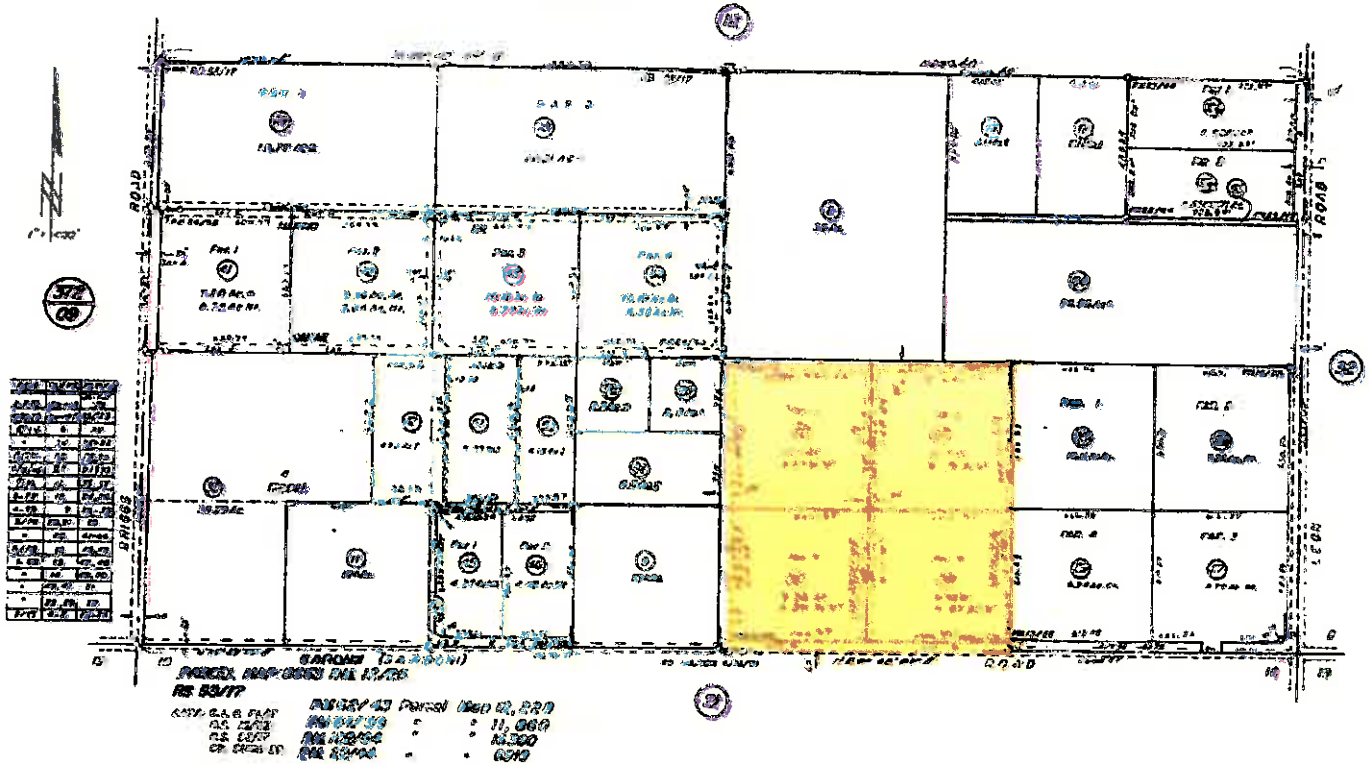
466-13
22-00

TRA. 020-125

S 1/2 SEC. 7, T. 6S., R. 2W.



ASSESSOR'S MAP BK 466 PG 13
RIVERSIDE COUNTY, CALIF.

Recording requested by and when recorded mail to:

PERRIS UNION HIGH SCHOOL DISTRICT
155 East 4th Street
Perris, CA 92570
Attn: Superintendent

This document is exempt from payment of a recording fee pursuant to Government Code Section 6103.

Space above this line for recorder's use

SCHOOL FACILITIES FUNDING AND MITIGATION AGREEMENT

PERRIS UNION HIGH SCHOOL DISTRICT and GLOBAL INVESTMENT POOL LLC

FOR

TENTATIVE TRACT MAP 36785

THIS SCHOOL FACILITIES FUNDING AND MITIGATION AGREEMENT ("Agreement") dated as of May 20, 2015 ("Effective Date"), is entered into by and between the PERRIS UNION HIGH SCHOOL DISTRICT, a public school district organized and existing under the laws of the State of California ("District"), and GLOBAL INVESTMENT POOL LLC a Delaware limited liability company ("Developer"). District and Developer may be referred to herein individually as a "Party," or collectively as the "Parties."

RECITALS

A. Developer intends to develop approximately 170 acres of property located in Riverside County ("County"), California, depicted on Exhibit A, with Assessor Parcel Numbers listed below: ("Property").

466-210-029	466-210-033	466-210-038
466-210-030	466-210-034	
466-210-031	466-210-035	
466-210-032	466-210-036	

B. Developer is processing entitlements with the County for proposed Tract Map 36785, consisting of a general plan amendment, rezoning and tentative subdivision map pursuant to which the Property is projected to be developed with approximately 523 residential units ("Project").

C. District is the fee owner of property located adjacent to the Property at the northwestern intersection of Leon and Wickerd Roads in the unincorporated portion of Riverside County, also depicted on Exhibit A, on which District intends to construct a new high school ("High School Property").

D. The Property is located within the attendance boundaries of the District, which is responsible for providing school facilities for students in Grades 9-12 who reside within those attendance boundaries.

E. Development of the Property will generate additional Grade 9-12 school students ("Project Students") which in turn will have an impact on existing facilities and the new high school ("New High School") to be constructed on the High School Property.

F. District and Developer acknowledge and agree that while funding the school facilities has been a shared obligation between the State and local school districts, both the adequacy and timing of State funding is unpredictable so that the Parties are not able to rely upon State funding to finance school facilities.

G. The Property is located within the boundaries of Community Facilities District No. 92-1 of Perris Union High School District ("CFD 92-1"). In the absence of the Parties' mutual agreement as set forth herein, District is authorized to collect special taxes as set forth in the notice of special tax lien of CFD 92-1 which is recorded against the Property.

H. District and Developer agree that given the uncertainties of the timing and amount of State funding for school facilities and given the close geographical proximity of the Project and the New High School, it is in the Parties' mutual best interests to enter into this Agreement to provide a local source of funding and improvements for the High School Property that may be in excess of the statutory amount Developer would otherwise be required to provide.

I. Developer's performance of this Agreement is intended to constitute complete mitigation of the impact of the development of the Property upon District in lieu of any special taxes of CFD 92-1 and any fees which the District might impose in connection with such development pursuant to Education Code Section 17620 or Government Code Sections 65970 et seq. and 65995 et seq. or any other present or future law.

