

SUBMITTAL



Submittal number	11.0	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	Class 1 Backfill		

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			

Notes



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:

6/21/18

REGARDING:

TRANSMITTAL NO.:

A-011

Project JBS Job No 0150

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

Email

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

#	Copies	Item Dated	Item #	Description
	1-Electronic		A-011	Backfill for Concrete Box Culverts and Bedding for RCP

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

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 18, 2018

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

Attention: Mr. Rick Foster

Subject: Physical Properties Testing (DIA)
Class 1 Fill, Pit 6
Project No. CT16373.000-400

This report presents results of physical properties testing performed on material delivered to our laboratory in December, 2017. Representative samples delivered were identified as Class 1 Fill, from Pit 6. Testing was performed to determine the materials compliance with DIA specifications. The following testing was performed in general conformance with the applicable standards.

- 1) Sieve Analysis (Gradation)
- 2) Particle Analysis (Hydrometer)
- 3) Material Finer Than No. 200 Sieve by Washing
- 4) Specific Gravity & Absorption
- 5) Clay Lumps & Friable Particles – Coarse Fraction
- 6) Clay Lumps & Friable Particles – Fine Fraction
- 7) Sodium Sulfate Soundness – Fine Fraction
- 8) Magnesium Sulfate Soundness – Fine Fraction
- 9) Total Evaporative Moisture Content
- 10) Rodded Unit Weight & Voids
- 11) Loose Unit Weight & Voids
- 12) Los Angeles Abrasion
- 13) Fractured Faces
- 14) Liquid Limit
- 15) Plasticity Index
- 16) Maximum Density – Standard Effort
- 17) Maximum Density – Modified Effort
- 18) Hveem (R-value) Test
- 19) Swell
- 20) Standard Permeability
- 21) Modified Permeability
- 22) Soil Classification
- 23) Resistivity
- 24) Water Soluble Chlorides
- 25) Water Soluble Sulfates
- 26) pH

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 DIA specifications for class 1 backfill. If you have any questions regarding this report, please call.



Respectfully submitted,

CTL | THOMPSON MATERIALS ENGINEERS, INC.

Daniel L. Barrett
Daniel L. Barrett
Materials Lab Manager



Reviewed by:
4/18/18

Damon B. Thomas, P.E.
Division Manager

DLB:DBT/clm

Enclosures

1 copy sent

1 copy emailed: rfoster@albertfreiansons.com



TABLE I
Aggregate Qualification Summary - ASTM Specifications (ASTM C 33)
Albert Frei and Sons, Inc. - Pit 6, Class 1 Fill

Project No. CT16373.000-400

Report Date: April 18, 2018

Sieve Analysis (ASTM C 136 & C 117)		
Sieve Size	Passing (%)	Specification (%) (Table 703-08)
2 inch (50 mm)	100	100
1-1/2 inch (37.5 mm)	100	-
1 inch (25mm)	100	-
3/4 inch (19 mm)	100	-
1/2 inch (12.5 mm)	100	-
3/8 inch (9.5 mm)	100	-
No. 4 (4.75 mm)	93	30-100
No. 8 (2.36 mm)	78	-
No. 16 (1.18 mm)	66	-
No. 30 (600 µm)	55	-
No. 50 (300 µm)	41	10-60
No. 100 (150 µm)	26	-
No. 200 (75 µm)	16	5-20
Hydrometer Analysis (ASTM D 6913)		
1 minute (37 µm)	13.8	-
4 minutes (19 µm)	9.2	-
19 minutes (9 µm)	6.5	-
60 minutes (5 µm)	4.6	-
7 hours 15 minutes (2 µm)	2.8	3% Max
25 hours 45 minutes (1 µm)	1.9	-

CTL | THOMPSON CONSULTANTS ENGINEERS, INC.

4/18/18
30990
Damon B. Thomas, P.E.



