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

An Employee Owned Company

6735 Kumar Heights
Colorado Springs, CO 80918
phone: (719) 632-7009
fax: (719) 632-1049
email: kacolospgs@kumarusa.com
www.kumarusa.com

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

August 7, 2024

R&R Engineers-Surveyors, Inc.
Jessie Heiny, PE
1635 W. 13th Ave, Suite 310
Denver, CO 80204

jheiny@rrengineers.com

Subject: Double-Ring Infiltrometer Results, Proposed Rain Garden - Fountain Valley Salvation Army, 208 Cunningham Drive, El Paso County, Colorado.

Project No. 24-2-183

Dear Ms. Heiny:

This letter presents the results of infiltration and subgrade testing performed on July 30, 2024, for the above referenced project. The infiltration test was performed at the existing grade in the area of the proposed rain garden as shown on Fig. 1. Additionally, a sample of the subgrade was hand excavated immediately adjacent to the infiltration test location to determine soil classification characteristics.

Laboratory Testing: Laboratory testing was performed on the bulk disturbed sample, and included Atterberg limits and gradation analysis. The test results are presented on Fig. 2, and indicate a soil classification of silty sand (SM) for the tested sample.

Infiltration Testing: A double-ring infiltrometer test was performed in general accordance with ASTM D3385. Infiltration volumes were measured at 15- to 60-minute intervals until a relatively steady rate of infiltration was achieved. The total duration of the infiltration test was 360 minutes. The measured rate of infiltration at the end of the measurement period was 1.42 cm/hr. The test results with calculated infiltration rates are attached.

Referencing the USDA Natural Resources Conservation Service, and based on the subgrade soil testing that was performed, the subgrade soil within the test location is categorized as a hydrologic soil group of B. Soils within this group characteristically have moderately low runoff potential when thoroughly wet.

Please let us know if you have any questions, or if you need anything additional.

