Architecture
Structural
Geotechnical

ROCKY MOUNTAIN GROUP
EMPLOYEE OWNED

Materials Testing
Forensic
Civil/Planning

Approved
By: Elizabeth NijKamp
Date:11/05/2018
El Paso County Planning & Community Development

PAVEMENT DESIGN REPORT

Fontaine Boulevard
Crossing East Tributary Jimmy Camp Creek
Lorson Ranch East, Filing No. 1
El Paso County, Colorado

PREPARED FOR:

Lorson Ranch Metropolitan District
212 N. Wahsatch Ave. Ste 301
Colorado Springs, CO

JOB NO. 162626

October 29, 2018

Respectfully Submitted,

RMG – Rocky Mountain Group

Kelli Zigler

Kelli Zigler
Project Geologist

Reviewed by,

RMG – Rocky Mountain Group

COLORADO LICENSED
GEOFF WEBSTER
10/29/18
45046
PROFESSIONAL ENGINEER

Geoff Webster, P.E.
Sr. Geotechnical Project Manager

SF Number – 18-008

TABLE OF CONTENTS

GENERAL SITE AND PROJECT DESCTIPTION

Location

Lorson Ranch East Filing No. 1 is located east of Marksheffel Road and between Fontaine Boulevard to the north and Lorson Boulevard to the south in El Paso County, Colorado. The East Tributary of Jimmy Camp Creek forms the western boundary of the development. The location of the site is shown on the Site Vicinity Map, Figure 1.

Existing Conditions

At the time of this report, Fontaine Boulevard is close to grade and utility mains and services had been installed. Curb and gutter had not been installed.

Project Description

This Pavement Design Report provides recommendations specific to the design and construction of Fontaine Boulevard where it crosses the ConSpan Arch Bridge spanning the East Tributary of Jimmy Camp Creek. The approximate roadway stationing along Fontaine Boulevard to which this pavement design report is applicable is Station 160+45 to Station 161+00. Fontaine Boulevard is classified a Principal Arterial, 4-lane, with a 100-foot ROW and two 24-foot wide travel lanes.

SUBSURFACE CONDITIONS

Introduction

RMG previously prepared a Pavement Design Report for Lorson Ranch East, Filing No. 1 (SF Number 18-008) that included a pavement section for Fontaine Boulevard consisting of 6-inches of Hot Mix Asphalt (HMA) over 15-inches of Cement Treated Subgrade (CTS). Where Fontaine Boulevard crosses the East Tributary of Jimmy Camp Creek, however, a ConSpan Arch Bridge has been constructed to carry the roadway. It has proven impractical to construct the prescribed pavement section across the span due to space limitations and construction considerations, and therefore a different pavement section is necessary. This report provides documentation and design of a pavement section that can be constructed in the available space and meets El Paso County development requirements.

Subsurface Materials

The approved bridge plans indicate the steel ConSpan arch receives a cover of select structural backfill upon which the pavement may be constructed. The structural backfill serves in essence the role of a prepared subgrade beneath a composite section of Hot Mix Asphalt over Aggregate Base Course. CDOT Class I material has been installed as the select structural fill over the arch.

LABORATORY DOCUMENTATION

Laboratory Testing

The annual laboratory testing report for the soil being utilized as structural backfill over the ConSpan arch is presented in Appendix A. The results indicate this soil classifies as SW-SM, well-graded silty sand in accordance with the Unified Soils Classification System (USCS), which correlates to A-1 soil in the AASHTO classification system. In accordance with AASHTO this soil is rated "excellent" for use as subgrade material.

The laboratory report further indicates the soil meets the gradation and physical properties of CDOT Class I Structural Fill, and has an R-value of 75.

PAVEMENT DESIGN

This pavement design was performed in accordance with the El Paso County Engineering Criteria Manual, Appendix D. Pavement design parameters and design calculations are presented below utilizing an R-value of 75 for the subgrade soil. The recommended pavement section is supported by the calculations below.

Street Classification – Urban Principal Arterial, 4-lane

1) Fontaine Boulevard
   ESAL = 5,256,000 (Table D-2)
   Serviceability Index = 2.5 (Table D-1)

2) Strength coefficients (Table D-3)
   Asphalt (HMA): $a_1 = 0.44$
   Aggregate Base Course (ABC): $a_2 = 0.11$

3) Subgrade (Section D.4.1.C)
   $S_1 = [(R-5) / 11.29] +3 = [(75-5) / 11.29] +3 = 9.2$
   $M_r = 10$ exponent $[(S_1 + 18.72) / 6.24] = 10$ exp $[(9.2 + 18.72) / 6.24] = 29{,}812$

4) Structural number (SN) = 2.65 (1993 AASHTO Empirical Equation, Appendix B)

5) Composite asphalt/base course section
   Minimum HMA thickness = $D_1 = 5$ inches (Table D-2)
   ABC thickness = $D_2 = \{SN – (D_1 \times a_1)\} / a_2 = \{2.65 – (5 \times 0.44)\} / 0.11 = 4.1$ inches
   Use minimum thickness $D_2 = 8$-inches
   Check SN = (5 x 0.44) + (8 x 0.11) = 3.08 > 2.65 (Min. SN required) => OK

6) Developer desires to use 6-inches of HMA over 8-inches ABC
Check SN = (6 x 0.44) + (8 x 0.11) = 3.52 > 2.65 (Min. SN required) => OK

Pavement Thickness

Based on the soil types and the design calculations, the recommended pavement section is presented below.

Recommended Pavement Section

Street	HMA (in)	ABC (in)	Subgrade Class I Structural Fill (in)
Fontaine Boulevard over ConSpan Bridge Approx. Sta. 160+45 to Sta. 161+00	6.0	8.0	6.0

Pavement Materials

Pavement materials should be selected, prepared, and placed in accordance with El Paso County specifications and the *Pikes Peak Region Asphalt Paving Specifications*. Tests should be performed in accordance with the applicable procedures presented in the specifications.

Soil Mitigation

The PDCM notes that mitigation measures may be required for expansive soils, shallow ground water, subgrade instability, etc. Based on the laboratory test results, the subgrade soils evaluated for this pavement design are expected to have no expansive potential. Groundwater or wet and unstable soil will not be present. Therefore, special mitigation measures do not appear to be necessary for subgrade preparation.

Subgrade Preparation

Subgrade for Fontaine Boulevard over the ConSpan Arch Bridge shall be CDOT Class I Structural Backfill. RMG understands the structural fill has been placed and compacted to 95 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D-1557). Prior to installation of the composite pavement section, the subgrade should be proof-rolled to a firm and unyielding condition. Areas which deform under wheel loads should be removed and replaced.

Surface Drainage

Surface drainage is important for the satisfactory performance of pavement. Wetting of the subgrade soils or base course will cause a loss of strength which can result in pavement distress. Surface drainage should provide for efficient removal of storm-water runoff. Water should not pond on the pavement or at the edges of the pavement.

Subgrade Observations and Testing

The pavement thicknesses presented above assume pavement construction is completed in accordance with El Paso County specifications and the *Pikes Peak Region Asphalt Paving Specifications*. RMG should be present at the site during subgrade preparation, placement of fill, and construction of pavements to perform site observations and testing.

CLOSING

This report has been prepared for the exclusive purpose of providing geotechnical engineering information and recommendations for development described in this report. RMG should be retained to review the final construction documents prior to construction to verify our findings, conclusions and recommendations have been appropriately implemented.

