GeoMat Testing Laboratories, Inc.

Soil Engineering, Environmental Engineering, Materials Testing, Geology

March 14, 2016

Project No. 16027-02

TO: Mr. Shakil Patel, AIA
25982 Hinkley Street
Loma Linda, California 92354

SUBJECT: Basic Soil Infiltration Testing Report, Northwest Corner of Beaumont Avenue and Nevada Street, APN 0293111150000, Redlands, California

Introduction

This report provides a summary of the geotechnical engineering services conducted to support evaluation of the feasibility of infiltration, in the upper five feet, at the subject site. The purpose of our services was to complete four insitu infiltration tests utilizing percolation testing procedure in boreholes to evaluate the feasibility of infiltration for disposal of stormwater runoff following the falling head method.

Scope of Services

GeoMat Testing Laboratories, Inc. was retained to provide geotechnical engineering services to support the project. Our scope of work consisted of the following specific tasks:

1) Drill three deep exploratory boreholes to maximum depth of 15 feet.

2) Complete four infiltration tests at the site utilizing the shallow boring percolation testing per San Bernardino County, Technical Guidance Document for Water Quality Management Plans procedures. The tests were completed in general accordance with the falling head method.

3) Complete laboratory gradation analysis and testing of selected soil sample.

4) Complete data analysis.

5) Preparation of this report summarizing our findings, conclusions, and recommendations. The report includes:

- Site plan showing the location of infiltration tests.
- Summary of site conditions observed at the testing locations.
- Results of the laboratory testing.
- Discussion of the results of insitu infiltration testing.
- A discussion of the surficial soil and anticipated groundwater conditions at the site.
- Evaluation of the feasibility of infiltration.
- Recommendations for infiltration facility.

Existing Site Conditions

The subject site is located on the northwestern corner of Beaumont Avenue and Nevada Street, Redlands, California. Both Beaumont Avenue and Nevada Street are paved streets without curb or gutter. The geographical relationship of the site and surrounding vicinity is shown on our Site Location Map, Figure 1.

The site is approximately five and a half acres. Topography of the site is generally flat with a maximum relief of 9 feet. Surface drainage sheeting flows to the northwest at a rate of approximately 1.3%. Currently the site is vacant with light seasonal grasses sparsely spread about.

Groundwater

Groundwater study is not within the scope of this work. Groundwater was not encountered in our exploratory borings drilled at the site up to 15 feet below ground surface. Depth to groundwater is not expected to impact site grading.

Highest historical groundwater record documented by the State of California, Department of Water Resources in a well located approximately 1 mile northeast of the site (State Well No. 01S03W33C001S, elevation 1206) was 65 feet (water surface elevation of 1141) below ground surface on March 28, 1945. The lowest site elevation is approximately 1248 feet.

Please note that the potential for rain or irrigation water locally seeping through from elevated areas and showing up near grades cannot be precluded. Our experience indicates that surface or near-surface groundwater conditions can develop in areas where groundwater conditions did not exist prior to site development, especially in areas where a substantial increase in surface water infiltration results from landscape irrigation. Fluctuations in perched water elevations are likely to occur in the future due to variations in precipitation, temperature, consumptive uses, and other factors including mounding of perched water over bedrock. Mitigation for nuisance shallow seeps moving from elevated lower areas will be needed if encountered. These mitigations may include subdrains, horizontal drains, toe drains, french drains, heel drains or other devices.

Exploratory Boreholes

Three exploratory boreholes were drilled on February 28, 2016 to 15 feet below ground surface. The boreholes were drilled utilizing a CME 45 drill rig equipped with 8 inch hollow stem augers. The bottom of the exploratory borehole is estimated to be at least 10 feet below proposed bottom of infiltration facility.

Soil Sampling and Laboratory Testing

Bulk soil samples were obtained from the bottom of each percolation hole for laboratory classification. Laboratory sieve analysis was performed for the collected soil samples. The soil classifications are in conformance with the Unified Soil Classifications System (USCS), as outlined in the Classification and Symbols Chart (Appendix B).

A summary of our laboratory testing is presented in Appendix C. Based on laboratory testing the onsite soil is classified as silty sand with gravel and well graded sand with silt and gravel (USCS "SM", "SPSM").

Boring Percolation Testing Method

Four infiltration test holes were drilled with a mobile drill rig. A 4-inch-diameter perforated PVC casing wrapped with filter fabric was placed in the boreholes. Pea gravel was placed below and around the pipe for stability of the boreholes.

The boreholes were presoaked prior to the percolation testing. Presoaking was conducted using five gallon water bottles. All of soaking water seeped away while the technician is onsite.

After presoaking, infiltration boreholes were tested for and met the Sandy Soil Criteria. Infiltration testing continued for an additional hour with readings taken every ten minutes. The measurements were taken by filling up the test holes with water and allowing the water to percolate. The drop of water level was recorded every measurement. A stop watch was used to record the time measurements.

Infiltration Test Results

Four infiltration tests were conducted for the upper five feet of soil. Based on the results of this study, infiltration of stormwater at the site is feasible. The following summarizes the result of the infiltration feasibility study.

Test No.	Test Depth Below Ground Surface	Percolation Raw Rate (in/hr)	Adjusted Infiltration Rate (in/hr)
P-1	37"	35.3	3.7
P-2	44"	39.0	4.2
P-3	43"	30.0	3.1
P-4	42"	36.8	3.9

The percolation rate is the rate in horizontal and vertical direction. This rate is adjusted using Perchet Method for horizontal water infiltration. Refer to Appendix D for test results.

A safety factor should be applied to this rate by the design engineer. Safety factor discussion is in the following paragraph.

Factors of Safety

Long-term infiltration rates may be reduced significantly by factors such as soil variability and inaccuracy in the infiltration rate measurement. The correction factor for site variability is between 2 and 10. Safety factors for operating the system, maintenance, siltation, biofouling, etc. should also be considered by the design civil engineer at his discretion. Minimum safety factor for the infiltration rate required by the County of San Bernardino for tests conducted when deep exploratory borehole has been drilled at the site is at least 2.

Conclusions/Recommendations

- In our opinion, water infiltration at the site is feasible.
- Filter fabric should be used whenever aggregates are placed against native soils. Only washed aggregates are allowed.
- Infiltration water should not be allowed to saturate pavement and concrete structures subgrade soils.
- The test results may be utilized when the bottom of the infiltration system will be located within the alluvial soil observed/tested. Should this system be located in a different soil type, the infiltration characteristics will be different than those observed during the infiltration testing. The infiltration rate recommended above is based on the assumption that only clean water will be introduced to the subsurface profile. Any fines, debris, or organic materials could significantly impact the infiltration rate.
- Please note that soils in infiltration areas should not be subject to compaction during construction.
- The proposed system by the civil engineer should be constructed and maintained in accordance with manufacturer guidelines.

An important consideration for infiltration facilities is that, during construction, great care must be taken not to reduce the infiltrative capacity of the soil in the facility through compaction by heavy equipment or by using the infiltration area as a sediment trap.

Infiltration facilities should be located down gradient from structures and constructed late in the site development after soils (that might erode and clog the units) have been stabilized, or should be protected (by flagging) until site work is completed.

Infiltration facilities should be sited with the following guidelines:

INFILTRATION FACILITY SETBACKS	
Setback From	Distance
Property Lines and Public Right of Way	10 feet
Foundations/Slabs	15 feet or within a 1:1 plane drawn up from the bottom of foundation
Slopes	H/2, 5 feet minimum (H: is slope height)
Private drinking water wells	100 feet

Ferrous metal pipes should be protected from potential corrosion by bituminous coating, etc. We recommend that all utility pipes be nonmetallic and/or corrosion resistant. Recommendations should be verified by soluble sulfate and corrosion testing of soil samples obtained from specific locations during construction.

If applicable, rigid eight to twelve inch diameter, with locking cap, perforated observation well(s) extending vertically into the system's bottom is suggested as an observation point. Observation well(s) and associated appurtenances should be checked regularly throughout the year and after large storm event. Once performance stabilizes, frequency of monitoring may be reduced.

GeoMat Testing Laboratories should observe during facility excavation. Additional laboratory testing including but not limited to grain size analysis, sand equivalent, sulfate content, etc should be conducted during construction.

Use of this Report

This report was prepared for the exclusive use of the addressee and his consultants for specific application to the proposed site. The use by others, or for the purposes other than intended, is at the user's sole risk.

The findings, conclusions, and recommendations presented herein are based on our understanding of the project and on subsurface conditions observed during our site work. Within the limitations of scope, schedule, and budget, the conclusions and recommendations presented in this report were prepared in accordance with generally accepted geotechnical engineering principals and practices in the area at the time the report was prepared. We make no other warranty either expressed or implied.

