EXHIBIT A

LEGAL DESCRIPTION

Real property in the City of , County of Riverside, State of California, described as follows:

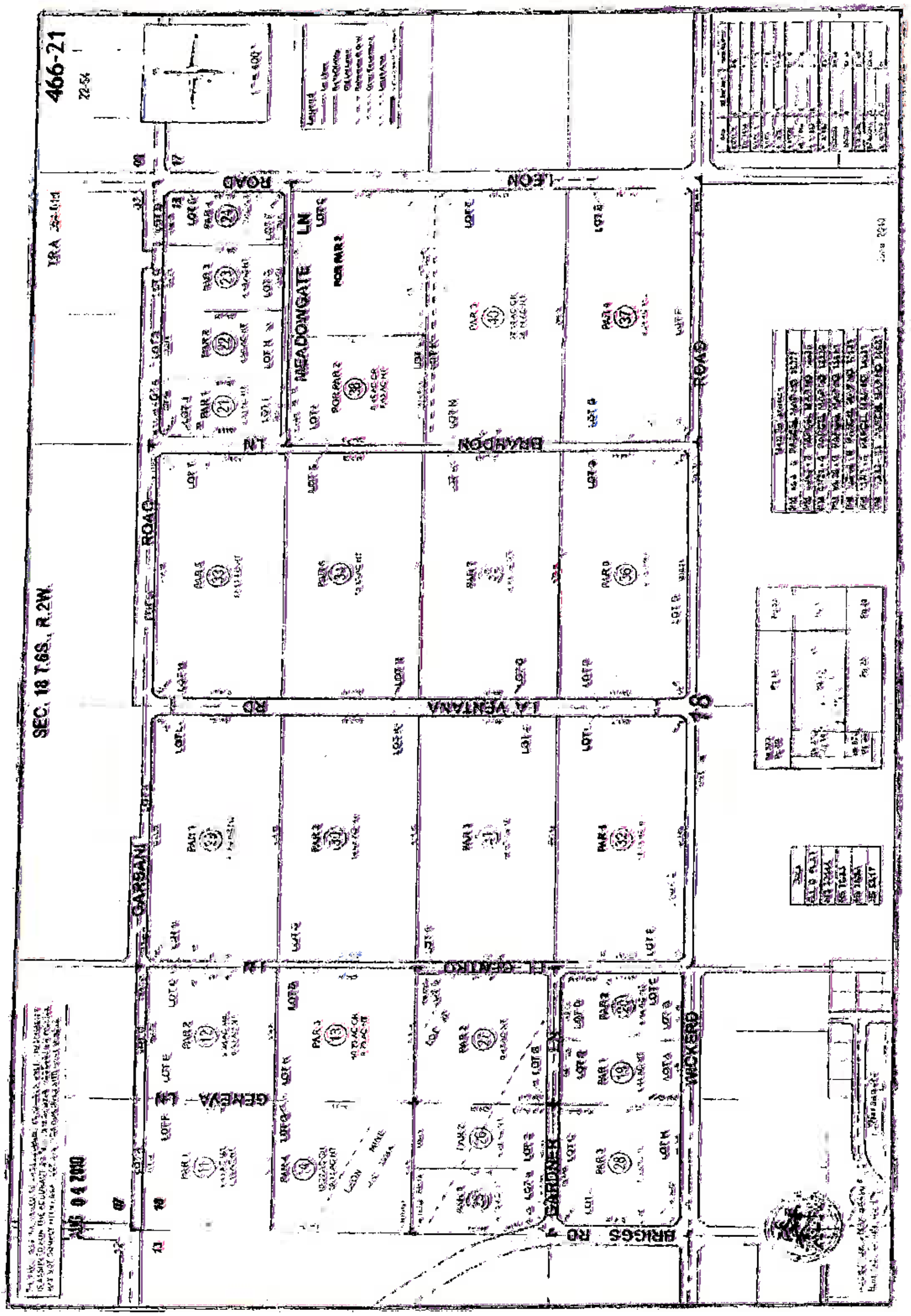
PARCEL 1: (APN: 466-210-029, 466-210-030, 466-210-031, 466-210-032, 466-210-033, 466-210-034, 466-210-035 AND 466-210-036)

PARCELS 1 THROUGH 8, INCLUSIVE, AND LETTERED LOTS "A" THROUGH "T", INCLUSIVE OF PARCEL MAP NO. 18607, IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 113 PAGES 52 AND 53 OF PARCEL MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

PARCEL 2: (APN: 466-210-038)

PARCEL B OF LOT LINE ADJUSTMENT NO. 5355 RECORDED JANUARY 11, 2010 AS INSTRUMENT NO. 2010-0010216 OF OFFICIAL RECORDS, DESCRIBED AS FOLLOWS:

THOSE PORTIONS OF PARCEL 2 AND LOT "L" OF PARCEL MAP NO. 10277, IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 46, PAGE 8 OF PARCEL MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, LYING WEST OF A LINE THAT IS PARALLEL WITH AND DISTANT 527.39 FEET, AS MEASURED AT RIGHT ANGLES TO THE WEST LINE OF SAID PARCEL 2.


466-21
SEC. 18 T.6S., R.2W.
GARGANI
ROAD
LEON
ROAD
MEADOWGATE
LN
BRANDON
ROAD
LA VENTANA
RD
EL CENTRO
LN
GENEVA
LN
WICKERD
BRIGGS RD
18

Dawson, Brett

From: Joe Castaneda <joe@jlcengineering.com>
Sent: Tuesday, June 14, 2016 11:34 AM
To: Jilleen Ferris
Subject: Fwd: La Ventana - Final Revision to COA
Attachments: image001.gif

Joe Castaneda
Principal
JLC Engineering & Consulting
951.304-9552
Sent from I-Phone

Begin forwarded message:

> **From:** "Larry R. Markham" <lrm@markhamdmg.com>
> **Date:** June 10, 2016 at 5:16:14 PM PDT
> **To:** Joseph Rivani <JRivani@GIDLLCO.COM>, "Alhadeff, Samuel" <Samuel.Alhadeff@lewisbrisbois.com>, Joe Castaneda <joe@jlcengineering.com>
> **Subject: RE: La Ventana - Final Revision to COA**
>
> THX
>
> ---
>
> **From:** Joseph Rivani [mailto:JRivani@GIDLLCO.COM]
> **Sent:** Friday, June 10, 2016 5:01 PM
> **To:** Alhadeff, Samuel; Joe Castaneda; Larry R. Markham
> **Subject:** RE: La Ventana - Final Revision to COA
>
> Consider it approved.
>
> Respectfully,
>
> Joseph Rivani
>
> **Global Investment & Development, LLC**
> 3470 Wilshire Blvd, Suite 1020
> Los Angeles, CA 90010
> Tel: 213.365.0005
> Cell: 213.369.9600
> Fax: 213.365.0405
>
> ---
>
> **From:** Alhadeff, Samuel [mailto:Samuel.Alhadeff@lewisbrisbois.com]
> **Sent:** Friday, June 10, 2016 10:15 AM
> **To:** 'Joe Castaneda' <joe@jlcengineering.com>; Larry R. Markham <lrm@markhamdmg.com>
> **Cc:** Joseph Rivani <JRivani@GIDLLCO.COM>
> **Subject:** RE: La Ventana - Final Revision to COA

:: 951.304.3568 – Fax

JLC Engineering & Consulting Inc.
36263 Calle de Lobo
Murrieta, CA 92562

May 24, 2016

Joseph Rivani

Global Investment & Development, LLC

3470 Wilshire Blvd., Suite 1020

Los Angeles, CA 90010

Subject: Drainage Acceptance by KGK Riverside Properties, LLC

TM 36785/APN 466-210-029 to 036 & 038

Dear Mr. Rivani,

The civil engineer retained by KGK, Larry Markham, MDMG, Inc. has reviewed the following documents provided by Joe Castaneda, JLC Engineering & Consulting Inc., submitted on behalf of Tentative Tract Map 36785 prepared for the applicant Joseph Rivani, Global Investment & Development, LLC.

1. Pre Project Condition

   Site Hydrology Map

   Exhibit A, TM 36785

2. Post Project Condition

   Offsite Hydrology Map

Exhibit B-1, TM 36785

3. Post Project Condition

   Onsite Hydrology Map

   Exhibit B-2, TM 36785

4. Post Project Flow Rate Exhibit

5. Rational Hydrology Studies – TM 36785 All 100 year Storm Event Hydrology Calculations

   a. Post Project – Onsite Area A
   b. Post Project – Onsite Area B
   c. Post Project – Onsite Area C
   d. Post Project – Onsite Area D
   e. Post Project – Onsite Area E
   f. Pre Project – Onsite Area F
   g. Post Project – Offsite Area F
   h. Post Project – Onsite Area Q
   i. Post Project – Onsite Area T

6. Line 1 Storm Drain Outlet

   Proposed Access and Easement

   Figure A-1 – Alternative #1

7. JLC email dated 4/6/16, 6:13am to Larry Markham, copied to J. Rivani.

The civil engineer for KGK finds the preliminary exhibits and hydrology calculations acceptable for the purpose of tentative tract approval and to be subject to the review and approval of the final hydrology and hydraulic calculations to be approved to the Riverside County Transportation Department (RCTD) and Riverside County Flood Control and Water Conservation District (RCFCWCD) and the civil engineer for KGK.

The civil engineer for KGK finds that Alternative #1 of the JLC email of 4/6/16, 6:13am acceptable as depicted. Alternative #2 depicted in the same JLC email is not acceptable. This acceptance is for the preliminary design of the Line 1 Storm Drain and is to be subject to final approval of the Line 1 Storm Drain improvement plans by RCTD and RCFCWCD and the civil engineer for KGK.

The Alternative #1 design shall be accepted for maintenance by RCFCWCD upon completion of construction.

KGK shall dedicate the south half width right of way for Wickerd Road to the County of Riverside to provide for the construction of the Line 1 Storm Drain. The dedication documents shall be prepared by Rivani, JVRL 220 or their successors in interest at no cost to KGK. KGK shall also provide for RCFCWCD maintenance access easements needed to maintain the Line 1 Storm Drain.

The dedication and easements shall be provided upon approval of the hydrology and hydraulic calculations and improvement plans for the Line 1 Storm Drain, by RCTD and RCFCWCD and the civil engineer for KGK.

This drainage acceptance shall be reflected within the Conditions of Approval for TM 36785 and/or any my subsequent or superseding approvals for this subject drainage area.

Rivani, JVRL 220 LLC or their successors in interest shall endorse and support any land us application proposed by KGK or their successors in interest that is similar in nature to the TM 36785.

This drainage acceptance shall be memorialized by means of a covenant recorded on the Rivani JVRL 220 LLC property, recorded in favor of KGK recorded prior to approval by Board of Supervisors.

Cc: Russell Williams, RCTD

Henry Olivo, RCFCWCD

Attachments: Items 1. through 7.

Nathan Heimann 6/1/16
for KGK

SHEET 1 OF 1

TENTATIVE TRACT MAP 36785

COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

PRE-PROJECT CONDITION SITE HYDROLOGY MAP

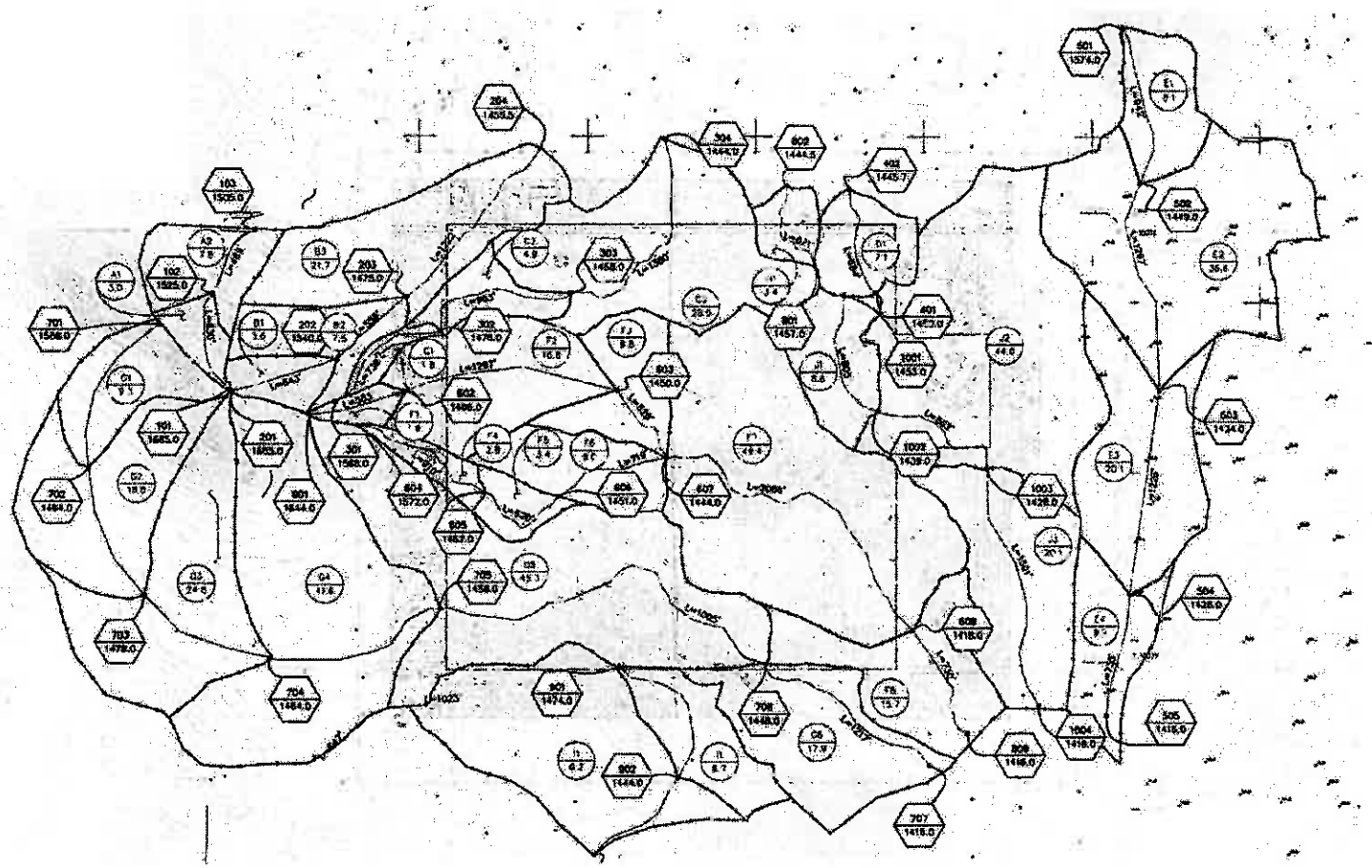


EXHIBIT "A"

JLC Engineering & Consulting, Inc.
36263 CALLE DE LORO
MURRIETA, CA 92562
PH. 951.304.9551 FAX 951.304.3568

TTM 36785

PRE-PROJECT CONDITION SITE HYDROLOGY MAP

SHEET 1 OF 1

TENTATIVE TRACT MAP 36785

COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

POST-PROJECT CONDITION OFFSITE HYDROLOGY MAP

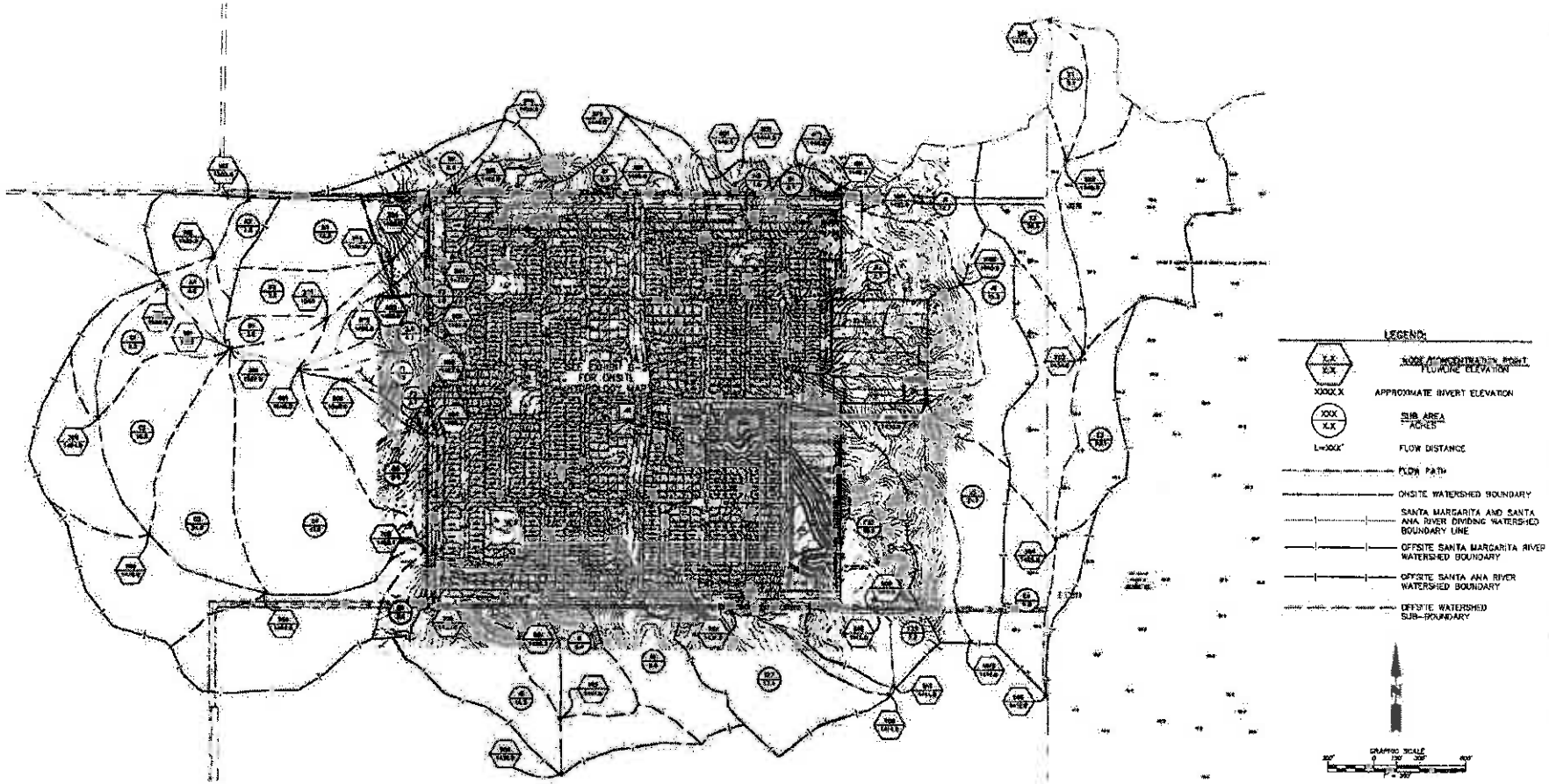


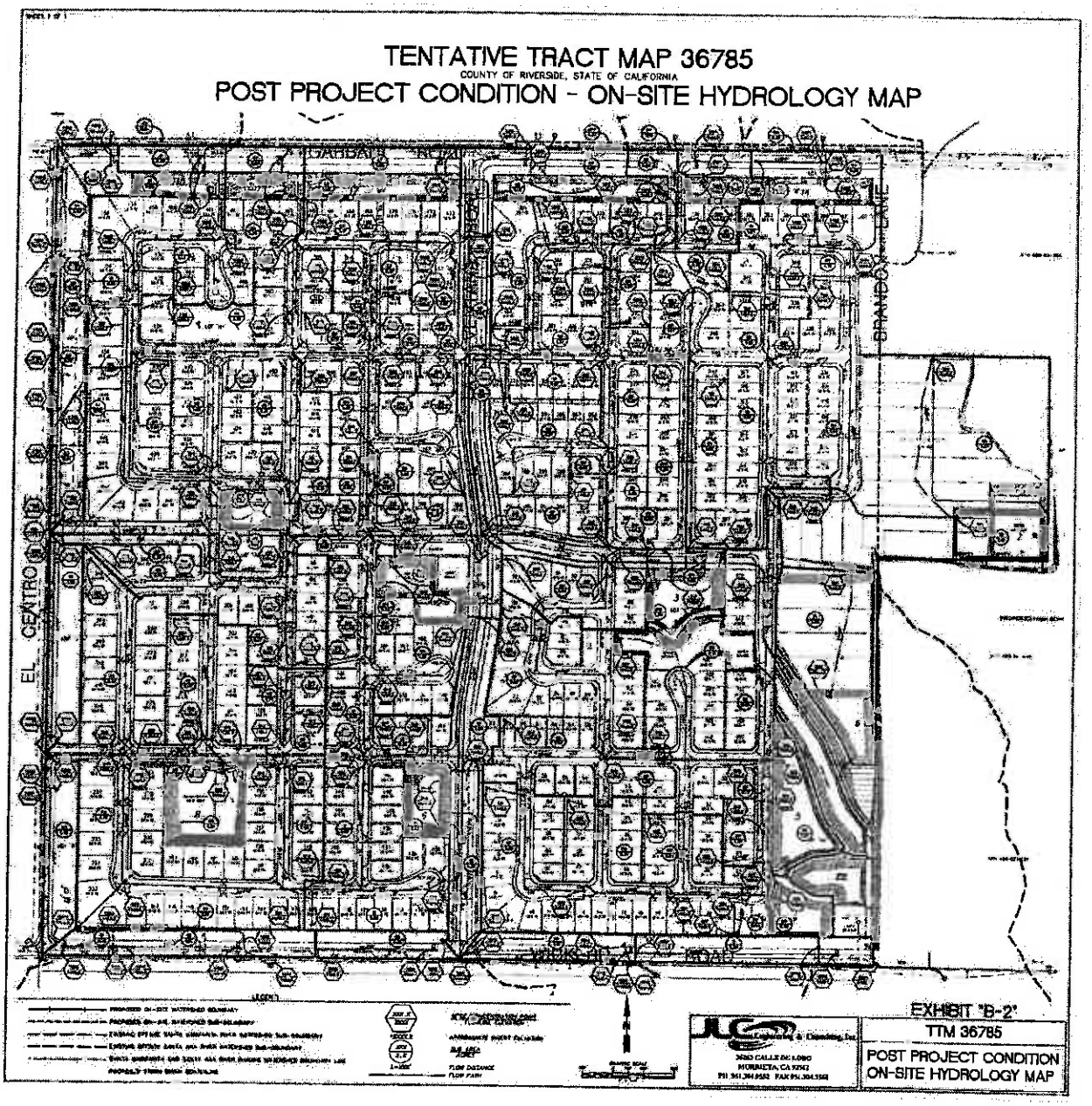
EXHIBIT "B-1"

JLC Engineering & Consulting, Inc.
36363 CALLE DE LOBO
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3569

TTM 36875

POST-PROJECT CONDITION OFFSITE HYDROLOGY MAP

Item 2.