J. Developer and District desire to enter into this Agreement to set forth Developer's obligations to mitigate the effects on the District of its development of the Property within the boundaries of the District and to set forth the corresponding obligations of District.

NOW, THEREFORE, the Parties agree as follows:

AGREEMENT

1. **Recitals.**

The foregoing recitals are true and correct.

2. **Definitions.**

Capitalized terms used in this Agreement shall have the meanings set forth as follows unless such terms are defined elsewhere herein or the context requires otherwise:

"Act" means the Mello-Roos Community Facilities Act of 1982, as amended (Government Code Section 53311, et seq.).

"Assessor's Parcel" means a lot or parcel of land designated on an Assessor's Parcel Map with an assigned Assessor's Parcel Number.

"Assessor's Parcel Map" means an official map of the Assessor of the County designating parcels by Assessor's Parcel Number.

"Assessor's Parcel Number" means the number assigned to an Assessor's Parcel by the County for the purpose of identification.

"Building Square Feet" means square footage of assessable internal living space exclusive of garages or other structures not used for living space in a Unit, as determined by reference to the building permit application for such Assessor Parcel.

"Certificate of Compliance" means (i) a certificate issued by the District pursuant to Education Code Section 17620(b) acknowledging the fact that the recipient has complied with all requirements of the District for the payment of statutory school fees/alternative school facility fees/mitigation payments or (ii) a certificate issued by the District acknowledging that adequate provisions have been made for school facilities.

"CFD 92-1" means Community Facilities District No. 92-1 of the Perris Union High School District.

"Commercial/Industrial Development" means any non-residential property including, but not limited to, any hotel, inn, motel, tourist home, or other lodging for which the maximum term of occupancy for guests does not exceed thirty days, but not including any residential hotel, as defined in paragraph (1) of subdivision (b) of section 50519 of the Health and Safety Code, nor any facility used exclusively for religious purposes that is thereby exempt from property taxation under the laws of California, any facility used exclusively as a private full-time day school as described in Section 48222 of the Education Code, or any facility that is owned and occupied by one or more agencies of federal, state, or local government.

"Community Facilities District" or "CFD" means a community facilities district authorized to finance public facilities that is formed by the District or other Public Agency pursuant to the provisions of the Act encompassing all or any portion of the Property.

"County" means the County of Riverside.

"Developer" means Global Investment Pool, LLC, a Delaware limited liability company, its successor and assigns.

"Effective Date" means the date this Agreement has been fully executed and approved by the District's governing board.

"Mitigation Payment" means Five Thousand Nine Hundred Fifty Dollars ($5,950) per Unit for all Units less than 4,000 Building Square Feet; and $1.69 per Building Square Foot for each Unit that is 4,000 Building Square Feet or larger ("Mitigation Payment"). The Mitigation Payment shall increase by 2% each January 1, beginning January 1, 2021.

"Project Students" mean Grades 9-12 students enrolled in the District and residing within the Property.

"Public Agency" means the County, any city or other public agency, the boundaries of which include all or any portion of the Property.

"PUHSD CFD 92-1 Special Tax Lien" means the Notice of Special Tax Lien, originally recorded January 25, 1993, in the County of Riverside, California as document number 28785, cancelled by that Notice of Cancellation of Special Tax Lien, recorded January 23, 1995 in the County of Riverside, California as document number 019882; and the Supplemental Notice of Special Tax Lien, recorded December 14, 1994, in the County of Riverside, California as document number 466806.

"Superintendent" means the Superintendent of the District, or his designee.

"Unit" means a separate single family detached dwelling unit constructed on a subdivided Assessor's Parcel within the Property."

3. **Mitigation of School Facilities Impacts.**

3.1 Purpose and Covenants. The purpose of this Agreement is to set forth the Parties' mutual obligations, including Developer's agreement to fund school facilities needed as a result of its development of the Project and the corresponding obligations of District relating to development of the Project.

3.2 Fulfillment of Obligations. By entering into this Agreement and complying with its terms, Developer shall be deemed to have fulfilled its obligation to assist in funding school facilities to house the Project Students resulting from development of the Property. In consideration of Developer's obligations provided for in this Agreement, District agrees to fulfill its obligations as described in Section 6 below.

3.3 Agreement Unaffected By Changes in Law. District and Developer agree that each Party has negotiated in good faith to reach accord on this Agreement, and as such, the Agreement is a legally binding contract between the Parties, enforceable in accordance with its terms. Developer and District agree that to the maximum extent permitted by law, this Agreement shall not be affected, modified, or annulled by any subsequent change in local, state or federal law.

4. **Developer Obligations Prior to Receipt of Certificate of Compliance.** In order for Developer to obtain a Certificate of Compliance for a Unit within the Project, Developer must

have completed the following pre-conditions, as described in more detail below: (i) Section 4.1 Timely Payment of Mitigation Payments; (ii) Section 4.2 Completion of Developer Improvements and (iii) Section 4.3 Payment of Fees for Commercial/Industrial Development, if applicable.

4.1 Timely Payment of Mitigation Payments.

4.1.1 Cancellation of CFD 92-1 Special Tax. Not later than 30 days after the District receives notice that all of the following conditions have been met, the District shall record the necessary documents in the official records of the County of Riverside, California to cancel the CFD 92-1 Special Tax Lien for each Assessor's Parcel that is part of the Property.

(a) No building permit has previously been issued for the Assessor's Parcel and therefore the Assessor's Parcel is not yet subject to the CFD 92-1 "Annual Special Tax" (as defined in the Rate And Method Of Apportionment Of Special Tax for CFD 92-1);

(b) This Agreement has been recorded against the Property in the official records of the County pursuant to Section 7.15 and has not terminated pursuant to Section 7.17;

(c) One or more final subdivision maps, for a total of no fewer than fifty (50) Units within the Project is recorded;

(d) Developer has deposited with the District an amount equal to Mitigation Payments for no fewer than twenty (20) Units within the Project. As a result of such deposit, Developer shall receive a credit against the Mitigation Payments due for twenty (20) Units.

4.1.2 Payment of Mitigation Payment. Upon Developer's request for a Certificate of Completion for any Assessor's Parcel, so long as the CFD 92-1 Special Tax Lien applicable to the Assessor's Parcel has been cancelled, Developer shall pay to District the then applicable Mitigation Payment for each Assessor's Parcel as part of its obligations to obtain a Certificate of Compliance.

4.2 Completion of Developer Improvements. Developer, at its sole expense, shall have completed construction of or posted a bond, if required, for the following improvements for the benefit of the District, collectively, the "Developer Improvements":

4.2.1 Sewer Facilities. Sewer facilities for the New High School in accordance with plans approved by Eastern Municipal Water District to a point of connection designated by District and Developer (currently anticipated to be approximately 150' north of the intersection of Wickerd Road and Brandon Lane at the westerly edge of the school site) with the final location yet to be determined; and

4.2.2 Garbani Road. Developer will construct improvements to Garbani Road from Brandon Lane to Leon Road, with street improvements that match the width and specifications required by the County of Riverside. If the Garbani Road improvements are not constructed or Developer has not posted bonds for the improvements by the time building

permits for two hundred (200) Units have been issued, District will have no obligation to issue a Certificate of Compliance for the remainder of the Property until such improvements are constructed or a bond for such improvements has been posted.

