

Premier Stone 901 S. County Road 31 Berthoud, Colorado 80513

Attn: Mr. Bret Ludwick (<u>bret@premierstone.org</u>)

Re: Laboratory Testing – 2-Inch and Size 57 Aggregate

Premier Stone Quarry Berthoud, Colorado

EEC Project No. 1255003A

Mr. Ludwick:

As requested, Earth Engineering Consultants, LLC (EEC) personnel have completed the laboratory testing you requested on the two (2) referenced materials produced at the Premier Stone Quarry Pit in Berthoud, Colorado. .

As requested, laboratory testing completed on the referenced materials to evaluate the durability for use in the production of aggregates for use in concrete and asphalt included washed sieve/grain-size distribution analysis, LA Abrasion, Micro-Deval, specific gravity, Magnesium Soundness, Clay Lumps and Friable Particles, Lightweight Particle and Alkali Silica Reactivity (ASR). The ASR results from the laboratory testing of the premier Stone aggregates indicated an average expansion of 0.20% at 14 days. According to ASTM C1260, expansions of greater than 0.10% at 16 days after casting will require mitigation. A typical mitigation method would be to add 10 to 20% fly ash as part of the cementitious replacement to reduce the ASR results; a typical procedure in the concrete production industrial. The laboratory tests were performed in general accordance with ASTM, AASHTO and CDOT CP-L procedures. Results are provided on the enclosed summary of test results.

We appreciate the opportunity to be of service to you. If you have any questions concerning this report, or if we can be of further service to you in any other way, please do not hesitate to contact us.

Very truly yours,

Earth Engineering Consultants, LLC

David A. Richer, P.E.

Senior Geotechnical Engineer

## EARTH ENGINEERING CONSULTANTS, LLC

Summary of Laboratory Testing 2025 Premier Stone - Laboratory Testing of 2-Inch Minus Aggregate

Sieve Size	% Passing	
2" (50.0 mm)	100	
1 1/2" (37.5 mm)	68	
1" (25.0 mm)	18	
3/4" (19.0 mm)	2	
1/2" (12.5 mm)	1	
3/8" (9.5 mm)	1	
No. 4 (4.75 mm)	1	
No. 8 (2.36 mm)	1	
No. 16 (1.18 mm)	1	
Νο. 30 (600 μm)	1	
Νο. 50 (300 μm)	1	
Νο. 100 (150 μm)	1	
No. 200 (75 μm)	1.1	
e to Degradation of Coarse Aggregate by	17.30%	50 Ma
e to Degradation of Coarse Aggregate by in the Micro-Deval Apparatus (CP-L 421		50 Ma
te to Degradation of Coarse Aggregate by in the Micro-Deval Apparatus (CP-L 421 Micro-Deval Abrasion Loss, Gradation A	9.40%	
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**Project:** 2025 Premier Stone - Laboratory Testing of 2-Inch Minus Aggregate

Date Received:January 8, 2025Project No.:1255003ADate:January 2025



## EARTH ENGINEERING CONSULTANTS, LLC

Summary of Laboratory Testing 2025 Premier Stone - Laboratory Testing of Size 57 Aggregate

