



Construction Testing Sciences
4069 S. Shiloh Rd. Garland, TX 75041
Phone: 214.789.3472
www.ctsciences.com

October 29, 2018

Durango Stone
Mr. Joel Allred
7946 E. McClain Dr.
Scottsdale, AZ 85260

Reference: Ashian Travertine
Physical Properties Testing

Dear Mr. Allred:

Construction Testing Sciences, LLC (CTS) has completed the laboratory testing of the Ashian Travertine samples submitted by Durango Stone. This test program included the following tests, performed in accordance with the applicable ASTM test standards.

ASTM C 97, Absorption and Bulk Density of Dimension Stone
ASTM C 99, Modulus of Rupture of Dimension Stone
ASTM C 170, Compressive Strength of Dimension Stone
ASTM C 880, Flexural Strength of Dimension Stone

A summary of the test results is given on the following pages.

This product is also being tested for freeze/thaw durability. The samples will be subjected to 300 cycles of freeze/thaw exposure in accordance with ASTM C 666. Upon completion, results of this test will be issued under separate cover.

We appreciate the opportunity to provide these services and look forward to working with you on this and future projects. If there are any questions concerning the attached test data or we can be of further assistance, please contact us at your convenience.

Respectfully submitted,

A handwritten signature in blue ink, appearing to read "Jack Gary".

Jack Gary
General Manager





Client: Durango Stone
Material: Ashian Travertine
Project No.: 101426

Summary of Results

Based on the test results obtained by CTS, the submitted material meets or exceeds the minimum requirement for class I - exterior travertine dimension stone. The table below gives the required values compared to the actual values obtained by CTS.

Test Results			
Physical Property	ASTM C1527 Minimum Requirements	Actual Results	Classification
Absorption by weight, max, %	2.5	1.02	Class I - Exterior
Density, min, lbs/cu ft	144	158.65	Class I - Exterior
Compr. Strength, min, psi	7,500 (Exterior) 5,000 (Interior)	14,386 (Wet) 15,175 (Dry)	Class I - Exterior
Modulus of Rupture	N/A	1,688 (Wet) 1,954 (Dry)	N/A
Flexural Strength	500	1,491 (Wet) 1,362 (Dry)	Class I - Exterior



LIMITATIONS: The test results presented herein were prepared based upon the specific samples provided for testing. We assume no responsibility for variation in quality (composition, appearance, performance, etc.) or any other feature of similar subject matter provided by persons or conditions over which we have no control. Our letters and reports are for the exclusive use of the clients to whom they are addressed and shall not be reproduced except in full without the written approval of



Report of Absorption and Bulk Specific Gravity of Dimension Stone

Client: Durango Stone
Project: Physical Properties Testing
Project No.: 101426

Report No.: 12930
Date of Service: 10/10/18

Material: Ashian Travertine
Test Method: ASTM C97, Absorption and Bulk Specific Gravity of Dimension Stone
Calculation: Absorption= $((SSD\ Weight - Oven\ Dry\ Weight) / Oven\ Dry\ Weight) \times 100$
 Bulk Specific Gravity= $(Oven\ Dry\ Weight) / (SSD\ Weight - In\ Water\ Weight)$
 Density= $Bulk\ Specific\ Gravity \times 62.4$

Sample Identification	Oven Dry Weight (g)	SSD Weight (g)	In Water Weight (g)	Absorption (percent)	Bulk Specific Gravity	Density (lbs./cu. ft.)
1	303.22	306.52	186.98	1.09	2.54	158.3
2	303.94	307.59	187.76	1.20	2.54	158.3
3	305.48	308.46	188.66	0.98	2.55	159.1
4	305.23	308.10	188.38	0.94	2.55	159.1
5	303.56	306.30	186.77	0.90	2.54	158.5
Average				1.02	2.54	158.65

Technician: K. Scarborough





Report of Modulus of Rupture

Client: Durango Stone **Report No.:** 12930
Project: Physical Properties Testing **Date of Service:** 10/18/18
Project No.: 101426

Material: Ashian Travertine
Test Method: ASTM C99, Test Method for Modulus of Rupture of Dimension Stone
Calculation: $(3 \times \text{the failure load} \times \text{the span}) / (2 \times \text{width} \times \text{thickness squared})$
Loading: Applied center point with the finished face in tension at 600 psi per minute.
Nominal Dimensions:

Span (inches)	Width (inches)	Thickness (cm)
7	4.0	5.0

Conditioning: Dry: Minimum 48 hours in a heated, ventilated, chamber at 140F (+/-4F)
 Wet: Minimum 48 hours immersion in water at 72F (+/-4F)

