INVESTIGATION OF THE ROAD REHABILITATION OPTIONS

LONGMEADOW DRIVE

TOWN OF POMFRET, CONNECTICUT

April 20, 2017

Prepared by:

LENARD ENGINEERING, INC. GLASTONBURY, CONNECTICUT

TABLE OF CONTENTS

- 1. INTRODUCTION
- 2. EXISTING CONDITIONS
- 3. CONSTRUCTION ESTIMATES AND LINE ITEMS
- 4. HEALTH AND ENVIRONMENTAL CONSIDERATIONS DURING CONSTRUCTION
- 5. REHABILITATION OPTIONS
- 6. CONCLUSIONS AND RECOMMENDATIONS

APPENDICES

- A. CONSTRUCTION ESTIMAES
- B. SILT SACK AND GEOTEXTILE MATERIAL INFORMATION

1. INTRODUCTION

On March 20, 2017 the Town of Pomfret, Connecticut retained Lenard Engineering, Inc. (LEI) to investigate pavement rehabilitation options and their environmental implications for Longmeadow Drive and its seven cul-de-sacs. The investigation became necessary because last summer a coal tar containing rejuvenator product, called *Pavement Dressing Conditioner (PDC)* was applied over the surface of said road and neighborhood residents became concerned about the short and long term health effects of *Polycyclic Aromatic Hydrocarbons (PAH's)* in the coal tar product.

From engineering perspective coal tar containing pavement sealcoats and rejuvenators are good and reliable. These products are used widely in commercial and military applications, however, since PAH's were discovered to be potentially cancer causing agents, their residential use is being gradually phased out.

Contact with PAH containing compounds can have short and long term health effects. The short term effects occur during the one to three weeks long curing period of the pavement sealants and rejuvenators and are associated with inhalation of airborne fumes from and direct contact with the tacky surface of the curing products. By the end of the curing period coal tar becomes chemically stable and the short term health effects dissipate. The long term health effects however may persist as long as the product is present on the road surface. PAH's are not soluble in water, but can be transported and get into biological systems on airborne dust and waterborne particles from the wearing road surface.

Longmeadow Drive and its cul-de-sacs were built in the mid - 1990's. PDC was applied last summer over the 23 years old roads and curbs in an attempt to stop and possibly reverse their deterioration and possibly postpone a more substantial and expensive pavement rehabilitation. By the time the implications of the coal tar based rejuvenator were realized the period of the short term health effects was over. The municipality's current objective is rehabilitation the road and the abatement of the PDC in and environmentally acceptable way.

A town commission, formed by and of knowledgeable local residents conducted extensive research on the PDC and the environmental/health effects of coal tars and PAH's. They made their results available to LEI, so we could focus on engineering issues in our investigation.

2. EXISTING CONDITIONS

Longmeadow Drive is a loop collector subdivision road connecting to Route 44 and Gary School House Road at its southerly and easterly ends respectively. The easterly terminal point of the road at its intersection with Gary School House Road is coincidental with the Pomfret/Putnam Town Line. Seven short, dead end side streets (called circles) of the average length of 300 feet connect to the road. The road was designed in 1993 by *Wenners Engineering Group of Hartford Connecticut*.

For layout and dimensions of Longmeadow Drive LEI utilized the information available in the original design documents. Construction line item quantities were estimated based on the following original survey and design drawings by Wenners Engineering Group:

- Sheet 2 of 7 Property History / Index Map
- Sheet 6 of 7 Construction Detail & Notes
- Sheet 7 of 7 Erosion & Sediment Control Requirements and Details

Design specifications of the roadway reference the <u>State of Connecticut Department of Transportation</u> <u>Standard Specifications for Roads, Bridges, and Incidental Construction, Form 814, 1988</u>.

The combined length of Longmeadow Drive and its side streets is approximately 7,200 feet. The typical curb to curb width of the roadway is 26 feet. The cross-slope of the crowned section is ¼ inch per foot (2.0 %). The cross slope varies; the road appears slightly superelevated in the horizontal curves. Curbs along the road are 6 inch bituminous lip curbing. The pavement structure consists of a 1 inch thick, class 2 wearing course overlying a 2 inches thick, class 1 base course. The road base consists of 6 inches of compacted processed aggregate over 12 inches thick rolled gravel subbase. The existing storm drainage consists of 26 type "C" catch basins and pipes. The drain pipes outlet into natural water courses at low points. There are no overhead wire utilities along the road. Power and communication cables are buried along the road right-of-way.

3. CONSTRUCTION ESTIMATES AND LINE ITEMS

The attached construction cost estimates were prepared with the Connecticut Department of Transportation Estimator software and data base of line items and unit prices. The data base cannot be customized for specific projects therefore item not found in the database were substituted with similar, available items. For example, item <u>0406133 – Rubberized Chip Seal</u> was used for <u>Stress Absorbing</u> <u>Membrane</u> by All States Material Group, and item <u>0406278 – Micro-Milling of H.M.A. (0"-2")</u> was used for <u>Shot Blasting</u> of the existing pavement. No Prevailing Wage Rates were assumed in the estimates. The estimates are surcharged 10% for contingencies.

The estimates are not competitive bids, and are based on estimated quantities generated from the available documents, not on exact design plans. The estimated construction costs therefore are comparative only, can be used to select the most prudent rehabilitation option, but should not be used for budgeting purposes. The estimates for the four construction options are included in Appendix A.

4. HEALTH AND ENVIRONMENTAL CONSIDERATIONS DURING CONSTRUCTION

The PDC rejuvenator on the existing pavements, curbs, catch basins, etc. is cured already, and can have long-term health effect only as it is transported on airborne dust or waterborne debris. Therefore it is imperative to prevent or minimize the generation of dust or sediment during construction in each of the rehabilitation options investigated. Dust and sediment are generated primarily during shot blasting and pavement milling and to a lesser extent in other construction procedures.

• <u>Shot blasting</u> is a relatively inexpensive procedure, primarily used for cleaning of concrete floors in buildings as a preparation for application of coating or finishing. Not often, but it is also used to clean bituminous road surfaces prior to seal coating or overlaying. Shot blasting is performed by high-speed striking the surface with small size steel media. The contact area with the

pavement is sealed in a curtain enclosure, and the steel media and the pavement particles are vacuumed back into a collection drum. The steel media is magnetically separated from the pavement millings and re-used. In addition to its relatively low cost the controlled dust/sediment generation is an advantage of this procedure. A disadvantage of the procedure is its limited (less than ¼ inches) penetration into the pavement; less than the estimated 3/8 inches penetration of PDC. Shot blasting would not remove PDC from the existing pavement completely, but would well prepare its surface for SAM coting or HMA overlay. Millings collected in the machine's storage drum will be PAH-laden material and would need to be handled and disposed of as *controlled material*.