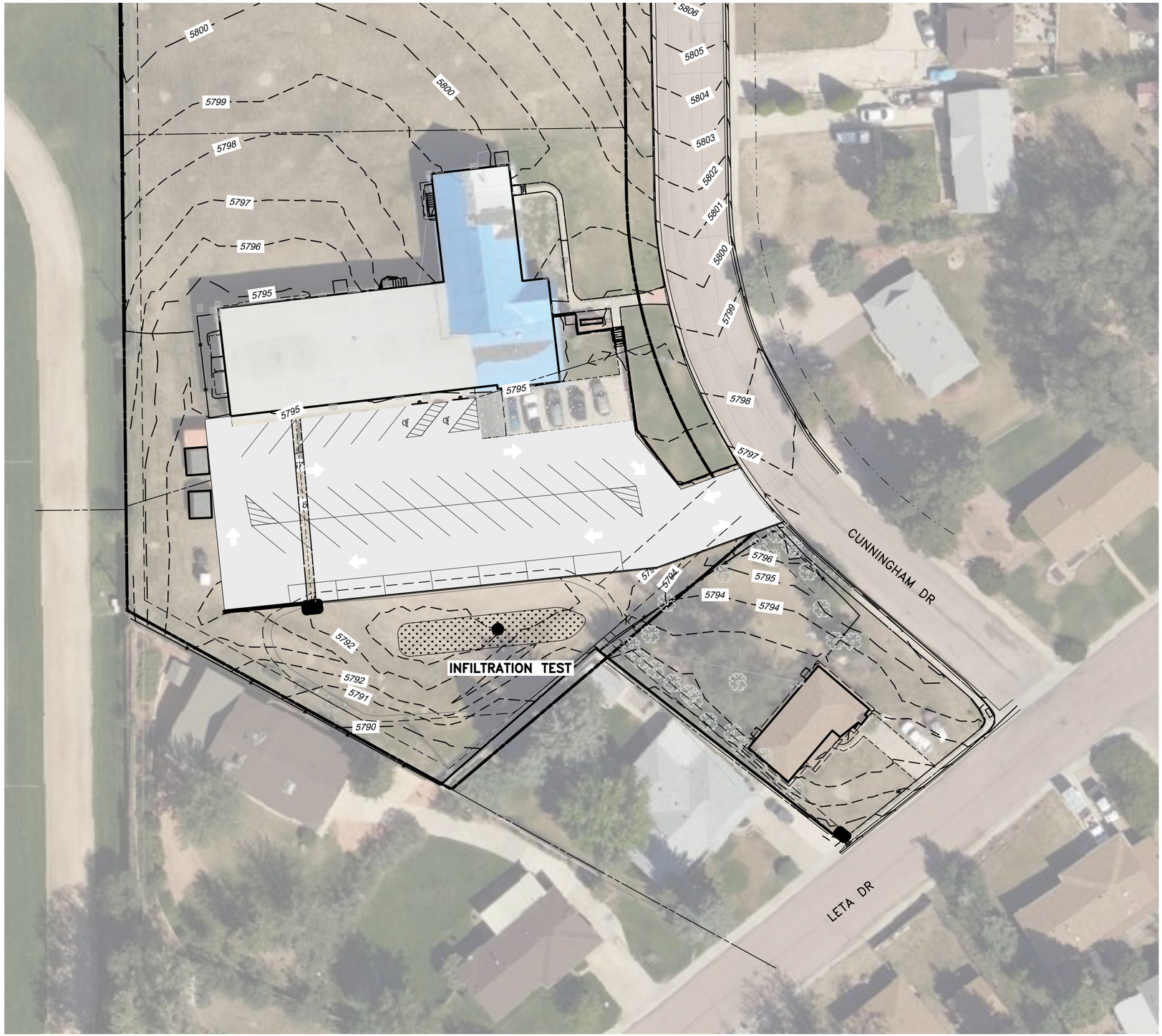
Sincerely,

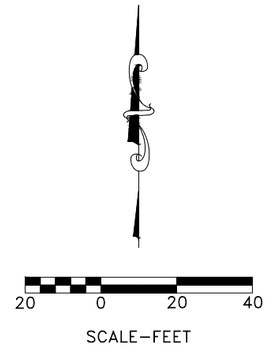
KUMAR & ASSOCIATES, INC.

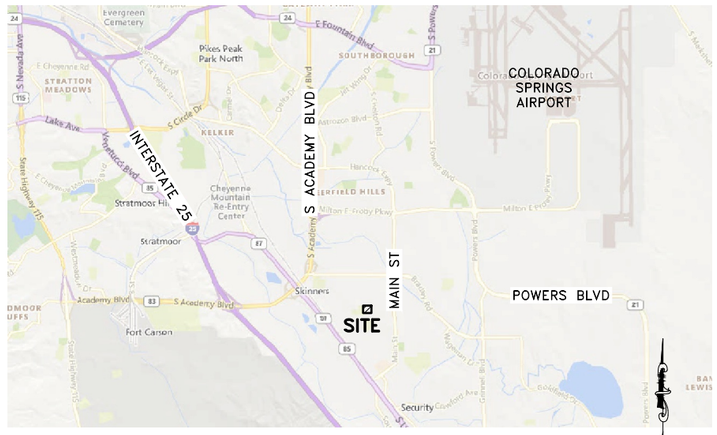
By _____
Duane P. Craft, P.E.

KUMAR & ASSOCIATES, INC.
Duane P. Craft, P.E.

