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STONE LABORATORY TEST REPORT

Report No.: 26-0064.01-R0
Test Date(s): 06/03/26 – 06/11/26
Report Date: 06/11/26
Retention Date: 06/11/30

Prepared for: David Carulla
Russell Stone Products
2640 Greenville Pike
Grampian, PA 16838

Product: Natural Sandstone Products (Trade Names: Bloom Run, Roaring Run)

Scope: The Natural Stone Institute (NSI) was contracted by Russell Stone Products to perform physical properties evaluations for natural quartzitic sandstone products. The scope of testing completed included Absorption, Density, Compressive Strength, Modulus of Rupture Flexural Strength, and Abrasion Resistance. All testing was performed at the NSI test laboratory located in Oberlin, Ohio.

Methods: The products were evaluated in accordance with the following test method(s):

ASTM C97/C97M-25, *Standard Test Method for Absorption and Bulk Specific Gravity of Dimension Stone*

ASTM C170/C170M-24a, *Standard Test Method for Compressive Strength of Dimension Stone*

ASTM C99/C99M-25, *Standard Test Method for Modulus of Rupture of Dimension Stone*

ASTM C880/C880M-25, *Standard Test Method for Flexural Strength of Dimension Stone*

ASTM C1353/C1353M-20e1, *Standard Test Method for Abrasion Resistance of Dimension Stone Subjected to Foot Traffic Using a Rotary Platform Abraser*

ASTM C616/C616M-22, *Standard Specification for Quartz-Based Dimension Stone*

Test Materials: The test specimens were provided by Russell Stone Products and were received on 06/01/26 and 06/08/09 in good condition for testing. The stone was represented as being natural quartzitic sandstone representative of two product tonal variations from the same sourcing with distinct trade names (Bloom Run, Roaring Run). All specimens were tested as received other than preconditioning as required by the applicable test method(s) prior to testing. Representative test materials shall be retained by the NSI for a period of four years.

Test Witness Record

Name	Company
Clint Eads	NSI
Scott Scallorn	NSI
Carmen Taran	NSI
Jeffrey Terleckyj	NSI

Test Procedure(s): Unless otherwise stated, all specimen conditioning and testing were conducted in standard laboratory conditions. Test photos are located on pages 14-17 of this report. Equipment calibration certificates are available upon request.

ASTM C97 - Absorption and Density Evaluation

The absorption and density evaluations were conducted in accordance with the procedures detailed in ASTM C97. The specimens were dried in a ventilated oven maintained at 60°C (ICN: NSI00012) to a stable mass condition (minimum 48 hours), reacclimated to ambient lab temperature and weighed on an Ohaus digital balance (ICN: NSI00022) for determination of dry condition mass. They were then immersed in a water bath maintained at 22°C temperature (verified by a Thermometer (ICN: NSI00038) for 48 hours prior to individual specimen removal, surface drying and determination of wet condition mass. The specimens were then suspended in the water within a wire cage and weighed for determination of immersed condition mass. Absorption (%) and bulk specific gravity were calculated for each specimen as per the equations in ASTM C97, Section 9. Test results were averaged for the test series and evaluated against the performance criteria presented in ASTM C616, Table 1.

ASTM C170 – Compressive Strength Evaluation

The compressive strength evaluation was conducted on a Test Mark compression tester (ICN: NSI00001) in accordance with the procedures detailed in ASTM C170. Pretest specimen dimensions were measured with a 6" x 0.0005" Digital Caliper (ICN: NSI00008). Specimens were tested in both oven-dry and wet conditions. Dry condition specimens were oven-dried at 60°C for a minimum of 48 hours and cooled to ambient prior to testing. Wet condition specimens were immersed in water for 48 hours prior to individual removal and testing. Compressive strength was calculated for each specimen as per the equation in ASTM C170, Section 10.1. Test results were averaged for each test series and evaluated against the performance criteria presented in ASTM C616, Table 1.