One company we managed to contact, and is a potential candidate for this project:

Shot Blast Inc. 203 East 10th Street. Box # 19 Marcus Hook, Pa 1906

Email: info@shotblastinc.com

Office: 610.494.1330 Fax: 610.494.1870

- Pavement milling is the most wildly used method to recycle bituminous pavement. It can be partial-depth as preparation for overlaying or full-depth as part of pavement reclamation. It would remove PDC from the pavement completely, but dust and sediment control is not integral part of the procedure and has to be provided for separately. Water spaying over the milled surface helps to reduce dust, but the volume of water used shall be limited, otherwise PAH-laden sediment would be carried into the drainage system. Immediate vacuuming the roadway behind the milling machine can help to minimize the entry of water and sediment into the drainage structures. Contract specifications shall be carefully worded to make dust control effective. In case of partial-depth procedure the milling has to be handled and disposed of as controlled material. In case the pavement milled full-depth, the milling can be either disposed of or reclaimed and added to the road base. In case of the reclamation the PAH-containing millings would remain at the site but locked permanently in the road base.
- <u>Catch basin protection</u> Geotextile silt sacks shall be installed in the catch basing under the grates to catch and retain PAH-contaminated and water-transported sediment. The sediment collected on the fabric can be safely removed, transported, and disposed of with the geotextile silt sacks. The silt sack can typically safely retain grain sizes between 0.002 mm and 0.075 mm. Silt sacks can be either purchased ready or prepared at the site. If prepared at the site, sediment control geotextile material (wire-supported or self-supported) from the Connecticut Department of Transportation Qualified Product List is recommended.
- <u>Catch basin cleaning</u> is likely the most problematic component of all four rehabilitation options. The precast concrete tops and steel grates as well as partially the interiors of the existing catch basins were sprayed with PDC. Due to the abrasive effect of traffic and the water-transported

road sand the PDC spraying on the catch basing components would gradually erode and the particles end up in the receiving water bodies. To prevent this undesirable process the following construction line items are recommended and used in the cost estimates:

- a) Line item <u>0507006 Type "C" Catch Basin Top</u> covers for the replacement of the precast concrete catch basing top. Few of the existing 26 catch basins will have their tops replaced; this item is used as a contingency. Replacement of the tops could be considered specifically in Option No. 4, in which the tops need to be reset to the new roadway grade.
- b) Line item <u>0507014 Type "C" Catch Basin Frame and Grate</u> covers for the replacement of the grates on all 26 catch basins. Replacing the grates is more cost effective than cleaning them.
- c) Line item <u>0653001 Clean Existing Catch Basin</u> covers for the collection and removal of all contaminated sediment that accumulated in the sump of each structure. The sediment can be vacuumed out of the structures easily and inexpensively upon completion of the project. This line item however does not cover for the cleaning the sprayed interior of the catch basins. The vertical walls are not subject to direct wear, and sprayings will likely stay on the walls indefinitely. Cleaning of the walls therefore can be omitted.
- <u>Curb replacement</u> The existing bituminous curbs, just as the catch basin tops and grates, were sprayed with PDC. In lieu of cleaning, the curbs should be removed, ground, disposed of as controlled material, and replaced with new curbs. Replacement is also justified by the age of the curbs.
- <u>Controlled Material</u> This terminology is used in the Connecticut Department of Transportation Estimator software, and conveniently used this report for waste materials resulting from pavement milling, pavement shot blasting, or cleaning of the catch basins. Unless reclaimed at the site or utilized otherwise locally or by the contractor, these materials can be disposed of with a permit from the Connecticut DEEP, only in landfills stipulated in the permit. The Connecticut DEEP sometimes uses the terminology "Special Waste" for these materials.
- <u>Pilot Program</u> In all four options dust generation and dust control is of major concern in the community. Whichever option is eventually selected for the project, it is recommended that the contract specifications include a pilot program to be executed in a remote area within the town, where the effectiveness of the dust control can be observed and evaluated before the procedure is applied in the actual project site.

5. REHABILITATION OPTIONS

As was stated, the two objectives of the project are the rehabilitation of the roadway and the abatement the environmentally harmful pavement rejuvenator (PDC) previously applied to the road surface.

We examined four rehabilitation/abatement options with their associated environmental and health effects, advantages and disadvantages. The following is a tabulated summary of the four options:

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1. Set up E&S control along road and at CB's 2. Reclaim entire bituminous curbing and pavement, material remains at mix with existing road base material remains at a Dispose of surplus as controlled material 3. Dispose of surplus as controlled material 4. Clean, adjust to grade CB's 5. Install new pavement and curbing 6. Restore top soil grass area behind curb 7. Clean catch basins upon project completion 8. Provide MPT, cleanup 9. The PAH- 1. PAH-laden dust during milling may be difficult to control and require special procedures (water spraying, vacuuming). The PAH- 1. PAH-laden dust during milling may be difficult to control and require special procedures (water spraying, vacuuming). The PAH-laden dust during milling may be difficult to control and require special procedures (water spraying, vacuuming). The PAH-laden dust during milling may be difficult to control and require special procedures (water spraying, vacuuming). The PAH-laden dust during milling may be difficult to control and require special procedures (water spraying, vacuuming). The PAH-laden dust during milling may be difficult to control and require special procedures (water spraying, vacuuming). The PAH-laden dust during milling may be difficult to control and require special procedures (water spraying, vacuuming). The PAH-control and require spraying, vacuuming). The PAH-control and require spraying, vacuuming or vacuuming. The PAH control and require spraying, vacuuming or vacuuming. The PAH control and require spraying, vacuuming or vacuuming. The PAH-control and require spraying.					
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material remains at procedures (water spraying, the site but is locked 2. Dispose of surplus as controlled material a bernanently in the 3. Install new pavement and curbing 6. Restore top soil grass area behind curb 7. Clean catch basins upon project completion 8. Provide MPT, cleanup material remains at the site against entry of sediment has to be disposed of.			contaminated asphalt	be difficult to control and require	
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Install new pavement and curbing restore top soil grass area behind curb clean catch basins upon project completion revoluted MPT, cleanup restored to grave to be disposed of.	amation		the site but is locked		Estimate)
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Clean catch basins upon project completion controlled material has to be disposed of.					
Provide MPT, cleanup has to be disposed of.		0 10		20 1020	
James			has to be disnosed of	against ontry of seament	
		32			

6. CONCLUSIONS AND RECOMMENDATIONS

It is our recommendation that either <u>Option No. 1</u> or <u>Option No. 3</u> be selected for this project.

