PRELIMINARY DRAINAGE REPORT
FOR
PLANNING AREA 61 - LOT 1
VTM/SDP/MDP/NDP/CPA & REZONE

October 7, 2021

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FOR REVIEW ONLY

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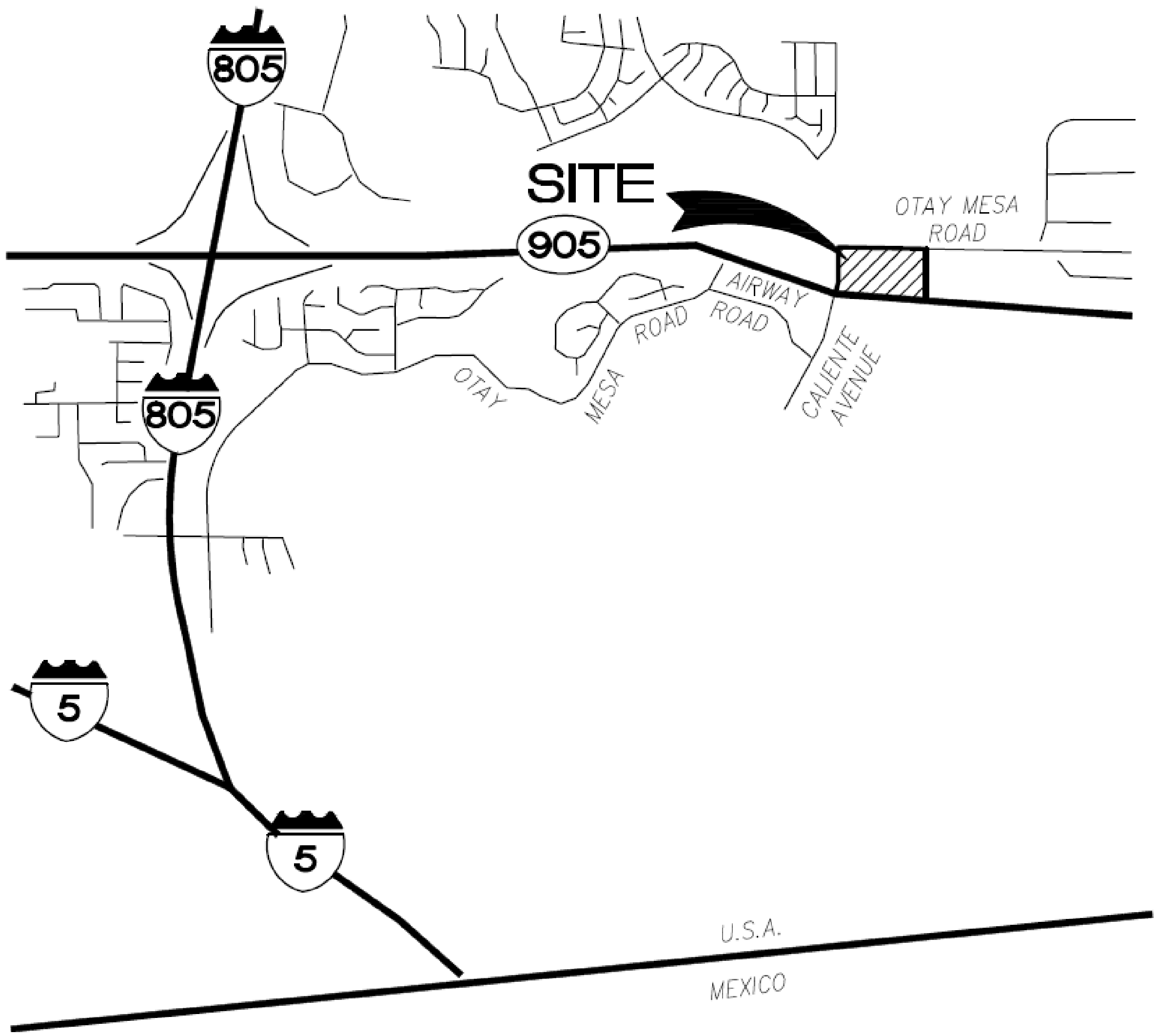
INTRODUCTION

Tri Pointe Homes is proposing to develop a 4.46-acre site located southeast of the intersection of Otay Mesa Road and Caliente Avenue in the city of San Diego (see the Vicinity Map). The site is currently being mass-graded as part of their recently approved California Terraces – PA-61 project (Project No. 648290) immediately to the east. The project proposes 79 multi-family dwelling units in 12 buildings with private access driveways, surface parking, passive turf recreational space, walkways, and landscaping. The project's preliminary plans are being designed by Civil Sense, Inc.



Vicinity Map

Under existing, pre-project conditions, storm runoff is directed over the natural ground surface towards the northwest corner of the site (towards the intersection of Otay Mesa Road and Caliente Avenue) and into an existing public storm drain system. There are no other existing on-site drainage facilities and there is minimal off-site run-on.

Under proposed, post-project conditions, storm runoff will be conveyed over the ground surface and by private driveways to two on-site private storm drain systems. A Modular Wetland System Linear will treat runoff at the lower downstream (north) end of each storm drain system. The treated runoff will then enter a single vault for flow control. The runoff will be conveyed west out of the vault by a proposed pipe to the existing public storm drain system at the intersection of Otay Mesa Road and Caliente Avenue. The existing storm drain system crosses Otay Mesa Road and continues north along Ocean View Hills Parkway (Ocean View Hills Parkway is named Caliente Avenue south of Otay Mesa Road) before outletting into a natural drainage within Dennery Canyon. The natural drainage continues north within Dennery Canyon and ultimately flows into the Otay River.

This preliminary drainage report has been prepared in support of Civil Sense, Inc's entitlement package.

HYDROLOGIC RESULTS

The overall study area covers 4.91 acres so the City of San Diego's 2017, *Drainage Design Manual's* (Manual) rational method procedure was the basis for the existing and proposed condition hydrologic analyses. The Manual states that "the combination of storm drain system capacity and overflow" shall be able to carry the 100-year, while "the underground storm drain system shall be based upon a 50-year frequency storm." Since the site is so small, there will be minimal differences between the 50- and 100-year flow rates, so 100-year analyses are being performed for entitlements. The CivilDesign Rational Method Hydrology Program is based on the City criteria and was used for the analyses. The rational method input parameters are summarized below and the supporting data is included in Appendix A:

- Intensity-Duration-Frequency: The City's 50- and 100-year Intensity-Duration-Frequency curve from the *Drainage Design Manual* was used.

- Drainage area: The drainage areas are shown on the Existing and Proposed Condition Rational Method Work Maps in Appendix A. The overall existing and proposed condition drainage areas were set equal to allow a comparison of results.

- Hydrologic soil groups: The soil group within the site is entirely 'D' according to the City criteria.

- Runoff coefficients: Under existing conditions, the study area is entirely pervious. The roughness coefficient (C=0.45) was based on the rural land use category. Under proposed conditions, the multi-family development was assigned a multi-unit land use (C=0.70).

The existing and proposed condition rational method analyses are contained in Appendix A. The existing and proposed condition 100-year flow rates from the 4.91 acre study area are 6.6 and 9.8 cubic feet per second (cfs), respectively.

A preliminary detention analysis was performed to estimate the storage volume needed to attenuate the 100-year flow from 9.8 to 6.6 cfs. The proposed condition peak flow was converted to a hydrograph using the County's rational method hydrograph procedure. The hydrograph was entered into HEC-1 for the detention analysis. The HEC-1 results are included in Appendix A and show that at least 0.093 acre-feet (4,051 cubic feet) of storage is needed. The project can provide the required on-site storage in the proposed vault in order to avoid increasing the 100-year flow. Alternatively, an engineering assessment can made of the off-site storm system determine if it has capacity for the additional flow.

