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Sri Sai Ram Mandir

San Bernardino County, California

PRELIMINARY HYDROLOGY REPORT

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JN 168168

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INTRODUCTION

The project is a 4.83-acre religious facility development located at 12594 Roswell Avenue, Chino in the unincorporated San Bernardino County, CA. The site is bounded by Roswell Avenue on the East, single family residential homes on the South and West, Walnut Ave and existing railroad track on the North.

The peak flow hydrologic analysis generated for this study includes 10-year design storm and 100-year design storm analysis. Refer to Appendix A through Appendix D for complete design results.

Goals
This Hydrology Report was generated to specifically achieve the following goals:

- To calculate pre- and post-development peak flows for the 10-year and 100-year storm events.
- To demonstrate that the proposed Best Management Practices (BMP's) are sized to mitigate peak flows and not increase runoff due to proposed land improvements.

PROJECT DESCRIPTION

Existing Conditions
The 4.83-acre project site is an undeveloped vacant site with poor land cover. Soil conditions for the site are classified as type B. Topography shows existing grades sloping generally from northwest direction to southeast direction. There is a low point on the site at the southwest corner of the site. Precipitation generated onsite sheet flows to southeast and southwest corners. There is a parkway drain at the southeast corner of the site the drains subarea A2 and discharges the runoff to an existing 18-inch pipe in Roswell Street (See Appendix A).

Proposed Conditions
The site is proposing approximately 3.28-acre religious facility on the south side of the site with entrances from Roswell Ave to the East and Walnut Avenue to the North. Approximately. 1.55-acre on the north of the proposed religious facility is slated for Three (3) single family residential homes as future development. Religious facility will contain a two-story building approximately 22,650 sq. ft., caretaker building, approximately 3,000 sq. ft., along with parking spaces to accommodate the development. Runoff from the development sheet flow to the parking areas and flow along the proposed gutters to catch basins placed throughout the site. Storm flows will confluence while traveling towards the east side of the property and ultimately discharge to a proposed underground retention chambers located at the east corner of the site. The retention basin will capture the first flush (WQMP storm) as well as 100-year storm flows. The captured

storm volume will infiltrate from the bottom of basin floor into the soils. Low flows entering the retention system directed to an inline hydro dynamic separator (CDS unit or equivalent) prior to entering for pre-treatment to capture trash, debris, sediment and other pollutants. High flows will bypass the unit and travel via a 34-in pipe into the retention basin. All flows entering the underground retention chambers will be sized to satisfy the WQMP requirements for Design Capture Volume (DCV) and the difference in volume between Pre- and Post- Development condition, whichever is greater. (See Appendix C)

VICINITY MAP

Figure 1-1
NTS

SITE MAP

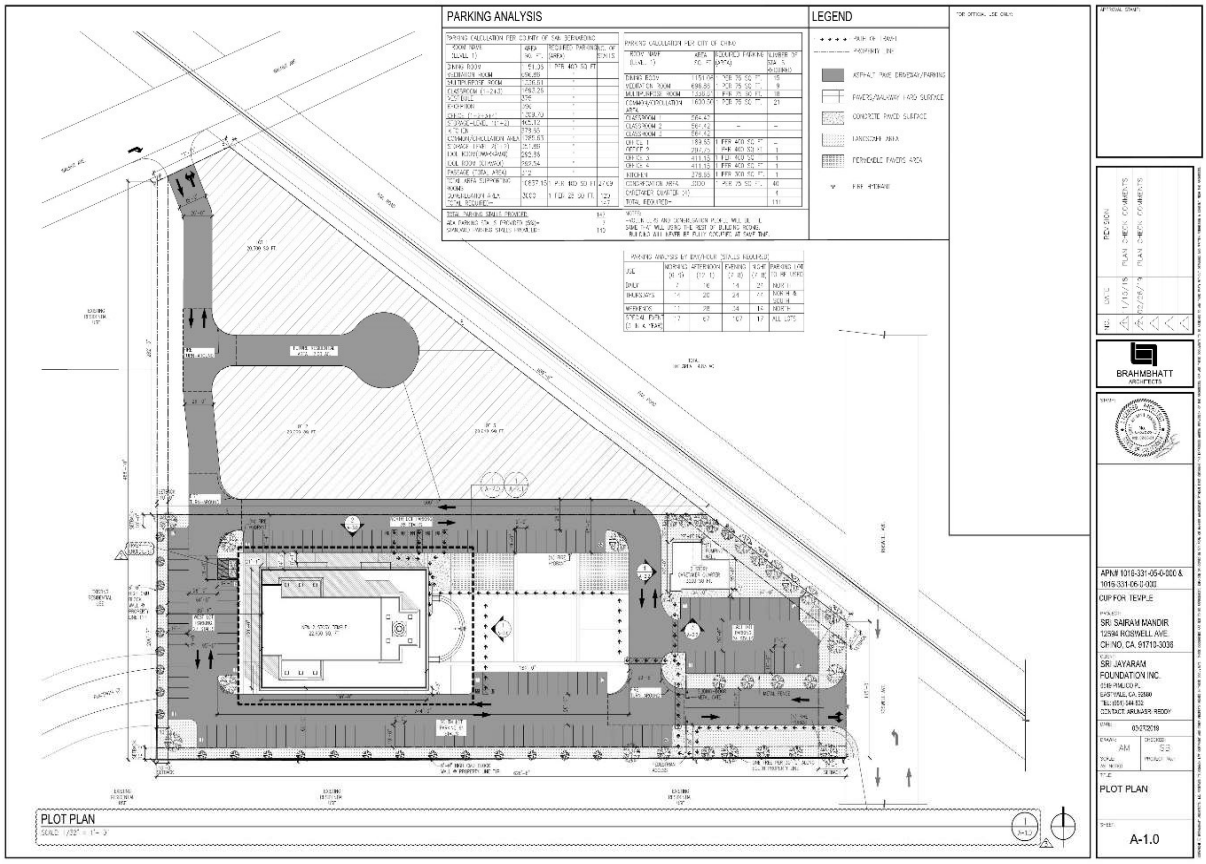


Figure 1-2
NTS

HYDROLOGIC METHODOLOGY

Hydrologic calculations to evaluate surface runoff associated with the 10-year and 100-year storm events were performed using data from the *Web Soils Survey* and *NOAA Atlas Point Precipitation Frequency Estimates to* find soil classification and rainfall intensity values.

Rational Method

The hydrologic calculations to determine the peak flow rates for different storm events were performed using the criteria in the *San Bernardino County Hydrology Manual*. The Rational Method is an empirical computation procedure for developing a peak runoff rate (discharge) for storms of a specific recurrence interval. Rational Method equations assume that the peak flow rate is directly proportional to the drainage area, rainfall intensity, and a loss rate coefficient, which describes the effects of land use and soil type. The Rational Method flow rates were computed using Civil Design software.

This Rational Method analysis is used as the basis for development of the small area unit hydrographs and flood routing analysis. This methodology is consistent with Section J of the hydrology manual.

Soil Type

The soil type within the project area is classified as Type B. (see Appendix F)

Loss Rates

Watershed losses generally consist of infiltration, depression storage, vegetation, and minor amounts of evaporation. Loss rates vary with each land use and soil type. The procedures and criteria used in this study for estimating loss rates follow the guidelines of the *San Bernardino Hydrology Manual*.

