STORM WATER MANAGEMENT INVESTIGATION

CHABAD JEWISH CENTER IMPROVEMENTS
14906 VIA DE LA VALLE
SAN DIEGO COUNTY, CALIFORNIA

PREPARED FOR

GEOCON
INCORPORATED

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

JUNE 14, 2023
PROJECT NO. G3134-52-01

Project No. G3134-52-01
June 14, 2023

Chabad Jewish Center of RSF
P.O. Box 8282
Rancho Santa Fe, California 92067

Attention: Mr. Levi Raskin

Subject: STORM WATER MANAGEMENT INVESTIGATION
CHABAD JEWISH CENTER IMPROVEMENTS
14906 VIA DE LA VALLE
SAN DIEGO COUNTY, CALIFORNIA

Dear Mr. Raskin:

In accordance with your request, we herein submit the results of our storm water management investigation for the subject project in the Rancho Santa Fe area in San Diego County, California (see Vicinity Map).

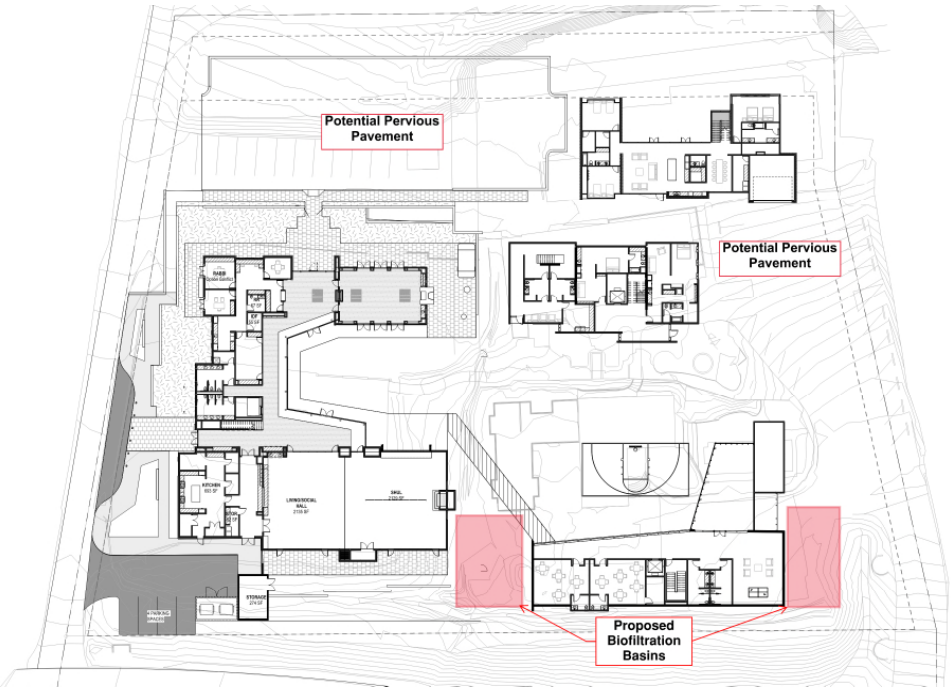
Vicinity Map

SITE AND PROJECT DESCRIPTION

The property is located at 14906 Via de la Valle in the Rancho Santa Fe area in San Diego County, California. The property currently consists of a few commercial and retail buildings, and some ancillary structures, along with accommodating pavement, utilities, flatwork and landscaping. The property gently to moderately slopes to the southeast with elevations ranging from about 100 feet to 70 feet above Mean Sea Level (MSL) from north to south, respectively. The Existing Site Map shows the current site conditions.

Existing Site Map

Final plans for the project have not yet been prepared; however, we understand the site will be redeveloped as a Jewish services facility in two development phases. The first phase will consist of constructing a 12,520 sq/ft building and the second phase will consist of constructing three buildings, ranging from 2,000 to 6,500 square-feet. We expect each development phase will include associated site improvements such as retaining walls, pavements, flatwork and underground utilities. Two storm water management devices are planned for the south side of the property. The Proposed Site Plan shows the planned buildings and improvements and the planned locations of the storm water management devices.



Proposed Site Plan

We performed our storm water field investigation on June 2, 2023 to evaluate the infiltration characteristics of the on-site material. The work consisted of advancing 2 borings (I-1 and I-2) into the alluvium and performing infiltration tests.

