

## CONSTRUCTION STANDARDS

### SECTION CS 7

#### GEOTEXTILE FABRICS

##### **CS 7-01 GENERAL:**

- A.** Geotextile Fabrics consisting of Subgrade Separation Fabric, Subgrade Stabilization Fabric, Trench Filter Fabric, Rock Slope Protection Fabric, and Pavement Fabric shall conform to this Section CS 7, “Geotextile Fabrics” of the City Standard Specifications.
- B.** Geotextile Fabric shall be placed as required by the Project Plans and various sections of the City Standard Specifications, which includes the Standard Drawings.
- C.** A Certificate of Compliance for each kind of fabric used on the project shall be furnished to the Inspector in conformance with the provisions in Section 6-1.07, “Certificates of Compliance” of the CALTRANS Standard Specifications.
- D.** Geotextile Fabric shall be furnished in protective covers capable of protecting the fabric from ultraviolet rays, abrasion, and water.
- E.** Atmospheric exposure of the fabric (with the exception of Pavement Fabric) to the elements following lay down of the material shall be a maximum of 14 days. Pavement Fabric shall be covered with Asphalt Concrete the same day the fabric is laid down. Fabric not in compliance with these requirements shall be removed from the work and disposed of at the Contractor’s expense.
- F.** The Contractor shall immediately repair damaged fabric, as identified by the Inspector. The Contractor shall clear the damaged area plus an additional three (3) feet of all fill material. Cover the damaged area with a new fabric patch extending three (3) feet beyond the perimeter of the damage.

**CS 7-02 SUBGRADE SEPARATION FABRIC:** Subgrade Separation Fabric shall be furnished and installed over the entire limits of subgrade for all roadways (Street and Paved Maintenance Roads), and for bus turnouts, median curbs, curb, gutter and a portion of driveways (Other Paved Locations) as shown on the Standard Drawings. The requirement to install fabric does not supersede the Contractor’s obligation to conform to Section 19-2.02, “Unsuitable Material” of CALTRANS Standard Specifications.

A. Subgrade Separation Fabric shall be, at the option of the Contractor, either woven or nonwoven type material, unless the Project Plans specify the type, and shall meet or exceed the specifications presented in **Table CS 7 -1**.

**Table CS 7-1**  
**Subgrade Separation Fabric**

<b>Property</b>	<b>ASTM Test Method</b>	<b>Woven Minimum Average Roll Value<sup>1</sup> English/Metric</b>	<b>Nonwoven Minimum Average Roll Value<sup>1</sup> English/Metric</b>
Grab Tensile Strength	D 4632	247 lbs/1100N <sup>2</sup>	157lbs/700N
Trapezoidal Tear Strength	D 4533	90 lbs/400N	56lbs/250N
Puncture Strength	D 4833	90 lbs/400N	56lbs/250N
Permittivity	D 4491	0.05 sec <sup>-1</sup>	1.2 sec <sup>-1</sup>
Apparent Opening Size (AOS)	D 4751	<b>Maximum</b> #40 sieve/ 0.425mm	<b>Maximum</b> #70 sieve/ 0.212mm
UV after 500 hours	D 4355	70%	70%

<sup>1</sup>All values in this table are the minimum values allowed in each direction except as noted, and are based on Minimum Average Roll Value (MARV).

<sup>2</sup>The abbreviation shown as “N” for the metric unit designates Newtons.

**B. INSTALLATION:**

1. The fabric shall be unrolled and laid smooth without wrinkles or folds on the prepared subgrade in the direction of construction traffic with the following exception: the fabric may be either cut or folded to fit horizontal curvilinear alignment of the roadway.
2. Adjacent rolls shall be overlapped a minimum of 30” in the longitudinal and transverse directions of the base placement. The fabric may be held in place by pins, staples, or piles of base material.
3. Unless otherwise allowed by the fabric manufacturer’s published recommendations which have been furnished to the Inspector by the Contractor a minimum of two (2) working days in advance of the planned installation, and the fabric is installed in strict conformance with these recommendations, the installation shall conform to the criteria identified as i through iv below:

- i. The Contractor's vehicles or equipment shall not be allowed directly onto the fabric.
  - ii. Aggregate Base Rock shall be placed by end dumping on to the fabric from the edge of the fabric, or over previously placed Aggregate Base Rock.
  - iii. Aggregate Base Rock shall be spread using a motor grader or bulldozer, maintaining a lift thickness of six (6) inches.
  - iv. Vibratory compaction is not permitted on the initial lift of Aggregate Base Rock material.
4. The Contractor shall not cover the fabric until the Inspector has inspected the fabric for proper installation and to ensure that the fabric has not been damaged (i.e. holes, rips, tears). Damaged fabric shall be repaired in accordance with paragraph CS 7-01F of these City Standard Specifications.