ASTM C99 – Modulus of Rupture Evaluation

The Modulus of Rupture (MoR) evaluation was conducted on an ATS Universal Test Machine (ICN: NSI00003) employing a 12.5-kip load cell (ICN: NSI00004) in accordance with the procedures detailed in ASTM C99. Pretest specimen dimensions were measured with a 6" x 0.0005" Digital Caliper (ICN: NSI00008). Specimens were tested in both oven-dry and wet condition. Dry condition specimens were oven-dried at 60°C for a minimum of 48 hours and cooled to ambient prior to testing. Wet condition specimens were immersed in water for 48 hours prior to individual removal and testing. Specimens were supported at a test span of 7.0 in. and loaded at midspan until failure. Flexural strength was calculated for each specimen as per the equation in ASTM C99, Section 11.1. Test results were averaged for each test series and evaluated against the performance criteria presented in ASTM C616, Table 1.

ASTM C880 – Flexural Strength

The Flexural strength evaluation was conducted on an ATS Universal Test Machine (ICN: NSI00006) employing a 5.0-kip load cell (ICN: NSI00007) in accordance with the procedures detailed in ASTM C880. Pretest specimen dimensions were measured with a 6" x 0.0005" Digital Caliper (ICN: NSI00008). Specimens were tested in both oven-dry and wet conditions. Dry condition specimens were oven-dried at 60°C for a minimum of 48 hours and cooled to ambient prior to testing. Wet condition specimens were immersed in water for 48 hours prior to individual removal and testing. Specimens were supported at a test span of 12.5 in. and loaded at quarter point (6.25 in. loading span) until failure. Flexural strength was calculated for each specimen as per the equation in ASTM C880, Section 10.1. Test results were averaged for each test series.

ASTM C1353 – Abrasion Resistance Evaluation

The abrasion resistance evaluation was conducted in accordance with the procedures detailed in ASTM C1353. The specimens were oven-dried at 60°C for a minimum of 48 hours and cooled prior to determination of pre-abrasion mass on an Ohaus digital balance (ICN: NSI00022) The specimens were then evaluated on a Taber Industries rotary platform abraser (ICN: NSI00024) employing H-22 Calibrade abrasive wheels with 1,000 grams of downward force applied to each for a total of 1000 wear cycles. Upon completion of cycling, post-exposure mass was determined for each specimen. Employing the bulk specific gravity results obtained from ASTM C97 evaluation, Index of Abrasion was calculated for each specimen as per the equation in ASTM C1353, Section 9.1. Test results were averaged for the series and evaluated against the performance criteria presented in ASTM C616, Table 1.

Specimen Details

Test Method	Quantity	Nominal Dimensions	Description
ASTM C97	5 Total	2.25 in. cubes (60 mm)	Bloom Run: pale buff/grey tone natural sandstone with and intermittent darker veining. Roaring Run deep buff/grey tone natural sandstone with elements in shades of brown, buff, tan, beige, pink, and cream with abundant darker veining.
ASTM C170	20 Total Perpendicular, Wet: 5 Perpendicular, Dry 5 Parallel, Wet: 5 Parallel, Wet: 5		
ASTM C99	20 Total Perpendicular, Wet: 5 Perpendicular, Dry 5 Edge, Wet: 5 Edge, Wet: 5	4.0 in. x 8.0 in. x 2.25 in. (100 mm x 200 mm x 60 mm)	
ASTM C880	20 Total Perpendicular, Wet: 6 Perpendicular, Dry 6 Parallel, Wet: 6 Parallel, Wet: 6	4.0 in. x 15.0 in. x 1.25 in. (100 mm x 380 mm x 30 mm)	
ASTM C1353	3 Total	4.0 in. octagon x 0.375 in. (100 mm x 100 mm x 10 mm)	

