

PRELIMINARY DRAINAGE STUDY

FOR

LONELY DOVE MOTEL

1473 Wamego Trail
Landers, CA 92285

Drainage Study Number: xxxxxxxxx

Prepared for:

LMA Architects

Prepared by:

Labib Funk + Associates
Structural | Shoring | Civil
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October 27, 2023

TABLE OF CONTENTS

- I.0 Project Summary
 - I.1 Existing Conditions
 - I.2 Proposed Conditions

- 2.0 Hydrology
 - 2.1 Methodology
 - 2.2 Rational Method
 - 2.3 Unit Hydrograph
 - 2.4 Results & Conclusion

Appendices

- Appendix A – Inputs
- Appendix B – Maps & Site Plans
- Appendix C – FEMA & DWR awareness maps
- Appendix D – Civil Design Outputs
- Appendix E – Soils and Perc Report

1.0 PROJECT SUMMARY

1.1 Existing Conditions

The existing project site is located on the east side of Wamego Trail, south of Sunnyslope Dr., and north of Desideria Dr. in Landers, CA. The project site spans over two existing lots. The eastern lot consists of one residential structure, one garage, and one auxiliary structure on approximately 5.02 acres at 2.1% impervious cover. The western lot is approximately 5.02 acres and is undeveloped. The combined project site drains by sheet flow from the southwest to northeast and into the adjacent lot and Desideria Rd.

There is some run-on to the property from sheet flow over the adjacent parcel and crosses over Wamego Trail. These are identified as RAI on the Drainage exhibit. Currently, these areas drain via sheet flow across the existing project site and empty into both the adjacent site and into Desideria Rd.

The project site is not located in a known flood zone defined by FEMA and DWR. Refer to Appendix C for FEMA flood map 06071C7400H and DWR Floodplain Map.

1.2 Proposed Conditions

The proposed project consists of renovation to the existing structures, along with new restaurant structures, detached guest rooms, storage facilities, covered parking, pool and spa, new site hardscape and landscaping, as well as constructing new dirt access roads and widening of existing dirt access roads. The completed proposed upgrades will bring the project site to a total percent imperviousness of 12.1%.

Runoff in this area of Landers is generally designed to sheet flow along existing contours, before entering into a natural drainage swales. Runoff from the site generally sheet flow from southwest to northeast and into natural drainage swales and into Desideria Rd. These roads will also be required to be replaced with “Graded Roads” and will help convey runoff around the site and eventually into Desideria Rd. and the adjacent existing natural drainage swales.

Site Drainage: There is some run-on to the project site from the adjacent private property to the west, which sheet flows over Wamego Trail and onto the project site. This runoff will be collected in the swales along the edge of the new graded roads for Wamego Trail and the fire access road and diverted around and/or through the property to the same existing drainage swales that they are tributary to in the existing condition via bubble up spreader. The rest of the site will consist of area drains and swales and diverted an

infiltration trench, whose overflow will be connected to a bubble up spreader and directed into the existing natural drainage swales in the private property to the south of Disidera Rd.

2.0 HYDROLOGY

2.1 Methodology

Hydrologic calculations were performed per the requirements of the San Bernadino County Hydrology Manual and addendum, dated April 2010. The Rational Method (per San Bernadino County Hydrology Manual) was used to calculate the peak discharge(Q) & time of concentration (T_c) for the proposed and existing project site. Unit Hydrograph analysis was used to determine the retention volume required to be stored on-site. The retention volume has been calculated using 90% of the Q_{25} of the existing conditions and Q_{100} from the proposed conditions.

The rainfall values were derived from NOAA Atlas 14 per 2010 Addendum to the San Bernadino County Hydrology Manual. Soil type B was determined for the project site, derived from the soils maps found in the San Bernadino Hydrology Manual which are presented in Appendix B. Civil design software was used to generate the results for the rational method and unit hydrographs for the site, which can be found in Appendix D.

2.2 Rational method

The Rational method was used to find the peak discharges from the project site due to the size of the property being less than 1-square mile. It uses rainfall intensity from the NOAA atlas 14, runoff coefficient derived from the San Bernadino Hydrology Manual, and drainage area to calculate peak discharge as shown in the below equation.

$$Q = CIA$$

Q = Peak discharge in cubic feet per second (cfs)

C = A runoff coefficient representing the ratio of runoff depth to rainfall depth

I = The time-averaged rainfall intensity for a storm duration equal to the time of concentration (in/hr)

A = Drainage Area (Acres)

Q can also be calculated per Section D.6 in the county manual for $I > F_p$ as below

$$Q = 0.9(I - F_m)A$$

Where $F_m = a_p F_p$

F_m = loss rate for the total watershed tributary to the point of concentration

a_p = ratio of pervious area to total area

F_p = Infiltration rate for pervious area(in/hr) (per section C.6.4)

If $I < F_p$, $Q = 0.90a_iIA$

a_i = ratio of impervious area to total area

Summary of the results from the civil design software that calculate peak flow rates using the rational method, as defined in Section D of San Bernadino County Hydrology Manual, Are shown below in Tables 1 & 2 and can be found in Appendix D.

Table 1: Rational method results for all years

YEAR	Pre-development flow rate	Post-development flow rate
10-yr	18.506	15.195
25-yr	23.168	22.283
100-yr	30.221	33.006

Table 2: Rational method results used for peak flow comparison.

Drainage Area	Q_{25} Pre-development flow rate	Existing T_c	Q_{100} Post-development flow rate	Proposed T_c
DAI	24.14	14.988	33.006	14.887

2.3 Unit Hydrograph

The Unit Hydrograph was derived using civil design software based on the T_c output from the Rational method calculations. Calculation of the time of concentration can be found in Appendix A. The unit hydrograph is used to for the the volumetric sizing for the required storage for the difference between 90% of the existing condition Q_{25} and the proposed conditions (Q_{100}). The summary of these results can be seen below in Table 3.

Table 3: Unit Hydrograph results

Drainage Area	Q_{25} Pre-development flow rate	Existing T_c	Q_{100} Post-development flow rate	Proposed T_c
DAI	24.14	14.988	31.37	14.887

The retention volume used for the design of the infiltration trench used for storage was based on the results of the civil design Synthetic Unit hydrograph. The summary of the volume calculations can be found below in Table 4 and in appendix D.

See the graph below for the volumetric increase based on proposed conditions(Q_{100})

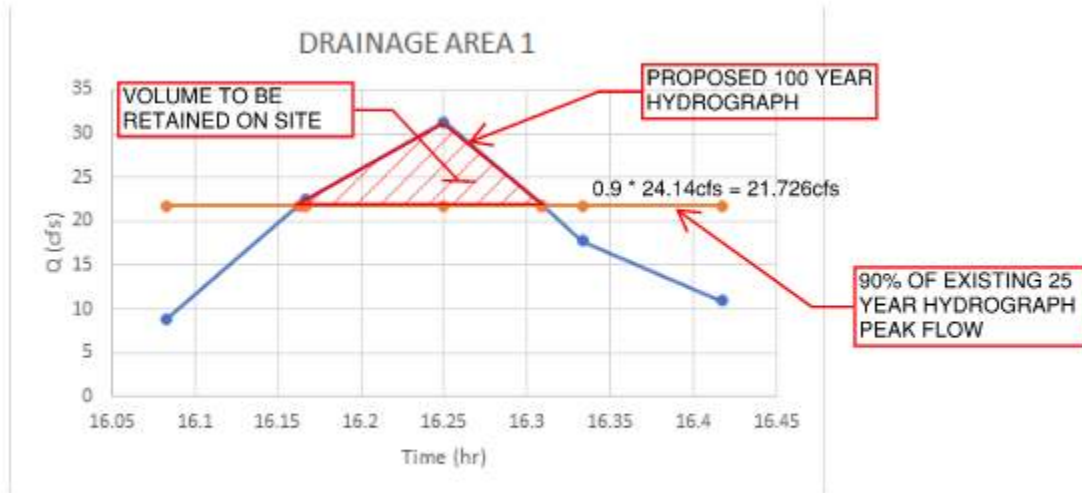


Table 4: Volumetric Increase

Unit Hydrograph time step	Peak flow Q_{100} (cfs)	Volumetric change from existing conditions (ft^3)
16+05	8.92	0
16+09.75	21.726	5
16+10	22.41	1,344
16+15	31.37	1,024
16+18.54	21.726	0
16+20	17.74	0

Overall volume to be stored = 2,373cf

Summary of Infiltration Trench Sizing

The proposed 10' x 5' x 98' infiltration trench with 3' diameter perforated pipe was designed to store the retention volume and can store 2375 cf of runoff which is more than the required retention volume. The trench assumes a 40% void ratio for the drain rock coverage in between the geofabric liner. The calculations show a conservative

approach using the trench as pure storage without a loss rate for infiltration. The calculations for the infiltration trench volume and drawdown time are shown below.

Infiltration trench calculations

Area of pipe (3ft dia) = 7.07 sf

Area of (40% porosity) rock = 17.2 sf

Cross sectional area of trench (10ft width) = 24.2 sf

Length of infiltration trench provided = 98 ft

Volume of infiltration trench = 2,376 ft³ > Required storage of 2,373 ft³

Table 5: Drawdown Time

Volume (ft³)	Infiltratable Area (sf)	Infiltration rate (in/hr.)	Infiltration Rate (ft/hr.)	Drawdown time (hr.)
2,376	980	8.3	0.69	3.5hr

The proposed shallow infiltration trench can infiltrate the retention volume within 3.5 hours which is less than required drawdown time of 48hrs. The overflow from the infiltration trench would be discharged to the existing drainage channels via a level spreader and a rip rap energy dissipator and can be seen in the proposed hydrology exhibit in Appendix B.

2.4 Results and Conclusions

The calculations performed in this report demonstrate how the proposed project will retain the additional runoff on-site due to the increase in impervious area from the existing to proposed condition. The proposed project was found to generate a higher peak runoff flow rate due to the change in the overall flow path length and increased impervious area. The Geotechnical report(Appendix E) concluded that infiltration is feasible and provided calculated infiltration design data. The most conservative rate was considered (25 in/hr.) along with a factor of safety of 3 in order to justify that the retained volume can be infiltrated in under 48 hours to adhere to the standards of San Bernadino County. The drawdown calculations can be found above in Table 5.

The proposed project will implement an infiltration trench (sized based on the retention volume without accounting for infiltration rates conservatively) to decrease the proposed project run-off and mitigate any downstream impacts from the proposed project.

APPENDIX A DA-I Inputs

DA-I

Pre-Development

A= 10.04 AC
L=933 ft
H=40 ft
 $a_i=0.021$
 $a_p=0.979$
 $T_c=11.3\text{min}$
CN=86
S=0.7

Lag Time^L = $0.8 * T_c$
= 0.1507 Hours

Q=25yr storm event

Rainfall intensity 24-hr storm event

1-hr = 1.15
6-hr = 2.02
24-hr = 3.25

DA-I

Post-Development

A=10.04 AC
L=933 ft
H=40 ft
 $a_i=0.121$
 $a_p=0.879$
 $T_c=14.0\text{min}$
CN=56
S=0.7

Lag Time^L = $0.8 * T_c$
= 0.1867 Hours

Q=100yr storm event

Rainfall intensity 24-hr storm event

1-hr = 1.62
6-hr = 2.79
24-hr = 4.50

APPENDIX B

Maps and Site Plans



GOV. LOT 38
APN: 0629-282-03-0-000
GROSS ACERS: 5.02

GOV. LOT 37
APN: 0629-282-03-0-000
GROSS ACERS: 5.02

LEGAL DESCRIPTION

GOVERNMENT LOT 38 OF SECTION 10, TOWNSHIP 2 NORTH, RANGE 5 EAST, SAN BERNARDINO BASE AND MERIDIAN, IN THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT OF SAID LAND FILED IN THE DISTRICT LAND OFFICE.

APN: 0629-282-03-0-000

GOVERNMENT LOT 37 OF SECTION 10, TOWNSHIP 2 NORTH, RANGE 5 EAST, SAN BERNARDINO BASE AND MERIDIAN, IN THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT OF SAID LAND FILED IN THE DISTRICT LAND OFFICE.

APN: 0629-282-06-0-000

BASIS OF BEARINGS

THE COORDINATES AND BEARINGS SHOWN HEREON ARE BASED UPON THE CALIFORNIA COORDINATE SYSTEM OF 1983, CCS83, ZONE 5, (2017.50) IN ACCORDANCE WITH THE CALIFORNIA PUBLIC RESOURCES CODE SECTIONS 8801-8819; SAID COORDINATES AND BEARINGS ARE BASED LOCALLY UPON FIELD-OBSERVED TIES TO THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) AND NATIONAL GEODETIC SURVEY (NGS OR CALIFORNIA SPATIAL REFERENCE CENTER (CSRC) CONTINUOUS OPERATING REFERENCE STATIONS (CORS).

JOSHUA TREE & YUCCA TREE INFORMATION

SURVEYOR HAS LOCATED AND IDENTIFIED, AS WHAT HE BELIEVES ARE JOSHUA AND YUCCA TREES ON THIS TOPOGRAPHIC MAP. IN AREAS WHERE A JOSHUA TREE MAY IMPACT FUTURE CONSTRUCTION, SAID JOSHUA AND YUCCA TREES SHOULD BE PROPERLY IDENTIFIED BY A DESERT BIOLOGIST OR OTHER TREE SPECIES SPECIALIST.

SURVEY PROCEDURE

THE MAPPING SHOWN HEREON IS BASED ON AN UNNAMED AERIAL VEHICLE (UAV) SURVEY. A FLIGHT HEIGHT OF 150' AGL AND A GROUND SAMPLING DISTANCE (GSD) OF 0.25 INCHES PER PIXEL WAS UTILIZED TO CAPTURE THE EXISTING CONDITIONS OF THE PROPERTY. A HIGH DEFINITION LASER SCANNER WAS ALSO USED TO CAPTURE FEATURES NEAR AND AROUND EXISTING STRUCTURES. THE SURVEY FOLLOWED ALL PROCEDURES AND GUIDELINES ESTABLISHED BY THE AMERICAN SOCIETY FOR PHOTOGRAMMETRY AND REMOTE SENSING (ASPRS).

BOUNDARY AND EASEMENT NOTES

THE BOUNDARY LINES SHOWN HEREON WERE ESTABLISHED DURING A FIELD SURVEY USING RECORD DATA AND RECOVERED CITY, COUNTY, STATE, AND OR PRIVATE SURVEYOR MONUMENTS WHOSE CHARACTER AND SOURCE ARE SO NOTED ON THE SURVEY. THE EASEMENT SHOWN HEREON IS A RIGHT OF WAY NOT EXCEEDING 50 FEET IN WIDTH, FOR ROADWAY AND PUBLIC UTILITIES PURPOSES, PER UNITED STATES PATENT, SERIAL PATENT 1184372 AND SERIAL PATENT 1204841.

ELEVATION NOTE

THE ELEVATIONS SHOWN HEREON ARE ASSUMED AND BASED LOCALLY UPON FIELD-OBSERVED TIES TO THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) AND NATIONAL GEODETIC SURVEY (NGS) CONTINUOUS OPERATING REFERENCE STATIONS (CORS).

PROJECT BENCH MARK: (M2) - FD. NAIL & TAG "LS 5297", UP 2", NORTH WEST PROPERTY CORNER.

ORTHIMETRIC ELEVATION: 3354.41'

ELEVATION CONTOURS ARE SHOWN AT 1' MINORS AND 5' MAJOR INTERVALS.

PROPERTY CORNER MONUMENT INFORMATION

M1 - FOUND USGLO BRASS CAP WITH ILLEGIBLE MARKINGS ACCEPTED AS THE NORTH 1/16 CORNER SECTION 10, MEASURED CENTER OF BRASS CAP.
M2 - FOUND 1" IRON PIPE WITH PLASTIC PLUG "PLS 9320", UP 2".
M3 - FOUND 1" IRON PIPE WITH PLASTIC PLUG "PLS 9320", UP 2".
M4 - FOUND 1" IRON PIPE WITH PLASTIC PLUG "PLS 9320", UP 2".
M5 - FOUND 1" IRON PIPE WITH PLASTIC PLUG "PLS 9320", UP 2".
M6 - FOUND 1" WITH ILLEGIBLE PLASTIC PLUG, BENT, MEASURED CENTER OF PLASTIC PLUG POINT IS S64°32'27"W 0.35' FROM TRUE CORNER.

MAPPING LEGEND

CONCRETE SLAB	BUSH
BUILDING	FIRE HYDRANT FH
BUILDING EAVE	GUARD POST
DIRT ROAD	JOSHUA TREE
EASEMENT LINE	POWER POLE
FENCE LINE	SIGN
GUY WIRE	TREE
OVERHEAD WIRES	UNKOWN UTILITY RISER UR
PROPERTY LINE PL	WATER METER WM
WALL	WATER VALVE WV
	YUCCA TREE

CONTROL POINTS

(M1) - FOUND USGLO BRASS CAP WITH ILLEGIBLE MARKINGS ACCEPTED AS THE NORTH 1/16 CORNER SECTION 10, MEASURED CENTER OF BRASS CAP.
N: 1926726.18
E: 7030380.19
EL: 3425.11'
(M5) - FOUND 1" IRON PIPE WITH PLASTIC PLUG "PLS 9320", UP 2".
N: 192608.84
E: 7030721.70

SURVEYOR'S STATEMENT

THIS IS TO CERTIFY THAT THIS TOPOGRAPHIC MAP WAS PERFORMED BY ME OR UNDER MY DIRECT SUPERVISION AND MEETS THE NATIONAL SOCIETY OF PROFESSIONAL SURVEYOR'S (NSPS) MAPPING STANDARDS. THE FIELD WORK WAS PERFORMED SEPTEMBER AND OCTOBER 2022.

Nicholas D. Ellis
NICHOLAS D. ELLIS, PLS 9320FOOTHILL SURVEYING, INC.

OCTOBER 03, 2022
DATE



www.foothillsurveying.com - 909-294-6908

SURVEYED	NDE	VERTICAL DATUM	NAVD 88	SURVEY JOB NUMBER	22-033
DRAWN	NDE	HORIZONTAL DATUM (EPOCH)	NAD83 (2010.00)	CCS ZONE	5
CHECKED	JEE	LATITUDE	34° 5'44.34"N	LONGITUDE	116° 18'23.48"W

TOPOGRAPHIC MAPPING

ROD RIGOLE
1473 WAMEGO TRAIL
LANDERS, CA 92285
APN:0629-282-03-000 & APN:0629-282-06-000

DATE	OCTOBER 2022
PROJECT NUMBER	22-036
SHEET	1 OF 1
DWG	B-18133
REV	0

LONELY DOVE MOTEL PROPOSED SITE PLAN

LONELY DOVE MOTEL
1473 WAMIEGO TRAIL,
LANDERS, CA, 92285
SCALE AT 30' X 42', As indicated
6/1/2023 4:52:13 PM

A

FLOOR AREA RATIO (FAR) ANALYSIS		
LAND USE ZONING	MAX. FAR ALLOWED	3.1
COMMERCIAL (H/VS-D-COM)		
TOTAL FAR		35,800 SF / 435,600 SF = .08

LOT COVERAGE ANALYSIS		
LAND USE ZONING	MAX. LOT COVERAGE ALLOWED	80%
COMMERCIAL (H/VS-D-COM)		
TOTAL LOT COVERAGE		35,800 SF / 435,600 SF = 8%

LANDSCAPING STANDARDS ANALYSIS		
LAND USE ZONING	MINIMUM LANDSCAPED AREA	15% OF LOT AREA
COMMERCIAL (H/VS-D-COM)		
PROVIDED AREA		132,000 SF / 435,000 SF = 30%
EXISTING NATURAL LANDSCAPE AREA = 80,000 SF		
PROPOSED DESERT LANDSCAPING = 52,000 SF		

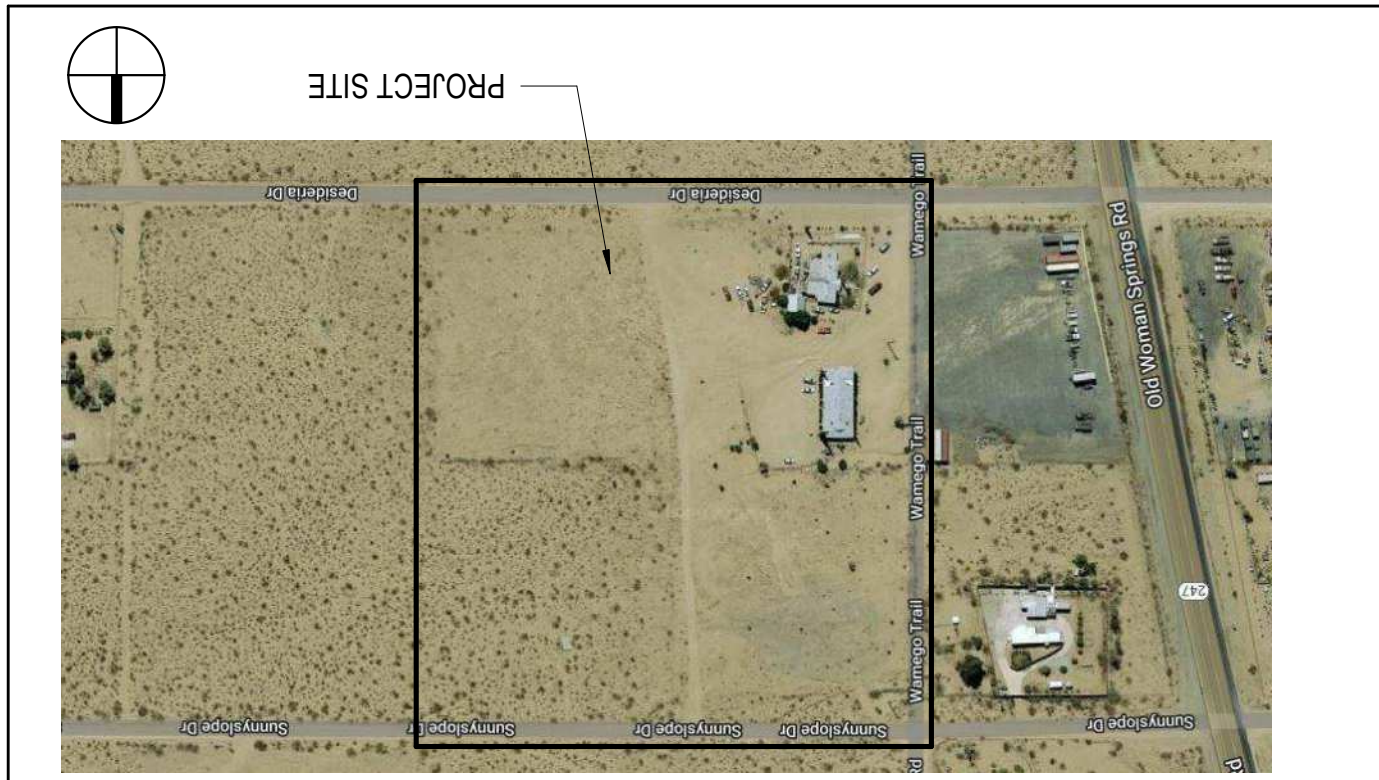
PARKING SPACE ANALYSIS		
LAND USE REQ.	REQUIRED	PROVIDED
MOTEL - 1 PER UNIT	EXISTING = 41 SPACES	43 SPACES
RESTAURANT (IN DESERT REGION) - 1	2,800 SF/100 = 28 SPACES	62 SPACES
TOTAL SPACES	69 SPACES	105 SPACES
DISABLED SPACES - 4 FOR 51-100	4 SPACES	5 SPACES
VAN ACCESSIBLE - 1 PER EVERY 8 DISABLED SPACES	1 SPACE	3 SPACES
ELECTRIC VEHICLE - 5 FOR 51-100	5 SPACES	5 SPACES

