Appendix H-2
Preliminary Hydrology Report

PRELIMINARY HYDROLOGY REPORT

FOR

OAKMONT - MISSION AT RAMONA INDUSTRIAL

APN 1012-151-20, 27, 28, 29, and 1012-161-01, 02, 03, 04, 05

PROJECT LOCATION

NW Corner of Mission Boulevard and Ramona Avenue
Montclair, CA

DEVELOPER

Mission Boulevard Industrial Owner, L.P.
3520 Piedmont Road Suite 100
Atlanta, GA 30305
949-215-3796

PREPARED BY:

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_____
David White, P.E.
C52921, Exp 12/31/2020

PREPARATION DATE

October 30, 2020

HZ PROJECT NUMBER

R310995.01

Table of Contents

List of Appendices

Introduction
This preliminary drainage report has been prepared for Mission Boulevard Industrial Owner, L.P. The project is a new development of eight industrial warehouses located at the northwest corner of Mission Boulevard and Ramona Avenue in the City of Montclair, CA. The proposed buildings total approximately 523,300 square feet in size on approximately 27.7 acres of land.

Purpose
The purpose of this report is to present the drainage concept for the project and to determine the design flow rates that will be needed for the project site. The hydrology maps and calculations reflect the tributary areas and Q_{100} flows.

Existing Condition
The existing land is currently occupied primarily by a drive-in movie theater. Majority of the site is an open paved lot. In the northwest of the site is an industrial building and a large storage yard. The maximum elevation, located in the northeast corner of the property, is approximately ±925 feet mean sea level (msl). The minimum elevation, located in the southwest corner of the property, is approximately ±903 feet msl. The project site slope ranges from 1.0 -1.7% downward from the north to the south, and has three different outlet points at the southwest, center south, and southeast edges of the property.

Existing runoff from the northeast (EX1) of the site exits onto Ramona Avenue is collected by a curb inlet catch basin at the northwest corner of Mission Blvd and Ramona Ave, which leads to a storm drain on Mission Blvd. Existing runoff from the central (EX2A), southeast (EX2B), and west (EX3A & EX3B) discharges to center south and southeast outlet points and is collected by curb inlet catch basins in Mission Blvd on the southeast side of the project site. The runoff then conveys to the Mission Blvd 66" public storm drain and ultimately charges the San Antonia Creek. See Appendix A for existing condition hydrology map.

Discussion
For the proposed condition, the project will be separated into four drainage areas, northeast & northwest sides of 3rd Street, 3rd Street, and south side of 3rd Street. Proposed runoff from these areas will be directed to three on-site underground infiltration system 1, 2, and 3. System 1 and 2 are located on the north side of the 3rd Street between the proposed building 1 and 2. System 3 will be placed on the south side of 3rd Street in the center of the south drainage area. See Appendix A for proposed on-site hydrology map.

Runoff from the northeast drainage area (Area A) will be collected by catch basin (CB) #1, #2, & #3 and discharged to the underground system 1 through the proposed storm drain Line A.

Runoff from the northwest drainage area (Area B) will be collected by CB#4, #5, & #6 and discharged to the underground system 2 through the proposed storm drain Line B.

Runoff from the 3rd Street (Area C) will be collected by CB#7 & #8 through storm drain Line C and join to Line A.

Runoff from the south side of 3rd Street (Area D) will be directed to CB#9 & #10 and discharged to the underground system 3 through storm drain Line D.

The overflow from the infiltration system 1, 2, and 3, in excess of the design capture volume, will be allowed to discharge to an existing 66" storm drain in Mission Blvd through the storm drain Line A.

Hydrologic Analysis
The hydrologic analysis has been prepared in accordance with the San Bernardino County Flood Control District Hydrology Manual Rational Method using the CIVILD 2014 software for San Bernardino County. CIVILD hydrology calculations are included in Appendix B and indicate flow data at each node.

The 100-year, 1-hour rainfall rate was taken from the NOAA Precipitation Frequency Data Server. The hydrologic soils type for the site is "B" and was taken from the soil map in the Hydrology Manual (see Appendix C for reference maps). A "commercial" land use was used for the project site with an AMC of III for the proposed condition.

Results
The total the underground infiltration systems provide is 107,450 cf of storage for water quality purpose. The existing conditions resulted in a Q100 of 100.3 cfs while the proposed conditions resulted in a Q100 of 104.6 cfs, see Appendix B for rational method calculations.

All proposed project site drainage and storm drain facilities will be sized adequately for 100-year storm event. Additional calculations, including parkway culvert, on-site storm drain hydraulics, and catch basin sizing, will be provided in the final drainage report.

Appendix A
Preliminary Hydrology Map

LEGEND

- ② — HYDROLOGY MODEL NODE NUMBER
- A-11 / 7.40 Ac — TRIBUTARY AREA IN ACRES
- L=67.9' — LENGTH OF FLOW
- ·-·-·- — DRAINAGE BOUNDARY
- ▭ — DRAINAGE INLET/CATCH BASIN (CB)
- ═══ — PROPOSED STORM DRAIN
- ⇐ — FLOW DIRECTION
- CB — CATCH BASIN
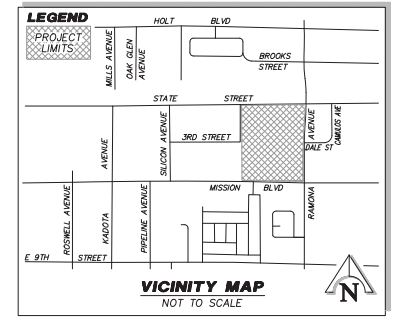
VICINITY MAP
NOT TO SCALE

STATE STREET

THIRD STREET

DALE STREET

RAMONA AVENUE

MISSION BOULEVARD

EX1 2.7 AC — INITIAL AREA
L=1000'

EX3A 6.2 AC — L=903'

EX2A 8.5 AC — L=1000'

EX3B 3.1 AC — L=520'

EX2B 6.8 AC — L=310'

31 922.2 FG INITIAL AREA
21 INITIAL AREA
923.5 FS
924.7 FG INITIAL AREA
① 1

32 909.0 FS / Q100=23.7 CFS
33 903.4 FS / Q100=10.2 CFS / Σ Q100=33.9 CFS
23 904.8 FS / Q100=24.2 CFS / Σ Q100=56.1 CFS
22 908.0 FS / Q100=31.9 CFS
② 907.5 FS / Q100=10.3 CFS

EX. 66" STORM DRAIN

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0 30 60 120 180
SCALE 1" = 60'
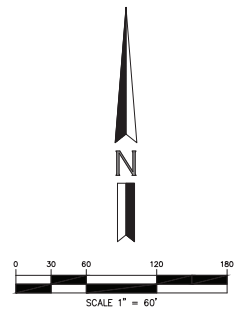
PRELIMINARY HYDROLOGY MAP - EXISTING CONDITION
FOR
OAKMONT - MISSION AT RAMONA
NW CORNER OF MISSION BLVD AND RAMONA AVE
CITY OF MONTCLAIR

HUITT-ZOLLARS
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DESIGNED BY: D.L.W.
DRAWN BY: H-Z STAFF
CHECKED BY: J.M.
FIELD BOOK:
JOB NO.: 310995.01

