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To: Mr. Malekan

Subject: Determining the Mechanical, Physical and Chemical properties of a sample of "Dimension Stone" as below

### Physical and Mechanical Specifications of the Dimension Stone

Referenced Documents: Standard ASTM C0568, ASTM C0615, ASTM C0616, ASTM C0119 and C1721

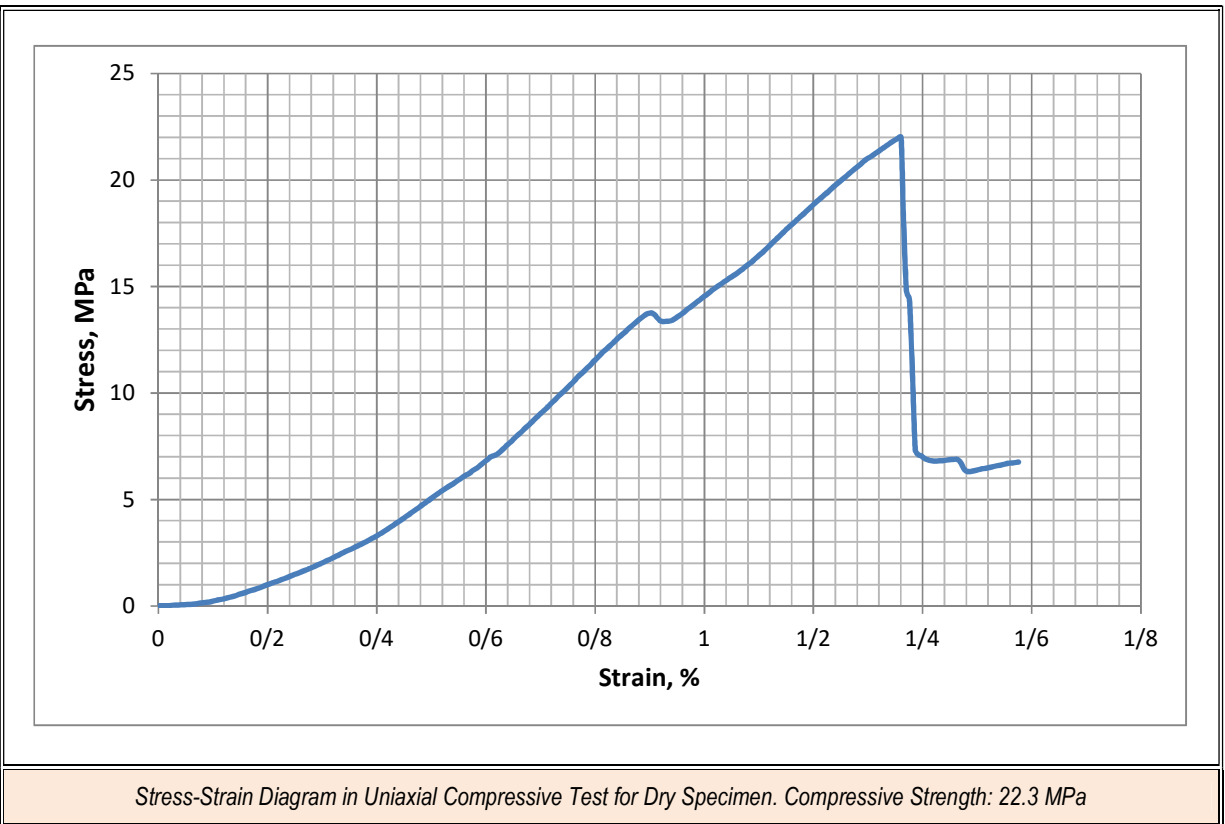
Measured Parameters		Standard Test Methods	Unit	Results	پارامترهای اندازه‌گیری شده	
Hardness in Moh's Scale (Surface Scratch Hardness according to Mohs)(1-10)		BSI 6431-13	-	2-3	سختی در مقیاس موس (آزمون خراش) (۱-۱۰)	
Unit Volume Weight/Bulk Specific Gravity (Apparent Specific Weight)		ASTM C0097	kg/m <sup>3</sup>	2.57	وزن واحد حجم (وزن مخصوص ظاهری یا توده)	
Real Density (Solid Specific Weight)			kg/m <sup>3</sup>	2.71	دانسیته واقعی (وزن مخصوص جامد)	
Apparent Porosity		ASTM C1039	%	5.2	تخلخل ظاهری	
Saturated Density				2.69	دانسیته اشباع	
Compressive (Compression) Strength (for Dry Sample)		ASTM C0170	MPa	22.3	مقاومت فشاری اندازه‌گیری شده (برای نمونه خشک)	
Brazilian Test (Indirect Measurement of Tensile Strength of Rocks)/Splitting Tensile Strength of Intact Rock Core Specimens		ASTM D3967 or ISRM	MPa	1.73	مقاومت کششی غیر مستقیم (برزیلی)	
Flexural (Bending) Strength of Dimension Stone		ASTM C0120 or ASTM C0880(C0099)	MPa	10.49	مقاومت خمشی	
Water Absorption Coefficient (by Weight)		ASTM C0097 or ASTM C0121	%	0.39	ضریب جذب آب (درصد وزنی)	
Point Load Test			KN	1.44	مقاومت بار نقطه ای	
Abrasion Resistance of Dimension Stone Subjected to Foot Traffic, Abrasive Hardness Value	Abrasion Resistance Index	ASTM C1353	-	21.69	اندیس مقاومت سایشی	
	Abrasion Weight Loss		gr	1.3	مقاومت سایش در اثر رفت و آمد برای سنگ‌های ساختمانی	
			%	0.75		
Slake Durability Index (After i Cycle, Id <sub>5</sub> )	Id <sub>5</sub>	ASTM D4644 & ASTM D5121	%	97.02	پس از ۵ سیکل	شاخص دوام (پس از ۵ سیکل، Id <sub>5</sub> )
Solubility Index (Durability Index against Acidic Solutions/Acid Resistance Test)	Id <sub>5</sub>	ISRM	%	96.56	پس از ۵ سیکل	شاخص دوام سنگ در مقابل انحلال و زوال‌پذیری آن بر اثر محلول‌های اسیدی (پس از ۵ سیکل، Id <sub>5</sub> )
Evaluation of Durability of Rock for Erosion Control under Freezing and Thawing Conditions		ASTM D5312/5312M & ASTM D5121	%	تا ۷ سیکل هیچگونه عیب یا ترک مشاهده نشد.		ارزیابی دوام و مقاومت سنگ برای کنترل فرسایش تحت شرایط یخ‌زدگی و یخ‌گشایی
				5.7	درصد افت استحکام فشاری	
The results are the average of 3-5 test results and they have been done according to the standards; ASTM, ISRM and BSI						

