Preliminary Drainage Report

Storage at Shea

SEC 116th Street & Shea Boulevard

Scottsdale, Arizona

COS

Case No. 50-DR-2017

Plan Check No. : 9-ZN-2017

Plan # _____
Case # 50-DR-2017
Q-S # _____
☑ Accepted
☐ Corrections
DGT 3/15/18
Reviewed By Date

Prepared for:

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For submittal to:

City of Scottsdale

15FEB18

EXP 9/30/20

Prepared by:

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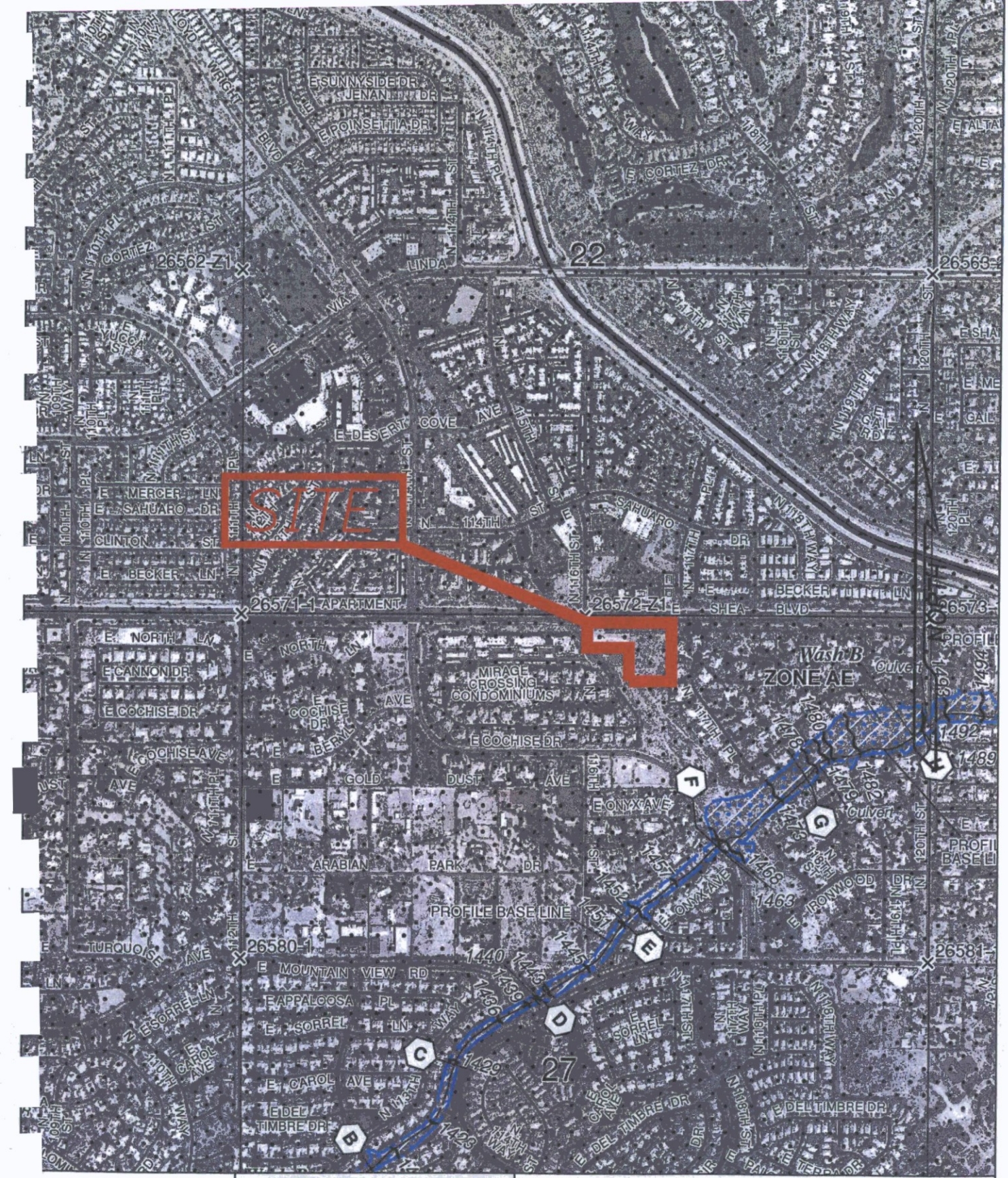
50-DR-2017
02/28/18

EA #2259.01

August 9, 2017
Revised: February 13, 2018

Erie & Associates, Inc.



