Kumar & Associates, Inc.®
Geotechnical and Materials Engineers
and Environmental Scientists

2390 South Lipan Street
Denver, CO 80223
phone: (303) 742-9700
fax: (303) 742-9666
email: kadenver@kumarusa.com
www.kumarusa.com

An Employee Owned Company

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

January 20, 2022

Matt Bustamante
Colorado Aggregate Recycling
9615 East County Line Road #303
Centennial, Colorado 80112

Subject: Laboratory Test Results, Recycled Concrete and Recycled Asphalt Samples, Foothills Landfill and Golden Pit Stockpile, Respectively

Project No. 21-1-235

Dear Mr. Bustamante:

Attached are the results of testing performed on two lab samples submitted to our laboratory of recycled concrete and recycled asphalt (Kumar Lab Sample Nos. 1822 and 1823, respectively) obtained from the Foothills Landfill and Golden Pit Stockpile locations, respectively. Testing was performed to determine soil classification parameters, including Atterberg Limits, gradation and moisture-density relationship (modified Proctor). Additional testing performed on the sample of recycled concrete included R-Value (Hveem stabilometer) and L.A. Abrasion. The results of the tests are summarized in the attachments.

Based on the test results, the submitted sample of recycled concrete conforms to the gradation requirements for Class 6 Aggregate Base Course presented on Table 703-2 in the Colorado Department of Transportation's (CDOT) 2021 *Standard Specifications for Road and Bridge Construction*.

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

Sincerely,

KUMAR & ASSOCIATES, INC.

Ryan R. Kumar, P.E.

RRK/ma
Attachments
cc: file

Kumar & Associates, Inc.
Geotechnical and Materials Engineers
and Environmental Scientists

ACEC
MEMBER

2390 South Lipan Street
Denver, CO 80223
phone: (303) 742-9700
fax: (303) 742-9666
e-mail: kadenver@kumarusa.com
www.kumarusa.com

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

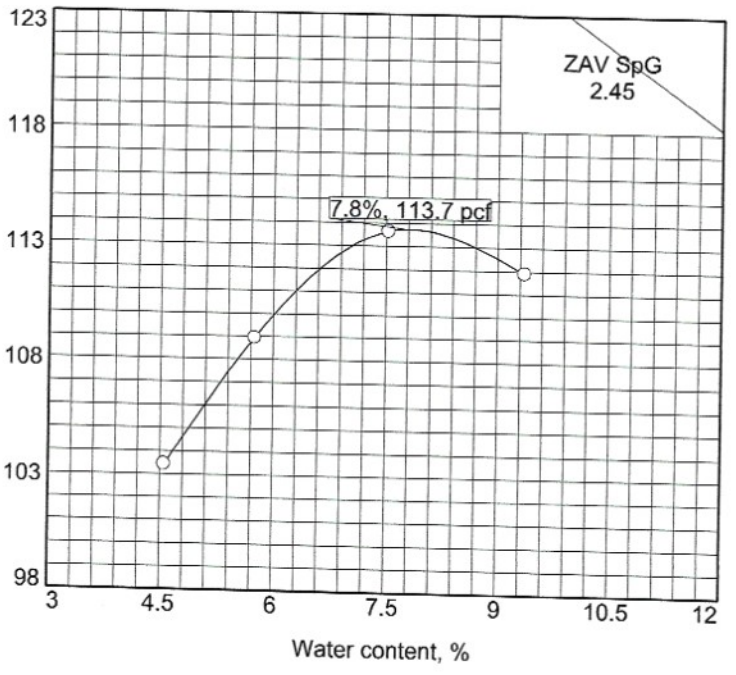
TABLE 1
SUMMARY OF LABORATORY TEST RESULTS

PROJECT NO.: 21-1-235
PROJECT NAME: COLORADO AGGREGATE RECYCLING
DATE SAMPLED: 12-20-21
DATE RECEIVED: 12-20-21

SAMPLE LOCATION	DATE TESTED	GRADATION		PERCENT PASSING No. 200 SIEVE	ATTERBERG LIMITS		WATER SOLUBLE SULFATES (%)	AASHTO T180 METHOD D		ASTM C131 METHOD B LOS ANGELES ABRASION PERCENT LOSS	ASTM D2844 R-VALUE @ 300 psi	SOIL OR BEDROCK TYPE
		GRAVEL (%)	SAND (%)		LIQUID LIMIT (%)	PLASTICITY INDEX (%)		MDD pcf	OMC (%)			
FOOTHILLS LANDFILL	01-03	49	46	4.9	NV	NP	0.11	113.7	7.8	22.5	82	CLASS 6 ABC/RECYCLED CONCRETE WELL-GRADED GRAVEL WITH SAND (GW) A-1-a
GOLDEN PIT STOCKPILE	12-22	64	34	2.1	NV	NP		123.0	6.4			RECYCLED ASPHALT WELL-GRADED GRAVEL WITH SAND (GW) A-1-a