TENTATIVE TRACT MAP 36785
COUNTY OF RIVERSIDE, STATE OF CALIFORNIA
POST PROJECT CONDITION - ON-SITE HYDROLOGY MAP
EL CENTRO AVE
BRANDON LANE
EXHIBIT "B-2"
TTM 36785
POST PROJECT CONDITION
ON-SITE HYDROLOGY MAP

Post-Project Flow Rate

Offsite Node 610-611	15.6
Offsite Node 609	27.3
Offsite Node 607	12.8
Offsite Node 604	2.9
Offsite Node 602-605	22
Onsite Node 409	28.3
Onsite Node 2004	5.2
Onsite Node 513	42.9
Onsite Node 602	12.8
Onsite Node 317	38.3
Onsite Node 225	44.1
Onsite node 118	42.6
Onsite Node 1709	2.5
Total Post-Project	**297.3**

A

Item 5a.

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 06/11/15 File:ARAPON100.out

TRACT MAP 36785
POST-PROJECT ON-SITE HYDROLOGY FOR AREA A
100-YEAR STORM EVENT
FILENAME: ARAPON100.RRV

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

English (in-lb) Units used in input data file

Program License Serial Number 6269

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation = 0.500(In.)
100 year, 1 hour precipitation = 1.500(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.500(In/Hr)
Slope of intensity duration curve = 0.5500

++

Process from Point/Station 101.000 to Point/Station 102.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 997.000(Ft.)
Top (of initial area) elevation = 1469.800(Ft.)
Bottom (of initial area) elevation = 1454.100(Ft.)
Difference in elevation = 15.700(Ft.)
Slope = 0.01575 s(percent)= 1.57
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 14.161 min.
Rainfall intensity = 3.319(In/Hr) for a 100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.835
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.790
Decimal fraction soil group D = 0.210
RI index for soil(AMC 2) = 70.30
Pervious area fraction = 0.500; Impervious fraction = 0.500
Initial subarea runoff = 8.726(CFS)
Total initial stream area = 3.150(Ac.)
Pervious area fraction = 0.500

++

Process from Point/Station 102.000 to Point/Station 105.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1453.100(Ft.)
Downstream point/station elevation = 1445.000(Ft.)
Pipe length = 47.00(Ft.) Manning's N = 0.013

```
No. of pipes = 1  Required pipe flow  =     8.726(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     8.726(CFS)
Normal flow depth in pipe =     6.63(In.)
Flow top width inside pipe =    11.93(In.)
Critical depth could not be calculated.
Pipe flow velocity =     19.61(Ft/s)
Travel time through pipe =     0.04 min.
Time of concentration (TC) =     14.20 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      105.000
**** CONFLUENCE OF MAIN STREAMS ****
--------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      3.150(Ac.)
Runoff from this stream =      8.726(CFS)
Time of concentration =    14.20 min.
Rainfall intensity =     3.314(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** INITIAL AREA EVALUATION ****
--------------------------------------------------------------------------------
Initial area flow distance =    601.000(Ft.)
Top (of initial area) elevation =   1465.700(Ft.)
Bottom (of initial area) elevation =   1458.300(Ft.)
Difference in elevation =     7.400(Ft.)
Slope =    0.01231  s(percent)=       1.23
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    12.149 min.
Rainfall intensity =      3.611(In/Hr) for a    100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.836
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      5.705(CFS)
Total initial stream area =       1.890(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
--------------------------------------------------------------------------------
Upstream point/station elevation =   1455.300(Ft.)
Downstream point/station elevation =   1445.000(Ft.)
Pipe length  =    47.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.705(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     5.705(CFS)
Normal flow depth in pipe =     5.74(In.)
Flow top width inside pipe =     8.65(In.)
Critical depth could not be calculated.
Pipe flow velocity =     19.17(Ft/s)
Travel time through pipe =     0.04 min.
Time of concentration (TC) =     12.19 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** CONFLUENCE OF MAIN STREAMS ****
--------------------------------------------------------------------------------
```

```
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.890(Ac.)
Runoff from this stream =      5.705(CFS)
Time of concentration =   12.19 min.
Rainfall intensity =     3.604(In/Hr)
Summary of stream data:

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


1         8.726     14.20                3.314
2         5.705     12.19                3.604
Largest stream flow has longer time of concentration
Qp =      8.726 + sum of
          Qb          Ia/Ib
           5.705 *    0.919 =      5.245
Qp =     13.971

Total of 2 main streams to confluence:
Flow rates before confluence point:
       8.726       5.705
Area of streams before confluence:
        3.150       1.890


Results of confluence:
Total flow rate =     13.971(CFS)
Time of concentration =    14.201 min.
Effective stream area after confluence  =      5.040(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      118.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1445.000(Ft.)
Downstream point/station elevation =  1444.000(Ft.)
Pipe length  =    22.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    13.971(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    13.971(CFS)
Normal flow depth in pipe =   10.30(In.)
Flow top width inside pipe =   17.81(In.)
Critical Depth =   16.57(In.)
Pipe flow velocity =     13.37(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =    14.23 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      118.000
**** CONFLUENCE OF MAIN STREAMS ****
----------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      5.040(Ac.)
Runoff from this stream =     13.971(CFS)
Time of concentration =   14.23 min.
Rainfall intensity =     3.310(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      107.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------------
Initial area flow distance =   571.000(Ft.)
Top (of initial area) elevation =  1472.700(Ft.)
Bottom (of initial area) elevation =  1451.100(Ft.)
```

```
Difference in elevation =    21.600(Ft.)
Slope =    0.03783  s(percent)=       3.78
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.509 min.
Rainfall intensity =      4.131(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.843
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.343(CFS)
Total initial stream area =        0.960(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      118.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1451.100(Ft.)
Downstream point/station elevation =  1444.000(Ft.)
Pipe length  =   207.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.343(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.343(CFS)
Normal flow depth in pipe =    6.05(In.)
Flow top width inside pipe =   12.00(In.)
Critical Depth =    9.38(In.)
Pipe flow velocity =      8.43(Ft/s)
Travel time through pipe =    0.41 min.
Time of concentration (TC) =     9.92 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      118.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.960(Ac.)
Runoff from this stream =      3.343(CFS)
Time of concentration =    9.92 min.
Rainfall intensity =     4.037(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      110.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   965.000(Ft.)
Top (of initial area) elevation =  1466.500(Ft.)
Bottom (of initial area) elevation =  1451.900(Ft.)
Difference in elevation =    14.600(Ft.)
Slope =    0.01513  s(percent)=       1.51
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.090 min.
Rainfall intensity =      3.328(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.831
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      5.616(CFS)
Total initial stream area =        2.030(Ac.)
```

```
Pervious area fraction = 0.500

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      110.000
**** CONFLUENCE OF MINOR STREAMS ****
--------------------------------------------------------------------------------
Along Main Stream number: 3 in normal stream number 1
Stream flow area =      2.030(Ac.)
Runoff from this stream =      5.616(CFS)
Time of concentration =   14.09 min.
Rainfall intensity =     3.328(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      110.000
**** INITIAL AREA EVALUATION ****
--------------------------------------------------------------------------------
Initial area flow distance =   719.000(Ft.)
Top (of initial area) elevation =  1463.100(Ft.)
Bottom (of initial area) elevation =  1451.900(Ft.)
Difference in elevation =    11.200(Ft.)
Slope =    0.01558  s(percent)=       1.56
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.453 min.
Rainfall intensity =      3.562(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.835
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      6.396(CFS)
Total initial stream area =       2.150(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      110.000
**** CONFLUENCE OF MINOR STREAMS ****
--------------------------------------------------------------------------------
Along Main Stream number: 3 in normal stream number 2
Stream flow area =      2.150(Ac.)
Runoff from this stream =      6.396(CFS)
Time of concentration =   12.45 min.
Rainfall intensity =     3.562(In/Hr)
Summary of stream data:

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


1         5.616     14.09                  3.328
2         6.396     12.45                  3.562
Largest stream flow has longer or shorter time of concentration
Qp =      6.396 + sum of
          Qa          Tb/Ta
           5.616 *    0.884 =      4.964
Qp =     11.360

Total of 2 streams to confluence:
Flow rates before confluence point:
       5.616       6.396
Area of streams before confluence:
       2.030       2.150
Results of confluence:
Total flow rate =     11.360(CFS)
Time of concentration =    12.453 min.
Effective stream area after confluence =      4.180(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      111.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
-------------------------------------------------------------------------------
Top of street segment elevation =  1451.900(Ft.)
End of street segment elevation =  1451.300(Ft.)
Length of street segment   =    70.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.000(Ft.)
Slope from gutter to grade break (v/hz) =    0.020
Slope from grade break to crown (v/hz)  =    0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =    0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     11.781(CFS)
Depth of flow =   0.419(Ft.), Average velocity =   2.596(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  14.636(Ft.)
Flow velocity =   2.60(Ft/s)
Travel time =    0.45 min.     TC =   12.90  min.
 Adding area flow to street
USER INPUT of soil data for subarea
Runoff Coefficient = 0.834
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      3.493(In/Hr) for a   100.0 year storm
Subarea runoff =      0.903(CFS) for      0.310(Ac.)
Total runoff =     12.263(CFS)        Total area =       4.490(Ac.)
Street flow at end of street =     12.263(CFS)
Half street flow at end of street =      6.132(CFS)
Depth of flow =   0.424(Ft.), Average velocity =   2.621(Ft/s)
Flow width (from curb towards crown)=  14.874(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      111.000 to Point/Station      118.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
-------------------------------------------------------------------------------
Upstream point/station elevation =  1448.300(Ft.)
Downstream point/station elevation =  1444.000(Ft.)
Pipe length  =    58.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.263(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    12.263(CFS)
Normal flow depth in pipe =    9.22(In.)
Flow top width inside pipe =   14.60(In.)
Critical depth could not be calculated.
Pipe flow velocity =     15.49(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    12.96 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      111.000 to Point/Station      118.000
**** CONFLUENCE OF MAIN STREAMS ****
-------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      4.490(Ac.)
```

```
Runoff from this stream =      12.263(CFS)
Time of concentration =   12.96 min.
Rainfall intensity =      3.484(In/Hr)
Program is now starting with Main Stream No. 4


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      112.000 to Point/Station      113.000
**** INITIAL AREA EVALUATION ****

----------------------------------------------------------------------------
Initial area flow distance =   173.000(Ft.)
Top (of initial area) elevation =  1453.400(Ft.)
Bottom (of initial area) elevation =  1451.300(Ft.)
Difference in elevation =      2.100(Ft.)
Slope =    0.01214  s(percent)=       1.21
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.404 min.
Rainfall intensity =      4.741(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.850
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.101(CFS)
Total initial stream area =        0.770(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      113.000 to Point/Station      115.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

----------------------------------------------------------------------------
Upstream point/station elevation =  1448.300(Ft.)
Downstream point/station elevation =  1447.300(Ft.)
Pipe length  =   150.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.101(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.101(CFS)
Normal flow depth in pipe =   10.80(In.)
Flow top width inside pipe =    7.20(In.)
Critical Depth =    9.06(In.)
Pipe flow velocity =       4.16(Ft/s)
Travel time through pipe =    0.60 min.
Time of concentration (TC) =     8.00 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      113.000 to Point/Station      115.000
**** CONFLUENCE OF MINOR STREAMS ****

----------------------------------------------------------------------------
Along Main Stream number: 4 in normal stream number 1
Stream flow area =      0.770(Ac.)
Runoff from this stream =      3.101(CFS)
Time of concentration =    8.00 min.
Rainfall intensity =     4.542(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      114.000 to Point/Station      115.000
**** INITIAL AREA EVALUATION ****

----------------------------------------------------------------------------
Initial area flow distance =   708.000(Ft.)
Top (of initial area) elevation =  1467.200(Ft.)
Bottom (of initial area) elevation =  1451.300(Ft.)
Difference in elevation =    15.900(Ft.)
Slope =    0.02246  s(percent)=       2.25
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.503 min.
```

```
Rainfall intensity =      3.721(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.841
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.780
Decimal fraction soil group D = 0.220
RI index for soil(AMC 2)  =  70.30
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      8.635(CFS)
Total initial stream area =       2.760(Ac.)
Pervious area fraction = 0.500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Process from Point/Station      114.000 to Point/Station      115.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 4 in normal stream number 2
Stream flow area =      2.760(Ac.)
Runoff from this stream =      8.635(CFS)
Time of concentration =   11.50 min.
Rainfall intensity =     3.721(In/Hr)
Summary of stream data:

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


1        3.101      8.00                  4.542
2        8.635     11.50                  3.721
Largest stream flow has longer time of concentration
Qp =      8.635 + sum of
          Qb          Ia/Ib
           3.101 *     0.819 =      2.541
Qp =     11.175

Total of 2 streams to confluence:
Flow rates before confluence point:
       3.101       8.635
Area of streams before confluence:
       0.770       2.760
Results of confluence:
Total flow rate =     11.175(CFS)
Time of concentration =    11.503 min.
Effective stream area after confluence =      3.530(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      115.000 to Point/Station      117.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1447.300(Ft.)
Downstream point/station elevation =  1446.300(Ft.)
Pipe length  =   150.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.175(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    11.175(CFS)
Normal flow depth in pipe =   15.07(In.)
Flow top width inside pipe =   18.91(In.)
Critical Depth =   14.95(In.)
Pipe flow velocity =      6.05(Ft/s)
Travel time through pipe =    0.41 min.
Time of concentration (TC) =    11.92 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      115.000 to Point/Station      117.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 4 in normal stream number 1
```

```
Stream flow area =       3.530(Ac.)
Runoff from this stream =      11.175(CFS)
Time of concentration =   11.92 min.
Rainfall intensity =     3.649(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      116.000 to Point/Station      117.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance =    271.000(Ft.)
Top (of initial area) elevation =  1454.100(Ft.)
Bottom (of initial area) elevation =  1451.300(Ft.)
Difference in elevation =      2.800(Ft.)
Slope =    0.01033  s(percent)=       1.03
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =     9.150 min.
Rainfall intensity =      4.220(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.848
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.740
Decimal fraction soil group D = 0.260
RI index for soil(AMC 2)  =  70.60
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.649(CFS)
Total initial stream area =        1.020(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      116.000 to Point/Station      117.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 4 in normal stream number 2
Stream flow area =      1.020(Ac.)
Runoff from this stream =      3.649(CFS)
Time of concentration =    9.15 min.
Rainfall intensity =     4.220(In/Hr)
Summary of stream data:

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


1       11.175      11.92                  3.649
2        3.649       9.15                  4.220
Largest stream flow has longer time of concentration
Qp =     11.175 + sum of
          Qb          Ia/Ib
           3.649 *    0.865 =      3.155
Qp =     14.331

Total of 2 streams to confluence:
Flow rates before confluence point:
      11.175       3.649
Area of streams before confluence:
        3.530       1.020
Results of confluence:
Total flow rate =     14.331(CFS)
Time of concentration =    11.916 min.
Effective stream area after confluence =      4.550(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      117.000 to Point/Station      118.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =  1446.300(Ft.)
Downstream point/station elevation =  1444.000(Ft.)
```

```
Pipe length  =   178.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    14.331(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    14.331(CFS)
Normal flow depth in pipe =   14.16(In.)
Flow top width inside pipe =   19.69(In.)
Critical Depth =   16.87(In.)
Pipe flow velocity =      8.31(Ft/s)
Travel time through pipe =    0.36 min.
Time of concentration (TC) =    12.27 min.


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Process from Point/Station      117.000 to Point/Station      118.000
**** CONFLUENCE OF MAIN STREAMS ****
--------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 4
Stream flow area =      4.550(Ac.)
Runoff from this stream =     14.331(CFS)
Time of concentration =   12.27 min.
Rainfall intensity =     3.591(In/Hr)
Summary of stream data:

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


1        13.971      14.23                3.310
2         3.343       9.92                4.037
3        12.263      12.96                3.484
4        14.331      12.27                3.591
Largest stream flow has longer or shorter time of concentration
Qp =     14.331 + sum of
          Qa           Tb/Ta
          13.971 *     0.863 =     12.050
          Qb          Ia/Ib
           3.343 *     0.889 =      2.974
          Qa           Tb/Ta
          12.263 *     0.947 =     11.609
Qp =     40.964

Total of 4 main streams to confluence:
Flow rates before confluence point:
      13.971       3.343      12.263      14.331
Area of streams before confluence:
        5.040        0.960        4.490        4.550


Results of confluence:
Total flow rate =      40.964(CFS)
Time of concentration =    12.273 min.
Effective stream area after confluence  =      15.040(Ac.)


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Process from Point/Station      118.000 to Point/Station      118.000
**** SUBAREA FLOW ADDITION ****
--------------------------------------------------------------------------------
USER INPUT of soil data for subarea
Runoff Coefficient = 0.771
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    12.27 min.
Rainfall intensity =      3.591(In/Hr) for a    100.0 year storm
Subarea runoff =       1.634(CFS) for       0.590(Ac.)
Total runoff =      42.598(CFS)        Total area =       15.630(Ac.)
```

End of computations, total study area = 15.63 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.519
Area averaged RI index number = 69.6

Item 5.b.

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 06/11/15 File:ARBPON100.out

TRACT MAP 36785
POST-PROJECT ON-SITE HYDROLOGY FOR AREA B
100-YEAR STORM EVENT
FILENAME: ARBPON100.RRV

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

English (in-lb) Units used in input data file

Program License Serial Number 6269

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation = 0.500(In.)
100 year, 1 hour precipitation = 1.500(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.500(In/Hr)
Slope of intensity duration curve = 0.5500

++

Process from Point/Station 201.000 to Point/Station 202.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 158.000(Ft.)
Top (of initial area) elevation = 1456.400(Ft.)
Bottom (of initial area) elevation = 1454.700(Ft.)
Difference in elevation = 1.700(Ft.)
Slope = 0.01076 s(percent)= 1.08
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 7.314 min.
Rainfall intensity = 4.773(In/Hr) for a 100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.850
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 69.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Initial subarea runoff = 3.002(CFS)
Total initial stream area = 0.740(Ac.)
Pervious area fraction = 0.500

++

Process from Point/Station 202.000 to Point/Station 204.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1451.700(Ft.)
Downstream point/station elevation = 1451.100(Ft.)
Pipe length = 130.00(Ft.) Manning's N = 0.013

```
No. of pipes = 1  Required pipe flow  =     3.002(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.002(CFS)
Normal flow depth in pipe =    9.11(In.)
Flow top width inside pipe =   14.65(In.)
Critical Depth =    8.36(In.)
Pipe flow velocity =      3.85(Ft/s)
Travel time through pipe =    0.56 min.
Time of concentration (TC) =     7.88 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      204.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      0.740(Ac.)
Runoff from this stream =      3.002(CFS)
Time of concentration =    7.88 min.
Rainfall intensity =     4.582(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      204.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   166.000(Ft.)
Top (of initial area) elevation =  1456.500(Ft.)
Bottom (of initial area) elevation =  1454.500(Ft.)
Difference in elevation =     2.000(Ft.)
Slope =    0.01205  s(percent)=       1.20
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.293 min.
Rainfall intensity =      4.780(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.850
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.128(CFS)
Total initial stream area =       0.770(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      204.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.770(Ac.)
Runoff from this stream =      3.128(CFS)
Time of concentration =    7.29 min.
Rainfall intensity =     4.780(In/Hr)
Summary of stream data:

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


1        3.002       7.88                4.582
2        3.128       7.29                4.780
Largest stream flow has longer or shorter time of concentration
Qp =      3.128 + sum of
          Qa          Tb/Ta
           3.002 *    0.926 =      2.779
```

```
Qp =      5.907

Total of 2 main streams to confluence:
Flow rates before confluence point:
      3.002       3.128
Area of streams before confluence:
       0.740       0.770


Results of confluence:
Total flow rate =      5.907(CFS)
Time of concentration =     7.293 min.
Effective stream area after confluence  =      1.510(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      207.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1451.000(Ft.)
Downstream point/station elevation =  1449.400(Ft.)
Pipe length  =   130.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.907(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     5.907(CFS)
Normal flow depth in pipe =   10.38(In.)
Flow top width inside pipe =   13.85(In.)
Critical Depth =   11.80(In.)
Pipe flow velocity =      6.52(Ft/s)
Travel time through pipe =    0.33 min.
Time of concentration (TC) =     7.63 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      207.000
**** CONFLUENCE OF MAIN STREAMS ****
----------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      1.510(Ac.)
Runoff from this stream =      5.907(CFS)
Time of concentration =     7.63 min.
Rainfall intensity =     4.665(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      205.000 to Point/Station      206.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------------
Initial area flow distance =   344.000(Ft.)
Top (of initial area) elevation =  1459.900(Ft.)
Bottom (of initial area) elevation =  1454.400(Ft.)
Difference in elevation =     5.500(Ft.)
Slope =    0.01599  s(percent)=       1.60
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.224 min.
Rainfall intensity =      4.201(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.844
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.659(CFS)
Total initial stream area =       0.750(Ac.)
Pervious area fraction = 0.500
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      206.000 to Point/Station      207.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1452.400(Ft.)
Downstream point/station elevation =  1449.400(Ft.)
Pipe length  =    73.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.659(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.659(CFS)
Normal flow depth in pipe =    6.05(In.)
Flow top width inside pipe =    8.45(In.)
Critical Depth =    8.44(In.)
Pipe flow velocity =      8.42(Ft/s)
Travel time through pipe =    0.14 min.
Time of concentration (TC) =     9.37 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      206.000 to Point/Station      207.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.750(Ac.)
Runoff from this stream =      2.659(CFS)
Time of concentration =    9.37 min.
Rainfall intensity =     4.165(In/Hr)
Summary of stream data:

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


1         5.907       7.63                4.665
2         2.659       9.37                4.165
Largest stream flow has longer or shorter time of concentration
Qp =      5.907 + sum of
          Qa           Tb/Ta
           2.659 *     0.814 =      2.164
Qp =      8.072

Total of 2 main streams to confluence:
Flow rates before confluence point:
       5.907       2.659
Area of streams before confluence:
        1.510       0.750


Results of confluence:
Total flow rate =      8.072(CFS)
Time of concentration =     7.625 min.
Effective stream area after confluence  =      2.260(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      207.000 to Point/Station      211.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1449.400(Ft.)
Downstream point/station elevation =  1447.100(Ft.)
Pipe length  =   360.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.072(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     8.072(CFS)
Normal flow depth in pipe =   14.16(In.)
Flow top width inside pipe =   14.75(In.)
Critical Depth =   13.20(In.)
Pipe flow velocity =      5.41(Ft/s)
Travel time through pipe =    1.11 min.
Time of concentration (TC) =     8.73 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      207.000 to Point/Station      211.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      2.260(Ac.)
Runoff from this stream =      8.072(CFS)
Time of concentration =    8.73 min.
Rainfall intensity =     4.329(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      208.000 to Point/Station      210.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   590.000(Ft.)
Top (of initial area) elevation =  1460.000(Ft.)
Bottom (of initial area) elevation =  1451.300(Ft.)
Difference in elevation =     8.700(Ft.)
Slope =    0.01475  s(percent)=       1.47
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.632 min.
Rainfall intensity =      3.698(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.837
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      4.180(CFS)
Total initial stream area =       1.350(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      208.000 to Point/Station      210.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.350(Ac.)
Runoff from this stream =      4.180(CFS)
Time of concentration =   11.63 min.
Rainfall intensity =     3.698(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      209.000 to Point/Station      210.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   393.000(Ft.)
Top (of initial area) elevation =  1455.300(Ft.)
Bottom (of initial area) elevation =  1451.300(Ft.)
Difference in elevation =     4.000(Ft.)
Slope =    0.01018  s(percent)=       1.02
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.648 min.
Rainfall intensity =      3.882(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.840
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
```

```
Initial subarea runoff =       6.456(CFS)
Total initial stream area =        1.980(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      209.000 to Point/Station      210.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.980(Ac.)
Runoff from this stream =       6.456(CFS)
Time of concentration =   10.65 min.
Rainfall intensity =     3.882(In/Hr)
Summary of stream data:

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


1         4.180      11.63                  3.698
2         6.456      10.65                  3.882
Largest stream flow has longer or shorter time of concentration
Qp =       6.456 + sum of
           Qa           Tb/Ta
            4.180 *     0.915 =       3.826
Qp =      10.282

Total of 2 streams to confluence:
Flow rates before confluence point:
       4.180        6.456
Area of streams before confluence:
        1.350        1.980
Results of confluence:
Total flow rate =      10.282(CFS)
Time of concentration =     10.648 min.
Effective stream area after confluence =       3.330(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      210.000 to Point/Station      211.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
Top of street segment elevation =  1451.300(Ft.)
End of street segment elevation =  1450.100(Ft.)
Length of street segment   =     98.000(Ft.)
Height of curb above gutter flowline  =     6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.000(Ft.)
Slope from gutter to grade break (v/hz) =    0.020
Slope from grade break to crown (v/hz)  =    0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =    0.020
Gutter width =    2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      11.193(CFS)
Depth of flow =    0.393(Ft.), Average velocity =   2.937(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  13.337(Ft.)
Flow velocity =    2.94(Ft/s)
Travel time =    0.56 min.      TC =   11.20  min.
 Adding area flow to street
USER INPUT of soil data for subarea
Runoff Coefficient = 0.838
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
```

```
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      3.775(In/Hr) for a   100.0 year storm
Subarea runoff =      1.867(CFS) for      0.590(Ac.)
Total runoff =     12.149(CFS)        Total area =       3.920(Ac.)
Street flow at end of street =     12.149(CFS)
Half street flow at end of street =      6.074(CFS)
Depth of flow =   0.402(Ft.), Average velocity =   2.995(Ft/s)
Flow width (from curb towards crown)=  13.789(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      210.000 to Point/Station      211.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      3.920(Ac.)
Runoff from this stream =     12.149(CFS)
Time of concentration =   11.20 min.
Rainfall intensity =     3.775(In/Hr)
Summary of stream data:

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


1         8.072       8.73                4.329
2        12.149      11.20                3.775
Largest stream flow has longer time of concentration
Qp =     12.149 + sum of
           Qb          Ia/Ib
           8.072 *     0.872 =       7.038
Qp =     19.187

Total of 2 main streams to confluence:
Flow rates before confluence point:
       8.072       12.149
Area of streams before confluence:
        2.260        3.920


Results of confluence:
Total flow rate =     19.187(CFS)
Time of concentration =     11.205 min.
Effective stream area after confluence  =      6.180(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      211.000 to Point/Station      213.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1447.100(Ft.)
Downstream point/station elevation =  1446.000(Ft.)
Pipe length  =   158.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    19.187(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    19.187(CFS)
Normal flow depth in pipe =   20.06(In.)
Flow top width inside pipe =   17.78(In.)
Critical Depth =   18.90(In.)
Pipe flow velocity =      6.84(Ft/s)
Travel time through pipe =    0.38 min.
Time of concentration (TC) =    11.59 min.


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Process from Point/Station      211.000 to Point/Station      213.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
```

```
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      6.180(Ac.)
Runoff from this stream =      19.187(CFS)
Time of concentration =    11.59 min.
Rainfall intensity =     3.705(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      212.000 to Point/Station      213.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =     80.000(Ft.)
Top (of initial area) elevation =  1450.800(Ft.)
Bottom (of initial area) elevation =  1450.000(Ft.)
Difference in elevation =      0.800(Ft.)
Slope =    0.01000  s(percent)=       1.00
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =     5.653 min.
Rainfall intensity =      5.499(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.856
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      0.706(CFS)
Total initial stream area =        0.150(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      212.000 to Point/Station      213.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.150(Ac.)
Runoff from this stream =      0.706(CFS)
Time of concentration =    5.65 min.
Rainfall intensity =     5.499(In/Hr)
Summary of stream data:

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


1       19.187     11.59                3.705
2        0.706      5.65                5.499
Largest stream flow has longer time of concentration
Qp =     19.187 + sum of
          Qb         Ia/Ib
           0.706 *    0.674 =      0.476
Qp =     19.663

Total of 2 main streams to confluence:
Flow rates before confluence point:
      19.187       0.706
Area of streams before confluence:
        6.180        0.150


Results of confluence:
Total flow rate =     19.663(CFS)
Time of concentration =    11.589 min.
Effective stream area after confluence  =       6.330(Ac.)
```

