PROJECT SPOTLIGHT

PORT OF MONTREAL, CONTAINER TERMINAL EXPANSION, PH. 1-3

LAFARGE
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HIGHLIGHTS:

LOCATION:
Montreal, Quebec

PROJECT TYPE:
Solidification and Stabilization (S/S) with cement-based hydraulic binder

PROJECT PURPOSE:
Port Expansion

DEVELOPER/OWNER:
Montreal Port Authority

ARCHITECHT/ENGINEER/CONSULTANT:
SNC Lavalin

QUANTITY OF SOIL TREATED:
35,000 T (19,000 m³)

SERVICES PROVIDED:
- Hydraulic binder mix design
- Bench-scale soil stabilization sample preparation and strength testing
- Contaminated soils treatment process management
- Environmental compliance management

HEAVY METAL CONTAMINANTS IN SOIL HAMPERS PORT EXPANSION

The heavy metal contaminants and unstable geotechnical soil attributes impeded the Montreal port expansion. These needed to be addressed so that the port could develop the land to accommodate growing demand for container storage. A traditional approach would be to dig up the soil and place it in a landfill. This technique is known as “dig and dump”. Moving the contaminated soil does not alleviate the problem of leaching, it merely moves it to another location. It can also be expensive and there are risks associated with transporting contaminated soil. The Montreal Port Authority (MPA) was looking for a cost-effective and safe way to deal with the soil.

The MPA is an autonomous federal agency that builds and maintains infrastructures that it leases to private stevedoring companies. The port authority also directly operates a passenger terminal and its own railway network.

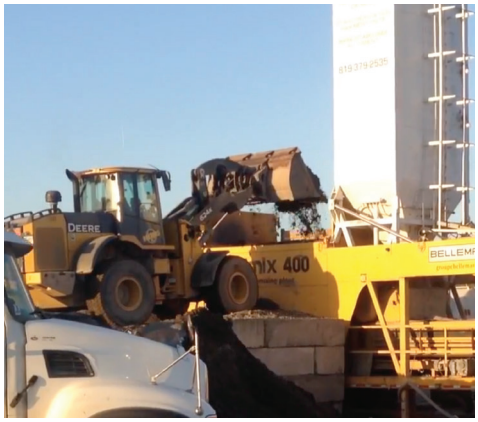
ALTERNATIVE TO DIG AND DUMP

The MPA chose solidification and stabilization (S/S) using cement-based hydraulic binder for its efficacy in containing contaminants, beneficial reuse as subgrade material and cost-effectiveness.

Lafarge worked with the engineering firm to provide the following services:

- Hydraulic binder mix design to meet both subgrade strength and remediation requirements

Contaminated material waiting for processing



Contaminated material being placed into pug mill bin

- Bench-scale soil stabilization sample preparation and strength testing
- Stabilization and quality control checks to allow for material reuse on site
- Phase 2 & 3, contaminated soils treatment process management
- Environmental compliance management for mobile operations and equipment.

POSITIVE ECONOMIC AND ENVIRONMENTAL RESULTS

S/S using hydraulic binders resulted in:

- $2.1M in cost savings compared with dig and dump
- Safe on site reclamation of 35,000T (19,000 m³) of contaminated materials
- Reduced transport and offsite disposal of contaminated soil resulted in:
  - lower transport related greenhouse gas (GHG) emissions
  - fewer public safety risks
- Minimized importation of clean and/or granular materials for backfilling
- Increased structural strength compared to conventional design and longer pavement infrastructure lifespan.

The MPA was pleased with their decision to use S/S with cement as it effectively contained the contaminants in the soil. It also reduced risks and costs associated with the traditional dig and dump method.

PORT MONTRĒAL

PHYSICAL PERFORMANCE CRITERIA:

Tensile Strength (28 days)>1.8Mpa
Compression Strength (28 days) >3.5Mpa
Hydraulic Conductivity <10^{-7}

PHASE 1 PERFORMACE RESULTS:

Achieved subgrade strength and remediation requirements
100% material reuse on site
Unit Cost $22/tonne (Hydraulic binder and on site processing)

CHEMICAL PERFORMANCE CRITERIA:

SPLP Leaching < Potability Criteria
Water Leaching < Potability Criteria
Diffusivity (Leachability Index) >9

QUALITY CONTROL:

1 test series per 500m³

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