



SGI TESTING SERVICES

A Georgia Limited Liability Company

12 August 2024

Mr. Mike Orton
SRW Products, Inc.
P.O. Box 70
Princeton, MN 55371

Subject: Laboratory Test Results Transmittal
Connection Strength Testing
SRW-3, 5, 7, 9, and 11 Geogrids Connected to ShoreLoc Blocks

Dear Mr. Orton,

SGI Testing Services, LLC (SGI) is pleased to present the attached test results for the above-mentioned testing program. The note section below addresses sample preparation, sample disposal and a disclosure statement.

SGI appreciates the opportunity to provide laboratory testing services to SRW Products, Inc.. Should you have any questions regarding the attached document(s), or if you require additional information, please do not hesitate to contact the undersigned.

Sincerely,

Seungcheol Yeom, Ph.D.
Laboratory Manager

Zehong Yuan, Ph.D., P.E.
President

Attachments

NOTES:

- (1) Unless otherwise noted in the test results the sample(s)/specimen(s) were prepared in accordance with the applicable test standards or generally accepted sampling procedures.
- (2) Materials that are not contaminated will be discarded after test specimens and archived specimens are obtained. Archived specimens will be discarded 30 days after the completion of the testing program, unless long-term storage arrangements are specifically made with SGI.
- (3) The reported results apply only to the materials and test conditions used in the laboratory testing program. The results do not necessarily apply to other materials or test conditions. The test results should not be used in engineering analysis unless the test conditions model the anticipated field conditions. The testing was performed in accordance with general engineering testing standards and requirements. The reported results are submitted for the exclusive use of the client to whom they are addressed.

SGI24036.REPORT.2024.01

ATTACHMENT A

GRAIN-SIZE CURVE OF AASHTO #57 STONE, AND CONNECTION TEST SETUP PHOTO

**THE #57 STONE USED IN THIS TESTING PROGRAM WAS MANUFACTURED
BY CRUSHING GRANITE ROCK
BY VULCAN MATERIALS COMPANY
NORCROSS QUARRY IN GEORGIA**



SGI Testing Services, LLC

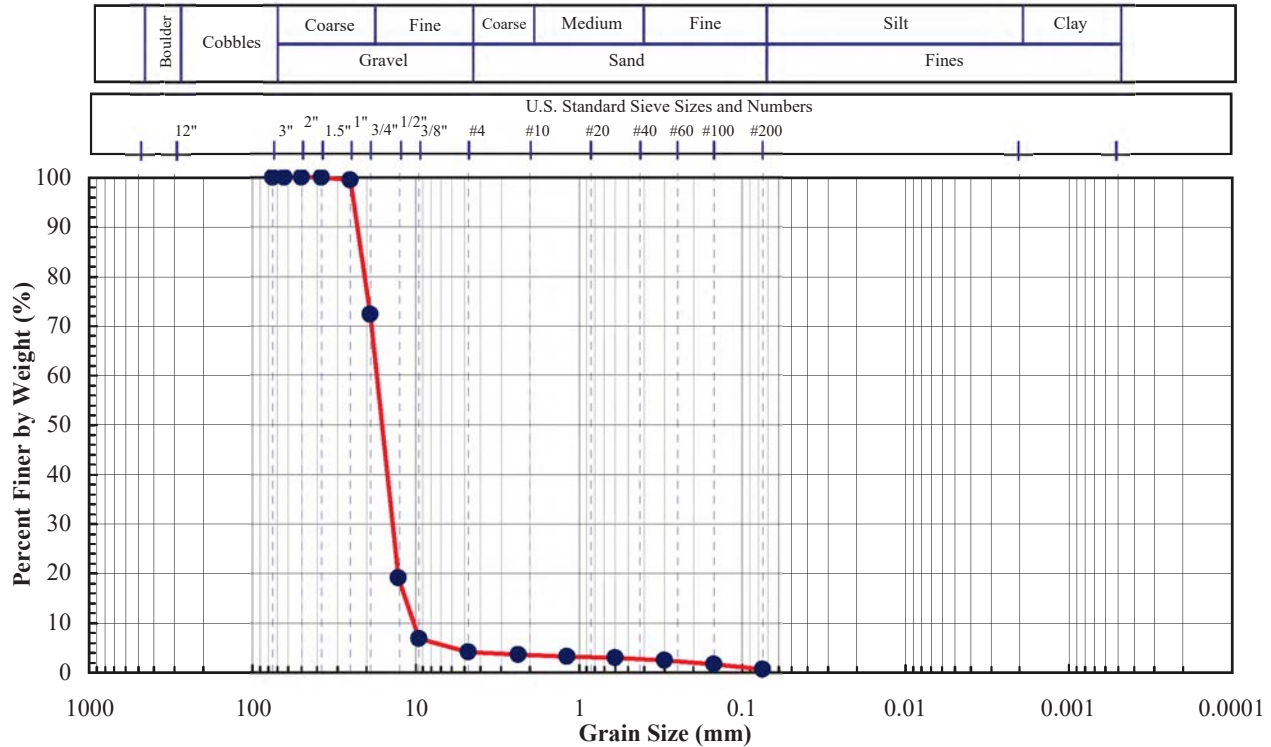
4405 International Blvd., Suite B-117, Norcross, GA 30093
 Ph: (770) 931-8222 Fax: (770) 931-8240