TABLE 1 (CONTINUED)
Aggregate Qualification Summary - ASTM Specifications (ASTM C 33)

Albert Frei and Sons, Inc. - Pit 6, Class 1 Fill

Project No. CT16373.000-400

Report Date: April 18, 2018

Test		Results	Specification
Specific Gravity (ASTM C 127) Coarse Fraction		2.78	-
Absorption (ASTM C 127) Coarse Fraction		1.4%	-
Specific Gravity (ASTM C 128) Fine Fraction		2.78	-
Absorption (ASTM C 128) Fine Fraction		0.6%	-
Clay Lumps and Friable Particles (ASTM C 142) Coarse		0.1%	2.0% Max
Clay Lumps and Friable Particles (ASTM C 142) Fine		1.3%	3.0% Max
Sodium Sulfate Soundness (ASTM C 88)		5% Weighted Loss	10% Max
Magnesium Sulfate Soundness (ASTM C 88)		11% Weighted Loss	15% Max
Rodded Unit	Unit Weight	102 pcf	-
Weight & Voids (ASTM C 29)	Percent Voids	40%	-
	Tons per cubic yard	1.38 tons/cu. yd.	-
Loose Unit	Unit Weight	93 pcf	-
Weight & Voids (ASTM C 29)	Percent Voids	46%	-
	Tons per cubic yard	1.26 tons/cu. yd.	-
Los Angeles Abrasion (ASTM C 131)		42%	50% Max
Percentage of Fractured Particles (ASTM D 5821)		100%	-
Total Evaporable Moisture Content (ASTM C 566)		4.1%	-
Hveem Test (R-value) (ASTM D 2844)		79	-
Swell Potential Test (ASTM D 4546)		0.0%	-
Liquid Limit (ASTM D 4318)		NL	25 Max
Plasticity Index (ASTM D 4318)		NP	4 Max
Maximum Density @ Optimum Moisture (ASTM D 698)		131.5 pcf @ 9.0%	-
Maximum Density @ Optimum Moisture (ASTM D 1557)		137.0 pcf @ 8.0%	-
Resistivity (ASTM G 57)		8,500 Ohm-cm	≥ 1,500 Ohm-cm
Chlorides (CP-L 2104)		0.001% (Cl)	0.05% Max (Cl)
Water Soluble Sulfates (CP-L 2103 Method B)		0.007% (SO ₄)	0.05% Max (SO ₄)
pH (ASTM G 51)		8.0 pH	6.0-8.5 pH
Standard Constant Head Permeability (ASTM D 2434)		6.52E-04 cm/s	-
Modified Constant Head Permeability (ASTM D 2434)		4.37E-04 cm/s	-
Soil Classification		A-1-b	-

CTL | THOMPSON MATERIALS ENGINEERS, INC.





ATTACHMENT A
LABORATORY TEST RESULTS

PHYSICAL PROPERTIES OF AGGREGATES



Company Name: Albert Frei and Sons, Inc.
Material Source: Pit 6
Material Type: Class 1 Fill

Project No. CT16373.000-400
Report Date: April 18, 2018

Sieve Analysis of Fine Aggregate
 (ASTM C 136 & ASTM D 6913)

Sieve Size	Percent Passing Class 1 Fill	Percent Passing CDOT (Table 703-08)
2 inch (50 mm)	100	100
1-1/2 inch (37.5 mm)	100	-
1 inch (25mm)	100	-
3/4 inch (19 mm)	100	-
1/2 inch (12.5 mm)	100	-
3/8 inch (9.5 mm)	100	-
No. 4 (4.75 mm)	93	30-100
No. 8 (2.36 mm)	78	-
No. 16 (1.18 mm)	66	-
No. 30 (600 µm)	55	-
No. 50 (300 µm)	41	10-60
No. 100 (150 µm)	26	-
No. 200 (75 µm)	16	5-20
1 minute (37 µm)	13.8	-
4 minutes (19 µm)	9.2	-
19 minutes (9 µm)	6.5	-
60 minutes (5 µm)	4.6	-
7 hours 15 minutes (2 µm)	2.8	3% Max
25 hours 45 minutes (1 µm)	1.9	-

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 (%)
619.7	520.8	16.0

Specific Gravity and Absorption of Fine Aggregate
 (ASTM C 128)

Pycnometer Weight With Water (g)	SSD In Air Weight (g)	Pycnometer Weight With Sample (g)	Bulk Volume	Oven Dry Weight (g)	Bulk (SSD) Specific Gravity	Absorption (%)
667.9	500.0	987.8	180.1	497.2	2.78	0.6

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

Oven Dry Weight (g)	SSD Weight (g)	Submerged Weight Sample (g)	Bulk Volume	Bulk (SSD) Specific Gravity	Absorption (%)
2085.1	2113.7	1354.1	759.6	2.78	1.4