JOB NO. 2259.01

DATE: 6/19/2017

SCALE: 1"=2000'

ERIE & ASSOCIATES, INC.
3120 NORTH 24th STREET
PHOENIX, ARIZONA 85016
(602) 954-6399

STORAGE AT SHEA

PLATE 2 – FEMA MAP

3.3 Drainage Concepts

- Detention basins will be provided for the 100-year, 2-hour onsite runoff volume from the developed portions of the site.

- Detention basins drain within 36 hours.

- Offsite flow will be collected in a constructed perimeter channel and routed around the east side of the development. For post-development conditions the flows will leave the site in the pre-development location. *Plate 5 – Master Drainage Plan.*

- Peak flows leaving the site during post-development conditions will not exceed predevelopment flows.

4.0 Hydrology

A hydrologic analysis was completed to determine the flows entering the site, for pre-development conditions. The peak flows for the 100-year storm event were calculated using the Rational Method for offsite subareas and HEC-1 for onsite subareas. See *Appendix A* for hydrologic data and calculations. The methodology used to calculate the peak flows is consistent with requirements outlined in the City of Scottsdale's Design Standards and Policies Manual.

4.1 Existing Hydrology

The offsite tributary area was delineated using City of Scottsdale topo and field reconnaissance. The remainder of the offsite and onsite tributary was determined using a one foot contour interval topo and point elevations survey completed as part of this project and field reconnaissance. See *Plate 4 – Existing Tributary Map* for the existing tributary areas. See *Appendix A* for the hydrologic worksheets and calculations.

4.2 Developed Hydrology

The onsite area was divided into two sub-areas for developed conditions. See *Plate 5 – Master Drainage Plan* for the developed tributary areas. The north portion of the site drains to detention basin DB-2 and the south portion drains to detention basin DB-2.

The sub-area parameters are summarized in *Table 1* and *Table 2*.

Table 1 – Offsite Sub-Area Parameters

Sub-Area	Area (acres)	i (in/hr)	C	Tc (min)
SA-1	0.65	7.8	0.7	5
SA-2	0.89	7.8	0.7	5
SA-3	1.17	7.8	0.7	5

Table 2 – Onsite Sub-Area Parameters

Sub-Area	Area (acres)	Length (mi)	Tc (hr)
SA-4 (existing)	1.8	0.086	0.198
SA-4N (developed)	0.7	0.060	0.102
SA-4S (developed)	1.4	0.105	0.155

7.0 References

"Drainage Design Manual for Maricopa County, Arizona", prepared by Flood Control District of Maricopa County, dated 2009.

"Design Standards and Policies Manual", prepared by City of Scottsdale, dated January 2010.