We appreciate this opportunity to provide geotechnical services on this project and look forward to assisting the Project Team as the design progresses. If you have any questions or comments regarding the information contained in this report, or if we may be of further services, please call us at (951) 688-5400.

Submitted for GeoMat Testing Laboratories, Inc.

Haytham Nabilsi, GE 2375
Principal Engineer

Distribution: [3] Addressee

Attachments:

Figure 1	Site Location Map
Plate 1	InfiltrationTest Location Map
Appendix A	References
Appendix B	Exploratory Borehole Logs
Appendix C	Laboratory Test Results
Appendix D	Infiltration Data/Graph

DeLORME

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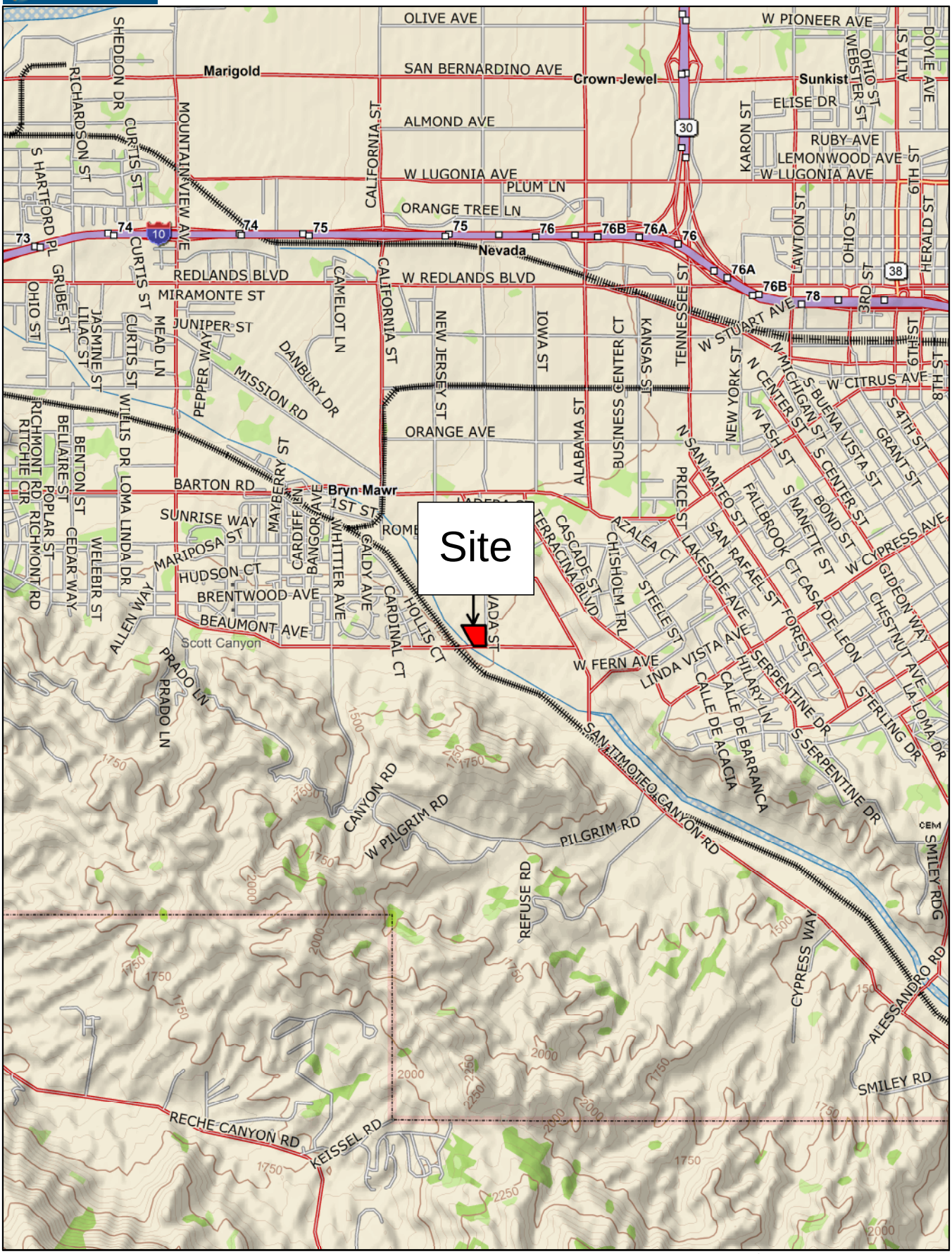

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TN

MN (11.9°E)

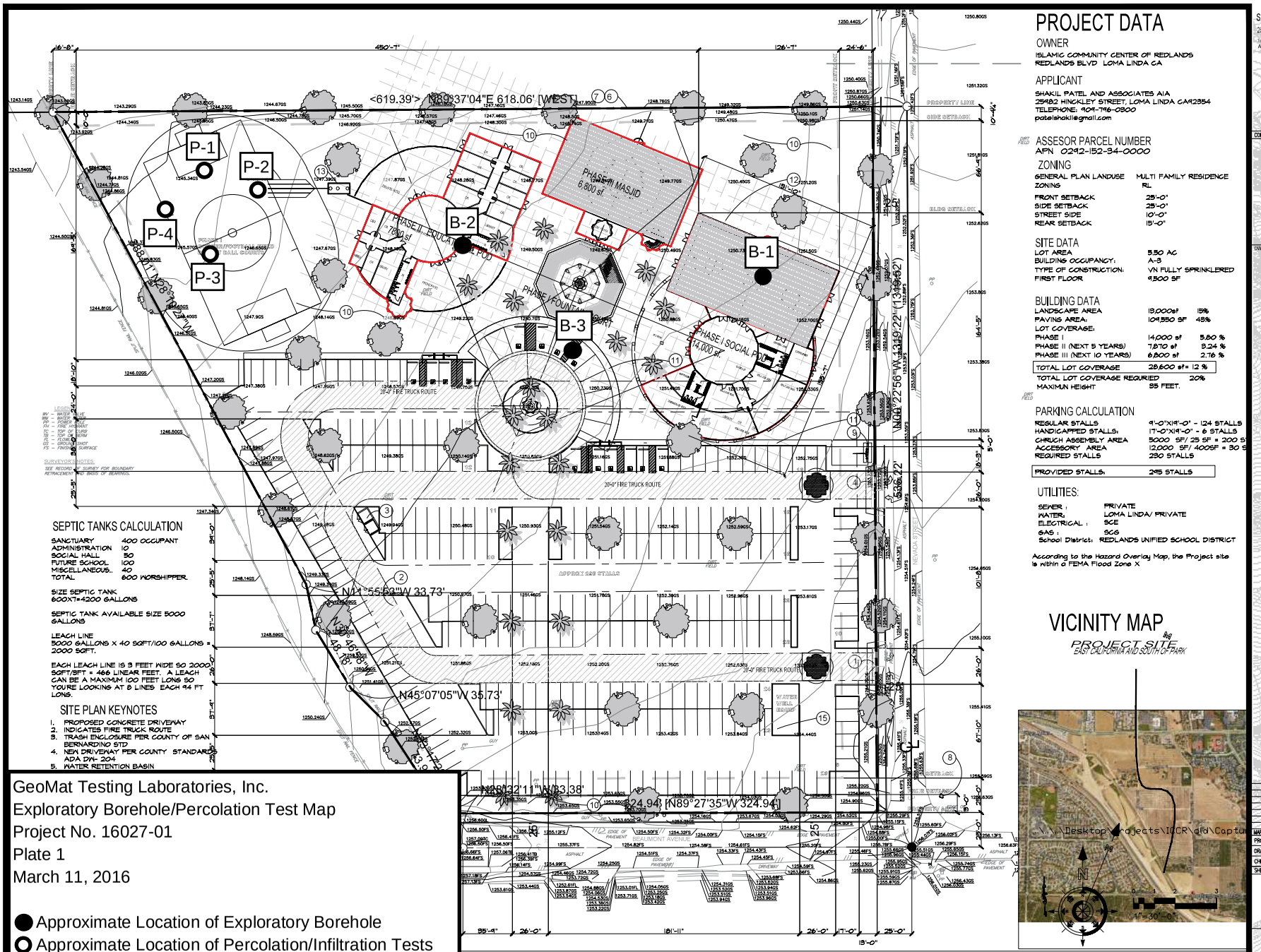
Scale 1 : 50,000

0 ¼ ½ ¾ 1 mi

0 ½ 1 1½ 2 km

1" = 4,166.7 ft

Data Zoom 12-0



GeoMat Testing Laboratories, Inc.
Exploratory Borehole/Percolation Test Map
Project No. 16027-01
Plate 1
March 11, 2016