The two options are comparably priced, in both the PDC would be either completely or mostly removed from the site, and both would provide a brand new, aesthetically pleasing, long lasting road surface. They differ that the road surface is cleaned by 1 inch deep milling in Option 1 and by shot blasting respectively in Option 3.

<u>Dust control</u> may be easier in Option 3 nevertheless it is very important in both. We recommend that whichever option is selected, the effectiveness of the dust control be tested through a pilot program at another site in town, where PDC is not present on the pavement. The pilot program should be included in the contract documents and specifications.

<u>Contractor availability</u> might be a problem in Option 3. Contractors specializing in shot blasting typically service larger areas, sometimes several states. Mobilization in Option 3 can be more expensive than in Option 1, which can be provided by local contractors.

<u>Waste Disposal</u> – the way waste material is disposed of has to be accurately specified in the contract documents since it can be of significant cost.

APPENDIX CONSTRUCTION COST ESTIMATES

ESTIMATE – OPTION NO. 1

Estimate

Estimated Cost:\$595,139.66

Contingency: 10.00%

Estimated Total: \$654,653.63

PAVEMENT REHABILITATION - OPTION NO. 1

(Mill 1 inch and overlay)

LONGMEADOW ROAD, POMFRET, CONNECTICUT

Base Date: 04/20/17

Spec Year: 11

Unit System: E

Work Type: ASPHALT PAVING

Highway Type: MINOR ART - Minor Arterial

Urban/Rural Type: Rural

Season: SUMMER 6/21 - 9/20

County: WINDHAM

Latitude of Midpoint: 415409

Longitude of Midpoint: 715614

District: 2

Federal/State Project Number: N/A

Estimate Type: Engineering Report

Prepared by Lenard Engineering, Inc. on 04/20/17 Checked by Paul Magyar, P.E. on 04/20/17 Approved by Paul Magyar, P.E. on 04/20/17 Line # Item Number

Supplemental Description			
roup 0001: Group al Group			
0001 0101099 1.000 SPOIL HANDLING AREAS	ea.	\$1,000.00000	\$1,000.0
0.000 0202312 0.000 REMOVAL AND DISPOSAL OF CONTAMINATED SOIL	c.y.	\$120.00000	\$0.0
0003 0202315 1,100.000 DISPOSAL OF CONTROLLED MATERIALS	ton	\$65.00000	\$71,500.00
0.000 0202522 0.000 REMOVAL OF BITUMINOUS TYPE PAVEMENT	s.y.	\$3.50000	\$0.00
0.000 0202529 0.000 CUT BITUMINOUS CONCRETE PAVEMENT	l.f.	\$6.15000	\$0.00
0006 0202533 15,000.000 REMOVAL OF EXISTING CURBING	l.f.	\$2.80000	\$42,000.00
0007 0202896 1.000 PROTECTION OF BUILDING AND PROPERTY	LS	\$2,000.00000	\$2,000.00
0.000 0209001 0.000 FORMATION OF SUBGRADE	s.y.	\$4.50000	\$0.0
0009 0212000 0.000 Subbase	c.y.	\$100.00000	\$0.00
0010 0219001 100.000 SEDIMENTATION CONTROL SYSTEM	l.f.	\$4.00000	\$400.00
0011 0219002 50.000 SEDIMENTATION CONTROL HAY BALE SYSTEM	l.f.	\$12.00000	\$600.00
0012 0219011 26.000 SEDIMENT CONTROL SYSTEM AT CATCH BASIN	ea.	\$81.28118	\$2,113.3
0.000 PROCESSED AGGREGATE BASE	c.y.	\$47.00000	\$0.00
0.000 FULL-DEPTH RECLAMATION - LOCAL ROADS	s.y.	\$3.50000	\$0.00
0015 0404101 10.000 BITUMINOUS CONCRETE PATCHING - PARTIAL DEPTH	s.y.	\$63.00000	\$630.00
0.000 0406133 0.000 RUBBERIZED CHIP SEAL	s.y.	\$3.80000	\$0.0
0.000 0.000 0.000	ton		\$0.0

Quantity Units Unit Price

Extension

Line # Item Number Description Supplemental Description	Quantity	<u>Units</u>	Unit Price	Extension
0018 0406172 HMA S0.375	1,150.000	ton	\$147.63698	\$169,782.53
0019 0406236 MATERIAL FOR TACK COAT	1,000.000	gal	\$7.44922	\$7,449.22
0020 0406267 MILLING OF HMA (0" TO 4")	0.000	s.y.	\$6.35000	\$0.00
0021 0406278 MICRO-MILLING OF H.M.A. (0" - 2")	20,000.000	s.y.	\$2.85435	\$57,087.00
0022 0507006 TYPE "C" CATCH BASIN TOP	0.000	ea.	\$500.00000	\$0.00
0023 0507014 TYPE "C" CATCH BASIN - FRAME AND GF		ea.	\$250.00000	\$6,500.00
0024 0507554 RESET FRAME AND GRATE FOR CATCH I	0.000 BASIN	ea.	\$350.00000	\$0.00
0025 0653001 CLEAN EXISTING CATCH BASIN	26.000	ea.	\$246.00000	\$6,396.00
0026 0815001 BITUMINOUS CONCRETE LIP CURBING	15,000.000	l.f.	\$11.00000	\$165,000.00
0027 0944000 Furnishing And Placing Topsoil	4,500.000	s.y.	\$8.66000	\$38,970.00
0028 0950005 TURF ESTABLISHMENT	4,500.000	s.y.	\$1.60000	\$7,200.00
0029 0971001 MAINTENANCE AND PROTECTION OF TRA	1.000 AFFIC	LS	\$5,000.00000	\$5,000.00
0030 0975004 MOBILIZATION AND PROJECT CLOSEOUT		LS	\$10,000.00000	\$10,000.00
0031 0977001 TRAFFIC CONE	25.000	ea.	\$23.28675	\$582.17
0032 0978002 TRAFFIC DRUM	10.000	ea.	\$92.94286	\$929.43
0033 0980001 CONSTRUCTION STAKING	0.000	LS	\$4,500.00000	\$0.00

Total for Group 0001:\$595,139.66

ESTIMATE – OPTION NO. 2

Estimate

Estimated Cost:\$462,827.91

Contingency: 10.00%

Estimated Total: \$509,110.70

PAVEMENT REHABILITATION - OPTION NO. 2

(Shot Blast and overlay with SAM)