SHEET 1 OF 1 SHEETS

STATE STREET

THIRD STREET

MISSION BOULEVARD

RAMONA AVENUE

BUILDING 1
BUILDING 2
BUILDING 3
BUILDING 4
BUILDING 5
BUILDING 6
BUILDING 7
BUILDING 8

48" CMP INFILTRATION SYSTEM 2 (74'x144')
905.00 SOFFIT
901.00 INVERT

48" CMP INFILTRATION SYSTEM 1 (56'x121')
909.00 SOFFIT
905.00 INVERT

48" CMP INFILTRATION SYSTEM 3 (116'x133')
900.00 SOFFIT
896.00 INVERT

B3 3.29 AC
A3 3.83 AC
B1 4.09 AC
B2 1.02 AC
A2 0.74 AC
A1 0.65 AC
C1 0.78 AC
C2 0.72 AC
D2 5.01 AC
D1 6.15 AC

STORM DRAIN LINE A
STORM DRAIN LINE B
STORM DRAIN LINE C
STORM DRAIN LINE D
STORM DRAIN LINE E

CB#1 CB#2 CB#3 CB#4 CB#5 CB#6 CB#7 CB#8 CB#9 CB#10

LEGEND

NO. — HYDROLOGY MODEL NODE NUMBER
A-11 / 7.40 Ac — TRIBUTARY AREA IN ACRES
L=67.3' — LENGTH OF FLOW
•—•—• DRAINAGE BOUNDARY
▭ DRAINAGE INLET/CATCH BASIN (CB)
—SD— PROPOSED STORM DRAIN
⇐ FLOW DIRECTION
CB CATCH BASIN

VICINITY MAP
NOT TO SCALE

LEGEND
PROJECT LIMITS

HOLT BLVD
BROOKS STREET
STATE STREET
3RD STREET
MISSION BLVD
OAK GLEN AVENUE
MILLS AVENUE
SILCON AVENUE
ROSWELL AVENUE
KADOTA AVENUE
PIPELINE AVENUE
RAMONA AVE
BENSON AVE
E. 9TH STREET

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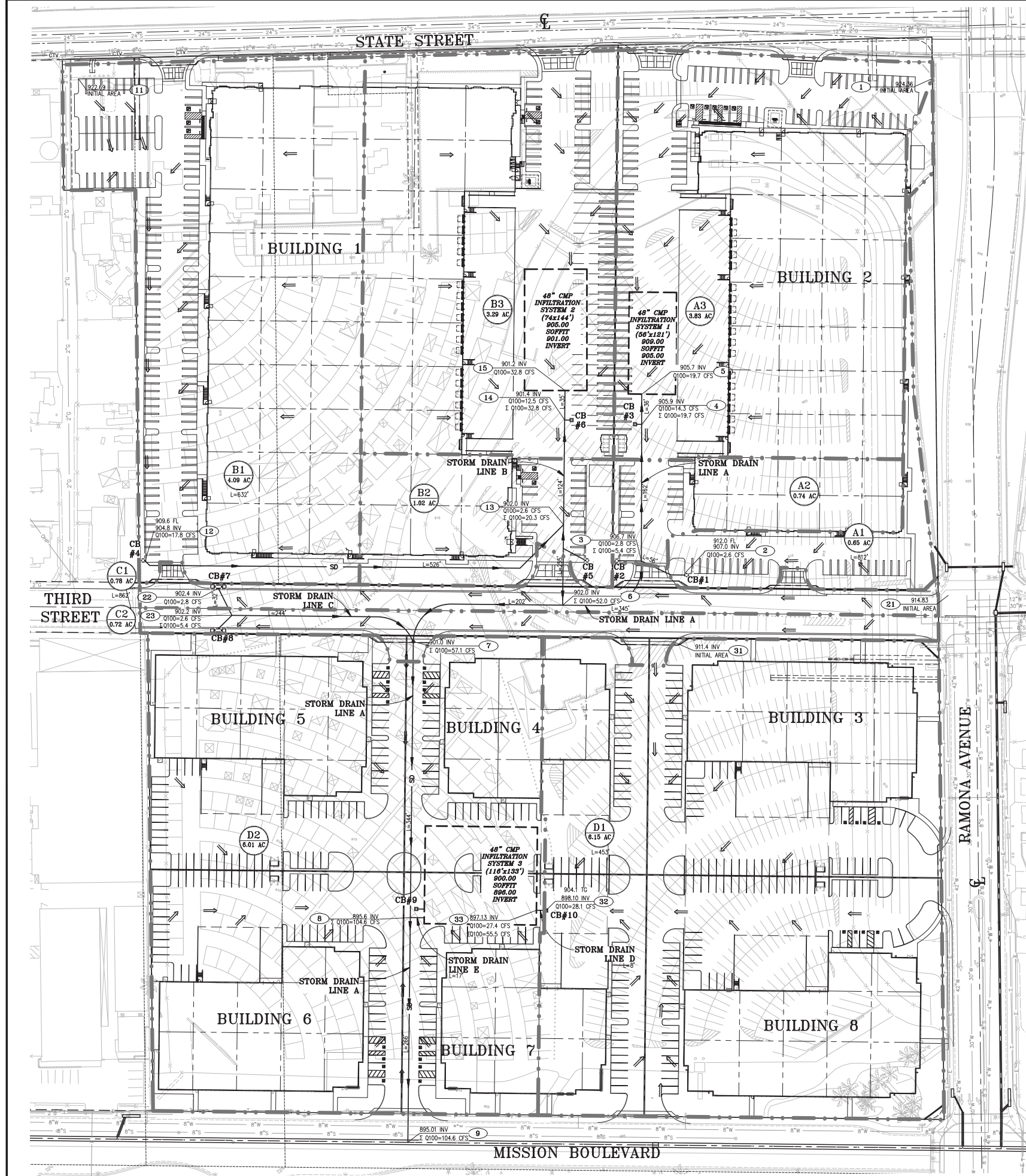CONTACT: JOHN ATWELL
EMAIL: JATWELL@OAKMONTRE.COM

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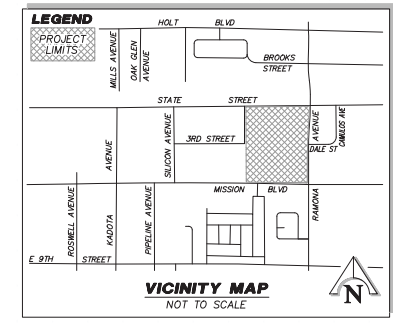PHONE: (909) 941-7799
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SCALE 1" = 50'
0 25 50 100 150

N

PRELIMINARY HYDROLOGY MAP - PROPOSED CONDITION
FOR
OAKMONT - MISSION AT RAMONA
NW CORNER OF MISSION BLVD AND RAMONA AVE
CITY OF MONTCLAIR

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DRAWN BY: H-Z STAFF
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SHEET 1 OF 1 SHEETS
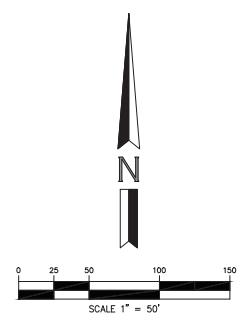
Appendix B