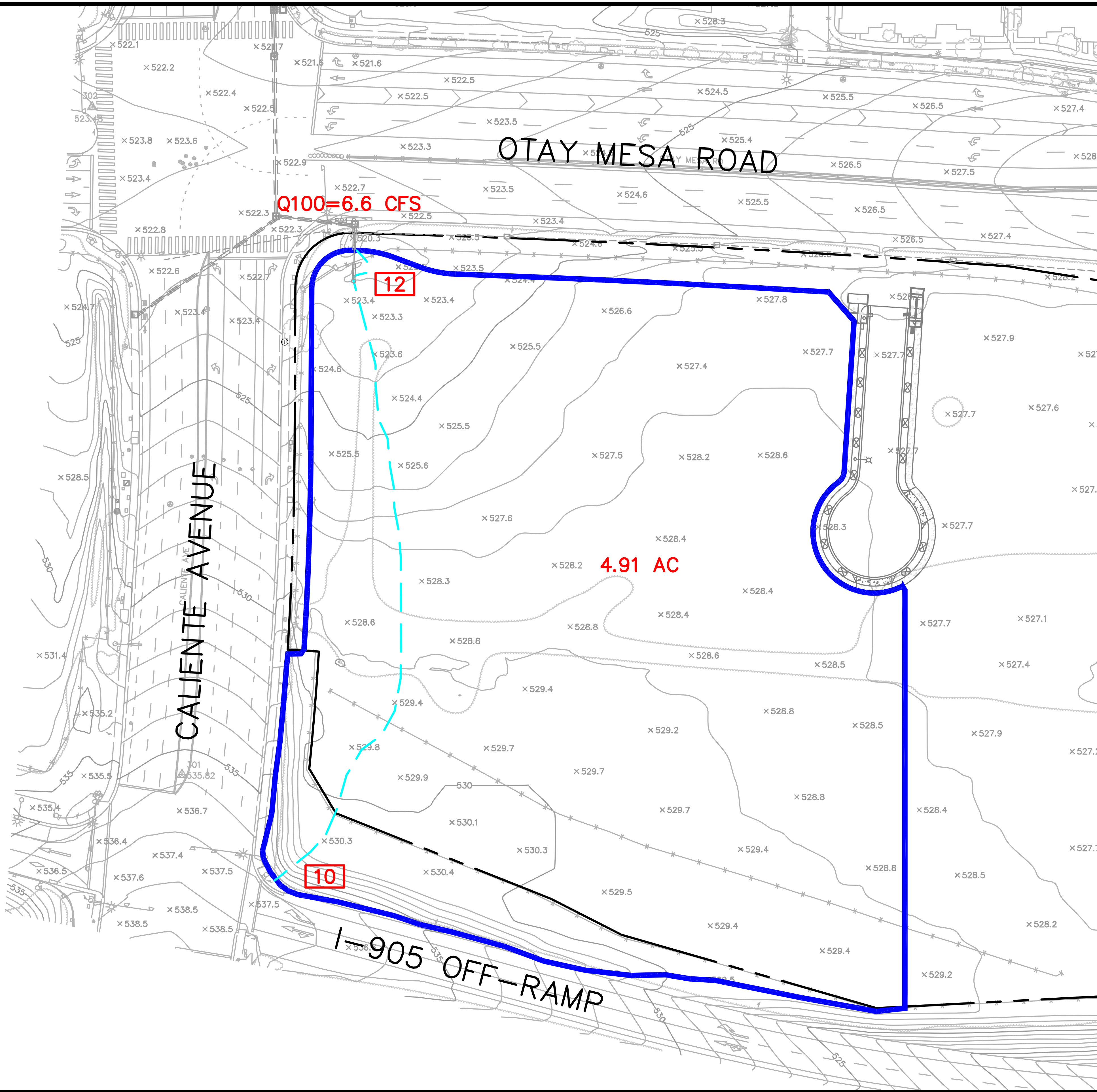
CONCLUSION

The analyses in this preliminary drainage report show that the project will increase the 100-year flow. The increase can be mitigated by on-site storage. This will avoid burdening the existing downstream storm drain facilities. The existing receiving public storm drain can also be evaluated to determine if it can convey the excess flow to Dennery Canyon.

There are no waters of the US at or in the immediate vicinity of the site. Therefore, neither a Federal Clean Water Act Section 401 (Regional Water Quality Control Board) nor 404 permit (US Army Corps of Engineers) are required.

APPENDIX A

RATIONAL METHOD ANALYSES AND BACKUP DATA



1" = 80'

0 80

LEGEND:

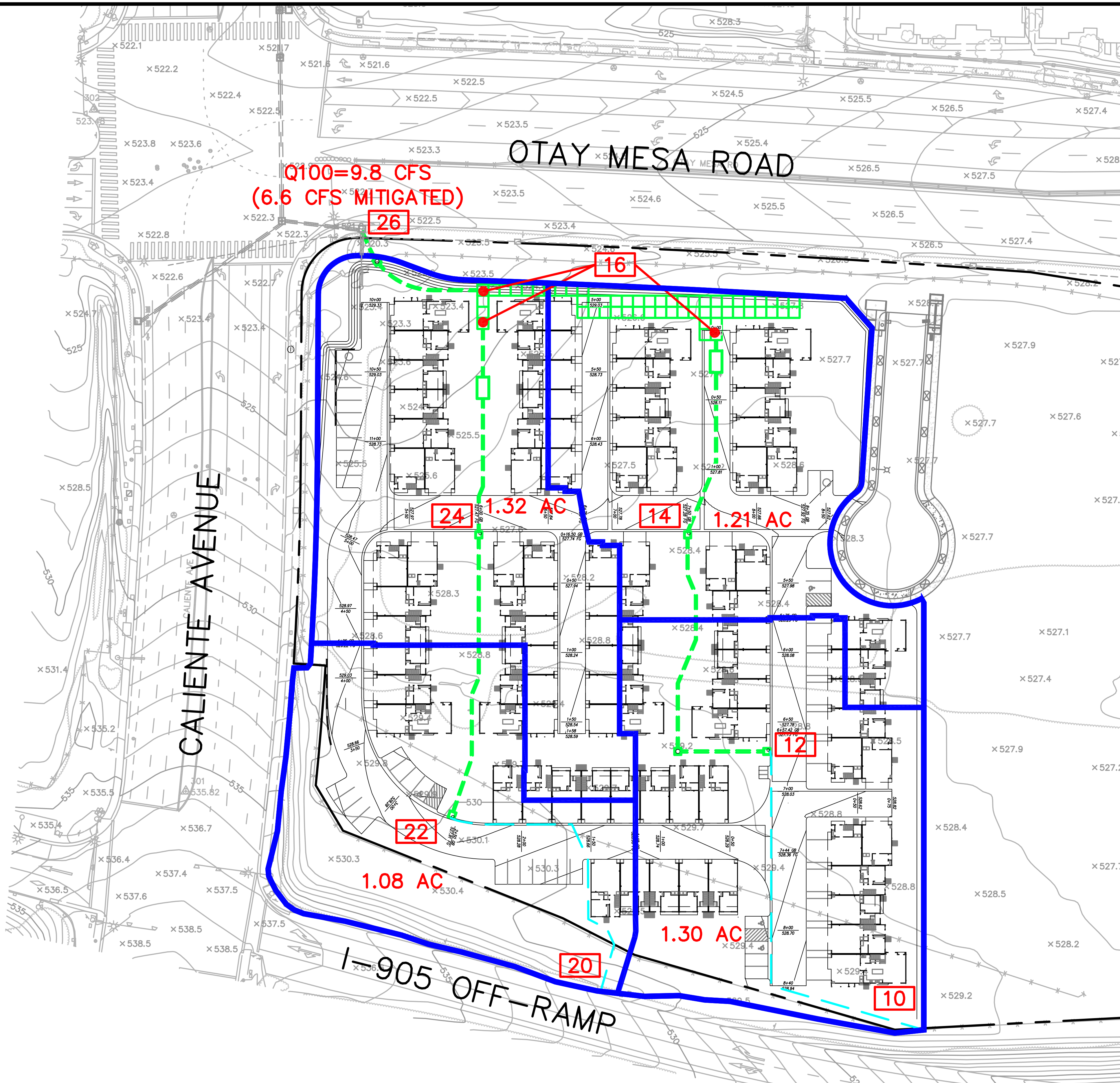
DRAINAGE BASIN BOUNDARY

OVERLAND FLOW PATH

4.91 AC DRAINAGE BASIN AREA

10 RATIONAL METHOD NODE NUMBER

EXISTING CONDITION
RATIONAL METHOD WORK MAP



1" = 80'

0 80

LEGEND:

	DRAINAGE BASIN BOUNDARY
	OVERLAND FLOW PATH
	PROPOSED DRAINAGE FACILITY
1.32 AC	DRAINAGE BASIN AREA
10	RATIONAL METHOD NODE NUMBER

NOTE:
STORMWATER ENTERS A VAULT (GRID PATTERN) AT NODE 16 FOR FLOW CONTROL.

