

ALBERTA TRANSPORTATION SPECIFICATION FOR HIGHWAY CONSTRUCTION (Edition 16)

GEOSYNTHETICS SECTION 5.31

A link to the published document is included below – this technote will highlight the changes in the materials required to meet AT specifications. In summary, they have updated the specification to better clarify where and when various geosynthetic materials are to be used. A key point to take away from this update is that they no longer will accept Slit Tape Woven materials – like LP200, LP250, or similar materials from other vendors to be used in road construction applications.

The new standard has been mirrored somewhat to the AASHTO M288-17 standard that has been in use in other jurisdictions, with some notable exceptions outlined in this technical note. AASHTO-M288-17 is listed as the first point of reference in the standard. The concept behind this new approach is to better guide the consultant and the contractor to use the most appropriate material for a given application and to be as inclusive as possible, allowing contractors to bid effectively.

Alberta Transport has made some changes to both the Quality Control and Assurance section 5.31.2 and the Identification, shipment, and storage section 5.31.3 – Be aware that the materials you are bidding meet these updated standards for testing and certification.

Under the 5.31.4 Materials heading – geosynthetic applications have been broken out and defined. Each application has a specific table and detailed specification as to which material to install for each given situation. Based on this new standard, you, as the contractor or consultant, will have to confirm the application prior to selecting which material to use/ quote etc. A hint as to which application should be in the reference material or possibly in the payment schedule, as it may describe or define how materials will be accounted for in the tender.

The classification/applications under **5.31.4 Materials** are as follows:

5.31.4.1 Separation and Filtration Geotextile Applications

5.31.4.2 Stabilization Geotextile Applications

5.31.4.3 Subsurface Drainage Geotextile Applications

5.31.4.4 Erosion Control Geotextile Application

A detailed link to the entire publication is below –

<https://open.alberta.ca/publications/standard-specifications-for-highway-construction-edition-16>

For up-to-date technical information, be sure to visit us online at www.LayfieldGeo.com

5.31.4.1 SEPARATION AND FILTRATION GEOTEXTILE APPLICATIONS

The primary function of the geotextile is to provide separation and filtration.

The geotextile shall meet the following requirements:

Table 5-31-1: Separation and Filtration Geotextile Properties				
Property	ASTM Test	Mechanical Properties ¹ Minimum Average Roll Values		
		Type A Nonwoven	Type B Nonwoven	Type C Nonwoven
Layfield Product Recommended		LP4.5	LP6	LP8
Grab Tensile Strength (N)	D4632	500	700	900
Grab Tensile Elongation (%)	D4632	50%	50%	50%
Static Puncture Strength (N)	D6241	990	1375	1925
Trapezoid Tear (N)	D4533	180	250	350
Sewn Seam Strength ² (N)	D4632	450	630	810
Ultraviolet Stability (% Retained Strength)	D4355	50% @ 500 hr.	50% @ 500 hr.	50% @ 500 hr.
Apparent Opening Size (mm)	D4751	0.3 max	0.3 max	0.3 max
Permittivity ³ (per sec)	D4491	1.7	1.5	1.2

Notes:

1. All numeric values in Table 1, except AOS, represent minimum average roll values (MARV) in the weaker principal direction. Values of AOS represent maximum average roll values.
2. If sewn, a minimum of two rows of sewing is required with at least 200 mm of overlap. The sewn strength shall be equal to or greater than 90% of the specified grab strength.
3. Default value. The permittivity of the geotextile should be greater than that of the soil. The consultant may also require the permeability of the geotextile to be greater than that of the soil.

5.31.4.2 STABILIZATION GEOTEXTILE APPLICATIONS

An application in which a geosynthetic is used in wet, saturated conditions to provide the coincident functions of separation, filtration, confinement, and reinforcement.