The Antecedent Moisture Condition (AMC) indicates the soil wetness prior to a particular storm and the runoff potential for the subject storm. An AMC is defined as:

AMC I: Lowest runoff potential

AMC II: Moderate runoff potential

AMC III: Highest runoff potential

AMC II was applied for the 10-year storm event. AMC III was applied for the 100-year storm event as outlined in the San Bernardino Hydrology manual.

Precipitation

Rainfall intensity was determined using *NOAA Atlas Point Precipitation Frequency Estimates* for 10-year and 100-year recurrence intervals with durations varying according to the time of concentration. (see Appendix E).

EXISTING CONDITION ANALYSIS

A summary of peak flows for existing conditions was generated as follows;

Watershed Area	***Area (ac.)***	***10-Year Storm Event***	***100-Year Storm Event***
A1	2.5	3.75 cfs	7.19 cfs
A2	2.3	2.96 cfs	5.84 cfs
Total	**4.8**	**6.71 cfs**	**13.03 cfs**

Refer to Appendix B for complete existing condition design results.

PROPOSED CONDITION ANALYSIS

A summary of peak flows for proposed conditions was generated as follows;

Watershed Area	***Area (ac.)***	***10-Year Storm Event***	***100-Year Storm Event***
A	4.8	11.79 cfs	20.57 cfs
Total	**4.8**	**11.79 cfs**	**20.57 cfs**

Refer to Appendix D for complete proposed condition design results.

CONCLUSION

Hydrology studies were performed for the 10-year design storm and 100-year design storm for pre- and post-development conditions. In comparing pre- and post-development conditions, peak flows increased under post development conditions due to the increase in impervious land cover. An increase of 7.54 cfs resulted which is calculated as the difference between pre and post-development conditions for the 100-year design storm. This difference in runoff is equivalent to approximately 5,619 cubic feet of volume.

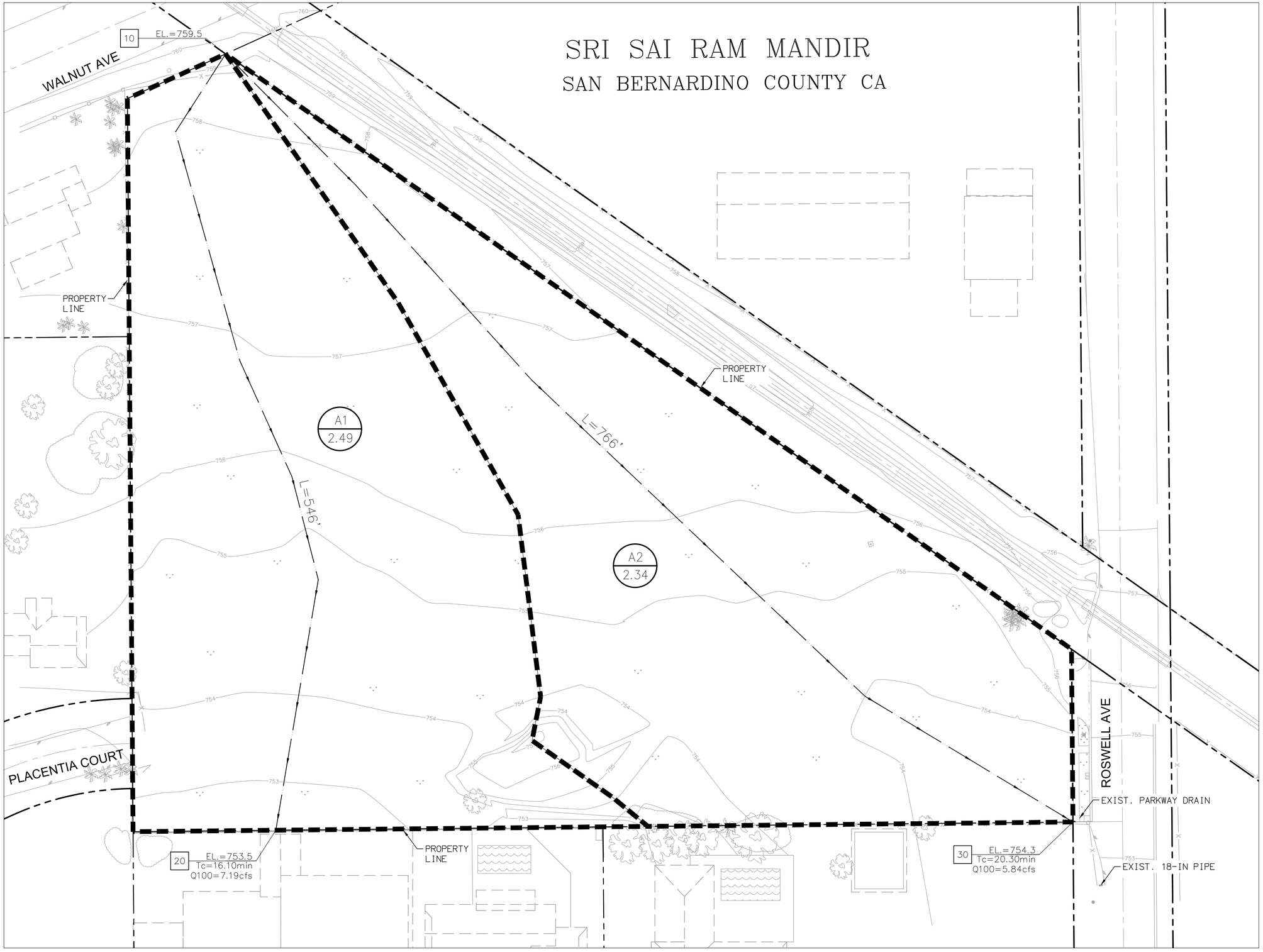
The WQMP design storm for the project requires a minimum design capture volume of 10,860 cubic feet. The project will provide an underground storage chambers to satisfy the WQMP treatment requirement by providing a storage capacity of 10,860 cubic feet of volume. This proposed underground storage is more than difference between the post- and pre- development 100-year flow rates. Therefore, stormwater runoff will not increase under post-development conditions.

Appendix A

Hydrology Map – Pre-Development Condition

SRI SAI RAM MANDIR

SAN BERNARDINO COUNTY CA



LEGEND

- PROPERTY LINE
- CENTER LINE
- EXISTING RETAINING WALL
- SUBAREA BOUNDARY
- WATERSHED DESIGNATION
- A2 / 1.00 — SUBAREA NUMBER / SUBAREA AREA, AC
- NODE NUMBER
- 100 — FINISH GRADE/FLOW LINE ELEVATION
- 669.3 EL
- Tc=5.0min — TIME OF CONCENTRATION
- Q100=0.7cfs — DISCHARGE AT NODE
- STORM YEAR FREQUENCY
- DIRECTION OF FLOW
- L=484' — FLOW PATH OF TRAVEL & LENGTH
- (SS) — EX. SANITARY SEWER
- (DW) — EX. DOMESTIC WATER
- (SD) — EX. STORM DRAIN
- STORM DRAIN MANHOLE
- FIRE HYDRANT
- GRATE CATCH BASIN
- CURB OPENING INLET

SCALE 1"=30'

30 15 0 30 60 90

SCALE: 1"=30'