LONGMEADOW ROAD, POMFRET, CONNECTICUT

Base Date: 04/20/17

Spec Year: 11

Unit System: E

Work Type: ASPHALT PAVING

Highway Type: MINOR ART - Minor Arterial

Urban/Rural Type: Rural

Season: SUMMER 6/21 - 9/20

County: WINDHAM

Latitude of Midpoint: 415409

Longitude of Midpoint: 715614

District: 2

Federal/State Project Number: N/A

Estimate Type: Preliminary Engineering Report

Prepared by Lenard Engineering, Inc. on 04/20/17 Checked by Paul Magyar, P.E. on 04/20/17 Approved by Paul Magyar, P.E. on 04/20/17

Tuesday, April 18, 2017

_ine # <u>Item Number</u> <u>Description</u> <u>Supplemental Description</u>	Quantity	<u>Units</u>	<u>Unit Price</u>	Extension
roup 0001: Group al Group 0001 0101099 SPOIL HANDLING AREAS	1.000	ea.	\$1,000.00000	\$1,000.00
0002 0202312	0.000	c.y.	\$120.00000	\$0.00
REMOVAL AND DISPOSAL OF CONTAM	INATED SOIL			
0003 0202315 DISPOSAL OF CONTROLLED MATERIAL	50.000 .S	ton	\$65.00000	\$3,250.00
0004 0202522 REMOVAL OF BITUMINOUS TYPE PAVE	0.000 MENT	s.y.	\$3.50000	\$0.00
0005 0202529 CUT BITUMINOUS CONCRETE PAVEME	0.000 INT	l.f.	\$6.15000	\$0.00
0006 0202533 REMOVAL OF EXISTING CURBING	15,000.000	l.f.	\$2.80000	\$42,000.00
0007 0202896 PROTECTION OF BUILDING AND PROP	1.000 ERTY	LS	\$2,000.00000	\$2,000.0
0008 0209001 FORMATION OF SUBGRADE	0.000	s.y.	\$4.50000	\$0.0
0009 0212000 Subbase	0.000	c.y.	\$100.00000	\$0.0
0010 0219001 SEDIMENTATION CONTROL SYSTEM	0.000	l.f.	\$4.00000	\$0.00
0011 0219002 SEDIMENTATION CONTROL HAY BALE	0.000 SYSTEM	l.f.	\$12.00000	\$0.00
0012 0219011 SEDIMENT CONTROL SYSTEM AT CATO	26.000 CH BASIN	ea.	\$81.28118	\$2,113.3
0013 0304002 PROCESSED AGGREGATE BASE	0.000	c.y.	\$47.00000	\$0.0
0014 0403873 FULL-DEPTH RECLAMATION - LOCAL R	0.000 OADS	s.y.	\$3.50000	\$0.0
0015 0404101 BITUMINOUS CONCRETE PATCHING - F	100.000 PARTIAL DEPTH	s.y.	\$63.00000	\$6,300.0
0016 0406133 RUBBERIZED CHIP SEAL	20,000.000	s.y.	\$5.00000	\$100,000.0
0017 0406170	0.000	ton		\$0.0

Page 2 of 3

Line # Item Number Description Supplemental De	-	<u>Units</u>	Unit Price	<u>Extension</u>
0018 0406172 HMA S0.375	0.000	ton		\$0.00
0019 0406236 MATERIAL FOR TAG	0.000 CK COAT	gal		\$0.00
0020 0406267 MILLING OF HMA (0	0.000 " TO 4")	s.y.	\$6.35000	\$0.00
0021 0406278 MICRO-MILLING OF	20,000.000 H.M.A. (0" - 2")	s.y.	\$2.85435	\$57,087.00
0022 0507006 TYPE "C" CATCH BA	0.000 ASIN TOP	ea.	\$500.00000	\$0.00
0023 0507014 TYPE "C" CATCH BA	26.000 ASIN - FRAME AND GRATE	ea.	\$250.00000	\$6,500.00
0024 0507554 RESET FRAME AND	0.000 GRATE FOR CATCH BASIN	ea.	\$350.00000	\$0.00
0025 0653001 CLEAN EXISTING C	26.000 ATCH BASIN	ea.	\$246.00000	\$6,396.00
0026 0815001 BITUMINOUS CONC	15,000.000 RETE LIP CURBING	l.f.	\$11.00000	\$165,000.00
0027 0944000 Furnishing And Placi	4,500.000 ng Topsoil	s.y.	\$8.66000	\$38,970.00
0028 0950005 TURF ESTABLISHM	4,500.000 ENT	s.y.	\$1.60000	\$7,200.00
0029 0971001 MAINTENANCE AND	1.000 PROTECTION OF TRAFFIC	LS	\$5,000.00000	\$5,000.00
0030 0975004 MOBILIZATION AND	1.000 PROJECT CLOSEOUT	LS	\$14,000.00000	\$14,000.00
0031 0977001 TRAFFIC CONE	25.000	ea.	\$23.28675	\$582.17
0050 0978002 TRAFFIC DRUM	10.000	ea.	\$92.94286	\$929.43
0051 0980001 CONSTRUCTION ST	1.000 AKING	LS	\$4,500.00000	\$4,500.00

Total for Group 0001:\$462,827.91

ESTIMATE – OPTION NO. 3

Estimate

Estimated Cost:\$538,250.37

Contingency: 10.00%

Estimated Total: \$592,075.41

PAVEMENT REHABILITATION - OPTION NO. 3

(Shot Blast and overlay with HMA)

LONGMEADOW ROAD, POMFRET, CONNECTICUT

Base Date: 04/20/17

Spec Year: 11

Unit System: E

Work Type: ASPHALT PAVING

Highway Type: MINOR ART - Minor Arterial

Urban/Rural Type: Rural

Season: SUMMER 6/21 - 9/20

County: WINDHAM

Latitude of Midpoint: 415409

Longitude of Midpoint: 715614

District: 2

Federal/State Project Number: N/A

Estimate Type: Preliminary Engineering Report

Prepared by Lenard Engineering, Inc. on 04/20/17 Checked by Paul Magyar, P.E. on 04/20/17 Approved by Paul Magyar, P.E. on 04/20/17 Line # Item Number