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Process from Point/Station      213.000 to Point/Station      216.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1446.000(Ft.)
Downstream point/station elevation =  1445.500(Ft.)
Pipe length  =    40.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    19.663(CFS)
Nearest computed pipe diameter  =    24.00(In.)
Calculated individual pipe flow  =    19.663(CFS)
Normal flow depth in pipe =   15.91(In.)
Flow top width inside pipe =   22.69(In.)
Critical Depth =   19.13(In.)
Pipe flow velocity =      8.90(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =    11.66 min.


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Process from Point/Station      213.000 to Point/Station      216.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      6.330(Ac.)
Runoff from this stream =     19.663(CFS)
Time of concentration =   11.66 min.
Rainfall intensity =    3.692(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      214.000 to Point/Station      215.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   240.000(Ft.)
Top (of initial area) elevation =  1452.400(Ft.)
Bottom (of initial area) elevation =  1452.000(Ft.)
Difference in elevation =     0.400(Ft.)
Slope =    0.00167  s(percent)=       0.17
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.554 min.
Rainfall intensity =      3.546(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.835
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.813(CFS)
Total initial stream area =       0.950(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      215.000 to Point/Station      216.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1449.000(Ft.)
Downstream point/station elevation =  1445.500(Ft.)
Pipe length  =    99.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.813(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.813(CFS)
Normal flow depth in pipe =    6.70(In.)
Flow top width inside pipe =    7.85(In.)
Critical Depth =    8.54(In.)
Pipe flow velocity =      7.97(Ft/s)
Travel time through pipe =    0.21 min.
```

```
Time of concentration (TC) =     12.76 min.


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Process from Point/Station       215.000 to Point/Station       216.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =       0.950(Ac.)
Runoff from this stream =       2.813(CFS)
Time of concentration =    12.76 min.
Rainfall intensity =      3.514(In/Hr)
Summary of stream data:

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


1        19.663      11.66                3.692
2         2.813      12.76                3.514
Largest stream flow has longer or shorter time of concentration
Qp =      19.663 + sum of
           Qa           Tb/Ta
            2.813 *     0.914 =       2.571
Qp =      22.234

Total of 2 main streams to confluence:
Flow rates before confluence point:
      19.663       2.813
Area of streams before confluence:
        6.330        0.950


Results of confluence:
Total flow rate =      22.234(CFS)
Time of concentration =     11.664 min.
Effective stream area after confluence  =       7.280(Ac.)


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Process from Point/Station       216.000 to Point/Station       225.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1445.500(Ft.)
Downstream point/station elevation =  1440.000(Ft.)
Pipe length  =   180.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    22.234(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    22.234(CFS)
Normal flow depth in pipe =   14.25(In.)
Flow top width inside pipe =   19.62(In.)
Critical Depth =   19.70(In.)
Pipe flow velocity =     12.80(Ft/s)
Travel time through pipe =    0.23 min.
Time of concentration (TC) =    11.90 min.


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Process from Point/Station       216.000 to Point/Station       225.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =       7.280(Ac.)
Runoff from this stream =      22.234(CFS)
Time of concentration =    11.90 min.
Rainfall intensity =      3.652(In/Hr)
Program is now starting with Main Stream No. 2
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      217.000 to Point/Station      218.000
**** INITIAL AREA EVALUATION ****

------------------------------------------------------------------------------
Initial area flow distance =   451.000(Ft.)
Top (of initial area) elevation =  1451.200(Ft.)
Bottom (of initial area) elevation =  1447.000(Ft.)
Difference in elevation =      4.200(Ft.)
Slope =    0.00931  s(percent)=       0.93
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.453 min.
Rainfall intensity =      3.730(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.838
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      6.218(CFS)
Total initial stream area =       1.990(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      218.000 to Point/Station      220.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

------------------------------------------------------------------------------
Upstream point/station elevation =  1444.000(Ft.)
Downstream point/station elevation =  1443.000(Ft.)
Pipe length  =   154.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.218(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.218(CFS)
Normal flow depth in pipe =   11.46(In.)
Flow top width inside pipe =   17.31(In.)
Critical Depth =   11.57(In.)
Pipe flow velocity =      5.23(Ft/s)
Travel time through pipe =    0.49 min.
Time of concentration (TC) =    11.94 min.


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Process from Point/Station      218.000 to Point/Station      220.000
**** CONFLUENCE OF MINOR STREAMS ****

------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.990(Ac.)
Runoff from this stream =      6.218(CFS)
Time of concentration =   11.94 min.
Rainfall intensity =     3.645(In/Hr)


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Process from Point/Station      219.000 to Point/Station      220.000
**** INITIAL AREA EVALUATION ****

------------------------------------------------------------------------------
Initial area flow distance =   180.000(Ft.)
Top (of initial area) elevation =  1449.800(Ft.)
Bottom (of initial area) elevation =  1447.000(Ft.)
Difference in elevation =     2.800(Ft.)
Slope =    0.01556  s(percent)=       1.56
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.158 min.
Rainfall intensity =      4.830(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.850
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
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Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.245(CFS)
Total initial stream area =        0.790(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      219.000 to Point/Station      220.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.790(Ac.)
Runoff from this stream =      3.245(CFS)
Time of concentration =    7.16 min.
Rainfall intensity =     4.830(In/Hr)
Summary of stream data:

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


1         6.218      11.94                   3.645
2         3.245       7.16                   4.830
Largest stream flow has longer time of concentration
Qp =       6.218 + sum of
          Qb          Ia/Ib
           3.245 *     0.755 =       2.448
Qp =       8.666

Total of 2 streams to confluence:
Flow rates before confluence point:
       6.218       3.245
Area of streams before confluence:
       1.990       0.790
Results of confluence:
Total flow rate =       8.666(CFS)
Time of concentration =     11.943 min.
Effective stream area after confluence =       2.780(Ac.)


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Process from Point/Station      220.000 to Point/Station      222.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1443.000(Ft.)
Downstream point/station elevation =  1442.000(Ft.)
Pipe length  =   140.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.666(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     8.666(CFS)
Normal flow depth in pipe =   14.39(In.)
Flow top width inside pipe =   14.41(In.)
Critical Depth =   13.68(In.)
Pipe flow velocity =      5.73(Ft/s)
Travel time through pipe =     0.41 min.
Time of concentration (TC) =     12.35 min.


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Process from Point/Station      220.000 to Point/Station      222.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      2.780(Ac.)
Runoff from this stream =      8.666(CFS)
Time of concentration =   12.35 min.
Rainfall intensity =     3.578(In/Hr)
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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      221.000 to Point/Station      222.000
**** INITIAL AREA EVALUATION ****

-------------------------------------------------------------------------------
Initial area flow distance =   231.000(Ft.)
Top (of initial area) elevation =  1450.300(Ft.)
Bottom (of initial area) elevation =  1447.000(Ft.)
Difference in elevation =     3.300(Ft.)
Slope =    0.01429  s(percent)=       1.43
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.045 min.
Rainfall intensity =      4.529(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.847
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.570(CFS)
Total initial stream area =        0.930(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      221.000 to Point/Station      222.000
**** CONFLUENCE OF MINOR STREAMS ****

-------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.930(Ac.)
Runoff from this stream =      3.570(CFS)
Time of concentration =    8.05 min.
Rainfall intensity =     4.529(In/Hr)
Summary of stream data:

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


1         8.666      12.35                  3.578
2         3.570       8.05                  4.529
Largest stream flow has longer time of concentration
Qp =       8.666 + sum of
          Qb          Ia/Ib
           3.570 *     0.790 =      2.820
Qp =     11.486

Total of 2 streams to confluence:
Flow rates before confluence point:
      8.666       3.570
Area of streams before confluence:
        2.780         0.930
Results of confluence:
Total flow rate =      11.486(CFS)
Time of concentration =    12.351 min.
Effective stream area after confluence =       3.710(Ac.)


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Process from Point/Station      222.000 to Point/Station      225.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

-------------------------------------------------------------------------------
Upstream point/station elevation =  1442.000(Ft.)
Downstream point/station elevation =  1440.000(Ft.)
Pipe length  =   102.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.486(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    11.486(CFS)
Normal flow depth in pipe =   11.96(In.)
Flow top width inside pipe =   17.00(In.)
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Critical Depth =    15.51(In.)
Pipe flow velocity =       9.21(Ft/s)
Travel time through pipe =     0.18 min.
Time of concentration (TC) =     12.54 min.


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Process from Point/Station       222.000 to Point/Station       225.000
**** CONFLUENCE OF MAIN STREAMS ****

--------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =       3.710(Ac.)
Runoff from this stream =      11.486(CFS)
Time of concentration =    12.54 min.
Rainfall intensity =      3.549(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       223.000 to Point/Station       224.000
**** INITIAL AREA EVALUATION ****

--------------------------------------------------------------------------------
Initial area flow distance =    637.000(Ft.)
Top (of initial area) elevation =   1456.500(Ft.)
Bottom (of initial area) elevation =   1446.100(Ft.)
Difference in elevation =     10.400(Ft.)
Slope =     0.01633  s(percent)=        1.63
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    11.753 min.
Rainfall intensity =       3.677(In/Hr) for a    100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.837
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)   =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =       8.432(CFS)
Total initial stream area =         2.740(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station       224.000 to Point/Station       225.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

--------------------------------------------------------------------------------
Upstream point/station elevation =   1443.100(Ft.)
Downstream point/station elevation =   1440.000(Ft.)
Pipe length  =    239.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      8.432(CFS)
Nearest computed pipe diameter  =      18.00(In.)
Calculated individual pipe flow  =      8.432(CFS)
Normal flow depth in pipe =    11.14(In.)
Flow top width inside pipe =    17.48(In.)
Critical Depth =    13.49(In.)
Pipe flow velocity =       7.33(Ft/s)
Travel time through pipe =     0.54 min.
Time of concentration (TC) =     12.30 min.


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Process from Point/Station       224.000 to Point/Station       225.000
**** CONFLUENCE OF MAIN STREAMS ****

--------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =       2.740(Ac.)
Runoff from this stream =       8.432(CFS)
Time of concentration =    12.30 min.
```

```
Rainfall intensity =     3.587(In/Hr)
Summary of stream data:

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


1        22.234      11.90                3.652
2        11.486      12.54                3.549
3         8.432      12.30                3.587
Largest stream flow has longer or shorter time of concentration
Qp =      22.234 + sum of
           Qa          Tb/Ta
           11.486 *    0.949 =      10.902
           Qa          Tb/Ta
            8.432 *    0.968 =       8.160
Qp =      41.296

Total of 3 main streams to confluence:
Flow rates before confluence point:
      22.234      11.486       8.432
Area of streams before confluence:
        7.280       3.710       2.740


Results of confluence:
Total flow rate =      41.296(CFS)
Time of concentration =     11.899 min.
Effective stream area after confluence =      13.730(Ac.)


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Process from Point/Station      225.000 to Point/Station      225.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
USER INPUT of soil data for subarea
Runoff Coefficient = 0.773
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    11.90 min.
Rainfall intensity =      3.652(In/Hr) for a   100.0 year storm
Subarea runoff =      2.796(CFS) for      0.990(Ac.)
Total runoff =     44.092(CFS)       Total area =      14.720(Ac.)
End of computations, total study area =           14.72 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.534
Area averaged RI index number =  69.0
```

C

Item 5. c.

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 06/11/15 File:ARCPON100.out

TRACT MAP 36785
POST-PROJECT ON-SITE HYDROLOGY FOR AREA c
100-YEAR STORM EVENT
FILENAME: ARCPON100.RRV

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

English (in-lb) Units used in input data file

Program License Serial Number 6269

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation = 0.500(In.)
100 year, 1 hour precipitation = 1.500(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.500(In/Hr)
Slope of intensity duration curve = 0.5500

++

Process from Point/Station 301.000 to Point/Station 302.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 434.000(Ft.)
Top (of initial area) elevation = 1458.600(Ft.)
Bottom (of initial area) elevation = 1453.400(Ft.)
Difference in elevation = 5.200(Ft.)
Slope = 0.01198 s(percent)= 1.20
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 10.724 min.
Rainfall intensity = 3.867(In/Hr) for a 100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.840
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 69.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Initial subarea runoff = 3.474(CFS)
Total initial stream area = 1.070(Ac.)
Pervious area fraction = 0.500

++

Process from Point/Station 302.000 to Point/Station 304.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

Top of street segment elevation = 1458.600(Ft.)
End of street segment elevation = 1446.000(Ft.)
Length of street segment = 290.000(Ft.)

