

II. ROAD CONSTRUCTION/SUBGRADE STABILIZATION

This section describes three different types of field conditions where a road or trafficked area can be stabilized using a geotextile:

- Light duty stabilization
- Moderate duty stabilization
- Heavy duty stabilization

Read each description and determine which most closely parallels the site conditions of your particular project. The corresponding specification addresses the requirements of a geotextile installation necessary to perform its intended function.

Each specification is written to select a geotextile that will serve one or more of the desired functions of:

- Installation survivability
- Environmental stability
- Separation
- Filtration
- Reinforcement

These specifications make certain basic design assumptions, (as outlined in the descriptions which follow). If you have any questions about design or selection methods, or if your application does not fit into one of the descriptive categories, contact the LINQ - QA Line (1-800-543-9966) for assistance.

II. ROAD CONSTRUCTION/SUBGRADE STABILIZATION

A1. LIGHT DUTY STABILIZATION - DESCRIPTION

- Subgrade Condition:
- CBR greater than 3
 - Fairly firm when saturated. Will not sink under own weight
 - SPT of 3 blows per foot or greater
 - Unified soil classification system including CL, CLML, SC
- Traffic Conditions:
- Construction traffic will be the heaviest seen
 - Axle loads of 18,000 lbs max.
 - Long term usage will be automobiles, occasional garbage trucks.
 - Less than 1000 passes per day
- Base Course Cover:-Minimum aggregate thickness of 6 inches
- Aggregate well graded, subrounded, sand and gravel (If sharp, angular aggregate is used, go to moderate duty stabilization specification.)
- Geotextile Function:
- Separation of subgrade from the base course aggregate
- Examples:
- Residential driveways
 - Golf cart paths
 - Farm roads
 - Park trails
 - Seldom used transmission corridor access roads
 - Other light duty, seldom used access roads

ROAD CONSTRUCTION/SUBGRADE STABILIZATION

SECTION 27***

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Product specifications, installation and method of payment for geotextile installation for subgrade stabilization.

1.02 RELATED SECTIONS

1.03 UNIT PRICE - MEASUREMENT AND PAYMENT

Geotextiles will be measured to the nearest square yard of surface area actually covered in accordance with the plans or as required by the Engineer.

The measurement for payment excludes the geotextile used for overlapping as well as geotextile used for seam overlaps.

The accepted pay quantities for geotextiles will be paid for at the contract price per square yard in place.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Stabilization/Separation Geotextile	Square Yard

1.04 SUBMITTALS

A. Certificate of compliance: The contractor shall submit to the engineer a certificate of compliance which shall include the following information:

- Full product name by trademark and style number
- Geotextile polymer type(s)
- Geotextile physical properties

B. The manufacturer shall maintain test records of the production of this lot of material. These records shall be made available to the Engineer upon request.

If more than one style or product code number has been produced under the same product name, the style, or product code number of the geotextile to be approved must be specifically identified. The certificate of compliance shall be attested to by a person having legal authority to bind the company.

C. Samples: At the engineers option, sample(s) of the geotextile shall be submitted for approval. Each sample shall have minimum dimensions of 1.5 yards by the full roll width of the geotextile.

The geotextile machine direction shall be marked clearly on each sample submitted for testing. The machine direction is defined as the direction perpendicular to the axis of the geotextile roll.

1.05 QUALITY CONTROL TESTING

A. Samples may be randomly taken by the Engineer at the job site to confirm that the geotextile meets the property values specified. Sampling shall be in accordance with ASTM D4354.

B. If sampling is performed, approval will be based on testing of samples from each lot. A "lot" shall be defined for the purposes of this specification as all geotextile rolls within the consignment (i.e., all rolls sent to the project site) which were manufactured at the same manufacturing plant, have the same product name, and have the same style, merge, or product code number.

C. All geotextile which has defects, deterioration, or damage, as determined by the Engineer, may be rejected. All rejected geotextile shall be replaced at no cost to the owner.

1.05 ACCEPTANCE REQUIREMENTS

Acceptance/rejection of geotextiles shall be determined in accordance with ASTM D4759 "Standard Practice for Determining the Specification Conformance of Geosynthetics."