Tuesday, April 18, 2017

Description Supplemental Description	Quantity	0	Unit Price	Extension
oup 0001: Group				
II Group 001 0101099	1.000	ea.	\$1,000.00000	\$1,000.0
SPOIL HANDLING AREAS	1.000	ca.	¥1,000.0000	Ψ1,000.0
002 0202312 REMOVAL AND DISPOSAL OF CONTAM	0.000 IINATED SOIL	c.y.	\$120.00000	\$0.0
003 0202315	50.000	ton	\$65.00000	\$3,250.0
DISPOSAL OF CONTROLLED MATERIA	LS			
004 0202522 REMOVAL OF BITUMINOUS TYPE PAVE	0.000 EMENT	s.y.	\$3.50000	\$0.0
005 0202529	200.000	l.f.	\$6.15000	\$1,230.0
CUT BITUMINOUS CONCRETE PAVEME	ENT			
006 0202533 REMOVAL OF EXISTING CURBING	15,000.000	l.f.	\$2.80000	\$42,000.0
007 0202896 PROTECTION OF BUILDING AND PROP	1.000 PERTY	LS	\$2,000.00000	\$2,000.0
008 0209001 FORMATION OF SUBGRADE	0.000	s.y.	\$4.50000	\$0.0
009 0212000 Subbase	0.000	c.y.	\$100.00000	\$0.0
010 0219001 SEDIMENTATION CONTROL SYSTEM	0.000	l.f.	\$4.00000	\$0.0
011 0219002	0.000	l.f.	\$12.00000	\$0.0
SEDIMENTATION CONTROL HAY BALE	SYSTEM			
012 0219011 SEDIMENT CONTROL SYSTEM AT CAT	26.000 CH BASIN	ea.	\$81.28118	\$2,113.5
013 0304002 PROCESSED AGGREGATE BASE	0.000	c.y.	\$47.00000	\$0.0
014 0403873 FULL-DEPTH RECLAMATION - LOCAL R		s.y.	\$3.50000	\$0.0
015 0404101 BITUMINOUS CONCRETE PATCHING -	100.000	s.y.	\$63.00000	\$6,300.0
016 0406133 RUBBERIZED CHIP SEAL	0.000	s.y.	\$3.80000	\$0.0
				\$0.0

Quantity Units Unit Price

Extension

Page 2 of 3

Line # Item Number Description Supplemental Description	Quantity	<u>Units</u>	Unit Price	Extension
0018 0406172 HMA S0.375	1,150.000	ton	\$147.63698	\$169,782.53
0019 0406236 MATERIAL FOR TACK COAT	500.000	gal	\$8.81987	\$4,409.93
0020 0406267 MILLING OF HMA (0" TO 4")	0.000	s.y.	\$6.35000	\$0.00
0021 0406278 MICRO-MILLING OF H.M.A. (0" - 2")	20,000.000	s.y.	\$2.85435	\$57,087.00
0022 0507006 TYPE "C" CATCH BASIN TOP	0.000	ea.	\$500.00000	\$0.00
0023 0507014 TYPE "C" CATCH BASIN - FRAME AND GRA	26.000 ATE	ea.	\$250.00000	\$6,500.00
0024 0507544 TYPE "P-R-W" CATCH BASIN DOUBLE GRA	0.000 TE TYPE I OVE	ea. ER 10' DE	\$350.00000 EP	\$0.00
0025 0653001 CLEAN EXISTING CATCH BASIN	26.000	ea.	\$246.00000	\$6,396.00
0026 0815001 BITUMINOUS CONCRETE LIP CURBING	15,000.000	l.f.	\$11.00000	\$165,000.00
0027 0944000 Furnishing And Placing Topsoil	4,500.000	s.y.	\$8.66000	\$38,970.00
0028 0950005 TURF ESTABLISHMENT	4,500.000	s.y.	\$1.60000	\$7,200.00
0029 0971001 MAINTENANCE AND PROTECTION OF TRA	1.000 FFIC	LS	\$5,000.00000	\$5,000.00
0030 0975004 MOBILIZATION AND PROJECT CLOSEOUT	1.000	LS	\$14,000.00000	\$14,000.00
0031 0977001 TRAFFIC CONE	25.000	ea.	\$23.28675	\$582.17
0032 0978002 TRAFFIC DRUM	10.000	ea.	\$92.94286	\$929.43
0033 0980001 CONSTRUCTION STAKING	1.000	LS	\$4,500.00000	\$4,500.00

Total for Group 0001:\$538,250.37

ESTIMATE – OPTION NO. 4

Estimate

Estimated Cost: \$969,211.63

Contingency: 10.00%

Estimated Total: \$1,066,132.79

PAVEMENT REHABILITATION - OPTION NO. 4

(Full reclamation)

LONGMEADOW ROAD, POMFRET, CONNECTICUT

Base Date: 04/20/17

Spec Year: 11

Unit System: E

Work Type: ASPHALT PAVING

Highway Type: MINOR ART - Minor Arterial

Urban/Rural Type: Rural

Season: SUMMER 6/21 - 9/20

County: WINDHAM

Latitude of Midpoint: 415409

Longitude of Midpoint: 715614

District: 2

Federal/State Project Number: N/A

Estimate Type: Preliminary Engineering Report

Prepared by Lenard Engineering, Inc. on 04/20/17 Checked by Paul Magyar, P.E. on 04/20/17 Approved by Paul Magyar, P.E. on 04/20/17

Line # Item Number Description Supplemental Description Sroup 0001: Group	Quantity	<u>Units</u>	<u>Unit Price</u>	Extension
itial Group 0001 0101099 SPOIL HANDLING AREAS	1.000	ea.	\$1,000.00000	\$1,000.00
0002 0202312 REMOVAL AND DISPOSAL OF CONTAMINATE	10.000 ED SOIL	c.y.	\$120.00000	\$1,200.00
0003 0202315 DISPOSAL OF CONTROLLED MATERIALS	150.000	ton	\$65.00000	\$9,750.00
0004 0202522 REMOVAL OF BITUMINOUS TYPE PAVEMENT	0.000 T	s.y.	\$3.50000	\$0.00
0005 0202529 CUT BITUMINOUS CONCRETE PAVEMENT	200.000	l.f.	\$6.15000	\$1,230.00
0006 0202533 1 REMOVAL OF EXISTING CURBING	5,000.000	l.f.	\$2.80000	\$42,000.00
0007 0202896 PROTECTION OF BUILDING AND PROPERTY	1.000	LS	\$2,000.00000	\$2,000.00
0008 0209001 FORMATION OF SUBGRADE	200.000	s.y.	\$4.50000	\$900.00
0009 0212000 Subbase	65.000	c.y.	\$100.00000	\$6,500.00
0010 0219001 SEDIMENTATION CONTROL SYSTEM	300.000	l.f.	\$4.00000	\$1,200.00
0011 0219002 SEDIMENTATION CONTROL HAY BALE SYST	100.000 EM	l.f.	\$12.00000	\$1,200.00
0012 0219011 SEDIMENT CONTROL SYSTEM AT CATCH BA	26.000 SIN	ea.	\$81.28118	\$2,113.31
0013 0304002 PROCESSED AGGREGATE BASE	30.000	c.y.	\$47.00000	\$1,410.00
0014 0403873 2 FULL-DEPTH RECLAMATION - LOCAL ROADS	0,000.000	s.y.	\$3.50000	\$70,000.00
0015 0404101 BITUMINOUS CONCRETE PATCHING - PARTI	0.000 AL DEPTH	s.y.	\$63.00000	\$0.00
0016 0406133 RUBBERIZED CHIP SEAL	0.000	s.y.	\$3.80000	\$0.00
0017 0406170 HMA S1	2,300.000	ton	\$115.56477	\$265,798.97

