PRELIMINARY HYDROLOGY CALCULATIONS

For

Clinton – Keith Road Village
Northeast Corner of George Avenue
&
Clinton Keith Road
Widomar, California

Prepared For

George Clinton – Keith Development LLC
4921 Birch Street
Suite 125
Newport Beach, Ca 92660

September 23, 2014
Revised January 16, 2016
Prepared By

Pfeiler & Associates Engineers, Inc.
22609 La Palma Avenue Suite 202
Yorba Linda, California 92887
Phone 909-993-5800 Fax 909-993-5801

Lynn James Mutch RCE 29517 Exp. 3/31/2015

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Site Soils Report

1. Introduction

The project site is located on the northeast corner of the intersection of Clinton Keith Road and George Avenue in the City of Wildomar in the County of Riverside. The site is currently vacant undeveloped land consisting of approximately 5 acres of land. The proposed project will widen both George Avenue and Clinton Keith Road to ultimate widths and extend the necessary utilities with the street right of ways. The onsite development will consist of seven commercial retail buildings with the required parking fields.

The sites greatest street frontage is onto George Avenue, which runs north from the intersection with Clinton Keith Road, which runs east west. The properties to the north and east of the project site are currently vacant and undeveloped but there are pending plans for the development of the north property for residential units. That development will eliminate a significant amount of offsite flow onto the project site. The property on the west side of George Avenue directly across from the project site is also vacant and undeveloped at this time.

2. Purpose

This Preliminary hydrology report was prepared to demonstrate that the proposed project can be designed to meet the current City of Wildomar design requirements as well as the County of Riverside Storm Water requirements. The report will also demonstrate that the storm water discharges from the developed site will be no greater than the existing undeveloped site for the 2, 5 and 10-year storms for 3, 6 and 24–hour duration storms. The report will also provide the preliminary sizes for the required water Quality BMP's.

3. Existing Drainage Conditions

The project site fronts onto George Avenue which was improved with Tract No. 30135 in 2007; with those street improvements a storm drain was extended from an existing culvert under Clinton Keith Road northerly within George Avenue. The existing storm drain within George Avenue consist of an RCRCWCD 72-inch CIP that extends across the projects site frontage approximately 340 feet from the intersection of Clinton Keith Road and George Avenue to a junction structure where the storm drain line size is

reduced to 54-inch RCP that extends across the remainder of the site within George Avenue. At the junction structure a 36-inch RCP lateral has been constructed into the project site. This lateral was intended to pickup the drainage from the existing properties; which include the proposed project site and additional areas to the north east of the project site. These areas consist of approximately 7.6 acres to the north and 4.2 acres to the northeast. The southerly portion of the site drains to the south onto Clinton Keith Road and onto the southerly section of George Avenue. On George Avenue at approximately 200 north of the intersection at Clinton Keith Road there is a high point that directs water to the north toward the existing 36-inch RCP lateral and to the south on to Clinton Keith Road. The storm water draining onto Clinton Keith Road drains to the west into catch basins south of George Avenue. The existing hydrology for the site includes only area within the site property lines, which provides the most conservative value for determining the volume of storm water required to be detained to mitigate peck flows and volume from the developed site.

4. Proposed Project

The proposed project will consist of seven (7) retail buildings and the required parking facilities. To construct the proposed project the site will be grade to create a 7 flat pads and parking fields. The onsite drainage system directs the onsite drainage to BMP facilities and then into the onsite storm drain which will direct the drainage thru the site to the existing public storm drain line in George Avenue. The onsite BMP's will consist of Bio-retention Basins and pervious pavement in limited areas. The BMP's were size to detain the differential flows between the undeveloped and developed site for 2, 5 and 10 year storms with durations of 3, 6 and 24-hour. Consequently, some of the BMP's are sized with more capacity to accommodate the detention volumes. Offsite drainage from the north and northeast will drain into underground storm drain lines at inlets along the proposed sites north and east property line. The line draining the offsite property along the east property line will extend through the site westerly to connect to the existing 54-inch RCP in George Avenue at the location of the existing of 36-RCP lateral. The offsite drainage from the north will connect to the line extending from the east property line. This connection may not be required depending on the timing of the development of the property to the north. If the northerly property has not begun to develop prior to this project, then the line will be constructed and used on a temporary basis until the property does

develop and then will be abandoned. These two lines will convey the existing offsite drainage through the proposed project site without any restrictions and will be sized to accommodate the 100-year storm flows The onsite storm flows will also connect to this line at a point prior to the line entering the George Avenue Right of way and from that point to the Storm drain line in George Avenue it will be sized to accommodate both the offsite and onsite 100-year storm flows.

5. Methodology

This hydrology report was prepared using the County of Riverside Hydrology Manual and the AES Computer Software conforming to the Hydrology Manual. Hydrographs were prepared using the County of Riverside County short cut synthetic hydrograph methodology. BMP size calculations were developed using the county of riverside LIP manual. In the computer calculations drainage areas 8 and 9 were combined for simplification but each area was considered separately in the BMP and in calculation the hydrographs for those areas

The existing onsite undeveloped storm flows and volumes were calculated for 2, 5 and 10-year storms with durations of 3. 6 and 24-hours using the county's synthetic hydrograph methodology. The same was done of the fully developed site. For each of the storms the existing and developed flows and volumes were compared to determine the amount of detention that was required for the site. The BMP's were then sized to accommodate the required detention volume. In determining if the peak Q's were reduced to the undeveloped condition the detain volume was applied to the bottom of the hydrograph, as the flows are routed through all the basins prior to flowing in to the onsite storm drain systems. If the volume applied at the point of intersection the hydrograph plot at a point that is greater than or equal differential Q between developed and undeveloped then the peak flow is mitigated. In the cases where the differential volume was 0 this calculation is not required.

The undeveloped onsite hydrographs were limited to the area within the existing property lines however the developed site hydrographs were calculated using the adjacent slope areas that drain on to the development. The developed hydrographs also do not contain any of the

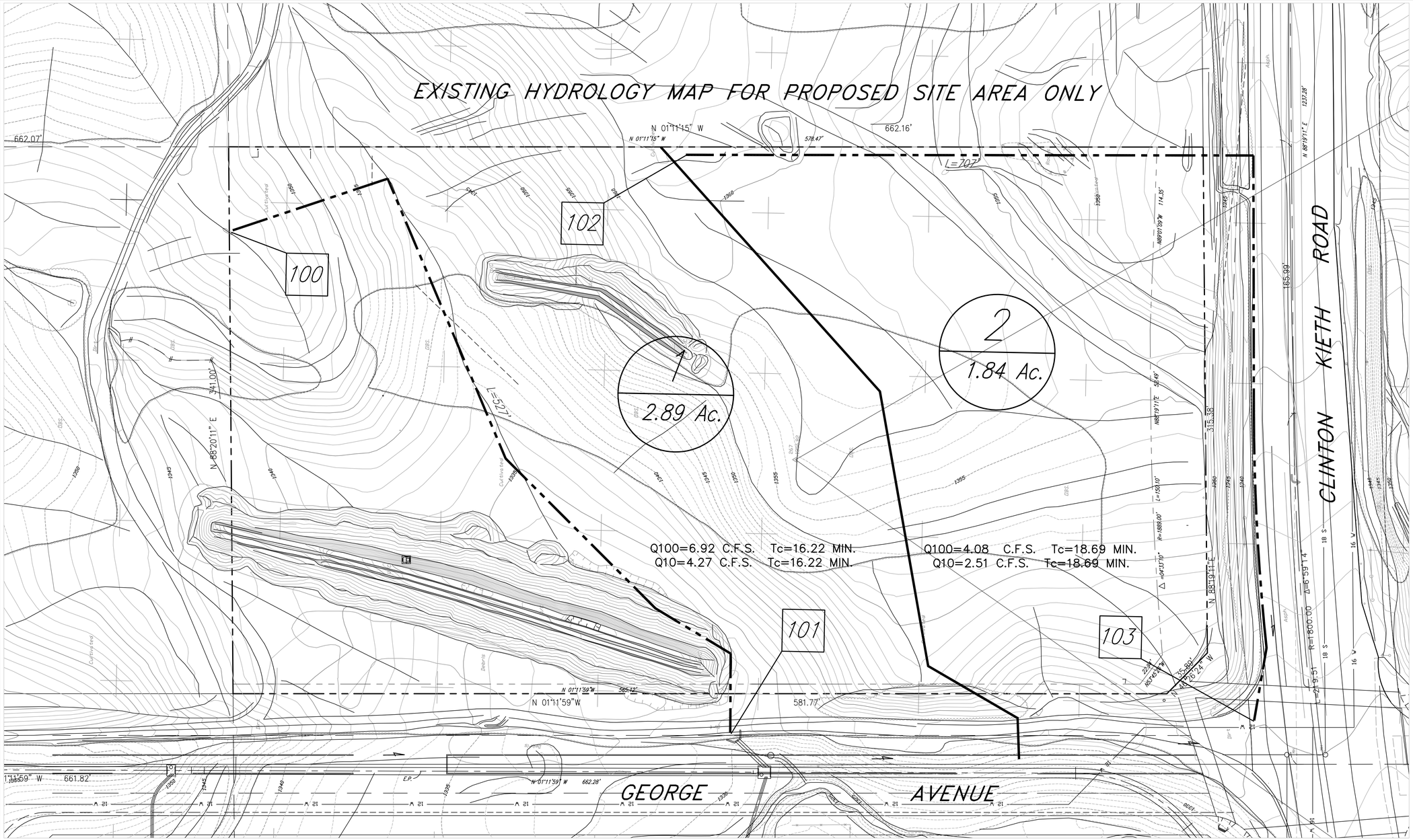
dedicated street right of way area as those areas do not drain into the onsite system.

6. Conclusion

The proposed site preliminary hydrology study has indicated that the site can be developed and meet the City of Wildomar drainage requirements. The onsite drainage can be concentrated at various locations within the site and conveyed through underground pipes to the public system in George Avenue. The offsite flows from the adjacent properties are not of such a volume that they cannot be convey across the site without difficulty. The proposed BMP's for each of the drainage areas within the have been size to accommodate the required treatment volume of 9025 cubic feet but also to provide additional an volume of 3891 cubic feet to mitigate the developed sites 2, 5 and 10-year storms of 3, 6 and 24-hours durations to the predeveloped sites storm flows. Our total detained volume within the site will be 12916 cubic feet. The site can be developed to meet all the agency requirements.

EXISITNG SITE HYDROLOGY MAP

EXISTING HYDROLOGY MAP FOR PROPOSED SITE AREA ONLY



SCALE: 1"= 30'

GRAPHIC SCALE

30 0 30 60 90

Underground Service Alert
Call: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG

MARK	BY	DATE		APPR.	DATE
1					

SEAL-COUNTY

CITY OF WILDOMAR
TRANSPORTATION DEPARTMENT
APPROVED BY:

DATE

SEAL-ENGINEER

REGISTERED PROFESSIONAL ENGINEER
LYNN J. MUTCH
No. 29517
EXP. 3-31-17
CIVIL ENGINEER
STATE OF CALIFORNIA

PFEILER & ASSOCIATES ENGINEERS, INC.
CIVIL ENGINEERING & LAND SURVEYING
909) 993-5801
22609 LA PALMA AVE., SUITE 202 YORBA LINDA, CA

LYNN J. MUTCH P.E.

BENCHMARK:

CITY OF WILDOMAR

EXISTING HYDROLOGY
CLINTON KEITH VILLAGE

SHEET NO.

OF _____ SHTS

FOR: ZOLFAGHARI

W.O.

CITY FILE NO.

28049B

10-YEAR HYDROLGY CALCULATIONS

EXISITING UNDEVELOPED SITE

January 16, 2016

JN 28049B

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***********
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
         RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION
DISTRICT
                        (RCFC&WCD)  1978 HYDROLOGY MANUAL
          (c) Copyright 1982-2015 Advanced Engineering Software
(aes)
                        (Rational Tabling Version 22.0)
                    Release Date: 07/01/2015  License ID 1320

                             Analysis prepared by:

                                Pfeiler Associates
                           22609 La Palma Avenue Suite 202
                            Yorba Linda, California 92887
                                   909-993-5800

  ************************** DESCRIPTION OF STUDY
**************************
 * CLINTON KEITH VILLAGE
*
 * 10-YEAR STORM HYDROLOGY UNDEVELOPED
*
 * JANUARY 12, 2016     28048B
*

****************************************************************
*********

   FILE NAME: EXWILD.DAT
   TIME/DATE OF STUDY: 08:47 01/13/2016
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   USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
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   USER SPECIFIED STORM EVENT(YEAR) =   10.00
   SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
   SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION
SLOPE = 0.85
   10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.320
   10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.980
   100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.540
   100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.500
   SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4809628
   SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4792280
   COMPUTED RAINFALL INTENSITY DATA:
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   STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.990
   SLOPE OF INTENSITY DURATION CURVE = 0.4810
   RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
   NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD
HYDROLOGY MANUAL
         AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM
ANALYSES
   *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND
STREETFLOW MODEL*
      HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-
GEOMETRIES:  MANNING
      WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP
HIKE  FACTOR
 NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)
(FT)    (n)
 ===  =====  =========  =================  ======  ===== ======
===== =======
   1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313
0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  1.00 FEET
        as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
     2. (Depth)*(Velocity) Constraint =  5.0 (FT*FT/S)
   *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
    OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*


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***********
   FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =
21
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   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

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          ASSUMED INITIAL SUBAREA UNIFORM
          DEVELOPMENT IS: UNDEVELOPED WITH FAIR COVER
   TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   520.00
   UPSTREAM ELEVATION(FEET) =   1355.50
   DOWNSTREAM ELEVATION(FEET) =   1333.00
   ELEVATION DIFFERENCE(FEET) =     22.50
   TC = 0.709*[(  520.00**3)/(    22.50)]**.2 =   16.220
     10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.857
   UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .7262
   SOIL CLASSIFICATION IS "D"
   SUBAREA RUNOFF(CFS) =      4.27
   TOTAL AREA(ACRES) =      3.17   TOTAL RUNOFF(CFS) =      4.27
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***********
   FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =
21
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   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

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===========
          ASSUMED INITIAL SUBAREA UNIFORM
          DEVELOPMENT IS: UNDEVELOPED WITH FAIR COVER
   TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   682.00
   UPSTREAM ELEVATION(FEET) =   1361.00
   DOWNSTREAM ELEVATION(FEET) =   1336.00
   ELEVATION DIFFERENCE(FEET) =     25.00
   TC = 0.709*[(  682.00**3)/(    25.00)]**.2 =   18.688
     10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.735
   UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .7164
   SOIL CLASSIFICATION IS "D"
   SUBAREA RUNOFF(CFS) =      2.51
   TOTAL AREA(ACRES) =      2.02   TOTAL RUNOFF(CFS) =      2.51

================================================================
===========
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)      =        2.0  TC(MIN.) =     18.69
   PEAK FLOW RATE(CFS)    =       2.51