LIGHTING LEGEND		
PATHWAY LIGHTING, NOTED FOR LOCATION, NOT QUANTITY		
BUILDING LIGHTING		
GUESTROOM ENTRY LIGHTS		

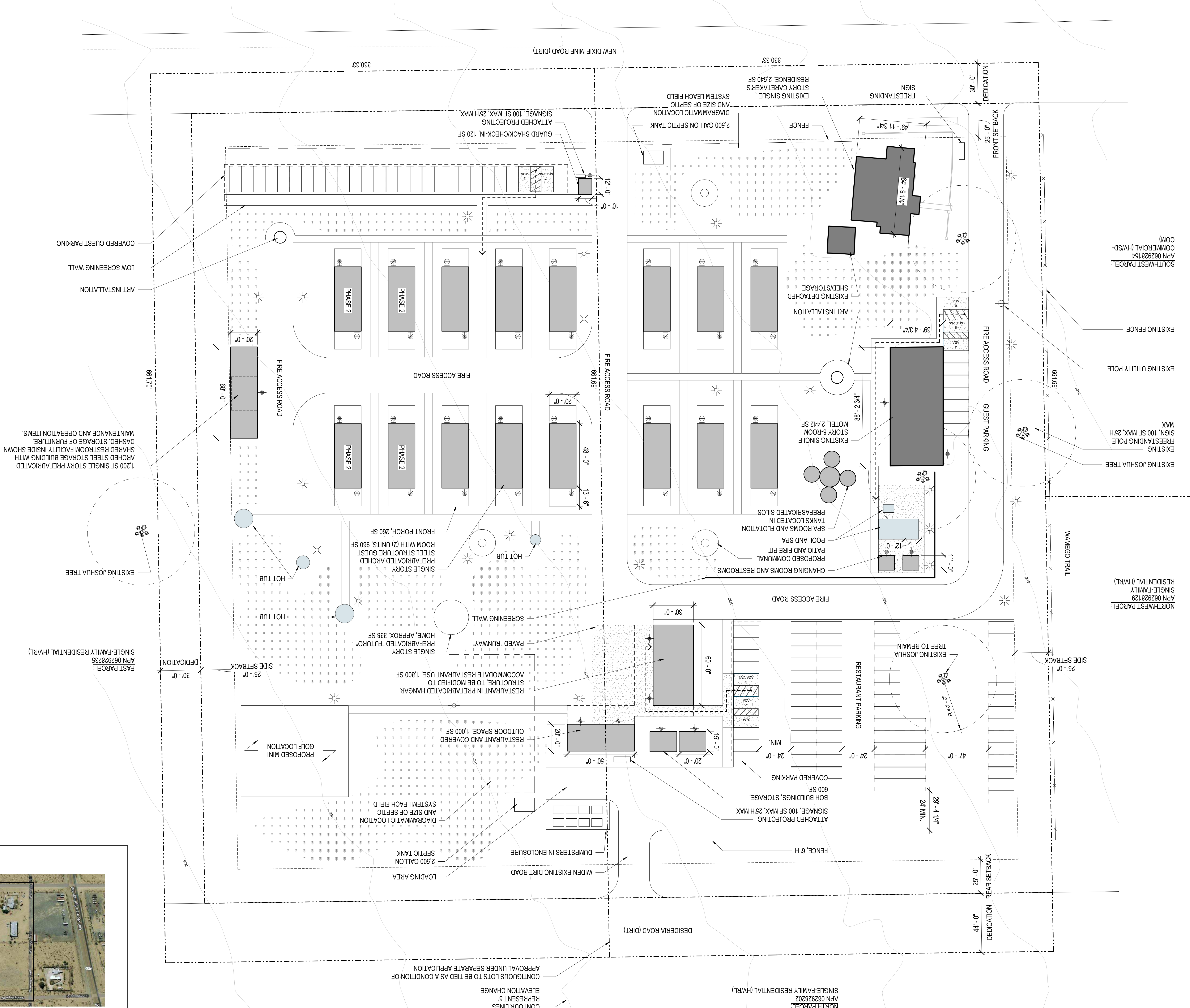
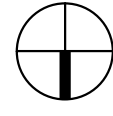
SITE PLAN LEGEND		
EXISTING BUILDINGS TO REMAIN		
PROPOSED BUILDING		
PROPOSED VEHICLE CIRCULATION		
PAVED AREA		
ROAD DEDICATIONS		
SETBACKS		
PRIMARY CIRCULATION PATH		
SECONDARY CIRCULATION PATH		
PROPOSED LANDSCAPING		
OVERHANG COVERED AREA		
EXISTING JOSHUA TREE TO REMAIN		

PROJECT DESCRIPTION		
THE APPLICANT SEEKS TO OBTAIN A CONDITIONAL USE PERMIT FOR THE EXPANSION OF AN EXISTING MOTEL AND ADDITION OF A RESTAURANT AND POOL/SPA COMPLEX WITHIN THE HOMESTEAD VALLEY COMMUNITY PLAN IN THE COMMUNITY OF LANDERS. THE PROJECT SPANS TWO CONTIGUOUS PARCELS WHICH WILL BE TIED IN A SEPARATE LOT MERGER APPLICATION.		
PROPERTY DESCRIPTION		
APNS: 0629-282-03 AND 0629-282-06		
APPLICANT: ROB RIGOLE		
ADDRESS: 1473 WAMIEGO TRAIL, LANDERS, CA, 92285		
LOT SIZE: 10 ACRES		
ZONING: COMMERCIAL (H/VS-D-COM)		
UTILITIES		
WATER: GIGORN DESERT VIEW WATER AGENCY		
SEWERAGE: SEPTIC W/ 2 TANKS AND LEACH FIELDS		
ELECTRIC: SOUTHERN CALIFORNIA EDISON		
GAS: G&K PROPANE		
TELEPHONE: SOUTHERN CALIFORNIA TELEPHONE		

OFFICIAL USE ONLY		
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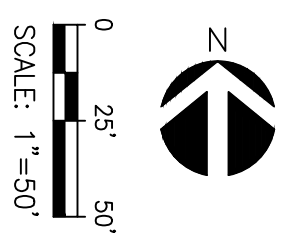
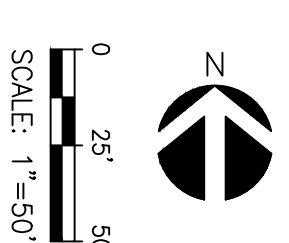


VICINITY MAP



[illegible]

SCALE AT ARCH E1 (30 X 42):



- RUNOFF FROM ADJACENT PROPERTY FLOWS TO THE NORTH AND INTO DESIDERIA RD.

RUNOFF FROM ADJACENT-
PROPERTY FLOWS TO THE
NORTH AND INTO DESIDERA
RD.

PROJECT NUMBER

CLIENT:

CONSULTANTS:

KEY PLAN:

PRELIMINARY
NOT FOR CONSTRUCTION

The drawings and specifications and designs represented hereby are and shall remain the property of the Architect, and no part thereof shall be used or reproduced for any purpose other than the specified project for which they have been prepared and developed without the written consent of the Architect. Written dimensions shall have precedence over scaled dimensions. The Contractor shall verify and be responsible for all dimensions and conditions on the jobsite and report any discrepancies to the Architect. The drawings and specifications indicate the general scope of work and required technical performance of the building systems and do not necessarily indicate or describe all the work required for full performance and completion of the construction contract. Based on the scope of work indicated Contractor shall furnish all items required for the proper execution of the project.

ISSUES AND REVISIONS		
NO.	DESCRIPTION	DATE REV

DRAINAGE EXHIBIT
DETAILS

EXHB

SCALE AT ARCH E1 (30 X 42):

© 2019 LOESCHER MEACHEM ARCHITECTS

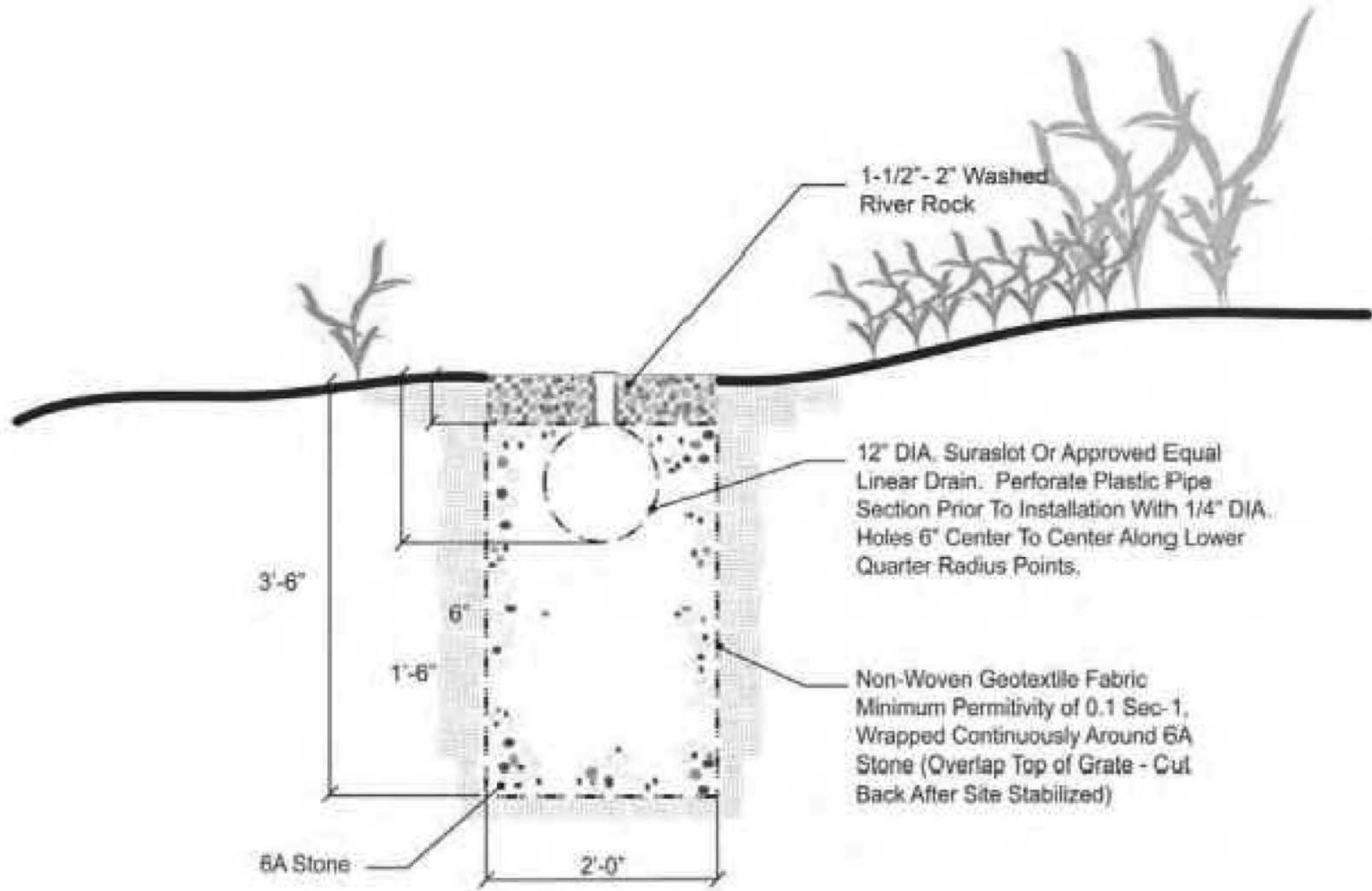


Figure 2-17. Schematic of a Typical Level Spreader
(Source: InSite Design Studio)

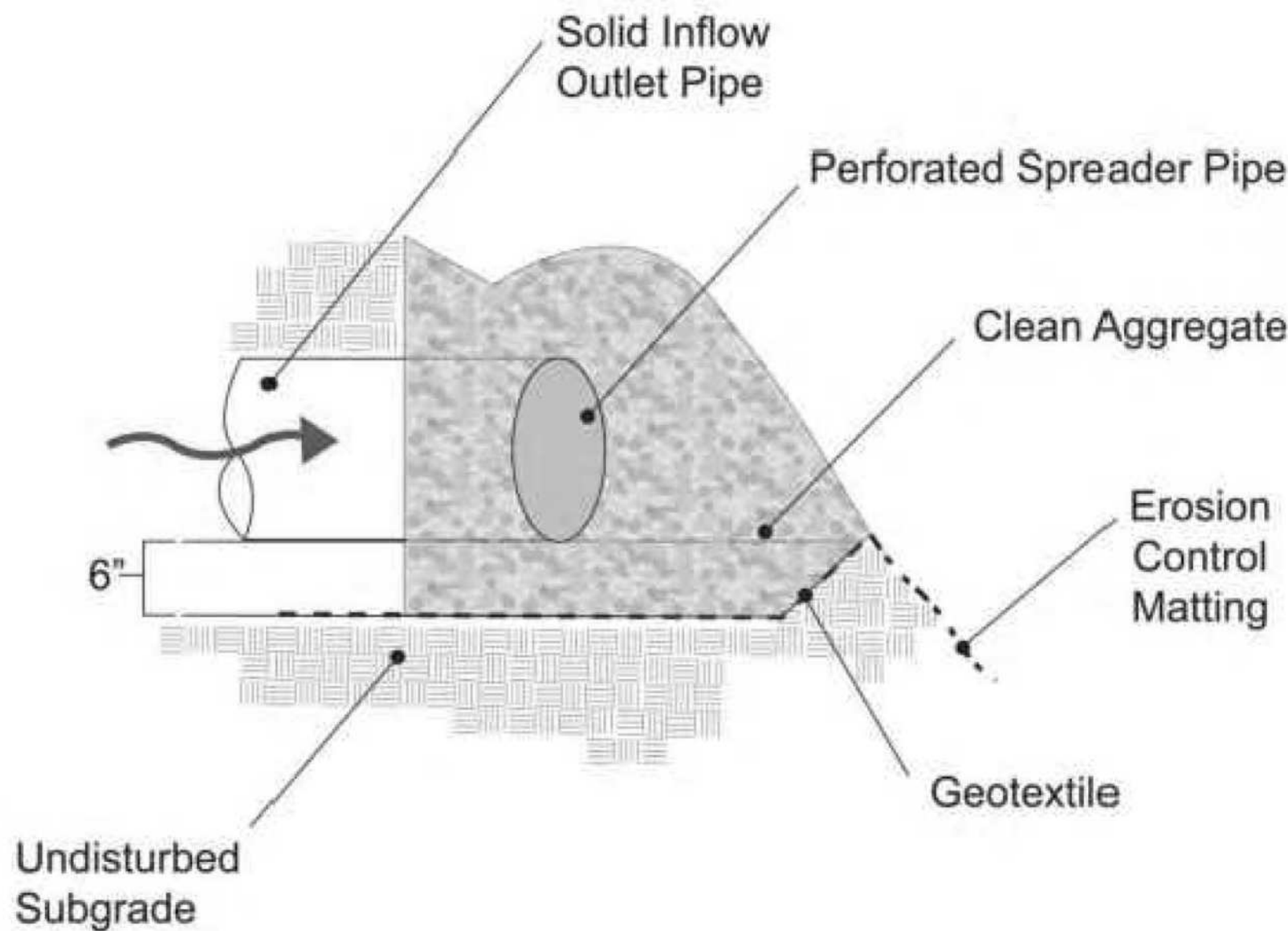


Figure 2-18. Level Spreader with an Inflow Pipe
(Source: SEMCOG, 2008)

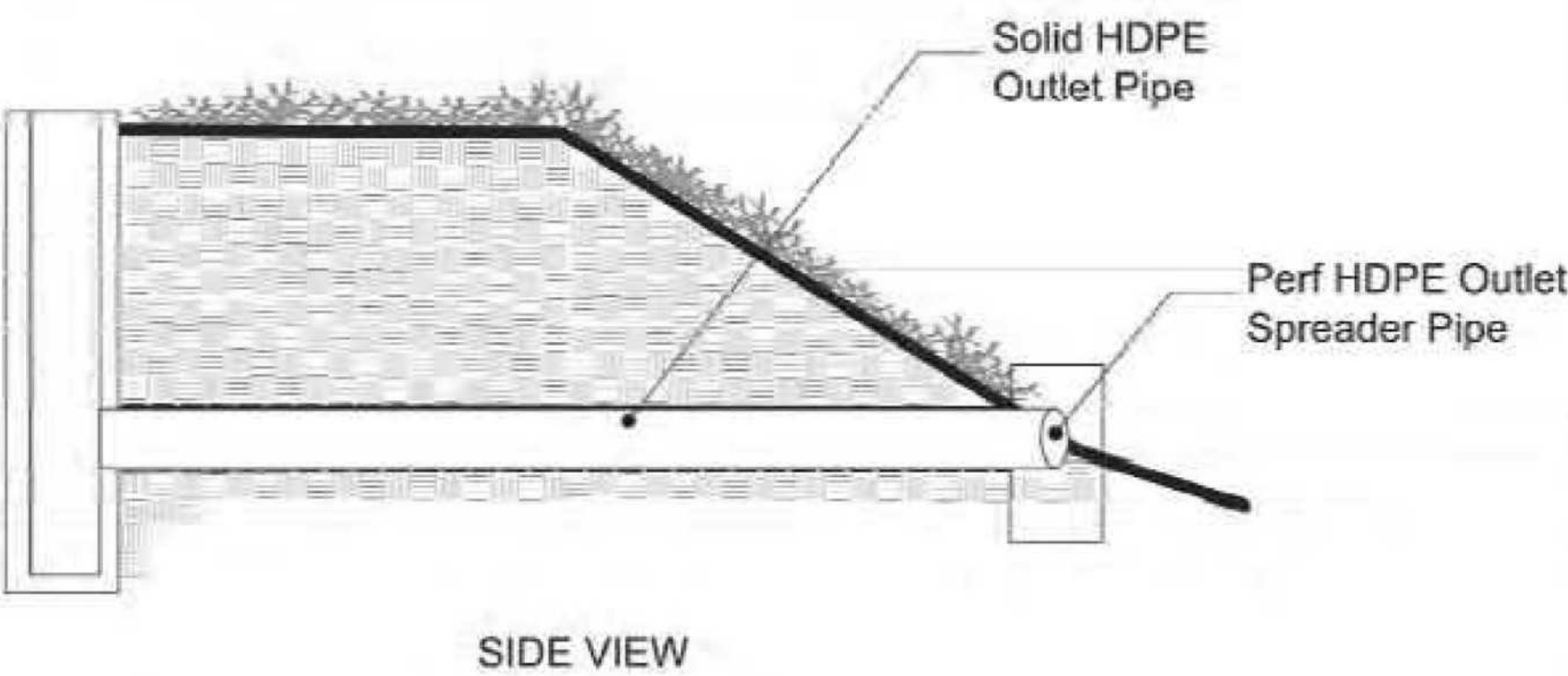
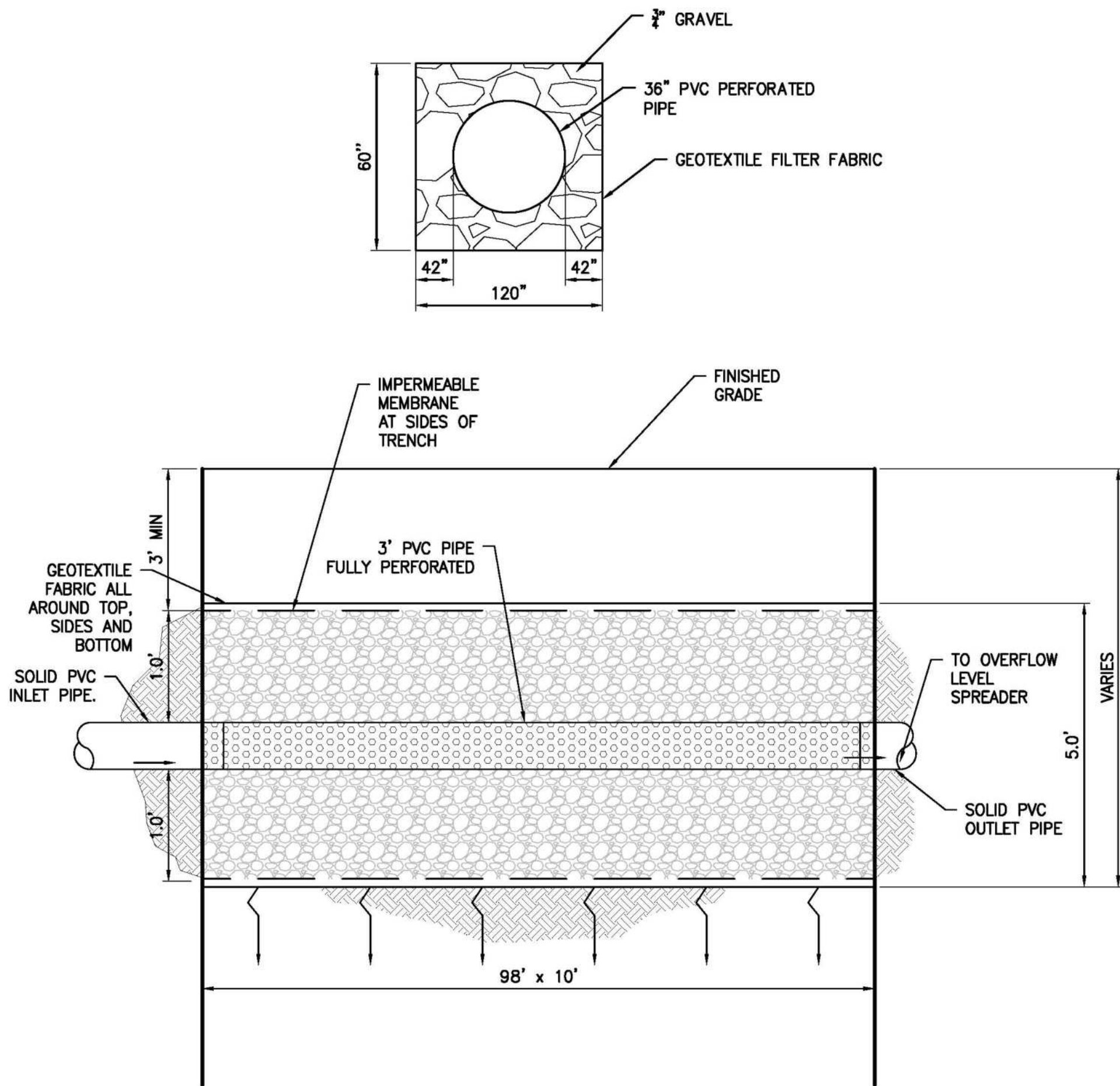


Figure 2-19. Level Spreader with a Perforated Outflow Pipe
(Source: SEMCOG, 2008)

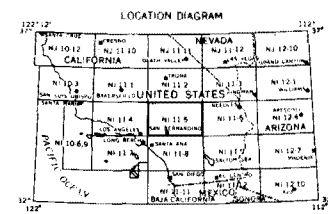
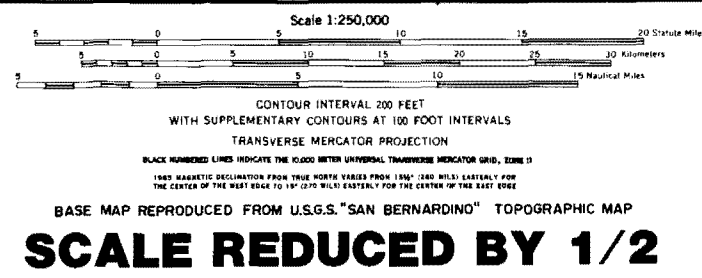
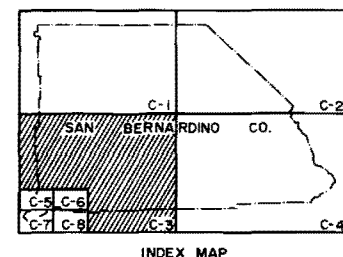


2 DETAIL INFILTRATION TRENCH
N.T.S.

1 LEVEL SPREADED DETAIL
N.T.S.

SAN BERNARDINO COUNTY HYDROLOGY MANUAL

PROJECT SITE



HYDROLOGIC SOILS GROUP MAP FOR SOUTHCENTRAL AREA



NOAA Atlas 14, Volume 6, Version 2
Location name: Landers, California, USA*
Latitude: 34.2759°, Longitude: -116.4479°
Elevation: 3425 ft**