	OT 11 / ASTM C 136 & C	11/1	<b>Specifications</b>
Sieve Size	% Passing		ASTM C33
	C		Size 57 Aggrega
2" (50.0 mm)	100		
1 1/2" (37.5 mm)	100		100
1" (25.0 mm)	99		95 - 100
3/4" (19.0 mm)	74		
1/2" (12.5 mm)	6		25 - 60
3/8" (9.5 mm)	5		
No. 4 (4.75 mm)	4		0 - 10
No. 8 (2.36 mm)	4		0 - 5
No. 16 (1.18 mm)	4		
No. 30 (600 μm)	4		
No. 50 (300 μm)	4		
No. 100 (150 μm)	3		
No. 200 (75 μm)	1.9		
ce to Degradation of Small Size Con and Impact in the Los Angeles M Los Angeles Abrasion Loss, Gradin	achine (AASHTO T 96 / A g A	17.30%	50 Max.
and Impact in the Los Angeles M Los Angeles Abrasion Loss, Gradin ce to Degradation of Coarse Aggre	achine (AASHTO T 96 / Ag A		50 Max.
and Impact in the Los Angeles M Los Angeles Abrasion Loss, Gradin ce to Degradation of Coarse Aggre in the Micro-Deval Apparatus (C	achine (AASHTO T 96 / Ag A g A gate by P-L 4211)	17.30%	
and Impact in the Los Angeles M Los Angeles Abrasion Loss, Gradin ce to Degradation of Coarse Aggre	achine (AASHTO T 96 / Ag A g A gate by P-L 4211)		50 Max.
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and Impact in the Los Angeles M Los Angeles Abrasion Loss, Gradin ce to Degradation of Coarse Aggre in the Micro-Deval Apparatus (C Micro-Deval Abrasion Loss, Gradat Gravity and Absorption (AASHTO Bulk Specific Gravity: Bulk Specific Gravity @ SSD: Apparent Specific Gravity:	achine (AASHTO T 96 / Ag A g A gate by P-L 4211) tion A	9.40%  9.27 & C 128)  2.56  2.58  2.62	
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and Impact in the Los Angeles M Los Angeles Abrasion Loss, Gradin ce to Degradation of Coarse Aggre in the Micro-Deval Apparatus (C Micro-Deval Abrasion Loss, Gradat Gravity and Absorption (AASHTO Bulk Specific Gravity: Bulk Specific Gravity @ SSD: Apparent Specific Gravity: Absorption:  ses of Aggregate by Use of Magnesi	achine (AASHTO T 96 / Ag A g A  gate by P-L 4211) tion A D T 84 & T 85 / ASTM C I	9.40%  9.40%  27 & C 128) 2.56 2.58 2.62 0.95%  04 / ASTM C88)	18% Max.
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<1%

**Project:** 2025 Premier Stone - Laboratory Testing of Size 57 Aggregate

Clay Lumps and Friable Particles (AASHTO T 112 / ASTM C142)

Clay Lumps and Friable Particles

Date Received:January 8, 2025Project No.:1255003ADate:January 2025



3.0% Max.

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Potential Alkali-Silica Reactivity of Aggregates (Mortar-Bar Method) (ASTM C1567)

### **Mortar Composition**

Cement: Mountain Type I/II	440 g	Premier Stone with Mountain Type I/II Cement		
Aggregate: Premier Stone - Crushed / Process Aggregates	990 g	Cement Autoclave Expansion <sup>1</sup>	0.02 %	
Aggregate 2:	0 g	Cement Equivalent Alkalies <sup>1</sup>	0.6	
Water	207 g	<sup>1</sup> Autoclave expansion and equivalent alkalis provided by supplier.		

#### **Longitudinal Expansion**

	<u>L(</u>					Longitu
Cure Time	Bar	Reading	Ref. Bar	Rel. Length	Change	Average Change
		(mm)	(mm)	(mm)	(%)	(%)
	1	7.654	8.006	0.352		
Initial	2	7.886	8.006	0.120		
	3	7.778	8.006	0.228		
	1	7.854	8.012	0.158		
Zero	2	8.082	8.012	-0.070		
	3	7.980	8.012	0.032		
	1	7.870	8.012	0.142	0.006	
3 Day	2	8.098	8.012	-0.086	0.006	0.01
	3	7.994	8.012	0.018	0.006	
	1	8.014	8.000	-0.014	0.069	
7 Day	2	8.248	8.000	-0.248	0.071	0.07
	3	8.150	8.000	-0.150	0.073	
	1	8.174	8.002	-0.172	0.132	
10 Day	2	8.408	8.002	-0.406	0.134	0.13
	3	8.308	8.002	-0.306	0.135	

IA	pansion						
	Cure Time	Bar	Reading	Ref. Bar	Rel. Length	Change	Average Change
			(mm)	(mm)	(mm)	(%)	(%)
		1	8.336	8.010	-0.326	0.194	
	14 Day	2	8.586	8.010	-0.576	0.202	0.20
		3	8.474	8.010	-0.464	0.198	

Effective Gauge Length (mm) = 250

**Length Change of Mortar Bars** 0.20 0.18 0.16 0.14 Length Change (%) 0.12 0.10 0.08 0.06 0.04 0.02 0.00 2 0 4 6 10 12 14 Days —Bar 2 Bar 3 — Bar 1

Project: Premier Stone - Minus 2-inch and Size 67 Aggregates

Project No.: 1255003A Date: January 2025