PHYSICAL PROPERTIES OF AGGREGATES



Company Name: Albert Frei and Sons, Inc.
Material Source: Pit 6
Material Type: Class 1 Fill

Project No. CT16373.000-400
Report Date: April 18, 2018

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

Sample Weight (lbs)	Bucket Volume (ft ³)	Unit Weight (pcf)
9.94	0.0987	100.7
10.10	0.0987	102.3
10.20	0.0987	103.3

Average Unit Weight: 102 pcf

Bulk Specific Gravity (OD) = 2.76
 Voids in Aggregate Compacted by Rodding = 40%

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

Sample Weight (lbs)	Bucket Volume (ft ³)	Unit Weight (pcf)
9.05	0.0987	91.7
9.12	0.0987	92.4
9.22	0.0987	93.4

Average Unit Weight: 93 pcf

Bulk Specific Gravity (OD) = 2.76
 Voids in Aggregate Compacted by Rodding = 46%

Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
 (ASTM C 131)

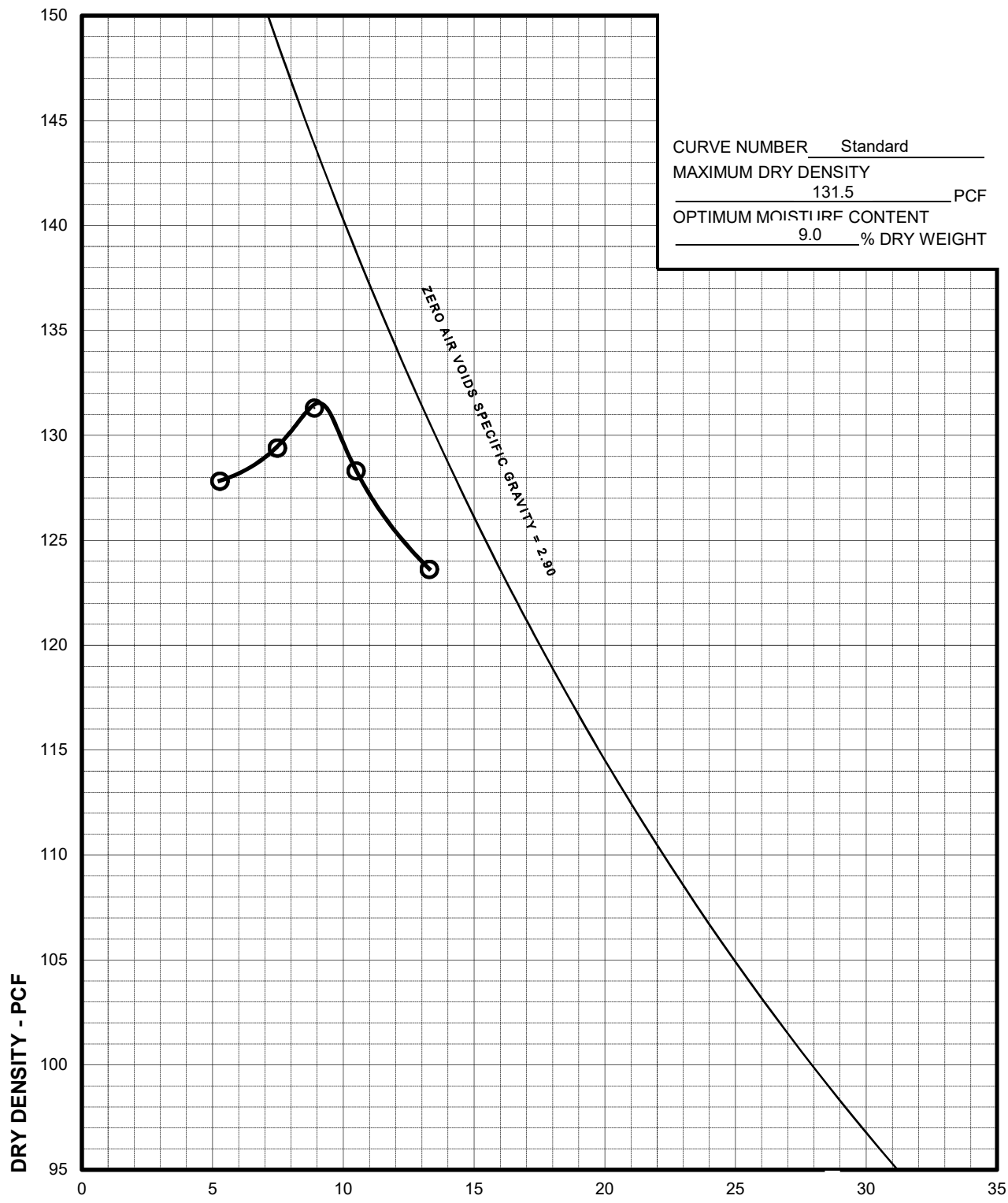
Grading	Initial Weight	Final Weight	Percent Loss
D	5000.2	2906.1	42