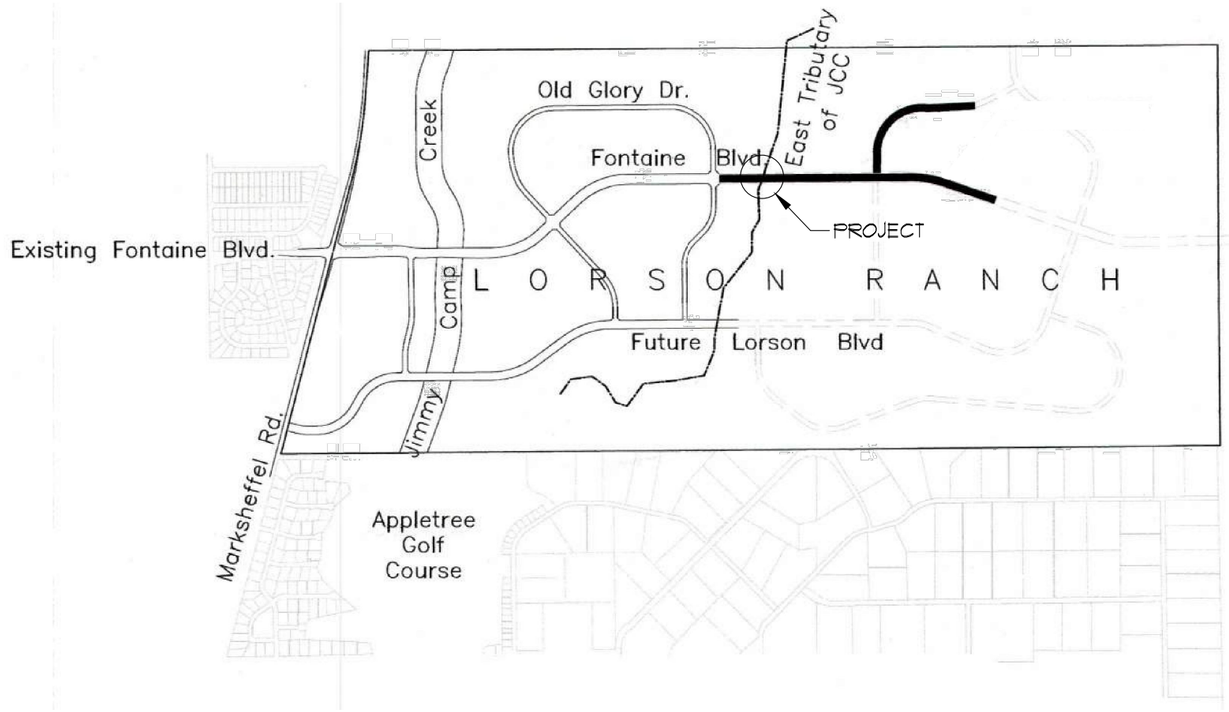
This report has been prepared for the exclusive use by the **Landhuis Company** for application as an aid in the design and construction of the proposed development in accordance with generally accepted geotechnical engineering practices. The analyses and recommendations in this report are based in part upon data obtained from test borings, site observations and the information presented in referenced reports. The nature and extent of variations may not become evident until construction. If variations then become evident, RMG should be retained to review the recommendations presented in this report considering the varied condition, and either verify or modify them in writing.

Our professional services were performed using that degree of care and skill ordinarily exercised, under similar circumstances, by geotechnical engineers practicing in this or similar localities. RMG does not warrant the work of regulatory agencies or other third parties supplying information which may have been used during the preparation of this report. No warranty, express or implied is made by the preparation of this report. Third parties reviewing this report should draw their own conclusions regarding site conditions and specific construction techniques to be used on this project.

The scope of services for this project does not include, either specifically or by implication, environmental assessment of the site or identification of contaminated or hazardous materials or conditions. Development of recommendations for the mitigation of environmentally related conditions, including but not limited to biological or toxicological issues, are beyond the scope of this report. If the Client desires investigation into the potential for such contamination or conditions, other studies should be undertaken.

If we can be of further assistance in discussing the contents of this report or analysis of the proposed development, from a geotechnical engineering point-of-view, please feel free to contact us.

FIGURES



CON SPAN ARCH BRIDGE
APPROX. STATIONS 160+45 TO 161+00
PVM'T SECTION: 6" HMA OVER 8" ABC
ATOP 6" STRUCT. FILL

ROCKY MOUNTAIN GROUP
ENGINEERS ARCHITECTS
RMG
EMPLOYEE OWNED
Geotechnical
Materials, Testing
Civil, Planning
Architectural
Structural
Forensics
SOUTHERN COLORADO
2910 AUSTIN BLUFFS PKWY, SUITE 100, COLORADO SPRINGS, CO 80918
(719) 548-0600 ~ WWW.RMGENGINEERS.COM
SOUTHERN COLORADO, DENVER METRO, NORTHERN COLORADO

SITE VICINITY MAP

FOUNTAIN BLVD CROSSING
EAST TRIB. JIMMY CAMP CREEK

LANDHUIS COMPANY

ARCH/ENG:	GGW
DRAWN:	CXM
CHECKED:	GGW
DATE	10-29-18

#	REVISION	DATE
1	.	.
	.	.
	.	.

JOB NO. 162626

SHEET NAME
VICINITY MAP

SHEET NO. FIG-1

APPENDIX A

Transit Mix Concrete Co. Materials Laboratory

444 East Costilla Avenue
Colorado Springs, Colorado 80903
Ph. (719) 475-0700 Fax (719) 475-0226

2596 Hwy 96 East
Pueblo, Colorado 81002
Ph. (719) 543-7898 Fax (719) 583-0345

February 12, 2018

RE: Class 1 Structure Backfill/Fine Fill
Daniels Sand Company
3710 Bradley Road
Colorado Springs, CO 80916

Gentlemen:

This letter presents the results of physical properties and deleterious substances tests performed on a Class 1 Structural Backfill that was sampled on January 17, 2018. Please be advised this is a raw bank product and variations may occur in test results. Testing was conducted to evaluate the suitability of the material for use as "Select Fill" for the City of Colorado Springs,CO.
The results are as follows:

Test Procedure	Test Description	Test Results	Specifications
ASTM C 117	-200 Wash	8.4%	N/A
ASTM C 136	Gradation	Satisfactory	N/A
ASTM D 4318	Liquid Limit	No Value	N/A
ASTM D 4318	Plastic Index	Non-Plastic	N/A
ASTM D 1557	Moisture-Density Relationship (Modified)	131.8 pcf @ 8.0%	N/A
ASTM D 698	Moisture-Density Relationship (Standard)	124.0 pcf @ 9.2%	N/A
ASTM D 2844	Resistance R-Value/Expansion Pressure	75	Please see Table
CP-L 2103	Water Soluble Sulfate	0	Please see Table

More detailed test results are indicated on the attached tables. ACI Certified technicians performed all tests in accordance to procedures prescribed by the American Society for Testing and Materials (ASTM) and Colorado Procedures.
If you have any questions feel free to contact me at your convenience.

Respectfully Submitted,

Robert L. Montoya, BSCET
NICET Technologist #1001

Transit Mix Concrete Co. Materials Laboratory

444 East Costilla Avenue
Colorado Springs, Colorado 80903
Ph. (719) 475-0700 Fax (719) 475-0226

2596 Hwy 96 East
Pueblo, Colorado
Ph. (719) 543-7898 Fax (719) 583-0345

FINE AGGREGATE REPORT No. 8069D-1-18

JOB NAME/SOURCE: **Daniels Sand Pit** SAMPLE DESCRIPTION: **Fine Fill**

Tube Sample

DATE SAMPLED: **January 17, 2018** TIME SAMPLED: **10:00 AM** SAMPLED BY: **MG**

DATE TESTED: **January 18, 2018** TIME TESTED: **2:00 PM** TESTED BY: **MG**

ASTM C 136	AASHTO T 27 & M 92				
SIEVE SIZE	INDIVIDUAL WEIGHT	CUMULATIVE WEIGHT	% RETAINED	% PASSING	
50.0 mm or 2"					
37.5 mm or 1.5"	0.0	0.0	0.0%	100.0%	
25.0 mm or 1"	0.0	0.0	0.0%	100.0%	
19.0 mm or 3/4"	0.0	0.0	0.0%	100.0%	
12.5 mm or 1/2"	0.0	0.0	0.0%	100.0%	
9.5 mm or 3/8"	0.0	0.0	0.0%	100.0%	
4.75 mm or 4	13.5	13.5	1.3%	98.7%	
2.36 mm or 8	72.7	86.2	8.6%	91.4%	
1.18 mm or 16	161.5	247.7	24.7%	75.3%	
600 um or 30	180.8	428.5	42.7%	57.3%	
300 um or 50	208.9	637.4	63.5%	36.5%	
150 um or 100	157.6	795.0	79.2%	20.8%	
75 um or 200	125.0	920.0	91.6%	8.4%	
Pan/Oven Dry Wt.	920.0	1004.0			

