January 24, 2025

EARTH ENGINEERING CONSULTANTS, LLC

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

Attn: Mr. Bret Ludwick (bret@premierstone.org)

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

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EARTH ENGINEERING CONSULTANTS, LLC

Summary of Laboratory Testing

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

Sieve Analysis (AASHTO T 27 & AASHTO T 11 / ASTM C 136 & C 117)

Sieve Size	% Passing	Specifications
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	
No. 30 (600 µm)	1	
No. 50 (300 µm)	1	
No. 100 (150 µm)	1	
No. 200 (75 µm)	1.1	

Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine (AASHTO T 96 / ASTM C 131)

Los Angeles Abrasion Loss, Grading A	17.30%	50 Max.

Resistance to Degradation of Coarse Aggregate by Abrasion in the Micro-Deval Apparatus (CP-L 4211)

Micro-Deval Abrasion Loss, Gradation A	9.40%	18% Max.

Specific Gravity and Absorption (AASHTO T 84 & T 85 / ASTM C 127 & C 128)

Bulk Specific Gravity:	2.56
Bulk Specific Gravity @ SSD:	2.58
Apparent Specific Gravity:	2.62
Absorption:	0.95%

Soundness of Aggregate by Use of Magnesium Sulfate (AASHTO T 104 / ASTM C88)

Loss After Five (5) Cycles - Course Aggregate	0.28%	15% Max.

Lightweight Pieces in Aggregate (AASHTO T 113 / ASTM C123)

Specific Gravity of Heavy Liquid = 2.0		
Lightweight Pieces	<0.1%	
Coal and Lignite (% of Total Lightweights)	None	0.25% Max.

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

Clay Lumps and Friable Particles	<1%	3.0% Max.

Project: 2025 Premier Stone - Laboratory Testing of 2-Inch Minus Aggregate
Date Received: January 8, 2025
Project No.: 1255003A
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Summary of Laboratory Testing

2025 Premier Stone - Laboratory Testing of Size 57 Aggregate

Sieve Analysis (AASHTO T 27 & AASHTO T 11 / ASTM C 136 & C 117)

Sieve Size	% Passing	Specifications ASTM C33 Size 57 Aggregate
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	

Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine (AASHTO T 96 / ASTM C 131)

Los Angeles Abrasion Loss, Grading A	17.30%	50 Max.

Resistance to Degradation of Coarse Aggregate by Abrasion in the Micro-Deval Apparatus (CP-L 4211)

Micro-Deval Abrasion Loss, Gradation A	9.40%	18% Max.

Specific Gravity and Absorption (AASHTO T 84 & T 85 / ASTM C 127 & C 128)

Bulk Specific Gravity:	2.56
Bulk Specific Gravity @ SSD:	2.58
Apparent Specific Gravity:	2.62
Absorption:	0.95%

Soundness of Aggregate by Use of Magnesium Sulfate (AASHTO T 104 / ASTM C88)

Loss After Five (5) Cycles - Course Aggregate	0.28%	15% Max.

Lightweight Pieces in Aggregate (AASHTO T 113 / ASTM C123)

Specific Gravity of Heavy Liquid = 2.0		
Lightweight Pieces	<0.1%	
Coal and Lignite (% of Total Lightweights)	None	0.25% Max.

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

Clay Lumps and Friable Particles	<1%	3.0% Max.

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

Mortar Composition

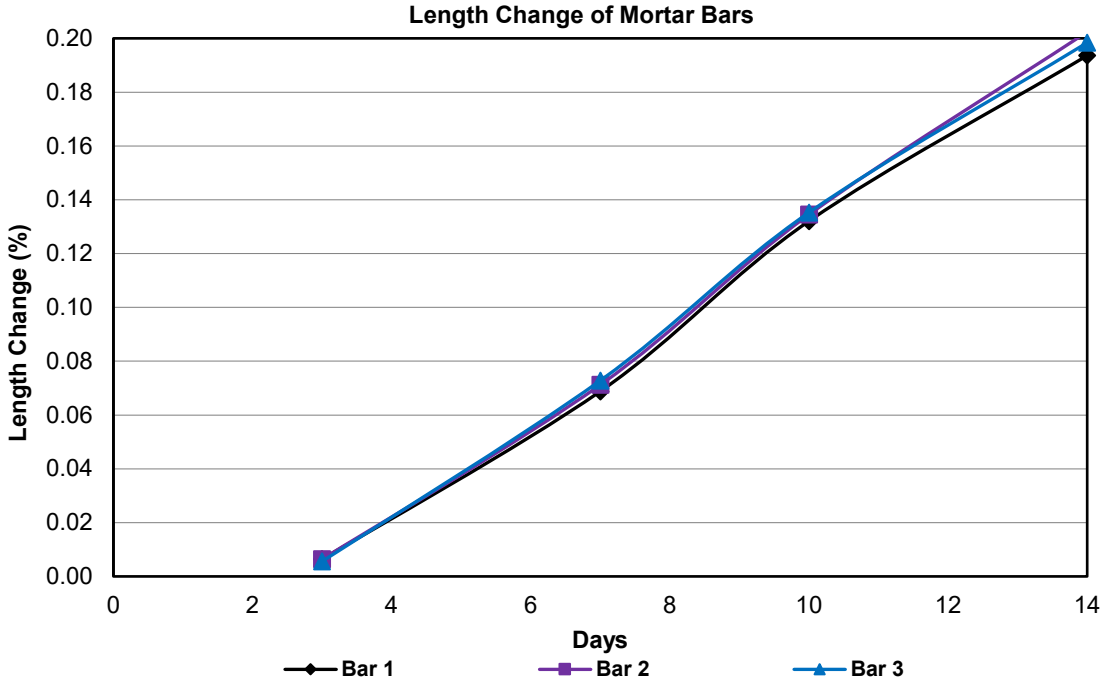
Cement: Mountain Type I/II	440 g	Premier Stone with Mountain Type I/II Cement	
Aggregate: Premier Stone - Crushed / Process Aggregates	990 g	Cement Autoclave Expansion[1]	0.02 %
Aggregate 2:	0 g	Cement Equivalent Alkalies[1]	0.6
Water	207 g		

[1]Autoclave expansion and equivalent alkalis provided by supplier.

Longitudinal Expansion

Cure Time	Bar	Reading (mm)	Ref. Bar (mm)	Rel. Length (mm)	Change (%)	Average Change (%)
Initial	1	7.654	8.006	0.352	--	--
	2	7.886	8.006	0.120	--	
	3	7.778	8.006	0.228	--	
Zero	1	7.854	8.012	0.158	--	--
	2	8.082	8.012	-0.070	--	
	3	7.980	8.012	0.032	--	
3 Day	1	7.870	8.012	0.142	0.006	0.01
	2	8.098	8.012	-0.086	0.006	
	3	7.994	8.012	0.018	0.006	
7 Day	1	8.014	8.000	-0.014	0.069	0.07
	2	8.248	8.000	-0.248	0.071	
	3	8.150	8.000	-0.150	0.073	
10 Day	1	8.174	8.002	-0.172	0.132	0.13
	2	8.408	8.002	-0.406	0.134	
	3	8.308	8.002	-0.306	0.135	
14 Day	1	8.336	8.010	-0.326	0.194	0.20
	2	8.586	8.010	-0.576	0.202	
	3	8.474	8.010	-0.464	0.198	

Effective Gauge Length (mm) = 250



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

Project No.: 1255003A

Date: January 2025