```
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      5.128(CFS)
Depth of flow =   0.270(Ft.), Average velocity =   4.019(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   7.150(Ft.)
Flow velocity =   4.02(Ft/s)
Travel time =    1.20 min.     TC =   11.93  min.
 Adding area flow to street
USER INPUT of soil data for subarea
Runoff Coefficient = 0.837
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      3.647(In/Hr) for a   100.0 year storm
Subarea runoff =      3.204(CFS) for      1.050(Ac.)
Total runoff =      6.678(CFS)        Total area =       2.120(Ac.)
Street flow at end of street =      6.678(CFS)
Half street flow at end of street =      3.339(CFS)
Depth of flow =   0.289(Ft.), Average velocity =   4.250(Ft/s)
Flow width (from curb towards crown)=   8.118(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      304.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      2.120(Ac.)
Runoff from this stream =      6.678(CFS)
Time of concentration =   11.93 min.
Rainfall intensity =     3.647(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      303.000 to Point/Station      304.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   455.000(Ft.)
Top (of initial area) elevation =  1451.500(Ft.)
Bottom (of initial area) elevation =  1446.000(Ft.)
Difference in elevation =     5.500(Ft.)
Slope =    0.01209  s(percent)=       1.21
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.909 min.
Rainfall intensity =      3.831(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.839
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      7.297(CFS)
```

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Total initial stream area =        2.270(Ac.)
Pervious area fraction = 0.500

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Process from Point/Station      303.000 to Point/Station      304.000
**** CONFLUENCE OF MAIN STREAMS ****
--------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.270(Ac.)
Runoff from this stream =      7.297(CFS)
Time of concentration =   10.91 min.
Rainfall intensity =     3.831(In/Hr)
Summary of stream data:

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


1        6.678     11.93               3.647
2        7.297     10.91               3.831
Largest stream flow has longer or shorter time of concentration
Qp =      7.297 + sum of
          Qa          Tb/Ta
           6.678 *    0.915 =      6.108
Qp =     13.405

Total of 2 main streams to confluence:
Flow rates before confluence point:
       6.678       7.297
Area of streams before confluence:
        2.120       2.270


Results of confluence:
Total flow rate =     13.405(CFS)
Time of concentration =    10.909 min.
Effective stream area after confluence  =      4.390(Ac.)

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Process from Point/Station      304.000 to Point/Station      305.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
--------------------------------------------------------------------------------
Top of street segment elevation =  1446.000(Ft.)
End of street segment elevation =  1444.400(Ft.)
Length of street segment  =   434.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     14.093(CFS)
Depth of flow =   0.496(Ft.), Average velocity =   1.994(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   1.99(Ft/s)
Travel time =    3.63 min.     TC =   14.54  min.
 Adding area flow to street
USER INPUT of soil data for subarea
Runoff Coefficient = 0.830
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Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      3.271(In/Hr) for a   100.0 year storm
Subarea runoff =      1.222(CFS) for      0.450(Ac.)
Total runoff =     14.628(CFS)       Total area =       4.840(Ac.)
Street flow at end of street =     14.628(CFS)
Half street flow at end of street =      7.314(CFS)
Depth of flow =   0.500(Ft.), Average velocity =   2.023(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    0.02(Ft.)
Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station      305.000 to Point/Station      308.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1441.400(Ft.)
Downstream point/station elevation =  1438.000(Ft.)
Pipe length  =   315.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    14.628(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    14.628(CFS)
Normal flow depth in pipe =   15.42(In.)
Flow top width inside pipe =   18.55(In.)
Critical Depth =   17.01(In.)
Pipe flow velocity =      7.73(Ft/s)
Travel time through pipe =  0.68 min.
Time of concentration (TC) =    15.22 min.


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Process from Point/Station      305.000 to Point/Station      308.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      4.840(Ac.)
Runoff from this stream =     14.628(CFS)
Time of concentration =   15.22 min.
Rainfall intensity =     3.190(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      306.000 to Point/Station      307.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   532.000(Ft.)
Top (of initial area) elevation =  1448.000(Ft.)
Bottom (of initial area) elevation =  1441.200(Ft.)
Difference in elevation =     6.800(Ft.)
Slope =    0.01278  s(percent)=       1.28
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.484 min.
Rainfall intensity =      3.724(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.838
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      7.923(CFS)
Total initial stream area =       2.540(Ac.)
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Pervious area fraction = 0.500

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Process from Point/Station      307.000 to Point/Station      308.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1439.200(Ft.)
Downstream point/station elevation =  1438.000(Ft.)
Pipe length  =   112.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.923(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     7.923(CFS)
Normal flow depth in pipe =   11.40(In.)
Flow top width inside pipe =   17.35(In.)
Critical Depth =   13.09(In.)
Pipe flow velocity =      6.71(Ft/s)
Travel time through pipe =    0.28 min.
Time of concentration (TC) =    11.76 min.


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Process from Point/Station      307.000 to Point/Station      308.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.540(Ac.)
Runoff from this stream =      7.923(CFS)
Time of concentration =   11.76 min.
Rainfall intensity =     3.675(In/Hr)
Summary of stream data:

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


1        14.628      15.22                3.190
2         7.923      11.76                3.675
Largest stream flow has longer time of concentration
Qp =     14.628 + sum of
           Qb          Ia/Ib
            7.923 *     0.868 =      6.878
Qp =     21.505

Total of 2 main streams to confluence:
Flow rates before confluence point:
      14.628       7.923
Area of streams before confluence:
        4.840        2.540


Results of confluence:
Total flow rate =     21.505(CFS)
Time of concentration =    15.215 min.
Effective stream area after confluence  =      7.380(Ac.)


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Process from Point/Station      308.000 to Point/Station      314.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1438.000(Ft.)
Downstream point/station elevation =  1437.000(Ft.)
Pipe length  =    90.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    21.505(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    21.505(CFS)
Normal flow depth in pipe =   17.84(In.)
Flow top width inside pipe =   20.97(In.)
Critical Depth =   19.89(In.)
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Pipe flow velocity =      8.59(Ft/s)
Travel time through pipe =    0.17 min.
Time of concentration (TC) =    15.39 min.


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Process from Point/Station      308.000 to Point/Station      314.000
**** CONFLUENCE OF MAIN STREAMS ****
----------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      7.380(Ac.)
Runoff from this stream =     21.505(CFS)
Time of concentration =   15.39 min.
Rainfall intensity =     3.170(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      309.000 to Point/Station      310.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------------
Initial area flow distance =   767.000(Ft.)
Top (of initial area) elevation =  1458.600(Ft.)
Bottom (of initial area) elevation =  1447.000(Ft.)
Difference in elevation =    11.600(Ft.)
Slope =    0.01512  s(percent)=       1.51
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.854 min.
Rainfall intensity =      3.500(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.834
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.037(CFS)
Total initial stream area =       1.040(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      310.000 to Point/Station      312.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
Top of street segment elevation =  1447.000(Ft.)
End of street segment elevation =  1442.200(Ft.)
Length of street segment  =   397.000(Ft.)
Height of curb above gutter flowline  =     6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      4.168(CFS)
Depth of flow =   0.302(Ft.), Average velocity =   2.326(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   8.771(Ft.)
Flow velocity =   2.33(Ft/s)
Travel time =    2.84 min.     TC =   15.70  min.
 Adding area flow to street
USER INPUT of soil data for subarea
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```
Runoff Coefficient = 0.828
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      3.136(In/Hr) for a   100.0 year storm
Subarea runoff =      2.129(CFS) for      0.820(Ac.)
Total runoff =      5.165(CFS)       Total area =       1.860(Ac.)
Street flow at end of street =      5.165(CFS)
Half street flow at end of street =      2.583(CFS)
Depth of flow =   0.320(Ft.), Average velocity =   2.440(Ft/s)
Flow width (from curb towards crown)=   9.652(Ft.)


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Process from Point/Station      310.000 to Point/Station      312.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.860(Ac.)
Runoff from this stream =      5.165(CFS)
Time of concentration =   15.70 min.
Rainfall intensity =     3.136(In/Hr)


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Process from Point/Station      311.000 to Point/Station      312.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------------
Initial area flow distance =   335.000(Ft.)
Top (of initial area) elevation =  1445.900(Ft.)
Bottom (of initial area) elevation =  1442.200(Ft.)
Difference in elevation =     3.700(Ft.)
Slope =    0.01104  s(percent)=       1.10
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.828 min.
Rainfall intensity =      4.057(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.842
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.382(CFS)
Total initial stream area =       0.990(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      311.000 to Point/Station      312.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.990(Ac.)
Runoff from this stream =      3.382(CFS)
Time of concentration =    9.83 min.
Rainfall intensity =     4.057(In/Hr)
Summary of stream data:

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


1         5.165      15.70                  3.136
2         3.382       9.83                  4.057
Largest stream flow has longer time of concentration
Qp =      5.165 + sum of
```

```
          Qb          Ia/Ib
           3.382 *     0.773 =       2.614
Qp =       7.780

Total of 2 streams to confluence:
Flow rates before confluence point:
       5.165       3.382
Area of streams before confluence:
        1.860        0.990
Results of confluence:
Total flow rate =       7.780(CFS)
Time of concentration =     15.699 min.
Effective stream area after confluence =       2.850(Ac.)


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Process from Point/Station       312.000 to Point/Station       314.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
Top of street segment elevation =  1442.200(Ft.)
End of street segment elevation =  1441.000(Ft.)
Length of street segment  =   131.000(Ft.)
Height of curb above gutter flowline  =     6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.000(Ft.)
Slope from gutter to grade break (v/hz) =    0.020
Slope from grade break to crown (v/hz)  =    0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =    0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =       8.530(CFS)
Depth of flow =   0.380(Ft.), Average velocity =   2.465(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  12.663(Ft.)
Flow velocity =   2.47(Ft/s)
Travel time =    0.89 min.     TC =   16.58  min.
 Adding area flow to street
USER INPUT of soil data for subarea
Runoff Coefficient = 0.826
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      3.043(In/Hr) for a   100.0 year storm
Subarea runoff =      1.382(CFS) for      0.550(Ac.)
Total runoff =      9.162(CFS)        Total area =       3.400(Ac.)
Street flow at end of street =      9.162(CFS)
Half street flow at end of street =      4.581(CFS)
Depth of flow =   0.387(Ft.), Average velocity =   2.507(Ft/s)
Flow width (from curb towards crown)=  13.040(Ft.)


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Process from Point/Station       312.000 to Point/Station       314.000
**** CONFLUENCE OF MAIN STREAMS ****
----------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      3.400(Ac.)
Runoff from this stream =      9.162(CFS)
Time of concentration =   16.58 min.
Rainfall intensity =     3.043(In/Hr)
Program is now starting with Main Stream No. 3
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Process from Point/Station      313.000 to Point/Station      314.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance =   835.000(Ft.)
Top (of initial area) elevation =  1456.100(Ft.)
Bottom (of initial area) elevation =  1441.000(Ft.)
Difference in elevation =    15.100(Ft.)
Slope =    0.01808  s(percent)=       1.81
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.832 min.
Rainfall intensity =      3.504(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.834
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      5.700(CFS)
Total initial stream area =        1.950(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      313.000 to Point/Station      314.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      1.950(Ac.)
Runoff from this stream =      5.700(CFS)
Time of concentration =  12.83 min.
Rainfall intensity =     3.504(In/Hr)
Summary of stream data:

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


1       21.505     15.39                3.170
2        9.162     16.58                3.043
3        5.700     12.83                3.504
Largest stream flow has longer or shorter time of concentration
Qp =     21.505 + sum of
          Qa          Tb/Ta
           9.162 *    0.928 =      8.502
          Qb          Ia/Ib
           5.700 *    0.905 =      5.158
Qp =     35.165

Total of 3 main streams to confluence:
Flow rates before confluence point:
      21.505       9.162       5.700
Area of streams before confluence:
        7.380       3.400       1.950


Results of confluence:
Total flow rate =     35.165(CFS)
Time of concentration =    15.390 min.
Effective stream area after confluence  =     12.730(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      314.000 to Point/Station      317.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =  1437.000(Ft.)
```

```
Downstream point/station elevation =  1433.000(Ft.)
Pipe length  =   180.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    35.165(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    35.165(CFS)
Normal flow depth in pipe =   20.72(In.)
Flow top width inside pipe =   16.49(In.)
Critical depth could not be calculated.
Pipe flow velocity =     12.19(Ft/s)
Travel time through pipe =    0.25 min.
Time of concentration (TC) =    15.64 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      314.000 to Point/Station      317.000
**** CONFLUENCE OF MAIN STREAMS ****
--------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     12.730(Ac.)
Runoff from this stream =     35.165(CFS)
Time of concentration =   15.64 min.
Rainfall intensity =     3.143(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      315.000 to Point/Station      316.000
**** INITIAL AREA EVALUATION ****
--------------------------------------------------------------------------------
Initial area flow distance =   111.000(Ft.)
Top (of initial area) elevation =  1442.300(Ft.)
Bottom (of initial area) elevation =  1441.000(Ft.)
Difference in elevation =     1.300(Ft.)
Slope =    0.01171  s(percent)=       1.17
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.244 min.
Rainfall intensity =      5.207(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.854
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      0.889(CFS)
Total initial stream area =        0.200(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      316.000 to Point/Station      317.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
--------------------------------------------------------------------------------
Upstream point/station elevation =  1437.000(Ft.)
Downstream point/station elevation =  1433.000(Ft.)
Pipe length  =    90.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.889(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.889(CFS)
Normal flow depth in pipe =    3.88(In.)
Flow top width inside pipe =    5.73(In.)
Critical Depth =    5.51(In.)
Pipe flow velocity =      6.62(Ft/s)
Travel time through pipe =    0.23 min.
Time of concentration (TC) =     6.47 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      316.000 to Point/Station      317.000
```

```
**** CONFLUENCE OF MAIN STREAMS ****
--------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.200(Ac.)
Runoff from this stream =      0.889(CFS)
Time of concentration =    6.47 min.
Rainfall intensity =     5.106(In/Hr)
Summary of stream data:

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


1        35.165     15.64                3.143
2         0.889      6.47                5.106
Largest stream flow has longer time of concentration
Qp =     35.165 + sum of
          Qb         Ia/Ib
           0.889 *    0.616 =      0.547
Qp =     35.712

Total of 2 main streams to confluence:
Flow rates before confluence point:
      35.165       0.889
Area of streams before confluence:
       12.730       0.200


Results of confluence:
Total flow rate =     35.712(CFS)
Time of concentration =    15.636 min.
Effective stream area after confluence  =     12.930(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      317.000 to Point/Station      317.000
**** SUBAREA FLOW ADDITION ****
--------------------------------------------------------------------------------
USER INPUT of soil data for subarea
Runoff Coefficient = 0.770
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.590
Decimal fraction soil group D = 0.410
RI index for soil(AMC 2)  =  71.50
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    15.64 min.
Rainfall intensity =      3.143(In/Hr) for a   100.0 year storm
Subarea runoff =      2.637(CFS) for      1.090(Ac.)
Total runoff =     38.349(CFS)        Total area =      14.020(Ac.)
End of computations, total study area =          14.02 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.539
Area averaged RI index number =  69.2
```

Item 5.d

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 06/12/15 File:ARDPON100.out

TRACT MAP 36785
POST-PROJECT ON-SITE HYDROLOGY FOR AREA D
100-YEAR STORM EVENT
FILENAME: ARDPON100.RRV

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

English (in-lb) Units used in input data file

Program License Serial Number 6269

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation = 0.500(In.)
100 year, 1 hour precipitation = 1.500(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.500(In/Hr)
Slope of intensity duration curve = 0.5500

++

Process from Point/Station 401.000 to Point/Station 402.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 620.000(Ft.)
Top (of initial area) elevation = 1448.100(Ft.)
Bottom (of initial area) elevation = 1438.200(Ft.)
Difference in elevation = 9.900(Ft.)
Slope = 0.01597 s(percent)= 1.60
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 11.678 min.
Rainfall intensity = 3.690(In/Hr) for a 100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.841
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.730
Decimal fraction soil group D = 0.270
RI index for soil(AMC 2) = 70.60
Pervious area fraction = 0.500; Impervious fraction = 0.500
Initial subarea runoff = 9.404(CFS)
Total initial stream area = 3.030(Ac.)
Pervious area fraction = 0.500

++

Process from Point/Station 402.000 to Point/Station 404.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1435.000(Ft.)
Downstream point/station elevation = 1430.000(Ft.)
Pipe length = 244.00(Ft.) Manning's N = 0.013

```
No. of pipes = 1  Required pipe flow  =     9.404(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     9.404(CFS)
Normal flow depth in pipe =   10.31(In.)
Flow top width inside pipe =   17.81(In.)
Critical Depth =   14.22(In.)
Pipe flow velocity =      8.98(Ft/s)
Travel time through pipe =    0.45 min.
Time of concentration (TC) =    12.13 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      404.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      3.030(Ac.)
Runoff from this stream =      9.404(CFS)
Time of concentration =   12.13 min.
Rainfall intensity =     3.614(In/Hr)
Program is now starting with Main Stream No. 2

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      403.000 to Point/Station      404.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance =   581.000(Ft.)
Top (of initial area) elevation =  1443.000(Ft.)
Bottom (of initial area) elevation =  1433.900(Ft.)
Difference in elevation =     9.100(Ft.)
Slope =    0.01566  s(percent)=       1.57
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.423 min.
Rainfall intensity =      3.735(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.843
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.640
Decimal fraction soil group D = 0.360
RI index for soil(AMC 2)  =  71.10
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      8.533(CFS)
Total initial stream area =       2.710(Ac.)
Pervious area fraction = 0.500

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      403.000 to Point/Station      404.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.710(Ac.)
Runoff from this stream =      8.533(CFS)
Time of concentration =   11.42 min.
Rainfall intensity =     3.735(In/Hr)
Summary of stream data:

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


1        9.404     12.13               3.614
2        8.533     11.42               3.735
Largest stream flow has longer time of concentration
Qp =      9.404 + sum of
          Qb         Ia/Ib
          8.533 *    0.967 =      8.255
```

```
Qp =     17.659

Total of 2 main streams to confluence:
Flow rates before confluence point:
      9.404       8.533
Area of streams before confluence:
      3.030       2.710


Results of confluence:
Total flow rate =     17.659(CFS)
Time of concentration =    12.131 min.
Effective stream area after confluence  =      5.740(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      404.000 to Point/Station      406.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1430.000(Ft.)
Downstream point/station elevation =  1427.500(Ft.)
Pipe length  =   244.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    17.659(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    17.659(CFS)
Normal flow depth in pipe =   15.82(In.)
Flow top width inside pipe =   22.75(In.)
Critical Depth =   18.17(In.)
Pipe flow velocity =      8.04(Ft/s)
Travel time through pipe =    0.51 min.
Time of concentration (TC) =    12.64 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      404.000 to Point/Station      406.000
**** CONFLUENCE OF MAIN STREAMS ****
----------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      5.740(Ac.)
Runoff from this stream =     17.659(CFS)
Time of concentration =   12.64 min.
Rainfall intensity =     3.533(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      405.000 to Point/Station      406.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------------
Initial area flow distance =   533.000(Ft.)
Top (of initial area) elevation =  1437.600(Ft.)
Bottom (of initial area) elevation =  1430.000(Ft.)
Difference in elevation =     7.600(Ft.)
Slope =    0.01426  s(percent)=       1.43
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.244 min.
Rainfall intensity =      3.768(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.839
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.960
Decimal fraction soil group D = 0.040
RI index for soil(AMC 2)  =  69.20
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      7.079(CFS)
Total initial stream area =        2.240(Ac.)
Pervious area fraction = 0.500
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      405.000 to Point/Station      406.000
**** CONFLUENCE OF MAIN STREAMS ****
--------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.240(Ac.)
Runoff from this stream =      7.079(CFS)
Time of concentration =   11.24 min.
Rainfall intensity =     3.768(In/Hr)
Summary of stream data:

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


1       17.659     12.64                3.533
2        7.079     11.24                3.768
Largest stream flow has longer time of concentration
Qp =     17.659 + sum of
          Qb         Ia/Ib
           7.079 *    0.938 =      6.638
Qp =     24.298

Total of 2 main streams to confluence:
Flow rates before confluence point:
      17.659       7.079
Area of streams before confluence:
        5.740        2.240


Results of confluence:
Total flow rate =     24.298(CFS)
Time of concentration =    12.637 min.
Effective stream area after confluence  =      7.980(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      406.000 to Point/Station      408.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
--------------------------------------------------------------------------------
Upstream point/station elevation =  1427.500(Ft.)
Downstream point/station elevation =  1425.000(Ft.)
Pipe length  =    81.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    24.298(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    24.298(CFS)
Normal flow depth in pipe =   15.19(In.)
Flow top width inside pipe =   18.79(In.)
Critical depth could not be calculated.
Pipe flow velocity =     13.04(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =    12.74 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      406.000 to Point/Station      408.000
**** CONFLUENCE OF MAIN STREAMS ****
--------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      7.980(Ac.)
Runoff from this stream =     24.298(CFS)
Time of concentration =   12.74 min.
Rainfall intensity =     3.517(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      407.000 to Point/Station      408.000
**** INITIAL AREA EVALUATION ****
```

```
Initial area flow distance =   188.000(Ft.)
Top (of initial area) elevation =  1431.800(Ft.)
Bottom (of initial area) elevation =  1429.000(Ft.)
Difference in elevation =     2.800(Ft.)
Slope =    0.01489  s(percent)=       1.49
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.347 min.
Rainfall intensity =      4.761(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.850
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.589(CFS)
Total initial stream area =        0.640(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      407.000 to Point/Station      408.000
**** CONFLUENCE OF MAIN STREAMS ****
--------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.640(Ac.)
Runoff from this stream =      2.589(CFS)
Time of concentration =    7.35 min.
Rainfall intensity =     4.761(In/Hr)
Summary of stream data:

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


1       24.298     12.74               3.517
2        2.589      7.35               4.761
Largest stream flow has longer time of concentration
Qp =     24.298 + sum of
          Qb         Ia/Ib
           2.589 *    0.739 =      1.913
Qp =     26.211

Total of 2 main streams to confluence:
Flow rates before confluence point:
      24.298       2.589
Area of streams before confluence:
        7.980       0.640


Results of confluence:
Total flow rate =     26.211(CFS)
Time of concentration =    12.740 min.
Effective stream area after confluence  =      8.620(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      408.000 to Point/Station      409.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
--------------------------------------------------------------------------------
Upstream point/station elevation =  1425.000(Ft.)
Downstream point/station elevation =  1422.000(Ft.)
Pipe length  =    45.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    26.211(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    26.211(CFS)
Normal flow depth in pipe =   14.25(In.)
Flow top width inside pipe =   14.62(In.)
```

```
Critical depth could not be calculated.
Pipe flow velocity =      17.49(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    12.78 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       409.000 to Point/Station       409.000
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
USER INPUT of soil data for subarea
Runoff Coefficient = 0.794
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.190
Decimal fraction soil group D = 0.810
RI index for soil(AMC 2)  =  73.90
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    12.78 min.
Rainfall intensity =      3.511(In/Hr) for a   100.0 year storm
Subarea runoff =      2.062(CFS) for      0.740(Ac.)
Total runoff =     28.272(CFS)        Total area =       9.360(Ac.)
End of computations, total study area =            9.36 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.540
Area averaged RI index number =  70.6
```

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Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 06/12/15 File:ARFPON100.out

TRACT MAP 36785
POST-PROJECT ON-SITE HYDROLOGY FOR AREA F
100-YEAR STORM EVENT
FILENAME: ARFPON100.RRV

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

English (in-lb) Units used in input data file

Program License Serial Number 6269

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation = 0.500(In.)
100 year, 1 hour precipitation = 1.500(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.500(In/Hr)
Slope of intensity duration curve = 0.5500

++

Process from Point/Station 601.000 to Point/Station 602.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 401.000(Ft.)
Top (of initial area) elevation = 1445.000(Ft.)
Bottom (of initial area) elevation = 1430.000(Ft.)
Difference in elevation = 15.000(Ft.)
Slope = 0.03741 s(percent)= 3.74
TC = k(0.417)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 8.847 min.
Rainfall intensity = 4.299(In/Hr) for a 100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.841
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.640
Decimal fraction soil group D = 0.360
RI index for soil(AMC 2) = 71.10
Pervious area fraction = 0.590; Impervious fraction = 0.410
Initial subarea runoff = 12.791(CFS)
Total initial stream area = 3.540(Ac.)
Pervious area fraction = 0.590
End of computations, total study area = 3.54 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.590
Area averaged RI index number = 71.1

Item 5.e.

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 06/12/15 File:AREPON100.out

TRACT MAP 36785
POST-PROJECT ON-SITE HYDROLOGY FOR AREA E
100-YEAR STORM EVENT
FILENAME: AREPON100.RRV

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

English (in-lb) Units used in input data file

Program License Serial Number 6269

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation = 0.500(In.)
100 year, 1 hour precipitation = 1.500(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.500(In/Hr)
Slope of intensity duration curve = 0.5500

++
Process from Point/Station 501.000 to Point/Station 502.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 708.000(Ft.)
Top (of initial area) elevation = 1446.700(Ft.)
Bottom (of initial area) elevation = 1438.500(Ft.)
Difference in elevation = 8.200(Ft.)
Slope = 0.01158 s(percent)= 1.16
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 13.132 min.
Rainfall intensity = 3.459(In/Hr) for a 100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.834
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 69.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Initial subarea runoff = 11.160(CFS)
Total initial stream area = 3.870(Ac.)
Pervious area fraction = 0.500