**CS 7-03 SUBGRADE STABILIZATION FABRIC:** Subgrade Stabilization Fabric shall be furnished and installed over the entire limits of subgrade for all unpaved (gravel) Maintenance Roads, at all other locations required by the Project Plans, and at paved locations where the Inspector determines that the subgrade is unstable for placement of Aggregate Base Rock.

**A. MATERIAL:** Subgrade Stabilization Fabric shall be woven fabric subject to the following conditions as specified herein.

1. **Street and Paved Roads and Other Paved Locations:** At locations where the Inspector determines the subgrade is unstable for placement of Aggregate Base Rock and requires additional support, the Inspector may require the Contractor to install a woven Subgrade Stabilization Fabric in lieu of a Separation fabric, or install a Geogrid in combination with Subgrade Separation or Stabilization Fabric. The Geotechnical Engineering firm testing the materials on the project will make a recommendation for the specification of the woven Stabilization Fabric and/or Geogrid. The Contractor shall furnish and install the Geogrid and/or Geotextile Fabric as recommended by the Geotechnical Engineer and approved by the Director of Public Works. The Geotextile Fabric shall meet or exceed the specifications presented in **Table CS 7-2**. These requirements do not supersede the Contractor's obligation to conform to Section 19-2.02, "Unsuitable Material" of CALTRANS Standard Specifications.
2. **Unpaved Maintenance Roads:** Subgrade Stabilization Fabric shall be a woven type material and shall meet or exceed the specifications presented in **Table CS 7-2**.

**Table CS 7-2**  
**Subgrade Stabilization Fabric**

<b>Property</b>	<b>ASTM Test Method</b>	<b>Woven Minimum<sup>1</sup> Average Roll value (English)/(Metric)</b>
Wide Width Tensile Strength	D 4595	2400 lbs/ft 35 kN/meter
Grab Tensile Strength	D 4632	315 lbs/ft 1.4 kN/meter
Trapezoidal Tear Strength	D 4533	125 lbs/ 0.556kN
Puncture Strength	D 4833	140 lbs/ 0.622 kN
Permittivity	D 4491	0.50 sec <sup>-1</sup>
Apparent Opening Size (AOS)	D 4751	<b>Maximum</b> #40 sieve/0.425 mm
UV after 500 hours	D 4355	80%

<sup>1</sup>All values in this table are the minimum values allowed in each direction except as noted, and are based on Minimum Average Roll Value (MARV).

<sup>2</sup>The abbreviation shown as “kN” for the metric unit designates kilonewtons.

**B. INSTALLATION:** Installation of Subgrade Stabilization Fabric shall conform to paragraph CS 7-02B of the City Standard Specifications.

**CS 7-04 TRENCH FILTER FABRIC:** Trench Filter Fabric shall be furnished and installed in all Trench conditions between the Bedding and Backfill material whenever Crushed Rock is used as bedding. Trench Filter Fabric shall also be furnished and installed at all other locations required by the Project Plans.

**A. MATERIAL:** Trench Filter Fabric shall be a nonwoven material type and meet or exceed the specifications presented in **Table CS 7-3**.

**Table CS 7-3  
Trench Filter Fabric**

<b>Property</b>	<b>ASTM Test Method</b>	<b>Nonwoven Minimum<sup>1</sup> Average Roll value (English)</b>	<b>Nonwoven Minimum<sup>1</sup> Average Roll Value (Metric)</b>
Grab Tensile Strength	D 4632	112 lbs	500 newtons
Trapezoidal Tear Strength	D 4533	40 lbs	180 newtons
Puncture Strength	D 4833	40lbs	180 newtons
Permittivity	D 4491	1.5 sec <sup>-1</sup>	1.5 sec <sup>-1</sup>
Apparent Opening Size (AOS)	D 4751	<b>Maximum</b> #70 Sieve	<b>Maximum</b> 0.212 mm
UV after 500 hours	D 4355	70%	70%

<sup>1</sup>All values in this table are the minimum values allowed in each direction except as noted, and are based on Minimum Average Roll Value (MARV).

**B. INSTALLATION:**

1. Trench Filter Fabric shall be installed in such a manner to prevent migration of fines.
2. Adjacent rolls shall be overlapped a minimum of 24” in the longitudinal and transverse directions.

