DALHOUSIE UNIVERSITY
FACULTY OF ENGINEERING

Seaside Engineering Ltd.- Group 9

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Client- BGC Engineering Inc.

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BGC

Department of Civil Engineering

Tailings Storage Facility Design

Academic Advisor: Dr. Hany El. Naggar

What is a tailings mine?

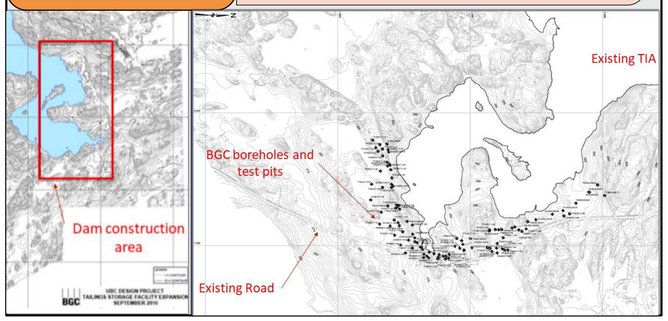
- Waste material left over after the intended material is extracted from ore. These tailings must be properly stored and treated.

How are they properly stored?

- These dams are designed to contain and store the left-over tailings material until it is either treated or reclaimed.

What is the scope of this project?

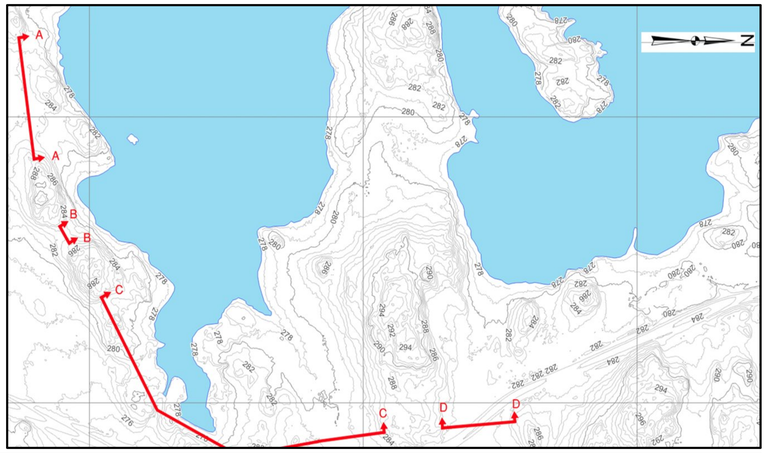
- The scope of this design is to increase the capacity of a Sudbury, Ontario sub-aqueous tailing's facility, by increasing the size of the dam.

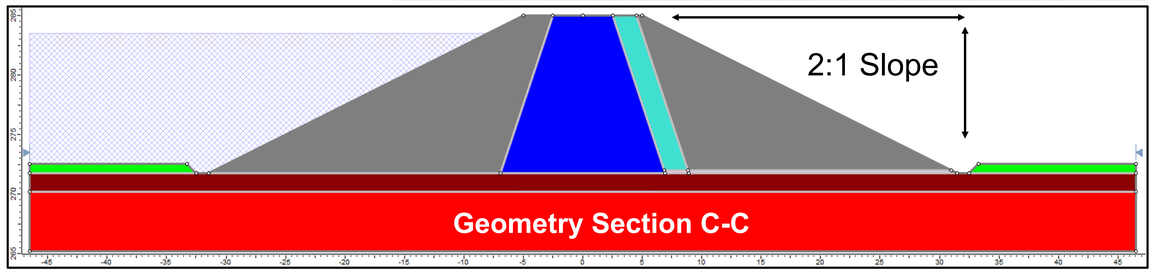


Details of Design

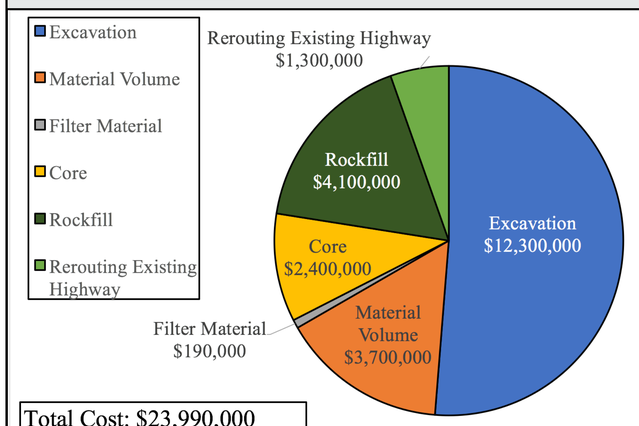
Shown in the figure right is the detailed dam alignment with all four cross sections displayed on a topographical map. Each dam has a crest height of 285 m.

