



Kumar & Associates, Inc.®
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An Employee Owned Company

Office Locations: Denver (HQ), Parker, Colorado Springs, Fort Collins, Glenwood Springs, and Summit County, Colorado

July 17, 2024

Colorado Aggregate Recycling

Attn: Matt Bustamante

8900 Highway 93, Unit A

Golden, Colorado 80403

Subject: Laboratory Test Results, Class 6 Aggregate Base Course/Recycled Concrete,
2024 Colorado Aggregate Recycling, Colorado Springs Pit, Colorado

Project No. 24-1-457

Dear Mr. Bustamante:

Attached are the results of laboratory testing performed on a bulk sample of aggregate submitted to our Denver laboratory by a representative of Colorado Aggregate Recycling. The sample was assigned Kumar & Associates, Inc. (K+A) laboratory sample number 3499. We understand the sample was requested to be tested to evaluate the material's suitability to be classified as CDOT Class 6 aggregate base course (ABC). The sample originated from Colorado Aggregate Recycling's Colorado Springs Pit. Laboratory testing was performed to determine the material classification parameters, including Atterberg Limits, gradation, and moisture-density relationships (modified Proctor). R-Value (Hveem-stabilometer) and Los Angeles Abrasion testing were also performed. The results of the testing are summarized in the attached Table and figures.

Based on the testing results, the submitted sample meets the gradation and Atterberg limit specifications for Class 6 ABC presented on Table 703-2 in the Colorado Department of Transportation's (CDOT) 2023 *Standard Specifications for Road and Bridge Construction*. The testing indicated the material had an R-value of 78 at an exudation pressure of 300 psi and a 38% loss as evaluated by the Los Angeles Abrasion test.

If you have questions or need further information, please call.

Sincerely,
KUMAR & ASSOCIATES, INC.

Justin Cupich, P.E.



JDC/ad
Attachments
cc: file



Office Locations: Denver (HQ), Parker, Colorado Springs, Fort Collins, Glenwood Springs and Summit County, Colorado