HYDROLOGY EXHIBIT

PRE-DEVELOPMENT CONDITION

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Appendix B

Rational Method Calculations (10-Yr, 100-Yr)

Pre-Development

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 04/05/19

SRI SAI RAM MANDIR
EXISTING CONDITION RATIONAL METHOD
10-YEAR DESIGN STORM FOR SUBAREA A1
ANALYZED BY PK IN APRIL 2019

Program License Serial Number 6388

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

```
Rational hydrology study storm event year is    10.0
Computed rainfall intensity:
Storm year =    10.00   1 hour rainfall =     0.944 (In.)
Slope used for rainfall intensity curve b =  0.6000
Soil antecedent moisture condition (AMC) = 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       20.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 78.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.404(In/Hr)
Initial subarea data:
Initial area flow distance =   546.000(Ft.)
Top (of initial area) elevation =   759.500(Ft.)
Bottom (of initial area) elevation =   753.500(Ft.)
Difference in elevation =     6.000(Ft.)
Slope =    0.01099  s(%)=       1.10
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.101 min.
Rainfall intensity =      2.079(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.725
Subarea runoff =      3.754(CFS)
Total initial stream area =        2.490(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.404(In/Hr)
End of computations, Total Study Area =            2.49 (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(Ap) = 1.000
Area averaged SCS curve number =  78.0
```

```
               San Bernardino County Rational Hydrology Program

                   (Hydrology Manual Date - August 1986)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2014 Version 9.0
       Rational Hydrology Study        Date: 04/05/19
------------------------------------------------------------------------
SRI SAI RAM MANDIR
EXISTING CONDITION RATIONAL METHOD
10-YEAR DESIGN STORM FOR SUBAREA A2
ANALYZED BY PK IN APRIL 2019
------------------------------------------------------------------------


Program License Serial Number 6388

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

------------------------------------------------------------------------
Rational hydrology study storm event year is    10.0
Computed rainfall intensity:
Storm year =    10.00   1 hour rainfall =     0.944 (In.)
Slope used for rainfall intensity curve b =  0.6000
Soil antecedent moisture condition (AMC) = 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       30.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 78.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.404(In/Hr)
Initial subarea data:
Initial area flow distance =   766.000(Ft.)
Top (of initial area) elevation =   759.500(Ft.)
Bottom (of initial area) elevation =   754.300(Ft.)
Difference in elevation =     5.200(Ft.)
Slope =    0.00679  s(%)=       0.68
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   20.300 min.
Rainfall intensity =      1.809(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.699
Subarea runoff =      2.959(CFS)
Total initial stream area =        2.340(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.404(In/Hr)
End of computations, Total Study Area =            2.34 (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(Ap) = 1.000
Area averaged SCS curve number =  78.0
```

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 04/05/19

SRI SAI RAM MANDIR
EXISTING CONDITION RATIONAL METHOD
100-YEAR DESIGN STORM FOR SUBAREA A1
ANALYZED BY PK IN APRIL 2019

Program License Serial Number 6388

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

```
Rational hydrology study storm event year is   100.0
Computed rainfall intensity:
Storm year =   100.00   1 hour rainfall =     1.520 (In.)
Slope used for rainfall intensity curve b =  0.6000
Soil antecedent moisture condition (AMC) = 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       20.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 78.00
Adjusted SCS curve number for AMC 3 = 92.80
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.140(In/Hr)
Initial subarea data:
Initial area flow distance =   546.000(Ft.)
Top (of initial area) elevation =   759.500(Ft.)
Bottom (of initial area) elevation =   753.500(Ft.)
Difference in elevation =     6.000(Ft.)
Slope =    0.01099  s(%)=       1.10
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.101 min.
Rainfall intensity =      3.347(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.862
Subarea runoff =      7.186(CFS)
Total initial stream area =        2.490(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.140(In/Hr)
End of computations, Total Study Area =            2.49 (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(Ap) = 1.000
Area averaged SCS curve number =  78.0
```

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 04/05/19

SRI SAI RAM MANDIR
EXISTING CONDITION RATIONAL METHOD
100-YEAR DESIGN STORM FOR SUBAREA A2
ANALYZED BY PK IN APRIL 2019

Program License Serial Number 6388

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

```
Rational hydrology study storm event year is   100.0
Computed rainfall intensity:
Storm year =   100.00   1 hour rainfall =     1.520 (In.)
Slope used for rainfall intensity curve b =  0.6000
Soil antecedent moisture condition (AMC) = 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       30.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 78.00
Adjusted SCS curve number for AMC 3 = 92.80
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.140(In/Hr)
Initial subarea data:
Initial area flow distance =   766.000(Ft.)
Top (of initial area) elevation =   759.500(Ft.)
Bottom (of initial area) elevation =   754.300(Ft.)
Difference in elevation =     5.200(Ft.)
Slope =    0.00679  s(%)=       0.68
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   20.300 min.
Rainfall intensity =      2.912(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.857
Subarea runoff =      5.838(CFS)
Total initial stream area =        2.340(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.140(In/Hr)
End of computations, Total Study Area =            2.34 (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.

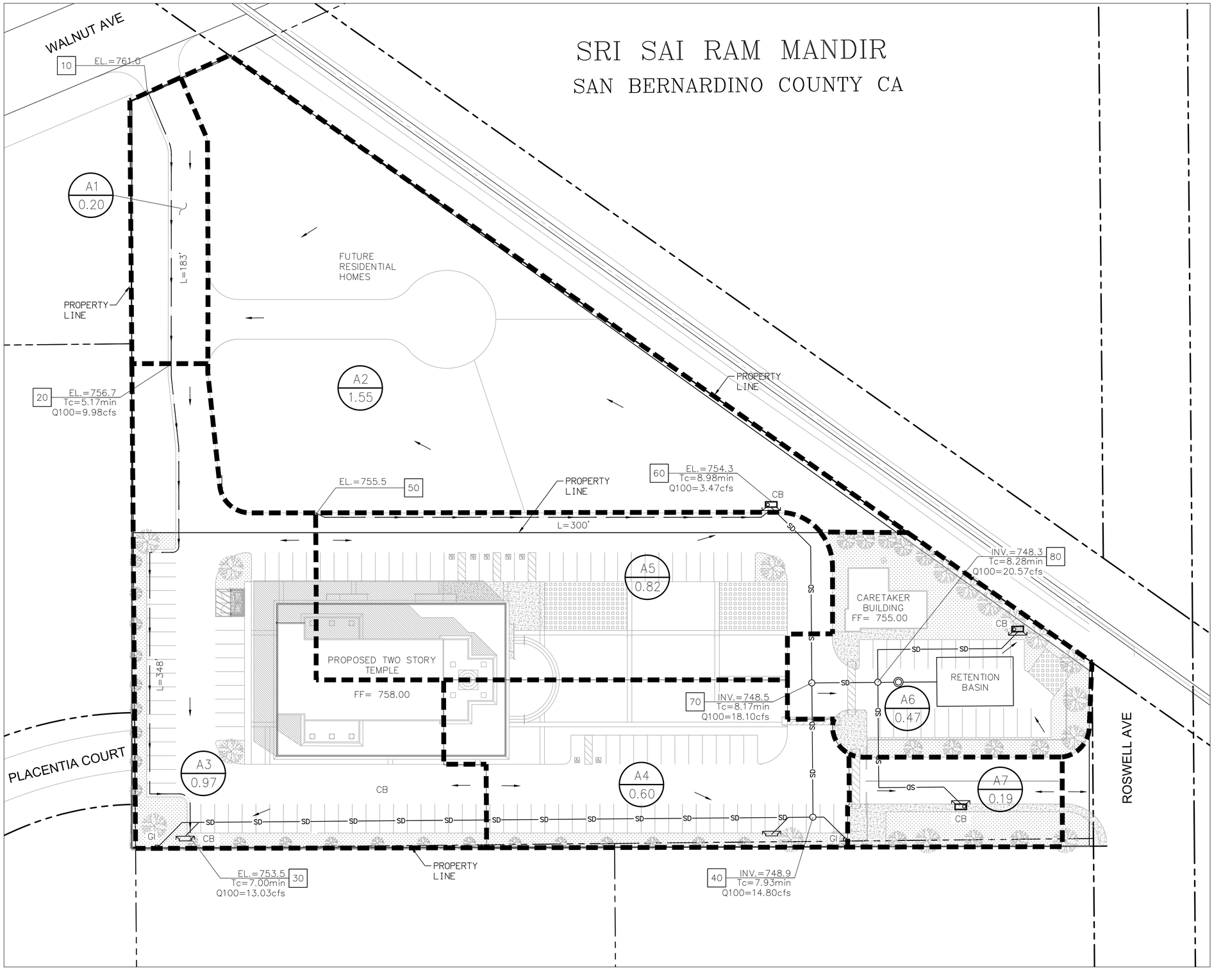
Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number =  78.0
```

