



**Preliminary Drainage Study  
Professional Auto Transport  
Proposed Car Hauling Facility  
APN 3039-321-08  
City of Hesperia  
July 27, 2020**

**Prepared for/Applicant:**

Professional Auto Transport  
Attn: Mr. David Floyd  
4513 Parkhurst Street  
Jurupa Valley, CA 91752

### **Introduction:**

The project proposes to develop the currently vacant subject site. The development of the site includes the construction of an approximate 12,765 square foot building to be utilized as a Professional Auto Transport facility. The development also consists of the construction of a parking lot, asphalt paving and perimeter landscaping and improvements. Two driveways are proposed to provide access to the site. The purpose of this study is to analyze the pre-development flows, post-development flows and proposed drainage mitigation improvements.

### **Description:**

The project site is approximately 10.08 net acres in size and consists of one parcel: APN 3039-321-08 located on the west side of Caliente Road, approximately 400 feet north of Joshua Street, in the City of Hesperia. The site is currently vacant with poor land cover, and it is populated by Joshua Trees. The site is bounded along the northerly and southerly property lines with an approximate 6 foot high chain link fence. The site's northerly boundary is adjacent to APN 3039-321-03, which is utilized as a manufacturing facility. That site drains north, and it does not contribute any tributary flows to the subject site. The site's easterly boundary is adjacent to the right of way for Caliente Road, which also drains north. The site's westerly boundary is adjacent to APN 3039-321-05 & 07. These two properties drain west, then northeast in a drainage wash before entering the Oro Grande Wash and the Mojave River. The project site's southerly boundary is adjacent to APN 3039-321-09. This site is partially developed, and it is utilized as a manufacturing facility. The easterly portion of the property (developed portion) is graded to retain drainage onsite. The westerly portion is undeveloped, and it is tributary to the subject site. It is included in this study.

Caliente Road is a partially improved roadway with asphalt concrete pavement adjacent to the project site. The street consists of curb, gutter, & sidewalk directly south of the project site, and curb & gutter directly north of the project site. The development proposes to improve the project frontage by dedicating additional right of way, and constructing a new concrete curb, gutter, & sidewalk, along with two new concrete driveway approaches.

The existing site drains as sheet flow from the southwest corner to the northeast corner of the site at an approximate grade of 2.1%. The majority of the flows from the site enter APN 3039-321-03 and Caliente Road right of way. Combined flows at Caliente Road are directed north along an existing curb & gutter on Caliente Road, then east toward Highway 395, then north before entering the aforementioned drainage wash, Oro Grande Wash, and ultimately entering the Mojave River. A small tributary area of the west side of the project site drains west to the existing drainage wash, similar to APN 3039-321-05 & 07, as mentioned above.

The proposed development of the site includes the construction of a proposed Professional Auto Transport facility with related parking, paved access and landscaping. The majority of post development flows will be directed via ribbon gutter or curb & gutter to a proposed catch basin located at the northeasterly corner of the site. Flows will then be directed via storm drain to a detention tank. The tank will be connected to a drywell system, which will allow flows to infiltrate for water quality treatment. Uninfiltrated flows from back to back 100-year storms will leave the site via an overflow pipe to the Caliente Road gutter via an under sidewalk drain near the northerly property line. The southeasterly portion of the site, which contains the proposed building and associated parking, will drain to two proposed above ground infiltration basins. Uninfiltrated flows will overflow through a proposed under sidewalk drain located between the two proposed driveways on Caliente Road. Flows from the area to remain natural on the west side of the site will be allowed to enter the two adjacent properties that drain toward the drainage wash as they do historically. Flows from the landscaped area along the north side of the site adjacent to Caliente Road will be allowed to enter Caliente Road. Tributary flows from APN 3039-321-09 will be captured by a proposed concrete v-ditch and directed to a proposed parkway drain to allow flows to enter Caliente Road as they have historically.

### **Purpose**

The purpose of this study is to analyze the flows to and through the site, both pre-development and post-development. Further, the mitigation measures proposed will be discussed to demonstrate that the additional flows from the development will not have a negative impact on the downstream properties.

### **Analysis**

To achieve the desired goal the following steps will be taken:

- Determine the 10 and 100 year, 24-hour pre-development flows and volumes. Note the pre-development flows currently drain into Caliente Road, APN 3039-321-03, and the drainage wash to the west. The portion of APN 3039-321-09 that is tributary to the project site is also included.
- Determine the 10 and 100 year, 24-hour post-development flows and volumes. Note the post-development flows will be directed to four areas. The first area (Area A) includes the developed portion of the site that drains to the proposed catch basin at the northeast corner of the site. The second area (Area B & C) includes the developed portion on the southeasterly portion of the site. The third area (Area D) includes the landscaped areas adjacent to Caliente Road right of way, which will be allowed to drain into the public right of way. The fourth area (Area E) includes the area to remain natural along the west property line allowed to enter the drainage wash.

- Identify the proposed mitigation and discuss the potential impacts the development of the site would have on the downstream properties.

## Results

Rainfall Values (per reference NOAA Precipitation Frequency, Figure 6.1):

$$Y_{10} = 0.816$$

$$Y_{100} = 1.36$$

Soil Group (per reference Soil Group Map in appendix, Figure 6.2): B

### 1A. PRE-DEVELOPMENT FLOWS- (NODE 1 TO NODE 2)

10-year peak flows:  $Q_{10} = 13.65$  CFS

10-year time of concentration:  $T_{C10} = 17.44$  min

24-hour runoff Volume = 60,984 CF

100-year peak flows:  $Q_{100} = 27.01$  CFS

100-year time of concentration:  $T_{C100} = 17.44$  min

24-hour runoff Volume = 187,744 CF

### 1B. PRE-DEVELOPMENT FLOWS- (NODE 3 TO NODE 4)

10-year peak flows:  $Q_{10} = 0.92$  CFS

10-year time of concentration:  $T_{C10} = 5.00$  min

100-year peak flows:  $Q_{100} = 1.63$  CFS

100-year time of concentration:  $T_{C100} = 5.00$  min

### 1C. PRE-DEVELOPMENT FLOWS – APN 3039-321-09 (NODE 5 TO NODE 6)

10-year peak flows:  $Q_{10} = 5.35$  CFS

10-year time of concentration:  $T_{C10} = 12.17$  min

100-year peak flows:  $Q_{100} = 10.12$  CFS

100-year time of concentration:  $T_{C100} = 12.17$  min

### 2A. POST-DEVELOPMENT FLOWS- (NODES 1 TO NODE 2)

10-year peak flows:  $Q_{10} = 20.98$  CFS

10-year time of concentration:  $T_{C10} = 10.94$  min

24-hour runoff Volume = 101,059 CF



**100-year peak flows:  $Q_{100} = 35.27$  CFS**  
**100-year time of concentration:  $T_{C100} = 10.27$  min**  
**24-hour runoff Volume = 182,081 CF**

**2B. POST-DEVELOPMENT FLOWS- (AREA B, NODE 3 TO NODE 4)**

**10-year peak flows:  $Q_{10} = 2.67$  CFS**  
**10-year time of concentration:  $T_{C10} = 5.31$  min**

**100-year peak flows:  $Q_{100} = 4.45$  CFS**  
**100-year time of concentration:  $T_{C100} = 5.31$  min**

**2C. POST-DEVELOPMENT FLOWS- (AREA C, NODE 5 TO NODE 6)**

**10-year peak flows:  $Q_{10} = 1.71$  CFS**  
**10-year time of concentration:  $T_{C10} = 5.67$  min**  
**24-hour runoff Volume = 10,019 CF**

**100-year peak flows:  $Q_{100} = 2.86$  CFS**  
**100-year time of concentration:  $T_{C100} = 5.67$  min**  
**24-hour runoff Volume = 20,909 CF**

**2D. POST-DEVELOPMENT FLOWS- LANDSCAPED AREA (NODE 7 TO NODE 8)**

**10-year peak flows:  $Q_{10} = 0.43$  CFS**  
**10-year time of concentration:  $T_{C10} = 5.00$  min**  
**24-hour runoff Volume = 436 CF**

**100-year peak flows:  $Q_{100} = 0.80$  CFS**  
**100-year time of concentration:  $T_{C100} = 5.00$  min**  
**24-hour runoff Volume = 1,743 CF**

**DRAINAGE IMPACTS**

- Pre-development: The site currently drains into Caliente Road Right of Way, APN 3039-321-03, and west drainage wash. Tributary flows from APN 3039-321-09 enter the project site as sheet flow, and they continue through the site as sheet flow until they ultimately enter Caliente Road.
- Post-development: Area A will be directed to an underground detention tank and drywells sized for water quality purposes. The full capacity of that system is 47,923 cubic feet, which includes the 43,110 cubic feet detention tank and 4,813 cubic feet from the drywell system.

- Post-development: Area B and Area C will drain to the proposed above ground basins on the east side of the site. They provide a retention volume of 2,827 cubic feet.
- Post-development: Area D will drain into the Caliente Road Right of way. Area E will drain to the drainage wash to the west. Flows from APN 3039-321-09 will be directed around the proposed development via a proposed concrete v-ditch along the project site's south property line that will direct flows through a proposed parkway drain to Caliente Road.
- The pre-development and post-development flow volumes from the project site tributary to the Caliente Road right of way are summarized in the following table. Associated calculations can be found in the appendix. The total onsite storage volume provided is 50,750 cubic feet. As shown on the table, additional flows generated from the development will be contained onsite.

	Pre-development	Post-development	Difference
10-year volume	60,984 cubic feet	111,514 cubic feet	50,530 cubic feet
100-year volume	187,744 cubic feet	204,733 cubic feet	16,989 cubic feet

## Conclusion

The increased post-development flow volumes from the development area will be contained within the proposed underground detention tank and above ground basins. Therefore, there will be no increased flows leaving the site. If large back to back storm occur before flows infiltrate, an overflow has been provided to direct flows to Caliente Road. Additionally, pre-development flows entering the property to the north (APN 3039-321-03) have been mitigated completely in the post-development condition as a result of the development. Flows from APN 3039-321-09 will enter Caliente Road as they have historically.

Prepared By:

Reviewed By:

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Rob Lane, E.I.T. 157676

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Patrick C. Flanagan, Jr., P.E.  
RCE 86046      Exp 9/30/20

## **APPENDIX**

<b>Figure 1.1</b>	<b>PRE-DEVELOPMENT FLOW CALCULATIONS – 10-YEAR STORM</b>
<b>Figure 1.2</b>	<b>PRE-DEVELOPMENT FLOW CALCULATIONS – 100-YEAR STORM</b>
<b>Figure 2.1</b>	<b>POST-DEVELOPMENT FLOW CALCULATIONS – 10-YEAR STORM</b>
<b>Figure 2.2</b>	<b>POST-DEVELOPMENT FLOW CALCULATIONS – 100-YEAR STORM</b>
<b>Figure 3.1</b>	<b>PRE-DEVELOPMENT LOW LOSS – 10-YEAR STORM</b>
<b>Figure 3.2</b>	<b>PRE-DEVELOPMENT LOW LOSS – 100-YEAR STORM</b>
<b>Figure 3.3</b>	<b>POST-DEVELOPMENT LOW LOSS (AREA A) – 10-YEAR STORM</b>
<b>Figure 3.4</b>	<b>POST-DEVELOPMENT LOW LOSS (AREA A) – 100-YEAR STORM</b>
<b>Figure 3.5</b>	<b>POST-DEVELOPMENT LOW LOSS (AREA B &amp; C) – 10-YEAR STORM</b>
<b>Figure 3.6</b>	<b>POST-DEVELOPMENT LOW LOSS (AREA B &amp; C) – 100-YEAR STORM</b>
<b>Figure 3.7</b>	<b>POST-DEVELOPMENT LOW LOSS (AREA D) – 10-YEAR STORM</b>
<b>Figure 3.8</b>	<b>POST-DEVELOPMENT LOW LOSS (AREA D) – 100-YEAR STORM</b>
<b>Figure 4.1</b>	<b>PRE-DEVELOPMENT HYDROGRAPH – 10-YEAR STORM</b>
<b>Figure 4.2</b>	<b>PRE-DEVELOPMENT HYDROGRAPH – 100-YEAR STORM</b>
<b>Figure 4.3</b>	<b>POST-DEVELOPMENT HYDROGRAPH (AREA A) – 10-YEAR STORM</b>
<b>Figure 4.4</b>	<b>POST-DEVELOPMENT HYDROGRAPH (AREA A) – 100-YEAR STORM</b>
<b>Figure 4.5</b>	<b>POST-DEVELOPMENT HYDROGRAPH (AREA B &amp; C) – 10-YEAR STORM</b>
<b>Figure 4.6</b>	<b>POST-DEVELOPMENT HYDROGRAPH (AREA B &amp; C) – 100-YEAR STORM</b>
<b>Figure 4.7</b>	<b>POST-DEVELOPMENT HYDROGRAPH (AREA D) – 10-YEAR STORM</b>
<b>Figure 4.8</b>	<b>POST-DEVELOPMENT HYDROGRAPH (AREA D) – 100-YEAR STORM</b>

**Figure 5.1     DRYWELL DETAIL**

**Figure 6.1     NOAA ATLAS 14, VOLUME 6, VERSION 2 POINT PRECIPITATION**

**Figure 6.2     SOIL GROUP**

**Figure 7.1     PRE-DEVELOPMENT TRIBUTARY MAP**

**Figure 7.2     POST-DEVELOPMENT TRIBUTARY MAP**

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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
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Analysis prepared by:

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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* APN 3039-321-08 \*  
\* PRE-DEVELOPMENT DRAINAGE STUDY \*  
\* 10-YEAR STORM EVENT \*  
\*\*\*\*\*

FILE NAME: 173001PR.DAT  
TIME/DATE OF STUDY: 14:08 07/27/2020

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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--\*TIME-OF-CONCENTRATION MODEL\*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*  
10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 0.816  
100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.360  
COMPUTED RAINFALL INTENSITY DATA:  
STORM EVENT = 10.00 1-HOUR INTENSITY(INCH/HOUR) = 0.8242  
SLOPE OF INTENSITY DURATION CURVE = 0.7000

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD\*

\*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL\*

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)

\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*

\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

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*****
FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE = 21
-----
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 903.00
ELEVATION DATA: UPSTREAM(FEET) = 90.20 DOWNSTREAM(FEET) = 72.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 17.440
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.957
SUBAREA Tc AND LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS      Tc
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
NATURAL POOR COVER
"GRASS"                B        9.84      0.42      1.000      78      17.44
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.42
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 13.65
TOTAL AREA(ACRES) = 9.84 PEAK FLOW RATE(CFS) = 13.65

*****
FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE = 21
-----
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 55.00
ELEVATION DATA: UPSTREAM(FEET) = 82.00 DOWNSTREAM(FEET) = 73.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.693
SUBAREA Tc AND LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS      Tc
    LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
NATURAL POOR COVER
"GRASS"                B        0.24      0.42      1.000      78      5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.42
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 0.92
TOTAL AREA(ACRES) = 0.24 PEAK FLOW RATE(CFS) = 0.92

*****
FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE = 21
-----
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 386.00
ELEVATION DATA: UPSTREAM(FEET) = 98.00 DOWNSTREAM(FEET) = 89.40

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20

```

SUBAREA ANALYSIS USED MINIMUM  $T_c$ (MIN.) = 12.168  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.518  
 SUBAREA  $T_c$  AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	$F_p$ (INCH/HR)	$A_p$ (DECIMAL)	SCS CN	$T_c$ (MIN.)
NATURAL POOR COVER "GRASS"	B	2.83	0.42	1.000	78	12.17

SUBAREA AVERAGE PERVIOUS LOSS RATE,  $F_p$ (INCH/HR) = 0.42  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION,  $A_p$  = 1.000  
 SUBAREA RUNOFF(CFS) = 5.35  
 TOTAL AREA(ACRES) = 2.83 PEAK FLOW RATE(CFS) = 5.35

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 2.8  $T_c$ (MIN.) = 12.17  
 EFFECTIVE AREA(ACRES) = 2.83 AREA-AVERAGED  $F_m$ (INCH/HR)= 0.42  
 AREA-AVERAGED  $F_p$ (INCH/HR) = 0.42 AREA-AVERAGED  $A_p$  = 1.000  
 PEAK FLOW RATE(CFS) = 5.35

=====

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END OF RATIONAL METHOD ANALYSIS

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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--\*TIME-OF-CONCENTRATION MODEL\*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*  
10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 0.816  
100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.360  
COMPUTED RAINFALL INTENSITY DATA:  
STORM EVENT = 100.00 1-HOUR INTENSITY(INCH/HOUR) = 1.3600  
SLOPE OF INTENSITY DURATION CURVE = 0.7000

\*ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD\*

\*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL\*

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT- / PARK- SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)

\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*

\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED



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*****
FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE = 21
-----
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 903.00
ELEVATION DATA: UPSTREAM(FEET) = 90.20 DOWNSTREAM(FEET) = 72.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 17.440
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.230
SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS      Tc
    LAND USE          GROUP  (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
NATURAL POOR COVER
"GRASS"                B        9.84      0.18      1.000      93      17.44
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.18
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 27.01
TOTAL AREA(ACRES) = 9.84 PEAK FLOW RATE(CFS) = 27.01

*****
FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE = 21
-----
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 55.00
ELEVATION DATA: UPSTREAM(FEET) = 82.00 DOWNSTREAM(FEET) = 73.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 7.744
SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS      Tc
    LAND USE          GROUP  (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
NATURAL POOR COVER
"GRASS"                B        0.24      0.18      1.000      93      5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.18
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 1.63
TOTAL AREA(ACRES) = 0.24 PEAK FLOW RATE(CFS) = 1.63

*****
FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE = 21
-----
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 386.00
ELEVATION DATA: UPSTREAM(FEET) = 98.00 DOWNSTREAM(FEET) = 89.40

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20

```

SUBAREA ANALYSIS USED MINIMUM  $T_c(\text{MIN.}) = 12.168$   
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.155  
 SUBAREA  $T_c$  AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	$F_p$ (INCH/HR)	$A_p$ (DECIMAL)	SCS CN	$T_c$ (MIN.)
NATURAL POOR COVER "GRASS"	B	2.83	0.18	1.000	93	12.17

SUBAREA AVERAGE PERVIOUS LOSS RATE,  $F_p(\text{INCH/HR}) = 0.18$   
 SUBAREA AVERAGE PERVIOUS AREA FRACTION,  $A_p = 1.000$   
 SUBAREA RUNOFF(CFS) = 10.12  
 TOTAL AREA(ACRES) = 2.83 PEAK FLOW RATE(CFS) = 10.12

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 2.8 TC(MIN.) = 12.17  
 EFFECTIVE AREA(ACRES) = 2.83 AREA-AVERAGED  $F_m(\text{INCH/HR}) = 0.18$   
 AREA-AVERAGED  $F_p(\text{INCH/HR}) = 0.18$  AREA-AVERAGED  $A_p = 1.000$   
 PEAK FLOW RATE(CFS) = 10.12

=====

END OF RATIONAL METHOD ANALYSIS

\*\*\*\*\*

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)  
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Analysis prepared by:

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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* APN 3039-321-08 \*  
\* POST-DEVELOPMENT DRAINAGE STUDY \*  
\* 10-YEAR STORM EVENT \*  
\*\*\*\*\*

FILE NAME: 173001PO.DAT  
TIME/DATE OF STUDY: 09:55 07/28/2020

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--\*TIME-OF-CONCENTRATION MODEL\*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*  
10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 0.816  
100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.360  
COMPUTED RAINFALL INTENSITY DATA:  
STORM EVENT = 10.00 1-HOUR INTENSITY(INCH/HOUR) = 0.8242  
SLOPE OF INTENSITY DURATION CURVE = 0.7000

\*ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD\*

\*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL\*

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT- / PARK- SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)

\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*

\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

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*****
FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE = 21
-----
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH( FEET) = 1047.00
ELEVATION DATA: UPSTREAM( FEET) = 90.00 DOWNSTREAM( FEET) = 71.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 10.942
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.712
SUBAREA Tc AND LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS      Tc
    LAND USE          GROUP  (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL            B      8.84    0.75    0.100    56    10.94
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 20.98
TOTAL AREA(ACRES) = 8.84 PEAK FLOW RATE(CFS) = 20.98

*****
FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE = 21
-----
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH( FEET) = 210.00
ELEVATION DATA: UPSTREAM( FEET) = 83.50 DOWNSTREAM( FEET) = 77.80

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.309
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.500
SUBAREA Tc AND LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS      Tc
    LAND USE          GROUP  (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL            B      0.67    0.75    0.100    56     5.31
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.67
TOTAL AREA(ACRES) = 0.67 PEAK FLOW RATE(CFS) = 2.67