PROPOSED CONDITION
RATIONAL METHOD WORK MAP

Table A-1. Runoff Coefficients for Rational Method

Land Use	Runoff Coefficient (C) Soil Type [1]
Residential:	
Single Family	0.55
Multi-Units	0.70
Mobile Homes	0.65
Rural (lots greater than ½ acre)	0.45
Commercial [2]	
80% Impervious	0.85
Industrial [2]	
90% Impervious	0.95

Note:
[1] Type D soil to be used for all areas.
[2] Where actual conditions deviate significantly from the tabulated imperviousness values of 80% or 90%, the values given for coefficient C, may be revised by multiplying 80% or 90% by the ratio of actual imperviousness to the tabulated imperviousness. However, in case shall the final coefficient be less than 0.50. For example: Consider commercial property on D soil.

Actual imperviousness			=	50%
Tabulated imperviousness			=	80%
Revised C	=	(50/80) x 0.85	=	0.53

The values in Table A–1 are typical for urban areas. However, if the basin contains rural or agricultural land use, parks, golf courses, or other types of nonurban land use that are expected to be permanent, the appropriate value should be selected based upon the soil and cover and approved by the City.

A.1.3. Rainfall Intensity

The rainfall intensity (I) is the rainfall in inches per hour (in/hr.) for a duration equal to the T_C for a selected storm frequency. Once a particular storm frequency has been selected for design and a T_C calculated for the drainage area, the rainfall intensity can be determined from the Intensity-Duration-Frequency Design Chart (Figure A-1).