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Geotextile shall consist of long chain polymers composed of at least 95% by weight of polypropylenes. They shall be formed into a network such that the filaments or yarns retain dimensional stability relative to each other, including selvages. These materials shall conform to the properties found in Section 2.02. Thread used for factory or field sewing shall be of contrasting color, composed of Polypropylene, polyester, polyamids, or polyaramids.

2.02 GEOTEXTILE PHYSICAL PROPERTIES

A. Geotextile property values should be expressed in terms of “Minimum Average Roll Values” and should be compared directly to the corresponding specification values. The minimum average property value of any roll within a shipment or lot of geotextile rolls shall meet or exceed the values required in the specification.

<u>Property</u>	<u>Test Method</u>	<u>Property Value</u>	
Elongation (%)	ASTM D4632	<50	≥50
Grab Tensile (lbs)	ASTM D4632	110	95
Trapezoid Tear (lbs)	ASTM D4533	55	40
Puncture (lbs)	ASTM D4833	50	30
U V Stability	ASTM D4355		
(%Strength retained)	150 hrs exposure	70	70
Permittivity (sec ⁻¹)	ASTM D4491	.01	.7
AOS (US Sieve#)	ASTM D4751	30	60

Product shall be LINQ 125EX or approved equivalent.

2.03 SHIPMENT

A. Packaging: Each roll of geotextile shall be packaged individually in a suitable sheet, wrapper or container to protect the geotextile from damage due to ultraviolet light and moisture during normal storage and handling.

B. Labeling: Each roll shall be identified by a tag or label securely affixed to the outside of the roll on one end. Identification shall be in accordance with ASTM D 4873.

C. Storage: The geotextile shall be stored so as not to become damaged or exposed to sunlight. Storage shall be in accordance with ASTM D 4873.

PART 3 EXECUTION

Geotextile shall be installed in accordance with the project drawings and this specification. In the event of a discrepancy between the specification and the drawings, the drawings shall govern.

3.01 SITE PREPARATION

A. The area to be covered by the geotextiles shall be graded to a smooth, uniform condition free from ruts, potholes, and protruding objects such as rocks or sticks.

3.02 INSTALLATION

A. The geotextile shall be spread immediately ahead of the covering operation. No geotextiles shall be left exposed to sunlight during installation for a total of more than seven calendar days. The geotextile shall be laid smooth without excessive wrinkles. The geotextile shall not be dragged through mud or over sharp objects which could damage the geotextile.

B. All adjoining sections of the geotextile shall be overlapped a minimum of 18 inches.

C. Pegs, pins, or the manufacturer's recommended method shall be used as needed to hold the geotextile in place until the specified cover material is placed.

D. Should the geotextile be torn or punctured, the damaged area shall be repaired or replaced by the Contractor at no cost to the owner. The repair shall consist of a patch of the same type of geotextile. The patch shall overlap the existing geotextile a minimum of 3 feet from the edge of any part of the damaged area.

3.03 FILL PLACEMENT

The cover material shall be placed on the geotextile in such a manner that a minimum of 6 inches of material will be between the vehicle or equipment tires, or tracks, and the geotextile at all times.

3.04 EQUIPMENT

Construction vehicles shall be limited in size and weight such that rutting in the initial lift above the geotextile is not greater than 4- 6 inches deep. Turning of vehicles on the first lift above the geotextile will not be permitted.

3.05 COMPACTION

Compaction of first lift above the geotextile shall be limited to routing of placement and spreading equipment only. No vibratory compaction will be allowed on the first lift.

3.07 CONTROL SAMPLING

A. The Engineer or representative may randomly select and obtain geotextile samples as soon as the geotextile rolls arrive at the site. The minimum sample size from a roll should be 1.5 yards by the full roll width. The sample should not be taken from the outer wrap of the roll nor the inner wrap of the core (i.e., do not take the sample from the geotextile at the very ends of the roll). The samples should be taken from the minimum number of rolls, based on the size of the lot, recommended in ASTM D4354, entitled "Sampling of Geosynthetics for Testing".

B. Samples required for control testing are to be taken at the job site, whereas the samples to be taken for the purpose of source approval, as required in Section 1.04, are taken before the geotextile is shipped to the job site.