STORM WATER MANAGEMENT INVESTIGATION

We understand storm water management devices are being proposed in accordance with the current Storm Water Standards (SWS). If not properly constructed, there is a potential for distress to improvements and properties located hydrologically down gradient or adjacent to these devices. Factors such as the amount of water to be detained, its residence time, and soil permeability have an important effect on seepage transmission and the potential adverse impacts that may occur if the storm water management features are not properly designed and constructed. We have not performed a hydrogeological study at the site. If infiltration of storm water runoff occurs, downstream properties may be subjected to seeps, springs, slope instability, raised groundwater, movement of foundations and slabs, or other undesirable impacts because of water infiltration.

Hydrologic Soil Group

The United States Department of Agriculture (USDA), Natural Resources Conservation Services, possesses general information regarding the existing soil conditions for areas within the United States. The USDA website also provides the Hydrologic Soil Group. Table 1 presents the descriptions of the hydrologic soil groups. If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter

is for drained areas and the second is for undrained areas. In addition, the USDA website also provides an estimated saturated hydraulic conductivity for the existing soil.

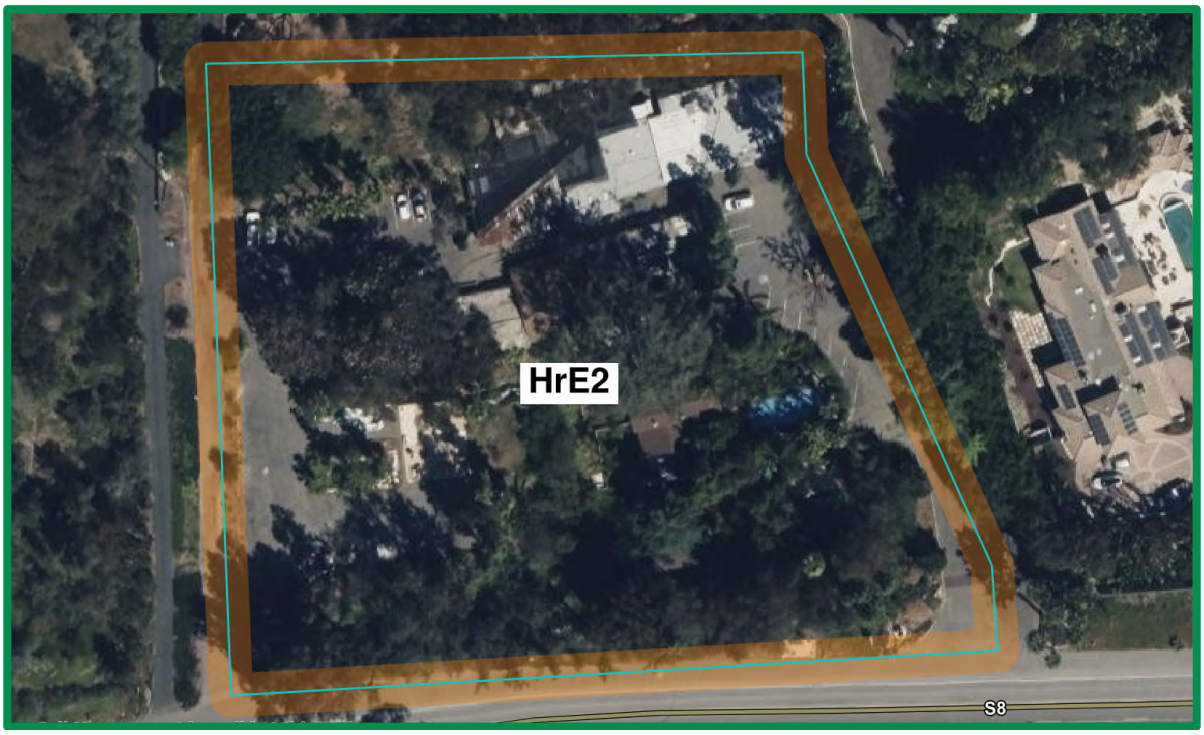
TABLE 1
HYDROLOGIC SOIL GROUP DEFINITIONS

Soil Group	Soil Group Definition
A	Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.
B	Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.
C	Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.
D	Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high-water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

According to geologic maps of the area, the property is underlain by alluvium (Qal) and Delmar Formation (Td). We encountered alluvium in the borings performed for this storm water investigation. Some undocumented fill associated with previous development of the property may exist overlying the alluvium. Table 2 presents the information from the USDA website for the subject property. The Hydrologic Soil Group Map presents output from the USDA website showing the limits of the soil units.