* source: ESRI Maps
 ** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aerals](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.099 (0.081-0.121)	0.140 (0.115-0.171)	0.199 (0.164-0.244)	0.250 (0.204-0.310)	0.327 (0.258-0.418)	0.391 (0.302-0.510)	0.461 (0.348-0.617)	0.539 (0.396-0.741)	0.655 (0.462-0.938)	0.756 (0.515-1.12)
10-min	0.141 (0.117-0.173)	0.200 (0.165-0.245)	0.285 (0.234-0.350)	0.359 (0.293-0.444)	0.468 (0.370-0.599)	0.560 (0.434-0.731)	0.661 (0.499-0.884)	0.773 (0.568-1.06)	0.939 (0.663-1.34)	1.08 (0.739-1.60)
15-min	0.171 (0.141-0.209)	0.242 (0.200-0.297)	0.345 (0.283-0.423)	0.434 (0.354-0.537)	0.567 (0.448-0.724)	0.678 (0.524-0.884)	0.799 (0.604-1.07)	0.935 (0.687-1.28)	1.14 (0.801-1.63)	1.31 (0.893-1.94)
30-min	0.254 (0.210-0.311)	0.361 (0.297-0.441)	0.512 (0.422-0.629)	0.645 (0.527-0.798)	0.842 (0.665-1.08)	1.01 (0.780-1.32)	1.19 (0.898-1.59)	1.39 (1.02-1.91)	1.69 (1.19-2.42)	1.95 (1.33-2.89)
60-min	0.346 (0.286-0.423)	0.490 (0.405-0.600)	0.697 (0.573-0.855)	0.877 (0.716-1.09)	1.15 (0.905-1.46)	1.37 (1.06-1.79)	1.62 (1.22-2.16)	1.89 (1.39-2.60)	2.30 (1.62-3.29)	2.65 (1.81-3.92)
2-hr	0.452 (0.373-0.553)	0.627 (0.517-0.768)	0.875 (0.720-1.08)	1.09 (0.892-1.35)	1.41 (1.12-1.81)	1.68 (1.30-2.19)	1.97 (1.49-2.63)	2.28 (1.68-3.14)	2.74 (1.94-3.93)	3.13 (2.14-4.64)
3-hr	0.527 (0.435-0.644)	0.725 (0.598-0.888)	1.01 (0.828-1.24)	1.25 (1.02-1.55)	1.62 (1.28-2.06)	1.92 (1.48-2.50)	2.24 (1.69-3.00)	2.60 (1.91-3.57)	3.12 (2.20-4.46)	3.54 (2.42-5.25)
6-hr	0.672 (0.555-0.822)	0.920 (0.759-1.13)	1.27 (1.05-1.56)	1.58 (1.29-1.95)	2.02 (1.60-2.59)	2.39 (1.85-3.12)	2.79 (2.11-3.73)	3.22 (2.37-4.43)	3.85 (2.72-5.51)	4.36 (2.98-6.46)
12-hr	0.818 (0.676-1.00)	1.14 (0.936-1.39)	1.58 (1.30-1.94)	1.96 (1.60-2.43)	2.52 (1.99-3.22)	2.98 (2.30-3.88)	3.46 (2.62-4.63)	3.99 (2.93-5.49)	4.75 (3.35-6.80)	5.37 (3.66-7.95)
24-hr	1.01 (0.892-1.16)	1.43 (1.26-1.64)	2.02 (1.78-2.33)	2.52 (2.21-2.94)	3.25 (2.76-3.92)	3.85 (3.20-4.73)	4.50 (3.64-5.66)	5.19 (4.10-6.72)	6.20 (4.70-8.36)	7.03 (5.15-9.80)
2-day	1.14 (1.01-1.31)	1.65 (1.46-1.90)	2.38 (2.10-2.74)	3.01 (2.63-3.50)	3.93 (3.33-4.73)	4.69 (3.89-5.76)	5.51 (4.47-6.94)	6.42 (5.06-8.30)	7.74 (5.86-10.4)	8.83 (6.47-12.3)
3-day	1.22 (1.08-1.40)	1.79 (1.58-2.06)	2.61 (2.31-3.02)	3.34 (2.92-3.89)	4.40 (3.73-5.29)	5.28 (4.39-6.49)	6.25 (5.07-7.87)	7.33 (5.78-9.48)	8.91 (6.75-12.0)	10.2 (7.50-14.3)
4-day	1.26 (1.12-1.45)	1.87 (1.66-2.16)	2.76 (2.44-3.19)	3.54 (3.10-4.13)	4.70 (3.98-5.65)	5.66 (4.70-6.96)	6.72 (5.45-8.46)	7.90 (6.23-10.2)	9.65 (7.31-13.0)	11.1 (8.14-15.5)
7-day	1.36 (1.21-1.57)	2.06 (1.83-2.38)	3.09 (2.72-3.57)	3.99 (3.50-4.65)	5.34 (4.52-6.42)	6.46 (5.36-7.94)	7.69 (6.23-9.67)	9.05 (7.14-11.7)	11.1 (8.38-14.9)	12.8 (9.34-17.8)
10-day	1.43 (1.27-1.64)	2.19 (1.94-2.52)	3.30 (2.92-3.82)	4.29 (3.76-5.00)	5.77 (4.89-6.94)	7.00 (5.81-8.60)	8.34 (6.76-10.5)	9.82 (7.75-12.7)	12.0 (9.10-16.2)	13.9 (10.1-19.3)
20-day	1.52 (1.34-1.75)	2.40 (2.12-2.76)	3.70 (3.26-4.28)	4.86 (4.25-5.66)	6.59 (5.59-7.94)	8.05 (6.68-9.89)	9.63 (7.81-12.1)	11.4 (8.97-14.7)	13.9 (10.5-18.7)	16.0 (11.7-22.3)
30-day	1.66 (1.47-1.91)	2.64 (2.34-3.05)	4.13 (3.64-4.77)	5.45 (4.78-6.35)	7.45 (6.32-8.97)	9.12 (7.57-11.2)	10.9 (8.85-13.7)	12.9 (10.2-16.7)	15.7 (11.9-21.2)	18.0 (13.2-25.1)
45-day	1.85 (1.64-2.14)	2.98 (2.64-3.44)	4.68 (4.13-5.41)	6.21 (5.44-7.24)	8.52 (7.23-10.3)	10.5 (8.69-12.9)	12.6 (10.2-15.8)	14.8 (11.7-19.1)	18.0 (13.7-24.3)	20.7 (15.1-28.8)
60-day	2.05 (1.81-2.36)	3.30 (2.92-3.80)	5.19 (4.58-6.00)	6.90 (6.04-8.04)	9.48 (8.03-11.4)	11.6 (9.67-14.3)	14.0 (11.3-17.6)	16.5 (13.0-21.3)	20.0 (15.2-27.0)	22.9 (16.8-31.9)

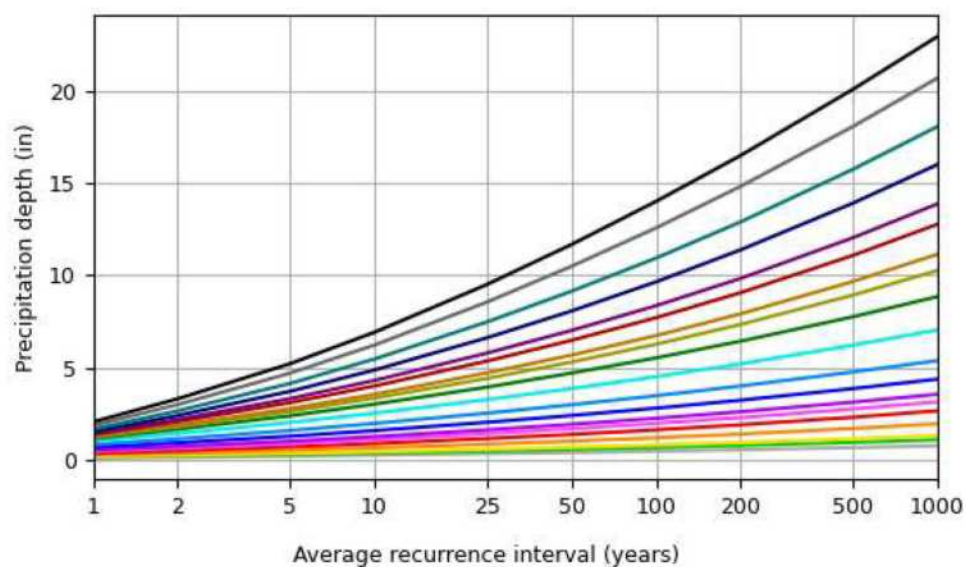
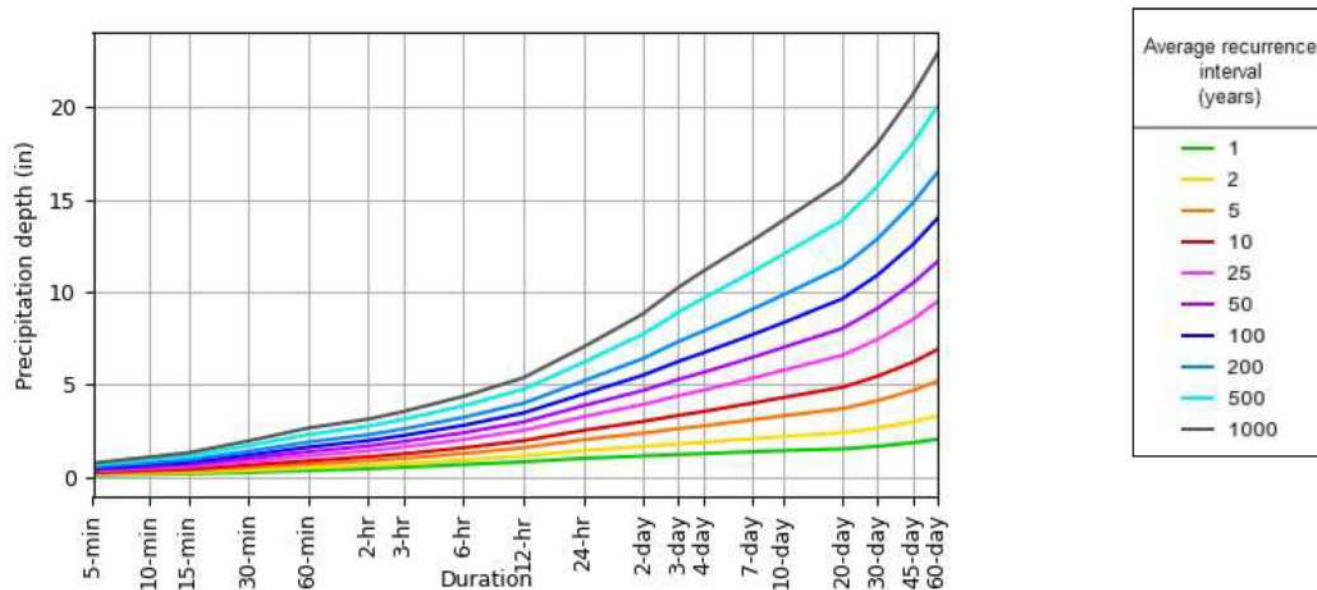
¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).
 Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.
 Please refer to NOAA Atlas 14 document for more information.

[Back to Top](#)

PF graphical

PDS-based depth-duration-frequency (DDF) curves

Latitude: 34.2759°, Longitude: -116.4479°



NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Fri Oct 20 21:25:10 2023

[Back to Top](#)**Maps & aerials****Small scale terrain**



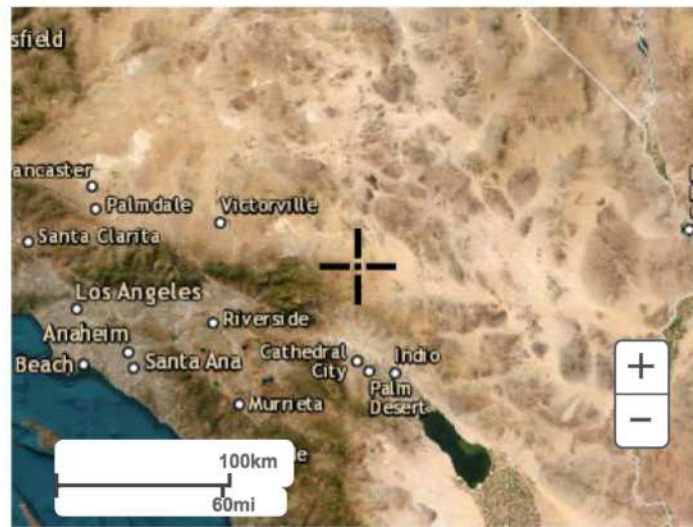
Large scale terrain



Large scale map



Large scale aerial



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Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

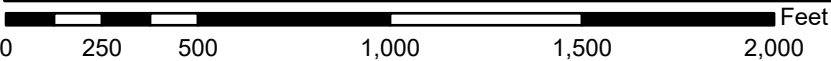
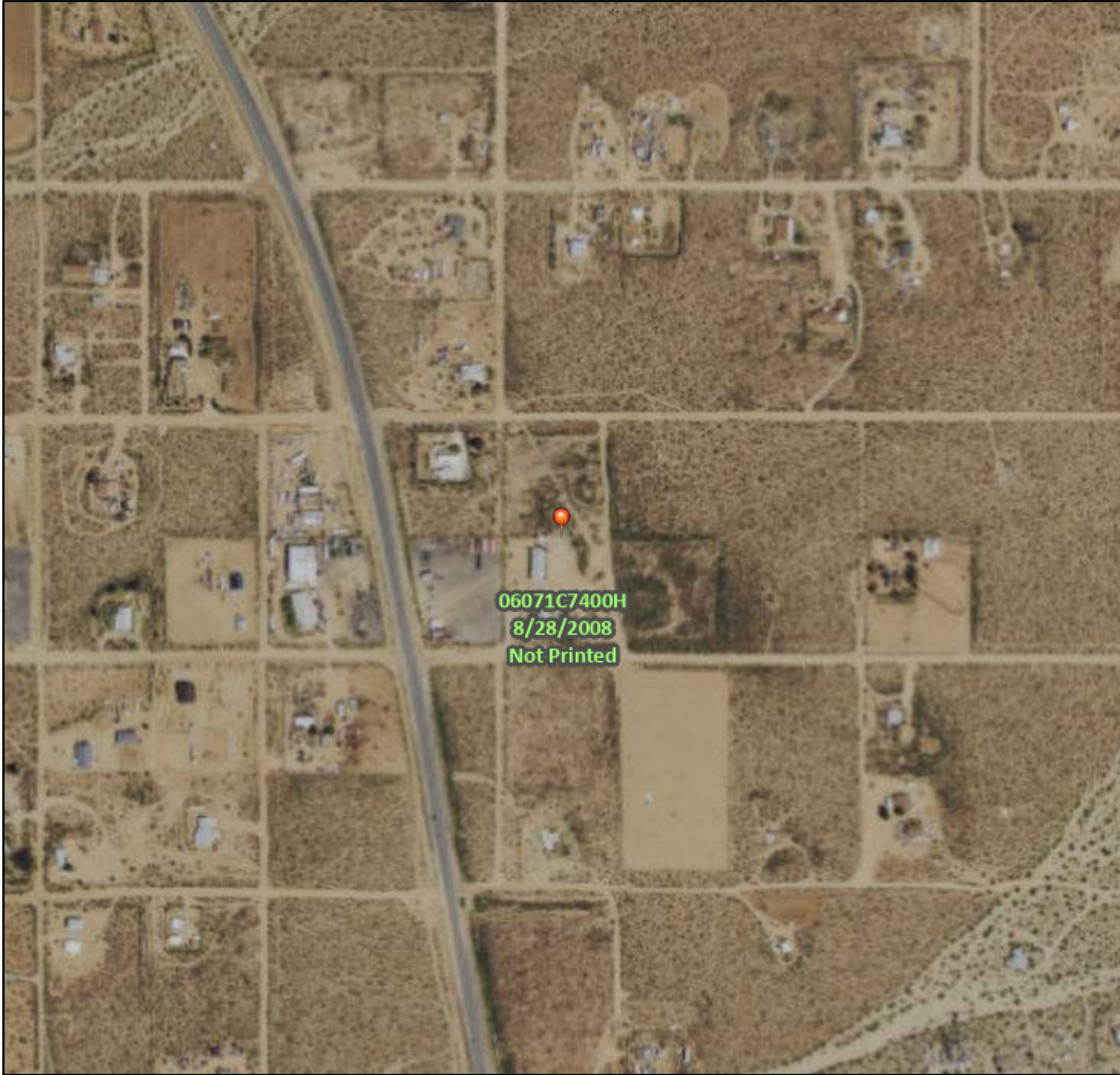
[Disclaimer](#)

APPENDIX C
FEMA & DWR awareness Maps

National Flood Hazard Layer FIRMMette



116°27'11"W 34°16'48"N



1:6,000

116°26'34"W 34°16'18"N

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
MAP PANELS		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **10/18/2023 at 7:01 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

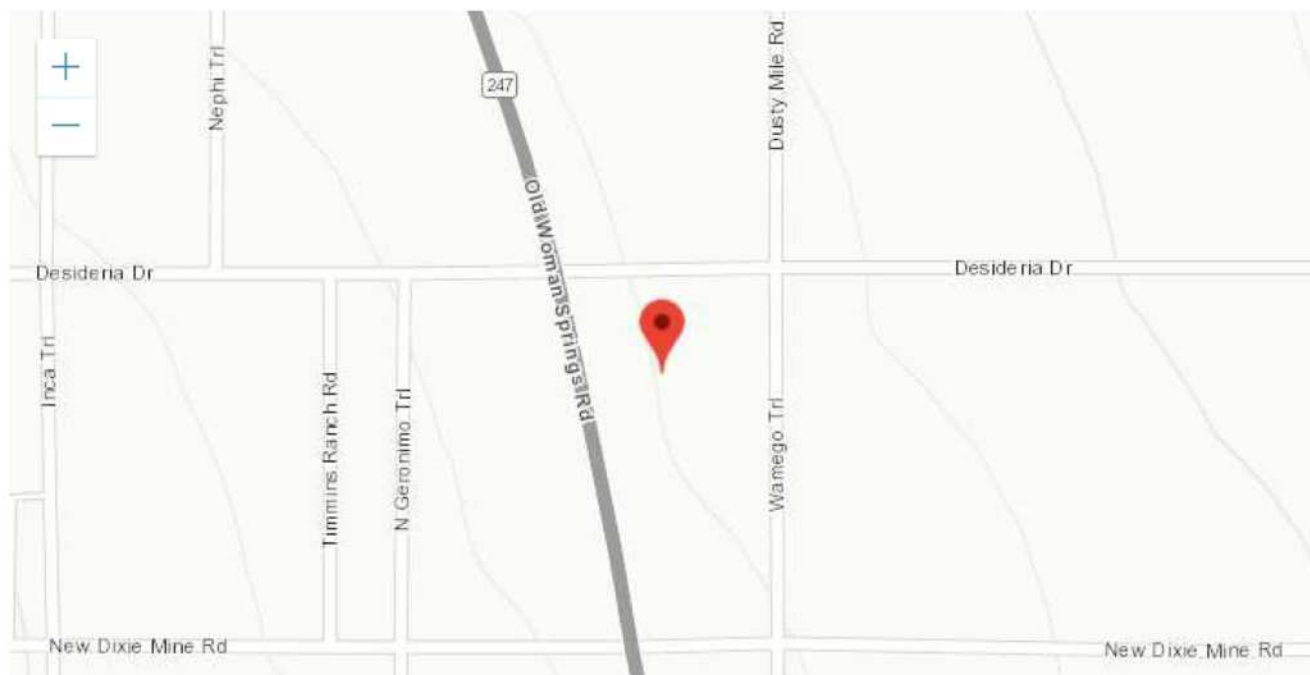
This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



CALIFORNIA DEPARTMENT OF WATER RESOURCES

Floodplain Information

Latitude: 34.27638, Longitude: -116.44911



Bureau of Land Management, Esri, HERE, Garmin, INCREMENT P, USGS, EPA, USDA

Powered by Esri

No point selected to display floodplain information

Floodplains are displayed using semi transparent colors. When viewing overlapping floodplains, the combination of multiple semi transparent colors will not match the legend colors. For accurate color representation, view floodplains individually.

No legend

APPENDIX D

Civil Design Outputs

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2019 Version 9.1
Rational Hydrology Study Date: 10/24/23

Lonely Dove
Rational Method
10 Year Existing Conditions

Program License Serial Number 6542

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.877 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

+++++
Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 0.9790 Max loss rate(Fm)= 0.260(In/Hr)
Initial subarea data:
Initial area flow distance = 933.000(Ft.)
Top (of initial area) elevation = 3437.500(Ft.)
Bottom (of initial area) elevation = 3398.250(Ft.)
Difference in elevation = 39.250(Ft.)
Slope = 0.04207 s(%)= 4.21
 $TC = k(0.516)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 14.988 min.
Rainfall intensity = 2.316(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.799
Subarea runoff = 18.506(CFS)
Total initial stream area = 10.000(Ac.)
Pervious area fraction = 0.979

Initial area Fm value = 0.260(In/Hr)
End of computations, Total Study Area = 10.00 (Ac.)

The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(A_p) = 0.979
Area averaged SCS curve number = 86.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2019 Version 9.1
Rational Hydrology Study Date: 10/26/23

Lonely Dove Motel
Rational Method
10 year Rational Method Proposed

Program License Serial Number 6542

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.877 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

+++++
Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 56.00
Pervious ratio(Ap) = 0.8790 Max loss rate(Fm)= 0.645(In/Hr)
Initial subarea data:
Initial area flow distance = 1001.000(Ft.)
Top (of initial area) elevation = 3437.500(Ft.)
Bottom (of initial area) elevation = 3398.250(Ft.)
Difference in elevation = 39.250(Ft.)
Slope = 0.03921 s(%)= 3.92
 $TC = k(0.491)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 14.887 min.
Rainfall intensity = 2.327(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.650
Subarea runoff = 15.195(CFS)
Total initial stream area = 10.040(Ac.)
Pervious area fraction = 0.879

Initial area Fm value = 0.645(In/Hr)

End of computations, Total Study Area = 10.04 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

Note: These figures do not consider reduced effective area effects caused by confluences in the rational equation.

Area averaged pervious area fraction(A_p) = 0.879

Area averaged SCS curve number = 56.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2019 Version 9.1
Rational Hydrology Study Date: 10/24/23

Lonely Dove
Rational Method
25 year existing conditions

Program License Serial Number 6542

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 25.0
10 Year storm 1 hour rainfall = 0.877(In.)
100 Year storm 1 hour rainfall = 1.370(In.)
Computed rainfall intensity:
Storm year = 25.00 1 hour rainfall = 1.073 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

+++++
Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 0.9790 Max loss rate(Fm)= 0.260(In/Hr)
Initial subarea data:
Initial area flow distance = 933.000(Ft.)
Top (of initial area) elevation = 3437.500(Ft.)
Bottom (of initial area) elevation = 3398.250(Ft.)
Difference in elevation = 39.250(Ft.)
Slope = 0.04207 s(%)= 4.21
 $TC = k(0.516)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 14.988 min.
Rainfall intensity = 2.834(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.818
Subarea runoff = 23.168(CFS)

Total initial stream area = 10.000(Ac.)

Pervious area fraction = 0.979

Initial area Fm value = 0.260(In/Hr)

End of computations, Total Study Area = 10.00 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

Note: These figures do not consider reduced effective area effects caused by confluences in the rational equation.

Area averaged pervious area fraction(A_p) = 0.979

Area averaged SCS curve number = 86.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2019 Version 9.1
Rational Hydrology Study Date: 10/26/23

Lonely Dove Motel
Rational Method
25 year Rational Method Proposed

Program License Serial Number 6542

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 25.0
10 Year storm 1 hour rainfall = 0.877(In.)
100 Year storm 1 hour rainfall = 1.620(In.)
Computed rainfall intensity:
Storm year = 25.00 1 hour rainfall = 1.173 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

+++++
Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 56.00
Pervious ratio(Ap) = 0.8790 Max loss rate(Fm)= 0.645(In/Hr)
Initial subarea data:
Initial area flow distance = 1001.000(Ft.)
Top (of initial area) elevation = 3437.500(Ft.)
Bottom (of initial area) elevation = 3398.250(Ft.)
Difference in elevation = 39.250(Ft.)
Slope = 0.03921 s(%)= 3.92
 $TC = k(0.491)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 14.887 min.
Rainfall intensity = 3.111(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.713
Subarea runoff = 22.283(CFS)

Total initial stream area = 10.040(Ac.)

Pervious area fraction = 0.879

Initial area Fm value = 0.645(In/Hr)

End of computations, Total Study Area = 10.04 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

Note: These figures do not consider reduced effective area effects caused by confluences in the rational equation.

Area averaged pervious area fraction(A_p) = 0.879

Area averaged SCS curve number = 56.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2019 Version 9.1
Rational Hydrology Study Date: 10/24/23

Lonely Dove
Rational Method
100 year existing conditons

Program License Serial Number 6542

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 100.0
10 Year storm 1 hour rainfall = 0.877(In.)
100 Year storm 1 hour rainfall = 1.370(In.)
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.370 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

+++++
Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 0.9790 Max loss rate(Fm)= 0.260(In/Hr)
Initial subarea data:
Initial area flow distance = 933.000(Ft.)
Top (of initial area) elevation = 3437.500(Ft.)
Bottom (of initial area) elevation = 3398.250(Ft.)
Difference in elevation = 39.250(Ft.)
Slope = 0.04207 s(%)= 4.21
 $TC = k(0.516)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 14.988 min.
Rainfall intensity = 3.617(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.835
Subarea runoff = 30.221(CFS)

Total initial stream area = 10.000(Ac.)

Pervious area fraction = 0.979

Initial area Fm value = 0.260(In/Hr)

End of computations, Total Study Area = 10.00 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

Note: These figures do not consider reduced effective area effects caused by confluences in the rational equation.

Area averaged pervious area fraction(A_p) = 0.979

Area averaged SCS curve number = 86.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2019 Version 9.1
Rational Hydrology Study Date: 10/24/23

Lonely Dove Motel
Rational Method
100 year proposed conditions

Program License Serial Number 6542

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 100.0
10 Year storm 1 hour rainfall = 0.877(In.)
100 Year storm 1 hour rainfall = 1.620(In.)
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.620 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

+++++
Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 56.00
Pervious ratio(Ap) = 0.8790 Max loss rate(Fm)= 0.645(In/Hr)
Initial subarea data:
Initial area flow distance = 933.000(Ft.)
Top (of initial area) elevation = 3437.500(Ft.)
Bottom (of initial area) elevation = 3398.250(Ft.)
Difference in elevation = 39.250(Ft.)
Slope = 0.04207 s(%)= 4.21
 $TC = k(0.491)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 14.272 min.
Rainfall intensity = 4.427(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.769
Subarea runoff = 34.035(CFS)

Total initial stream area = 10.000(Ac.)
Pervious area fraction = 0.879
Initial area Fm value = 0.645(In/Hr)
End of computations, Total Study Area = 10.00 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(A_p) = 0.879
Area averaged SCS curve number = 56.0

Unit Hydrograph Analysis

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018, Version 9.0

Study date 10/24/23

+++++

San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 6542

Lonely Dove Motel
Synthetic Unit Hydrograph
25 year existing conditions

Storm Event Year = 25

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 25		
10.04	1	1.15

Rainfall data for year 25		
10.04	6	2.02

Rainfall data for year 25		
10.04	24	3.25

+++++

***** Area-averaged max loss rate, Fm *****

SCS curve No.(AMCII)	SCS curve NO.(AMC 2)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
86.0	86.0	10.04	1.000	0.265	0.979	0.260

Area-averaged adjusted loss rate Fm (In/Hr) = 0.260

***** Area-Averaged low loss rate fraction, Yb *****

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
9.83	0.979	86.0	86.0	1.63	0.578
0.21	0.021	98.0	98.0	0.20	0.928

Area-averaged catchment yield fraction, Y = 0.585

Area-averaged low loss fraction, Yb = 0.415

User entry of time of concentration = 0.250 (hours)

+++++

Watershed area = 10.04(Ac.)