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   END OF RATIONAL METHOD ANALYSIS
```

100-YEAR HYDROLOGY CALCULATIONS

EXISITING UNDEVELOPED SITE

January 16, 2016

JN 28049B

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***********
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
          RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION
DISTRICT
                        (RCFC&WCD)  1978 HYDROLOGY MANUAL
           (c) Copyright 1982-2015 Advanced Engineering Software
(aes)
                        (Rational Tabling Version 22.0)
                     Release Date: 07/01/2015  License ID 1320

                           Analysis prepared by:

                              Pfeiler Associates
                         22609 La Palma Avenue Suite 202
                          Yorba Linda, California 92887
                                 909-993-5800

  ************************** DESCRIPTION OF STUDY
**************************
 * CLINTON KEITH VILLAGE
*
 * 100-YEAR STORM HYDROLOGGY UNDEVELOPED SITE
*
 * JANUARY 12, 2016     28048B
*

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*********

   FILE NAME: EXWILD.DAT
   TIME/DATE OF STUDY: 08:43 01/13/2016
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   USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
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   USER SPECIFIED STORM EVENT(YEAR) =  100.00
   SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
   SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION
SLOPE = 0.85
   10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.320
   10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.980
   100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.540
   100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.500
   SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4809628
   SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4792280
   COMPUTED RAINFALL INTENSITY DATA:
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   STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.500
   SLOPE OF INTENSITY DURATION CURVE = 0.4792
   RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
   NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD
HYDROLOGY MANUAL
         AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM
ANALYSES
   *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND
STREETFLOW MODEL*
      HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-
GEOMETRIES:  MANNING
      WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP
HIKE  FACTOR
 NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)
(FT)    (n)
 ===  =====  =========  =================  ======  ===== ======
===== =======
   1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313
0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  1.00 FEET
        as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
     2. (Depth)*(Velocity) Constraint =  5.0 (FT*FT/S)
   *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
    OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*


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***********
   FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =
21
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   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

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===========
          ASSUMED INITIAL SUBAREA UNIFORM
          DEVELOPMENT IS: UNDEVELOPED WITH FAIR COVER
   TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   520.00
   UPSTREAM ELEVATION(FEET) =   1355.50
   DOWNSTREAM ELEVATION(FEET) =   1333.00
   ELEVATION DIFFERENCE(FEET) =     22.50
   TC = 0.709*[(  520.00**3)/(    22.50)]**.2 =   16.220
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.808
   UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .7770
   SOIL CLASSIFICATION IS "D"
   SUBAREA RUNOFF(CFS) =      6.92
   TOTAL AREA(ACRES) =      3.17   TOTAL RUNOFF(CFS) =      6.92
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****************************************************************
***********
   FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =
21
 ---------------------------------------------------------------
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   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

================================================================
===========
          ASSUMED INITIAL SUBAREA UNIFORM
          DEVELOPMENT IS: UNDEVELOPED WITH FAIR COVER
   TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   682.00
   UPSTREAM ELEVATION(FEET) =   1361.00
   DOWNSTREAM ELEVATION(FEET) =   1336.00
   ELEVATION DIFFERENCE(FEET) =     25.00
   TC = 0.709*[(  682.00**3)/(    25.00)]**.2 =   18.688
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.623
   UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .7696
   SOIL CLASSIFICATION IS "D"
   SUBAREA RUNOFF(CFS) =      4.08
   TOTAL AREA(ACRES) =      2.02   TOTAL RUNOFF(CFS) =      4.08

================================================================
===========
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)      =        2.0  TC(MIN.) =     18.69
   PEAK FLOW RATE(CFS)    =       4.08

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   END OF RATIONAL METHOD ANALYSIS
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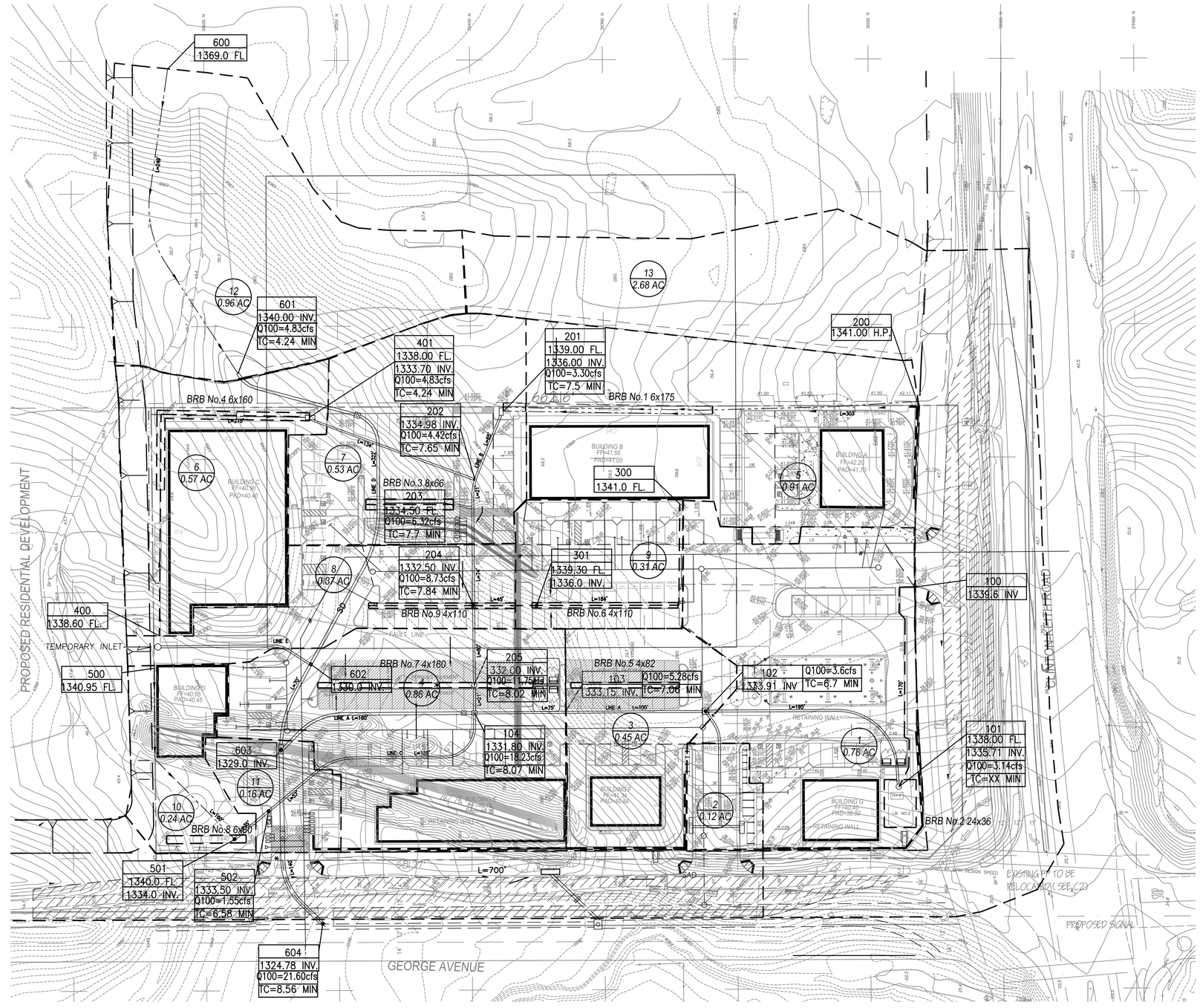
DEVELOPED SITE HYDROLOGY MAP



SCALE: 1"=40'

ABBREVIATIONS

AC=ASPHALT CONCRETE
BW=BACK OF WALK
TC=TOP OF CURB
FL=FLOW LINE
FS=FINISHED SURFACE
FF=FINISHED FLOOR
GB=GRADE BREAK
RD=ROOF DRAIN
CB=CATCH BASIN
CL=CENTER LINE
CF=CURB FACE
D/W=DRIVEWAY
CLR=CLEAR
SCO=SEWER CLEAN OUT
SMH=SEWER MANHOLE
SDMH=STORM DRAIN MANHOLE
WM=WATER METER
WV=WATER VALVE
FH=FIRE HYDRANT
FDC=FIRE DEPARTMENT CONNECTION
PIV=POST INDICATOR VALVE
GM=GAS METER
TE=TRASH ENCLOSURE
PP=POWER POLE
HC=HANDICAP
PL=PROPERTY LINE
EG=EDGE OF GUTTER
EP=EDGE OF PAVEMENT
PB=PULL BOX
CONC=CONCRETE
TW=TOP OF WALL
TOP=TOP OF SLOPE
TOE=TOE OF SLOPE
STA=STATION

LEGEND

1 — AREA NUMBER
1.9 AC — AREA ACRE

100 — NODE NUMBER
55.50 FL — ELEVATION
55.50 INV. — PIPE OR CHANNEL INVERT

L=300' — LENTH OF DRAINAGE PATH
DRAINAGE PATH

DRAINAGE AREA BOUNDARY
PROPERTY LINE
Q100p=2.0 — PIPE FLOW
Q10C=2.0 — OPEN CHANNEL FLOW
SOILS GROUP D

DIG ALERT
2 WORKING DAYS BEFORE YOU DIG CALL TOLL FREE
1-800-227-2600
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

CLINTON KEITH
ON-SITE HYDROLOGY MAP

28049B

January 21, 2016

REGISTERED PROFESSIONAL ENGINEER
LYNN J. MUTCH
No. 29517
EXP. 3-31-17
CIVIL ENGINEER
STATE OF CALIFORNIA

REVISIONS

PFEILER & ASSOCIATES ENGINEERS, INC.
CIVIL ENGINEERING & LAND SURVEYING
22609 LA PALMA AVENUE, SUITE 202/203
YORBA LINDA, CA 92887 (909) 993-5800

PREPARED FOR
GEORGE CLINTON-KEITH DEVELOPMENT
4921 Birch Street suite 125
Newport Beach Ca 92660

HYDROLOGY MAP
FOR
CLINTON KEITH VILLAGE

DRAWN BY : JE
DATE: 21 JANUARY 2016
SHEET 1 OF 1
JOB NO.: 28049B

10-YEAR HYDROLGY CALCULATIONS

DEVELOPED SITE

January 16, 2016

JN 28049B

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             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
         RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION
DISTRICT
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(aes)
                        (Rational Tabling Version 22.0)
                    Release Date: 07/01/2015  License ID 1320

                            Analysis prepared by:

                              Pfeiler Associates
                         22609 La Palma Avenue Suite 202
                          Yorba Linda, California 92887
                                 909-993-5800

  ************************** DESCRIPTION OF STUDY
**************************
 * clinton keith Village
*
 * 10-YEAR STORM HYDROLOGY
*
 * January 11, 2016      28049B
*

****************************************************************
*********

   FILE NAME: WILDOMAR.DAT
   TIME/DATE OF STUDY: 08:08 01/13/2016
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   USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
 ---------------------------------------------------------------
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   USER SPECIFIED STORM EVENT(YEAR) =   10.00
   SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
   SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION
SLOPE = 0.85
   10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.320
   10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.980
   100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.540
   100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.500
   SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4809628
   SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4792280
   COMPUTED RAINFALL INTENSITY DATA:
```

```
   STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.990
   SLOPE OF INTENSITY DURATION CURVE = 0.4810
   RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
   NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD
HYDROLOGY MANUAL
         AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM
ANALYSES
   *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND
STREETFLOW MODEL*
      HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-
GEOMETRIES:  MANNING
      WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP
HIKE  FACTOR
 NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)
(FT)    (n)
 ===  =====  =========  =================  ======  ===== ======
===== =======
   1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312
0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  1.00 FEET
        as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
     2. (Depth)*(Velocity) Constraint =  5.0 (FT*FT/S)
   *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
    OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*


****************************************************************
***********
   FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =
21
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   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

================================================================
===========
          ASSUMED INITIAL SUBAREA UNIFORM
          DEVELOPMENT IS COMMERCIAL
   TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   170.00
   UPSTREAM ELEVATION(FEET) =   1339.60
   DOWNSTREAM ELEVATION(FEET) =   1338.00
   ELEVATION DIFFERENCE(FEET) =      1.60
   TC = 0.303*[(  170.00**3)/(     1.60)]**.2 =    6.012
     10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.993
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8884
   SOIL CLASSIFICATION IS "D"
   SUBAREA RUNOFF(CFS) =      2.07
   TOTAL AREA(ACRES) =      0.78   TOTAL RUNOFF(CFS) =      2.07
```

```
****************************************************************
***********
   FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =
31
 ----------------------------------------------------------------
------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
<<<<<

================================================================
===========
   ELEVATION DATA: UPSTREAM(FEET) =  1335.71  DOWNSTREAM(FEET) =
1333.91
   FLOW LENGTH(FEET) =   195.00   MANNING'S N =  0.013
   ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
   DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.8 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   4.23
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =
1
   PIPE-FLOW(CFS) =       2.07
   PIPE TRAVEL TIME(MIN.) =   0.77    Tc(MIN.) =    6.78
   LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =
365.00 FEET.


****************************************************************
***********
   FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =
81
 ----------------------------------------------------------------
------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

================================================================
===========
     10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.825
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8878
   SOIL CLASSIFICATION IS "D"
   SUBAREA AREA(ACRES) =    0.12   SUBAREA RUNOFF(CFS) =    0.30
   TOTAL AREA(ACRES) =        0.9   TOTAL RUNOFF(CFS) =
2.37
   TC(MIN.) =    6.78


****************************************************************
***********
   FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =
31
 ----------------------------------------------------------------
------------
```

```
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
<<<<<

================================================================
===========
   ELEVATION DATA: UPSTREAM(FEET) =  1333.91  DOWNSTREAM(FEET) =
1333.15
   FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
   ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
   DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.5 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   4.10
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =
1
   PIPE-FLOW(CFS) =       2.37
   PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =    7.19
   LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =
465.00 FEET.


****************************************************************
***********
   FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =
81
 ----------------------------------------------------------------
-----------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

================================================================
===========
     10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.747
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8875
   SOIL CLASSIFICATION IS "D"
   SUBAREA AREA(ACRES) =    0.45   SUBAREA RUNOFF(CFS) =    1.10
   TOTAL AREA(ACRES) =        1.3   TOTAL RUNOFF(CFS) =
3.47
   TC(MIN.) =    7.19


****************************************************************
***********
   FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =
31
 ----------------------------------------------------------------
-----------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
<<<<<

================================================================
===========
   ELEVATION DATA: UPSTREAM(FEET) =  1333.15  DOWNSTREAM(FEET) =
```

```
1331.80
   FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
   ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
   DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.4 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   6.22
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =
1
   PIPE-FLOW(CFS) =       3.47
   PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    7.39
   LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =
540.00 FEET.


****************************************************************
***********
   FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =
10
 ----------------------------------------------------------------
------------
   >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<

================================================================
===========


****************************************************************
***********
   FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =
21
 ----------------------------------------------------------------
------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

================================================================
===========
          ASSUMED INITIAL SUBAREA UNIFORM
          DEVELOPMENT IS COMMERCIAL
   TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   303.00
   UPSTREAM ELEVATION(FEET) =   1341.00
   DOWNSTREAM ELEVATION(FEET) =   1338.00
   ELEVATION DIFFERENCE(FEET) =      3.00
   TC = 0.303*[(  303.00**3)/(     3.00)]**.2 =    7.499
     10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.691
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8872
   SOIL CLASSIFICATION IS "D"
   SUBAREA RUNOFF(CFS) =      2.17
   TOTAL AREA(ACRES) =      0.91   TOTAL RUNOFF(CFS) =      2.17


****************************************************************
***********
```

```
   FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =
31
 ----------------------------------------------------------------
------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
<<<<<

================================================================
===========
   ELEVATION DATA: UPSTREAM(FEET) =  1336.00  DOWNSTREAM(FEET) =
1334.98
   FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
   ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
   DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.9 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   5.51
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =
1
   PIPE-FLOW(CFS) =       2.17
   PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =    7.67
   LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =
358.00 FEET.


****************************************************************
***********
   FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =
10
 ----------------------------------------------------------------
------------
   >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<

================================================================
===========


****************************************************************
***********
   FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =
21
 ----------------------------------------------------------------
------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

================================================================
===========
          ASSUMED INITIAL SUBAREA UNIFORM
          DEVELOPMENT IS COMMERCIAL
   TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   275.00
   UPSTREAM ELEVATION(FEET) =   1338.60
   DOWNSTREAM ELEVATION(FEET) =   1338.00
```

```
   ELEVATION DIFFERENCE(FEET) =       0.60
   TC = 0.303*[(  275.00**3)/(     0.60)]**.2 =    9.762
     10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.370
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8858
   SOIL CLASSIFICATION IS "D"
   SUBAREA RUNOFF(CFS) =       1.20
   TOTAL AREA(ACRES) =       0.57   TOTAL RUNOFF(CFS) =       1.20

****************************************************************
***********
   FLOW PROCESS FROM NODE    401.00 TO NODE    202.00 IS CODE =
31
 ----------------------------------------------------------------
------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
<<<<<

================================================================
===========
   ELEVATION DATA: UPSTREAM(FEET) =  1335.00  DOWNSTREAM(FEET) =
1334.98
   FLOW LENGTH(FEET) =   134.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.6 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   0.80
   ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =
1
   PIPE-FLOW(CFS) =       1.20
   PIPE TRAVEL TIME(MIN.) =   2.80    Tc(MIN.) =   12.57
   LONGEST FLOWPATH FROM NODE    400.00 TO NODE    202.00 =
409.00 FEET.


****************************************************************
***********
   FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =
11
 ----------------------------------------------------------------
------------
   >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY
<<<<<

================================================================
===========

   ** MAIN STREAM CONFLUENCE DATA **
   STREAM     RUNOFF      Tc      INTENSITY     AREA
   NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
       1        1.20    12.57       2.099        0.57
   LONGEST FLOWPATH FROM NODE    400.00 TO NODE    202.00 =
409.00 FEET.
```

```
   LONGEST FLOWPATH FROM NODE    400.00 TO NODE    203.00 =
430.00 FEET.

****************************************************************
***********
   FLOW PROCESS FROM NODE    203.00 TO NODE    203.00 IS CODE =
81
 ----------------------------------------------------------------
------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

================================================================
===========
     10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.654
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8871
   SOIL CLASSIFICATION IS "D"
   SUBAREA AREA(ACRES) =    0.53   SUBAREA RUNOFF(CFS) =    1.25
   TOTAL AREA(ACRES) =        2.0   TOTAL RUNOFF(CFS) =
4.15
   TC(MIN.) =    7.72

****************************************************************
***********
   FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =
31
 ----------------------------------------------------------------
------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
<<<<<

================================================================
===========
   ELEVATION DATA: UPSTREAM(FEET) =  1334.50  DOWNSTREAM(FEET) =
1332.50
   FLOW LENGTH(FEET) =    74.00   MANNING'S N =  0.013
   ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
   DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.3 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   7.58
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =
1
   PIPE-FLOW(CFS) =       4.15
   PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    7.88
   LONGEST FLOWPATH FROM NODE    400.00 TO NODE    204.00 =
504.00 FEET.

****************************************************************
***********
   FLOW PROCESS FROM NODE    204.00 TO NODE    204.00 IS CODE =
```

```
81
 ------------------------------------------------------------------
------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

==================================================================
===========
     10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.627
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8870
   SOIL CLASSIFICATION IS "D"
   SUBAREA AREA(ACRES) =    0.68   SUBAREA RUNOFF(CFS) =    1.58
   TOTAL AREA(ACRES) =        2.7   TOTAL RUNOFF(CFS) =
5.74
   TC(MIN.) =    7.88


******************************************************************
***********
   FLOW PROCESS FROM NODE    204.00 TO NODE    205.00 IS CODE =
31
 ------------------------------------------------------------------
------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
<<<<<

==================================================================
===========
   ELEVATION DATA: UPSTREAM(FEET) =  1332.50  DOWNSTREAM(FEET) =
1332.00
   FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.6 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   5.32
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =
1
   PIPE-FLOW(CFS) =       5.74
   PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =    8.07
   LONGEST FLOWPATH FROM NODE    400.00 TO NODE    205.00 =
564.00 FEET.


******************************************************************
***********
   FLOW PROCESS FROM NODE    205.00 TO NODE    205.00 IS CODE =
81
 ------------------------------------------------------------------
------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

==================================================================
===========
     10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.598
```

```
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8869
   SOIL CLASSIFICATION IS "D"
   SUBAREA AREA(ACRES) =    0.86   SUBAREA RUNOFF(CFS) =    1.98
   TOTAL AREA(ACRES) =        3.6   TOTAL RUNOFF(CFS) =
7.72
   TC(MIN.) =    8.07


****************************************************************
***********
   FLOW PROCESS FROM NODE    205.00 TO NODE    104.00 IS CODE =
31
 ----------------------------------------------------------------
------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
<<<<<

================================================================
===========
   ELEVATION DATA: UPSTREAM(FEET) =  1332.00  DOWNSTREAM(FEET) =
1331.80
   FLOW LENGTH(FEET) =    21.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.4 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   5.96
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =
1
   PIPE-FLOW(CFS) =       7.72
   PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    8.13
   LONGEST FLOWPATH FROM NODE    400.00 TO NODE    104.00 =
585.00 FEET.


****************************************************************
***********
   FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =
11
 ----------------------------------------------------------------
------------
   >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY
<<<<<

================================================================
===========

   ** MAIN STREAM CONFLUENCE DATA **
   STREAM     RUNOFF      Tc      INTENSITY     AREA
   NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
       1        7.72     8.13       2.589        3.55
   LONGEST FLOWPATH FROM NODE    400.00 TO NODE    104.00 =
585.00 FEET.
```

```
   ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM      RUNOFF       Tc       INTENSITY      AREA
   NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
       1         3.47      7.39        2.710         1.35
   LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =
540.00 FEET.


**********************************WARNING*************************
*********
   IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
   ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS
FORMULA
   WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.

*****************************************************************
*********

   ** PEAK FLOW RATE TABLE **
   STREAM    RUNOFF       Tc       INTENSITY
   NUMBER     (CFS)     (MIN.)    (INCH/HOUR)
       1      10.48       7.39        2.710
       2      11.03       8.13        2.589

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =      11.03   Tc(MIN.) =     8.13
   TOTAL AREA(ACRES) =        4.9


*****************************************************************
***********
   FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =
10
 ---------------------------------------------------------------
------------
   >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<

===============================================================
===========


*****************************************************************
***********
   FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =
12
 ---------------------------------------------------------------
------------
   >>>>>CLEAR MEMORY BANK # 1 <<<<<

===============================================================
===========
```

```
****************************************************************
***********
   FLOW PROCESS FROM NODE    500.00 TO NODE    501.00 IS CODE =
21
 ----------------------------------------------------------------
------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

================================================================
===========
          ASSUMED INITIAL SUBAREA UNIFORM
          DEVELOPMENT IS COMMERCIAL
   TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   160.00
   UPSTREAM ELEVATION(FEET) =   1340.95
   DOWNSTREAM ELEVATION(FEET) =   1340.00
   ELEVATION DIFFERENCE(FEET) =      0.95
   TC = 0.303*[(  160.00**3)/(     0.95)]**.2 =    6.435
     10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.897
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8880
   SOIL CLASSIFICATION IS "D"
   SUBAREA RUNOFF(CFS) =      0.62
   TOTAL AREA(ACRES) =      0.24   TOTAL RUNOFF(CFS) =      0.62


****************************************************************
***********
   FLOW PROCESS FROM NODE    501.00 TO NODE    502.00 IS CODE =
31
 ----------------------------------------------------------------
------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
<<<<<

================================================================
===========
   ELEVATION DATA: UPSTREAM(FEET) =  1334.00  DOWNSTREAM(FEET) =
1333.50
   FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
   ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
   DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.8 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   3.49
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =
1
   PIPE-FLOW(CFS) =       0.62
   PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =    6.60
   LONGEST FLOWPATH FROM NODE    500.00 TO NODE    502.00 =
195.00 FEET.
```

```
****************************************************************
***********
   FLOW PROCESS FROM NODE    502.00 TO NODE    502.00 IS CODE =
81
 ----------------------------------------------------------------
------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

================================================================
===========
     10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.861
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8879
   SOIL CLASSIFICATION IS "D"
   SUBAREA AREA(ACRES) =    0.16   SUBAREA RUNOFF(CFS) =    0.41
   TOTAL AREA(ACRES) =        0.4   TOTAL RUNOFF(CFS) =
1.02
   TC(MIN.) =    6.60


****************************************************************
***********
   FLOW PROCESS FROM NODE    502.00 TO NODE    104.00 IS CODE =
31
 ----------------------------------------------------------------
------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
<<<<<

================================================================
===========
   ELEVATION DATA: UPSTREAM(FEET) =  1333.50  DOWNSTREAM(FEET) =
1331.80
   FLOW LENGTH(FEET) =   160.00   MANNING'S N =  0.013
   ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
   DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.9 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   3.63
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =
1
   PIPE-FLOW(CFS) =       1.02
   PIPE TRAVEL TIME(MIN.) =   0.74    Tc(MIN.) =    7.34
   LONGEST FLOWPATH FROM NODE    500.00 TO NODE    104.00 =
355.00 FEET.


****************************************************************
***********
   FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =
11
 ----------------------------------------------------------------
------------
   >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY
```

```
<<<<<

================================================================
===========

   ** MAIN STREAM CONFLUENCE DATA **
   STREAM      RUNOFF       Tc       INTENSITY      AREA
   NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
       1         1.02      7.34        2.720         0.40
   LONGEST FLOWPATH FROM NODE    500.00 TO NODE    104.00 =
355.00 FEET.

   ** MEMORY BANK #  3 CONFLUENCE DATA **
   STREAM      RUNOFF       Tc       INTENSITY      AREA
   NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
       1        11.03      8.13        2.589         4.90
   LONGEST FLOWPATH FROM NODE    400.00 TO NODE    104.00 =
585.00 FEET.


**********************************WARNING*************************
*********
   IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
   ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS
FORMULA
   WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.

*****************************************************************
*********

   ** PEAK FLOW RATE TABLE **
   STREAM     RUNOFF       Tc       INTENSITY
   NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
       1       10.98       7.34        2.720
       2       12.01       8.13        2.589

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =      12.01   Tc(MIN.) =    8.13
   TOTAL AREA(ACRES) =        5.3


*****************************************************************
***********
   FLOW PROCESS FROM NODE    104.00 TO NODE    603.00 IS CODE =
31
 ---------------------------------------------------------------
------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
<<<<<

================================================================
```

```
===========
   ELEVATION DATA: UPSTREAM(FEET) =  1331.80  DOWNSTREAM(FEET) =
1329.00
   FLOW LENGTH(FEET) =   160.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.8 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   8.24
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =
1
   PIPE-FLOW(CFS) =      12.01
   PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =     8.45
   LONGEST FLOWPATH FROM NODE    400.00 TO NODE    603.00 =
745.00 FEET.


****************************************************************
***********
   FLOW PROCESS FROM NODE    603.00 TO NODE    603.00 IS CODE =
10
 ----------------------------------------------------------------
------------
   >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<

================================================================
===========


****************************************************************
***********
   FLOW PROCESS FROM NODE    600.00 TO NODE    601.00 IS CODE =
21
 ----------------------------------------------------------------
------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

================================================================
===========
          ASSUMED INITIAL SUBAREA UNIFORM
          DEVELOPMENT IS COMMERCIAL
   TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   249.00
   UPSTREAM ELEVATION(FEET) =   1369.00
   DOWNSTREAM ELEVATION(FEET) =   1340.00
   ELEVATION DIFFERENCE(FEET) =     29.00
   TC = 0.303*[(  249.00**3)/(    29.00)]**.2 =    4.235
   COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
     10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.270
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8892
   SOIL CLASSIFICATION IS "D"
   SUBAREA RUNOFF(CFS) =      2.79
   TOTAL AREA(ACRES) =      0.96   TOTAL RUNOFF(CFS) =      2.79
```

```
****************************************************************
***********
   FLOW PROCESS FROM NODE    602.00 TO NODE    603.00 IS CODE =
31
 ----------------------------------------------------------------
------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
<<<<<

================================================================
===========
   ELEVATION DATA: UPSTREAM(FEET) =  1330.00  DOWNSTREAM(FEET) =
1329.00
   FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
   ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
   DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.0 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   5.39
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =
1
   PIPE-FLOW(CFS) =       2.79
   PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =    5.22
   LONGEST FLOWPATH FROM NODE    600.00 TO NODE    603.00 =
319.00 FEET.


****************************************************************
***********
   FLOW PROCESS FROM NODE    603.00 TO NODE    603.00 IS CODE =
11
 ----------------------------------------------------------------
------------
   >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY
<<<<<

================================================================
===========

   ** MAIN STREAM CONFLUENCE DATA **
   STREAM     RUNOFF      Tc      INTENSITY     AREA
   NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        2.79     5.22       3.204        0.96
   LONGEST FLOWPATH FROM NODE    600.00 TO NODE    603.00 =
319.00 FEET.

   ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM     RUNOFF      Tc      INTENSITY     AREA
   NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       12.01     8.45       2.540        5.30
   LONGEST FLOWPATH FROM NODE    400.00 TO NODE    603.00 =
745.00 FEET.
```

```
**********************************WARNING*************************
*********
   IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
   ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS
FORMULA
   WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.

*****************************************************************
*********

   ** PEAK FLOW RATE TABLE **
   STREAM    RUNOFF       Tc       INTENSITY
   NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
       1      10.20       5.22        3.204
       2      14.22       8.45        2.540

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =      14.22   Tc(MIN.) =     8.45
   TOTAL AREA(ACRES) =        6.3


*****************************************************************
***********
   FLOW PROCESS FROM NODE    603.00 TO NODE    604.00 IS CODE =
31
 -----------------------------------------------------------------
------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
<<<<<

=================================================================
===========
   ELEVATION DATA: UPSTREAM(FEET) =  1329.00  DOWNSTREAM(FEET) =
1324.78
   FLOW LENGTH(FEET) =   140.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.7 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =  10.67
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =
1
   PIPE-FLOW(CFS) =      14.22
   PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =     8.67
   LONGEST FLOWPATH FROM NODE    400.00 TO NODE    604.00 =
885.00 FEET.

=================================================================
===========
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)      =        6.3  TC(MIN.) =      8.67
   PEAK FLOW RATE(CFS)    =      14.22
```

