



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 23, 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, Golden Pit, Colorado

Project No. 24-1-457

Dear Mr. Bustamante:

Attached are the results of laboratory testing performed on a bulk sample of recycled concrete 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 3503. 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 Golden 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 80 at an exudation pressure of 300 psi and a 37% loss as evaluated by the Los Angeles Abrasion test. Based on the laboratory testing, the sample was classified as poorly graded sand with silt and gravel (SP-SM) and A-1-a soil per the USCS and AASHTO soil classification systems, respectively.

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

Sincerely,
KUMAR & ASSOCIATES, INC.
Justin Cupich, P.E.



JDC/mm
Attachments
cc: File



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

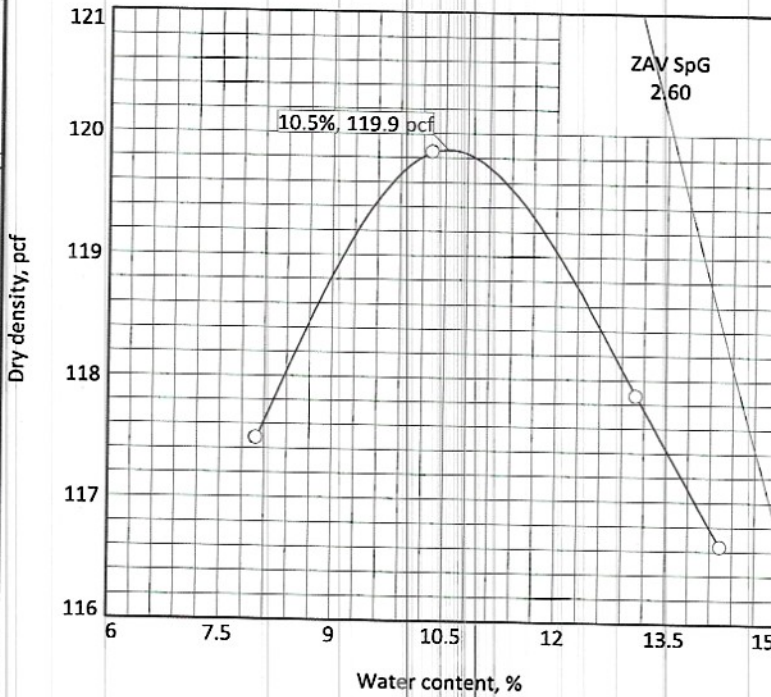
TABLE 1
SUMMARY OF LABORATORY TEST RESULTS
GOLDEN PIT

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

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 (%)	
3503	7/18/24	119.9	10.5	44	49	7	NV	NP	80	B	37	POORLY GRADED SAND WITH SILT AND GRAVEL (RECYCLED CONCRETE)

COMPACTION TEST REPORT

Curve No. 3503



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	6.7
Atterberg (D 4318): LL	NV	PI	NP
NM (D 2216)		Sp.G. (D 854)	2.6
USCS (D 2487)	SP-SM		
AASHTO (M 145)	A-1-a		
Date: Sampled	6/24/24		
Received	6/24/24		
Tested	7/18/24		
Tested By	AS		

COMPACTION TESTING DATA
AASHTO T 180-22 Method D Modified

	1	2	3	4	5	6
WM + WS	10796.0	10978.0	11015.0	11013.0		
WM	6474.0	6474.0	6474.0	6474.0		
WW + T #1	529.0	517.2	693.0	559.3		
WD + T #1	501.2	483.2	640.0	508.8		
TARE #1	153.6	154.0	235.4	154.3		
WW + T #2						
WD + T #2						
TARE #2						
MOIST.	8.0	10.3	13.1	14.2		
DRY DENS.	117.5	119.8	117.9	116.6		

SIEVE TEST RESULTS

Opening Size	% Passing	Specs.
1"	100	100
3/4"	100	95-100
3/8"	75	
#4	56	30-65
#8	49	25-55
#16	40	
#30	29	
#50	19	
#100	12	
#200	6.7	3-12

TEST RESULTS

Maximum dry density = 119.9 pcf

Optimum moisture = 10.5 %

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

Project: Colorado Aggregate Recycling 2024 Laboratory Testing

Loc.: Golden Pit - ABC Class 6 (Recycled Concrete) Sample No.: 3503

Kumar & Associates, Inc.