++
Process from Point/Station 502.000 to Point/Station 505.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1435.000(Ft.)
Downstream point/station elevation = 1432.000(Ft.)
Pipe length = 265.00(Ft.) Manning's N = 0.013

```
No. of pipes = 1  Required pipe flow  =    11.160(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    11.160(CFS)
Normal flow depth in pipe =   14.72(In.)
Flow top width inside pipe =   13.90(In.)
Critical Depth =   15.33(In.)
Pipe flow velocity =      7.21(Ft/s)
Travel time through pipe =    0.61 min.
Time of concentration (TC) =    13.74 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      502.000 to Point/Station      505.000
**** CONFLUENCE OF MAIN STREAMS ****
----------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      3.870(Ac.)
Runoff from this stream =     11.160(CFS)
Time of concentration =   13.74 min.
Rainfall intensity =     3.374(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      503.000 to Point/Station      504.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------------
Initial area flow distance =   443.000(Ft.)
Top (of initial area) elevation =  1447.800(Ft.)
Bottom (of initial area) elevation =  1434.700(Ft.)
Difference in elevation =    13.100(Ft.)
Slope =    0.02957  s(percent)=       2.96
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.025 min.
Rainfall intensity =      4.252(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.844
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      6.247(CFS)
Total initial stream area =       1.740(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      504.000 to Point/Station      505.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
Top of street segment elevation =  1437.400(Ft.)
End of street segment elevation =  1434.700(Ft.)
Length of street segment  =   196.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      8.069(CFS)
Depth of flow =   0.354(Ft.), Average velocity =   2.844(Ft/s)
```

```
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  11.367(Ft.)
Flow velocity =   2.84(Ft/s)
Travel time =    1.15 min.     TC =   10.17  min.
 Adding area flow to street
USER INPUT of soil data for subarea
Runoff Coefficient = 0.841
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      3.981(In/Hr) for a   100.0 year storm
Subarea runoff =      3.516(CFS) for      1.050(Ac.)
Total runoff =      9.763(CFS)       Total area =       2.790(Ac.)
Street flow at end of street =      9.763(CFS)
Half street flow at end of street =      4.881(CFS)
Depth of flow =   0.373(Ft.), Average velocity =   2.974(Ft/s)
Flow width (from curb towards crown)=  12.307(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      504.000 to Point/Station      505.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.790(Ac.)
Runoff from this stream =      9.763(CFS)
Time of concentration =   10.17 min.
Rainfall intensity =     3.981(In/Hr)
Summary of stream data:

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


1       11.160     13.74               3.374
2        9.763     10.17               3.981
Largest stream flow has longer time of concentration
Qp =     11.160 + sum of
          Qb         Ia/Ib
           9.763 *    0.848 =      8.274
Qp =     19.434

Total of 2 main streams to confluence:
Flow rates before confluence point:
     11.160       9.763
Area of streams before confluence:
       3.870       2.790


Results of confluence:
Total flow rate =     19.434(CFS)
Time of concentration =    13.744 min.
Effective stream area after confluence  =      6.660(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      505.000 to Point/Station      512.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1432.000(Ft.)
Downstream point/station elevation =  1424.000(Ft.)
Pipe length  =   333.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    19.434(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    19.434(CFS)
Normal flow depth in pipe =   14.09(In.)
Flow top width inside pipe =   19.74(In.)
```

```
Critical Depth =    19.01(In.)
Pipe flow velocity =      11.32(Ft/s)
Travel time through pipe =     0.49 min.
Time of concentration (TC) =     14.23 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       505.000 to Point/Station       512.000
**** CONFLUENCE OF MAIN STREAMS ****
----------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =       6.660(Ac.)
Runoff from this stream =      19.434(CFS)
Time of concentration =    14.23 min.
Rainfall intensity =      3.309(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       506.000 to Point/Station       508.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------------
Initial area flow distance =    855.000(Ft.)
Top (of initial area) elevation =   1445.700(Ft.)
Bottom (of initial area) elevation =   1429.800(Ft.)
Difference in elevation =     15.900(Ft.)
Slope =     0.01860  s(percent)=        1.86
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    12.881 min.
Rainfall intensity =       3.496(In/Hr) for a    100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.839
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.680
Decimal fraction soil group D = 0.320
RI index for soil(AMC 2)  =  70.90
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =       6.894(CFS)
Total initial stream area =        2.350(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       506.000 to Point/Station       508.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =       2.350(Ac.)
Runoff from this stream =       6.894(CFS)
Time of concentration =    12.88 min.
Rainfall intensity =      3.496(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       507.000 to Point/Station       508.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------------
Initial area flow distance =    787.000(Ft.)
Top (of initial area) elevation =   1444.900(Ft.)
Bottom (of initial area) elevation =   1429.800(Ft.)
Difference in elevation =     15.100(Ft.)
Slope =     0.01919  s(percent)=        1.92
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    12.384 min.
Rainfall intensity =       3.573(In/Hr) for a    100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.849
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
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Decimal fraction soil group C = 0.080
Decimal fraction soil group D = 0.920
RI index for soil(AMC 2)  =  74.50
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =     12.771(CFS)
Total initial stream area =        4.210(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      507.000 to Point/Station      508.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      4.210(Ac.)
Runoff from this stream =     12.771(CFS)
Time of concentration =   12.38 min.
Rainfall intensity =     3.573(In/Hr)
Summary of stream data:

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


1         6.894     12.88                  3.496
2        12.771     12.38                  3.573
Largest stream flow has longer or shorter time of concentration
Qp =     12.771 + sum of
          Qa          Tb/Ta
           6.894 *    0.961 =      6.628
Qp =     19.398

Total of 2 streams to confluence:
Flow rates before confluence point:
       6.894      12.771
Area of streams before confluence:
        2.350       4.210
Results of confluence:
Total flow rate =     19.398(CFS)
Time of concentration =    12.384 min.
Effective stream area after confluence =      6.560(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      508.000 to Point/Station      511.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
Top of street segment elevation =  1429.800(Ft.)
End of street segment elevation =  1429.200(Ft.)
Length of street segment  =    57.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     19.650(CFS)
Depth of flow =   0.471(Ft.), Average velocity =   3.176(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  17.223(Ft.)
Flow velocity =   3.18(Ft/s)
Travel time =    0.30 min.     TC =   12.68  min.
 Adding area flow to street
USER INPUT of soil data for subarea
```

```
Runoff Coefficient = 0.836
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.880
Decimal fraction soil group D = 0.120
RI index for soil(AMC 2)  =  69.70
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      3.526(In/Hr) for a   100.0 year storm
Subarea runoff =      0.501(CFS) for      0.170(Ac.)
Total runoff =     19.900(CFS)        Total area =       6.730(Ac.)
Street flow at end of street =     19.900(CFS)
Half street flow at end of street =      9.950(CFS)
Depth of flow =   0.473(Ft.), Average velocity =   3.186(Ft/s)
Flow width (from curb towards crown)=  17.309(Ft.)


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Process from Point/Station      508.000 to Point/Station      511.000
**** CONFLUENCE OF MINOR STREAMS ****

----------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      6.730(Ac.)
Runoff from this stream =     19.900(CFS)
Time of concentration =   12.68 min.
Rainfall intensity =     3.526(In/Hr)


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Process from Point/Station      509.000 to Point/Station      510.000
**** INITIAL AREA EVALUATION ****

----------------------------------------------------------------------------
Initial area flow distance =   787.000(Ft.)
Top (of initial area) elevation =  1432.000(Ft.)
Bottom (of initial area) elevation =  1429.000(Ft.)
Difference in elevation =     3.000(Ft.)
Slope =    0.00381  s(percent)=       0.38
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   17.109 min.
Rainfall intensity =      2.991(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.825
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.990
Decimal fraction soil group D = 0.010
RI index for soil(AMC 2)  =  69.10
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.900(CFS)
Total initial stream area =        0.770(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      510.000 to Point/Station      511.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

----------------------------------------------------------------------------
Upstream point/station elevation =  1426.000(Ft.)
Downstream point/station elevation =  1425.000(Ft.)
Pipe length  =   180.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.900(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     1.900(CFS)
Normal flow depth in pipe =    7.51(In.)
Flow top width inside pipe =   11.61(In.)
Critical Depth =    7.05(In.)
Pipe flow velocity =      3.68(Ft/s)
Travel time through pipe =    0.82 min.
Time of concentration (TC) =    17.93 min.


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Process from Point/Station      510.000 to Point/Station      511.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.770(Ac.)
Runoff from this stream =      1.900(CFS)
Time of concentration =   17.93 min.
Rainfall intensity =     2.915(In/Hr)
Summary of stream data:

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


1        19.900      12.68                  3.526
2         1.900      17.93                  2.915
Largest stream flow has longer or shorter time of concentration
Qp =     19.900 + sum of
           Qa           Tb/Ta
            1.900 *     0.708 =      1.345
Qp =     21.244

Total of 2 streams to confluence:
Flow rates before confluence point:
      19.900        1.900
Area of streams before confluence:
        6.730        0.770
Results of confluence:
Total flow rate =     21.244(CFS)
Time of concentration =    12.683 min.
Effective stream area after confluence =      7.500(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      511.000 to Point/Station      512.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1425.000(Ft.)
Downstream point/station elevation =  1424.000(Ft.)
Pipe length  =    60.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    21.244(CFS)
Nearest computed pipe diameter  =    24.00(In.)
Calculated individual pipe flow  =    21.244(CFS)
Normal flow depth in pipe =   15.19(In.)
Flow top width inside pipe =   23.14(In.)
Critical Depth =   19.80(In.)
Pipe flow velocity =     10.14(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =    12.78 min.


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Process from Point/Station      511.000 to Point/Station      512.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      7.500(Ac.)
Runoff from this stream =     21.244(CFS)
Time of concentration =   12.78 min.
Rainfall intensity =     3.511(In/Hr)
Summary of stream data:

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


1        19.434      14.23                  3.309
2        21.244      12.78                  3.511
Largest stream flow has longer or shorter time of concentration
Qp =     21.244 + sum of
```

```
          Qa          Tb/Ta
          19.434 *    0.898 =      17.450
Qp =      38.694

Total of 2 main streams to confluence:
Flow rates before confluence point:
      19.434      21.244
Area of streams before confluence:
        6.660       7.500


Results of confluence:
Total flow rate =      38.694(CFS)
Time of concentration =     12.782 min.
Effective stream area after confluence  =      14.160(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       512.000 to Point/Station       513.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1424.000(Ft.)
Downstream point/station elevation =  1422.000(Ft.)
Pipe length  =    52.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    38.694(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    38.694(CFS)
Normal flow depth in pipe =   17.34(In.)
Flow top width inside pipe =   21.49(In.)
Critical depth could not be calculated.
Pipe flow velocity =      15.91(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =    12.84 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       513.000 to Point/Station       513.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
USER INPUT of soil data for subarea
Runoff Coefficient = 0.791
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.250
Decimal fraction soil group D = 0.750
RI index for soil(AMC 2)  =  73.50
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    12.84 min.
Rainfall intensity =      3.503(In/Hr) for a   100.0 year storm
Subarea runoff =      4.186(CFS) for      1.510(Ac.)
Total runoff =     42.881(CFS)        Total area =      15.670(Ac.)
End of computations, total study area =           15.67 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.548
Area averaged RI index number =  71.2
```

F
Onsite
Item 5.f.

```
                    Riverside County Rational Hydrology Program

 CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
        Rational Hydrology Study        Date: 07/24/14  File:ARFEX100.out
 ------------------------------------------------------------------------
 100-YEAR RATIONAL METHOD FOR AREA F
 PRE-PROJECT CONDITION
 FN: ARFEX100.RRV

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

  English (in-lb) Units used in input data file

 ------------------------------------------------------------------------


 Program License Serial Number 6269

 ------------------------------------------------------------------------
 Rational Method Hydrology Program based on
 Riverside County Flood Control & Water Conservation District
 1978 hydrology manual

 Storm event (year) =  100.00 Antecedent Moisture Condition = 2

 2 year, 1 hour precipitation =  0.500(In.)
 100 year, 1 hour precipitation =  1.200(In.)

 Storm event year = 100.0
 Calculated rainfall intensity data:
 1 hour intensity =  1.200(In/Hr)
 Slope of intensity duration curve = 0.5500



 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 Process from Point/Station      601.000 to Point/Station      602.000
 **** INITIAL AREA EVALUATION ****
 ------------------------------------------------------------------------
 Initial area flow distance =   583.000(Ft.)
 Top (of initial area) elevation =  1644.000(Ft.)
 Bottom (of initial area) elevation =  1496.000(Ft.)
 Difference in elevation =   148.000(Ft.)
 Slope =    0.25386  s(percent)=      25.39
 TC = k(-1.036)*[(length^3)/(elevation change)]^0.2
 Warning: TC computed to be less than 5 min.; program is assuming the
 time of concentration is 5 minutes.
 Initial area time of concentration =    5.000 min.
 Rainfall intensity =      4.707(In/Hr) for a   100.0 year storm
 USER INPUT of soil data for subarea
 Runoff Coefficient = 0.868
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2)  =  88.00
 Pervious area fraction =  0.970; Impervious fraction =  0.030
 Initial subarea runoff =      7.758(CFS)
 Total initial stream area =       1.900(Ac.)
 Pervious area fraction = 0.970


 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 Process from Point/Station      602.000 to Point/Station      603.000
 **** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
 ------------------------------------------------------------------------
 Top of natural channel elevation =   1496.000(Ft.)
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End of natural channel elevation =   1450.000(Ft.)
Length of natural channel  =  1297.000(Ft.)
Estimated mean flow rate at midpoint of channel =     42.058(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   6.94(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0355
Corrected/adjusted channel slope =  0.0355
Travel time =    3.12 min.     TC =    8.12  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.846
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.700
Decimal fraction soil group D = 0.300
RI index for soil(AMC 2)  =  85.00
Pervious area fraction =  0.980; Impervious fraction =  0.020
Rainfall intensity =     3.606(In/Hr) for a   100.0 year storm
Subarea runoff =     51.248(CFS) for     16.800(Ac.)
Total runoff =     59.007(CFS)       Total area =      18.700(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      603.000 to Point/Station      607.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
Top of natural channel elevation =   1450.000(Ft.)
End of natural channel elevation =   1444.000(Ft.)
Length of natural channel  =   526.000(Ft.)
Estimated mean flow rate at midpoint of channel =     72.891(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.61(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0114
Corrected/adjusted channel slope =  0.0114
Travel time =    1.90 min.     TC =   10.02  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.834
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  84.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =     3.212(In/Hr) for a   100.0 year storm
Subarea runoff =     23.575(CFS) for      8.800(Ac.)
Total runoff =     82.582(CFS)       Total area =      27.500(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      603.000 to Point/Station      607.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     27.500(Ac.)
```

```
Runoff from this stream =      82.582(CFS)
Time of concentration =    10.02 min.
Rainfall intensity =      3.212(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      604.000 to Point/Station      605.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------------
Initial area flow distance =    910.000(Ft.)
Top (of initial area) elevation =  1572.000(Ft.)
Bottom (of initial area) elevation =  1462.000(Ft.)
Difference in elevation =    110.000(Ft.)
Slope =     0.12088  s(percent)=       12.09
TC = k(-0.964)*[(length^3)/(elevation change)]^0.2
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration =     5.000 min.
Rainfall intensity =       4.707(In/Hr) for a    100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.860
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.700
Decimal fraction soil group D = 0.300
RI index for soil(AMC 2)  =  85.10
Pervious area fraction =  0.930; Impervious fraction =  0.070
Initial subarea runoff =      11.745(CFS)
Total initial stream area =         2.900(Ac.)
Pervious area fraction = 0.930


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      605.000 to Point/Station      606.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
Top of natural channel elevation =    1462.000(Ft.)
End of natural channel elevation =    1451.000(Ft.)
Length of natural channel  =    620.000(Ft.)
Estimated mean flow rate at midpoint of channel =      18.630(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =    3.92(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0177
Corrected/adjusted channel slope =  0.0177
Travel time =     2.64 min.     TC =     7.64  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.843
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  84.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =       3.728(In/Hr) for a    100.0 year storm
Subarea runoff =      10.681(CFS) for       3.400(Ac.)
Total runoff =      22.426(CFS)        Total area =       6.300(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      606.000 to Point/Station      607.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
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```
Top of natural channel elevation =   1451.000(Ft.)
End of natural channel elevation =   1444.000(Ft.)
Length of natural channel  =   719.000(Ft.)
Estimated mean flow rate at midpoint of channel =     38.444(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.54(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0097
Corrected/adjusted channel slope =  0.0097
Travel time =    3.38 min.     TC =   11.02  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.834
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.900
Decimal fraction soil group D = 0.100
RI index for soil(AMC 2)  =  84.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      3.047(In/Hr) for a   100.0 year storm
Subarea runoff =     22.863(CFS) for      9.000(Ac.)
Total runoff =     45.289(CFS)       Total area =      15.300(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      606.000 to Point/Station      607.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     15.300(Ac.)
Runoff from this stream =     45.289(CFS)
Time of concentration =   11.02 min.
Rainfall intensity =     3.047(In/Hr)
Summary of stream data:

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


1       82.582      10.02                 3.212
2       45.289      11.02                 3.047
Largest stream flow has longer or shorter time of concentration
Qp =     82.582 + sum of
          Qa          Tb/Ta
          45.289 *    0.909 =     41.158
Qp =    123.740

Total of 2 streams to confluence:
Flow rates before confluence point:
      82.582      45.289
Area of streams before confluence:
       27.500       15.300
Results of confluence:
Total flow rate =    123.740(CFS)
Time of concentration =    10.016 min.
Effective stream area after confluence =     42.800(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      607.000 to Point/Station      608.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
Top of natural channel elevation =   1444.000(Ft.)
End of natural channel elevation =   1418.000(Ft.)
```

```
Length of natural channel  =  2066.000(Ft.)
Estimated mean flow rate at midpoint of channel =    195.150(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   6.53(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0126
Corrected/adjusted channel slope =  0.0126
Travel time =    5.27 min.     TC =   15.29  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.823
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.200
RI index for soil(AMC 2)  =  84.80
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =     2.545(In/Hr) for a   100.0 year storm
Subarea runoff =    103.451(CFS) for     49.400(Ac.)
Total runoff =    227.191(CFS)       Total area =      92.200(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      608.000 to Point/Station      609.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
Top of natural channel elevation =   1418.000(Ft.)
End of natural channel elevation =   1416.000(Ft.)
Length of natural channel  =   730.000(Ft.)
Estimated mean flow rate at midpoint of channel =    246.534(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.28(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0027
Corrected/adjusted channel slope =  0.0027
Travel time =    3.71 min.     TC =   19.00  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.822
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.500
RI index for soil(AMC 2)  =  86.10
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =     2.258(In/Hr) for a   100.0 year storm
Subarea runoff =    29.135(CFS) for     15.700(Ac.)
Total runoff =    256.326(CFS)       Total area =     107.900(Ac.)
End of computations, total study area =          107.90 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.994
Area averaged RI index number =  85.0
```

F

Item 5.g.

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 06/16/15 File:ARFPOST100.out

TRACT 36785
100-YEAR RATIONAL METHOD FOR AREA F
OFFSITE POST PROJECT CONDITION
FN: ARFPOST100.PRV

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

English (in-lb) Units used in input data file

Program License Serial Number 6269

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation = 0.500(In.)
100 year, 1 hour precipitation = 1.500(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.500(In/Hr)
Slope of intensity duration curve = 0.5500

++
Process from Point/Station 601.000 to Point/Station 602.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 606.000(Ft.)
Top (of initial area) elevation = 1648.000(Ft.)
Bottom (of initial area) elevation = 1496.000(Ft.)
Difference in elevation = 152.000(Ft.)
Slope = 0.25083 s(percent)= 25.08
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 9.065 min.
Rainfall intensity = 4.241(In/Hr) for a 100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.866
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 89.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 6.982(CFS)
Total initial stream area = 1.900(Ac.)
Pervious area fraction = 1.000

++
Process from Point/Station 602.000 to Point/Station 605.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1496.000(Ft.)
End of natural channel elevation = 1475.000(Ft.)
Length of natural channel = 337.000(Ft.)

```
Estimated mean flow rate at midpoint of channel =     14.882(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   6.91(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0623
Corrected/adjusted channel slope =  0.0623
Travel time =    0.81 min.     TC =    9.88  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.865
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      4.046(In/Hr) for a   100.0 year storm
Subarea runoff =     15.045(CFS) for      4.300(Ac.)
Total runoff =     22.026(CFS)       Total area =       6.200(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      602.000 to Point/Station      605.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      6.200(Ac.)
Runoff from this stream =     22.026(CFS)
Time of concentration =    9.88 min.
Rainfall intensity =     4.046(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      603.000 to Point/Station      604.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   527.000(Ft.)
Top (of initial area) elevation =  1485.000(Ft.)
Bottom (of initial area) elevation =  1472.000(Ft.)
Difference in elevation =    13.000(Ft.)
Slope =    0.02467  s(percent)=       2.47
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.632 min.
Rainfall intensity =      3.389(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.846
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  86.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      2.866(CFS)
Total initial stream area =        1.000(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      604.000 to Point/Station      605.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1472.000(Ft.)
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Downstream point/station elevation =  1469.000(Ft.)
Pipe length  =   492.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.866(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     2.866(CFS)
Normal flow depth in pipe =    8.10(In.)
Flow top width inside pipe =   14.95(In.)
Critical Depth =    8.17(In.)
Pipe flow velocity =      4.24(Ft/s)
Travel time through pipe =    1.93 min.
Time of concentration (TC) =    15.57 min.


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Process from Point/Station      604.000 to Point/Station      605.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.000(Ac.)
Runoff from this stream =      2.866(CFS)
Time of concentration =   15.57 min.
Rainfall intensity =     3.151(In/Hr)
Summary of stream data:

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


1       22.026      9.88                4.046
2        2.866     15.57                3.151
Largest stream flow has longer or shorter time of concentration
Qp =     22.026 + sum of
          Qa          Tb/Ta
           2.866 *    0.635 =      1.819
Qp =     23.845

Total of 2 main streams to confluence:
Flow rates before confluence point:
      22.026       2.866
Area of streams before confluence:
        6.200        1.000


Results of confluence:
Total flow rate =     23.845(CFS)
Time of concentration =     9.878 min.
Effective stream area after confluence  =      7.200(Ac.)


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Process from Point/Station      605.000 to Point/Station      608.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1469.000(Ft.)
Downstream point/station elevation =  1467.000(Ft.)
Pipe length  =   400.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    23.845(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    23.845(CFS)
Normal flow depth in pipe =   20.72(In.)
Flow top width inside pipe =   27.73(In.)
Critical Depth =   19.95(In.)
Pipe flow velocity =      6.60(Ft/s)
Travel time through pipe =    1.01 min.
Time of concentration (TC) =    10.89 min.


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Process from Point/Station      605.000 to Point/Station      608.000
**** CONFLUENCE OF MAIN STREAMS ****
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The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      7.200(Ac.)
Runoff from this stream =     23.845(CFS)
Time of concentration =   10.89 min.
Rainfall intensity =     3.835(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      606.000 to Point/Station      607.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   642.000(Ft.)
Top (of initial area) elevation =  1580.000(Ft.)
Bottom (of initial area) elevation =  1469.300(Ft.)
Difference in elevation =   110.700(Ft.)
Slope =    0.17243  s(percent)=      17.24
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.999 min.
Rainfall intensity =      4.019(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.861
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.320
Decimal fraction soil group D = 0.680
RI index for soil(AMC 2)  =  88.04
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =     12.805(CFS)
Total initial stream area =        3.700(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      607.000 to Point/Station      608.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1469.300(Ft.)
Downstream point/station elevation =  1467.000(Ft.)
Pipe length  =   137.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.805(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    12.805(CFS)
Normal flow depth in pipe =   13.88(In.)
Flow top width inside pipe =   15.13(In.)
Critical Depth =   16.13(In.)
Pipe flow velocity =      8.76(Ft/s)
Travel time through pipe =    0.26 min.
Time of concentration (TC) =    10.26 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      607.000 to Point/Station      608.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      3.700(Ac.)
Runoff from this stream =     12.805(CFS)
Time of concentration =   10.26 min.
Rainfall intensity =     3.962(In/Hr)
Summary of stream data:

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


1        23.845      10.89                3.835
2        12.805      10.26                3.962
```

```
Largest stream flow has longer time of concentration
Qp =     23.845 + sum of
          Qb          Ia/Ib
          12.805 *     0.968 =      12.393
Qp =     36.238

Total of 2 main streams to confluence:
Flow rates before confluence point:
      23.845      12.805
Area of streams before confluence:
       7.200       3.700


Results of confluence:
Total flow rate =      36.238(CFS)
Time of concentration =     10.889 min.
Effective stream area after confluence =      10.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      608.000 to Point/Station      609.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1467.000(Ft.)
Downstream point/station elevation =  1415.500(Ft.)
Pipe length =  3907.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow =    36.238(CFS)
Nearest computed pipe diameter =     27.00(In.)
Calculated individual pipe flow =    36.238(CFS)
Normal flow depth in pipe =   22.64(In.)
Flow top width inside pipe =   19.87(In.)
Critical Depth =   24.41(In.)
Pipe flow velocity =     10.18(Ft/s)
Travel time through pipe =    6.39 min.
Time of concentration (TC) =    17.28 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      609.000 to Point/Station      609.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.842
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.750
Decimal fraction soil group D = 0.250
RI index for soil(AMC 2)  =  86.75
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    17.28 min.
Rainfall intensity =      2.974(In/Hr) for a   100.0 year storm
Subarea runoff =     27.308(CFS) for     10.900(Ac.)
Total runoff =     63.547(CFS)        Total area =      21.800(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      609.000 to Point/Station      610.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1415.500(Ft.)
Downstream point/station elevation =  1415.000(Ft.)
Pipe length =    52.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow =    63.547(CFS)
Nearest computed pipe diameter =     36.00(In.)
Calculated individual pipe flow =    63.547(CFS)
Normal flow depth in pipe =   28.64(In.)
Flow top width inside pipe =   29.04(In.)
Critical Depth =   30.74(In.)
Pipe flow velocity =     10.54(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    17.36 min.
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      610.000 to Point/Station      611.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
Top of natural channel elevation =   1415.000(Ft.)
End of natural channel elevation =   1414.000(Ft.)
Length of natural channel  =   537.000(Ft.)
Estimated mean flow rate at midpoint of channel =     74.041(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.87(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0019
Corrected/adjusted channel slope =  0.0019
Travel time =    4.78 min.     TC =   22.14  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.835
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.750
Decimal fraction soil group D = 0.250
RI index for soil(AMC 2)  =  86.75
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =     2.595(In/Hr) for a   100.0 year storm
Subarea runoff =     15.594(CFS) for      7.200(Ac.)
Total runoff =     79.141(CFS)       Total area =      29.000(Ac.)
End of computations, total study area =           29.00 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  87.4
```

Q

Item 5.h.