==========
==========

==========
==========
END OF RATIONAL METHOD ANALYSIS

100-YEAR HYDROLOGY CALCULATIONS

DEVELOPED SITE

```
****************************************************************
***********
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
          RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION
DISTRICT
                        (RCFC&WCD)  1978 HYDROLOGY MANUAL
           (c) Copyright 1982-2015 Advanced Engineering Software
(aes)
                        (Rational Tabling Version 22.0)
                     Release Date: 07/01/2015  License ID 1320

                           Analysis prepared by:

                              Pfeiler Associates
                         22609 La Palma Avenue Suite 202
                          Yorba Linda, California 92887
                                 909-993-5800

  ************************** DESCRIPTION OF STUDY
**************************
 * clinton keith Village
*
 * 100-year storm hydrology
*
 * January 11, 2016      28049B
*

****************************************************************
*********

   FILE NAME: WILDOMAR.DAT
   TIME/DATE OF STUDY: 15:33 01/12/2016
 ---------------------------------------------------------------
------------
   USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
 ---------------------------------------------------------------
------------
   USER SPECIFIED STORM EVENT(YEAR) =  100.00
   SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
   SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION
SLOPE = 0.85
   10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.320
   10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.980
   100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.540
   100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.500
   SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4809628
   SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4792280
   COMPUTED RAINFALL INTENSITY DATA:
```

```
   STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.500
   SLOPE OF INTENSITY DURATION CURVE = 0.4792
   RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
   NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD
HYDROLOGY MANUAL
         AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM
ANALYSES
   *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND
STREETFLOW MODEL*
      HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-
GEOMETRIES:  MANNING
      WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP
HIKE  FACTOR
 NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)
(FT)    (n)
 ===  =====  =========  =================  ======  ===== ======
===== =======
   1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313
0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  1.00 FEET
        as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
     2. (Depth)*(Velocity) Constraint =  5.0 (FT*FT/S)
   *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
    OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*


****************************************************************
***********
   FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =
21
 ----------------------------------------------------------------
------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

================================================================
===========
          ASSUMED INITIAL SUBAREA UNIFORM
          DEVELOPMENT IS COMMERCIAL
   TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   170.00
   UPSTREAM ELEVATION(FEET) =   1339.60
   DOWNSTREAM ELEVATION(FEET) =   1338.00
   ELEVATION DIFFERENCE(FEET) =      1.60
   TC = 0.303*[(  170.00**3)/(     1.60)]**.2 =    6.012
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.517
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8919
   SOIL CLASSIFICATION IS "D"
   SUBAREA RUNOFF(CFS) =      3.14
   TOTAL AREA(ACRES) =      0.78   TOTAL RUNOFF(CFS) =      3.14
```

```
****************************************************************
***********
   FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =
31
 ---------------------------------------------------------------
------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
<<<<<

===============================================================
===========
   ELEVATION DATA: UPSTREAM(FEET) =  1335.71  DOWNSTREAM(FEET) =
1333.91
   FLOW LENGTH(FEET) =   195.00   MANNING'S N =  0.013
   ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
   DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.2 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   4.75
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =
1
   PIPE-FLOW(CFS) =       3.14
   PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =    6.70
   LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =
365.00 FEET.


****************************************************************
***********
   FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =
81
 ---------------------------------------------------------------
------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

===============================================================
===========
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.290
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8916
   SOIL CLASSIFICATION IS "D"
   SUBAREA AREA(ACRES) =    0.12   SUBAREA RUNOFF(CFS) =    0.46
   TOTAL AREA(ACRES) =        0.9   TOTAL RUNOFF(CFS) =
3.60
   TC(MIN.) =    6.70


****************************************************************
***********
   FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =
31
 ---------------------------------------------------------------
------------
```

```
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
<<<<<

================================================================
===========
   ELEVATION DATA: UPSTREAM(FEET) =  1333.91  DOWNSTREAM(FEET) =
1333.15
   FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
   ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
   DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.2 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   4.59
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =
1
   PIPE-FLOW(CFS) =       3.60
   PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =    7.06
   LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =
465.00 FEET.


****************************************************************
***********
   FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =
81
 ----------------------------------------------------------------
------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

================================================================
===========
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.183
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8914
   SOIL CLASSIFICATION IS "D"
   SUBAREA AREA(ACRES) =    0.45   SUBAREA RUNOFF(CFS) =    1.68
   TOTAL AREA(ACRES) =        1.3   TOTAL RUNOFF(CFS) =
5.28
   TC(MIN.) =    7.06


****************************************************************
***********
   FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =
31
 ----------------------------------------------------------------
------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
<<<<<

================================================================
===========
   ELEVATION DATA: UPSTREAM(FEET) =  1333.15  DOWNSTREAM(FEET) =
```

```
1331.80
   FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
   ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
   DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.0 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   6.97
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =
1
   PIPE-FLOW(CFS) =       5.28
   PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    7.24
   LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =
540.00 FEET.


****************************************************************
***********
   FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =
10
 ----------------------------------------------------------------
------------
   >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<

================================================================
===========


****************************************************************
***********
   FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =
21
 ----------------------------------------------------------------
------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

================================================================
===========
          ASSUMED INITIAL SUBAREA UNIFORM
          DEVELOPMENT IS COMMERCIAL
   TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   303.00
   UPSTREAM ELEVATION(FEET) =   1341.00
   DOWNSTREAM ELEVATION(FEET) =   1338.00
   ELEVATION DIFFERENCE(FEET) =      3.00
   TC = 0.303*[(  303.00**3)/(     3.00)]**.2 =    7.499
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.063
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8911
   SOIL CLASSIFICATION IS "D"
   SUBAREA RUNOFF(CFS) =      3.30
   TOTAL AREA(ACRES) =      0.91   TOTAL RUNOFF(CFS) =      3.30


****************************************************************
***********
```

```
   FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =
31
 ----------------------------------------------------------------
------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
<<<<<

================================================================
===========
   ELEVATION DATA: UPSTREAM(FEET) =  1336.00  DOWNSTREAM(FEET) =
1334.98
   FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
   ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
   DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   6.21
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =
1
   PIPE-FLOW(CFS) =       3.30
   PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    7.65
   LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =
358.00 FEET.


****************************************************************
***********
   FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =
10
 ----------------------------------------------------------------
------------
   >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<

================================================================
===========


****************************************************************
***********
   FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =
21
 ----------------------------------------------------------------
------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

================================================================
===========
          ASSUMED INITIAL SUBAREA UNIFORM
          DEVELOPMENT IS COMMERCIAL
   TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   275.00
   UPSTREAM ELEVATION(FEET) =   1338.60
   DOWNSTREAM ELEVATION(FEET) =   1338.00
```

```
   ELEVATION DIFFERENCE(FEET) =       0.60
   TC = 0.303*[(  275.00**3)/(      0.60)]**.2 =     9.762
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.581
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8901
   SOIL CLASSIFICATION IS "D"
   SUBAREA RUNOFF(CFS) =       1.82
   TOTAL AREA(ACRES) =       0.57   TOTAL RUNOFF(CFS) =       1.82

****************************************************************
***********
   FLOW PROCESS FROM NODE    401.00 TO NODE    202.00 IS CODE =
31
 ----------------------------------------------------------------
------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
<<<<<

================================================================
===========
   ELEVATION DATA: UPSTREAM(FEET) =  1335.00  DOWNSTREAM(FEET) =
1334.98
   FLOW LENGTH(FEET) =   134.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.0 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   0.88
   ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =
1
   PIPE-FLOW(CFS) =       1.82
   PIPE TRAVEL TIME(MIN.) =   2.54    Tc(MIN.) =   12.30
   LONGEST FLOWPATH FROM NODE    400.00 TO NODE    202.00 =
409.00 FEET.


****************************************************************
***********
   FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =
11
 ----------------------------------------------------------------
------------
   >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY
<<<<<

================================================================
===========

   ** MAIN STREAM CONFLUENCE DATA **
   STREAM     RUNOFF      Tc      INTENSITY     AREA
   NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        1.82     12.30       3.206        0.57
   LONGEST FLOWPATH FROM NODE    400.00 TO NODE    202.00 =
409.00 FEET.
```

```
   ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM      RUNOFF       Tc       INTENSITY      AREA
   NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
       1         3.30      7.65        4.026         0.91
   LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =
358.00 FEET.


*********************************WARNING*************************
*********
   IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
   ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS
FORMULA
   WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.

*****************************************************************
*********

   ** PEAK FLOW RATE TABLE **
   STREAM    RUNOFF       Tc       INTENSITY
   NUMBER     (CFS)     (MIN.)    (INCH/HOUR)
       1       4.42       7.65        4.026
       2       4.44      12.30        3.206

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =       4.42   Tc(MIN.) =    7.65
   TOTAL AREA(ACRES) =        1.5


*****************************************************************
***********
   FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =
31
 -------------------------------------------------------------
------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
<<<<<

=============================================================
===========
   ELEVATION DATA: UPSTREAM(FEET) =  1334.98  DOWNSTREAM(FEET) =
1334.50
   FLOW LENGTH(FEET) =    21.00   MANNING'S N =  0.013
   ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
   DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.8 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   7.26
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =
1
   PIPE-FLOW(CFS) =       4.42
   PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    7.70
```

```
   LONGEST FLOWPATH FROM NODE    400.00 TO NODE    203.00 =
430.00 FEET.

****************************************************************
***********
   FLOW PROCESS FROM NODE    203.00 TO NODE    203.00 IS CODE =
81
 ----------------------------------------------------------------
------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

================================================================
===========
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.014
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8910
   SOIL CLASSIFICATION IS "D"
   SUBAREA AREA(ACRES) =     0.53   SUBAREA RUNOFF(CFS) =     1.90
   TOTAL AREA(ACRES) =        2.0   TOTAL RUNOFF(CFS) =
6.32
   TC(MIN.) =    7.70

****************************************************************
***********
   FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =
31
 ----------------------------------------------------------------
------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
<<<<<

================================================================
===========
   ELEVATION DATA: UPSTREAM(FEET) =  1334.50  DOWNSTREAM(FEET) =
1332.50
   FLOW LENGTH(FEET) =    74.00   MANNING'S N =  0.013
   ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
   DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.9 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   8.49
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =
1
   PIPE-FLOW(CFS) =       6.32
   PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    7.84
   LONGEST FLOWPATH FROM NODE    400.00 TO NODE    204.00 =
504.00 FEET.

****************************************************************
***********
   FLOW PROCESS FROM NODE    204.00 TO NODE    204.00 IS CODE =
```

```
81
 ----------------------------------------------------------------
------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

================================================================
===========
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.978
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8910
   SOIL CLASSIFICATION IS "D"
   SUBAREA AREA(ACRES) =    0.68   SUBAREA RUNOFF(CFS) =    2.41
   TOTAL AREA(ACRES) =        2.7   TOTAL RUNOFF(CFS) =
8.73
   TC(MIN.) =    7.84


****************************************************************
***********
   FLOW PROCESS FROM NODE    204.00 TO NODE    205.00 IS CODE =
31
 ----------------------------------------------------------------
------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
<<<<<

================================================================
===========
   ELEVATION DATA: UPSTREAM(FEET) =  1332.50  DOWNSTREAM(FEET) =
1332.00
   FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.6 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   5.70
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =
1
   PIPE-FLOW(CFS) =       8.73
   PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    8.02
   LONGEST FLOWPATH FROM NODE    400.00 TO NODE    205.00 =
564.00 FEET.


****************************************************************
***********
   FLOW PROCESS FROM NODE    205.00 TO NODE    205.00 IS CODE =
81
 ----------------------------------------------------------------
------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

================================================================
===========
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.936
```

```
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8909
   SOIL CLASSIFICATION IS "D"
   SUBAREA AREA(ACRES) =     0.86   SUBAREA RUNOFF(CFS) =     3.02
   TOTAL AREA(ACRES) =        3.6   TOTAL RUNOFF(CFS) =
11.75
   TC(MIN.) =     8.02

****************************************************************
***********
   FLOW PROCESS FROM NODE    205.00 TO NODE    104.00 IS CODE =
31
 ----------------------------------------------------------------
------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
<<<<<

================================================================
===========
   ELEVATION DATA: UPSTREAM(FEET) =  1332.00  DOWNSTREAM(FEET) =
1331.80
   FLOW LENGTH(FEET) =    21.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.5 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   6.62
   ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =
1
   PIPE-FLOW(CFS) =      11.75
   PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    8.07
   LONGEST FLOWPATH FROM NODE    400.00 TO NODE    104.00 =
585.00 FEET.

****************************************************************
***********
   FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =
11
 ----------------------------------------------------------------
------------
   >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY
<<<<<

================================================================
===========

   ** MAIN STREAM CONFLUENCE DATA **
   STREAM     RUNOFF      Tc      INTENSITY     AREA
   NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
       1       11.75     8.07       3.923        3.55
   LONGEST FLOWPATH FROM NODE    400.00 TO NODE    104.00 =
585.00 FEET.
```

```
   ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM     RUNOFF      Tc      INTENSITY     AREA
   NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
       1        5.28     7.24       4.133        1.35
   LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =
540.00 FEET.


*********************************WARNING************************
*********
   IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
   ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS
FORMULA
   WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.

*****************************************************************
*********

   ** PEAK FLOW RATE TABLE **
   STREAM    RUNOFF       Tc      INTENSITY
   NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
       1      15.82       7.24       4.133
       2      16.76       8.07       3.923

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =      16.76   Tc(MIN.) =    8.07
   TOTAL AREA(ACRES) =        4.9


*****************************************************************
***********
   FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =
10
 -------------------------------------------------------------
------------
   >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<

=============================================================
===========


*****************************************************************
***********
   FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =
12
 -------------------------------------------------------------
------------
   >>>>>CLEAR MEMORY BANK # 1 <<<<<

=============================================================
===========
```

```
****************************************************************
***********
   FLOW PROCESS FROM NODE    500.00 TO NODE    501.00 IS CODE =
21
 ----------------------------------------------------------------
------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

================================================================
===========
          ASSUMED INITIAL SUBAREA UNIFORM
          DEVELOPMENT IS COMMERCIAL
   TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   160.00
   UPSTREAM ELEVATION(FEET) =   1340.95
   DOWNSTREAM ELEVATION(FEET) =   1340.00
   ELEVATION DIFFERENCE(FEET) =      0.95
   TC = 0.303*[(  160.00**3)/(     0.95)]**.2 =    6.435
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.373
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8917
   SOIL CLASSIFICATION IS "D"
   SUBAREA RUNOFF(CFS) =      0.94
   TOTAL AREA(ACRES) =      0.24   TOTAL RUNOFF(CFS) =      0.94


****************************************************************
***********
   FLOW PROCESS FROM NODE    501.00 TO NODE    502.00 IS CODE =
31
 ----------------------------------------------------------------
------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
<<<<<

================================================================
===========
   ELEVATION DATA: UPSTREAM(FEET) =  1334.00  DOWNSTREAM(FEET) =
1333.50
   FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
   ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
   DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.5 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   3.95
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =
1
   PIPE-FLOW(CFS) =       0.94
   PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    6.58
   LONGEST FLOWPATH FROM NODE    500.00 TO NODE    502.00 =
195.00 FEET.
```

```
****************************************************************
***********
   FLOW PROCESS FROM NODE    502.00 TO NODE    502.00 IS CODE =
81
 ----------------------------------------------------------------
------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

================================================================
===========
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.326
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8916
   SOIL CLASSIFICATION IS "D"
   SUBAREA AREA(ACRES) =    0.16   SUBAREA RUNOFF(CFS) =    0.62
   TOTAL AREA(ACRES) =        0.4   TOTAL RUNOFF(CFS) =
1.55
   TC(MIN.) =    6.58


****************************************************************
***********
   FLOW PROCESS FROM NODE    502.00 TO NODE    104.00 IS CODE =
31
 ----------------------------------------------------------------
------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
<<<<<

================================================================
===========
   ELEVATION DATA: UPSTREAM(FEET) =  1333.50  DOWNSTREAM(FEET) =
1331.80
   FLOW LENGTH(FEET) =   160.00   MANNING'S N =  0.013
   ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
   DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.8 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   4.10
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =
1
   PIPE-FLOW(CFS) =       1.55
   PIPE TRAVEL TIME(MIN.) =   0.65    Tc(MIN.) =    7.23
   LONGEST FLOWPATH FROM NODE    500.00 TO NODE    104.00 =
355.00 FEET.


****************************************************************
***********
   FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =
11
 ----------------------------------------------------------------
------------
   >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY
```

```
<<<<<

================================================================
===========

   ** MAIN STREAM CONFLUENCE DATA **
   STREAM     RUNOFF      Tc      INTENSITY     AREA
   NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
       1        1.55     7.23       4.135        0.40
   LONGEST FLOWPATH FROM NODE    500.00 TO NODE    104.00 =
355.00 FEET.

   ** MEMORY BANK #  3 CONFLUENCE DATA **
   STREAM     RUNOFF      Tc      INTENSITY     AREA
   NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
       1       16.76     8.07       3.923        4.90
   LONGEST FLOWPATH FROM NODE    400.00 TO NODE    104.00 =
585.00 FEET.


*********************************WARNING************************
*********
   IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
   ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS
FORMULA
   WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.

****************************************************************
*********

   ** PEAK FLOW RATE TABLE **
   STREAM    RUNOFF      Tc      INTENSITY
   NUMBER     (CFS)    (MIN.)   (INCH/HOUR)
       1      16.57      7.23       4.135
       2      18.23      8.07       3.923

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =      18.23   Tc(MIN.) =    8.07
   TOTAL AREA(ACRES) =        5.3


****************************************************************
***********
   FLOW PROCESS FROM NODE    104.00 TO NODE    603.00 IS CODE =
31
 ---------------------------------------------------------------
------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
<<<<<

================================================================
```

```
===========
   ELEVATION DATA: UPSTREAM(FEET) =  1331.80  DOWNSTREAM(FEET) =
1329.00
   FLOW LENGTH(FEET) =   160.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.2 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   9.14
   ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =
1
   PIPE-FLOW(CFS) =      18.23
   PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =    8.36
   LONGEST FLOWPATH FROM NODE    400.00 TO NODE    603.00 =
745.00 FEET.


****************************************************************
***********
   FLOW PROCESS FROM NODE    603.00 TO NODE    603.00 IS CODE =
10
 ----------------------------------------------------------------
------------
   >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<

================================================================
===========


****************************************************************
***********
   FLOW PROCESS FROM NODE    600.00 TO NODE    601.00 IS CODE =
21
 ----------------------------------------------------------------
------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

================================================================
===========
          ASSUMED INITIAL SUBAREA UNIFORM
          DEVELOPMENT IS COMMERCIAL
   TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   249.00
   UPSTREAM ELEVATION(FEET) =   1369.00
   DOWNSTREAM ELEVATION(FEET) =   1340.00
   ELEVATION DIFFERENCE(FEET) =     29.00
   TC = 0.303*[(  249.00**3)/(    29.00)]**.2 =    4.235
   COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.935
   COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8926
   SOIL CLASSIFICATION IS "D"
   SUBAREA RUNOFF(CFS) =      4.23
   TOTAL AREA(ACRES) =      0.96   TOTAL RUNOFF(CFS) =      4.23
```

```
****************************************************************
***********
   FLOW PROCESS FROM NODE    602.00 TO NODE    603.00 IS CODE =
31
 ----------------------------------------------------------------
------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
<<<<<

================================================================
===========
   ELEVATION DATA: UPSTREAM(FEET) =  1330.00  DOWNSTREAM(FEET) =
1329.00
   FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
   ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
   DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.5 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   6.04
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =
1
   PIPE-FLOW(CFS) =       4.23
   PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =    5.19
   LONGEST FLOWPATH FROM NODE    600.00 TO NODE    603.00 =
319.00 FEET.


****************************************************************
***********
   FLOW PROCESS FROM NODE    603.00 TO NODE    603.00 IS CODE =
11
 ----------------------------------------------------------------
------------
   >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY
<<<<<

================================================================
===========

   ** MAIN STREAM CONFLUENCE DATA **
   STREAM     RUNOFF      Tc      INTENSITY     AREA
   NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
       1        4.23     5.19       4.846        0.96
   LONGEST FLOWPATH FROM NODE    600.00 TO NODE    603.00 =
319.00 FEET.

   ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM     RUNOFF      Tc      INTENSITY     AREA
   NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
       1       18.23     8.36       3.857        5.30
   LONGEST FLOWPATH FROM NODE    400.00 TO NODE    603.00 =
745.00 FEET.
```

```
*********************************WARNING*************************
*********
   IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
   ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS
FORMULA
   WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.

*****************************************************************
*********

   ** PEAK FLOW RATE TABLE **
   STREAM    RUNOFF       Tc       INTENSITY
   NUMBER     (CFS)     (MIN.)    (INCH/HOUR)
       1      15.55       5.19        4.846
       2      21.60       8.36        3.857

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =      21.60   Tc(MIN.) =    8.36
   TOTAL AREA(ACRES) =        6.3


*****************************************************************
***********
   FLOW PROCESS FROM NODE    603.00 TO NODE    604.00 IS CODE =
31
 ---------------------------------------------------------------
------------
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
<<<<<

================================================================
===========
   ELEVATION DATA: UPSTREAM(FEET) =  1329.00  DOWNSTREAM(FEET) =
1324.78
   FLOW LENGTH(FEET) =   140.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.9 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =  11.84
   ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =
1
   PIPE-FLOW(CFS) =      21.60
   PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    8.56
   LONGEST FLOWPATH FROM NODE    400.00 TO NODE    604.00 =
885.00 FEET.

================================================================
===========
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)     =        6.3  TC(MIN.) =      8.56
   PEAK FLOW RATE(CFS)   =      21.60
```

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==========
END OF RATIONAL METHOD ANALYSIS

2,5 and 10 year storms at 3, 6 and 24- hour duration hydrographs for undeveloped site

January 16, 2016

JN 28049B

RAINFALL PATTERNS IN PERCENT

3-HOUR STORM

TIME PERIOD	5-MIN PERIOD	10-MIN PERIOD	15-MIN PERIOD	30-MIN PERIOD
1	1.3	2.6	3.7	8.5
2	1.3	2.6	4.8	10.0
3	1.1	3.3	5.1	13.9
4	1.5	3.3	4.9	17.4
5	1.5	3.3	6.6	29.9
6	1.8	3.4	7.3	20.3
7	1.5	4.4	8.4	
8	1.8	4.2	9.0	
9	1.8	5.3	12.3	
10	1.5	5.1	17.6	
11	1.6	6.4	16.1	
12	1.8	5.9	4.2	
13	2.2	7.3		
14	2.2	8.5		
15	2.2	14.1		
16	2.0	14.1		
17	2.6	3.8		
18	2.7	2.4		
19	2.4			
20	2.7			
21	3.3			
22	3.1			
23	2.9			
24	3.0			
25	3.1			
26	4.2			
27	5.0			
28	3.5			
29	6.8			
30	7.3			
31	8.2			
32	5.9			
33	2.0			
34	1.8			
35	1.8			
36	.6			

6-HOUR STORM

TIME PERIOD	5-MIN PERIOD	10-MIN PERIOD	15-MIN PERIOD	30-MIN PERIOD
1	.5	1.1	1.7	3.6
2	.6	1.2	1.9	4.3
3	.6	1.3	2.1	4.8
4	.6	1.4	2.2	4.9
5	.6	1.4	2.4	5.3
6	.7	1.5	2.4	5.8
7	.7	1.6	2.4	6.8
8	.7	1.6	2.5	9.0
9	.7	1.6	2.6	11.6
10	.7	1.6	2.7	14.4
11	.7	1.6	2.8	25.1
12	.8	1.7	3.0	4.4
13	.8	1.7	3.2	
14	.8	1.8	3.6	
15	.8	1.8	4.3	
16	.8	1.8	4.7	
17	.8	2.0	5.4	
18	.8	2.0	6.2	
19	.8	2.1	6.9	
20	.8	2.2	7.5	
21	.8	2.5	10.6	
22	.8	2.8	14.5	
23	.8	3.0	3.4	
24	.9	3.2	1.0	
25	.8	3.5		
26	.9	3.9		
27	.9	4.2		
28	.9	4.5		
29	.9	4.8		
30	.9	5.1		
31	.9	6.7		
32	.9	8.1		
33	1.0	10.3		
34	1.0	2.8		
35	1.0	1.1		
36	1.0	.5		
37	1.0			
38	1.1			
39	1.1			
40	1.1			
41	1.2			
42	1.3			
43	1.4			
44	1.4			
45	1.5			
46	1.5			
47	1.6			
48	1.6			