Project Name: SRW TESTING
 Project No: SGI24052
 Client Sample ID: AASHTO #57 Stone
 Lab Sample No: SGIGP

ASTM D 2216, D 1140, D 422,
 C 136, D 4318, D 2487

SOIL INDEX PROPERTIES

Moisture Content, Grain Size, Atterberg
 Limits, Classification

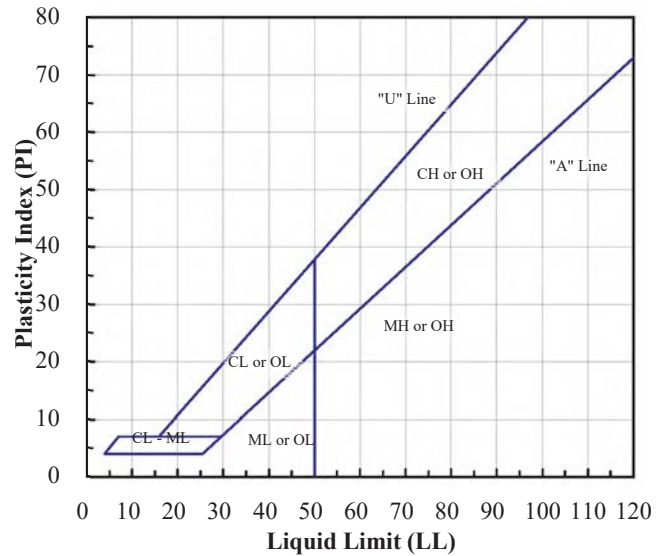


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	99.5
3/4"	19	72.3
1/2"	12.5	19.2
3/8"	9.5	6.8
#4	4.75	4.1
#8	2.36	3.6
#16	1.180	3.2
#30	0.600	3.0
#50	0.300	2.5
#100	0.150	1.7
#200	0.075	0.7

Hydrometer Particle Diameter (mm)	% Finer
0.0340	
0.0220	
0.0064	
0.0032	
0.0013	

Gravel (%):	95.9
Sand (%):	3.4
Fines (%):	0.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	1.7
Coeff. Curv. (Cc):	1.1



Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (%)	PL (%)	PI (-)	
AASHTO #57 Stone	SGIGP		0.7				GP