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 06/16/15 File:ARQPON100.out

TRACT MAP 36785
POST-PROJECT ON-SITE HYDROLOGY FOR AREA Q
100-YEAR STORM EVENT
FILENAME: ARQPON100.RRV

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

English (in-lb) Units used in input data file

Program License Serial Number 6269

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation = 0.500(In.)
100 year, 1 hour precipitation = 1.500(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.500(In/Hr)
Slope of intensity duration curve = 0.5500

++
Process from Point/Station 1701.000 to Point/Station 1702.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 292.000(Ft.)
Top (of initial area) elevation = 1477.000(Ft.)
Bottom (of initial area) elevation = 1474.100(Ft.)
Difference in elevation = 2.900(Ft.)
Slope = 0.00993 s(percent)= 0.99
TC = k(0.353)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 8.601 min.
Rainfall intensity = 4.366(In/Hr) for a 100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.867
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 69.00
Pervious area fraction = 0.300; Impervious fraction = 0.700
Initial subarea runoff = 2.840(CFS)
Total initial stream area = 0.750(Ac.)
Pervious area fraction = 0.300

++
Process from Point/Station 1702.000 to Point/Station 1703.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1474.100(Ft.)
Downstream point elevation = 1470.200(Ft.)
Channel length thru subarea = 80.000(Ft.)

```
Channel base width     =    5.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
Manning's 'N'    = 0.025
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =      2.840(CFS)
Depth of flow =   0.151(Ft.), Average velocity =   3.553(Ft/s)
Channel flow top width =    5.603(Ft.)
Flow Velocity =    3.55(Ft/s)
Travel time  =    0.38 min.
Time of concentration =    8.98 min.

Sub-Channel No. 1 Critical depth =      0.209(Ft.)
                  Critical flow top width =      5.836(Ft.)
                  Critical flow velocity=    2.509(Ft/s)
                  Critical flow area =      1.132(Sq.Ft)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1703.000 to Point/Station     1706.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1470.200(Ft.)
Downstream point/station elevation =  1470.000(Ft.)
Pipe length  =   466.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.840(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     2.840(CFS)
Normal flow depth in pipe =   15.09(In.)
Flow top width inside pipe =   18.88(In.)
Critical Depth =    7.33(In.)
Pipe flow velocity =      1.54(Ft/s)
Travel time through pipe =    5.06 min.
Time of concentration (TC) =    14.03 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1703.000 to Point/Station     1706.000
**** CONFLUENCE OF MAIN STREAMS ****
----------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      0.750(Ac.)
Runoff from this stream =      2.840(CFS)
Time of concentration =   14.03 min.
Rainfall intensity =     3.336(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1704.000 to Point/Station     1705.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------------
Initial area flow distance =   196.000(Ft.)
Top (of initial area) elevation =  1477.000(Ft.)
Bottom (of initial area) elevation =  1475.000(Ft.)
Difference in elevation =     2.000(Ft.)
Slope =    0.01020  s(percent)=       1.02
TC = k(0.353)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.293 min.
Rainfall intensity =      4.780(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.870
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.300; Impervious fraction =  0.700
Initial subarea runoff =      3.202(CFS)
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Total initial stream area =        0.770(Ac.)
Pervious area fraction = 0.300

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1705.000 to Point/Station     1706.000
**** IMPROVED CHANNEL TRAVEL TIME ****
------------------------------------------------------------------------------
Upstream point elevation =  1475.000(Ft.)
Downstream point elevation =  1470.000(Ft.)
Channel length thru subarea =    93.000(Ft.)
Channel base width     =    5.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
Manning's 'N'    = 0.025
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =      3.202(CFS)
Depth of flow =   0.157(Ft.), Average velocity =   3.831(Ft/s)
Channel flow top width =    5.629(Ft.)
Flow Velocity =    3.83(Ft/s)
Travel time  =    0.40 min.
Time of concentration =    7.70 min.

Sub-Channel No. 1 Critical depth =      0.227(Ft.)
                  Critical flow top width =      5.906(Ft.)
                  Critical flow velocity=    2.592(Ft/s)
                  Critical flow area =      1.235(Sq.Ft)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1705.000 to Point/Station     1706.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.770(Ac.)
Runoff from this stream =      3.202(CFS)
Time of concentration =    7.70 min.
Rainfall intensity =     4.641(In/Hr)
Summary of stream data:

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


1         2.840      14.03                3.336
2         3.202       7.70                4.641
Largest stream flow has longer or shorter time of concentration
Qp =       3.202 + sum of
           Qa          Tb/Ta
            2.840 *    0.549 =       1.558
Qp =       4.760

Total of 2 main streams to confluence:
Flow rates before confluence point:
       2.840       3.202
Area of streams before confluence:
        0.750        0.770


Results of confluence:
Total flow rate =       4.760(CFS)
Time of concentration =      7.698 min.
Effective stream area after confluence  =       1.520(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1706.000 to Point/Station     1710.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
```

```
Upstream point/station elevation =  1470.000(Ft.)
Downstream point/station elevation =  1467.000(Ft.)
Pipe length =  508.00(Ft.)  Manning's N = 0.013
No. of pipes = 1  Required pipe flow =  4.760(CFS)
Nearest computed pipe diameter =  15.00(In.)
Calculated individual pipe flow =  4.760(CFS)
Normal flow depth in pipe =  11.77(In.)
Flow top width inside pipe =  12.34(In.)
Critical Depth =  10.61(In.)
Pipe flow velocity =  4.61(Ft/s)
Travel time through pipe =  1.84 min.
Time of concentration (TC) =  9.54 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station  1706.000 to Point/Station  1710.000
**** CONFLUENCE OF MAIN STREAMS ****
--------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =  1.520(Ac.)
Runoff from this stream =  4.760(CFS)
Time of concentration =  9.54 min.
Rainfall intensity =  4.125(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station  1707.000 to Point/Station  1708.000
**** INITIAL AREA EVALUATION ****
--------------------------------------------------------------------------------
Initial area flow distance =  223.000(Ft.)
Top (of initial area) elevation =  1476.200(Ft.)
Bottom (of initial area) elevation =  1474.000(Ft.)
Difference in elevation =  2.200(Ft.)
Slope =  0.00987  s(percent)=  0.99
TC = k(0.353)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =  7.732 min.
Rainfall intensity =  4.629(In/Hr) for a  100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.873
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.520
Decimal fraction soil group D = 0.480
RI index for soil(AMC 2)  =  71.90
Pervious area fraction =  0.300; Impervious fraction =  0.700
Initial subarea runoff =  2.464(CFS)
Total initial stream area =  0.610(Ac.)
Pervious area fraction = 0.300


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station  1708.000 to Point/Station  1709.000
**** IMPROVED CHANNEL TRAVEL TIME ****
--------------------------------------------------------------------------------
Upstream point elevation =  1474.000(Ft.)
Downstream point elevation =  1469.000(Ft.)
Channel length thru subarea =  25.000(Ft.)
Channel base width  =  5.000(Ft.)
Slope or 'Z' of left channel bank =  2.000
Slope or 'Z' of right channel bank =  2.000
Manning's 'N'  = 0.025
Maximum depth of channel =  2.000(Ft.)
Flow(q) thru subarea =  2.464(CFS)
Depth of flow =  0.091(Ft.), Average velocity =  5.227(Ft/s)
Channel flow top width =  5.364(Ft.)
Flow Velocity =  5.23(Ft/s)
Travel time =  0.08 min.
Time of concentration =  7.81 min.
```

```
Sub-Channel No. 1 Critical depth =      0.191(Ft.)
                  Critical flow top width =      5.766(Ft.)
                  Critical flow velocity=    2.392(Ft/s)
                  Critical flow area =      1.030(Sq.Ft)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1709.000 to Point/Station     1710.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1469.000(Ft.)
Downstream point/station elevation =  1467.000(Ft.)
Pipe length =    56.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow =     2.464(CFS)
Nearest computed pipe diameter =      9.00(In.)
Calculated individual pipe flow =     2.464(CFS)
Normal flow depth in pipe =    6.02(In.)
Flow top width inside pipe =    8.47(In.)
Critical Depth =    8.28(In.)
Pipe flow velocity =      7.84(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =     7.93 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1709.000 to Point/Station     1710.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.610(Ac.)
Runoff from this stream =      2.464(CFS)
Time of concentration =    7.93 min.
Rainfall intensity =     4.565(In/Hr)
Summary of stream data:

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


1         4.760       9.54                4.125
2         2.464       7.93                4.565
Largest stream flow has longer time of concentration
Qp =      4.760 + sum of
          Qb          Ia/Ib
           2.464 *    0.904 =       2.227
Qp =      6.987

Total of 2 main streams to confluence:
Flow rates before confluence point:
       4.760       2.464
Area of streams before confluence:
       1.520       0.610


Results of confluence:
Total flow rate =      6.987(CFS)
Time of concentration =     9.536 min.
Effective stream area after confluence  =      2.130(Ac.)
End of computations, total study area =           2.13 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.300
Area averaged RI index number =  69.8
```

Item 5.i

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 06/16/15 File:ARTPON100.out

TRACT MAP 36785
POST-PROJECT ON-SITE HYDROLOGY FOR AREA T
100-YEAR STORM EVENT
FILENAME: ARTPON100.RRV

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

English (in-lb) Units used in input data file

Program License Serial Number 6269

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation = 0.500(In.)
100 year, 1 hour precipitation = 1.500(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.500(In/Hr)
Slope of intensity duration curve = 0.5500

++
Process from Point/Station 2001.000 to Point/Station 2002.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 642.000(Ft.)
Top (of initial area) elevation = 1432.500(Ft.)
Bottom (of initial area) elevation = 1425.100(Ft.)
Difference in elevation = 7.400(Ft.)
Slope = 0.01153 s(percent)= 1.15
TC = k(0.353)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 11.441 min.
Rainfall intensity = 3.732(In/Hr) for a 100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.868
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.330
Decimal fraction soil group D = 0.670
RI index for soil(AMC 2) = 73.00
Pervious area fraction = 0.300; Impervious fraction = 0.700
Initial subarea runoff = 5.153(CFS)
Total initial stream area = 1.590(Ac.)
Pervious area fraction = 0.300

++
Process from Point/Station 2002.000 to Point/Station 2003.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1426.100(Ft.)
Downstream point elevation = 1425.100(Ft.)
Channel length thru subarea = 62.000(Ft.)

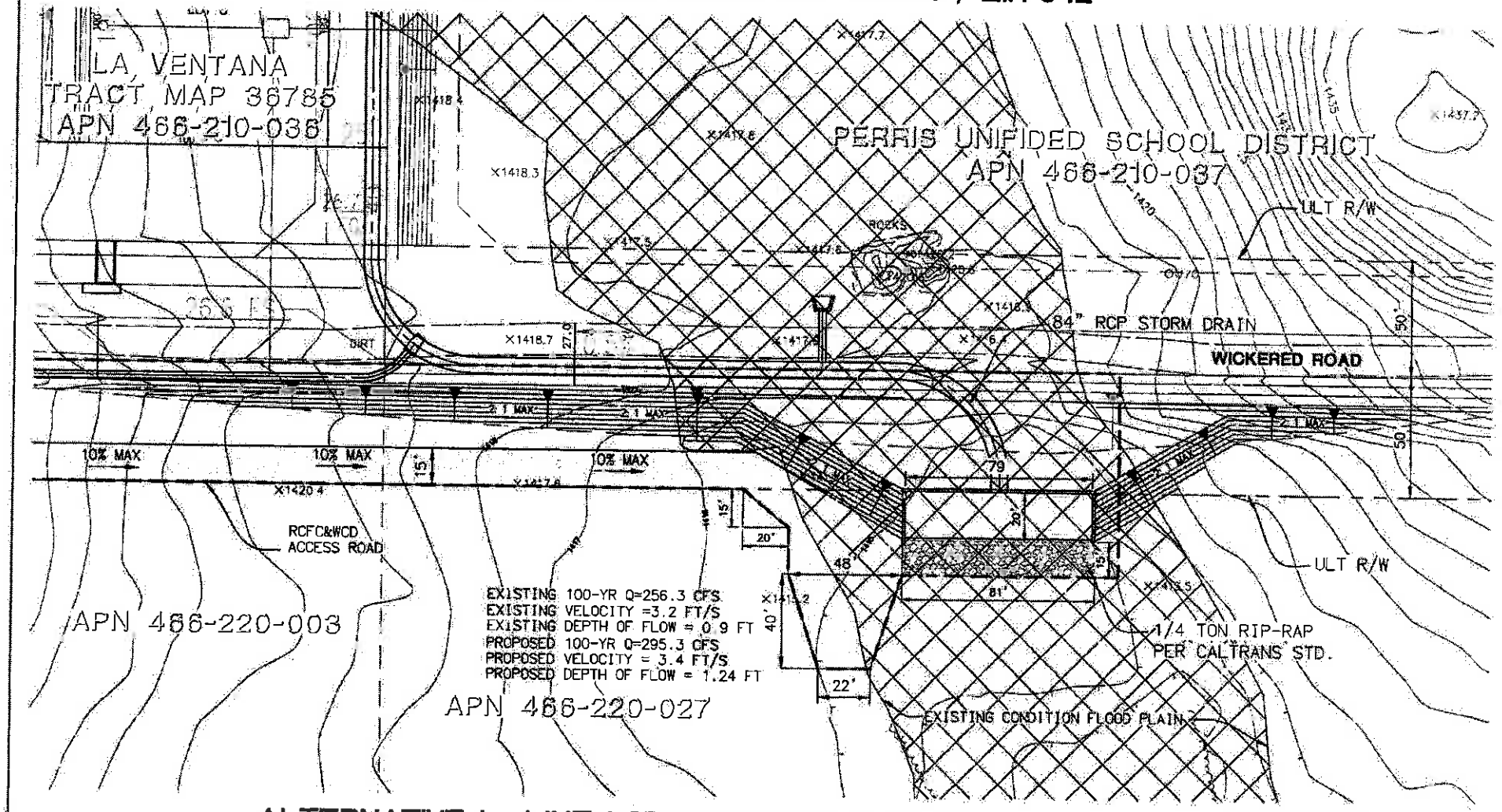
```
Channel base width     =    5.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
Manning's 'N'    = 0.025
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =      5.153(CFS)
Depth of flow =   0.297(Ft.), Average velocity =   3.097(Ft/s)
Channel flow top width =    6.189(Ft.)
Flow Velocity =    3.10(Ft/s)
Travel time  =    0.33 min.
Time of concentration =   11.77 min.

Sub-Channel No. 1 Critical depth =      0.309(Ft.)
                  Critical flow top width =      6.234(Ft.)
                  Critical flow velocity=    2.973(Ft/s)
                  Critical flow area =      1.733(Sq.Ft)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2003.000 to Point/Station     2004.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1425.100(Ft.)
Downstream point/station elevation =  1423.100(Ft.)
Pipe length  =   240.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.153(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     5.153(CFS)
Normal flow depth in pipe =   10.85(In.)
Flow top width inside pipe =   13.42(In.)
Critical Depth =   11.05(In.)
Pipe flow velocity =      5.42(Ft/s)
Travel time through pipe =    0.74 min.
Time of concentration (TC) =    12.51 min.
End of computations, total study area =            1.59 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.300
Area averaged RI index number =  73.0
```

GPA 1129/ CZ 7856/TRACT MAP 36785 / EIR 542



ALTERNATIVE 1 - LINE 1 STORM DRAIN OUTLET
PROPOSED ACCESS AND EASEMENT

JLC Engineering & Consulting, Inc.
36263 CALLE DE LOBO
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

FIGURE A-1

Item 6.

Larry R. Markham

From: Joe Castaneda
Sent: Wednesday, April 06, 2016 6:13 AM
To: Larry R. Markham
Cc: JRivani@GIDLLCO.COM
Subject: RE: La Ventana- Tract Map 36785
Attachments: LINE 1 OUTLET_ALT #1 and Alt #2.pdf

Larry,

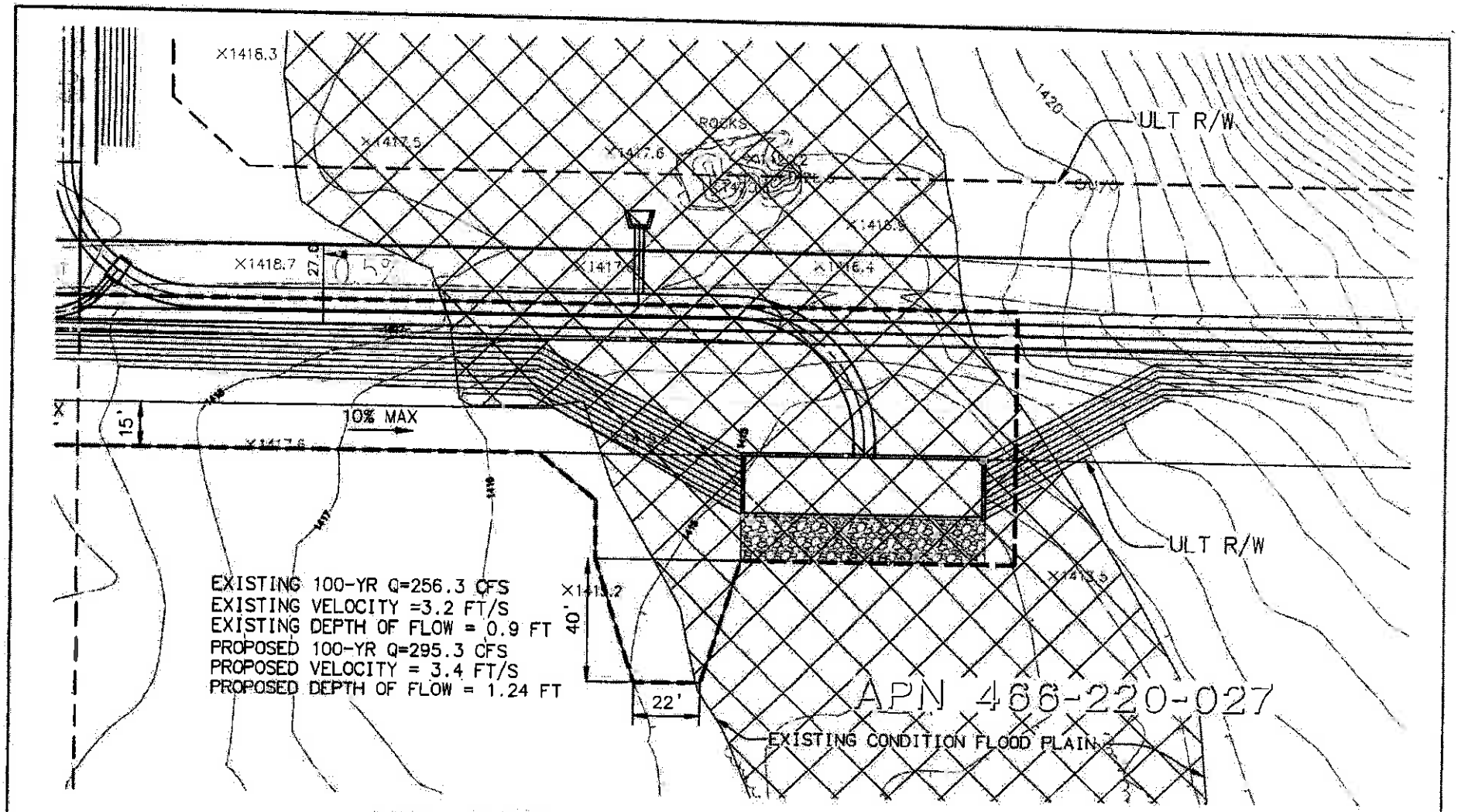
Based on conversation on Friday April 1, 2016 we did the following to provide more information related to the design of the storm drain entering the Neumann property:

1. We evaluated the 100 year flood plain and placed it on the two alternatives that we discussed on Friday. The exhibits show the limits of the 100 year flood plain in blue. In order to make the exhibits less cumbersome I removed the cross sections used to evaluate the flood plain. The flood plain was assessed using HEC-RAS. We placed the existing flow rate and velocity on the exhibit.
2. On alternative 1 and 2 we relocated the limits of the storm drain system and the culvert to extend to the future right-of-way as we discussed on Friday. We also provided the anticipated grading required over the system that is needed to extend the systems to the right-of-way.
3. We assessed the proposed velocity using the post-project condition flow rate that would be discharged by the project. The analyses we did for the project assessed hydromodifications and the RCFC&WCD interim design criteria. As you know, the interim design criteria requires mitigation for the 2, 5, and 10 year storms. We did not assess the 100 year, 1 hour. However, based on the projects we have been working we have noticed that the hydromodification criteria is so onerous that mitigating the 100 year, 1 hour is not difficult to do.
4. The outlet velocities were calculated using a normal depth analysis across the rip-rap dissipator.
5. The following are descriptions of the Alternatives:
    a. Alternative #1: This is a conventional storm drain solution that would require the system to be maintained by RCTD or RCFCD. As I mentioned, this is the schools preferred alternative. The storm drain system would be located along the centerline of Wickered Road. We would discharge the flow rate into a stilling basin with a downstream impact wall to reduce the velocities and recreate the sheet flow condition. A 15 feet rip-rap dissipator would be used downstream of the stilling basin. The rip-rap dissipator would implement the use of a concrete grade beam downstream of the rip-rap to ensure flows are distributed in a manner similar to what occurs today.
    b. Alternative #2: This a design in which we discharge flows onto the school site. The flows would go through the school site and flow towards Wickered Road. This solution implements the use of 3-14'W x 7'H RCBs that would allow for the flows to be spread in a sheet flow condition. Wingwalls would be constructed and a rip-rap dissipator would be used to reduce the flow rate exiting the RCB.

Please review the revisions and do not hesitate to call with any questions.