Test Results

ASTM C97 – Absorption & Density Evaluation

Specimen No.	Measured Mass (g)			Absorption (%)	Bulk Specific Gravity	Density	
	Oven-Dry	48-Hour Wetted	Immersed Suspended			(lbs/ft^3)	[kg/m^3]
1	516.39	522.67	314.76	1.22	2.484	155.1	2,484
2	512.97	519.95	312.79	1.36	2.476	154.6	2,476
3	522.33	528.99	319.90	1.28	2.498	155.9	2,498
4	528.58	535.20	323.73	1.25	2.500	156.1	2,500
5	534.60	541.27	326.18	1.25	2.485	155.1	2,485
Series Average				**1.27**	**2.489**	**155.0**	**2,489**
Standard Deviation				0.05	0.010	0.62	10.14
Coefficient of Variation (%)				4.30	0.407	0.40	0.41

ASTM C1353 – Abrasion Resistance

Specimen No.	Bulk Specific Gravity †	Mass (g)			Wear Cycles Completed	Index of Abrasion
		Initial	End	Loss		
1	2.49	202.04	200.70	1.34	1,000	68.3
2		207.18	206.28	0.90		101.6
3		202.78	201.84	0.94		97.3
Series Average						**89.1**
Standard Deviation						18.2
Coefficient of Variation (%)						20.4

† *Bulk specific gravity calculated per ASTM C97.*

ASTM C170 – Compressive Strength
Test Condition: Wet Condition, Perpendicular Loading

Specimen No.	Test Condition	Specimen Dimensions (in)		Loading Area (in^2)	Failure Load (lb_f)	Compressive Strength	
		Length	Width			(psi)	[MPa]
PP-W-1	Loaded Perpendicular to stone rift plane Wet Condition	2.33	2.31	5.39	97,681	18,120	125.0
PP-W-2		2.30	2.29	5.26	94,760	18,020	124.2
PP-W-3		2.31	2.33	5.38	82,690	15,370	106.0
PP-W-4		2.31	2.28	5.27	95,510	18,120	125.0
PP-W-5		2.32	2.32	5.37	93,700	17,450	120.3
Series Average						**17,420**	**120.1**
Standard Deviation						1,177	8.1
Coefficient of Variation (%)						6.8	6.8

ASTM C170 – Compressive Strength
Test Condition: Dry Condition, Perpendicular Loading

Specimen No.	Test Condition	Specimen Dimensions (in)		Loading Area (in^2)	Failure Load (lb_f)	Compressive Strength	
		Length	Width			(psi)	[MPa]
PP-D-1	Loaded Perpendicular to stone rift plane Dry Condition	2.33	2.29	5.33	94,070	17,650	121.7
PP-D-2		2.30	2.32	5.33	105,770	19,840	136.8
PP-D-3		2.31	2.29	5.28	94,180	17,840	123.0
PP-D-4		2.34	2.31	5.41	100,630	18,600	128.2
PP-D-5		2.33	2.34	5.47	83,320	15,230	105.0
Series Average						**17,830**	**122.9**
Standard Deviation						1,690	11.7
Coefficient of Variation (%)						9.5	9.5

ASTM C170 – Compressive Strength
Test Condition: Wet Condition, Parallel Loading

Specimen No.	Test Condition	Specimen Dimensions (in)		Loading Area (in^2)	Failure Load (lb_f)	Compressive Strength	
		Length	Width			(psi)	[MPa]
LL-W-1	Loaded Parallel to stone rift plane Wet Condition	2.29	2.39	5.48	106,210	19,380	133.6
LL-W-2		2.32	2.39	5.53	89,880	16,250	112.1
LL-W-3		2.30	2.39	5.49	88,400	16,100	111.0
LL-W-4		2.33	2.45	5.71	115,060	20,150	138.9
LL-W-5		2.34	2.44	5.70	87,240	15,310	105.5
Series Average						**17,440**	**120.2**
Standard Deviation						2,171	15.0
Coefficient of Variation (%)						12.4	12.4