TABLE 2
USDA WEB SOIL SURVEY – HYDROLOGIC SOIL GROUPS

Map Unit Name	Map Unit Symbol	Approximate Percentage of Property	Hydrologic Soil Group	k_{SAT} of Most Limiting Layer (Inches/Hour)
Huerhuero loam, 15 to 30 percent slopes, eroded	HrE2	100	D	0.00 to 0.06



Hydrologic Soil Group Map

In-Situ Testing

We performed 2 infiltration tests using the Aardvark permeameter within the general area of potential storm water management basins. The results of the tests provide design parameters regarding the saturated hydraulic conductivity and infiltration characteristics of on-site soil and geologic units. Table 3 presents the results of the estimated field saturated hydraulic conductivity and estimated infiltration rates obtained from the infiltration tests. The field sheets are also attached herein. We applied a feasibility factor of safety of 2.0 to our estimated infiltration rates to provide input on Table D.2-3. Soil infiltration rates from in-situ tests can vary significantly from one location to another due to the heterogeneous characteristics inherent to most soil. The Storm Water Geologic Map, Figure 1, presents the locations of the infiltration tests.

TABLE 3
FIELD PERCOLATION INFILTRATION TEST RESULTS

Test Location	Test Depth (Feet)	Geologic Unit	Field-Saturated Infiltration Rate, k_{sat} (Inch/Hour)	Factored[1] Field Infiltration Rate, k_{sat} (Inch/Hour)
I-1	4.6	Qal	0.058	0.029
I-2	4.1	Qal	0.019	0.009
		Average:	**0.039**	**0.019**

[1]Using a factor of safety of 2.

Infiltration categories include full infiltration, partial infiltration and no infiltration. Table 4 presents the commonly accepted definitions of the potential infiltration categories based on the infiltration rates.

TABLE 4
INFILTRATION CATEGORIES

Infiltration Category	Field Infiltration Rate, I (inches/hour)	Factored Infiltration Rate[1], I (inches/hour)
Full Infiltration	$I > 1.0$	$I > 0.5$
Partial Infiltration	$0.10 < I \leq 1.0$	$0.05 < I \leq 0.5$
No Infiltration (Infeasible)	$I < 0.10$	$I < 0.05$

[1] Using a Factor of Safety of 2.

GEOLOGIC HAZARDS AND CONSIDERATIONS

Soil/Groundwater Contamination or Industrial Activities

During our investigation, we did not observe, nor are we aware of any soil or groundwater contamination Additionally, we did not observe any industrial activities adjacent to the site. The environmental consultant should evaluate if infiltration would be possible from an environmental standpoint, if allowed. We expect infiltration associated with this risk would be considered feasible.

Groundwater Elevations/Well or Groundwater Basin

The *BMP Design Manual* indicates that the depth to the groundwater table beneath an infiltration BMP must be greater than 10 feet for infiltration to be allowed. We did not encounter static groundwater during our field investigation to the maximum depth explored. We expect static groundwater exists at depths greater than 50 feet below existing grades. We did not observe a well or groundwater basin within 100 feet of the proposed basins. Therefore, infiltration due to groundwater elevations, wells or groundwater basins would be considered feasible at the site.

Septic Tanks/Leach Fields

We understand the site does not have any existing septic tanks or leach fields. Full or partial infiltration is feasible at the site as long as a 50-foot setback from existing or proposed septic tanks or leach fields is incorporated into the design.

Existing and Planned Structures

Several commercial and retail buildings currently exist at the site. Development plans consist of demolishing the existing structures and constructing a new Jewish services facility consisting of 4 new buildings. Water should not be allowed to infiltrate in areas where it could affect the existing or proposed

structures. Mitigation for existing structures consists of not allowing water infiltration within a lateral distance of at least 10 feet from the new or existing foundations and property lines.