Catchment Lag time = 0.200 hours

Unit interval = 5.000 minutes

Unit interval percentage of lag time = 41.7000

Hydrograph baseflow = 0.00(CFS)

Average maximum watershed loss rate(Fm) = 0.260(In/Hr)

Average low loss rate fraction (Yb) = 0.415 (decimal)

DESERT S-Graph Selected

Computed peak 5-minute rainfall = 0.546(In)

Computed peak 30-minute rainfall = 0.934(In)

Specified peak 1-hour rainfall = 1.150(In)

Computed peak 3-hour rainfall = 1.624(In)

Specified peak 6-hour rainfall = 2.020(In)

Specified peak 24-hour rainfall = 3.250(In)

Rainfall depth area reduction factors:

Using a total area of 10.04(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.545(In)

30-minute factor = 1.000 Adjusted rainfall = 0.934(In)

1-hour factor = 1.000 Adjusted rainfall = 1.149(In)

3-hour factor = 1.000 Adjusted rainfall = 1.624(In)

6-hour factor = 1.000 Adjusted rainfall = 2.020(In)

24-hour factor = 1.000 Adjusted rainfall = 3.250(In)

U n i t H y d r o g r a p h

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Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))

	(K = 121.42 (CFS))	
1	2.939	3.568
2	20.652	21.508
3	51.511	37.469
4	67.252	19.113
5	76.134	10.784
6	81.991	7.113
7	86.266	5.190
8	89.446	3.861
9	91.788	2.844
10	93.696	2.317
11	95.180	1.802
12	96.368	1.443
13	97.283	1.110
14	97.924	0.778
15	98.362	0.533
16	98.856	0.600
17	99.351	0.601
18	99.686	0.407
19	100.000	0.381

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)

1	0.5454	0.5454
2	0.6715	0.1261
3	0.7584	0.0869
4	0.8267	0.0684
5	0.8840	0.0572
6	0.9337	0.0497
7	0.9778	0.0442
8	1.0178	0.0400
9	1.0544	0.0366
10	1.0883	0.0339
11	1.1198	0.0316
12	1.1495	0.0296
13	1.1788	0.0293
14	1.2066	0.0278
15	1.2331	0.0265
16	1.2584	0.0253
17	1.2827	0.0242
18	1.3059	0.0233
19	1.3284	0.0224
20	1.3500	0.0216
21	1.3709	0.0209
22	1.3911	0.0202
23	1.4107	0.0196

24	1.4297	0.0190
25	1.4482	0.0185
26	1.4662	0.0180
27	1.4837	0.0175
28	1.5008	0.0171
29	1.5175	0.0167
30	1.5338	0.0163
31	1.5497	0.0159
32	1.5652	0.0156
33	1.5805	0.0152
34	1.5954	0.0149
35	1.6100	0.0146
36	1.6244	0.0143
37	1.6384	0.0141
38	1.6522	0.0138
39	1.6658	0.0136
40	1.6791	0.0133
41	1.6922	0.0131
42	1.7050	0.0129
43	1.7177	0.0127
44	1.7302	0.0125
45	1.7424	0.0123
46	1.7545	0.0121
47	1.7664	0.0119
48	1.7781	0.0117
49	1.7897	0.0116
50	1.8011	0.0114
51	1.8124	0.0113
52	1.8235	0.0111
53	1.8344	0.0110
54	1.8452	0.0108
55	1.8559	0.0107
56	1.8665	0.0105
57	1.8769	0.0104
58	1.8872	0.0103
59	1.8973	0.0102
60	1.9074	0.0101
61	1.9173	0.0099
62	1.9272	0.0098
63	1.9369	0.0097
64	1.9465	0.0096
65	1.9560	0.0095
66	1.9654	0.0094
67	1.9747	0.0093
68	1.9840	0.0092
69	1.9931	0.0091
70	2.0021	0.0090
71	2.0111	0.0089
72	2.0199	0.0089
73	2.0295	0.0096

74	2.0390	0.0095
75	2.0484	0.0094
76	2.0578	0.0093
77	2.0670	0.0092
78	2.0762	0.0092
79	2.0853	0.0091
80	2.0943	0.0090
81	2.1032	0.0089
82	2.1121	0.0089
83	2.1209	0.0088
84	2.1296	0.0087
85	2.1383	0.0087
86	2.1469	0.0086
87	2.1554	0.0085
88	2.1639	0.0085
89	2.1723	0.0084
90	2.1806	0.0083
91	2.1889	0.0083
92	2.1971	0.0082
93	2.2053	0.0082
94	2.2134	0.0081
95	2.2215	0.0080
96	2.2295	0.0080
97	2.2374	0.0079
98	2.2453	0.0079
99	2.2531	0.0078
100	2.2609	0.0078
101	2.2686	0.0077
102	2.2763	0.0077
103	2.2839	0.0076
104	2.2915	0.0076
105	2.2991	0.0075
106	2.3065	0.0075
107	2.3140	0.0074
108	2.3214	0.0074
109	2.3287	0.0074
110	2.3360	0.0073
111	2.3433	0.0073
112	2.3505	0.0072
113	2.3577	0.0072
114	2.3648	0.0071
115	2.3719	0.0071
116	2.3790	0.0071
117	2.3860	0.0070
118	2.3930	0.0070
119	2.3999	0.0069
120	2.4068	0.0069
121	2.4137	0.0069
122	2.4205	0.0068
123	2.4273	0.0068

124	2.4341	0.0068
125	2.4408	0.0067
126	2.4474	0.0067
127	2.4541	0.0066
128	2.4607	0.0066
129	2.4673	0.0066
130	2.4738	0.0065
131	2.4803	0.0065
132	2.4868	0.0065
133	2.4933	0.0064
134	2.4997	0.0064
135	2.5061	0.0064
136	2.5124	0.0064
137	2.5187	0.0063
138	2.5250	0.0063
139	2.5313	0.0063
140	2.5375	0.0062
141	2.5437	0.0062
142	2.5499	0.0062
143	2.5561	0.0061
144	2.5622	0.0061
145	2.5683	0.0061
146	2.5743	0.0061
147	2.5804	0.0060
148	2.5864	0.0060
149	2.5923	0.0060
150	2.5983	0.0060
151	2.6042	0.0059
152	2.6101	0.0059
153	2.6160	0.0059
154	2.6219	0.0059
155	2.6277	0.0058
156	2.6335	0.0058
157	2.6393	0.0058
158	2.6450	0.0058
159	2.6508	0.0057
160	2.6565	0.0057
161	2.6622	0.0057
162	2.6678	0.0057
163	2.6735	0.0056
164	2.6791	0.0056
165	2.6847	0.0056
166	2.6902	0.0056
167	2.6958	0.0055
168	2.7013	0.0055
169	2.7068	0.0055
170	2.7123	0.0055
171	2.7178	0.0055
172	2.7232	0.0054
173	2.7286	0.0054

174	2.7340	0.0054
175	2.7394	0.0054
176	2.7448	0.0054
177	2.7501	0.0053
178	2.7554	0.0053
179	2.7607	0.0053
180	2.7660	0.0053
181	2.7713	0.0053
182	2.7765	0.0052
183	2.7817	0.0052
184	2.7869	0.0052
185	2.7921	0.0052
186	2.7973	0.0052
187	2.8024	0.0052
188	2.8076	0.0051
189	2.8127	0.0051
190	2.8178	0.0051
191	2.8229	0.0051
192	2.8279	0.0051
193	2.8330	0.0050
194	2.8380	0.0050
195	2.8430	0.0050
196	2.8480	0.0050
197	2.8530	0.0050
198	2.8579	0.0050
199	2.8629	0.0049
200	2.8678	0.0049
201	2.8727	0.0049
202	2.8776	0.0049
203	2.8825	0.0049
204	2.8874	0.0049
205	2.8922	0.0048
206	2.8970	0.0048
207	2.9019	0.0048
208	2.9067	0.0048
209	2.9114	0.0048
210	2.9162	0.0048
211	2.9210	0.0048
212	2.9257	0.0047
213	2.9304	0.0047
214	2.9352	0.0047
215	2.9399	0.0047
216	2.9445	0.0047
217	2.9492	0.0047
218	2.9539	0.0047
219	2.9585	0.0046
220	2.9631	0.0046
221	2.9677	0.0046
222	2.9723	0.0046
223	2.9769	0.0046

224	2.9815	0.0046
225	2.9861	0.0046
226	2.9906	0.0045
227	2.9951	0.0045
228	2.9997	0.0045
229	3.0042	0.0045
230	3.0087	0.0045
231	3.0131	0.0045
232	3.0176	0.0045
233	3.0221	0.0045
234	3.0265	0.0044
235	3.0309	0.0044
236	3.0354	0.0044
237	3.0398	0.0044
238	3.0442	0.0044
239	3.0485	0.0044
240	3.0529	0.0044
241	3.0573	0.0044
242	3.0616	0.0043
243	3.0660	0.0043
244	3.0703	0.0043
245	3.0746	0.0043
246	3.0789	0.0043
247	3.0832	0.0043
248	3.0874	0.0043
249	3.0917	0.0043
250	3.0960	0.0043
251	3.1002	0.0042
252	3.1044	0.0042
253	3.1087	0.0042
254	3.1129	0.0042
255	3.1171	0.0042
256	3.1213	0.0042
257	3.1254	0.0042
258	3.1296	0.0042
259	3.1338	0.0042
260	3.1379	0.0041
261	3.1420	0.0041
262	3.1462	0.0041
263	3.1503	0.0041
264	3.1544	0.0041
265	3.1585	0.0041
266	3.1626	0.0041
267	3.1666	0.0041
268	3.1707	0.0041
269	3.1748	0.0041
270	3.1788	0.0040
271	3.1828	0.0040
272	3.1869	0.0040
273	3.1909	0.0040

274	3.1949	0.0040
275	3.1989	0.0040
276	3.2029	0.0040
277	3.2068	0.0040
278	3.2108	0.0040
279	3.2148	0.0040
280	3.2187	0.0039
281	3.2226	0.0039
282	3.2266	0.0039
283	3.2305	0.0039
284	3.2344	0.0039
285	3.2383	0.0039
286	3.2422	0.0039
287	3.2461	0.0039
288	3.2500	0.0039

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0039	0.0016	0.0023
2	0.0039	0.0016	0.0023
3	0.0039	0.0016	0.0023
4	0.0039	0.0016	0.0023
5	0.0039	0.0016	0.0023
6	0.0039	0.0016	0.0023
7	0.0040	0.0016	0.0023
8	0.0040	0.0016	0.0023
9	0.0040	0.0017	0.0023
10	0.0040	0.0017	0.0023
11	0.0040	0.0017	0.0024
12	0.0040	0.0017	0.0024
13	0.0040	0.0017	0.0024
14	0.0041	0.0017	0.0024
15	0.0041	0.0017	0.0024
16	0.0041	0.0017	0.0024
17	0.0041	0.0017	0.0024
18	0.0041	0.0017	0.0024
19	0.0041	0.0017	0.0024
20	0.0041	0.0017	0.0024
21	0.0042	0.0017	0.0024
22	0.0042	0.0017	0.0024
23	0.0042	0.0017	0.0025
24	0.0042	0.0017	0.0025
25	0.0042	0.0018	0.0025
26	0.0042	0.0018	0.0025
27	0.0043	0.0018	0.0025
28	0.0043	0.0018	0.0025
29	0.0043	0.0018	0.0025
30	0.0043	0.0018	0.0025

31	0.0043	0.0018	0.0025
32	0.0043	0.0018	0.0025
33	0.0044	0.0018	0.0026
34	0.0044	0.0018	0.0026
35	0.0044	0.0018	0.0026
36	0.0044	0.0018	0.0026
37	0.0044	0.0018	0.0026
38	0.0045	0.0018	0.0026
39	0.0045	0.0019	0.0026
40	0.0045	0.0019	0.0026
41	0.0045	0.0019	0.0026
42	0.0045	0.0019	0.0027
43	0.0046	0.0019	0.0027
44	0.0046	0.0019	0.0027
45	0.0046	0.0019	0.0027
46	0.0046	0.0019	0.0027
47	0.0046	0.0019	0.0027
48	0.0047	0.0019	0.0027
49	0.0047	0.0019	0.0027
50	0.0047	0.0019	0.0028
51	0.0047	0.0020	0.0028
52	0.0047	0.0020	0.0028
53	0.0048	0.0020	0.0028
54	0.0048	0.0020	0.0028
55	0.0048	0.0020	0.0028
56	0.0048	0.0020	0.0028
57	0.0049	0.0020	0.0028
58	0.0049	0.0020	0.0029
59	0.0049	0.0020	0.0029
60	0.0049	0.0020	0.0029
61	0.0050	0.0021	0.0029
62	0.0050	0.0021	0.0029
63	0.0050	0.0021	0.0029
64	0.0050	0.0021	0.0029
65	0.0051	0.0021	0.0030
66	0.0051	0.0021	0.0030
67	0.0051	0.0021	0.0030
68	0.0051	0.0021	0.0030
69	0.0052	0.0021	0.0030
70	0.0052	0.0022	0.0030
71	0.0052	0.0022	0.0031
72	0.0052	0.0022	0.0031
73	0.0053	0.0022	0.0031
74	0.0053	0.0022	0.0031
75	0.0053	0.0022	0.0031
76	0.0054	0.0022	0.0031
77	0.0054	0.0022	0.0032
78	0.0054	0.0022	0.0032
79	0.0055	0.0023	0.0032
80	0.0055	0.0023	0.0032

81	0.0055	0.0023	0.0032
82	0.0055	0.0023	0.0032
83	0.0056	0.0023	0.0033
84	0.0056	0.0023	0.0033
85	0.0057	0.0023	0.0033
86	0.0057	0.0024	0.0033
87	0.0057	0.0024	0.0034
88	0.0058	0.0024	0.0034
89	0.0058	0.0024	0.0034
90	0.0058	0.0024	0.0034
91	0.0059	0.0024	0.0034
92	0.0059	0.0024	0.0035
93	0.0060	0.0025	0.0035
94	0.0060	0.0025	0.0035
95	0.0060	0.0025	0.0035
96	0.0061	0.0025	0.0035
97	0.0061	0.0025	0.0036
98	0.0061	0.0025	0.0036
99	0.0062	0.0026	0.0036
100	0.0062	0.0026	0.0036
101	0.0063	0.0026	0.0037
102	0.0063	0.0026	0.0037
103	0.0064	0.0026	0.0037
104	0.0064	0.0027	0.0038
105	0.0065	0.0027	0.0038
106	0.0065	0.0027	0.0038
107	0.0066	0.0027	0.0039
108	0.0066	0.0027	0.0039
109	0.0067	0.0028	0.0039
110	0.0067	0.0028	0.0039
111	0.0068	0.0028	0.0040
112	0.0068	0.0028	0.0040
113	0.0069	0.0029	0.0040
114	0.0069	0.0029	0.0041
115	0.0070	0.0029	0.0041
116	0.0071	0.0029	0.0041
117	0.0071	0.0030	0.0042
118	0.0072	0.0030	0.0042
119	0.0073	0.0030	0.0043
120	0.0073	0.0030	0.0043
121	0.0074	0.0031	0.0043
122	0.0074	0.0031	0.0044
123	0.0075	0.0031	0.0044
124	0.0076	0.0031	0.0044
125	0.0077	0.0032	0.0045
126	0.0077	0.0032	0.0045
127	0.0078	0.0032	0.0046
128	0.0079	0.0033	0.0046
129	0.0080	0.0033	0.0047
130	0.0080	0.0033	0.0047

131	0.0082	0.0034	0.0048
132	0.0082	0.0034	0.0048
133	0.0083	0.0035	0.0049
134	0.0084	0.0035	0.0049
135	0.0085	0.0035	0.0050
136	0.0086	0.0036	0.0050
137	0.0087	0.0036	0.0051
138	0.0088	0.0036	0.0052
139	0.0089	0.0037	0.0052
140	0.0090	0.0037	0.0053
141	0.0092	0.0038	0.0054
142	0.0092	0.0038	0.0054
143	0.0094	0.0039	0.0055
144	0.0095	0.0039	0.0056
145	0.0089	0.0037	0.0052
146	0.0089	0.0037	0.0052
147	0.0091	0.0038	0.0053
148	0.0092	0.0038	0.0054
149	0.0094	0.0039	0.0055
150	0.0095	0.0039	0.0056
151	0.0097	0.0040	0.0057
152	0.0098	0.0041	0.0058
153	0.0101	0.0042	0.0059
154	0.0102	0.0042	0.0060
155	0.0104	0.0043	0.0061
156	0.0105	0.0044	0.0062
157	0.0108	0.0045	0.0063
158	0.0110	0.0045	0.0064
159	0.0113	0.0047	0.0066
160	0.0114	0.0047	0.0067
161	0.0117	0.0049	0.0069
162	0.0119	0.0049	0.0070
163	0.0123	0.0051	0.0072
164	0.0125	0.0052	0.0073
165	0.0129	0.0053	0.0075
166	0.0131	0.0054	0.0077
167	0.0136	0.0056	0.0079
168	0.0138	0.0057	0.0081
169	0.0143	0.0059	0.0084
170	0.0146	0.0061	0.0086
171	0.0152	0.0063	0.0089
172	0.0156	0.0065	0.0091
173	0.0163	0.0067	0.0095
174	0.0167	0.0069	0.0098
175	0.0175	0.0073	0.0103
176	0.0180	0.0075	0.0105
177	0.0190	0.0079	0.0111
178	0.0196	0.0081	0.0115
179	0.0209	0.0087	0.0122
180	0.0216	0.0090	0.0127

181	0.0233	0.0097	0.0136
182	0.0242	0.0101	0.0142
183	0.0265	0.0110	0.0155
184	0.0278	0.0115	0.0163
185	0.0296	0.0123	0.0173
186	0.0316	0.0131	0.0185
187	0.0366	0.0152	0.0214
188	0.0400	0.0166	0.0234
189	0.0497	0.0206	0.0291
190	0.0572	0.0216	0.0356
191	0.0869	0.0216	0.0652
192	0.1261	0.0216	0.1044
193	0.5454	0.0216	0.5238
194	0.0684	0.0216	0.0467
195	0.0442	0.0183	0.0259
196	0.0339	0.0140	0.0198
197	0.0293	0.0122	0.0172
198	0.0253	0.0105	0.0148
199	0.0224	0.0093	0.0131
200	0.0202	0.0084	0.0118
201	0.0185	0.0077	0.0108
202	0.0171	0.0071	0.0100
203	0.0159	0.0066	0.0093
204	0.0149	0.0062	0.0087
205	0.0141	0.0058	0.0082
206	0.0133	0.0055	0.0078
207	0.0127	0.0052	0.0074
208	0.0121	0.0050	0.0071
209	0.0116	0.0048	0.0068
210	0.0111	0.0046	0.0065
211	0.0107	0.0044	0.0063
212	0.0103	0.0043	0.0060
213	0.0099	0.0041	0.0058
214	0.0096	0.0040	0.0056
215	0.0093	0.0039	0.0055
216	0.0090	0.0037	0.0053
217	0.0096	0.0040	0.0056
218	0.0093	0.0039	0.0055
219	0.0091	0.0038	0.0053
220	0.0089	0.0037	0.0052
221	0.0087	0.0036	0.0051
222	0.0085	0.0035	0.0050
223	0.0083	0.0034	0.0048
224	0.0081	0.0034	0.0047
225	0.0079	0.0033	0.0046
226	0.0078	0.0032	0.0046
227	0.0076	0.0032	0.0045
228	0.0075	0.0031	0.0044
229	0.0074	0.0030	0.0043
230	0.0072	0.0030	0.0042

231	0.0071	0.0029	0.0042
232	0.0070	0.0029	0.0041
233	0.0069	0.0028	0.0040
234	0.0068	0.0028	0.0040
235	0.0066	0.0028	0.0039
236	0.0065	0.0027	0.0038
237	0.0064	0.0027	0.0038
238	0.0064	0.0026	0.0037
239	0.0063	0.0026	0.0037
240	0.0062	0.0026	0.0036
241	0.0061	0.0025	0.0036
242	0.0060	0.0025	0.0035
243	0.0059	0.0025	0.0035
244	0.0059	0.0024	0.0034
245	0.0058	0.0024	0.0034
246	0.0057	0.0024	0.0033
247	0.0056	0.0023	0.0033
248	0.0056	0.0023	0.0033
249	0.0055	0.0023	0.0032
250	0.0054	0.0023	0.0032
251	0.0054	0.0022	0.0031
252	0.0053	0.0022	0.0031
253	0.0053	0.0022	0.0031
254	0.0052	0.0022	0.0030
255	0.0052	0.0021	0.0030
256	0.0051	0.0021	0.0030
257	0.0050	0.0021	0.0030
258	0.0050	0.0021	0.0029
259	0.0049	0.0020	0.0029
260	0.0049	0.0020	0.0029
261	0.0048	0.0020	0.0028
262	0.0048	0.0020	0.0028
263	0.0048	0.0020	0.0028
264	0.0047	0.0020	0.0028
265	0.0047	0.0019	0.0027
266	0.0046	0.0019	0.0027
267	0.0046	0.0019	0.0027
268	0.0045	0.0019	0.0027
269	0.0045	0.0019	0.0026
270	0.0045	0.0019	0.0026
271	0.0044	0.0018	0.0026
272	0.0044	0.0018	0.0026
273	0.0044	0.0018	0.0026
274	0.0043	0.0018	0.0025
275	0.0043	0.0018	0.0025
276	0.0043	0.0018	0.0025
277	0.0042	0.0017	0.0025
278	0.0042	0.0017	0.0025
279	0.0042	0.0017	0.0024
280	0.0041	0.0017	0.0024

281	0.0041	0.0017	0.0024
282	0.0041	0.0017	0.0024
283	0.0040	0.0017	0.0024
284	0.0040	0.0017	0.0023
285	0.0040	0.0016	0.0023
286	0.0039	0.0016	0.0023
287	0.0039	0.0016	0.0023
288	0.0039	0.0016	0.0023

 Total soil rain loss = 1.09(In)
 Total effective rainfall = 2.16(In)
 Peak flow rate in flood hydrograph = 24.14(CFS)

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 24 - H O U R S T O R M
 R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume	Ac.Ft	Q(CFS)	0	7.5	15.0	22.5	30.0
0+ 5	0.0001	0.01	Q					
0+10	0.0004	0.06	Q					
0+15	0.0014	0.14	Q					
0+20	0.0027	0.19	Q					
0+25	0.0042	0.21	Q					
0+30	0.0057	0.23	Q					
0+35	0.0074	0.24	Q					
0+40	0.0091	0.25	Q					
0+45	0.0109	0.26	Q					
0+50	0.0127	0.26	Q					
0+55	0.0145	0.27	Q					
1+ 0	0.0164	0.27	Q					
1+ 5	0.0183	0.28	Q					
1+10	0.0202	0.28	Q					
1+15	0.0222	0.28	Q					
1+20	0.0241	0.28	Q					
1+25	0.0261	0.29	Q					
1+30	0.0281	0.29	Q					
1+35	0.0301	0.29	Q					
1+40	0.0321	0.29	Q					
1+45	0.0341	0.29	Q					
1+50	0.0361	0.29	Q					
1+55	0.0381	0.29	Q					
2+ 0	0.0402	0.30	Q					
2+ 5	0.0422	0.30	Q					
2+10	0.0443	0.30	Q					
2+15	0.0463	0.30	QV					

