

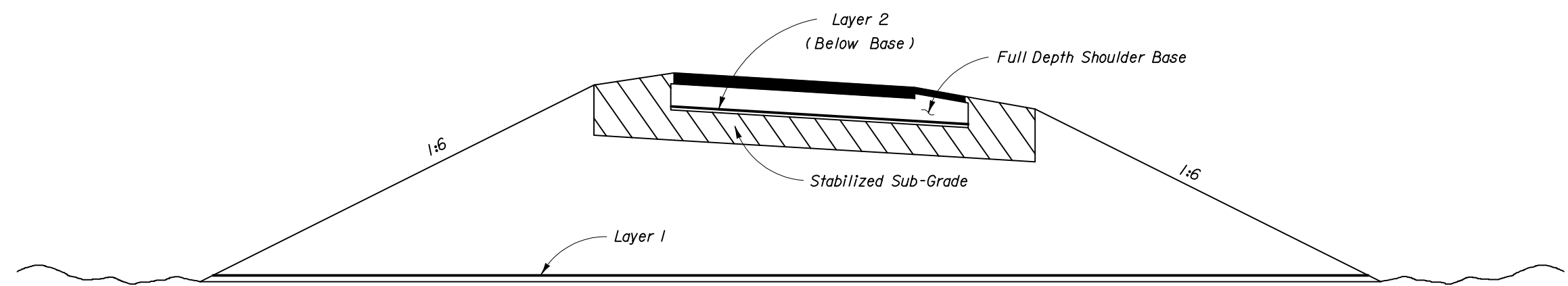
- GENERAL NOTES**
1. All Designs shall meet the requirements shown on this sheet and the contract documents.
 2. $T_a = \frac{T_{ult}}{RF_c RF_d RF_j CRF}$
 3. Intermediate reinforcement shall be rolled out parallel to slope face.

GEOSYNTHETIC REINFORCED SOIL SLOPES

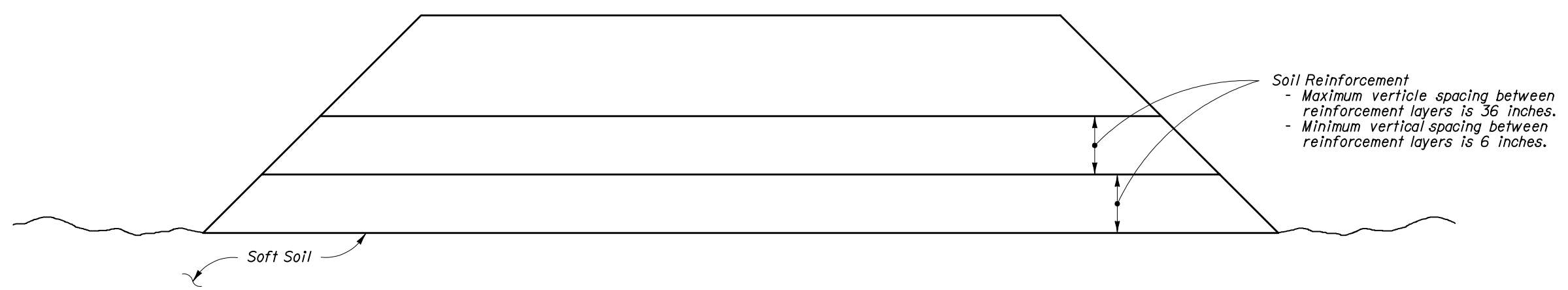
INTERIM STANDARD IN ENGLISH UNITS
 APPLICABLE TO DESIGN STANDARDS
 BOOKLET PUBLISHED IN ENGLISH UNITS.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
GEOSYNTHETIC REINFORCED SOILS		
INTERIM STANDARD	APPROVED BY <i>[Signature]</i> Roadway Design Engineer	
THIS INDEX REPLACES INDEX NO. 501 OF THE DESIGN STANDARDS, BOOKLET DATED JANUARY 2002.		
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REINFORCED EMBANKMENT



GEOSYNTHETIC REINFORCED FOUNDATIONS CONSTRUCTED ON SOFT SOILS

INTERIM STANDARD IN ENGLISH UNITS
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GEOSYNTHETIC REINFORCED SOILS		
INTERIM STANDARD	APPROVED BY <i>[Signature]</i> Roadway Design Engineer	
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TABLE OF WOVEN GEOTEXTILE VALUES