New or Existing Utilities

Existing utilities are located in the roadways adjacent to the site and within the current site limits. Full or partial infiltration should not be allowed in the areas of the existing or proposed utilities to help prevent potential damage/distress to improvements. Mitigation measures to prevent water from infiltrating the utilities consist of setbacks, installing cutoff walls around the utilities and installing subdrains and/or installing liners. The horizontal and vertical setbacks for infiltration devices should be a minimum of 10 feet and a 1:1 plane of 1 foot below the closest edge of the deepest adjacent utility, respectively.

Existing Fill Materials

We did not encounter undocumented fill in our borings; however, we expect some undocumented fill associated with previous development exists throughout the site. Infiltration should not be allowed in areas with greater than 5 feet of existing fill materials. Due to the potential for lateral water migration within the existing soils, full or partial infiltration should be considered infeasible within the undocumented fill but would be considered feasible in the underlying alluvium and formational materials, provided the fill is relatively thin.

Slope Hazards

The *BMP Design Manual* recommends a minimum setback of 1½ times the height of adjacent steep slopes greater than 4:1 or 25 percent. Several slopes exist throughout the site, including an approximately 15-foot-high slope that descends from Via de la Valle to a drainage channel on the south side of the property. Infiltration devices should not be installed adjacent to slopes unless they are lined, possess a minimum setback distance of 1.5 times the slope height, or extend below the height of the slope.

Considerations of Infiltration Restrictions

The *BMP Design Manual* includes *Table D.1.1: Considerations for Geotechnical Analysis of Infiltration Restrictions* that determines the infiltration restrictions at the site. Table 5 presents the mandatory and optional considerations for the site.

TABLE 5
CONSIDERATIONS FOR GEOTECHNICAL ANALYSIS OF INFILTRATION RESTRICTIONS

Restriction Element		Is Element Applicable? (Yes/No)
Mandatory Considerations	BMP is within 100' of Contaminated Soils	No
	BMP is within 100' of Industrial Activities Lacking Source Control	No
	BMP is within 100' of Well/Groundwater Basin	No
	BMP is within 50' of Septic Tanks/Leach Fields	No
	BMP is within 10' of Structures/Tanks/Walls	No
	BMP is within 10' of Sewer Utilities	No
	BMP is within 10' of Groundwater Table	No
	BMP is within Hydric Soils	No
	BMP is within Highly Liquefiable Soils and has Connectivity to Structures	No
	BMP is within 1.5 Times the Height of Adjacent Steep Slopes (>25%)	No
	County Staff has Assigned "Restricted" Infiltration Category	No
Optional Considerations	BMP is within Predominantly Type D Soil	Yes
	BMP is within 10' of Property Line	No
	BMP is within Fill Depths of >5' (Existing or Proposed)	No
	BMP is within 10' of Underground Utilities	No
	BMP is within 250' of Ephemeral Stream	No
	Other (Provide detailed geotechnical support) – Geologic Hazards	Yes
Result	Based on examination of the best available information, I have **not identified any restrictions** above	O Unrestricted
	Based on examination of the best available information, I have **identified one or more restrictions** above	**X Restricted**

CONCLUSIONS AND RECOMMENDATIONS

Storm Water Evaluation Narrative

The in-place infiltration test locations were selected in areas likely used for possible basins and storm water management devices that correspond with the natural drainage on the site (located in the low points of the property). We performed 2 infiltration tests within the alluvium and the results indicate an average rate of 0.019 inches per hour with an applied factor of safety of 2.

Storm Water Infiltration Conclusion

Infiltration would not be possible in the areas of existing underground utilities and buildings, and areas with fill depths greater than 5 feet, as discussed herein. The average infiltration test results within the alluvium indicate infiltration rates less than 0.05 inches per hour (with a FOS of 2). Therefore, full or partial infiltration within the alluvium is considered infeasible at the site. The rates recorded can be applied to the geologic unit across the property.

Storm Water Infiltration Recommendations

Liners and subdrains should be incorporated into the design and construction of the planned storm water devices. The liners should be impermeable (e.g. High-density polyethylene, HDPE, with a thickness of about 30 mil or equivalent Polyvinyl Chloride**,** PVC) to prevent water migration. The subdrains should be perforated within the liner area, installed at the base and above the liner, be at least 3 inches in diameter and consist of Schedule 40 PVC pipe. The subdrains outside of the liner should consist of solid pipe. The penetration of the liners at the subdrains should be properly waterproofed. The subdrains should be connected to a proper outlet. The devices should also be installed in accordance with the manufacturer's recommendations.