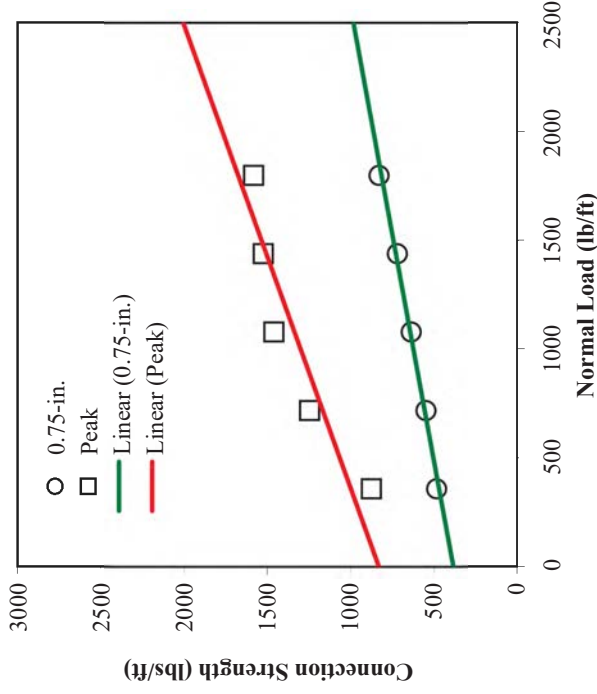
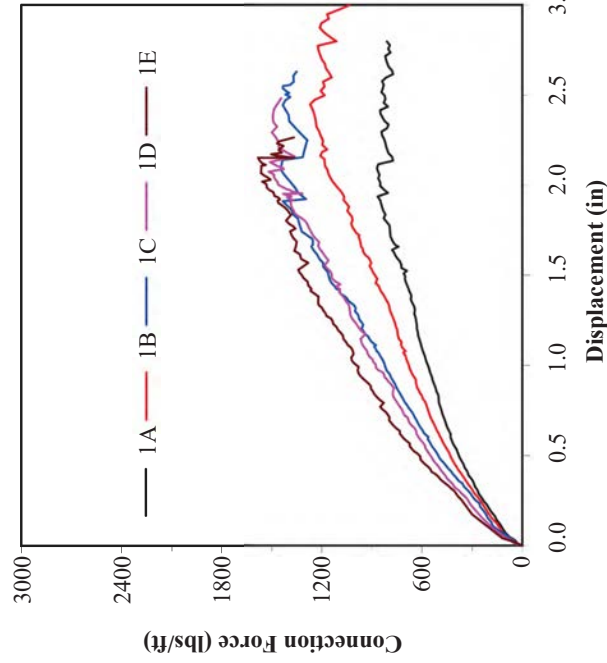
Figure A-2. SF20 geogrid / ShoreLoc block connection test setup.

ATTACHMENT B

SUMMARY OF CONNECTION TEST RESULTS

**SRW PRODUCTS
CONNECTION STRENGTH TESTING (ASTM D 6638)**

TEST SERIES NO. 1: SRW-3 geogrid in MD between two courses of ShoreLoc blocks with AASHTO #57 stone compacted in block cores and spaces between blocks



Test No.	Geogrid Specimen Width W (in.)	Test Normal Stress σ_n (psi)	Equivalent Normal Load N (lb/ft)	Approximate No. of Blocks n	Approximate Wall Height h (ft)	0.75-in. Strength $T_{0.75-in}$ (lb/ft)	Peak Strength T_{peak} (lb/ft)	Connection Strength Equations (Strength assumed to be linearly related to N)
1A	34.0	2.5	360	5	3.0	483	876	$T_{0.75-in.} = 385 + (N) \tan (13^\circ)$
1B	34.0	5.0	720	9	6.0	548	1246	
1C	34.0	7.5	1080	14	9.0	637	1459	
1D	34.0	10.0	1440	18	12.0	718	1523	$T_{peak} = 830 + (N) \tan (25^\circ)$
1E	34.0	12.5	1800	23	15.0	829	1582	

NOTES:

Nominal Dimensions of Block:

18" wide x 12" deep x 8" high

73 lbs

120 pcf.

Average Unit Weight of Facing:

Abrasion and rupture of geogrid ribs in each test.

Failure Mode:

DATE REPORTED: 8/12/2024

FIGURE NO. B-1

PROJECT NO. SGI24036

DOCUMENT NO.