Denver, Colorado

Material Description

poorly graded sand with silt and gravel

Remarks:

Checked by: JJM

Title: Lab Manager

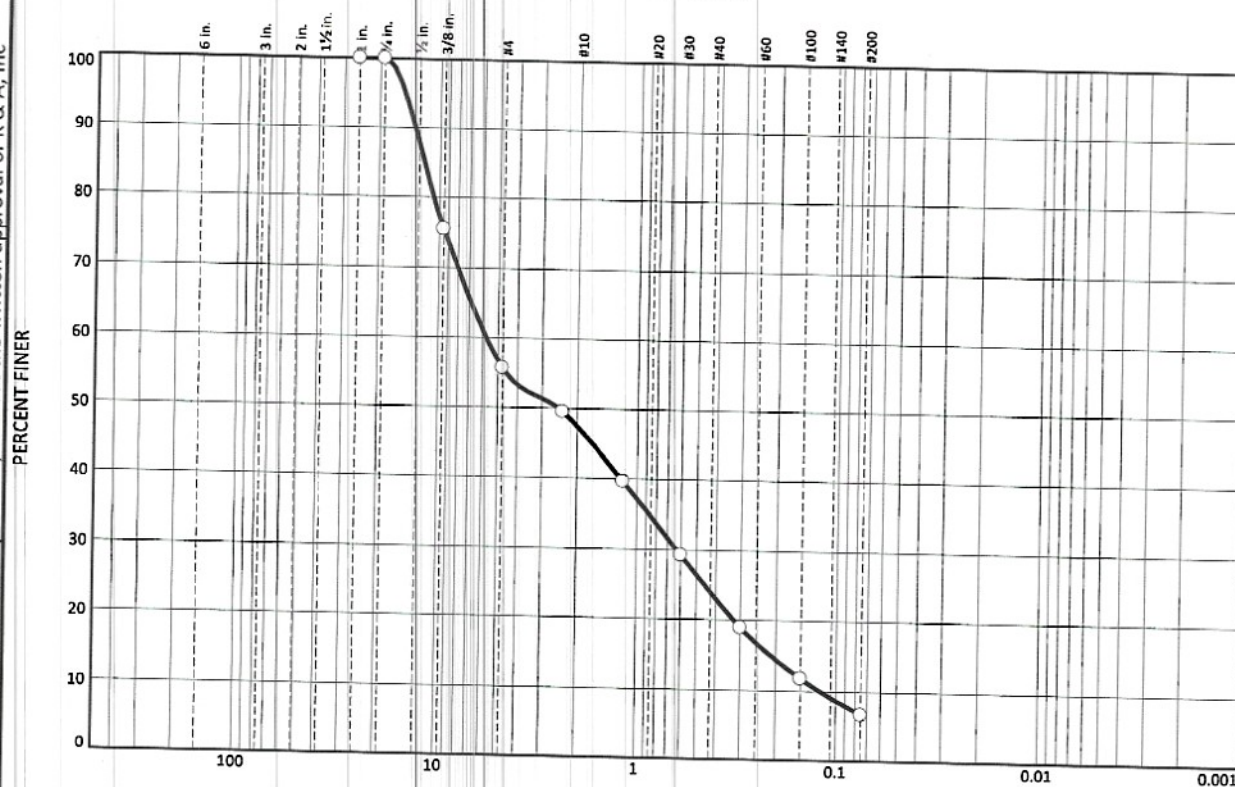
Figure

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"

0

% Gravel

Coarse

0

Fine

44

% Sand

Coarse

9

Medium

23

Fine

17

% Fines

Silt

7

Clay

Test Results (AASHTO T 27 & T 11)

Sieve Size or Diam. (mm.)	Finer (%)	Spec. * (%)	Out of Spec. (%)	Pct. of Fines
1"	100	100		
3/4"	100	95-100		
3/8"	75			
#4	56	30-65		
#8	49	25-55		89
#16	40			71
#30	29			53
#50	19			34
#100	12			21
#200	6.7	3-12		12

* CDOT - ABC Class 6

Location: Golden Pit - ABC Class 6 (Recycled Concrete)
Sample Number: 3503

Material Description

poorly graded sand with silt and gravel

PL= NP

Atterberg Limits

LL= NV

PI= NP

USCS= SP-SM

Classification

AASHTO= A-1-a

Test Remarks

Sample Date: 6/24/24

Kumar & Associates, Inc.