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

Initial Weight (g)	Final Weight (g)	Moisture Content %
537.3	516.0	4.1

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

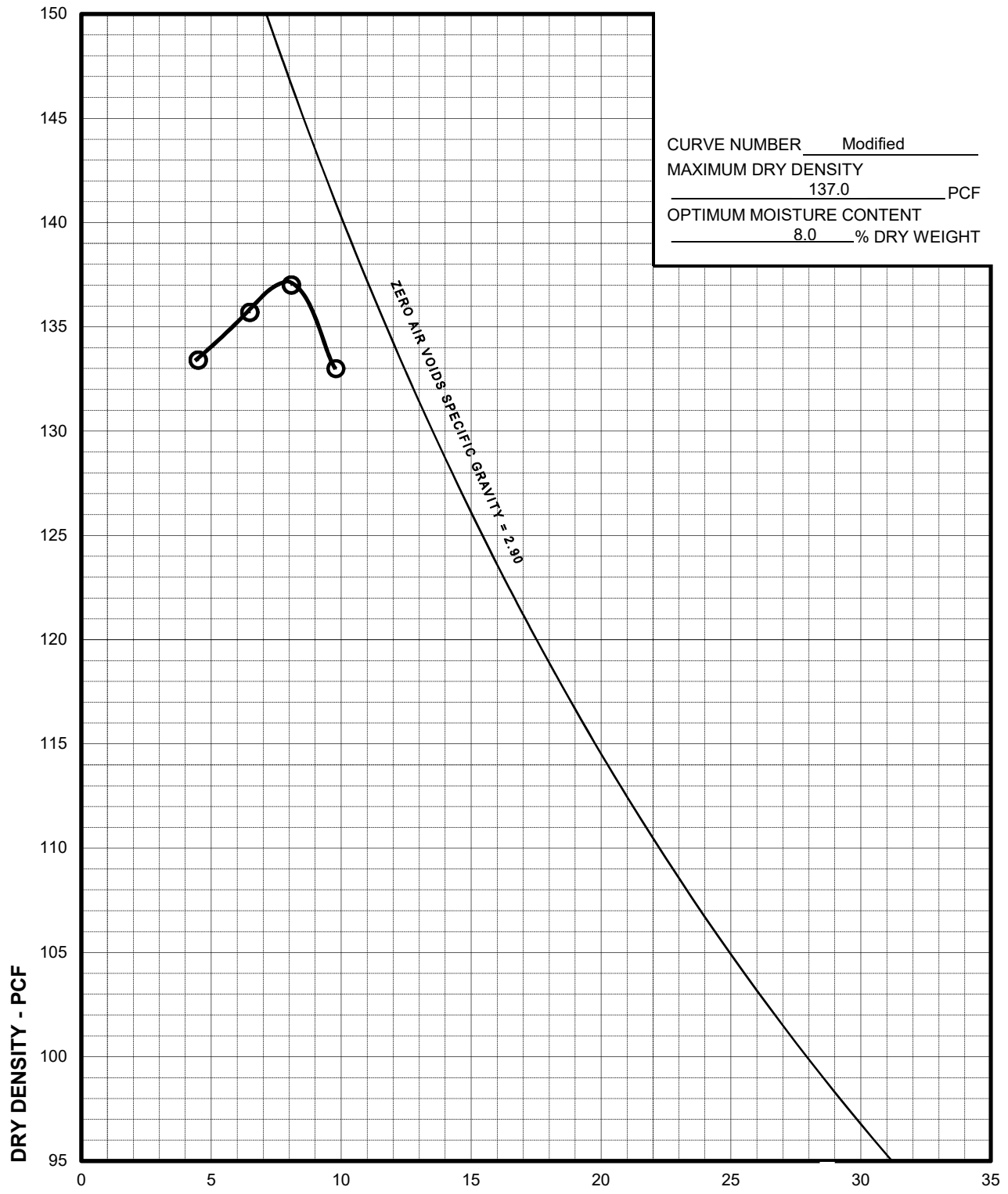
Initial Weight (g)	Weight of Fractured Particles (g)	Percent of Fractured Particles (minimum 2 faces)
257.3	257.3	100