*****
FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE = 21
-----
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH( FEET) = 187.00
ELEVATION DATA: UPSTREAM( FEET) = 78.90 DOWNSTREAM( FEET) = 76.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.669
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.298

```

SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	B	0.45	0.75	0.100	56	5.67

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100  
 SUBAREA RUNOFF(CFS) = 1.71  
 TOTAL AREA(ACRES) = 0.45 PEAK FLOW RATE(CFS) = 1.71

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 7.00 TO NODE 8.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
 =====

INITIAL SUBAREA FLOW-LENGTH( FEET) = 25.00  
 ELEVATION DATA: UPSTREAM( FEET) = 72.50 DOWNSTREAM( FEET) = 72.00

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$   
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 4.693  
 SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL ".4 DWELLING/ACRE"	B	0.12	0.75	0.900	56	5.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900  
 SUBAREA RUNOFF(CFS) = 0.43  
 TOTAL AREA(ACRES) = 0.12 PEAK FLOW RATE(CFS) = 0.43

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 9.00 TO NODE 10.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<  
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<  
 =====

INITIAL SUBAREA FLOW-LENGTH( FEET) = 896.00  
 ELEVATION DATA: UPSTREAM( FEET) = 98.00 DOWNSTREAM( FEET) = 89.40

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$   
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 20.167  
 \* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.768  
 SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL POOR COVER "BARREN"	B	2.83	0.27	1.000	86	20.17

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.27  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000  
 SUBAREA RUNOFF(CFS) = 3.81  
 TOTAL AREA(ACRES) = 2.83 PEAK FLOW RATE(CFS) = 3.81

\*\*\*\*\*

FLOW PROCESS FROM NODE 11.00 TO NODE 12.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH( FEET) = 55.00

ELEVATION DATA: UPSTREAM( FEET) = 82.00 DOWNSTREAM( FEET) = 73.00

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$

SUBAREA ANALYSIS USED MINIMUM  $T_c$ ( MIN.) = 5.000

\* 10 YEAR RAINFALL INTENSITY( INCH/HR) = 4.693

SUBAREA  $T_c$  AND LOSS RATE DATA( AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA ( ACRES)	$F_p$ ( INCH/HR)	$A_p$ ( DECIMAL)	SCS CN	$T_c$ ( MIN.)
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NATURAL POOR COVER

"GRASS"	B	0.24	0.42	1.000	78	5.00
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SUBAREA AVERAGE PERVIOUS LOSS RATE,  $F_p$ ( INCH/HR) = 0.42

SUBAREA AVERAGE PERVIOUS AREA FRACTION,  $A_p$  = 1.000

SUBAREA RUNOFF( CFS) = 0.92

TOTAL AREA( ACRES) = 0.24 PEAK FLOW RATE( CFS) = 0.92

END OF STUDY SUMMARY:

TOTAL AREA( ACRES) = 0.2  $T_c$ ( MIN.) = 5.00

EFFECTIVE AREA( ACRES) = 0.24 AREA-AVERAGED  $F_m$ ( INCH/HR) = 0.42

AREA-AVERAGED  $F_p$ ( INCH/HR) = 0.42 AREA-AVERAGED  $A_p$  = 1.000

PEAK FLOW RATE( CFS) = 0.92

END OF RATIONAL METHOD ANALYSIS

\*\*\*\*\*

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\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* APN 3039-321-08 \*  
\* POST-DEVELOPMENT DRAINAGE STUDY \*  
\* 100-YEAR STORM EVENT \*  
\*\*\*\*\*

FILE NAME: 173001PO.DAT  
TIME/DATE OF STUDY: 09:54 07/28/2020

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--\*TIME-OF-CONCENTRATION MODEL\*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00  
SPECIFIED MINIMUM PIPE SIZE(INCH) = 3.00  
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95  
\*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL\*  
10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 0.816  
100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.360  
COMPUTED RAINFALL INTENSITY DATA:  
STORM EVENT = 100.00 1-HOUR INTENSITY(INCH/HOUR) = 1.3600  
SLOPE OF INTENSITY DURATION CURVE = 0.7000

\*ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD\*

\*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL\*

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET  
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)

\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*

\*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

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*****
FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
-----
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) =  1047.00
ELEVATION DATA: UPSTREAM(FEET) =    90.00  DOWNSTREAM(FEET) =    71.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.942
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =   4.476
SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS      Tc
      LAND USE          GROUP  (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL              B      8.84    0.42    0.100    76    10.94
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   0.42
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   0.100
SUBAREA RUNOFF(CFS) =    35.27
TOTAL AREA(ACRES) =    8.84  PEAK FLOW RATE(CFS) =    35.27

*****
FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  21
-----
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) =   210.00
ELEVATION DATA: UPSTREAM(FEET) =    83.50  DOWNSTREAM(FEET) =    77.80

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.309
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =   7.425
SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS      Tc
      LAND USE          GROUP  (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL              B      0.67    0.42    0.100    76     5.31
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   0.42
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   0.100
SUBAREA RUNOFF(CFS) =     4.45
TOTAL AREA(ACRES) =    0.67  PEAK FLOW RATE(CFS) =     4.45

*****
FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  21
-----
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) =   187.00
ELEVATION DATA: UPSTREAM(FEET) =    78.90  DOWNSTREAM(FEET) =    76.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.669
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =   7.092

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SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS      Tc
    LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL                B       0.45     0.42     0.100     76     5.67
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.42
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.86
TOTAL AREA(ACRES) = 0.45 PEAK FLOW RATE(CFS) = 2.86

*****
FLOW PROCESS FROM NODE 7.00 TO NODE 8.00 IS CODE = 21
-----
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 25.00
ELEVATION DATA: UPSTREAM(FEET) = 72.50 DOWNSTREAM(FEET) = 72.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 7.744
SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS      Tc
    LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
RESIDENTIAL
".4 DWELLING/ACRE"        B       0.12     0.42     0.900     76     5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.42
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900
SUBAREA RUNOFF(CFS) = 0.80
TOTAL AREA(ACRES) = 0.12 PEAK FLOW RATE(CFS) = 0.80

*****
FLOW PROCESS FROM NODE 9.00 TO NODE 10.00 IS CODE = 21
-----
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 896.00
ELEVATION DATA: UPSTREAM(FEET) = 98.00 DOWNSTREAM(FEET) = 89.40

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 20.167
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.917
SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS      Tc
    LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
NATURAL POOR COVER
"BARREN"                  B       2.83     0.11     1.000     97     20.17
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.11
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 7.16
TOTAL AREA(ACRES) = 2.83 PEAK FLOW RATE(CFS) = 7.16

*****

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FLOW PROCESS FROM NODE 11.00 TO NODE 12.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH (FEET) = 55.00

ELEVATION DATA: UPSTREAM (FEET) = 82.00 DOWNSTREAM (FEET) = 73.00

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$

SUBAREA ANALYSIS USED MINIMUM  $T_c$  (MIN.) = 5.000

\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 7.744

SUBAREA  $T_c$  AND LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	$F_p$ (INCH/HR)	$A_p$ (DECIMAL)	SCS CN	$T_c$ (MIN.)
-------------------------------	-------------------	-----------------	--------------------	--------------------	-----------	-----------------

NATURAL POOR COVER

"GRASS"	B	0.24	0.18	1.000	93	5.00
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SUBAREA AVERAGE PERVIOUS LOSS RATE,  $F_p$  (INCH/HR) = 0.18

SUBAREA AVERAGE PERVIOUS AREA FRACTION,  $A_p$  = 1.000

SUBAREA RUNOFF (CFS) = 1.63

TOTAL AREA (ACRES) = 0.24 PEAK FLOW RATE (CFS) = 1.63

END OF STUDY SUMMARY:

TOTAL AREA (ACRES) = 0.2  $T_c$  (MIN.) = 5.00

EFFECTIVE AREA (ACRES) = 0.24 AREA-AVERAGED  $F_m$  (INCH/HR) = 0.18

AREA-AVERAGED  $F_p$  (INCH/HR) = 0.18 AREA-AVERAGED  $A_p$  = 1.000

PEAK FLOW RATE (CFS) = 1.63

END OF RATIONAL METHOD ANALYSIS

\*\*\*\*\*

NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)  
AND LOW LOSS FRACTION ESTIMATIONS

=====

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\*\*\*\*\*

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Problem Descriptions:

APN 3039-321-08  
PRE-DEVELOPMENT LOW LOSS  
10-YEAR, 24 HOUR STORM EVENT

=====

\*\*\* NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)  
AND LOW LOSS FRACTION ESTIMATIONS FOR AMC II:

TOTAL 24-HOUR DURATION RAINFALL DEPTH = 3.89 (inches)

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp (in./hr.)	YIELD
1	9.84	100.00	78.	0.416	0.463

TOTAL AREA (Acres) = 9.84

AREA-AVERAGED LOSS RATE,  $\bar{F}_m$  (in./hr.) = 0.416

AREA-AVERAGED LOW LOSS FRACTION,  $\bar{Y}$  = 0.537

=====

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NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)  
AND LOW LOSS FRACTION ESTIMATIONS

=====

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\*\*\*\*\*

-----

Problem Descriptions:

APN 3039-321-08  
PRE-DEVELOPMENT LOW LOSS  
100-YEAR, 24-HOUR STORM EVENT

=====

\*\*\* NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)  
AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

TOTAL 24-HOUR DURATION RAINFALL DEPTH = 6.66 (inches)

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp(in./hr.)	YIELD
1	9.84	100.00	78.(AMC II)	0.180	0.876

TOTAL AREA (Acres) = 9.84

AREA-AVERAGED LOSS RATE,  $\bar{F}_m$  (in./hr.) = 0.180

AREA-AVERAGED LOW LOSS FRACTION,  $\bar{Y}$  = 0.124

=====

\*\*\*\*\*

NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)  
AND LOW LOSS FRACTION ESTIMATIONS

=====

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\*\*\*\*\*

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Problem Descriptions:

APN 3039-321-08  
POST-DEVELOPMENT LOW LOSS (AREA A)  
10-YEAR, 24-HOUR STORM EVENT

=====

\*\*\* NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)  
AND LOW LOSS FRACTION ESTIMATIONS FOR AMC II:

TOTAL 24-HOUR DURATION RAINFALL DEPTH = 3.89 (inches)

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp(in./hr.)	YIELD
1	8.35	0.00	98.	0.000	0.940
2	0.49	100.00	56.	0.748	0.136

TOTAL AREA (Acres) = 8.84

AREA-AVERAGED LOSS RATE,  $\bar{F}_m$  (in./hr.) = 0.041

AREA-AVERAGED LOW LOSS FRACTION,  $\bar{Y}$  = 0.105

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NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)  
AND LOW LOSS FRACTION ESTIMATIONS

=====

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Analysis prepared by:

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\*\*\*\*\*

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Problem Descriptions:

APN 3039-321-08  
POST-DEVELOPMENT LOW LOSS (AREA A)  
100-YEAR, 24-HOUR STORM EVENT

=====

\*\*\* NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)  
AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