PROPERTY	REQUIRED TEST METHOD	MIRAFI HP 370	MIRAFI HP 470	MIRAFI HP 570	MIRAFI HP 670	MIRAFI HP 770	MIRAFI HS 400	MIRAFI HS 600	MIRAFI HS 800	MIRAFI HS 1150
Permittivity (0.05 sec ⁻¹ Min.)	ASTM D 4491	0.52	0.20	0.40	0.50	0.23	0.026	0.32	0.20	0.32
UV Stability (Min. Retained Strength @ 500 hr.)	ASTM D 4355	70%	70%	70%	70%	70%	70%	70%	70%	70%
Burst Strength (psi)	GRI & GSI	800	1,200	1,200	1,200	1,200	—	—	—	—
Grab Strength (lb)	ASTM D 4632	400 x 250	380 x 350	475 x 440	650 x 450	600 x 550	—	—	—	—
A.O.S. (In)	ASTM D 4751	0.0236	0.0335	0.0236	0.0335	0.0236	0.0118	0.0335	0.0335	0.0236
Tensile Strength (lb/ft)										
Machine Direction	Ultimate	3,240	3,600	4,800	6,420	7,200	4,800	7,200	9,600	13,800
	2% Ultimate	540	900	960	1,080	1,080	—	—	—	—
	5% Ultimate	1,356	1,800	2,400	2,700	3,000	1,080	2,040	3,600	4,800
Cross Direction	Ultimate	2,700	3,600	4,800	4,800	4,800	4,800	3,600	3,600	3,600
	2% Ultimate	540	1,200	1,320	1,200	1,320	—	—	—	—
	5% Ultimate	1,356	1,800	2,400	2,700	2,400	2,400	—	—	—
Strain @ Ultimate Tensile Strength (lb/ft)		14%	10%	10%	14%	12%	15%	15%	10%	12%
Secant Modulus @	2% strain	27,000	45,000	48,000	54,000	54,000	—	—	—	—
	5% strain	27,120	36,000	48,000	54,000	60,000	21,600	40,800	72,000	96,000
	10% strain	24,000	36,000	48,000	54,000	66,000	33,600	57,600	96,000	120,000
Seam Breaking Strength (lb/ft)	ASTM D 4884	1,440	1,800	3,000	3,600	1,200	2,400	2,400	2,400	2,400
Puncture Resistance (lb)	ASTM D 4833	180	170	190	200	220	—	—	—	—
Tear Strength (lb)	Machine Direction	180	130	180	250	250	—	—	—	—
	Cross Direction	110	200	180	200	400	—	—	—	—
Soil-Geosynthetic Friction	GRI & GG5, GT7	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9
Creep Resistance-T _{creep} (lb/ft)	ASTM D 5262	—	—	—	—	—	2,880	4,320	5,760	8,280
Creep Reduction Factor (T _{ult} /T _{creep})	GRI & GG3 & GT5	5.0	5.0	5.0	5.0	5.0	1.67	1.67	1.67	1.67
Installation Damage (RF _C)	Sand	1.25	1.25	1.15	1.15	1.15	1.3	1.25	1.2	1.15
	Limestone	1.5	1.5	1.35	1.35	1.35	5	3.5	1.85	1.7
Durability (RF _D)	Chemical	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
	Biological	ASTM D1987, D3083, G21 & G22	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Joint Strength (RF _J)	Mechanical	ASTM D 4595, GRI & GG4 & GT7	—	—	—	—	—	—	—	—
	Overlap *	GRI & GG5 & GT6	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Approved Application Usage		3, 4	3, 4	3, 4	3, 4	3, 4	3, 4	3, 4	3, 4	3, 4

Approved Application Usage: 1 = Steepened Slopes
 2 = Reinforcement of Foundations over Soft Soils
 3 = Both Steepened Slopes & Reinforcement of Foundations over Soft Soils
 4 = Reinforced Embankment
 5 = Construction Expedient