The geotextile shall meet the following requirements:

Table 5-31-2: Enhanced Woven Stabilization Properties			
Property	ASTM Test	Mechanical Properties ¹ Minimum Average Roll Values	
		Enhanced Woven Class 1A (CBR < 2.5%)	Enhanced Woven Class 1B (CBR > 2.5%)
Layfield Product Recommended		LP1AEW	LP1BEW
Wide Width Tensile Strength (kN/m)	D4595	70	35
Sewn Seam Strength (kN)	D4884	42	18
Permittivity ² (per sec)	D4491	0.2	0.2
Apparent Opening Size (mm)	D4751	0.43	0.43
Ultraviolet Stability (% Retained Strength)	D4355	70% @ 500 hr.	70% @ 500 hr.

Notes:

1. All numeric values in Table 2, except AOS, represent minimum average roll values (MARV) in the weaker principal direction. Values of AOS represent maximum average roll values.
2. Default value. The permittivity of the geotextile should be greater than that of the soil. The consultant may also require the permeability of the geotextile to be greater than that of the soil.

5.31.4.3 SUBSURFACE DRAINAGE GEOTEXTILE APPLICATIONS

An application in which a geosynthetic is placed against a soil to allow long-term passage of water into a subsurface drain system while retaining the in-situ soil. The primary function of the geotextile is to provide filtration.

The geotextile shall meet the following requirements:

Table 5-31-3: Subsurface Drainage Properties

Property	ASTM Test	Mechanical Properties ¹ Minimum Average Roll Values				
		Type A Nonwoven	Type B Nonwoven ²	Class 1 Woven	Class 2 Woven	Class 3 Woven
Grab Tensile Strength (N)	D4632	400	700	1400	1100	800
Grab Tensile Elongation (%)	D4632	>50%	≥50%	<50%	<50%	<50%
Static Puncture Strength (N)	D6241	990	1375	2400	2200	1650
Trapezoid Tear (N)	D4533	180	250	500	250	250
Sewn Seam Strength ³ (N)	D4632	360	630	1260	990	720
Ultraviolet Stability (% Retained Strength)	D4355	50% @ 500 hr.	50% @ 500 hr.	50% @ 500 hr.	50% @ 500 hr.	50% @ 500 hr.
Apparent Opening Size ⁴ (mm)	D4751	0.43 mm when in-situ soils passing 0.075 mm sieve < 15%				
		0.25 mm when in-situ soils passing 0.075 mm sieve 15% to 50%				
		0.22 mm when in-situ soils passing 0.075 mm sieve >50%				
Permittivity ⁴ (per sec)	D4491	0.5 sec ⁻¹ when in-situ soils passing 0.075 mm sieve < 15%				
		0.2 sec ⁻¹ when in-situ soils passing 0.075 mm sieve 15% to 50%				
		0.1 sec ⁻¹ when in-situ soils passing 0.075 mm sieve > 50%				

Notes:

1. All numeric values in Table 3, except AOS, represent minimum average roll values (MARV) in the weaker principal direction. Values of AOS represent maximum average roll values.
2. Typically used with perforated pipe and similar applications.
3. If sewn, a minimum of two rows of sewing is required with at least 200 mm of overlap. The sewn strength shall be equal to or greater than 90% of the specified grab strength.
4. Based on grain size analysis of in-situ soils in accordance with ASTM C136.

Layfield Specification Design note – Previous AT specification made a reference note that for woven monofilament geotextiles, the required minimum average roll value for tear strength is 250N – we believe that this note has been omitted in error on the currently published document and will be remedied in a future addendum. This design note to accept a 250N tear strength is fully supported by the AASHTO M288 design guide, which this AT document references. Once updated, we will be able to recommend materials to meet the Class 1 Woven that is currently listed as n/a.

5.31.4.3 Subsurface Drainage Geotextile Applications – Layfield Cross Reference Chart

In Alberta, the majority of the in-situ soils encountered will be passing 0.075 mm sieve 15% - 50%, so as a default, if soil conditions unknown or unspecified, this material would be a good default. As you can tell by this table, several products can be used –

We've simplified the table from the previous pages (see below) to make product selection a little easier.