● Approximate Location of Exploratory Borehole
○ Approximate Location of Percolation/Infiltration Tests

PROJECT DATA

OWNER
ISLAMIC COMMUNITY CENTER OF REDLANDS
REDLANDS BLVD LOMA LINDA CA

APPLICANT
SHAKIL PATEL AND ASSOCIATES AIA
25802 HINCKLEY STREET, LOMA LINDA CA92354
TELEPHONE: 909-796-0800
patelshakil@gmail.com

ASSESOR PARCEL NUMBER
APN 0292-152-34-0000

ZONING

GENERAL PLAN LANDUSE	MULTI FAMILY RESIDENCE
ZONING	RL
FRONT SETBACK	25'-0"
SIDE SETBACK	25'-0"
STREET SIDE	10'-0"
REAR SETBACK	15'-0"

SITE DATA

LOT AREA	5.50 AC
BUILDING OCCUPANCY:	A-3
TYPE OF CONSTRUCTION:	VN FULLY SPRINKLERED
FIRST FLOOR	9,500 SF

BUILDING DATA

LANDSCAPE AREA	18,000sf	15%
PAVING AREA:	104,550 SF	43%
LOT COVERAGE:		
PHASE I	14,000 sf	5.80 %
PHASE II (NEXT 5 YEARS)	7,870 sf	3.24 %
PHASE III (NEXT 10 YEARS)	6,800 sf	2.76 %
TOTAL LOT COVERAGE	28,600 sf= 12 %	
TOTAL LOT COVERAGE REQUIRED	20%	
MAXIMUN HEIGHT	35 FEET.	

PARKING CALCULATION

REGULAR STALLS	9'-0"X19'-0" - 124 STALLS
HANDICAPPED STALLS.	17'-0"X19'-0" - 6 STALLS
CHRUCH ASSEMBLY AREA	5000 SF/ 25 SF = 200 S
ACCESSORY AREA	12,000 SF/ 4005F = 30 S
REQUIRED STALLS	230 STALLS
PROVIDED STALLS.	245 STALLS

UTILITIES:

SEWER :	PRIVATE
WATER:	LOMA LINDA/ PRIVATE
ELECTRICAL :	SCE
GAS :	SCG
School District:	REDLANDS UNIFIED SCHOOL DISTRICT

According to the Hazard Overlay Map, the Project site is within a FEMA Flood Zone X

VICINITY MAP

PROJECT SITE
EAST CALIFORNIA AND SOUTH OF PARK

SHAKIL PATEL & ASSOCIATES AIA, LEED-AP
25802 HINCKLEY STREET, LOMA LINDA CA 92354
Architecture, Interiors, Construction Management

CONSULTANTS

OWNER

ISLAMIC COMMUNITY CENTER OF REDLANDS

NORTH WEST CORNER OF
BEAUMONT AVENUE AND NEVADA STREET

MASTER PLANNING PHAS

MARK	DATE	DESCRIPTION
PROJECT NO:	122015	
DRAWN BY:	SP	
CHK'D BY:	SP	
SHEET TITLE		

SITE PLAN PHASE III

SHEET A103 OF

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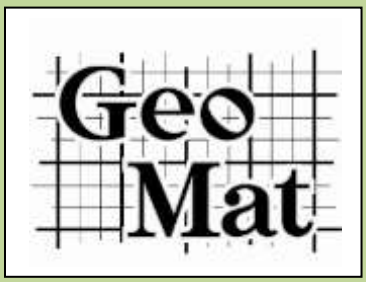
Appendix A



REFERENCES

Shakil Patel & Associates' Islamic Community Center of Redlands, Northwest Corner of Beaumont Avenue and Nevada Street, Redlands, California, Site Plan Phase III, Sheet A103, Plan Dated February 2, 2016.

Technical Guidance Document for Water Quality Management Plans, The County of San Bernardino Areawide Stormwater Program, NPDES No. CAS618036, Order No. R8-2010-0036.

San Bernardino County Stormwater Program, Model Water Quality Management Plan Guidance, Jun. 9, 2005.

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Massmann, JW, Butchart, and S Stolar, Infiltration Characteristics, Performance, and Design of Stormwater Facilities, Final Research Report, Research Project TI 803, Task 12, Washington DOT 2003.

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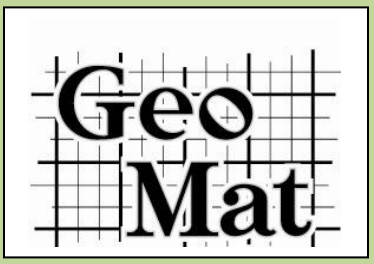
BMP Handbook, Part B, Planning Activities, Stormwater Mitigation Measures, Watershed Protection Division, City of Los Angeles.

Appendix B



General Notes

DRILLING NOTES

WATER LEVEL MEASUREMENTS

Water levels indicated on the boring logs are levels measured in the borings at the times indicated. In permeable materials, the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of groundwater levels is not possible with only short-term observations.

WATER LEVEL OBSERVATION DESIGNATION

W.D.	While Drilling
A.B.	After Boring
B.C.R.	Before Casing Removal
A.C.R.	After Casing Removal
24 hr.	Water level taken approximately 24 hrs. after boring completion

DRILLING AND SAMPLING SYMBOLS

AS	Auger Sample
CS	Continuous Sampler
DB	Diamond Bit -NX unless otherwise noted
HA	Hand Auger
HS	Hollow Stem Auger
PA	Power Auger
RB	Rock Bit
SS*	Split-Barrel
ST	Shelby Tube - 2" (51mm) unless otherwise noted
WB	Wash Bore
CR	Calfornia Ring Sampler 3" O.D., Lined with 2.5"X1" Rings

*The Standard Penetration Test is conducted in conjunction with the split-barrel sampling procedure. The "N" value corresponds to the number of blows required to drive the last 1 foot (0.3m) of an 18 in. (0.46m) long, 2 in. (51mm) O.D. split-barrel sampler with a 140 lb. (63.5 kg) hammer falling a distance of 30 in. (0.76m). The Standard Penetration Test is carried out according to ASTM D-1586. (See "N" Value below.)

SOIL PROPERTIES & DESCRIPTIONS

TEXTURE

PARTICLE	SIZE	
Clay	< 0.002 mm	(< 0.002 mm)
Silt	< #200 Sieve	(0.075 mm)
Sand	#4 to #200 Sieve	(4.75 to 0.075 mm)
Gravel	3 in. to #4 Sieve	(75 mm to 4.75 mm)
Cobbles	12 in. to 3 in.	(300 mm to 75 mm)
Boulders	> 12 in.	(300 mm)

COMPOSITION

SAND & GRAVEL

Description	% by Dry Weight
trace	< 15
with	15 - 29
modifer	> 30

FINES

Description	% by Dry Weight
trace	< 5
with	5 - 12
modifier	> 12

Soil descriptions are based on the Unified Soil Classification System (USCS) as outlined in ASTM Designations D-2487 and D-2488. The USCS group symbol shown on the boring logs correspond to the group names listed below. The description includes soil constituents, consistency, relative density, color and other appropriate descriptive terms. Geologic description of bedrock, when encountered, also is shown in the description column.

GROUP SYMBOL	GROUP NAME	GROUP SYMBOL	GROUP NAME
GW	Well Graded Gravel	CL	Lean Clay
GP	Poorly Graded Gravel	ML	Silt
GM	Silty Gravel	OL	Organic Clay or Silt
GC	Clayey Gravel	CH	Fat Clay
SW	Well Graded Sand	MH	Elastic Silt
SP	Poorly Graded Sand	OH	Organic Clay or Silt
SM	Silty Sand	PT	Peat
SC	Clayey Sand	CL-CH	Lean to Fat Clay

COHESIVE SOILS

CONSISTENCY	UNCONFINED COMPRESSIVE STRENGTH (Qu) (psf)	(kPa)
Very Soft	< 500	(< 24)
Soft	500 - 1000	(24 - 48)
Medium	1001 - 2000	(48 - 96)
Stiff	2001 - 4000	(96 - 192)
Very Stiff	4001 - 8000	(192 - 383)
Hard	> 8001	(> 383)

PLASTICITY	
Description	Liquid Limit (%)
Lean	< 45%
Lean to Fat	45 to 49%
Fat	≥ 50%

Cohesive Soils Consistenacy "N" value

Very Soft	<2
Soft	2-4
Medium	4-8
Stiff (Firm)	8-15
Very Stiff (Very Firm)	15-30
Hard	>30

COHESIONLESS SOILS

RELATIVE DENSITY	"N" VALUE*
Very Loose	0 - 3
Loose	4 - 9
Medium Dense	10 - 29
Dense	30 - 49
Very Dense	≥ 50

BEDROCK PROPERTIES & DESCRIPTIONS

ROCK QUALITY DESIGNATION (RQD**)

DESCRIPTION OF ROCK QUALITY	RQD (%)
Very Poor	0 - 25
Poor	25 - 50
Fair	50 - 75
Good	75 - 90
Excellent	90 - 100

**RQD is defined as the total length of sound core pieces, 4 inches (102mm) or greater in length, expressed as a percentage of the total length cored. RQD provides an indication of the integrity of the rock mass and relative extent of seams and bedding planes.