* Minimum 3' Overlap

**APPROVED GEOSYNTHETIC PRODUCTS
 (WOVEN GEOTEXTILES)
 APPLICATION AND PROPERTIES**

INTERIM STANDARD IN ENGLISH UNITS
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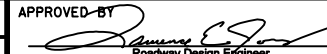
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
GEOSYNTHETIC REINFORCED SOILS		
INTERIM STANDARD	APPROVED BY 	
THIS INDEX REPLACES INDEX NO. 501 OF THE DESIGN STANDARDS, BOOKLET DATED JANUARY 2002.	REVISION NO. _____ SHEET NO. _____ INDEX NO. _____	3 of 8 0501

TABLE OF WOVEN GEOTEXTILE VALUES

PROPERTY	REQUIRED TEST METHOD	MIRAFI HS 1400	MIRAFI HS 1715	MIRAFI HS 2400	MIRAFI HS 3000	MIRAFI HS 3600	AMOCO 2006	AMOCO 2016	AMOCO 2044	COMTRAC 70/70
Permittivity (0.05 sec ⁻¹ Min.)	ASTM D 4491	0.20	0.32	0.02	0.02	0.02	0.05	0.70	0.15	0.20
UV Stability (Min. Retained Strength @ 500 hr.)	ASTM D 4355	70%	70%	70%	70%	70%	70%	70%	70%	70%
Burst Strength (psi)	GRI : GSI	—	—	—	—	—	1,000	1,000	1,500	—
Grab Strength (lb)	ASTM D 4632	—	—	—	—	—	315	315	600/500	—
A.O.S. (In)	ASTM D 4751	0.0335	0.0335	0.0118	0.0118	0.0118	0.0167	0.0167	0.0236	0.0335
Tensile Strength (lb/ft)										
Machine Direction	Ultimate	16,800	20,580	28,800	36,000	43,200	2,000	2,400	4,800	16,800
	2% Ultimate	—	—	—	—	—	156	276	456	—
	5% Ultimate	6,000	8,400	14,400	18,000	21,600	564	744	1,452	6,000
Cross Direction	Ultimate	3,600	3,600	3,600	3,600	3,600	2,000	2,400	4,800	3,600
	2% Ultimate	—	—	—	—	—	576	660	1,380	—
	5% Ultimate	—	—	—	—	—	1,004	1,404	2,604	—
Strain @ Ultimate Tensile Strength		14%	14%	10%	10%	10%	8%	8%	8%	14%
Modulus @ (lb/ft)	2% strain	—	—	—	—	—	7,800	13,800	22,800	—
	5% strain	120,000	168,000	288,000	360,000	432,000	11,280	14,880	29,040	120,000
	10% strain	120,000	162,000	288,000	360,000	432,000	10,440	12,480	31,200	120,000
Seam Breaking Strength (lb/ft)	ASTM D 4884	2,400	2,400	3,600	3,600	3,600	—	—	—	2,400
Puncture Resistance (lb)	ASTM D 4833	—	—	—	—	—	120	120	170	—
Stitch Strength (lb)	Machine Direction	—	—	—	—	—	120	120	250	—
	Cross Direction	—	—	—	—	—	120	120	250	—
Soil-Geosynthetic Friction	GRI : GG5, GT7	0.9	0.9	0.9	0.9	0.9	0.65	0.65	0.65	0.9
Creep Resistance-T _{creep} (lb/ft)	ASTM D 5262	10,080	12,348	17,280	21,600	21,600	600	685	1,371	—
Creep Reduction Factor (T _{ult} /T _{creep})	GRI : GG3 & GT5	1.67	1.67	1.67	1.67	1.67	3.5	3.5	3.5	1.67
Installation Damage (RF _C)	Sand	1.15	1.15	1.1	1.1	1.1	1.10	1.05	1.05	1.15
	Limestone	1.5	1.35	1.25	1.25	1.25	1.20	1.20	1.10	1.5
Durability (RF _D)	Chemical	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
	Biological	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Joint Strength (RF _J)	Mechanical	—	—	—	—	—	—	—	—	—
	Overlap *	1.0	1.0	1.0	1.0	1.0	1.2	1.2	1.2	1.0
Approved Application Usage		3, 4	3, 4	3, 4	3, 4	3, 4	3	3	3	3

Approved Application Usage: 1 = Steepened Slopes
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* Minimum 3' Overlap

**APPROVED GEOSYNTHETIC PRODUCTS
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INTERIM STANDARD IN ENGLISH UNITS
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STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
GEOSYNTHETIC REINFORCED SOILS		
INTERIM STANDARD	APPROVED BY 	
THIS INDEX REPLACES INDEX NO. 501 OF THE DESIGN STANDARDS, BOOKLET DATED JANUARY 2002.		
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TABLE OF WOVEN GEOGRID VALUES