100-year Rational Method Hydrologic Analysis

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                  San Bernardino County Rational Hydrology Program

                       (Hydrology Manual Date - August 1986)

       CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2005 Version 7.1
            Rational Hydrology Study        Date: 04/21/20
    ------------------------------------------------------------------------
    OAKMONT - MISSION AT RAMONA
    100 YEAR RATIONAL METHOD
    0995Q100E1
    EXISTING CONDITION
    ------------------------------------------------------------------------


    Program License Serial Number 6145

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

    ------------------------------------------------------------------------
    Rational hydrology study storm event year is   100.0
    Computed rainfall intensity:
    Storm year =   100.00   1 hour rainfall =     1.530 (In.)
    Slope used for rainfall intensity curve b =  0.6000
    Soil antecedent moisture condition (AMC) = 3


    +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
    Process from Point/Station        1.000 to Point/Station       2.000
    **** 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 = 1000.000(Ft.)
    Top (of initial area) elevation =   924.700(Ft.)
    Bottom (of initial area) elevation =   907.500(Ft.)
    Difference in elevation =    17.200(Ft.)
    Slope =    0.01720  s(%)=      1.72
    TC = k(0.304)*[(length^3)/(elevation change)]^0.2
    Initial area time of concentration =   10.858 min.
    Rainfall intensity =      4.267(In/Hr) for a   100.0 year storm
    Effective runoff coefficient used for area (Q=KCIA) is C = 0.891
    Subarea runoff =      10.262(CFS)
    Total initial stream area =       2.700(Ac.)
    Pervious area fraction = 0.100
    Initial area Fm value =    0.044(In/Hr)
    End of computations, Total Study Area =          2.70 (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) = 0.100
    Area averaged SCS curve number =  56.0
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                San Bernardino County Rational Hydrology Program

                    (Hydrology Manual Date - August 1986)

     CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2005 Version 7.1
          Rational Hydrology Study        Date: 04/21/20
    -------------------------------------------------------------------
    OAKMONT - MISSION AT RAMONA
    100 YEAR RATIONAL METHOD
    0995Q100E2
    EXISTING CONDITION
    -------------------------------------------------------------------


    Program License Serial Number 6145


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

    -------------------------------------------------------------------
    Rational hydrology study storm event year is   100.0
    Computed rainfall intensity:
    Storm year =   100.00   1 hour rainfall =     1.530 (In.)
    Slope used for rainfall intensity curve b =  0.6000
    Soil antecedent moisture condition (AMC) = 3



    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
    Process from Point/Station       21.000 to Point/Station       22.000
    **** 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 = 1000.000(Ft.)
    Top (of initial area) elevation =   923.500(Ft.)
    Bottom (of initial area) elevation =    908.000(Ft.)
    Difference in elevation =    15.500(Ft.)
    Slope =    0.01550  s(%)=       1.55
    TC = k(0.304)*[(length^3)/(elevation change)]^0.2
    Initial area time of concentration =   11.087 min.
    Rainfall intensity =      4.214(In/Hr) for a   100.0 year storm
    Effective runoff coefficient used for area (Q=KCIA) is C = 0.891
    Subarea runoff =     31.901(CFS)
    Total initial stream area =        8.500(Ac.)
    Pervious area fraction = 0.100
    Initial area Fm value =    0.044(In/Hr)



    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
    Process from Point/Station       22.000 to Point/Station       23.000
    **** IMPROVED CHANNEL TRAVEL TIME ****

    _____
    Upstream point elevation =    908.000(Ft.)
    Downstream point elevation =   904.800(Ft.)
    Channel length thru subarea =   310.000(Ft.)
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```
Channel base width  =    0.000(Ft.)
Slope or 'Z' of left channel bank =   1.000
Slope or 'Z' of right channel bank =   1.000
Estimated mean flow rate at midpoint of channel =     44.046(CFS)
Manning's 'N'     = 0.015
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =     44.046(CFS)
Depth of flow =   2.338(Ft.), Average velocity =  11.985(Ft/s)
!!Warning: Water is above left or right bank elevations
Channel flow top width =     2.000(Ft.)
Flow Velocity =   11.99(Ft/s)
Travel time  =    0.43 min.
Time of concentration =   11.52 min.
Critical depth =      2.969(Ft.)
ERROR - Channel depth exceeds maximum allowable depth
 Adding area flow to channel
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 =     4.119(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.890
Subarea runoff =     24.208(CFS) for    6.800(Ac.)
Total runoff =      56.108(CFS)
Effective area this stream =        15.30(Ac.)
Total Study Area (Main Stream No. 1) =       15.30(Ac.)
Area averaged Fm value =    0.044(In/Hr)
Depth of flow =   2.625(Ft.), Average velocity =  13.203(Ft/s)
!!Warning: Water is above left or right bank elevations
ERROR - Channel depth exceeds maximum allowable depth
Critical depth =      3.406(Ft.)
End of computations, Total Study Area =           15.30 (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) = 0.100
Area averaged SCS curve number =  56.0
```

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
        Rational Hydrology Study   Date: 06/19/20

OAKMONT - MISSION AT RAMONA
100 YEAR RATIONAL METHOD
0995Q100E3
EXISTING CONDITION

Program License Serial Number 6145

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

Rational hydrology study storm event year is   100.0
Computed rainfall intensity:
Storm year =   100.00   1 hour rainfall =   1.530 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 3

++
Process from Point/Station   31.000 to Point/Station   32.000
**** 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 =   903.000(Ft.)
Top (of initial area) elevation =   922.200(Ft.)
Bottom (of initial area) elevation =   909.000(Ft.)
Difference in elevation =   13.200(Ft.)
Slope =   0.01462 s(%)=   1.46
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.769 min.
Rainfall intensity =   4.288(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.891
Subarea runoff =   23.683(CFS)
Total initial stream area =   6.200(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =   0.044(In/Hr)

++
Process from Point/Station   32.000 to Point/Station   33.000
**** IMPROVED CHANNEL TRAVEL TIME ****
_____
Upstream point elevation =   909.000(Ft.)
Downstream point elevation =   903.400(Ft.)
Channel length thru subarea =   520.000(Ft.)
Channel base width =   0.000(Ft.)