TOTAL 24-HOUR DURATION RAINFALL DEPTH = 6.66 (inches)

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp(in./hr.)	YIELD
1	8.35	0.00	98.(AMC II)	0.000	0.964
2	0.49	100.00	56.(AMC II)	0.423	0.594

TOTAL AREA (Acres) = 8.84

AREA-AVERAGED LOSS RATE,  $\bar{F}_m$  (in./hr.) = 0.023

AREA-AVERAGED LOW LOSS FRACTION,  $\bar{Y}$  = 0.056

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NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)  
AND LOW LOSS FRACTION ESTIMATIONS

=====

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\*\*\*\*\*

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Problem Descriptions:

APN 3039-321-08  
POST-DEVELOPMENT LOW LOSS (AREA B & C)  
10-YEAR, 24-HOUR STORM EVENT

=====

\*\*\* NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)  
AND LOW LOSS FRACTION ESTIMATIONS FOR AMC II:

TOTAL 24-HOUR DURATION RAINFALL DEPTH = 3.89 (inches)

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp (in./hr.)	YIELD
1	0.36	100.00	56.	0.748	0.136
2	0.76	0.00	98.	0.000	0.940

TOTAL AREA (Acres) = 1.12

AREA-AVERAGED LOSS RATE,  $\bar{F}_m$  (in./hr.) = 0.240

AREA-AVERAGED LOW LOSS FRACTION,  $\bar{Y}$  = 0.319

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NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)  
AND LOW LOSS FRACTION ESTIMATIONS

=====

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\*\*\*\*\*

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Problem Descriptions:

APN 3039-321-08  
POST-DEVELOPMENT LOW LOSS (AREA B & C)  
100-YEAR, 24-HOUR STORM EVENT

=====

\*\*\* NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)  
AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

TOTAL 24-HOUR DURATION RAINFALL DEPTH = 6.66 (inches)

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp(in./hr.)	YIELD
1	0.36	100.00	56.(AMC II)	0.423	0.594
2	0.76	0.00	98.(AMC II)	0.000	0.964

TOTAL AREA (Acres) = 1.12

AREA-AVERAGED LOSS RATE,  $\bar{F}_m$  (in./hr.) = 0.136

AREA-AVERAGED LOW LOSS FRACTION,  $\bar{Y}$  = 0.155

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NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)  
AND LOW LOSS FRACTION ESTIMATIONS

=====

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\*\*\*\*\*

Problem Descriptions:

APN 3039-321-08  
POST-DEVELOPMENT LOW LOSS (AREA D)  
10-YEAR, 24-HOUR STORM EVENT

=====

\*\*\* NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)  
AND LOW LOSS FRACTION ESTIMATIONS FOR AMC II:

TOTAL 24-HOUR DURATION RAINFALL DEPTH = 3.89 (inches)

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp(in./hr.)	YIELD
1	0.12	100.00	56.	0.748	0.136

TOTAL AREA (Acres) = 0.12

AREA-AVERAGED LOSS RATE,  $\bar{F}_m$  (in./hr.) = 0.748

AREA-AVERAGED LOW LOSS FRACTION,  $\bar{Y}$  = 0.864

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NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)  
AND LOW LOSS FRACTION ESTIMATIONS

=====

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\*\*\*\*\*

-----

Problem Descriptions:

APN 3039-321-08  
POST-DEVELOPMENT LOW LOSS (AREA D)  
100-YEAR, 24-HOUR STORM EVENT

=====

\*\*\* NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)  
AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

TOTAL 24-HOUR DURATION RAINFALL DEPTH = 6.66 (inches)

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp(in./hr.)	YIELD
1	0.12	100.00	56.(AMC II)	0.423	0.594

TOTAL AREA (Acres) = 0.12

AREA-AVERAGED LOSS RATE,  $\bar{F}_m$  (in./hr.) = 0.423

AREA-AVERAGED LOW LOSS FRACTION,  $\bar{Y}$  = 0.406

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SMALL AREA UNIT HYDROGRAPH MODEL

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\*\*\*\*\*

-----

Problem Descriptions:

APN 3039-321-08  
PRE-DEVELOPMENT HYDRO  
10-YEAR, 24-HOUR STORM EVENT

-----

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90  
TOTAL CATCHMENT AREA(ACRES) = 9.84  
SOIL-LOSS RATE,  $F_m$ , (INCH/HR) = 0.416  
LOW LOSS FRACTION = 0.537  
TIME OF CONCENTRATION(MIN.) = 17.44  
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA  
USER SPECIFIED RAINFALL VALUES ARE USED  
RETURN FREQUENCY(YEARS) = 10  
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.22  
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.57  
1-HOUR POINT RAINFALL VALUE(INCHES) = 0.82  
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.38  
6-HOUR POINT RAINFALL VALUE(INCHES) = 1.96  
24-HOUR POINT RAINFALL VALUE(INCHES) = 3.89

-----

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 1.40  
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 1.79

\*\*\*\*\*

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	2.5	5.0	7.5	10.0
0.01	0.0000	0.00	Q	.	.	.	.
0.30	0.0040	0.33	.Q	.	.	.	.
0.59	0.0119	0.33	.Q	.	.	.	.
0.89	0.0199	0.33	.Q	.	.	.	.
1.18	0.0280	0.34	.Q	.	.	.	.
1.47	0.0362	0.34	.Q	.	.	.	.
1.76	0.0445	0.35	.Q	.	.	.	.

2.05	0.0528	0.35	.Q	.	.	.	.
2.34	0.0612	0.35	.Q	.	.	.	.
2.63	0.0698	0.36	.Q	.	.	.	.
2.92	0.0784	0.36	.Q	.	.	.	.
3.21	0.0871	0.36	.Q	.	.	.	.
3.50	0.0959	0.37	.Q	.	.	.	.
3.79	0.1048	0.37	.Q	.	.	.	.
4.08	0.1138	0.38	.Q	.	.	.	.
4.37	0.1229	0.38	.Q	.	.	.	.
4.66	0.1322	0.39	.Q	.	.	.	.
4.95	0.1415	0.39	.Q	.	.	.	.
5.25	0.1510	0.40	.Q	.	.	.	.
5.54	0.1606	0.40	.Q	.	.	.	.
5.83	0.1704	0.41	.Q	.	.	.	.
6.12	0.1802	0.41	.Q	.	.	.	.
6.41	0.1903	0.42	.Q	.	.	.	.
6.70	0.2004	0.43	.Q	.	.	.	.
6.99	0.2108	0.43	.Q	.	.	.	.
7.28	0.2213	0.44	.Q	.	.	.	.
7.57	0.2319	0.45	.Q	.	.	.	.
7.86	0.2428	0.45	.Q	.	.	.	.
8.15	0.2538	0.47	.Q	.	.	.	.
8.44	0.2651	0.47	.Q	.	.	.	.
8.73	0.2765	0.48	.Q	.	.	.	.
9.02	0.2882	0.49	.Q	.	.	.	.
9.31	0.3002	0.50	. Q	.	.	.	.
9.61	0.3123	0.51	. Q	.	.	.	.
9.90	0.3248	0.53	. Q	.	.	.	.
10.19	0.3376	0.53	. Q	.	.	.	.
10.48	0.3506	0.55	. Q	.	.	.	.
10.77	0.3640	0.56	. Q	.	.	.	.
11.06	0.3778	0.58	. Q	.	.	.	.
11.35	0.3919	0.60	. Q	.	.	.	.
11.64	0.4065	0.62	. Q	.	.	.	.
11.93	0.4216	0.63	. Q	.	.	.	.
12.22	0.4373	0.67	. Q	.	.	.	.
12.51	0.4538	0.70	. Q	.	.	.	.
12.80	0.4710	0.74	. Q	.	.	.	.
13.09	0.4890	0.76	. Q	.	.	.	.
13.38	0.5078	0.81	. Q	.	.	.	.
13.67	0.5275	0.84	. Q	.	.	.	.
13.97	0.5484	0.91	. Q	.	.	.	.
14.26	0.5705	0.93	. Q	.	.	.	.
14.55	0.5936	1.00	. Q	.	.	.	.
14.84	0.6184	1.07	. Q	.	.	.	.
15.13	0.6463	1.25	. Q	.	.	.	.
15.42	0.6781	1.39	. Q	.	.	.	.
15.71	0.7193	2.04	. Q	.	.	.	.
16.00	0.7760	2.68	. Q	.	.	.	.
16.29	0.9196	9.28	.	.	.	Q	.
16.58	1.0509	1.65	. Q	.	.	.	.
16.87	1.0846	1.15	. Q	.	.	.	.
17.16	1.1097	0.94	. Q	.	.	.	.
17.45	1.1315	0.87	. Q	.	.	.	.
17.74	1.1513	0.78	. Q	.	.	.	.

Figure 4.1  
Page 2 of 3

18.03	1.1692	0.72	. Q	.	.	.	.
18.33	1.1856	0.65	. Q	.	.	.	.
18.62	1.2007	0.61	. Q	.	.	.	.
18.91	1.2149	0.57	. Q	.	.	.	.
19.20	1.2283	0.54	. Q	.	.	.	.
19.49	1.2411	0.52	. Q	.	.	.	.
19.78	1.2533	0.50	.Q	.	.	.	.
20.07	1.2650	0.48	.Q	.	.	.	.
20.36	1.2762	0.46	.Q	.	.	.	.
20.65	1.2871	0.44	.Q	.	.	.	.
20.94	1.2976	0.43	.Q	.	.	.	.
21.23	1.3077	0.42	.Q	.	.	.	.
21.52	1.3176	0.41	.Q	.	.	.	.
21.81	1.3272	0.39	.Q	.	.	.	.
22.10	1.3366	0.38	.Q	.	.	.	.
22.39	1.3457	0.38	.Q	.	.	.	.
22.69	1.3546	0.37	.Q	.	.	.	.
22.98	1.3633	0.36	.Q	.	.	.	.
23.27	1.3719	0.35	.Q	.	.	.	.
23.56	1.3802	0.34	.Q	.	.	.	.
23.85	1.3884	0.34	.Q	.	.	.	.
24.14	1.3964	0.33	.Q	.	.	.	.
24.43	1.4004	0.00	Q	.	.	.	.

-----

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:  
(Note: 100% of Peak Flow Rate estimate assumed to have  
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
=====	=====
0%	1447.5
10%	191.8
20%	52.3
30%	17.4
40%	17.4
50%	17.4
60%	17.4
70%	17.4
80%	17.4
90%	17.4

\*\*\*\*\*

SMALL AREA UNIT HYDROGRAPH MODEL

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\*\*\*\*\*

-----  
Problem Descriptions:

APN 3039-321-08  
PRE-DEVELOPMENT HYDRO  
100-YEAR, 24-HOUR STORM EVENT  
-----

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90  
TOTAL CATCHMENT AREA(ACRES) = 9.84  
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.180  
LOW LOSS FRACTION = 0.124  
TIME OF CONCENTRATION(MIN.) = 17.44  
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA  
USER SPECIFIED RAINFALL VALUES ARE USED  
RETURN FREQUENCY(YEARS) = 100  
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.36  
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.95  
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.36  
3-HOUR POINT RAINFALL VALUE(INCHES) = 2.29  
6-HOUR POINT RAINFALL VALUE(INCHES) = 3.25  
24-HOUR POINT RAINFALL VALUE(INCHES) = 6.66  
-----

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 4.31  
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 1.15

\*\*\*\*\*

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	7.5	15.0	22.5	30.0
0.01	0.0000	0.00	Q	.	.	.	.
0.30	0.0134	1.12	.Q	.	.	.	.
0.59	0.0404	1.13	.Q	.	.	.	.
0.89	0.0675	1.13	.Q	.	.	.	.
1.18	0.0950	1.15	.Q	.	.	.	.
1.47	0.1226	1.16	.Q	.	.	.	.
1.76	0.1506	1.17	.Q	.	.	.	.

2.05	0.1788	1.18	.Q	.	.	.	.
2.34	0.2073	1.19	.Q	.	.	.	.
2.63	0.2361	1.20	.Q	.	.	.	.
2.92	0.2652	1.22	.Q	.	.	.	.
3.21	0.2946	1.23	.Q	.	.	.	.
3.50	0.3243	1.25	.Q	.	.	.	.
3.79	0.3543	1.26	.Q	.	.	.	.
4.08	0.3847	1.27	.Q	.	.	.	.
4.37	0.4154	1.28	.Q	.	.	.	.
4.66	0.4465	1.30	.Q	.	.	.	.
4.95	0.4780	1.32	.Q	.	.	.	.
5.25	0.5099	1.34	.Q	.	.	.	.
5.54	0.5422	1.35	.Q	.	.	.	.
5.83	0.5749	1.37	.Q	.	.	.	.
6.12	0.6080	1.39	.Q	.	.	.	.
6.41	0.6416	1.41	.Q	.	.	.	.
6.70	0.6757	1.43	.Q	.	.	.	.
6.99	0.7103	1.45	.Q	.	.	.	.
7.28	0.7455	1.47	.Q	.	.	.	.
7.57	0.7812	1.50	. Q	.	.	.	.
7.86	0.8174	1.52	. Q	.	.	.	.
8.15	0.8543	1.55	. Q	.	.	.	.
8.44	0.8918	1.57	. Q	.	.	.	.
8.73	0.9300	1.61	. Q	.	.	.	.
9.02	0.9690	1.63	. Q	.	.	.	.
9.31	1.0086	1.67	. Q	.	.	.	.
9.61	1.0491	1.70	. Q	.	.	.	.
9.90	1.0905	1.75	. Q	.	.	.	.
10.19	1.1328	1.77	. Q	.	.	.	.
10.48	1.1761	1.83	. Q	.	.	.	.
10.77	1.2204	1.86	. Q	.	.	.	.
11.06	1.2660	1.93	. Q	.	.	.	.
11.35	1.3127	1.96	. Q	.	.	.	.
11.64	1.3608	2.04	. Q	.	.	.	.
11.93	1.4104	2.09	. Q	.	.	.	.
12.22	1.4613	2.15	. Q	.	.	.	.
12.51	1.5133	2.18	. Q	.	.	.	.
12.80	1.5672	2.30	. Q	.	.	.	.
13.09	1.6234	2.37	. Q	.	.	.	.
13.38	1.6822	2.53	. Q	.	.	.	.
13.67	1.7441	2.62	. Q	.	.	.	.
13.97	1.8096	2.84	. Q	.	.	.	.
14.26	1.8786	2.91	. Q	.	.	.	.
14.55	1.9509	3.11	. Q	.	.	.	.
14.84	2.0282	3.32	. Q	.	.	.	.
15.13	2.1151	3.91	. Q	.	.	.	.
15.42	2.2144	4.35	. Q	.	.	.	.
15.71	2.3438	6.42	. Q	.	.	.	.
16.00	2.5222	8.44	. .Q	.	.	.	.
16.29	2.8643	20.04	. Q	.	Q	.	.
16.58	3.1672	5.18	. Q	.	.	.	.
16.87	3.2725	3.58	. Q	.	.	.	.
17.16	3.3508	2.93	. Q	.	.	.	.
17.45	3.4187	2.72	. Q	.	.	.	.
17.74	3.4808	2.45	. Q	.	.	.	.

Figure 4.2  
Page 2 of 3

18.03	3.5371	2.24	. Q	.	.	.	.
18.33	3.5896	2.13	. Q	.	.	.	.
18.62	3.6393	2.00	. Q	.	.	.	.
18.91	3.6861	1.89	. Q	.	.	.	.
19.20	3.7304	1.80	. Q	.	.	.	.
19.49	3.7728	1.72	. Q	.	.	.	.
19.78	3.8133	1.65	. Q	.	.	.	.
20.07	3.8522	1.59	. Q	.	.	.	.
20.36	3.8898	1.54	. Q	.	.	.	.
20.65	3.9260	1.49	.Q	.	.	.	.
20.94	3.9612	1.44	.Q	.	.	.	.
21.23	3.9953	1.40	.Q	.	.	.	.
21.52	4.0284	1.36	.Q	.	.	.	.
21.81	4.0607	1.33	.Q	.	.	.	.
22.10	4.0922	1.29	.Q	.	.	.	.
22.39	4.1229	1.26	.Q	.	.	.	.
22.69	4.1530	1.24	.Q	.	.	.	.
22.98	4.1824	1.21	.Q	.	.	.	.
23.27	4.2112	1.19	.Q	.	.	.	.
23.56	4.2394	1.16	.Q	.	.	.	.
23.85	4.2671	1.14	.Q	.	.	.	.
24.14	4.2943	1.12	.Q	.	.	.	.
24.43	4.3077	0.00	Q	.	.	.	.

-----

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:  
 (Note: 100% of Peak Flow Rate estimate assumed to have  
 an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
=====	=====
0%	1447.5
10%	418.6
20%	87.2
30%	52.3
40%	34.9
50%	17.4
60%	17.4
70%	17.4
80%	17.4
90%	17.4



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SMALL AREA UNIT HYDROGRAPH MODEL

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PHONE: (909) 748-7777 FAX: (909) 748-7776

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Problem Descriptions:

APN 3039-321-08  
POST-DEVELOPMENT HYDRO (AREA A)  
10-YEAR, 24-HOUR STORM EVENT

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RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90  
TOTAL CATCHMENT AREA(ACRES) = 8.84  
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.041  
LOW LOSS FRACTION = 0.105  
TIME OF CONCENTRATION(MIN.) = 10.94  
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA  
USER SPECIFIED RAINFALL VALUES ARE USED  
RETURN FREQUENCY(YEARS) = 10  
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.22  