ASTM C170 – Compressive Strength
Test Condition: Dry Condition, Parallel Loading

Specimen No.	Test Condition	Specimen Dimensions (in)		Loading Area (in^2)	Failure Load (lb_f)	Compressive Strength	
		Length	Width			(psi)	[MPa]
LL-D-1	Loaded Parallel to stone rift plane Dry Condition	2.34	2.45	5.73	115,750	20,200	139.3
LL-D-2		2.32	2.37	5.50	114,380	20,800	143.4
LL-D-3		2.33	2.45	5.71	122,310	21,420	147.7
LL-D-4		2.32	2.41	5.59	91,710	16,410	113.1
LL-D-5		2.31	2.38	5.50	83,490	15,180	104.7
Series Average						**18,800**	**129.6**
Standard Deviation						2,813	19.4
Coefficient of Variation (%)						15.0	15.0

ASTM C99 – Modulus of Rupture
Test Condition: Wet Condition, Perpendicular Loading

Specimen Details		Support Span (in)	Specimen Dimensions (in)		Failure Load (lb_f)	Modulus of Rupture	
No.	**Test Condition**		**Width**	**Depth**		**(psi)**	**[MPa]**
PP-W-1	Loaded Perpendicular to stone rift plane Wet Condition	7.0	4.04	2.40	4,464	2,020	13.9
PP-W-2			4.04	2.37	4,609	2,130	14.7
PP-W-3			4.04	2.39	4,696	2,130	14.7
PP-W-4			4.04	2.39	4,122	1,870	12.9
PP-W-5			4.05	2.36	4,883	2,280	15.7
Series Average						**2,090**	**14.4**
Standard Deviation						152	1.0
Coefficient of Variation (%)						7.27	7.23

ASTM C99 – Modulus of Rupture
Test Condition: Dry Condition, Perpendicular Loading

Specimen Details		Specimen Details	Specimen Dimensions (in)		Failure Load (lb_f)	Modulus of Rupture	
No.	**Test Condition**		**Width**	**Depth**		**(psi)**	**[MPa]**
PP-D-1	Loaded Perpendicular to stone rift plane Dry Condition	7.0	4.06	2.38	4,944	2,270	15.6
PP-D-2			4.04	2.40	5,027	2,260	15.6
PP-D-3			4.05	2.41	5,402	2,400	16.6
PP-D-4			4.04	2.43	5,068	2,230	15.4
PP-D-5			4.04	2.38	4,932	2,260	15.6
Series Average						**2,280**	**15.8**
Standard Deviation						67	0.5
Coefficient of Variation (%)						2.94	2.98

ASTM C99 – Modulus of Rupture
Test Condition: Wet Condition, Edge Loading

Specimen Details		Support Span (in)	Specimen Dimensions (in)		Failure Load (lb_f)	Modulus of Rupture	
No.	**Test Condition**		**Width**	**Depth**		**(psi)**	**[MPa]**
ED-W-1	Loaded Perpendicular to the Edge of the stone rift plane Wet Condition	7.0	4.05	2.22	3,430	1,810	12.5
ED-W-2			4.02	2.25	4,174	2,150	14.8
ED-W-3			3.95	2.22	3,422	1,850	12.8
ED-W-4			3.99	2.26	3,428	1,770	12.2
ED-W-5			4.02	2.22	3,609	1,920	13.2
Series Average						**1,900**	**13.1**
Standard Deviation						150	1.0
Coefficient of Variation (%)						7.89	7.94

ASTM C99 – Modulus of Rupture
Test Condition: Dry Condition, Edge Loading

Specimen Details		Support Span (in)	Specimen Dimensions (in)		Failure Load (lb_f)	Modulus of Rupture	
No.	**Test Condition**		**Width**	**Depth**		**(psi)**	**[MPa]**
ED-D-1	Loaded Perpendicular to the Edge of the stone rift plane Dry Condition	7.0	3.99	2.21	4,114	2,210	15.2
ED-D-2			3.95	2.26	3,994	2,080	14.3
ED-D-3			3.95	2.30	4,199	2,120	14.6
ED-D-4			3.95	2.29	3,883	1,970	13.6
ED-D-5			4.02	2.28	4,410	2,210	15.3
Series Average						**2,120**	**14.6**
Standard Deviation						100	0.7
Coefficient of Variation (%)						4.72	4.72