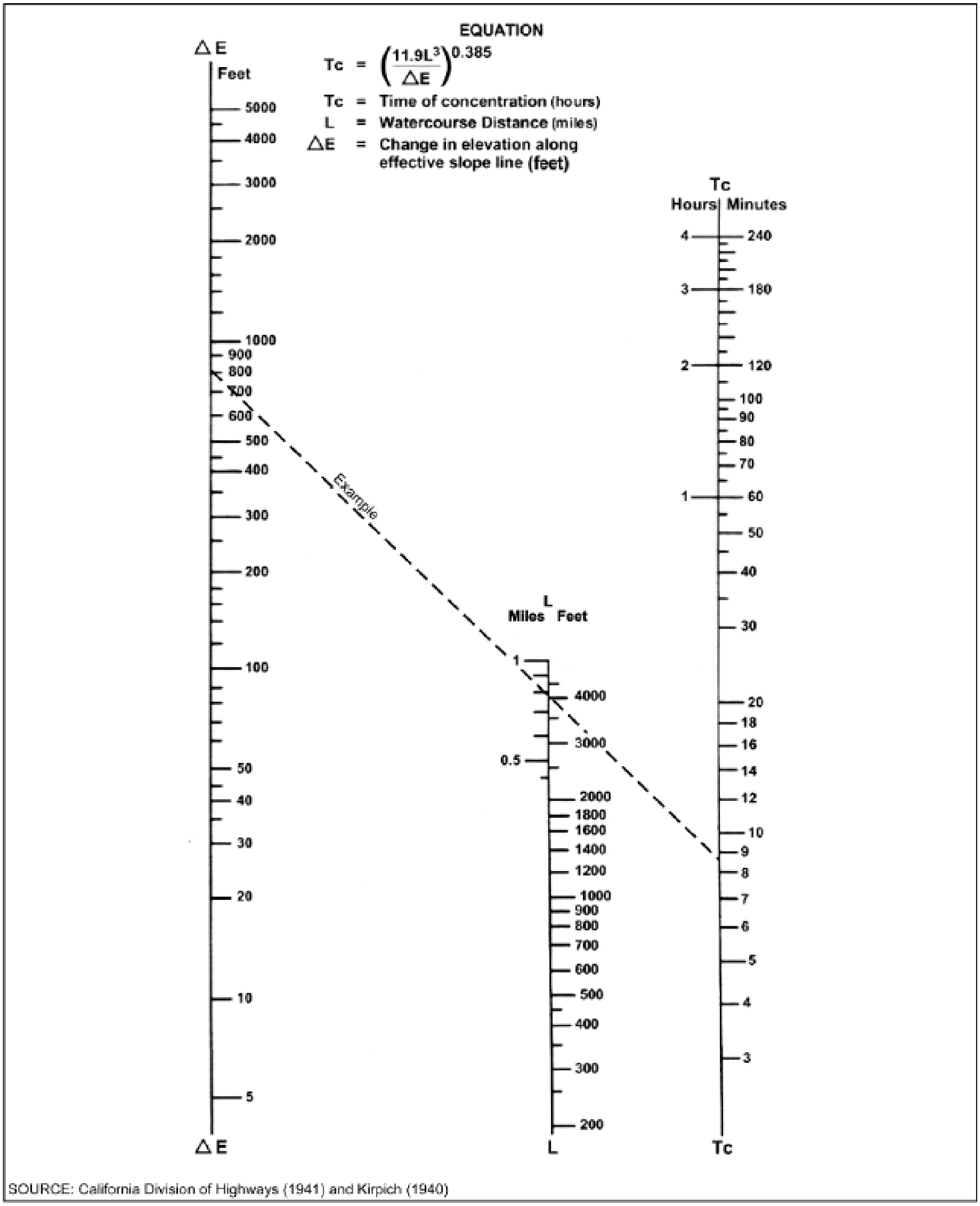


Figure A-2. Nomograph for Determination of T_c for Natural Watersheds

__Note__: Add ten minutes to the computed time of concentration from Figure A-2.

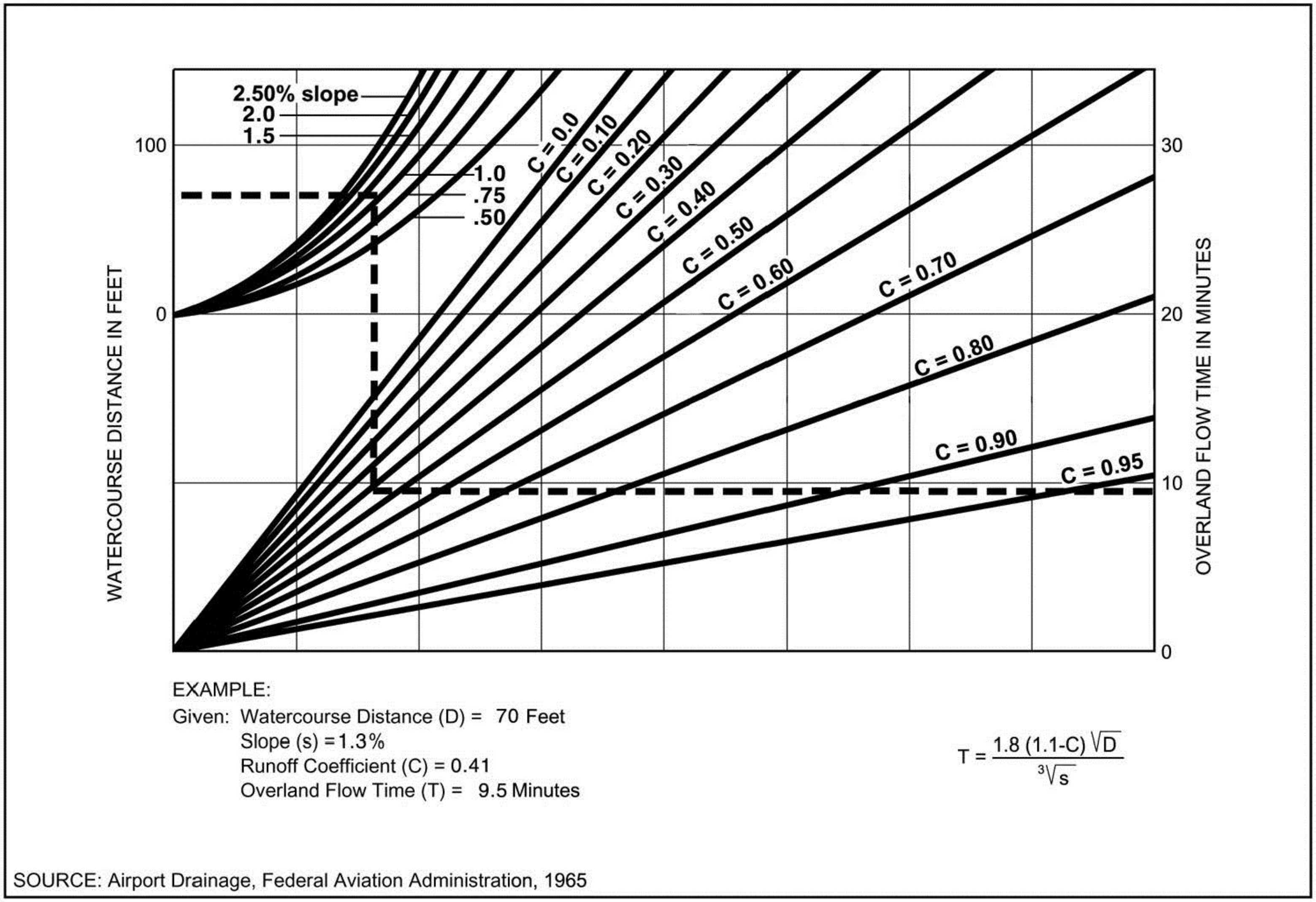


Figure A-4. Rational Formula – Overland Time of Flow Nomograph

Note: Use formula for watercourse distances in excess of 100 feet.

RAINFALL

INTENSITY - DURATION - FREQUENCY
CURVES

FOR

COUNTY OF SAN DIEGO

ELEV.	FACTOR
0-1500	1.00
1500-3000	1.25
3000-4000	1.42
4000-5000	1.60
5000-6000	1.7
DESERT	1.25

TO OBTAIN CORRECT INTENSITY, MULTIPLY INTENSITY ON CHART BY FACTOR FOR DESIGN ELEVATION.

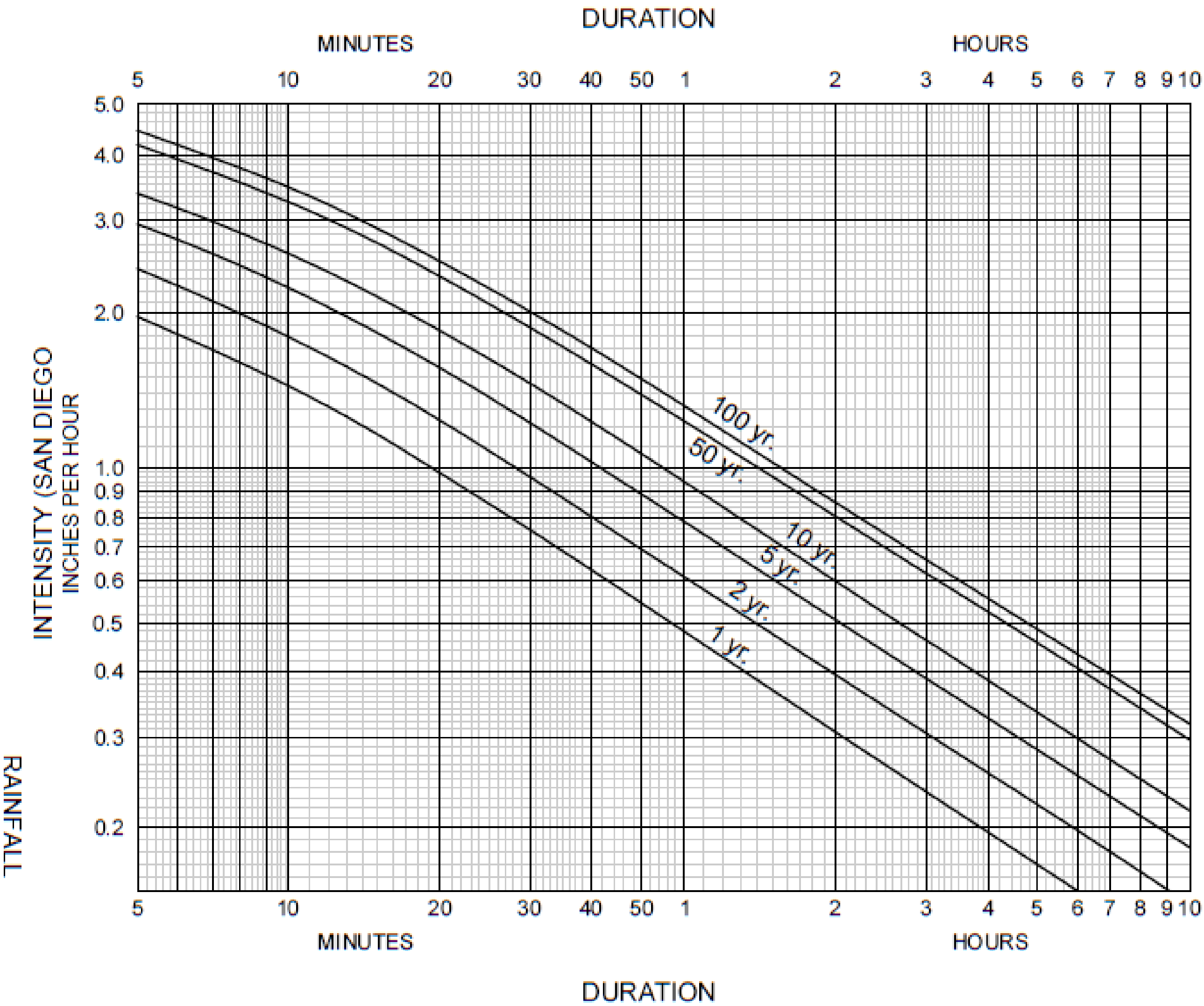
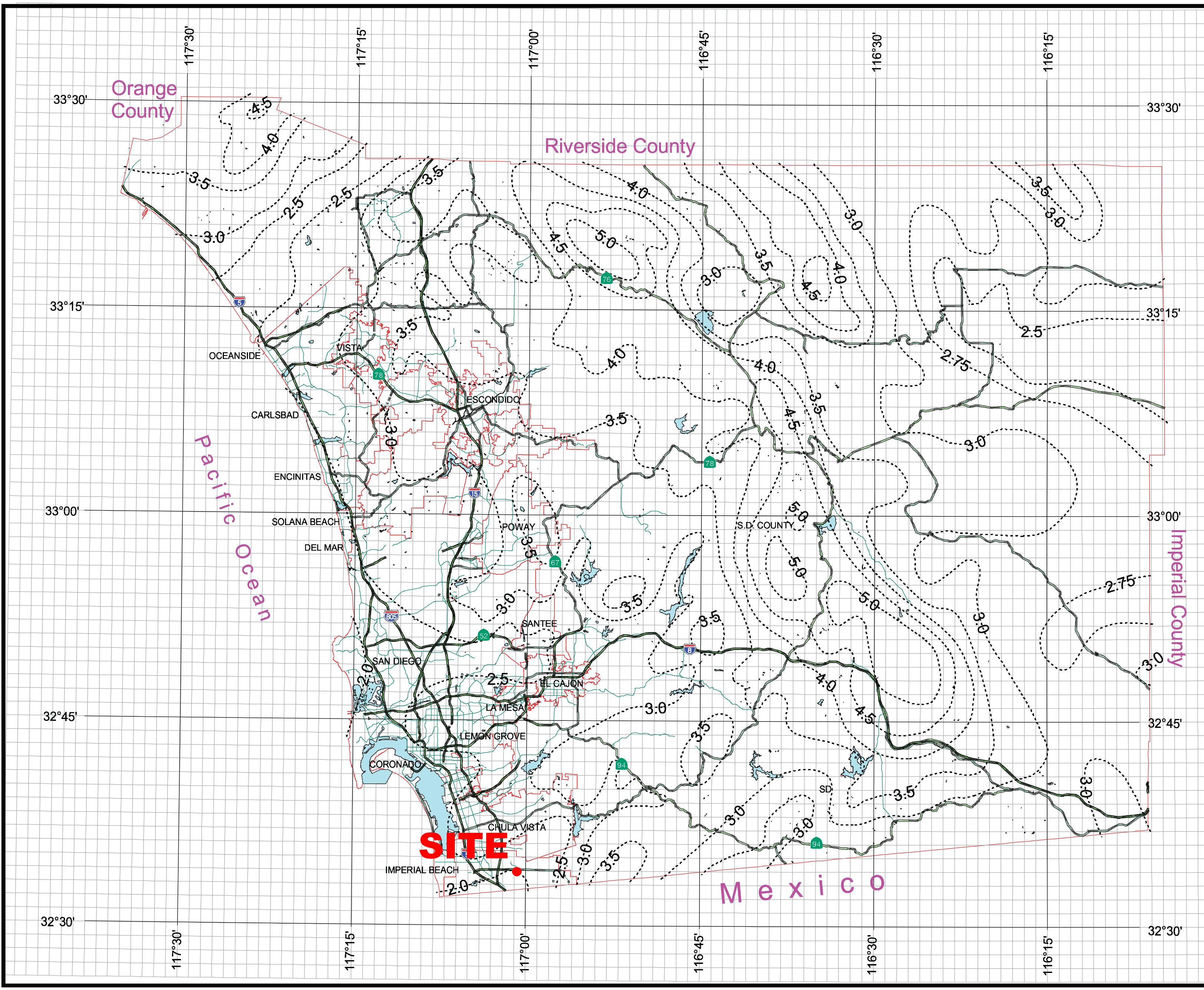