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.57  
1-HOUR POINT RAINFALL VALUE(INCHES) = 0.82  
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.38  
6-HOUR POINT RAINFALL VALUE(INCHES) = 1.96  
24-HOUR POINT RAINFALL VALUE(INCHES) = 3.89

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TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 2.32  
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.54

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TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	5.0	10.0	15.0	20.0
0.14	0.0032	0.57	.Q	.	.	.	.
0.32	0.0119	0.57	.Q	.	.	.	.
0.50	0.0205	0.58	.Q	.	.	.	.
0.68	0.0293	0.58	.Q	.	.	.	.
0.87	0.0380	0.58	.Q	.	.	.	.

[Type here]

1.05	0.0469	0.59	.Q	.	.	.	.
1.23	0.0557	0.59	.Q	.	.	.	.
1.41	0.0647	0.59	.Q	.	.	.	.
1.60	0.0737	0.60	.Q	.	.	.	.
1.78	0.0827	0.60	.Q	.	.	.	.
1.96	0.0918	0.61	.Q	.	.	.	.
2.14	0.1010	0.61	.Q	.	.	.	.
2.33	0.1102	0.62	.Q	.	.	.	.
2.51	0.1195	0.62	.Q	.	.	.	.
2.69	0.1289	0.62	.Q	.	.	.	.
2.87	0.1383	0.63	.Q	.	.	.	.
3.05	0.1478	0.63	.Q	.	.	.	.
3.24	0.1573	0.64	.Q	.	.	.	.
3.42	0.1669	0.64	.Q	.	.	.	.
3.60	0.1766	0.64	.Q	.	.	.	.
3.78	0.1864	0.65	.Q	.	.	.	.
3.97	0.1962	0.65	.Q	.	.	.	.
4.15	0.2061	0.66	.Q	.	.	.	.
4.33	0.2161	0.66	.Q	.	.	.	.
4.51	0.2261	0.67	.Q	.	.	.	.
4.70	0.2363	0.67	.Q	.	.	.	.
4.88	0.2465	0.68	.Q	.	.	.	.
5.06	0.2568	0.69	.Q	.	.	.	.
5.24	0.2672	0.69	.Q	.	.	.	.
5.42	0.2777	0.70	.Q	.	.	.	.
5.61	0.2883	0.71	.Q	.	.	.	.
5.79	0.2989	0.71	.Q	.	.	.	.
5.97	0.3097	0.72	.Q	.	.	.	.
6.15	0.3205	0.72	.Q	.	.	.	.
6.34	0.3315	0.73	.Q	.	.	.	.
6.52	0.3426	0.74	.Q	.	.	.	.
6.70	0.3537	0.75	.Q	.	.	.	.
6.88	0.3650	0.75	.Q	.	.	.	.
7.07	0.3764	0.76	.Q	.	.	.	.
7.25	0.3879	0.77	.Q	.	.	.	.
7.43	0.3995	0.78	.Q	.	.	.	.
7.61	0.4113	0.78	.Q	.	.	.	.
7.80	0.4232	0.79	.Q	.	.	.	.
7.98	0.4352	0.80	.Q	.	.	.	.
8.16	0.4473	0.81	.Q	.	.	.	.
8.34	0.4596	0.82	.Q	.	.	.	.
8.52	0.4720	0.83	.Q	.	.	.	.
8.71	0.4846	0.84	.Q	.	.	.	.
8.89	0.4973	0.85	.Q	.	.	.	.
9.07	0.5103	0.86	.Q	.	.	.	.
9.25	0.5233	0.88	.Q	.	.	.	.
9.44	0.5366	0.88	.Q	.	.	.	.
9.62	0.5500	0.90	.Q	.	.	.	.
9.80	0.5636	0.91	.Q	.	.	.	.
9.98	0.5774	0.93	.Q	.	.	.	.
10.17	0.5915	0.94	.Q	.	.	.	.
10.35	0.6057	0.96	.Q	.	.	.	.
10.53	0.6202	0.97	.Q	.	.	.	.

Figure 4.3  
Page 2 of 4

[Type here]

10.71	0.6349	0.99	.Q	.	.	.	.
10.89	0.6499	1.00	.Q	.	.	.	.
11.08	0.6651	1.02	. Q	.	.	.	.
11.26	0.6806	1.04	. Q	.	.	.	.
11.44	0.6964	1.06	. Q	.	.	.	.
11.62	0.7125	1.08	. Q	.	.	.	.
11.81	0.7290	1.11	. Q	.	.	.	.
11.99	0.7458	1.12	. Q	.	.	.	.
12.17	0.7632	1.18	. Q	.	.	.	.
12.35	0.7811	1.20	. Q	.	.	.	.
12.54	0.7996	1.24	. Q	.	.	.	.
12.72	0.8185	1.26	. Q	.	.	.	.
12.90	0.8378	1.31	. Q	.	.	.	.
13.08	0.8578	1.34	. Q	.	.	.	.
13.27	0.8783	1.39	. Q	.	.	.	.
13.45	0.8995	1.42	. Q	.	.	.	.
13.63	0.9214	1.49	. Q	.	.	.	.
13.81	0.9441	1.52	. Q	.	.	.	.
13.99	0.9677	1.61	. Q	.	.	.	.
14.18	0.9920	1.61	. Q	.	.	.	.
14.36	1.0168	1.67	. Q	.	.	.	.
14.54	1.0425	1.74	. Q	.	.	.	.
14.72	1.0698	1.89	. Q	.	.	.	.
14.91	1.0989	1.98	. Q	.	.	.	.
15.09	1.1305	2.21	. Q	.	.	.	.
15.27	1.1650	2.36	. Q	.	.	.	.
15.45	1.2047	2.91	. Q	.	.	.	.
15.64	1.2522	3.39	. Q	.	.	.	.
15.82	1.3133	4.72	. Q	.	.	.	.
16.00	1.3954	6.17	. Q	.	.	.	.
16.18	1.5485	14.14	.	.	Q	.	.
16.36	1.6842	3.87	. Q	.	.	.	.
16.55	1.7326	2.55	. Q	.	.	.	.
16.73	1.7675	2.09	. Q	.	.	.	.
16.91	1.7968	1.81	. Q	.	.	.	.
17.09	1.8226	1.62	. Q	.	.	.	.
17.28	1.8466	1.56	. Q	.	.	.	.
17.46	1.8693	1.45	. Q	.	.	.	.
17.64	1.8905	1.36	. Q	.	.	.	.
17.82	1.9105	1.29	. Q	.	.	.	.
18.01	1.9294	1.22	. Q	.	.	.	.
18.19	1.9472	1.14	. Q	.	.	.	.
18.37	1.9640	1.09	. Q	.	.	.	.
18.55	1.9801	1.05	. Q	.	.	.	.
18.73	1.9957	1.01	. Q	.	.	.	.
18.92	2.0106	0.98	.Q	.	.	.	.
19.10	2.0251	0.95	.Q	.	.	.	.
19.28	2.0391	0.92	.Q	.	.	.	.
19.46	2.0528	0.89	.Q	.	.	.	.
19.65	2.0660	0.87	.Q	.	.	.	.
19.83	2.0789	0.85	.Q	.	.	.	.
20.01	2.0915	0.82	.Q	.	.	.	.
20.19	2.1038	0.81	.Q	.	.	.	.

Figure 4.3  
Page 3 of 4

[Type here]

20.38	2.1158	0.79	.Q	.	.	.	.
20.56	2.1275	0.77	.Q	.	.	.	.
20.74	2.1391	0.76	.Q	.	.	.	.
20.92	2.1503	0.74	.Q	.	.	.	.
21.11	2.1614	0.73	.Q	.	.	.	.
21.29	2.1723	0.71	.Q	.	.	.	.
21.47	2.1829	0.70	.Q	.	.	.	.
21.65	2.1934	0.69	.Q	.	.	.	.
21.83	2.2037	0.68	.Q	.	.	.	.
22.02	2.2138	0.67	.Q	.	.	.	.
22.20	2.2238	0.66	.Q	.	.	.	.
22.38	2.2337	0.65	.Q	.	.	.	.
22.56	2.2434	0.64	.Q	.	.	.	.
22.75	2.2529	0.63	.Q	.	.	.	.
22.93	2.2623	0.62	.Q	.	.	.	.
23.11	2.2716	0.61	.Q	.	.	.	.
23.29	2.2808	0.60	.Q	.	.	.	.
23.48	2.2898	0.60	.Q	.	.	.	.
23.66	2.2988	0.59	.Q	.	.	.	.
23.84	2.3076	0.58	.Q	.	.	.	.
24.02	2.3163	0.58	.Q	.	.	.	.
24.20	2.3206	0.00	Q	.	.	.	.

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TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:  
 (Note: 100% of Peak Flow Rate estimate assumed to have  
 an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
=====	=====
0%	1444.1
10%	251.6
20%	65.6
30%	32.8
40%	21.9
50%	10.9
60%	10.9
70%	10.9
80%	10.9
90%	10.9

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SMALL AREA UNIT HYDROGRAPH MODEL

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Ver. 23.0 Release Date: 07/01/2016 License ID 1533

Analysis prepared by:

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Problem Descriptions:

APN 3039-321-08  
POST-DEVELOPMNET HYDRO (AREA A)  
100-YEAR, 24-HOUR STORM EVENT  
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RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90  
TOTAL CATCHMENT AREA(ACRES) = 8.84  
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.023  
LOW LOSS FRACTION = 0.056  
TIME OF CONCENTRATION(MIN.) = 10.94  
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA  
USER SPECIFIED RAINFALL VALUES ARE USED  
RETURN FREQUENCY(YEARS) = 100  
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.36  
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.95  
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.36  
3-HOUR POINT RAINFALL VALUE(INCHES) = 2.29  
6-HOUR POINT RAINFALL VALUE(INCHES) = 3.25  
24-HOUR POINT RAINFALL VALUE(INCHES) = 6.66  
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TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 4.18  
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.73

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TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	7.5	15.0	22.5	30.0
0.14	0.0061	1.08	.Q	.	.	.	.
0.32	0.0224	1.08	.Q	.	.	.	.
0.50	0.0388	1.09	.Q	.	.	.	.
0.68	0.0553	1.10	.Q	.	.	.	.
0.87	0.0718	1.10	.Q	.	.	.	.
1.05	0.0885	1.11	.Q	.	.	.	.
1.23	0.1053	1.12	.Q	.	.	.	.

1.41	0.1221	1.12	.Q	.	.	.	.
1.60	0.1391	1.13	.Q	.	.	.	.
1.78	0.1561	1.13	.Q	.	.	.	.
1.96	0.1733	1.14	.Q	.	.	.	.
2.14	0.1906	1.15	.Q	.	.	.	.
2.33	0.2080	1.16	.Q	.	.	.	.
2.51	0.2255	1.16	.Q	.	.	.	.
2.69	0.2431	1.17	.Q	.	.	.	.
2.87	0.2608	1.18	.Q	.	.	.	.
3.05	0.2787	1.19	.Q	.	.	.	.
3.24	0.2966	1.19	.Q	.	.	.	.
3.42	0.3147	1.21	.Q	.	.	.	.
3.60	0.3329	1.21	.Q	.	.	.	.
3.78	0.3512	1.22	.Q	.	.	.	.
3.97	0.3697	1.23	.Q	.	.	.	.
4.15	0.3883	1.24	.Q	.	.	.	.
4.33	0.4071	1.25	.Q	.	.	.	.
4.51	0.4259	1.26	.Q	.	.	.	.
4.70	0.4450	1.27	.Q	.	.	.	.
4.88	0.4641	1.28	.Q	.	.	.	.
5.06	0.4835	1.29	.Q	.	.	.	.
5.24	0.5029	1.30	.Q	.	.	.	.
5.42	0.5226	1.31	.Q	.	.	.	.
5.61	0.5424	1.32	.Q	.	.	.	.
5.79	0.5623	1.33	.Q	.	.	.	.
5.97	0.5824	1.34	.Q	.	.	.	.
6.15	0.6027	1.35	.Q	.	.	.	.
6.34	0.6232	1.37	.Q	.	.	.	.
6.52	0.6439	1.38	.Q	.	.	.	.
6.70	0.6648	1.39	.Q	.	.	.	.
6.88	0.6858	1.40	.Q	.	.	.	.
7.07	0.7071	1.42	.Q	.	.	.	.
7.25	0.7285	1.43	.Q	.	.	.	.
7.43	0.7502	1.45	.Q	.	.	.	.
7.61	0.7721	1.46	.Q	.	.	.	.
7.80	0.7942	1.48	.Q	.	.	.	.
7.98	0.8166	1.49	.Q	.	.	.	.
8.16	0.8392	1.51	. Q	.	.	.	.
8.34	0.8620	1.52	. Q	.	.	.	.
8.52	0.8851	1.55	. Q	.	.	.	.
8.71	0.9085	1.56	. Q	.	.	.	.
8.89	0.9321	1.58	. Q	.	.	.	.
9.07	0.9561	1.60	. Q	.	.	.	.
9.25	0.9803	1.62	. Q	.	.	.	.
9.44	1.0049	1.64	. Q	.	.	.	.
9.62	1.0298	1.67	. Q	.	.	.	.
9.80	1.0550	1.68	. Q	.	.	.	.
9.98	1.0805	1.71	. Q	.	.	.	.
10.17	1.1065	1.73	. Q	.	.	.	.
10.35	1.1328	1.76	. Q	.	.	.	.
10.53	1.1595	1.78	. Q	.	.	.	.
10.71	1.1866	1.82	. Q	.	.	.	.
10.89	1.2142	1.84	. Q	.	.	.	.
11.08	1.2423	1.88	. Q	.	.	.	.
11.26	1.2708	1.90	. Q	.	.	.	.

Figure 4.4  
Page 2 of 4

11.44	1.2998	1.95	. Q	.	.	.	.
11.62	1.3294	1.98	. Q	.	.	.	.
11.81	1.3596	2.03	. Q	.	.	.	.
11.99	1.3904	2.06	. Q	.	.	.	.
12.17	1.4216	2.07	. Q	.	.	.	.
12.35	1.4530	2.10	. Q	.	.	.	.
12.54	1.4852	2.17	. Q	.	.	.	.
12.72	1.5181	2.21	. Q	.	.	.	.
12.90	1.5520	2.29	. Q	.	.	.	.
13.08	1.5868	2.33	. Q	.	.	.	.
13.27	1.6226	2.43	. Q	.	.	.	.
13.45	1.6596	2.48	. Q	.	.	.	.
13.63	1.6979	2.60	. Q	.	.	.	.
13.81	1.7375	2.66	. Q	.	.	.	.
13.99	1.7787	2.81	. Q	.	.	.	.
14.18	1.8211	2.81	. Q	.	.	.	.
14.36	1.8642	2.91	. Q	.	.	.	.
14.54	1.9088	3.02	. Q	.	.	.	.
14.72	1.9564	3.30	. Q	.	.	.	.
14.91	2.0073	3.47	. Q	.	.	.	.
15.09	2.0627	3.90	. Q	.	.	.	.
15.27	2.1235	4.17	. Q	.	.	.	.
15.45	2.1940	5.18	. Q	.	.	.	.
15.64	2.2783	6.00	. Q	.	.	.	.
15.82	2.3855	8.23	. Q	.	.	.	.
16.00	2.5277	10.65	. Q	.	.	.	.
16.18	2.7885	23.96	. Q	.	.	.	.
16.36	3.0203	6.81	. Q	.	.	.	.
16.55	3.1056	4.51	. Q	.	.	.	.
16.73	3.1672	3.66	. Q	.	.	.	.
16.91	3.2185	3.15	. Q	.	.	.	.
17.09	3.2634	2.81	. Q	.	.	.	.
17.28	3.3051	2.73	. Q	.	.	.	.
17.46	3.3448	2.54	. Q	.	.	.	.
17.64	3.3818	2.38	. Q	.	.	.	.
17.82	3.4167	2.25	. Q	.	.	.	.
18.01	3.4497	2.13	. Q	.	.	.	.
18.19	3.4815	2.09	. Q	.	.	.	.
18.37	3.5123	2.00	. Q	.	.	.	.
18.55	3.5419	1.93	. Q	.	.	.	.
18.73	3.5704	1.86	. Q	.	.	.	.
18.92	3.5980	1.80	. Q	.	.	.	.
19.10	3.6248	1.75	. Q	.	.	.	.
19.28	3.6507	1.70	. Q	.	.	.	.
19.46	3.6759	1.65	. Q	.	.	.	.
19.65	3.7005	1.61	. Q	.	.	.	.
19.83	3.7244	1.57	. Q	.	.	.	.
20.01	3.7478	1.53	. Q	.	.	.	.
20.19	3.7706	1.50	. Q	.	.	.	.
20.38	3.7930	1.47	. Q	.	.	.	.
20.56	3.8149	1.44	. Q	.	.	.	.
20.74	3.8363	1.41	. Q	.	.	.	.
20.92	3.8574	1.38	. Q	.	.	.	.
21.11	3.8781	1.36	. Q	.	.	.	.
21.29	3.8984	1.34	. Q	.	.	.	.

Figure 4.4  
Page 3 of 4

21.47	3.9183	1.31	.Q	.	.	.	.
21.65	3.9380	1.29	.Q	.	.	.	.
21.83	3.9573	1.27	.Q	.	.	.	.
22.02	3.9763	1.25	.Q	.	.	.	.
22.20	3.9951	1.23	.Q	.	.	.	.
22.38	4.0135	1.22	.Q	.	.	.	.
22.56	4.0317	1.20	.Q	.	.	.	.
22.75	4.0497	1.18	.Q	.	.	.	.
22.93	4.0674	1.17	.Q	.	.	.	.
23.11	4.0849	1.15	.Q	.	.	.	.
23.29	4.1022	1.14	.Q	.	.	.	.
23.48	4.1193	1.13	.Q	.	.	.	.
23.66	4.1361	1.11	.Q	.	.	.	.
23.84	4.1528	1.10	.Q	.	.	.	.
24.02	4.1693	1.09	.Q	.	.	.	.
24.20	4.1775	0.00	Q	.	.	.	.

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TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:  
 (Note: 100% of Peak Flow Rate estimate assumed to have  
 an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
=====	=====
0%	1444.1
10%	262.6
20%	65.6
30%	32.8
40%	21.9
50%	10.9
60%	10.9
70%	10.9
80%	10.9
90%	10.9



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SMALL AREA UNIT HYDROGRAPH MODEL

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Ver. 23.0 Release Date: 07/01/2016 License ID 1533

Analysis prepared by:

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Problem Descriptions:

APN 3039-321-08  
POST-DEVELOPMENT HYDRO (AREA B & C)  
10-YEAR, 24-HOUR STORM EVENT

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RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90  
TOTAL CATCHMENT AREA(ACRES) = 1.12  
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.240  
LOW LOSS FRACTION = 0.319  
TIME OF CONCENTRATION(MIN.) = 5.67  
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA  
USER SPECIFIED RAINFALL VALUES ARE USED  
RETURN FREQUENCY(YEARS) = 10  
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.22  
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.57  
1-HOUR POINT RAINFALL VALUE(INCHES) = 0.82  
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.38  
6-HOUR POINT RAINFALL VALUE(INCHES) = 1.96  
24-HOUR POINT RAINFALL VALUE(INCHES) = 3.89

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TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 0.23  
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.14

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TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	2.5	5.0	7.5	10.0
0.03	0.0000	0.00	Q	.	.	.	.
0.12	0.0002	0.06	Q	.	.	.	.
0.22	0.0006	0.06	Q	.	.	.	.
0.31	0.0011	0.06	Q	.	.	.	.
0.41	0.0015	0.06	Q	.	.	.	.
0.50	0.0019	0.06	Q	.	.	.	.
0.60	0.0024	0.06	Q	.	.	.	.

0.69	0.0028	0.06	Q
0.79	0.0033	0.06	Q