PROPERTY	REQUIRED TEST METHOD	MIRAFI MG 2XT	MIRAFI MG 3XT	MIRAFI MG 5XT (Matrex 30)	MIRAFI MG 7XT	MIRAFI MG 8XT	MIRAFI MG 10XT (Matrex 60)	MIRAFI MG 18XT (Matrex 90)	MIRAFI MG 20XT (Matrex 120)	MIRAFI MG 22XT (Matrex 180)	MIRAFI MG 24XT (Matrex 240)	
UV Stability (Min. Retained Strength @ 500 hr.)	ASTM D 4355	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	
Tensile Strength (lb/ft)	ASTM D 6637	Ultimate	2,000	2,800	3,590	4,350	6,230	8,300	9,360	12,420	17,760	25,380
		2% Ultimate	—	—	—	—	—	—	—	—	—	—
		5% Ultimate	1,200	1,056	1,740	2,160	2,520	3,120	4,400	5,340	7,140	10,020
		Ultimate	2,000	—	—	—	—	—	—	—	—	—
		2% Ultimate	—	—	—	—	—	—	—	—	—	—
		5% Ultimate	—	—	—	—	—	—	—	—	—	—
Strain @ Ultimate Tensile Strength	ASTM D 6637	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	
		2% strain	—	—	—	—	—	—	—	—	—	—
		5% strain	—	21,120	34,800	43,200	50,400	62,400	88,800	106,800	142,800	200,400
10% strain	—	—	—	—	—	—	—	—	—	—		
Junction Strength (lb/ft)	GRI # GG2	—	—	—	—	—	—	—	—	—	—	
Soil- Geosynthetic Friction	GRI # GG5, GT7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	
Creep Resistance - T_{creep} (lb/ft)	ASTM D 5262	1,200	1,680	2,154	2,610	3,738	4,980	5,616	7,221	10,326	14,756	
Creep Reduction Factor (T_{ult} / T_{creep})	GRI # GG3 & GT5	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	
Installation Damage (RF _E)	Sand	GRI # GG4 & GT7	1.25	1.20	1.15	1.15	1.15	1.1	1.1	1.1	1.1	1.1
	Limestone	Not Permitted	1.75	1.3	1.3	1.3	1.3	1.25	1.25	1.25	1.25	1.25
Durability (RF _D)	Chemical	ASTM D 5322	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	
	Biological	ASTM D1987, D3083, G21 & G22	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Joint Strength (RF _J)	Mechanical	ASTM D 6637, GRI # GG4 & GT7	—	—	—	—	—	—	—	—	—	
	Overlap *	GRI # GG5 & GT6	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	
Approved Application Usage		3	3	3	3	3	3	3	3	3	3	

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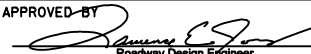
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TABLE OF WOVEN GEOGRID VALUES