Line # Item N Description Supplement	umber al Description	Quantity	<u>Units</u>	<u>Unit Price</u>	<u>Extensio</u>
0018 040617 HMA S0.375	2	1,150.000	ton	\$147.63698	\$169,782.5
0019 040623 MATERIAL FO	6 DR TACK COAT	1,000.000	gal	\$7.44922	\$7,449.2
0020 040626 MILLING OF H	7 IMA (0" TO 4")	20,000.000	s.y.	\$6.35000	\$127,000.0
0021 040627 MICRO-MILLI	8 NG OF H.M.A. (0" - 2")	0.000	s.y.		\$0.0
0022 050700 TYPE "C" CA	6 CCH BASIN TOP	5.000	ea.	\$500.00000	\$2,500.0
0023 050701 TYPE "C" CAT	4 TCH BASIN - FRAME AND GR	26.000 ATE	ea.	\$250.00000	\$6,500.0
0024 050755 RESET FRAM	4 E AND GRATE FOR CATCH I	26.000 BASIN	ea.	\$350.00000	\$9,100.0
0025 065300 CLEAN EXIST	1 ING CATCH BASIN	26.000	ea.	\$246.00000	\$6,396.0
0026 081500 BITUMINOUS	1 CONCRETE LIP CURBING	15,000.000	l.f.	\$11.00000	\$165,000.0
0027 094400 Furnishing And	O I Placing Topsoil	4,500.000	s.y.	\$8.66000	\$38,970.0
0028 095000 TURF ESTABI		4,500.000	s.y.	\$1.60000	\$7,200.0
0029 097100 MAINTENANC	1 E AND PROTECTION OF TRA	1.000 AFFIC	LS	\$5,000.00000	\$5,000.C
0030 097500 MOBILIZATIO	4 N AND PROJECT CLOSEOUT		LS	\$12,000.00000	\$12,000.0
0031 097700 TRAFFIC CON		25.000	ea.	\$23.28675	\$582.1
0032 097800 TRAFFIC DRU		10.000	ea.	\$92.94286	\$929.4
0033 098000 CONSTRUCTI		1.000	LS	\$4,500.00000	\$4,500.0

Total for Group 0001:\$969,211.63

APPENDIX B

SILT SACK AND GEOTEXTILE MATERIAL INFORMATION

Canada's leader of complete geosynthetic solutions

terrafix geosynthetics inc.

SILTSACK® Catch Basin

To view our complete product line visit us at www.terrafixgeo.com

terrafix geosynthetics inc.

Construction Sequence

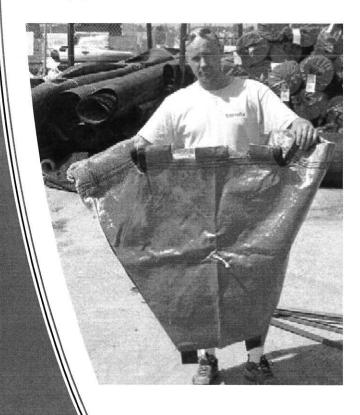
To install the SILTSACK® in the catch basin, remove the grate and place the sack in the opening. Hold approximately six inches of the sack outside the frame. This is the area of the lifting straps. Replace the grate to hold the sack in place.

The SILTSACK® is full and should be emptied when the restraint cord is no longer visible.

To remove the SILTSACK®, take two pieces of 1" diameter rebar and place through the lifting loops on each side of the sack to facilitate the lifting of the SILTSACK®.

To empty the SILTSACK®, place it where the contents will be collected. Place the rebar through the lift straps (connected to the bottom of the sack) and lift. This will turn the SILTSACK® inside out and empty the contents. Clean out and rinse. Return the SILTSACK® to its original shape and place back in the basin.

The SILTSACK® is reusable. Once the construction cycle is complete, remove the SILTSACK® from the basin and clean. The SILTSACK® should be stored out of the sunlight until needed on another project.



SILTSACK® Specifications

Control of Sediment Entering Catch Basins for Storm Water Management

The SILTSACK® will be manufactured from a woven polypropylene geotextile and sewn by a double needle machine, using a high strength nylon thread.

The SILTSACK® seams have a certified average wide width strength per ASTM D-4884 standards as follows:

SILTSACK® Style	Test Method	Minimum Values
Regular Flow	ASTM D-4884	165.0 lbs./in

The SILTSACK® will be manufactured to fit the opening of the catch basin or drop inlet. The SILTSACK® will have the following features: two dump straps attached at the bottom to facilitate the emptying of the SILTSACK®; the SILTSACK® will also have lifting loops as an integral part of the system to be used to lift the SILTSACK® from the basin. The SILTSACK® will have a restraint cord approximately halfway up the sack to keep the sides away from the catch basin walls, this yellow cord is also a visual means of indicating when the sack should be emptied. Once the strap is covered with sediment, the SILTSACK® should be emptied, cleaned, and placed back into the basin.

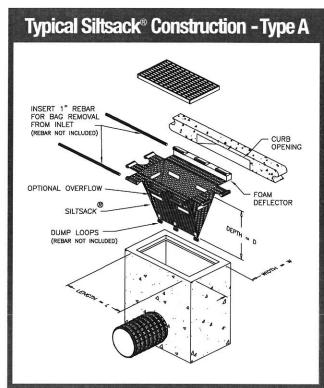
The geotextile fabric will be woven polypropylene fabric with the following properties:

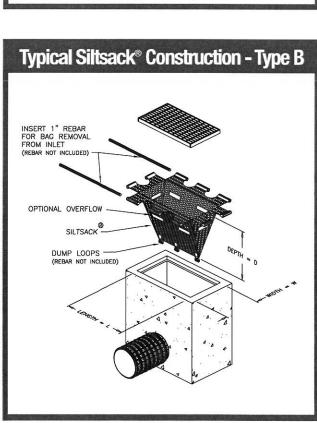
SILTSACK® Regular Flow

Property	Test Method	Minimum Value		
Grab Tensile	ASTM D-4632	300 lbs.		
Grab Elongation	ASTM D-4632	20%		
Puncture	ASTM D-4633	120 lbs.		
Mullen Burst	ASTM D-3786	800 psi		
Trapezoid Tear	ASTM D-4533	120 lbs.		
UV Resistance	ASTM D-4355	80%		
Apparent Opening	ASTM D-4751	40 US Sieve		
Flow Rate	ASTM D-4491	40 Gal/Min/Ft ²		
Permittivity	ASTM D-4491	0,55 sec ⁻¹		