2+20	0.0484	0.30	QV
2+25	0.0505	0.30	QV
2+30	0.0526	0.30	QV
2+35	0.0546	0.30	QV
2+40	0.0567	0.30	QV
2+45	0.0589	0.31	QV
2+50	0.0610	0.31	QV
2+55	0.0631	0.31	QV
3+ 0	0.0652	0.31	QV
3+ 5	0.0674	0.31	QV
3+10	0.0695	0.31	QV
3+15	0.0717	0.31	QV
3+20	0.0738	0.31	QV
3+25	0.0760	0.32	QV
3+30	0.0782	0.32	QV
3+35	0.0804	0.32	QV
3+40	0.0826	0.32	QV
3+45	0.0848	0.32	QV
3+50	0.0871	0.32	QV
3+55	0.0893	0.32	QV
4+ 0	0.0915	0.33	Q V
4+ 5	0.0938	0.33	Q V
4+10	0.0961	0.33	Q V
4+15	0.0983	0.33	Q V
4+20	0.1006	0.33	Q V
4+25	0.1029	0.33	Q V
4+30	0.1052	0.33	Q V
4+35	0.1075	0.34	Q V
4+40	0.1099	0.34	Q V
4+45	0.1122	0.34	Q V
4+50	0.1146	0.34	Q V
4+55	0.1169	0.34	Q V
5+ 0	0.1193	0.34	Q V
5+ 5	0.1217	0.35	Q V
5+10	0.1241	0.35	Q V
5+15	0.1265	0.35	Q V
5+20	0.1289	0.35	Q V
5+25	0.1313	0.35	Q V
5+30	0.1338	0.35	Q V
5+35	0.1362	0.36	Q V
5+40	0.1387	0.36	Q V
5+45	0.1412	0.36	Q V
5+50	0.1437	0.36	Q V
5+55	0.1462	0.36	Q V
6+ 0	0.1487	0.37	Q V
6+ 5	0.1512	0.37	Q V
6+10	0.1538	0.37	Q V
6+15	0.1564	0.37	Q V
6+20	0.1589	0.37	Q V
6+25	0.1615	0.38	Q V

6+30	0.1641	0.38	Q	V				
6+35	0.1667	0.38	Q	V				
6+40	0.1694	0.38	Q	V				
6+45	0.1720	0.38	Q	V				
6+50	0.1747	0.39	Q	V				
6+55	0.1774	0.39	Q	V				
7+ 0	0.1801	0.39	Q	V				
7+ 5	0.1828	0.39	Q	V				
7+10	0.1855	0.40	Q	V				
7+15	0.1883	0.40	Q	V				
7+20	0.1910	0.40	Q	V				
7+25	0.1938	0.40	Q	V				
7+30	0.1966	0.41	Q	V				
7+35	0.1994	0.41	Q	V				
7+40	0.2022	0.41	Q	V				
7+45	0.2051	0.41	Q	V				
7+50	0.2079	0.42	Q	V				
7+55	0.2108	0.42	Q	V				
8+ 0	0.2137	0.42	Q	V				
8+ 5	0.2166	0.42	Q	V				
8+10	0.2196	0.43	Q	V				
8+15	0.2226	0.43	Q	V				
8+20	0.2255	0.43	Q	V				
8+25	0.2285	0.44	Q	V				
8+30	0.2316	0.44	Q	V				
8+35	0.2346	0.44	Q	V				
8+40	0.2377	0.45	Q	V				
8+45	0.2408	0.45	Q	V				
8+50	0.2439	0.45	Q	V				
8+55	0.2470	0.46	Q	V				
9+ 0	0.2502	0.46	Q	V				
9+ 5	0.2533	0.46	Q	V				
9+10	0.2565	0.47	Q	V				
9+15	0.2598	0.47	Q	V				
9+20	0.2630	0.47	Q	V				
9+25	0.2663	0.48	Q	V				
9+30	0.2696	0.48	Q	V				
9+35	0.2729	0.48	Q	V				
9+40	0.2763	0.49	Q	V				
9+45	0.2797	0.49	Q	V				
9+50	0.2831	0.50	Q	V				
9+55	0.2866	0.50	Q	V				
10+ 0	0.2900	0.50	Q	V				
10+ 5	0.2935	0.51	Q	V				
10+10	0.2971	0.51	Q	V				
10+15	0.3006	0.52	Q	V				
10+20	0.3042	0.52	Q	V				
10+25	0.3079	0.53	Q	V				
10+30	0.3115	0.53	Q	V				
10+35	0.3152	0.54	Q	V				

10+40	0.3190	0.54	Q	V				
10+45	0.3228	0.55	Q	V				
10+50	0.3266	0.55	Q	V				
10+55	0.3304	0.56	Q	V				
11+ 0	0.3343	0.56	Q	V				
11+ 5	0.3382	0.57	Q	V				
11+10	0.3422	0.58	Q	V				
11+15	0.3462	0.58	Q	V				
11+20	0.3503	0.59	Q	V				
11+25	0.3544	0.60	Q	V				
11+30	0.3585	0.60	Q	V				
11+35	0.3627	0.61	Q	V				
11+40	0.3670	0.62	Q	V				
11+45	0.3713	0.62	Q	V				
11+50	0.3756	0.63	Q	V				
11+55	0.3800	0.64	Q	V				
12+ 0	0.3845	0.65	Q	V				
12+ 5	0.3890	0.65	Q	V				
12+10	0.3935	0.65	Q	V				
12+15	0.3979	0.64	Q	V				
12+20	0.4023	0.64	Q	V				
12+25	0.4068	0.65	Q	V				
12+30	0.4113	0.65	Q	V				
12+35	0.4158	0.66	Q	V				
12+40	0.4204	0.67	Q	V				
12+45	0.4251	0.68	Q	V				
12+50	0.4299	0.69	Q	V				
12+55	0.4347	0.70	Q	V				
13+ 0	0.4396	0.71	Q	V				
13+ 5	0.4445	0.72	Q	V				
13+10	0.4496	0.73	Q	V				
13+15	0.4547	0.75	Q	V				
13+20	0.4600	0.76	Q	V				
13+25	0.4653	0.78	Q	V				
13+30	0.4708	0.79	Q	V				
13+35	0.4763	0.81	Q	V				
13+40	0.4820	0.82	Q	V				
13+45	0.4878	0.84	Q	V				
13+50	0.4938	0.86	Q	V				
13+55	0.4999	0.88	Q	V				
14+ 0	0.5061	0.90	Q	V				
14+ 5	0.5125	0.93	Q	V				
14+10	0.5190	0.95	Q	V				
14+15	0.5258	0.98	Q	V				
14+20	0.5327	1.01	Q	V				
14+25	0.5398	1.04	Q	V				
14+30	0.5472	1.07	Q	V				
14+35	0.5548	1.10	Q	V				
14+40	0.5627	1.14	Q	V				
14+45	0.5708	1.18	Q	V				

14+50	0.5793	1.23	Q		V			
14+55	0.5881	1.28	Q		V			
15+ 0	0.5972	1.33	Q		V			
15+ 5	0.6069	1.40	Q		V			
15+10	0.6169	1.46	Q		V			
15+15	0.6276	1.54	Q		V			
15+20	0.6388	1.63	Q		V			
15+25	0.6508	1.74	Q		V			
15+30	0.6635	1.84	Q		V			
15+35	0.6770	1.96	Q		V			
15+40	0.6916	2.12	Q		V			
15+45	0.7078	2.35	Q		V			
15+50	0.7261	2.66	Q		V			
15+55	0.7483	3.22	Q		V			
16+ 0	0.7787	4.41	Q		V			
16+ 5	0.8344	8.09		Q	V			
16+10	0.9556	17.59				V	Q	
16+15	1.1218	24.14					V	Q
16+20	1.2218	14.51			Q		V	
16+25	1.2871	9.49		Q			V	
16+30	1.3353	7.00		Q			V	
16+35	1.3735	5.55		Q			V	
16+40	1.4046	4.51		Q			V	
16+45	1.4301	3.71	Q				V	
16+50	1.4520	3.19	Q				V	
16+55	1.4708	2.73	Q				V	
17+ 0	1.4871	2.37	Q				V	
17+ 5	1.5012	2.05	Q				V	
17+10	1.5133	1.76	Q				V	
17+15	1.5240	1.55	Q				V	
17+20	1.5342	1.49	Q				V	
17+25	1.5439	1.40	Q				V	
17+30	1.5523	1.23	Q				V	
17+35	1.5601	1.13	Q				V	
17+40	1.5663	0.89	Q				V	
17+45	1.5720	0.84	Q				V	
17+50	1.5776	0.80	Q				V	
17+55	1.5829	0.77	Q				V	
18+ 0	1.5879	0.74	Q				V	
18+ 5	1.5928	0.71	Q				V	
18+10	1.5976	0.70	Q				V	
18+15	1.6024	0.69	Q				V	
18+20	1.6071	0.68	Q				V	
18+25	1.6117	0.67	Q				V	
18+30	1.6162	0.65	Q				V	
18+35	1.6206	0.64	Q				V	
18+40	1.6249	0.62	Q				V	
18+45	1.6291	0.61	Q				V	
18+50	1.6332	0.60	Q				V	
18+55	1.6372	0.58	Q				V	

19+ 0	1.6411	0.57	Q				V
19+ 5	1.6450	0.56	Q				V
19+10	1.6488	0.55	Q				V
19+15	1.6525	0.54	Q				V
19+20	1.6562	0.53	Q				V
19+25	1.6598	0.52	Q				V
19+30	1.6633	0.51	Q				V
19+35	1.6667	0.50	Q				V
19+40	1.6701	0.49	Q				V
19+45	1.6735	0.49	Q				V
19+50	1.6768	0.48	Q				V
19+55	1.6800	0.47	Q				V
20+ 0	1.6832	0.46	Q				V
20+ 5	1.6864	0.46	Q				V
20+10	1.6895	0.45	Q				V
20+15	1.6925	0.44	Q				V
20+20	1.6955	0.44	Q				V
20+25	1.6985	0.43	Q				V
20+30	1.7014	0.43	Q				V
20+35	1.7043	0.42	Q				V
20+40	1.7072	0.41	Q				V
20+45	1.7100	0.41	Q				V
20+50	1.7128	0.40	Q				V
20+55	1.7155	0.40	Q				V
21+ 0	1.7183	0.39	Q				V
21+ 5	1.7209	0.39	Q				V
21+10	1.7236	0.39	Q				V
21+15	1.7262	0.38	Q				V
21+20	1.7288	0.38	Q				V
21+25	1.7314	0.37	Q				V
21+30	1.7339	0.37	Q				V
21+35	1.7364	0.36	Q				V
21+40	1.7389	0.36	Q				V
21+45	1.7414	0.36	Q				V
21+50	1.7438	0.35	Q				V
21+55	1.7462	0.35	Q				V
22+ 0	1.7486	0.35	Q				V
22+ 5	1.7510	0.34	Q				V
22+10	1.7533	0.34	Q				V
22+15	1.7557	0.34	Q				V
22+20	1.7580	0.33	Q				V
22+25	1.7602	0.33	Q				V
22+30	1.7625	0.33	Q				V
22+35	1.7647	0.33	Q				V
22+40	1.7669	0.32	Q				V
22+45	1.7691	0.32	Q				V
22+50	1.7713	0.32	Q				V
22+55	1.7735	0.31	Q				V
23+ 0	1.7756	0.31	Q				V
23+ 5	1.7778	0.31	Q				V

23+10	1.7799	0.31	Q				V
23+15	1.7820	0.30	Q				V
23+20	1.7840	0.30	Q				V
23+25	1.7861	0.30	Q				V
23+30	1.7882	0.30	Q				V
23+35	1.7902	0.29	Q				V
23+40	1.7922	0.29	Q				V
23+45	1.7942	0.29	Q				V
23+50	1.7962	0.29	Q				V
23+55	1.7981	0.29	Q				V
24+ 0	1.8001	0.28	Q				V
24+ 5	1.8020	0.27	Q				V
24+10	1.8035	0.22	Q				V
24+15	1.8045	0.14	Q				V
24+20	1.8051	0.09	Q				V
24+25	1.8056	0.07	Q				V
24+30	1.8059	0.05	Q				V
24+35	1.8062	0.04	Q				V
24+40	1.8064	0.03	Q				V
24+45	1.8066	0.02	Q				V
24+50	1.8067	0.02	Q				V
24+55	1.8068	0.01	Q				V
25+ 0	1.8068	0.01	Q				V
25+ 5	1.8069	0.01	Q				V
25+10	1.8069	0.01	Q				V
25+15	1.8070	0.00	Q				V
25+20	1.8070	0.00	Q				V
25+25	1.8070	0.00	Q				V
25+30	1.8070	0.00	Q				V

Unit Hydrograph Analysis

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Study date 10/26/23

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 6542

Lonely Dove Motel
Synthetic Unit Hydrograph
100 year proposed conditionss

Storm Event Year = 100

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
10.04	1	1.62

Rainfall data for year 100		
10.04	6	2.79

Rainfall data for year 100		
10.04	24	4.50

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***** Area-averaged max loss rate, Fm *****

SCS curve No.(AMCII)	SCS curve NO.(AMC 2)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
56.0	56.0	10.04	1.000	0.734	0.879	0.645

Area-averaged adjusted loss rate Fm (In/Hr) = 0.645

***** Area-Averaged low loss rate fraction, Yb *****

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
8.83	0.879	56.0	56.0	7.86	0.177
1.21	0.121	98.0	98.0	0.20	0.948

Area-averaged catchment yield fraction, Y = 0.270

Area-averaged low loss fraction, Yb = 0.730

User entry of time of concentration = 0.248 (hours)

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Watershed area = 10.04(Ac.)

Catchment Lag time = 0.198 hours

Unit interval = 5.000 minutes

Unit interval percentage of lag time = 41.9858

Hydrograph baseflow = 0.00(CFS)

Average maximum watershed loss rate(Fm) = 0.645(In/Hr)

Average low loss rate fraction (Yb) = 0.730 (decimal)

DESERT S-Graph Selected

Computed peak 5-minute rainfall = 0.769(In)

Computed peak 30-minute rainfall = 1.316(In)

Specified peak 1-hour rainfall = 1.620(In)

Computed peak 3-hour rainfall = 2.261(In)

Specified peak 6-hour rainfall = 2.790(In)

Specified peak 24-hour rainfall = 4.500(In)

Rainfall depth area reduction factors:

Using a total area of 10.04(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.768(In)

30-minute factor = 1.000 Adjusted rainfall = 1.315(In)

1-hour factor = 1.000 Adjusted rainfall = 1.619(In)

3-hour factor = 1.000 Adjusted rainfall = 2.261(In)

6-hour factor = 1.000 Adjusted rainfall = 2.790(In)

24-hour factor = 1.000 Adjusted rainfall = 4.500(In)

U n i t H y d r o g r a p h

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Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))

	(K = 121.42 (CFS))	
1	2.972	3.608
2	20.986	21.873
3	51.888	37.522
4	67.513	18.971
5	76.348	10.728
6	82.174	7.074
7	86.431	5.169
8	89.579	3.822
9	91.911	2.831
10	93.803	2.298
11	95.276	1.788
12	96.452	1.429
13	97.347	1.086
14	97.966	0.752
15	98.409	0.537
16	98.909	0.607
17	99.400	0.596
18	99.717	0.385
19	100.000	0.343

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.7683	0.7683
2	0.9459	0.1776
3	1.0683	0.1224
4	1.1646	0.0963
5	1.2452	0.0806
6	1.3152	0.0700
7	1.3775	0.0623
8	1.4338	0.0563
9	1.4854	0.0516
10	1.5330	0.0477
11	1.5775	0.0445
12	1.6192	0.0417
13	1.6591	0.0399
14	1.6969	0.0378
15	1.7328	0.0359
16	1.7671	0.0343
17	1.8000	0.0328
18	1.8315	0.0315
19	1.8618	0.0303
20	1.8910	0.0292
21	1.9193	0.0282
22	1.9466	0.0273
23	1.9731	0.0265

24	1.9987	0.0257
25	2.0237	0.0249
26	2.0479	0.0243
27	2.0715	0.0236
28	2.0946	0.0230
29	2.1170	0.0224
30	2.1389	0.0219
31	2.1603	0.0214
32	2.1813	0.0209
33	2.2017	0.0205
34	2.2218	0.0201
35	2.2415	0.0197
36	2.2607	0.0193
37	2.2796	0.0189
38	2.2981	0.0185
39	2.3163	0.0182
40	2.3342	0.0179
41	2.3517	0.0176
42	2.3690	0.0173
43	2.3860	0.0170
44	2.4027	0.0167
45	2.4191	0.0164
46	2.4353	0.0162
47	2.4512	0.0159
48	2.4669	0.0157
49	2.4824	0.0155
50	2.4977	0.0153
51	2.5127	0.0151
52	2.5276	0.0148
53	2.5422	0.0147
54	2.5567	0.0145
55	2.5710	0.0143
56	2.5851	0.0141
57	2.5990	0.0139
58	2.6127	0.0138
59	2.6263	0.0136
60	2.6398	0.0134
61	2.6530	0.0133
62	2.6662	0.0131
63	2.6791	0.0130
64	2.6920	0.0128
65	2.7047	0.0127
66	2.7172	0.0126
67	2.7296	0.0124
68	2.7419	0.0123
69	2.7541	0.0122
70	2.7662	0.0121
71	2.7781	0.0119
72	2.7899	0.0118
73	2.8032	0.0133

74	2.8164	0.0132
75	2.8295	0.0131
76	2.8424	0.0130
77	2.8553	0.0128
78	2.8680	0.0127
79	2.8806	0.0126
80	2.8931	0.0125
81	2.9056	0.0124
82	2.9179	0.0123
83	2.9301	0.0122
84	2.9422	0.0121
85	2.9543	0.0120
86	2.9662	0.0119
87	2.9781	0.0118
88	2.9898	0.0118
89	3.0015	0.0117
90	3.0131	0.0116
91	3.0246	0.0115
92	3.0360	0.0114
93	3.0473	0.0113
94	3.0586	0.0113
95	3.0698	0.0112
96	3.0809	0.0111
97	3.0919	0.0110
98	3.1029	0.0110
99	3.1137	0.0109
100	3.1246	0.0108
101	3.1353	0.0107
102	3.1460	0.0107
103	3.1566	0.0106
104	3.1671	0.0105
105	3.1776	0.0105
106	3.1880	0.0104
107	3.1983	0.0103
108	3.2086	0.0103
109	3.2188	0.0102
110	3.2290	0.0102
111	3.2391	0.0101
112	3.2491	0.0100
113	3.2591	0.0100
114	3.2690	0.0099
115	3.2788	0.0099
116	3.2886	0.0098
117	3.2984	0.0097
118	3.3081	0.0097
119	3.3177	0.0096
120	3.3273	0.0096
121	3.3368	0.0095
122	3.3463	0.0095
123	3.3558	0.0094

124	3.3651	0.0094
125	3.3745	0.0093
126	3.3838	0.0093
127	3.3930	0.0092
128	3.4022	0.0092
129	3.4113	0.0091
130	3.4204	0.0091
131	3.4295	0.0091
132	3.4385	0.0090
133	3.4475	0.0090
134	3.4564	0.0089
135	3.4652	0.0089
136	3.4741	0.0088
137	3.4829	0.0088
138	3.4916	0.0087
139	3.5003	0.0087
140	3.5090	0.0087
141	3.5176	0.0086
142	3.5262	0.0086
143	3.5347	0.0085
144	3.5432	0.0085
145	3.5517	0.0085
146	3.5601	0.0084
147	3.5685	0.0084
148	3.5769	0.0084
149	3.5852	0.0083
150	3.5935	0.0083
151	3.6017	0.0082
152	3.6099	0.0082
153	3.6181	0.0082
154	3.6262	0.0081
155	3.6343	0.0081
156	3.6424	0.0081
157	3.6504	0.0080
158	3.6584	0.0080
159	3.6664	0.0080
160	3.6743	0.0079
161	3.6822	0.0079
162	3.6901	0.0079
163	3.6979	0.0078
164	3.7057	0.0078
165	3.7135	0.0078
166	3.7213	0.0077
167	3.7290	0.0077
168	3.7367	0.0077
169	3.7443	0.0077
170	3.7520	0.0076
171	3.7595	0.0076
172	3.7671	0.0076
173	3.7747	0.0075

174	3.7822	0.0075
175	3.7896	0.0075
176	3.7971	0.0075
177	3.8045	0.0074
178	3.8119	0.0074
179	3.8193	0.0074
180	3.8266	0.0073
181	3.8340	0.0073
182	3.8412	0.0073
183	3.8485	0.0073
184	3.8558	0.0072
185	3.8630	0.0072
186	3.8702	0.0072
187	3.8773	0.0072
188	3.8845	0.0071
189	3.8916	0.0071
190	3.8987	0.0071
191	3.9057	0.0071
192	3.9128	0.0070
193	3.9198	0.0070
194	3.9268	0.0070
195	3.9337	0.0070
196	3.9407	0.0069
197	3.9476	0.0069
198	3.9545	0.0069
199	3.9614	0.0069
200	3.9682	0.0069
201	3.9751	0.0068
202	3.9819	0.0068
203	3.9887	0.0068
204	3.9954	0.0068
205	4.0022	0.0067
206	4.0089	0.0067
207	4.0156	0.0067
208	4.0223	0.0067
209	4.0289	0.0067
210	4.0356	0.0066
211	4.0422	0.0066
212	4.0488	0.0066
213	4.0553	0.0066
214	4.0619	0.0066
215	4.0684	0.0065
216	4.0750	0.0065
217	4.0815	0.0065
218	4.0879	0.0065
219	4.0944	0.0065
220	4.1008	0.0064
221	4.1072	0.0064
222	4.1136	0.0064
223	4.1200	0.0064

224	4.1264	0.0064
225	4.1327	0.0063
226	4.1390	0.0063
227	4.1454	0.0063
228	4.1516	0.0063
229	4.1579	0.0063
230	4.1642	0.0063
231	4.1704	0.0062
232	4.1766	0.0062
233	4.1828	0.0062
234	4.1890	0.0062
235	4.1952	0.0062
236	4.2013	0.0061
237	4.2074	0.0061
238	4.2136	0.0061
239	4.2197	0.0061
240	4.2257	0.0061
241	4.2318	0.0061
242	4.2378	0.0060
243	4.2439	0.0060
244	4.2499	0.0060
245	4.2559	0.0060
246	4.2619	0.0060
247	4.2678	0.0060
248	4.2738	0.0060
249	4.2797	0.0059
250	4.2856	0.0059
251	4.2915	0.0059
252	4.2974	0.0059
253	4.3033	0.0059
254	4.3092	0.0059
255	4.3150	0.0058
256	4.3208	0.0058
257	4.3266	0.0058
258	4.3324	0.0058
259	4.3382	0.0058
260	4.3440	0.0058
261	4.3498	0.0058
262	4.3555	0.0057
263	4.3612	0.0057
264	4.3669	0.0057
265	4.3726	0.0057
266	4.3783	0.0057
267	4.3840	0.0057
268	4.3896	0.0057
269	4.3953	0.0056
270	4.4009	0.0056
271	4.4065	0.0056
272	4.4121	0.0056
273	4.4177	0.0056

274	4.4233	0.0056
275	4.4288	0.0056
276	4.4344	0.0055
277	4.4399	0.0055
278	4.4454	0.0055
279	4.4509	0.0055
280	4.4564	0.0055
281	4.4619	0.0055
282	4.4674	0.0055
283	4.4728	0.0055
284	4.4783	0.0054
285	4.4837	0.0054
286	4.4891	0.0054
287	4.4945	0.0054
288	4.4999	0.0054

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0054	0.0039	0.0015
2	0.0054	0.0039	0.0015
3	0.0054	0.0040	0.0015
4	0.0054	0.0040	0.0015
5	0.0055	0.0040	0.0015
6	0.0055	0.0040	0.0015
7	0.0055	0.0040	0.0015
8	0.0055	0.0040	0.0015
9	0.0055	0.0040	0.0015
10	0.0056	0.0041	0.0015
11	0.0056	0.0041	0.0015
12	0.0056	0.0041	0.0015
13	0.0056	0.0041	0.0015
14	0.0056	0.0041	0.0015
15	0.0057	0.0041	0.0015
16	0.0057	0.0041	0.0015
17	0.0057	0.0042	0.0015
18	0.0057	0.0042	0.0015
19	0.0058	0.0042	0.0016
20	0.0058	0.0042	0.0016
21	0.0058	0.0042	0.0016
22	0.0058	0.0042	0.0016
23	0.0058	0.0043	0.0016
24	0.0059	0.0043	0.0016
25	0.0059	0.0043	0.0016
26	0.0059	0.0043	0.0016
27	0.0059	0.0043	0.0016
28	0.0060	0.0043	0.0016
29	0.0060	0.0044	0.0016
30	0.0060	0.0044	0.0016

31	0.0060	0.0044	0.0016
32	0.0060	0.0044	0.0016
33	0.0061	0.0044	0.0016
34	0.0061	0.0045	0.0016
35	0.0061	0.0045	0.0017
36	0.0061	0.0045	0.0017
37	0.0062	0.0045	0.0017
38	0.0062	0.0045	0.0017
39	0.0062	0.0046	0.0017
40	0.0063	0.0046	0.0017
41	0.0063	0.0046	0.0017
42	0.0063	0.0046	0.0017
43	0.0063	0.0046	0.0017
44	0.0064	0.0046	0.0017
45	0.0064	0.0047	0.0017
46	0.0064	0.0047	0.0017
47	0.0065	0.0047	0.0017
48	0.0065	0.0047	0.0017
49	0.0065	0.0048	0.0018
50	0.0065	0.0048	0.0018
51	0.0066	0.0048	0.0018
52	0.0066	0.0048	0.0018
53	0.0066	0.0048	0.0018
54	0.0067	0.0049	0.0018
55	0.0067	0.0049	0.0018
56	0.0067	0.0049	0.0018
57	0.0068	0.0049	0.0018
58	0.0068	0.0050	0.0018
59	0.0068	0.0050	0.0018
60	0.0069	0.0050	0.0019
61	0.0069	0.0050	0.0019
62	0.0069	0.0051	0.0019
63	0.0070	0.0051	0.0019
64	0.0070	0.0051	0.0019
65	0.0070	0.0051	0.0019
66	0.0071	0.0052	0.0019
67	0.0071	0.0052	0.0019
68	0.0071	0.0052	0.0019
69	0.0072	0.0052	0.0019
70	0.0072	0.0053	0.0019
71	0.0073	0.0053	0.0020
72	0.0073	0.0053	0.0020
73	0.0073	0.0054	0.0020
74	0.0074	0.0054	0.0020
75	0.0074	0.0054	0.0020
76	0.0075	0.0054	0.0020
77	0.0075	0.0055	0.0020
78	0.0075	0.0055	0.0020
79	0.0076	0.0055	0.0021
80	0.0076	0.0056	0.0021

