

# GROUND ENGINEERING

March 2, 2021

Subject: Laboratory Testing  
Services, Delivered Recycled  
Concrete Aggregate Base  
Sample

**Job No. 20-1036**

Mr. Gary Hansen  
**Allied Recycled Aggregates**  
P.O. Box 566  
Commerce City, Colorado 80037

Dear Mr. Hansen,

As requested, material testing was performed on a sample of recycled concrete delivered to GROUND's Commerce City laboratory. A representative of Allied Recycled Aggregates delivered five buckets of material on February 19, 2021. The following tests were completed in general accordance with the listed standards:

- Atterberg Limits (AASHTO T89 and T90)
- Modified Proctor AASHTO T180, Method D)
- Sieve Analysis (ASTM C136 / AASHTO T27)
- R-Value (AASHTO T190 / CP-L 3101)
- Los Angeles Abrasion – Small Size (ASTM C131 / AASHTO T96)

A summary of test results is provided herein. Test results were compared to specifications for CDOT Class 6 Aggregate Base Course and Aurora Type 2 Aggregate Base Course. Based on these test results, the sample meets the respective base course specifications for each agency. Individual test results are also attached.

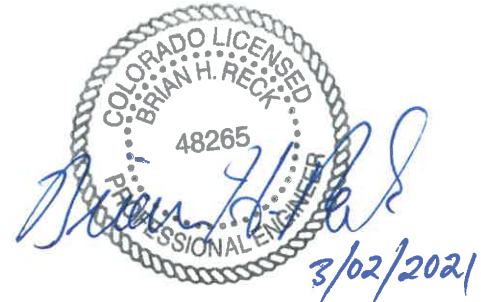
If you have any questions regarding this data, please do not hesitate to contact GROUND's Commerce City office.

**Ground Engineering**

Sincerely,



Evan Kuhn  
Laboratory Supervisor



Brian H. Reck, P.G., C.E.G., P.E.

Ground ID: Soil9781  
 Client Project: C6-21921  
 Client Location: 4082  
 Sample Received: February 19, 2021  
 Description: Recycled Concrete Aggregate Base

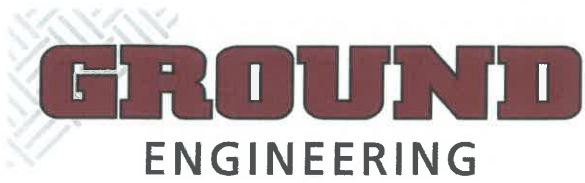
Sieve Analysis Summary:

Sieve	Cumulative Passing (%)	CDOT Class 6	Aurora Type 2
1 in	100	100	100
3/4 in	100	95-100	--
1/2 in	86	--	--
3/8 in	75	--	50-85
No.4	55	30-65	35-65
No. 8	41	25-55	--
No. 10	38	--	25-50
No. 16	29	--	--
No. 30	20	--	--
No. 40	16	--	15-30
No. 50	13	--	--
No. 100	8	--	--
No. 200	4.7	3-12	3-15

Summary of Atterberg Limits (Liquid Limit and Plasticity Index), Modified Proctor (Maximum Dry Density and Optimum Moisture), LA Abrasion (Loss by Abrasion), and R-Value Tests:

Test	Result	CDOT Class 6	Aurora Type 2
Liquid Limit	No Value	30 max.	25 max.
Plasticity Index	Non-plastic	6 max.	15 max.
Max. Dry Density (pcf)	116.9	--	--
Opt. Moisture (%)	12.4	--	--
Loss by Abrasion (%)*	43	50 max.	45 max.
R-Value	80	--	78 min.

Individual test results are attached.



Client: Gary Hansen  
Allied Recycled Aggregates  
7901 Hwy 85  
P.O. Box 566  
Commerce City, CO 80037

### Allied Recycling Laboratory Testing Services

Report Date: Feb 24, 2021

Work Order No.: 20-1036.SoilSampling.0003; ver: 1

Work Order Date: Feb 19, 2021

Reviewed by: Evan Kuhn

#### Soil/Aggregate Laboratory Summary

General Location: CDOT CL6 / Aurora Class 2 Aggregate Base Course

Logged-in by: Evan Kuhn

General Comments: Allied #C6-21921, Location 4082

## Allied Recycling Laboratory Testing Services

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Work Order Date: Feb 19, 2021