Figure A-1. Intensity-Duration-Frequency Design Chart



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

P6=2.0

DPW GIS
Department of Public Works Geographic Information Services

SanGIS
We Have San Diego Covered!

3 0 3 Miles

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            San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.4

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
     Rational Hydrology Study        Date: 10/07/21
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Planning Area 61 - Lot 1 Residential
Preliminary Hydrology
Existing Conditions
100-Year Storm Event

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

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Program License Serial Number 4028

------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity)  =  1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      10.000 to Point/Station      12.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Time of concentration computed by the
natural watersheds nomograph (App X-A)
TC = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr) + 10 min.
Initial subarea flow distance  =  513.000(Ft.)
Highest elevation =  537.200(Ft.)
Lowest elevation =  522.000(Ft.)
Elevation difference =   15.200(Ft.)
TC=[(11.9*0.0972^3)/( 15.20)]^.385=  3.70 + 10 min. =    13.70 min.
Rainfall intensity (I) =      3.007(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
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Subarea runoff =      6.645(CFS)
Total initial stream area =       4.910(Ac.)
End of computations, total study area =          4.910 (Ac.)
```

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.4

Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
Rational Hydrology Study   Date: 10/07/21

Planning Area 61 - Lot 1 Residential
Preliminary Hydrology
Proposed Conditions
100-Year Storm Event

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

Program License Serial Number 4028

Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity) = 1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

++
Process from Point/Station   10.000 to Point/Station   12.000
**** INITIAL AREA EVALUATION ****

____

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[MULTI - UNITS area type   ]
Initial subarea flow distance = 283.000(Ft.)
Highest elevation = 529.100(Ft.)
Lowest elevation = 527.730(Ft.)
Elevation difference =   1.370(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =   15.43 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7000)*(283.000^.5)/(0.484^(1/3)]= 15.43
Rainfall intensity (I) =   2.874(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.700

```
Subarea runoff =      2.615(CFS)
Total initial stream area =       1.300(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      12.000 to Point/Station      14.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   527.730(Ft.)
Downstream point/station elevation =   527.280(Ft.)
Pipe length  =   220.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.615(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     2.615(CFS)
Normal flow depth in pipe =   11.07(In.)
Flow top width inside pipe =   13.19(In.)
Critical Depth =    7.77(In.)
Pipe flow velocity =      2.69(Ft/s)
Travel time through pipe =    1.36 min.
Time of concentration (TC) =    16.79 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      14.000 to Point/Station      14.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[MULTI - UNITS area type                    ]
Time of concentration =    16.79 min.
Rainfall intensity =      2.779(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.700
Subarea runoff =      2.354(CFS) for    1.210(Ac.)
Total runoff =      4.968(CFS)   Total area =       2.51(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      14.000 to Point/Station      16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   527.280(Ft.)
Downstream point/station elevation =   525.860(Ft.)
Pipe length  =   142.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.968(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.968(CFS)
Normal flow depth in pipe =    9.87(In.)
Flow top width inside pipe =   14.23(In.)
Critical Depth =   10.84(In.)
Pipe flow velocity =      5.81(Ft/s)
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Travel time through pipe =    0.41 min.
Time of concentration (TC) =    17.20 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      14.000 to Point/Station      16.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.510(Ac.)
Runoff from this stream =      4.968(CFS)
Time of concentration =   17.20 min.
Rainfall intensity =     2.752(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      20.000 to Point/Station      22.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[MULTI - UNITS area type                     ]
Initial subarea flow distance  =  221.000(Ft.)
Highest elevation =  531.900(Ft.)
Lowest elevation =  527.910(Ft.)
Elevation difference =    3.990(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     8.79 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7000)*( 221.000^.5)/( 1.805^(1/3)]=   8.79
Rainfall intensity (I) =      3.536(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.700
Subarea runoff =      2.673(CFS)
Total initial stream area =        1.080(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      22.000 to Point/Station      24.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   527.910(Ft.)
Downstream point/station elevation =   527.470(Ft.)
Pipe length  =   201.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.673(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     2.673(CFS)
Normal flow depth in pipe =   10.97(In.)
Flow top width inside pipe =   13.30(In.)
Critical Depth =    7.86(In.)
Pipe flow velocity =      2.78(Ft/s)
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```
Travel time through pipe =    1.20 min.
Time of concentration (TC) =     9.99 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       24.000 to Point/Station       24.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[MULTI - UNITS area type                     ]
Time of concentration =     9.99 min.
Rainfall intensity =      3.375(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.700
Subarea runoff =      3.118(CFS) for    1.320(Ac.)
Total runoff =      5.791(CFS)   Total area =        2.40(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       24.000 to Point/Station       16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   527.470(Ft.)
Downstream point/station elevation =   526.000(Ft.)
Pipe length  =   147.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.791(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     5.791(CFS)
Normal flow depth in pipe =   11.09(In.)
Flow top width inside pipe =   13.17(In.)
Critical Depth =   11.68(In.)
Pipe flow velocity =      5.95(Ft/s)
Travel time through pipe =    0.41 min.
Time of concentration (TC) =    10.41 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       24.000 to Point/Station       16.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.400(Ac.)
Runoff from this stream =      5.791(CFS)
Time of concentration =   10.41 min.
Rainfall intensity =     3.326(In/Hr)
Summary of stream data:

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

```
1        4.968     17.20            2.752
2        5.791     10.41            3.326
Qmax(1) =
        1.000 *    1.000 *     4.968) +
        0.827 *    1.000 *     5.791) + =       9.760
Qmax(2) =
        1.000 *    0.605 *     4.968) +
        1.000 *    1.000 *     5.791) + =       8.798

Total of 2 streams to confluence:
Flow rates before confluence point:
       4.968       5.791
Maximum flow rates at confluence using above data:
        9.760        8.798
Area of streams before confluence:
        2.510        2.400
Results of confluence:
Total flow rate =      9.760(CFS)
Time of concentration =    17.195 min.
Effective stream area after confluence =      4.910(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 to Point/Station       26.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   523.500(Ft.)
Downstream point/station elevation =   521.800(Ft.)
Pipe length  =   107.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.760(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     9.760(CFS)
Normal flow depth in pipe =   11.48(In.)
Flow top width inside pipe =   17.30(In.)
Critical Depth =   14.47(In.)
Pipe flow velocity =      8.19(Ft/s)
Travel time through pipe =    0.22 min.
Time of concentration (TC) =    17.41 min.
End of computations, total study area =          4.910 (Ac.)
```