Appendix C

Hydrology Map – Post-Development Condition

SRI SAI RAM MANDIR

SAN BERNARDINO COUNTY CA



LEGEND

- PROPERTY LINE
- CENTER LINE
- EXISTING RETAINING WALL
- SUBAREA BOUNDARY
- WATERSHED DESIGNATION
- SUBAREA NUMBER (A2)
- SUBAREA AREA, AC (1.00)
- NODE NUMBER (100)
- FINISH GRADE/FLOW LINE ELEVATION (669.3 EL)
- TIME OF CONCENTRATION (Tc=5.0min)
- DISCHARGE AT NODE (Q100=0.7cfs)
- STORM YEAR FREQUENCY
- DIRECTION OF FLOW
- FLOW PATH OF TRAVEL & LENGTH (L=484')
- EX. SANITARY SEWER (SS)
- EX. DOMESTIC WATER (DW)
- EX. STORM DRAIN (SD)
- STORM DRAIN MANHOLE
- FIRE HYDRANT
- GRATE INLET (GI)
- CATCH BASIN (CB)

SCALE 1"=30'

30 15 0 30 60 90

SCALE: 1"=30'

HYDROLOGY EXHIBIT
POST-DEVELOPMENT CONDITION

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Appendix D

Rational Method Calculations (10-Yr, 100-Yr)

Post-Development

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 04/04/19

SRI SAI RAM MANDIR
PROPOSED CONDITION RATIONAL METHOD
10-YEAR DESIGN STORM FOR SUBAREAS A1 THRU A7
ANALYZED BY PK IN APRIL 2019

Program License Serial Number 6388

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.944 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++
Process from Point/Station 10.000 to Point/Station 20.000
**** INITIAL AREA EVALUATION ****

COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 56.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.073(In/Hr)
Initial subarea data:
Initial area flow distance = 183.000(Ft.)
Top (of initial area) elevation = 761.000(Ft.)
Bottom (of initial area) elevation = 756.700(Ft.)
Difference in elevation = 4.300(Ft.)
Slope = 0.02350 s(%)= 2.35
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 5.172 min.
Rainfall intensity = 4.108(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.884
Subarea runoff = 0.726(CFS)
Total initial stream area = 0.200(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.073(In/Hr)

++
Process from Point/Station 20.000 to Point/Station 20.000
**** SUBAREA FLOW ADDITION ****

RESIDENTIAL(2 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 56.00
Pervious ratio(Ap) = 0.7000 Max loss rate(Fm)= 0.514(In/Hr)
Time of concentration = 5.17 min.
Rainfall intensity = 4.108(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.798
Subarea runoff = 5.015(CFS) for 1.550(Ac.)
Total runoff = 5.741(CFS)
Effective area this stream = 1.75(Ac.)
Total Study Area (Main Stream No. 1) = 1.75(Ac.)
Area averaged Fm value = 0.463(In/Hr)

