

# SUBMITTAL



Submittal number	12.0	Date	06/24/2018
Project	TRAILS AT CROWFOOT #1&9	6954 N. CROWFOOT VALLEY RD. PARKER, CO 80138	
Project number	201810		
Spec section			
Subsection		Status	Open
Current action	Submitted	Ball in court	
Topic	Type 2 Bedding		

Submitter	
Reviewer	
Cc	

Date submitted	06/24/2018	Submission due date	06/24/2018
Released for review	06/24/2018	Review due date	06/29/2018
Date returned		Required on site date	
Date closed			

<b>Notes</b>



# LETTER OF TRANSMITTAL

**PIPELINE CONTRACTORS**  
8600 Verbena St.  
Commerce City, CO 80022  
Office 303-289-4355  
Fax 303-289-4353

**ISSUED TO:**

Owner ATTN: Con Cockrun, Kelley Trucking

DATE:

**REGARDING:**

TRANSMITTAL NO.:

Project JBS Job No 0150

We are issuing you under separate cover the following (via):

- Blue Prints
- Submittals
- Change Order
- Request for Information
- Copy of a letter
- Shop Drawings

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#	Copies	Item Dated	Item #	Description
	1-Electronic		A-012	Storm Sewer

- For your bid
- For Approval
- As Requested
- Returned for Correction
- For Review and Comment
- For Pricing

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Prints are loaned to you and are to be returned to us by: Date: \_\_\_\_\_

Bids are due on or before: Date: \_\_\_\_\_

**COMMENTS**

CC:

**Amie Parent**  
**JBS Pipeline Contractors**

April 5, 2018

Albert Frei and Sons  
P.O. Box 700  
Henderson, Colorado 80640

Attention: Mr. Rick Foster

Subject: Physical Properties Testing (ASTM)  
Type 2 Bedding, Pit 6  
Project No. CT16373.000-400

Dear Mr. Foster:


This report presents results of physical properties testing performed on material delivered to our laboratory in December, 2017. Representative samples delivered were identified as Type 2 Bedding from Pit 6. Testing was performed to determine the materials compliance with ASTM specifications. The following testing was performed in general conformance with the applicable standards.

- 1) Sieve Analysis (Gradation)
- 2) Material Finer Than No. 200 Sieve by Washing
- 3) Specific Gravity & Absorption
- 4) Clay Lumps & Friable Particles
- 5) Lightweight Particles 2.0
- 6) Lightweight Particles 2.4
- 7) Sodium Sulfate Soundness
- 8) Magnesium Sulfate Soundness
- 9) Rodded Unit Weight & Voids
- 10) Loose Unit Weight & Voids
- 11) Los Angeles Abrasion
- 12) Fractured Faces
- 13) Moisture Content
- 14) Flat and Elongated Particles
- 15) Scratch Hardness

A summary of the aggregate test results is attached, followed by the complete test results. Based on the test results, the material tested meets the ASTM specifications for coarse aggregate for the properties tested. If you have any questions regarding this report, please call.

Respectfully submitted,

CTL | THOMPSON MATERIALS ENGINEERS, INC.

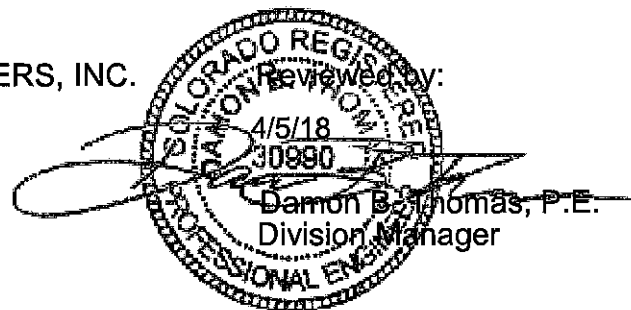
  
Daniel L. Barrett  
Materials Lab Manager

DLB:DBT/clm

Enclosures

1 copy sent

1 copy emailed: [rfoster@albertfreiansons.com](mailto:rfoster@albertfreiansons.com)