4.3 Payment of Fees for Commercial/Industrial Development. Upon Developer's request for a Certificate of Compliance for any Commercial/Industrial Development within the Property, Developer shall pay to District the then current statutory fees per square foot pursuant to Education Code Section 17620 and Government Code Section 65995.

5. Other Development Issues

5.1 Wickerd Road Improvements.

5.1.1 Reimbursement. In the event Developer constructs improvements to or within Wickerd Road prior to District's completion of such improvements, Developer shall be reimbursed by the District within thirty (30) days of completion for actual construction costs related only to that portion of Wickerd Road from Leon Road to Brandon Lane that the District is required to improve as a condition of the County of Riverside Transportation Department.

5.1.2 Scope of Work. The Developer's specific scope of work shall be limited to (a) pavement from the north curb face to south curb face/edge of pavement; (b) necessary engineered grading to daylight with existing topography; and (c) any drainage facilities determined necessary for the High School Property.

5.1.3 District's Obligations. If Developer constructs the portion of Wickerd Road from Leon Road to Brandon Lane, the District shall provide to Developer the following for that portion: a) all approved improvement plans (including temporary drainage structures), b) necessary right of way/easements, c) drainage acceptance/flow concentration letters, and d) bonding, if required by the County.

5.2 Entry Requirements. In the event that construction of the improvements discussed in this Agreement requires entry onto and work on District property, Developer shall obtain a right of entry permit on a form mutually agreed to by the Parties requiring Developer to indemnify and hold harmless the District for any claims, loss or injury resulting from such construction on District property, in addition to maintaining appropriate levels of insurance naming the District as an "Additional Insured."

5.3 Reciprocal Easements. Developer and District shall, in good faith, provide each other with necessary easements and/or drainage acceptance letter(s) for any improvements adjacent to shared property lines between the Project and the High School Property.

6. District Obligations.

6.1 So long as Developer is not in breach of this Agreement, District hereby covenants the following as to the Project:

6.1.1 District's governing board shall include language in its resolution

approving this Agreement stating that Developer has fully mitigated for any potential Project impacts to District facilities, that the District will not seek any additional mitigation for the Project, that the District supports the Project and will cooperate with Developer to obtain approvals from the County.

6.1.2 Except for the Mitigation Payments, District will not exercise any power or authority (under Section 17620 of the California Education Code or any other provision of applicable current or future law) to levy a fee, charge, dedication, or other form of requirement against any Unit or any development undertaken within the boundaries of the Property for the purpose of funding or financing any school facilities.

6.1.4 District will not require the County or any other governmental entity to exercise, or cooperate with the County or any other governmental entity in the exercise of, the power under Title 7, Division 1, Chapter 4.7 of the California Government Code (commencing with Section 65970) or any other provision of applicable current or future law, to require the dedication of land, the payment of fees in lieu thereof, or both, or any other exaction or requirement for classroom or related facilities as a condition to the approval of a Unit or any development within the boundaries of the Property.

6.1.5 District will not sponsor or require the formation of a CFD, assessment district or similar district which includes the Project, without the written consent of Developer, which consent may be given or withheld in Developer's sole discretion.

6.2 District acknowledges that compliance with terms in this Agreement makes adequate provision for the school facilities needed to house the Project Students. By execution of this Agreement, the Superintendent is authorized to execute a document from time to time, if requested by Developer, indicating that this Agreement has been approved by the District, that performance of this Agreement by Developer mitigates the school facilities impacts of the development of the Property and that Developer, as of the time of execution of such document, has performed its obligations as set forth in this Agreement.

6.3 If Developer requests the District to (i) form a CFD for the Project and/or (ii) enter into a Joint Community Facilities Agreement in connection with a CFD being formed by another Public Agency for the Project for the purpose of funding the Mitigation Payments, the District will make reasonable efforts to cooperate.

7. Miscellaneous.

7.1 Successors and Assigns. All of the covenants, stipulations, promises, and agreements contained in this Agreement by or on behalf of, or for the benefit of, either of the Parties, shall bind or inure to the benefit of the successors and assigns of the respective Parties. Nothing in this Agreement shall in any way limit the right or ability of Developer to transfer, assign, encumber, hypothecate or in any way convey any interest of Developer in the Property without the consent of the District provided that transferee assumes all obligations of Developer under this Agreement. District agrees to thereafter look solely to the transferee for performance of Developer's obligations under this Agreement.

7.2 Amendment. This Agreement may not be amended except in writing by Developer and District, duly executed by their authorized agents. Developer and District recognize that it may be necessary to make revisions to this Agreement, clarify its terms or provide additional detail in order to implement its terms after execution by the Parties. Therefore, District delegates to the Superintendent the authority to approve amendments to this Agreement that do not substantially affect the terms contained herein and to approve implementation agreements with Developer that implement or clarify the terms contained herein. Amendments to this Agreement that do substantially modify the terms contained herein must be approved by the Board of Education of the District.

7.3 Entire Agreement. This Agreement supersedes and cancels any and all other agreements, either oral or written, between the Parties with respect to the subject matter herein. Each Party to this Agreement acknowledges that no representation by any Party which is not embodied herein or in any other agreement, statement, or promise not contained in this Agreement shall be valid and binding. The Parties hereto agree to act in a manner that will not frustrate the purposes of this Agreement.

7.4 Attorney Fees. In the event of any action or proceeding brought by either Party against the other under this Agreement, the prevailing party shall be entitled to recover its reasonable attorney fees, costs and expenses incurred in such action or proceeding. In addition to the foregoing, the prevailing party shall be entitled to its reasonable attorney fees and costs and expenses incurred in any post-judgment proceedings to collect or enforce the judgment. This provision is separate and several and shall survive the merger of this Agreement into any judgment on this Agreement.

7.5 Execution. This Agreement may be executed in several counterparts, each of which shall be an original and all of which shall constitute but one and the same agreement.