END OF SECTION

II. ROAD CONSTRUCTION/SUBGRADE STABILIZATION

B1. MODERATE DUTY STABILIZATION - DESCRIPTION

- Subgrade Condition:
- CBR between 1 and 3
 - Fairly soft when saturated. Will sink under own weight
 - SPT of 1-2 blows per foot or greater
 - Unified soil classification system including CL, CLML, SC
- Traffic Conditions:
- Construction traffic will be the heaviest seen
 - Axle loads of 18,000 lbs max.
 - Long term usage will be automobiles, occasional garbage Trucks.
 - Less than 1000 passes per day
- Base Course Cover:-Minimum aggregate thickness of 8-10 inches
- Aggregate well graded, angular to subangular, crushed rock
- Geotextile Function:
- Separation of subgrade from the base course aggregate
- Examples:
- Subdivision roadways
 - Heavily traveled parking lots
 - Haul roads
 - Other light duty, seldom used access roads
 - Rural roads
 - City street construction
 - Flexible pavements for light aircraft

ROAD CONSTRUCTION - MODERATE DUTY

SECTION 27***

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Product specifications, installation and method of payment for geotextile installation for subgrade stabilization.

1.02 RELATED SECTIONS

1.03 UNIT PRICE - MEASUREMENT AND PAYMENT

Geotextiles will be measured to the nearest square yard of surface area actually covered in accordance with the plans or as required by the Engineer.

The measurement for payment excludes the geotextile used for overlapping as well as geotextile used for seam overlaps.

The accepted pay quantities for geotextiles will be paid for at the contract price per square yard in place.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Stabilization/Separation Geotextile	Square Yard

1.04 SUBMITTALS

A. Certificate of compliance: The contractor shall submit to the engineer a certificate of compliance which shall include the following information:

- Full product name by trademark and style number
- Geotextile polymer type(s)
- Geotextile physical properties

B. The manufacturer shall maintain test records of the production of this lot of material. These records shall be made available to the Engineer upon request.

If more than one style or product code number has been produced under the same product name, the style, or product code number of the geotextile to be approved must be specifically identified. The certificate of compliance shall be attested to by a person having legal authority to bind the company.

C. Samples: At the engineers option, Sample(s) of the geotextile shall be submitted for source approval. Each sample shall have minimum dimensions of 1.5 yards by the full roll width of the geotextile.

The geotextile machine direction shall be marked clearly on each sample submitted for testing. The machine direction is defined as the direction perpendicular to the axis of the geotextile roll.

D. Seams: At the Engineers option, when seams are to be used, at least one sewn sample, with a minimum of 2 yards of seam length per sample and with a minimum of 18 inches of geotextile width on each side of the seam shall also be submitted

1.05 QUALITY CONTROL TESTING

A. At the engineers option, samples may be randomly taken by the Engineer at the job site to confirm that the geotextile meets the property values specified. Sampling shall be in accordance with ASTM D4354.

B. If samples are obtained, approval will be based on testing of samples from each lot. A "lot" shall be defined for the purposes of this specification as all geotextile rolls within the consignment (i.e., all rolls sent to the project site) which were manufactured at the same manufacturing plant, have the same product name, and have the same style, merge, or product code number.

C. All geotextile which has defects, deterioration, or damage, as determined by the Engineer, may be rejected. All rejected geotextile shall be replaced at no cost to the owner.

1.05 ACCEPTANCE REQUIREMENTS

Acceptance/rejection of geotextiles shall be determined in accordance with ASTM D4759 "Standard Practice for Determining the Specification Conformance of Geosynthetics."

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Fibers used in the manufacture of geotextiles, shall consist of long chain polymers composed of at least 95% by weight of polypropylenes. They shall be formed into a network such that the filaments or yarns retain dimensional stability relative to each other, including selvages. These materials shall conform to the properties found in Section 2.02. Thread used for factory or field sewing shall be of contrasting color composed of polypropylene, polyester, polyamids, or polyaramids.

2.02 GEOTEXTILE PHYSICAL PROPERTIES

A. Geotextile property values should be expressed in terms of “Minimum Average Roll Values” and should be compared directly to the corresponding specification values. The minimum average property value of any roll within a shipment or lot of geotextile rolls meet or exceed the values required in the specification.