COLORADO LICENSED — TOM S. TORMAN — 5806 — PROFESSIONAL ENGINEER

FINENESS MODULUS:	2.2

ASTM D 422 (0.02 mm)	

ASTM C 566	AASHTO T 255					
Max. Nominal Size (in)	4.75 mm (#4)	9.5 mm (3/8 in)	12.5 mm (1/2 in)	19.0 mm (3/4 in)	25.0 mm (1 in)	37.5 mm ($1^1/_2$ in)
Min. Sample Size (g)	500	1500	2000	3000	4000	6000
Mass of Original Sample (W)	1056.7					
Mass of Dried Sample (D,B)	1004.0	p = 100 (W - D)/D				Moisture Content 5.2%

ASTM C 117	AASHTO T 11			
Max. Nominal Size (in)	≤ 4.75 mm (#4)	> 4.75 mm (#4) to 9.5 mm (3/8 in)	>9.5 mm (3/8 in) to 19.0 mm (3/4 in)	> 19.0 mm (3/4 in)
Min. Sample Size (g)	300	1000	2500	5000
Mass of Dried Sample (D,B)	1004.0			
Dry Mass of Sample-Washed (C)	920.0	A = [(B - C)/B] X 100		% Mat. Finer than #200 Sieve 8.4%

ASTM D 2419	AASHTO T 176
Solution Temperature (72° +/- 5°f)	

Sample Identification	Sample Weight	Clay Reading	Sand Reading	Actual SE	Adjusted SE	Average SE	Reported Sand Equivalent Value
A	109.5	3.3	2.2	66.7	67	65.3	66
B	109.1	2.9	1.8	62.1	63		
C	110.4	3.2	2.1	65.6	66		

Revised: 10/2009

Moisture Density Relationship

Curve No.: DFF-S

Project No.: 2017 Date: 2-11-2018

Project: VARIOUS

Location: Daniels Sand Pit

Elev./Depth: Stockpile

Remarks: Daniels Fine Fill/ Structural Fill 9D-698)

COLORADO LICENSED JOHN B. MORRAY 35806 PROFESSIONAL ENGINEER

MATERIAL DESCRIPTION

Description: Daniels Fine Fill/ Structural Fill

Classifications - USCS: AASHTO:

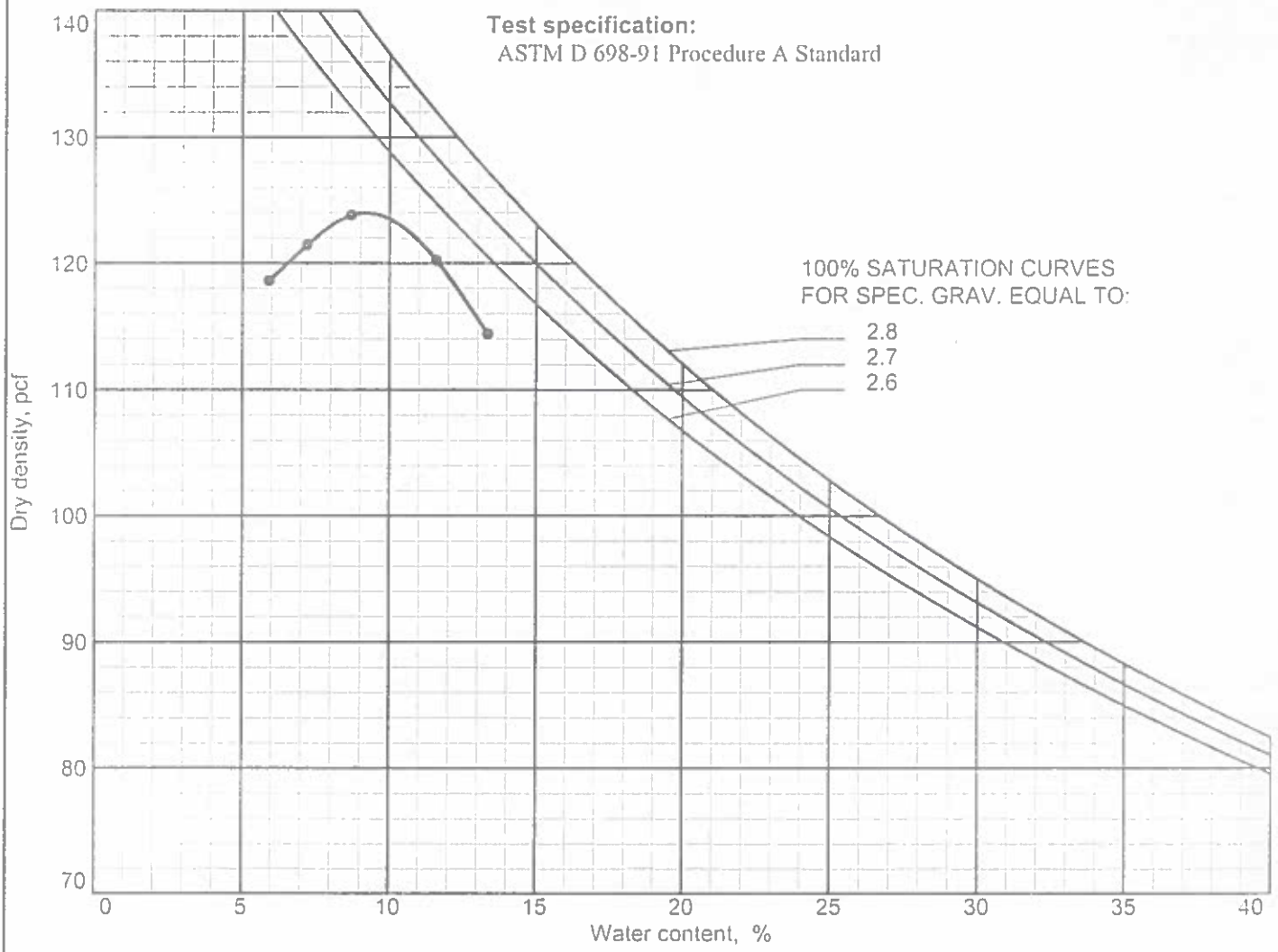
Nat. Moist. = 5.2 % Sp.G. =

Liquid Limit = NV Plasticity Index = NP

% > No.4 = 1.3 % % < No.200 = 8.4 %

TEST RESULTS
Maximum dry density = 124.0 pcf
Optimum moisture = 9.2 %

Test specification:
ASTM D 698-91 Procedure A Standard



Plate

TRANSIT MIX CONCRETE CO.

