QA laboratories to check materials conformance with required specifications.
- Failure of the material to meet physical requirements may results in rejection, removal, price reduction, or penalty.

Concluding remarks

- Aggregate is a fundamental part of our day-to-day lives (rural, suburban, and urban living). It is used by the public and private sector to sustain our present and build our future.



Next Steps

- PTTW & ECA (isw) – MOE will make decision over the next several months.
- Road design work will continue through the winter.
- Next CAP meeting: February 2014
 - ▶ Topics could include:
 - Trends in the aggregate industry
 - ARA Review Update



Dufferin Aggregates

A division of Holcim (Canada) Inc.