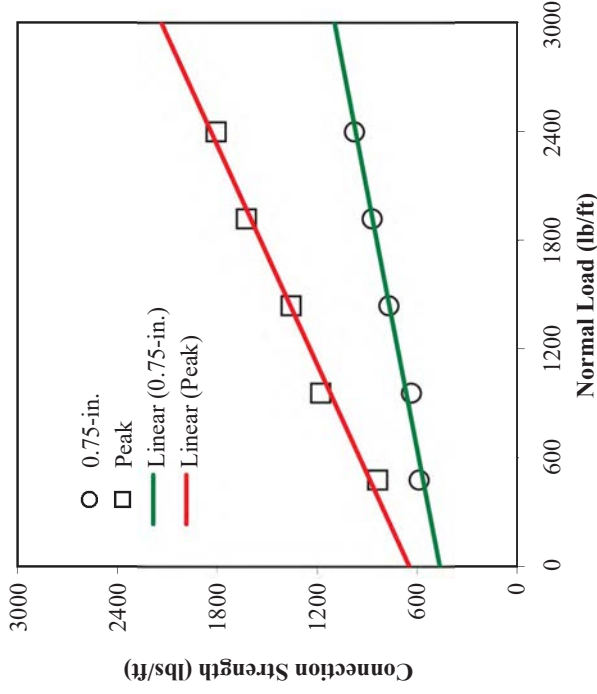
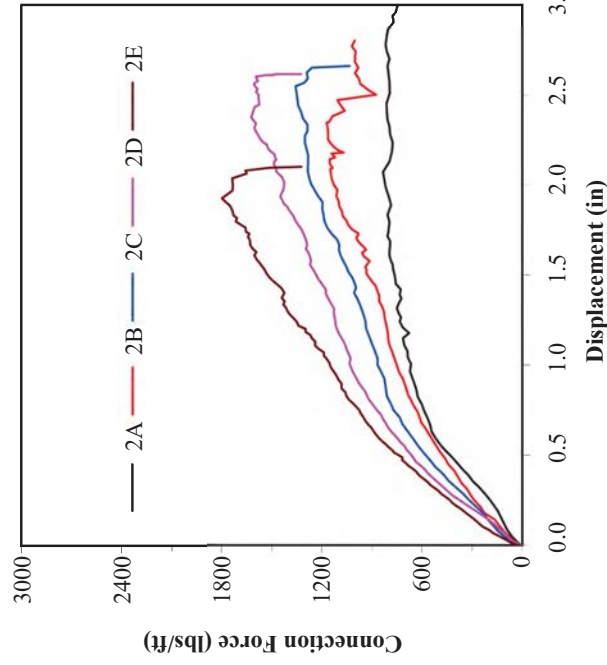
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**SRW PRODUCTS
CONNECTION STRENGTH TESTING (ASTM D 6638)**

TEST SERIES NO. 2: SRW-5 geogrid in MD between two courses of ShoreLoc blocks with AASHTO #57 stone compacted in block cores and spaces between blocks



Test No.	Geogrid Specimen Width W (in.)	Test Normal Stress σ_n (psi)	Equivalent Normal Load N (lb/ft)	Approximate No. of Blocks n	Approximate Wall Height h (ft)	0.75-in. Strength $T_{0.75-in}$ (lb/ft)	Peak Strength T_{peak} (lb/ft)	Connection Strength Equations (Strength assumed to be linearly related to N)
2A	34.0	3.3	480	6	4.0	588	837	$T_{0.75-in.} = 465 + (N) \tan (12^\circ)$ $T_{peak} = 645 + (N) \tan (26^\circ)$
2B	34.0	6.7	960	12	8.0	634	1179	
2C	34.0	10.0	1440	18	12.0	770	1356	
2D	34.0	13.3	1920	24	16.0	870	1623	
2E	34.0	16.7	2400	30	20.0	975	1805	

NOTES:

Nominal Dimensions of Block: 18" wide x 12" deep x 8" high
 Weight of Full-Size Block: 73 lbs
 Average Unit Weight of Facing: 120 pcf.
 Failure Mode: Abrasion and rupture of geogrid ribs in each test.

DATE REPORTED: 8/12/2024

FIGURE NO. B-2

PROJECT NO. SGI24036

DOCUMENT NO.