ASTM C880 – Flexural Strength
Test Condition: Perpendicular Loading, Wet Condition

Specimen Details		Support Span (in)	Specimen Dimensions (in)		Failure Load (lb_f)	Flexural Strength	
No.	**Test Condition**		**Width**	**Depth**		**(psi)**	**[MPa]**
PP-W-1	Loaded Perpendicular to stone rift plane Wet Condition	12.5	4.09	1.27	1,200	1,690	11.7
PP-W-2			4.08	1.29	1,263	1,740	12.0
PP-W-3			4.04	1.30	1,208	1,670	11.5
PP-W-4			4.03	1.27	1,116	1,620	11.2
PP-W-5			4.05	1.28	1,343	1,890	13.1
PP-W-6			4.04	1.28	1,230	1,730	11.9
Series Average						**1,720**	**11.9**
Standard Deviation						92	0.6
Coefficient of Variation (%)						5.3	5.4

ASTM C880 – Flexural Strength
Test Condition: Perpendicular Loading, Dry Condition

Specimen Details		Support Span (in)	Specimen Dimensions (in)		Failure Load (lb_f)	Flexural Strength	
No.	**Test Condition**		**Width**	**Depth**		**(psi)**	**[MPa]**
PP-D-1	Loaded Perpendicular to stone rift plane Dry Condition	12.5	4.07	1.28	1,443	2,040	14.1
PP-D-2			4.02	1.27	1,393	2,020	14.0
PP-D-3			4.05	1.36	1,541	1,950	13.4
PP-D-4			4.07	1.26	1,494	2,160	14.9
PP-D-5			4.10	1.28	1,399	1,940	13.4
PP-D-6			4.08	1.35	1,483	1,880	13.0
Series Average						**2,000**	**13.8**
Standard Deviation						98	0.7
Coefficient of Variation (%)						4.9	4.9

ASTM C880 – Flexural Strength
Test Condition: Parallel Loading, Wet Condition

Specimen Details		Support Span (in)	Specimen Dimensions (in)		Failure Load (lb_f)	Flexural Strength	
No.	**Test Condition**		**Width**	**Depth**		**(psi)**	**[MPa]**
LL-W-1	Loaded Parallel to the stone rift plane Wet Condition	12.5	4.00	1.25	578	870	6.0
LL-W-2			4.01	1.37	788	990	6.8
LL-W-3			4.01	1.27	809	1,170	8.1
LL-W-4			4.02	1.36	738	930	6.4
LL-W-5			4.03	1.35	792	1,010	6.9
LL-W-6			4.01	1.36	793	1,000	6.9
Series Average						**1,000**	**6.9**
Standard Deviation						101	0.7
Coefficient of Variation (%)						10.1	10.4

ASTM C880 – Flexural Strength
Test Condition: Parallel Loading, Dry Condition

Specimen Details		Support Span (in)	Specimen Dimensions (in)		Failure Load (lb_f)	Flexural Strength	
No.	**Test Condition**		**Width**	**Depth**		**(psi)**	**[MPa]**
LL-D-1	Loaded Parallel to the stone rift plane Dry Condition	12.5	4.01	1.36	963	1,220	8.4
LL-D-2			4.03	1.28	816	1,160	8.0
LL-D-3			4.01	1.37	1,064	1,330	9.2
LL-D-4			3.99	1.26	703	1,040	7.2
LL-D-5			4.03	1.36	1,033	1,300	8.9
LL-D-6			4.02	1.27	853	1,240	8.5
Series Average						**1,220**	**8.4**
Standard Deviation						105	0.7
Coefficient of Variation (%)						8.6	8.5

Conclusion: The test results as presented within this test report reflect the performance of those specimens provided for testing. The average test results for the sandstone product were evaluated against the performance criteria presented in ASTM C616, Table 1 and are presented in the table below.