++
Process from Point/Station 20.000 to Point/Station 30.000

```
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________
Top of street segment elevation =   756.700(Ft.)
End of street segment elevation =   753.500(Ft.)
Length of street segment  =   348.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  64.000(Ft.)
Distance from crown to crossfall grade break  =  62.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.050
Slope from grade break to crown (v/hz)  =   0.027
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   8.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      6.666(CFS)
Depth of flow =   0.453(Ft.), Average velocity =   2.948(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  12.615(Ft.)
Flow velocity =   2.95(Ft/s)
Travel time =    1.97 min.     TC =    7.14  min.
 Adding area flow to street
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.073(In/Hr)
Rainfall intensity =      3.386(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.814
Subarea runoff =      1.754(CFS) for    0.970(Ac.)
Total runoff =      7.495(CFS)
Effective area this stream =        2.72(Ac.)
Total Study Area (Main Stream No. 1) =        2.72(Ac.)
Area averaged Fm value =    0.324(In/Hr)
Street flow at end of street =      7.495(CFS)
Half street flow at end of street =      7.495(CFS)
Depth of flow =   0.470(Ft.), Average velocity =   3.033(Ft/s)
Flow width (from curb towards crown)=  13.217(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       30.000 to Point/Station       40.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____________________________________________________________________
Upstream point/station elevation =   751.000(Ft.)
Downstream point/station elevation =   748.940(Ft.)
Pipe length  =   412.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     7.495(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     7.495(CFS)
Normal flow depth in pipe =   13.76(In.)
Flow top width inside pipe =   15.28(In.)
Critical Depth =   12.73(In.)
Pipe flow velocity =      5.17(Ft/s)
Travel time through pipe =    1.33 min.
Time of concentration (TC) =     8.47 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       40.000 to Point/Station       40.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.073(In/Hr)
Time of concentration =     8.47 min.
Rainfall intensity =      3.057(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.818
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```
Subarea runoff =      0.805(CFS) for    0.600(Ac.)
Total runoff =      8.299(CFS)
Effective area this stream =        3.32(Ac.)
Total Study Area (Main Stream No. 1) =        3.32(Ac.)
Area averaged Fm value =    0.279(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       40.000 to Point/Station       70.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   748.940(Ft.)
Downstream point/station elevation =   748.500(Ft.)
Pipe length  =    87.80(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     8.299(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     8.299(CFS)
Normal flow depth in pipe =   11.70(In.)
Flow top width inside pipe =   23.99(In.)
Critical Depth =   12.32(In.)
Pipe flow velocity =      5.46(Ft/s)
Travel time through pipe =    0.27 min.
Time of concentration (TC) =     8.73 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       70.000 to Point/Station       70.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      3.320(Ac.)
Runoff from this stream =      8.299(CFS)
Time of concentration =    8.73 min.
Rainfall intensity =     3.000(In/Hr)
Area averaged loss rate (Fm) =    0.2790(In/Hr)
Area averaged Pervious ratio (Ap) = 0.3801
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       50.000 to Point/Station       60.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.073(In/Hr)
Initial subarea data:
Initial area flow distance =   300.000(Ft.)
Top (of initial area) elevation =   755.500(Ft.)
Bottom (of initial area) elevation =   754.300(Ft.)
Difference in elevation =     1.200(Ft.)
Slope =    0.00400  s(%)=       0.40
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.981 min.
Rainfall intensity =      2.950(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.878
Subarea runoff =      2.123(CFS)
Total initial stream area =        0.820(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.073(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       60.000 to Point/Station       70.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   751.300(Ft.)
Downstream point/station elevation =   748.500(Ft.)
Pipe length  =   125.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     2.123(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     2.123(CFS)
Normal flow depth in pipe =    4.29(In.)
Flow top width inside pipe =   15.34(In.)
```

```
Critical Depth =    6.60(In.)
Pipe flow velocity =      6.57(Ft/s)
Travel time through pipe =    0.32 min.
Time of concentration (TC) =     9.30 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       70.000 to Point/Station       70.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.820(Ac.)
Runoff from this stream =      2.123(CFS)
Time of concentration =    9.30 min.
Rainfall intensity =     2.890(In/Hr)
Area averaged loss rate (Fm) =    0.0734(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min)  (In/Hr)     (In/Hr)


1      8.30     3.320      8.73    0.279      3.000
2      2.12     0.820      9.30    0.073      2.890
Qmax(1) =
          1.000 *    1.000 *     8.299) +
          1.039 *    0.939 *     2.123) + =      10.372
Qmax(2) =
          0.959 *    1.000 *     8.299) +
          1.000 *    1.000 *     2.123) + =      10.086

Total of 2 main streams to confluence:
Flow rates before confluence point:
       9.299       3.123
Maximum flow rates at confluence using above data:
       10.372       10.086
Area of streams before confluence:
        3.320        0.820
Effective area values after confluence:
        4.090        4.140


Results of confluence:
Total flow rate =     10.372(CFS)
Time of concentration =     8.735 min.
Effective stream area after confluence  =      4.090(Ac.)
Study area average Pervious fraction(Ap) =  0.325
Study area average soil loss rate(Fm) =    0.238(In/Hr)
Study area total =       4.14(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       70.000 to Point/Station       80.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   748.500(Ft.)
Downstream point/station elevation =   748.300(Ft.)
Pipe length  =    43.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    10.372(CFS)
Given pipe size =     36.00(In.)
Calculated individual pipe flow  =    10.372(CFS)
Normal flow depth in pipe =   11.21(In.)
Flow top width inside pipe =   33.34(In.)
Critical Depth =   12.23(In.)
Pipe flow velocity =      5.52(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =     8.86 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       80.000 to Point/Station       80.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
```

```
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.073(In/Hr)
Time of concentration =     8.86 min.
Rainfall intensity =      2.974(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.833
Subarea runoff =      0.924(CFS) for    0.470(Ac.)
Total runoff =     11.296(CFS)
Effective area this stream =        4.56(Ac.)
Total Study Area (Main Stream No. 1) =        4.61(Ac.)
Area averaged Fm value =    0.221(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       80.000 to Point/Station       80.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.073(In/Hr)
Time of concentration =     8.86 min.
Rainfall intensity =      2.974(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.835
Subarea runoff =      0.496(CFS) for    0.190(Ac.)
Total runoff =     11.792(CFS)
Effective area this stream =        4.75(Ac.)
Total Study Area (Main Stream No. 1) =        4.80(Ac.)
Area averaged Fm value =    0.215(In/Hr)
End of computations, Total Study Area =            4.80 (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(Ap) = 0.294
Area averaged SCS curve number =  56.0
```

```
               San Bernardino County Rational Hydrology Program

                    (Hydrology Manual Date - August 1986)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2014 Version 9.0
       Rational Hydrology Study        Date: 04/04/19
----------------------------------------------------------------------
SRI SAI RAM MANDIR
PROPOSED CONDITION RATIONAL METHOD
100-YEAR DESIGN STORM FOR SUBAREAS A1 THRU A7
ANALYZED BY PK IN APRIL 2019
----------------------------------------------------------------------


Program License Serial Number 6388

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

----------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
Computed rainfall intensity:
Storm year =   100.00   1 hour rainfall =     1.520 (In.)
Slope used for rainfall intensity curve b =  0.6000
Soil antecedent moisture condition (AMC) = 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       20.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Adjusted SCS curve number for AMC 3 = 75.80
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.044(In/Hr)
Initial subarea data:
Initial area flow distance =   183.000(Ft.)
Top (of initial area) elevation =   761.000(Ft.)
Bottom (of initial area) elevation =   756.700(Ft.)
Difference in elevation =     4.300(Ft.)
Slope =    0.02350  s(%)=       2.35
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.172 min.
Rainfall intensity =      6.615(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.894
Subarea runoff =      1.183(CFS)