CURVE NUMBER Standard
MAXIMUM DRY DENSITY 131.5 PCF
OPTIMUM MOISTURE CONTENT 9.0 % DRY WEIGHT

Sample Description	<u>Class 1 Fill</u>	LIQUID LIMIT	<u>NL</u>	%
Location	<u></u>	PLASTICITY INDEX	<u>NP</u>	%
Compaction Test Procedure	<u>ASTM D 698 - 00</u>	GRAVEL	<u>7</u>	%
	<u>METHOD "B"</u>	SAND	<u>77</u>	%
		SILT AND CLAY	<u>16</u>	%

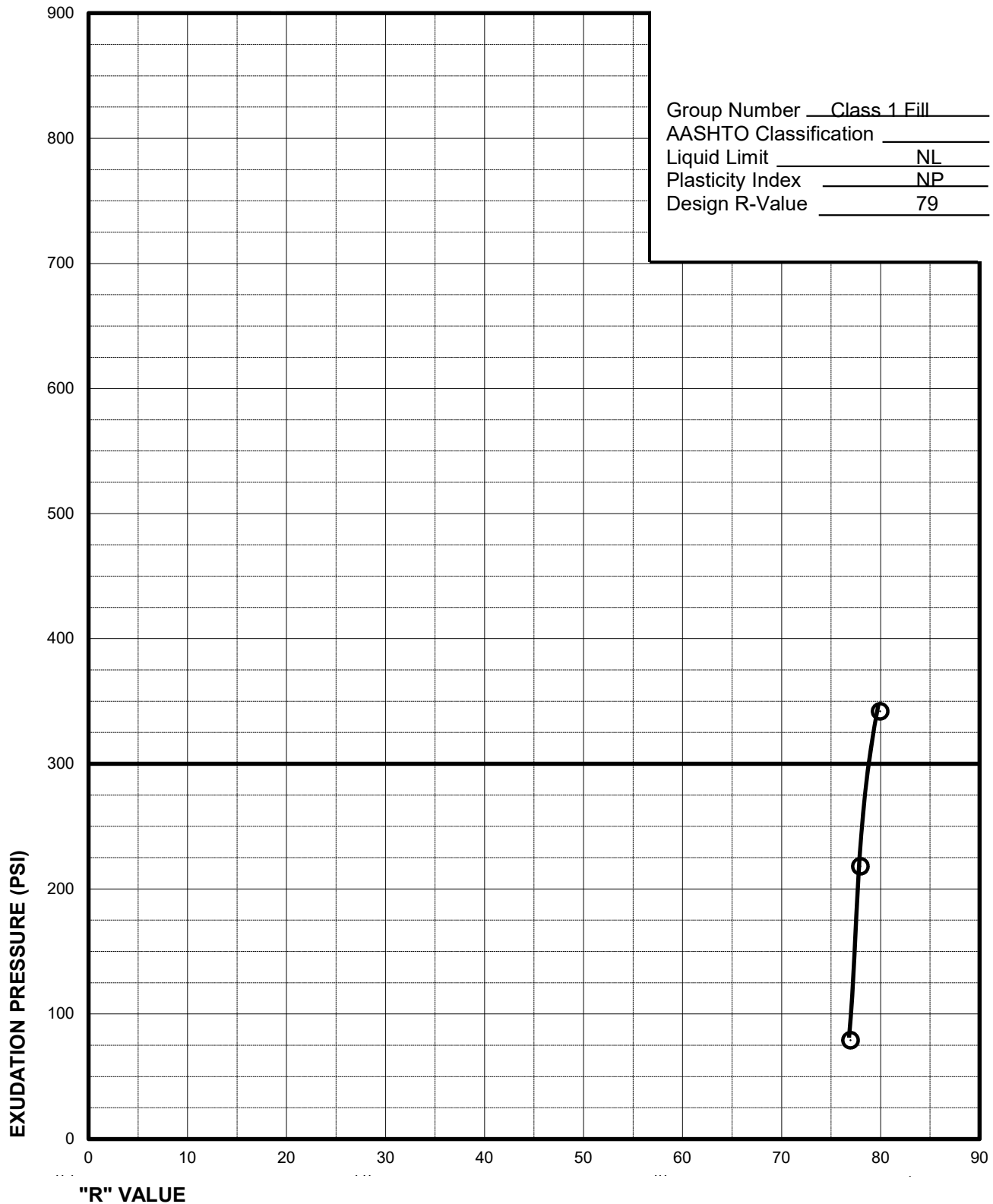