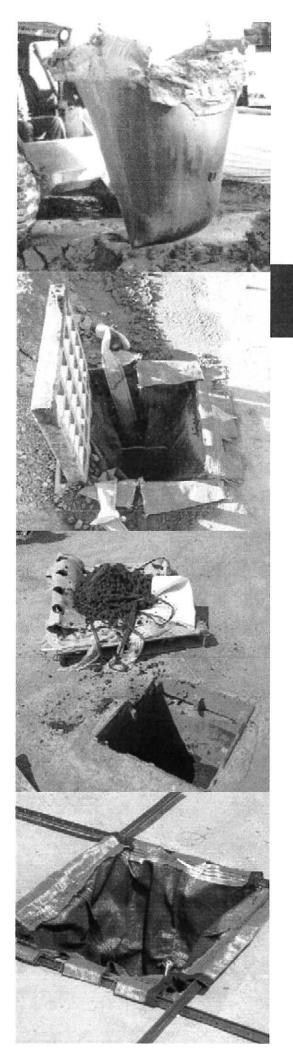
All properties are minimum average roll values

Catch Basin Sediment Capture Device









Catch Basin Sediment Capture Device

SILTSACK® Catch Basin

SILTSACK® is a simple and cost-effective solution to prevent clogging of catch basins.

SILTSACK® is a sediment control device used to prevent silt and sediment from entering your drainage system. SILTSACK® traps the silt / sediment but allows water to pass through into the sewer. SILTSACK® can be used as a primary or secondary sediment control device to prevent failure of drainage system due to clogging with silt / sedimentation. Maintenance of the SILTSACK® on a regular basis will ensure that the SILTSACK® will function properly.

Available in two styles:

- Regular flow
- · High flow

Basic Installation Instructions

- Remove drain gate
- Insert SILTSACK®
- Replace grate to hold SILTSACK® in position

Benefits

- SILTSACK® traps silt & sediment
- · Saves money and time

Routine Inspection of the SILTSACK®'s collected sediment level is important to prevent over-flow of silt and sediment.

SILTSACK® should be inspected every 2-3 weeks and after every major storm.

The yellow restraint cord should be visible at all times. If the cord is covered with sediment. the SILTSACK® should be emptied.

The information contained herein has been complied by Terrafix Geosynthetics Inc. and is, to the best of knowledge, true and accurate. All suggestions and recommendations are offered without guarantee. Final determination of suitability for use based on any information provided is the sole responsibility of the user. There is no implied or expressed warranty of merchantability or fitness of the product for the contemplated use

DISTRIBUTED BY



Telephone (416) 674-0363 Fax (416) 674-1159

December 2009 • 1435

Geotextiles:

SPECIFICATION: Form 816, Sections 2.19, 7.51, 7.55 and M.08.01-19
PREAPPROVAL CRITERIA: Certified Test Report According to AASHTO M 288

The following list denotes those geotextiles that are approved for use on ConnDOT projects. The categories listed are in accordance with the AASHTO M 288 specification. Geotextile selection shall be based on the following definitive information and the applicable design criteria.

- 1. Subsurface Drainage Geotextiles within this category shall be used for, but not limited to the following applications: pavement edge drains; interceptor drains; wall drains; recharge basins and relief wells. The geotextile shall be designed to allow the passage of water normal to its surface while retaining in situ soil without clogging. Class A drainage applications for fabrics are where installation stresses are more severe than Class B applications; i.e., very coarse, sharp, angular aggregate is used; a heavy degree of compaction (95% or greater by AASHTO method T 99) is specified; or depth of trench is greater than 3.00 m. Class B drainage applications are those where the fabric is used with smooth graded surfaces having no sharp angular projections, no sharp angular aggregate is used; compaction requirements are light (less than 95% by AASHTO method T 99); and trenches are less than 3.00 m in depth.
- 2. <u>Sediment Control</u> Geotextiles within this category shall be used as a barrier-fence designed to remove suspended particles from the water that passes through it. "Wire Supported" signifies that fabric is supported with a mesh made of wire or plastic.
- 3. Erosion Control Geotextiles within this category shall be used for, but not limited to the following applications: cut and fill slope protection; protection of various small drainage structures and ditches, wave protection for causeways and shoreline roadway embankments and scour protection for structures such as bridges and abutments. The geotextile shall be designed to allow the passage of water while retaining in situ soil without clogging. Class A erosion control applications are those where the fabrics are used under conditions where installation stresses are more severe than Class B, i.e., aggregate placement height should be less than 1.00 m, and aggregate weights should not exceed 115.00 kg. Class B erosion control applications are those where the fabric is used in structures or under conditions where the fabric is protected by a sand cushion or by "zero drop height" placement of aggregate.
- 4. <u>Separation</u> Geotextiles within this category shall be used for, but are not limited to, the following applications: separation of dissimilar materials, such as subgrades and pavement base courses and zones in embankments, foundations and select fill materials. When soil stabilization is the primary concern, the Design Engineer is cautioned that a detailed process must be followed, taking into consideration not only the separation properties of the geotextile, but its reinforcement function as well. The geotextile shall be designed to allow the passage of water while retaining in situ soil without clogging

Revised: (07/2016)

Geotextiles:

	SUBSURFAC	CE DRAINAGE	SEDIMEN'	T CONTROL	EROSIC	N CONTROL	SEPARATION	
			Wire	Self			High	Medium
	Class A	Class B	Supported	Supported	Class A	Class B	Surviv.	Surviv.
A.H. Harris & Sons Inc. P.O. Box 311058 367 Alumni Road Newington, CT 06131			Harris Siltfence	Harris Siltfence				
American Engineering Fabrics, Inc. 1 Coffin Ave. New Bedford, MA 02746 www.boomenviro.com	AEF: 880 1080 1280 600W 650W 200W 300W	AEF: 480 480HS 680 880 1080 1280 600W 650W 200W 300W 130W 150W	AEF: 180W	AEF: 100W 150W 180W	AEF: 880 1080 1280 650W 300W	AEF: 480 480HS 680 880 1080 1280 650W 300W 100W	AEF: 1080 1280 300W	AEF: 880 1080 1280 600W 200W 300W
Belton Industries, Inc. P.O. Box 127 Belton, SC 29627 www.boomenviro.com	768 769 977 1475	307 308 751 768 769 977 1475	940	307 940	769 1475	307 769 940 1475	1475	768 977 1475
BBA Fiberweb Inc. 70 Old Hickory Blvd. Old Hickory, TN 37138		Typar: 3401G	Typar: 3401G	Typar: 3401G		Typar: 3401G	Typar: 3631G	Typar: 3401G

^{*} Product is satisfactory only where the affected soil contains less than 50% material, by weight, passing the number 200 sieve.

