



**Construction Testing Sciences**  
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October 29, 2018

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

Reference: Cortez Marble  
Physical Properties Testing

Dear Mr. Allred:

Construction Testing Sciences, LLC (CTS) has completed the laboratory testing of the Cortez Marble 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:** Cortez Marble  
**Project No.:** 101426

### Summary of Results

Based on the test results obtained by CTS, the submitted material meets or exceeds the minimum requirement for Group A Marble dimension stone except for absorption. The table below gives the required values compared to the actual values obtained by CTS.

| <b>Test Results</b>          |                                       |                              |                       |
|------------------------------|---------------------------------------|------------------------------|-----------------------|
| <b>Physical Property</b>     | <b>ASTM C503 Minimum Requirements</b> | <b>Actual Results</b>        | <b>Classification</b> |
| Absorption by weight, max, % | 0.2                                   | 0.23                         | Group A               |
| Density, min, lbs/cu ft      | 162                                   | 167.7                        | Group A               |
| Compr. Strength, min, psi    | 7,500                                 | 17,720 (Wet)<br>19,855 (Dry) | Group A               |
| Modulus of Rupture           | 1,000                                 | 1,089 (Wet)<br>1,072 (Dry)   | Group A               |
| Flexural Strength            | 1,000                                 | 1,496 (Wet)<br>1,485 (Dry)   | Group A               |



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

Construction Testing Sciences, LLC.



## Report of Absorption and Bulk Specific Gravity of Dimension Stone

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

**Report No.:** 12392  
**Date of Service:** 10/10/18

**Material:** Cortez Marble  
**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                     | 340.76              | 341.35         | 215.05              | 0.17                 | 2.70                  | 168.4                  |
| 2                     | 337.13              | 338.12         | 212.33              | 0.29                 | 2.68                  | 167.2                  |
| 3                     | 335.21              | 336.38         | 210.89              | 0.35                 | 2.67                  | 166.7                  |
| 4                     | 339.95              | 340.54         | 214.44              | 0.17                 | 2.70                  | 168.2                  |
| 5                     | 339.98              | 340.57         | 214.45              | 0.17                 | 2.70                  | 168.2                  |
| <b>Average</b>        |                     |                |                     | <b>0.23</b>          | <b>2.69</b>           | <b>167.74</b>          |

Technician: K. Scarborough





## Report of Modulus of Rupture

**Client:** Durango Stone **Report No.:** 12934  
**Project:** Physical Properties Testing **Date of Service:** 10/17/18  
**Project No.:** 101426

**Material:** Cortez Marble  
**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<br>(inches) | Width<br>(inches) | Thickness<br>(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:** N/A

| Sample Number                    | Block Number | Dimensions       |                   |                       | Failure Load<br>(pounds) | Test Results<br>(psi) |
|----------------------------------|--------------|------------------|-------------------|-----------------------|--------------------------|-----------------------|
|                                  |              | Span<br>(inches) | Width<br>(inches) | Thickness<br>(inches) |                          |                       |
| Wet-1                            | N/A          | 7.00             | 4.00              | 1.93                  | 1365                     | 962                   |
| Wet-2                            | N/A          | 7.00             | 4.00              | 1.93                  | 1524                     | 1074                  |
| Wet-3                            | N/A          | 7.00             | 4.01              | 1.94                  | 1623                     | 1129                  |
| Wet-4                            | N/A          | 7.00             | 4.01              | 1.93                  | 1125                     | 791                   |
| Wet-5                            | N/A          | 7.00             | 4.00              | 1.93                  | 1597                     | 1125                  |
| Dry-1                            | N/A          | 7.00             | 4.02              | 1.93                  | 1473                     | 1033                  |
| Dry-2                            | N/A          | 7.00             | 4.00              | 1.93                  | 931                      | 656                   |
| Dry-3                            | N/A          | 7.00             | 4.01              | 1.93                  | 1599                     | 1124                  |
| Dry-4                            | N/A          | 7.00             | 4.00              | 1.93                  | 1546                     | 1089                  |
| Dry-5                            | N/A          | 7.00             | 4.00              | 1.94                  | 1575                     | 1099                  |
| <b>Average wet mode:</b>         |              |                  |                   |                       |                          | <b>1016</b>           |
| Standard deviation:              |              |                  |                   |                       |                          | 143                   |
| Variance:                        |              |                  |                   |                       |                          | 14.07 %               |
| <b>Average dry mode:</b>         |              |                  |                   |                       |                          | <b>1000</b>           |
| Standard deviation:              |              |                  |                   |                       |                          | 195                   |
| Variance:                        |              |                  |                   |                       |                          | 19.50 %               |
| <b>Average wet and dry mode:</b> |              |                  |                   |                       |                          | <b>1008</b>           |
| Standard deviation:              |              |                  |                   |                       |                          | 161                   |
| Variance:                        |              |                  |                   |                       |                          | 15.97 %               |