PROPERTY	REQUIRED TEST METHOD	SYNTEEN SF 20	SYNTEEN SF 35	SYNTEEN SF 40	SYNTEEN SF 50	SYNTEEN SF 55	SYNTEEN SF 80	SYNTEEN SF 110	Raugrid 3/3	Raugrid 4/2	Raugrid 6/3	Raugrid 8/3	Raugrid 10/3	
UV Stability (Min. Retained Strength @ 500 hr.)	ASTM D 4355	70%	70%	70%	70%	70%	70%	70%	95%	95%	95%	95%	95%	
Tensile Strength (lb/ft)	ASTM D 6637													
Machine Direction		Ultimate	1,672	2,627	3,050	3,731	3,774	5,583	7,462	2,233	2,843	4,350	5,288	6,590
		2% Ultimate	370	462	488	791	736	1,016	1,186	—	—	—	—	—
		5% Ultimate	670	725	970	922	1,159	1,273	1,684	712	767	1,144	1,165	1,582
Cross Direction		Ultimate	1,630	2,556	3,050	3,933	2,499	2,206	2,179	2,213	1,459	1,959	2,089	2,192
		2% Ultimate	370	399	430	630	604	882	1,274	—	—	—	—	—
	5% Ultimate	670	583	765	815	796	1,563	1,581	541	356	452	507	521	
Strain @ Ultimate Tensile Strength	ASTM D 6637	9.4%	14.1%	9.9%	14.2%	11.5%	13.9%	18.8%	10.8%	11.8%	13.1%	12.2%	11.5%	
Secant Modulus @ (lb/ft)		2% strain	18,494	23,114	24,408	39,551	36,799	50,807	59,298	—	—	—	—	—
		5% strain	13,397	14,499	19,404	18,432	23,174	25,459	33,712	—	—	—	—	—
		10% strain	15,206	15,234	22,089	18,432	27,137	37,910	27,380	—	—	—	—	—
Junction Strength (lb/ft)	GRI : GG2	—	—	—	—	—	—	—	N/A	100%	100%	100%	100%	
Soil- Geosynthetic Friction	GRI : GG5, GT7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	
Creep Resistance- T_{creep} (lb/ft)	ASTM D 5262	1,005	1,523	1,525	2,201	2,265	3,182	4,029	1,466	1,870	2,862	3,479	4,335	
Creep Reduction Factor (T_{ult} / T_{creep})	GRI : GG3 & GT5	1.66	1.73	2.00	1.70	1.67	1.75	2.02	1.52	1.52	1.52	1.52	1.52	
Installation Damage (RF _G)	Sand	GRI : GG4 & GT7	1.05	1.15	1.15	1.08	1.08	1.08	1.08	1.10	1.10	1.10	1.10	1.10
	Limestone		1.75	1.70	1.60	1.55	1.55	1.55	1.35	1.17	1.17	1.17	1.17	1.17
Durability (RF _D)	Chemical	ASTM D 5322	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.15	1.15	1.15	1.15	
	Biological	ASTM D1987, D3083, G21 & G22	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.15	1.15	1.15	1.15	
Joint Strength (RF _J)	Mechanical	ASTM D 6637, GRI : GG4 & GT7	—	—	—	—	—	—	—	—	—	—	—	
	Overlap *	GRI : GG5 & GT6	1.10	1.10	1.10	1.10	1.10	1.10	1.10	—	—	—	—	
Approved Application Usage		3	3	3	3	3	3	3	2, 5	2, 5	2, 5	2, 5	2, 5	

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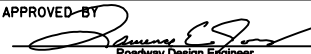
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TABLE OF EXTRUDED GEOGRID VALUES									
PROPERTY	REQUIRED TEST METHOD	TENSAR BX 4100	TENSAR BX 4120	TENSAR BX 4200	TENSAR BX 4220	TENSAR BX 1100	TENSAR BX 1200	TENSAR BX 1500	
UV Stability (Min. Retained Strength @ 500 hr.)	ASTM D 4355	—	90%	—	90%	90%	90%	90%	
Tensile Strength (lb/ft)	ASTM D 6637								
Machine Direction		Ultimate	860	860	1,270	1,270	850	1,315	1,790
		2% Ultimate	240	240	370	370	280	410	580
		5% Ultimate	480	480	705	705	580	810	1,200
Cross Direction		Ultimate	875	875	1,370	1,370	1,300	1,975	2,055
		2% Ultimate	300	300	500	500	450	670	685
	5% Ultimate	635	635	960	960	920	1,360	1,370	
Strain @ Ultimate Tensile Strength	ASTM D 6637	10%	10%	10%	10%	10%	10%	10%	
Secant Modulus @ (lb/ft)		2% strain	11,995	11,995	18,506	18,506	14,000	20,500	29,000
		5% strain	9,596	9,596	14,092	14,092	11,600	16,200	27,400
		10% strain	—	—	—	—	—	—	—
Junction Strength (lb/ft)	GRI # GG2	90%	90%	90%	90%	93%	93%	93%	
Soil- Geosynthetic Friction	GRI # GG5, GT7	—	0.90	0.95	0.95	0.90	0.90	0.90	
Creep Resistance- T_{creep} (lb/ft)	ASTM D 5262	250	250	420	420	180/280	255/555	470/575	
Creep Reduction Factor (T_{ult} / T_{creep})	GRI # GG3 & GT5	3.5	3.5	3.27	3.27	2.07	1.61	2.09	
Installation Damage (RF _C)	Sand	GRI # GG4 & GT7	1.10	1.10	1.10	1.10	1.10	1.10	1.10
	Limestone		1.43	1.43	1.35	1.35	1.35	1.35	1.35
Durability (RF _D)	Chemical	ASTM D 5322	1.1	1.1	1.1	1.1	1.1	1.1	1.1
	Biological	ASTM D1987, D3083, G21 & G22	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Joint Strength (RF _J)	Mechanical	ASTM D 6637, GRI # GG4 & GT7	—	—	—	—	—	—	—
	Overlap *	GRI # GG5 & GT6	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Approved Application Usage		2, 4, 5	3, 4, 5	2, 4, 5	3, 4, 5	3, 4, 5	3, 4, 5	3, 4, 5	