ASTM C616 Performance Evaluation Summary					
Physical Requirement	**Test Series Detail**		**Result**		
			Mean Test Value		**Performance Evaluation**
C97 Absorption (%): Class I (Sandstone): ≤8.0 Class II (Quartzitic Sandstone): ≤3.0 Class III (Quartzite): ≤1.0			1.27		Meets as Stated: Class II
C97 Density: (lbs/ft^3, [kg/m^3]) Class I (Sandstone): ≥125 [2,000] Class II (Quartzitic Sandstone): ≥150 [2,400] Class III (Quartzite): ≥160 [2,560]			155.0	2,489	Meets as Stated: Class II
C170 Compressive Strength: (psi, [MPa]) Class I (Sandstone): ≥4,000 [28] Class II (Quartzitic Sandstone): ≥10,000 [69] Class III (Quartzite): ≥20,000 [138]	Perpendicular	Wet	17,420	120.1	Meets as Stated: Class II
		Dry	17,830	122.9	
	Parallel	Wet	17,440	120.2	
		Dry	18,800	129.6	
C99 Modulus of Rupture: (psi, [MPa]) Class I (Sandstone): ≥350 [2.4] Class II (Quartzitic Sandstone): ≥1,000 [7] Class III (Quartzite): ≥2,000 [13.8]	Perpendicular	Wet	2,090	14.4	Meets as Stated: Class II
		Dry	2,280	15.8	
	Edge	Wet	1,900	13.1	
		Dry	2,120	14.6	
C1353 Abrasion Resistance: Class I (Sandstone): H_a ≥2 Class II (Quartzitic Sandstone): H_a ≥8, Class III (Quartzite): H_a ≥8			89.1		Meets as Stated: Class II
* **C880 Flexural Strength (psi, [MPa]):** N/A	Perpendicular	Wet	1,720	11.9	*Design Property Only*
		Dry	2,000	13.8	
	Parallel	Wet	1,000	6.9	
		Dry	1,220	8.4	

Test Methods with no ASTM C568 minimum performance criteria are reported as obtained.

There are no published ASTM C616 performance requirements for ASTM C880 flexural strength for quartz-based stone products, so results are reported as design property only.

Conclusion (Cont.):

ASTM C616 – Quartz-based Stone Properties Evaluation

The sandstone products (Trade Names: Bloom Run, Roaring Run) satisfied the ASTM C616 minimum performance criteria for Class II (Quartzitic Sandstone) product for all properties evaluated.

There are no published ASTM C616 performance requirements for ASTM C880 flexural strength for quartz-based stone products, so results are reported as design property only.

It has been our pleasure to provide this product testing service for your project. Please do not hesitate to contact us if you have any questions or require additional information. Contact information is listed below.

Respectfully submitted,

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Revision Log

No.	Date	Page(s)	Description
0	06/11/26	N/A	Initial report release

Document Control Number: *NSICD 00001-R0*

Photographs

Photo No. 1
ASTM C97 – Test Apparatus
(Dry Mass Determination Depicted)

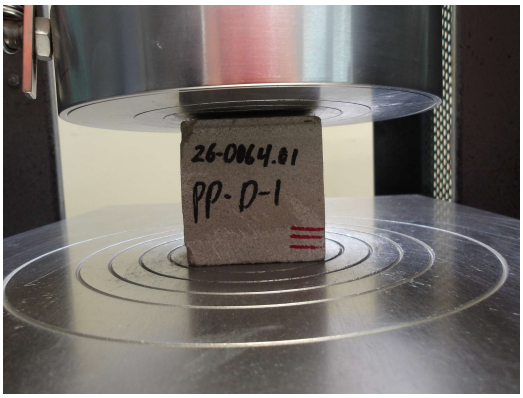

Photo No. 2
ASTM C170 – Compressive Strength
Test Setup

Photo No. 3
ASTM C170 – Representative
Specimen Failure Mode
(Parallel Loading - Wet Condition)