<u>Property</u>	<u>Test Method</u>	<u>Property Value</u>	
Elongation (%)	ASTM D4632	<50	≥50
Grab Tensile (lbs)	ASTM D4632	180	120
Trapezoid Tear (lbs)	ASTM D4533	70	40
Puncture (lbs)	ASTM D4833	70	40
U V Stability	ASTM D4355		
(% Strength retained)	150 hrs exposure	70	70
Permittivity (sec ⁻¹)	ASTM D4491	.03	.7
AOS (US Sieve#)	ASTM D4751	30	70
Seam strength(%)	ASTM D1683	90	90

Product shall be LINQ GTF 200, GTF 200S, 140EX or approved equivalent.

2.03 SHIPMENT

A. Packaging: Each roll of geotextile shall be packaged individually in a suitable sheet, wrapper or container to protect the geotextile from damage due to ultraviolet light and moisture during normal storage and handling.

B. Labelling: Each roll shall be identified by a tag or label securely affixed to the outside of the roll on one end. Identification shall be in accordance with ASTM D 4873.

C. Storage: The geotextile shall be stored so as not to become damaged or exposed to sunlight. Storage shall be in accordance with ASTM D 4873.

PART 3 EXECUTION

Geotextile shall be installed in accordance with the project drawings and this specification. In the event of a discrepancy between the specification and the drawings, the drawings shall govern.

3.01 SITE PREPARATION

A. The area to be covered by the geotextiles shall be graded to a smooth, uniform condition free from ruts, potholes, and protruding objects such as rocks or sticks.

3.02 INSTALLATION

A. The geotextile shall be spread immediately ahead of the covering operation. No geotextiles shall be left exposed to sunlight during installation for a total of more than seven calendar days. The geotextile shall be laid smooth without excessive wrinkles. Under no circumstances shall the geotextile be dragged through mud or over sharp objects which could damage the geotextile.

B. Overlap shall be a minimum of 24 inches. The end of the roll overlaps shall be three feet, minimum. Overlap shall be increased if during fill placement excessive wandering of the unrolled geotextile is observed.

C. Pegs, pins, or the manufacturer's recommended method shall be used as needed to hold the geotextile in place until the specified cover material is placed.

D. Should the geotextile be torn or punctured, the damaged area shall be repaired or replaced by the Contractor at no cost to the owner. The repair shall consist of a patch of the same type of geotextile used for the intended application, the patch shall overlap the existing geotextile a minimum of 3 feet from the edge of any part of the damaged area.

3.03 FILL PLACEMENT

The cover material shall be placed on the geotextile in such a manner that a minimum of 8 inches of material will be between the vehicle or equipment tires, or tracks, and the geotextile at all times.

3.04 EQUIPMENT

Construction vehicles shall be limited in size and weight such that rutting in the initial lift above the geotextile is not greater than 6 inches deep. Turning of vehicles on the first lift above the geotextile will not be permitted.

3.05 COMPACTION

Compaction of first lift above the geotextile shall be limited to routing of placement and spreading equipment only. No vibratory compaction will be allowed on the first lift.

3.06 GEOTEXTILE SEWING

A. Factory sewn geotextile seams shall consist of one (minimum) row of stitching. The stitching shall be lock-type stitch. The seam and stitch type used to perform the sewing shall be as recommended by the manufacturer of the geotextile and as approved by the Engineer.

B. The seams shall be sewn in such a manner that the seam can be inspected readily by the Engineer or representative. At the Engineers option the seam strength will be tested and shall meet the requirements stated in Section 2.02.

3.07 CONTROL SAMPLING

A. The Engineer or representative may randomly select and obtain geotextile samples as soon as the geotextile rolls arrive at the site. The minimum sample size from a roll should be 1.5 yards by the full roll width. The sample should not be taken from the outer wrap of the roll nor the inner wrap of the core (i.e., do not take the sample from the geotextile at the very ends of the roll). The samples should be taken from the minimum number of rolls, based on the size of the lot, recommended in ASTM D4354, entitled "Standard Practice for Sampling of Geotextiles for Testing."