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Reviewed by: Evan Kuhn

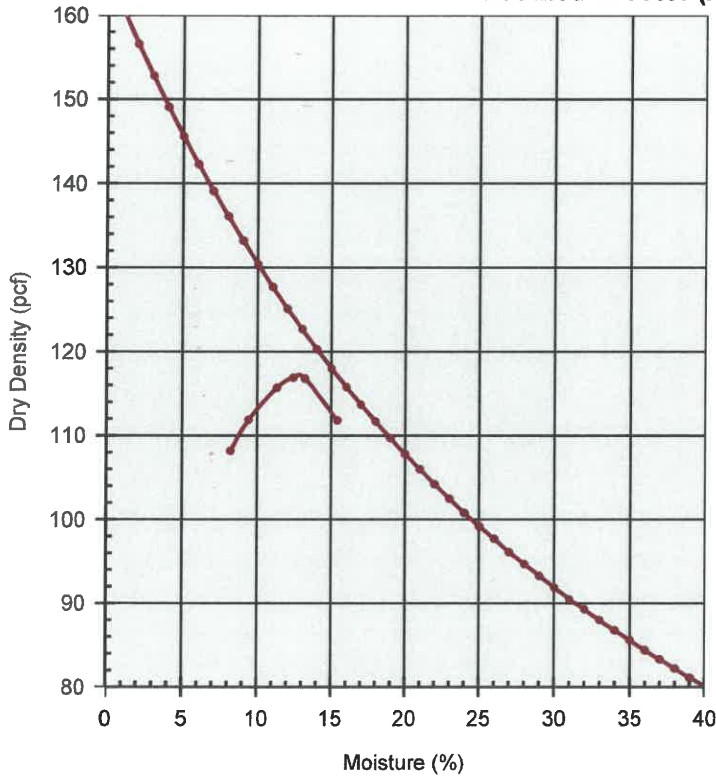
### Soil/Aggregate Laboratory Summary

Sample No.: 4  
Dropped Off By: Client \*Sampling may not be in accordance with reported method.  
Sampling Method: ASTM D75 / AASHTO T2 / CDOT CP30  
Sample Location: CDOT CL6 / Aurora Class 2, Aggregate Base Course  
Lab ID: Soil9781

### Atterberg Limits (AASHTO T89 & T90) and Classification (ASTM D2487 & AASHTO M145)

Method	Liquid Limit		Plastic Limit		Plasticity Index		Classification	
	Value	Spec.	Value	Spec.	Value	Spec.	USCS	AASHTO
Single Point	-	30 max.	NP	-	NP	15 max.	(SP)g	A-1-a (0)

### Modified Proctor (AASHTO T180)



Method	Preparation	Hammer
Method D	Moist Preparation	Manual

Maximum Dry Density (pcf)	Optimum Moisture (%)	Oversize Corrected	
		Maximum Dry Density (pcf)	Optimum Moisture (%)
116.9	12.4	-	-

Oversize Sieve: 3/4 in  
Coarse Fraction (%): -  
Fine Fraction (%): -  
Coarse Specific Gravity: -  
Coarse Absorption (%): -  
Fine Specific Gravity: Estimated 2.65

### No. 200 Wash (ASTM C117 / AASHTO T11)

Method	Passing No. 200 (%)	
	Value	Specified
Procedure A - Plain Water	4.2	3 - 15

Results apply only to the specific items and locations referenced and at the time of testing, observations or special inspections. Unless noted otherwise, samples were received in adequate condition. This report should not be reproduced, except in full, without the written permission of GROUND Engineering Consultants, Inc.

## Allied Recycling Laboratory Testing Services

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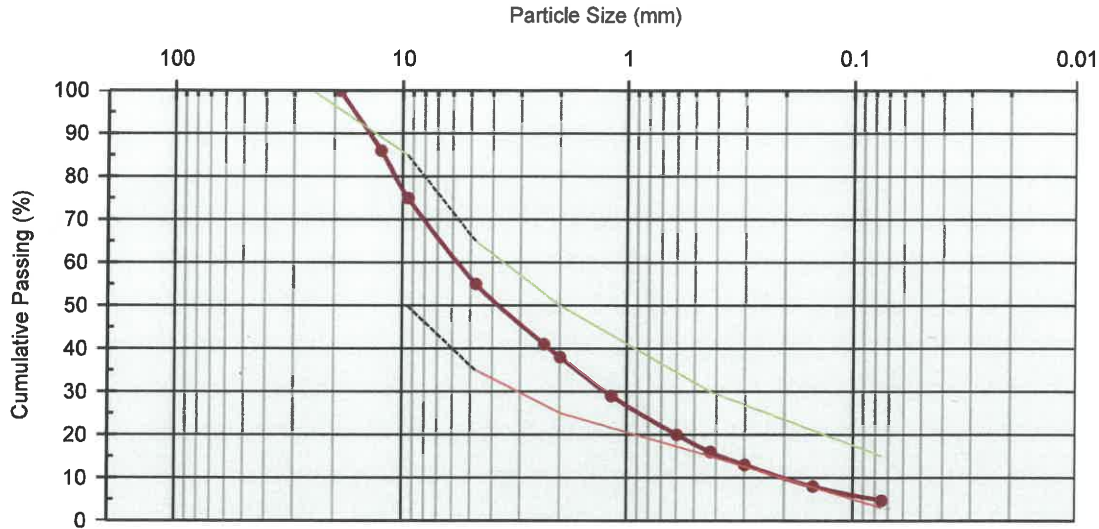
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### Soil/Aggregate Laboratory Summary