Joe Castaneda P.E.
President
:: 951.304.9552 – Office
:: 951.304.3568 – Fax

JLC Engineering & Consulting Inc.
36263 Calle de Lobo
Murrieta, CA 92562



LINE 1 STORM DRAIN OUTLET
PROPOSED ACCESS AND EASEMENT

JLC Engineering & Consulting, Inc.
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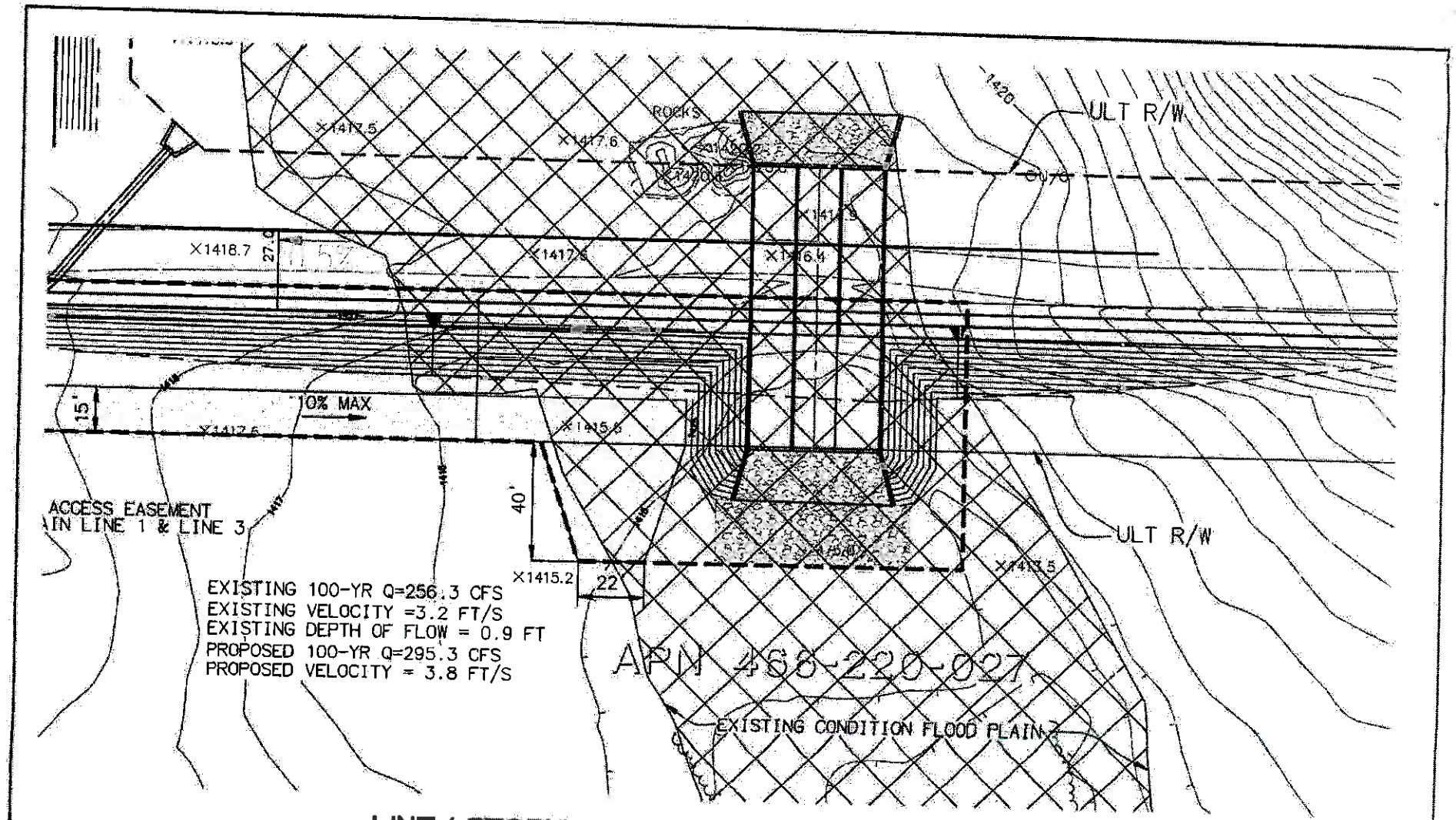
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

FIGURE A-1



LINE 1 STORM DRAIN OUTLET
PROPOSED ACCESS AND EASEMENT

Rejected

JLC Engineering & Consulting, Inc.
36263 CALLE DE LOBO
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

FIGURE A-1

Clerk's Original

RIVERSIDE COUNTY
PLANNING DEPARTMENT

Steve Weiss AICP
Planning Director

Memorandum

Date: July 12, 2016

To: Board of Supervisors

From: Brett Dawson, Project Planner, Planning Department

RE: Updated Information for Agenda Item 16.1 (General Plan Amendment No. 1129, Change of Zone No. 7856, Tentative Tract Map No. 36785, Environmental Impact Report No. 542.)

To the Honorable Chair,

- Included are additional signatures in support of the project provided by the applicant Mike Naggar.
- Included are two letters from Delano and Delano.
- Attached is a letter from Valley Wide Recreation and Park District.
- Included is a letter to the Board of Supervisors from Andy and Cindy Domenigoni.
- 50.TRANS.023 MAP- OFF SITE IMPROVEMENTS was revised regarding the Line 1 Storm Drain which outlets at the ultimate south Wickerd Road right-of-way line. The end of the condition states, "To implement this condition the adjoining property right of way, and easements as required by RCFC&WCD for the design, construction and maintenance of the Line 1 Storm drain system.

  Or as approved by the Director of Transportation." The condition has been revised to remove "Or as approved by the Director of Transportation."

- 90.TRANS.1 MAP – WRCOG TUMF was revised to state "Prior to the issuance of an occupancy permit, the project proponent shall pay the Transportation Uniform Mitigation Fee (TUMF) in accordance with the fee schedule in effect at the time of issuance, pursuant to Ordinance No. 824."

- 80.TRANS.2 MAP – R&BBD was revised to state:
  "The project is not required to participate in the Scott Road CFD 05-8.

  Prior to the time of issuance of a building permit, the project proponent shall pay fees in accordance with Zone A of the Scott Road and Bridge Benefit District (RBBD) fee schedule in effect at the time of payment. The project proponent may be eligible to pay a reduced Scott Road RBBD fee in accordance with Zone A, in lieu of Zone A1, as indicated in the fee schedule

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P.O. Box 1409, Riverside, California 92502-1409
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Desert Office · 77-588 El Duna Court, Suite H
Palm Desert, California 92211
(760) 863-8277 · Fax (760) 863-7040

07-12-2016
16-1

in effect at the time of these conditions. It should be noted that RBBD fee schedules may be amended in the future, and the fee schedule in effect at the time of payment will govern.

NOTE: The project gross acreage is 170.8 acres and proposed 511 residential lots.

This condition shall not be deferred to occupancy permit."

- 50.TRANS.10 MAP- DEDICATION Has been revised at the end of the condition, following "A minimum 6' bike lane shall be striped on the roadway and shall conform to the Caltrans Highway Design Manual." To state:

  "or as approved by the Director of Transportation for any of the conditions described above.

  Sufficient public street right-of-way along Meadowgate Lane shall be conveyed for public use to provide for a 30 foot half-width right-of-way. Areas designated as culturally sensitive shall be omitted for the area to be dedicated. Any projects that would improve Meadowgate Lane shall consult with the Pechanga Band of Lusieno Indians or other Native American Indian Tribes." And "or as approved by the Director of Transportation" has been removed.

In addition to the findings and conclusions in the attached staff report and Environmental Impact Report No. 542, Planning staff would like to provide additional facts supporting the approval recommendation for Tentative Tract Map No. 36785. Tentative Tract Map No. 36785 is not located within a boundary of an existing Specific Plan. Tentative Tract Map No. 36785 is associated with General Plan Amendment No. 1129 which will change the property's Foundation Component to Community Development and its land use designation to Medium Density Residential. The medium density residential land use designation provides for single family homes and suburban subdivisions with a density range between 2 to 5 dwelling units. Lot sizes within this land use designation range from 5,500 to 20,000 square feet. Tentative Tract Map No. 36785 proposes a subdivision for single family homes with a density of approximately 2.9 dwelling units per acre and a minimum lot size of 5,500. Additionally, General Plan Amendment No. 1129 proposed to remove the project site from the Rural Residential Area East of Interstate 215 Policy Area. Once removed, there will be no further conflict or internal inconsistency regarding residential development densities. Therefore, Tentative Tract Map No. 36785 is consistent with the property's General Plan land use designation as amended by proposed General Plan Amendment No. 1129.

Furthermore, the design of the proposed Tentative Tract Map No. 36785 is consistent with the County's General Plan. The General Plan's Vision Statement encourages critical community facilities such as parks, schools, healthcare and mental health facilities to be distributed throughout Riverside County so that they are accessible to and benefit all residents. The Vision Statement also emphasizes the importance of partnerships between school districts and local governments in providing quality educational facilities in the County. Appendix B of the General Plan, Principle II.C. and IV.G., encourages usable open space, parks connected to schools and recreational facilities that are available for persons of all ages to enjoy. Tentative Tract Map No. 36785 includes a park and open space along the eastern edge of the site, bordering the new high school. This park will include ball fields including baseball and soccer fields. These can be used for joint use, allowing the school to have more activities. Additionally, the proposed project will include a park specially designed for person with disabilities. The project's design will act as a buffer between the school use and the remaining rural community and provide a transition from the proposed medium density subdivision to the existing rural community.

Additionally, Principle IV.A.1 provides that the intent of the General Plan is to foster variety and choice in community development, particularly in the choice and opportunity for housing in various styles, of varying densities and of a wide range of prices and accommodating a range of life styles in equally diverse community settings, emphasizing compact and higher density choices. Moreover, Principle IV.A. 4 provides that low density residential development should not be the predominant use or standard by which residential desirability is determined. Tentative Tract Map No. 36785 will create a transition of housing density ranges from Medium Density Residential along Scott Road to larger lot requirements to the north, which is consistent with the principle to provide a variety of housing products and lot sizes.

The site is physically suitable for the proposed residential development and density because it consists of lightly rolling terrain, is not located within either a CAL Fire state responsibility area or a very high fire hazard severity zone and is not located within a Criteria Area of the Multi-Species Habitat Conservation Plan. Additionally, higher density development is consistent with the recent approvals of General Plan Amendment Nos. 921 and 928 and project's conditions of approval will also improve access for the site and surrounding area. The parks and athletic fields included in Tentative Tract Map No. 36785 will also serve as recreational areas for the development's residents.

Environmental Impact Report No. 542 (EIR No. 542) was prepared for the project which includes General Plan Amendment No. 1129, Change of Zone No. 7856 and Tentative Tract Map No. 36785. EIR No. 542 analyzed the project's potential significant effects on the environment and made the required findings in compliance with the State CEQA Guidelines and Riverside County CEQA implementing projects. Based on the findings and conclusions in EIR No. 542 and the project's conditions of approval, the design of Tentative Tract Map No. 36785 is not likely to cause serious public health problems.

The design of Tentative Tract Map No. 36785 will not conflict with easements, acquired by the public at large, for access through or use of, property within the proposed subdivision. Within the tentative map there are existing recorded easements for public access roads, however, through the project's design these easements for public access will be maintained or alternatives will be provided. Additionally, in accordance with Section 3.2.J. of Ordinance No. 460, the applicant has provided written assurances (copies of which are attached) from the owners of the properties underlying the off-site improvement/alignment (as shown on the Tentative Map) that sufficient right-of-way can and will be provided.

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07/02/2016

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At: Riverside, California

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COUNTY OF RIVERSIDE
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Ad Copy:

NOTICE OF PUBLIC HEARING BEFORE THE BOARD OF SUPERVISORS OF RIVERSIDE COUNTY ON A GENERAL PLAN AMENDMENT, CHANGE OF ZONE, AND A TENTATIVE TRACT MAP IN THE THIRD SUPERVISORIAL DISTRICT AND NOTICE OF INTENT TO CERTIFY AN ENVIRONMENTAL IMPACT REPORT

NOTICE IS HEREBY GIVEN that a public hearing at which all interested persons will be heard, will be held before the Board of Supervisors of Riverside County, California, on the 1st Floor Board Chambers, County Administrative Center, 4080 Lemon Street, Riverside, on **Tuesday, July 12, 2016 at 10:30 A.M.** or as soon as possible thereafter, to consider the application submitted by Joseph Rivani - Jeff Anderson on **General Plan Amendment No. 1129**, which proposes an Extraordinary Foundation Level Amendment to amend the land use from Rural Community: Estate Density Residential (RC:EDR) (2-Acre Minimum) to Community Development: Medium Density Residential (CD:MDR) (2-5 dwelling units per acre) and Open Space: Recreation (OS:R), to modify the General Plan to remove the Estate Density and Rural Residential East of Interstate 215 Policy Area from the project site, and to amend the Circulation Element to downgrade La Ventana road within the project boundary (between Garbani Road and Wickerd Road) from a Secondary Highway to a Collector; **Change of Zone No. 7856**, which proposes to change the zone from Residential Agricultural 5-Acre Minimum (R-A-5) to Planned Residential (R-4), or such other zones as the Board may find appropriate; **Tentative Tract Map No. 36785, Schedule A**, which proposes to subdivide 170.8 gross acres into 511 residential lots with a 5,500 sq. ft. minimum lot size, and 25 lettered lots consisting of drainage basins, parks, paseos, and open space. The project is located northerly of Wickerd Road, easterly of Heinz Lane, southerly of Garbani Road, and westerly of Brandon Lane in the Winchester Zoning - Sun City / Menifee Valley Area Plan, Third Supervisorial District.

The Planning Commission approved the project, found that the environmental effects have been addressed and recommended the certification of **Environmental Impact Report No. 542.**

The project case file may be viewed from the date of this notice until the public hearing, Monday through Friday, from 8:00 a.m. to 5:00 p.m. at the Clerk of the Board of Supervisors at 4080 Lemon Street, 1st Floor, Riverside, California 92501, and at the Riverside County Planning Department at 4080 Lemon Street, 12th Floor, Riverside, California 92501.

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Please send all written correspondence to: Clerk of the Board, 4080 Lemon Street, 1st Floor, Post Office Box 1147, Riverside, CA 92502-1147

Dated: June 29, 2016
Kecia Harper-Ihem, Clerk of the Board
By: Cecilia Gil, Board Assistant 7/2

NOTICE OF PUBLIC HEARING BEFORE THE BOARD OF SUPERVISORS OF RIVERSIDE COUNTY ON A GENERAL PLAN AMENDMENT, CHANGE OF ZONE, AND A TENTATIVE TRACT MAP IN THE THIRD SUPERVISORIAL DISTRICT AND NOTICE OF INTENT TO CERTIFY AN ENVIRONMENTAL IMPACT REPORT

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Dated: June 29, 2016

Kecia Harper-Ihem, Clerk of the Board
By: Cecilia Gil, Board Assistant

16-1 of 07/12/16

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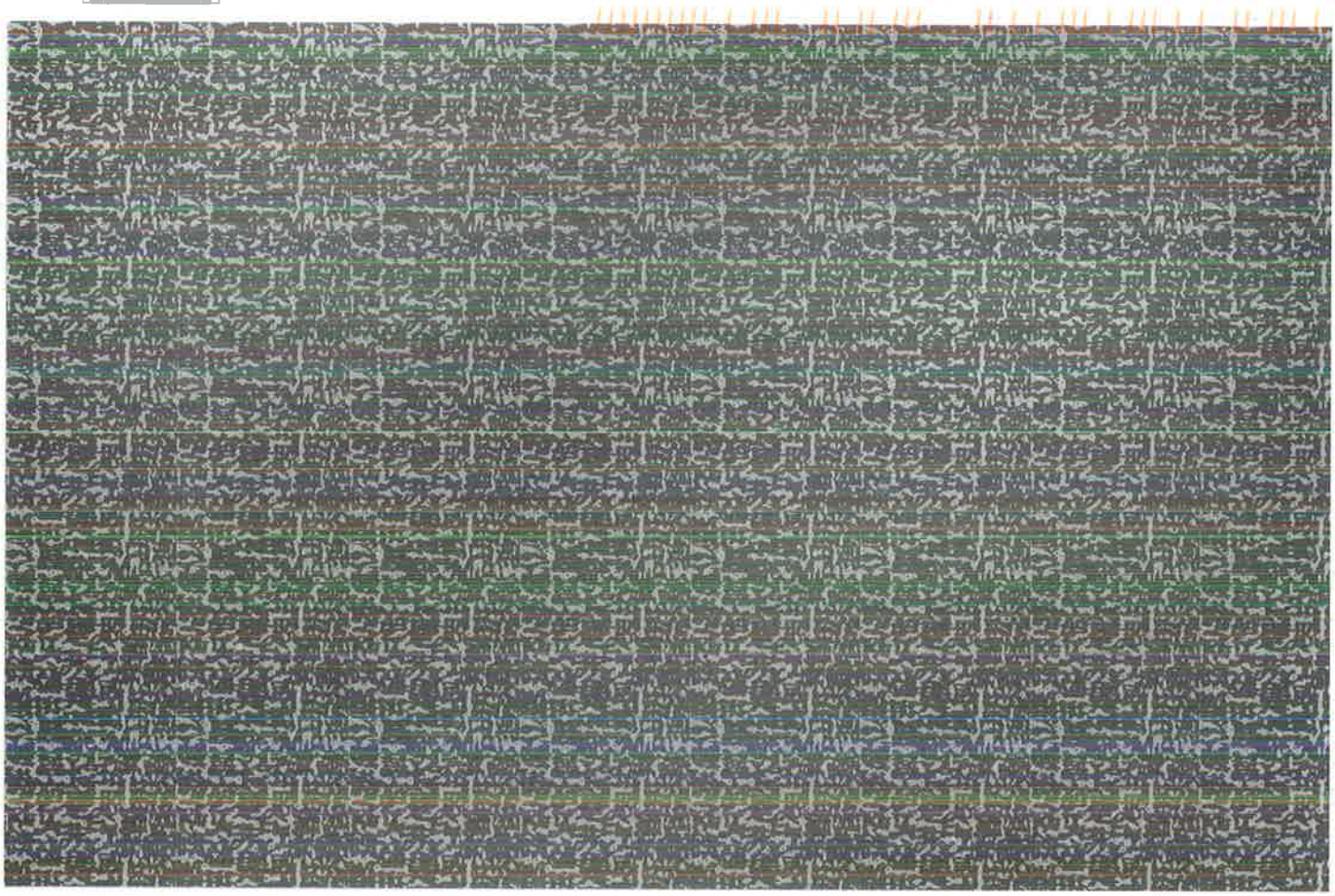
THEN FOLD AND TEAR THIS STUB ALONG PERFORATION



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JEFFREY & TERRY MASSIE
29735 KEMPE CIRCLE
MENIFEE CA 92584

RECEIVED RIVERSIDE COUNTY
CLERK/BOARD OF SUPERVISORS
2016 JUL -8 PM 1:20

NIXIE 914 NFE 1260 16I0007/05/16
RETURN TO SENDER
NOT DELIVERABLE AS ADDRESSED
UNABLE TO FORWARD
BC: 92502114747 *0952-03180-05-38

EVI 92502 92547

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Dated: June 29, 2016

Kecia Harper-Ihem, Clerk of the Board
By: Cecilia Gil, Board Assistant

16-1 of 07/12/16

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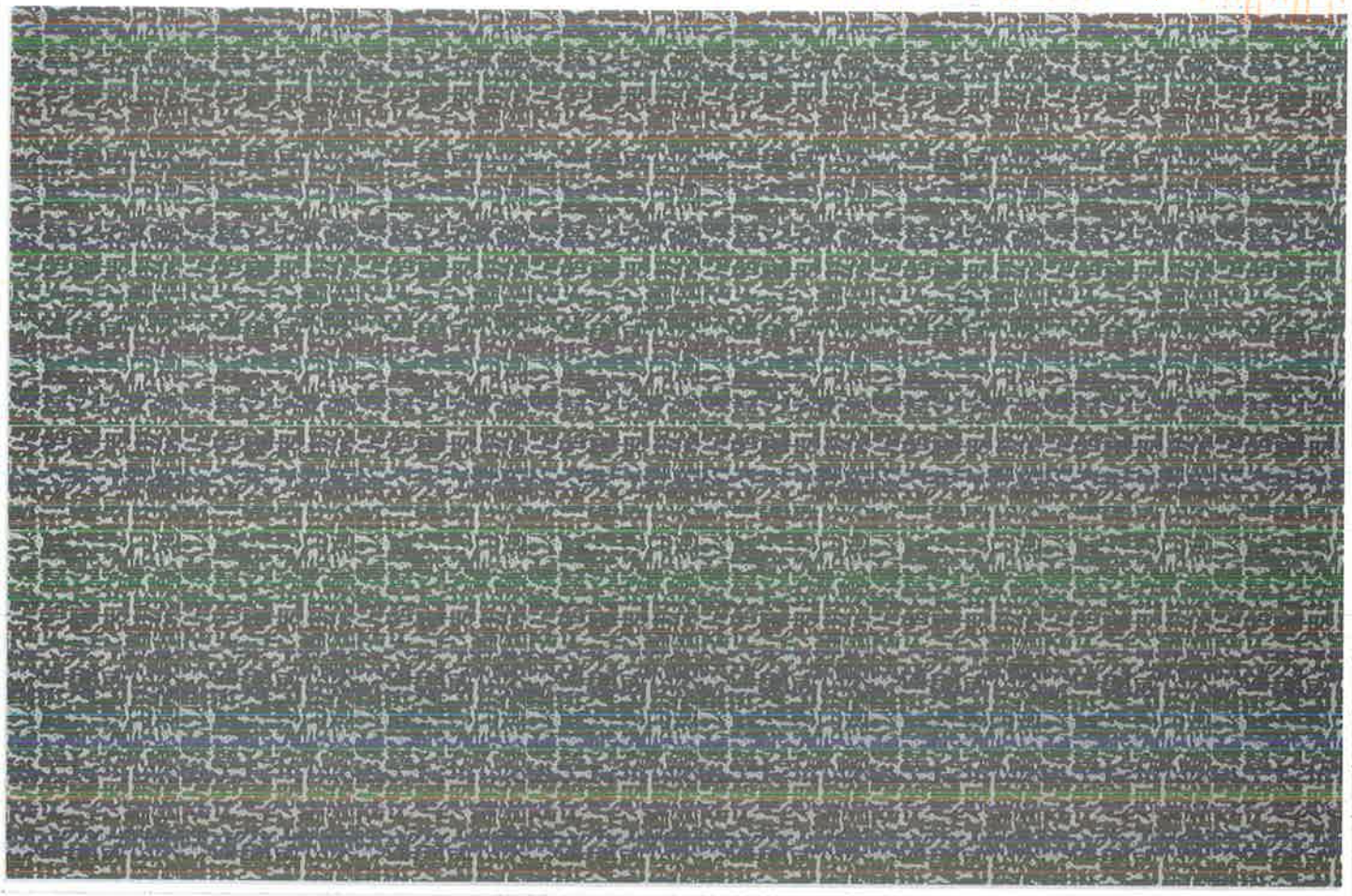

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P. O. Box 1147
Riverside, CA 92502-1147

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PUBLIC HEARING NOTICE

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CLERK/BOARD OF SUPERVISORS
2016 JUL -7 AM 11:26

ASMT: 466130039, APN: 466130039
NORTHERN TRUST, ETAL
C/O THOMAS M MENDELSON
355 S GRAND AVE STE 2600
LOS ANGELES CA 90071

NIXIE 914 DE 1260 0007/03/16
RETURN TO SENDER
ATTEMPTED - NOT KNOWN
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BC: 92502114747 *2252-04886-03-31