Storm Water Standard Worksheets

The BMP Design Manual Table D.2-4 helps the project civil engineer estimate the factor of safety based on several factors. Table 6 describes the suitability assessment input parameters related to the geotechnical engineering aspects for the factor of safety determination.

TABLE 6
GUIDANCE FOR DETERMINING INDIVIDUAL FACTOR VALUES (TABLE D.2-4)

Consideration	High Concern – 3 Points	Medium Concern – 2 Points	Low Concern – 1 Point
Infiltration Testing Method	Any	At least 2 tests of any kind within 50' of BMP.	At least 4 tests within BMP footprint, OR Large/Small Scale Pilor Infiltration Testing over at least 5% of BMP footprint
Soil Texture Class	Unknown, Silty, or Clayey	Loamy	Granular /Slightly Loamy
Soil Variability	Unknown or high	Moderately Homogenous	Significantly Homogenous
Depth to Groundwater/ Obstruction	<5 feet below BMP	5-15 feet below BMP	>15 feet below BMP

Based on our geotechnical investigation and the previous table, Table 7 presents the estimated factor values for the evaluation of the factor of safety. This table only presents the suitability assessment safety factor (Part A) of the worksheet. The project civil engineer should evaluate the safety factor for design (Part B) and use the combined safety factor for the design infiltration rate.

TABLE 7
FACTOR OF SAFETY WORKSHEET DESIGN VALUES (TABLE D.2-3-PART A)

Consideration	Assigned Weight (w)	Factor Value (v)	Product (p = w x v)
Infiltration Testing Method	0.25	2	0.50
Soil Texture Class	0.25	2	0.50
Soil Variability	0.25	2	0.50
Depth to Groundwater/ Obstruction	0.25	1	0.25
Suitability Assessment Safety Factor, $S_A = \Sigma p$			1.75

[1.] The project civil engineer should complete Table D.2-3 using the data on this table. Additional information is required to evaluate the design factor of safety.

If you have any questions regarding this correspondence, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

GEOCON INCORPORATED

Bradley R. Kuna
RCE 89846

Shawn Foy Weedon
GE 2714

BRK:SFW:arm

Attachments: Storm Water Geologic Map, Figure 1
Aardvark Permeameter Data Sheets (2)