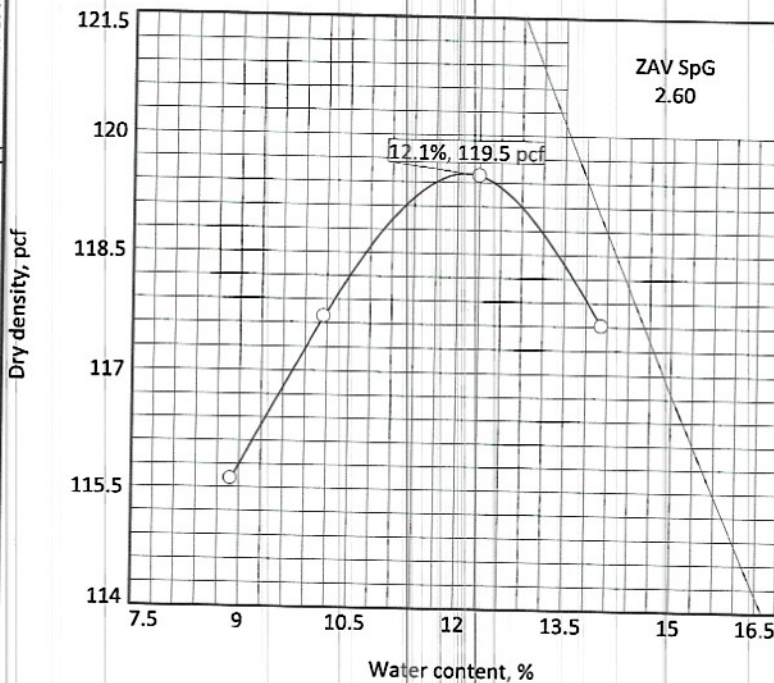
TABLE 1
SUMMARY OF LABORATORY TEST RESULTS
COLORADO SPRINGS PIT

PROJECT NO.: 24-1-457
PROJECT NAME: 2024 COLORADO AGGREGATE RECYCLING LABORATORY TESTING
DATE RECEIVED: 6/19/2024

SAMPLE NO.	DATE TESTED	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE CONTENT (%)	GRADATION		PERCENT PASSING NO. 200 SIEVE	ATTERBERG LIMITS			R-VALUE @ 300 PSI	LOS ANGELES ABRASION (ASTM C-131)		SOIL OR BEDROCK TYPE
				GRAVEL (%)	SAND (%)		LIQUID LIMIT (%)	PLASTICITY INDEX (%)			GRADING	PERCENT LOSS (%)	
3499	6/26/24	119.5	12.1	46	50	4	NV	NP		78	B	38	WELL-GRADED SAND WITH GRAVEL (RECYCLED CONCRETE)

COMPACTION TEST REPORT

Curve No. 3499



Preparation Method

Rammer: Wt. 10 lb. Drop 18 in.

Type Manual

Layers: No. five Blows per 56

Mold Size 0.075 cu. ft.

Test Performed on Material

Passing 3/4 in. Sieve

%>3/4 in. 0 %<No.200 4.5

Atterberg (D 4318): LL NV PI NP

NM (D 2216) Sp.G. (D 854) 2.6

USCS (D 2487) SW

AASHTO (M 145) A-1-a

Date: Sampled 6/19/24

Received 6/19/24

Tested 6/26/24

Tested By AS

COMPACTION TESTING DATA AASHTO T 180-22 Method D Modified

	1	2	3	4	5	6
WM + WS	10762.0	10890.0	11045.0	11042.0		
WM	6474.0	6474.0	6474.0	6474.0		
WW + T #1	498.3	610.2	759.2	712.2		
WD + T #1	470.2	567.9	708.7	648.6		
TARE #1	154.0	151.6	298.3	195.1		
WW + T #2						
WD + T #2						
TARE #2						
MOIST.	8.9	10.2	12.3	14.0		
DRY DENS.	115.6	117.7	119.5	117.6		

SIEVE TEST RESULTS

Opening Size	% Passing	Specs.
3/4"	100	95-100
3/8"	74	
#4	54	30-65
#8	40	25-55
#16	29	
#30	20	
#50	13	
#100	8	
#200	4.5	3-12

TEST RESULTS

Maximum dry density = 119.5 pcf

Optimum moisture = 12.1 %

Project No. 24-1-457 Client: Colorado Aggregate Recycling

Project: Colorado Aggregate Recycling 2024 Laboratory Testing

Loc.: Colorado Springs Pit - ABC Class 6 (Recycled Concrete)

Kumar & Associates, Inc.

Denver, Colorado

Material Description

well-graded sand with gravel

Remarks:

Checked by: JJM

Title: Lab Manager

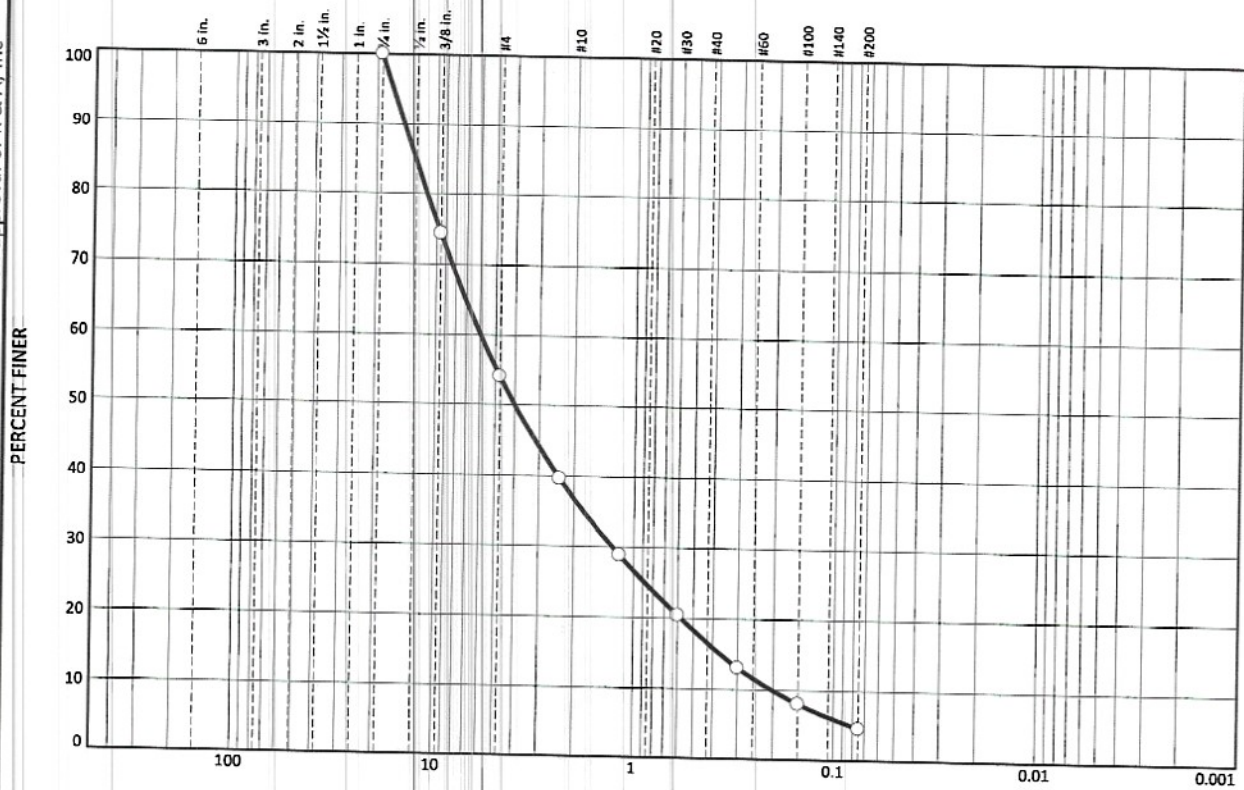
Figure

These test results apply only to the samples which were tested. The testing report shall not be reproduced, except in full, without the written approval of K & A, Inc.

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Particle Size Distribution Report

AASHTO T 27 & T 11



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	46	17	20	13	4	

Test Results (AASHTO T 27 & T 11)				
Sieve Size or Diam. (mm.)	Finer (%)	Spec. * (%)	Out of Spec. (%)	Pct. of Fines
3/4"	100	95-100		
3/8"	74			
#4	54	30-65		
#8	40	25-55		73
#16	29			53
#30	20			38
#50	13			24
#100	8			15
#200	4.5	3-12		8.3

* CDOT - ABC Class 6

Material Description

well-graded sand with gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Classification

USCS= SW AASHTO= A-1-a

Test Remarks

Location: Colorado Springs Pit - ABC Class 6 (Recycled Concrete)
Sample Number: 3499

Sample Date: 6/19/24

Kumar & Associates, Inc.

Denver, Colorado

Client: Colorado Aggregate Recycling
Project: Colorado Aggregate Recycling 2024 Laboratory Testing