**Chemical Composition and Mineralogical Properties of the Stone**

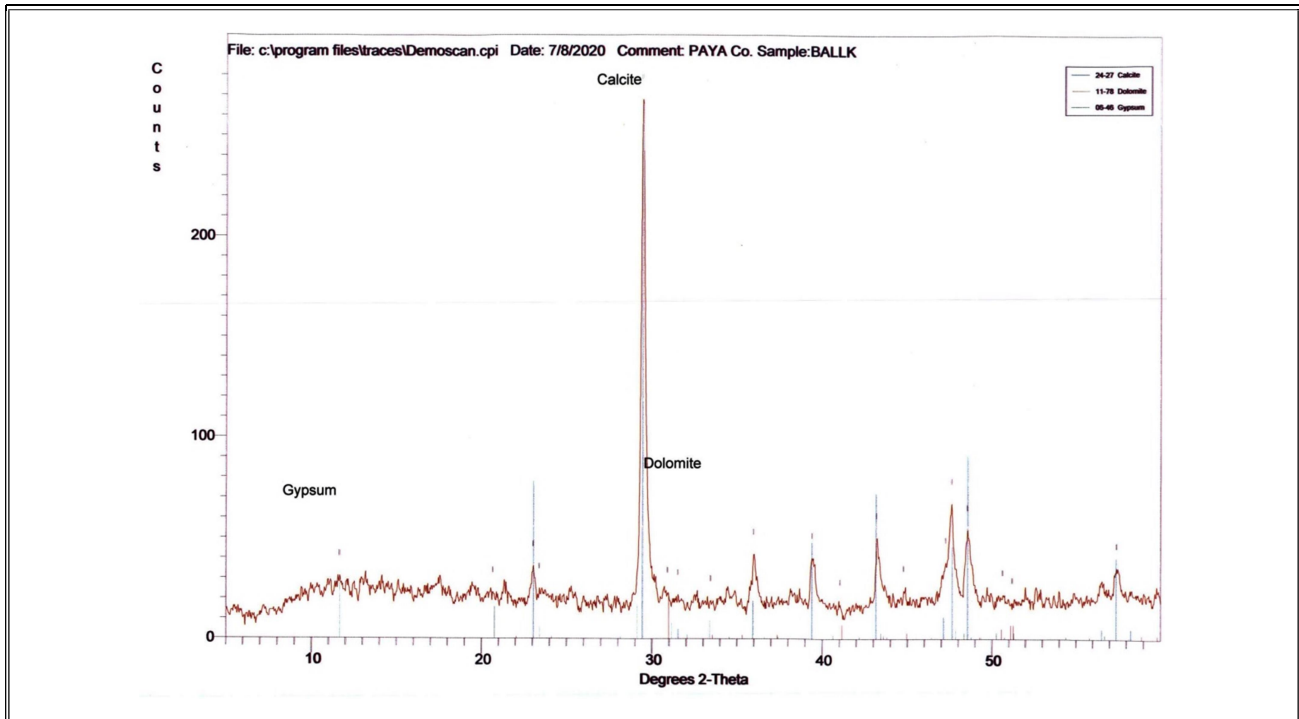
Referenced Documents: Standard ASTM C0871 and C0982.