0.88	0.0037	0.06	Q
0.97	0.0041	0.06	Q
1.07	0.0046	0.06	Q
1.16	0.0050	0.06	Q
1.26	0.0055	0.06	Q
1.35	0.0059	0.06	Q
1.45	0.0064	0.06	Q
1.54	0.0068	0.06	Q
1.64	0.0073	0.06	Q
1.73	0.0077	0.06	Q
1.82	0.0082	0.06	Q
1.92	0.0086	0.06	Q
2.01	0.0091	0.06	Q
2.11	0.0096	0.06	Q
2.20	0.0100	0.06	Q
2.30	0.0105	0.06	Q
2.39	0.0109	0.06	Q
2.49	0.0114	0.06	Q
2.58	0.0119	0.06	Q
2.68	0.0123	0.06	Q
2.77	0.0128	0.06	Q
2.86	0.0133	0.06	Q
2.96	0.0138	0.06	Q
3.05	0.0142	0.06	Q
3.15	0.0147	0.06	Q
3.24	0.0152	0.06	Q
3.34	0.0157	0.06	Q
3.43	0.0162	0.06	Q
3.53	0.0166	0.06	Q
3.62	0.0171	0.06	Q
3.71	0.0176	0.06	Q
3.81	0.0181	0.06	Q
3.90	0.0186	0.06	Q
4.00	0.0191	0.06	Q
4.09	0.0196	0.06	Q
4.19	0.0201	0.06	Q
4.28	0.0206	0.06	Q
4.38	0.0211	0.06	Q
4.47	0.0216	0.06	Q
4.57	0.0221	0.07	Q
4.66	0.0226	0.07	Q
4.75	0.0231	0.07	Q
4.85	0.0236	0.07	Q
4.94	0.0242	0.07	Q
5.04	0.0247	0.07	Q
5.13	0.0252	0.07	Q
5.23	0.0257	0.07	Q
5.32	0.0262	0.07	Q
5.42	0.0268	0.07	Q
5.51	0.0273	0.07	Q
5.61	0.0278	0.07	Q
5.70	0.0284	0.07	Q
5.79	0.0289	0.07	Q

5.89	0.0294	0.07	Q	.	.	.	.
5.98	0.0300	0.07	Q	.	.	.	.
6.08	0.0305	0.07	Q	.	.	.	.
6.17	0.0311	0.07	Q	.	.	.	.
6.27	0.0316	0.07	Q	.	.	.	.
6.36	0.0322	0.07	Q	.	.	.	.
6.46	0.0327	0.07	Q	.	.	.	.
6.55	0.0333	0.07	Q	.	.	.	.
6.64	0.0338	0.07	Q	.	.	.	.
6.74	0.0344	0.07	Q	.	.	.	.
6.83	0.0350	0.07	Q	.	.	.	.
6.93	0.0355	0.07	Q	.	.	.	.
7.02	0.0361	0.07	Q	.	.	.	.
7.12	0.0367	0.07	Q	.	.	.	.
7.21	0.0372	0.07	Q	.	.	.	.
7.31	0.0378	0.07	Q	.	.	.	.
7.40	0.0384	0.08	Q	.	.	.	.
7.49	0.0390	0.08	Q	.	.	.	.
7.59	0.0396	0.08	Q	.	.	.	.
7.68	0.0402	0.08	Q	.	.	.	.
7.78	0.0408	0.08	Q	.	.	.	.
7.87	0.0414	0.08	Q	.	.	.	.
7.97	0.0420	0.08	Q	.	.	.	.
8.06	0.0426	0.08	Q	.	.	.	.
8.16	0.0432	0.08	Q	.	.	.	.
8.25	0.0438	0.08	Q	.	.	.	.
8.35	0.0444	0.08	Q	.	.	.	.
8.44	0.0451	0.08	Q	.	.	.	.
8.53	0.0457	0.08	Q	.	.	.	.
8.63	0.0463	0.08	Q	.	.	.	.
8.72	0.0470	0.08	Q	.	.	.	.
8.82	0.0476	0.08	Q	.	.	.	.
8.91	0.0482	0.08	Q	.	.	.	.
9.01	0.0489	0.08	Q	.	.	.	.
9.10	0.0495	0.08	Q	.	.	.	.
9.20	0.0502	0.08	Q	.	.	.	.
9.29	0.0508	0.08	Q	.	.	.	.
9.38	0.0515	0.09	Q	.	.	.	.
9.48	0.0522	0.09	Q	.	.	.	.
9.57	0.0529	0.09	Q	.	.	.	.
9.67	0.0535	0.09	Q	.	.	.	.
9.76	0.0542	0.09	Q	.	.	.	.
9.86	0.0549	0.09	Q	.	.	.	.
9.95	0.0556	0.09	Q	.	.	.	.
10.05	0.0563	0.09	Q	.	.	.	.
10.14	0.0570	0.09	Q	.	.	.	.
10.24	0.0577	0.09	Q	.	.	.	.
10.33	0.0584	0.09	Q	.	.	.	.
10.42	0.0592	0.09	Q	.	.	.	.
10.52	0.0599	0.09	Q	.	.	.	.
10.61	0.0606	0.09	Q	.	.	.	.
10.71	0.0614	0.10	Q	.	.	.	.
10.80	0.0621	0.10	Q	.	.	.	.
10.90	0.0629	0.10	Q	.	.	.	.
10.99	0.0636	0.10	Q	.	.	.	.

Figure 4.5  
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11.09	0.0644	0.10	Q	.	.	.	.
11.18	0.0652	0.10	Q	.	.	.	.
11.27	0.0660	0.10	Q	.	.	.	.
11.37	0.0668	0.10	Q	.	.	.	.
11.46	0.0676	0.10	Q	.	.	.	.
11.56	0.0684	0.10	Q	.	.	.	.
11.65	0.0692	0.11	Q	.	.	.	.
11.75	0.0700	0.11	Q	.	.	.	.
11.84	0.0709	0.11	Q	.	.	.	.
11.94	0.0717	0.11	Q	.	.	.	.
12.03	0.0726	0.11	Q	.	.	.	.
12.13	0.0734	0.11	Q	.	.	.	.
12.22	0.0743	0.12	Q	.	.	.	.
12.31	0.0752	0.12	Q	.	.	.	.
12.41	0.0762	0.12	Q	.	.	.	.
12.50	0.0771	0.12	Q	.	.	.	.
12.60	0.0780	0.12	Q	.	.	.	.
12.69	0.0790	0.12	Q	.	.	.	.
12.79	0.0800	0.12	Q	.	.	.	.
12.88	0.0810	0.13	Q	.	.	.	.
12.98	0.0819	0.13	Q	.	.	.	.
13.07	0.0830	0.13	Q	.	.	.	.
13.16	0.0840	0.13	Q	.	.	.	.
13.26	0.0850	0.14	Q	.	.	.	.
13.35	0.0861	0.14	Q	.	.	.	.
13.45	0.0872	0.14	Q	.	.	.	.
13.54	0.0883	0.14	Q	.	.	.	.
13.64	0.0894	0.15	Q	.	.	.	.
13.73	0.0905	0.15	Q	.	.	.	.
13.83	0.0917	0.15	Q	.	.	.	.
13.92	0.0929	0.15	Q	.	.	.	.
14.02	0.0941	0.16	Q	.	.	.	.
14.11	0.0953	0.15	Q	.	.	.	.
14.20	0.0965	0.16	Q	.	.	.	.
14.30	0.0978	0.16	Q	.	.	.	.
14.39	0.0991	0.17	Q	.	.	.	.
14.49	0.1004	0.17	Q	.	.	.	.
14.58	0.1017	0.18	Q	.	.	.	.
14.68	0.1031	0.18	Q	.	.	.	.
14.77	0.1046	0.19	Q	.	.	.	.
14.87	0.1061	0.19	Q	.	.	.	.
14.96	0.1076	0.21	Q	.	.	.	.
15.05	0.1093	0.21	Q	.	.	.	.
15.15	0.1110	0.23	Q	.	.	.	.
15.24	0.1128	0.24	Q	.	.	.	.
15.34	0.1147	0.26	.Q	.	.	.	.
15.43	0.1168	0.28	.Q	.	.	.	.
15.53	0.1192	0.32	.Q	.	.	.	.
15.62	0.1218	0.34	.Q	.	.	.	.
15.72	0.1247	0.40	.Q	.	.	.	.
15.81	0.1280	0.45	.Q	.	.	.	.
15.91	0.1323	0.63	. Q	.	.	.	.
16.00	0.1382	0.88	. Q	.	.	.	.
16.09	0.1504	2.25	.	Q	.	.	.
16.19	0.1611	0.51	. Q	.	.	.	.

Figure 4.5  
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16.28	0.1645	0.37	.Q	.	.	.	.
16.38	0.1672	0.31	.Q	.	.	.	.
16.47	0.1693	0.25	Q	.	.	.	.
16.57	0.1711	0.22	Q	.	.	.	.
16.66	0.1728	0.20	Q	.	.	.	.
16.76	0.1743	0.19	Q	.	.	.	.
16.85	0.1757	0.17	Q	.	.	.	.
16.94	0.1770	0.16	Q	.	.	.	.
17.04	0.1782	0.15	Q	.	.	.	.
17.13	0.1794	0.16	Q	.	.	.	.
17.23	0.1806	0.15	Q	.	.	.	.
17.32	0.1818	0.14	Q	.	.	.	.
17.42	0.1829	0.14	Q	.	.	.	.
17.51	0.1839	0.13	Q	.	.	.	.
17.61	0.1850	0.13	Q	.	.	.	.
17.70	0.1860	0.13	Q	.	.	.	.
17.80	0.1869	0.12	Q	.	.	.	.
17.89	0.1879	0.12	Q	.	.	.	.
17.98	0.1888	0.12	Q	.	.	.	.
18.08	0.1897	0.11	Q	.	.	.	.
18.17	0.1905	0.11	Q	.	.	.	.
18.27	0.1914	0.11	Q	.	.	.	.
18.36	0.1922	0.10	Q	.	.	.	.
18.46	0.1930	0.10	Q	.	.	.	.
18.55	0.1938	0.10	Q	.	.	.	.
18.65	0.1946	0.10	Q	.	.	.	.
18.74	0.1953	0.10	Q	.	.	.	.
18.83	0.1961	0.09	Q	.	.	.	.
18.93	0.1968	0.09	Q	.	.	.	.
19.02	0.1975	0.09	Q	.	.	.	.
19.12	0.1982	0.09	Q	.	.	.	.
19.21	0.1989	0.09	Q	.	.	.	.
19.31	0.1996	0.09	Q	.	.	.	.
19.40	0.2003	0.09	Q	.	.	.	.
19.50	0.2009	0.08	Q	.	.	.	.
19.59	0.2016	0.08	Q	.	.	.	.
19.69	0.2022	0.08	Q	.	.	.	.
19.78	0.2029	0.08	Q	.	.	.	.
19.87	0.2035	0.08	Q	.	.	.	.
19.97	0.2041	0.08	Q	.	.	.	.
20.06	0.2047	0.08	Q	.	.	.	.
20.16	0.2053	0.08	Q	.	.	.	.
20.25	0.2059	0.08	Q	.	.	.	.
20.35	0.2065	0.08	Q	.	.	.	.
20.44	0.2071	0.07	Q	.	.	.	.
20.54	0.2077	0.07	Q	.	.	.	.
20.63	0.2083	0.07	Q	.	.	.	.
20.73	0.2089	0.07	Q	.	.	.	.
20.82	0.2094	0.07	Q	.	.	.	.
20.91	0.2100	0.07	Q	.	.	.	.
21.01	0.2105	0.07	Q	.	.	.	.
21.10	0.2111	0.07	Q	.	.	.	.
21.20	0.2116	0.07	Q	.	.	.	.
21.29	0.2121	0.07	Q	.	.	.	.
21.39	0.2127	0.07	Q	.	.	.	.

Figure 4.5  
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21.48	0.2132	0.07	Q	.	.	.	.
21.58	0.2137	0.07	Q	.	.	.	.
21.67	0.2142	0.07	Q	.	.	.	.
21.76	0.2148	0.07	Q	.	.	.	.
21.86	0.2153	0.06	Q	.	.	.	.
21.95	0.2158	0.06	Q	.	.	.	.
22.05	0.2163	0.06	Q	.	.	.	.
22.14	0.2168	0.06	Q	.	.	.	.
22.24	0.2173	0.06	Q	.	.	.	.
22.33	0.2177	0.06	Q	.	.	.	.
22.43	0.2182	0.06	Q	.	.	.	.
22.52	0.2187	0.06	Q	.	.	.	.
22.61	0.2192	0.06	Q	.	.	.	.
22.71	0.2197	0.06	Q	.	.	.	.
22.80	0.2201	0.06	Q	.	.	.	.
22.90	0.2206	0.06	Q	.	.	.	.
22.99	0.2211	0.06	Q	.	.	.	.
23.09	0.2215	0.06	Q	.	.	.	.
23.18	0.2220	0.06	Q	.	.	.	.
23.28	0.2224	0.06	Q	.	.	.	.
23.37	0.2229	0.06	Q	.	.	.	.
23.47	0.2233	0.06	Q	.	.	.	.
23.56	0.2238	0.06	Q	.	.	.	.
23.65	0.2242	0.06	Q	.	.	.	.
23.75	0.2247	0.06	Q	.	.	.	.
23.84	0.2251	0.06	Q	.	.	.	.
23.94	0.2255	0.06	Q	.	.	.	.
24.03	0.2260	0.06	Q	.	.	.	.
24.13	0.2262	0.00	Q	.	.	.	.

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TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:  
 (Note: 100% of Peak Flow Rate estimate assumed to have  
 an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
=====	=====
0%	1440.2
10%	85.1
20%	28.4
30%	11.3
40%	5.7
50%	5.7
60%	5.7
70%	5.7
80%	5.7
90%	5.7

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SMALL AREA UNIT HYDROGRAPH MODEL

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Analysis prepared by:

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Problem Descriptions:

APN 3039-321-08  
POST-DEVELOPMENT HYDRO (AREA B & C)  
100-YEAR, 24-HOUR STORM EVENT

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RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90  
TOTAL CATCHMENT AREA(ACRES) = 1.12  
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.136  
LOW LOSS FRACTION = 0.155  
TIME OF CONCENTRATION(MIN.) = 5.67  
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA  
USER SPECIFIED RAINFALL VALUES ARE USED  
RETURN FREQUENCY(YEARS) = 100  
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.36  
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.95  
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.36  
3-HOUR POINT RAINFALL VALUE(INCHES) = 2.29  
6-HOUR POINT RAINFALL VALUE(INCHES) = 3.25  
24-HOUR POINT RAINFALL VALUE(INCHES) = 6.66

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TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 0.48  
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.15

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TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	2.5	5.0	7.5	10.0
0.03	0.0000	0.00	Q	.	.	.	.
0.12	0.0005	0.12	Q	.	.	.	.
0.22	0.0014	0.12	Q	.	.	.	.
0.31	0.0024	0.12	Q	.	.	.	.
0.41	0.0034	0.12	Q	.	.	.	.
0.50	0.0043	0.12	Q	.	.	.	.
0.60	0.0053	0.12	Q	.	.	.	.

0.69	0.0063	0.12	Q	.	.	.	.
0.79	0.0072	0.13	Q	.	.	.	.
0.88	0.0082	0.13	Q	.	.	.	.
0.97	0.0092	0.13	Q	.	.	.	.
1.07	0.0102	0.13	Q	.	.	.	.
1.16	0.0112	0.13	Q	.	.	.	.
1.26	0.0122	0.13	Q	.	.	.	.
1.35	0.0132	0.13	Q	.	.	.	.
1.45	0.0142	0.13	Q	.	.	.	.
1.54	0.0152	0.13	Q	.	.	.	.
1.64	0.0162	0.13	Q	.	.	.	.
1.73	0.0172	0.13	Q	.	.	.	.
1.82	0.0182	0.13	Q	.	.	.	.
1.92	0.0192	0.13	Q	.	.	.	.
2.01	0.0202	0.13	Q	.	.	.	.
2.11	0.0212	0.13	Q	.	.	.	.
2.20	0.0222	0.13	Q	.	.	.	.
2.30	0.0233	0.13	Q	.	.	.	.
2.39	0.0243	0.13	Q	.	.	.	.
2.49	0.0253	0.13	Q	.	.	.	.
2.58	0.0264	0.13	Q	.	.	.	.
2.68	0.0274	0.13	Q	.	.	.	.
2.77	0.0284	0.13	Q	.	.	.	.
2.86	0.0295	0.13	Q	.	.	.	.
2.96	0.0305	0.13	Q	.	.	.	.
3.05	0.0316	0.14	Q	.	.	.	.
3.15	0.0326	0.14	Q	.	.	.	.
3.24	0.0337	0.14	Q	.	.	.	.
3.34	0.0348	0.14	Q	.	.	.	.
3.43	0.0358	0.14	Q	.	.	.	.
3.53	0.0369	0.14	Q	.	.	.	.
3.62	0.0380	0.14	Q	.	.	.	.
3.71	0.0391	0.14	Q	.	.	.	.
3.81	0.0401	0.14	Q	.	.	.	.
3.90	0.0412	0.14	Q	.	.	.	.
4.00	0.0423	0.14	Q	.	.	.	.
4.09	0.0434	0.14	Q	.	.	.	.
4.19	0.0445	0.14	Q	.	.	.	.
4.28	0.0456	0.14	Q	.	.	.	.
4.38	0.0467	0.14	Q	.	.	.	.
4.47	0.0478	0.14	Q	.	.	.	.
4.57	0.0490	0.14	Q	.	.	.	.
4.66	0.0501	0.14	Q	.	.	.	.
4.75	0.0512	0.14	Q	.	.	.	.
4.85	0.0523	0.15	Q	.	.	.	.
4.94	0.0535	0.15	Q	.	.	.	.
5.04	0.0546	0.15	Q	.	.	.	.
5.13	0.0558	0.15	Q	.	.	.	.
5.23	0.0569	0.15	Q	.	.	.	.
5.32	0.0581	0.15	Q	.	.	.	.
5.42	0.0592	0.15	Q	.	.	.	.
5.51	0.0604	0.15	Q	.	.	.	.
5.61	0.0616	0.15	Q	.	.	.	.
5.70	0.0627	0.15	Q	.	.	.	.
5.79	0.0639	0.15	Q	.	.	.	.

Figure 4.6  
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5.89	0.0651	0.15	Q	.	.	.	.
5.98	0.0663	0.15	Q	.	.	.	.
6.08	0.0675	0.15	Q	.	.	.	.
6.17	0.0687	0.15	Q	.	.	.	.
6.27	0.0699	0.16	Q	.	.	.	.
6.36	0.0711	0.16	Q	.	.	.	.
6.46	0.0723	0.16	Q	.	.	.	.
6.55	0.0736	0.16	Q	.	.	.	.
6.64	0.0748	0.16	Q	.	.	.	.
6.74	0.0760	0.16	Q	.	.	.	.
6.83	0.0773	0.16	Q	.	.	.	.
6.93	0.0785	0.16	Q	.	.	.	.
7.02	0.0798	0.16	Q	.	.	.	.
7.12	0.0810	0.16	Q	.	.	.	.
7.21	0.0823	0.16	Q	.	.	.	.
7.31	0.0836	0.16	Q	.	.	.	.
7.40	0.0848	0.16	Q	.	.	.	.
7.49	0.0861	0.17	Q	.	.	.	.
7.59	0.0874	0.17	Q	.	.	.	.
7.68	0.0887	0.17	Q	.	.	.	.
7.78	0.0900	0.17	Q	.	.	.	.
7.87	0.0913	0.17	Q	.	.	.	.
7.97	0.0927	0.17	Q	.	.	.	.
8.06	0.0940	0.17	Q	.	.	.	.
8.16	0.0953	0.17	Q	.	.	.	.
8.25	0.0967	0.17	Q	.	.	.	.
8.35	0.0980	0.17	Q	.	.	.	.
8.44	0.0994	0.17	Q	.	.	.	.
8.53	0.1008	0.18	Q	.	.	.	.
8.63	0.1021	0.18	Q	.	.	.	.
8.72	0.1035	0.18	Q	.	.	.	.
8.82	0.1049	0.18	Q	.	.	.	.
8.91	0.1063	0.18	Q	.	.	.	.
9.01	0.1077	0.18	Q	.	.	.	.
9.10	0.1092	0.18	Q	.	.	.	.
9.20	0.1106	0.18	Q	.	.	.	.
9.29	0.1120	0.19	Q	.	.	.	.
9.38	0.1135	0.19	Q	.	.	.	.
9.48	0.1149	0.19	Q	.	.	.	.
9.57	0.1164	0.19	Q	.	.	.	.
9.67	0.1179	0.19	Q	.	.	.	.
9.76	0.1194	0.19	Q	.	.	.	.
9.86	0.1209	0.19	Q	.	.	.	.
9.95	0.1224	0.19	Q	.	.	.	.
10.05	0.1239	0.20	Q	.	.	.	.
10.14	0.1255	0.20	Q	.	.	.	.
10.24	0.1270	0.20	Q	.	.	.	.
10.33	0.1286	0.20	Q	.	.	.	.
10.42	0.1301	0.20	Q	.	.	.	.
10.52	0.1317	0.20	Q	.	.	.	.
10.61	0.1333	0.21	Q	.	.	.	.
10.71	0.1349	0.21	Q	.	.	.	.
10.80	0.1365	0.21	Q	.	.	.	.
10.90	0.1382	0.21	Q	.	.	.	.
10.99	0.1398	0.21	Q	.	.	.	.

Figure 4.6  
Page 3 of 6

11.09	0.1415	0.21	Q	.	.	.	.
11.18	0.1432	0.22	Q	.	.	.	.
11.27	0.1449	0.22	Q	.	.	.	.
11.37	0.1466	0.22	Q	.	.	.	.
11.46	0.1483	0.22	Q	.	.	.	.
11.56	0.1501	0.23	Q	.	.	.	.
11.65	0.1519	0.23	Q	.	.	.	.
11.75	0.1536	0.23	Q	.	.	.	.
11.84	0.1554	0.23	Q	.	.	.	.
11.94	0.1573	0.24	Q	.	.	.	.
12.03	0.1591	0.24	Q	.	.	.	.
12.13	0.1610	0.23	Q	.	.	.	.
12.22	0.1628	0.24	Q	.	.	.	.
12.31	0.1647	0.24	Q	.	.	.	.
12.41	0.1665	0.24	Q	.	.	.	.
12.50	0.1685	0.25	Q	.	.	.	.
12.60	0.1704	0.25	Q	.	.	.	.
12.69	0.1724	0.25	.Q	.	.	.	.
12.79	0.1743	0.26	.Q	.	.	.	.