7.6 Notices. All correspondence, notices or certificates required by this Agreement shall be sufficiently given and served if delivered by hand directly to the individuals named below or sent by United States first-class mail postage prepaid, with return receipt requested, and addressed as follows:

If to Developer:	Global Investment Pool, LLC Attention: Joseph Rivani, Principal 3470 Wilshire Boulevard, Suite 1020 Los Angeles, CA 90010
With a copy to:	Best Best & Krieger LLP 3390 University Avenue, 5th Floor Riverside, CA 92501 Attention: Michelle Ouellette
If to District:	Perris Union High School District 155 East 4th Street Perris, CA, 92570

Attention: Superintendent

With a copy to: Perris Union High School District
155 East 4th Street
Perris, CA, 92570
Attention: Asst. Superintendent, Business Services

With a copy to: Fagen Friedman & Fulfrost LLP
1525 Faraday Avenue Suite #300
Carlsbad, CA 92008
Attention: Kathleen J. McKee

Either Party may change its mailing address at any time by giving written notice of such change to the other Party in the manner provided herein. All notices under this Agreement shall be deemed given, received, made, or communicated on the date personal delivery is effected or, if mail, on the delivery date or attempted delivery date shown on the return receipt.

7.7 Exhibits. The Exhibits attached hereto are deemed incorporated into this Agreement in their entirety by reference.

7.8 Time. Time is of the essence in this Agreement for each and every term, provision and condition for which time is a factor.

7.9 Remedies Cumulative. No remedy or election hereunder shall be deemed exclusive but shall, wherever possible, be cumulative with all other remedies at law or in equity. The waiver or failure to enforce any provision of this Agreement shall not operate as a waiver of any future breach of such provision or of any other provision hereof.

7.10 Construction. The Parties acknowledge and agree that each has been given the opportunity to review this Agreement with legal counsel independently, and/or has the requisite experience and sophistication to understand, interpret, and agree to the particular language of these provisions. In the event of an ambiguity in or dispute regarding the interpretation of same, the interpretation of this Agreement shall not be resolved by any rule of interpretation providing for interpretation against the party who causes the uncertainty to exist or against the draftsman.

7.11 Choice of Law. This Agreement has been negotiated and executed in the State of California and shall be governed and construed by the laws of that state without regard to the conflicts of laws principles.

7.12 Captions. The captions, headings, and titles to the various articles and paragraphs of this Agreement are not a part of this Agreement, are for convenience and identification only, and shall have no effect upon the construction or interpretation of any part hereof.

7.13 No Third Party Benefit. This Agreement is by and between the parties named herein, and unless expressly provided in the foregoing provisions no third party shall be benefited hereby. This Agreement may not be enforced by anyone other than a party hereto or a successor to such party who has acquired his/her/its interest in a way permitted by the above provisions.

7.14 Force Majeure. The obligations of any Party under this Agreement and all deadlines by which any Party's obligations must be performed, shall be excused or extended for a period of time equal to any prevention, delay or stoppage in performance which is attributable to any strike, lock-out or other labor or industrial disturbance, civil disturbance, act of a public enemy, war, riot, sabotage, blockade, embargo, lightning, earthquake, fire, storm, hurricane, tornado, flood or explosion.

7.15 Recording the Mitigation Agreement. Within 30 days of District's receipt of notice from Developer (or Developer's successor) that Developer is the legal owner of the Property, District shall cause this Agreement to be recorded in the official records of the County.

7.16 Binding. Developer acknowledges that District's support of the Project is in consideration of the terms contained in this Agreement. Therefore, this Agreement shall be recorded in the County Recorder's Office and shall bind and inure to Developer's successors and assigns; provided, however, that individual purchasers of Units shall not be deemed successors and assigns of the Developer.

7.17 Termination. This Agreement shall automatically terminate ten years after the Effective Date unless all of the conditions listed below have been met within that ten year period:

7.17.1 This Agreement is recorded against the Property in the official records of the County;

7.17.2 One or more final subdivision maps, for a total of no fewer than fifty (50) Units within the Project is recorded; and,

7.17.3 Developer has deposited with the District an amount equal to Mitigation Payments for no fewer than twenty (20) Units within the Project. As a result of such deposit, Developer shall receive a credit against the Mitigation Payments due for twenty (20) Units.

7.18 Governing Board Approval. This Agreement is subject to the approval or ratification of the District's Board of Trustees.

[Signatures on following page]

IN WITNESS WHEREOF, the Parties have executed this Agreement as of the dates set forth below.

DISTRICT

PERRIS UNION HIGH SCHOOL DISTRICT

Date: 5/27/15

Name: Nick Newkirk

Title: Purchasing Agent

DEVELOPER

GLOBAL INVESTMENT POOL LLC

Date: 5/28/2015

Joseph Rivani

Name: JOSEPH RIVANI

Title: MANAGER

Date: _____

Name: _____

Title: _____

EXHIBIT A

LEGAL DESCRIPTION

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

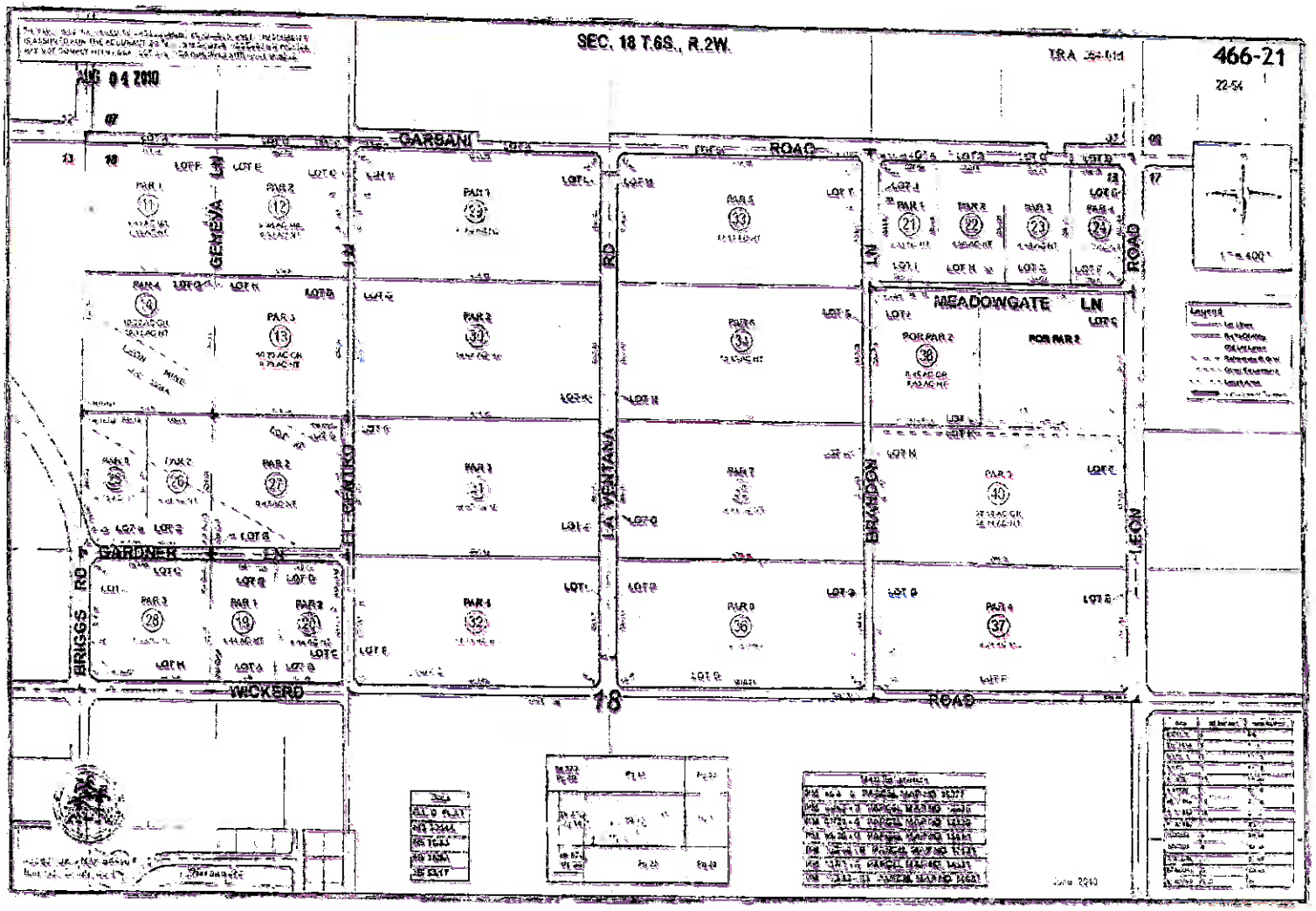
PARCEL 1: (APN: 466-210-029, 466-210-030, 466-210-031, 466-210-032, 466-210-033, 466-210-034, 466-210-035 AND 466-210-036)