```
Slope or 'Z' of left channel bank =   1.000
Slope or 'Z' of right channel bank =   1.000
Estimated mean flow rate at midpoint of channel =      28.834(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =     28.834(CFS)
Depth of flow =   1.907(Ft.), Average velocity =  10.246(Ft/s)
!!Warning: Water is above left or right bank elevations
Channel flow top width =     2.000(Ft.)
Flow Velocity =    10.25(Ft/s)
Travel time  =    0.85 min.
Time of concentration =   11.61 min.
Critical depth =       2.359(Ft.)
ERROR - Channel depth exceeds maximum allowable depth
 Adding area flow to channel
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 =     4.098(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.890
Subarea runoff =     10.249(CFS) for    3.100(Ac.)
Total runoff =      33.932(CFS)
Effective area this stream =          9.30(Ac.)
Total Study Area (Main Stream No. 1) =          9.30(Ac.)
Area averaged Fm value =    0.044(In/Hr)
Depth of flow =   2.051(Ft.), Average velocity =  10.936(Ft/s)
!!Warning: Water is above left or right bank elevations
ERROR - Channel depth exceeds maximum allowable depth
Critical depth =       2.563(Ft.)
End of computations, Total Study Area =             9.30 (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) = 0.100
Area averaged SCS curve number =   56.0
```

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                San Bernardino County Rational Hydrology Program

                     (Hydrology Manual Date - August 1986)

      CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2005 Version 7.1
           Rational Hydrology Study      Date: 10/19/20
------------------------------------------------------------------------
OAKMONT - MISSION AT RAMONA
100 YEAR RATIONAL METHOD
0995Q100P
PROPOSED CONDITION
------------------------------------------------------------------------


Program License Serial Number 6145


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


------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
Computed rainfall intensity:
Storm year =   100.00   1 hour rainfall =     1.530 (In.)
Slope used for rainfall intensity curve b =  0.6000
Soil antecedent moisture condition (AMC) = 3


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station         2.000
**** 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 =   812.000(Ft.)
Top (of initial area) elevation =   924.360(Ft.)
Bottom (of initial area) elevation =   912.000(Ft.)
Difference in elevation =    12.360(Ft.)
Slope =    0.01522  s(%)=       1.52
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.238 min.
Rainfall intensity =     4.420(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.891
Subarea runoff =      2.560(CFS)
Total initial stream area =        0.650(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.044(In/Hr)


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.000 to Point/Station         3.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

_____
Upstream point/station elevation =   907.000(Ft.)
Downstream point/station elevation =   906.700(Ft.)
Pipe length =     56.00(Ft.)   Manning's N = 0.012
```

```
No. of pipes = 1  Required pipe flow  =    2.560(CFS)
Nearest computed pipe diameter  =    12.00(In.)
Calculated individual pipe flow  =    2.560(CFS)
Normal flow depth in pipe =    8.95(In.)
Flow top width inside pipe =   10.45(In.)
Critical Depth =    8.22(In.)
Pipe flow velocity =     4.07(Ft/s)
Travel time through pipe =   0.23 min.
Time of concentration (TC) =   10.47 min.


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station       3.000
**** 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 =    10.47 min.
Rainfall intensity =     4.362(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.891
Subarea runoff =      2.842(CFS) for    0.740(Ac.)
Total runoff =      5.402(CFS)
Effective area this stream =        1.39(Ac.)
Total Study Area (Main Stream No. 1) =        1.39(Ac.)
Area averaged Fm value =    0.044(In/Hr)


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station       4.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
Upstream point/station elevation =   906.700(Ft.)
Downstream point/station elevation =   905.900(Ft.)
Pipe length  =   162.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    5.402(CFS)
Nearest computed pipe diameter  =    18.00(In.)
Calculated individual pipe flow  =    5.402(CFS)
Normal flow depth in pipe =   10.84(In.)
Flow top width inside pipe =   17.62(In.)
Critical Depth =   10.76(In.)
Pipe flow velocity =     4.86(Ft/s)
Travel time through pipe =   0.56 min.
Time of concentration (TC) =   11.02 min.


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       4.000
**** 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 =    11.02 min.
Rainfall intensity =        4.229(In/Hr) for a    100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.891
Subarea runoff =       14.258(CFS) for    3.830(Ac.)
Total runoff =      19.660(CFS)
Effective area this stream =          5.22(Ac.)
Total Study Area (Main Stream No. 1) =        5.22(Ac.)
Area averaged Fm value =    0.044(In/Hr)


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station         4.000 to Point/Station         5.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
Upstream point/station elevation =   905.900(Ft.)
Downstream point/station elevation =   905.700(Ft.)
Pipe length  =    36.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    19.660(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    19.660(CFS)
Normal flow depth in pipe =   18.05(In.)
Flow top width inside pipe =   25.42(In.)
Critical Depth =   18.63(In.)
Pipe flow velocity =      6.97(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    11.11 min.


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station         5.000 to Point/Station         6.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
Upstream point/station elevation =   905.700(Ft.)
Downstream point/station elevation =   902.000(Ft.)
Pipe length  =   345.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    19.660(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    19.660(CFS)
Normal flow depth in pipe =   15.87(In.)
Flow top width inside pipe =   22.72(In.)
Critical Depth =   19.11(In.)
Pipe flow velocity =      8.92(Ft/s)
Travel time through pipe =    0.64 min.
Time of concentration (TC) =    11.75 min.


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station         6.000 to Point/Station         6.000
**** CONFLUENCE OF MAIN STREAMS ****
_____
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =       5.220(Ac.)
Runoff from this stream =      19.660(CFS)
Time of concentration =   11.75 min.
Rainfall intensity =     4.069(In/Hr)
Area averaged loss rate (Fm) =    0.0440(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Program is now starting with Main Stream No. 2
```

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Process from Point/Station        11.000 to Point/Station        12.000
**** 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 =    632.000(Ft.)
Top (of initial area) elevation =    922.690(Ft.)
Bottom (of initial area) elevation =    909.600(Ft.)
Difference in elevation =     13.090(Ft.)
Slope =     0.02071  s(%)=        2.07
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =     8.708 min.
Rainfall intensity =       4.871(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.892
Subarea runoff =       17.769(CFS)
Total initial stream area =         4.090(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =     0.044(In/Hr)


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Process from Point/Station        12.000 to Point/Station        13.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
Upstream point/station elevation =    904.800(Ft.)
Downstream point/station elevation =    902.000(Ft.)
Pipe length  =    526.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     17.769(CFS)
Nearest computed pipe diameter   =      24.00(In.)
Calculated individual pipe flow  =     17.769(CFS)
Normal flow depth in pipe =    19.55(In.)
Flow top width inside pipe =    18.66(In.)
Critical Depth =    18.23(In.)
Pipe flow velocity =        6.49(Ft/s)
Travel time through pipe =    1.35 min.
Time of concentration (TC) =    10.06 min.


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        13.000 to Point/Station        13.000
**** 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 =    10.06 min.
Rainfall intensity =       4.467(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.891
Subarea runoff =       2.574(CFS) for    1.020(Ac.)
```

```
Total runoff =     20.343(CFS)
Effective area this stream =        5.11(Ac.)
Total Study Area (Main Stream No. 2) =       10.33(Ac.)
Area averaged Fm value =    0.044(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       14.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
Upstream point/station elevation =   902.000(Ft.)
Downstream point/station elevation =   901.400(Ft.)
Pipe length =   124.00(Ft.)   Manning's N = 0.012
No. of pipes = 1 Required pipe flow  =     20.343(CFS)
Nearest computed pipe diameter  =      27.00(In.)
Calculated individual pipe flow  =     20.343(CFS)
Normal flow depth in pipe =   19.50(In.)
Flow top width inside pipe =    24.19(In.)
Critical Depth =   18.94(In.)
Pipe flow velocity =      6.61(Ft/s)
Travel time through pipe =    0.31 min.
Time of concentration (TC) =    10.37 min.