DEGREE OF WEATHERING

Slightly Weathered	Slight decomposition of parent material in joints and seams.
Weathered	Well-developed and decomposed joints and seams.
Highly Weathered	Rock highly decomposed, may be extremely broken.

SOLUTION AND VOID CONDITIONS

Solid	Contains no voids.
Vuggy	Containing small pits or cavities < 1/2" (13mm).
Porous	Containing numerous voids which may be interconnected.
Cavernous	Containing cavities, sometimes quite large.

When classification of rock materials has been estimated from disturbed samples, core samples and petrographic analysis may reveal other rock types.

HARDNESS & DEGREE OF CEMENTATION

LIMESTONE	
Hard	Difficult to scratch with knife.
Moderately Hard	Can scratch with knife but not with fingernail.
Soft	Can be scratched with fingernail.
SHALE	
Hard	Can scratch with knife but not with fingernail.
Moderately Hard	Can be scratched with fingernail.
Soft	Can be molded easily with fingers.
SANDSTONE	
Well Cemented	Capable of scratching a knife blade.
Cemented	Can be scratched with knife.
Poorly Cemented	Can be broken apart easily with fingers.

BEDDING CHARACTERISTICS

TERM	THICKNESS (inches)	THICKNESS (mm)
Very Thick Bedded	> 36	> 915
Thick Bedded	12 - 36	305 - 915
Medium Bedded	4 - 12	102 - 305
Thin Bedded	1 - 4	25 - 102
Very Thin Bedded	0.4 - 1	10 - 25
Laminated	0.1 - 0.4	2.5 - 10
Thinly Laminated	< 0.1	< 2.5

Bedding Planes	Planes dividing the individual layers, beds or strata of rocks.
Joint	Fracture in rock, generally more or less vertical or transverse to the bedding.
Seam	Applies to bedding plane with an unspecified degree of weathering.

BORHOLE LOG — BH-1

Sheet	1 OF 1		
Date	2/28/2016		
Project No.	16027-01	Drilling Rig	CME 45
Project	Redlands Masjid	Sampler	Cal Mod. And SPT
Client	Mr. Shakil Patel	Method	Hollow Stem
Location	APN 0293-111-15-0000, Redlands, CA	Hammer Type	140 lb
Coodinate		Surface Elev.	
Notes		Total Depth	15'

Type/Symbol	Casing	Split Spoon	Ring Sampler	Cutting
I.D.		S	R	C
O.D.				
Length				
Hammer Wt.				
Hammer Fall				

Date	Time	Water Depth (ft)	Casing Size (in)	Casing Depth (ft)	Hole Depth (ft)	Symbol
2/28/2016		None				

Depth Below Surface (ft)	Elevation (ft)	Graphic	Soil Sample Type	Soil Sample Number	Soil Sample Symbol	Soil Sample Depth	Blows 0-152.4 mm	Blows 152.4-304.8 mm	Blows 304.8-457.2 mm	N-Value	N60	(N1)60	VISUAL MATERIAL CLASSIFICATION AND REMARKS	Moisture (%)	Dry Density (pcf)	Test
0													**SILTY SAND (SM)**			
1													medium brown silty sand			
2													**WELL-GRADED SAND w/SILT & GRAVEL (SW-SM)**			
3			R				10	13	15	18			grayish brown sand with silt and gravel, dry	2	121	
4													6" cobbles noted at the surface			
5													medium dense			
6																
7																
8													**SANDY SILT (ML)**			
9													brownish gray silt with fine grained sand			
10			S				2	2	3	5			medium firm	13		
11													% Passing No. 200 Sieve = 53			
12																
13																
14													**WELL-GRADED SAND w/GRAVEL (SW)**			
15			S				7	11	15	26			medium dense, dry			
16																
17																
18																
19																
20																
21																
22																
23																
24																

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ, the transition may be gradual.

BORHOLE LOG — BH-2

Sheet	1 OF 1		
Date	2/28/2016		
Project No.	16027-01	Drilling Rig	CME 45
Project	Redlands Masjid	Sampler	Cal Mod. And SPT
Client	Mr. Shakil Patel	Method	Hollow Stem
Location	APN 0293-111-15-0000, Redlands, CA	Hammer Type	140 lb
Coodinate		Surface Elev.	
Notes		Total Depth	15'

Type/Symbol	Casing	Split Spoon	Ring Sampler	Cutting
I.D.		S	R	C
O.D.				
Length				
Hammer Wt.				
Hammer Fall				

Date	Time	Water Depth (ft)	Casing Size (in)	Casing Depth (ft)	Hole Depth (ft)	Symbol
2/28/2016		None				

Depth Below Surface (ft)	Elevation (ft)	Graphic	Soil Sample Type	Soil Sample Number	Soil Sample Symbol	Soil Sample Depth	Blows 0-152.4 mm	Blows 152.4-304.8 mm	Blows 304.8-457.2 mm	N-Value	N60	(N1)60	VISUAL MATERIAL CLASSIFICATION AND REMARKS	Moisture (%)	Dry Density (pcf)	Test
0													**SILTY SAND (SM)**			
1													medium brown silty sand			
2													**WELL-GRADED SAND w/SILT & GRAVEL**			
3													grayish-brown sand with silt and gravel, dry			
4													6" cobbles noted at the surface			
5			S				13	15	23	38			dense, dry	2		
6													% Passing No. 200 Sieve = 10			
7																
8																
9																
10			R				13	30	44	48			dense, dry	1	123	
11																
12													**WELL-GRADED SAND w/GRAVEL**			
13													gray-brown sand with gravel, dry			
14																
15			S				15	29	33	62			very dense			
16																
17																
18																
19																
20																
21																
22																
23																
24																

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ, the transition may be gradual.

BORHOLE LOG — BH-3

Sheet	1 OF 1		
Date	2/28/2016		
Project No.	16027-01	Drilling Rig	CME 45
Project	Redlands Masjid	Sampler	Cal Mod. And SPT
Client	Mr. Shakil Patel	Method	Hollow Stem
Location	APN 0293-111-15-0000, Redlands, CA	Hammer Type	140 lb
Coodinate		Surface Elev.	
Notes		Total Depth	15'

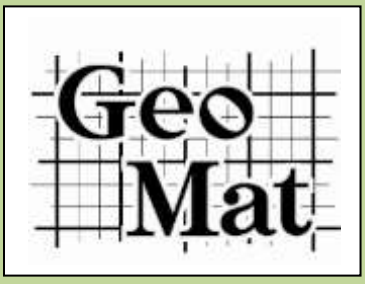
Type/Symbol	Casing	Split Spoon	Ring Sampler	Cutting
I.D.		S	R	C
O.D.				
Length				
Hammer Wt.				
Hammer Fall				

Date	Time	Water Depth (ft)	Casing Size (in)	Casing Depth (ft)	Hole Depth (ft)	Symbol
2/28/2016		None				