**CS 7-05 ROCK SLOPE PROTECTION FABRIC**

**A. MATERIAL:**

1. Rock Slope Protection (RSP) Fabric shall be furnished and installed below all areas to receive rock slope protection and shall be manufactured from at least 95% polypropylene, polyester, or a combination of these materials.
2. RSP Fabric shall be nonwoven, needle-punched geotextile, unless otherwise specified on the Project Plans.
3. RSP Fabric shall conform to the requirements shown in **Table CS 7-4** unless otherwise specified on the Project Plans. The fabric specification

values shown in the table are based upon CALTRANS Method A placement where dumping of the RSP material is not allowed. Where the Project Plans do allow for Method B Placement, the free rockfall (height from which a rock may be dropped directly on the geotextile) shall not be greater than two (2) feet unless there is a layer of rock covering the RSP Fabric.

**Table CS 7-4  
Rock Slope Protection Fabric**

<b>Property</b>	<b>ASTM Test Method</b>	<b>Rock Slope Protection of 1-ton RSP class or lighter rock Nonwoven Minimum Values<sup>1</sup> (English/Metric)</b>	<b>Rock Slope Protection of greater than 1 ton RSP class rock Nonwoven Minimum Values<sup>1</sup> (English/Metric)</b>
Weight	D 5261	7.5 oz/yd <sup>2</sup> 256 g/meter <sup>2</sup>	9.5oz/yd <sup>2</sup> 324 g/meter <sup>2</sup>
Permittivity, second <sup>-1</sup>	D 4491	1.0	0.80
Grab Tensile Strength, in each direction	D 4632	200 lbs 886 N	300 lbs 1329 N
Elongation at break, percent in each direction	D 4632	50	50
Range Apparent Opening Size, US standard sieve No	D 4751	<b>Maximum</b> 70	<b>Maximum</b> 70
UV after 500 hours	D 4355	70%	70%

<sup>1</sup>All values shown on this table are minimum values allowed except as noted and are based on Minimum Average Roll Value (MARV).

**B. INSTALLATION:**

1. Rock Slope Protection Fabric installation shall conform to Section 72, Slope Protection of CALTRANS Standard Specifications except as amended herein.
2. Rocks placed over fabric shall be installed in accordance with CALTRANS Method A unless the Project Plans allow for Method B and the conditions in paragraph CS 7-05.A.3 are complied with.

**CS 7-06 PAVEMENT FABRIC:** Pavement Fabric shall be furnished and installed on existing Asphalt Concrete pavements that are shown on the Project Plans to be overlaid with Asphalt Concrete.

**A. MATERIAL:** Pavement Fabric shall be at least 95 percent polypropylene staple fiber fabric material, needle-punched, thermally bonded on one side, and meet or exceed the specifications presented in **Table CS 7-4**.

**TABLE CS 7-4**

**Pavement Fabric**

<b>Property</b>	<b>ASTM Test Method</b>	<b>Requirement (English)</b>	<b>Requirement (Metric)</b>
Weight per area	D 5261	4.1oz/square yard	140 grams/square meter
Grab tensile strength	D 4632	101 lbs	450N
Elongation at break, percent in each direction	D 4632	50%	50%
Asphalt retention by fabric (Residual Minimum)	D6140	0.20 gallons/sq yard	900 grams/square meter

Note: Weight, grab, elongation and asphalt retention are based on Minimum Average Roll Value (MARV).

**B. INSTALLATION:**

1. The existing Asphalt Concrete pavement to receive pavement fabric shall be cleaned by the Contractor and be free of moisture, dirt, dust or other debris prior to the application of a binder of paving asphalt.
2. The paving asphalt binder shall conform to the requirements of the CALTRANS Standard Specifications and shall be applied to the surface to receive pavement fabric at an approximate rate of 0.25 gallon per square yard of surface covered. The exact rate will be determined by the Inspector based upon the actual rate necessary to saturate the fabric and bond the existing and new Asphalt Concrete based upon the site conditions.

3. The asphalt binder shall be applied to a width equal to the paving fabric plus three inches on each side.
4. The Contractor shall apply the binder of paving asphalt in such a manner that it does not come in contact with adjacent concrete surfaces. The Contractor shall be responsible to remove any binder on concrete surfaces.
5. The Pavement Fabric shall be placed over the entire limits of the existing Asphalt Concrete surface up to within four (4) inches of the lip of gutter. Additionally, the Pavement Fabric shall not extend through street intersections. The installation of fabric shall begin at the curb return of the street to be overlaid and extend through the length of the street to the next street intersection and nearside curb return.
6. Adjacent rolls shall be overlapped a minimum of four (4) inches measured at any single point in the longitudinal and transverse directions.