MOISTURE DENSITY TEST DATA

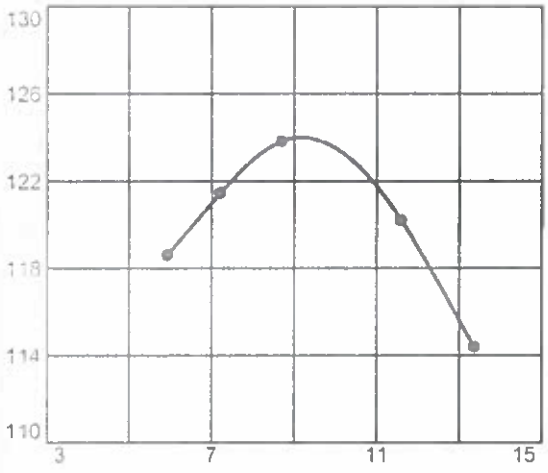
Client: VARIOUS
Project: VARIOUS
Project Number: 2017

Specimen Data

Source: Dan's Fine Fill 2018
Sample No.: D-FF-Std.
Elev. or Depth: Stockpile Sample Length (in./cm.): Stockpile
Location: Daniels Sand Pit
Description: Daniels Fine Fill/ Structural Fill
Liquid Limit: NV Plasticity Index: NP Natural Moisture: 5.2
Date: 2-11-2018 USCS Classification: AASHTO Classification:
Testing Remarks: Daniels Fine Fill/ Structural Fill 9D-698)
Percent retained on No.4 sieve: 1.3
Percent passing No. 200 sieve: 8.4 Specific gravity:

Test Data And Results For Curve DFF-S

Type of test: ASTM D 698-91 Procedure A Standard
Mold Dia.: 4.00 in. Hammer Wt.: 5.5 lb. Drop: 12 in.
Layers: three Blows per Layer: 25



POINT NO.	1	2	3	4	5
WM + WS	6152.5	6221.6	6287.9	6281.1	6213.5
WM	4253.0	4253.0	4253.0	4253.0	4253.0
WW+T	610.20	684.20	537.40	649.80	675.40
WD+T	576.10	638.20	494.40	582.30	595.80
TARE	0.00	0.00	0.00	0.00	0.00
MOIST	5.9	7.2	8.7	11.6	13.4
MOISTURE	5.9	7.2	8.7	11.6	13.4
DRY DEN	118.6	121.5	123.8	120.2	114.4

Max dry den= 124.0 pcf Opt moisture= 9.2 %

Oversize Correction Not Applied

Moisture Density Relationship

Curve No.: DFF-M

Project No.: 2017 **Date:** 2-11-2018

Project: VARIOUS

Location: Daniels Sand Pit

Elev./Depth: Stockpile

Remarks: Daniels Fine Fill Structural Fill (D-1557-A)

COLORADO LICENSED JOHN B MORGAN 5806 PROFESSIONAL ENGINEER

MATERIAL DESCRIPTION

Description: Daniels Fine Fill (Structural Fill)

Classifications - **USCS:** **AASHTO:**

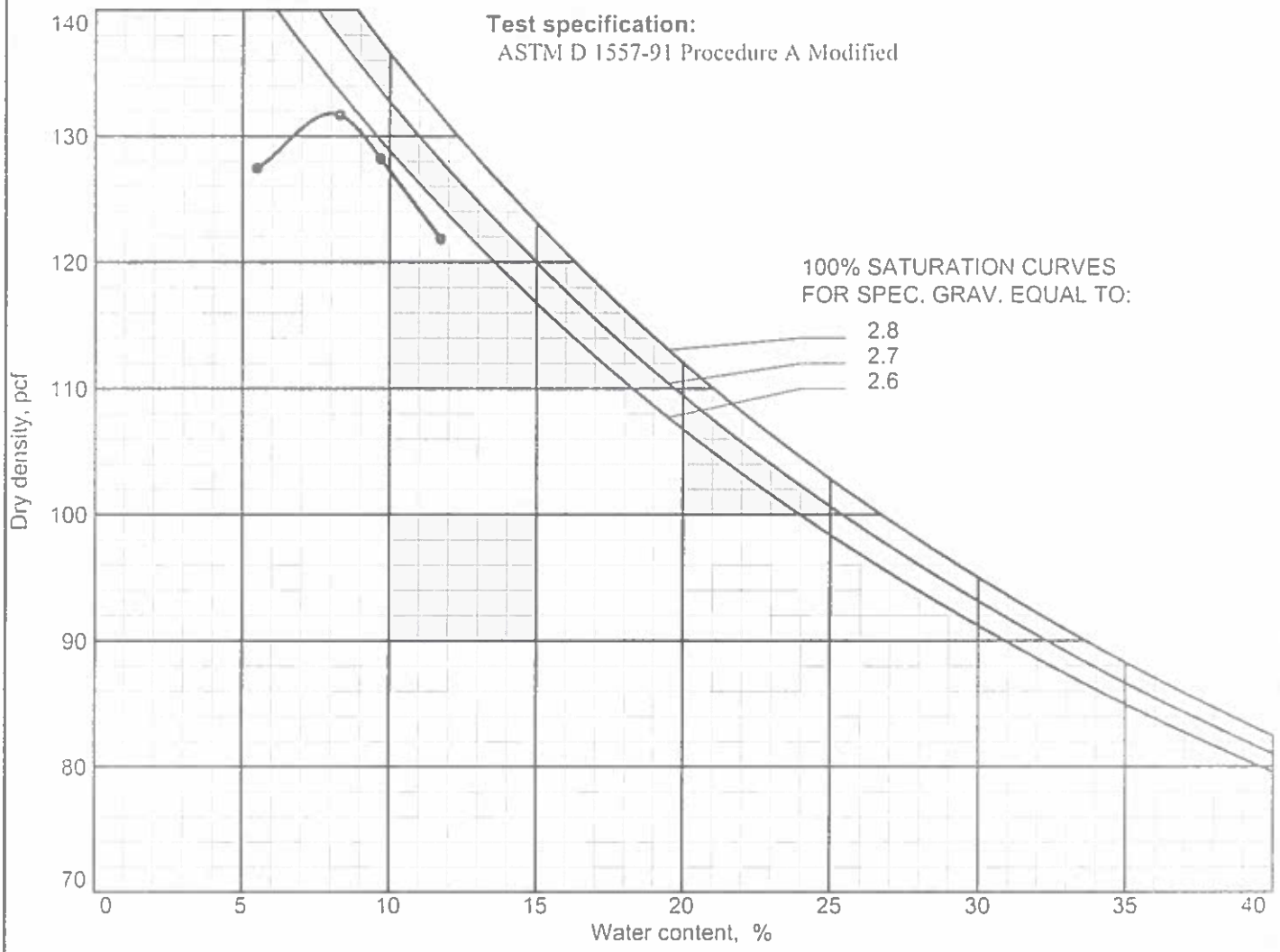
Nat. Moist. = 5.2 % **Sp.G. =**

Liquid Limit = NV **Plasticity Index =** NP

% > No.4 = 1.3 % **% < No.200 =** 8.4 %

TEST RESULTS
Maximum dry density = 131.8 pcf
Optimum moisture = 8.0 %

Test specification:
ASTM D 1557-91 Procedure A Modified



Plate

TRANSIT MIX CONCRETE CO.

MOISTURE DENSITY TEST DATA

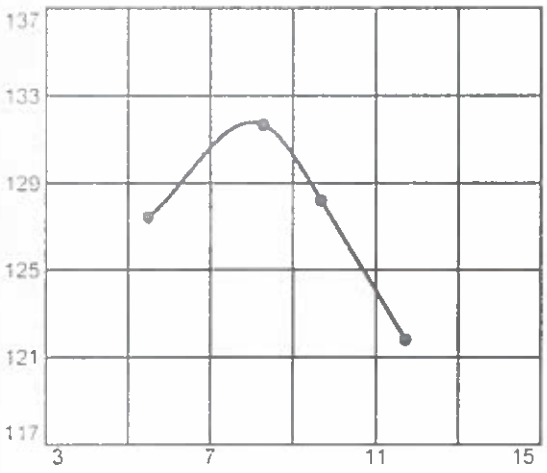
Client: VARIOUS
Project: VARIOUS
Project Number: 2017

Specimen Data

Source: Dan's Fine Fill 2018
Sample No.: D-FF-Mod.
Elev. or Depth: Stockpile **Sample Length (in./cm.):** Stockpile
Location: Daniels Sand Pit
Description: Daniels Fine Fill (Structural Fill)
Liquid Limit: NV **Plasticity Index:** NP **Natural Moisture:** 5.2
Date: 2-11-2018 **USCS Classification:** **AASHTO Classification:**
Testing Remarks: Daniels Fine Fill/Structural Fill (D-1557-A)
Percent retained on No.4 sieve: 1.3
Percent passing No. 200 sieve: 8.4 **Specific gravity:**