# Aggregate Qualification Summary - ASTM Specifications (ASTM C 33)

Albert Frei and Sons, Inc. - Pit 6, Type 2 Bedding

Project No. CT16373.000-400

Report Date: April 04, 2018

Sieve Analysis (ASTM C 136 & C 117)		
Sieve Size	Passing (%)	Specification (%)
3 1/2 inch (87.5 mm)	100	100
3 inch (75 mm)	100	90-100
2 1/2 inch (62.5 mm)	100	-
2 inch (50 mm)	100	-
1-1/2 inch (37.5 mm)	99	-
1 inch (25 mm)	70	-
3/4 inch (19 mm)	45	20-90
1/2 inch (12.5 mm)	8	-
3/8 inch (9.5 mm)	2	-
No. 4 (4.75 mm)	1	0-20
No. 200 (75 µm)	0.4	0-3

Test	Results	Specification
Specific Gravity (ASTM C 127)	2.86	-
Absorption (ASTM C 127)	0.6%	-
Clay Lumps and Friable Particles (ASTM C 142)	0.2% Weighted Particles	2.0% Max
Lightweight Particles, 2.0 sp.g. (ASTM C 123)	< 0.01%	0.5% Max
Lightweight Particles, 2.4 sp.g. (ASTM C 123)	< 0.01%	3.0% Max
Sodium Sulfate Soundness (ASTM C 88)	1% Weighted Loss	12% Max
Magnesium Sulfate Soundness (ASTM C 88)	3% Weighted Loss	18% Max
Rodded Unit	Unit Weight	103 pcf
Weight & Voids (ASTM C 29)	Percent Voids	42%
	Tons per cubic yard	1.39 tons/cu. yd.
	Unit Weight	94 pcf
Loose Unit (ASTM C 29)	Percent Voids	47%
	Tons per cubic yard	1.27 tons/cu. yd.
	Unit Weight	94 pcf
Los Angeles Abrasion (ASTM C 535)	32%	50% Max
Percentage of Fractured Particles (ASTM D 5821)	100%	-
Total Evaporable Moisture Content (ASTM C 566)	0.7%	-
Scratch Hardness (CRD-C 130-01)	0.0%	-
Weighted Average Flat Particles	0.9%	-
Weighted Average Elongated Particles	0.0%	-
Total Weighted Average Flat and/or Elongated Particles	0.9%	-

CTL | THOMAS B. THOMAS ENGINEERS, INC.

Thomas B. Thomas, P.E.



ATTACHMENT A  
LABORATORY TEST RESULTS

**PHYSICAL PROPERTIES OF AGGREGATES**



**Company Name:** Albert Frei and Sons, Inc.  
**Material Source:** Pit 6  
**Material Type:** Type 2 Bedding

**Project No.** CT16373.000-400  
**Report Date:** April 4, 2018

**Sieve Analysis of Coarse Aggregate**  
 (ASTM C 136)

Sieve Size	Percent Passing Type 2 Bedding	Percent Passing Urban Drainage Spec.
3 1/2 inch (87.5 mm)	100	100
3 inch (75 mm)	100	90-100
2 1/2 inch (62.5 mm)	100	-
2 inch (50 mm)	100	-
1-1/2 inch (37.5 mm)	99	-
1 inch (25 mm)	70	-
3/4 inch (19 mm)	45	20-90
1/2 inch (12.5 mm)	8	-
3/8 inch (9.5 mm)	2	-
No. 4 (4.75 mm)	1	0-20
No. 200 (75 µm)	0.4	0-3

**Material Finer Than No. 200 Sieve by Washing**  
 (ASTM C 117)

Initial Dry Weight (g)	Final Dry Weight (g)	Material Finer Than No. 200 Sieve (%)
6095.0	6072.5	0.4

**Specific Gravity and Absorption of Coarse Aggregate**  
 (ASTM C 127)

Oven Dry Weight (g)	SSD in Air Weight (g)	Submerged Weight (g)	Bulk Volume	Bulk (SSD) Specific Gravity	Absorption (%)
9643.0	9697.4	6301.5	3395.9	2.86	0.6

**Clay Lumps and Friable Particles in Aggregate**  
 (ASTM C 142)

Sieve Size		Percent Grading of Sample	Weight Before (g)	Weight After (g)	Percent Loss	Weighted Percent Loss
Passing	Retained					
	1-1/2 inch	1	-	-	0.1	0.0
1-1/2 inch	3/4 inch	54	3313.6	3309.3	0.1	0.1
3/4 inch	3/8 inch	43	2463.0	2457.7	0.2	0.1
3/8 inch	No. 4	1	-	-	0.2	0.0
Less Than No. 4		1	-	-	-	-
Total Percent Grading		100	Total Weighted Loss		0.2%	