Geotextiles:

	SUBSURFACE DRAINAGE		SEDIMENT CONTROL		EROSION CONTROL		SEPARATION	
			Wire	Self			High	Medium
	Class A	Class B	Supported	Supported	Class A	Class B	Surviv.	Surviv.
Carthage Mills 4243 Hunt Road Cincinnati, OH 45242 www.carthagemills.com	FX-75NW Carthage- 6%	FX-35HS FX-40HS FX-35NW FX-40NW FX-75NW Carthage- 6%	FX-11	FX-11	FX-75NW FX-55 * FX-66 Carthage- 6%	FX-35HS FX-40HS FX-35NW FX-40NW FX-33 FX-44 FX-75NW FX-55 * FX-66 Carthage- 6%	FX-66 FX-75NW	FX-55 * FX-66 FX-75NW
DGI Industries P.O. Box 16522 Hooksett, NH 03442 www.dgiindustries.com			CT138036 CT213036	CT138036 CT213036				
Evergreen Technologies Inc. (Div. of Tensar) 200 Miller Sellers Dr. Evergreen, AL 36401	TG650	TG650 TG500 TG420 *	TG420	TG550	TG700	TG700 TG500 TG420 *	TG650	TG650 TG500
First Line Corp. P.O. Box 68 Pearson, GA 31642			CSF 330	CSF 330				
Hanes Geo Components 815 Buxton St. Winston-Salem, NC 27101 www.hanesgeo.com	Terratex: EP NO8	Terratex: SD NO4 EP NO8 SO4	Terratex: SC SC-90	Terratex: SC SC-90	Terratex: GS * NO8	Terratex: SD NO4 GS-150 * GS * NO8	Terrate x: HD * EP	Terratex: GS * NO8 HD * EP
Hoechst Celanese Corp. P.O. Box 5650 Spartanburg, SC 29304-5650			Trevira: 011/140			Trevira: 011/140		Trevira: 011/200

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Geotextiles:

	SUBSURFACE DRAINAGE		SEDIMENT CONTROL		EROSION CONTROL		SEPARATION	
			Wire	Self		T	High	Medium
	Class A	Class B	Supported	Supported	Class A	Class B	Surviv.	Surviv.
Indian Valley Industries Inc. 60-100 Corliss Avenue Johnson City, NY 13790 www.iviindustries.com			CT-3611	CT-3611		CT-3611		
LINQ Industrial Fabrics, Inc. 4550 W. Fifth North St. Summerville, SC 29483	180EX 225EX 250EX 275EX 350EX	180EX 125EX 130EX 150EX 225EX 250EX 275EX 350EX	180 102 104 105	180 102 104 105	180EX 225EX 250EX 275EX 350EX GTF 400E	180EX 125EX 130EX 150EX 225EX 250EX 275EX 350EX GTF 400E	180EX 225EX 250EX 275EX GTF 300 * 350#X Typar: 3631	180EX GTF 200S GTF 200 * GTF 300 * 130EX 150EX 225EX 250EX 275EX 350EX
Mutual Industries Inc. 707 West Grange Street Philadelphia, PA 19120			MISF 1830 MISF 1855	MISF 1830 MISF 1855				
OnSite Systems, Inc. P.O. Box 241166 Charlotte, NC 28224			WCF 120	WCF 120	WCF 200	WCF 150 WCF 200	WCF 300	WCF 200 WCF 300
Propex Geosolutions 6025 Lee Highway Suite 425 PO Box 22788 Chattanooga, TN 37422 www.geotextile.com	Geotex 104F 135ST 102F 200ST 401 701 801 1071 1291 1701	Geotex 200ST 311 351 401 451 501 601 701 801 1071 1291		Geotex 117F 2130	Geotex 104F 200ST 315ST 102F 801 1071 1291 1701	Geotex 104F 200ST 315ST 102F 351 401 451 601 801 1071 1291 1701	Geotex 315ST 2x2HF 701 801 1071 1291 1701	Geotex 200ST 31SST 2x2HF 451 501 601 701 801 1071 1291 1701

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Geotextiles:

	SUBSURFACE DRAINAGE		SEDIMENT CONTROL		EROSION CONTROL		SEPARATION	
			Wire Self				High	Medium
	Class A	Class B	Supported	Supported	Class A	Class B	Surviv.	Surviv.
SKAPS INDUSTRIES	M706	GT131	GT135	W100	SW200*	GT135	M760	M706
335 ATHENA DRIVE	GT170	GT135	W100		Sw315*	GT140	SW315*	GT140
ATHENS, GA 30601	GT180	GT140			GT180	GT142	GT170	GT142
	100000000000000000000000000000000000000	GT142			M706	SW200*	GT180	SW200*
		M706				SW315*		SW315*
								GT180
TenCate Geosynthetics	FW404	FW404	FW500	FW404	FW404	FW404	HP370	FW500
North America	FW500	FW500	100X	FW500	FW500	FW500	FW 4 O 4	FW700
(formally TC Mirafi)	FW700	FW700	FW700	FW700	FW700	FW700	FW500	140N
365 South Holland Drive	170N	140N	1200000000000	100X	180N	140N	FW700	500X *
Pendergrass, GA 30567	180N	140NL		Enviro-	500X *	140NL	600X *	550X
www.tencate.com	Section Market 17	135N		Fence	600X *	500X *	170N	600X *
		140NC				600X *	180N	
TNS Advanced	R070	R031	R035	W 280	R080	R035	R070	R042
Technologies Inc.	R080	R035	9888848030	15-58 1000m20-5	10000000000	R040	R080	
681 DeYoung Road		R040				R042		
Greer, SC 29651		R042				1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -		
US Silt & Site Supply/			CT36112130	CT36112130				
GETSco								
sales@ussilt.com								1
PH: 603-225-4600 X10								1
www.ussilt.com								
	100000000000000000000000000000000000000						0.000.000	
Willacoochee Industrial	WINFAB:	WINFAB:			WINFAB:	WINFAB:	WINFAB:	WINFAB:
Fabrics, Inc.	2199	600N			2199	2199	315W	200W
PO Box 599	200W	700N	1		200W	200W	700N	315W
769 W Main St	400N	800N			315W	315W	800N	600N
Willacoochee, GA 31650	700N	1000NE			800N	400N	2x2HF	700N
	800N	1	1		1000NE	600N	1000NE	800N
www.winfabusa.com	1000NE	1	1			700N		2x2HF
		1	1			800N		1000NE
		B				1000NE		

 $^{^{\}star}$ Product is satisfactory only where the affected soil contains less than 50% material, by weight, passing the number 200 sieve.