B. Samples required for control testing are to be taken at the job site, whereas the samples to be taken for the purpose of source approval, as required in Section 1.04, are taken before the geotextile is shipped to the project site.

END OF SECTION

II. ROAD CONSTRUCTION/SUBGRADE STABILIZATION

C1. HEAVY DUTY STABILIZATION - DESCRIPTION

- Subgrade Condition:
- CBR less than 1
 - Soft when saturated. Will sink under own weight
 - SPT of <1 blows per foot (rod drop)
 - Unified soil classification system including CL, CLML,OH
- Traffic Conditions:
- Significant heavy traffic will be seen
 - Axle loads up to 40,000 lbs.
 - 1000 to 5000 passes per day
 - High usage of off road vehicles
- Base Course Cover:-Minimum aggregate thickness of 18 inches
- Aggregate well graded, angular, sharp odd shaped
 - Maximum particle size is 3-5 inches
- Geotextile Function:
- Separation of subgrade from the base course aggregate
 - Tensile reinforcement (Tensioned membrane action)
- Examples:
- Mine haul roads
 - Construction haul roads
 - Logging roads
 - Work platforms
 - Flexible pavements for airfields

ROAD CONSTRUCTION - HEAVY DUTY

SECTION 27***

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Product specifications, installation and method of payment for geotextile installation for subgrade stabilization.

1.02 RELATED SECTIONS

1.03 UNIT PRICE - MEASUREMENT AND PAYMENT

Geotextiles will be measured to the nearest square yard of surface area actually covered in accordance with the plans or as required by the Engineer.

The measurement for payment excludes the geotextile used for overlapping as well as geotextile used for seam overlaps.

The accepted pay quantities for geotextiles will be paid for at the contract price per square yard in place.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Stabilization/Separation Geotextile	Square Yard

1.04 SUBMITTALS

A. Certificate of compliance: The contractor shall submit to the engineer a certificate of compliance which shall include the following information:

- Full product name by trademark and style number
- Geotextile polymer type(s),
- Geotextile physical properties,

B. The manufacturer shall maintain test records of the production of this lot of material. These records shall be made available to the Engineer upon request.

If more than one style or product code number has been produced under the same product name, the style, or product code number of the geotextile to be approved must be specifically identified. The certificate of compliance shall be attested to by a person having legal authority to bind the company.

C. Samples: At the engineers request sample(s) of the geotextile shall be submitted to the testing laboratory for source approval. Each sample shall have minimum dimensions of 1.5 yards by the full roll width of the geotextile.

The geotextile machine direction shall be marked clearly on each sample submitted for testing. The machine direction is defined as the roll length.

D. Seams: At the Engineers option, when seams are to be used, at least one sewn sample, with a minimum of 2 linear yards of seam length per sample and with a minimum of 18 inches of geotextile width on each side of the seam shall also be submitted

1.05 QUALITY CONTROL TESTING

A. At the Engineers option samples will be randomly taken by the Engineer at the job site to confirm that the geotextile meets the property values specified. Sampling shall be in accordance with ASTM D4354.

B. If testing is required approval will be based on testing of samples from each lot. A "lot" shall be defined for the purposes of this specification as all geotextile rolls within the consignment (i.e., all rolls sent to the project site) which were manufactured at the same manufacturing plant, have the same product name, and have the same style, merge, or product code number.

C. All geotextile which has defects, deterioration, or damage, as determined by the Engineer, may be rejected. All rejected geotextile shall be replaced at no cost to the owner.

1.05 ACCEPTANCE REQUIREMENTS

Acceptance/rejection of geotextiles shall be determined in accordance with ASTM D4759 "Standard Practice for Determining the Specification Conformance of Geosynthetics."

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. The Geotextile, shall consist of long chain polymers composed of at least 95% by weight of polypropylenes. They shall be formed into a network such that the filaments or yarns retain dimensional stability relative to each other, including selvages. These materials shall conform to the properties found in Section 2.02. Thread used for factor or field sewing shall be of contrasting color composed of polypropylene, polyester, polyamids, or polyaramids.