81	0.0077	0.0056	0.0021
82	0.0077	0.0056	0.0021
83	0.0078	0.0057	0.0021
84	0.0078	0.0057	0.0021
85	0.0079	0.0057	0.0021
86	0.0079	0.0058	0.0021
87	0.0080	0.0058	0.0022
88	0.0080	0.0058	0.0022
89	0.0081	0.0059	0.0022
90	0.0081	0.0059	0.0022
91	0.0082	0.0060	0.0022
92	0.0082	0.0060	0.0022
93	0.0083	0.0060	0.0022
94	0.0083	0.0061	0.0022
95	0.0084	0.0061	0.0023
96	0.0084	0.0062	0.0023
97	0.0085	0.0062	0.0023
98	0.0085	0.0062	0.0023
99	0.0086	0.0063	0.0023
100	0.0087	0.0063	0.0023
101	0.0087	0.0064	0.0024
102	0.0088	0.0064	0.0024
103	0.0089	0.0065	0.0024
104	0.0089	0.0065	0.0024
105	0.0090	0.0066	0.0024
106	0.0091	0.0066	0.0024
107	0.0091	0.0067	0.0025
108	0.0092	0.0067	0.0025
109	0.0093	0.0068	0.0025
110	0.0093	0.0068	0.0025
111	0.0094	0.0069	0.0025
112	0.0095	0.0069	0.0026
113	0.0096	0.0070	0.0026
114	0.0096	0.0070	0.0026
115	0.0097	0.0071	0.0026
116	0.0098	0.0072	0.0026
117	0.0099	0.0072	0.0027
118	0.0100	0.0073	0.0027
119	0.0101	0.0074	0.0027
120	0.0102	0.0074	0.0027
121	0.0103	0.0075	0.0028
122	0.0103	0.0075	0.0028
123	0.0105	0.0076	0.0028
124	0.0105	0.0077	0.0028
125	0.0107	0.0078	0.0029
126	0.0107	0.0078	0.0029
127	0.0109	0.0079	0.0029
128	0.0110	0.0080	0.0030
129	0.0111	0.0081	0.0030
130	0.0112	0.0082	0.0030

131	0.0113	0.0083	0.0031
132	0.0114	0.0083	0.0031
133	0.0116	0.0085	0.0031
134	0.0117	0.0085	0.0032
135	0.0118	0.0086	0.0032
136	0.0119	0.0087	0.0032
137	0.0121	0.0089	0.0033
138	0.0122	0.0089	0.0033
139	0.0124	0.0091	0.0034
140	0.0125	0.0091	0.0034
141	0.0127	0.0093	0.0034
142	0.0128	0.0094	0.0035
143	0.0131	0.0095	0.0035
144	0.0132	0.0096	0.0036
145	0.0118	0.0086	0.0032
146	0.0119	0.0087	0.0032
147	0.0122	0.0089	0.0033
148	0.0123	0.0090	0.0033
149	0.0126	0.0092	0.0034
150	0.0127	0.0093	0.0034
151	0.0130	0.0095	0.0035
152	0.0131	0.0096	0.0035
153	0.0134	0.0098	0.0036
154	0.0136	0.0099	0.0037
155	0.0139	0.0102	0.0038
156	0.0141	0.0103	0.0038
157	0.0145	0.0106	0.0039
158	0.0147	0.0107	0.0040
159	0.0151	0.0110	0.0041
160	0.0153	0.0111	0.0041
161	0.0157	0.0115	0.0042
162	0.0159	0.0116	0.0043
163	0.0164	0.0120	0.0044
164	0.0167	0.0122	0.0045
165	0.0173	0.0126	0.0047
166	0.0176	0.0128	0.0047
167	0.0182	0.0133	0.0049
168	0.0185	0.0135	0.0050
169	0.0193	0.0141	0.0052
170	0.0197	0.0143	0.0053
171	0.0205	0.0150	0.0055
172	0.0209	0.0153	0.0057
173	0.0219	0.0160	0.0059
174	0.0224	0.0164	0.0061
175	0.0236	0.0172	0.0064
176	0.0243	0.0177	0.0065
177	0.0257	0.0187	0.0069
178	0.0265	0.0193	0.0071
179	0.0282	0.0206	0.0076
180	0.0292	0.0213	0.0079

181	0.0315	0.0230	0.0085
182	0.0328	0.0240	0.0089
183	0.0359	0.0262	0.0097
184	0.0378	0.0276	0.0102
185	0.0417	0.0305	0.0113
186	0.0445	0.0325	0.0120
187	0.0516	0.0376	0.0139
188	0.0563	0.0411	0.0152
189	0.0700	0.0511	0.0189
190	0.0806	0.0538	0.0269
191	0.1224	0.0538	0.0686
192	0.1776	0.0538	0.1238
193	0.7683	0.0538	0.7146
194	0.0963	0.0538	0.0425
195	0.0623	0.0454	0.0168
196	0.0477	0.0348	0.0129
197	0.0399	0.0291	0.0108
198	0.0343	0.0250	0.0093
199	0.0303	0.0221	0.0082
200	0.0273	0.0199	0.0074
201	0.0249	0.0182	0.0067
202	0.0230	0.0168	0.0062
203	0.0214	0.0156	0.0058
204	0.0201	0.0146	0.0054
205	0.0189	0.0138	0.0051
206	0.0179	0.0130	0.0048
207	0.0170	0.0124	0.0046
208	0.0162	0.0118	0.0044
209	0.0155	0.0113	0.0042
210	0.0148	0.0108	0.0040
211	0.0143	0.0104	0.0039
212	0.0138	0.0100	0.0037
213	0.0133	0.0097	0.0036
214	0.0128	0.0094	0.0035
215	0.0124	0.0091	0.0034
216	0.0121	0.0088	0.0033
217	0.0133	0.0097	0.0036
218	0.0130	0.0095	0.0035
219	0.0126	0.0092	0.0034
220	0.0123	0.0090	0.0033
221	0.0120	0.0088	0.0032
222	0.0118	0.0086	0.0032
223	0.0115	0.0084	0.0031
224	0.0113	0.0082	0.0030
225	0.0110	0.0081	0.0030
226	0.0108	0.0079	0.0029
227	0.0106	0.0077	0.0029
228	0.0104	0.0076	0.0028
229	0.0102	0.0075	0.0028
230	0.0100	0.0073	0.0027

231	0.0099	0.0072	0.0027
232	0.0097	0.0071	0.0026
233	0.0095	0.0070	0.0026
234	0.0094	0.0069	0.0025
235	0.0092	0.0067	0.0025
236	0.0091	0.0066	0.0025
237	0.0090	0.0065	0.0024
238	0.0088	0.0064	0.0024
239	0.0087	0.0064	0.0024
240	0.0086	0.0063	0.0023
241	0.0085	0.0062	0.0023
242	0.0084	0.0061	0.0023
243	0.0082	0.0060	0.0022
244	0.0081	0.0059	0.0022
245	0.0080	0.0059	0.0022
246	0.0079	0.0058	0.0021
247	0.0078	0.0057	0.0021
248	0.0077	0.0057	0.0021
249	0.0077	0.0056	0.0021
250	0.0076	0.0055	0.0020
251	0.0075	0.0055	0.0020
252	0.0074	0.0054	0.0020
253	0.0073	0.0053	0.0020
254	0.0072	0.0053	0.0020
255	0.0072	0.0052	0.0019
256	0.0071	0.0052	0.0019
257	0.0070	0.0051	0.0019
258	0.0069	0.0051	0.0019
259	0.0069	0.0050	0.0019
260	0.0068	0.0050	0.0018
261	0.0067	0.0049	0.0018
262	0.0067	0.0049	0.0018
263	0.0066	0.0048	0.0018
264	0.0066	0.0048	0.0018
265	0.0065	0.0047	0.0018
266	0.0064	0.0047	0.0017
267	0.0064	0.0047	0.0017
268	0.0063	0.0046	0.0017
269	0.0063	0.0046	0.0017
270	0.0062	0.0045	0.0017
271	0.0062	0.0045	0.0017
272	0.0061	0.0045	0.0017
273	0.0061	0.0044	0.0016
274	0.0060	0.0044	0.0016
275	0.0060	0.0044	0.0016
276	0.0059	0.0043	0.0016
277	0.0059	0.0043	0.0016
278	0.0058	0.0043	0.0016
279	0.0058	0.0042	0.0016
280	0.0057	0.0042	0.0015

281	0.0057	0.0042	0.0015
282	0.0057	0.0041	0.0015
283	0.0056	0.0041	0.0015
284	0.0056	0.0041	0.0015
285	0.0055	0.0040	0.0015
286	0.0055	0.0040	0.0015
287	0.0055	0.0040	0.0015
288	0.0054	0.0040	0.0015

 Total soil rain loss = 2.64(In)
 Total effective rainfall = 1.86(In)
 Peak flow rate in flood hydrograph = 31.37(CFS)

+++++

24 - H O U R S T O R M
 R u n o f f H y d r o g r a p h

 Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume	Ac.Ft	Q(CFS)	0	10.0	20.0	30.0	40.0
0+ 5	0.0000	0.01	Q					
0+10	0.0003	0.04	Q					
0+15	0.0009	0.09	Q					
0+20	0.0017	0.12	Q					
0+25	0.0027	0.14	Q					
0+30	0.0037	0.15	Q					
0+35	0.0048	0.15	Q					
0+40	0.0059	0.16	Q					
0+45	0.0070	0.17	Q					
0+50	0.0082	0.17	Q					
0+55	0.0094	0.17	Q					
1+ 0	0.0106	0.18	Q					
1+ 5	0.0118	0.18	Q					
1+10	0.0130	0.18	Q					
1+15	0.0143	0.18	Q					
1+20	0.0155	0.18	Q					
1+25	0.0168	0.18	Q					
1+30	0.0181	0.18	Q					
1+35	0.0193	0.19	Q					
1+40	0.0206	0.19	Q					
1+45	0.0219	0.19	Q					
1+50	0.0232	0.19	Q					
1+55	0.0245	0.19	Q					
2+ 0	0.0258	0.19	Q					
2+ 5	0.0271	0.19	Q					
2+10	0.0284	0.19	Q					
2+15	0.0298	0.19	Q					

2+20	0.0311	0.19	Q				
2+25	0.0324	0.19	Q				
2+30	0.0338	0.19	Q				
2+35	0.0351	0.19	Q				
2+40	0.0364	0.20	Q				
2+45	0.0378	0.20	Q				
2+50	0.0392	0.20	QV				
2+55	0.0405	0.20	QV				
3+ 0	0.0419	0.20	QV				
3+ 5	0.0433	0.20	QV				
3+10	0.0446	0.20	QV				
3+15	0.0460	0.20	QV				
3+20	0.0474	0.20	QV				
3+25	0.0488	0.20	QV				
3+30	0.0502	0.20	QV				
3+35	0.0516	0.20	QV				
3+40	0.0531	0.21	QV				
3+45	0.0545	0.21	QV				
3+50	0.0559	0.21	QV				
3+55	0.0573	0.21	QV				
4+ 0	0.0588	0.21	QV				
4+ 5	0.0602	0.21	QV				
4+10	0.0617	0.21	QV				
4+15	0.0631	0.21	QV				
4+20	0.0646	0.21	QV				
4+25	0.0661	0.21	QV				
4+30	0.0676	0.21	QV				
4+35	0.0690	0.22	QV				
4+40	0.0705	0.22	QV				
4+45	0.0720	0.22	QV				
4+50	0.0735	0.22	QV				
4+55	0.0751	0.22	QV				
5+ 0	0.0766	0.22	QV				
5+ 5	0.0781	0.22	Q V				
5+10	0.0797	0.22	Q V				
5+15	0.0812	0.22	Q V				
5+20	0.0828	0.23	Q V				
5+25	0.0843	0.23	Q V				
5+30	0.0859	0.23	Q V				
5+35	0.0875	0.23	Q V				
5+40	0.0890	0.23	Q V				
5+45	0.0906	0.23	Q V				
5+50	0.0922	0.23	Q V				
5+55	0.0938	0.23	Q V				
6+ 0	0.0955	0.23	Q V				
6+ 5	0.0971	0.24	Q V				
6+10	0.0987	0.24	Q V				
6+15	0.1004	0.24	Q V				
6+20	0.1020	0.24	Q V				
6+25	0.1037	0.24	Q V				

6+30	0.1053	0.24	Q	V
6+35	0.1070	0.24	Q	V
6+40	0.1087	0.25	Q	V
6+45	0.1104	0.25	Q	V
6+50	0.1121	0.25	Q	V
6+55	0.1138	0.25	Q	V
7+ 0	0.1156	0.25	Q	V
7+ 5	0.1173	0.25	Q	V
7+10	0.1191	0.25	Q	V
7+15	0.1208	0.26	Q	V
7+20	0.1226	0.26	Q	V
7+25	0.1244	0.26	Q	V
7+30	0.1262	0.26	Q	V
7+35	0.1280	0.26	Q	V
7+40	0.1298	0.26	Q	V
7+45	0.1316	0.27	Q	V
7+50	0.1334	0.27	Q	V
7+55	0.1353	0.27	Q	V
8+ 0	0.1372	0.27	Q	V
8+ 5	0.1390	0.27	Q	V
8+10	0.1409	0.27	Q	V
8+15	0.1428	0.28	Q	V
8+20	0.1447	0.28	Q	V
8+25	0.1467	0.28	Q	V
8+30	0.1486	0.28	Q	V
8+35	0.1505	0.28	Q	V
8+40	0.1525	0.29	Q	V
8+45	0.1545	0.29	Q	V
8+50	0.1565	0.29	Q	V
8+55	0.1585	0.29	Q	V
9+ 0	0.1605	0.29	Q	V
9+ 5	0.1626	0.30	Q	V
9+10	0.1646	0.30	Q	V
9+15	0.1667	0.30	Q	V
9+20	0.1688	0.30	Q	V
9+25	0.1709	0.31	Q	V
9+30	0.1730	0.31	Q	V
9+35	0.1751	0.31	Q	V
9+40	0.1773	0.31	Q	V
9+45	0.1794	0.32	Q	V
9+50	0.1816	0.32	Q	V
9+55	0.1838	0.32	Q	V
10+ 0	0.1861	0.32	Q	V
10+ 5	0.1883	0.33	Q	V
10+10	0.1906	0.33	Q	V
10+15	0.1929	0.33	Q	V
10+20	0.1952	0.34	Q	V
10+25	0.1975	0.34	Q	V
10+30	0.1999	0.34	Q	V
10+35	0.2022	0.34	Q	V

10+40	0.2046	0.35	Q	V				
10+45	0.2070	0.35	Q	V				
10+50	0.2095	0.35	Q	V				
10+55	0.2120	0.36	Q	V				
11+ 0	0.2145	0.36	Q	V				
11+ 5	0.2170	0.37	Q	V				
11+10	0.2195	0.37	Q	V				
11+15	0.2221	0.37	Q	V				
11+20	0.2247	0.38	Q	V				
11+25	0.2273	0.38	Q	V				
11+30	0.2300	0.39	Q	V				
11+35	0.2327	0.39	Q	V				
11+40	0.2354	0.39	Q	V				
11+45	0.2381	0.40	Q	V				
11+50	0.2409	0.40	Q	V				
11+55	0.2437	0.41	Q	V				
12+ 0	0.2466	0.41	Q	V				
12+ 5	0.2495	0.42	Q	V				
12+10	0.2523	0.41	Q	V				
12+15	0.2551	0.40	Q	V				
12+20	0.2579	0.40	Q	V				
12+25	0.2606	0.40	Q	V				
12+30	0.2634	0.40	Q	V				
12+35	0.2662	0.41	Q	V				
12+40	0.2691	0.41	Q	V				
12+45	0.2720	0.42	Q	V				
12+50	0.2749	0.42	Q	V				
12+55	0.2779	0.43	Q	V				
13+ 0	0.2809	0.44	Q	V				
13+ 5	0.2840	0.45	Q	V				
13+10	0.2871	0.45	Q	V				
13+15	0.2903	0.46	Q	V				
13+20	0.2935	0.47	Q	V				
13+25	0.2968	0.48	Q	V				
13+30	0.3002	0.49	Q	V				
13+35	0.3036	0.50	Q	V				
13+40	0.3071	0.51	Q	V				
13+45	0.3107	0.52	Q	V				
13+50	0.3144	0.53	Q	V				
13+55	0.3181	0.55	Q	V				
14+ 0	0.3220	0.56	Q	V				
14+ 5	0.3259	0.57	Q	V				
14+10	0.3300	0.59	Q	V				
14+15	0.3342	0.61	Q	V				
14+20	0.3385	0.62	Q	V				
14+25	0.3429	0.64	Q	V				
14+30	0.3474	0.66	Q	V				
14+35	0.3522	0.69	Q	V				
14+40	0.3570	0.71	Q	V				
14+45	0.3621	0.74	Q	V				

14+50	0.3674	0.76	Q	V					
14+55	0.3728	0.80	Q	V					
15+ 0	0.3786	0.83	Q	V					
15+ 5	0.3846	0.87	Q	V					
15+10	0.3908	0.91	Q	V					
15+15	0.3975	0.96	Q	V					
15+20	0.4045	1.02	Q	V					
15+25	0.4120	1.09	Q	V					
15+30	0.4200	1.16	Q	V					
15+35	0.4287	1.25	Q	V					
15+40	0.4381	1.37	Q	V					
15+45	0.4486	1.52	Q	V					
15+50	0.4606	1.74	Q	V					
15+55	0.4762	2.27	Q	V					
16+ 0	0.5023	3.79	Q	V					
16+ 5	0.5637	8.92		Q	V				
16+10	0.7180	22.41			V	Q			
16+15	0.9341	31.37				V		Q	
16+20	1.0563	17.74			Q		V		
16+25	1.1316	10.93		Q			V		
16+30	1.1846	7.69		Q			V		
16+35	1.2251	5.89		Q			V		
16+40	1.2568	4.60		Q			V		
16+45	1.2820	3.65		Q			V		
16+50	1.3031	3.06		Q			V		
16+55	1.3206	2.54		Q			V		
17+ 0	1.3353	2.14		Q			V		
17+ 5	1.3474	1.77	Q				V		
17+10	1.3574	1.44	Q				V		
17+15	1.3659	1.23	Q				V		
17+20	1.3743	1.22	Q				V		
17+25	1.3821	1.14	Q				V		
17+30	1.3885	0.93	Q				V		
17+35	1.3942	0.83	Q				V		
17+40	1.3980	0.55	Q				V		
17+45	1.4016	0.52	Q				V		
17+50	1.4050	0.49	Q				V		
17+55	1.4083	0.47	Q				V		
18+ 0	1.4114	0.45	Q				V		
18+ 5	1.4144	0.44	Q				V		
18+10	1.4174	0.43	Q				V		
18+15	1.4204	0.44	Q				V		
18+20	1.4233	0.43	Q				V		
18+25	1.4263	0.42	Q				V		
18+30	1.4291	0.41	Q				V		
18+35	1.4319	0.41	Q				V		
18+40	1.4346	0.40	Q				V		
18+45	1.4373	0.39	Q				V		
18+50	1.4399	0.38	Q				V		
18+55	1.4425	0.37	Q				V		

19+ 0	1.4450	0.37	Q				V
19+ 5	1.4475	0.36	Q				V
19+10	1.4499	0.35	Q				V
19+15	1.4523	0.35	Q				V
19+20	1.4546	0.34	Q				V
19+25	1.4569	0.33	Q				V
19+30	1.4592	0.33	Q				V
19+35	1.4614	0.32	Q				V
19+40	1.4636	0.32	Q				V
19+45	1.4657	0.31	Q				V
19+50	1.4678	0.31	Q				V
19+55	1.4699	0.30	Q				V
20+ 0	1.4720	0.30	Q				V
20+ 5	1.4740	0.29	Q				V
20+10	1.4760	0.29	Q				V
20+15	1.4779	0.28	Q				V
20+20	1.4799	0.28	Q				V
20+25	1.4818	0.28	Q				V
20+30	1.4836	0.27	Q				V
20+35	1.4855	0.27	Q				V
20+40	1.4873	0.27	Q				V
20+45	1.4891	0.26	Q				V
20+50	1.4909	0.26	Q				V
20+55	1.4927	0.26	Q				V
21+ 0	1.4944	0.25	Q				V
21+ 5	1.4961	0.25	Q				V
21+10	1.4978	0.25	Q				V
21+15	1.4995	0.24	Q				V
21+20	1.5012	0.24	Q				V
21+25	1.5028	0.24	Q				V
21+30	1.5045	0.24	Q				V
21+35	1.5061	0.23	Q				V
21+40	1.5077	0.23	Q				V
21+45	1.5092	0.23	Q				V
21+50	1.5108	0.23	Q				V
21+55	1.5124	0.22	Q				V
22+ 0	1.5139	0.22	Q				V
22+ 5	1.5154	0.22	Q				V
22+10	1.5169	0.22	Q				V
22+15	1.5184	0.22	Q				V
22+20	1.5199	0.21	Q				V
22+25	1.5213	0.21	Q				V
22+30	1.5228	0.21	Q				V
22+35	1.5242	0.21	Q				V
22+40	1.5256	0.21	Q				V
22+45	1.5271	0.20	Q				V
22+50	1.5285	0.20	Q				V
22+55	1.5298	0.20	Q				V
23+ 0	1.5312	0.20	Q				V
23+ 5	1.5326	0.20	Q				V

23+10	1.5339	0.20	Q				V
23+15	1.5353	0.20	Q				V
23+20	1.5366	0.19	Q				V
23+25	1.5379	0.19	Q				V
23+30	1.5392	0.19	Q				V
23+35	1.5406	0.19	Q				V
23+40	1.5418	0.19	Q				V
23+45	1.5431	0.19	Q				V
23+50	1.5444	0.18	Q				V
23+55	1.5457	0.18	Q				V
24+ 0	1.5469	0.18	Q				V
24+ 5	1.5481	0.18	Q				V
24+10	1.5491	0.14	Q				V
24+15	1.5497	0.09	Q				V
24+20	1.5501	0.06	Q				V
24+25	1.5504	0.04	Q				V
24+30	1.5506	0.03	Q				V
24+35	1.5508	0.02	Q				V
24+40	1.5509	0.02	Q				V
24+45	1.5510	0.01	Q				V
24+50	1.5511	0.01	Q				V
24+55	1.5512	0.01	Q				V
25+ 0	1.5512	0.01	Q				V
25+ 5	1.5512	0.00	Q				V
25+10	1.5513	0.00	Q				V
25+15	1.5513	0.00	Q				V
25+20	1.5513	0.00	Q				V
25+25	1.5513	0.00	Q				V
25+30	1.5513	0.00	Q				V

APPENDIX E
Soils report



Sladden Engineering

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February 13, 2023
(Revised April 4, 2023)

Project No. 544-22395
22-12-724

1.0 DESCRIPTION OF SITE AND PROPOSAL

1.1 Mr. Rod Rigole
504½ Marguerite Avenue
Corona Del Mar, California 92625

Project: Proposed Lonely Dove Motel Renovation and Expansion
SEC Wamego Trail and Desideria Road
APNs: 0629-282-03 & 06 (Parcel Merger in Process)
Landers Area
San Bernardino County, California

Subject: Revised Percolation Testing for Onsite Sewage Disposal Feasibility

Sladden Engineering (Sladden) is pleased to submit our Revised Percolation Testing for Onsite Sewage Disposal Feasibility Report to address San Bernardino County Department of Environmental Health, Onsite Wastewater Treatment Systems (OWTS) review comments. The San Bernardino County Department of Environmental Health OWTS comments are attached to this report as Appendix F.

1.2. Location:

The project site is located on the northeast corner of Wamego Trail and Desideria Drive in the Landers area of San Bernardino County, California. The project site consists of two (2) parcels that are formally identified by the County of San Bernardino County as APNs 0629-282-03 and 0629-282-06. **A parcel merger is currently in progress to join the two individual parcels into a single parcel.** The subject property occupies a total area of approximately 10 acres and is currently zoned for commercial (HV/SD-COM) usage. At the time of our investigation, APN 0629-282-03 was occupied by an existing 8-room motel with unpaved dirt parking areas and a caretaker's residence with a detached storage structure. Generally, APN 0629-282-06 remains undeveloped and covered by scattered natural desert vegetation. The subject property is near the elevation of the adjacent properties and roadways. The site is located at approximately 34.2757 degrees north latitude and 116.4475 degrees west longitude (Figure 1). The subject property is bounded by Desideria Road on the north, by Wamego Trail on the west, by an undeveloped parcel on the east and by New Dixie Mine Road on the south.