Finish: Honed
Rift Direction: Parallel to the direction of loading

Sample Number	Block Number	Dimensions			Failure Load (pounds)	Test Results (psi)
		Span (inches)	Width (inches)	Thickness (inches)		
Wet-1	N/A	7.00	4.02	2.02	3150	2016
Wet-2	N/A	7.00	4.01	2.03	1833	1165
Wet-3	N/A	7.00	4.03	2.03	1677	1060
Wet-4	N/A	7.00	4.01	2.03	3010	1913
Wet-5	N/A	7.00	4.01	2.05	2760	1725
Dry-1	N/A	7.00	4.00	2.04	3040	1918
Dry-2	N/A	7.00	4.00	2.04	1539	971
Dry-3	N/A	7.00	4.03	2.04	3590	2248
Dry-4	N/A	7.00	4.01	2.04	3430	2158
Dry-5	N/A	7.00	4.01	2.03	2870	1824
Average wet mode:						1576
Standard deviation:						437
Variance:						27.73 %
Average dry mode:						1824
Standard deviation:						507
Variance:						27.80 %
Average wet and dry mode:						1700
Standard deviation:						446
Variance:						26.24 %

Technician: K. Scarborough





Report of Compressive Strength

Client: Durango Stone **Report No.:** 12930
Project: Physical Properties Testing **Date of Service:** 10/09/18
Project No.: 101426

Material: Ashian Travertine
Test Method: ASTM C170, Compressive Strength of Dimension Stone
Calculation: Applied Load / (Length x Width)
Loading: Load applied at a maximum rate of 100 psi per second.
Nominal Dimensions:

Length (inches)	Width (inches)	Height (inches)
2	2	2

Conditioning: Dry: Minimum 48 hours in a heated, ventilated, chamber at 140F (+/-4F)
 Wet: Minimum 48 hours immersion in water at 72F (+/-4F)

Finish: Sawn

Rift Direction: Parallel to the direction of loading

Sample Number	Block Number	Dimensions			Failure Load (lbf)	Compressive Strength (psi)
		Length (inches)	Width (inches)	Area (sq. in.)		
Wet 1	N/A	1.92	1.95	3.74	51,580	13,777
Wet 2	N/A	1.94	1.95	3.78	51,580	13,635
Wet 3	N/A	1.94	1.95	3.78	57,790	15,276
Wet 4	N/A	1.95	1.95	3.80	37,590	9,886
Wet 5	N/A	1.94	1.94	3.76	55,910	14,855
Dry 1	N/A	1.94	1.95	3.78	59,520	15,734
Dry 2	N/A	1.95	1.94	3.78	62,350	16,482
Dry 3	N/A	1.95	1.95	3.80	53,620	14,101
Dry 4	N/A	1.94	1.95	3.78	26,480	7,000
Dry 5	N/A	1.95	1.95	3.80	54,700	14,385
Average Wet Mode:						14,386
Standard Deviation						2720
Variance						18.91
Average Dry Mode:						15,175
Standard Deviation						4852
Variance						31.97

Technician: K. Scarborough





Report of Flexural Strength

Client: Durango Stone
Project: Physical Properties Testing
Project No.: 101426

Report No.: 12930
Date of Service: 10/17/18

Material: Ashian Travertine
Test Method: ASTM C880, Test Method for Flexural Strength of Dimensional Stone
Calculation: (3 x the failure load x the span) / (4 x width x thickness squared)
Loading: Applied quarter point with the finished face in tension at 600 psi per minute.
Nominal Dimensions:

Span (inches)	Width (inches)	Thickness (cm)
12.5	4.0	3.0

Conditioning: Dry: Minimum 48 hours in a heated, ventilated, chamber at 140F (+/-4F)
 Wet: Minimum 48 hours immersion in water at 72F (+/-4F)

Finish: Honed

Rift Direction: Parallel to the direction of loading

Sample Number	Block Number	Dimensions			Failure Load (pounds)	Test Results (psi)
		Span (inches)	Width (inches)	Thickness (inches)		
Wet-1	N/A	12.50	4.01	1.23	997	1541
Wet-2	N/A	12.50	4.01	1.19	895	1478
Wet-3	N/A	12.50	4.01	1.24	1061	1613
Wet-4	N/A	12.50	4.01	1.18	637	1070
Wet-5	N/A	12.50	4.02	1.22	1120	1755
Dry-1	N/A	12.50	4.03	1.20	486	785
Dry-2	N/A	12.50	4.01	1.18	856	1437
Dry-3	N/A	12.50	4.01	1.23	968	1496
Dry-4	N/A	12.50	4.00	1.23	1277	1978
Dry-5	N/A	12.50	4.00	1.24	731	1114
Average wet mode:						1491
Standard deviation:						257
Variance:						17.23 %
Average dry mode:						1362
Standard deviation:						447
Variance:						32.82 %
Average wet and dry mode:						1427
Standard deviation:						344
Variance:						24.11 %

Technician: K. Scarborough