Test Data And Results For Curve DFF-M

Type of test: ASTM D 1557-91 Procedure A Modified
Mold Dia.: 4.00 in. **Hammer Wt.:** 10 lb. **Drop:** 18 in.
Layers: five **Blows per Layer:** 25



POINT NO.	1	2	3	4
WM + WS	6285.4	6408.6	6378.8	6310.5
WM	4253.0	4253.0	4253.0	4253.0
WW+T	538.20	687.60	718.50	672.90
WD+T	510.20	635.00	655.10	602.30
TARE	0.00	0.00	0.00	0.00
MOIST	5.5	8.3	9.7	11.7
MOISTURE	5.5	8.3	9.7	11.7
DRY DEN	127.4	131.7	128.2	121.8

Max dry den= 131.8 pcf **Opt moisture=** 8.0 %

Oversize Correction Not Applied

CTL | THOMPSON

February 8, 2018

Transit Mix Concrete Company
2596 Highway 96 East
Pueblo, Colorado 81006

Attention: Mr. Robert Montoya

Subject: Laboratory Test Results
Hveem Stabilometer and Sulfate Testing
Project No. DN48,806.001-300

This letter transmits the results of laboratory tests performed on samples delivered to our office on January 23, 2018. The test results transmitted at this time are those requested by Mr. Robert Montoya when the samples were submitted.

The samples were tested in accordance with American Association of State Highway and Transportation Offices (AASHTO). Test results are presented in Table 1 and 1A and in Figs. 1 through 6. Gradation analysis, used in Hveem stabilometer tests were performed by Transit Mix Concrete Company's material laboratory.

TABLE 1

Sample ID	R-Value	Sulfate (%) CDOT Method
Fine Fill, Daniels Sand Pit	75	0.00
Class 1, Pikeview Quarry	83	0.00
Colorado White Fines, Pikeview Quarry	61	0.00
Class 6, Rec. Concrete, Daniels Sand	82	0.02
Class 6 Roadbase, Pikeview Quarry	80	0.01
Class 5 Roadbase, Pikeview Quarry	87	0.02

Should you have any questions regarding these test results, please call.

Very truly yours,

CTL | THOMPSON, INC.

Frank Schenck
Asphalt Laboratory Supervisor

FS/bg

Via email: robert_montoya@transitmix.com

CLIENT NAME Transit Mix Concrete Company

Project No. DN48806.001-300

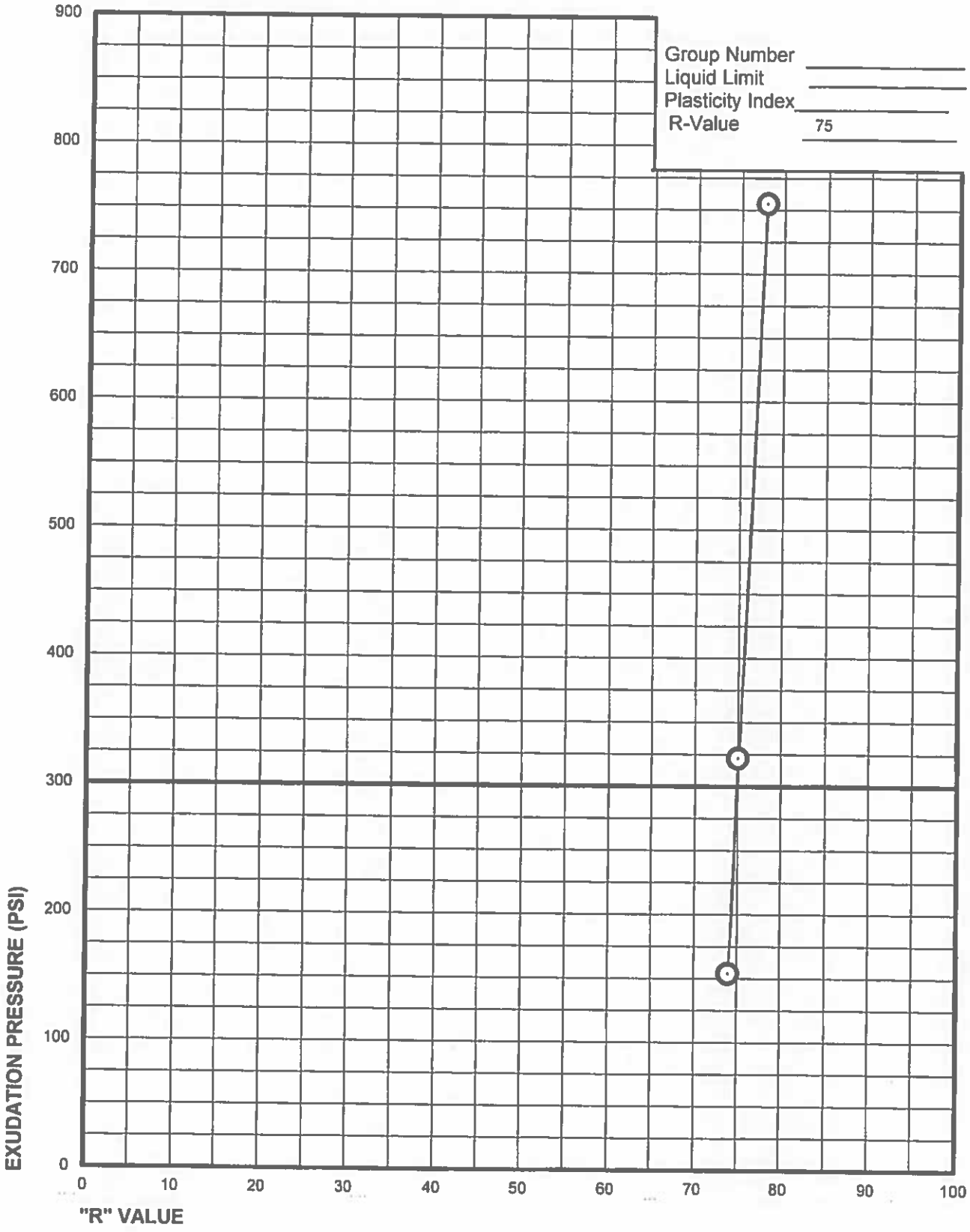
Date Submitted: January 23, 2018

TABLE 1A
HVEEMSTABILOMETER DATA

SAMPLE DESIGNATION	COMPACTION PRESSURE (PSI)	ELAPSED TIME TO REACH EXUDATION	SAMPLE DATA		EXUDATION PRESSURE (LBS)	EXPANSION PRESSURE (PSI)	HORIZONTAL PRESSURE AT 2000 LBS	NUMBER OF TURNS (D)	SAMPLE HEIGHT (INCHES)	UNCORRECTED R-VALUE *	CORRECTED R-VALUE
			DENSITY (PCF)	WATER (%)							
Fine Fill	105	0.97	113.2	12.7	1940	154	26	5.04	2.63	72	74
Daniels	105	2.02	114.1	12.0	4040	322	24	5.19	2.63	73	75
Sand Pit	105	4.74	113.9	11.4	9480	755	24	4.75	2.73	75	78
Class I	200	0.99	131.8	9.9	1980	158	22	4.30	2.54	78	78
Pikeview	200	1.60	131.7	9.6	3200	255	17	4.51	2.55	82	82
Quarry	200	2.35	131.8	8.9	4700	374	15	4.36	2.56	85	85
Colorado White Fines	50	0.89	130.9	10.4	1780	142	121	3.62	2.62	18	19
Pikeview	125	1.90	134.6	8.3	3800	302	47	3.86	2.49	61	61
Quarry	200	2.69	135.0	8.1	5380	428	34	3.84	2.49	71	71
Class 6 Rec. Concrete	200	1.07	103.3	17.1	2140	170	21	7.52	2.56	69	71
Daniels	200	1.82	104.8	16.3	3640	290	14	5.63	2.54	82	82
Sand	200	2.51	105.2	15.2	5020	400	13	6.12	2.56	82	83
Class 6 Roadbase	200	1.74	130.3	9.1	3480	277	14	6.53	2.56	79	80
Pikeview	200	2.90	132.0	8.9	5800	462	13	6.14	2.54	82	82
Quarry	200	3.75	132.3	8.3	7500	597	11	6.62	2.55	84	84
Class 5 Roadbase	200	1.70	137.9	8.0	3400	270	9	5.98	2.45	87	87
Pikeview	200	2.49	137.2	7.5	4980	396	9	5.49	2.49	88	88
Quarry	200	3.50	138.8	6.9	7000	557	10	5.21	2.48	88	88