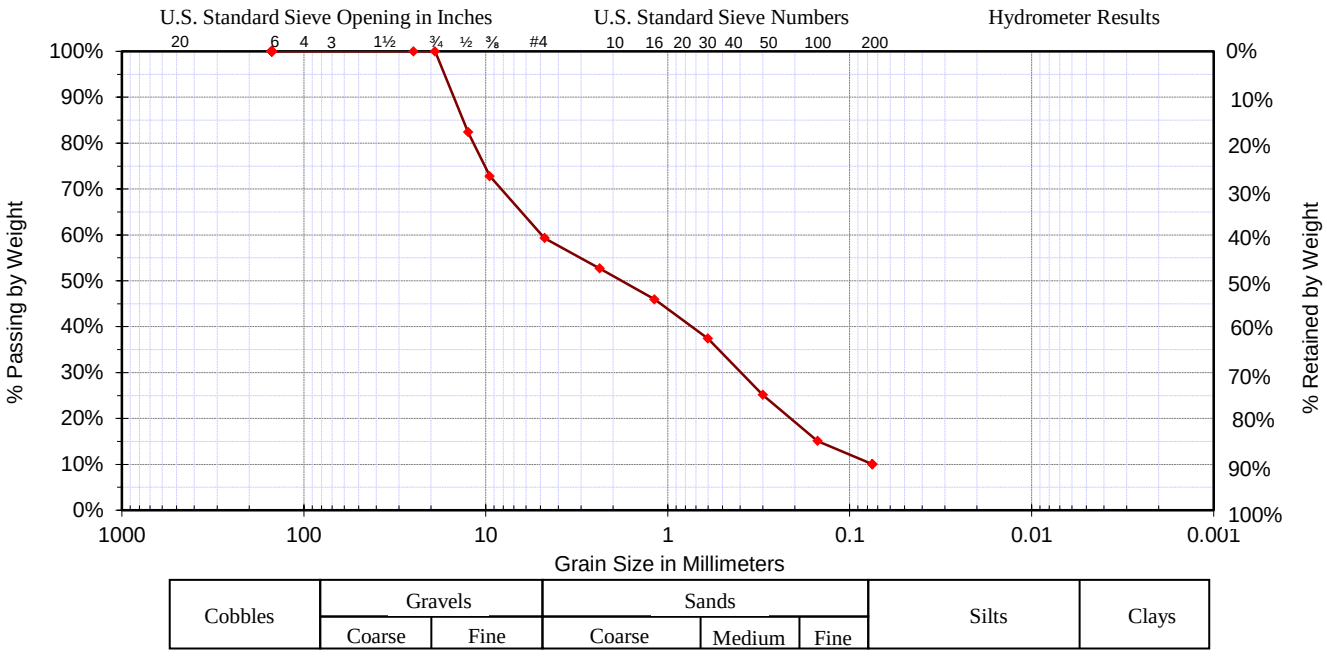
Depth Below Surface (ft)	Elevation (ft)	Graphic	Soil Sample Type	Soil Sample Number	Soil Sample Symbol	Soil Sample Depth	Blows 0-152.4 mm	Blows 152.4-304.8 mm	Blows 304.8-457.2 mm	N-Value	N60	(N1)60	VISUAL MATERIAL CLASSIFICATION AND REMARKS	Moisture (%)	Dry Density (pcf)	Test
0													**SILTY SAND (SM)**			
1													medium brown silty sand			
2													cobbles noted at the surface			
3																
4																
5			R				10	19	33	34			dense	6	121	
6													**WELL-GRADED SAND w/SILT & GRAVEL**			
7													grayish-brown sand with silt and gravel, dry			
8																
9																
10			S				13	17	18	35			dense, dry			
11																
12																
13													**WELL-GRADED SAND w/GRAVEL**			
14													gray-brown sand with gravel, dry			
15			S				9	12	12	24			medium dense, dry	2		
16													% Passing No. 200 Sieve = 4			
17																
18																
19																
20																
21																
22																
23																
24																

The stratification lines represent the approximate boundary lines between soil and rock types. In-situ, the transition may be gradual.

Appendix C



LABORATORY TEST RESULTS



Date : 02/28/16
Sample #:
Sample ID: P1
Source: Bulk
Project: Redlands Masjid
Location: NWC Beaumont Ave & Nevada St., Redlands
Boring #: P1
Depth: 37"

D_{10} = 0.07
D_{30} = 0.42
D_{60} = 5.00
C_C = 0.47
$C_{U=}$ 66.75
Liquid Limit= n/a
Plastic Limit= n/a
Plasticity Index= n/a

Classification
SP-SM, Poorly graded Sand with Silt and Gravel

Specifications
custom specs 1

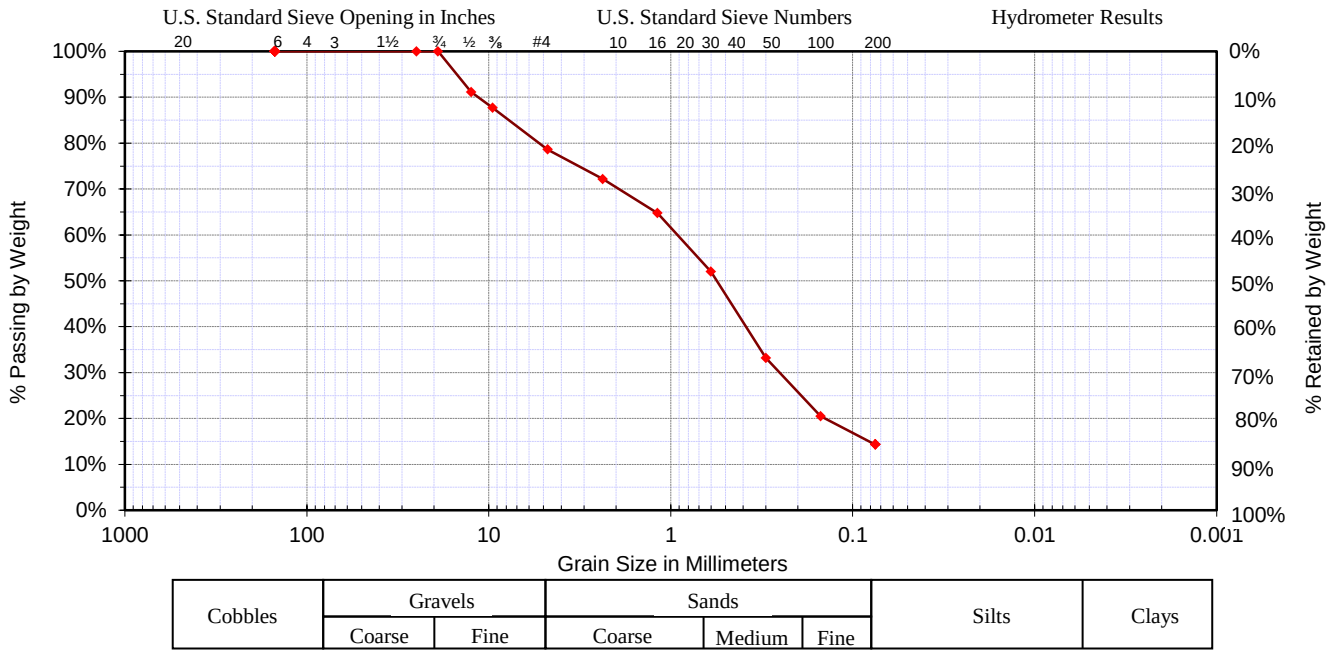
Fineness Modulus
3.92

% Gravel
40.71%
% Sand
49.28%
% Silt & Clay
10.01%
Sample Moisture
2.0%

Coarse Section Sieve Size US	Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
6.00"	150.00		100.0%		
4.00"	100.00		100.0%		
3.00"	75.00		100.0%		
2.50"	63.00		100.0%		
2.00"	50.00		100.0%		
1.75"	45.00		100.0%		
1.50"	37.50		100.0%		
1.25"	31.50		100.0%		
1.00"	25.00	100.0%	100.0%		
7/8"	22.40		100.0%		
3/4"	19.00	100.0%	100.0%		
5/8"	16.00		91.9%		
1/2"	12.50	82.4%	82.4%		
3/8"	9.50	72.8%	72.8%		
1/4"	6.30		63.7%		
#4	4.75	59.3%	59.3%		

Fines Section Sieve Size US	Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
#4	4.750	59.3%	59.3%		
#8	2.360	52.7%	52.7%		
#10	2.000		50.6%		
#16	1.180	45.9%	45.9%		
#20	0.850		41.1%		
#30	0.600	37.4%	37.4%		
#40	0.425		30.2%		
#50	0.300	25.1%	25.1%		
#60	0.250		21.8%		
#80	0.180		17.1%		
#100	0.150	15.1%	15.1%		
#140	0.106		12.1%		
#170	0.090		11.0%		
#200	0.075	10.0%	10.0%		
#270	0.053				