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Process from Point/Station       14.000 to Point/Station       14.000
**** 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 =    10.37 min.
Rainfall intensity =      4.386(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.891
Subarea runoff =      12.483(CFS) for    3.290(Ac.)
Total runoff =     32.826(CFS)
Effective area this stream =        8.40(Ac.)
Total Study Area (Main Stream No. 2) =       13.62(Ac.)
Area averaged Fm value =    0.044(In/Hr)


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Process from Point/Station       14.000 to Point/Station       15.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
Upstream point/station elevation =   901.400(Ft.)
Downstream point/station elevation =   901.200(Ft.)
Pipe length =    35.00(Ft.)   Manning's N = 0.012
No. of pipes = 1 Required pipe flow  =     32.826(CFS)
Nearest computed pipe diameter  =      30.00(In.)
Calculated individual pipe flow  =     32.826(CFS)
Normal flow depth in pipe =   24.00(In.)
Flow top width inside pipe =    24.00(In.)
Critical Depth =   23.41(In.)
Pipe flow velocity =      7.80(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =    10.45 min.
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Process from Point/Station       15.000 to Point/Station        6.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
Upstream point/station elevation =   903.300(Ft.)
Downstream point/station elevation =   902.000(Ft.)
Pipe length =   255.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow =    32.826(CFS)
Nearest computed pipe diameter =     33.00(In.)
Calculated individual pipe flow =    32.826(CFS)
Normal flow depth in pipe =   22.38(In.)
Flow top width inside pipe =   30.83(In.)
Critical Depth =   22.87(In.)
Pipe flow velocity =      7.66(Ft/s)
Travel time through pipe =    0.56 min.
Time of concentration (TC) =    11.00 min.


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Process from Point/Station        6.000 to Point/Station        6.000
**** CONFLUENCE OF MAIN STREAMS ****
_____
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      8.400(Ac.)
Runoff from this stream =     32.826(CFS)
Time of concentration =   11.00 min.
Rainfall intensity =    4.234(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     19.66    5.220    11.75    0.044      4.069
2     32.83    8.400    11.00    0.044      4.234
Qmax(1) =
        1.000 *    1.000 *    19.660) +
        0.961 *    1.000 *    32.826) + =     51.197
Qmax(2) =
        1.041 *    0.936 *    19.660) +
        1.000 *    1.000 *    32.826) + =     51.981

Total of 2 main streams to confluence:
Flow rates before confluence point:
     20.660      33.826
Maximum flow rates at confluence using above data:
      51.197       51.981
Area of streams before confluence:
      5.220        8.400
Effective area values after confluence:
     13.620       13.286


Results of confluence:
Total flow rate =     51.981(CFS)
Time of concentration =    11.001 min.
Effective stream area after confluence =     13.286(Ac.)
Study area average Pervious fraction(Ap) =  0.100
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Study area average soil loss rate(Fm) =    0.044(In/Hr)
Study area total =      13.62(Ac.)


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Process from Point/Station        6.000 to Point/Station       7.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
Upstream point/station elevation =   902.000(Ft.)
Downstream point/station elevation =   901.000(Ft.)
Pipe length  =   202.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    51.981(CFS)
Nearest computed pipe diameter  =      39.00(In.)
Calculated individual pipe flow  =    51.981(CFS)
Normal flow depth in pipe =   27.00(In.)
Flow top width inside pipe =   36.00(In.)
Critical Depth =   27.64(In.)
Pipe flow velocity =      8.47(Ft/s)
Travel time through pipe =    0.40 min.
Time of concentration (TC) =    11.40 min.


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Process from Point/Station        7.000 to Point/Station       7.000
**** CONFLUENCE OF MAIN STREAMS ****
_____
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     13.286(Ac.)
Runoff from this stream =     51.981(CFS)
Time of concentration =   11.40 min.
Rainfall intensity =     4.144(In/Hr)
Area averaged loss rate (Fm) =    0.0440(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Program is now starting with Main Stream No. 2


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Process from Point/Station       21.000 to Point/Station      22.000
**** 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 =   862.000(Ft.)
Top (of initial area) elevation =   914.830(Ft.)
Bottom (of initial area) elevation =   907.690(Ft.)
Difference in elevation =     7.140(Ft.)
Slope =    0.00828  s(%)=       0.83
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.842 min.
Rainfall intensity =     4.051(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.890
Subarea runoff =      2.813(CFS)
Total initial stream area =        0.780(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.044(In/Hr)
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Process from Point/Station        22.000 to Point/Station        23.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
Upstream point/station elevation =   902.400(Ft.)
Downstream point/station elevation =   902.200(Ft.)
Pipe length  =    32.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     2.813(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.813(CFS)
Normal flow depth in pipe =    9.08(In.)
Flow top width inside pipe =    10.30(In.)
Critical Depth =    8.63(In.)
Pipe flow velocity =      4.41(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =    11.96 min.


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Process from Point/Station        23.000 to Point/Station        23.000
**** 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 =    11.96 min.
Rainfall intensity =     4.026(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.890
Subarea runoff =      2.563(CFS) for    0.720(Ac.)
Total runoff =       5.376(CFS)
Effective area this stream =        1.50(Ac.)
Total Study Area (Main Stream No. 2) =       15.12(Ac.)
Area averaged Fm value =    0.044(In/Hr)


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        23.000 to Point/Station         7.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
Upstream point/station elevation =   902.200(Ft.)
Downstream point/station elevation =    901.000(Ft.)
Pipe length  =   244.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     5.376(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     5.376(CFS)
Normal flow depth in pipe =   10.82(In.)
Flow top width inside pipe =    17.63(In.)
Critical Depth =   10.73(In.)
Pipe flow velocity =      4.85(Ft/s)
Travel time through pipe =    0.84 min.
Time of concentration (TC) =    12.80 min.


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Process from Point/Station         7.000 to Point/Station         7.000
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**** CONFLUENCE OF MAIN STREAMS ****
_____
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =       1.500(Ac.)
Runoff from this stream =      5.376(CFS)
Time of concentration =   12.80 min.
Rainfall intensity =     3.865(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     51.98    13.286    11.40    0.044      4.144
2     5.38     1.500     12.80    0.044      3.865
Qmax(1) =
         1.000 *    1.000 *     51.981) +
         1.073 *    0.890 *      5.376) + =      57.117
Qmax(2) =
         0.932 *    1.000 *     51.981) +
         1.000 *    1.000 *      5.376) + =      53.820


Total of 2 main streams to confluence:
Flow rates before confluence point:
     52.981         6.376
Maximum flow rates at confluence using above data:
     57.117        53.820
Area of streams before confluence:
      13.286         1.500
Effective area values after confluence:
       14.622        14.786


Results of confluence:
Total flow rate =     57.117(CFS)
Time of concentration =    11.399 min.
Effective stream area after confluence  =     14.622(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.044(In/Hr)
Study area total =     14.79(Ac.)