Total initial stream area =        0.200(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.044(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station       20.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
RESIDENTIAL(2 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Adjusted SCS curve number for AMC 3 = 75.80
Pervious ratio(Ap) = 0.7000     Max loss rate(Fm)=     0.308(In/Hr)
Time of concentration =     5.17 min.
Rainfall intensity =      6.615(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.862
Subarea runoff =      8.799(CFS) for    1.550(Ac.)
Total runoff =      9.981(CFS)
Effective area this stream =        1.75(Ac.)
Total Study Area (Main Stream No. 1) =        1.75(Ac.)
Area averaged Fm value =    0.278(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station       30.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   756.700(Ft.)
End of street segment elevation =   753.500(Ft.)
Length of street segment  =   348.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  64.000(Ft.)
Distance from crown to crossfall grade break  =  62.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.050
Slope from grade break to crown (v/hz)  =   0.027
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   8.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     11.545(CFS)
Depth of flow =   0.546(Ft.), Average velocity =   3.174(Ft/s)
Warning: depth of flow exceeds top of curb
Distance that curb overflow reaches into property =    2.29(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  16.039(Ft.)
Flow velocity =   3.17(Ft/s)
Travel time =    1.83 min.     TC =    7.00  min.
 Adding area flow to street
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Adjusted SCS curve number for AMC 3 = 75.80
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.044(In/Hr)
Rainfall intensity =      5.517(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.868
Subarea runoff =      3.048(CFS) for    0.970(Ac.)
Total runoff =     13.030(CFS)
Effective area this stream =        2.72(Ac.)
Total Study Area (Main Stream No. 1) =        2.72(Ac.)
Area averaged Fm value =    0.194(In/Hr)
Street flow at end of street =     13.030(CFS)
Half street flow at end of street =     13.030(CFS)
Depth of flow =   0.568(Ft.), Average velocity =   3.203(Ft/s)
Warning: depth of flow exceeds top of curb
Distance that curb overflow reaches into property =    3.40(Ft.)
Flow width (from curb towards crown)=  16.865(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       30.000 to Point/Station       40.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   751.000(Ft.)
Downstream point/station elevation =   748.940(Ft.)
Pipe length  =   412.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    13.030(CFS)
Given pipe size =     18.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     4.606(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      5.400(Ft.)
 Minor friction loss =      1.266(Ft.)       K-factor =   1.50
Pipe flow velocity =      7.37(Ft/s)
Travel time through pipe =    0.93 min.
Time of concentration (TC) =     7.93 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       40.000 to Point/Station       40.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
```

```
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Adjusted SCS curve number for AMC 3 = 75.80
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.044(In/Hr)
Time of concentration =     7.93 min.
Rainfall intensity =      5.119(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.871
Subarea runoff =      1.765(CFS) for    0.600(Ac.)
Total runoff =     14.795(CFS)
Effective area this stream =        3.32(Ac.)
Total Study Area (Main Stream No. 1) =        3.32(Ac.)
Area averaged Fm value =    0.167(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       40.000 to Point/Station       70.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   748.940(Ft.)
Downstream point/station elevation =   748.500(Ft.)
Pipe length  =    87.80(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    14.795(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    14.795(CFS)
Normal flow depth in pipe =   17.04(In.)
Flow top width inside pipe =   21.78(In.)
Critical Depth =   16.63(In.)
Pipe flow velocity =      6.20(Ft/s)
Travel time through pipe =    0.24 min.
Time of concentration (TC) =     8.17 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       70.000 to Point/Station       70.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      3.320(Ac.)
Runoff from this stream =     14.795(CFS)
Time of concentration =    8.17 min.
Rainfall intensity =     5.029(In/Hr)
Area averaged loss rate (Fm) =    0.1672(In/Hr)
Area averaged Pervious ratio (Ap) = 0.3801
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       50.000 to Point/Station       60.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Adjusted SCS curve number for AMC 3 = 75.80
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.044(In/Hr)
Initial subarea data:
Initial area flow distance =   300.000(Ft.)
Top (of initial area) elevation =   755.500(Ft.)
Bottom (of initial area) elevation =   754.300(Ft.)
Difference in elevation =     1.200(Ft.)
Slope =    0.00400  s(%)=       0.40
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.981 min.
Rainfall intensity =      4.751(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.892
Subarea runoff =      3.473(CFS)
Total initial stream area =        0.820(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.044(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       60.000 to Point/Station       70.000
```

```
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____________________________________________________________________
Upstream point/station elevation =   751.300(Ft.)
Downstream point/station elevation =   748.500(Ft.)
Pipe length  =   125.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     3.473(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     3.473(CFS)
Normal flow depth in pipe =    5.51(In.)
Flow top width inside pipe =   16.59(In.)
Critical Depth =    8.54(In.)
Pipe flow velocity =      7.57(Ft/s)
Travel time through pipe =    0.28 min.
Time of concentration (TC) =     9.26 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       70.000 to Point/Station       70.000
**** CONFLUENCE OF MAIN STREAMS ****
_____________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.820(Ac.)
Runoff from this stream =      3.473(CFS)
Time of concentration =    9.26 min.
Rainfall intensity =     4.665(In/Hr)
Area averaged loss rate (Fm) =    0.0440(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1     14.79     3.320      8.17    0.167      5.029
2      3.47     0.820      9.26    0.044      4.665
Qmax(1) =
          1.000 *    1.000 *    14.795) +
          1.079 *    0.882 *     3.473) + =      18.101
Qmax(2) =
          0.925 *    1.000 *    14.795) +
          1.000 *    1.000 *     3.473) + =      17.160

Total of 2 main streams to confluence:
Flow rates before confluence point:
      15.795       4.473
Maximum flow rates at confluence using above data:
       18.101       17.160
Area of streams before confluence:
        3.320        0.820
Effective area values after confluence:
        4.043        4.140


Results of confluence:
Total flow rate =     18.101(CFS)
Time of concentration =     8.167 min.
Effective stream area after confluence  =      4.043(Ac.)
Study area average Pervious fraction(Ap) =  0.325
Study area average soil loss rate(Fm) =    0.143(In/Hr)
Study area total =       4.14(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       70.000 to Point/Station       80.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____________________________________________________________________
Upstream point/station elevation =   748.500(Ft.)
Downstream point/station elevation =   748.300(Ft.)
Pipe length  =    43.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    18.101(CFS)
Given pipe size =     36.00(In.)
Calculated individual pipe flow  =    18.101(CFS)
Normal flow depth in pipe =   15.09(In.)
Flow top width inside pipe =   35.53(In.)
Critical Depth =   16.34(In.)
Pipe flow velocity =      6.44(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =     8.28 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       80.000 to Point/Station       80.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Adjusted SCS curve number for AMC 3 = 75.80
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.044(In/Hr)
Time of concentration =     8.28 min.
Rainfall intensity =      4.989(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.876
Subarea runoff =      1.625(CFS) for    0.470(Ac.)
Total runoff =     19.726(CFS)
Effective area this stream =        4.51(Ac.)
Total Study Area (Main Stream No. 1) =        4.61(Ac.)
Area averaged Fm value =    0.133(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       80.000 to Point/Station       80.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Adjusted SCS curve number for AMC 3 = 75.80
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.044(In/Hr)
Time of concentration =     8.28 min.
Rainfall intensity =      4.989(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.877
Subarea runoff =      0.846(CFS) for    0.190(Ac.)
Total runoff =     20.572(CFS)
Effective area this stream =        4.70(Ac.)
Total Study Area (Main Stream No. 1) =        4.80(Ac.)
Area averaged Fm value =    0.129(In/Hr)
End of computations, Total Study Area =            4.80 (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(Ap) = 0.294
Area averaged SCS curve number =  56.0
```