12.88	0.1764	0.26	.Q	.	.	.	.
12.98	0.1784	0.26	.Q	.	.	.	.
13.07	0.1805	0.27	.Q	.	.	.	.
13.16	0.1826	0.27	.Q	.	.	.	.
13.26	0.1848	0.28	.Q	.	.	.	.
13.35	0.1869	0.28	.Q	.	.	.	.
13.45	0.1892	0.29	.Q	.	.	.	.
13.54	0.1914	0.29	.Q	.	.	.	.
13.64	0.1937	0.30	.Q	.	.	.	.
13.73	0.1961	0.30	.Q	.	.	.	.
13.83	0.1985	0.31	.Q	.	.	.	.
13.92	0.2009	0.32	.Q	.	.	.	.
14.02	0.2034	0.32	.Q	.	.	.	.
14.11	0.2059	0.31	.Q	.	.	.	.
14.20	0.2084	0.32	.Q	.	.	.	.
14.30	0.2109	0.33	.Q	.	.	.	.
14.39	0.2135	0.34	.Q	.	.	.	.
14.49	0.2162	0.35	.Q	.	.	.	.
14.58	0.2189	0.36	.Q	.	.	.	.
14.68	0.2218	0.37	.Q	.	.	.	.
14.77	0.2248	0.39	.Q	.	.	.	.
14.87	0.2278	0.40	.Q	.	.	.	.
14.96	0.2310	0.42	.Q	.	.	.	.
15.05	0.2344	0.44	.Q	.	.	.	.
15.15	0.2379	0.47	.Q	.	.	.	.
15.24	0.2416	0.48	.Q	.	.	.	.
15.34	0.2455	0.53	. Q	.	.	.	.
15.43	0.2499	0.58	. Q	.	.	.	.
15.53	0.2548	0.67	. Q	.	.	.	.
15.62	0.2601	0.71	. Q	.	.	.	.
15.72	0.2662	0.85	. Q	.	.	.	.
15.81	0.2733	0.97	. Q	.	.	.	.
15.91	0.2822	1.32	. Q	.	.	.	.
16.00	0.2941	1.73	. Q	.	.	.	.
16.09	0.3166	4.02	.	Q	.	.	.
16.19	0.3366	1.11	. Q	.	.	.	.

Figure 4.6  
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16.28	0.3439	0.76	. Q	.	.	.	.
16.38	0.3493	0.63	. Q	.	.	.	.
16.47	0.3537	0.50	. Q	.	.	.	.
16.57	0.3575	0.45	.Q	.	.	.	.
16.66	0.3608	0.41	.Q	.	.	.	.
16.76	0.3639	0.38	.Q	.	.	.	.
16.85	0.3668	0.35	.Q	.	.	.	.
16.94	0.3694	0.33	.Q	.	.	.	.
17.04	0.3720	0.31	.Q	.	.	.	.
17.13	0.3744	0.32	.Q	.	.	.	.
17.23	0.3769	0.31	.Q	.	.	.	.
17.32	0.3792	0.29	.Q	.	.	.	.
17.42	0.3815	0.28	.Q	.	.	.	.
17.51	0.3837	0.27	.Q	.	.	.	.
17.61	0.3858	0.27	.Q	.	.	.	.
17.70	0.3878	0.26	.Q	.	.	.	.
17.80	0.3898	0.25	.Q	.	.	.	.
17.89	0.3918	0.24	Q	.	.	.	.
17.98	0.3937	0.24	Q	.	.	.	.
18.08	0.3955	0.24	Q	.	.	.	.
18.17	0.3973	0.23	Q	.	.	.	.
18.27	0.3992	0.23	Q	.	.	.	.
18.36	0.4009	0.22	Q	.	.	.	.
18.46	0.4027	0.22	Q	.	.	.	.
18.55	0.4044	0.22	Q	.	.	.	.
18.65	0.4060	0.21	Q	.	.	.	.
18.74	0.4077	0.21	Q	.	.	.	.
18.83	0.4093	0.20	Q	.	.	.	.
18.93	0.4109	0.20	Q	.	.	.	.
19.02	0.4124	0.20	Q	.	.	.	.
19.12	0.4139	0.20	Q	.	.	.	.
19.21	0.4155	0.19	Q	.	.	.	.
19.31	0.4170	0.19	Q	.	.	.	.
19.40	0.4184	0.19	Q	.	.	.	.
19.50	0.4199	0.18	Q	.	.	.	.
19.59	0.4213	0.18	Q	.	.	.	.
19.69	0.4227	0.18	Q	.	.	.	.
19.78	0.4241	0.18	Q	.	.	.	.
19.87	0.4255	0.18	Q	.	.	.	.
19.97	0.4268	0.17	Q	.	.	.	.
20.06	0.4282	0.17	Q	.	.	.	.
20.16	0.4295	0.17	Q	.	.	.	.
20.25	0.4308	0.17	Q	.	.	.	.
20.35	0.4321	0.17	Q	.	.	.	.
20.44	0.4334	0.16	Q	.	.	.	.
20.54	0.4347	0.16	Q	.	.	.	.
20.63	0.4360	0.16	Q	.	.	.	.
20.73	0.4372	0.16	Q	.	.	.	.
20.82	0.4384	0.16	Q	.	.	.	.
20.91	0.4397	0.16	Q	.	.	.	.
21.01	0.4409	0.15	Q	.	.	.	.
21.10	0.4421	0.15	Q	.	.	.	.
21.20	0.4433	0.15	Q	.	.	.	.
21.29	0.4444	0.15	Q	.	.	.	.
21.39	0.4456	0.15	Q	.	.	.	.

Figure 4.6  
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21.48	0.4468	0.15	Q	.	.	.	.
21.58	0.4479	0.15	Q	.	.	.	.
21.67	0.4491	0.15	Q	.	.	.	.
21.76	0.4502	0.14	Q	.	.	.	.
21.86	0.4513	0.14	Q	.	.	.	.
21.95	0.4524	0.14	Q	.	.	.	.
22.05	0.4535	0.14	Q	.	.	.	.
22.14	0.4546	0.14	Q	.	.	.	.
22.24	0.4557	0.14	Q	.	.	.	.
22.33	0.4568	0.14	Q	.	.	.	.
22.43	0.4579	0.14	Q	.	.	.	.
22.52	0.4589	0.14	Q	.	.	.	.
22.61	0.4600	0.13	Q	.	.	.	.
22.71	0.4610	0.13	Q	.	.	.	.
22.80	0.4621	0.13	Q	.	.	.	.
22.90	0.4631	0.13	Q	.	.	.	.
22.99	0.4642	0.13	Q	.	.	.	.
23.09	0.4652	0.13	Q	.	.	.	.
23.18	0.4662	0.13	Q	.	.	.	.
23.28	0.4672	0.13	Q	.	.	.	.
23.37	0.4682	0.13	Q	.	.	.	.
23.47	0.4692	0.13	Q	.	.	.	.
23.56	0.4702	0.13	Q	.	.	.	.
23.65	0.4712	0.13	Q	.	.	.	.
23.75	0.4721	0.12	Q	.	.	.	.
23.84	0.4731	0.12	Q	.	.	.	.
23.94	0.4741	0.12	Q	.	.	.	.
24.03	0.4750	0.12	Q	.	.	.	.
24.13	0.4755	0.00	Q	.	.	.	.

-----

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:  
 (Note: 100% of Peak Flow Rate estimate assumed to have  
 an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
=====	=====
0%	1440.2
10%	107.7
20%	34.0
30%	17.0
40%	11.3
50%	5.7
60%	5.7
70%	5.7
80%	5.7
90%	5.7

\*\*\*\*\*

SMALL AREA UNIT HYDROGRAPH MODEL

=====

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Ver. 23.0 Release Date: 07/01/2016 License ID 1533

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\*\*\*\*\*

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Problem Descriptions:

APN 3039-321-08  
POST-DEVELOPMENT HYDRO (AREA D)  
10-YEAR, 24-HOUR STORM EVENT

-----

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90  
TOTAL CATCHMENT AREA(ACRES) = 0.12  
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.748  
LOW LOSS FRACTION = 0.864  
TIME OF CONCENTRATION(MIN.) = 5.00  
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA  
USER SPECIFIED RAINFALL VALUES ARE USED  
RETURN FREQUENCY(YEARS) = 10  
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.22  
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.57  
1-HOUR POINT RAINFALL VALUE(INCHES) = 0.82  
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.38  
6-HOUR POINT RAINFALL VALUE(INCHES) = 1.96  
24-HOUR POINT RAINFALL VALUE(INCHES) = 3.89

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TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 0.01  
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.03

\*\*\*\*\*

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	2.5	5.0	7.5	10.0
0.08	0.0000	0.00	Q	.	.	.	.
0.17	0.0000	0.00	Q	.	.	.	.
0.25	0.0000	0.00	Q	.	.	.	.
0.33	0.0000	0.00	Q	.	.	.	.
0.42	0.0000	0.00	Q	.	.	.	.
0.50	0.0000	0.00	Q	.	.	.	.
0.58	0.0001	0.00	Q	.	.	.	.

0.67	0.0001	0.00	Q	.	.	.	.
0.75	0.0001	0.00	Q	.	.	.	.
0.83	0.0001	0.00	Q	.	.	.	.
0.92	0.0001	0.00	Q	.	.	.	.
1.00	0.0001	0.00	Q	.	.	.	.
1.08	0.0001	0.00	Q	.	.	.	.
1.17	0.0001	0.00	Q	.	.	.	.
1.25	0.0001	0.00	Q	.	.	.	.
1.33	0.0001	0.00	Q	.	.	.	.
1.42	0.0001	0.00	Q	.	.	.	.
1.50	0.0001	0.00	Q	.	.	.	.
1.58	0.0002	0.00	Q	.	.	.	.
1.67	0.0002	0.00	Q	.	.	.	.
1.75	0.0002	0.00	Q	.	.	.	.
1.83	0.0002	0.00	Q	.	.	.	.
1.92	0.0002	0.00	Q	.	.	.	.
2.00	0.0002	0.00	Q	.	.	.	.
2.08	0.0002	0.00	Q	.	.	.	.
2.17	0.0002	0.00	Q	.	.	.	.
2.25	0.0002	0.00	Q	.	.	.	.
2.33	0.0002	0.00	Q	.	.	.	.
2.42	0.0002	0.00	Q	.	.	.	.
2.50	0.0002	0.00	Q	.	.	.	.
2.58	0.0003	0.00	Q	.	.	.	.
2.67	0.0003	0.00	Q	.	.	.	.
2.75	0.0003	0.00	Q	.	.	.	.
2.83	0.0003	0.00	Q	.	.	.	.
2.92	0.0003	0.00	Q	.	.	.	.
3.00	0.0003	0.00	Q	.	.	.	.
3.08	0.0003	0.00	Q	.	.	.	.
3.17	0.0003	0.00	Q	.	.	.	.
3.25	0.0003	0.00	Q	.	.	.	.
3.33	0.0003	0.00	Q	.	.	.	.
3.42	0.0003	0.00	Q	.	.	.	.
3.50	0.0004	0.00	Q	.	.	.	.
3.58	0.0004	0.00	Q	.	.	.	.
3.67	0.0004	0.00	Q	.	.	.	.
3.75	0.0004	0.00	Q	.	.	.	.
3.83	0.0004	0.00	Q	.	.	.	.
3.92	0.0004	0.00	Q	.	.	.	.
4.00	0.0004	0.00	Q	.	.	.	.
4.08	0.0004	0.00	Q	.	.	.	.
4.17	0.0004	0.00	Q	.	.	.	.
4.25	0.0004	0.00	Q	.	.	.	.
4.33	0.0004	0.00	Q	.	.	.	.
4.42	0.0005	0.00	Q	.	.	.	.
4.50	0.0005	0.00	Q	.	.	.	.
4.58	0.0005	0.00	Q	.	.	.	.
4.67	0.0005	0.00	Q	.	.	.	.
4.75	0.0005	0.00	Q	.	.	.	.
4.83	0.0005	0.00	Q	.	.	.	.
4.92	0.0005	0.00	Q	.	.	.	.
5.00	0.0005	0.00	Q	.	.	.	.
5.08	0.0005	0.00	Q	.	.	.	.
5.17	0.0005	0.00	Q	.	.	.	.

Figure 4.7  
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5.25	0.0006	0.00	Q	.	.	.	.
5.33	0.0006	0.00	Q	.	.	.	.
5.42	0.0006	0.00	Q	.	.	.	.
5.50	0.0006	0.00	Q	.	.	.	.
5.58	0.0006	0.00	Q	.	.	.	.
5.67	0.0006	0.00	Q	.	.	.	.
5.75	0.0006	0.00	Q	.	.	.	.
5.83	0.0006	0.00	Q	.	.	.	.
5.92	0.0006	0.00	Q	.	.	.	.
6.00	0.0006	0.00	Q	.	.	.	.
6.08	0.0007	0.00	Q	.	.	.	.
6.17	0.0007	0.00	Q	.	.	.	.
6.25	0.0007	0.00	Q	.	.	.	.
6.33	0.0007	0.00	Q	.	.	.	.
6.42	0.0007	0.00	Q	.	.	.	.
6.50	0.0007	0.00	Q	.	.	.	.
6.58	0.0007	0.00	Q	.	.	.	.
6.67	0.0007	0.00	Q	.	.	.	.
6.75	0.0007	0.00	Q	.	.	.	.
6.83	0.0008	0.00	Q	.	.	.	.
6.92	0.0008	0.00	Q	.	.	.	.
7.00	0.0008	0.00	Q	.	.	.	.
7.08	0.0008	0.00	Q	.	.	.	.
7.17	0.0008	0.00	Q	.	.	.	.
7.25	0.0008	0.00	Q	.	.	.	.
7.33	0.0008	0.00	Q	.	.	.	.
7.42	0.0008	0.00	Q	.	.	.	.
7.50	0.0008	0.00	Q	.	.	.	.
7.58	0.0009	0.00	Q	.	.	.	.
7.67	0.0009	0.00	Q	.	.	.	.
7.75	0.0009	0.00	Q	.	.	.	.
7.83	0.0009	0.00	Q	.	.	.	.
7.92	0.0009	0.00	Q	.	.	.	.
8.00	0.0009	0.00	Q	.	.	.	.
8.08	0.0009	0.00	Q	.	.	.	.
8.17	0.0009	0.00	Q	.	.	.	.
8.25	0.0009	0.00	Q	.	.	.	.
8.33	0.0010	0.00	Q	.	.	.	.
8.42	0.0010	0.00	Q	.	.	.	.
8.50	0.0010	0.00	Q	.	.	.	.
8.58	0.0010	0.00	Q	.	.	.	.
8.67	0.0010	0.00	Q	.	.	.	.
8.75	0.0010	0.00	Q	.	.	.	.
8.83	0.0010	0.00	Q	.	.	.	.
8.92	0.0010	0.00	Q	.	.	.	.
9.00	0.0010	0.00	Q	.	.	.	.
9.08	0.0011	0.00	Q	.	.	.	.
9.17	0.0011	0.00	Q	.	.	.	.
9.25	0.0011	0.00	Q	.	.	.	.
9.33	0.0011	0.00	Q	.	.	.	.
9.42	0.0011	0.00	Q	.	.	.	.
9.50	0.0011	0.00	Q	.	.	.	.
9.58	0.0011	0.00	Q	.	.	.	.
9.67	0.0011	0.00	Q	.	.	.	.
9.75	0.0012	0.00	Q	.	.	.	.

Figure 4.7  
Page 3 of 7

9.83	0.0012	0.00	Q	.	.	.	.
9.92	0.0012	0.00	Q	.	.	.	.
10.00	0.0012	0.00	Q	.	.	.	.
10.08	0.0012	0.00	Q	.	.	.	.
10.17	0.0012	0.00	Q	.	.	.	.
10.25	0.0012	0.00	Q	.	.	.	.
10.33	0.0013	0.00	Q	.	.	.	.
10.42	0.0013	0.00	Q	.	.	.	.
10.50	0.0013	0.00	Q	.	.	.	.
10.58	0.0013	0.00	Q	.	.	.	.
10.67	0.0013	0.00	Q	.	.	.	.
10.75	0.0013	0.00	Q	.	.	.	.
10.83	0.0013	0.00	Q	.	.	.	.
10.92	0.0014	0.00	Q	.	.	.	.
11.00	0.0014	0.00	Q	.	.	.	.
11.08	0.0014	0.00	Q	.	.	.	.
11.17	0.0014	0.00	Q	.	.	.	.
11.25	0.0014	0.00	Q	.	.	.	.
11.33	0.0014	0.00	Q	.	.	.	.
11.42	0.0014	0.00	Q	.	.	.	.
11.50	0.0015	0.00	Q	.	.	.	.
11.58	0.0015	0.00	Q	.	.	.	.
11.67	0.0015	0.00	Q	.	.	.	.
11.75	0.0015	0.00	Q	.	.	.	.
11.83	0.0015	0.00	Q	.	.	.	.
11.92	0.0015	0.00	Q	.	.	.	.
12.00	0.0016	0.00	Q	.	.	.	.
12.08	0.0016	0.00	Q	.	.	.	.
12.17	0.0016	0.00	Q	.	.	.	.
12.25	0.0016	0.00	Q	.	.	.	.
12.33	0.0016	0.00	Q	.	.	.	.
12.42	0.0016	0.00	Q	.	.	.	.
12.50	0.0017	0.00	Q	.	.	.	.
12.58	0.0017	0.00	Q	.	.	.	.
12.67	0.0017	0.00	Q	.	.	.	.
12.75	0.0017	0.00	Q	.	.	.	.
12.83	0.0017	0.00	Q	.	.	.	.
12.92	0.0017	0.00	Q	.	.	.	.
13.00	0.0018	0.00	Q	.	.	.	.
13.08	0.0018	0.00	Q	.	.	.	.
13.17	0.0018	0.00	Q	.	.	.	.
13.25	0.0018	0.00	Q	.	.	.	.
13.33	0.0018	0.00	Q	.	.	.	.
13.42	0.0019	0.00	Q	.	.	.	.
13.50	0.0019	0.00	Q	.	.	.	.
13.58	0.0019	0.00	Q	.	.	.	.
13.67	0.0019	0.00	Q	.	.	.	.
13.75	0.0019	0.00	Q	.	.	.	.
13.83	0.0020	0.00	Q	.	.	.	.
13.92	0.0020	0.00	Q	.	.	.	.
14.00	0.0020	0.00	Q	.	.	.	.
14.08	0.0020	0.00	Q	.	.	.	.
14.17	0.0021	0.00	Q	.	.	.	.
14.25	0.0021	0.00	Q	.	.	.	.
14.33	0.0021	0.00	Q	.	.	.	.

Figure 4.7  
Page 4 of 7



14.42	0.0021	0.00	Q	.	.	.	.
14.50	0.0022	0.00	Q	.	.	.	.
14.58	0.0022	0.00	Q	.	.	.	.
14.67	0.0022	0.00	Q	.	.	.	.
14.75	0.0022	0.00	Q	.	.	.	.
14.83	0.0023	0.00	Q	.	.	.	.
14.92	0.0023	0.00	Q	.	.	.	.
15.00	0.0023	0.00	Q	.	.	.	.
15.08	0.0024	0.00	Q	.	.	.	.
15.17	0.0024	0.00	Q	.	.	.	.
15.25	0.0024	0.01	Q	.	.	.	.
15.33	0.0025	0.01	Q	.	.	.	.
15.42	0.0025	0.01	Q	.	.	.	.
15.50	0.0025	0.01	Q	.	.	.	.
15.58	0.0026	0.01	Q	.	.	.	.
15.67	0.0026	0.01	Q	.	.	.	.
15.75	0.0027	0.01	Q	.	.	.	.
15.83	0.0028	0.01	Q	.	.	.	.
15.92	0.0029	0.02	Q	.	.	.	.
16.00	0.0031	0.05	Q	.	.	.	.
16.08	0.0039	0.20	Q	.	.	.	.
16.17	0.0047	0.01	Q	.	.	.	.
16.25	0.0047	0.01	Q	.	.	.	.
16.33	0.0048	0.01	Q	.	.	.	.
16.42	0.0048	0.01	Q	.	.	.	.
16.50	0.0049	0.01	Q	.	.	.	.
16.58	0.0049	0.00	Q	.	.	.	.
16.67	0.0049	0.00	Q	.	.	.	.
16.75	0.0050	0.00	Q	.	.	.	.
16.83	0.0050	0.00	Q	.	.	.	.
16.92	0.0050	0.00	Q	.	.	.	.
17.00	0.0050	0.00	Q	.	.	.	.
17.08	0.0051	0.00	Q	.	.	.	.
17.17	0.0051	0.00	Q	.	.	.	.
17.25	0.0051	0.00	Q	.	.	.	.
17.33	0.0051	0.00	Q	.	.	.	.
17.42	0.0052	0.00	Q	.	.	.	.
17.50	0.0052	0.00	Q	.	.	.	.
17.58	0.0052	0.00	Q	.	.	.	.
17.67	0.0052	0.00	Q	.	.	.	.
17.75	0.0052	0.00	Q	.	.	.	.
17.83	0.0053	0.00	Q	.	.	.	.
17.92	0.0053	0.00	Q	.	.	.	.
18.00	0.0053	0.00	Q	.	.	.	.
18.08	0.0053	0.00	Q	.	.	.	.
18.17	0.0053	0.00	Q	.	.	.	.
18.25	0.0053	0.00	Q	.	.	.	.
18.33	0.0054	0.00	Q	.	.	.	.
18.42	0.0054	0.00	Q	.	.	.	.
18.50	0.0054	0.00	Q	.	.	.	.
18.58	0.0054	0.00	Q	.	.	.	.
18.67	0.0054	0.00	Q	.	.	.	.
18.75	0.0054	0.00	Q	.	.	.	.
18.83	0.0054	0.00	Q	.	.	.	.
18.92	0.0055	0.00	Q	.	.	.	.

Figure 4.7  
Page 5 of 7

19.00	0.0055	0.00	Q	.	.	.	.
19.08	0.0055	0.00	Q	.	.	.	.
19.17	0.0055	0.00	Q	.	.	.	.
19.25	0.0055	0.00	Q	.	.	.	.
19.33	0.0055	0.00	Q	.	.	.	.
19.42	0.0055	0.00	Q	.	.	.	.
19.50	0.0055	0.00	Q	.	.	.	.
19.58	0.0056	0.00	Q	.	.	.	.
19.67	0.0056	0.00	Q	.	.	.	.
19.75	0.0056	0.00	Q	.	.	.	.
19.83	0.0056	0.00	Q	.	.	.	.
19.92	0.0056	0.00	Q	.	.	.	.
20.00	0.0056	0.00	Q	.	.	.	.
20.08	0.0056	0.00	Q	.	.	.	.
20.17	0.0056	0.00	Q	.	.	.	.
20.25	0.0057	0.00	Q	.	.	.	.
20.33	0.0057	0.00	Q	.	.	.	.
20.42	0.0057	0.00	Q	.	.	.	.
20.50	0.0057	0.00	Q	.	.	.	.
20.58	0.0057	0.00	Q	.	.	.	.