Elements	% by Weight
CaO	55.9
L.O.I (Loss on Ignition)	43.22
MgO	0.68
Fe <sub>2</sub> O <sub>3</sub>	0.085
SO <sub>3</sub>	0.063
SrO	0.023
P <sub>2</sub> O <sub>5</sub>	0.015
Sum La..Lu	0.009
MnO	0.005

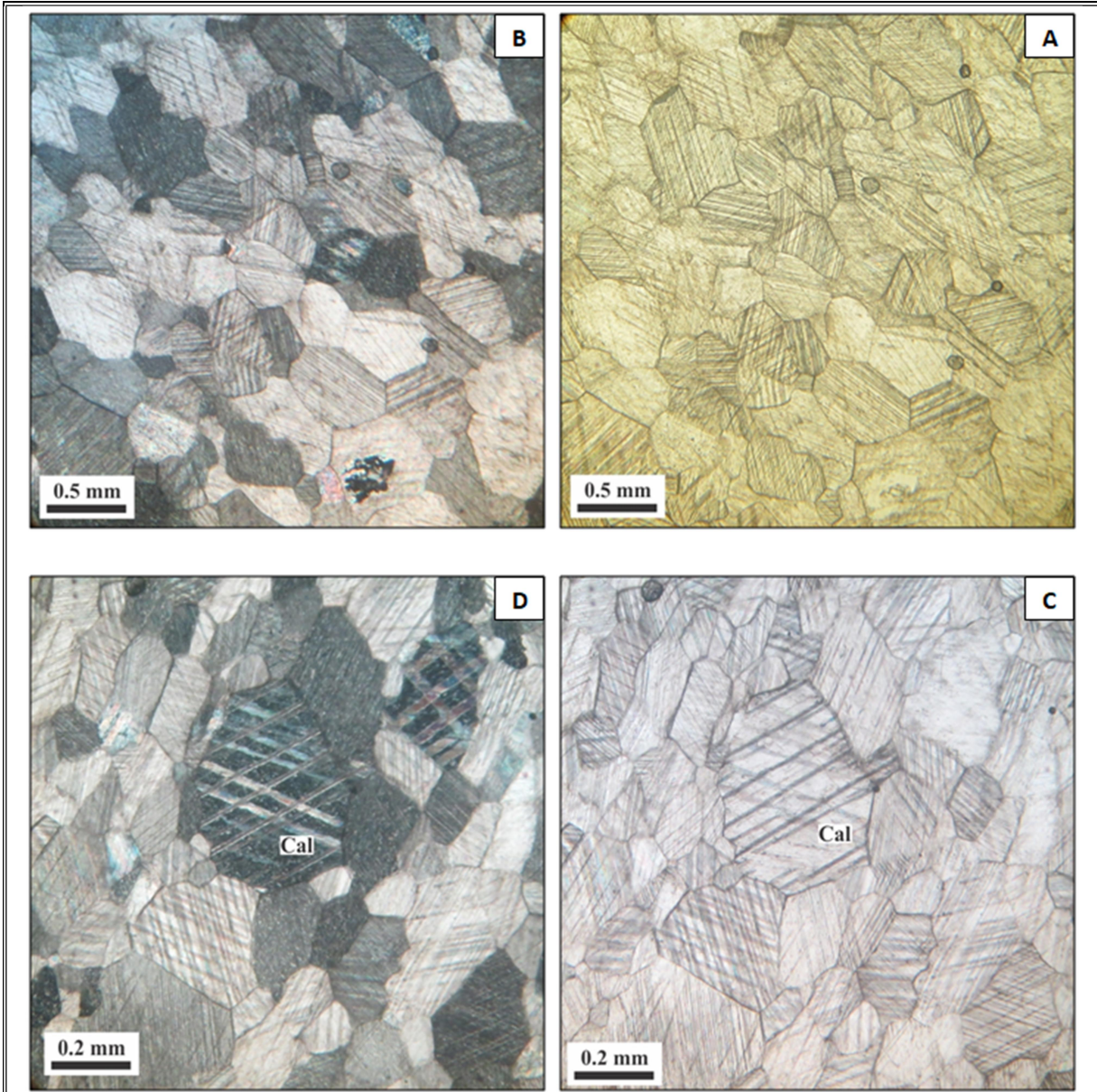
*Stone Name: Marble (A Metamorphic Rock)*  
*Main Mineral: Calcite (Calcites Crystals are between 0.2 to 2mm)*  
*Secondary Minerals: Dolomite & Gypsum*  
*Type of Alteration: calcite*  
*Main Texture: Granoblastic*  
*Sub-texture: Mosaic*



*Stress-Strain Diagram in Uniaxial Compressive Test for Dry Specimen. Compressive Strength: 22.3 MPa*



Mineralogical Analysis by XRD Method



**Optical Photos of Thin Sections:**

- a) General view of the rock, calcite crystals with one or two directions of complete occurrence and with granoblastic and mosaic texture (PPL light)
- b) Figure A in polarized light
- c) Image of a calcite macro crystal with recurrent mackle (PPL light)
- d) Figure C in polarized light.