LABORATORY TEST RESULTS

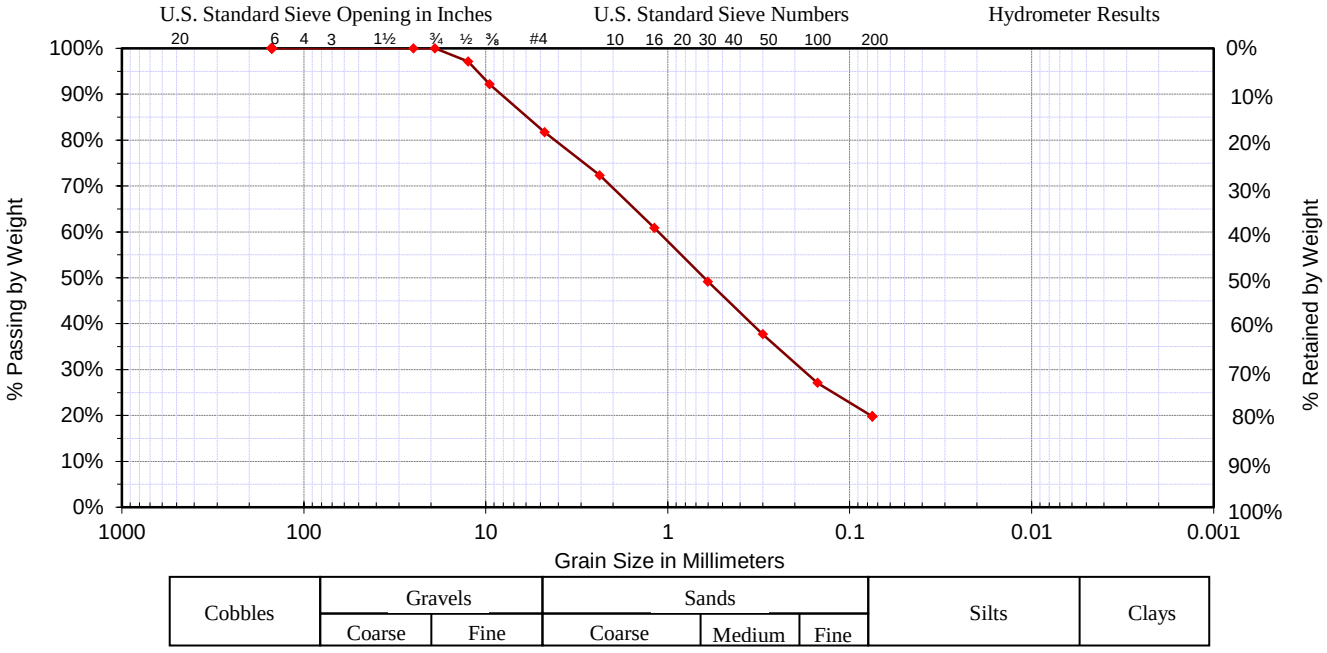


Date :	02/28/16	D_{10} =	0.05	**Classification**	% Gravel
Sample #:		D_{30} =	0.26	SM, Silty Sand with Gravel	21.38%
Sample ID:	P2	D_{60} =	0.96		% Sand
Source:	Bulk	C_C =	1.36	**Specifications**	64.31%
Project:	Redlands Masjid	$C_{U=}$	18.40	custom specs 1	% Silt & Clay
Location:	NWC Beaumont Ave & Nevada St., Redlands	Liquid Limit=	n/a		14.31%
Boring #:	P2	Plastic Limit=	n/a	Fineness Modulus	Sample Moisture
Depth:	44"	Plasticity Index=	n/a	2.91	**1.5%**

Coarse Section		Actual Cumulative	Interpolated Cumulative		
Sieve Size		Percent	Percent	Specs	Specs
US	Metric	Passing	Passing	Max	Min
6.00"	150.00		100.0%		
4.00"	100.00		100.0%		
3.00"	75.00		100.0%		
2.50"	63.00		100.0%		
2.00"	50.00		100.0%		
1.75"	45.00		100.0%		
1.50"	37.50		100.0%		
1.25"	31.50		100.0%		
1.00"	25.00	100.0%	100.0%		
7/8"	22.40		100.0%		
3/4"	19.00	100.0%	100.0%		
5/8"	16.00		95.9%		
1/2"	12.50	91.1%	91.1%		
3/8"	9.50	87.7%	87.7%		
1/4"	6.30		81.6%		
#4	4.75	78.6%	78.6%		

Fines Section		Actual Cumulative	Interpolated Cumulative		
Sieve Size		Percent	Percent	Specs	Specs
US	Metric	Passing	Passing	Max	Min
#4	4.750	78.6%	78.6%		
#8	2.360	72.2%	72.2%		
#10	2.000		69.9%		
#16	1.180	64.7%	64.7%		
#20	0.850		57.5%		
#30	0.600	52.0%	52.0%		
#40	0.425		41.0%		
#50	0.300	33.2%	33.2%		
#60	0.250		28.9%		
#80	0.180		23.0%		
#100	0.150	20.5%	20.5%		
#140	0.106		16.9%		
#170	0.090		15.5%		
#200	0.075	14.3%	14.3%		
#270	0.053				

LABORATORY TEST RESULTS

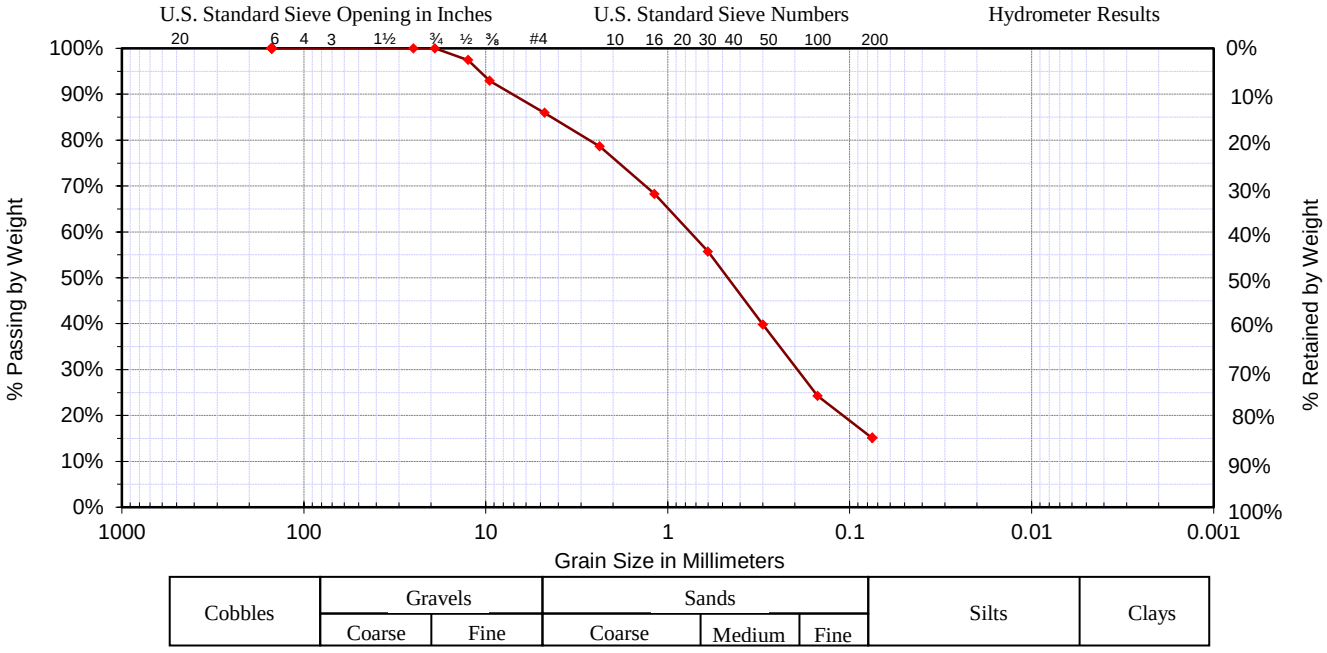


Date :	02/28/16	D_{10} =	0.04	**Classification**	% Gravel
Sample #:		D_{30} =	0.19	SM, Silty Sand with Gravel	18.28%
Sample ID:	P3	D_{60} =	1.14		% Sand
Source:	Bulk	C_C =	0.85	**Specifications**	61.94%
Project:	Redlands Masjid	$C_{U=}$	30.04	custom specs 1	% Silt & Clay
Location:	NWC Beaumont Ave & Nevada St., Redlands	Liquid Limit=	n/a		19.77%
Boring #:	P3	Plastic Limit=	n/a	Fineness Modulus	Sample Moisture
Depth:	43"	Plasticity Index=	n/a	2.79	**3.7%**

Coarse Section		Actual Cumulative	Interpolated Cumulative		
Sieve Size		Percent	Percent	Specs	Specs
US	Metric	Passing	Passing	Max	Min
6.00"	150.00		100.0%		
4.00"	100.00		100.0%		
3.00"	75.00		100.0%		
2.50"	63.00		100.0%		
2.00"	50.00		100.0%		
1.75"	45.00		100.0%		
1.50"	37.50		100.0%		
1.25"	31.50		100.0%		
1.00"	25.00	100.0%	100.0%		
7/8"	22.40		100.0%		
3/4"	19.00	100.0%	100.0%		
5/8"	16.00		98.7%		
1/2"	12.50	97.1%	97.1%		
3/8"	9.50	92.1%	92.1%		
1/4"	6.30		85.1%		
#4	4.75	81.7%	81.7%		