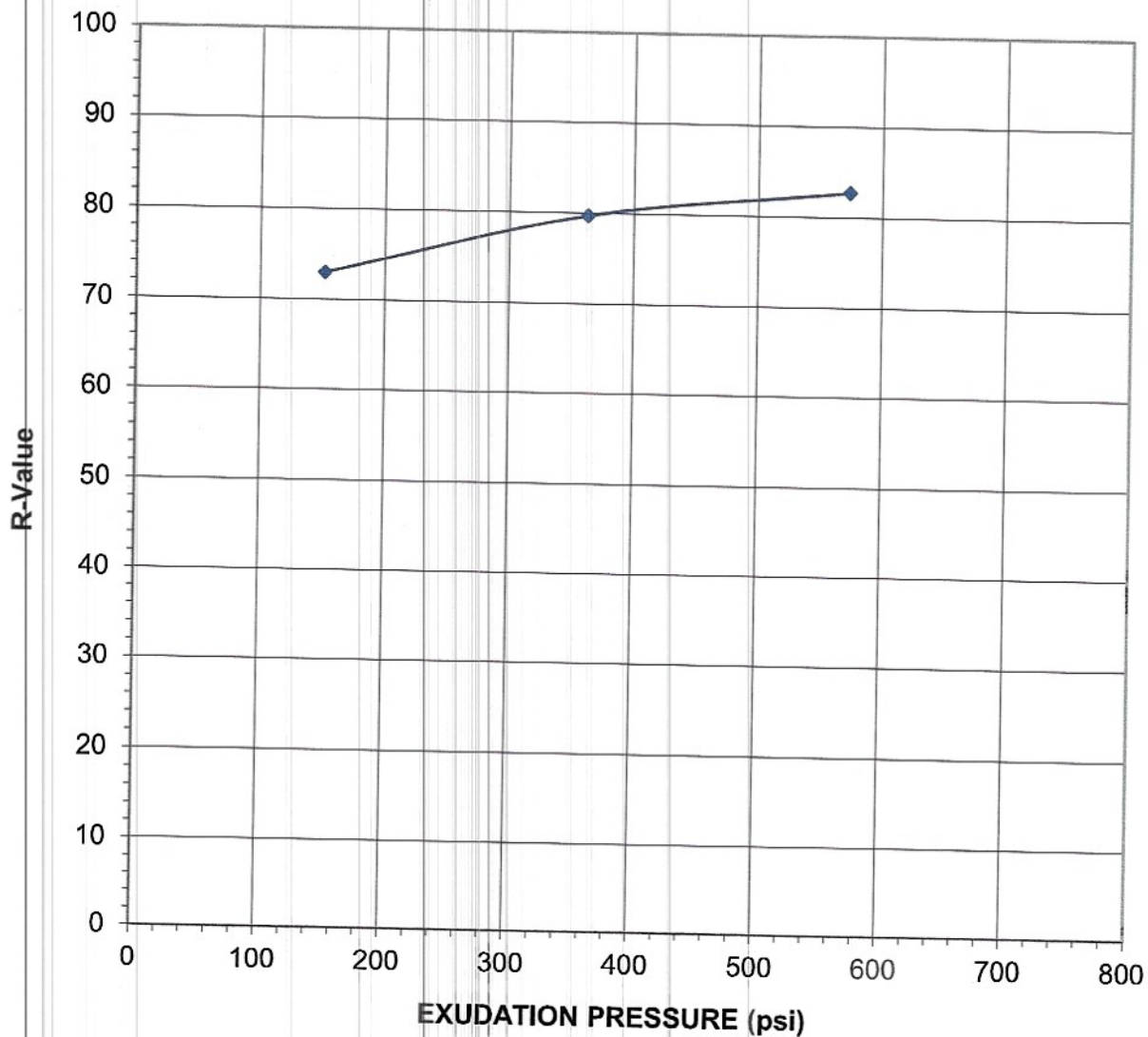
Project No: 24-1-457

Figure

Tested By: JF Checked By: JJM

R-VALUE

TEST SPECIMEN	1	2	3	4	R-VALUE (300 psi)
MOISTURE CONTENT (%)	11.2	12.6	13.4		78
DENSITY (pcf)	118.8	113.4	112.5		
EXPANSION PRESSURE (psi)	0.000	0.000	0.000		
EXUDATION PRESSURE (psi)	573	363	152		
R-VALUE	83	80	73		



SOIL TYPE: Well-Graded Sand with Gravel

LOCATION: ABC Class 6 Recycled Concrete Pile - CO Springs Pit

DATE SAMPLED: 6/19/24

DATE RECEIVED: 6/19/24

DATE TESTED: 6/26/24

GRAVEL: 46

SAND: 50

SILT AND CLAY: 4

LIQUID LIMIT: NV

PLASTICITY INDEX: NP

These test results apply to the samples which were tested. The testing report shall not be reproduced, except in full, without the written approval of Kumar & Associates, Inc. R-value performed in accordance with ASTM D2844. Atterberg limits performed in accordance with ASTM D4318. Sieve analyses performed in accordance with ASTM D422, D1140

24-1-457

KUMAR & ASSOCIATES

HVEEM STABILOMETER TEST RESULTS

3499