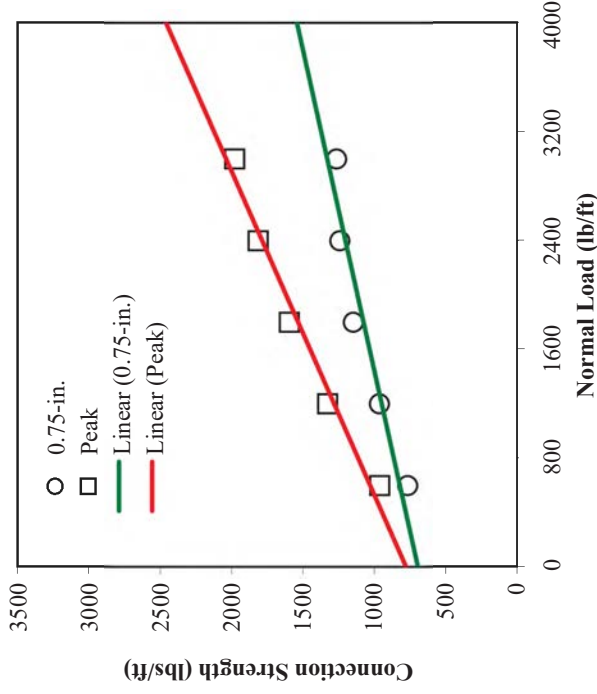
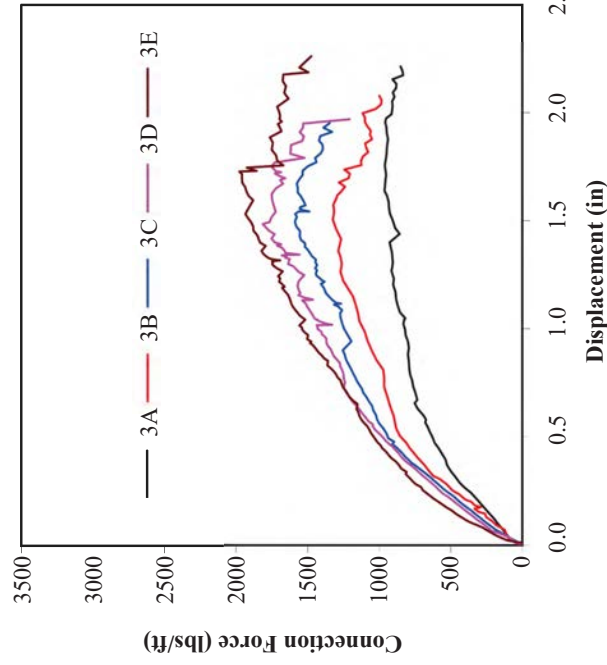
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**SRW PRODUCTS
CONNECTION STRENGTH TESTING (ASTM D 6638)**

TEST SERIES NO. 3: SRW-7 geogrid in MD between two courses of ShoreLoc blocks
AASHTO #57 stone compacted in block cores and spaces between blocks



Test No.	Geogrid Specimen Width W (in.)	Test Normal Stress σ_n (psi)	Equivalent Normal Load N (lb/ft)	Approximate No. of Blocks n	Approximate Wall Height h (ft)	0.75-in. Strength $T_{0.75-in}$ (lb/ft)	Peak Strength T_{Peak} (lb/ft)	Connection Strength Equations (Strength assumed to be linearly related to N)
3A	34.0	4.2	600	8	5.0	768	962	$T_{0.75-in.} = 695 + (N) \tan (12^\circ)$ $T_{Peak} = 780 + (N) \tan (23^\circ)$
3B	34.0	8.3	1200	15	10.0	966	1327	
3C	34.0	12.5	1800	23	15.0	1148	1594	
3D	34.0	16.7	2400	30	20.0	1241	1814	
3E	34.0	20.8	3000	38	25.0	1265	1978	

NOTES:

- Nominal Dimensions of Block: 18" wide x 12" deep x 8" high
- Weight of Full-Size Block: 73 lbs
- Average Unit Weight of Facing: 120 pcf.
- Failure Mode: Abrasion and rupture of geogrid ribs in each test.