TIME PERIOD	5-MIN PERIOD
49	1.7
50	1.8
51	1.9
52	2.0
53	2.1
54	2.1
55	2.2
56	2.3
57	2.4
58	2.4
59	2.5
60	2.6
61	3.1
62	3.6
63	3.9
64	4.2
65	4.7
66	5.6
67	1.9
68	.9
69	.6
70	.5
71	.3
72	.2

24-HOUR STORM

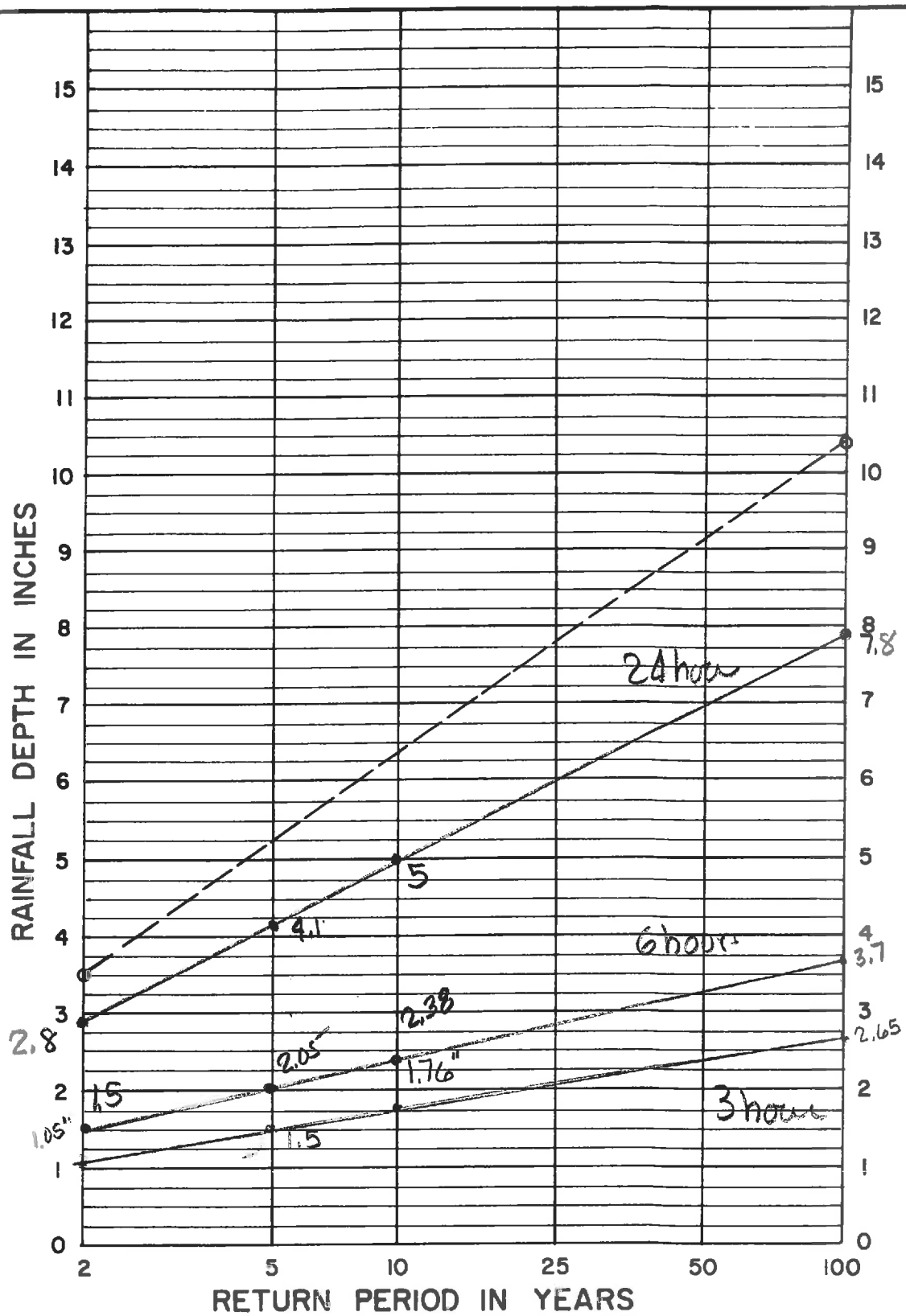
TIME PERIOD	15-MIN PERIOD	30-MIN PERIOD	60-MIN PERIOD
1	.2	.5	1.2
2	.3	.7	1.3
3	.3	.6	1.8
4	.4	.7	2.1
5	.3	.8	2.8
6	.3	1.0	2.9
7	.3	1.0	3.8
8	.4	1.1	4.6
9	.4	1.3	6.3
10	.4	1.5	8.2
11	.5	1.3	7.0
12	.5	1.6	7.3
13	.5	1.8	10.8
14	.5	2.0	11.4
15	.5	2.1	10.4
16	.6	2.5	8.5
17	.6	3.0	1.4
18	.7	3.3	1.9
19	.7	3.9	1.3
20	.8	4.3	1.2
21	.6	3.0	1.1
22	.7	4.0	1.0
23	.8	3.8	.9
24	.8	3.5	.8
25	.9	5.1	
26	.9	5.7	
27	1.0	6.8	
28	1.0	4.6	
29	1.0	5.3	
30	1.1	5.1	
31	1.2	4.7	
32	1.3	3.8	
33	1.5	.8	
34	1.5	.6	
35	1.6	1.0	
36	1.7	.9	
37	1.9	.8	
38	2.0	.5	
39	2.1	.7	
40	2.2	.5	
41	1.5	.6	
42	1.5	.5	
43	2.0	.5	
44	2.0	.5	
45	1.9	.5	
46	1.9	.4	
47	1.7	.4	
48	1.8	.4	

TIME PERIOD	15-MIN PERIOD
49	2.5
50	2.6
51	2.8
52	2.9
53	3.4
54	3.4
55	2.3
56	2.3
57	2.7
58	2.6
59	2.6
60	2.5
61	2.4
62	2.3
63	1.9
64	1.9
65	.4
66	.4
67	.3
68	.3
69	.5
70	.5
71	.5
72	.4
73	.4
74	.4
75	.3
76	.2
77	.3
78	.4
79	.3
80	.2
81	.3
82	.3
83	.3
84	.2
85	.3
86	.2
87	.3
88	.2
89	.3
90	.2
91	.2
92	.2
93	.2
94	.2
95	.2
96	.2

NOTES:

1. 3 and 6-hour patterns based on the Indio area thunderstorm of September 24,1939.
2. 24-hour patterns based on the general storm of March 2 & 3,1938.

RAINFALL PATTERNS IN PERCENT



NOTE:

1. For intermediate return periods plot 2-year and 100-year values from maps for a specific duration, then connect points and read value for desired return period. For example given 2-year 24-hour = 3.50" and 100-year 24-hour = 10.40", 25-year 24-hour = 7.80"

Reference: NOAA Atlas 2, Volume XI-California, 1973.

RCFC & WCD

HYDROLOGY MANUAL

RAINFALL DEPTH VERSUS RETURN PERIOD FOR PARTIAL DURATION SERIES

RAINFALL INTENSITY—INCHES PER HOUR

MIRA LOMA

DURATION MINUTES	FREQUENCY 10 YEAR	FREQUENCY 100 YEAR
5	2.84	4.48
6	2.58	4.07
7	2.37	3.75
8	2.21	3.49
9	2.08	3.28
10	1.96	3.10
11	1.87	2.95
12	1.78	2.82
13	1.71	2.70
14	1.64	2.60
15	1.58	2.50
16	1.53	2.42
17	1.48	2.34
18	1.44	2.27
19	1.40	2.21
20	1.36	2.15
22	1.29	2.04
24	1.24	1.95
26	1.18	1.87
28	1.14	1.80
30	1.10	1.73
32	1.06	1.67
34	1.03	1.62
36	1.00	1.57
38	.97	1.53
40	.94	1.49
45	.89	1.40
50	.84	1.32
55	.80	1.26
60	.76	1.20
65	.73	1.15
70	.70	1.11
75	.68	1.07
80	.65	1.03
85	.63	1.00

SLOPE = .530

MURRIETA - TEMECULA & RANCHO CALIFORNIA

DURATION MINUTES	FREQUENCY 10 YEAR	FREQUENCY 100 YEAR
5	3.45	5.10
6	3.12	4.61
7	2.87	4.24
8	2.67	3.94
9	2.50	3.69
10	2.36	3.48
11	2.24	3.30
12	2.13	3.15
13	2.04	3.01
14	1.96	2.89
15	1.89	2.79
16	1.82	2.69
17	1.76	2.60
18	1.71	2.52
19	1.66	2.45
20	1.61	2.38
22	1.53	2.26
24	1.46	2.15
26	1.39	2.06
28	1.34	1.98
30	1.29	1.90
32	1.24	1.84
34	1.20	1.78
36	1.17	1.72
38	1.13	1.67
40	1.10	1.62
45	1.03	1.52
50	.97	1.44
55	.92	1.36
60	.88	1.30
65	.84	1.24
70	.81	1.19
75	.78	1.15
80	.75	1.11
85	.73	1.07

SLOPE = .550

NORCO

DURATION MINUTES	FREQUENCY 10 YEAR	FREQUENCY 100 YEAR
5	2.77	4.16
6	2.53	3.79
7	2.34	3.51
8	2.19	3.29
9	2.07	3.10
10	1.96	2.94
11	1.87	2.80
12	1.79	2.68
13	1.72	2.58
14	1.66	2.48
15	1.60	2.40
16	1.55	2.32
17	1.50	2.25
18	1.46	2.19
19	1.42	2.13
20	1.39	2.08
22	1.32	1.98
24	1.26	1.90
26	1.22	1.82
28	1.17	1.76
30	1.13	1.70
32	1.10	1.64
34	1.06	1.59
36	1.03	1.55
38	1.01	1.51
40	.98	1.47
45	.92	1.39
50	.88	1.31
55	.84	1.25
60	.80	1.20
65	.77	1.15
70	.74	1.11
75	.72	1.07
80	.69	1.04
85	.67	1.01

SLOPE = .500

PALM SPRINGS

DURATION MINUTES	FREQUENCY 10 YEAR	FREQUENCY 100 YEAR
5	4.23	6.76
6	3.80	6.08
7	3.48	5.56
8	3.22	5.15
9	3.01	4.81
10	2.83	4.52
11	2.67	4.28
12	2.54	4.07
13	2.43	3.88
14	2.33	3.72
15	2.23	3.58
16	2.15	3.44
17	2.08	3.32
18	2.01	3.22
19	1.95	3.12
20	1.89	3.03
22	1.79	2.86
24	1.70	2.72
26	1.62	2.60
28	1.56	2.49
30	1.49	2.39
32	1.44	2.30
34	1.39	2.22
36	1.34	2.15
38	1.30	2.09
40	1.27	2.02
45	1.18	1.89
50	1.11	1.78
55	1.05	1.68
60	1.00	1.60
65	.95	1.53
70	.91	1.46
75	.88	1.41
80	.85	1.35
85	.82	1.31

SLOPE = .580

PERRIS VALLEY

DURATION MINUTES	FREQUENCY 10 YEAR	FREQUENCY 100 YEAR
5	2.64	3.78
6	2.41	3.46
7	2.24	3.21
8	2.09	3.01
9	1.98	2.84
10	1.88	2.69
11	1.79	2.57
12	1.72	2.46
13	1.65	2.37
14	1.59	2.29
15	1.54	2.21
16	1.49	2.14
17	1.45	2.08
18	1.41	2.02
19	1.37	1.97
20	1.34	1.92
22	1.28	1.83
24	1.22	1.75
26	1.18	1.69
28	1.13	1.63
30	1.10	1.57
32	1.06	1.52
34	1.03	1.48
36	1.00	1.44
38	.98	1.40
40	.95	1.37
45	.90	1.29
50	.85	1.22
55	.81	1.17
60	.78	1.12
65	.75	1.08
70	.72	1.04
75	.70	1.00
80	.68	.97
85	.66	.94

SLOPE = .490

STANDARD INTENSITY-DURATION CURVES DATA

Synthetic Hydrograph						
total adjusted rain		1.05		total Area	4.73	
Unit time		10				
storm	2 year	3 hour				
Unit time	Rain %	Storm Rain	Loss Rate	low Loss	Effective Rain	Q
1	2.6	0.1638	0.127		0.0368	0.17
2	2.6	0.1638	0.127		0.0368	0.17
3	3.3	0.2079	0.127		0.0809	0.38
4	3.3	0.2079	0.127		0.0809	0.38
5	3.3	0.2079	0.127		0.0809	0.38
6	4.4	0.2772	0.127		0.1502	0.71
7	4.2	0.2646	0.127		0.1376	0.65
8	5.3	0.3339	0.127		0.2069	0.98
9	5.1	0.3213	0.127		0.1943	0.92
10	6.4	0.4032	0.127		0.2762	1.31
11	5.9	0.3717	0.127		0.2447	1.16
12	7.3	0.4599	0.127		0.3329	1.57
13	8.5	0.5355	0.127		0.4085	1.93
14	14.1	0.8883	0.127		0.7613	3.60
15	14.1	0.8883	0.127		0.7613	3.60
16	3.6	0.2268	0.127		0.0998	0.47
17	2.4	0.1512	0.127		0.0242	0.11
						3.91
			Volume			2348.52

Synthetic Hydrograph						
total adjusted rain		1.5		total Area	4.73	
Unit time		10				
storm	5 year	3 hour				
Unit time	Rain %	Storm Rain	Loss Rate	low Loss	Effective Rain	Q
1	2.6	0.234	0.127		0.107	0.51
2	2.6	0.234	0.127		0.107	0.51
3	3.3	0.297	0.127		0.17	0.80
4	3.3	0.297	0.127		0.17	0.80
5	3.3	0.297	0.127		0.17	0.80
6	4.4	0.396	0.127		0.269	1.27
7	4.2	0.378	0.127		0.251	1.19
8	5.3	0.477	0.127		0.35	1.66
9	5.1	0.459	0.127		0.332	1.57
10	6.4	0.576	0.127		0.449	2.12
11	5.9	0.531	0.127		0.404	1.91
12	7.3	0.657	0.127		0.53	2.51
13	8.5	0.765	0.127		0.638	3.02
14	14.1	1.269	0.127		1.142	5.40
15	14.1	1.269	0.127		1.142	5.40
16	3.6	0.324	0.127		0.197	0.93
17	2.4	0.216	0.127		0.089	0.42
						30.83
			Volume			18495.25

Synthetic Hydrograph						
total adjusted rain		1.76		total Area	4.73	
Unit time		10				
storm	10 year	3 hour				
Unit time	Rain %	Storm Rain	Loss Rate	low Loss	Effective Rain	Q
1	2.6	0.27456	0.127		0.14756	0.70
2	2.6	0.27456	0.127		0.14756	0.70
3	3.3	0.34848	0.127		0.22148	1.05
4	3.3	0.34848	0.127		0.22148	1.05
5	3.3	0.34848	0.127		0.22148	1.05
6	4.4	0.46464	0.127		0.33764	1.60
7	4.2	0.44352	0.127		0.31652	1.50
8	5.3	0.55968	0.127		0.43268	2.05
9	5.1	0.53856	0.127		0.41156	1.95
10	6.4	0.67584	0.127		0.54884	2.60
11	5.9	0.62304	0.127		0.49604	2.35
12	7.3	0.77088	0.127		0.64388	3.05
13	8.5	0.8976	0.127		0.7706	3.64
14	14.1	1.48896	0.127		1.36196	6.44
15	14.1	1.48896	0.127		1.36196	6.44
16	3.6	0.38016	0.127		0.25316	1.20
17	2.4	0.25344	0.127		0.12644	0.60
					8.02	
			Volume		4812.504	

Synthetic Hydrograph						
total adjusted rain		1.5				
Unit time		10	total Area	4.73		
	2 year	6 hour				
Unit time	Rain %	Storm Rain	Loss Rate	low Loss	Effective Rain	Q
1	1.1	0.099	0.127	0.0792	0.0198	0.093654
2	1.2	0.108	0.127	0.0864	0.0216	0.102168
3	1.3	0.117	0.127	0.0936	0.0234	0.110682
4	1.4	0.126	0.127	0.1008	0.0252	0.119196
5	1.4	0.126	0.127	0.1008	0.0252	0.119196
6	1.5	0.135	0.127	0.108	0.008	0.03784
7	1.6	0.144	0.127	0.1152	0.017	0.08041
8	1.6	0.144	0.127	0.1152	0.017	0.08041
9	1.6	0.144	0.127	0.1152	0.017	0.08041
10	1.6	0.144	0.127	0.1152	0.017	0.08041
11	1.6	0.144	0.127	0.1152	0.017	0.08041
12	1.7	0.153	0.127	0.1224	0.026	0.12298
13	1.7	0.153	0.127	0.1224	0.026	0.12298
14	1.8	0.162	0.127	0.1296	0.035	0.16555
15	1.8	0.162	0.127	0.1296	0.035	0.16555
16	1.8	0.162	0.127	0.1296	0.035	0.16555
17	2	0.18	0.127	0.144	0.053	0.25069
18	2	0.18	0.127	0.144	0.053	0.25069
19	2.1	0.189	0.127	0.1512	0.062	0.29326
20	2.2	0.198	0.127	0.1584	0.071	0.33583
21	2.5	0.225	0.127	0.18	0.098	0.46354
22	2.8	0.252	0.127	0.2016	0.125	0.59125
23	3	0.27	0.127	0.216	0.143	0.67639
24	3.2	0.288	0.127	0.2304	0.161	0.76153
25	3.5	0.315	0.127	0.252	0.188	0.88924
26	3.9	0.351	0.127	0.2808	0.224	1.05952
27	4.2	0.378	0.127	0.3024	0.251	1.18723
28	4.5	0.405	0.127	0.324	0.278	1.31494
29	4.8	0.432	0.127	0.3456	0.305	1.44265
30	5.1	0.459	0.127	0.3672	0.332	1.57036
31	6.7	0.603	0.127	0.4824	0.476	2.25148
32	8.1	0.729	0.127	0.5832	0.602	2.84746
33	10.3	0.927	0.127	0.7416	0.8	3.784
34	2.8	0.252	0.127	0.2016	0.125	0.59125
35	1.1	0.099	0.127	0.0792	0.0198	0.093654
36	0.5	0.045	0.127	0.036	0.009	0.04257
						22.42493
				Volume		13454.96

Synthetic Hydrograph						
total adjusted rain		2.05				
Unit time		10	total Area	4.73		
	5 year	6 hour				
Unit time	Rain %	Storm Rain	Loss Rate	low Loss	Effective Rain	Q
1	1.1	0.1353	0.127	0.10824	0.02706	0.127994
2	1.2	0.1476	0.127	0.11808	0.02952	0.13963
3	1.3	0.1599	0.127	0.12792	0.03198	0.151265
4	1.4	0.1722	0.127	0.13776	0.03444	0.162901
5	1.4	0.1722	0.127	0.13776	0.03444	0.162901
6	1.5	0.1845	0.127	0.1476	0.0575	0.271975
7	1.6	0.1968	0.127	0.15744	0.0698	0.330154
8	1.6	0.1968	0.127	0.15744	0.0698	0.330154
9	1.6	0.1968	0.127	0.15744	0.0698	0.330154
10	1.6	0.1968	0.127	0.15744	0.0698	0.330154
11	1.6	0.1968	0.127	0.15744	0.0698	0.330154
12	1.7	0.2091	0.127	0.16728	0.0821	0.388333
13	1.7	0.2091	0.127	0.16728	0.0821	0.388333
14	1.8	0.2214	0.127	0.17712	0.0944	0.446512
15	1.8	0.2214	0.127	0.17712	0.0944	0.446512
16	1.8	0.2214	0.127	0.17712	0.0944	0.446512
17	2	0.246	0.127	0.1968	0.119	0.56287
18	2	0.246	0.127	0.1968	0.119	0.56287
19	2.1	0.2583	0.127	0.20664	0.1313	0.621049
20	2.2	0.2706	0.127	0.21648	0.1436	0.679228
21	2.5	0.3075	0.127	0.246	0.1805	0.853765
22	2.8	0.3444	0.127	0.27552	0.2174	1.028302
23	3	0.369	0.127	0.2952	0.242	1.14466
24	3.2	0.3936	0.127	0.31488	0.2666	1.261018
25	3.5	0.4305	0.127	0.3444	0.3035	1.435555
26	3.9	0.4797	0.127	0.38376	0.3527	1.668271
27	4.2	0.5166	0.127	0.41328	0.3896	1.842808
28	4.5	0.5535	0.127	0.4428	0.4265	2.017345
29	4.8	0.5904	0.127	0.47232	0.4634	2.191882
30	5.1	0.6273	0.127	0.50184	0.5003	2.366419
31	6.7	0.8241	0.127	0.65928	0.6971	3.297283
32	8.1	0.9963	0.127	0.79704	0.8693	4.111789
33	10.3	1.2669	0.127	1.01352	1.1399	5.391727
34	2.8	0.3444	0.127	0.27552	0.2174	1.028302
35	1.1	0.1353	0.127	0.10824	0.02706	0.127994
36	0.5	0.0615	0.127	0.0492	0.0123	0.058179
						37.03495
				Volume		22220.97