1.3 Proposed Development:

- a) It is our understanding that the proposed project will consist of renovating and expanding the existing onsite motel. The motel renovation and expansion will include a new swimming pool and spa area, new changing rooms, restrooms, a communal fire pit and patio area. A new restaurant, 12 new Quonset Huts and 1 new storage Quonset Hut are also proposed for the project. In addition, new glamping tent areas, a mini-golf area, a new guard shack and paved uncovered and covered parking areas are proposed for the project. Concrete flatwork, landscape areas and various associated site improvements are also anticipated. The buildings will be serviced by private on-site sewage disposal systems consisting of septic tanks and leach lines.

1.4 Description of Site and Surroundings:

- a) The subject parcel is relatively level with no discernable surface gradients. The project site is located at an elevation of approximately 3,425 feet above mean sea level (MSL)¹.
- b) No natural ponding of water or surface seeps were observed at or near the site during our investigation conducted on October 5, 2022. Site drainage appears to be controlled via sheet flow and surface infiltration. No "blue line" streams or significant drainage courses were identified on the project site. The closest "blue line" stream is located approximately 1,050 feet to the southeast of the subject site.
- c) It is assumed that the properties within the vicinity of the project site are utilizing individual on-site sewage disposal systems consisting of septic tanks and leach lines or seepage pits.
- d) At the time of our investigation no wells were identified on the property. The property is serviced by the "Bighorn Desert View Water Agency".
- e) No bedrock outcrops were observed on the subject property or in the immediate site vicinity.
- f) Bedrock was not encountered within the exploratory boreholes and test holes excavated to a maximum depth of approximately 15 feet bgs.
- g) Groundwater was not encountered within our exploratory boreholes or test holes that extended to a maximum explored depth of approximately 15 feet bgs. Information regarding the approximate depth to groundwater provided by the California Department of Water Resources² online database suggests that the groundwater should be in excess of 100 feet below the existing ground surface in the vicinity of the site.
- a) Site geologic features are not expected to have a significant impact on sewage disposal system design.
- b) It appears that there will be sufficient area for the on-site sewage disposal system and the required expansion area on the subject site.

¹ United States Geological Survey (USGS), 2018, Landers Quadrangle, California-San Bernardino County, 7.5 Minute Series.

² California Department of Water Resources, 2023, Water Data Library; available at: <https://wdl.water.ca.gov/waterdatalibrary/>

2.0 EQUIPMENT

- a) Two (2) exploratory boreholes and eight (8) test holes were excavated on the subject property using a track mounted John Deere 30 excavator equipped with a 24-inch-wide bucket and an 8-inch outside diameter solid stem augers attachment.
- b) Tools used during testing consisted of a water level measuring device, a multi-timer application and a 500-gallon truck mounted water tank.

3.0 METHODOLOGY AND PROCEDURES

- 3.1 The exploratory boreholes and test hole locations were determined by a handheld Global Positioning System (GPS). The approximate locations of the exploratory boreholes and test holes are indicated on the attached Exploration Location Plan (Figure 2).
- 3.2 The test results and soil conditions encountered during our site exploration indicated “favorable” conditions. The rapid percolation test rates determined by testing were consistent with the alluvial soil conditions observed throughout the subject parcel. The surface gradient throughout the site is less than 30 percent.
- 3.3 The soil encountered in our boreholes and test holes consisted primarily of fine- to coarse-grained silty sand (SM) with gravel.
- 3.4 Test procedures for leach lines:
 - a) Prior to testing, the County of San Bernardino DEHS was notified of the intent to perform percolation testing. The notification was submitted on September 28, 2022 via email.
 - b) Two (2) exploratory boreholes and eight (8) leach line percolation test holes were excavated on the site to depths between approximately 5 and 15 feet bgs. Percolation testing was performed at a depth of approximately 5.0 feet bgs within each of the test holes. Two (2) inches of ½ inch gravel was placed on the bottom of the test holes to prevent scouring when water was added.
 - c) Twelve inches of water (10 inches above gravel) of water was placed in the test holes and the drop in the water level was recorded over two consecutive 10-minute readings. Because 10 inches of water percolated through the test holes within two consecutive readings, testing was initiated immediately.
 - d) Percolation testing was performed by filling each test hole with approximately 8 inches of water and recording the time required to drop 3-inches in accordance with San Bernardino County OWTS guidelines³.

³ San Bernardino Public Health, Environmental Health Services, Percolation Testing and Reporting Standards for Onsite Wastewater Treatment Systems, Revised September 2019.

3.4 Leach line Test Results

TABLE 1
LEACH LINE TEST RESULTS

Test Hole No.	Depth (Ft.)	Q gal/sq. ft/day	Q minutes/inch	Minimum Square Feet of Absorption Area Per Gallon Per Day
P-1	5.0	----	1.23	0.83
P-2	5.0	----	1.33	0.83
P-3	5.0	----	1.38	0.83
P-4	5.0	----	1.40	0.83
P-5	5.0	----	2.40	0.83
P-6	5.0	----	1.33	0.83
P-7	5.0	----	1.32	0.83
P-8	5.0	----	1.68	0.83

4.0 DISCUSSION OF RESULTS

4.1 Testing indicates rapid percolation rates between 1.23 and 2.40 minutes per inch that are consistent with the alluvium encountered within the exploratory boreholes and test holes.

4.2 The recorded measurements are considered accurate, and the consistency of the individual test results indicates accuracy.

5.0 DESIGN

5.1 Criteria:

- a) Leach lines may be designed based on an application rate of 0.83 square feet per gallon per day in accordance with San Bernardino County DEHS guidelines. **Based upon information provided by the developer, the total combined daily flow rates were estimated to be approximately 4,442 gallons per day for the proposed restaurant, BOH, motel, caretakers' residence, Quonset huts, campsites, and swimming pool restrooms.** Based on our correspondence with the County of San Bernardino Division of Environmental Health, a proposed project may have a maximum daily flow rate of 6,000-gallon to utilize a conventional OWTS system. In accordance with Table H 201 of the California Plumbing Code, the septic tank requirement was determined by multiplying the daily flow by 0.75 and adding 1,125 gallons per day. The septic tank requirement for the proposed project equals 4,456 gallons. We recommend that two (2) 2500-gallon septic tanks be utilized to service the proposed new structures described above. **Tabulated flow rate calculations are included in Appendix D.**

- b) Design Rate: The following calculation may be utilized to determine the design rate in square feet (ft²) per 100 gallons of septic tank capacity (gsc):

$$= \text{Application Rate (ft}^2/\text{gal/day)} * \text{Flow (gal)} / (\text{Septic Tank Size}/100 \text{ gal})$$

$$\text{2500 Gallon Tank} = (0.83 \text{ ft}^2/\text{gal/day} * 2,221 \text{ gal}) / (2500 \text{ gal}/100 \text{ gal}) = 73.72 \text{ ft}^2 \text{ per } 100 \text{ gsc}$$

Information to assist in the design of the on-site sewage disposal systems is presented below:

PRELIMINARY OWTS DESIGN

Standard Design (3 Feet of Gravel @ Bottom of Leach Lines)

Commercial Use: Based on Provided Flow Rates

Application Rate (ft²/gal/day): 0.83

Estimated Gallons of Effluent Per Day: 2,221

Gallons of Septic Tank Capacity: 2,500

Design Rate: 73.72 ft² per 100 gsc

Absorption Area (ft²): 843 ft²

Absorption Area (ft²): 843 ft² + 30% = 2,949 ft²

Trench Credit (ft² per ft): 7

Leach Line Length (ft): 422

Number of Leach Lines: 5 at 85 ft each for each system

6.0 SEE EXPLORATION LOCATION PLAN

7.0 GENERAL DISCUSSION AND CONCLUSIONS

- 7.1 Based on the data presented in the report, it is the judgment of this engineer that leach lines may be used for the sewage disposal on this property.
- 7.2 Based on the data presented in this report and the tested information accumulated, it is the judgment of the engineer that the groundwater table should not encroach with the allowable limit set forth by County and State requirements, when the recommendations of this report are followed. Also, there appears to be sufficient area for the proposed on-site sewage disposal systems and future expansion.
- 7.3 All minimum setback distances shall be maintained for the proposed sewage disposal system in accordance with San Bernardino County guidelines⁴.

⁴ San Bernardino Public Health, Environmental Health Services, Percolation Testing and Reporting Standards for Onsite Wastewater Treatment Systems, Revised September 2019; Appendix D.

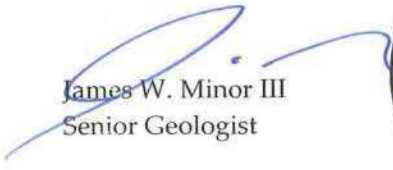
8.0 GENERAL

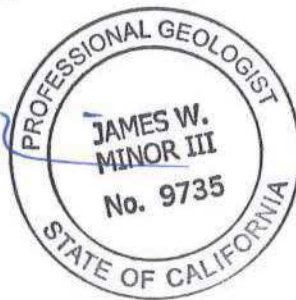
The findings and recommendations presented in this report are based upon an interpolation of the soil conditions between bore locations and extrapolation of the conditions throughout the sewage disposal system area. Should conditions encountered during grading (or excavation) appear different than that indicated in this report, this office should be notified.

This report is considered applicable for use by the client for the specific site and project described herein. The use of this report by other parties or for other projects is not authorized.

We appreciate the opportunity to provide service to you on this project. If you have any questions regarding this report, please contact the undersigned.

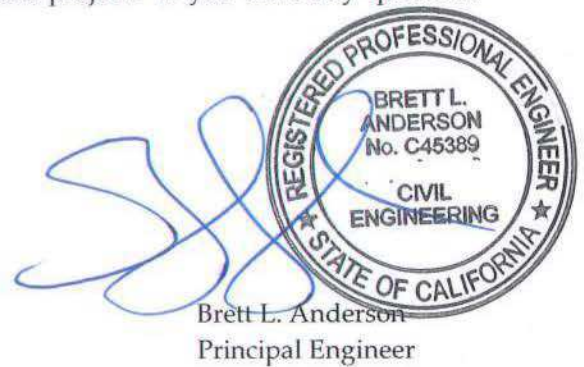
Respectfully submitted,
SLADDEN ENGINEERING


James W. Minor III
Senior Geologist



Perc/jm

PDF/Addressee



Brett L. Anderson
Principal Engineer

FIGURES
SITE LOCATION MAP
EXPLORATION LOCATION PLAN



USGS (2018)

SITE LOCATION MAP

FIGURE

1



Sladden Engineering

Project Number:

544-22395

Report Number:

22-12-724

Date:

Revised 4/4/2023

APPENDIX A

BORELOGS

**BORE LOG**

Excavator: Mini-Ex

Date Drilled: 10/5/2022

Elevation: 3,425 Ft (MSL)

Boring No: BH-1

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							2		
							4		
							6		
							8		Silty Sand (SM); yellowish brown, dry, fine-to coarse-grained with gravel.
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		Terminated at ~ 15.0 Feet bgs
							26		No Bedrock Encountered
							28		No Groundwater or Seepage Encountered
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		
Completion Notes:								COMMERCIAL REMODEL & RENOVATION	
								LANDERS AREA; APN: 0629-282-03 & 06	
								Project No: 544-22395	
								Report No: 22-12-724	Page 1

**BORE LOG**Excavator: Mini-Ex
Elevation: 3,425 Ft (MSL)Date Drilled: 10/5/2022
Boring No: BH-2

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							2 4 6 8 10 12 14		Silty Sand (SM); yellowish brown, dry, fine-to coarse-grained with gravel.
							16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50		Terminated at ~ 15.0 Feet bgs No Bedrock Encountered No Groundwater or Seepage Encountered
Completion Notes:								COMMERCIAL REMODEL & RENOVATION LANDERS AREA; APN: 0629-282-03 & 06	
								Project No: 544-22395	Page 2
								Report No: 22-12-724	

**SLADDEN ENGINEERING****BORE LOG**

Excavator: Mini-Ex

Date Drilled: 10/5/2022

Elevation: 3,425 Ft (MSL)

Boring No: P-1

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							2		Silty Sand (SM); yellowish brown, dry, fine-to coarse-grained with gravel.
							4		
							6		Terminated at ~ 5.0 Feet bgs No Bedrock Encountered No Groundwater or Seepage Encountered Borehole Cased with Perforated Pipe for Percolation Testing
							8		
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		
Completion Notes:								COMMERCIAL REMODEL & RENOVATION	
								LANDERS AREA; APN: 0629-282-03 & 06	
								Project No: 544-22395	
Report No: 22-12-724									

**SLADDEN ENGINEERING****BORE LOG**

Excavator:

Mini-Ex

Date Drilled:

10/5/2022

Elevation:

3,425 Ft (MSL)

Boring No:

P-2

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description			
							2		Silty Sand (SM); yellowish brown, dry, fine-to coarse-grained with gravel.			
							4					
							6		Terminated at ~ 5.0 Feet bgs No Bedrock Encountered No Groundwater or Seepage Encountered Borehole Cased with Perforated Pipe for Percolation Testing			
							8					
							10					
							12					
							14					
							16					
							18					
							20					
							22					
							24					
							26					
							28					
							30					
							32					
							34					
							36					
							38					
							40					
							42					
							44					
							46					
							48					
							50					
Completion Notes:									COMMERCIAL REMODEL & RENOVATION			
									LANDERS AREA; APN: 0629-282-03 & 06			
									Project No: 544-22395		Page	4
									Report No: 22-12-724			

**SLADDEN ENGINEERING****BORE LOG**

Excavator: Mini-Ex

Date Drilled: 10/5/2022

Elevation: 3,425 Ft (MSL)

Boring No: P-3

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							2		Silty Sand (SM); yellowish brown, dry, fine-to coarse-grained with gravel.
							4		
							6	Terminated at ~ 5.0 Feet bgs No Bedrock Encountered No Groundwater or Seepage Encountered Borehole Cased with Perforated Pipe for Percolation Testing	
							8		
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		
Completion Notes:								COMMERCIAL REMODEL & RENOVATION	
								LANDERS AREA; APN: 0629-282-03 & 06	
								Project No: 544-22395	
								Report No: 22-12-724	
								Page	5

**BORE LOG**

Excavator: Mini-Ex

Date Drilled: 10/5/2022

Elevation: 3,425 Ft (MSL)

Boring No: P-4

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							2		Silty Sand (SM); yellowish brown, dry, fine-to coarse-grained with gravel.
							4		
							6		
							8		Terminated at ~ 5.0 Feet bgs
							10		No Bedrock Encountered
							12		No Groundwater or Seepage Encountered
							14		Borehole Cased with Perforated Pipe for Percolation Testing
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		
Completion Notes:								COMMERCIAL REMODEL & RENOVATION	
								LANDERS AREA; APN: 0629-282-03 & 06	
								Project No: 544-22395	Page 6
								Report No: 22-12-724	

**BORE LOG**

Excavator: Mini-Ex

Date Drilled: 10/5/2022

Elevation: 3,425 Ft (MSL)

Boring No: P-5

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							2		Silty Sand (SM); yellowish brown, dry, fine-to coarse-grained with gravel.
							4		
							6		Terminated at ~ 5.0 Feet bgs No Bedrock Encountered No Groundwater or Seepage Encountered Borehole Cased with Perforated Pipe for Percolation Testing
							8		
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		
Completion Notes:								COMMERCIAL REMODEL & RENOVATION	
								LANDERS AREA; APN: 0629-282-03 & 06	
								Project No: 544-22395	
								Report No: 22-12-724	
								Page	7

**SLADDEN ENGINEERING****BORE LOG**

Excavator: Mini-Ex

Date Drilled: 10/5/2022

Elevation: 3,425 Ft (MSL)

Boring No: P-6

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							2		Silty Sand (SM); yellowish brown, dry, fine-to coarse-grained with gravel.
							4		
							6	Terminated at ~ 5.0 Feet bgs No Bedrock Encountered No Groundwater or Seepage Encountered Borehole Cased with Perforated Pipe for Percolation Testing	
							8		
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		
Completion Notes:								COMMERCIAL REMODEL & RENOVATION	
								LANDERS AREA; APN: 0629-282-03 & 06	
								Project No: 544-22395	
								Report No: 22-12-724	
								Page	8

**BORE LOG**

Excavator: Mini-Ex

Date Drilled: 10/5/2022

Elevation: 3,425 Ft (MSL)

Boring No: P-7

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							2		Silty Sand (SM); yellowish brown, dry, fine-to coarse-grained with gravel.
							4		
							6	Terminated at ~ 5.0 Feet bgs No Bedrock Encountered No Groundwater or Seepage Encountered Borehole Cased with Perforated Pipe for Percolation Testing	
							8		
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		
Completion Notes:								COMMERCIAL REMODEL & RENOVATION LANDERS AREA; APN: 0629-282-03 & 06	
								Project No: 544-22395	
								Report No: 22-12-724	
								Page	9

**SLADDEN ENGINEERING****BORE LOG**

Excavator: Mini-Ex

Date Drilled: 10/5/2022

Elevation: 3,425 Ft (MSL)

Boring No: P-8

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description	
							2		Silty Sand (SM); yellowish brown, dry, fine-to coarse-grained with gravel.	
							4			
							6	Terminated at ~ 5.0 Feet bgs No Bedrock Encountered No Groundwater or Seepage Encountered Borehole Cased with Perforated Pipe for Percolation Testing		
							8			
							10			
							12			
							14			
							16			
							18			
							20			
							22			
							24			
							26			
							28			
							30			
							32			
							34			
							36			
							38			
							40			
							42			
							44			
							46			
							48			
							50			
Completion Notes:									COMMERCIAL REMODEL & RENOVATION	
									LANDERS AREA; APN: 0629-282-03 & 06	
								Project No: 544-22395		
								Report No: 22-12-724		
								Page	10	

APPENDIX B

LEACH LINE TEST DATA SHEETS

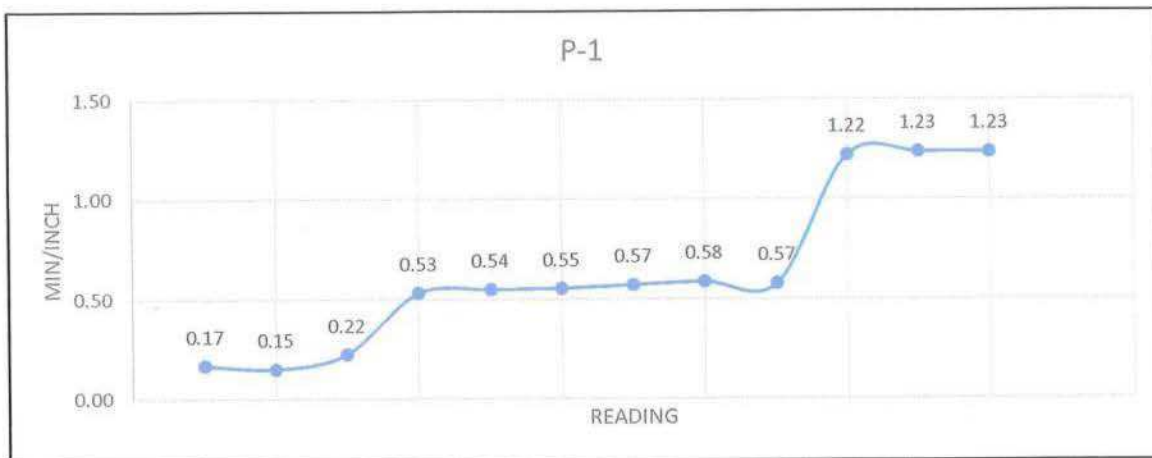
SAN BERNARDINO COUNTY LEACH LINE DATA SHEETS

Notification of Testing: 9/28/2022
 Project: APNs: 0629-282-03 & 0629-282-06
 Job No. : 544-22395
 Date: 10/5/2022
 Test Hole #: P-1
 Depth (ft): 5
 Disposal Area: Favorable
 USCS Soil Class: SM
 Tested By: S.D.

READING	TIME (h:m:s)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	Min/Inch
A	0:01:39	5	12	2	10	0.17
B	0:01:28	5	12	2	10	0.15
C	0:01:06	5	8	3	5	0.22

READING*	TIME (h:m:s)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	Min/Inch
1	0:01:35	5	8	5	3	0.53
2	0:01:38	5	8	5	3	0.54
3	0:01:39	5	8	5	3	0.55
4	0:01:42	5	8	5	3	0.57
5	0:01:45	5	8	5	3	0.58
6	0:01:43	5	8	5	3	0.57
7	0:01:13	5	8	7	1	1.22
8	0:01:14	5	8	7	1	1.23
9	0:01:14	5	8	7	1	1.23

*Initial Water level of 8-Inches



Rate (Min/Inch): 1.23

SAN BERNARDINO COUNTY LEACH LINE DATA SHEETS

Notification of Testing: 9/28/2022
 Project: APNs: 0629-282-03 & 0629-282-06
 Job No. : 544-22395
 Date: 10/5/2022
 Test Hole #: P-2
 Depth (ft): 5
 Disposal Area: Favorable
 USCS Soil Class: SM
 Tested By: S.D.

READING	TIME (h:m:s)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	Min/Inch
A	0:02:12	5	12	2	10	0.22
B	0:02:30	5	12	2	10	0.25
C	0:01:43	5	8	3	5	0.34

READING*	TIME (h:m:s)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	Min/Inch
1	0:01:58	5	8	5	3	0.66
2	0:01:59	5	8	5	3	0.66
3	0:02:02	5	8	5	3	0.68
4	0:02:02	5	8	5	3	0.68
5	0:02:03	5	8	5	3	0.68
6	0:02:05	5	8	5	3	0.69
7	0:01:19	5	8	7	1	1.32
8	0:01:20	5	8	7	1	1.33
9	0:01:20	5	8	7	1	1.33

*Initial Water level of 8-Inches



Rate (Min/Inch): 1.33

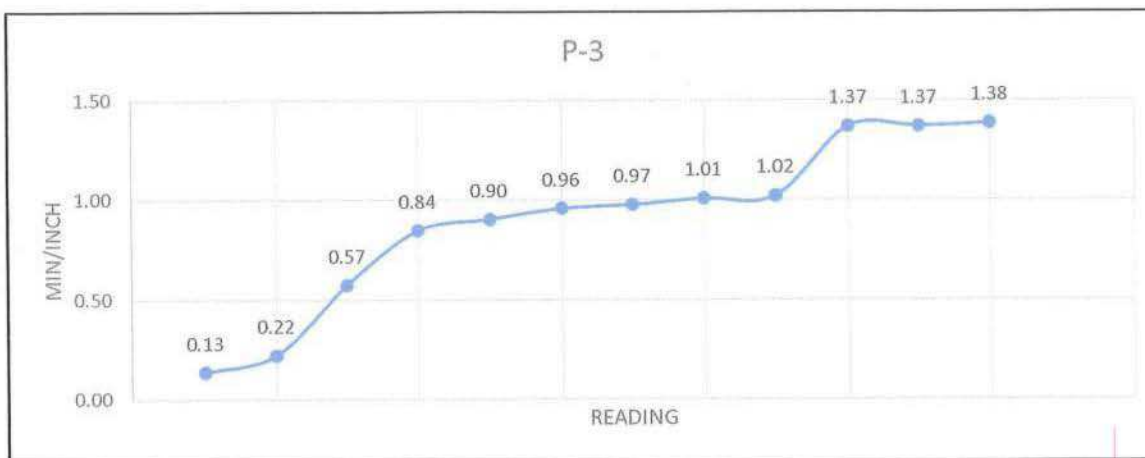
SAN BERNARDINO COUNTY LEACH LINE DATA SHEETS

Notification of Testing: 9/28/2022
 Project: APNs: 0629-282-03 & 0629-282-06
 Job No. : 544-22395
 Date: 10/5/2022
 Test Hole #: P-3
 Depth (ft): 5
 Disposal Area: Favorable
 USCS Soil Class: SM
 Tested By: S.D.