Fig. A-1

**PHYSICAL PROPERTIES OF AGGREGATES**



**Company Name:** Albert Frei and Sons, Inc.  
**Material Source:** Pit 6  
**Material Type:** Type 2 Bedding

**Project No.** CT16373.000-400  
**Report Date:** April 4, 2018

**Lightweight Particles in Aggregate**  
 (ASTM C 123)

Sample Weight (g)	Specific Gravity of Liquid	Percentage by Mass of Lightweight Particles
5803.8	2.0	< 0.01
5803.8	2.4	< 0.01

**Soundness of Coarse Aggregates by Use of Sodium Sulfate**  
 (ASTM C 88)

Sieve Size		Percent Grading of Sample	Weight Before (g)	Weight After (g)	Percent Loss	Weighted % Loss
Passing	Retained					
2 inch	1-1/2 inch	1	-	-	1.5	0.0
1-1/2 inch	1 inch	29	1000.9	986.1	1.5	0.4
1 inch	3/4 inch	25	510.9	506.8	0.8	0.2
3/4 inch	1/2 inch	37	671.5	666.4	0.8	0.3
1/2 inch	3/8 inch	6	331.9	320.2	3.5	0.2
3/8 inch	No. 4	1	-	-	3.5	0.0
Less Than No. 4		1	-	-	-	-
Total Percent Grading:		100	Total Weighted Loss:		1	

**Soundness of Coarse Aggregates by Use of Magnesium Sulfate**  
 (ASTM C 88)

Sieve Size		Percent Grading of Sample	Weight Before (g)	Weight After (g)	Percent Loss	Weighted % Loss
Passing	Retained					
2 inch	1-1/2 inch	1	-	-	2.3	0.0
1-1/2 inch	1 inch	29	1013.9	990.4	2.3	0.7
1 inch	3/4 inch	25	500.5	489.9	2.1	0.5
3/4 inch	1/2 inch	37	673.7	651.4	3.3	1.2
1/2 inch	3/8 inch	6	330.4	317.0	4.1	0.2
3/8 inch	No. 4	1	-	-	4.1	0.0
Less Than No. 4		1	-	-	-	-
Total Percent Grading:		100	Total Weighted Loss:		3	

**Bulk Density (Unit Weight) and Voids in Aggregates (Rodded Method)**  
 (ASTM C 29)

Sample Weight (lbs)	Bucket Volume (ft <sup>3</sup> )	Unit Weight (pcf)
103.1	1.016	101.5
105.0	1.016	103.3
104.6	1.016	103.0

Average Unit Weight: 103 pcf

Bulk Specific Gravity (OD) = 2.84  
 Voids in Aggregate Compacted by Rodding = 42%

**PHYSICAL PROPERTIES OF AGGREGATES**



**Company Name:** Albert Frei and Sons, Inc.  
**Material Source:** Pit 6  
**Material Type:** Type 2 Bedding

**Project No.** CT16373.000-400  
**Report Date:** April 4, 2018

**Bulk Density (Unit Weight) and Voids in Aggregates (Loose Method)**  
 (ASTM C 29)

Sample Weight (lbs)	Bucket Volume (ft <sup>3</sup> )	Unit Weight (pcf)
96.7	1.016	95.2
95.3	1.016	93.8
95.7	1.016	94.2

Average Unit Weight: 94 pcf

Bulk Specific Gravity (OD) = 2.84  
 Voids in Aggregate Compacted by Rodding = 47%

**Resistance to Degradation of Large-Size Coarse Aggregate  
 by Abrasion and Impact in the Los Angeles Machine**  
 (ASTM C 535)

Grading	Initial Weight (g)	Final Weight (g)	Percent Loss
A	5009.4	3383.9	32

**Determining the Percentage of Fractured Particles in Coarse Aggregate**  
 (ASTM D 5821)

Initial Weight (g)	Weight of Fractured Particles (g)	Percent of Fractured Particles * (minimum 2 faces)
15472.3	15472.3	100

\* Footnote: This material is quarried. Therefore all surfaces are freshly fractured. Each prismatic particle must have at least 4 faces, which is consistent with our observations.