Synthetic Hydrograph						
total adjusted rain		2.38				
Unit time		10		4.73		
	10 year	6 hour				
Unit time	Rain %	Storm Rain	Loss Rate	low Loss	Effective Rain	Q
1	1.1	0.15708	0.127	0.125664	0.031416	0.148598
2	1.2	0.17136	0.127	0.137088	0.034272	0.162107
3	1.3	0.18564	0.127	0.148512	0.037128	0.175615
4	1.4	0.19992	0.127	0.159936	0.039984	0.189124
5	1.4	0.19992	0.127	0.159936	0.039984	0.189124
6	1.5	0.2142	0.127	0.17136	0.0872	0.412456
7	1.6	0.22848	0.127	0.182784	0.10148	0.48
8	1.6	0.22848	0.127	0.182784	0.10148	0.48
9	1.6	0.22848	0.127	0.182784	0.10148	0.48
10	1.6	0.22848	0.127	0.182784	0.10148	0.48
11	1.6	0.22848	0.127	0.182784	0.10148	0.48
12	1.7	0.24276	0.127	0.194208	0.11576	0.547545
13	1.7	0.24276	0.127	0.194208	0.11576	0.547545
14	1.8	0.25704	0.127	0.205632	0.13004	0.615089
15	1.8	0.25704	0.127	0.205632	0.13004	0.615089
16	1.8	0.25704	0.127	0.205632	0.13004	0.615089
17	2	0.2856	0.127	0.22848	0.1586	0.750178
18	2	0.2856	0.127	0.22848	0.1586	0.750178
19	2.1	0.29988	0.127	0.239904	0.17288	0.817722
20	2.2	0.31416	0.127	0.251328	0.18716	0.885267
21	2.5	0.357	0.127	0.2856	0.23	1.0879
22	2.8	0.39984	0.127	0.319872	0.27284	1.290533
23	3	0.4284	0.127	0.34272	0.3014	1.425622
24	3.2	0.45696	0.127	0.365568	0.32996	1.560711
25	3.5	0.4998	0.127	0.39984	0.3728	1.763344
26	3.9	0.55692	0.127	0.445536	0.42992	2.033522
27	4.2	0.59976	0.127	0.479808	0.47276	2.236155
28	4.5	0.6426	0.127	0.51408	0.5156	2.438788
29	4.8	0.68544	0.127	0.548352	0.55844	2.641421
30	5.1	0.72828	0.127	0.582624	0.60128	2.844054
31	6.7	0.95676	0.127	0.765408	0.82976	3.924765
32	8.1	1.15668	0.127	0.925344	1.02968	4.870386
33	10.3	1.47084	0.127	1.176672	1.34384	6.356363
34	2.8	0.39984	0.127	0.319872	0.27284	1.290533
35	1.1	0.15708	0.127	0.125664	0.031416	0.148598
36	0.5	0.0714	0.127	0.05712	0.01428	0.067544
						45.80097
			total Volume			27480.58

Synthetic Hydrograph						
total adjusted rain		4.1		total Area	4.73	
Unit time		15				
	5 year	24 hour				
Unit time	Rain %	Storm Rain	Loss Rate	low Loss	Effective Rain	Q
1	0.2	0.0328	0.079501	0.02624	0.00656	0.031029
2	0.3	0.0492	0.079241	0.03936	0.00984	0.046543
3	0.3	0.0492	0.078982	0.03936	0.00984	0.046543
4	0.4	0.0656	0.078725	0.05248	0.01312	0.062058
5	0.3	0.0492	0.078469	0.03936	0.00984	0.046543
6	0.3	0.0492	0.078215	0.03936	0.00984	0.046543
7	0.3	0.0492	0.077963	0.03936	0.00984	0.046543
8	0.4	0.0656	0.077711	0.05248	0.01312	0.062058
9	0.4	0.0656	0.077462	0.05248	0.01312	0.062058
10	0.4	0.0656	0.077214	0.05248	0.01312	0.062058
11	0.5	0.082	0.076968	0.0656	0.0164	0.077572
12	0.5	0.082	0.076723	0.0656	0.0164	0.077572
13	0.5	0.082	0.07648	0.0656	0.0164	0.077572
14	0.5	0.082	0.076238	0.0656	0.0164	0.077572
15	0.5	0.082	0.075998	0.0656	0.0164	0.077572
16	0.6	0.0984	0.07576	0.07872	0.02264	0.107089
17	0.6	0.0984	0.075523	0.07872	0.022877	0.108208
18	0.7	0.1148	0.075288	0.09184	0.039512	0.186892
19	0.7	0.1148	0.075054	0.09184	0.02296	0.108601
20	0.8	0.1312	0.074823	0.10496	0.056377	0.266665
21	0.6	0.0984	0.074593	0.07872	0.01968	0.093086
22	0.7	0.1148	0.074364	0.09184	0.040436	0.191261
23	0.8	0.1312	0.074137	0.10496	0.02624	0.124115
24	0.8	0.1312	0.073912	0.10496	0.057288	0.27097
25	0.9	0.1476	0.073689	0.11808	0.073911	0.349598
26	0.9	0.1476	0.073468	0.11808	0.074132	0.350646
27	1	0.164	0.073248	0.1312	0.090752	0.429258
28	1	0.164	0.07303	0.1312	0.09097	0.43029
29	1	0.164	0.072813	0.1312	0.091187	0.431313
30	1.1	0.1804	0.072599	0.14432	0.107801	0.5099
31	1.2	0.1968	0.072386	0.15744	0.124414	0.588478
32	1.3	0.2132	0.072175	0.17056	0.141025	0.667048
33	1.5	0.246	0.071966	0.1968	0.174034	0.823182
34	1.5	0.246	0.071758	0.1968	0.174242	0.824163
35	1.6	0.2624	0.071553	0.20992	0.190847	0.902707
36	1.7	0.2788	0.071349	0.22304	0.207451	0.981242
37	1.9	0.3116	0.071147	0.24928	0.240453	1.137341
38	2	0.328	0.070947	0.2624	0.257053	1.215859
39	2.1	0.3444	0.070749	0.27552	0.273651	1.294368
40	2.2	0.3608	0.070553	0.28864	0.290247	1.372868
41	1.5	0.246	0.070359	0.1968	0.175641	0.830783
42	1.5	0.246	0.070167	0.1968	0.175833	0.831692
43	2	0.328	0.069976	0.2624	0.258024	1.220453
44	2	0.328	0.069788	0.2624	0.258212	1.221344
45	1.9	0.3116	0.069601	0.24928	0.241999	1.144654
46	1.9	0.3116	0.069417	0.24928	0.242183	1.145526
47	1.7	0.2788	0.069234	0.22304	0.209566	0.991245
48	1.8	0.2952	0.069054	0.23616	0.226146	1.06967
49	2.5	0.41	0.068876	0.328	0.341124	1.613518
50	2.6	0.4264	0.0687	0.34112	0.3577	1.691923
51	2.8	0.4592	0.068525	0.36736	0.390675	1.847891
52	2.9	0.4756	0.068353	0.38048	0.407247	1.926277
53	3.4	0.5576	0.068183	0.44608	0.489417	2.31494
54	3.4	0.5576	0.068016	0.44608	0.489584	2.315734
55	2.3	0.3772	0.06785	0.30176	0.30935	1.463225
56	2.3	0.3772	0.067687	0.30176	0.309513	1.463997
57	2.7	0.4428	0.067526	0.35424	0.375274	1.775048
58	2.6	0.4264	0.067367	0.34112	0.359033	1.698227
59	2.6	0.4264	0.06721	0.34112	0.35919	1.698968
60	2.5	0.41	0.067056	0.328	0.342944	1.622125

61	2.4	0.3936	0.066904	0.31488	0.326696	1.545272
62	2.3	0.3772	0.066754	0.30176	0.310446	1.468407
63	1.9	0.3116	0.066607	0.24928	0.244993	1.158815
64	1.9	0.3116	0.066463	0.24928	0.245137	1.1595
65	0.4	0.0656	0.06632	0.05248	0.01312	0.062058
66	0.4	0.0656	0.066181	0.05248	0.01312	0.062058
67	0.3	0.0492	0.066043	0.03936	0.00984	0.046543
68	0.3	0.0492	0.065909	0.03936	0.00984	0.046543
69	0.5	0.082	0.065777	0.0656	0.016223	0.076736
70	0.5	0.082	0.065647	0.0656	0.016353	0.077348
71	0.5	0.082	0.065521	0.0656	0.016479	0.077947
72	0.4	0.0656	0.065397	0.05248	0.000203	0.000961
73	0.4	0.0656	0.065276	0.05248	0.000324	0.001534
74	0.4	0.0656	0.065157	0.05248	0.000443	0.002093
75	0.3	0.0492	0.065042	0.03936	0.00984	0.046543
76	0.2	0.0328	0.06493	0.02624	0.00656	0.031029
77	0.3	0.0492	0.064821	0.03936	0.00984	0.046543
78	0.4	0.0656	0.064714	0.05248	0.000886	0.004189
79	0.3	0.0492	0.064611	0.03936	0.00984	0.046543
80	0.2	0.0328	0.064512	0.02624	0.00656	0.031029
81	0.3	0.0492	0.064415	0.03936	0.00984	0.046543
82	0.3	0.0492	0.064323	0.03936	0.00984	0.046543
83	0.3	0.0492	0.064233	0.03936	0.00984	0.046543
84	0.2	0.0328	0.064148	0.02624	0.00656	0.031029
85	0.3	0.0492	0.064066	0.03936	0.00984	0.046543
86	0.2	0.0328	0.063988	0.02624	0.00656	0.031029
87	0.3	0.0492	0.063915	0.03936	0.00984	0.046543
88	0.2	0.0328	0.063846	0.02624	0.00656	0.031029
89	0.3	0.0492	0.063781	0.03936	0.00984	0.046543
90	0.2	0.0328	0.063721	0.02624	0.00656	0.031029
91	0.2	0.0328	0.063667	0.02624	0.00656	0.031029
92	0.2	0.0328	0.063618	0.02624	0.00656	0.031029
93	0.2	0.0328	0.063576	0.02624	0.00656	0.031029
94	0.2	0.0328	0.06354	0.02624	0.00656	0.031029
95	0.2	0.0328	0.063514	0.02624	0.00656	0.031029
96	0.2	0.0328	0.0635	0.02624	0.00656	0.031029
						51.13346
			total volume			46020.12

Synthetic Hydrograph						
	total adjusted rain		2.8		total Area	4.73
	Unit time		15			
	2 year	24 hour				
Unit time	Rain %	Storm Rain	Loss Rate	low Loss	Effective Rain	Q
1	0.2	0.0224	0.079501	0.01792	0.00448	0.02119
2	0.3	0.0336	0.079241	0.02688	0.00672	0.031786
3	0.3	0.0336	0.078982	0.02688	0.00672	0.031786
4	0.4	0.0448	0.078725	0.03584	0.00896	0.042381
5	0.3	0.0336	0.078469	0.02688	0.00672	0.031786
6	0.3	0.0336	0.078215	0.02688	0.00672	0.031786
7	0.3	0.0336	0.077963	0.02688	0.00672	0.031786
8	0.4	0.0448	0.077711	0.03584	0.00896	0.042381
9	0.4	0.0448	0.077462	0.03584	0.00896	0.042381
10	0.4	0.0448	0.077214	0.03584	0.00896	0.042381
11	0.5	0.056	0.076968	0.0448	0.0112	0.052976
12	0.5	0.056	0.076723	0.0448	0.0112	0.052976
13	0.5	0.056	0.07648	0.0448	0.0112	0.052976
14	0.5	0.056	0.076238	0.0448	0.0112	0.052976
15	0.5	0.056	0.075998	0.0448	0.0112	0.052976
16	0.6	0.0672	0.07576	0.05376	0.01344	0.063571
17	0.6	0.0672	0.075523	0.05376	0.01344	0.063571
18	0.7	0.0784	0.075288	0.06272	0.01568	0.074166
19	0.7	0.0784	0.075054	0.06272	0.01568	0.074166
20	0.8	0.0896	0.074823	0.07168	0.01792	0.084762
21	0.6	0.0672	0.074593	0.05376	0.01344	0.063571
22	0.7	0.0784	0.074364	0.06272	0.01568	0.074166
23	0.8	0.0896	0.074137	0.07168	0.01792	0.084762
24	0.8	0.0896	0.073912	0.07168	0.015688	0.074202
25	0.9	0.1008	0.073689	0.08064	0.027111	0.128234
26	0.9	0.1008	0.073468	0.08064	0.027332	0.129282
27	1	0.112	0.073248	0.0896	0.038752	0.183298
28	1	0.112	0.07303	0.0896	0.03897	0.18433
29	1	0.112	0.072813	0.0896	0.039187	0.185353
30	1.1	0.1232	0.072599	0.09856	0.050601	0.239344
31	1.2	0.1344	0.072386	0.10752	0.062014	0.293326
32	1.3	0.1456	0.072175	0.11648	0.073425	0.3473
33	1.5	0.168	0.071966	0.1344	0.096034	0.454242
34	1.5	0.168	0.071758	0.1344	0.096242	0.455223
35	1.6	0.1792	0.071553	0.14336	0.107647	0.509171
36	1.7	0.1904	0.071349	0.15232	0.119051	0.56311
37	1.9	0.2128	0.071147	0.17024	0.141653	0.670017
38	2	0.224	0.070947	0.1792	0.153053	0.723939
39	2.1	0.2352	0.070749	0.18816	0.164451	0.777852
40	2.2	0.2464	0.070553	0.19712	0.175847	0.831756
41	1.5	0.168	0.070359	0.1344	0.097641	0.461843
42	1.5	0.168	0.070167	0.1344	0.097833	0.462752
43	2	0.224	0.069976	0.1792	0.154024	0.728533
44	2	0.224	0.069788	0.1792	0.154212	0.729424
45	1.9	0.2128	0.069601	0.17024	0.143199	0.67733
46	1.9	0.2128	0.069417	0.17024	0.143383	0.678202
47	1.7	0.1904	0.069234	0.15232	0.121166	0.573113
48	1.8	0.2016	0.069054	0.16128	0.132546	0.626942
49	2.5	0.28	0.068876	0.224	0.211124	0.998618
50	2.6	0.2912	0.0687	0.23296	0.2225	1.052427
51	2.8	0.3136	0.068525	0.25088	0.245075	1.159203
52	2.9	0.3248	0.068353	0.25984	0.256447	1.212993
53	3.4	0.3808	0.068183	0.30464	0.312617	1.478676
54	3.4	0.3808	0.068016	0.30464	0.312784	1.47947
55	2.3	0.2576	0.06785	0.20608	0.18975	0.897517
56	2.3	0.2576	0.067687	0.20608	0.189913	0.898289
57	2.7	0.3024	0.067526	0.24192	0.234874	1.110956
58	2.6	0.2912	0.067367	0.23296	0.223833	1.058731
59	2.6	0.2912	0.06721	0.23296	0.22399	1.059472
60	2.5	0.28	0.067056	0.224	0.212944	1.007225

61	2.4	0.2688	0.066904	0.21504	0.201896	0.954968
62	2.3	0.2576	0.066754	0.20608	0.190846	0.902699
63	1.9	0.2128	0.066607	0.17024	0.146193	0.691491
64	1.9	0.2128	0.066463	0.17024	0.146337	0.692176
65	0.4	0.0448	0.06632	0.03584	0.00896	0.042381
66	0.4	0.0448	0.066181	0.03584	0.00896	0.042381
67	0.3	0.0336	0.066043	0.02688	0.00672	0.031786
68	0.3	0.0336	0.065909	0.02688	0.00672	0.031786
69	0.5	0.056	0.065777	0.0448	0.0112	0.052976
70	0.5	0.056	0.065647	0.0448	0.0112	0.052976
71	0.5	0.056	0.065521	0.0448	0.0112	0.052976
72	0.4	0.0448	0.065397	0.03584	0.00896	0.042381
73	0.4	0.0448	0.065276	0.03584	0.00896	0.042381
74	0.4	0.0448	0.065157	0.03584	0.00896	0.042381
75	0.3	0.0336	0.065042	0.02688	0.00672	0.031786
76	0.2	0.0224	0.06493	0.01792	0.00448	0.02119
77	0.3	0.0336	0.064821	0.02688	0.00672	0.031786
78	0.4	0.0448	0.064714	0.03584	0.00896	0.042381
79	0.3	0.0336	0.064611	0.02688	0.00672	0.031786
80	0.2	0.0224	0.064512	0.01792	0.00448	0.02119
81	0.3	0.0336	0.064415	0.02688	0.00672	0.031786
82	0.3	0.0336	0.064323	0.02688	0.00672	0.031786
83	0.3	0.0336	0.064233	0.02688	0.00672	0.031786
84	0.2	0.0224	0.064148	0.01792	0.00448	0.02119
85	0.3	0.0336	0.064066	0.02688	0.00672	0.031786
86	0.2	0.0224	0.063988	0.01792	0.00448	0.02119
87	0.3	0.0336	0.063915	0.02688	0.00672	0.031786
88	0.2	0.0224	0.063846	0.01792	0.00448	0.02119
89	0.3	0.0336	0.063781	0.02688	0.00672	0.031786
90	0.2	0.0224	0.063721	0.01792	0.00448	0.02119
91	0.2	0.0224	0.063667	0.01792	0.00448	0.02119
92	0.2	0.0224	0.063618	0.01792	0.00448	0.02119
93	0.2	0.0224	0.063576	0.01792	0.00448	0.02119
94	0.2	0.0224	0.06354	0.01792	0.00448	0.02119
95	0.2	0.0224	0.063514	0.01792	0.00448	0.02119
96	0.2	0.0224	0.0635	0.01792	0.00448	0.02119
						30.55743
			total volume			27501.68

Synthetic Hydrograph						
total adjusted rain		5			4.73	
Unit time		15				
	10 year	24 hour				
Unit time	Rain %	Storm Rain	Loss Rate	low Loss	Effective Rain	Q
1	0.2	0.04	0.079501	0.032	0.008	0.03784
2	0.3	0.06	0.079241	0.048	0.012	0.05676
3	0.3	0.06	0.078982	0.048	0.012	0.05676
4	0.4	0.08	0.078725	0.064	0.016	0.07568
5	0.3	0.06	0.078469	0.048	0.012	0.05676
6	0.3	0.06	0.078215	0.048	0.012	0.05676
7	0.3	0.06	0.077963	0.048	0.012	0.05676
8	0.4	0.08	0.077711	0.064	0.016	0.07568
9	0.4	0.08	0.077462	0.064	0.016	0.07568
10	0.4	0.08	0.077214	0.064	0.016	0.07568
11	0.5	0.1	0.076968	0.08	0.02	0.0946
12	0.5	0.1	0.076723	0.08	0.02	0.0946
13	0.5	0.1	0.07648	0.08	0.02	0.0946
14	0.5	0.1	0.076238	0.08	0.02	0.0946
15	0.5	0.1	0.075998	0.08	0.02	0.0946
16	0.6	0.12	0.07576	0.096	0.04424	0.209256798
17	0.6	0.12	0.075523	0.096	0.044477	0.21037645
18	0.7	0.14	0.075288	0.112	0.064712	0.306088334
19	0.7	0.14	0.075054	0.112	0.064946	0.307192405
20	0.8	0.16	0.074823	0.128	0.085177	0.402888618
21	0.6	0.12	0.074593	0.096	0.045407	0.214776926
22	0.7	0.14	0.074364	0.112	0.065636	0.310457283
23	0.8	0.16	0.074137	0.128	0.085863	0.406129639
24	0.8	0.16	0.073912	0.128	0.086088	0.407193946
25	0.9	0.18	0.073689	0.144	0.106311	0.502850153
26	0.9	0.18	0.073468	0.144	0.106532	0.503898211
27	1	0.2	0.073248	0.16	0.126752	0.599538065
28	1	0.2	0.07303	0.16	0.12697	0.600569664
29	1	0.2	0.072813	0.16	0.127187	0.601592952
30	1.1	0.22	0.072599	0.176	0.147401	0.697207874
31	1.2	0.24	0.072386	0.192	0.167614	0.792814373
32	1.3	0.26	0.072175	0.208	0.187825	0.888412392
33	1.5	0.3	0.071966	0.24	0.228034	1.07860187
34	1.5	0.3	0.071758	0.24	0.228242	1.079582748
35	1.6	0.32	0.071553	0.256	0.248447	1.175154962
36	1.7	0.34	0.071349	0.272	0.268651	1.27071845
37	1.9	0.38	0.071147	0.304	0.308853	1.460873145
38	2	0.4	0.070947	0.32	0.329053	1.556418982
39	2.1	0.42	0.070749	0.336	0.349251	1.651955892
40	2.2	0.44	0.070553	0.352	0.369447	1.747483805
41	1.5	0.3	0.070359	0.24	0.229641	1.086202648
42	1.5	0.3	0.070167	0.24	0.229833	1.087112349
43	2	0.4	0.069976	0.32	0.330024	1.56101283
44	2	0.4	0.069788	0.32	0.330212	1.561904015
45	1.9	0.38	0.069601	0.304	0.310399	1.468185823
46	1.9	0.38	0.069417	0.304	0.310583	1.469058173
47	1.7	0.34	0.069234	0.272	0.270766	1.280720978
48	1.8	0.36	0.069054	0.288	0.290946	1.376174153
49	2.5	0.5	0.068876	0.4	0.431124	2.039217607
50	2.6	0.52	0.0687	0.416	0.4513	2.134651247
51	2.8	0.56	0.068525	0.448	0.491475	2.324674979
52	2.9	0.58	0.068353	0.464	0.511647	2.420088704
53	3.4	0.68	0.068183	0.544	0.611817	2.89389232
54	3.4	0.68	0.068016	0.544	0.611984	2.894685722
55	2.3	0.46	0.06785	0.368	0.39215	1.854868802
56	2.3	0.46	0.067687	0.368	0.392313	1.855641445
57	2.7	0.54	0.067526	0.432	0.472474	2.234803537
58	2.6	0.52	0.067367	0.416	0.452633	2.140954957
59	2.6	0.52	0.06721	0.416	0.45279	2.141695577
60	2.5	0.5	0.067056	0.4	0.432944	2.047825269
61	2.4	0.48	0.066904	0.384	0.413096	1.953943897

62	2.3	0.46	0.066754	0.368	0.393246	1.860051319
63	1.9	0.38	0.066607	0.304	0.313393	1.482347388
64	1.9	0.38	0.066463	0.304	0.313537	1.483031951
65	0.4	0.08	0.06632	0.064	0.01368	0.064704848
66	0.4	0.08	0.066181	0.064	0.013819	0.065365909
67	0.3	0.06	0.066043	0.048	0.012	0.05676
68	0.3	0.06	0.065909	0.048	0.012	0.05676
69	0.5	0.1	0.065777	0.08	0.034223	0.161876282
70	0.5	0.1	0.065647	0.08	0.034353	0.162488154
71	0.5	0.1	0.065521	0.08	0.034479	0.163087217
72	0.4	0.08	0.065397	0.064	0.014603	0.069073241
73	0.4	0.08	0.065276	0.064	0.014724	0.069645986
74	0.4	0.08	0.065157	0.064	0.014843	0.070205194
75	0.3	0.06	0.065042	0.048	0.012	0.05676
76	0.2	0.04	0.06493	0.032	0.008	0.03784
77	0.3	0.06	0.064821	0.048	0.012	0.05676
78	0.4	0.08	0.064714	0.064	0.015286	0.072300893
79	0.3	0.06	0.064611	0.048	0.012	0.05676
80	0.2	0.04	0.064512	0.032	0.008	0.03784
81	0.3	0.06	0.064415	0.048	0.012	0.05676
82	0.3	0.06	0.064323	0.048	0.012	0.05676
83	0.3	0.06	0.064233	0.048	0.012	0.05676
84	0.2	0.04	0.064148	0.032	0.008	0.03784
85	0.3	0.06	0.064066	0.048	0.012	0.05676
86	0.2	0.04	0.063988	0.032	0.008	0.03784
87	0.3	0.06	0.063915	0.048	0.012	0.05676
88	0.2	0.04	0.063846	0.032	0.008	0.03784
89	0.3	0.06	0.063781	0.048	0.012	0.05676
90	0.2	0.04	0.063721	0.032	0.008	0.03784
91	0.2	0.04	0.063667	0.032	0.008	0.03784
92	0.2	0.04	0.063618	0.032	0.008	0.03784
93	0.2	0.04	0.063576	0.032	0.008	0.03784
94	0.2	0.04	0.06354	0.032	0.008	0.03784
95	0.2	0.04	0.063514	0.032	0.008	0.03784
96	0.2	0.04	0.0635	0.032	0.008	0.03784
						66.70932735
			total volume			60038.39462