COMPACTION TEST REPORT

Curve No. 1822



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 4.9

Atterberg (D 4318): LL NV PI NP

NM (D 2216) Sp.G. (D 854) 2.45

USCS (D 2487) GW

AASHTO (M 145) A-1-a

Date: Sampled 12/20/21

Received 12/20/21

Tested 01/03/22

Tested By JP

COMPACTION TESTING DATA
AASHTO T 180-10 Method D Modified

	1	2	3	4	5	6
WM + WS	10423.0	10661.0	10667.0	10183.0		
WM	6504.0	6504.0	6504.0	6504.0		
WW + T #1	1446.6	1522.9	1371.9	1681.4		
WD + T #1	1375.8	1426.8	1267.1	1618.2		
TARE #1	144.6	151.1	147.4	230.1		
WW + T #2						
WD + T #2						
TARE #2						
MOIST.	5.8	7.5	9.4	4.6		
DRY DENS.	108.9	113.6	111.9	103.4		

SIEVE TEST RESULTS
AASHTO T27 AASHTO T11

Opening Size	% Passing	Specs.
1"	100	100
3/4"	100	95 - 100
3/8"	77	
#4	51	30 - 65
#8	40	25 - 55
#16	29	
#30	20	
#50	13	
#100	8	
#200	4.9	3.0 - 12

TEST RESULTS

Maximum dry density = 113.7 pcf

Optimum moisture = 7.8 %

Material Description

Class 6 ABC/Recycled Concrete/well-graded gravel with sand

Project No. 21-1-235 **Client:**

Project: Colorado Aggregate Recycling

Remarks:

○ **Location:** Foothills Landfill **Sample Number:** 1822

Kumar & Associates, Inc.

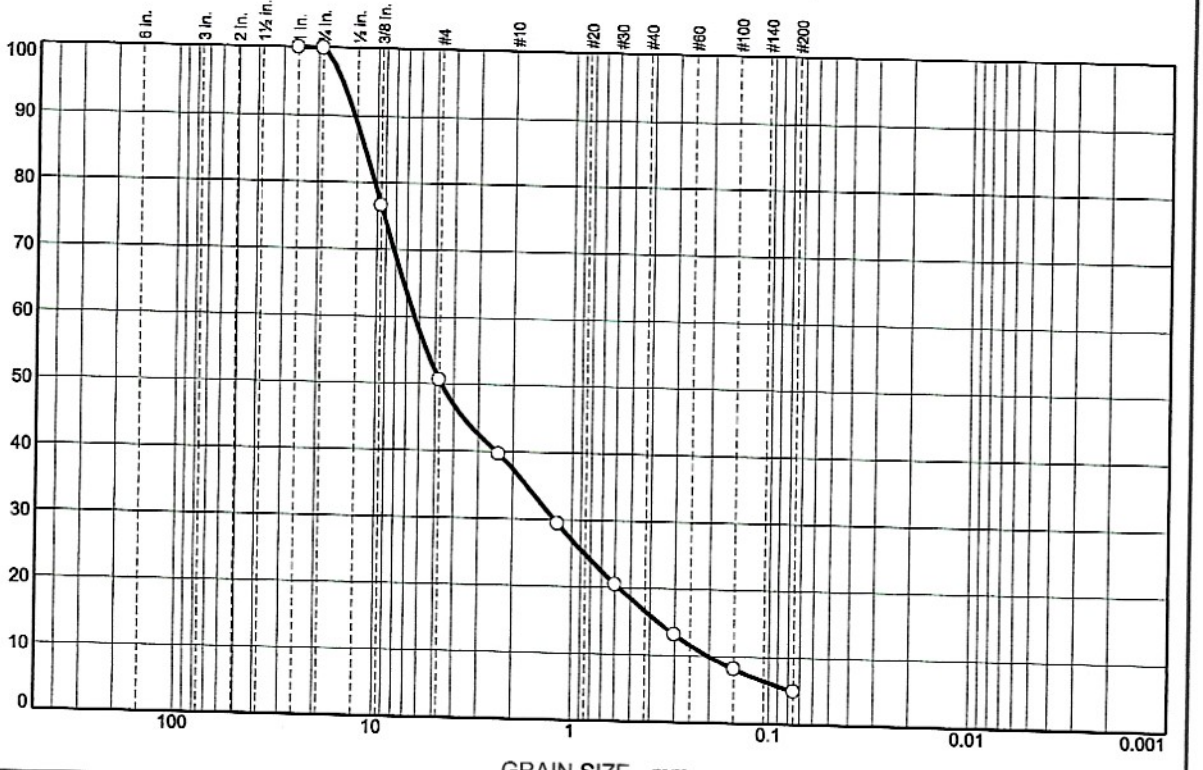
Denver, Colorado

Checked by: DS

Title: Lab Manager

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	49	14	20	12	5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100	100	
3/4"	100	95 - 100	
3/8"	77		
#4	51	30 - 65	
#8	40	25 - 55	
#16	29		
#30	20		
#50	13		
#100	8		
#200	4.9	3.0 - 12	

* AASHTO M 147 Class 6 ABC

Material Description

Class 6 ABC/Recycled Concrete/well-graded gravel with sand

Atterberg Limits

PL= NP LL= NV PI= NP

Classification

USCS= GW AASHTO= A-1-a

Remarks

Location: Foothills Landfill
Sample Number: 1822

Date: 12/20/21

Kumar & Associates, Inc.