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 (EXTRUDED GEOGRID)
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 APPLICABLE TO DESIGN STANDARDS
 BOOKLET PUBLISHED IN ENGLISH UNITS.

Date: 07-01-03


STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
GEOSYNTHETIC REINFORCED SOILS		
INTERIM STANDARD	APPROVED BY 	
THIS INDEX REPLACES INDEX NO. 501 OF THE DESIGN STANDARDS, BOOKLET DATED JANUARY 2002.		
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TABLE OF EXTRUDED GEOGRID VALUES

PROPERTY		REQUIRED TEST METHOD	TENSAR UX 1400 HS UX 1400 MSE UX MESA 3	TENSAR UX 1500 HS UX 1500 MSE UX MESA 4	TENSAR UX 1600 HS UX 1600 MSE UX MESA 5	TENSAR UX 1700 HS UX 1700 MSE UX MESA 6	TENAX MS 220	TENAX MS 330
UV Stability (Min. Retained Strength @ 500 hr.)		ASTM D 4355	90%	90%	90%	90%	85%	85%
Tensile Strength (lb/ft)		ASTM D 6637						
Machine Direction	Ultimate		4,790	7810	9,860	11,980	925	1,370
	2% Ultimate		1,400	1,850	2,330	2,740	300	418
	5% Ultimate		2,430	3,560	3,980	5,440	615	925
Cross Direction	Ultimate		—	—	—	—	1,400	2,100
	2% Ultimate		—	—	—	—	445	616
	5% Ultimate	—	—	—	—	890	1,340	
Strain @ Ultimate Tensile Strength		ASTM D 6637	10%	10%	10%	10%	12%	12%
Secant Modulus @ (lb/ft)	2% strain		55,000	92,500	116,500	137,000	15,000	20,900
	5% strain		42,600	71,200	79,600	102,800	12,330	18,500
	10% strain		—	—	—	—	—	—
Junction Strength (lb/ft)		GRI # GG2	90%	90%	90%	90%	835	1,230
Soil- Geosynthetic Friction		GRI # GG5, GT7	0.462	0.462	0.462	0.462	—	—
Creep Resistance- T_{creep} (lb/ft)		ASTM D 5262	1,970	3,000	3,960	4,975	—	—
Creep Reduction Factor (T_{ult} / T_{creep})		GRI # GG3 & GT5	2.43	2.60	2.49	2.41	5.0	5.0
Installation Damage (RF _D)	Sand	GRI # GG4 & GT7	1.10	1.10	1.10	1.10	3.0	3.0
	Limestone		1.20	1.20	1.20	1.20	3.0	3.0
Durability (RF _D)	Chemical	ASTM D 5322	1.1	1.1	1.1	1.1	2.0	2.0
	Biological	ASTM D1987, D3083, G21 & G22	1.0	1.0	1.0	1.0	2.0	2.0
Joint Strength (RF _J)	Mechanical	ASTM D 6637, GRI # GG4 & GT7	1.0	1.0	1.0	1.0	—	—
	Overlap *	GRI # GG5 & GT6	1.0	1.0	1.0	1.0	—	—
Approved Application Usage			3	3	3	3	2	2

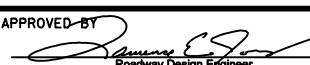
Approved Application Usage: 1 = Steepened Slopes
 2 = Reinforcement of Foundations over Soft Soils
 3 = Both Steepened Slopes & Reinforcement of Foundations over Soft Soils
 4 = Reinforced Embankment
 5 = Construction Expedient

* Minimum 3' Overlap

**APPROVED GEOSYNTHETIC PRODUCTS
 (EXTRUDED GEOGRID)
 APPLICATION AND PROPERTIES**

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