

Case Study

application	Blast Wall Barricade
location	Bedford, Nova Scotia, Canada
product	Mirafi® HS600

job owner	Defence Construction Canada
engineer	Mitchelmore Engineering
contractor	A&I Contracting

TenCate™ develops and produces materials that function to increase performance, reduce costs and deliver measurable results by working with our customers to provide advanced solutions.

THE CHALLENGE

The Canadian Forces Ammunition Depot (CFAD) in Bedford Nova Scotia, Canada required upgrading of their existing concrete blast walls. The concrete walls, originally constructed in the 1950's had reached their design life. The ammunition depot sits on a hillside that faces Halifax Harbour. Due to it's location on the hillside, concrete blast walls are situated in front of each ammunition bunker to absorb any blast that might occur if the bunkers were to explode, which in turn shields the harbour from the force of the blast. Regulations have changed since these walls were originally constructed and the new regulations require the blast walls to be constructed of material that would not fragment into pieces larger than 19mm (3/4 in) if hit by an explosive blast.

THE DESIGN

Mitchelmore Engineering looked at a variety of wall systems that might satisfy the project requirements. Criteria that had to be met were maximum particle size when exposed to blast, economics, a life expectancy of 20 years, ease of construction, and availability. A total of three walls were to be built. After careful evaluation, a geotextile wrapped wall was chosen. The geotextile option allowed for the face and reinforcement components to be one material. If exposed to a blast, the maximum particle size would be limited by the gradation of the granular backfill which was 3/4 in (19mm). It would be easy to construct using temporary forms, and by spraying the exposed geotextile face with an asphalt emulsion after completion, UV stability would not be an issue. In addition, the new blast walls would have to be freestanding,

therefore requiring four exposed sides.

The design required a polyester geotextile with a minimum wide width tensile strength as per ASTM 4595 of 47kN/m (3220lb/ft) in both the machine and cross machine direction and a minimum LTDS of 30kN/m (2055 lb/ft) in the MD in type 2 granular. Mirafi® HS600 polyester geotextile met these requirements. The contract documents also stipulated that the manufacturer had to provide a qualified technician, experienced in construction of these types of wall systems, to provide on site technical support to the contractor at start up.

The blast wall dimensions were as follows: 72m x 9m x 6m high (236ft x 30ft x 20ft high). Each wall was constructed of 11 lifts of Mirafi® HS600 with a vertical spacing of 600mm (2ft). Set back for each layer was 200mm (8in).



Completed blast berm with asphalt emulsion UV protection.

THE CONSTRUCTION

Construction of the blast barricade walls started in August of 2007 and was completed by October of that fall. With the aid of drawings supplied by TenCate™ distributor Armtex, the contractor constructed temporary form work that would enable him to maintain correct alignment and setback of the wall.

Construction sequence was:

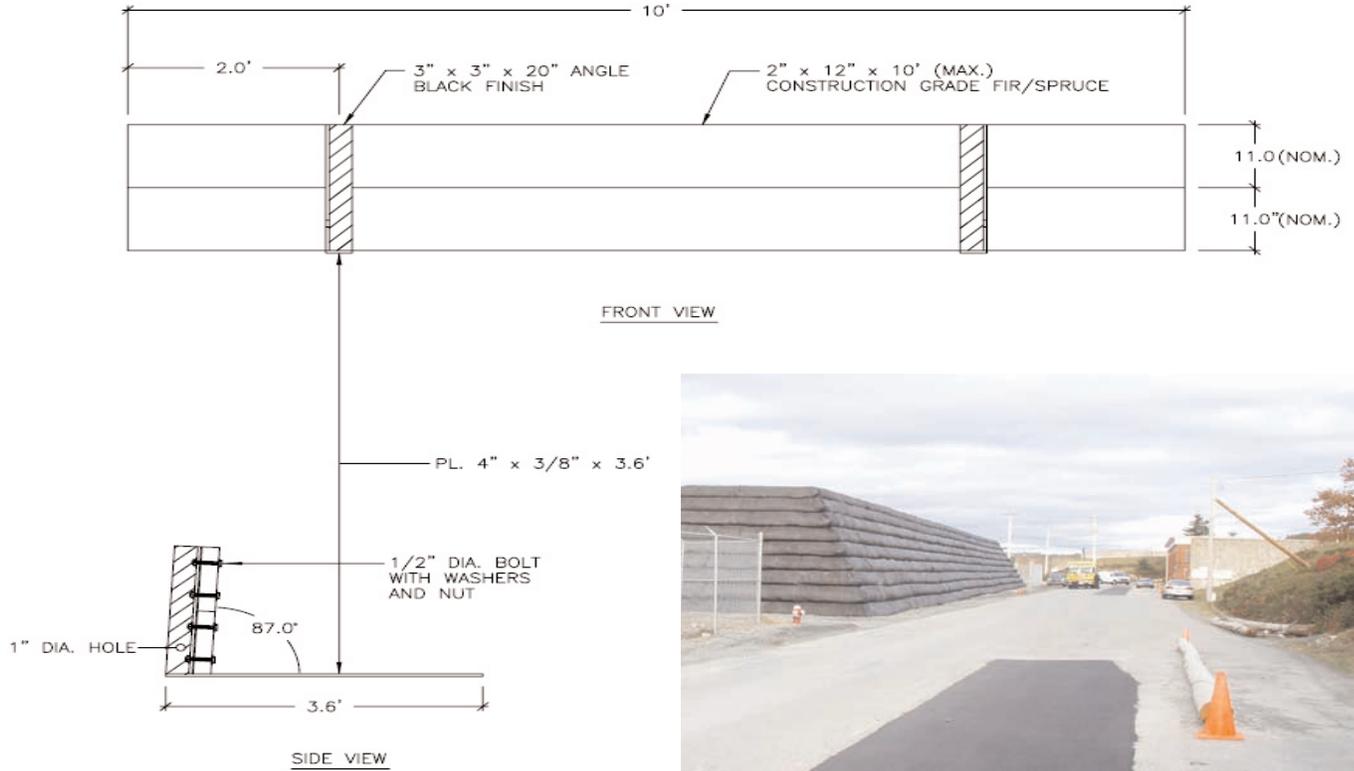
1. Place and align the temporary form work along the first lift.
2. Install the Mirafi® HS600 geotextile allowing for enough material at the front face to provide a 1000mm (39in) wrap return.
3. Place and compact backfill to 95% SPD.
4. Wrap Mirafi® HS600 back, place and align next lift of temporary forms.
5. The Above sequences were repeated until step 4, at which time the first set of forms are pulled and reused.

A staging area was setup where the Mirafi® HS600 was cut to the required lengths 4.5m (15ft). This length included 1.5m (5ft) for the face wrap and marked with paint where the face wrap would start 1600mm (5ft) from the end. The contractor was able to construct one lift of wall every 2-3 days with a crew of 6 men.

Upon completion of all 3 barricade walls, the face of each was sprayed with asphalt emulsion to provide long-term UV protection.



First layer of Mirafi® HS600 being placed with temporary forms.



Completed blast berm showing corner detail.

THE PERFORMANCE

The use of Mirafi® HS600 for the blast barricade walls enabled the engineer to design a structure that was cost effective yet had the ability to absorb extreme explosive forces without sending large diameter shrapnel into Halifax Harbour. The flexibility of the geotextile/form work enabled the contractor to maintain alignment and construct square corners.



Complete 6.0m (20ft) blast wall situated on top of a 6m (20ft) MSE structure.

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