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Process from Point/Station        7.000 to Point/Station       8.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
Upstream point/station elevation =   901.000(Ft.)
Downstream point/station elevation =   895.600(Ft.)
Pipe length  =   328.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    57.117(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    57.117(CFS)
Normal flow depth in pipe =   21.87(In.)
Flow top width inside pipe =   31.21(In.)
Critical Depth =   29.36(In.)
Pipe flow velocity =     13.68(Ft/s)
Travel time through pipe =    0.40 min.
Time of concentration (TC) =    11.80 min.
```

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Process from Point/Station        8.000 to Point/Station        8.000
**** CONFLUENCE OF MAIN STREAMS ****
_____
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      14.622(Ac.)
Runoff from this stream =      57.117(CFS)
Time of concentration =   11.80 min.
Rainfall intensity =     4.060(In/Hr)
Area averaged loss rate (Fm) =    0.0440(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Program is now starting with Main Stream No. 2


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Process from Point/Station       31.000 to Point/Station       32.000
**** 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 =    453.000(Ft.)
Top (of initial area) elevation =    911.400(Ft.)
Bottom (of initial area) elevation =    904.100(Ft.)
Difference in elevation =      7.300(Ft.)
Slope =     0.01611  s(%)=        1.61
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =     8.014 min.
Rainfall intensity =      5.120(In/Hr) for a    100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.892
Subarea runoff =      28.095(CFS)
Total initial stream area =         6.150(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =     0.044(In/Hr)


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Process from Point/Station       32.000 to Point/Station       33.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
Upstream point/station elevation =    898.100(Ft.)
Downstream point/station elevation =    897.130(Ft.)
Pipe length  =      8.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow =     28.095(CFS)
Nearest computed pipe diameter  =      18.00(In.)
Calculated individual pipe flow  =     28.095(CFS)
Normal flow depth in pipe =   11.19(In.)
Flow top width inside pipe =   17.46(In.)
Critical depth could not be calculated.
Pipe flow velocity =     24.33(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =     8.02 min.


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Process from Point/Station       33.000 to Point/Station       33.000
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**** 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 =     8.02 min.
Rainfall intensity =     5.118(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.892
Subarea runoff =     27.433(CFS) for    6.010(Ac.)
Total runoff =     55.528(CFS)
Effective area this stream =        12.16(Ac.)
Total Study Area (Main Stream No. 2) =       27.28(Ac.)
Area averaged Fm value =    0.044(In/Hr)


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Process from Point/Station      33.000 to Point/Station       8.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
Upstream point/station elevation =   896.000(Ft.)
Downstream point/station elevation =   895.600(Ft.)
Pipe length  =    17.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    55.528(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    55.528(CFS)
Normal flow depth in pipe =   20.58(In.)
Flow top width inside pipe =   27.85(In.)
Critical Depth =   28.29(In.)
Pipe flow velocity =     15.48(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =     8.04 min.


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Process from Point/Station       8.000 to Point/Station       8.000
**** CONFLUENCE OF MAIN STREAMS ****
_____
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     12.160(Ac.)
Runoff from this stream =     55.528(CFS)
Time of concentration =    8.04 min.
Rainfall intensity =     5.111(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     57.12    14.622     11.80    0.044      4.060
2     55.53    12.160      8.04    0.044      5.111
Qmax(1) =
        1.000 *    1.000 *     57.117) +
        0.793 *    1.000 *     55.528) + =     101.125
Qmax(2) =
```

```
              1.262 *    0.681 *    57.117) +
              1.000 *    1.000 *    55.528) + =      104.627


Total of 2 main streams to confluence:
Flow rates before confluence point:
       58.117      56.528
Maximum flow rates at confluence using above data:
       101.125      104.627
Area of streams before confluence:
        14.622       12.160
Effective area values after confluence:
        26.782       22.122


Results of confluence:
Total flow rate =     104.627(CFS)
Time of concentration =      8.038 min.
Effective stream area after confluence  =      22.122(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =     0.044(In/Hr)
Study area total =       26.78(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station         8.000 to Point/Station         9.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
Upstream point/station elevation =    895.600(Ft.)
Downstream point/station elevation =   895.010(Ft.)
Pipe length  =   266.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    104.627(CFS)
Nearest computed pipe diameter   =      57.00(In.)
Calculated individual pipe flow  =    104.627(CFS)
Normal flow depth in pipe =    42.38(In.)
Flow top width inside pipe =   49.79(In.)
Critical Depth =   35.49(In.)
Pipe flow velocity =      7.40(Ft/s)
Travel time through pipe =     0.60 min.
Time of concentration (TC) =      8.64 min.
End of computations, Total Study Area =         27.28 (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) = 0.100
Area averaged SCS curve number =  56.0
```
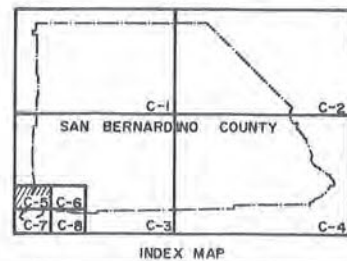
Appendix C

Soil Group Map and NOAA Rainfall Data
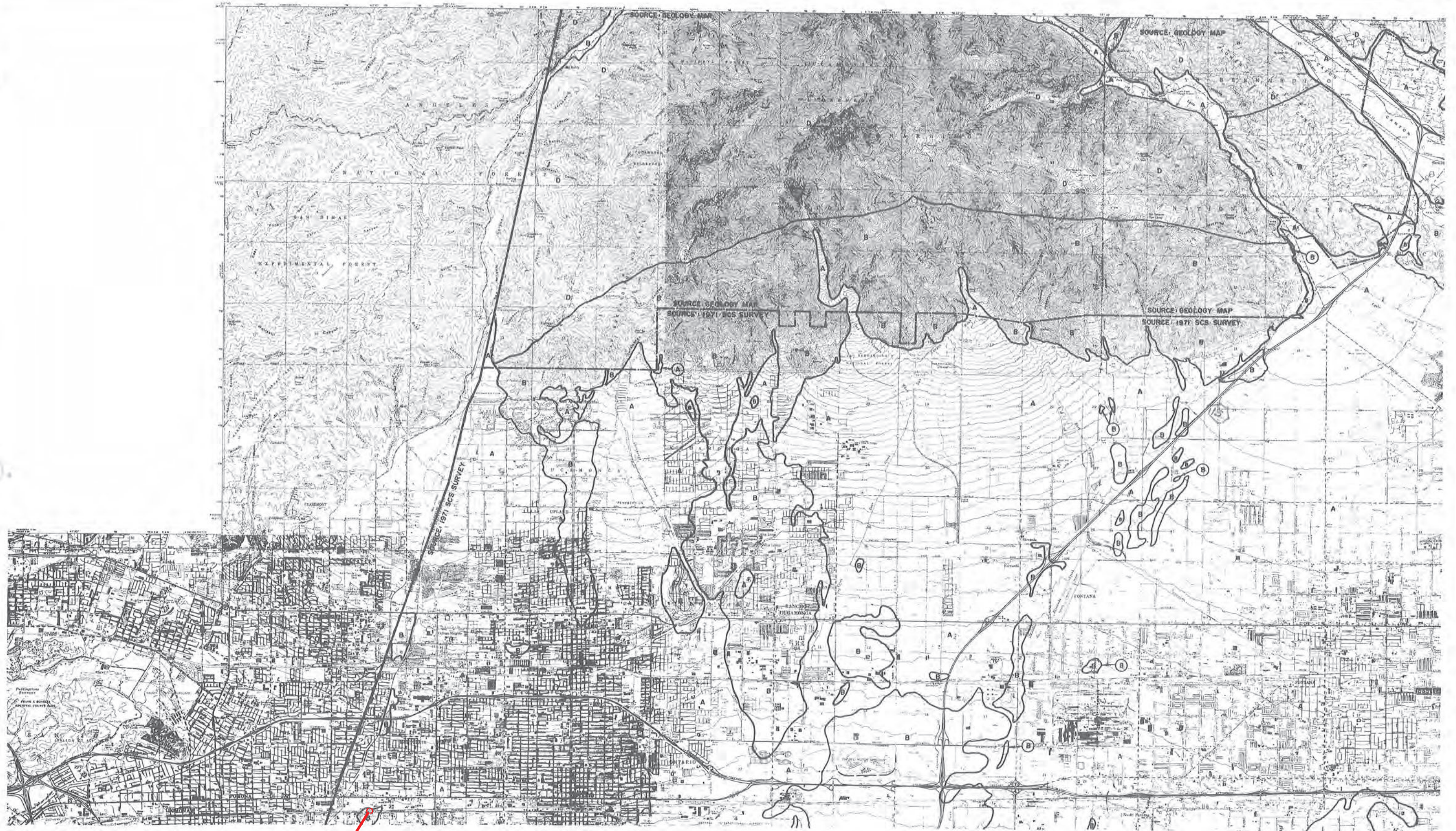
SITE LOCATION

