



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: Dorado Travertine
Physical Properties Testing

Dear Mr. Allred:

Construction Testing Sciences, LLC (CTS) has completed the laboratory testing of the Dorado 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: Dorado 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	0.53	Class I - Exterior
Density, min, lbs/cu ft	144	165.09	Class I - Exterior
Compr. Strength, min, psi	7,500 (Exterior) 5,000 (Interior)	18,549 (Wet) 19,850 (Dry)	Class I - Exterior
Modulus of Rupture	N/A	5,529 (Wet) 5,364 (Dry)	N/A
Flexural Strength	500	1,614 (Wet) 1,870 (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.: 12933
Date of Service: 05/11/18

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

Sample Identification	Oven Dry Weight (g)	SSD Weight (g)	In Water Weight (g)	Absorption (percent)	Bulk Specific Gravity	Density (lbs./cu. ft.)
1	338.62	340.96	212.17	0.69	2.63	164.1
2	345.08	346.04	216.84	0.28	2.67	166.7
3	337.54	340.42	211.67	0.85	2.62	163.6
4	340.28	342.09	213.35	0.53	2.64	164.9
5	342.96	344.00	215.22	0.30	2.66	166.2
Average				0.53	2.65	165.09

Technician: K. Scarborough





Report of Modulus of Rupture

Client: Durango Stone **Report No.:** 12933
Project: Physical Properties Testing **Date of Service:** 10/18/18
Project No.: 101426

Material: Dorado 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	4.04	1.19	2880	5286
Wet-2	N/A	7.00	4.02	1.19	3250	5994
Wet-3	N/A	7.00	4.02	1.19	2470	4556
Wet-4	N/A	7.00	4.02	1.19	2670	4925
Wet-5	N/A	7.00	4.03	1.19	2740	5041
Dry-1	N/A	7.00	4.05	1.19	2850	5218
Dry-2	N/A	7.00	4.03	1.19	2220	4085
Dry-3	N/A	7.00	4.04	1.19	2500	4588
Dry-4	N/A	7.00	4.04	1.19	2970	5451
Dry-5	N/A	7.00	4.04	1.19	3100	5690
Average wet mode:						5160
Standard deviation:						535
Variance:						10.37 %
Average dry mode:						5006
Standard deviation:						658
Variance:						13.14 %
Average wet and dry mode:						5083
Standard deviation:						566
Variance:						11.13 %

Technician: K. Scarborough





Report of Compressive Strength

Client: Durango Stone **Report No.:** 12933
Project: Physical Properties Testing **Date of Service:** 10/15/18
Project No.: 101426

Material: Dorado 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	1.99	1.99	3.96	67,380	17,015
Wet 2	N/A	2.00	1.96	3.92	75,380	19,230
Wet 3	N/A	1.99	2.00	3.98	64,170	16,123
Wet 4	N/A	2.00	2.01	4.02	77,150	19,192
Wet 5	N/A	1.99	2.00	3.98	86,880	21,829
Dry 1	N/A	2.00	2.00	4.00	47,830	11,958
Dry 2	N/A	1.99	1.99	3.96	87,830	22,179
Dry 3	N/A	1.99	2.00	3.98	89,730	22,545
Dry 4	N/A	1.99	2.00	3.98	53,190	13,364
Dry 5	N/A	1.99	1.99	3.96	89,960	22,717
Average Wet Mode:						18,549
Standard Deviation						2574
Variance						13.88
Average Dry Mode:						19,850
Standard Deviation						6462
Variance						32.55

Technician: K. Scarborough





Report of Flexural Strength

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

Report No.: 12933
Date of Service: 10/17/18

Material: Dorado 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	4.02	1.18	789	1321
Wet-2	N/A	12.50	4.03	1.19	1135	1865
Wet-3	N/A	12.50	4.02	1.16	901	1562
Wet-4	N/A	12.50	4.02	1.19	983	1619
Wet-5	N/A	12.50	4.02	1.19	1033	1701
Dry-1	N/A	12.50	4.03	1.17	1123	1908
Dry-2	N/A	12.50	4.02	1.20	1115	1806
Dry-3	N/A	12.50	4.02	1.19	784	1291
Dry-4	N/A	12.50	4.02	1.17	1221	2080
Dry-5	N/A	12.50	4.02	1.18	1353	2266
Average wet mode:						1614
Standard deviation:						199
Variance:						12.33 %
Average dry mode:						1870
Standard deviation:						368
Variance:						19.68 %
Average wet and dry mode:						1742
Standard deviation:						279
Variance:						16.02 %

Technician: K. Scarborough