Appendix E

Rainfall Intensity Data

NOAA Atlas 14, Volume 6, Version 2
Location name: Chino, California, USA*
Latitude: 34.0244°, Longitude: -117.72°
Elevation: 762.85 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_&_aerials

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	0.120 (0.100-0.145)	0.156 (0.130-0.189)	0.206 (0.171-0.250)	0.247 (0.204-0.303)	0.305 (0.243-0.387)	0.351 (0.273-0.455)	0.398 (0.302-0.530)	0.449 (0.331-0.615)	0.520 (0.367-0.744)	0.576 (0.392-0.855)
10-min	0.172 (0.143-0.208)	0.224 (0.187-0.272)	0.295 (0.245-0.358)	0.354 (0.292-0.434)	0.437 (0.348-0.554)	0.503 (0.391-0.652)	0.571 (0.434-0.760)	0.644 (0.474-0.882)	0.745 (0.526-1.07)	0.826 (0.563-1.23)
15-min	0.208 (0.173-0.251)	0.271 (0.226-0.328)	0.357 (0.297-0.433)	0.428 (0.353-0.525)	0.528 (0.421-0.670)	0.608 (0.473-0.788)	0.691 (0.524-0.919)	0.778 (0.574-1.07)	0.901 (0.636-1.29)	0.999 (0.680-1.48)
30-min	0.307 (0.256-0.371)	0.401 (0.334-0.485)	0.527 (0.439-0.640)	0.633 (0.522-0.776)	0.781 (0.622-0.991)	0.899 (0.700-1.17)	1.02 (0.775-1.36)	1.15 (0.848-1.58)	1.33 (0.940-1.91)	1.48 (1.01-2.19)
60-min	0.458 (0.382-0.554)	0.598 (0.498-0.724)	0.786 (0.654-0.955)	0.944 (0.778-1.16)	1.17 (0.927-1.48)	1.34 (1.04-1.74)	1.52 (1.16-2.03)	1.72 (1.26-2.35)	1.99 (1.40-2.84)	2.20 (1.50-3.27)
2-hr	0.688 (0.574-0.832)	0.897 (0.748-1.09)	1.17 (0.973-1.42)	1.39 (1.15-1.71)	1.69 (1.35-2.15)	1.93 (1.50-2.50)	2.16 (1.64-2.88)	2.41 (1.77-3.30)	2.74 (1.93-3.92)	3.00 (2.04-4.45)
3-hr	0.873 (0.729-1.06)	1.14 (0.947-1.38)	1.48 (1.23-1.79)	1.75 (1.44-2.14)	2.12 (1.69-2.69)	2.40 (1.87-3.11)	2.69 (2.04-3.57)	2.98 (2.19-4.08)	3.37 (2.38-4.83)	3.68 (2.51-5.46)
6-hr	1.22 (1.02-1.47)	1.58 (1.32-1.92)	2.05 (1.70-2.49)	2.42 (2.00-2.97)	2.92 (2.33-3.71)	3.30 (2.57-4.28)	3.68 (2.80-4.90)	4.08 (3.00-5.58)	4.60 (3.25-6.58)	5.01 (3.41-7.43)
12-hr	1.61 (1.34-1.95)	2.09 (1.74-2.53)	2.72 (2.26-3.30)	3.22 (2.66-3.95)	3.91 (3.11-4.96)	4.43 (3.45-5.74)	4.96 (3.76-6.60)	5.50 (4.06-7.54)	6.24 (4.41-8.93)	6.82 (4.64-10.1)
24-hr	2.10 (1.86-2.42)	2.75 (2.43-3.18)	3.62 (3.19-4.19)	4.33 (3.78-5.05)	5.30 (4.49-6.39)	6.06 (5.03-7.46)	6.85 (5.54-8.63)	7.66 (6.04-9.92)	8.78 (6.64-11.8)	9.66 (7.07-13.5)
2-day	2.57 (2.27-2.96)	3.42 (3.02-3.95)	4.58 (4.03-5.30)	5.55 (4.85-6.47)	6.91 (5.85-8.33)	8.00 (6.63-9.84)	9.13 (7.40-11.5)	10.3 (8.14-13.4)	12.0 (9.09-16.2)	13.4 (9.78-18.7)
3-day	2.78 (2.46-3.21)	3.76 (3.32-4.34)	5.08 (4.48-5.89)	6.21 (5.43-7.25)	7.81 (6.61-9.41)	9.09 (7.54-11.2)	10.4 (8.45-13.2)	11.9 (9.36-15.4)	13.9 (10.5-18.8)	15.6 (11.4-21.7)
4-day	3.02 (2.67-3.48)	4.10 (3.62-4.73)	5.58 (4.92-6.46)	6.83 (5.97-7.97)	8.60 (7.28-10.4)	10.0 (8.31-12.3)	11.5 (9.32-14.5)	13.1 (10.3-17.0)	15.4 (11.6-20.7)	17.2 (12.6-24.0)
7-day	3.44 (3.04-3.96)	4.69 (4.15-5.42)	6.39 (5.63-7.40)	7.81 (6.83-9.11)	9.79 (8.29-11.8)	11.4 (9.42-14.0)	13.0 (10.5-16.4)	14.7 (11.6-19.0)	17.1 (12.9-23.1)	19.0 (13.9-26.5)
10-day	3.75 (3.32-4.33)	5.14 (4.55-5.94)	7.00 (6.17-8.11)	8.55 (7.47-9.97)	10.7 (9.05-12.9)	12.4 (10.3-15.2)	14.1 (11.4-17.8)	15.9 (12.6-20.7)	18.5 (14.0-24.9)	20.5 (15.0-28.6)
20-day	4.52 (4.00-5.21)	6.26 (5.53-7.22)	8.59 (7.57-9.94)	10.5 (9.21-12.3)	13.2 (11.2-15.9)	15.3 (12.7-18.9)	17.5 (14.2-22.1)	19.9 (15.6-25.7)	23.1 (17.4-31.1)	25.6 (18.7-35.7)
30-day	5.39 (4.77-6.21)	7.48 (6.62-8.64)	10.3 (9.10-12.0)	12.7 (11.1-14.8)	16.1 (13.6-19.4)	18.7 (15.5-23.1)	21.5 (17.4-27.1)	24.5 (19.3-31.7)	28.6 (21.6-38.6)	31.9 (23.4-44.6)
45-day	6.39 (5.66-7.37)	8.85 (7.82-10.2)	12.2 (10.8-14.2)	15.1 (13.2-17.7)	19.3 (16.3-23.3)	22.7 (18.8-27.9)	26.2 (21.2-33.0)	30.0 (23.7-38.9)	35.5 (26.9-47.9)	40.0 (29.2-55.8)
60-day	7.37 (6.52-8.50)	10.1 (8.94-11.7)	14.0 (12.3-16.2)	17.3 (15.2-20.2)	22.2 (18.8-26.8)	26.2 (21.8-32.3)	30.6 (24.7-38.5)	35.3 (27.8-45.7)	42.1 (31.9-56.9)	47.8 (35.0-66.7)

[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.