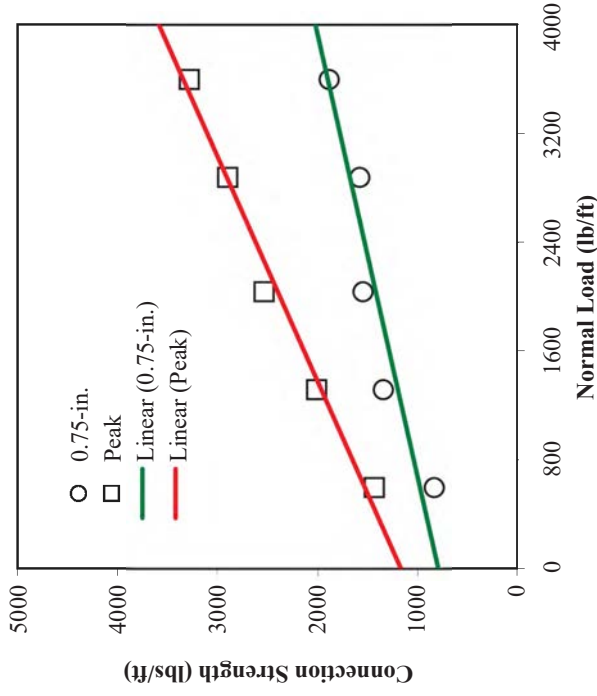
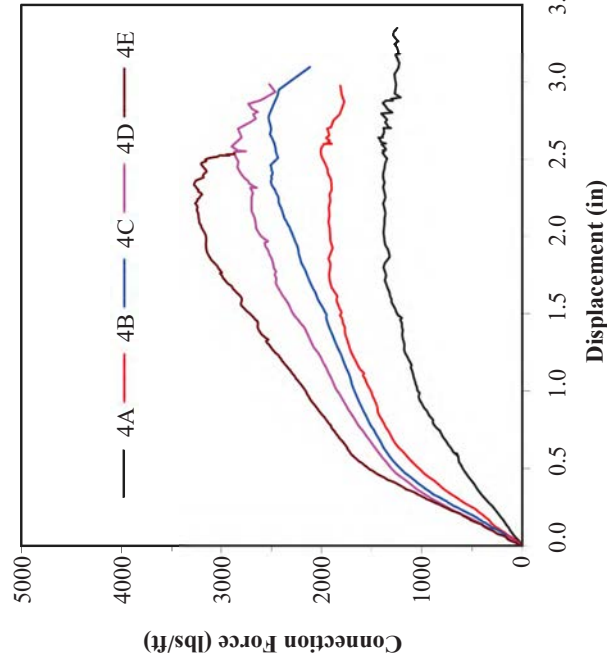
DATE REPORTED: 8/12/2024
 FIGURE NO. B-3
 PROJECT NO. SGI24036
 DOCUMENT NO.
 FILE NO.



SGI TESTING SERVICES, LLC

**SRW PRODUCTS
CONNECTION STRENGTH TESTING (ASTM D 6638)**

TEST SERIES NO. 4: SRW-9 geogrid in MD between two courses of ShoreLoc blocks
AASHTO #57 stone compacted in block cores and spaces between blocks



Test No.	Geogrid Specimen Width W (in.)	Test Normal Stress σ_n (psi)	Equivalent Normal Load N (lb/ft)	Approximate No. of Blocks n	Approximate Wall Height h (ft)	0.75-in. Strength $T_{0.75-in}$ (lb/ft)	Peak Strength T_{peak} (lb/ft)	Connection Strength Equations (Strength assumed to be linearly related to N)
4A	34.0	4.2	600	8	5.0	834	1433	$T_{0.75-in.} = 795 + (N) \tan (17^\circ)$ $T_{peak} = 1170 + (N) \tan (31^\circ)$
4B	34.0	9.2	1320	17	11.0	1343	2009	
4C	34.0	14.2	2040	26	17.0	1544	2531	
4D	34.0	20.0	2880	36	24.0	1579	2895	
4E	34.0	25.0	3600	45	30.0	1884	3277	

NOTES:

Nominal Dimensions of Block:

18" wide x 12" deep x 8" high

73 lbs

120 pcf.

Average Unit Weight of Facing:

Abrasion and rupture of geogrid ribs in each test.

Failure Mode:

DATE REPORTED: 8/12/2024

FIGURE NO. B-4

PROJECT NO. SGI24036

DOCUMENT NO.