Compaction



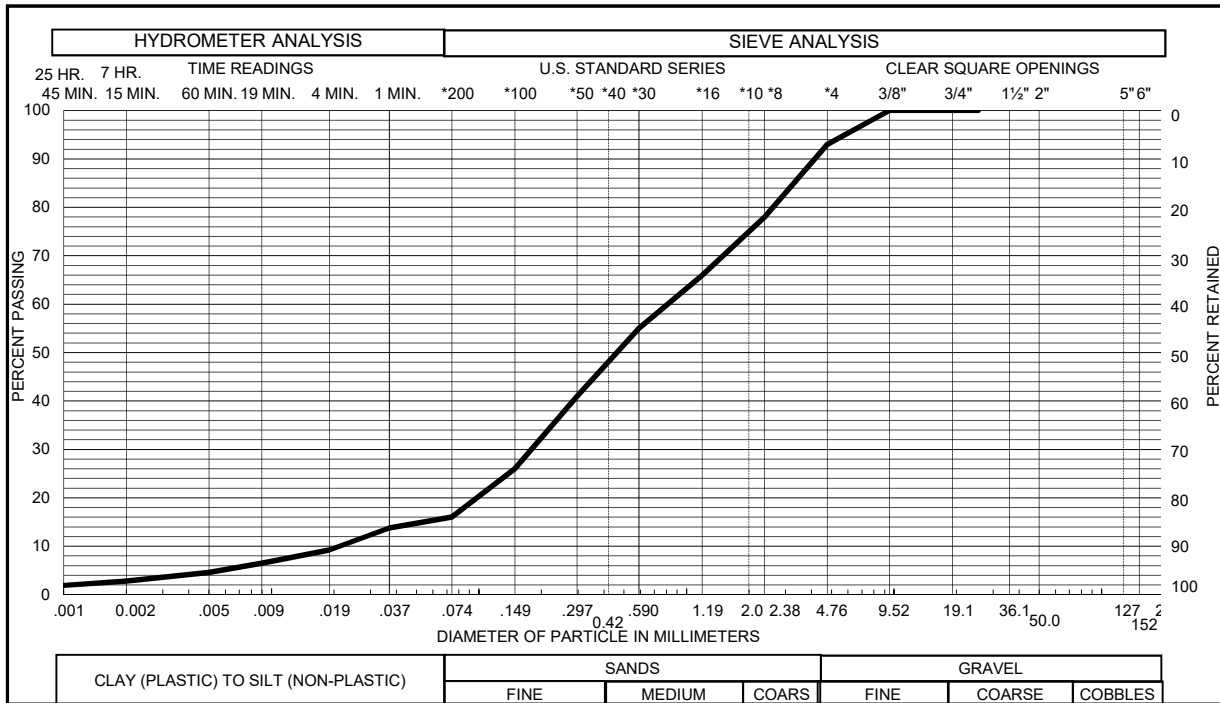
CURVE NUMBER Modified
MAXIMUM DRY DENSITY 137.0 PCF
OPTIMUM MOISTURE CONTENT 8.0 % DRY WEIGHT

Sample Description	<u>Class 1 Fill</u>	LIQUID LIMIT	<u>NL</u>	%
Location	<u></u>	PLASTICITY INDEX	<u>NP</u>	%
Compaction Test Procedure	<u>ASTM D 1557 METHOD "B"</u>	GRAVEL	<u>7</u>	%
		SAND	<u>77</u>	%
		SILT AND CLAY	<u>16</u>	%