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****************************************                                                        ***************************************
 *                                      *                                                        *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                                        *   U.S. ARMY CORPS OF ENGINEERS      *
 *              JUN   1998              *                                                        *   HYDROLOGIC ENGINEERING CENTER     *
 *           VERSION 4.1                *                                                        *        609 SECOND STREET            *
 *                                      *                                                        *     DAVIS, CALIFORNIA 95616         *
 *  RUN DATE   07OCT21  TIME  22:25:52  *                                                        *         (916) 756-1104              *
 *                                      *                                                        *                                     *
****************************************                                                        ***************************************




                                                X     X XXXXXXX  XXXXX          X
                                                X     X X       X     X        XX
                                                X     X X       X               X
                                                XXXXXXX XXXX    X       XXXXX   X
                                                X     X X       X               X
                                                X     X X       X     X         X
                                                X     X XXXXXXX  XXXXX         XXX




            THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

            THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
            THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
            NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
            DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
            KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM
```

```
        LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

                    *DIAGRAM
*** FREE ***
           1        ID   PLANNING AREA 61 - LOT 1 RESIDENTIAL
           2        ID   PRELIMINARY DETENTION ANALYSIS
           3        ID   100-YEAR STORM EVENT
           4        IT       2 01JAN90    1200     200

           5        KK    SITE
           6        KM   RATIONAL METHOD HYDROGRAPH PROGRAM
           7        KM   100-YEAR, 6-HOUR RAINFALL IS 2.0 INCHES
           8        KM   RATIONAL METHOD RUNOFF COEFFICIENT IS 0.70
           9        KM   RATIONAL METHOD TIME OF CONCENTRATION IS 17.41 MINUTES
          10        BA  0.0077
          11        IN      17 01JAN90    1154
          12        QI       0     0.4     0.4     0.5     0.5     0.5     0.5     0.6     0.6     0.7
          13        QI     0.8       1     1.1     1.6     0.7     9.8     1.3     0.9     0.7     0.6
          14        QI     0.5     0.4       0       0       0       0       0       0       0       0
          15        QI       0       0       0

          16        KK  DETAIN
          17        RS       1    STOR      -1
          18        SV       0   0.093
          19        SQ       0     6.6
          20        SE     100     101
          21        ZZ
```

```
              SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   5         SITE
                V
                V
  16       DETAIN