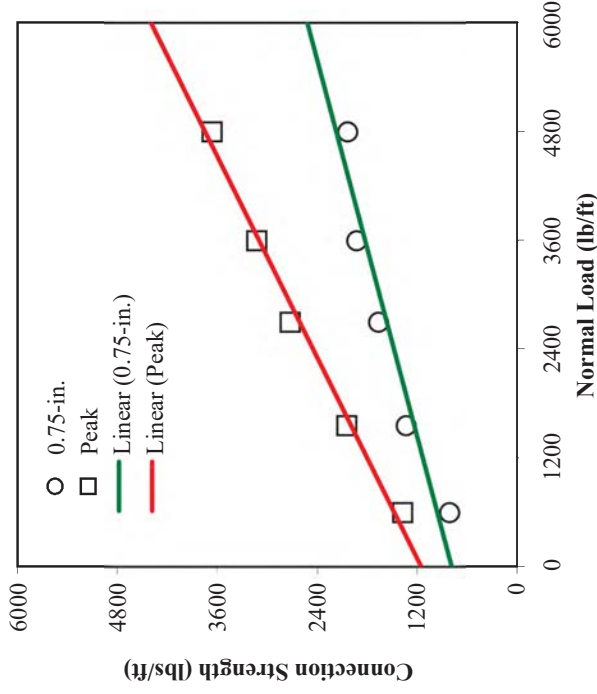
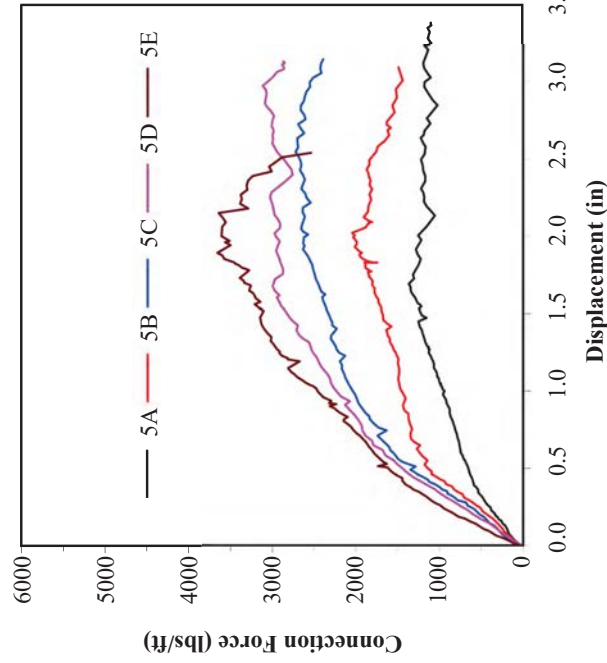
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SRW PRODUCTS CONNECTION STRENGTH TESTING (ASTM D 6638)

TEST SERIES NO. 5: SRW-11 geogrid in MD between two courses of ShoreLoc blocks
AASHTO #57 stone compacted in block cores and spaces between blocks



Test No.	Geogrid Specimen Width W (in.)	Test Normal Stress σ_n (psi)	Equivalent Normal Load N (lb/ft)	Approximate No. of Blocks n	Approximate Wall Height h (ft)	0.75-in. Strength $T_{0.75-in}$ (lb/ft)	Peak Strength T_{peak} (lb/ft)	Connection Strength Equations (Strength assumed to be linearly related to N)
5A	34.0	4.2	600	8	5.0	811	1371	$T_{0.75-in.} = 785 + (N) \tan (16^\circ)$ $T_{peak} = 1150 + (N) \tan (28^\circ)$
5B	34.0	10.8	1560	20	13.0	1332	2044	
5C	34.0	18.8	2700	34	22.5	1661	2723	
5D	34.0	25.0	3600	45	30.0	1925	3122	
5E	34.0	33.3	4800	60	40.0	2032	3658	

NOTES:

- Nominal Dimensions of Block: 18" wide x 12" deep x 8" high
- Weight of Full-Size Block: 73 lbs
- Average Unit Weight of Facing: 120 pcf.
- Failure Mode: Abrasion and rupture of geogrid ribs in each test.

DATE REPORTED: 8/12/2024

FIGURE NO. B-5

PROJECT NO. SGI24036

DOCUMENT NO.

FILE NO.



SGI TESTING SERVICES, LLC