Compaction



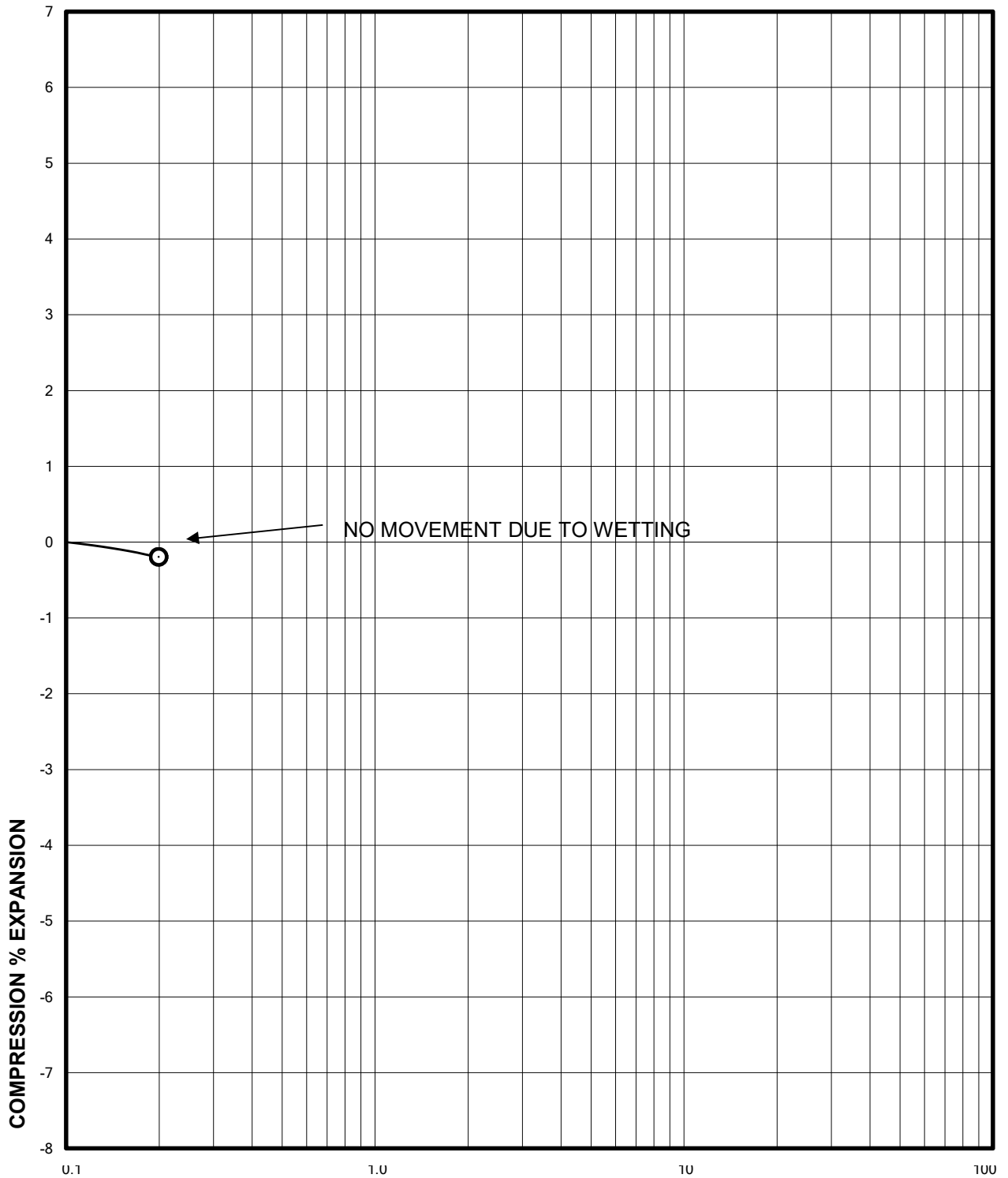
Hveem Stabilometer Test Results



Sample of Class 1 Fill
 From Pit 6

GRAVEL	7 %	SAND	77 %
SILT & CLAY	16 %	LIQUID LIMIT	NL %
PLASTICITY INDEX			NP %

Gradation



Sample of Class 1 Fill
From Pit 6

NATURAL DRY UNIT WEIGHT= 131.5 PCF
NATURAL MOISTURE CONTENT= 9.0 %

Swell Consolidation

Constant Head Permeability



Project No.	CT16373.000	Job Name:	Al Frei	Date:	4/18/2018
Test Hole:		Sample No.:	Class 1 Fill	Depth:	

