



An aerial view of the FMF Cape Breton site as Allterra Construction & Environmental crews near completion.

BREAKING new ground

Allterra Construction & Environmental takes mass stabilization to the next level

By Jillian Mitchell

Every generation develops new ideas and concepts, many harnessed with what was once only plausible in the minds of revolutionary thinkers. Such is the case with Allterra Construction & Environmental Ltd. and its role in the multi-phase Shop Consolidation Project at the FMF (Fleet Maintenance Facility) Cape Breton site at CFB Esquimalt.

In its entirety, the FMF Cape Breton project will consolidate the FMF's 38 maintenance shops into one of the largest enclosed buildings on North America's West Coast. At the beginning of the 20th Century, however, the FMF Cape Breton site was a natural cove – soon to be backfilled for development.

In the past, hundreds of tons of bedrock from adjacent rock formations were blasted

and used to fill the cove, as was waste from the shipyard including welding slag and sheet metal, virtually any items involved with ship-building and repair. While, at the time, the techniques and materials employed at the in-house government shipyard were status quo, the proverbial shoe would drop almost 70 years later when, during a site revitalization project, the area's soil was tested as per Canadian Soil Regulations prior to new construction.

"Through that process they determined that there was leachable metals – copper, zincs and leads – that were at a level exceeding five milligrams per litre, which put it at a hazardous waste level," explains Todd Mizuik, co-founder of Allterra Construction & Environmental, one of the project's environmental remediation contractors.

The scope of the work defined by contract owners Defence Construction Canada and their consultant Stantec Consulting would see Allterra taking on a formidable challenge: to design and execute a system by which the remaining concrete slabs and footings left from initial demolition of the pre-existing building would be further demolished before removing the top three metres of soil, rock, metal and other debris. This dirt and debris would need to be removed and either cleaned or relocated to an appropriate waste management site.

Next up was the task of mass stabilizing the soil's bearing capacity to meet with the client's geotechnical requirement of 350 kPa (kilopascals) in addition to a complete encapsulation of all contaminants that



Allterra cleaned and decontaminated every particle of waste on the FMF Cape Breton site to prevent further contamination outside of the project site.



Thousands of tons of metal waste were unearthed at the FMF Cape Breton site.

remained in the soil. Once the site was remediated and stabilized, new soil would need to be brought in and backfilled to a desired elevation so that construction managers EllisDon-Kinetic could go ahead with construction on the new structure.

“Because the contaminants are leachable, the more you dig into the soil, the more the metal leaches,” adds Mizuik of the project’s challenges. “One

of the things that has to be done is an encapsulation of that area to perform any work, and we typically would insert sheet piling around the perimeter, which would encapsulate the work area.”

Mizuik affirms that the aforesaid process is typically effective when extracting soil, classifying it for soil type and disposal, and then replacing the soil with clean fill. However, on the FMF Cape Breton

site, the process proved ineffective and cost-prohibitive, due to further site complications.

According to Mizuik, his team was aware that the underground rock fill could create problems (some of the rocks were up to nine feet in diameter), and that the size and hardness of the armour stones would make inserting the sheet piling virtually impossible. Alternately,



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Allterra crews use a water cannon to contain environmental particulates during the injection process.



Excavator bucket designed by Allterra to more effectively dig for the types of metal and cabling that crews had to contend with at the FMF Cape Breton site.



Allterra Construction & Environmental co-founders: (L to R) Gary Isacson, Raymond Lam, Todd Mizuik.

a secondary perimeter could have been excavated in order to properly encapsulate the area and avoid making contact with the stone, but Mizuik says the price tag on this process would have been “astronomical.”

“Rather than try to dig the soil out and create that encapsulation area, it was proposed to stabilize the hazardous waste soils in-situ,” he says. “The tender was then two-pronged; it was geotechnical improvement and environmental encapsulation.”

Much of Allterra’s efforts are continually put into research and development, and equipment and technology employed by the company is industry standard. Interestingly, Allterra is one of only five companies in the world to combine methodology with technology and innovation in the environmental remediation realm.

For Allterra founders Raymond Lam, Todd Mizuik and Gary Isacson, a collaborative team approach was integral to accomplishing a successful outcome on such a unique project. The three men are adept at bringing their own unique skills to the table

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on any job and within the company itself.

Co-founder Gary Isacson, a long-time excavator and equipment specialist, was instrumental in the modifications behind the specialized equipment that would prove its worth ten-fold at the FMF Cape Breton site. To start, modified excavators used in the company's mass stabilization services were equipped with a device commonly used for rock scaling known as a drum cutter. In addition the company also modified the drum's mixing paddles.

Mizuik explains that the decision to go with the drum cutter was due to the fact that the cutter's engine and modified mixing paddles were best suited to deal with the dense, rocky soil conditions that exist on Vancouver Island.

In mass stabilization, the binding agent, its delivery and its mix ratio are imperative for successful results. The company has spent a significant amount of time and energy in engineering a more accurate soil binder injection system that would be retrofitted to the drum cutter. On the FMF Cape Breton site, these modified excavators allowed the team to simultaneously inject the binding agent, while homogeneously mixing the binder and soil. This process encapsulates the hazardous waste in place and stabilizes the land for further development.

Allterra's technological innovations also allowed the team to monitor the injection and mixing process by way of the GPS technology. Through the FMF Cape Breton project, the company further developed a system whereby it could provide real-time reports to the client through data acquisition, in addition to reducing binder waste brought about by the injection process.

For company co-founder Raymond Lam, this practice of innovation and development meant a result that would prove far more cost-efficient and would guarantee peace of mind for the client for years to come.

"With mass stabilization, for the purposes of geotechnical strengthening, [the client] is not as concerned if you've got a cubic-foot pocket of non-stabilized soil, but that everything else around that pocket is firm," Lam says. "But because we were containing hazardous waste material, they are concerned if you miss a soccer-ball-sized pocket of hazardous waste. That's why our detailed level of reporting is so important moving

into the environmental field for mass stabilization, because it's giving you that accuracy and confidence."

For the client, the FMF Cape Breton site now begins another era of its long history in the community. For Lam, Mizuik and Isacson, the teamwork and collaboration prided by their company saw a very unique project to a satisfying conclusion – and one that would enrich the lives of many generations to come. ■

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