Photo No. 4
ASTM C170 – Representative
Specimen Failure Mode
(Perpendicular Loading - Dry Condition)

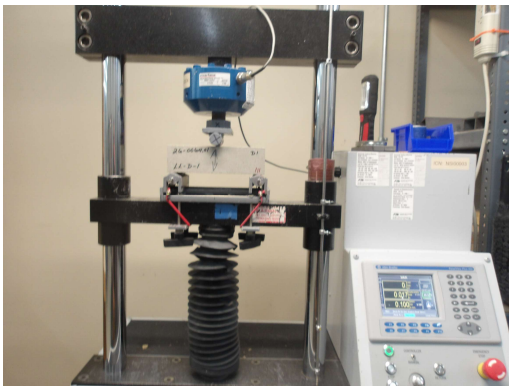

Photo No. 5
ASTM C99 – Modulus of Rupture
Test Setup

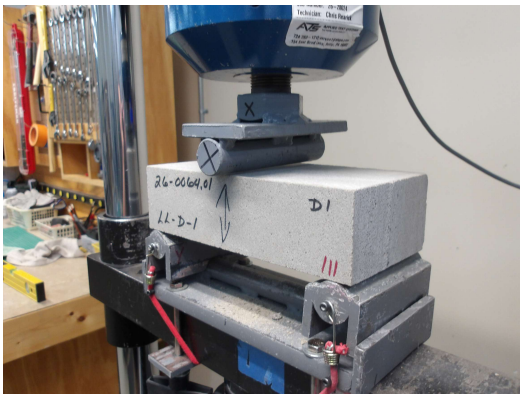

Photo No. 6
ASTM C99 – Specimen Loading Detail

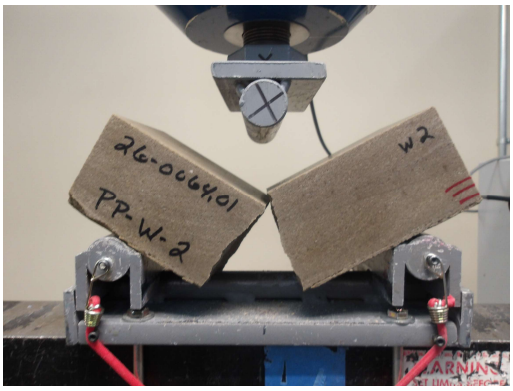

Photo No. 7
ASTM C99 – Representative
Specimen Failure Mode
(Perpendicular Loading – Wet Condition)

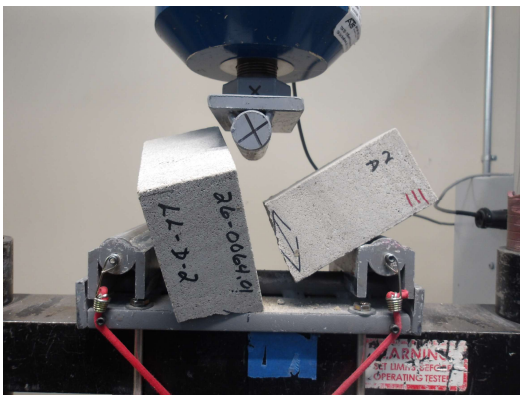

Photo No. 8
ASTM C99 – Representative
Specimen Failure Mode
(Edge Loading - Dry Condition)