Denver, Colorado

Client: Colorado Aggregate Recycling

Project: Colorado Aggregate Recycling 2024 Laboratory Testing

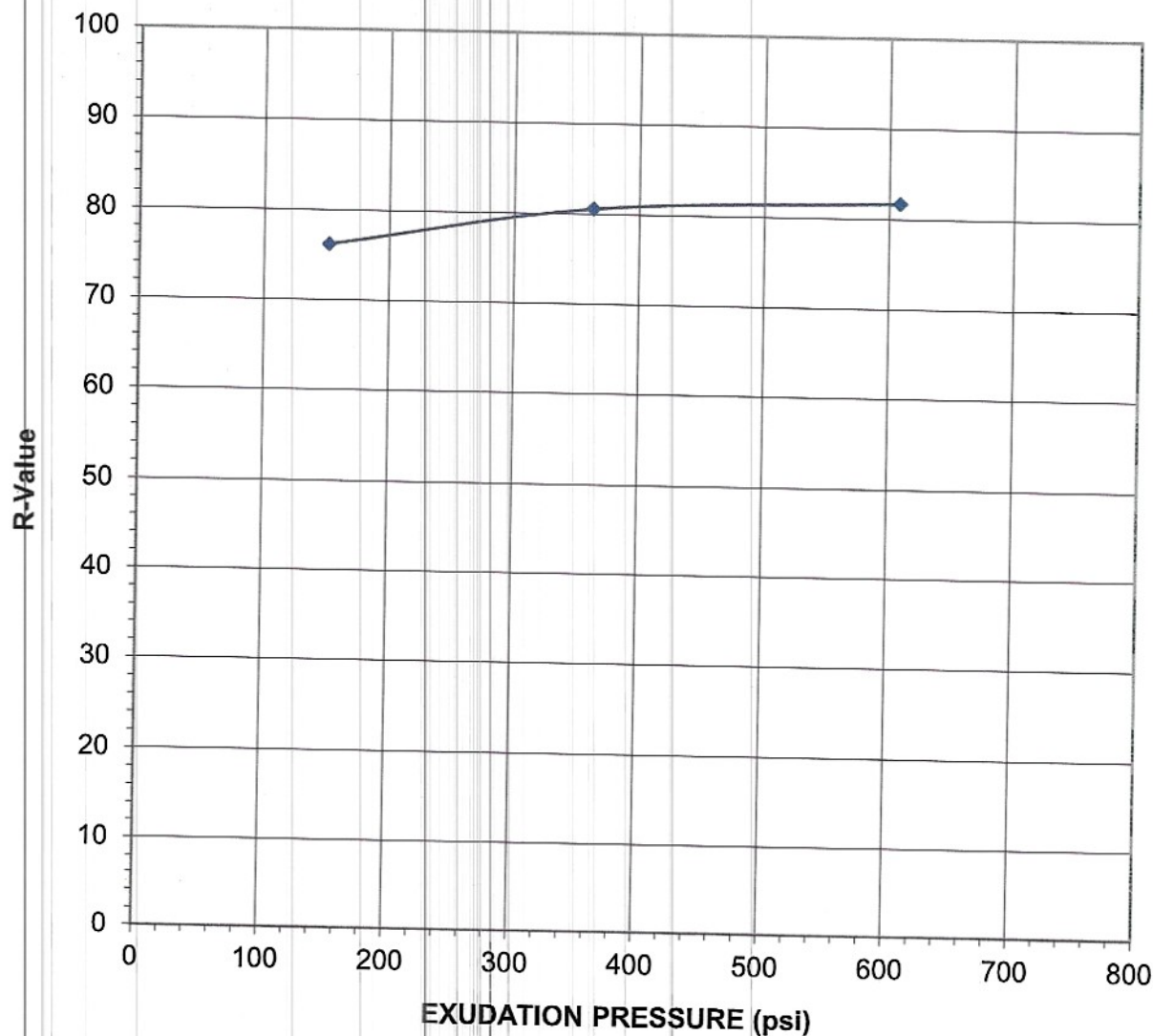
Project No: 24-1-457

Figure

Tested By: HS

Checked By: JJM

R-VALUE					
TEST SPECIMEN	1	2	3	4	R-VALUE (300 psi)
MOISTURE CONTENT (%)	10.8	11.6	12.5		80
DENSITY (pcf)	118.2	118.0	118.0		
EXPANSION PRESSURE (psi)	0.000	0.000	0.000		
EXUDATION PRESSURE (psi)	608	363	152		
R-VALUE	82	81	76		



SOIL TYPE: Poorly Graded Sand with Silt and Gravel

LOCATION: ABC Class 6 Recycled Concrete Pile - Golden Pit

DATE SAMPLED: 6/24/24

DATE RECEIVED: 6/24/24

DATE TESTED: 7/18/24

GRAVEL: 44

SAND: 49

SILT AND CLAY: 7

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

3503