#### Aggregate Gradation (ASTM C136 / AASHTO T27)



Coarse Gradation				Fine Gradation			
Sieve Size	Particle Size (mm)	Cumulative Passing (%)	Specified (%)	Sieve Size	Particle Size (mm)	Cumulative Passing (%)	Specified (%)
6 in	150	-	-	No. 4	4.75	55	35 - 65
5 in	125	-	-	No. 8	2.36	41	-
4 in	100	-	-	No. 10	2.00	38	25 - 50
3.5 in	90	-	-	No. 16	1.18	29	-
3 in	75	-	-	No. 20	0.85	-	-
2.5 in	63	-	-	No. 30	0.60	20	-
2 in	50	-	-	No. 40	0.425	16	15 - 30
1.5 in	37.5	-	-	No. 50	0.300	13	-
1 in	25.0	-	100 max.	No. 60	0.250	-	-
3/4 in	19.0	100	-	No. 80	0.180	-	-
1/2 in	12.5	86	-	No. 100	0.150	8	-
3/8 in	9.5	75	50 - 85	No. 140	0.090	-	-
No. 4	4.75	55	35 - 65	No. 200	0.075	4.7	3 - 15

Remarks: Aurora Type 2 Specifications shown.

## Allied Recycling Laboratory Testing Services

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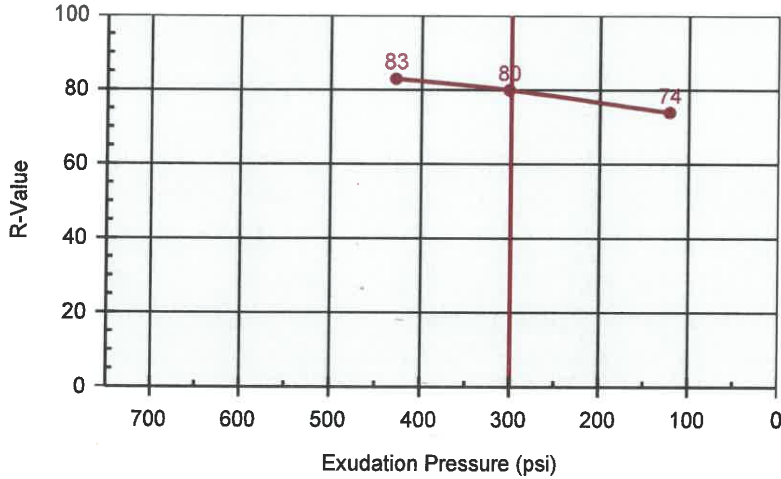
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### Soil/Aggregate Laboratory Summary

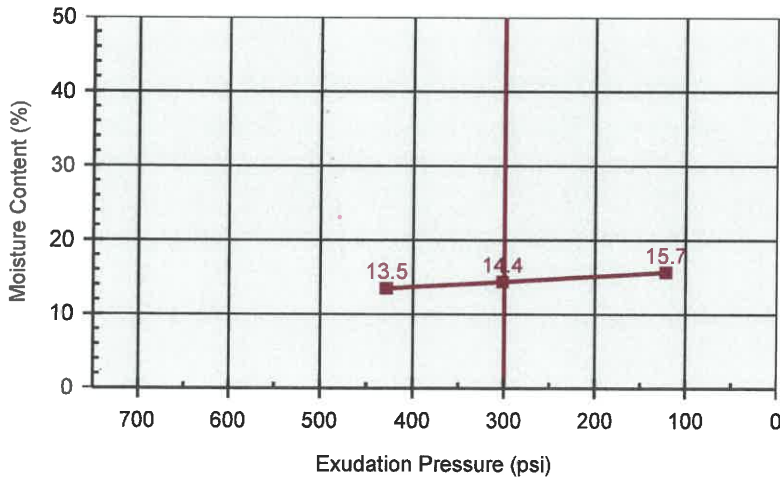
#### R-Value (CDOT CPL 3101 / AASHTO T-190)



Test Point	Moisture (%)	Exudation Pressure (psi)	R-Value
1	13.5	429	83
2	14.4	302	80
3	15.7	122	74

R-Value at 300 psi Exudation Pressure	Spec.
80	78 min.

Remarks:



#### L.A. Abrasion - Small Size (ASTM C131 / AASHTO T96)

Nominal Maximum Size	Grading Used	Loss by Abrasion and Impact (%)	Specified Loss (%)
1/2 in	B	43	45 max.