Subsurface Drainage					
Alberta Transportation	Type A	Type B	Class 1 Woven	Class 2 Woven	Class 3 Woven
<15% fines	LP 4	LP 6	FW403	FW404	FW404
15% to 50% fines	LP 4	LP 6	n/a	FW700	FW700
>50% fines	LP 4	LP 6	n/a	FW700	FW700

5.31.4.4 EROSION CONTROL GEOTEXTILE APPLICATIONS

An application in which a geotextile is placed between an energy-absorbing hard-armour system (e.g. rip/rap or cable concrete mattress) and the in-situ soil to prevent soil loss (scour) and hydraulic uplift pressures causing instability of the permanent erosion control system. The primary function of this geotextile is to provide filtration. The geotextile filtration properties are a function of hydraulic conditions and in-situ soil gradation, density, and plasticity.

The geotextile shall meet the following requirements:

Table 5-31-4: Permanent Erosion Control				
Property	ASTM Test	Mechanical Properties ¹ Minimum Average Roll Values		
		Class 2 Woven Monofilament ²	Type B Nonwoven ³	Type C Nonwoven ⁴
Grab Tensile Strength (N)	D4632	400	700	1400
Grab Tensile Elongation (%)	D4632	>50%	≥50%	<50%
CBR Puncture (N)	D6241	990	1375	2400
Trapezoid Tear (N)	D4533	180	250	500
Sewn Seam Strength ⁵ (N)	D4632	360	630	1260
Ultraviolet Stability (% Retained Strength)	D4355	50% @ 500 hr.	50% @ 500 hr.	50% @ 500 hr.
Apparent Opening Size ⁶ (mm)	D4751	0.43 mm when in-situ soils passing 0.075 mm sieve < 15%		
		0.25 mm when in-situ soils passing 0.075 mm sieve 15% to 50%		
		0.22 mm when in-situ soils passing 0.075 mm sieve >50%		
Permittivity ⁶ (per sec)	D4491	0.7 sec ⁻¹ when in-situ soils passing 0.075 mm sieve < 15%		
		0.2 sec ⁻¹ when in-situ soils passing 0.075 mm sieve 15% to 50%		
		0.1 sec ⁻¹ when in-situ soils passing 0.075 mm sieve > 50%		

Notes:

1. All values in Table 4, except AOS, represent minimum average roll values (MARV) in the weaker principal direction. Values of AOS represent maximum average roll values.
2. Typically used under nonbridge sized CSP and SPCSP Structures.
3. Typically used in heavy-duty applications such as under Articulated Concrete Blocks, Class 1M, 1 & 2 riprap.
4. Typically used in medium-duty situations such as under Class 3 riprap.
5. If sewn, a minimum of two rows of sewing is required with at least 200 mm of overlap. The sewn strength shall be equal to or greater than 90% of the specified grab strength.
6. Based on grain size analysis of in-situ soils in accordance with ASTM C136.

5.31.4.4 Erosion Control Geotextile Applications – Layfield Cross Reference Chart

Layfield Specification Design note – Previous AT specification made a reference note. For woven monofilament geotextiles, the required minimum average roll value for tear strength is 250N. We believe that this note has been omitted in error on the currently published document and will be remedied in a future addendum. This design note, to allow the use of a 250N tear strength is also supported by the AASHTO M288 design guide, which this AT document references. Once updated by AT we will be able to provide recommendations for materials under Class 2 Woven monofilament that currently show as n/a

In Alberta, the majority of the in-situ soils encountered will be passing 0.075 mm sieve 15% - 50%, so as a default, if soil conditions unknown or unspecified, this material would be a good default. It will be FW700 once AT updates the tear strength specifications for the monofilament woven.

We've simplified the table from the previous page (see below) to make product selection a little easier.

Permanent Erosion Control			
Alberta Transportation	Class 2 Woven Monofilament	Type B Nonwoven	Type C Nonwoven
<15% fines	FW403/404	LP 6	LP 8
15% to 50% fines	n/a	LP 6	LP 8
>50% fines	n/a	LP 6	LP 8