Technician: K. Scarborough





## Report of Compressive Strength

**Client:** Durango Stone **Report No.:** 12932  
**Project:** Physical Properties Testing **Date of Service:** 10/15/18  
**Project No.:** 101426

**Material:** Cortez Marble  
**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<br>(inches) | Width<br>(inches) | Height<br>(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:** N/A

| Sample Number             | Block Number | Dimensions      |                |                | Failure Load (lbf) | Compressive Strength (psi) |
|---------------------------|--------------|-----------------|----------------|----------------|--------------------|----------------------------|
|                           |              | Length (inches) | Width (inches) | Area (sq. in.) |                    |                            |
| Wet 1                     | N/A          | 1.99            | 1.92           | 3.82           | 49,360             | 12,919                     |
| Wet 2                     | N/A          | 2.00            | 1.99           | 3.98           | 57,280             | 14,392                     |
| Wet 3                     | N/A          | 1.99            | 1.98           | 3.94           | 74,170             | 18,824                     |
| Wet 4                     | N/A          | 2.00            | 1.96           | 3.92           | 45,190             | 11,528                     |
| Wet 5                     | N/A          | 2.00            | 1.98           | 3.96           | 97,990             | 24,745                     |
| Dry 1                     | N/A          | 2.00            | 1.97           | 3.94           | 86,350             | 21,916                     |
| Dry 2                     | N/A          | 2.00            | 1.98           | 3.96           | 70,890             | 17,902                     |
| Dry 3                     | N/A          | 2.00            | 1.97           | 3.94           | 40,940             | 10,391                     |
| Dry 4                     | N/A          | 2.00            | 1.98           | 3.96           | 86,710             | 21,896                     |
| Dry 5                     | N/A          | 1.99            | 1.97           | 3.92           | 114,520            | 29,212                     |
| <b>Average Wet Mode:</b>  |              |                 |                |                |                    | <b>17,720</b>              |
| <b>Standard Deviation</b> |              |                 |                |                |                    | <b>6404</b>                |
| <b>Variance</b>           |              |                 |                |                |                    | <b>36.14</b>               |
| <b>Average Dry Mode:</b>  |              |                 |                |                |                    | <b>19,855</b>              |
| <b>Standard Deviation</b> |              |                 |                |                |                    | <b>7945</b>                |
| <b>Variance</b>           |              |                 |                |                |                    | <b>40.01</b>               |

Technician: K. Scarborough





## Report of Flexural Strength

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

**Report No.:** 12932  
**Date of Service:** 10/17/18

**Material:** Cortez Marble  
**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 400 psi per minute.  
**Nominal Dimensions:**

| Span<br>(inches) | Width<br>(inches) | Thickness<br>(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:** N/A

| Sample Number                    | Block Number | Dimensions       |                   |                       | Failure Load<br>(pounds) | Test Results<br>(psi) |
|----------------------------------|--------------|------------------|-------------------|-----------------------|--------------------------|-----------------------|
|                                  |              | Span<br>(inches) | Width<br>(inches) | Thickness<br>(inches) |                          |                       |
| Wet-1                            | N/A          | 12.50            | 4.03              | 1.17                  | 978                      | 1662                  |
| Wet-2                            | N/A          | 12.50            | 4.02              | 1.22                  | 956                      | 1498                  |
| Wet-3                            | N/A          | 12.50            | 4.03              | 1.20                  | 936                      | 1512                  |
| Wet-4                            | N/A          | 12.50            | 4.04              | 1.20                  | 1015                     | 1636                  |
| Wet-5                            | N/A          | 12.50            | 4.01              | 1.21                  | 733                      | 1170                  |
| Dry-1                            | N/A          | 12.50            | 4.02              | 1.22                  | 1112                     | 1742                  |
| Dry-2                            | N/A          | 12.50            | 4.02              | 1.17                  | 751                      | 1279                  |
| Dry-3                            | N/A          | 12.50            | 4.02              | 1.22                  | 993                      | 1556                  |
| Dry-4                            | N/A          | 12.50            | 4.02              | 1.25                  | 922                      | 1376                  |
| Dry-5                            | N/A          | 12.50            | 4.03              | 1.21                  | 927                      | 1473                  |
| <b>Average wet mode:</b>         |              |                  |                   |                       |                          | <b>1496</b>           |
| Standard deviation:              |              |                  |                   |                       |                          | 196                   |
| Variance:                        |              |                  |                   |                       |                          | 13.10 %               |
| <b>Average dry mode:</b>         |              |                  |                   |                       |                          | <b>1485</b>           |
| Standard deviation:              |              |                  |                   |                       |                          | 177                   |
| Variance:                        |              |                  |                   |                       |                          | 11.92 %               |
| <b>Average wet and dry mode:</b> |              |                  |                   |                       |                          | <b>1490</b>           |
| Standard deviation:              |              |                  |                   |                       |                          | 176                   |
| Variance:                        |              |                  |                   |                       |                          | 11.81 %               |

Technician: K. Scarborough