LEGEND

―――――― SOIL GROUP BOUNDARY

A SOIL GROUP DESIGNATION

―――――― BOUNDARY OF INDICATED SOURCE

SCALE 1:48,000

SCALE REDUCED BY 1/2

INDEX MAP

SAN BERNARDINO COUNTY

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

HYDROLOGIC SOILS GROUP MAP
FOR
SOUTHWEST-A AREA

C-26 FIGURE C-13

NOAA Atlas 14, Volume 6, Version 2
Location name: Montclair, California, USA*
Latitude: 34.0589°, Longitude: -117.7077°
Elevation: 923.53 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	0.121 (0.101-0.147)	0.159 (0.133-0.193)	0.210 (0.175-0.255)	0.253 (0.208-0.310)	0.312 (0.248-0.395)	0.358 (0.279-0.465)	0.406 (0.308-0.541)	0.457 (0.337-0.627)	0.528 (0.373-0.756)	0.585 (0.398-0.868)
10-min	0.174 (0.145-0.210)	0.228 (0.190-0.277)	0.301 (0.250-0.366)	0.362 (0.298-0.444)	0.447 (0.355-0.567)	0.513 (0.399-0.666)	0.582 (0.442-0.775)	0.655 (0.483-0.898)	0.757 (0.534-1.08)	0.838 (0.571-1.24)
15-min	0.210 (0.175-0.254)	0.276 (0.230-0.334)	0.364 (0.303-0.443)	0.438 (0.361-0.537)	0.540 (0.430-0.685)	0.621 (0.483-0.805)	0.704 (0.534-0.938)	0.793 (0.584-1.09)	0.916 (0.646-1.31)	1.01 (0.690-1.50)
30-min	0.308 (0.257-0.372)	0.404 (0.337-0.490)	0.534 (0.444-0.649)	0.642 (0.529-0.787)	0.791 (0.630-1.00)	0.910 (0.708-1.18)	1.03 (0.783-1.37)	1.16 (0.856-1.59)	1.34 (0.947-1.92)	1.49 (1.01-2.21)
60-min	0.457 (0.382-0.553)	0.601 (0.501-0.728)	0.794 (0.660-0.964)	0.953 (0.786-1.17)	1.18 (0.936-1.49)	1.35 (1.05-1.75)	1.53 (1.16-2.04)	1.73 (1.27-2.37)	1.99 (1.41-2.86)	2.21 (1.50-3.28)
2-hr	0.689 (0.575-0.834)	0.899 (0.749-1.09)	1.18 (0.978-1.43)	1.40 (1.16-1.72)	1.72 (1.37-2.18)	1.96 (1.53-2.55)	2.21 (1.68-2.95)	2.48 (1.82-3.39)	2.84 (2.00-4.06)	3.12 (2.13-4.63)
3-hr	0.872 (0.728-1.06)	1.13 (0.946-1.38)	1.48 (1.23-1.80)	1.76 (1.45-2.16)	2.15 (1.71-2.73)	2.45 (1.90-3.17)	2.75 (2.09-3.67)	3.08 (2.27-4.21)	3.52 (2.48-5.03)	3.87 (2.63-5.73)
6-hr	1.24 (1.03-1.50)	1.60 (1.34-1.94)	2.08 (1.73-2.53)	2.48 (2.04-3.03)	3.01 (2.40-3.82)	3.43 (2.67-4.45)	3.85 (2.92-5.13)	4.30 (3.17-5.89)	4.91 (3.46-7.02)	5.39 (3.67-7.99)
12-hr	1.63 (1.36-1.98)	2.13 (1.77-2.58)	2.78 (2.31-3.37)	3.31 (2.73-4.06)	4.04 (3.22-5.13)	4.61 (3.59-5.99)	5.20 (3.95-6.92)	5.81 (4.28-7.97)	6.66 (4.70-9.53)	7.32 (4.98-10.9)
24-hr	2.18 (1.93-2.52)	2.87 (2.54-3.31)	3.79 (3.34-4.39)	4.55 (3.98-5.31)	5.61 (4.75-6.76)	6.44 (5.34-7.92)	7.30 (5.91-9.19)	8.20 (6.46-10.6)	9.45 (7.14-12.7)	10.4 (7.63-14.6)
2-day	2.70 (2.39-3.11)	3.61 (3.19-4.17)	4.84 (4.27-5.61)	5.88 (5.14-6.86)	7.32 (6.20-8.83)	8.47 (7.03-10.4)	9.67 (7.83-12.2)	10.9 (8.62-14.2)	12.7 (9.63-17.2)	14.2 (10.4-19.8)
3-day	2.96 (2.62-3.41)	4.00 (3.54-4.62)	5.42 (4.78-6.28)	6.62 (5.79-7.72)	8.31 (7.03-10.0)	9.65 (8.01-11.9)	11.1 (8.96-13.9)	12.6 (9.91-16.3)	14.7 (11.1-19.8)	16.4 (12.0-22.9)
4-day	3.20 (2.83-3.69)	4.36 (3.85-5.03)	5.94 (5.24-6.88)	7.27 (6.36-8.49)	9.16 (7.75-11.0)	10.7 (8.84-13.1)	12.2 (9.91-15.4)	13.9 (11.0-18.0)	16.3 (12.3-22.0)	18.2 (13.3-25.4)
7-day	3.64 (3.22-4.19)	5.01 (4.43-5.78)	6.87 (6.06-7.95)	8.44 (7.38-9.84)	10.6 (9.00-12.8)	12.4 (10.3-15.2)	14.2 (11.5-17.9)	16.2 (12.7-20.9)	18.9 (14.3-25.5)	21.1 (15.4-29.4)
10-day	3.94 (3.49-4.55)	5.46 (4.83-6.31)	7.52 (6.63-8.70)	9.25 (8.09-10.8)	11.7 (9.88-14.1)	13.6 (11.3-16.7)	15.6 (12.6-19.7)	17.8 (14.0-23.0)	20.8 (15.7-28.0)	23.2 (16.9-32.3)
20-day	4.73 (4.19-5.45)	6.61 (5.84-7.63)	9.17 (8.09-10.6)	11.3 (9.91-13.2)	14.4 (12.2-17.3)	16.8 (13.9-20.7)	19.4 (15.7-24.4)	22.1 (17.4-28.6)	25.9 (19.6-34.9)	29.0 (21.2-40.4)
30-day	5.59 (4.95-6.45)	7.81 (6.90-9.01)	10.8 (9.56-12.6)	13.4 (11.7-15.7)	17.1 (14.5-20.6)	20.0 (16.6-24.6)	23.1 (18.7-29.2)	26.5 (20.8-34.3)	31.2 (23.6-42.0)	35.0 (25.6-48.8)
45-day	6.68 (5.91-7.70)	9.24 (8.17-10.7)	12.8 (11.3-14.8)	15.9 (13.9-18.5)	20.2 (17.1-24.4)	23.8 (19.7-29.3)	27.6 (22.3-34.7)	31.6 (24.9-41.0)	37.5 (28.3-50.5)	42.2 (30.9-58.9)
60-day	7.74 (6.85-8.92)	10.6 (9.36-12.2)	14.6 (12.9-16.9)	18.0 (15.8-21.0)	23.0 (19.5-27.8)	27.1 (22.5-33.4)	31.5 (25.5-39.7)	36.3 (28.6-47.0)	43.2 (32.7-58.2)	48.8 (35.7-68.2)