READING	TIME (h:m:s)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	Min/Inch
A	0:01:20	5	12	2	10	0.13
B	0:02:11	5	12	2	10	0.22
C	0:02:51	5	8	3	5	0.57

READING*	TIME (h:m:s)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	Min/Inch
1	0:02:32	5	8	5	3	0.84
2	0:02:42	5	8	5	3	0.90
3	0:02:52	5	8	5	3	0.96
4	0:02:55	5	8	5	3	0.97
5	0:03:01	5	8	5	3	1.01
6	0:03:03	5	8	5	3	1.02
7	0:01:22	5	8	7	1	1.37
8	0:01:22	5	8	7	1	1.37
9	0:01:23	5	8	7	1	1.38

*Initial Water level of 8-inches



Rate (Min/Inch): 1.38

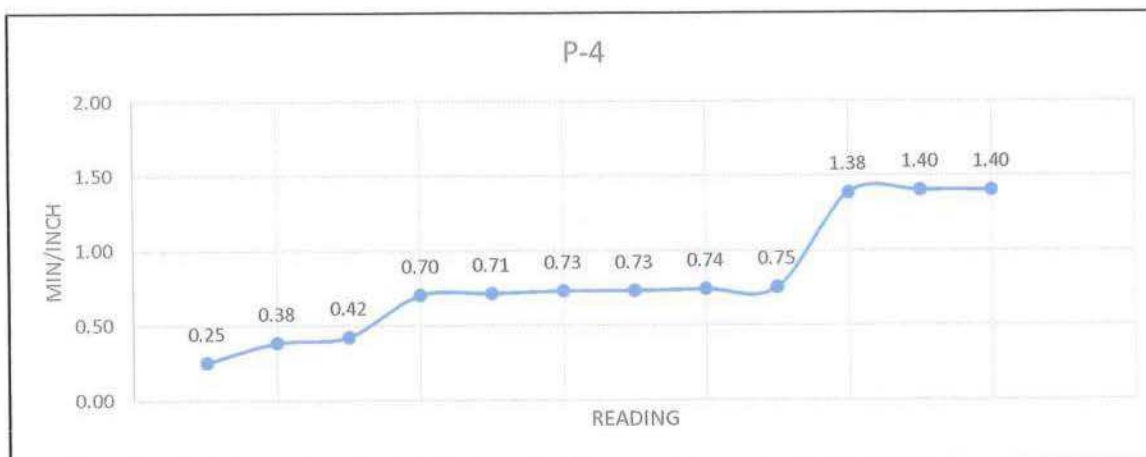
SAN BERNARDINO COUNTY LEACH LINE DATA SHEETS

Notification of Testing: 9/28/2022
 Project: APNs: 0629-282-03 & 0629-282-06
 Job No. : 544-22395
 Date: 10/5/2022
 Test Hole #: P-4
 Depth (ft): 5
 Disposal Area: Favorable
 USCS Soil Class: SM
 Tested By: S.D.

READING	TIME (h:m:s)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	Min/Inch
A	0:02:30	5	12	2	10	0.25
B	0:03:49	5	12	2	10	0.38
C	0:02:06	5	8	3	5	0.42

READING*	TIME (h:m:s)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	Min/Inch
1	0:02:06	5	8	5	3	0.70
2	0:02:08	5	8	5	3	0.71
3	0:02:11	5	8	5	3	0.73
4	0:02:11	5	8	5	3	0.73
5	0:02:13	5	8	5	3	0.74
6	0:02:15	5	8	5	3	0.75
7	0:01:23	5	8	7	1	1.38
8	0:01:24	5	8	7	1	1.40
9	0:01:24	5	8	7	1	1.40

*Initial Water level of 8-inches



Rate (Min/Inch): 1.40

SAN BERNARDINO COUNTY LEACH LINE DATA SHEETS

Notification of Testing: 9/28/2022
 Project: APNs: 0629-282-03 & 0629-282-06
 Job No. : 544-22395
 Date: 10/5/2022
 Test Hole #: P-5
 Depth (ft): 5
 Disposal Area: Favorable
 USCS Soil Class: SM
 Tested By: S.D.

READING	TIME (h:m:s)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	Min/Inch
A	0:03:12	5	12	2	10	0.32
B	0:05:49	5	12	2	10	0.58
C	0:03:27	5	8	3	5	0.69

READING*	TIME (h:m:s)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	Min/Inch
1	0:02:18	5	8	5	3	0.77
2	0:02:22	5	8	5	3	0.79
3	0:02:24	5	8	5	3	0.80
4	0:02:25	5	8	5	3	0.81
5	0:02:25	5	8	5	3	0.81
6	0:02:27	5	8	5	3	0.82
7	0:02:23	5	8	7	1	2.38
8	0:02:24	5	8	7	1	2.40
9	0:02:24	5	8	7	1	2.40

*Initial Water level of 8-Inches



Rate (Min/Inch): 2.40

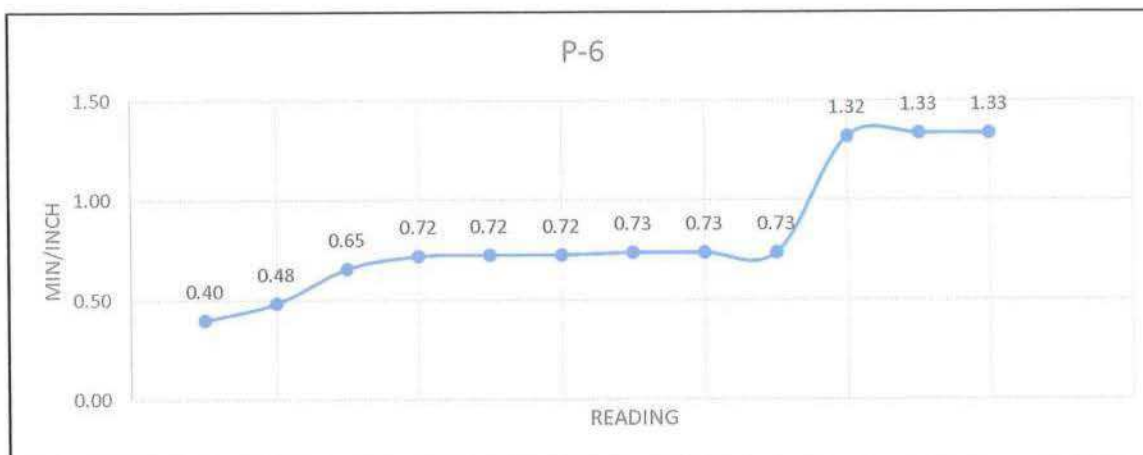
SAN BERNARDINO COUNTY LEACH LINE DATA SHEETS

Notification of Testing: 9/28/2022
 Project: APNs: 0629-282-03 & 0629-282-06
 Job No. : 544-22395
 Date: 10/5/2022
 Test Hole #: P-6
 Depth (ft): 5
 Disposal Area: Favorable
 USCS Soil Class: SM
 Tested By: S.D.

READING	TIME (h:m:s)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	Min/Inch
A	0:03:57	5	12	2	10	0.40
B	0:04:48	5	12	2	10	0.48
C	0:03:16	5	8	3	5	0.65

READING*	TIME (h:m:s)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	Min/Inch
1	0:02:09	5	8	5	3	0.72
2	0:02:10	5	8	5	3	0.72
3	0:02:10	5	8	5	3	0.72
4	0:02:12	5	8	5	3	0.73
5	0:02:12	5	8	5	3	0.73
6	0:02:12	5	8	5	3	0.73
7	0:01:19	5	8	7	1	1.32
8	0:01:20	5	8	7	1	1.33
9	0:01:20	5	8	7	1	1.33

*Initial Water level of 8-inches



Rate (Min/Inch): 1.33

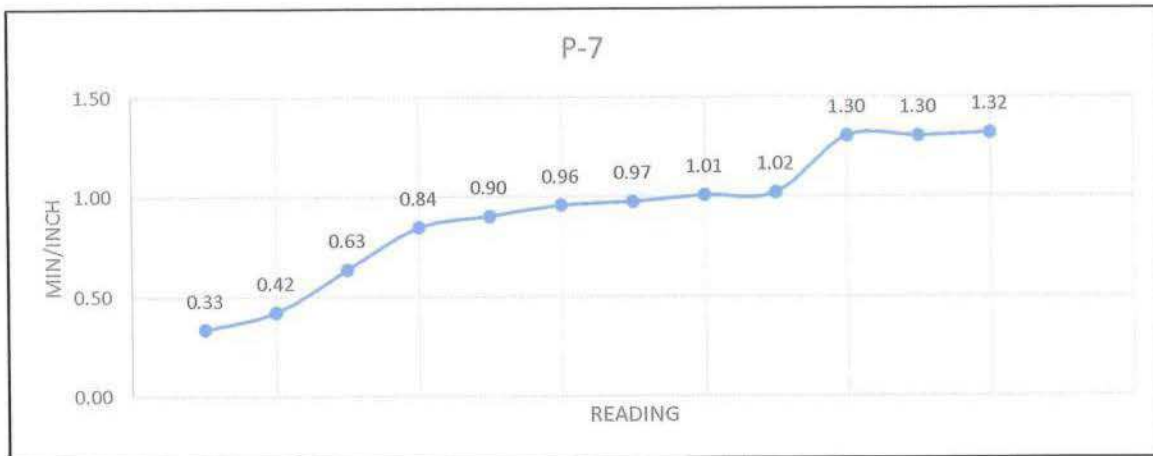
SAN BERNARDINO COUNTY LEACH LINE DATA SHEETS

Notification of Testing: 9/28/2022
 Project: APNs: 0629-282-03 & 0629-282-06
 Job No. : 544-22395
 Date: 10/5/2022
 Test Hole #: P-7
 Depth (ft): 5
 Disposal Area: Favorable
 USCS Soil Class: SM
 Tested By: S.D.

READING	TIME (h:m:s)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	Min/Inch
A	0:03:20	5	12	2	10	0.33
B	0:04:11	5	12	2	10	0.42
C	0:03:10	5	8	3	5	0.63

READING*	TIME (h:m:s)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	Min/Inch
1	0:02:32	5	8	5	3	0.84
2	0:02:42	5	8	5	3	0.90
3	0:02:52	5	8	5	3	0.96
4	0:02:55	5	8	5	3	0.97
5	0:03:01	5	8	5	3	1.01
6	0:03:03	5	8	5	3	1.02
7	0:01:18	5	8	7	1	1.30
8	0:01:18	5	8	7	1	1.30
9	0:01:19	5	8	7	1	1.32

*Initial Water level of 8-inches



Rate (Min/Inch): 1.32

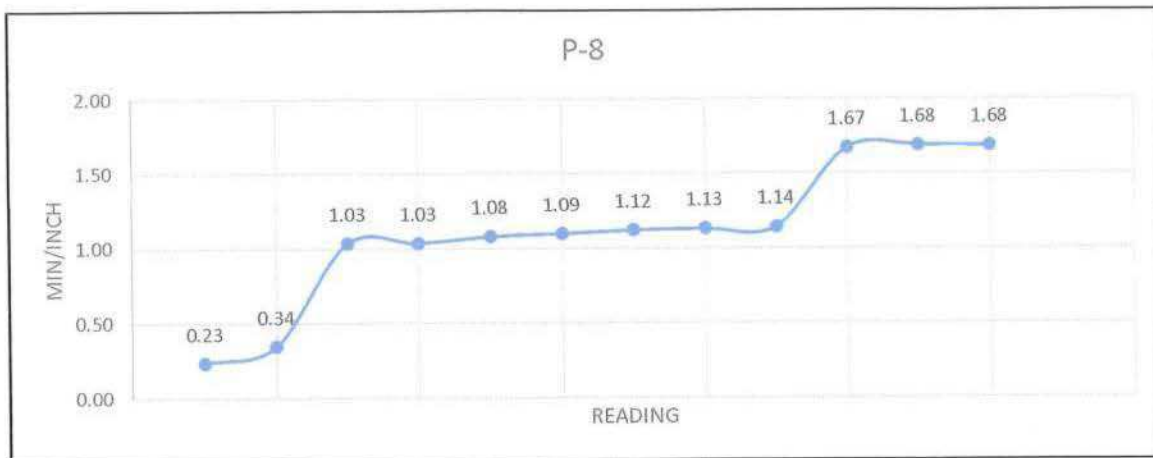
SAN BERNARDINO COUNTY LEACH LINE DATA SHEETS

Notification of Testing: 9/28/2022
 Project: APNs: 0629-282-03 & 0629-282-06
 Job No. : 544-22395
 Date: 10/5/2022
 Test Hole #: P-8
 Depth (ft): 5
 Disposal Area: Favorable
 USCS Soil Class: SM
 Tested By: S.D.

READING	TIME (h:m:s)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	Min/Inch
A	0:02:19	5	12	2	10	0.23
B	0:03:26	5	12	2	10	0.34
C	0:05:10	5	8	3	5	1.03

READING*	TIME (h:m:s)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	Min/Inch
1	0:03:06	5	8	5	3	1.03
2	0:03:14	5	8	5	3	1.08
3	0:03:17	5	8	5	3	1.09
4	0:03:21	5	8	5	3	1.12
5	0:03:23	5	8	5	3	1.13
6	0:03:25	5	8	5	3	1.14
7	0:01:40	5	8	7	1	1.67
8	0:01:41	5	8	7	1	1.68
9	0:01:41	5	8	7	1	1.68

*Initial Water level of 8-inches



Rate (Min/Inch): 1.68

APPENDIX C

PERCOLATION TEST NOTIFICATION



Public Health
Environmental Health Services
PERCOLATION TEST NOTIFICATION

www.SBCounty.gov
www.sbcounty.gov/dph/dehs
Phone: (800) 442-2283



Please email form to EHS.CustomerService@dph.sbcounty.gov or fax to 909.387.4323 at least two (2) working days before testing.

THIS SECTION TO BE COMPLETED BY QUALIFIED PROFESSIONAL				
QUALIFIED PROFESSIONAL INFORMATION				
Firm Name Sladden Engineering			Date 9/28/2022	
Firm Address 45090 Golf Center Pkwy., Suite F		City Indio	State Ca	Zip 92201
Firm Contact Person James Minor	Email(s) jminor@sladdenengineering.com		Phone Number 760 863-0713	
SITE INFORMATION				
Owner's Name Rod Rigole		Assessor's Parcel Number (APN) 0629-282-03 & 06		
Site Address NEC Wamego Trail & Desideria		City Landers	State Ca	Zip
Email(s) rarigole@gmail.com			Phone Number 210 722-2994	
BILLING INFORMATION				
Environmental Health Services may need to be onsite to observe percolation testing. This will be billed at the current hourly professional rate. Provide billing information below or check one of the following: ☐ Same as Qualified Professional Information ☒ Same as Site Information				
Billing Name				
Billing Address		City	State	Zip
Email(s)			Phone Number	
PROJECT INFORMATION				
Disposal field	☒ Leach Lines ☐ Seepage Pits ☐ Alternative Treatment System			
Exploratory Boring(s)	Boring Date(s) 10/3	Boring Time 8am	Number of Borings 2	Depth of Boring(s) in ft. 15 ft.
Testing	Test Date(s) 10/3/2022	Test Time 10am	Number of Tests 8	Depth of Test Hole(s) in ft. 5 ft.
Project Type	☒ Single Family Residence Lot Size (ft ² /acres)		☐ Multi Family Residential Number of Units Lot Size (ft ² /acres)	
	☐ Commercial Lot Size (ft ² /acres)		Estimated Flow	
	Please select one of the following ☐ Tentative Tract (TT) # >50' ☐ Tentative Parcel Map (TPM) # >50'			
	Number of Proposed Lots		Original Lot Size (ft ² /acres) >50'	Average New Lot Size (ft ² /acres)
A sewer connection will be required if a sewer is available within 200 ft. of the nearest property line (add 100 ft. for each additional lot). A "sewer will not serve" letter may be required prior to submittal of the percolation report.				
Site Conditions	Historic groundwater level in feet >50'		Slope in disposal area (%) <30%	
	Source of Water ☐ Private Well ☐ Water Purveyor			
	☐ Check box if parcel is on Forest Service Land			
	☐ Check box if lot is within 100 feet of a river/stream			
For Office Use Only For Office Use Only For Office Use Only For Office Use Only For Office Use Only				
Fee:	FA Number:		Record ID:	PE Number:
Late Fee: ☐ Y ☐ N	Designated Employee:		Received By:	Date:
Check One: ☐ New ☐ Transfer ☐ Reactivate			Changes (please specify):	

APPENDIX D
DAILY FLOW RATES

Lonely Dove Motel Daily Flow Rates

KITCHEN & RESTAURANT

Number of Employees	Number of Customers	Number of meals served (peak days)	Total Daily Flow Rate (per PC H201.1(4))
5 (1,000 SF Kitchen / 200 gross)	226 (3,400 SF Restaurant / 15 gross)	300	Restaurant - with toilet waste (per customer) = 7 per customer $226 \times 7 = 1,582$ gallons per day

BOH

Number of Employees	Number of Customers	Number of meals served (peak days)	Total Daily Flow Rate (per PC H201.1(4))
2 (600 SF BOH / 300 gross)	-	-	Motel (per bed space) = 50 $\times 2 = 100$ gallons per day

FUTURO HOME

Number of Employees	Number of Customers	Number of meals served (peak days)	Total Daily Flow Rate (per PC H201.1(4))
-	1	-	Motel (per bed space) = 50 $\times 1 = 50$ gallons per day

MOTEL

Number of Employees	Number of Customers	Number of meals served (peak days)	Total Daily Flow Rate (per PC H201.1(4))
-	8	-	Motel (per bed space) = 50 $\times 8 = 400$ gallons per day

CARETAKER'S RESIDENCE

Number of Employees	Number of Customers	Number of meals served (peak days)	Total Daily Flow Rate (per PC H201.1(4))
-	1	-	Motel (per bed space) = 50 $\times 1 = 50$ gallons per day

QUONSET HUTS

Number of Employees	Number of Customers	Number of meals served (peak days)	Total Daily Flow Rate (per PC H201.1(4))
-	24	-	Motel (per bed space) = 50 $\times 24 = 1,200$ gallons per day

CAMPSITES

Number of Employees	Number of Customers	Number of meals served (peak days)	Total Daily Flow Rate (per PC H201.1(4))
-	18	-	Camps - with central comfort station (per person) = 30 $\times 18 = 540$ gallons per day

POOL

Number of Employees	Number of Customers	Number of meals served (peak days)	Total Daily Flow Rate (per PC H201.1(4))
-	52	-	Swimming pools - public (per person) = 10 $\times 52 = 520$ gallons per day

APPENDIX E
OWTS DESIGN

[illegible]

- PROJECT SITE

THE APPLICANT SEEKS TO OBTAIN A CONDITIONAL USE PERMIT FOR THE EXPANSION OF AN EXISTING MOTEL AND ADDITION OF A RESTAURANT AND POOL/SPA COMPLEX WITHIN THE HOMESTEAD VALLEY COMMUNITY PLAN IN THE COMMUNITY OF LANDERS. THE PROJECT SPANS TWO CONTIGUOUS PARCELS WHICH WILL BE TIED AS PART OF THIS APPLICATION.

APNS: 0629-282-03 AND 0629-282-06
APPLICANT: ROD RIGOLE
COMMUNITY: LANDERS
ADDRESS: 1473 WAMEGO TRAIL, LANDERS, CA, 92285
LOT SIZE: 10 ACRES
ZONING: COMMERCIAL (HV/SD-COM)

WATER: BIGHORN DESERT VIEW WATER AGENCY
SEWAGE: SEPTIC W/ 2 TANKS AND LEACH FIELDS
ELECTRIC: SOUTHERN CALIFORNIA EDISON
GAS: G&K PROPANE
TELEPHONE: SOUTHERN CALIFORNIA TELEPHONE

	EXISTING BUILDINGS TO REMAIN
	PROPOSED BUILDING
	PROPOSED VEHICLE CIRCULATION
	ROAD DEDICATIONS
	SETBACKS
	PRIMARY CIRCULATION PATH
	SECONDARY CIRCULATION PATH
	PROPOSED LANDSCAPING
	BUILDING OVERHANGS

	PATHWAY LIGHTING. NOTED FOR LOCATION, NOT QUANTITY
	BUILDING LIGHTING
	GUESTROOM ENTRY LIGHTS

LAND USE REQ.	REQUIRED	PROVIDED
MOTEL - 1 PER UNIT	25 NEW UNITS + 9 EXISTING = 34 SPACES	43 SPACES
RESTAURANT (IN DESERT REGION) - 1 SP. PER 100 SF OF GLA	2,800 SF/100 = 28 SPACES	44 SPACES
CAMPING SITES - 1 PER UNIT	18 SPACES	18 SPACES
TOTAL SPACES	80 SPACES	105 SPACES
DISABLED SPACES - 4 FOR 51-100 SPACES	4 SPACES	5 SPACES
VAN ACCESSIBLE - 1 PER EVERY 8 DISABLED SPACES	1 SPACE	3 SPACES
ELECTRIC VEHICLE - 5 FOR 51-100 SPACES	5 SPACES	5 SPACES

LAND USE ZONING	MINIMUM LANDSCAPED AREA	PROVIDED AREA
COMMERCIAL (HV/SD-COM)	15% OF LOT AREA	110,000 SF / 435,000 SF = 25%
		EXISTING NATURAL LANDSCAPE AREA = 80,000
		PROPOSED DESERT LANDSCAPING = 30,000 SF

LAND USE ZONING	MAX. LOT COVERAGE ALLOWED	TOTAL LOT COVERAGE
COMMERCIAL (HV/SD-COM)	80%	30,000 SF / 435,600 SF = 6.9%

LAND USE ZONING	MAX. FAR ALLOWED	TOTAL FAR
COMMERCIAL (HV/SD-COM)	.3:1	30,000 SF / 435,600 SF = .0

PROPOSED SITE PLAN
1" = 30'-0"

LONELY DOVE MOTEL
1473 WAMEGO TRAIL,
LANDERS, CA, 92285

SCALE AT 30 X 42: As indicated
3/2/2023 12:58:01 PM

APPENDIX F

OWTS REVIEW - OFFICIAL INSPECTION REPORT



OWTS REVIEW - OFFICIAL INSPECTION REPORT

FACILITY NAME RIGOLE ROD (LONELY DOVE MOTEL)		REINSPECTION DATE Not Specified	INSPECTOR Joseph Contreras	DATE 3/16/2023
LOCATION 1473 WAMEGO TR, LANDERS, CA 92285		PERMIT EXPIRATION	IDENTIFIER: None	
TIME IN 10:02 AM	TIME OUT 1:10 PM	FACILITY ID Not Specified	RELATED ID SR0115218	PE 4108
		SERVICE: 025 - PLAN REVIEW		
		RESULT: 01 - CORRECTIVE ACTION NOT REQUIRED		
		ACTION: 57 - PLANS REJECTED		

OWTS REVIEW - Commercial Dvlpmnt Perc Test Review

Based on an inspection this day, the items marked below identify the violation(s) in operation or facilities which must be corrected. Failure to correct listed violation(s) prior to the designated compliance date may necessitate an additional inspection to be billed at the hourly rate as provided in the San Bernardino County Code, Schedule of Fees.

Administrative Order to Show Cause (OSC): The Permittee has the right to a hearing if requested in writing within 15 calendar days of receipt of this notice, to show cause why the permit to operate should not be suspended or revoked; otherwise the right to a hearing shall be deemed waived.

See the following pages for the code sections and general requirements that correspond to each violation listed below.

41P983 PERC - Rejected - Resubmittal Required



Compliance Date: Not Specified

Inspector Comments: Initial resubmission requires no fee.

Not In Compliance

Violation Reference - SBCC - SBC Policy

All subsequent resubmissions will require resubmission fee as according to the current Fee Schedule.

Violation Description: The percolation report cannot be approved as submitted. Corrections and resubmittal are required along with the current resubmittal fee. If additional testing is required, DEHS will need to be notified 48 hours in advance.

41P062 PERC - General Criteria - Calculations

Compliance Date: Not Specified

Inspector Comments: 1.) The DFU count uses incorrect values.

Not In Compliance

Reference - SBCC - SBC Policy

Calculate the DFU's using the Public values from California Plumbing code table 702.1. Do not use Private values for commercial projects.

2.) Verify the estimated flow for the kitchen/restaurant.

Ensure the result for estimated flow includes employees and meal waste.

Description: Provide accurate calculations for the proposed system.

41P083 PERC - General Criteria - Scale

Compliance Date: Not Specified

Inspector Comments: The plot plan is not legible and must include the following:

Not In Compliance

Reference - SBCC - SBC Policy

- leach lines location and length
- 100 % expansion area
- septic tank location and size
- water supply line location

Update the plot plan with the information listed above and is clearly legible.

Description: A plot plan must be provided and include a map scale (i.e. 1" = 20').

41P100 PERC - Location - Accuracy

Compliance Date: Not Specified

Inspector Comments: There were two parcel numbers mentioned in the submitted Percolation Report. An EHS approved design rate can only be assigned to the parcel that a percolation test was completed and shall not be used nor borrowed by neighboring lots.

Not In Compliance

Reference - SBCC - SBC Policy

A separate percolation test and percolation report will be required per parcel. If a lot merger is proposed, please submit documentations of a lot merger approval from the San Bernardino County Land Use department. Otherwise, submit a separate Percolation Report for each parcel to EHS for review and approval. A separate invoice for the review fee will be issued per parcel

Description: Provide the correct Assessor Parcel Number (APN) in the report.

Overall Inspection Comments

Prior to resubmission it is recommended to review the "Perc Standard"

<http://http://wp.sbcounty.gov/dph/wp-content/uploads/sites/7/2019/09/PERC-9.26.19-APPROVED.pdf> and Local Agency Management Program

<http://wp.sbcounty.gov/dph/wp-content/uploads/sites/7/2017/08/San-Bernardino-County-LAMP.pdf>



Public Health
Environmental Health Services

385 N Arrowhead Ave, San Bernardino, CA 92415 | Phone: 800.442.2283 Fax: 909.387.4323

www.SBCounty.gov
www.SBCounty.gov/dph/dehs

OWTS REVIEW - OFFICIAL INSPECTION REPORT

FACILITY NAME RIGOLE ROD (LONELY DOVE MOTEL)	DATE 3/16/2023
LOCATION 1473 WAMEGO TR, LANDERS, CA 92285	INSPECTOR Joseph Contreras

Total # of Images: 0