**Total Evaporable Moisture Content of Aggregates by Drying**  
 (ASTM C 566)

Initial Weight (g)	Final Weight (g)	Moisture Content %
8357.5	8352.0	0.7



**PHYSICAL PROPERTIES OF AGGREGATES**

Client: Albert Frei and Sons, Inc.  
 Project: Flat and Elongated Particles  
 Project No. CT16373.000

Sample ID: Type 2 Bedding  
 Pit Name: Pit 6

**Percentage of Flat Particles in Coarse Aggregate  
 (ASTM D 4791) Criteria: 3:1 Ratio**

Sieve Retained Size	Percent of Grading	Number of Particles	Weight of Particles (g)	Flat Particles (by count)	Flat Particles (by weight) (g)	Percentage of Flat Particles (by count)	Percentage of Flat Particles (by weight)	Weighted Percentage of Flat Particles (by count)	Weighted Percentage of Flat Particles (by weight)
1½ inch	1	-	-	-	-	-	-	-	-
1 inch	29	100	5,829.6	0	0.0	0.0	0.0	0.0	0.0
¾ inch	25	100	2,327.7	2	24.6	2.0	1.1	0.5	0.3
½ inch	37	100	962.1	2	15.6	2.0	1.6	0.7	0.6
⅜ inch	6	-	-	-	-	-	-	-	-
< 3/8 inch	2	-	-	-	-	-	-	-	-
<b>Total:</b>	<b>100</b>							<b>Total Weighted Average Flat Particles:</b>	<b>1.2      0.9</b>

**Percentage of Elongated Particles in Coarse Aggregate  
 (ASTM D 4791) Criteria: 3:1 Ratio**

Particle Size	Percent of Grading	Number of Particles	Weight of Particles (g)	Elongated Particles (by count)	Elongated Particles (by weight) (g)	Percentage of Elongated Particles (by count)	Percentage of Elongated Particles (by weight)	Weighted Percentage of Elongated Particles (by count)	Weighted Percentage of Elongated Particles (by weight)
1½ inch	1	-	-	-	-	-	-	-	-
1 inch	29	100	5,829.6	0	0.0	0.0	0.0	0.0	0.0
¾ inch	25	100	2,327.7	0	0.0	0.0	0.0	0.0	0.0
½ inch	37	100	962.1	0	0.0	0.0	0.0	0.0	0.0
⅜ inch	6	-	-	-	-	-	-	-	-
< 3/8 inch	2	-	-	-	-	-	-	-	-
<b>Total:</b>	<b>100</b>							<b>Total Weighted Average Elongated Particles:</b>	<b>0.0      0.0</b>

**Total Weighted Average Flat Particles and Elongated Particles:      1.2      0.9**

Fig. A-4



**CRD-C 130-01 Standard Recommended Practice for Estimating Scratch Hardness of Coarse Aggregate Particles**

Client: Albert Frei and Sons, Inc.  
 Job No.: CT16373.000  
 Material: Type 2 Bedding

Date Submitted: 12/2017  
 By Technician: DB  
 Nominal Sieve Size: 2"

**Minimum Criteria:**

Particle Size Passing/Retain	Total Individual Weight	Total Individual Number	Classified "Soft" by Weight	Classified "Soft" by Number	% of Soft by Weight (5.1.3)	% of "Soft" by Number (5.1.3)	% Grading of representative sample (> %10)	Weighted Avg.
1/2" to 3/8" min. (200g)	-	-	-	-	-	-	6	0.0
3/4" to 1/2" min. (600g)	629.8	63	0	0	0.0	0.0	37	0.0
1" to 3/4" min. (1500g)	1524.0	70	0	0	0.0	0.0	25	0.0
1 1/2" to 1" min. (4500g)	4520.3	83	0	0	0.0	0.0	29	0.0
2" to 1 1/2" min. (12000g)	-	-	-	-	-	-	1	0.0

Total Weights:	Total Individual Weight	Total Individual Number	Total Classified "Soft" by Weight	Total Classified "Soft" by Number	Total % of Soft by Weight (5.1.3)	Total % of Soft by Number (5.1.3)	Total Grading	Total Weighted Avg.
	6674.1	216	0	0	0	0	98	0

Fig. A-5