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.



First American Title

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.

Katherine Heumann 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

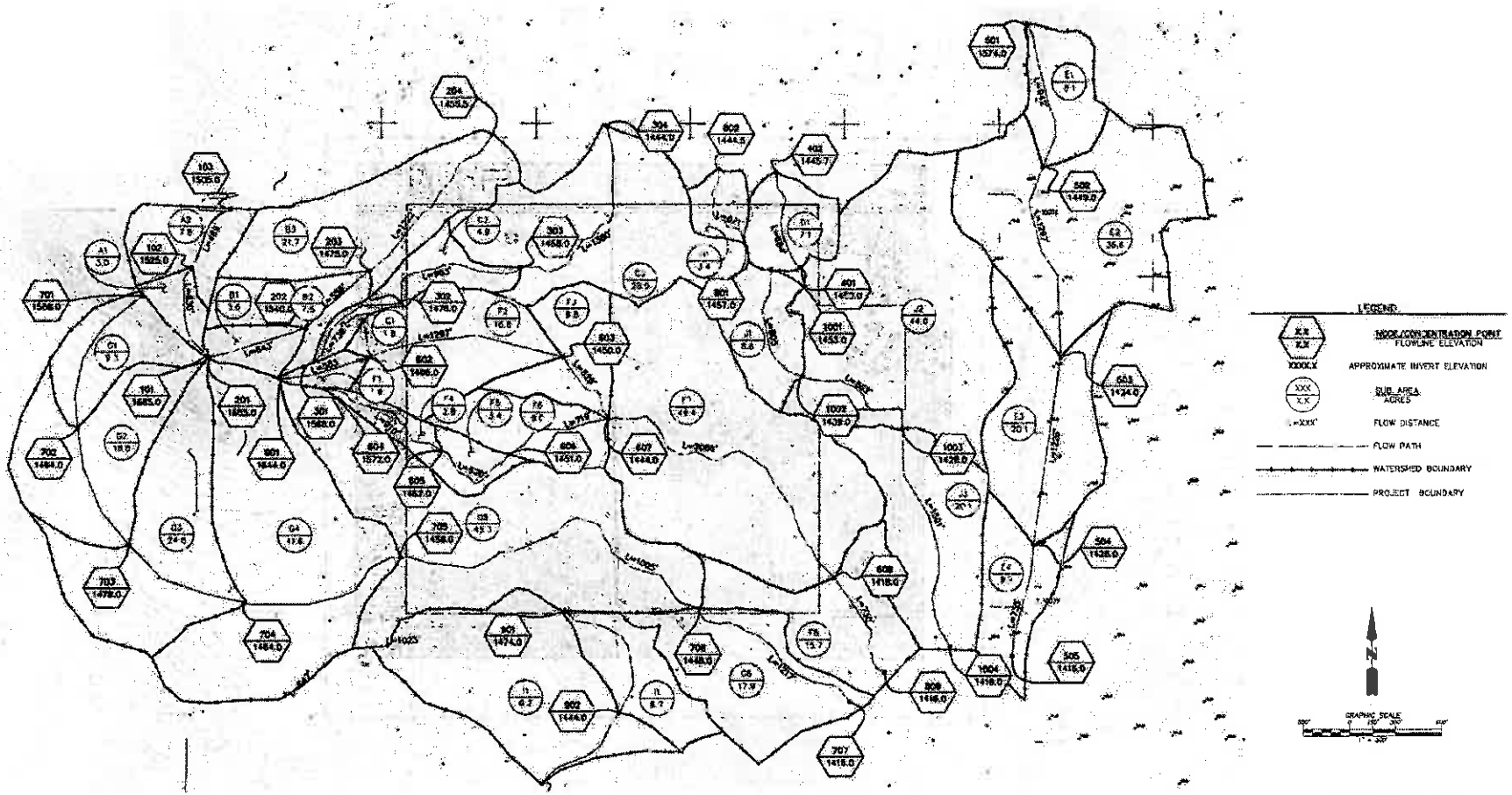


EXHIBIT "A"

JLC Engineering & Consulting, Inc.
36265 CALLE DE LORO
MURRIETA, CA 92562
PH. 951.304.9551 FAX 951.304.3568