Denver, Colorado

Client:

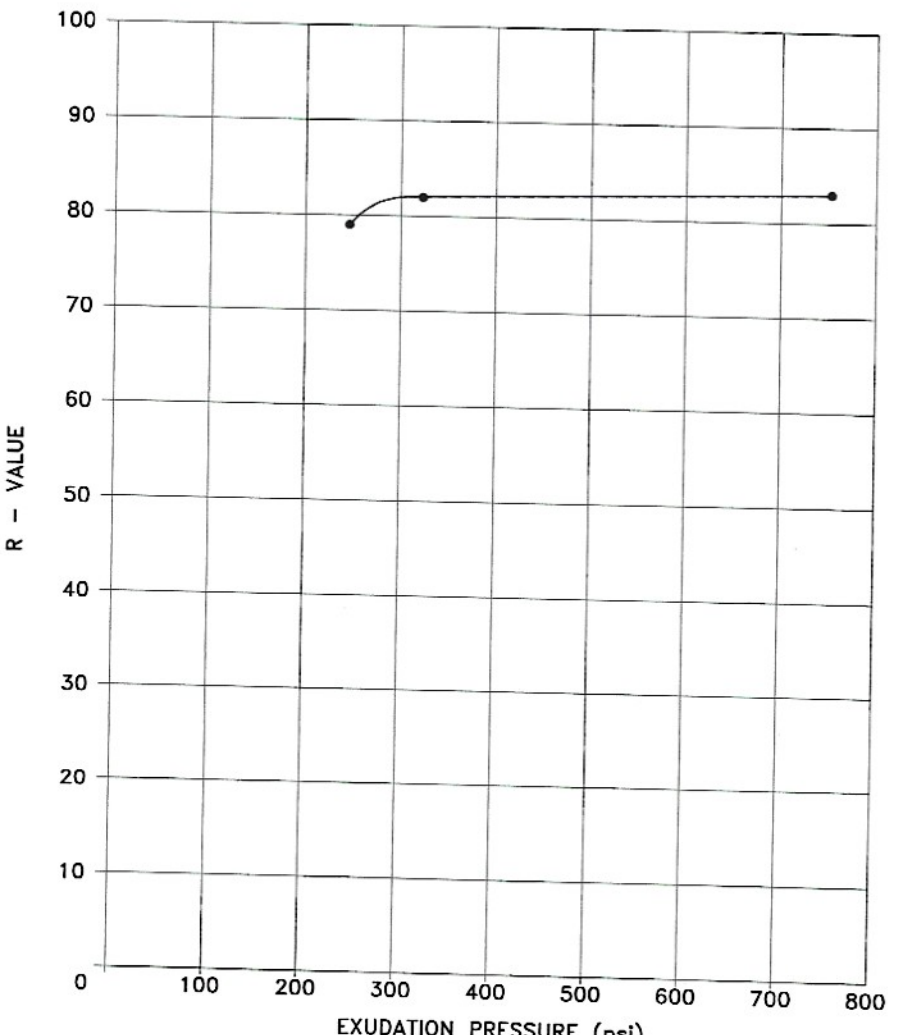
Project: Colorado Aggregate Recycling

Project No: 21-1-235

Figure

Tested By: WP **Checked By:** DS

TEST SPECIMEN	1	2	3	4	R -VALUE (300 psi)
MOISTURE CONTENT (%)	9.9	11.6	13.3		
DENSITY (pcf)	115.3	114.7	110.9		
EXPANSION PRESSURE (psi)	0.000	0.000	0.000		
EXUDATION PRESSURE (psi)	753	323	246		
R VALUE	83	82	79		82



SOIL TYPE: CLASS 6 ABC/RECYCLED CONCRETE/WELL GRADED GRAVEL WITH SAND

LOCATION: COLORADO AGGREGATE RECYCLING/FOOTHILLS LANDFILL

DATE SAMPLED: 12-20-2021 DATE RECEIVED: 12-20-2021 DATE TESTED: 01-10-2022

GRAVEL: 49 % SAND: 46 % SILT AND CLAY: 4.9 %

LIQUID LIMIT: NV PLASTICITY INDEX: NP

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 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.

21-1-235	Kumar & Associates	HVEEM STABILOMETER TEST RESULTS	1822