Fines Section		Actual Cumulative	Interpolated Cumulative		
Sieve Size		Percent	Percent	Specs	Specs
US	Metric	Passing	Passing	Max	Min
#4	4.750	81.7%	81.7%		
#8	2.360	72.3%	72.3%		
#10	2.000		68.8%		
#16	1.180	60.8%	60.8%		
#20	0.850		54.2%		
#30	0.600	49.1%	49.1%		
#40	0.425		42.4%		
#50	0.300	37.7%	37.7%		
#60	0.250		34.1%		
#80	0.180		29.2%		
#100	0.150	27.1%	27.1%		
#140	0.106		22.8%		
#170	0.090		21.2%		
#200	0.075	19.8%	19.8%		
#270	0.053				

LABORATORY TEST RESULTS

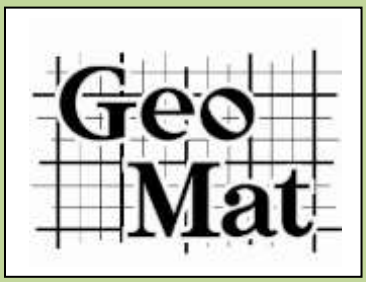


Date :	02/28/16	D_{10} =	0.05	**Classification**	% Gravel
Sample #:		D_{30} =	0.21	SM, Silty Sand	14.06%
Sample ID:	P4	D_{60} =	0.80		% Sand
Source:	Bulk	C_C =	1.06	**Specifications**	70.85%
Project:	Redlands Masjid	$C_{U=}$	16.08	custom specs 1	% Silt & Clay
Location:	NWC Beaumont Ave & Nevada St., Redlands	Liquid Limit=	n/a		15.10%
Boring #:	P4	Plastic Limit=	n/a	Fineness Modulus	Sample Moisture
Depth:	42"	Plasticity Index=	n/a	2.55	**3.5%**

Coarse Section		Actual Cumulative	Interpolated Cumulative		
Sieve Size		Percent	Percent	Specs	Specs
US	Metric	Passing	Passing	Max	Min
6.00"	150.00		100.0%		
4.00"	100.00		100.0%		
3.00"	75.00		100.0%		
2.50"	63.00		100.0%		
2.00"	50.00		100.0%		
1.75"	45.00		100.0%		
1.50"	37.50		100.0%		
1.25"	31.50		100.0%		
1.00"	25.00	100.0%	100.0%		
7/8"	22.40		100.0%		
3/4"	19.00	100.0%	100.0%		
5/8"	16.00		98.8%		
1/2"	12.50	97.5%	97.5%		
3/8"	9.50	92.9%	92.9%		
1/4"	6.30		88.2%		
#4	4.75	85.9%	85.9%		

Fines Section		Actual Cumulative	Interpolated Cumulative		
Sieve Size		Percent	Percent	Specs	Specs
US	Metric	Passing	Passing	Max	Min
#4	4.750	85.9%	85.9%		
#8	2.360	78.6%	78.6%		
#10	2.000		75.4%		
#16	1.180	68.3%	68.3%		
#20	0.850		61.1%		
#30	0.600	55.7%	55.7%		
#40	0.425		46.4%		
#50	0.300	39.8%	39.8%		
#60	0.250		34.6%		
#80	0.180		27.4%		
#100	0.150	24.3%	24.3%		
#140	0.106		18.9%		
#170	0.090		16.9%		
#200	0.075	15.1%	15.1%		
#270	0.053				

Appendix D



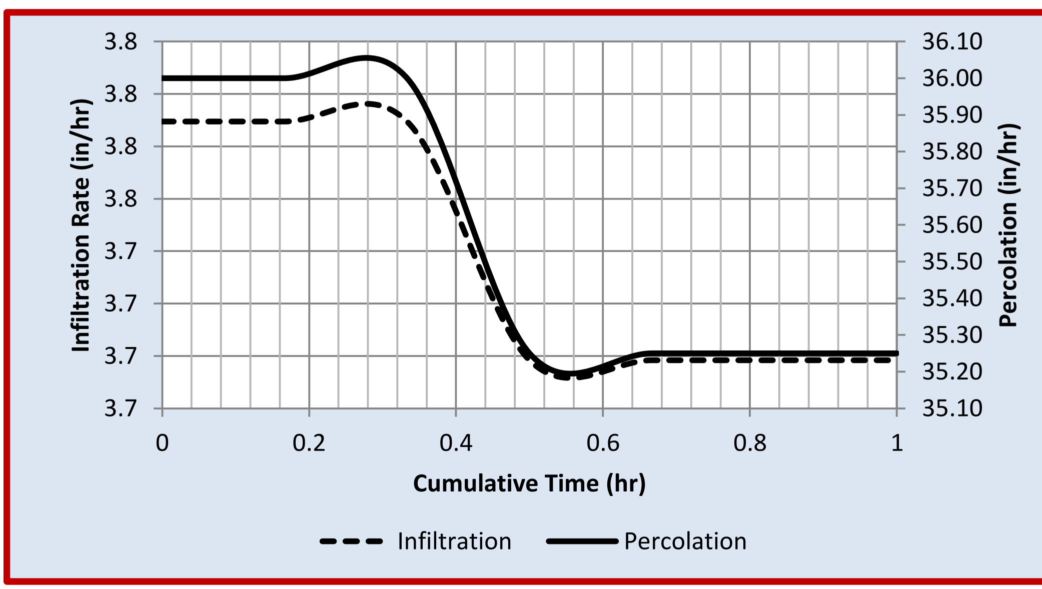
PERCOLATION TEST - P-1

Project No.	16027-01	Project Name	Redlands Masjid		
Proj. Location	Northwest Corner of Beaumont Ave and Nevada St, Redlands			Soak Method	5 gallons
Drilling Date	2/28/2016	Soak Date	3/19/2016	Depth of Hole (in)	37
Testing Date	3/19/2016	Borehole Diameter (in)	8	Test Refill Depth (in)	20

CRITERIA	TIME	TIME INTERVAL (min)	D_0, INITIAL DEPTH TO WATER (in)	D_f, FINAL DEPTH TO WATER (in)	ΔH, WATER DROP (in)	AVERAGE WETTED DEPTH (in)	PERC RATE (min/in)	PERC RATE (in/hr)	CORECTED* INFILTRATION RATE (in/hr)
Sandy Soil Criteria	0:00:00 0:15:00	0:15:00 15.00	17	11	6				
	0:00:00 0:15:00	0:15:00 15.00	17	11	6				
Percolation Test Data	0:00:00 0:10:00	0:10:00 10.00	17	23	6	17	1.7	36.0	3.79
	0:00:00 0:10:00	0:10:00 10.00	17	23	6	17	1.7	36.0	3.79
	0:00:00 0:10:00	0:10:00 10.00	17	22.875	5.875	17.0625	1.7	35.3	3.70
	0:00:00 0:10:00	0:10:00 10.00	17	22.875	5.875	17.0625	1.7	35.3	3.70
	0:00:00 0:10:00	0:10:00 10.00	17	22.875	5.875	17.0625	1.7	35.3	3.70
	0:00:00 0:10:00	0:10:00 10.00	17	22.875	5.875	17.0625	1.7	35.3	3.70

*Porchet Method

Cumulative Time (hr)	Percolation (in/hr)	Infiltration (in/hr
0	36.00	3.8
0.17	36.00	3.8
0.33	36.00	3.8
0.50	35.25	3.7
0.67	35.25	3.7
0.83	35.25	3.7
1.00	35.25	3.7



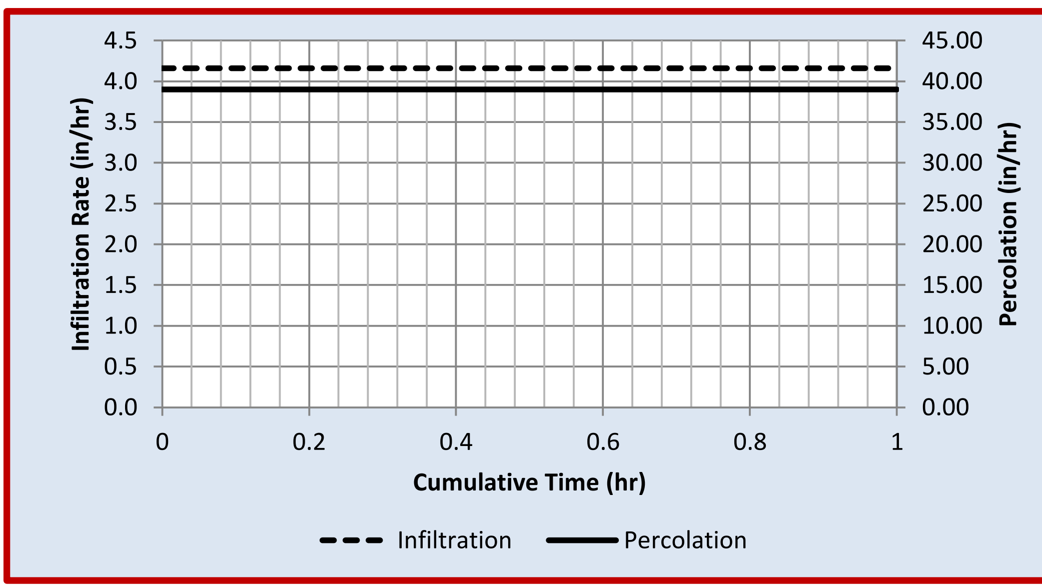
PERCOLATION TEST - P-2

Project No.	16027-01	Project Name	Redlands Masjid		
Proj. Location	Northwest Corner of Beaumont Ave and Nevada St, Redlands			Soak Method	5 gallons
Drilling Date	2/28/2016	Soak Date	3/19/2016	Depth of Hole (in)	44
Testing Date	3/19/2016	Borehole Diameter (in)	8	Test Refill Depth (in)	20