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```

```
*****************************************                               ***************************************
*                                       *                               *                                     *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                               *   U.S. ARMY CORPS OF ENGINEERS      *
*              JUN   1998               *                               *   HYDROLOGIC ENGINEERING CENTER     *
*           VERSION 4.1                 *                               *          609 SECOND STREET          *
*                                       *                               *       DAVIS, CALIFORNIA 95616       *
*  RUN DATE   07OCT21  TIME  22:25:52   *                               *            (916) 756-1104           *
*                                       *                               *                                     *
*****************************************                               ***************************************



                    PLANNING AREA 61 - LOT 1 RESIDENTIAL
                    PRELIMINARY DETENTION ANALYSIS
                    100-YEAR STORM EVENT

    IT          HYDROGRAPH TIME DATA
                     NMIN          2  MINUTES IN COMPUTATION INTERVAL
                    IDATE     1JAN90  STARTING DATE
                    ITIME       1200  STARTING TIME
                       NQ        200  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE     1JAN90  ENDING DATE
                   NDTIME       1838  ENDING TIME
                    ICENT         19  CENTURY MARK

               COMPUTATION INTERVAL     .03 HOURS
                    TOTAL TIME BASE    6.63 HOURS

     ENGLISH UNITS
          DRAINAGE AREA         SQUARE MILES
          PRECIPITATION DEPTH   INCHES
          LENGTH, ELEVATION     FEET
          FLOW                  CUBIC FEET PER SECOND
          STORAGE VOLUME        ACRE-FEET
          SURFACE AREA          ACRES
          TEMPERATURE           DEGREES FAHRENHEIT


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


          **************
          *            *
   5 KK   *      SITE  *
          *            *
          **************
                    RATIONAL METHOD HYDROGRAPH PROGRAM
                    100-YEAR, 6-HOUR RAINFALL IS 2.0 INCHES
                    RATIONAL METHOD RUNOFF COEFFICIENT IS 0.70
                    RATIONAL METHOD TIME OF CONCENTRATION IS 17.41 MINUTES

  11 IN         TIME DATA FOR INPUT TIME SERIES
                    JXMIN         17  TIME INTERVAL IN MINUTES
                   JXDATE     1JAN90  STARTING DATE
                   JXTIME       1154  STARTING TIME

          SUBBASIN RUNOFF DATA

  10 BA         SUBBASIN CHARACTERISTICS
                    TAREA        .01  SUBBASIN AREA

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                                              HYDROGRAPH AT STATION     SITE
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DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW
1 JAN 1200	1	0.	1 JAN 1340	51	1.	1 JAN 1520	101	1.	1 JAN 1700	151	1.
1 JAN 1202	2	0.	1 JAN 1342	52	1.	1 JAN 1522	102	1.	1 JAN 1702	152	1.
1 JAN 1204	3	0.	1 JAN 1344	53	1.	1 JAN 1524	103	1.	1 JAN 1704	153	1.
1 JAN 1206	4	0.	1 JAN 1346	54	1.	1 JAN 1526	104	1.	1 JAN 1706	154	1.
1 JAN 1208	5	0.	1 JAN 1348	55	1.	1 JAN 1528	105	1.	1 JAN 1708	155	1.
1 JAN 1210	6	0.	1 JAN 1350	56	1.	1 JAN 1530	106	1.	1 JAN 1710	156	1.
1 JAN 1212	7	0.	1 JAN 1352	57	1.	1 JAN 1532	107	2.	1 JAN 1712	157	1.
1 JAN 1214	8	0.	1 JAN 1354	58	1.	1 JAN 1534	108	2.	1 JAN 1714	158	1.
1 JAN 1216	9	0.	1 JAN 1356	59	1.	1 JAN 1536	109	2.	1 JAN 1716	159	1.
1 JAN 1218	10	0.	1 JAN 1358	60	1.	1 JAN 1538	110	1.	1 JAN 1718	160	1.
1 JAN 1220	11	0.	1 JAN 1400	61	1.	1 JAN 1540	111	1.	1 JAN 1720	161	1.
1 JAN 1222	12	0.	1 JAN 1402	62	1.	1 JAN 1542	112	1.	1 JAN 1722	162	1.
1 JAN 1224	13	0.	1 JAN 1404	63	1.	1 JAN 1544	113	1.	1 JAN 1724	163	1.
1 JAN 1226	14	0.	1 JAN 1406	64	1.	1 JAN 1546	114	1.	1 JAN 1726	164	1.
1 JAN 1228	15	0.	1 JAN 1408	65	1.	1 JAN 1548	115	1.	1 JAN 1728	165	1.
1 JAN 1230	16	0.	1 JAN 1410	66	1.	1 JAN 1550	116	1.	1 JAN 1730	166	1.
1 JAN 1232	17	0.	1 JAN 1412	67	1.	1 JAN 1552	117	1.	1 JAN 1732	167	1.
1 JAN 1234	18	0.	1 JAN 1414	68	1.	1 JAN 1554	118	2.	1 JAN 1734	168	1.
1 JAN 1236	19	0.	1 JAN 1416	69	1.	1 JAN 1556	119	3.	1 JAN 1736	169	0.
1 JAN 1238	20	0.	1 JAN 1418	70	1.	1 JAN 1558	120	4.	1 JAN 1738	170	0.
1 JAN 1240	21	0.	1 JAN 1420	71	1.	1 JAN 1600	121	5.	1 JAN 1740	171	0.
1 JAN 1242	22	0.	1 JAN 1422	72	1.	1 JAN 1602	122	6.	1 JAN 1742	172	0.
1 JAN 1244	23	0.	1 JAN 1424	73	1.	1 JAN 1604	123	7.	1 JAN 1744	173	0.
1 JAN 1246	24	1.	1 JAN 1426	74	1.	1 JAN 1606	124	8.	1 JAN 1746	174	0.
1 JAN 1248	25	1.	1 JAN 1428	75	1.	1 JAN 1608	125	9.	1 JAN 1748	175	0.
1 JAN 1250	26	1.	1 JAN 1430	76	1.	1 JAN 1610	126	9.	1 JAN 1750	176	0.
1 JAN 1252	27	1.	1 JAN 1432	77	1.	1 JAN 1612	127	8.	1 JAN 1752	177	0.
1 JAN 1254	28	1.	1 JAN 1434	78	1.	1 JAN 1614	128	7.	1 JAN 1754	178	0.
1 JAN 1256	29	1.	1 JAN 1436	79	1.	1 JAN 1616	129	6.	1 JAN 1756	179	0.
1 JAN 1258	30	1.	1 JAN 1438	80	1.	1 JAN 1618	130	5.	1 JAN 1758	180	0.
1 JAN 1300	31	1.	1 JAN 1440	81	1.	1 JAN 1620	131	4.	1 JAN 1800	181	0.
1 JAN 1302	32	1.	1 JAN 1442	82	1.	1 JAN 1622	132	3.	1 JAN 1802	182	0.
1 JAN 1304	33	1.	1 JAN 1444	83	1.	1 JAN 1624	133	2.	1 JAN 1804	183	0.
1 JAN 1306	34	1.	1 JAN 1446	84	1.	1 JAN 1626	134	1.	1 JAN 1806	184	0.
1 JAN 1308	35	1.	1 JAN 1448	85	1.	1 JAN 1628	135	1.	1 JAN 1808	185	0.
1 JAN 1310	36	1.	1 JAN 1450	86	1.	1 JAN 1630	136	1.	1 JAN 1810	186	0.
1 JAN 1312	37	1.	1 JAN 1452	87	1.	1 JAN 1632	137	1.	1 JAN 1812	187	0.
1 JAN 1314	38	1.	1 JAN 1454	88	1.	1 JAN 1634	138	1.	1 JAN 1814	188	0.
1 JAN 1316	39	1.	1 JAN 1456	89	1.	1 JAN 1636	139	1.	1 JAN 1816	189	0.
1 JAN 1318	40	1.	1 JAN 1458	90	1.	1 JAN 1638	140	1.	1 JAN 1818	190	0.
1 JAN 1320	41	1.	1 JAN 1500	91	1.	1 JAN 1640	141	1.	1 JAN 1820	191	0.
1 JAN 1322	42	1.	1 JAN 1502	92	1.	1 JAN 1642	142	1.	1 JAN 1822	192	0.
1 JAN 1324	43	1.	1 JAN 1504	93	1.	1 JAN 1644	143	1.	1 JAN 1824	193	0.
1 JAN 1326	44	1.	1 JAN 1506	94	1.	1 JAN 1646	144	1.	1 JAN 1826	194	0.
1 JAN 1328	45	1.	1 JAN 1508	95	1.	1 JAN 1648	145	1.	1 JAN 1828	195	0.
1 JAN 1330	46	1.	1 JAN 1510	96	1.	1 JAN 1650	146	1.	1 JAN 1830	196	0.
1 JAN 1332	47	1.	1 JAN 1512	97	1.	1 JAN 1652	147	1.	1 JAN 1832	197	0.
1 JAN 1334	48	1.	1 JAN 1514	98	1.	1 JAN 1654	148	1.	1 JAN 1834	198	0.
1 JAN 1336	49	1.	1 JAN 1516	99	1.	1 JAN 1656	149	1.	1 JAN 1836	199	0.
1 JAN 1338	50	1.	1 JAN 1518	100	1.	1 JAN 1658	150	1.	1 JAN 1838	200	0.

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	6.63-HR
+	(CFS)	(HR)					
			(CFS)				
+	9.	4.17		1.	1.	1.	1.
			(INCHES)	1.368	1.371	1.371	1.371
			(AC-FT)	1.	1.	1.	1.

CUMULATIVE AREA = .01 SQ MI

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          *            *
 16 KK    *   DETAIN   *
          *            *
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             HYDROGRAPH ROUTING DATA