EYI-LMB 90071
92502@1147

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16-1 of 07/12/16

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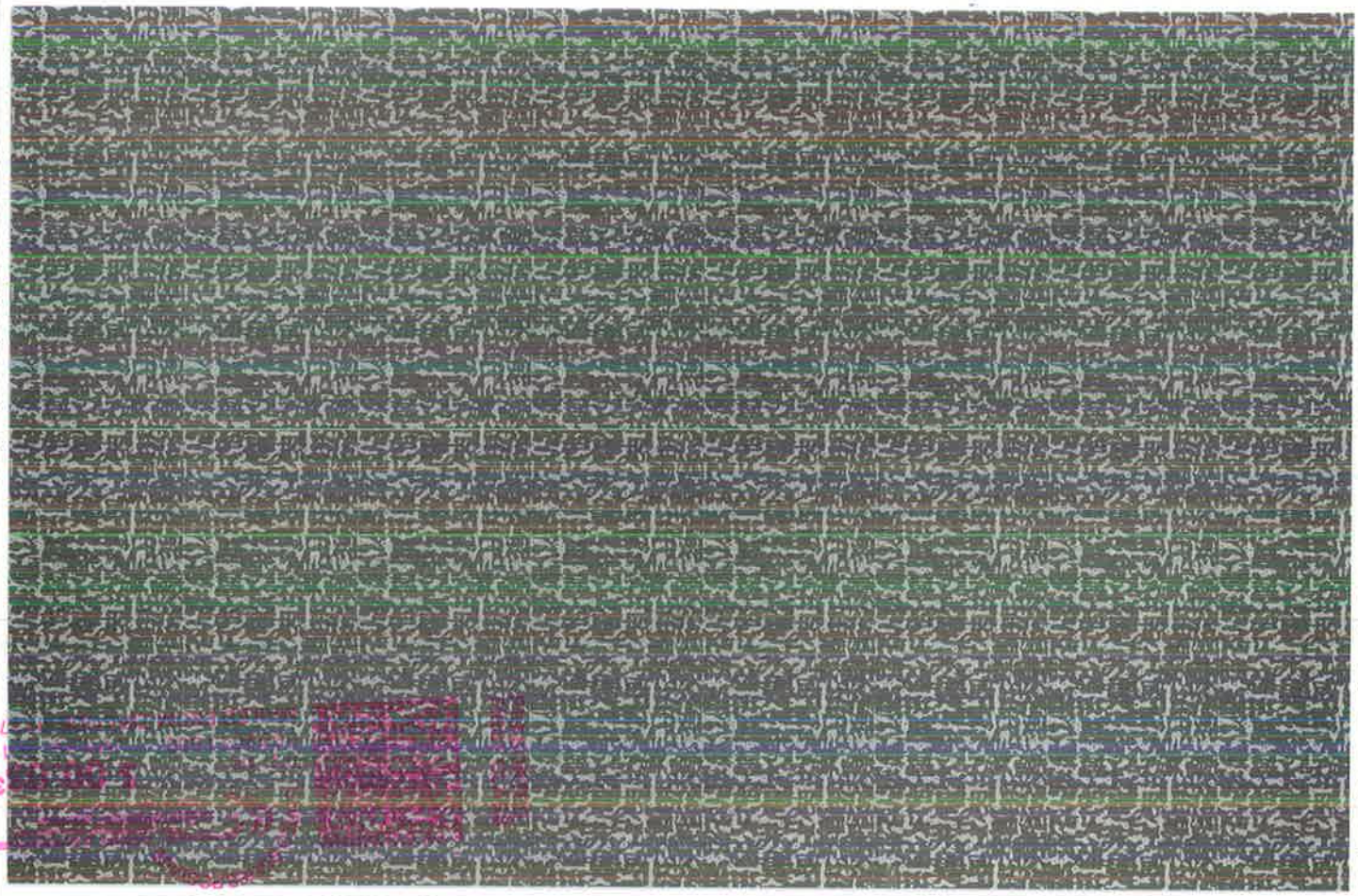
THEN FOLD AND TEAR THIS STUB ALONG PERFORATION



Riverside County Clerk of the Board
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PUBLIC HEARING NOTICE
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RECEIVED RIVERSIDE COUNTY
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2016 JUL -7 AM 11:26

Planning Commission Riverside Count
c/o Mary Stark, Planning Commission
Secretary
Mail Stop 1070

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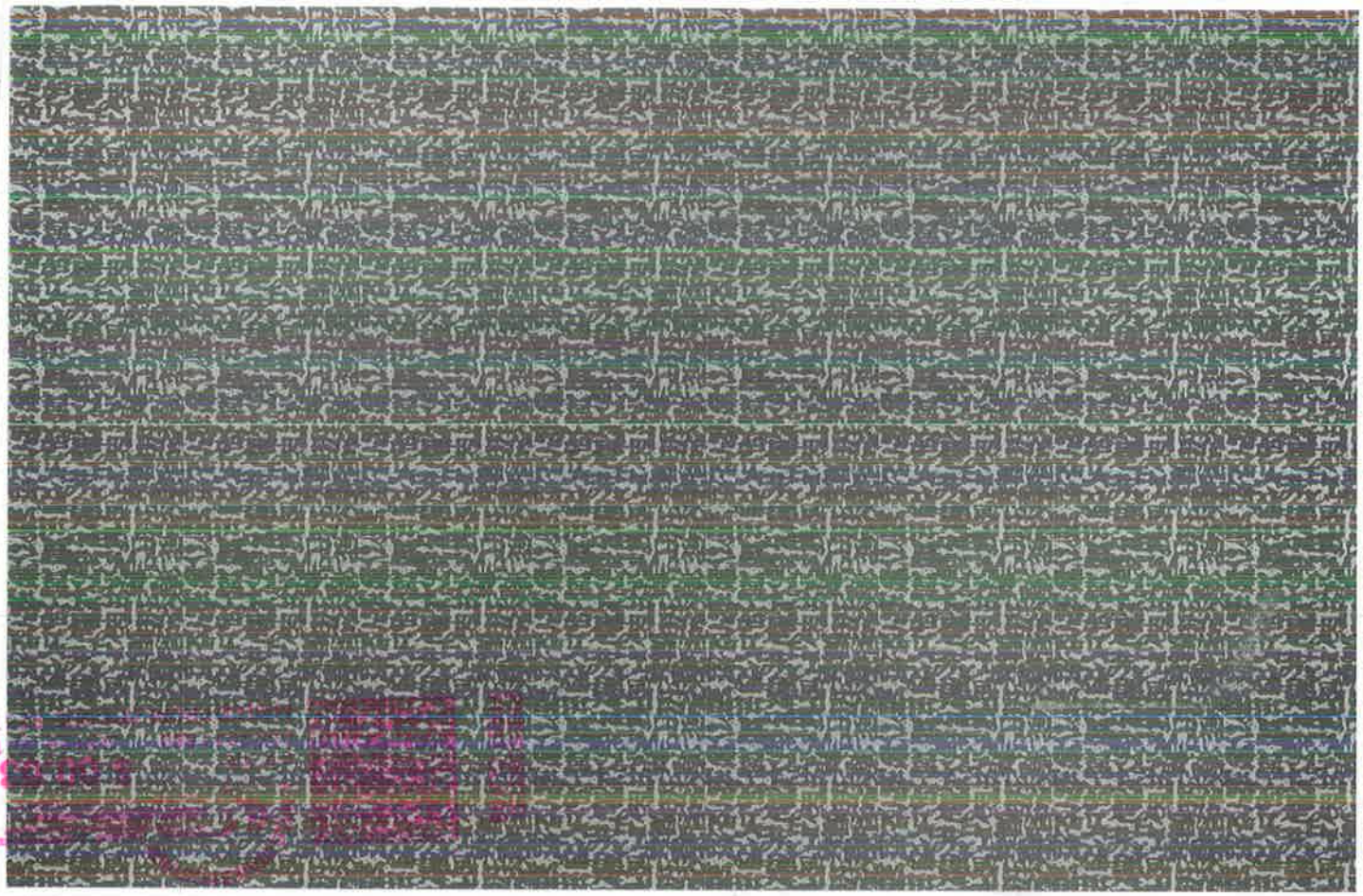

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PUBLIC HEARING NOTICE

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3rd Supervisor District
Chuck Washington, Supervisor
Board of Supervisors
Riverside County
Mail Stop 1003

RECEIVED RIVERSIDE COUNTY
CLERK/BOARD OF SUPERVISORS
2016 JUL -6 AM 10:55

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NIXIE 914 DC 1 0007/01/16

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BC: 92502114747 *1004-06552-29-43

92502@1147

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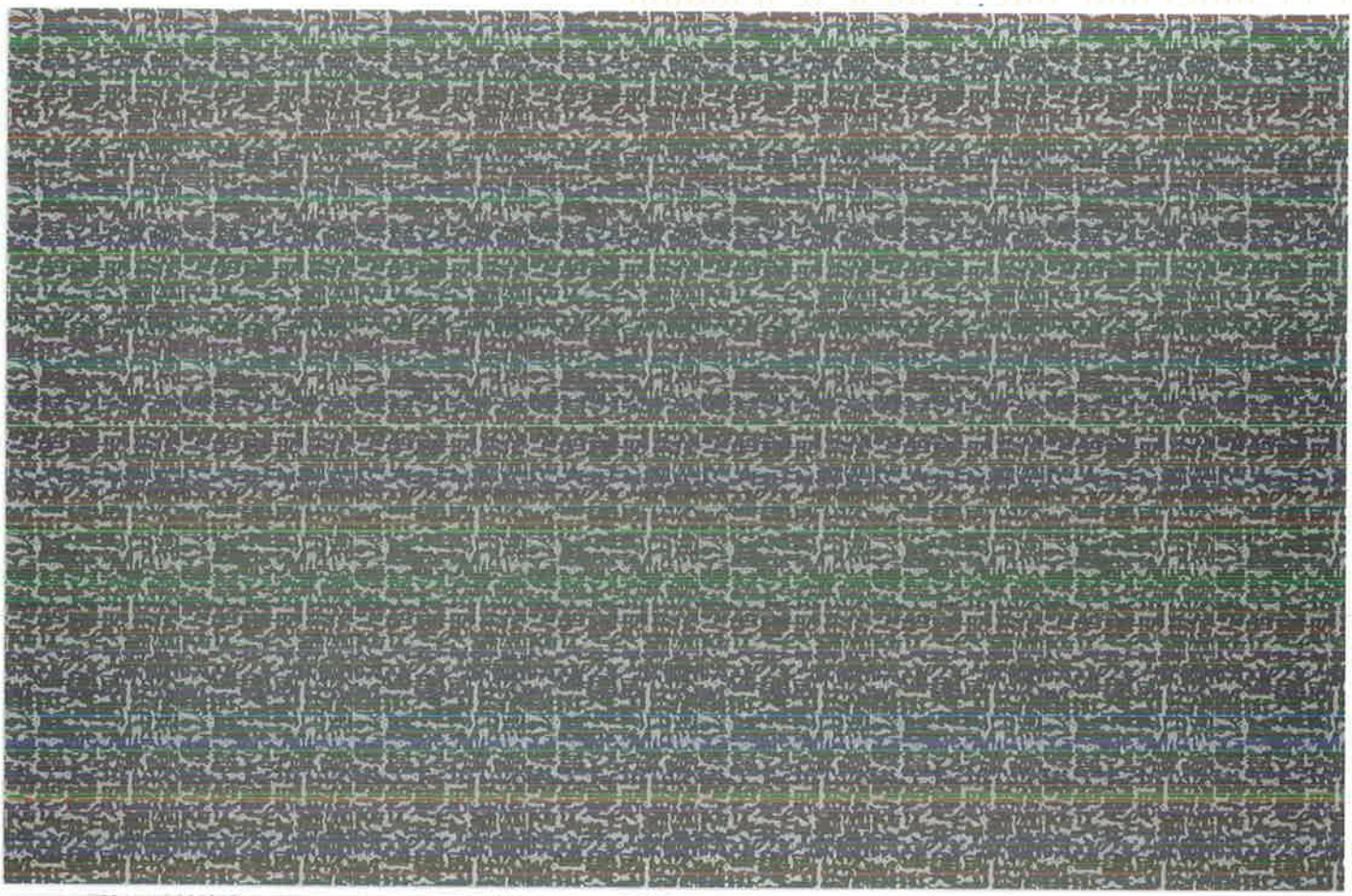

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PUBLIC HEARING NOTICE

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UEBERSETZIG LARRY J
31568 RAILROAD CYN RD 130
CANYON LAKE CA 92587

Not @ This Address

2016 JUL 15 AM 11:45

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CLERK/BOARD OF SUPERVISORS

EVF-CMB 92587

NIXIE 914 7E 1260 0007/12/16

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BC: 92502114747 *2604-03680-08-36

NOTICE OF PUBLIC HEARING BEFORE THE BOARD OF SUPERVISORS OF RIVERSIDE COUNTY ON A GENERAL PLAN AMENDMENT, CHANGE OF ZONE, AND A TENTATIVE TRACT MAP IN THE THIRD SUPERVISORIAL DISTRICT AND NOTICE OF INTENT TO CERTIFY AN ENVIRONMENTAL IMPACT REPORT

NOTICE IS HEREBY GIVEN that a public hearing at which all interested persons will be heard, will be held before the Board of Supervisors of Riverside County, California, on the 1st Floor Board Chambers, County Administrative Center, 4080 Lemon Street, Riverside, on **Tuesday, July 12, 2016 at 10:30 A.M.** or as soon as possible thereafter, to consider the application submitted by Joseph Rivani – Jeff Anderson on **General Plan Amendment No. 1129,** which proposes an Extraordinary Foundation Level Amendment to amend the land use from Rural Community: Estate Density Residential (RC:EDR) (2-Acre Minimum) to Community Development: Medium Density Residential (CD:MDR) (2-5 dwelling units per acre) and Open Space: Recreation (OS:R), to modify the General Plan to remove the Estate Density and Rural Residential East of Interstate 215 Policy Area from the project site, and to amend the Circulation Element to downgrade La Ventana road within the project boundary (between Garbani Road and Wickerd Road) from a Secondary Highway to a Collector; **Change of Zone No. 7856,** which proposes to change the zone from Residential Agricultural 5-Acre Minimum (R-A-5) to Planned Residential (R-4), or such other zones as the Board may find appropriate; **Tentative Tract Map No. 36785, Schedule A,** which proposes to subdivide 170.8 gross acres into 511 residential lots with a 5,500 sq. ft. minimum lot size, and 25 lettered lots consisting of drainage basins, parks, paseos, and open space. The project is located northerly of Wickerd Road, easterly of Heinz Lane, southerly of Garbani Road, and westerly of Brandon Lane in the Winchester Zoning – Sun City / Menifee Valley Area Plan, Third Supervisorial District.

The Planning Commission approved the project, found that the environmental effects have been addressed and recommended the certification of **Environmental Impact Report No. 542.**

The project case file may be viewed from the date of this notice until the public hearing, Monday through Friday, from 8:00 a.m. to 5:00 p.m. at the Clerk of the Board of Supervisors at 4080 Lemon Street, 1st Floor, Riverside, California 92501, and at the Riverside County Planning Department at 4080 Lemon Street, 12th Floor, Riverside, California 92501.

FOR FURTHER INFORMATION REGARDING THIS PROJECT, PLEASE CONTACT BRETT DAWSON, PROJECT PLANNER, AT (951) 955-0972 OR EMAIL BDawson@rctlma.org.

Any person wishing to testify in support of or in opposition to the project may do so in writing between the date of this notice and the public hearing, or may appear and be heard at the time and place noted above. All written comments received prior to the public hearing will be submitted to the Board of Supervisors and the Board of Supervisors will consider such comments, in addition to any oral testimony, before making a decision on the project.

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Alternative formats available upon request to individuals with disabilities. If you require reasonable accommodation, please contact Lisa Wagner at (951) 955-1063, 72 hours prior to the hearing.

Please send all written correspondence to: Clerk of the Board, 4080 Lemon Street, 1st Floor, Post Office Box 1147, Riverside, CA 92502-1147

Dated: June 29, 2016

Kecia Harper-Ihem, Clerk of the Board
By: Cecilia Gil, Board Assistant

16-1 of 07/12/16

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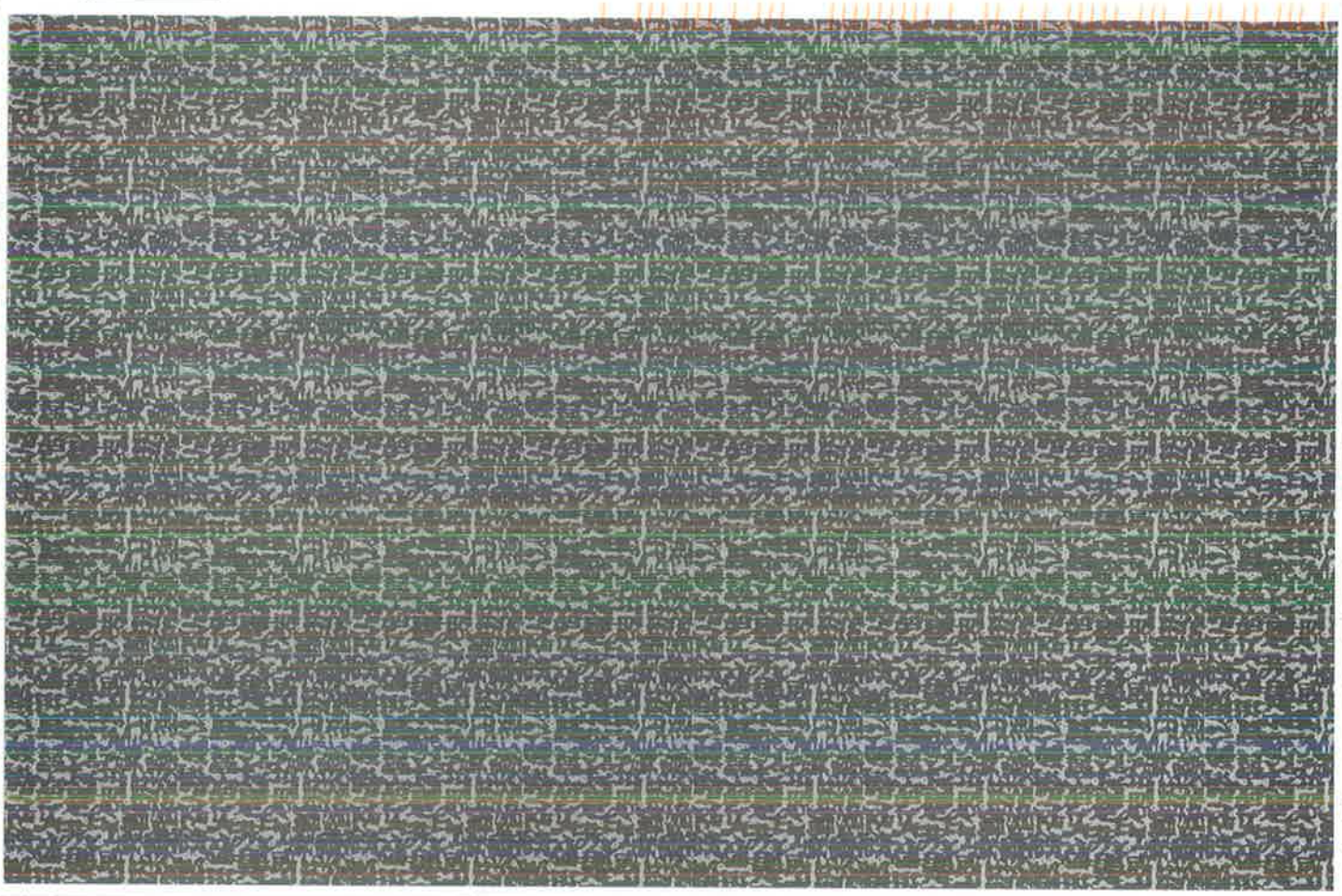

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JEFFREY & TERRY MASSIE
29735 KEMPE CIRCLE
MENIFEE CA 92584

RECEIVED RIVERSIDE COUNTY
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2016 JUL 15 AM 11:45

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Dated: June 29, 2016

Kecia Harper-Ihem, Clerk of the Board
By: Cecilia Gil, Board Assistant

16-1 of 07/12/16

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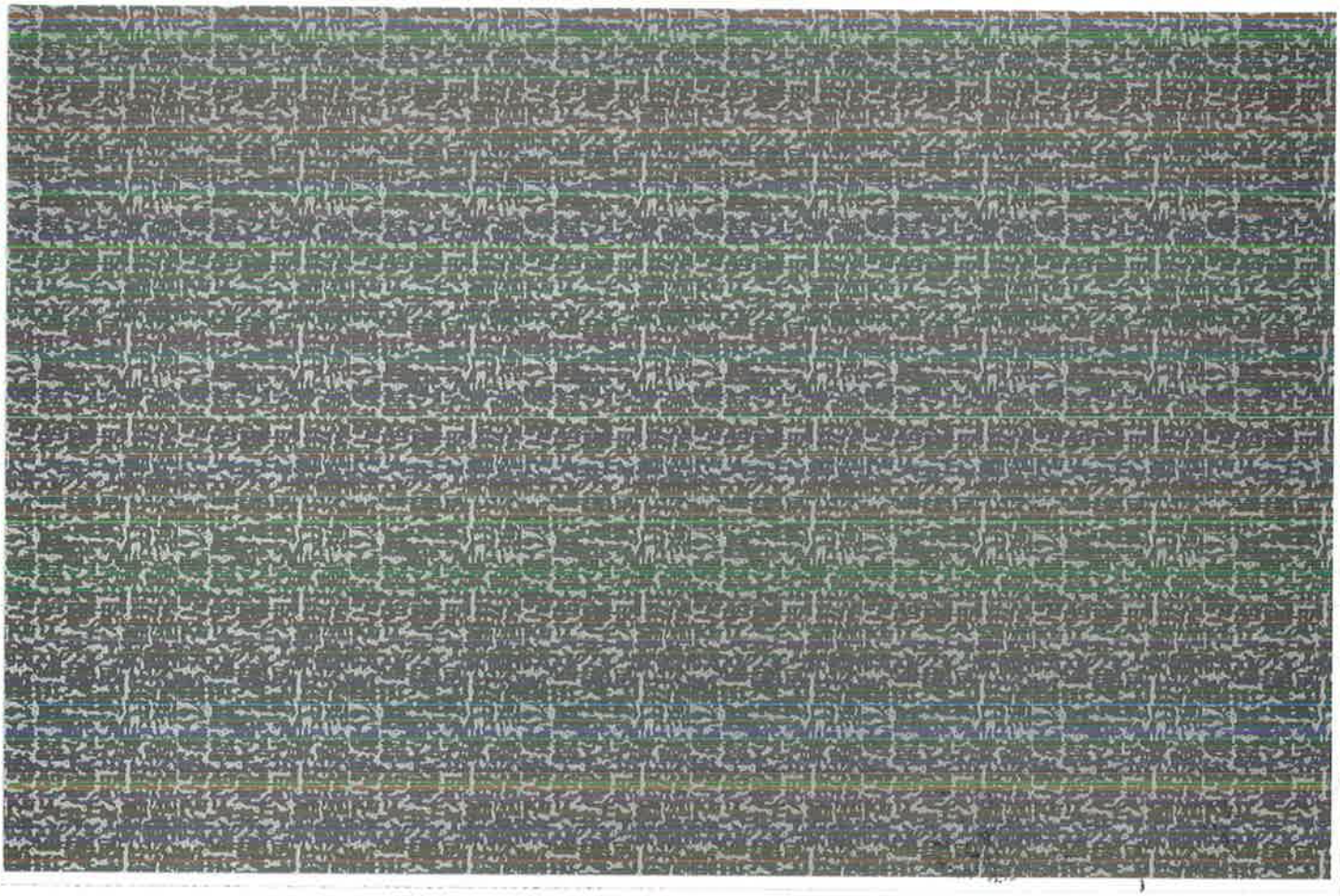

Riverside County Clerk of the Board
County Administrative Center
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UEBERSETZIG LARRY J
31568 RAILROAD CYN RD 130
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16-1 of 07/12/16

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ENVIRONMENTAL REVIEW
9174 SKY PARK COURT, SUITE 100
SAN DIEGO CA 92123-4340

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