2.02 GEOTEXTILE PHYSICAL PROPERTIES

A. Geotextile shall be expressed in terms of “Minimum average roll values “ and should be compared directly to the corresponding specification values. The minimum average property value of any roll within a shipment or lot of geotextile rolls shall meet or exceed the values required below.

<u>Property</u>	<u>Test Method</u>	<u>Property Value</u>	
Elongation (%)	ASTM D4632	<50	≥50
Grab Tensile (lbs)	ASTM D4632	300	200
Trapezoid Tear (lbs)	ASTM D4533	115	75
Puncture (lbs)	ASTM D4833	115	80
U V Stability	ASTM D4355		
(% Strength retained)	150 hrs exposure	70	70
Permittivity (sec ⁻¹)	ASTM D4491	.01	.1
AOS (US Sieve#)	ASTM D4751	30	70
Seam strength (%)	ASTM D1683	90	90

Product shall be LINQ GTF 300, LINQ 180EX or approved equivalent.

2.03 SHIPMENT

A. Packaging: Each roll of geotextile shall be packaged individually in a suitable sheet, wrapper or container to protect the geotextile from damage due to ultraviolet light and moisture during normal storage and handling.

B. Labeling: Each roll shall be identified by a tag or label securely affixed to the outside of the roll on one end. Identification shall be in accordance with ASTM D 4873.

C. Storage: The Geotextile shall be stored so as not to become damaged or exposed directly to the sunlight. Storage shall be in accordance with ASTM D 4873.

PART 3 EXECUTION

Geotextile shall be installed in accordance with the project drawings and this specification. In the event of a discrepancy between the specification and the drawings, the drawings shall govern.

3.01 SITE PREPARATION

A. The area to be covered by the geotextile shall be prepared to as smooth and uniform a surface as site conditions and construction equipment will allow. Remove all sharp protruding objects and saw off tree stumps flat.

3.02 INSTALLATION

A. The geotextile shall be spread immediately ahead of the covering operation. No geotextiles shall be left exposed to sunlight during installation for a total of more than seven calendar days. The geotextile shall be laid smooth without excessive wrinkles. The geotextile shall not be dragged through mud or over sharp objects which could damage the geotextile.

B. All adjoining sections of the geotextile shall be overlapped a minimum of 36 inches.

C. If necessary to maintain overlap, pegs, pins, or the manufacturer's recommended method shall be used as needed to hold the geotextile in place until the specified cover material is placed.

D. Should the geotextile be torn or punctured, the damaged area shall be repaired or replaced by the Contractor at no cost to the owner. The repair shall consist of a patch of the same type of geotextile used for the intended application, the patch shall overlap the existing geotextile a minimum of 3 feet from the edge of any part of the damaged area.

3.03 FILL PLACEMENT

The cover material shall be placed on the geotextile in such a manner that a minimum of 12 inches of material will be between the vehicle or equipment tires, or tracks, and the geotextile at all times.

3.04 EQUIPMENT

Construction vehicles shall be limited in size and weight to prevent excessive rutting in the initial lift above the geotextile. Turning of vehicles on the first lift above the geotextile should be avoided.

3.05 COMPACTION

Compaction of first lift above the geotextile shall be limited to routing of placement and spreading equipment only. No static or vibratory compaction will be allowed on the first lift.

3.06 GEOTEXTILE SEWING

A. If sewing is to be utilized, factory sewn geotextile seams shall consist of one (minimum) row of stitching. The stitching shall be lock-type stitch. The seam and stitch type used to perform the sewing shall be as recommended by the manufacturer of the geotextile and as approved by the Engineer

B. The seams shall be sewn in such a manner that the seam can be inspected readily by the Engineer or representative. At the Engineer's option, the seam strength will be tested and shall meet the requirements stated in Section 2.02.

3.07 CONTROL SAMPLING

A. The engineer or representative may randomly select and obtain geotextile samples as soon as the geotextile rolls arrive at the site in accordance with that recommended in ASTM D4354, entitled "Standard Practice for Sampling of Geotextiles for Testing."

B. Samples required for control testing are to be taken at the job site, whereas the samples to be taken for the purpose of source approval, as required in Section 1.04, are taken before the geotextile is shipped to the job site.