Shown on the figure below is a dam geometry for cross-section C-C. It includes a rockfill, clay layer and filter material with a 2:1 slope.





Cost Estimate



Total Cost: $23,990,000

Conclusion and Recommendations

The final design provides a storage capacity of 27 million cubic meters of tailings over its expected facility lifespan ending in 2037.

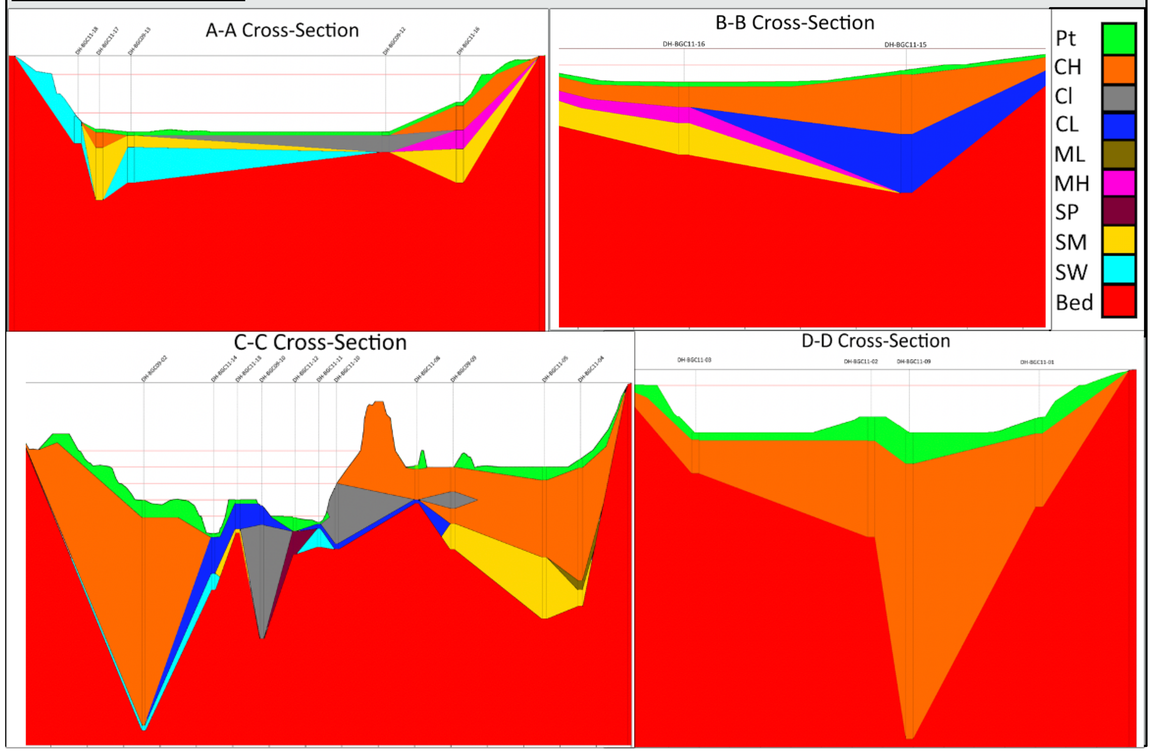
It is recommended that local borrowed materials are used when possible, to reduce cost and speed up construction time, while the highway rerouting was more costly to ensure a wider road crest to optimize safety.

Additionally, we recommend using the originally excavated peat to cover the site as a possible reclamation plan for the facilities end of lifespan.

Design Process

- Detailed design accomplished in 2020
  - Tailings Storage Capacity
  - Dam Elevation and Alignment
  - Dam Cross-Sections
  - Soil Properties Analysis
  - Existing Infrastructure
- Detailed design accomplished in 2021
  - Dam foundation preparation
  - Dam zonation and geometries
  - Stability and seepage analysis
  - Borrow materials and locations
  - Emergency spillway location
  - Closure and reclamation plan
  - Project cost and schedule

Cross-Sections



Acknowledgments

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We would also like to thank our supervisor Dr. Hany El Naggar for working closely along side the project and providing valuable input.

References

- BCG (2020). Kickoff Presentation 2020. Presented by Greg Horne, September 23, 2020
- CDA (2007). CDA Dam Safety Guidelines (2013 Edition). Provided by Jana Purmalis of BGC Engineering Library