CRITERIA	TIME	TIME INTERVAL (min)	D_0, INITIAL DEPTH TO WATER (in)	D_f, FINAL DEPTH TO WATER (in)	ΔH, WATER DROP (in)	AVERAGE WETTED DEPTH (in)	PERC RATE (min/in)	PERC RATE (in/hr)	CORECTED* INFILTRATION RATE (in/hr)
Sandy Soil Criteria	0:00:00	0:09:00	24	18	6				
	0:09:00	9.00							
	0:00:00	0:09:00	24	18	6				
	0:09:00	9.00							
Percolation Test Data	0:00:00	0:10:00	24	30.5	6.5	16.75	1.5	39.0	4.16
	0:10:00	10.00							
	0:00:00	0:10:00	24	30.5	6.5	16.75	1.5	39.0	4.16
	0:10:00	10.00							
	0:00:00	0:10:00	24	30.5	6.5	16.75	1.5	39.0	4.16
	0:10:00	10.00							
	0:00:00	0:10:00	24	30.5	6.5	16.75	1.5	39.0	4.16
	0:10:00	10.00							
	0:00:00	0:10:00	24	30.5	6.5	16.75	1.5	39.0	4.16
	0:10:00	10.00							
	0:00:00	0:10:00	24	30.5	6.5	16.75	1.5	39.0	4.16
	0:10:00	10.00							

*Porchet Method

Cumulative Time (hr)	Percolation (in/hr)	Infiltration (in/hr
0	39.00	4.2
0.17	39.00	4.2
0.33	39.00	4.2
0.50	39.00	4.2
0.67	39.00	4.2
0.83	39.00	4.2
1.00	39.00	4.2



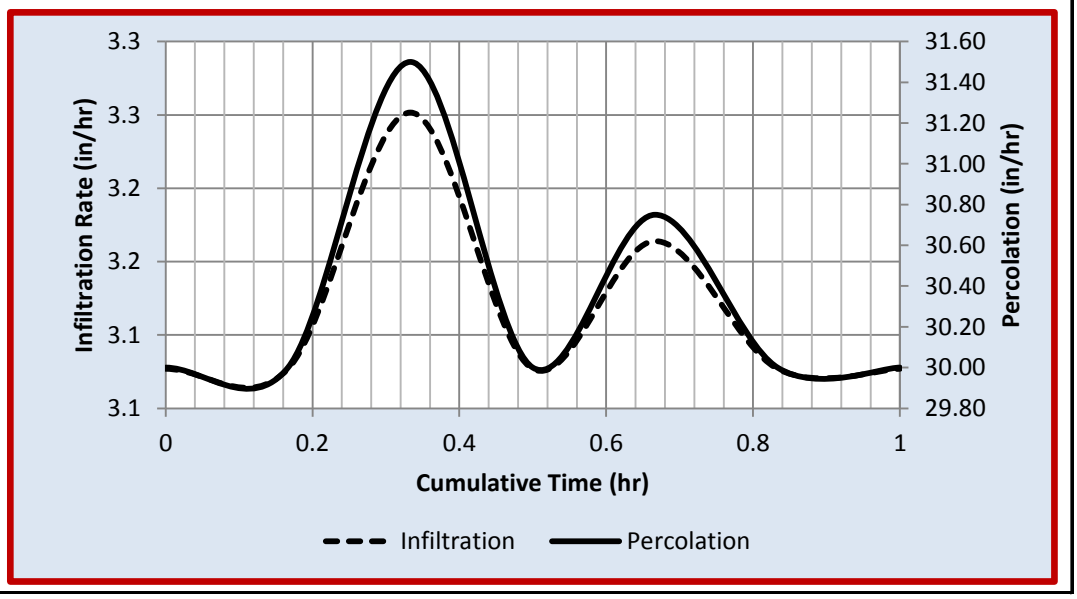
PERCOLATION TEST - P-3

Project No.	16027-01	Project Name	Redlands Masjid		
Proj. Location	Northwest Corner of Beaumont Ave and Nevada St, Redlands			Soak Method	5 gallons
Drilling Date	2/28/2016	Soak Date	3/19/2016	Depth of Hole (in)	43
Testing Date	3/19/2016	Borehole Diameter (in)	8	Test Refill Depth (in)	20

CRITERIA	TIME	TIME INTERVAL (min)	$D_{0,}$ INITIAL DEPTH TO WATER (in)	D_f, FINAL DEPTH TO WATER (in)	ΔH, WATER DROP (in)	AVERAGE WETTED DEPTH (in)	PERC RATE (min/in)	PERC RATE (in/hr)	CORECTED* INFILTRATION RATE (in/hr)
Sandy Soil Criteria	0:00:00	0:12:00	23	17	6				
	0:12:00	12.00							
	0:00:00	0:12:00	23	17	6				
	0:12:00	12.00							
Percolation Test Data	0:00:00	0:10:00	23	28	5	17.5	2.0	30.0	3.08
	0:10:00	10.00							
	0:00:00	0:10:00	23	28.25	5.25	17.375	1.9	31.5	3.25
	0:10:00	10.00							
	0:00:00	0:10:00	23	28	5	17.5	2.0	30.0	3.08
	0:10:00	10.00							
	0:00:00	0:10:00	23	28.125	5.125	17.4375	2.0	30.8	3.16
	0:10:00	10.00							
	0:00:00	0:10:00	23	28	5	17.5	2.0	30.0	3.08
	0:10:00	10.00							
	0:00:00	0:10:00	23	28	5	17.5	2.0	30.0	3.08
	0:10:00	10.00							

*Porchet Method

Cumulative Time (hr)	Percolation (in/hr)	Infiltration (in/hr
0	30.00	3.1
0.17	30.00	3.1
0.33	31.50	3.3
0.50	30.00	3.1
0.67	30.75	3.2
0.83	30.00	3.1
1.00	30.00	3.1



PERCOLATION TEST - P-4

Project No.	16027-01	Project Name	Redlands Masjid		
Proj. Location	Northwest Corner of Beaumont Ave and Nevada St, Redlands			Soak Method	5 gallons
Drilling Date	2/28/2016	Soak Date	3/19/2016	Depth of Hole (in)	42
Testing Date	3/19/2016	Borehole Diameter (in)	8	Test Refill Depth (in)	20

CRITERIA	TIME	TIME INTERVAL (min)	D_0, INITIAL DEPTH TO WATER (in)	D_f, FINAL DEPTH TO WATER (in)	ΔH, WATER DROP (in)	AVERAGE WETTED DEPTH (in)	PERC RATE (min/in)	PERC RATE (in/hr)	CORECTED* INFILTRATION RATE (in/hr)
Sandy Soil Criteria	0:00:00	0:10:00	22	16	6				
	0:10:00	10.00							
	0:00:00	0:10:00	22	16	6				
	0:10:00	10.00							
Percolation Test Data	0:00:00	0:10:00	22	28.125	6.125	16.9375	1.6	36.8	3.88
	0:10:00	10.00							
	0:00:00	0:10:00	22	28.125	6.125	16.9375	1.6	36.8	3.88
	0:10:00	10.00							
	0:00:00	0:10:00	22	28.125	6.125	16.9375	1.6	36.8	3.88
	0:10:00	10.00							
	0:00:00	0:10:00	22	28.125	6.125	16.9375	1.6	36.8	3.88
	0:10:00	10.00							
	0:00:00	0:10:00	22	28.125	6.125	16.9375	1.6	36.8	3.88
	0:10:00	10.00							
	0:00:00	0:10:00	22	28.125	6.125	16.9375	1.6	36.8	3.88
	0:10:00	10.00							

*Porchet Method

Cumulative Time (hr)	Percolation (in/hr)	Infiltration (in/hr
0	36.75	3.9
0.17	36.75	3.9
0.33	36.75	3.9
0.50	36.75	3.9
0.67	36.75	3.9
0.83	36.75	3.9
1.00	36.75	3.9