TTM 36785

PRE-PROJECT CONDITION SITE HYDROLOGY MAP

Item 1

SHEET 1 OF 1

TENTATIVE TRACT MAP 36785

COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

POST-PROJECT CONDITION OFFSITE HYDROLOGY MAP

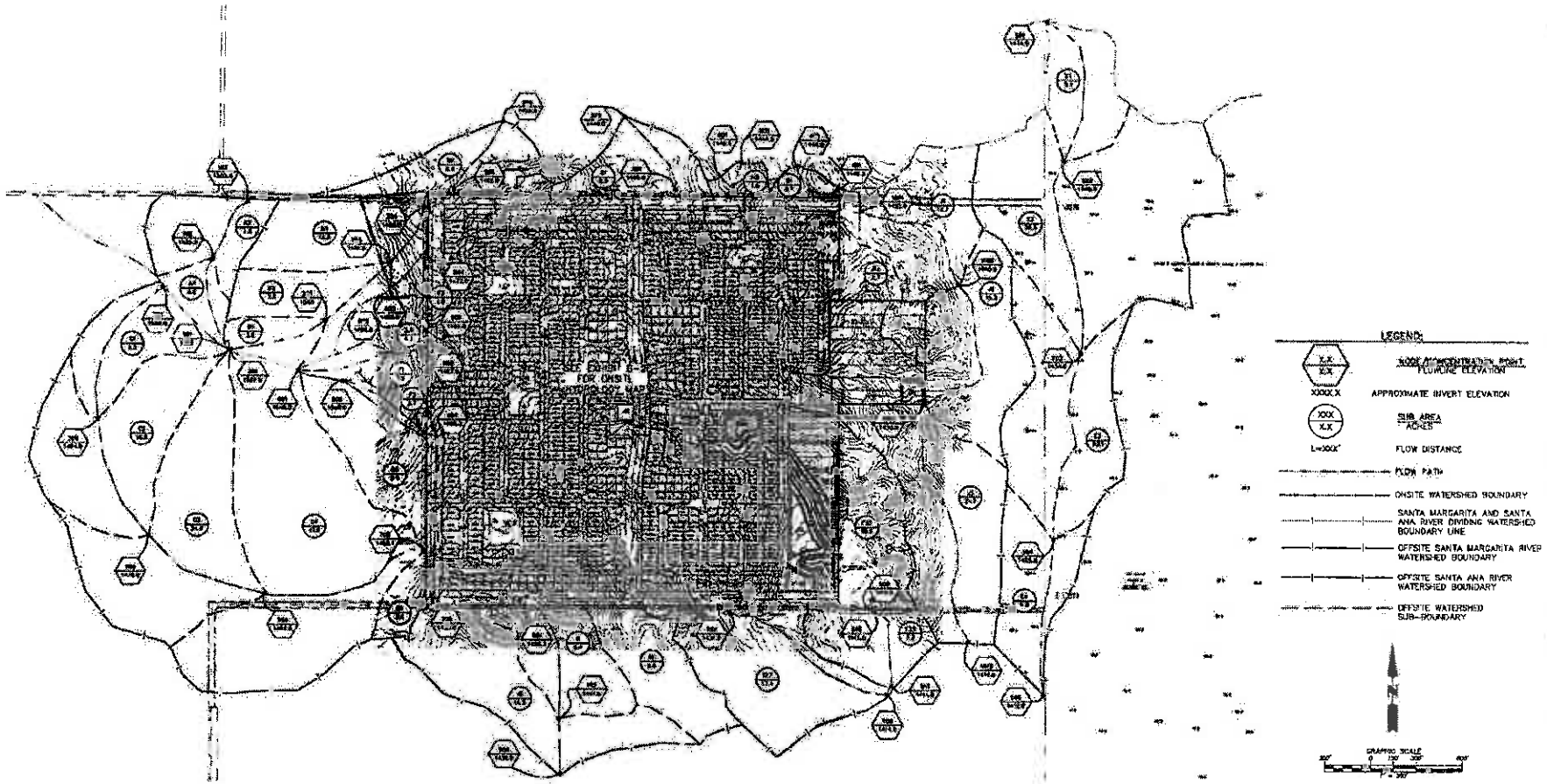


EXHIBIT "B-1"

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TTM 36875

POST-PROJECT CONDITION OFFSITE HYDROLOGY MAP

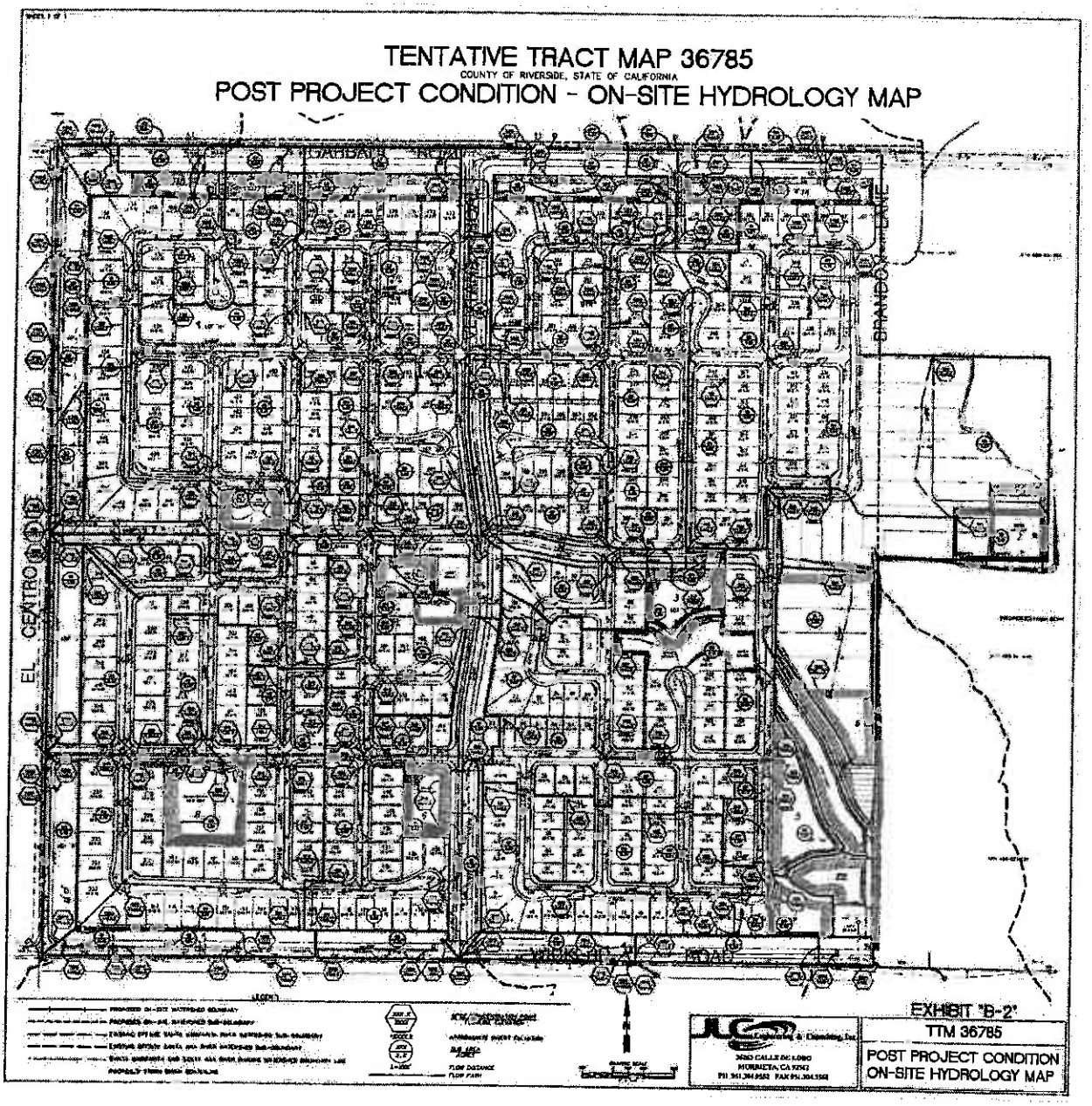
Item 2.