$$\frac{100}{\frac{2.5}{D}\ \frac{160}{Ph}-1+1}$$

** AT 2,000 Lb. VERTICAL LOAD

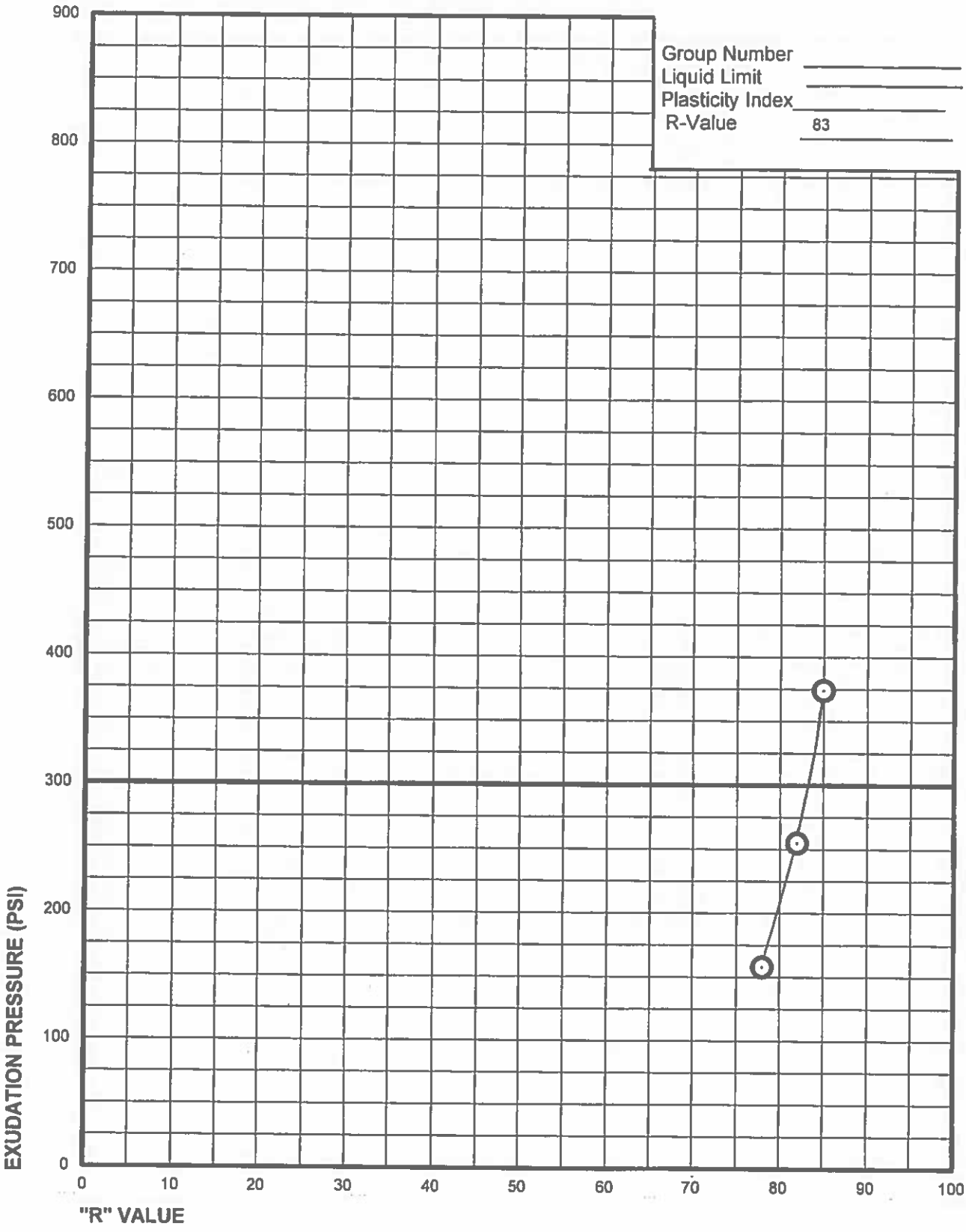


Transit Mix Concrete Co.
Fine Fill, Daniels Sand Pit
Submitted: January 23rd,2018