2,5 and 10 year storms at 3, 6 and 24- hour duration hydrographs for developed site

Synthetic Hydrograph					
total adjusted rain		1.05		total Area	4.9
Unit time		10			
storm	2 year	3 hour			
Unit time	Rain %	Storm Rain	Loss Rate	Effective Rain	Q
1	2.6	0.1638	0.057	0.1068	0.52
2	2.6	0.1638	0.057	0.1068	0.52
3	3.3	0.2079	0.057	0.1509	0.74
4	3.3	0.2079	0.057	0.1509	0.74
5	3.3	0.2079	0.057	0.1509	0.74
6	4.4	0.2772	0.057	0.2202	1.08
7	4.2	0.2646	0.057	0.2076	1.02
8	5.3	0.3339	0.057	0.2769	1.36
9	5.1	0.3213	0.057	0.2643	1.30
10	6.4	0.4032	0.057	0.3462	1.70
11	5.9	0.3717	0.057	0.3147	1.54
12	7.3	0.4599	0.057	0.4029	1.97
13	8.5	0.5355	0.057	0.4785	2.34
14	14.1	0.8883	0.057	0.8313	4.07
15	14.1	0.8883	0.057	0.8313	4.07
16	3.6	0.2268	0.057	0.1698	0.83
17	2.4	0.1512	0.057	0.0942	0.46
					25.01
			Volume		15006.35

Synthetic Hydrograph					
total adjusted rain		1.76		total Area	4.9
Unit time		10			
storm	5 year	3 hour			
Unit time	Rain %	Storm Rain	Loss Rate	Effective Rain	Q
1	2.6	0.27456	0.057	0.21756	1.07
2	2.6	0.27456	0.057	0.21756	1.07
3	3.3	0.34848	0.057	0.29148	1.43
4	3.3	0.34848	0.057	0.29148	1.43
5	3.3	0.34848	0.057	0.29148	1.43
6	4.4	0.46464	0.057	0.40764	2.00
7	4.2	0.44352	0.057	0.38652	1.89
8	5.3	0.55968	0.057	0.50268	2.46
9	5.1	0.53856	0.057	0.48156	2.36
10	6.4	0.67584	0.057	0.61884	3.03
11	5.9	0.62304	0.057	0.56604	2.77
12	7.3	0.77088	0.057	0.71388	3.50
13	8.5	0.8976	0.057	0.8406	4.12
14	14.1	1.48896	0.057	1.43196	7.02
15	14.1	1.48896	0.057	1.43196	7.02
16	3.6	0.38016	0.057	0.32316	1.58
17	2.4	0.25344	0.057	0.19644	0.96
					45.13
			Volume		27079.87

Synthetic Hydrograph						
total adjusted rain		1.5				
Unit time		10	total Area	4.9		
	2 year	6 hour				
Unit time	Rain %	Storm Rain	Loss Rate	low Loss	Effective Rain	Q
1	1.1	0.099	0.057	0.0792	0.042	0.2058
2	1.2	0.108	0.057	0.0864	0.051	0.2499
3	1.3	0.117	0.057	0.0936	0.06	0.294
4	1.4	0.126	0.057	0.1008	0.069	0.3381
5	1.4	0.126	0.057	0.1008	0.069	0.3381
6	1.5	0.135	0.057	0.108	0.078	0.3822
7	1.6	0.144	0.057	0.1152	0.087	0.4263
8	1.6	0.144	0.057	0.1152	0.087	0.4263
9	1.6	0.144	0.057	0.1152	0.087	0.4263
10	1.6	0.144	0.057	0.1152	0.087	0.4263
11	1.6	0.144	0.057	0.1152	0.087	0.4263
12	1.7	0.153	0.057	0.1224	0.096	0.4704
13	1.7	0.153	0.057	0.1224	0.096	0.4704
14	1.8	0.162	0.057	0.1296	0.105	0.5145
15	1.8	0.162	0.057	0.1296	0.105	0.5145
16	1.8	0.162	0.057	0.1296	0.105	0.5145
17	2	0.18	0.057	0.144	0.123	0.6027
18	2	0.18	0.057	0.144	0.123	0.6027
19	2.1	0.189	0.057	0.1512	0.132	0.6468
20	2.2	0.198	0.057	0.1584	0.141	0.6909
21	2.5	0.225	0.057	0.18	0.168	0.8232
22	2.8	0.252	0.057	0.2016	0.195	0.9555
23	3	0.27	0.057	0.216	0.213	1.0437
24	3.2	0.288	0.057	0.2304	0.231	1.1319
25	3.5	0.315	0.057	0.252	0.258	1.2642
26	3.9	0.351	0.057	0.2808	0.294	1.4406
27	4.2	0.378	0.057	0.3024	0.321	1.5729
28	4.5	0.405	0.057	0.324	0.348	1.7052
29	4.8	0.432	0.057	0.3456	0.375	1.8375
30	5.1	0.459	0.057	0.3672	0.402	1.9698
31	6.7	0.603	0.057	0.4824	0.546	2.6754
32	8.1	0.729	0.057	0.5832	0.672	3.2928
33	10.3	0.927	0.057	0.7416	0.87	4.263
34	2.8	0.252	0.057	0.2016	0.195	0.9555
35	1.1	0.099	0.057	0.0792	0.042	0.2058
36	0.5	0.045	0.057	0.036	0.009	0.0441
						34.1481
			total Volume			20488.86

Synthetic Hydrograph						
total adjusted rain		2.05				
Unit time		10	total Area	4.9		
	5 year	6 hour				
Unit time	Rain %	Storm Rain	Loss Rate	low Loss	Effective Rain	Q
1	1.1	0.1353	0.057	0.10824	0.0783	0.38367
2	1.2	0.1476	0.057	0.11808	0.0906	0.44394
3	1.3	0.1599	0.057	0.12792	0.1029	0.50421
4	1.4	0.1722	0.057	0.13776	0.1152	0.56448
5	1.4	0.1722	0.057	0.13776	0.1152	0.56448
6	1.5	0.1845	0.057	0.1476	0.1275	0.62475
7	1.6	0.1968	0.057	0.15744	0.1398	0.68502
8	1.6	0.1968	0.057	0.15744	0.1398	0.68502
9	1.6	0.1968	0.057	0.15744	0.1398	0.68502
10	1.6	0.1968	0.057	0.15744	0.1398	0.68502
11	1.6	0.1968	0.057	0.15744	0.1398	0.68502
12	1.7	0.2091	0.057	0.16728	0.1521	0.74529
13	1.7	0.2091	0.057	0.16728	0.1521	0.74529
14	1.8	0.2214	0.057	0.17712	0.1644	0.80556
15	1.8	0.2214	0.057	0.17712	0.1644	0.80556
16	1.8	0.2214	0.057	0.17712	0.1644	0.80556
17	2	0.246	0.057	0.1968	0.189	0.9261
18	2	0.246	0.057	0.1968	0.189	0.9261
19	2.1	0.2583	0.057	0.20664	0.2013	0.98637
20	2.2	0.2706	0.057	0.21648	0.2136	1.04664
21	2.5	0.3075	0.057	0.246	0.2505	1.22745
22	2.8	0.3444	0.057	0.27552	0.2874	1.40826
23	3	0.369	0.057	0.2952	0.312	1.5288
24	3.2	0.3936	0.057	0.31488	0.3366	1.64934
25	3.5	0.4305	0.057	0.3444	0.3735	1.83015
26	3.9	0.4797	0.057	0.38376	0.4227	2.07123
27	4.2	0.5166	0.057	0.41328	0.4596	2.25204
28	4.5	0.5535	0.057	0.4428	0.4965	2.43285
29	4.8	0.5904	0.057	0.47232	0.5334	2.61366
30	5.1	0.6273	0.057	0.50184	0.5703	2.79447
31	6.7	0.8241	0.057	0.65928	0.7671	3.75879
32	8.1	0.9963	0.057	0.79704	0.9393	4.60257
33	10.3	1.2669	0.057	1.01352	1.2099	5.92851
34	2.8	0.3444	0.057	0.27552	0.2874	1.40826
35	1.1	0.1353	0.057	0.10824	0.0783	0.38367
36	0.5	0.0615	0.057	0.0492	0.0045	0.02205
						50.2152
			total Volume			30129.12

Synthetic Hydrograph						
total adjusted rain		2.38				
Unit time		10		total Area	4.9	
	10 year	6 hour				
Unit time	Rain %	Storm Rain	Loss Rate	low Loss	Effective Rain	Q
1	1.1	0.15708	0.057	0.125664	0.10008	0.490392
2	1.2	0.17136	0.057	0.137088	0.11436	0.560364
3	1.3	0.18564	0.057	0.148512	0.12864	0.630336
4	1.4	0.19992	0.057	0.159936	0.14292	0.700308
5	1.4	0.19992	0.057	0.159936	0.14292	0.700308
6	1.5	0.2142	0.057	0.17136	0.1572	0.77028
7	1.6	0.22848	0.057	0.182784	0.17148	0.840252
8	1.6	0.22848	0.057	0.182784	0.17148	0.840252
9	1.6	0.22848	0.057	0.182784	0.17148	0.840252
10	1.6	0.22848	0.057	0.182784	0.17148	0.840252
11	1.6	0.22848	0.057	0.182784	0.17148	0.840252
12	1.7	0.24276	0.057	0.194208	0.18576	0.910224
13	1.7	0.24276	0.057	0.194208	0.18576	0.910224
14	1.8	0.25704	0.057	0.205632	0.20004	0.980196
15	1.8	0.25704	0.057	0.205632	0.20004	0.980196
16	1.8	0.25704	0.057	0.205632	0.20004	0.980196
17	2	0.2856	0.057	0.22848	0.2286	1.12014
18	2	0.2856	0.057	0.22848	0.2286	1.12014
19	2.1	0.29988	0.057	0.239904	0.24288	1.190112
20	2.2	0.31416	0.057	0.251328	0.25716	1.260084
21	2.5	0.357	0.057	0.2856	0.3	1.47
22	2.8	0.39984	0.057	0.319872	0.34284	1.679916
23	3	0.4284	0.057	0.34272	0.3714	1.81986
24	3.2	0.45696	0.057	0.365568	0.39996	1.959804
25	3.5	0.4998	0.057	0.39984	0.4428	2.16972
26	3.9	0.55692	0.057	0.445536	0.49992	2.449608
27	4.2	0.59976	0.057	0.479808	0.54276	2.659524
28	4.5	0.6426	0.057	0.51408	0.5856	2.86944
29	4.8	0.68544	0.057	0.548352	0.62844	3.079356
30	5.1	0.72828	0.057	0.582624	0.67128	3.289272
31	6.7	0.95676	0.057	0.765408	0.89976	4.408824
32	8.1	1.15668	0.057	0.925344	1.09968	5.388432
33	10.3	1.47084	0.057	1.176672	1.41384	6.927816
34	2.8	0.39984	0.057	0.319872	0.34284	1.679916
35	1.1	0.15708	0.057	0.125664	0.10008	0.490392
36	0.5	0.0714	0.057	0.05712	0.0144	0.07056
						59.9172
			total Volume			35950.32

Synthetic Hydrograph						
total adjusted rain		2.8		total Area	4.9	
Unit time		15				
	2 year	24 hour				
Unit time	Rain %	Storm Rain	Loss Rate	low Loss	Effective Rain	Q
1	0.2	0.0224	0.106339	0.01792	0.00448	0.021952
2	0.3	0.0336	0.105104	0.02688	0.00672	0.032928
3	0.3	0.0336	0.103876	0.02688	0.00672	0.032928
4	0.4	0.0448	0.102655	0.03584	0.00896	0.043904
5	0.3	0.0336	0.101441	0.02688	0.00672	0.032928
6	0.3	0.0336	0.100235	0.02688	0.00672	0.032928
7	0.3	0.0336	0.099036	0.02688	0.00672	0.032928
8	0.4	0.0448	0.097844	0.03584	0.00896	0.043904
9	0.4	0.0448	0.09666	0.03584	0.00896	0.043904
10	0.4	0.0448	0.095483	0.03584	0.00896	0.043904
11	0.5	0.056	0.094314	0.0448	0.0112	0.05488
12	0.5	0.056	0.093152	0.0448	0.0112	0.05488
13	0.5	0.056	0.091998	0.0448	0.0112	0.05488
14	0.5	0.056	0.090851	0.0448	0.0112	0.05488
15	0.5	0.056	0.089713	0.0448	0.0112	0.05488
16	0.6	0.0672	0.088581	0.05376	0.01344	0.065856
17	0.6	0.0672	0.087458	0.05376	0.01344	0.065856
18	0.7	0.0784	0.086342	0.06272	0.01568	0.076832
19	0.7	0.0784	0.085235	0.06272	0.01568	0.076832
20	0.8	0.0896	0.084135	0.07168	0.01792	0.087808
21	0.6	0.0672	0.083043	0.05376	0.01344	0.065856
22	0.7	0.0784	0.081959	0.06272	0.01568	0.076832
23	0.8	0.0896	0.080883	0.07168	0.01792	0.087808
24	0.8	0.0896	0.079815	0.07168	0.009785	0.047946
25	0.9	0.1008	0.078755	0.08064	0.022045	0.108018
26	0.9	0.1008	0.077704	0.08064	0.023096	0.113171
27	1	0.112	0.076661	0.0896	0.035339	0.173163
28	1	0.112	0.075626	0.0896	0.036374	0.178235
29	1	0.112	0.074599	0.0896	0.037401	0.183266
30	1.1	0.1232	0.073581	0.09856	0.049619	0.243135
31	1.2	0.1344	0.072571	0.10752	0.061829	0.302964
32	1.3	0.1456	0.071569	0.11648	0.074031	0.36275
33	1.5	0.168	0.070577	0.1344	0.097423	0.477375
34	1.5	0.168	0.069592	0.1344	0.098408	0.482197
35	1.6	0.1792	0.068617	0.14336	0.110583	0.541857
36	1.7	0.1904	0.06765	0.15232	0.12275	0.601474
37	1.9	0.2128	0.066692	0.17024	0.146108	0.715927
38	2	0.224	0.065743	0.1792	0.158257	0.775457
39	2.1	0.2352	0.064803	0.18816	0.170397	0.834943
40	2.2	0.2464	0.063872	0.19712	0.182528	0.894385
41	1.5	0.168	0.06295	0.1344	0.10505	0.514743
42	1.5	0.168	0.062038	0.1344	0.105962	0.519215
43	2	0.224	0.061134	0.1792	0.162866	0.798042
44	2	0.224	0.06024	0.1792	0.16376	0.802424
45	1.9	0.2128	0.059355	0.17024	0.153445	0.751879
46	1.9	0.2128	0.05848	0.17024	0.15432	0.756168
47	1.7	0.1904	0.057614	0.15232	0.132786	0.650649
48	1.8	0.2016	0.056758	0.16128	0.144842	0.709724
49	2.5	0.28	0.055912	0.224	0.224088	1.098031
50	2.6	0.2912	0.055076	0.23296	0.236124	1.157009
51	2.8	0.3136	0.054249	0.25088	0.259351	1.270819
52	2.9	0.3248	0.053433	0.25984	0.271367	1.329699
53	3.4	0.3808	0.052627	0.30464	0.328173	1.60805
54	3.4	0.3808	0.05183	0.30464	0.32897	1.611951
55	2.3	0.2576	0.051045	0.20608	0.206555	1.012121
56	2.3	0.2576	0.05027	0.20608	0.20733	1.015919
57	2.7	0.3024	0.049505	0.24192	0.252895	1.239186
58	2.6	0.2912	0.048751	0.23296	0.242449	1.188
59	2.6	0.2912	0.048008	0.23296	0.243192	1.191641
60	2.5	0.28	0.047276	0.224	0.232724	1.140349
61	2.4	0.2688	0.046555	0.21504	0.222245	1.089002

62	2.3	0.2576	0.045845	0.20608	0.211755	1.0376
63	1.9	0.2128	0.045147	0.17024	0.167653	0.821502
64	1.9	0.2128	0.04446	0.17024	0.16834	0.824867
65	0.4	0.0448	0.043785	0.03584	0.001015	0.004975
66	0.4	0.0448	0.043121	0.03584	0.001679	0.008225
67	0.3	0.0336	0.04247	0.02688	0.00672	0.032928
68	0.3	0.0336	0.041831	0.02688	0.00672	0.032928
69	0.5	0.056	0.041205	0.0448	0.014795	0.072497
70	0.5	0.056	0.040591	0.0448	0.015409	0.075506
71	0.5	0.056	0.03999	0.0448	0.01601	0.078451
72	0.4	0.0448	0.039402	0.03584	0.005398	0.026452
73	0.4	0.0448	0.038827	0.03584	0.005973	0.029268
74	0.4	0.0448	0.038266	0.03584	0.006534	0.032017
75	0.3	0.0336	0.037719	0.02688	0.00672	0.032928
76	0.2	0.0224	0.037186	0.01792	0.00448	0.021952
77	0.3	0.0336	0.036667	0.02688	0.00672	0.032928
78	0.4	0.0448	0.036163	0.03584	0.008637	0.04232
79	0.3	0.0336	0.035675	0.02688	0.00672	0.032928
80	0.2	0.0224	0.035202	0.01792	0.00448	0.021952
81	0.3	0.0336	0.034744	0.02688	0.00672	0.032928
82	0.3	0.0336	0.034304	0.02688	0.00672	0.032928
83	0.3	0.0336	0.03388	0.02688	0.00672	0.032928
84	0.2	0.0224	0.033474	0.01792	0.00448	0.021952
85	0.3	0.0336	0.033086	0.02688	0.000514	0.002517
86	0.2	0.0224	0.032717	0.01792	0.00448	0.021952
87	0.3	0.0336	0.032368	0.02688	0.001232	0.006036
88	0.2	0.0224	0.03204	0.01792	0.00448	0.021952
89	0.3	0.0336	0.031733	0.02688	0.001867	0.009147
90	0.2	0.0224	0.03145	0.01792	0.00448	0.021952
91	0.2	0.0224	0.031191	0.01792	0.00448	0.021952
92	0.2	0.0224	0.03096	0.01792	0.00448	0.021952
93	0.2	0.0224	0.030759	0.01792	0.00448	0.021952
94	0.2	0.0224	0.030591	0.01792	0.00448	0.021952
95	0.2	0.0224	0.030465	0.01792	0.00448	0.021952
96	0.2	0.0224	0.0304	0.01792	0.00448	0.021952
						33.3294
				total volume		29996.46

Synthetic Hydrograph						
total adjusted rain		4.1		total Area	4.9	
Unit time		15				
	5 year	24 hour				
Unit time	Rain %	Storm Rain	Loss Rate	low Loss	Effective Rain	Q
1	0.2	0.0328	0.106339	0.02624	0.00656	0.032144
2	0.3	0.0492	0.105104	0.03936	0.00984	0.048216
3	0.3	0.0492	0.103876	0.03936	0.00984	0.048216
4	0.4	0.0656	0.102655	0.05248	0.01312	0.064288
5	0.3	0.0492	0.101441	0.03936	0.00984	0.048216
6	0.3	0.0492	0.100235	0.03936	0.00984	0.048216
7	0.3	0.0492	0.099036	0.03936	0.00984	0.048216
8	0.4	0.0656	0.097844	0.05248	0.01312	0.064288
9	0.4	0.0656	0.09666	0.05248	0.01312	0.064288
10	0.4	0.0656	0.095483	0.05248	0.01312	0.064288
11	0.5	0.082	0.094314	0.0656	0.0164	0.08036
12	0.5	0.082	0.093152	0.0656	0.0164	0.08036
13	0.5	0.082	0.091998	0.0656	0.0164	0.08036
14	0.5	0.082	0.090851	0.0656	0.0164	0.08036
15	0.5	0.082	0.089713	0.0656	0.0164	0.08036
16	0.6	0.0984	0.088581	0.07872	0.009818553	0.048111
17	0.6	0.0984	0.087458	0.07872	0.010941936	0.053615
18	0.7	0.1148	0.086342	0.09184	0.028457525	0.139442
19	0.7	0.1148	0.085235	0.09184	0.02296	0.112504
20	0.8	0.1312	0.084135	0.10496	0.047065142	0.230619
21	0.6	0.0984	0.083043	0.07872	0.01968	0.096432
22	0.7	0.1148	0.081959	0.09184	0.032841033	0.160921
23	0.8	0.1312	0.080883	0.10496	0.02624	0.128576
24	0.8	0.1312	0.079815	0.10496	0.051384817	0.251786
25	0.9	0.1476	0.078755	0.11808	0.068844544	0.337338
26	0.9	0.1476	0.077704	0.11808	0.069896094	0.342491
27	1	0.164	0.076661	0.1312	0.087339414	0.427963
28	1	0.164	0.075626	0.1312	0.08837445	0.433035
29	1	0.164	0.074599	0.1312	0.089401148	0.438066
30	1.1	0.1804	0.073581	0.14432	0.106819453	0.523415
31	1.2	0.1968	0.072571	0.15744	0.124229306	0.608724
32	1.3	0.2132	0.071569	0.17056	0.141630651	0.69399
33	1.5	0.246	0.070577	0.1968	0.175423427	0.859575
34	1.5	0.246	0.069592	0.1968	0.176407573	0.864397
35	1.6	0.2624	0.068617	0.20992	0.193783027	0.949537
36	1.7	0.2788	0.06765	0.22304	0.211149725	1.034634
37	1.9	0.3116	0.066692	0.24928	0.244907603	1.200047
38	2	0.328	0.065743	0.2624	0.262256591	1.285057
39	2.1	0.3444	0.064803	0.27552	0.279596624	1.370023
40	2.2	0.3608	0.063872	0.28864	0.296927629	1.454945
41	1.5	0.246	0.06295	0.1968	0.183049534	0.896943
42	1.5	0.246	0.062038	0.1968	0.183962266	0.901415
43	2	0.328	0.061134	0.2624	0.266865749	1.307642
44	2	0.328	0.06024	0.2624	0.267759904	1.312024
45	1.9	0.3116	0.059355	0.24928	0.25224465	1.235999
46	1.9	0.3116	0.05848	0.24928	0.253119907	1.240288
47	1.7	0.2788	0.057614	0.22304	0.221185587	1.083809
48	1.8	0.2952	0.056758	0.23616	0.238441605	1.168364
49	2.5	0.41	0.055912	0.328	0.35408787	1.735031
50	2.6	0.4264	0.055076	0.34112	0.371324289	1.819489
51	2.8	0.4592	0.054249	0.36736	0.404950766	1.984259
52	2.9	0.4756	0.053433	0.38048	0.422167203	2.068619
53	3.4	0.5576	0.052627	0.44608	0.504973497	2.47437
54	3.4	0.5576	0.05183	0.44608	0.505769543	2.478271
55	2.3	0.3772	0.051045	0.30176	0.326155231	1.598161
56	2.3	0.3772	0.05027	0.30176	0.32693045	1.601959
57	2.7	0.4428	0.049505	0.35424	0.393295082	1.927146
58	2.6	0.4264	0.048751	0.34112	0.377649005	1.85048
59	2.6	0.4264	0.048008	0.34112	0.378392094	1.854121
60	2.5	0.41	0.047276	0.328	0.362724218	1.777349