 17 RS         STORAGE ROUTING
                     NSTPS          1  NUMBER OF SUBREACHES
                      ITYP       STOR  TYPE OF INITIAL CONDITION
                    RSVRIC      -1.00  INITIAL CONDITION
                         X        .00 WORKING R AND D COEFFICIENT

 18 SV           STORAGE          .0        .1

 19 SQ         DISCHARGE          0.        7.

 20 SE         ELEVATION      100.00    101.00

                                                              ***

WARNING --- ROUTED OUTFLOW (      7.) IS GREATER THAN MAXIMUM OUTFLOW (      7.) IN STORAGE-OUTFLOW TABLE

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                                                     HYDROGRAPH AT STATION   DETAIN

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DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1	JAN	1200	1	0.	.0	100.0	1	JAN	1414	68	1.	.0	100.1	1	JAN	1628	135	4.	.1	100.6
1	JAN	1202	2	0.	.0	100.0	1	JAN	1416	69	1.	.0	100.1	1	JAN	1630	136	4.	.0	100.5
1	JAN	1204	3	0.	.0	100.0	1	JAN	1418	70	1.	.0	100.1	1	JAN	1632	137	3.	.0	100.5
1	JAN	1206	4	0.	.0	100.0	1	JAN	1420	71	1.	.0	100.1	1	JAN	1634	138	3.	.0	100.4
1	JAN	1208	5	0.	.0	100.0	1	JAN	1422	72	1.	.0	100.1	1	JAN	1636	139	2.	.0	100.4
1	JAN	1210	6	0.	.0	100.0	1	JAN	1424	73	1.	.0	100.1	1	JAN	1638	140	2.	.0	100.3
1	JAN	1212	7	0.	.0	100.0	1	JAN	1426	74	1.	.0	100.1	1	JAN	1640	141	2.	.0	100.3
1	JAN	1214	8	0.	.0	100.0	1	JAN	1428	75	1.	.0	100.1	1	JAN	1642	142	2.	.0	100.3
1	JAN	1216	9	0.	.0	100.0	1	JAN	1430	76	1.	.0	100.1	1	JAN	1644	143	2.	.0	100.2
1	JAN	1218	10	0.	.0	100.0	1	JAN	1432	77	1.	.0	100.1	1	JAN	1646	144	2.	.0	100.2
1	JAN	1220	11	0.	.0	100.1	1	JAN	1434	78	1.	.0	100.1	1	JAN	1648	145	1.	.0	100.2
1	JAN	1222	12	0.	.0	100.1	1	JAN	1436	79	1.	.0	100.1	1	JAN	1650	146	1.	.0	100.2
1	JAN	1224	13	0.	.0	100.1	1	JAN	1438	80	1.	.0	100.1	1	JAN	1652	147	1.	.0	100.2
1	JAN	1226	14	0.	.0	100.1	1	JAN	1440	81	1.	.0	100.1	1	JAN	1654	148	1.	.0	100.2
1	JAN	1228	15	0.	.0	100.1	1	JAN	1442	82	1.	.0	100.1	1	JAN	1656	149	1.	.0	100.2
1	JAN	1230	16	0.	.0	100.1	1	JAN	1444	83	1.	.0	100.1	1	JAN	1658	150	1.	.0	100.2
1	JAN	1232	17	0.	.0	100.1	1	JAN	1446	84	1.	.0	100.1	1	JAN	1700	151	1.	.0	100.1
1	JAN	1234	18	0.	.0	100.1	1	JAN	1448	85	1.	.0	100.1	1	JAN	1702	152	1.	.0	100.1
1	JAN	1236	19	0.	.0	100.1	1	JAN	1450	86	1.	.0	100.1	1	JAN	1704	153	1.	.0	100.1
1	JAN	1238	20	0.	.0	100.1	1	JAN	1452	87	1.	.0	100.1	1	JAN	1706	154	1.	.0	100.1
1	JAN	1240	21	0.	.0	100.1	1	JAN	1454	88	1.	.0	100.1	1	JAN	1708	155	1.	.0	100.1
1	JAN	1242	22	0.	.0	100.1	1	JAN	1456	89	1.	.0	100.1	1	JAN	1710	156	1.	.0	100.1
1	JAN	1244	23	0.	.0	100.1	1	JAN	1458	90	1.	.0	100.1	1	JAN	1712	157	1.	.0	100.1
1	JAN	1246	24	0.	.0	100.1	1	JAN	1500	91	1.	.0	100.1	1	JAN	1714	158	1.	.0	100.1
1	JAN	1248	25	0.	.0	100.1	1	JAN	1502	92	1.	.0	100.1	1	JAN	1716	159	1.	.0	100.1
1	JAN	1250	26	0.	.0	100.1	1	JAN	1504	93	1.	.0	100.1	1	JAN	1718	160	1.	.0	100.1
1	JAN	1252	27	0.	.0	100.1	1	JAN	1506	94	1.	.0	100.1	1	JAN	1720	161	1.	.0	100.1
1	JAN	1254	28	0.	.0	100.1	1	JAN	1508	95	1.	.0	100.1	1	JAN	1722	162	1.	.0	100.1
1	JAN	1256	29	0.	.0	100.1	1	JAN	1510	96	1.	.0	100.1	1	JAN	1724	163	1.	.0	100.1
1	JAN	1258	30	0.	.0	100.1	1	JAN	1512	97	1.	.0	100.1	1	JAN	1726	164	1.	.0	100.1
1	JAN	1300	31	0.	.0	100.1	1	JAN	1514	98	1.	.0	100.2	1	JAN	1728	165	1.	.0	100.1
1	JAN	1302	32	0.	.0	100.1	1	JAN	1516	99	1.	.0	100.2	1	JAN	1730	166	1.	.0	100.1
1	JAN	1304	33	0.	.0	100.1	1	JAN	1518	100	1.	.0	100.2	1	JAN	1732	167	1.	.0	100.1
1	JAN	1306	34	0.	.0	100.1	1	JAN	1520	101	1.	.0	100.2	1	JAN	1734	168	1.	.0	100.1
1	JAN	1308	35	0.	.0	100.1	1	JAN	1522	102	1.	.0	100.2	1	JAN	1736	169	1.	.0	100.1
1	JAN	1310	36	0.	.0	100.1	1	JAN	1524	103	1.	.0	100.2	1	JAN	1738	170	1.	.0	100.1
1	JAN	1312	37	0.	.0	100.1	1	JAN	1526	104	1.	.0	100.2	1	JAN	1740	171	1.	.0	100.1

1 JAN 1314	38	0.	.0	100.1	*	1 JAN 1528	105	1.	.0	100.2	*	1 JAN 1742	172	1.	.0	100.1
1 JAN 1316	39	0.	.0	100.1	*	1 JAN 1530	106	1.	.0	100.2	*	1 JAN 1744	173	1.	.0	100.1
1 JAN 1318	40	0.	.0	100.1	*	1 JAN 1532	107	1.	.0	100.2	*	1 JAN 1746	174	0.	.0	100.1
1 JAN 1320	41	0.	.0	100.1	*	1 JAN 1534	108	1.	.0	100.2	*	1 JAN 1748	175	0.	.0	100.1
1 JAN 1322	42	0.	.0	100.1	*	1 JAN 1536	109	1.	.0	100.2	*	1 JAN 1750	176	0.	.0	100.1
1 JAN 1324	43	0.	.0	100.1	*	1 JAN 1538	110	1.	.0	100.2	*	1 JAN 1752	177	0.	.0	100.1
1 JAN 1326	44	0.	.0	100.1	*	1 JAN 1540	111	1.	.0	100.2	*	1 JAN 1754	178	0.	.0	100.1
1 JAN 1328	45	0.	.0	100.1	*	1 JAN 1542	112	1.	.0	100.2	*	1 JAN 1756	179	0.	.0	100.1
1 JAN 1330	46	0.	.0	100.1	*	1 JAN 1544	113	1.	.0	100.2	*	1 JAN 1758	180	0.	.0	100.1
1 JAN 1332	47	0.	.0	100.1	*	1 JAN 1546	114	1.	.0	100.2	*	1 JAN 1800	181	0.	.0	100.1
1 JAN 1334	48	0.	.0	100.1	*	1 JAN 1548	115	1.	.0	100.2	*	1 JAN 1802	182	0.	.0	100.0
1 JAN 1336	49	0.	.0	100.1	*	1 JAN 1550	116	1.	.0	100.2	*	1 JAN 1804	183	0.	.0	100.0
1 JAN 1338	50	1.	.0	100.1	*	1 JAN 1552	117	1.	.0	100.2	*	1 JAN 1806	184	0.	.0	100.0
1 JAN 1340	51	1.	.0	100.1	*	1 JAN 1554	118	1.	.0	100.2	*	1 JAN 1808	185	0.	.0	100.0
1 JAN 1342	52	1.	.0	100.1	*	1 JAN 1556	119	1.	.0	100.2	*	1 JAN 1810	186	0.	.0	100.0
1 JAN 1344	53	1.	.0	100.1	*	1 JAN 1558	120	2.	.0	100.3	*	1 JAN 1812	187	0.	.0	100.0
1 JAN 1346	54	1.	.0	100.1	*	1 JAN 1600	121	2.	.0	100.3	*	1 JAN 1814	188	0.	.0	100.0
1 JAN 1348	55	1.	.0	100.1	*	1 JAN 1602	122	3.	.0	100.4	*	1 JAN 1816	189	0.	.0	100.0
1 JAN 1350	56	1.	.0	100.1	*	1 JAN 1604	123	3.	.0	100.5	*	1 JAN 1818	190	0.	.0	100.0
1 JAN 1352	57	1.	.0	100.1	*	1 JAN 1606	124	4.	.1	100.6	*	1 JAN 1820	191	0.	.0	100.0
1 JAN 1354	58	1.	.0	100.1	*	1 JAN 1608	125	5.	.1	100.8	*	1 JAN 1822	192	0.	.0	100.0
1 JAN 1356	59	1.	.0	100.1	*	1 JAN 1610	126	6.	.1	100.9	*	1 JAN 1824	193	0.	.0	100.0
1 JAN 1358	60	1.	.0	100.1	*	1 JAN 1612	127	6.	.1	101.0	*	1 JAN 1826	194	0.	.0	100.0
1 JAN 1400	61	1.	.0	100.1	*	1 JAN 1614	128	7.	.1	101.0	*	1 JAN 1828	195	0.	.0	100.0
1 JAN 1402	62	1.	.0	100.1	*	1 JAN 1616	129	7.	.1	101.0	*	1 JAN 1830	196	0.	.0	100.0
1 JAN 1404	63	1.	.0	100.1	*	1 JAN 1618	130	6.	.1	101.0	*	1 JAN 1832	197	0.	.0	100.0
1 JAN 1406	64	1.	.0	100.1	*	1 JAN 1620	131	6.	.1	100.9	*	1 JAN 1834	198	0.	.0	100.0
1 JAN 1408	65	1.	.0	100.1	*	1 JAN 1622	132	6.	.1	100.9	*	1 JAN 1836	199	0.	.0	100.0
1 JAN 1410	66	1.	.0	100.1	*	1 JAN 1624	133	5.	.1	100.8	*	1 JAN 1838	200	0.	.0	100.0
1 JAN 1412	67	1.	.0	100.1	*	1 JAN 1626	134	5.	.1	100.7	*					
					*						*					

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	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	6.63-HR
+	(CFS)	(HR)					
			(CFS)				
+	7.	4.27		1.	1.	1.	1.
			(INCHES)	1.364	1.375	1.375	1.375
			(AC-FT)	1.	1.	1.	1.

	PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	6.63-HR
+	(AC-FT)	(HR)				
	0.	4.23	0.	0.	0.	0.

	PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	6.63-HR
+	(FEET)	(HR)				
	101.00	4.27	100.17	100.16	100.16	100.16

CUMULATIVE AREA = .01 SQ MI

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
	HYDROGRAPH AT									
+		SITE	9.8	4.17	1.	1.	1.	.01		
	ROUTED TO									
+		DETAIN	6.6	4.27	1.	1.	1.	.01		
+									101.00	4.27

*** NORMAL END OF HEC-1 ***