Gravel WATCH ONTARIO

Alternatives to Virgin Aggregate:
Road construction

Virgin aggregates are newly extracted materials, such as sand, rock, stone, and gravel, that are used as building supplies for different projects. Virgin materials can be bought from a local mine, but many mining companies also ship them to specified project sites.

Recycled aggregates are produced by crushing concrete, and sometimes asphalt. After the removal of contaminants through a process of screening, air separation and size reduction, the crushed aggregate can then be used for a variety of purposes including for pavements, curbing, and bridge foundations. Previously, leftover aggregate would have been sent to landfill – but reusing it is now regarded as highly beneficial for a number of reasons.

Environmental, Health and Safety Concerns

- Gravel extraction requires a great deal of resources and can be massively harmful to the environment.
- Virgin materials have a bigger impact on the environment because extracting them involves digging up the land. It also requires the use of natural resources to extract and process the aggregates for construction use.
- On the other hand, creating recycled aggregates is an industrial process, and noise and dust production caused by the grinding and blending are a cause for concern.
- Other concerns about recycled aggregate are related to its chemical constituents, dust, fine particulate matter, diesel emissions, airborne silica, and heavy metals such as arsenic, boron, cadmium, chromium, nickel, cobalt, lead, mercury, and thallium.

Cost Comparison

- Generally, virgin materials are more expensive than recycled aggregates.
- Using recycled aggregates materials saves costs and stretches construction dollars substantially. Not only do recycled aggregates cost less than virgin aggregates, but shorter haul lengths result in lower transportation costs as well.
- With the cost of quarried aggregates rising, and the standard of recycled products improving, recycled aggregates are becoming a favourable and convenient alternative.
- However, actual cost savings are dependent on a number of factors including how far virgin aggregates would have to be hauled, volumes of recycled aggregates to be supplied and hauling and crushing requirements to process the materials to specification.

Alternative Options:

Permeable Pavements

- *Permeable pavements are a valuable alternative to common asphalt.*
- *There are a variety of different permeable surfaces that are available for a range of applications (ex.* ***PurePave, Ecoraster, Tech Bloc****).*
- *The benefits of permeable surfaces are far greater than current impervious asphalt and with proper funding and planning, represents a more sustainable and cost effective option.*
- *The initial construction costs of permeable pavement were found to be slightly more expensive, but the life cycle costs were marginally lower.*

Lightweight Aggregates

- *Also known as Synthetic Aggregates; there are two common types:*
- ***Pyroprocessed aggregates,*** *which are by heating shale, clay or slate to temperatures in excess of 1,000 degrees Celsius in a rotary kiln, which causes the material to expand into a synthetic lightweight aggregate (SLA).*
- ***Plastic aggregates,*** *which are made by intensely heat-treating reclaimed industrial by-products and post-consumer plastics.*
- *It has already been shown that the plastic content of this synthetic aggregate forms a unique bond with hot liquid asphalt that can lead to pavement performance benefits.*

Green Concrete

- *A form of eco-friendly concrete that is manufactured using waste or residual materials from different industries, and requires less amount of energy for production.*
- *Compared to traditional concrete, it produces less carbon dioxide, and is considered cheap and more durable.*
- *The aim of using green concrete is to lessen the burden on natural resources, and increase dependency on recycled materials.*
- *Examples of Green Concrete include* ***Fly Ash/Ashcrete, Blast Furnace Slag, Micro Silica, Post-consumer Glass, and more.***

Links:

- https://landscapeontario.com/bracing-for-the-100-year-storm
- https://sustainabletechnologies.ca/app/uploads/2015/01/PP-Tech-Brief-Final.pdf
- http://watermanagement.ucdavis.edu/files/5414/3891/2393/A03_Terhell_Cai_Chiu_Murphy_ESM121_FinalReport.pdf
- https://www.agg-net.com/resources/articles/recycling-waste/exploring-the-synthetic-aggregates-alternative
- https://www.brewsterbros.com/recycled-aggregates-what-you-need-to-know/
- https://www.cdrecycler.com/article/tarba-unveils-recycled-concrete-aggregate-research/
- http://www.onasphalt.org/files/Publications/ABCs of Recycled Aggregates.pdf
- https://www.purepave.com/
- https://www.sciencedirect.com/topics/engineering/recycled-aggregate
- https://www.specifyconcrete.org/blog/eco-friendly-alternatives-to-traditional-concrete
- https://www.techo-bloc.com/Aquastorm-Ad/
- https://www.wise-geek.com/what-are-the-different-types-of-recycled-aggregate.htm