61	2.4	0.3936	0.046555	0.31488	0.34704524	1.700522
62	2.3	0.3772	0.045845	0.30176	0.33135502	1.62364
63	1.9	0.3116	0.045147	0.24928	0.266453409	1.305622
64	1.9	0.3116	0.04446	0.24928	0.267140253	1.308987
65	0.4	0.0656	0.043785	0.05248	0.021815392	0.106895
66	0.4	0.0656	0.043121	0.05248	0.022478656	0.110145
67	0.3	0.0492	0.04247	0.03936	0.00984	0.048216
68	0.3	0.0492	0.041831	0.03936	0.007368848	0.036107
69	0.5	0.082	0.041205	0.0656	0.040795395	0.199897
70	0.5	0.082	0.040591	0.0656	0.041409307	0.202906
71	0.5	0.082	0.03999	0.0656	0.042010366	0.205851
72	0.4	0.0656	0.039402	0.05248	0.026198343	0.128372
73	0.4	0.0656	0.038827	0.05248	0.026772996	0.131188
74	0.4	0.0656	0.038266	0.05248	0.027334068	0.133937
75	0.3	0.0492	0.037719	0.03936	0.011481283	0.056258
76	0.2	0.0328	0.037186	0.02624	0.00656	0.032144
77	0.3	0.0492	0.036667	0.03936	0.012532951	0.061411
78	0.4	0.0656	0.036163	0.05248	0.02943675	0.14424
79	0.3	0.0492	0.035675	0.03936	0.013525384	0.066274
80	0.2	0.0328	0.035202	0.02624	0.00656	0.032144
81	0.3	0.0492	0.034744	0.03936	0.014455533	0.070832
82	0.3	0.0492	0.034304	0.03936	0.014896147	0.072991
83	0.3	0.0492	0.03388	0.03936	0.00984	0.048216
84	0.2	0.0328	0.033474	0.02624	0.00656	0.032144
85	0.3	0.0492	0.033086	0.03936	0.016113705	0.078957
86	0.2	0.0328	0.032717	0.02624	8.26318E-05	0.000405
87	0.3	0.0492	0.032368	0.03936	0.016831792	0.082476
88	0.2	0.0328	0.03204	0.02624	0.000760224	0.003725
89	0.3	0.0492	0.031733	0.03936	0.017466795	0.085587
90	0.2	0.0328	0.03145	0.02624	0.001350145	0.006616
91	0.2	0.0328	0.031191	0.02624	0.001608595	0.007882
92	0.2	0.0328	0.03096	0.02624	0.00184	0.009016
93	0.2	0.0328	0.030759	0.02624	0.002041464	0.010003
94	0.2	0.0328	0.030591	0.02624	0.002208754	0.010823
95	0.2	0.0328	0.030465	0.02624	0.002334688	0.01144
96	0.2	0.0328	0.0304	0.02624	0.0024	0.01176
						55.47079
			total volume			49923.71

Synthetic Hydrograph						
total adjusted rain		5		total Area	4.9	
Unit time		15				
	10 year	24 hour				
Unit time	Rain %	Storm Rain	Loss Rate	low Loss	Effective Rain	Q
1	0.2	0.04	0.106339	0.032	0.008	0.0392
2	0.3	0.06	0.105104	0.048	0.012	0.0588
3	0.3	0.06	0.103876	0.048	0.012	0.0588
4	0.4	0.08	0.102655	0.064	0.016	0.0784
5	0.3	0.06	0.101441	0.048	0.012	0.0588
6	0.3	0.06	0.100235	0.048	0.012	0.0588
7	0.3	0.06	0.099036	0.048	0.012	0.0588
8	0.4	0.08	0.097844	0.064	0.016	0.0784
9	0.4	0.08	0.09666	0.064	0.016	0.0784
10	0.4	0.08	0.095483	0.064	0.016	0.0784
11	0.5	0.1	0.094314	0.08	0.02	0.098
12	0.5	0.1	0.093152	0.08	0.02	0.098
13	0.5	0.1	0.091998	0.08	0.02	0.098
14	0.5	0.1	0.090851	0.08	0.02	0.098
15	0.5	0.1	0.089713	0.08	0.02	0.098
16	0.6	0.12	0.088581	0.096	0.031418553	0.153951
17	0.6	0.12	0.087458	0.096	0.032541936	0.159455
18	0.7	0.14	0.086342	0.112	0.053657525	0.262922
19	0.7	0.14	0.085235	0.112	0.054765276	0.26835
20	0.8	0.16	0.084135	0.128	0.075865142	0.371739
21	0.6	0.12	0.083043	0.096	0.036957077	0.18109
22	0.7	0.14	0.081959	0.112	0.058041033	0.284401
23	0.8	0.16	0.080883	0.128	0.079116963	0.387673
24	0.8	0.16	0.079815	0.128	0.080184817	0.392906
25	0.9	0.18	0.078755	0.144	0.101244544	0.496098
26	0.9	0.18	0.077704	0.144	0.102296094	0.501251
27	1	0.2	0.076661	0.16	0.123339414	0.604363
28	1	0.2	0.075626	0.16	0.12437445	0.609435
29	1	0.2	0.074599	0.16	0.125401148	0.614466
30	1.1	0.22	0.073581	0.176	0.146419453	0.717455
31	1.2	0.24	0.072571	0.192	0.167429306	0.820404
32	1.3	0.26	0.071569	0.208	0.188430651	0.92331
33	1.5	0.3	0.070577	0.24	0.229423427	1.124175
34	1.5	0.3	0.069592	0.24	0.230407573	1.128997
35	1.6	0.32	0.068617	0.256	0.251383027	1.231777
36	1.7	0.34	0.06765	0.272	0.272349725	1.334514
37	1.9	0.38	0.066692	0.304	0.313307603	1.535207
38	2	0.4	0.065743	0.32	0.334256591	1.637857
39	2.1	0.42	0.064803	0.336	0.355196624	1.740463
40	2.2	0.44	0.063872	0.352	0.376127629	1.843025
41	1.5	0.3	0.06295	0.24	0.237049534	1.161543
42	1.5	0.3	0.062038	0.24	0.237962266	1.166015
43	2	0.4	0.061134	0.32	0.338865749	1.660442
44	2	0.4	0.06024	0.32	0.339759904	1.664824
45	1.9	0.38	0.059355	0.304	0.32064465	1.571159
46	1.9	0.38	0.05848	0.304	0.321519907	1.575448
47	1.7	0.34	0.057614	0.272	0.282385587	1.383689
48	1.8	0.36	0.056758	0.288	0.303241605	1.485884
49	2.5	0.5	0.055912	0.4	0.44408787	2.176031
50	2.6	0.52	0.055076	0.416	0.464924289	2.278129
51	2.8	0.56	0.054249	0.448	0.505750766	2.478179
52	2.9	0.58	0.053433	0.464	0.526567203	2.580179
53	3.4	0.68	0.052627	0.544	0.627373497	3.07413
54	3.4	0.68	0.05183	0.544	0.628169543	3.078031
55	2.3	0.46	0.051045	0.368	0.408955231	2.003881
56	2.3	0.46	0.05027	0.368	0.40973045	2.007679
57	2.7	0.54	0.049505	0.432	0.490495082	2.403426
58	2.6	0.52	0.048751	0.416	0.471249005	2.30912
59	2.6	0.52	0.048008	0.416	0.471992094	2.312761
60	2.5	0.5	0.047276	0.4	0.452724218	2.218349
61	2.4	0.48	0.046555	0.384	0.43344524	2.123882

62	2.3	0.46	0.045845	0.368	0.41415502	2.02936
63	1.9	0.38	0.045147	0.304	0.334853409	1.640782
64	1.9	0.38	0.04446	0.304	0.335540253	1.644147
65	0.4	0.08	0.043785	0.064	0.036215392	0.177455
66	0.4	0.08	0.043121	0.064	0.036878656	0.180705
67	0.3	0.06	0.04247	0.048	0.01752987	0.085896
68	0.3	0.06	0.041831	0.048	0.018168848	0.089027
69	0.5	0.1	0.041205	0.08	0.058795395	0.288097
70	0.5	0.1	0.040591	0.08	0.059409307	0.291106
71	0.5	0.1	0.03999	0.08	0.060010366	0.294051
72	0.4	0.08	0.039402	0.064	0.040598343	0.198932
73	0.4	0.08	0.038827	0.064	0.041172996	0.201748
74	0.4	0.08	0.038266	0.064	0.041734068	0.204497
75	0.3	0.06	0.037719	0.048	0.022281283	0.109178
76	0.2	0.04	0.037186	0.032	0.002814349	0.01379
77	0.3	0.06	0.036667	0.048	0.023332951	0.114331
78	0.4	0.08	0.036163	0.064	0.04383675	0.2148
79	0.3	0.06	0.035675	0.048	0.024325384	0.119194
80	0.2	0.04	0.035202	0.032	0.004798455	0.023512
81	0.3	0.06	0.034744	0.048	0.025255533	0.123752
82	0.3	0.06	0.034304	0.048	0.025696147	0.125911
83	0.3	0.06	0.03388	0.048	0.026119776	0.127987
84	0.2	0.04	0.033474	0.032	0.006525844	0.031977
85	0.3	0.06	0.033086	0.048	0.026913705	0.131877
86	0.2	0.04	0.032717	0.032	0.007282632	0.035685
87	0.3	0.06	0.032368	0.048	0.027631792	0.135396
88	0.2	0.04	0.03204	0.032	0.007960224	0.039005
89	0.3	0.06	0.031733	0.048	0.028266795	0.138507
90	0.2	0.04	0.03145	0.032	0.008550145	0.041896
91	0.2	0.04	0.031191	0.032	0.008808595	0.043162
92	0.2	0.04	0.03096	0.032	0.00904	0.044296
93	0.2	0.04	0.030759	0.032	0.009241464	0.045283
94	0.2	0.04	0.030591	0.032	0.009408754	0.046103
95	0.2	0.04	0.030465	0.032	0.009534688	0.04672
96	0.2	0.04	0.0304	0.032	0.0096	0.04704
						72.30007
			total volume			65070.06

BMP Calculations

Summary Of Mitigation Volumes and Peak Q's

Year Storm	duration Hours	Proposed Volume	Existing volume	delta Volume	BMP Volume	Detention Volume required	Peak Q Devloped	Peak Q Existing	Delta Q
2	3	15006	11109	3897	12916	0	4.07	3.6	0.47
5	3	22659	19495	3164	12916	0	5.94	5.4	0.54
10	3	27080	22763	4317	12916	0	7.02	6.44	0.58
					12916				
2	6	20489	13455	7034	12916	0	4.26	2.84	1.42
5	6	30129	22221	7908	12916	0	5.93	5.39	0.54
10	6	35950	27481	8469	12916	0	6.92	6.35	0.57
2	24	29997	27502	2495	12916	0	1.19	1.48	0
5	24	49924	46020	3904	12916	0	2.48	2.32	0.16
10	24	65070	60038	5032	12916	0	3.08	2.89	0.19

BMP TREATMENT VOLUME SUMMARY

Bioretention Basin No	Pervious Pavement No	BMP Volume Required	BRB Volume Supplied	PP Volume Supplied	Total Vbmp Supplied
1		1251	1784		1784
2		1534	1572		1572
3		839	903		903
4		751	1613		1613
5	5	991	684	1088	1772
6		683	792		792
7	7	1894	1066	1830	2896
8		268	648		648
9		814	936		936
Totals		9025	9998	2918	12916

BMP VOLUME CALCULATIONS

BRB No	Drainage Area	Area SF	Surface Type	If	C	CxArea	rain depth	BMP Volume
1	5A 5B	16988 22651	LS AC/Build	0.1 1	0.11 0.892	1868.68 20204.69		
					Total	22073.37	0.68	1250.8
2	2A 2B	4145 29832	LS AC/Build	0.1 1	0.11 0.892	455.95 26610.14		
					Total	27066.09	0.68	1533.7
3	7A 7B	7405 15682	LS AC/Build	0.1 1	0.11 0.892	814.55 13988.34		
					Total	14802.89	0.68	838.8
4	6A 6B	11386 13443	LS AC/Build	0.1 1	0.11 0.892	1252.46 11991.16		
					Total	13243.62	0.68	750.5
5	3A	19602	AC/Build	1	0.892	17484.98		
					Total	17484.98	0.68	990.8
6	9A	13504	AC/Build	1	0.892	12045.57		
					Total	12045.57	0.68	682.6
7	4A	37462	AC/Build	1	0.892	33416.1		
					Total	33416.1	0.68	1893.6
8	11A 11S	5893 4561	LS AC/Build	0.1 1	0.11 0.892	648.23 4068.412		
					Total	4716.642	0.68	267.3
9	8A	16117.2	AC/Build	1	0.892	14376.54 0		
					Total	14376.54	0.68	814.7

218671.2

Bioretention Facility - Design Procedure	BMP ID BRB 1	Legend:	Required Entries Calculated Cells
Company Name:	Pfeiler Associates	Date:	1/18/2016
Designed by:	LJM	County/City Case No.:	

Design Volume

Enter the area tributary to this feature — A_T= 0.91 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP}= 1.251 ft^3

Type of Bioretention Facility Design

◉ Side slopes required (parallel to parking spaces or adjacent to walkways)

○ No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb — w_T = 6.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.68 ft

Minimum Surface Area, A_m

$$A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$$

A_M = 744 ft^2

Proposed Surface Area — A= 1,062 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0 %

6" Check Dam Spacing — 0 feet

Describe Vegetation:

Notes:

Bioretention Facility - Design Procedure	BMP ID BRB 2	Legend:	Required Entries / Calculated Cells
Company Name:	Pfeiler Associates	Date:	1/18/2016
Designed by:	LJM	County/City Case No.:	

Design Volume

Enter the area tributary to this feature — A_T = 0.78 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP} = 1.534 ft^3

Type of Bioretention Facility Design

◉ Side slopes required (parallel to parking spaces or adjacent to walkways)

○ No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb — w_T = 24.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.77 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 867 ft^2

Proposed Surface Area — A= 888 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0 %

6" Check Dam Spacing — 0 feet

Describe Vegetation:

Notes:

Bioretention Facility - Design Procedure	BMP ID BRB3	Legend:	Required Entries / Calculated Cells
Company Name:	Pfeiler Associates	Date:	1/18/2016
Designed by:	LJM	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	0.53 acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	839 ft^3

Type of Bioretention Facility Design

◉ Side slopes required (parallel to parking spaces or adjacent to walkways)

○ No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	3.0 ft
Top Width of Bioretention Facility, excluding curb	w_T =	8.0 ft
Total Effective Depth, d_E $d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$	d_E =	1.71 ft
Minimum Surface Area, A_m $A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M=	490 ft^2
Proposed Surface Area	A=	528 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4 :1
Diameter of Underdrain		6 inches
Longitudinal Slope of Site (3% maximum)		0 %
6" Check Dam Spacing		0 feet
Describe Vegetation:		

Notes:

Bioretention Facility - Design Procedure	BMP ID	Legend:	Required Entries
	BRB 4		Calculated Cells

Company Name:	Pfeiler Associates	Date:	1/18/2016
Designed by:	LJM	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	0.57	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	751	ft^3

Type of Bioretention Facility Design

◉ Side slopes required (parallel to parking spaces or adjacent to walkways)

○ No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	3.0	ft
Top Width of Bioretention Facility, excluding curb	w_T =	6.0	ft
Total Effective Depth, d_E $d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$	d_E =	1.68	ft
Minimum Surface Area, A_m $A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M =	447	ft^2
Proposed Surface Area	A=	960	ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		0	%
6" Check Dam Spacing		0	feet
Describe Vegetation:			

Notes:

Bioretention Facility - Design Procedure	BMP ID BRB 5	Legend:	Required Entries / Calculated Cells
Company Name:	Pfeiler Associates	Date:	1/18/2016
Designed by:	LJM	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T= 0.45	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}= 991	ft^3

Type of Bioretention Facility Design

○ Side slopes required (parallel to parking spaces or adjacent to walkways)

◉ No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S = 3.0	ft
Top Width of Bioretention Facility, excluding curb	w_T= 4.0	ft
Total Effective Depth, d_E		
$d_E = [(0.3) \times d_S + (0.4) \times 1] + 0.5$	d_E = 1.80	ft
Minimum Surface Area, A_m		
$A_M\ (ft^2) = \dfrac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M= 551	ft^2
Proposed Surface Area	A= 380	ft^2

ERROR, the proposed surface area must be equal to or greater than the minimum surface area

Minimum Required Length of Bioretention Facility, L	L = 137.8	ft

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z = 4	:1
Diameter of Underdrain	6	inches
Longitudinal Slope of Site (3% maximum)	0	%
6" Check Dam Spacing	0	feet
Describe Vegetation:		

Notes:

Permeable Pavement - Design Procedure	BMP ID PP 5	Legend:	Required Entries Calculated Cells
Company Name:	Pfeiler Associates	Date:	1/18/2016
Designed by:	LJM	County/City Case No.:	

Design Volume

Enter the area tributary to this feature A_T= 0.45 acres

Enter V_{BMP} determines from Section 2.1 of this Handbook V_{BMP}= 308 ft^3

Permeable Pavement Surface Area

Reservoir Layer Depth, b_{TH} b_{TH}= 12 inches

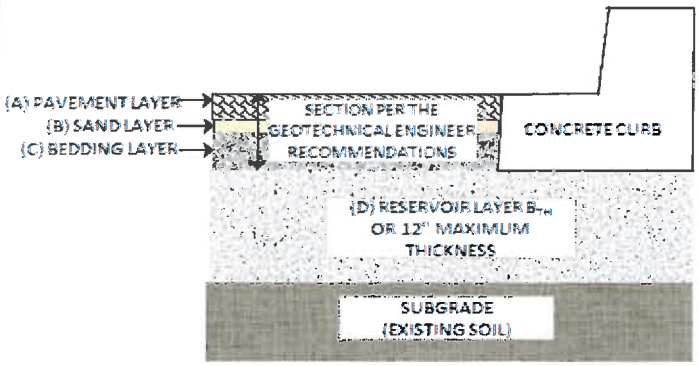
Minimum Surface Area Required, A_S

$$A_{S\,(ft)} = \frac{V_{BMP}\,(ft^3)}{(0.4 \times b_{TH}\,(in))\,/\,12(in/ft)}$$

A_S= 770 ft^2

Proposed Surface Area = 2,720 ft^2

Permeable Pavement Cross Section



Per the Geotechnical	(A)	4	in
Engineer's	(B)	3	in
Recommendations	(C)	4	in
Reservoir Layer	(D)	12	in
Total Permeable Pavement Section		23	in
Slope of Permeable Pavement		1	%

Sediment Control Provided? (Use pulldown) Yes

Geotechnical report attached? (Use pulldown) Yes

Describe Surrounding Vegetation:

Notes:

If the permeable pavement has been designed correctly, there should be no error messages on the spreadsheet.

Bioretention Facility - Design Procedure	BMP ID BRB 6	Legend:	Required Entries / Calculated Cells
Company Name:	Pfeiler Associates	Date:	1/18/2016
Designed by:	LJM	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	0.31 acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	683 ft^3

Type of Bioretention Facility Design

○ Side slopes required (parallel to parking spaces or adjacent to walkways)

◉ No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	3.0 ft
Top Width of Bioretention Facility, excluding curb	w_T=	4.0 ft
Total Effective Depth, d_E		
$d_E = [(0.3) \times d_S + (0.4) \times 1] + 0.5$	d_E =	1.80 ft
Minimum Surface Area, A_m $A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$	A_M=	380 ft^2
Proposed Surface Area	A=	440 ft^2
Minimum Required Length of Bioretention Facility, L	L =	95.0 ft

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4 :1
Diameter of Underdrain		6 inches
Longitudinal Slope of Site (3% maximum)		0 %
6" Check Dam Spacing		0 feet
Describe Vegetation:		

Notes:

Bioretention Facility - Design Procedure	BMP ID BRB 7	Legend:	Required Entries Calculated Cells
Company Name:	Pfeiler Associates	Date:	1/18/2016
Designed by:	LJM	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T= 0.86	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}= 1,894	ft^3

Type of Bioretention Facility Design

○ Side slopes required (parallel to parking spaces or adjacent to walkways)

◉ No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S = 3.0	ft
Top Width of Bioretention Facility, excluding curb	w_T= 4.0	ft
Total Effective Depth, d_E		
$d_E = [(0.3) \times d_S + (0.4) \times 1] + 0.5$	d_E = 1.80	ft
Minimum Surface Area, A_m		
$A_M\ (ft^2) = \dfrac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M= 1,053	ft^2
Proposed Surface Area	A= 592	ft^2

ERROR, the proposed surface area must be equal to or greater than the minimum surface area

Minimum Required Length of Bioretention Facility, L	L = 263.3	ft

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z = 1	:1
Diameter of Underdrain	6	inches
Longitudinal Slope of Site (3% maximum)	0	%
6" Check Dam Spacing	0	feet
Describe Vegetation:		

Notes:

Permeable Pavement - Design Procedure	BMP ID	Legend:	Required Entries
	PP 7		Calculated Cells

Company Name:	Pfeiler Associates	Date:	1/18/2016
Designed by:	LJM	County/City Case No.:	

Design Volume

Enter the area tributary to this feature A_T= 0.86 acres

Enter V_{BMP} determines from Section 2.1 of this Handbook V_{BMP}= 830 ft^3

Permeable Pavement Surface Area

Reservoir Layer Depth, b_{TH} b_{TH}= 12 inches

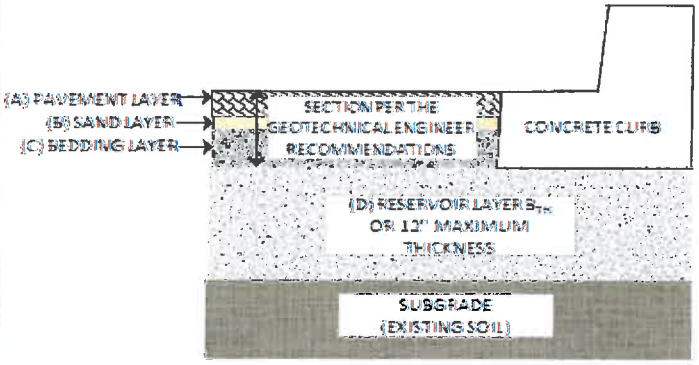
Minimum Surface Area Required, A_S

$$A_{S\,(ft)} = \frac{V_{BMP}\,(ft^3)}{(0.4 \times b_{TH}\,(in)) / 12(in/ft)}$$

A_S= 2,075 ft^2

Proposed Surface Area = 4,576 ft^2

Permeable Pavement Cross Section



Per the Geotechnical Engineer's Recommendations	(A)	4	in
	(B)	3	in
	(C)	4	in
Reservoir Layer	(D)	12	in
Total Permeable Pavement Section		23	in
Slope of Permeable Pavement		1	%

Sediment Control Provided? (Use pulldown) Yes

Geotechnical report attached? (Use pulldown) Yes

Describe Surrounding Vegetation:

Notes:

If the permeable pavement has been designed correctly, there should be no error messages on the spreadsheet.