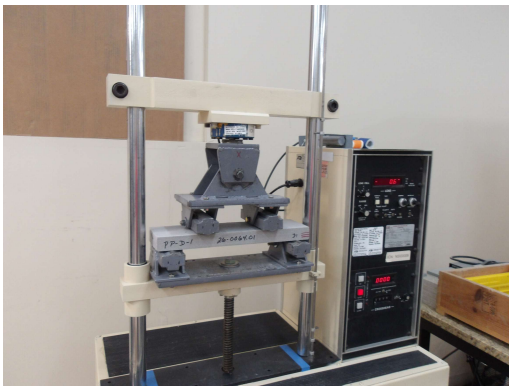

Photo No. 9
ASTM C880 – Flexural Strength Test Setup

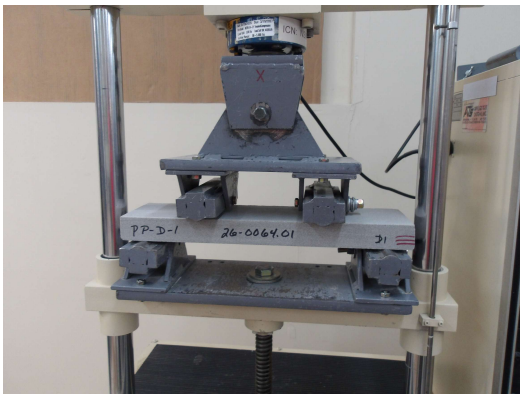

Photo No. 10
ASTM C880 –
Specimen Loading Detail

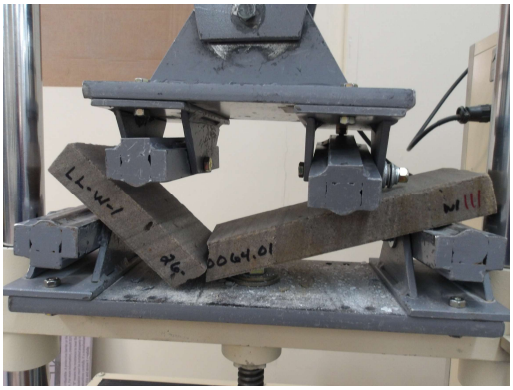

Photo No. 11
ASTM C880 – Representative
Specimen Failure Mode
(Parallel Loading - Wet Condition)

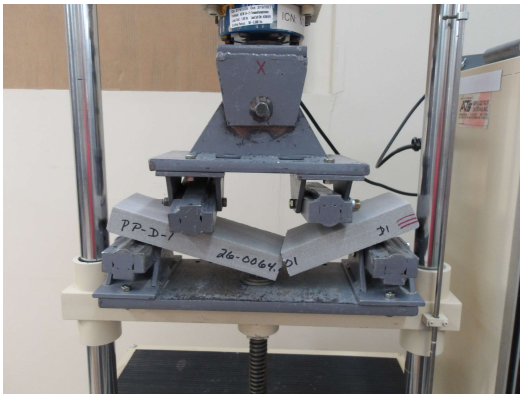

Photo No. 12
ASTM C880 – Representative
Specimen Failure Mode
(Perpendicular Loading - Dry Condition)

Photo No. 13
ASTM C1353 – Abrasion Apparatus

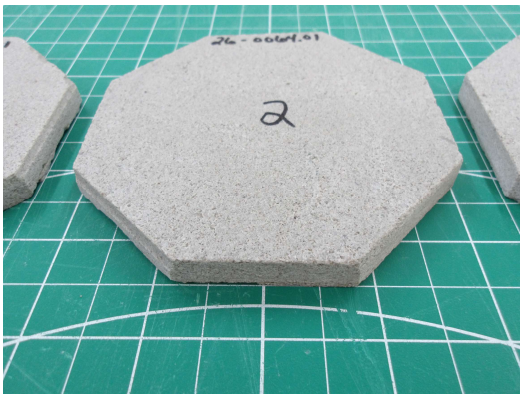

Photo No. 14
ASTM C1353 – Representative Pretest Specimen Condition

Photo No. 15
ASTM C1353 – Representative Post-Abrasion Specimen Condition

Photo No. 16
ASTM C1353 – Representative Post-Abrasion Mass Determination