Test System Data		Sample Description: Class 1 Fill, Pit 6, 95% (opt) 131.5 pcf @ 9.0% Standard			
Sample Diameter (in), D:	8.00	Calculation: $K=qL/Ath$, where $q = ml$			
Sample Length (in), L:	4.00	Trial One			
Sample Volume (ft ³), V:	0.1164				
Permeameter Area (in ²), A:	50.2655	Head, (in):	5	Permeability	
		Time (s)	Outflow (ml)	ft/day	cm/s
Density Data		189	50	1.85	6.53E-04
Wet Soil/Mold, lbs.:	16.84	185	50	1.89	6.67E-04
Mold Wt., lbs:	1.00	188	50	1.86	6.56E-04
Wet Density, pcf:	136.1				
Dry Density, pcf:	125.8	Head, (in):	10	Permeability	
		Time (s)	Outflow (ml)	ft/day	cm/s
Moisture Data		98	50	1.78	6.29E-04
<i>Before Test:</i>		95	50	1.84	6.49E-04
Dish Number:	SP375	93	50	1.88	6.63E-04
Wet Wt., g:	2427.9				
Dry Wt., g:	2265.7	Head, (in):	20	Permeability	
Dish Wt., g:	297.7	Time (s)	Outflow (ml)	ft/day	cm/s
Moisture, %:	8.2	97	100	1.80	6.36E-04
		95	100	1.84	6.49E-04
<i>After Test:</i>		92	100	1.90	6.70E-04
Dish Number:	Coyote				
Wet Wt., g:	2055.1	Head, (in):		Permeability	
Dry Wt., g:	1824.6	Time (s)	Outflow (ml)	ft/day	cm/s
Dish Wt., g:	229.6				
Moisture, %:	14.5				
		Trial Five			
		Head, (in):		Permeability	
		Time (s)	Outflow (ml)	ft/day	cm/s

Average Permeability: 1.85 6.52E-04

Constant Head Permeability



Project No.	CT16373.000	Job Name:	Al Frei	Date:	4/17/2018
Test Hole:		Sample No.:	Class 1 Fill	Depth:	

Test System Data		Sample Description: Class 1 Fill, Pit 6, 95% (opt) 137.0 pcf @ 8.0% Modified			
Sample Diameter (in), D:	8.00	Calculation: $K=qL/Ath$, where $q = ml$			
Sample Length (in), L:	4.00	Trial One			
Sample Volume (ft ³), V:	0.1164				
Permeameter Area (in ²), A:	50.2655				
		Head, (in):	5	Permeability	
		Time (s)	Outflow (ml)	ft/day	cm/s
		291	50	1.20	4.24E-04
Density Data					
Wet Soil/Mold, lbs.:	17.36	288	50	1.21	4.28E-04
Mold Wt., lbs:	1.00	286	50	1.22	4.31E-04
Wet Density, pcf:	140.6				
Dry Density, pcf:	130.0				
		Head, (in):	10	Permeability	
		Time (s)	Outflow (ml)	ft/day	cm/s
		151	50	1.16	4.08E-04
Moisture Data					
<i>Before Test:</i>		143	50	1.22	4.31E-04
Dish Number:	Moby	136	50	1.29	4.53E-04
Wet Wt., g:	2186.7				
Dry Wt., g:	2045.5				
Dish Wt., g:	317.3				
Moisture, %:	8.2				
		Head, (in):	20	Permeability	
		Time (s)	Outflow (ml)	ft/day	cm/s
		138	100	1.27	4.47E-04
		136	100	1.29	4.53E-04
		136	100	1.29	4.53E-04
<i>After Test:</i>					
Dish Number:	SP303				
Wet Wt., g:	2447.4				
Dry Wt., g:	2166.5				
Dish Wt., g:	278.8				
Moisture, %:	14.9				
		Trial Five			
		Head, (in):		Permeability	
		Time (s)	Outflow (ml)	ft/day	cm/s

Average Permeability: 1.24 4.37E-04