Bioretention Facility - Design Procedure	BMP ID BRB 8	Legend:	Required Entries Calculated Cells
Company Name:	Pfeiler Associates	Date:	1/18/2016
Designed by:	LJM	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	0.24 acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	268 ft^3

Type of Bioretention Facility Design

○ Side slopes required (parallel to parking spaces or adjacent to walkways)

◉ No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	3.0 ft
Top Width of Bioretention Facility, excluding curb	w_T =	4.0 ft
Total Effective Depth, d_E		
$d_E = [(0.3) \times d_S + (0.4) \times 1] + 0.5$	d_E =	1.80 ft
Minimum Surface Area, A_m		
$A_M\ (ft^2) = \dfrac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M =	149 ft^2
Proposed Surface Area	A=	360 ft^2
Minimum Required Length of Bioretention Facility, L	L =	37.3 ft

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	1 :1
Diameter of Underdrain		6 inches
Longitudinal Slope of Site (3% maximum)		0 %
6" Check Dam Spacing		0 feet
Describe Vegetation:		

Notes:

Bioretention Facility - Design Procedure	BMP ID: BRB 9	Legend:	Required Entries / Calculated Cells
Company Name:	Pfeiler Associates	Date:	1/18/2016
Designed by:	LJM	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	0.37 acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	682 ft^3

Type of Bioretention Facility Design

○ Side slopes required (parallel to parking spaces or adjacent to walkways)

◉ No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	3.0 ft
Top Width of Bioretention Facility, excluding curb	w_T =	4.0 ft
Total Effective Depth, d_E		
$d_E = [(0.3) \times d_S + (0.4) \times 1] + 0.5$	d_E =	1.80 ft
Minimum Surface Area, A_m $A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$	A_M=	379 ft^2
Proposed Surface Area	A=	520 ft^2
Minimum Required Length of Bioretention Facility, L	L =	94.8 ft

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	1 :1
Diameter of Underdrain		6 inches
Longitudinal Slope of Site (3% maximum)		0 %
6" Check Dam Spacing		0 feet
Describe Vegetation:		

Notes:

Site Soils Report

January 16, 2016

JN 28049B

EnGEN CORPORATION

SOILS PERCOLATION FEASIBILITY STUDY
STORMWATER INFILTRATION BASINS
Clinton Keith Village - Assessor's Parcel Number: 326-250-003
Clinton Keith Road and George Avenue, City of Murrieta, County of Riverside, California
Project Number: M3551-P

April 22, 2008

Prepared for:

Venture Point Development
Mr. John E. Clement
3419 Via Lido, Suite 640
Newport Beach, California 92663

25759 Jefferson Avenue, Murrieta, California 92562 • Phone: (951) 834-9000 • Fax: (951) 834-9001

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EXPLORATORY BORING LOGS
DRAWINGS

EnGEN CORPORATION

April 22, 2008

Venture Point Development
Mr. John E. Clement
3419 Via Lido, Suite 640
Newport Beach, California 92663
(949) 673-4660 / FAX (949) 673-4540

Regarding: **SOILS PERCOLATION FEASIBILITY STUDY**
STORMWATER INFILTRATION BASINS
Clinton Keith Village - Assessor's Parcel Number: 326-250-003
Clinton Keith Road and George Avenue
City of Murrieta, County of Riverside, California
Project Number: M3551-P

Dear Mr. Clement:

In accordance your request and signed proposal, **EnGEN Corporation** has performed a Soils Percolation Feasibility Study for the above referenced project. The purpose of this study was to perform percolation testing within the subject property for use in the design of stormwater infiltration basins. Submitted herewith are the results of this firm's findings, along with the supporting data.

1.0 PROPOSED DEVELOPMENT

The proposed development of the subject parcel will consist of a commercial/retail development, along with associated hardscape and landscape improvements. Capture of stormwater run-off for the proposed development will be managed by the use of stormwater infiltration basins.

2.0 SITE DESCRIPTION

The subject site consists of vacant land totaling approximately 5-acres in size. The subject site is located on the northeast corner of Clinton Keith Road and George Avenue in the City of Murrieta, County of Riverside, California. Topography across the proposed infiltration areas consist of relatively flat terrain, with surface drainage by sheet flow generally to the southwest at a gradient of less than five percent. At the time of the field study, no wells were observed within 100-feet of the proposed infiltration area.

3.0 SUBSURFACE STUDY

3.1 PREVIOUS STUDY

Field reconnaissance and geologic mapping of the site was performed on March 13, 2007, by our Field Geologist (Referenced No. 1 Report). A study of the property's subsurface condition was performed to evaluate underlying earth strata and the presence of groundwater. Three (3) exploratory soil borings (B1, B2 & B3) were excavated on the study site by 2 Bit Drilling utilizing a CME 45 truck-mounted drill rig, equipped with 7.0-inch outside diameter continuous flight hollow-stem augers. The maximum depth explored on site was approximately 50.5-feet below the existing ground surface (bgs). The boring logs associated with this previous study are located in the Appendix of this report.

3.2 TEST HOLE EXCAVATION

Two (2) exploratory backhoe pits (TP-1 and TP2) were excavated on the subject property to depths of 6.0-feet and 11.0-feet, respectively below surface elevation within the area of the proposed basins. The location of the backhoe pits were determined by Glen Holmes of Pfeifer & Associates. Upon completion of testing, the exploratory backhoe pits were not backfilled. It is recommended that the backhoe pits be backfilled with reasonable effort to restore the area to its natural condition as a temporary safety precaution. As with any area as small and deep as a backhoe pit, consolidation and subsidence of the backfill soil may result in time, causing a depression of the area and a potentially hazardous condition. The client is advised to periodically examine the excavated area and, if necessary, backfill any noted depressions.

3.3 PERCOLATION TESTING

The percolation test areas were verified as being in undisturbed natural earth materials. One (1) percolation test hole was excavated in the bottom of each backhoe pit (TP-1 and TP-2) and tested within the anticipated infiltration areas on the subject site. The percolation test holes were filled with water and allowed to presoak for a minimum of 24 hours prior to testing. Percolation testing was performed in general accordance with the procedures outlined in Chapter 3 of the "Waste Disposal for Individual Homes, Commercial and Industrial" publication issued by the **Riverside County Department of Environmental Health**. A time interval of 30-minutes was utilized for TP-1. A time

interval of 30 minutes were used for the first two readings and then every ten (10) minutes thereafter for TP-2. The percolation test results are presented in Section 5.1.

4.0 SUBSURFACE CONDITIONS

4.1 EARTH MATERIALS

The earth materials encountered within the exploratory borings previously excavated on the subject parcel consisted of alluvium overlying Pauba Formation Bedrock to the maximum depths explored (50.5-feet bgs). For a detailed description of material types encountered in the exploratory borings, refer to the Exploratory Boring Logs presented in the Appendix. Refusal was not encountered within 50.5-feet of the surface in the areas explored. The earth material strata as shown on the Exploratory Boring Logs generally represents the conditions in the actual backhoe pit locations. However variations may occur throughout the subject property.

4.2 GROUNDWATER

Groundwater was encountered at 15-feet bgs in boring B2. Groundwater was not encountered in borings B1 & B3.

5.0 PERCOLATION TEST DATA

5.1 RESULTS

The following table presents the actual drop in water level recorded in the test holes during percolation testing.

Location	Time (Minutes)	Water Level Drop (Feet)
TP-1	30	.12
TP-1	60	.09
TP-1	90	.09
TP-1	120	.08
TP-1	150	.07
TP-1	180	.07
TP-1	210	.06
TP-1	240	.06
TP-1	270	.05
TP-1	300	.05
TP-1	330	.05
TP-1	360	.05

Location	Time (Minutes)	Water Level Drop (Feet)
TP-2	30	.75
TP-2	60	.65
TP-2	70	.26
TP-2	80	.24
TP-2	90	.24
TP-2	100	.23
TP-2	110	.23
TP-2	120	.22
TP-2	130	.22
TP-2	140	.21
TP-2	150	.21
TP-2	160	.20

5.2 DESIGN RATE

The final percolation rate for a six-hour test suggests that soils percolation will occur at rates of 0.1-feet per hour for TP-1 and 1.8-feet per hour for TP-2. **(As a result, an infiltration rate of 1.2 inches per hour for TP-1 and 21.6 inches per hour for TP-2 may be used for design of infiltration trenches or ponds).**

6.0 CLOSURE

This report has been prepared for use by the parties or project named or described in this document. It may or may not contain sufficient information for other parties or purposes. In the event that changes in the assumed nature, design, or location of the proposed structure and/or project as described in this report are planned, the conclusions and recommendations contained in this report will not be considered valid unless the changes are reviewed and the conclusions and recommendations of this report modified or verified in writing. This study was conducted in general accordance with the applicable standards of the Geotechnical Engineering profession and accepted sewage disposal system testing and design principles and practices at the time this report was prepared. No other warranty, implied or expressed beyond the representations of this report is made.

Although every effort has been made to obtain information regarding the subsurface conditions of the site, limitations exist with respect to the knowledge of unknown regional or localized off-site conditions which may have an impact on the parcels. The recommendations presented in this report are valid as of the date of this report. However, changes in the conditions of a property can occur with the passage of time, whether they are due to natural processes or to the works of man on this and/or adjacent properties. If conditions are observed or information becomes available during the design and construction process that are not reflected in this report, **EnGEN Corporation** should be notified so that supplemental evaluations can be performed and the conclusions and recommendations presented in this report can be modified or verified in writing. In addition, changes in applicable or appropriate standards of care or practice occur, whether they result from legislation or the broadening of knowledge and experience. Accordingly, the conclusions and recommendations presented in this report may be invalidated, wholly or in part, by changes outside of our control which occur in the future.

Thank you for the opportunity to provide our services. Please direct any questions you may have regarding this report to this office at your convenience.

Respectfully submitted,
EnGEN Corporation

S. Ryan Waroff
V.P. – General Manager

Osbjorn Bratene, GE-162
President
Expires 09-30-09

REGISTERED PROFESSIONAL ENGINEER
OSBJORN BRATENE
No. 162
Exp. 09-30-09
GEOTECHNICAL
STATE OF CALIFORNIA

RW/OB:al

Distribution: (4) Addressee

FILE EnGEN/Reporting/P/M3551-P Venture Point Development

PROJECT REFERENCE

1. **EnGEN Corporation,** Zolfaghari Commercial, Assessors Parcel Number: 326-250-003, Clinton Keith Road and George Avenue, City of Murrieta, County of Riverside, California, Project Number: M3551-GS, April 6, 2007.

PERCOLATION TEST RESULTS

PERCOLATION TEST RESULTS

EnGEN Corporation Project Number: M3551-P

CLINTON KEITH ROAD

Percolation Test No. TP-1 Date of Test: 4/11/2008

No.	Time (Military Time)	D-Time (In Minutes)	D1 (In Feet)	D2 (In Feet)	D2 - D1 (In Inches)	R-Value (Min/Inch)	SF/100 (Gallons)
	7 07						
1	7.37	30.00	5.00	5.12	1.44	20.83	50
2	8.07	30.00	5.00	5.09	1.08	27.78	65
3	8.37	30.00	5.00	5.09	1.08	27 78	65
4	9 07	30.00	5.00	5.08	0.96	31.25	70
5	9.37	30.00	5.00	5.07	0.84	35.71	80
6	10 07	30.00	5.00	5.07	0.84	35.71	80
7	10 37	30.00	5.00	5.06	0.72	41.67	90
8	11 07	30.00	5.00	5.06	0.72	41.67	90
9	11 37	30.00	5.00	5.05	0.60	50.00	110
10	12.07	30.00	5.00	5.05	0.60	50.00	110
11	12 37	30.00	5.00	5.05	0.60	50.00	110
12	13.07	30.00	5.00	5.05	0.60	50.00	110

SLOPE ACROSS SITE IS:	5%	TEST PIT DEPTH IS:	6.00 Feet
MINIMUM PIT DEPTH IN FT.	6.00	MINIMUM COVER:	N/A Feet

PERCOLATION TEST RESULTS

CLINTON KEITH ROAD

Percolation Test No. TP-2 Date of Test: 4/11/2008

No.	Time (Military Time)	D-Time (In Minutes)	D1 (In Feet)	D2 (In Feet)	D2 - D1 (In Inches)	R-Value (Min/Inch)	SF/100 (Gallons)
	7 15						
1	7.45	30.00	10.00	10.75	9.00	3.33	20
2	8.15	30 00	10.00	10.65	7.80	3.85	20
3	8.25	10.00	10.00	10.26	3.12	3.21	20
4	8.35	10.00	10.00	10.24	2.88	3.47	20
5	8.45	10.00	10.00	10.24	2.88	3 47	20
6	8.55	10.00	10.00	10.23	2.76	3.62	20
7	9.05	10.00	10.00	10.23	2.76	3.62	20
8	9.15	10.00	10.00	10 22	2.64	3.79	20
9	9.25	10.00	10 00	10.22	2.64	3 79	20
10	9.35	10.00	10.00	10.21	2.52	3 97	20
11	9.45	10.00	10.00	10.21	2.52	3.97	20
12	9.55	10.00	10.00	10.20	2.40	4.17	20

SLOPE ACROSS SITE IS:	5%	TEST PIT DEPTH IS:	11.00 Feet
MINIMUM PIT DEPTH IN FT.	11.00	MINIMUM COVER:	N/A Feet

EXPLORATORY BORING LOGS

(B1 THROUGH B3)

GEOTECHNICAL BORING LOG

Project Number: M3551-GS
Boring Number: B1
Date: 03/13/07

Project: Zolfaghari Commercial
Surface Elevation: 1352
Logged By: ED

Soil Graphic	Description	Sampler	Sample Depth	USCS	Blow Count	Dry Density	In-Situ Moisture Content	Maximum Density	Optimum Moisture Content
	UNDOCUMENTED FILL (Afu) Silty fine- to medium-grained sand, light olive brown (5Y 5/3), dry, medium dense.		0	SM					
	PAUBA FORMATION (Qps) Fine sandy siltstone, light olive brown (2.5Y 5/4), moist, very dense.	■		ML	16-29-50/1	109.1	6.7		
			5						
	Fine sandy claystone, strong brown (7.5YR 5/6), moist, very hard.	■			48-50/4	120.7	11.9		
	Silty fine sandstone, light olive brown (2.5 Y 5/4), moist, very dense.		10		18-38-50/5	113.3	8.4		
	Cobble or boulder.					113.3	8.4		
	Silty fine to medium sandstone, olive brown (2.5Y 4/4), moist, very dense. Total Depth 15-feet bgs. No Groundwater Encountered.	■	15		24-37-50/6	126.8	8.4		
			20						
			25						
			30						
			35						

Notes:

GEOTECHNICAL BORING LOG

Project Number: M3551-GS
Boring Number: B2
Date: 03/13/07

Project: Zolfaghari Commercial
Surface Elevation: 1341
Logged By: ED

Soil Graphic	Description	Sampler	Sample Depth	USCS	Blow Count	Dry Density	In-Situ Moisture Content	Maximum Density	Optimum Moisture Content
	UNDOCUMENTED FILL (Afu) Silty fine- to medium-grained sand, brown (10YR 4/3), dry, dense.		0	SM					
	PAUBA FORMATION (Qps) Silty fine sandstone, Light Yellowish Brown (2.5Y 6/3), moist, very dense.			SM	23-34-47		22.9		
			5		22-50/5	116.3	12.5		
					35-46-50/3		16.0		
	Fine sandy siltstone, olive (5Y 5/4), moist, very dense, a few fine gravel, angular.		10	ML	15-50/4		16.5		
	Fine to medium sandstone, pale olive (5Y 6/3), wet, very dense.		15	SP	50/6		10.6		
	Fine to medium sandstone, pale olive (5Y 6/3), wet, very dense.		20	SP	40-50		13.5		
	Fine to medium sandstone, pale olive (5Y 6/3), wet, very dense.		25	SP	50/5		12.8		
	Fine to medium sandstone, pale olive (5Y 6/3), wet, very dense.		30	SP	23-50/3		13.1		
	Medium to coarse sandstone, light gray (2.5Y 7/2), wet, very dense.		35	SP	45-50/3		11.0		

Notes:

GEOTECHNICAL BORING LOG

Project Number: M3551-GS
Boring Number: B2
Date: 03/13/07

Project: Zolfaghari Commercial
Surface Elevation: 1341
Logged By: ED

Soil Graphic	Description	Sampler	Sample Depth	USCS	Blow Count	Dry Density	In-Situ Moisture Content	Maximum Density	Optimum Moisture Content
	Fine to medium sandstone, light gray (2.5Y 7/2), wet, very dense, 1-inch recovery.		40	SP	50/2		20.1		
	No recovery.		45		50/5				
	Fine to medium sandstone, pale olive (5Y 6/3), wet, very dense. Total Depth 50.5-feet bgs. Groundwater Encountered at 15-feet bgs.		50	SP	55/2		15.4		
			55						
			60						
			65						
			70						

Notes:

GEOTECHNICAL BORING LOG

Project Number: M3551-GS
Boring Number: B3
Date: 03/13/07

Project: Zolfaghari Commercial
Surface Elevation: 1533
Logged By: ED

Soil Graphic	Description	Sampler	Sample Depth	USCS	Blow Count	Dry Density	In-Situ Moisture Content	Maximum Density	Optimum Moisture Content
	UNDOCUMENTED FILL (Afu) Silty fine- to medium-grained sand, yellowish brown (10YR 5/4), dry, loose.		0	SM					
	ALLUVIUM (Qal) Silty fine- to medium-grained sand, yellowish brown (10YR 5/4), dry, very dense, slightly porous.			SM	20-31-50/6	124.5	3.4		
	Silty fine- to medium-grained sand, dark yellowish brown (10YR 4/4), moist, dense.		5	SM	19-30-33	121.8	6.4		
	Silty fine- to medium-grained sand, dark yellowish brown (10YR 4/4), moist, dense.			SM	16-22-31	130.0	8.0		
	PAUBA FORMATION (Qps) Silty fine sandstone with clay, light olive brown (2.5Y 5/4), moist, very dense. Total Depth 11.5-feet bgs. No Groundwater Encountered.		10	SM	27-34-50/6	127.0	8.5		
			15						
			20						
			25						
			30						
			35						

Notes:

KEY TO SYMBOLS

Symbol Description

Strata symbols

Silty sand

Silt

Poorly graded sand

Misc. Symbols

Boring continues

Soil Samplers

California sampler

Standard penetration test

Notes:

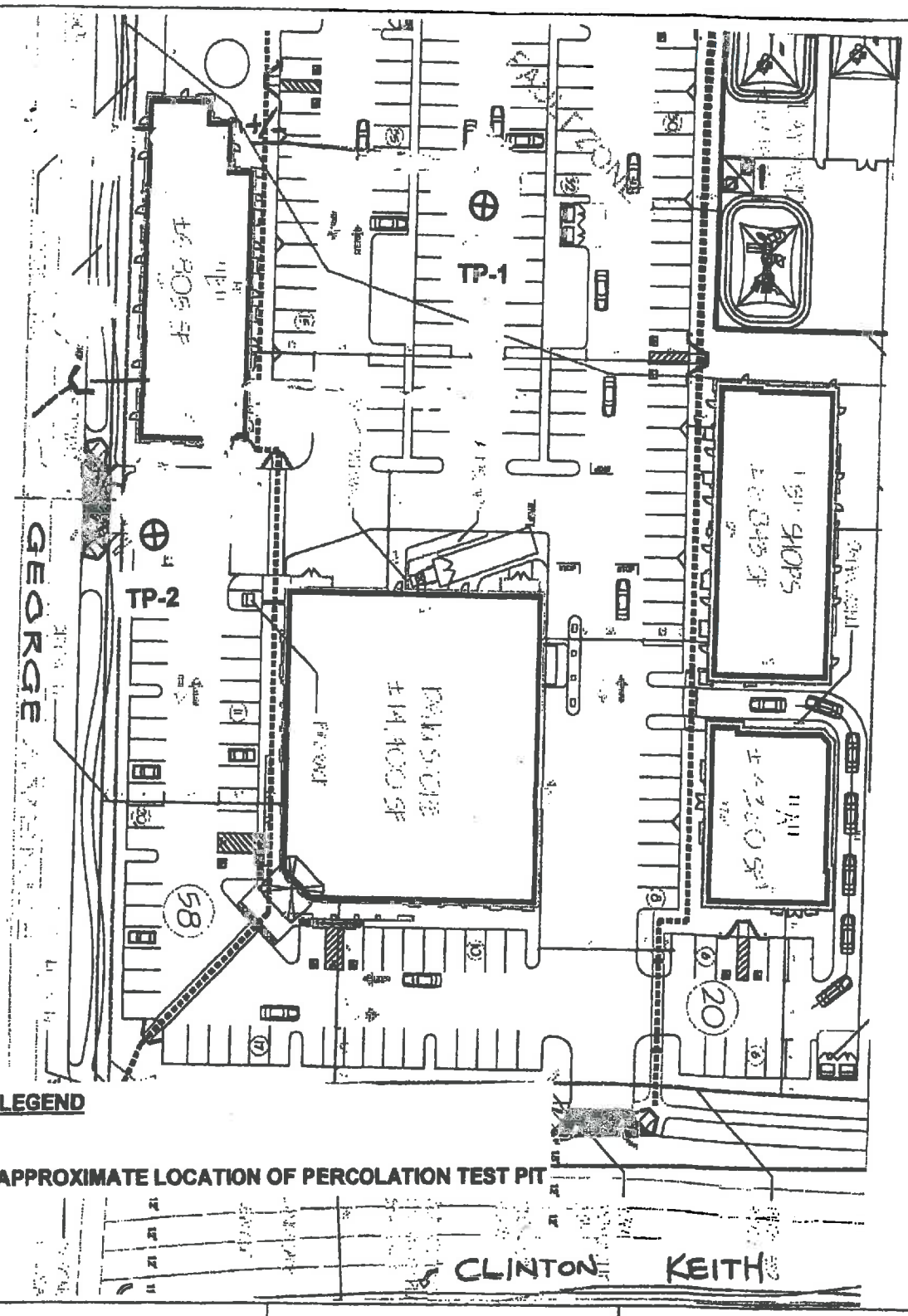
1. Exploratory borings were drilled on 03/13/07 using a 7-inch diameter continuous flight power auger.

2. Water was encountered at the time of drilling at the depths shown.

3. Boring locations were measured from existing features and elevations extrapolated from the final design plan.

4. These logs are subject to the limitations, conclusions, and recommendations in this report.

5. Results of tests conducted on samples recovered are reported on the logs.



LEGEND

TP-1 ⊕ APPROXIMATE LOCATION OF PERCOLATION TEST PIT

LEGAL DESCRIPTION: **A.P.N.: 326-250-003**	**SITE MAP**	**PROJECT NUMBER: M3551-P** **DATE: APRIL 2008**

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