



IDENTIFYING OPPORTUNITIES TO IMPROVE SUSTAINABLE MATERIAL USE IN ENGINEERING OPERATIONS

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Date: August 28, 2017

ACKNOWLEDGEMENT

Raghav Grover, Civil Engineer (EIT) of the PMO office at City of Vancouver and mentor for this project, for providing valuable feedback during weekly meetings, contributing time and resources to the project outcomes, leading the stakeholder effort and guiding me through challenges.

Sydney Koch, Engineering Assistant of Kent Yards at City of Vancouver, for providing key documents and arranging meetings with subject matter experts.

Jeff Markovic, Branch Manager of Kent Yards at City of Vancouver, for contributing his vast knowledge and insights for this project.

Marisa Espinosa, Director of Green Operations at City of Vancouver, for providing valuable feedback during the monthly steering committee meetings and perspectives on strategy.

Jimmy Zammar, Manager of the PMO office at City of Vancouver, for providing valuable feedback during monthly steering committee meetings and methods of analysis used in this project.

Doug Smith, Acting director of Sustainability Group at City of Vancouver, for providing valuable discussion and contacts at other municipalities.

All the **City of Vancouver employees** who provided time and knowledge for my project.

City of Vancouver and **UBC Sustainability Initiative** for this wonderful opportunity to collaborate with the amazing city staff and support the Greenest City goals.

This report was produced as part of the Greenest City Scholars (GCS) Program, a partnership between the City of Vancouver and The University of British Columbia, in support of the Greenest City Action Plan.

This GCS project was conducted under the mentorship of City staff. The opinions and recommendations in this report, and any errors, are those of the author, and do not necessarily reflect the views of the City of Vancouver or The University of British Columbia.

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EXECUTIVE SUMMARY

The City of Vancouver wants to become the greenest city in the world by 2020. To support this vision, the City of Vancouver developed the Greenest City 2020 Action Plan. Subsequently, Engineering services established three targets by 2020 to green their internal operations. The first target is **reducing 50%** of city operations greenhouse gas emissions from 2007 level. The second target is **70% solid waste diversion** of public-facing city facilities and **90% solid waste diversion** of all other city facilities. The final target is **meet or beat** the most stringent air quality guidelines set by Metro Vancouver or World Health Organization. The main objective of this project is to benchmark the existing use of sustainable materials in city's internal operations and **identify areas for improvement.**

This project builds on work done by past scholars to investigate further the following three materials:

- ❖ **Asphalt** – used for road paving
- ❖ **Concrete** – used to build curbs, gutters, sidewalks, bus pads and sewer pipes.
- ❖ **Aggregates** – used as bedding materials for construction projects and provide materials for concrete & asphalt.

The methodology adopted for this project is as follows:

1. **Review** of current practices and requirements – interviewed relevant stakeholders and benchmarked current metrics.
2. **Understanding** of best practices – interviewed other municipalities and conducted desktop studies.
3. **Identifying areas** for improvement – analyzed business processes to identify bottlenecks with relevant stakeholders.

For the three engineering materials (asphalt, concrete and aggregate), internal and external procurement processes were mapped. In addition, existing requirements in procurement and reports pertaining to sustainability were documented. Following the benchmarking, five improvement areas were identified:

1. Sustainable Procurement

2. Use of **Reclaimed Asphalt Pavement** for paving
3. Use of **Warm-mix Asphalt** for paving
4. **Reclaimed Roadbase** for backfilling
5. **Supplementary Cementitious Materials** for concrete

Business process for the five sustainable practices were analyzed using the Supplier, Input, Process, Output and Customer (**SIPOC**) framework. Subsequently, gaps between current practices and best practices were identified. To narrow these gaps, **key bottlenecks** were isolated from the business processes. Some of these bottlenecks for sustainable materials include logistics coordination, equipment capacity, misconceived risks, and lack of formalized communication and training. This report conclude with recommendations to address the existing bottlenecks.

This project may support further work in addressing the identified gaps. Detailed recommendations such as training programs and improved coordination frameworks can be developed. Furthermore, a plan of action with established short-term and long-term targets can be drafted to support process improvement.