[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.

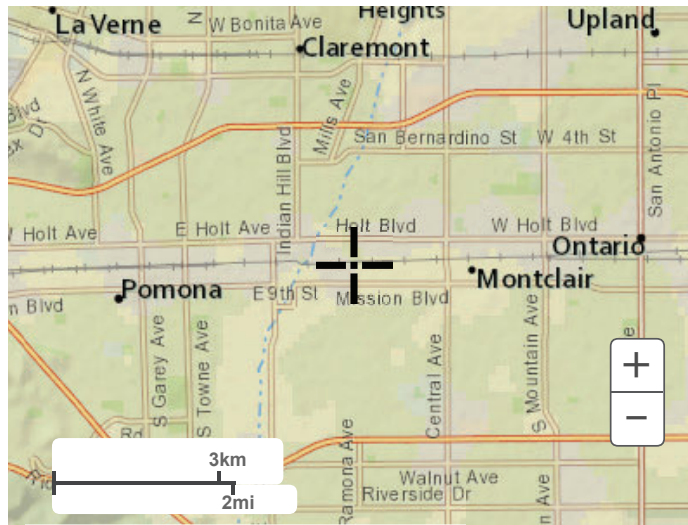Please refer to NOAA Atlas 14 document for more information.

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PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 34.0589°, Longitude: -117.7077°

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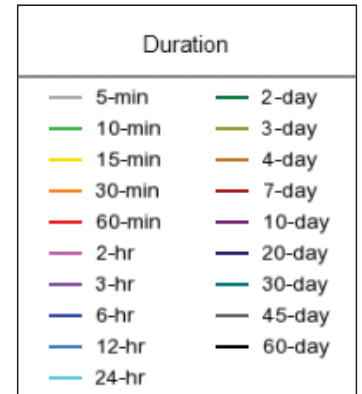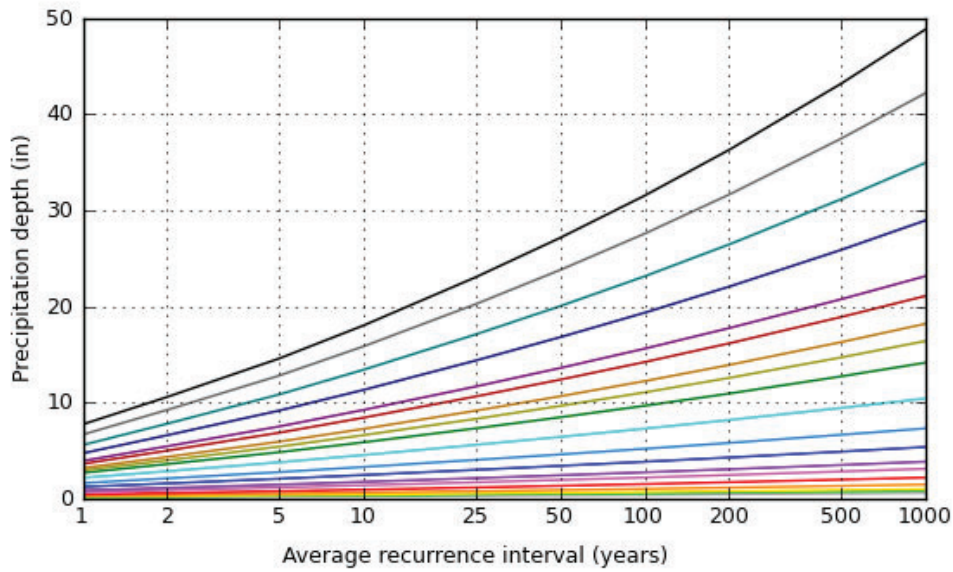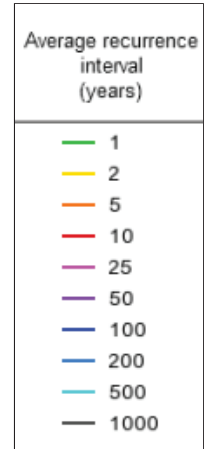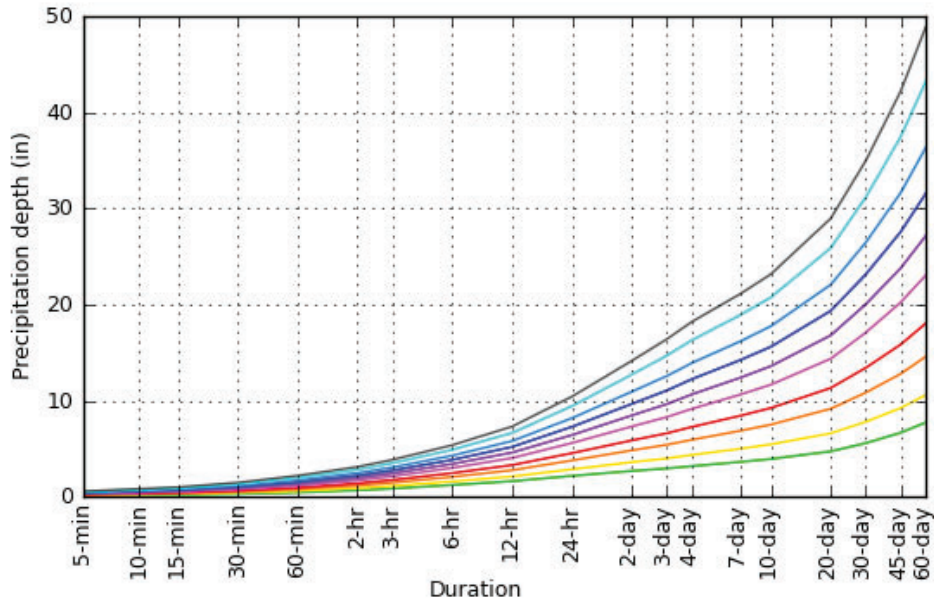
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