Hveem Stabilometer

Project No. DN48,806.001-300

Fig. 1

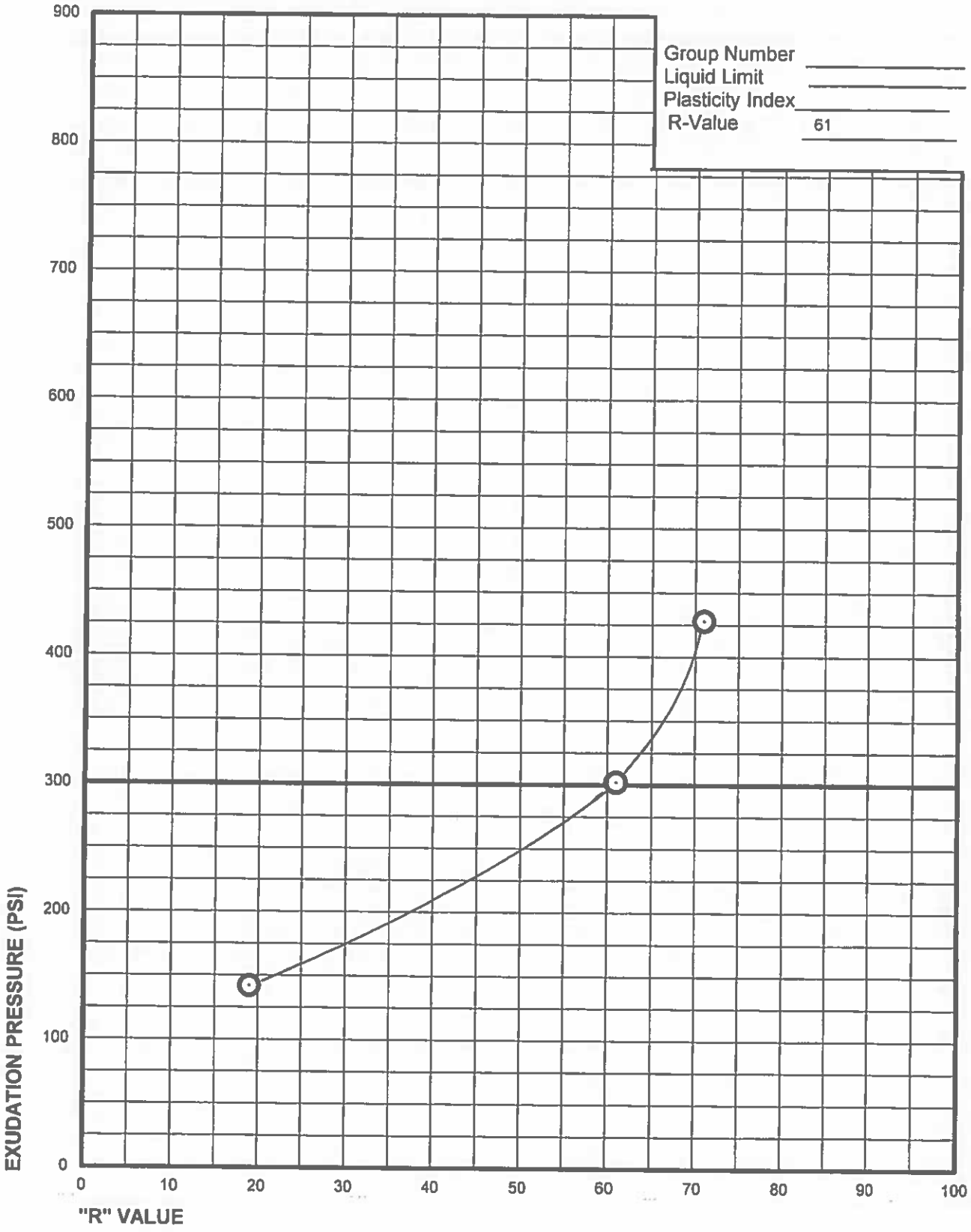


Transit Mix Concrete Co.
Class 1, Pikeview Quarry
Submitted: January 23rd,2018

Hveem Stabilometer

Project No. DN48,806.001-300

Fig. 2

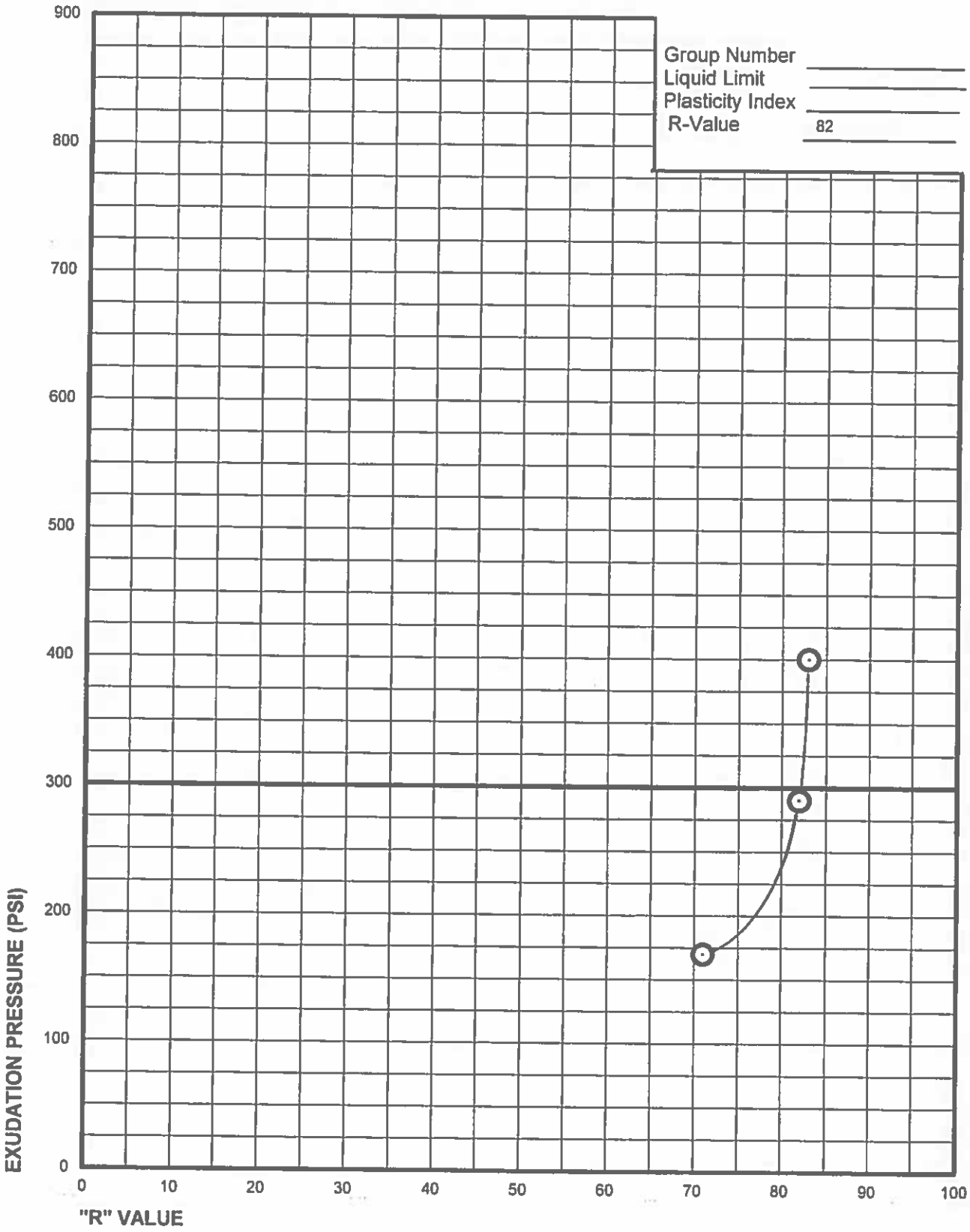


Transit Mix Concrete Co.
Colorado White Fines,Pikeview Quarry
Submitted: January 23rd,2018

Hveem Stabilometer

Project No. DN48,806.001-300

Fig.3

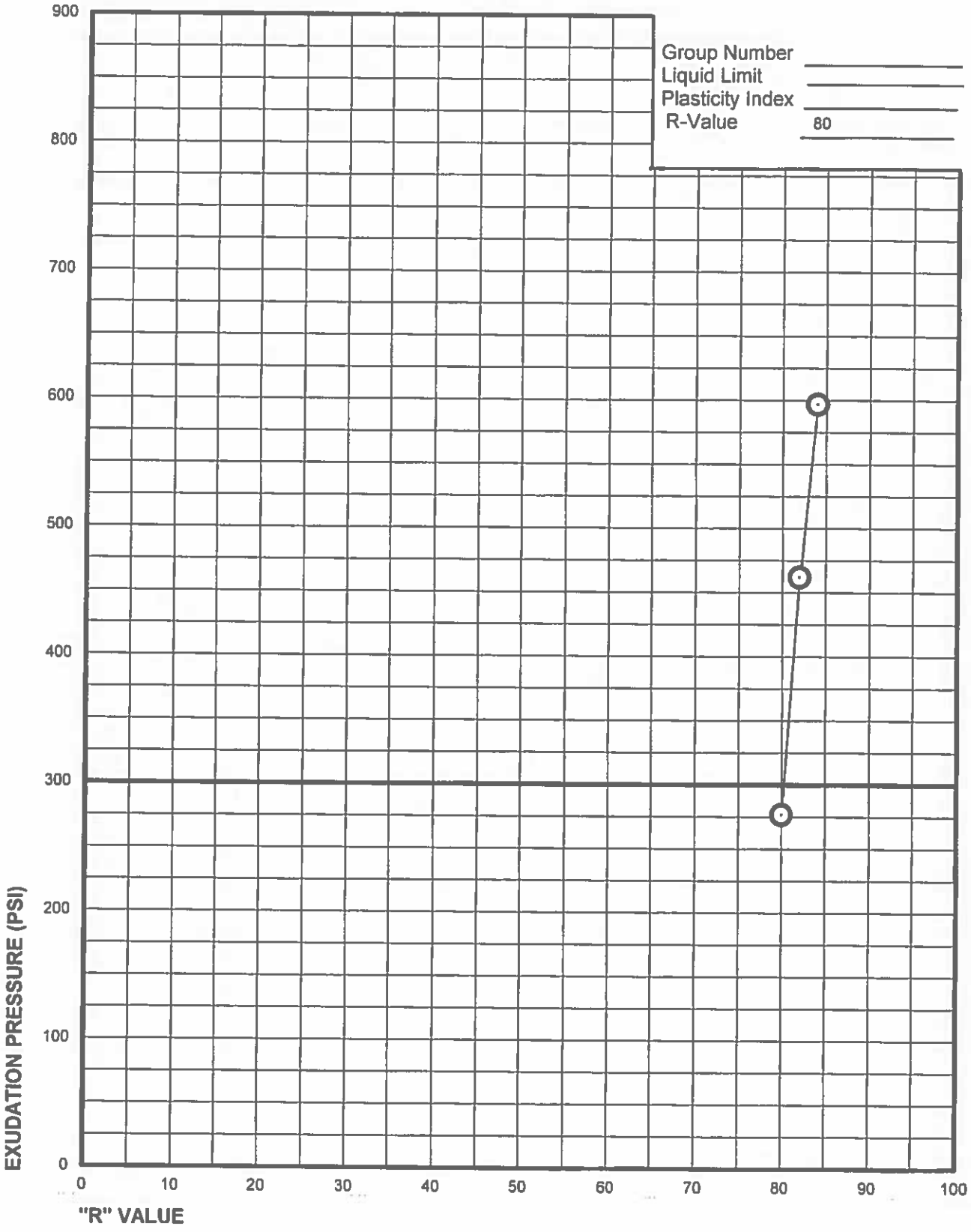


Transit Mix Concrete Co.
Class 6 Recycled Concrete,Daniels Sand
Submitted: January 23rd,2018