Item 3.

TENTATIVE TRACT MAP 36785

COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

POST PROJECT CONDITION - ON-SITE HYDROLOGY MAP



Item 4.

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.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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.)
```

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Pervious area fraction = 0.500

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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

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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)


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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


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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


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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
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)


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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.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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


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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.
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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.
```

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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
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Item 5. c.

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                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



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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


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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.)
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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.)


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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
```

```
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)
```

Pervious area fraction = 0.500

++
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.

++
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 No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (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.)

++
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.)

```
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


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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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)


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Process from Point/Station       314.000 to Point/Station       317.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1437.000(Ft.)
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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.


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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


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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


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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.


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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.)


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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


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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.)


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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.


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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


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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
```

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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.)


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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.


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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


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


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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.)


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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.)
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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.

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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.

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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: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

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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


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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


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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)
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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.)


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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.)


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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.)
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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.

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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

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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)

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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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.

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                    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.)
```

```
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 ****
____________________________________________________________________________________
```

```
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
```

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


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      604.000 to Point/Station      605.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1472.000(Ft.)
```

```
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 ****
```

```
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


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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.


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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.)


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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.


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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.)


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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 S.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

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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.)


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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.


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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


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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


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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.
```

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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)


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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.


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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.)
```

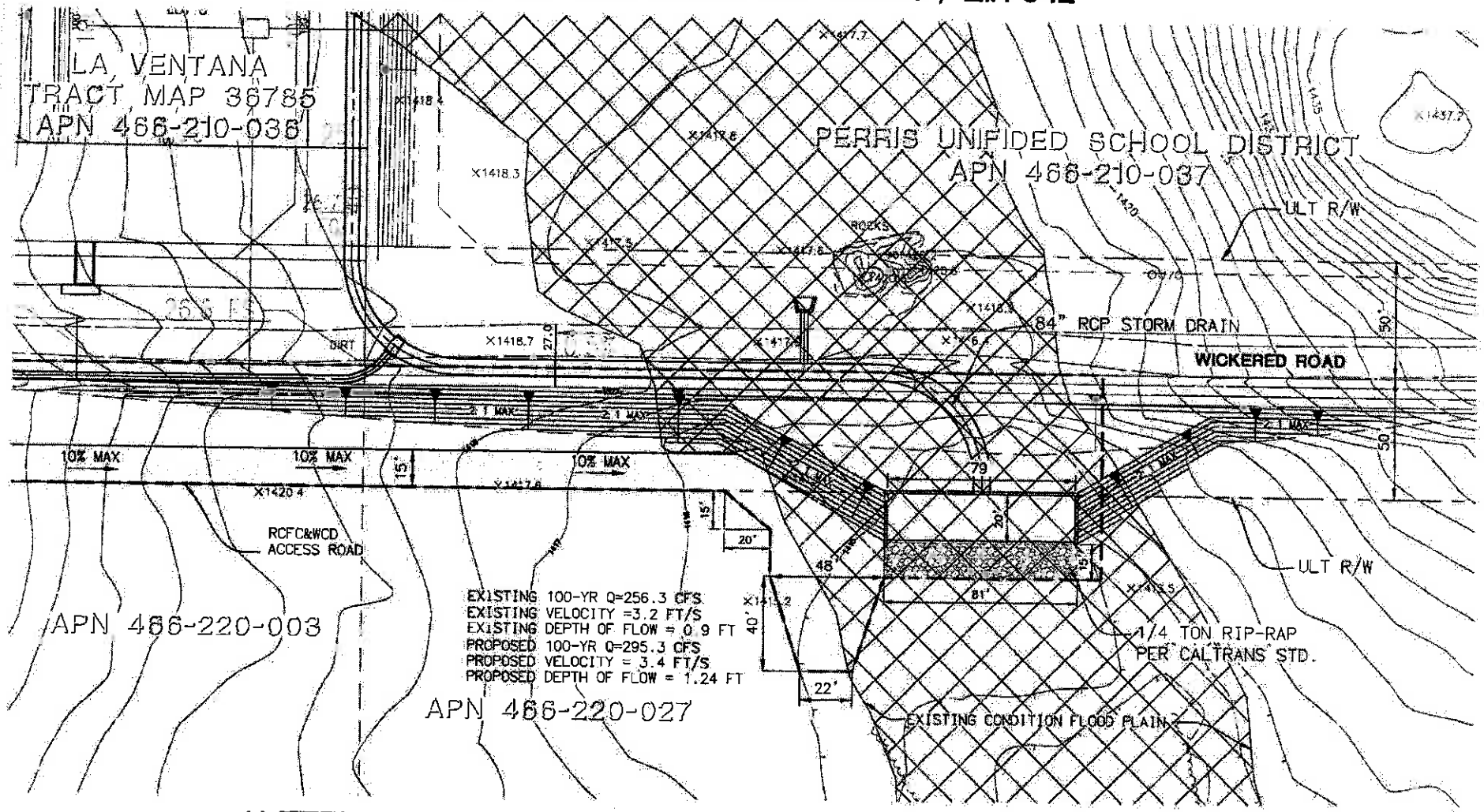
```
Channel base width     =     5.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
Manning's 'N'     = 0.025
Maximum depth of channel  =     2.000(Ft.)
Flow(q) thru subarea =       5.153(CFS)
Depth of flow =   0.297(Ft.), Average velocity =   3.097(Ft/s)
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

GRAPHIC SCALE
1" = 40'

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FIGURE A-1

Item 6.

Item 7.

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

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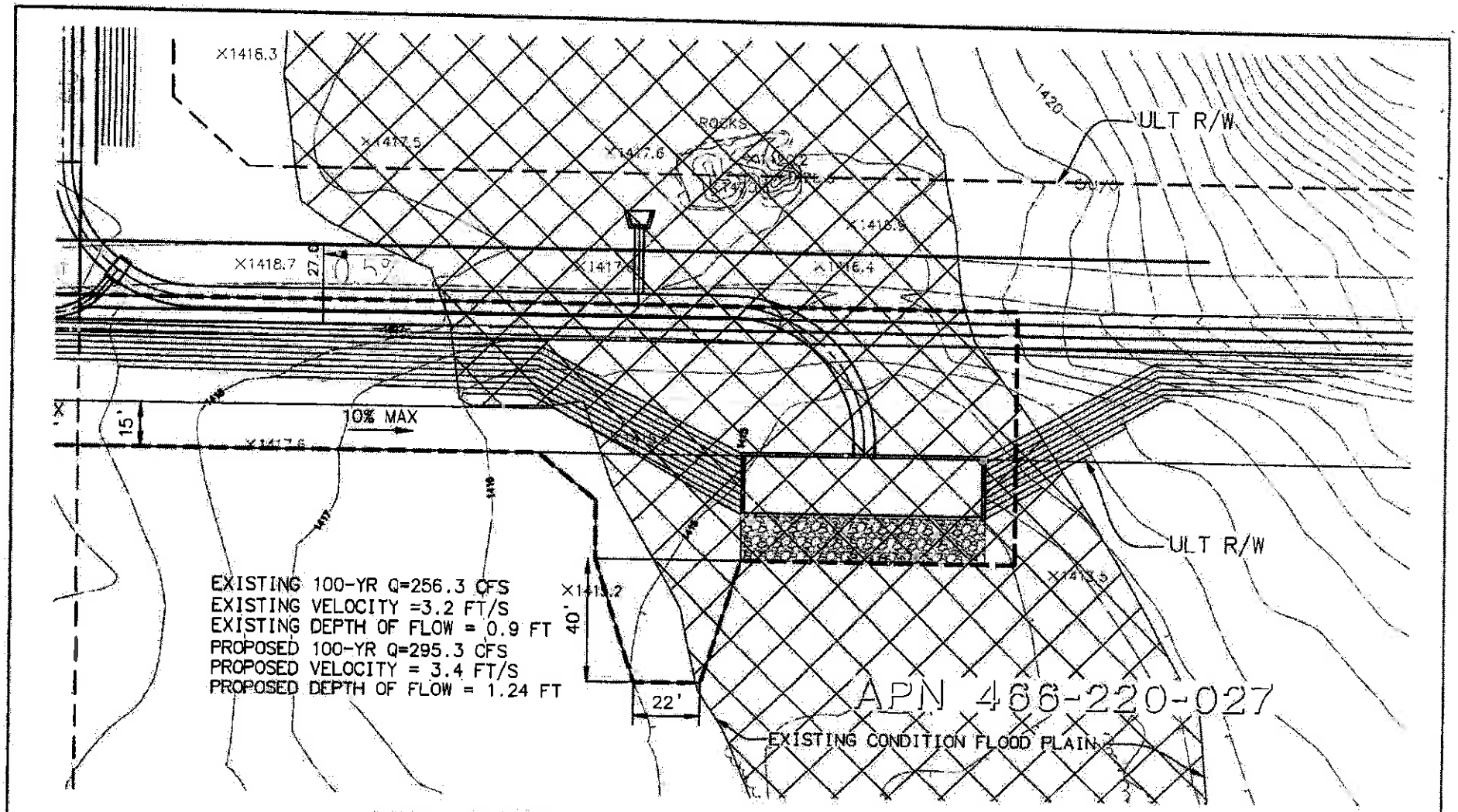

LINE 1 STORM DRAIN OUTLET
PROPOSED ACCESS AND EASEMENT

GRAPHIC SCALE
30 0 15 30 60
1" = 30'

N

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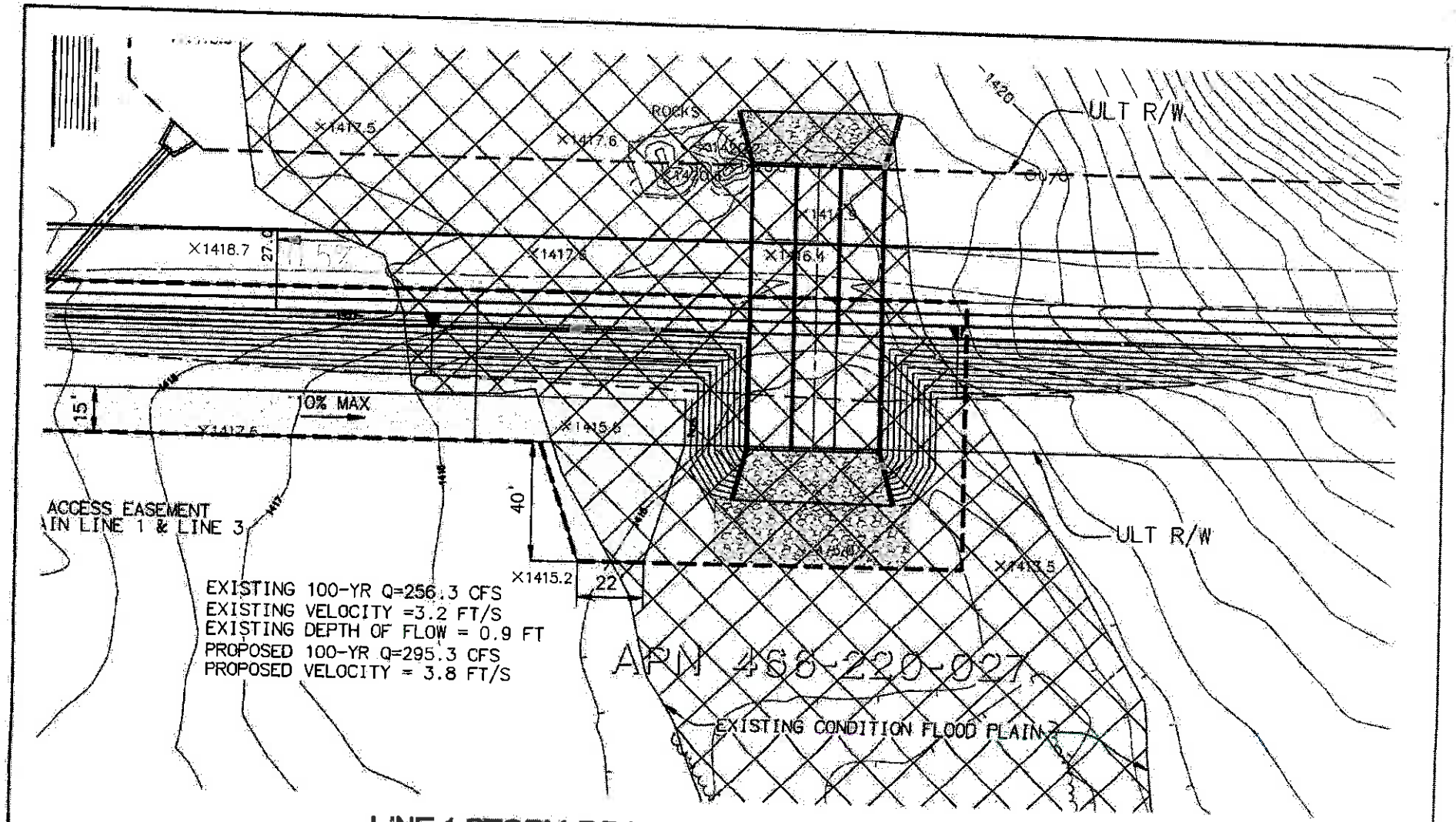
FIGURE A-1



LINE 1 STORM DRAIN OUTLET
PROPOSED ACCESS AND EASEMENT

Rejected

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FIGURE A-1