20.67	0.0057	0.00	Q	.	.	.	.
20.75	0.0057	0.00	Q	.	.	.	.
20.83	0.0057	0.00	Q	.	.	.	.
20.92	0.0057	0.00	Q	.	.	.	.
21.00	0.0057	0.00	Q	.	.	.	.
21.08	0.0058	0.00	Q	.	.	.	.
21.17	0.0058	0.00	Q	.	.	.	.
21.25	0.0058	0.00	Q	.	.	.	.
21.33	0.0058	0.00	Q	.	.	.	.
21.42	0.0058	0.00	Q	.	.	.	.
21.50	0.0058	0.00	Q	.	.	.	.
21.58	0.0058	0.00	Q	.	.	.	.
21.67	0.0058	0.00	Q	.	.	.	.
21.75	0.0058	0.00	Q	.	.	.	.
21.83	0.0058	0.00	Q	.	.	.	.
21.92	0.0059	0.00	Q	.	.	.	.
22.00	0.0059	0.00	Q	.	.	.	.
22.08	0.0059	0.00	Q	.	.	.	.
22.17	0.0059	0.00	Q	.	.	.	.
22.25	0.0059	0.00	Q	.	.	.	.
22.33	0.0059	0.00	Q	.	.	.	.
22.42	0.0059	0.00	Q	.	.	.	.
22.50	0.0059	0.00	Q	.	.	.	.
22.58	0.0059	0.00	Q	.	.	.	.
22.67	0.0059	0.00	Q	.	.	.	.
22.75	0.0059	0.00	Q	.	.	.	.
22.83	0.0060	0.00	Q	.	.	.	.
22.92	0.0060	0.00	Q	.	.	.	.
23.00	0.0060	0.00	Q	.	.	.	.
23.08	0.0060	0.00	Q	.	.	.	.
23.17	0.0060	0.00	Q	.	.	.	.
23.25	0.0060	0.00	Q	.	.	.	.
23.33	0.0060	0.00	Q	.	.	.	.
23.42	0.0060	0.00	Q	.	.	.	.
23.50	0.0060	0.00	Q	.	.	.	.

Figure 4.7  
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23.58	0.0060	0.00	Q	.	.	.	.
23.67	0.0060	0.00	Q	.	.	.	.
23.75	0.0061	0.00	Q	.	.	.	.
23.83	0.0061	0.00	Q	.	.	.	.
23.92	0.0061	0.00	Q	.	.	.	.
24.00	0.0061	0.00	Q	.	.	.	.
24.08	0.0061	0.00	Q	.	.	.	.

-----

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:  
 (Note: 100% of Peak Flow Rate estimate assumed to have  
 an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
=====	=====
0%	1440.0
10%	10.0
20%	10.0
30%	5.0
40%	5.0
50%	5.0
60%	5.0
70%	5.0
80%	5.0
90%	5.0

\*\*\*\*\*

SMALL AREA UNIT HYDROGRAPH MODEL

=====

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Ver. 23.0 Release Date: 07/01/2016 License ID 1533

Analysis prepared by:

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\*\*\*\*\*

-----  
Problem Descriptions:

APN 3039-321-08  
POST-DEVELOPMENT HYDRO (AREA D)  
100-YEAR, 24-HOUR STORM EVENT  
-----

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90  
TOTAL CATCHMENT AREA(ACRES) = 0.12  
SOIL-LOSS RATE, Fm, (INCH/HR) = 0.423  
LOW LOSS FRACTION = 0.406  
TIME OF CONCENTRATION(MIN.) = 5.00  
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA  
USER SPECIFIED RAINFALL VALUES ARE USED  
RETURN FREQUENCY(YEARS) = 100  
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.36  
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.95  
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.36  
3-HOUR POINT RAINFALL VALUE(INCHES) = 2.29  
6-HOUR POINT RAINFALL VALUE(INCHES) = 3.25  
24-HOUR POINT RAINFALL VALUE(INCHES) = 6.66  
-----

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 0.04  
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.03

\*\*\*\*\*

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	2.5	5.0	7.5	10.0
0.08	0.0000	0.01	Q	.	.	.	.
0.17	0.0001	0.01	Q	.	.	.	.
0.25	0.0002	0.01	Q	.	.	.	.
0.33	0.0002	0.01	Q	.	.	.	.
0.42	0.0003	0.01	Q	.	.	.	.
0.50	0.0004	0.01	Q	.	.	.	.
0.58	0.0004	0.01	Q	.	.	.	.

0.67	0.0005	0.01	Q	.	.	.	.
0.75	0.0005	0.01	Q	.	.	.	.
0.83	0.0006	0.01	Q	.	.	.	.
0.92	0.0007	0.01	Q	.	.	.	.
1.00	0.0007	0.01	Q	.	.	.	.
1.08	0.0008	0.01	Q	.	.	.	.
1.17	0.0009	0.01	Q	.	.	.	.
1.25	0.0009	0.01	Q	.	.	.	.
1.33	0.0010	0.01	Q	.	.	.	.
1.42	0.0011	0.01	Q	.	.	.	.
1.50	0.0011	0.01	Q	.	.	.	.
1.58	0.0012	0.01	Q	.	.	.	.
1.67	0.0013	0.01	Q	.	.	.	.
1.75	0.0013	0.01	Q	.	.	.	.
1.83	0.0014	0.01	Q	.	.	.	.
1.92	0.0015	0.01	Q	.	.	.	.
2.00	0.0015	0.01	Q	.	.	.	.
2.08	0.0016	0.01	Q	.	.	.	.
2.17	0.0017	0.01	Q	.	.	.	.
2.25	0.0017	0.01	Q	.	.	.	.
2.33	0.0018	0.01	Q	.	.	.	.
2.42	0.0019	0.01	Q	.	.	.	.
2.50	0.0019	0.01	Q	.	.	.	.
2.58	0.0020	0.01	Q	.	.	.	.
2.67	0.0021	0.01	Q	.	.	.	.
2.75	0.0022	0.01	Q	.	.	.	.
2.83	0.0022	0.01	Q	.	.	.	.
2.92	0.0023	0.01	Q	.	.	.	.
3.00	0.0024	0.01	Q	.	.	.	.
3.08	0.0024	0.01	Q	.	.	.	.
3.17	0.0025	0.01	Q	.	.	.	.
3.25	0.0026	0.01	Q	.	.	.	.
3.33	0.0026	0.01	Q	.	.	.	.
3.42	0.0027	0.01	Q	.	.	.	.
3.50	0.0028	0.01	Q	.	.	.	.
3.58	0.0029	0.01	Q	.	.	.	.
3.67	0.0029	0.01	Q	.	.	.	.
3.75	0.0030	0.01	Q	.	.	.	.
3.83	0.0031	0.01	Q	.	.	.	.
3.92	0.0031	0.01	Q	.	.	.	.
4.00	0.0032	0.01	Q	.	.	.	.
4.08	0.0033	0.01	Q	.	.	.	.
4.17	0.0034	0.01	Q	.	.	.	.
4.25	0.0034	0.01	Q	.	.	.	.
4.33	0.0035	0.01	Q	.	.	.	.
4.42	0.0036	0.01	Q	.	.	.	.
4.50	0.0037	0.01	Q	.	.	.	.
4.58	0.0037	0.01	Q	.	.	.	.
4.67	0.0038	0.01	Q	.	.	.	.
4.75	0.0039	0.01	Q	.	.	.	.
4.83	0.0040	0.01	Q	.	.	.	.
4.92	0.0040	0.01	Q	.	.	.	.
5.00	0.0041	0.01	Q	.	.	.	.
5.08	0.0042	0.01	Q	.	.	.	.
5.17	0.0043	0.01	Q	.	.	.	.

Figure 4.8  
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5.25	0.0043	0.01	Q	.	.	.	.
5.33	0.0044	0.01	Q	.	.	.	.
5.42	0.0045	0.01	Q	.	.	.	.
5.50	0.0046	0.01	Q	.	.	.	.
5.58	0.0046	0.01	Q	.	.	.	.
5.67	0.0047	0.01	Q	.	.	.	.
5.75	0.0048	0.01	Q	.	.	.	.
5.83	0.0049	0.01	Q	.	.	.	.
5.92	0.0050	0.01	Q	.	.	.	.
6.00	0.0050	0.01	Q	.	.	.	.
6.08	0.0051	0.01	Q	.	.	.	.
6.17	0.0052	0.01	Q	.	.	.	.
6.25	0.0053	0.01	Q	.	.	.	.
6.33	0.0054	0.01	Q	.	.	.	.
6.42	0.0054	0.01	Q	.	.	.	.
6.50	0.0055	0.01	Q	.	.	.	.
6.58	0.0056	0.01	Q	.	.	.	.
6.67	0.0057	0.01	Q	.	.	.	.
6.75	0.0058	0.01	Q	.	.	.	.
6.83	0.0058	0.01	Q	.	.	.	.
6.92	0.0059	0.01	Q	.	.	.	.
7.00	0.0060	0.01	Q	.	.	.	.
7.08	0.0061	0.01	Q	.	.	.	.
7.17	0.0062	0.01	Q	.	.	.	.
7.25	0.0063	0.01	Q	.	.	.	.
7.33	0.0064	0.01	Q	.	.	.	.
7.42	0.0064	0.01	Q	.	.	.	.
7.50	0.0065	0.01	Q	.	.	.	.
7.58	0.0066	0.01	Q	.	.	.	.
7.67	0.0067	0.01	Q	.	.	.	.
7.75	0.0068	0.01	Q	.	.	.	.
7.83	0.0069	0.01	Q	.	.	.	.
7.92	0.0070	0.01	Q	.	.	.	.
8.00	0.0070	0.01	Q	.	.	.	.
8.08	0.0071	0.01	Q	.	.	.	.
8.17	0.0072	0.01	Q	.	.	.	.
8.25	0.0073	0.01	Q	.	.	.	.
8.33	0.0074	0.01	Q	.	.	.	.
8.42	0.0075	0.01	Q	.	.	.	.
8.50	0.0076	0.01	Q	.	.	.	.
8.58	0.0077	0.01	Q	.	.	.	.
8.67	0.0078	0.01	Q	.	.	.	.
8.75	0.0079	0.01	Q	.	.	.	.
8.83	0.0079	0.01	Q	.	.	.	.
8.92	0.0080	0.01	Q	.	.	.	.
9.00	0.0081	0.01	Q	.	.	.	.
9.08	0.0082	0.01	Q	.	.	.	.
9.17	0.0083	0.01	Q	.	.	.	.
9.25	0.0084	0.01	Q	.	.	.	.
9.33	0.0085	0.01	Q	.	.	.	.
9.42	0.0086	0.01	Q	.	.	.	.
9.50	0.0087	0.01	Q	.	.	.	.
9.58	0.0088	0.01	Q	.	.	.	.
9.67	0.0089	0.01	Q	.	.	.	.
9.75	0.0090	0.01	Q	.	.	.	.

Figure 4.8  
Page 3 of 7

9.83	0.0091	0.01	Q	.	.	.	.
9.92	0.0092	0.01	Q	.	.	.	.
10.00	0.0093	0.01	Q	.	.	.	.
10.08	0.0094	0.01	Q	.	.	.	.
10.17	0.0095	0.01	Q	.	.	.	.
10.25	0.0096	0.02	Q	.	.	.	.
10.33	0.0097	0.02	Q	.	.	.	.
10.42	0.0098	0.02	Q	.	.	.	.
10.50	0.0099	0.02	Q	.	.	.	.
10.58	0.0100	0.02	Q	.	.	.	.
10.67	0.0101	0.02	Q	.	.	.	.
10.75	0.0102	0.02	Q	.	.	.	.
10.83	0.0104	0.02	Q	.	.	.	.
10.92	0.0105	0.02	Q	.	.	.	.
11.00	0.0106	0.02	Q	.	.	.	.
11.08	0.0107	0.02	Q	.	.	.	.
11.17	0.0108	0.02	Q	.	.	.	.
11.25	0.0109	0.02	Q	.	.	.	.
11.33	0.0110	0.02	Q	.	.	.	.
11.42	0.0111	0.02	Q	.	.	.	.
11.50	0.0113	0.02	Q	.	.	.	.
11.58	0.0114	0.02	Q	.	.	.	.
11.67	0.0115	0.02	Q	.	.	.	.
11.75	0.0116	0.02	Q	.	.	.	.
11.83	0.0117	0.02	Q	.	.	.	.
11.92	0.0118	0.02	Q	.	.	.	.
12.00	0.0120	0.02	Q	.	.	.	.
12.08	0.0121	0.02	Q	.	.	.	.
12.17	0.0122	0.02	Q	.	.	.	.
12.25	0.0123	0.02	Q	.	.	.	.
12.33	0.0125	0.02	Q	.	.	.	.
12.42	0.0126	0.02	Q	.	.	.	.
12.50	0.0127	0.02	Q	.	.	.	.
12.58	0.0128	0.02	Q	.	.	.	.
12.67	0.0130	0.02	Q	.	.	.	.
12.75	0.0131	0.02	Q	.	.	.	.
12.83	0.0132	0.02	Q	.	.	.	.
12.92	0.0134	0.02	Q	.	.	.	.
13.00	0.0135	0.02	Q	.	.	.	.
13.08	0.0137	0.02	Q	.	.	.	.
13.17	0.0138	0.02	Q	.	.	.	.
13.25	0.0139	0.02	Q	.	.	.	.
13.33	0.0141	0.02	Q	.	.	.	.
13.42	0.0142	0.02	Q	.	.	.	.
13.50	0.0144	0.02	Q	.	.	.	.
13.58	0.0145	0.02	Q	.	.	.	.
13.67	0.0147	0.02	Q	.	.	.	.
13.75	0.0148	0.02	Q	.	.	.	.
13.83	0.0150	0.02	Q	.	.	.	.
13.92	0.0152	0.02	Q	.	.	.	.
14.00	0.0153	0.02	Q	.	.	.	.
14.08	0.0155	0.02	Q	.	.	.	.
14.17	0.0157	0.02	Q	.	.	.	.
14.25	0.0158	0.02	Q	.	.	.	.
14.33	0.0160	0.02	Q	.	.	.	.

Figure 4.8  
Page 4 of 7

14.42	0.0162	0.03	Q	.	.	.	.
14.50	0.0163	0.03	Q	.	.	.	.
14.58	0.0165	0.03	Q	.	.	.	.
14.67	0.0167	0.03	Q	.	.	.	.
14.75	0.0169	0.03	Q	.	.	.	.
14.83	0.0171	0.03	Q	.	.	.	.
14.92	0.0173	0.03	Q	.	.	.	.
15.00	0.0175	0.03	Q	.	.	.	.
15.08	0.0178	0.03	Q	.	.	.	.
15.17	0.0180	0.04	Q	.	.	.	.
15.25	0.0183	0.04	Q	.	.	.	.
15.33	0.0185	0.04	Q	.	.	.	.
15.42	0.0188	0.05	Q	.	.	.	.
15.50	0.0191	0.05	Q	.	.	.	.
15.58	0.0195	0.05	Q	.	.	.	.
15.67	0.0199	0.06	Q	.	.	.	.
15.75	0.0203	0.07	Q	.	.	.	.
15.83	0.0208	0.08	Q	.	.	.	.
15.92	0.0215	0.12	Q	.	.	.	.
16.00	0.0225	0.17	Q	.	.	.	.
16.08	0.0245	0.43	.Q	.	.	.	.
16.17	0.0263	0.10	Q	.	.	.	.
16.25	0.0269	0.06	Q	.	.	.	.
16.33	0.0272	0.05	Q	.	.	.	.
16.42	0.0276	0.04	Q	.	.	.	.
16.50	0.0278	0.04	Q	.	.	.	.
16.58	0.0281	0.03	Q	.	.	.	.
16.67	0.0283	0.03	Q	.	.	.	.
16.75	0.0285	0.03	Q	.	.	.	.
16.83	0.0287	0.03	Q	.	.	.	.
16.92	0.0288	0.03	Q	.	.	.	.
17.00	0.0290	0.02	Q	.	.	.	.
17.08	0.0292	0.02	Q	.	.	.	.
17.17	0.0294	0.02	Q	.	.	.	.
17.25	0.0295	0.02	Q	.	.	.	.
17.33	0.0297	0.02	Q	.	.	.	.
17.42	0.0298	0.02	Q	.	.	.	.
17.50	0.0300	0.02	Q	.	.	.	.
17.58	0.0301	0.02	Q	.	.	.	.
17.67	0.0302	0.02	Q	.	.	.	.
17.75	0.0304	0.02	Q	.	.	.	.
17.83	0.0305	0.02	Q	.	.	.	.
17.92	0.0306	0.02	Q	.	.	.	.
18.00	0.0308	0.02	Q	.	.	.	.
18.08	0.0309	0.02	Q	.	.	.	.
18.17	0.0310	0.02	Q	.	.	.	.
18.25	0.0311	0.02	Q	.	.	.	.
18.33	0.0312	0.02	Q	.	.	.	.
18.42	0.0314	0.02	Q	.	.	.	.
18.50	0.0315	0.02	Q	.	.	.	.
18.58	0.0316	0.02	Q	.	.	.	.
18.67	0.0317	0.02	Q	.	.	.	.
18.75	0.0318	0.02	Q	.	.	.	.
18.83	0.0319	0.02	Q	.	.	.	.
18.92	0.0320	0.02	Q	.	.	.	.

Figure 4.8  
Page 5 of 7



19.00	0.0321	0.01	Q	.	.	.	.
19.08	0.0322	0.01	Q	.	.	.	.
19.17	0.0323	0.01	Q	.	.	.	.
19.25	0.0324	0.01	Q	.	.	.	.
19.33	0.0325	0.01	Q	.	.	.	.
19.42	0.0326	0.01	Q	.	.	.	.
19.50	0.0327	0.01	Q	.	.	.	.
19.58	0.0328	0.01	Q	.	.	.	.
19.67	0.0329	0.01	Q	.	.	.	.
19.75	0.0330	0.01	Q	.	.	.	.
19.83	0.0331	0.01	Q	.	.	.	.
19.92	0.0332	0.01	Q	.	.	.	.
20.00	0.0333	0.01	Q	.	.	.	.
20.08	0.0333	0.01	Q	.	.	.	.
20.17	0.0334	0.01	Q	.	.	.	.
20.25	0.0335	0.01	Q	.	.	.	.
20.33	0.0336	0.01	Q	.	.	.	.
20.42	0.0337	0.01	Q	.	.	.	.
20.50	0.0338	0.01	Q	.	.	.	.
20.58	0.0339	0.01	Q	.	.	.	.
20.67	0.0339	0.01	Q	.	.	.	.
20.75	0.0340	0.01	Q	.	.	.	.
20.83	0.0341	0.01	Q	.	.	.	.
20.92	0.0342	0.01	Q	.	.	.	.
21.00	0.0343	0.01	Q	.	.	.	.
21.08	0.0344	0.01	Q	.	.	.	.
21.17	0.0344	0.01	Q	.	.	.	.
21.25	0.0345	0.01	Q	.	.	.	.
21.33	0.0346	0.01	Q	.	.	.	.
21.42	0.0347	0.01	Q	.	.	.	.
21.50	0.0347	0.01	Q	.	.	.	.
21.58	0.0348	0.01	Q	.	.	.	.
21.67	0.0349	0.01	Q	.	.	.	.
21.75	0.0350	0.01	Q	.	.	.	.
21.83	0.0350	0.01	Q	.	.	.	.
21.92	0.0351	0.01	Q	.	.	.	.
22.00	0.0352	0.01	Q	.	.	.	.
22.08	0.0353	0.01	Q	.	.	.	.
22.17	0.0353	0.01	Q	.	.	.	.
22.25	0.0354	0.01	Q	.	.	.	.
22.33	0.0355	0.01	Q	.	.	.	.
22.42	0.0356	0.01	Q	.	.	.	.
22.50	0.0356	0.01	Q	.	.	.	.
22.58	0.0357	0.01	Q	.	.	.	.
22.67	0.0358	0.01	Q	.	.	.	.
22.75	0.0358	0.01	Q	.	.	.	.
22.83	0.0359	0.01	Q	.	.	.	.
22.92	0.0360	0.01	Q	.	.	.	.
23.00	0.0360	0.01	Q	.	.	.	.
23.08	0.0361	0.01	Q	.	.	.	.
23.17	0.0362	0.01	Q	.	.	.	.
23.25	0.0362	0.01	Q	.	.	.	.
23.33	0.0363	0.01	Q	.	.	.	.
23.42	0.0364	0.01	Q	.	.	.	.
23.50	0.0364	0.01	Q	.	.	.	.

Figure 4.8  
Page 6 of 7

23.58	0.0365	0.01	Q	.	.	.	.
23.67	0.0366	0.01	Q	.	.	.	.
23.75	0.0366	0.01	Q	.	.	.	.
23.83	0.0367	0.01	Q	.	.	.	.
23.92	0.0368	0.01	Q	.	.	.	.
24.00	0.0368	0.01	Q	.	.	.	.
24.08	0.0369	0.00	Q	.	.	.	.

-----

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:  
 (Note: 100% of Peak Flow Rate estimate assumed to have  
 an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
=====	=====
0%	1440.0
10%	60.0
20%	20.0
30%	10.0
40%	5.0
50%	5.0
60%	5.0
70%	5.0
80%	5.0
90%	5.0



## Hesperia







**NOAA Atlas 14, Volume 6, Version 2**  
**Location name: Hesperia, California, USA\***  
**Latitude: 34.4094°, Longitude: -117.4047°**  
**Elevation: 3681.9 ft\*\***

\* source: ESRI Maps  
 \*\* source: USGS



**POINT PRECIPITATION FREQUENCY ESTIMATES**

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aerals](#)

**PF tabular**

<b>PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)<sup>1</sup></b>										
<b>Duration</b>	<b>Average recurrence interval (years)</b>									
	<b>1</b>	<b>2</b>	<b>5</b>	<b>10</b>	<b>25</b>	<b>50</b>	<b>100</b>	<b>200</b>	<b>500</b>	<b>1000</b>
<b>5-min</b>	0.091 (0.075-0.111)	0.128 (0.106-0.156)	0.177 (0.146-0.217)	0.218 (0.178-0.269)	0.274 (0.217-0.350)	0.318 (0.247-0.415)	0.364 (0.275-0.486)	0.411 (0.302-0.565)	0.477 (0.336-0.684)	0.529 (0.360-0.785)