Hveem Stabilometer

Project No. DN48,806.001-300

Fig.4

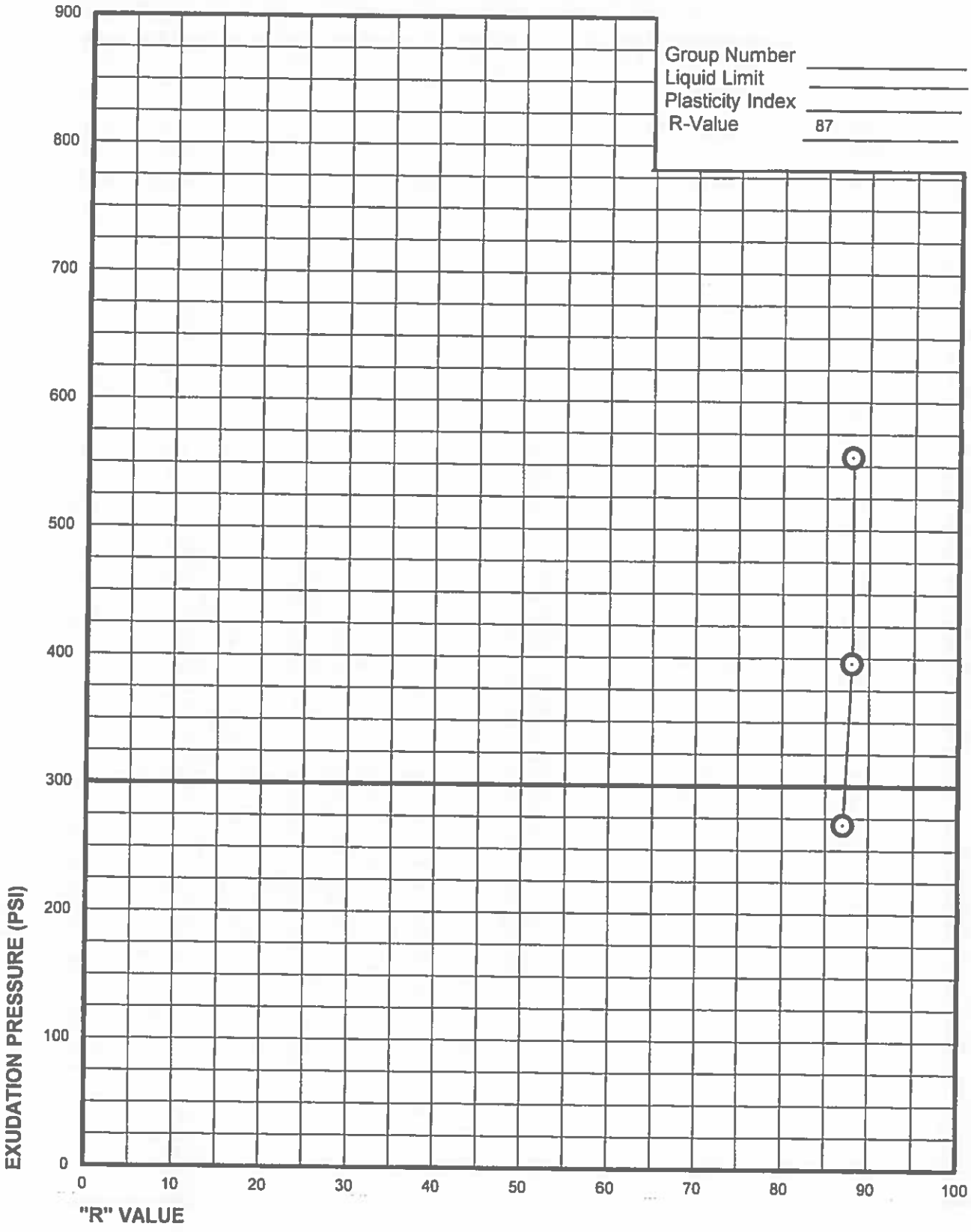


Transit Mix Concrete Co.
Class 6 Roadbase,Pikeview Quarry
Submitted: January 23rd,2018

Hveem Stabilometer

Project No. DN48,806.001-300

Fig.5



Transit Mix Concrete Co.
Class 5 Roadbase,Pikeview Quarry
Submitted: January 23rd,2018

Hveem Stabilometer

Project No. DN48,806.001-300

Fig.6

WesTest
627 Sheridan Boulevard • Lakewood, CO 80214
303.975.9959 • office@westest.net

CONCRETE PHYSICAL PROPERTY TEST REPORT

PROJECT: Barrington Heights, Colorado Springs, CO
WesTest PROJECT NO.: 568917
CLIENT: Reconstruction Experts, Inc.
Mr. Aaron Acker
5310 Vivian Street
Arvada, CO 80002

REPORT DATE: February 8, 2018
DATE TESTED: February 7, 2018
TECHNICIAN: ATS
SUPPLIER: Transit Mix Concrete
SAMPLE LOCATION: Chute

TIME	AMBIENT TEMP. (°F)	TICKET NO.	GALS. WATER ADDED	CUBIC YARDS	PLACEMENT LOCATION	CONCRETE TEMP. (°F)	AIR CONTENT (%) 5.0 - 8.0	SLUMP (IN.) 3 - 5	UNIT WEIGHT (PCF)	WATER CEMENT RATIO 0.45 Max.	YIELD	CYLINDER ID NO.
10:08 AM	27	289913	0	8	Curb and gutter, 15' South and 250' East of SE corner of High Knolls Grove and Baytree Grove	69	5.5	5 - 1/2*	141.8	0.31		56899
11:05 AM	29	289923	0	7	V-Pan, 30' South and 185' East of SE corner of High Knolls Grove and Baytree Grove	71	5.2	4 - 1/4	142.6			
11:58 AM	32	289930	10	9	V-Pan, Hogback Pt. 80' South and 80' East of SE corner of High Knolls Grove and Baytree Grove	74	5.4	6 - 1/2*	141.6	0.32		568910

* Denotes deviation from specification

Comments: Jerry with Reconstruction Experts approved the placement of this concrete.

CC: Jerry Harper with Reconstruction Experts, Robert Montoya with Transit Mix.

REVIEWED BY:_____

APPENDIX B

1993 AASHTO Empirical Equation for Flexible Pavements

Equation Solver | Variable Descriptions and Typical Values | Precautions

Type in data in the grey boxes and click the calculate button to see the output. To make additional calculations, change the desired input data and click the calculate button again. Click on the text descriptions of the input or output variables for more information.

INPUT

1. Loading

Total Design ESALs (W_{18}): 5256000

2. Reliability

Reliability Level in percent (R): 90

Combined Standard Error (S_0): 0.45

3. Serviceability

Initial Serviceability Index (p_i): 4.5

Terminal Serviceability Index (p_t): 2

4. Layer Parameters

Number of Base Layers: 0

	a	m	M_R	Min. Depth
Surface	0.44	1.0	N/A	0
Subgrade	N/A	N/A	29812	N/A

OUTPUT

1. Calculation Parameters

Standard Normal Deviate (z_R): -1.282

ΔPSI: 2.5

Design Structural Number (SN): 2.645

2. Layer Depths (to the nearest 1/2 inch)

Surface: 6.5

Total SN based on layer depths: 2.86

See Solution Details

Comments

Calculate