DPC/sw
Rev by: AFK
Attachments



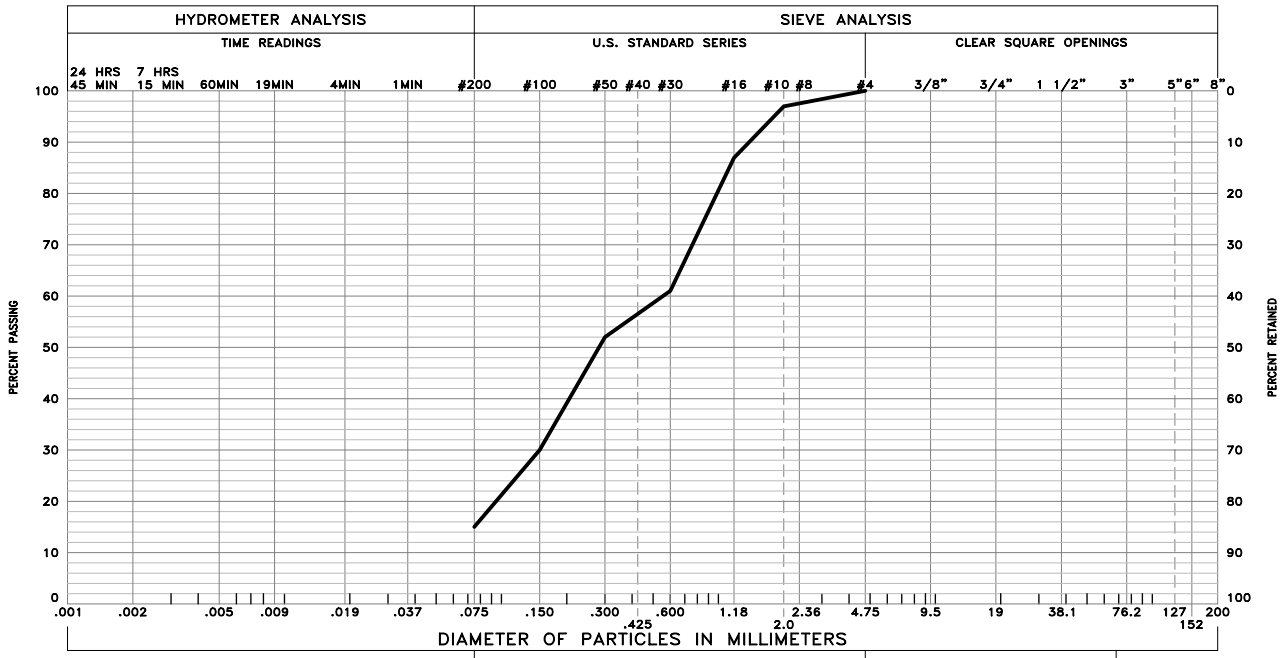




VICINITY MAP
NOT TO SCALE

24–2–183	Kumar & Associates		LOCATION OF INFILTRATION TEST	Fig. 1

August 07, 2024 – 09:39am
C:\Users\mromero\AppData\Local\Temp\AcPublish_9176\242183-01.dwg



GRAVEL 0 % SAND 85 % SILT AND CLAY 15 %

LIQUID LIMIT – PLASTICITY INDEX NP

SAMPLE OF: Silty Sand (SM) FROM: Infiltration Test @ 0–2'

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. Sieve analysis testing is performed in accordance with ASTM D6913, ASTM D7928, ASTM C136 and/or ASTM D1140.

24–2–183	Kumar & Associates	GRADATION TEST RESULTS	Fig. 2

PROJECT:	Fountain Salvation Army Rain Garden	**JOB NO:**	24-2-183
LOCATION:	208 Cunningham Dr	**DATE TESTED:**	7/30/2024
MATERIAL:	Appearance of SM	**TESTED BY:**	RY
CLIENT:	R&R Engineers		

INFILTATION RATE OF SOILS IN FIELD USING DOUBLE-RING INFILTOMETER
ASTM D3385-09

Constants	Area (cm^2)	Depth of Liquid (cm)	Liquid No.	Reservoirs Vol/ΔH (cm^3/cm)
Inner Ring	730	15.0	1	62.17
Annular Space	2189	15.0	2	182.30
Outer Ring	2919			

Liquid Used	Water
pH	N/A
Depth to WT (m)	N/A
Ground temp (°C) at 30 cm depth	27.0

Ring Penetration(cm)	
Inner	15.0
Outer	15.0

Trial No.		Time (hh:mm)	Elaspsed Time: Δ/total (min)	Flow Readings				Liquid Temp (°C)	Incremental Infiltration Rate		Remarks: Weather Conditions, etc.
				Inner Reading		Annular Space			Inner (cm/h)	Annular (cm/h)	
				Reading (cm)	Volume (cm^3)	Reading (cm)	Volume (cm^3)				
1	S	10:45	15	45.8	19	47.5	638		0.10	1.17	Constant flow of water added, Mostly Sunny
	E	11:00	(15)	45.5		44.0					
2	S	11:00	15	45.5	330	44.0	3464		1.81	6.33	Constant flow of water added
	E	11:15	(30)	40.2		25.0					
3	S	11:15	15	40.2	162	25.0	602		0.89	1.10	Constant flow of water added
	E	11:30	(45)	37.6		21.7					
4	S	11:30	15	37.6	591	21.7	2024		3.24	3.70	Constant flow of water added
	E	11:45	(60)	28.1		10.6					
5	S	11:45	30	28.1	516	40.8	2662		1.41	2.43	Constant flow of water added
	E	12:15	(90)	19.8		26.2					
6	S	12:15	30	19.8	640	26.2	2625		1.76	2.40	Constant flow of water added
	E	12:45	(120)	9.5		11.8					
7	S	12:45	60	46.1	951	48.9	7128		1.30	3.26	Constant flow of water added
	E	1:45	(180)	30.8		9.8					
8	S	1:45	60	30.8	951	47.9	5451		1.30	2.49	Constant flow of water added
	E	2:45	(240)	15.5		18.0					
9	S	2:45	60	45.2	1256	46.5	5979	35.0	1.72	2.73	Constant flow of water added
	E	3:45	(300)	25.0		13.7					
10	S	3:45	60	47.4	1038	42.5	6308		1.42	2.88	End of Test
	E	4:45	(360)	30.7		7.9		35.5			
11	S										Mostly Sunny to Sunny throughout testing
	E										
12	S										
	E										

Water in inner ring is 35 °C at 3:05 & 35.5 °C at 4:40
Air Temperature is 31.6 °C at start (10:45) to 34.4 °C at completion (5:00)