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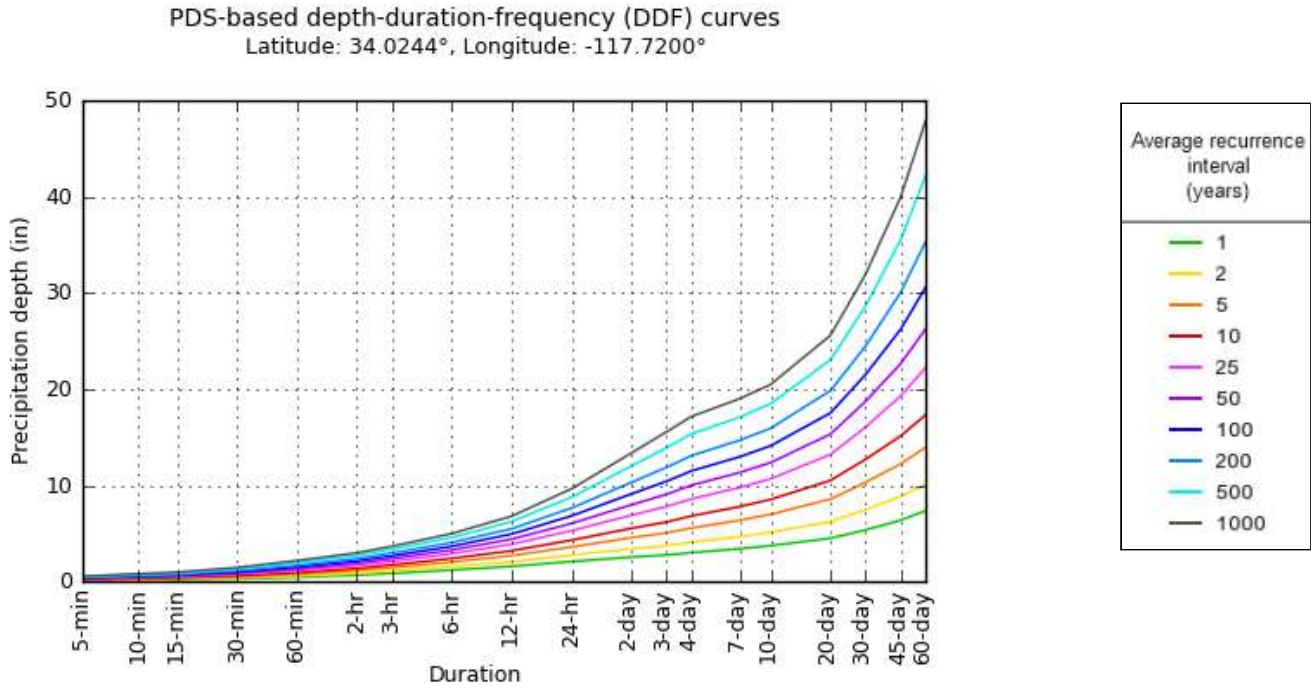
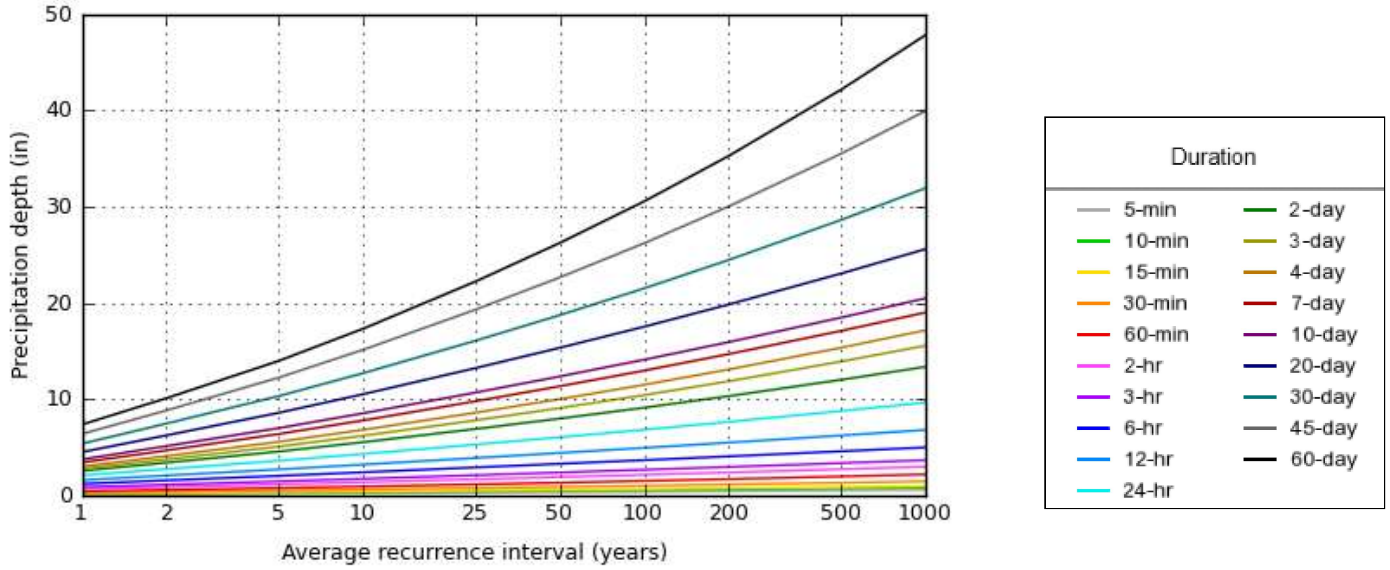
PF graphical





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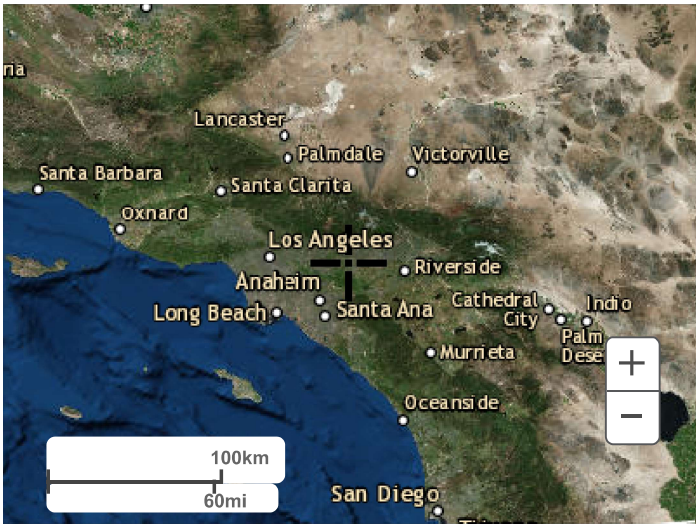
Maps & aerials

Small scale terrain

Large scale terrain

Large scale map

Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Appendix F

Soils Map

United States Department of Agriculture

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for San Bernardino County Southwestern Part, California

Sri Sai Ram Mandir Site

April 15, 2019

Custom Soil Resource Report
Soil Map

Map Scale: 1:1,310 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Bernardino County Southwestern Part, California
Survey Area Data: Version 10, Sep 12, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 5, 2015—Jan 18, 2015

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Gr	Grangeville fine sandy loam, warm MAAT, MLRA 19	4.7	94.8%
Hr	Hilmar loamy fine sand	0.3	5.2%
Totals for Area of Interest		**4.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

San Bernardino County Southwestern Part, California

Gr—Grangeville fine sandy loam, warm MAAT, MLRA 19

Map Unit Setting

National map unit symbol: 2vncy
Elevation: 490 to 1,430 feet
Mean annual precipitation: 11 to 17 inches
Mean annual air temperature: 64 to 66 degrees F
Frost-free period: 271 to 365 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Grangeville and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Grangeville

Setting

Landform: Flood plains, alluvial fans
Landform position (two-dimensional): Toeslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

A - 0 to 12 inches: fine sandy loam
C - 12 to 79 inches: fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum in profile: 2 percent
Salinity, maximum in profile: Very slightly saline to slightly saline (2.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 3.0
Available water storage in profile: Moderate (about 7.9 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 3c
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Unnamed, hydric

Percent of map unit: 5 percent

Landform: Depressions, alluvial fans, flood plains
Landform position (two-dimensional): Toeslope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

San emigdio, fine sandy loam
Percent of map unit: 5 percent
Landform: Alluvial fans, flood plains
Landform position (two-dimensional): Toeslope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Chino
Percent of map unit: 5 percent
Landform: Flood plains, alluvial fans
Landform position (two-dimensional): Toeslope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Hr—Hilmar loamy fine sand

Map Unit Setting
National map unit symbol: hck6
Elevation: 540 to 890 feet
Mean annual precipitation: 11 to 15 inches
Mean annual air temperature: 63 to 65 degrees F
Frost-free period: 320 to 365 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition
Hilmar and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hilmar

Setting
Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile
A - 0 to 13 inches: loamy fine sand
C1 - 13 to 16 inches: loamy sand
C2 - 16 to 23 inches: loamy sand
2C - 23 to 60 inches: stratified loam to sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Available water storage in profile: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Delhi

Percent of map unit: 10 percent
Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Tujunga, loamy sand

Percent of map unit: 5 percent
Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No