<b>10-min</b>	0.130 (0.108-0.159)	0.183 (0.152-0.224)	0.254 (0.210-0.311)	0.313 (0.256-0.386)	0.393 (0.311-0.502)	0.456 (0.353-0.595)	0.521 (0.394-0.697)	0.589 (0.433-0.810)	0.683 (0.482-0.980)	0.758 (0.516-1.13)
<b>15-min</b>	0.157 (0.130-0.192)	0.222 (0.183-0.271)	0.307 (0.253-0.377)	0.378 (0.309-0.467)	0.476 (0.376-0.607)	0.552 (0.427-0.720)	0.631 (0.476-0.843)	0.713 (0.524-0.980)	0.827 (0.582-1.19)	0.916 (0.624-1.36)
<b>30-min</b>	0.237 (0.196-0.289)	0.334 (0.276-0.408)	0.463 (0.382-0.567)	0.569 (0.465-0.703)	0.716 (0.566-0.914)	0.831 (0.643-1.08)	0.949 (0.717-1.27)	1.07 (0.788-1.48)	1.24 (0.877-1.78)	1.38 (0.939-2.05)
<b>60-min</b>	0.339 (0.281-0.414)	0.478 (0.396-0.584)	0.663 (0.547-0.812)	0.816 (0.667-1.01)	1.03 (0.812-1.31)	1.19 (0.922-1.55)	1.36 (1.03-1.82)	1.54 (1.13-2.12)	1.78 (1.26-2.56)	1.98 (1.35-2.94)
<b>2-hr</b>	0.504 (0.417-0.615)	0.683 (0.565-0.834)	0.923 (0.762-1.13)	1.13 (0.920-1.39)	1.41 (1.11-1.80)	1.63 (1.26-2.13)	1.86 (1.41-2.49)	2.11 (1.55-2.90)	2.45 (1.73-3.52)	2.73 (1.86-4.05)
<b>3-hr</b>	0.636 (0.527-0.776)	0.850 (0.703-1.04)	1.14 (0.940-1.40)	1.38 (1.13-1.71)	1.73 (1.37-2.21)	2.00 (1.55-2.61)	2.29 (1.73-3.06)	2.59 (1.91-3.57)	3.03 (2.13-4.34)	3.37 (2.30-5.01)
<b>6-hr</b>	0.916 (0.758-1.12)	1.21 (1.00-1.48)	1.62 (1.33-1.98)	1.96 (1.60-2.42)	2.44 (1.93-3.12)	2.84 (2.20-3.70)	3.25 (2.46-4.34)	3.69 (2.71-5.08)	4.33 (3.05-6.21)	4.85 (3.30-7.19)
<b>12-hr</b>	1.21 (1.00-1.48)	1.64 (1.36-2.00)	2.22 (1.83-2.72)	2.71 (2.22-3.35)	3.41 (2.69-4.35)	3.97 (3.07-5.17)	4.56 (3.44-6.09)	5.19 (3.81-7.14)	6.10 (4.30-8.74)	6.84 (4.65-10.1)
<b>24-hr</b>	1.64 (1.45-1.89)	2.28 (2.02-2.63)	3.16 (2.79-3.65)	3.89 (3.41-4.54)	4.93 (4.18-5.94)	5.77 (4.79-7.10)	6.66 (5.39-8.39)	7.60 (5.99-9.85)	8.95 (6.76-12.1)	10.0 (7.34-14.0)
<b>2-day</b>	1.92 (1.70-2.21)	2.69 (2.38-3.10)	3.74 (3.30-4.32)	4.64 (4.06-5.40)	5.93 (5.02-7.14)	6.98 (5.79-8.58)	8.10 (6.56-10.2)	9.31 (7.33-12.1)	11.0 (8.35-14.9)	12.5 (9.12-17.4)
<b>3-day</b>	2.06 (1.83-2.37)	2.89 (2.56-3.33)	4.03 (3.56-4.66)	5.02 (4.39-5.85)	6.45 (5.46-7.76)	7.62 (6.32-9.36)	8.87 (7.19-11.2)	10.2 (8.07-13.3)	12.2 (9.24-16.5)	13.9 (10.1-19.4)
<b>4-day</b>	2.22 (1.97-2.56)	3.12 (2.76-3.59)	4.36 (3.85-5.04)	5.43 (4.76-6.33)	6.99 (5.92-8.42)	8.27 (6.86-10.2)	9.65 (7.81-12.2)	11.2 (8.79-14.4)	13.3 (10.1-18.0)	15.2 (11.1-21.2)
<b>7-day</b>	2.50 (2.21-2.87)	3.49 (3.09-4.02)	4.87 (4.30-5.63)	6.06 (5.31-7.06)	7.79 (6.60-9.38)	9.21 (7.64-11.3)	10.7 (8.70-13.5)	12.4 (9.78-16.1)	14.8 (11.2-20.0)	16.9 (12.3-23.6)
<b>10-day</b>	2.67 (2.37-3.07)	3.72 (3.30-4.29)	5.19 (4.58-5.99)	6.45 (5.65-7.51)	8.27 (7.01-9.96)	9.78 (8.11-12.0)	11.4 (9.23-14.4)	13.2 (10.4-17.0)	15.7 (11.9-21.2)	17.9 (13.0-24.9)
<b>20-day</b>	3.19 (2.83-3.67)	4.44 (3.93-5.12)	6.18 (5.46-7.14)	7.68 (6.73-8.95)	9.85 (8.35-11.9)	11.6 (9.66-14.3)	13.6 (11.0-17.1)	15.7 (12.3-20.3)	18.7 (14.2-25.3)	21.3 (15.6-29.8)
<b>30-day</b>	3.76 (3.33-4.33)	5.22 (4.62-6.01)	7.23 (6.39-8.36)	8.97 (7.86-10.5)	11.5 (9.74-13.8)	13.6 (11.3-16.7)	15.8 (12.8-19.9)	18.3 (14.4-23.7)	21.9 (16.6-29.5)	24.9 (18.2-34.8)
<b>45-day</b>	4.49 (3.98-5.17)	6.16 (5.45-7.10)	8.46 (7.47-9.78)	10.5 (9.16-12.2)	13.3 (11.3-16.1)	15.7 (13.1-19.3)	18.3 (14.8-23.1)	21.2 (16.7-27.4)	25.4 (19.2-34.3)	28.9 (21.1-40.4)
<b>60-day</b>	5.14 (4.56-5.92)	6.94 (6.14-8.00)	9.42 (8.32-10.9)	11.6 (10.1-13.5)	14.7 (12.4-17.7)	17.3 (14.3-21.2)	20.1 (16.3-25.3)	23.2 (18.3-30.1)	27.8 (21.0-37.6)	31.8 (23.2-44.4)

<sup>1</sup> Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

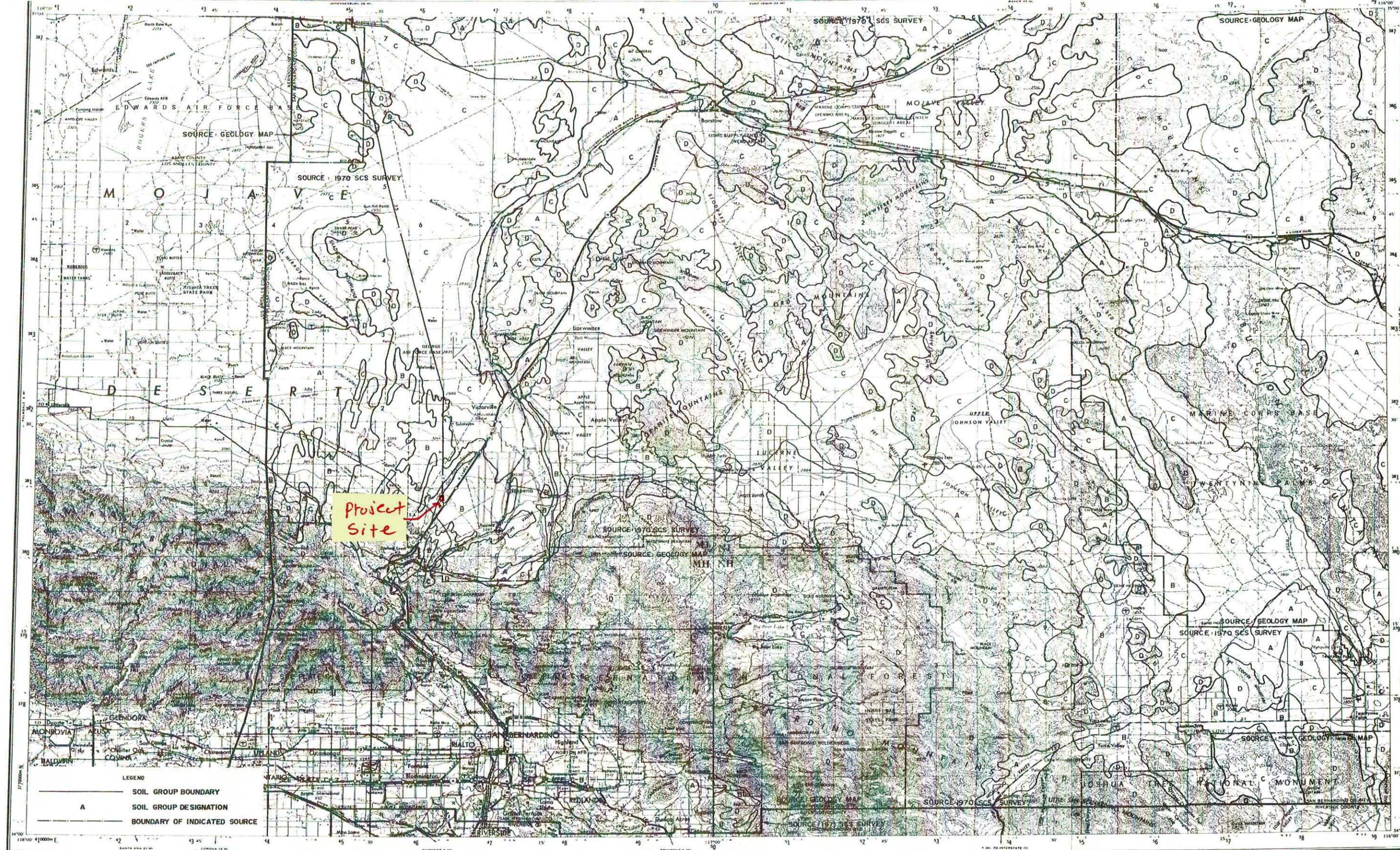
Please refer to NOAA Atlas 14 document for more information.

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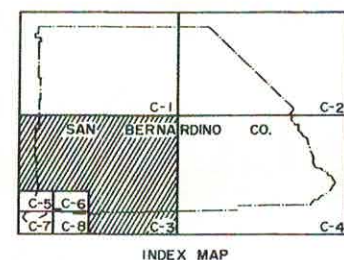
**PF graphical**

Figure 6.1





# **SAN BERNARDINO COUNTY** **HYDROLOGY MANUAL**



**Figure 6.2**

**HYDROLOGIC SOILS GROUP MAP**

**FOR**

**SOUTHCENTRAL AREA**



# TRIBUTARY AREA MAP

PRE-DEVELOPMENT  
PROFESSIONAL AUTO TRANSPORT  
PROPOSED CAR HAULING FACILITY  
APN 3039-321-08  
WEST SIDE OF CALIENTE ROAD  
CITY OF HESPERIA

TOTAL ON-SITE  
PRE-DEVELOPMENT  
FLOWS LEAVING THE  
SITE @ NODE 4  
Q(10) = 0.92 CFS  
Q(100) = 1.63 CFS

**SOIL ENGINEER**  
REPORT DATED SEPTEMBER 11, 2019  
PROJECT NO. 13561.1  
AS CONDUCTED BY  
**LOR GEOTECHNICAL GROUP, INC.**  
6121 QUAIL VALLEY COURT  
RIVERSIDE, CA 92507  
PHONE: (951) 653-1760  
FAX: (951) 653-1741

**SOURCE OF SURVEY**  
TOPOGRAPHIC SURVEY  
DATED APRIL 2019  
AS CONDUCTED BY  
**ON POINT LAND SURVEYING, INC.**  
1910 ORANGE TREE LANE, SUITE 344  
REDLANDS, CA 92374  
PHONE: (909) 792-2221

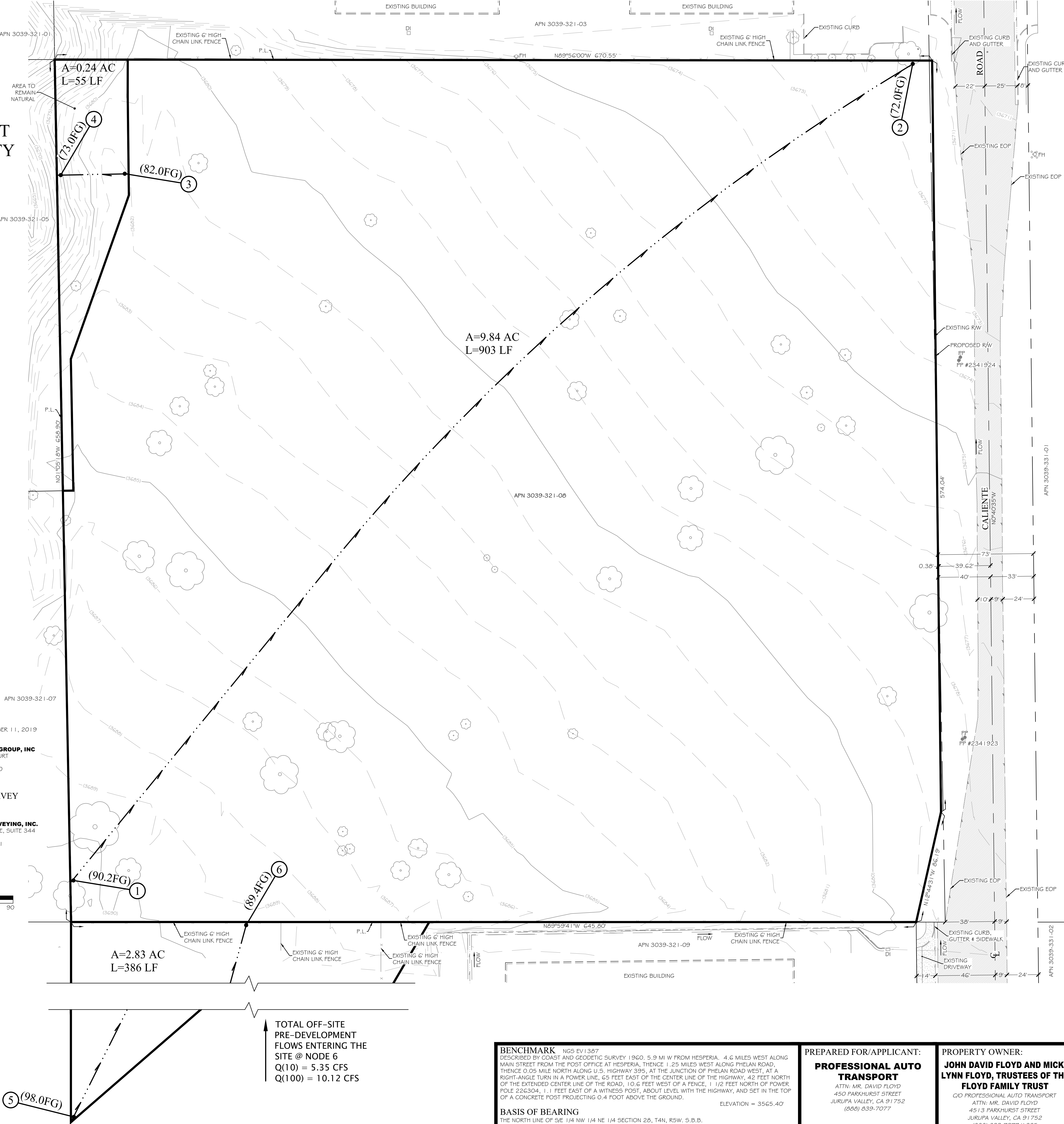
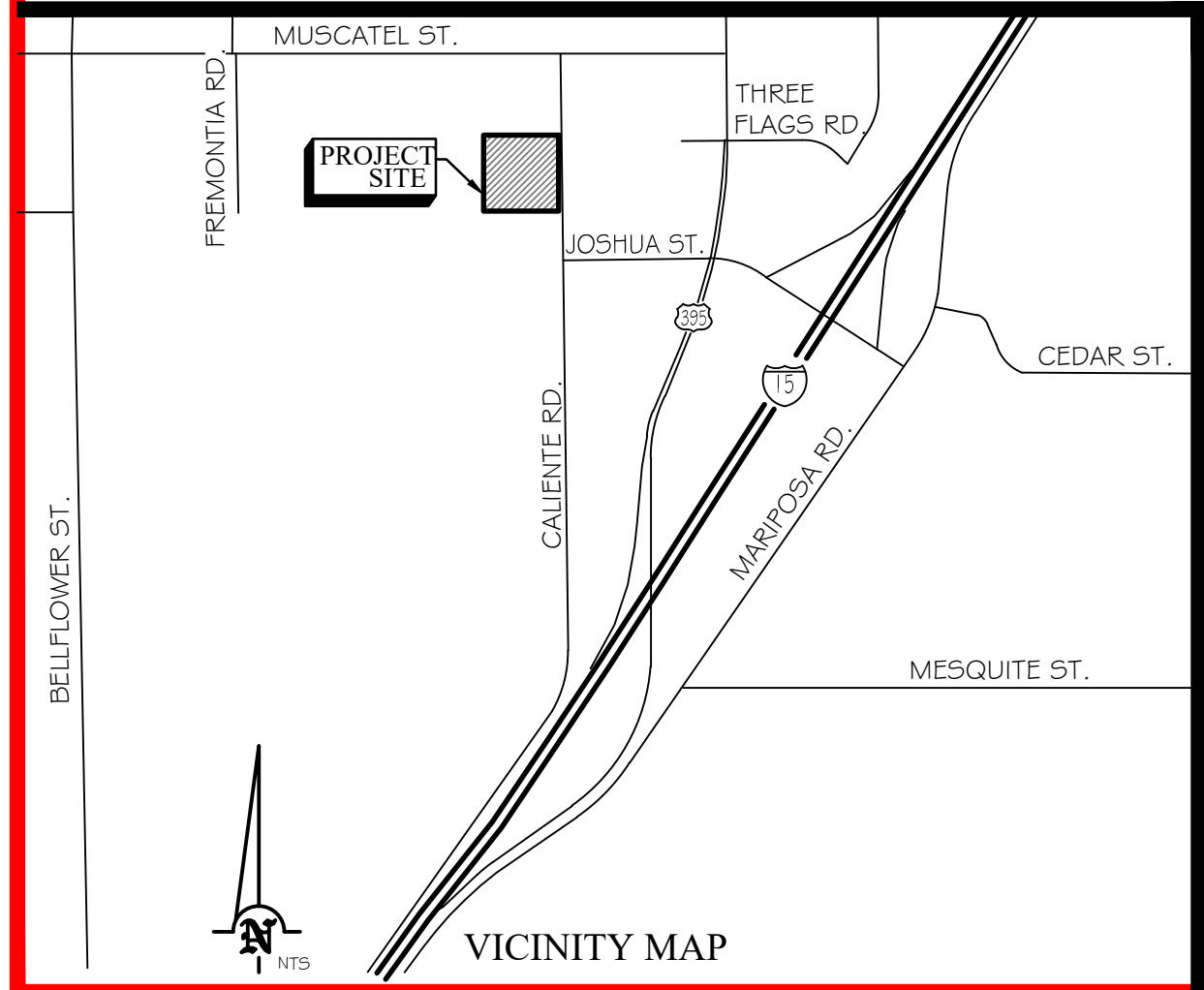
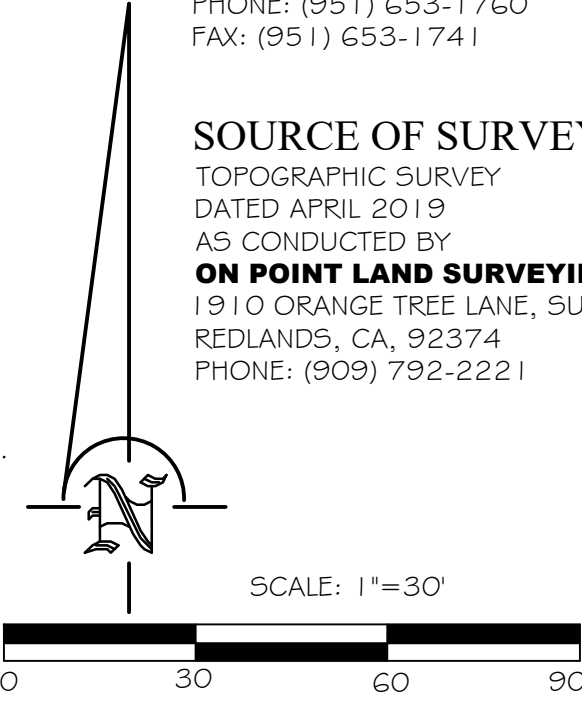
## UTILITIES

**ELECTRIC:**  
SOUTHERN CALIFORNIA  
EDISON COMPANY  
30553 RIMROCK RD  
BARSTOW, CA 92311  
(760) 252-6402

**TELEPHONE:**  
FRONTIER COMMUNICATIONS  
95 4TH STREET  
REDLANDS, CA 92373  
(909) 748-6676

**WATER:**  
CITY OF HESPERIA  
9700 SEVENTH AVENUE  
HESPERIA, CA 92345  
(760) 947-1840

**SEWER:**  
ON-SITE SEPTIC  
**GAS:**  
SOUTHWEST GAS  
13471 MARIPOSA ROAD  
VICTORVILLE, CA 92392  
(760) 951-4044  
**TELEPHONE:**  
RACE COMMUNICATIONS  
1170 UNIT C, E TEHACHAPI BLVD.  
TEHACHAPI, CA 93561  
(877) 722-3833



TOTAL ON-SITE  
PRE-DEVELOPMENT  
FLOW LEAVING THE SITE  
@ NODE 2  
Q(10) = 13.65 CFS  
Q(100) = 27.01 CFS

## LEGEND

DI EX DROP INLET  
EOP EXISTING EDGE OF PAVEMENT  
EX EXISTING  
FH EXISTING FIRE HYDRANT  
GM EX GAS METER  
GV EX GAS VALVE  
ICV EX IRRIGATION CONTROL VALVE  
OH OVERHANG  
PFH PROPOSED FIRE HYDRANT  
PL PROPERTY LINE  
PP EX POWER POLE (TO BE RELOCATED)  
R/W RIGHT-OF-WAY  
S EX SIGN  
STL PROPOSED STREET LIGHT  
TYP TYPICAL  
UM EX UTILITY MARKER  
UMH EX UTILITY MANHOLE  
WM EX WATER METER

EXISTING TREESHRUB

## HATCH LEGEND

EXISTING PCC PAVING  
EXISTING AC PAVING

## LEGEND

① **ELEV.**  
L=165'  
A=1.44 AC  
— FLOWLINE  
— TRIBUTARY BOUNDARY

NODE # & ELEV.  
FLOWLINE LENGTH  
SUB AREA  
FLOWLINE  
TRIBUTARY BOUNDARY

## LEGAL DESCRIPTION

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF HESPERIA, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

THE SOUTHEAST 1/4 OF THE NORTHWEST 1/4 OF THE NORTHEAST 1/4 OF SECTION 28, TOWNSHIP 4 NORTH, RANGE 5 WEST, SAN BERNARDINO BASE AND MERIDIAN, IN THE CITY OF HESPERIA, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT OF SAID LAND.

## EASEMENTS

NO KNOWN EASEMENTS PER TITLE REPORT DATED 8/21/2017 BY CHICAGO TITLE COMPANY

**TRIBUTARY AREA MAP**  
PRE-DEVELOPMENT  
PROFESSIONAL AUTO TRANSPORT  
PROPOSED CAR HAULING FACILITY  
APN 3039-321-08  
WEST SIDE OF CALIENTE ROAD  
CITY OF HESPERIA

**thatcher engineering & associates, inc.**  
1461 10th street suite 105, redlands, ca 92373  
• land planning  
• civil engineering  
• landscape architecture  
phone 909.748.7777  
fax 909.748.7776



**BENCHMARK** NGS EV1387  
DESCRIBED BY COAST AND GEODETIC SURVEY 1960, 5.9 MI W FROM HESPERIA, 4.6 MILES WEST ALONG MAIN STREET FROM THE POST OFFICE AT HESPERIA, THENCE 1.25 MILES WEST ALONG PHELAN ROAD, THENCE 0.05 MILE NORTH ALONG U.S. HIGHWAY 395, AT THE JUNCTION OF PHELAN ROAD WEST, AT A RIGHT-ANGLE TURN IN A POWER LINE, 65 FEET EAST OF THE CENTER LINE OF THE HIGHWAY, 42 FEET NORTH OF THE EXTENDED CENTER LINE OF THE ROAD, 10.6 FEET WEST OF A FENCE, 1 1/2 FEET NORTH OF POWER POLE 226304, 1 1/2 FEET EAST OF A WITNESS POST, ABOUT LEVEL WITH THE HIGHWAY, AND SET IN THE TOP OF A CONCRETE POST PROJECTING 0.4 FOOT ABOVE THE GROUND.  
ELEVATION = 3565.40'

**BASIS OF BEARING**  
THE NORTH LINE OF 5/4 NE 1/4 NE 1/4 SECTION 28, T4N, R5W, S.B.B.  
BEARING BEING N89°56'00"E PER RS 5779B.

**PREPARED FOR/APPLICANT:**  
**PROFESSIONAL AUTO TRANSPORT**  
ATTN: MR. DAVID FLOYD  
450 PARKHURST STREET  
JURUPA VALLEY, CA 91752  
(888) 839-7077

**PROPERTY OWNER:**  
**JOHN DAVID FLOYD AND MICKI LYNN FLOYD, TRUSTEES OF THE FLOYD FAMILY TRUST**  
G/O PROFESSIONAL AUTO TRANSPORT  
ATTN: MR. DAVID FLOYD  
4513 PARKHURST STREET  
JURUPA VALLEY, CA 91752  
(888) 839-7077 X.225

Patrick C. Flanagan, Jr. R.C.E. 86046 Exp. Sep 30, 2020  
Job Number: Date Prepared: Drawn By: Reference Number:  
173001 8/1/2020 RL 173001TAM



# TRIBUTARY AREA MAP

POST-DEVELOPMENT  
PROFESSIONAL AUTO TRANSPORT  
PROPOSED CAR HAULING FACILITY  
APN 3039-321-08  
WEST SIDE OF CALIENTE ROAD  
CITY OF HESPERIA

TOTAL ON-SITE  
POST-DEVELOPMENT  
FLOWS LEAVING THE  
SITE @ NODE 12  
Q(10) = 0.92 CFS  
Q(100) = 1.63 CFS

## LEGAL DESCRIPTION

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF HESPERIA, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:  
THE SOUTHEAST 1/4 OF THE NORTHWEST 1/4 OF THE NORTHWEST 1/4 OF SECTION 28, TOWNSHIP 4 NORTH, RANGE 5 WEST, SAN BERNARDINO BASIN AND MERIDIAN, IN THE CITY OF HESPERIA, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT OF SAID LAND.

## EASEMENTS

NO KNOWN EASEMENTS PER TITLE REPORT DATED 8/21/2017 BY CHICAGO TITLE COMPANY

## SOURCE OF SURVEY

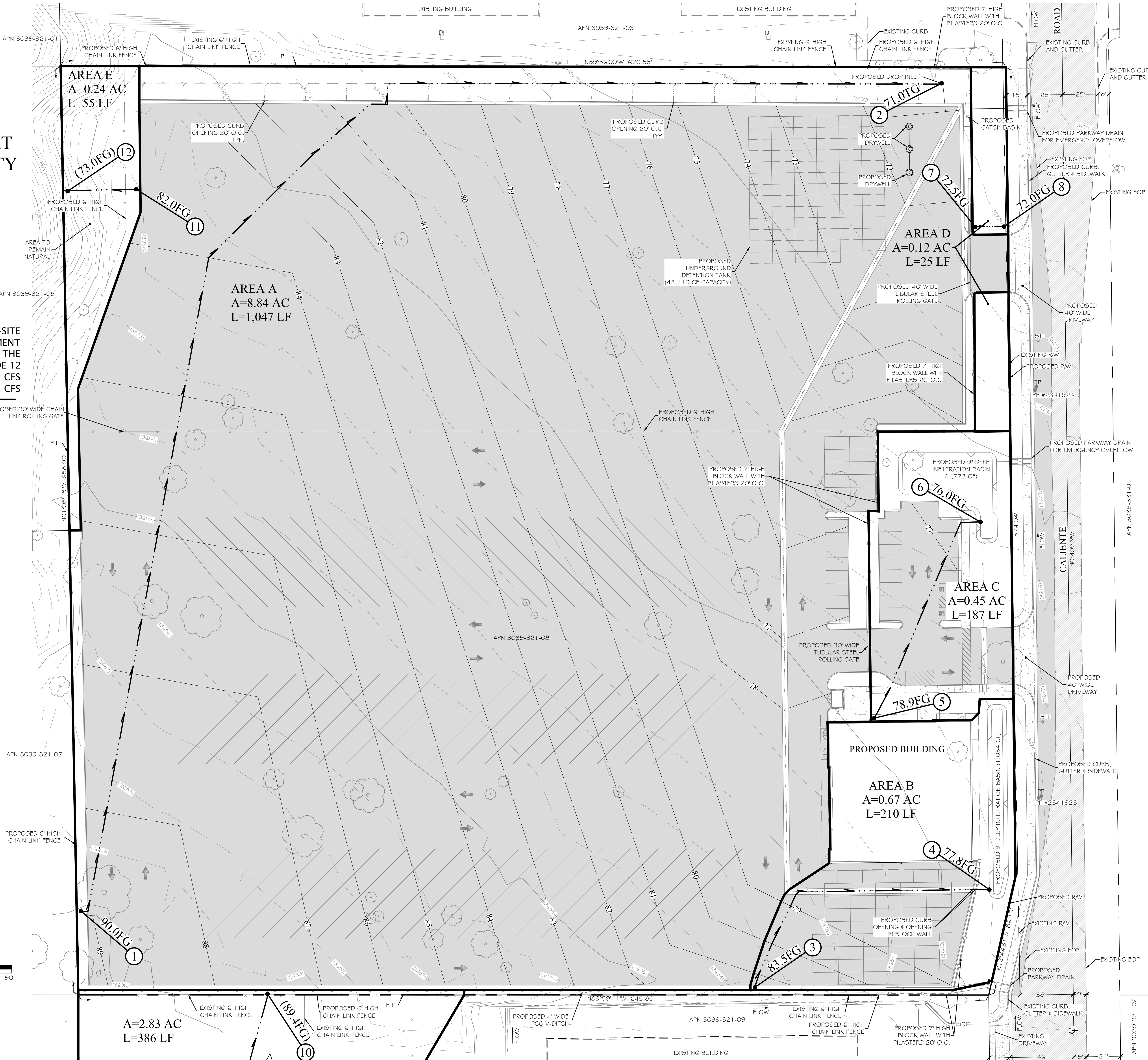
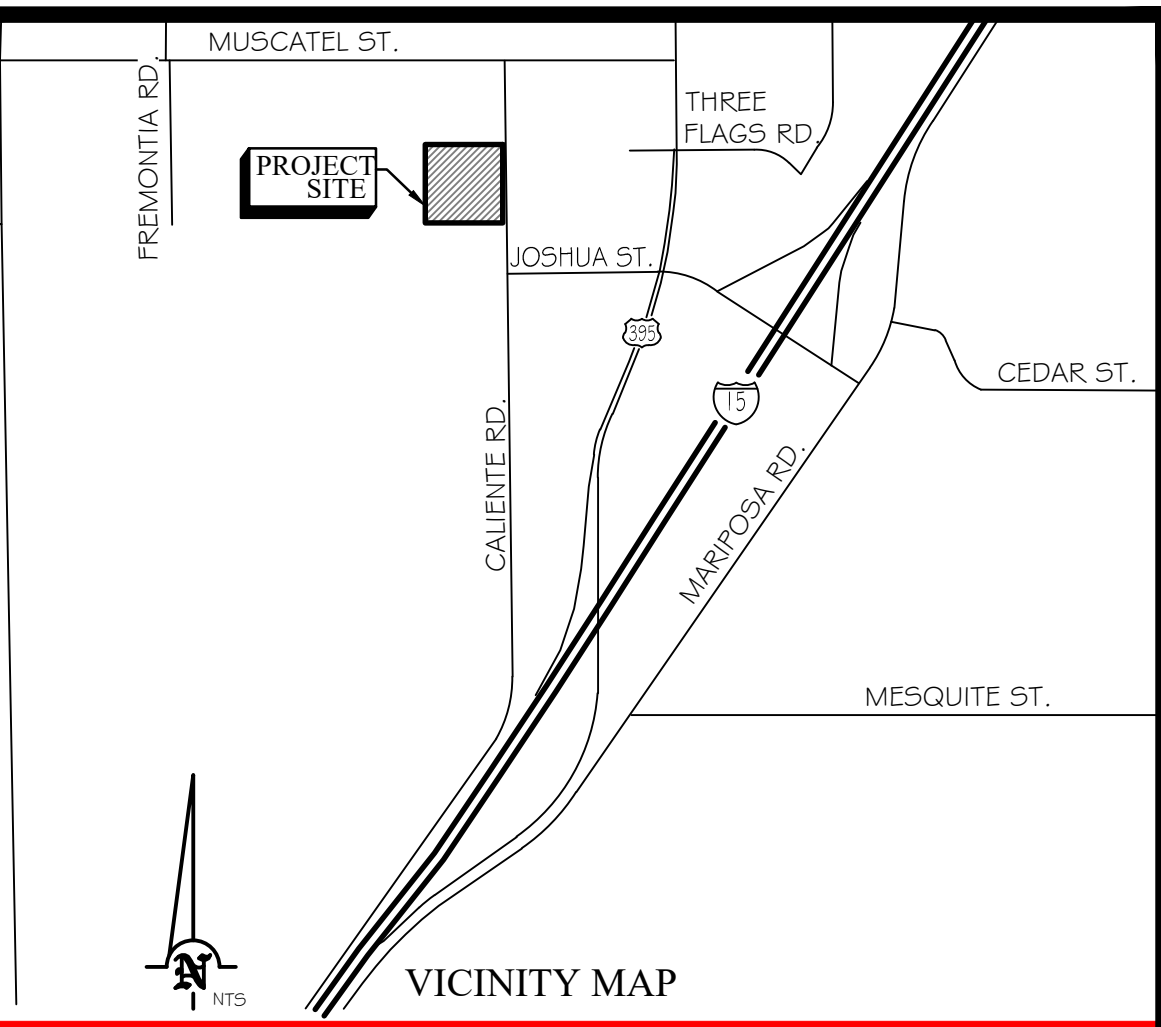
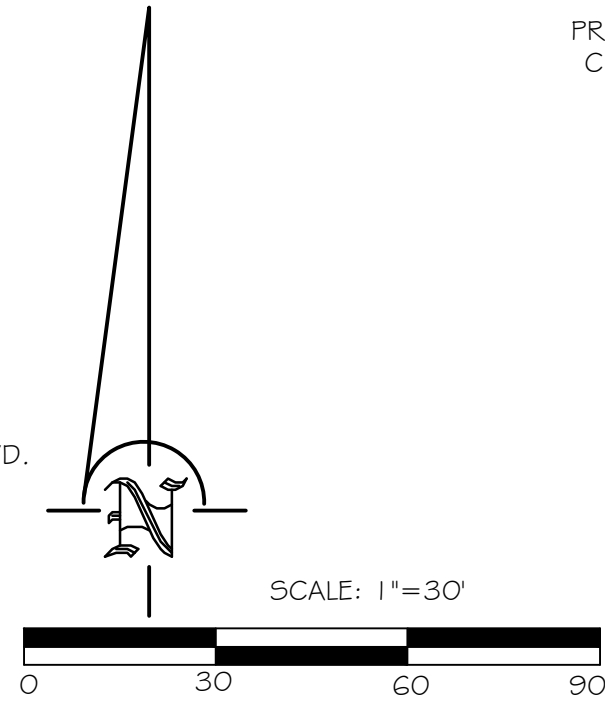
TOPOGRAPHIC SURVEY  
DATED APRIL 2019  
AS CONDUCTED BY  
**ON POINT LAND SURVEYING, INC.**  
1910 ORANGE TREE LANE, SUITE 344  
REDLANDS, CA 92374  
PHONE: (909) 792-2221

## SOIL ENGINEER

REPORT DATED SEPTEMBER 11, 2019  
PROJECT NO. 13561.1  
AS CONDUCTED BY  
**LOR GEOTECHNICAL GROUP, INC.**  
6121 QUAIL VALLEY COURT  
RIVERSIDE, CA 92507  
PHONE: (951) 653-1760  
FAX: (951) 653-1741

## UTILITIES

**ELECTRIC:**  
SOUTHERN CALIFORNIA  
EDISON COMPANY  
30553 RIMROCK RD  
BARSTOW, CA 92311  
(760) 252-6402  
**TELEPHONE:**  
FRONTIER COMMUNICATIONS  
9 S. 4TH STREET  
REDLANDS, CA 92373  
(909) 748-6676  
**WATER:**  
CITY OF HESPERIA  
9700 SEVENTH AVENUE  
HESPERIA, CA 92345  
(760) 947-1840  
**SEWER:**  
ON-SITE SEPTIC  
**GAS:**  
SOUTHWEST GAS  
13471 MARIPOSA ROAD  
VICTORVILLE, CA 92392  
(760) 951-4044  
**TELEPHONE:**  
RACE COMMUNICATIONS  
1170 UNIT C, E TEHACHAPI BLVD.  
TEHACHAPI, CA 93561  
(877) 722-3633



ADDITIONAL ON-SITE  
POST-DEVELOPMENT  
FLOWS LEAVING THE SITE  
Q(10) = 0.00 CFS  
Q(100) = 0.00 CFS

TOTAL ON-SITE  
POST-DEVELOPMENT  
FLOWS LEAVING THE SITE  
@ NODE 8  
Q(10) = 0.43 CFS  
Q(100) = 0.80 CFS

## LEGEND

DI	EX DROP INLET
EOP	EDGE OF PAVEMENT
EX	EXISTING
FH	EXISTING FIRE HYDRANT
FL	FLOWLINE
GM	EX GAS METER
GV	EX GAS VALVE
ICV	EX IRRIGATION CONTROL VALVE
O.C.	ON CENTER
OH	OVERHANG
PFH	PROPOSED FIRE HYDRANT
PL	PROPERTY LINE
PP	EX POWER POLE (TO BE RELOCATED)
PPH	PROPOSED POWER POLE
PP	EX SIGN
PPH	PROPOSED SIGN
STL	PROPOSED STREET LIGHT
TG	TOP OF GRATE
TYP	TYPICAL
UM	EX UTILITY MARKER
UMH	EX UTILITY MANHOLE
WM	EX WATER METER
	EXISTING TREES/SHRUB TO BE REMOVED/RELOCATED

## HATCH LEGEND

	PROPOSED AC PAVING
	EXISTING PCC PAVING
	PROPOSED PCC SIDEWALK/DRIVEWAY
	EXISTING AC PAVING

## LEGEND

① ELEV.	NODE # & ELEV.
L=165'	FLOWLINE LENGTH
A=1.44 AC	SUB AREA
---	FLOWLINE
---	TRIBUTARY BOUNDARY

TOTAL OFF-SITE  
POST-DEVELOPMENT  
FLOWS LEAVING THE SITE  
THROUGH PARKWAY DRAIN  
Q(10) = 5.35 CFS  
Q(100) = 10.12 CFS

TRIBUTARY AREA MAP  
POST-DEVELOPMENT  
PROFESSIONAL AUTO TRANSPORT  
PROPOSED CAR HAULING FACILITY  
APN 3039-321-08  
WEST SIDE OF CALIENTE ROAD  
CITY OF HESPERIA

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Exp. 9/30/2020



**BENCHMARK** NGS EV1387  
DESCRIBED BY COAST AND GEODETIC SURVEY 1960, 5.9 MI W FROM HESPERIA, 4.6 MILES WEST ALONG MAIN STREET FROM THE POST OFFICE AT HESPERIA, THENCE 1.25 MILES WEST ALONG PHELAN ROAD, THENCE 0.05 MILE NORTH ALONG U.S. HIGHWAY 395, AT THE JUNCTION OF PHELAN ROAD WEST, AT A RIGHT-ANGLE TURN IN A POWER LINE, 65 FEET EAST OF THE CENTER LINE OF THE HIGHWAY, 42 FEET NORTH OF THE EXTENDED CENTER LINE OF THE ROAD, 10.6 FEET WEST OF A FENCE, 1 1/2 FEET NORTH OF POWER POLE 226304, 1 1/2 FEET EAST OF A WITNESS POST, ABOUT LEVEL WITH THE HIGHWAY, AND SET IN THE TOP OF A CONCRETE POST PROJECTING 0.4 FOOT ABOVE THE GROUND.  
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BEARING BEING N89°56'00"E PER RS 5798.

**PREPARED FOR/APPLICANT:**  
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Patrick C. Flanagan, Jr. R.C.E. 86046 Exp. Sep 30, 2020

Job Number: 173001 Date Prepared: 8/1/2020 Drawn By: RL Reference Number: 173001TAM