(e-mail) Addressee

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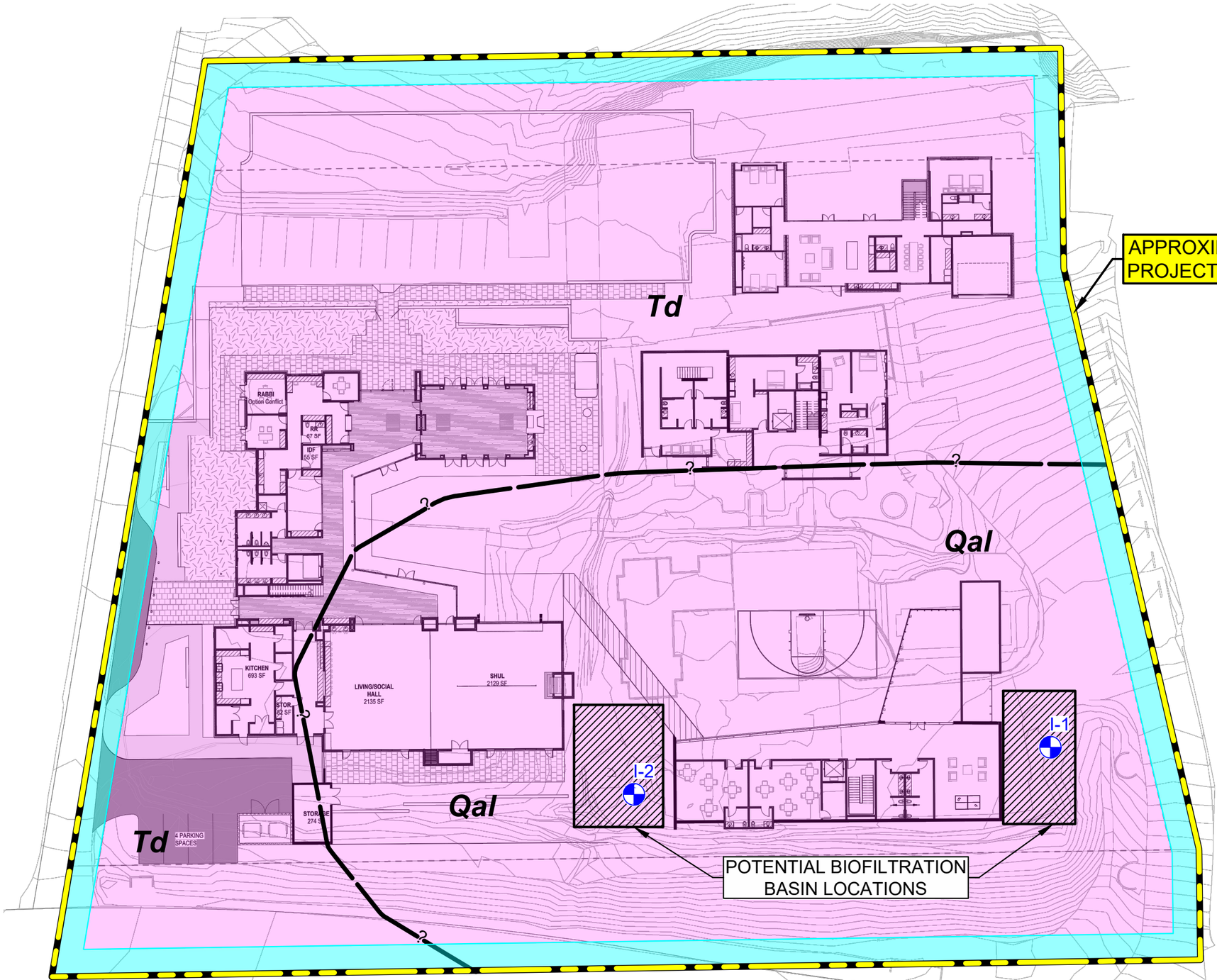

0' 40' 80'
SCALE 1"= 40' (On 11x17)

GEOCON LEGEND

Qal .....ALLUVIUM
Td .....DELMAR FORMATION
I-2 .....APPROX. LOCATION OF GEOTECHNICAL BORING
.....APPROX. LOCATION OF GEOLOGIC CONTACT (Queried Where Uncertain)
.....10-FOOT OFFSET FROM PROPERTY LINE (Infiltration Infeasible)
.....INFILTRATION INFEASIBLE DUE TO LOW INFILTRATION RATES

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PROJECT NO. G3134 - 52 - 01
FIGURE 1
DATE 06 - 14 - 2023

STORM WATER GEOLOGIC MAP

Plotted:06/14/2023 2:16PM | By:JONATHAN WILKINS | File Location:Y:\PROJECTS\G3134-52-01 (Chabad Jewish Center)\SHEETS\G3134-52-01 StormWaterMAP.dwg

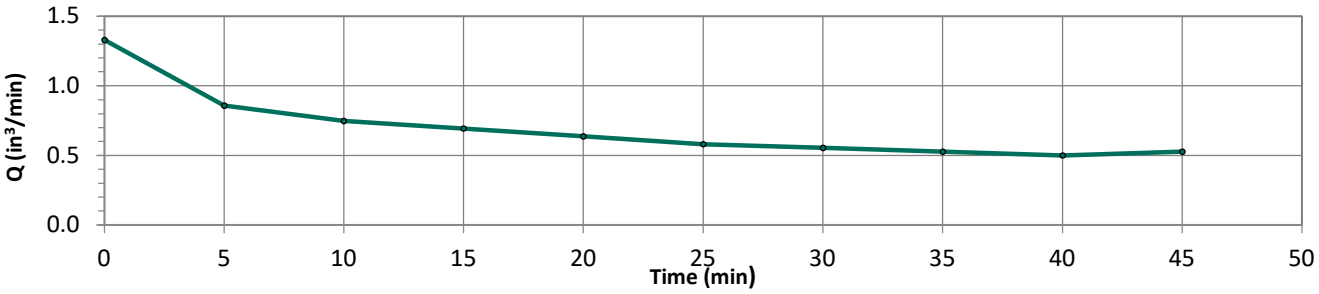
TEST NO.: I-1

GEOLOGIC UNIT: Qal

EXCAVATION ELEVATION (MSL, FT): 71 +/-

TEST INFORMATION	
BOREHOLE DIAMETER (IN):	4
BOREHOLE DEPTH (FT):	4.6
TEST/BOTTOM ELEVATION (MSL, FT):	66 +/-
MEASURED HEAD HEIGHT (IN):	6.5
CALCULATED HEAD HEIGHT (IN):	6.2
FACTOR OF SAFETY:	2.0

TEST RESULTS	
STEADY FLOW RATE (IN^3/MIN):	**0.517**
FIELD-SATURATED INFILTRATION RATE (IN/HR):	**0.058**
FACTORED INFILTRATION RATE (IN/HR):	**0.029**



TEST DATA				
Reading	Time Elapsed (min)	Water Weight Consumed (lbs)	Water Volume Consumed (in^3)	Q (in^3/min)
1	0.00	0.000	0.00	0.00
2	5.00	0.240	6.65	1.329
3	5.00	0.155	4.29	0.858
4	5.00	0.135	3.74	0.748
5	5.00	0.125	3.46	0.692
6	5.00	0.115	3.18	0.637
7	5.00	0.105	2.91	0.582
8	5.00	0.100	2.77	0.554
9	5.00	0.095	2.63	0.526
10	5.00	0.090	2.49	0.498
11	5.00	0.095	2.63	0.526

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AARDVARK PERMEAMETER TEST RESULTS

CHABAD JEWISH CENTER IMPROVEMENTS
14906 VIA DE LA VALLE

PROJECT NO.: G3134-52-01

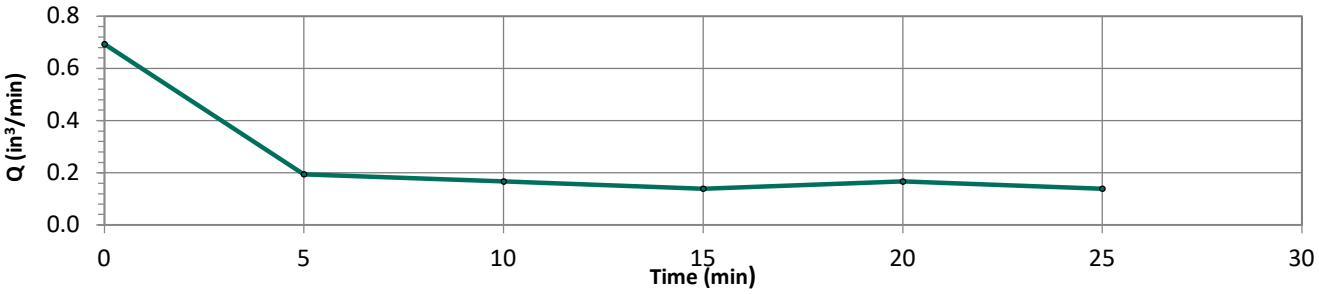
TEST NO.: **I-2**

GEOLOGIC UNIT: **Qal**

EXCAVATION ELEVATION (MSL, FT): **76 +/-**

TEST INFORMATION	
BOREHOLE DIAMETER (IN):	4
BOREHOLE DEPTH (FT):	4.1
TEST/BOTTOM ELEVATION (MSL, FT):	72 +/-
MEASURED HEAD HEIGHT (IN):	5.8
CALCULATED HEAD HEIGHT (IN):	6.1
FACTOR OF SAFETY:	2.0

TEST RESULTS	
STEADY FLOW RATE (IN^3/MIN):	**0.152**
FIELD-SATURATED INFILTRATION RATE (IN/HR):	**0.019**
FACTORED INFILTRATION RATE (IN/HR):	**0.009**



TEST DATA				
Reading	Time Elapsed (min)	Water Weight Consumed (lbs)	Water Volume Consumed (in^3)	Q (in^3/min)
1	0.00	0.000	0.00	0.00
2	5.00	0.125	3.46	0.692
3	5.00	0.035	0.97	0.194
4	5.00	0.030	0.83	0.166
5	5.00	0.025	0.69	0.138
6	5.00	0.030	0.83	0.166
7	5.00	0.025	0.69	0.138

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AARDVARK PERMEAMETER TEST RESULTS

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