Appendix A – Calculation Worksheets

Revised Aug 8, 2017 by LE

SA-1 (RATIONAL) EXISTING

$Q = CiA$

$Q = 0.7(7.8)(0.65)$

$Q = 4$ CFS

$A = 0.65$ ac

$i = 7.8$ in/hr

$C = 0.5(0.95) + 0.5(0.45)$

$C = 0.7$

SA-2 EXISTING

$Q = 0.7(7.8)(0.89)$

$Q = 5$ CFS

$A = 0.89$ ac

$i = 7.8$ in/hr

$C = 0.7$

SA-3 EXISTING $A_{SA3} = 1.17$ ac $+ SA_2 = 1.17 + 0.89$

$= 2.06$ ac $TC = 5$ min

$i = 7.8$ inch/hr

$C = 0.7$

$Q = (0.7)(7.8)(2.06) \cong 11.$ CFS

SA-4 EXISTING

$A = 220(320) = 1.98$ ac

$Tc = 5$ min $i = 7.8$ in/hr

$C = 0.45$ undev. desert

$Q_{EX} = (0.45)(7.8)(1.98) = 6.95$ CFS

SAY 7. CFS

SA4 Developed

$A = 270(320) = 1.98$ ac

$T_C = 5$ min, $i_{100} = 7.8$ IN/HR

Composite

$A_{\text{BUILDING}} = 1.31$ ac $C = 0.95$

$A_{\text{OPEN}} = 1.98 - 1.31 = 0.67$ $C = 0.45$

$$C_{AVG} = \frac{1.31(0.95) + 0.67(0.45)}{1.98}$$

$C_{AVG} = 0.78$

$\therefore Q_{\text{INTO BASINS}} = (0.78)(7.8)(1.98) = 12.4$ cfs

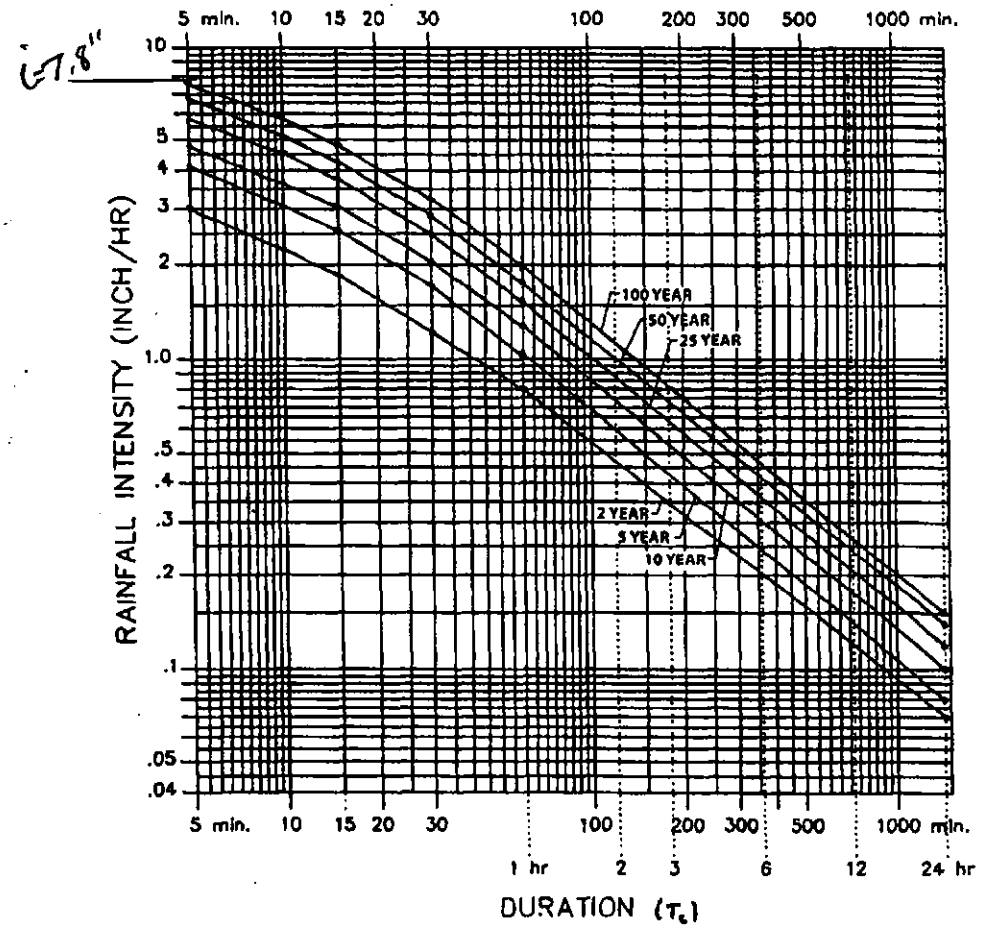
given flood event. For infrastructure design, the estimate of the actual split based on a hydraulic analysis of the current channel cross sections must include a minimum safety factor of 30 percent of the total flow. If the designer feels that there are extenuating factors affecting the stability of the split, the safety factor should be increased accordingly. The report should include a description of all assumptions made regarding watershed conditions used to calculate the peak flow rates.

C. The Rational Method

The Rational Method is limited to use on small, uniform, regularly shaped watersheds less than or equal to 160 acres in size. The methodology is provided in the Drainage Design Manual for Maricopa County, Hydrology.

1. Precipitation

Precipitation input is rainfall intensity, "**I**," and can be obtained directly from NOAA 14 at http://hdsc.nws.noaa.gov/hdsc/pfds/sa/az_pfds.html or from Figure 4.1-3. The time of concentration, "**Tc**," is all that is required to determine "I" from this figure.(source: NOAA 14)



RAINFALL INTENSITY–DURATION–FREQUENCY RELATION
FOR MARICOPA COUNTY, ARIZONA

FIGURE 4.1-3 RAINFALL INTENSITY (I) VALUES FOR USE IN RATIONAL METHOD

100-2. VOLUME CALCULATION (EAST PARCEL)

$$V_r = \frac{P}{12} A C$$

$A_T = 3.28$ ac

$A_{\text{ASHEA AC}} = 0.32$ ac $C = 0.95$

$A_{\text{PARK + BLDG}} = 1.31$ ac $C = 0.95$

$A_{\text{MANOR}} = 1.65$ ac $C = 0.45$

$\Sigma = 3.28$ ac

$$C = \frac{1.63(0.95) + 1.65(0.45)}{3.28}$$

$C = 0.70$

$$V_r = \frac{2.3}{12}(3.28)(0.70) = 0.44 \text{ ac-ft}$$

2. Time of Concentration

Time of concentration "Tc" is the total time of travel from the most hydraulically remote part of the watershed to the concentration point of interest. The calculation of "Tc" must follow FCDMC Hydrology Manual procedures.

***Note:** **Do not add a standard set amount of time to the estimated "Tc" for lot runoff delay (such as 5 or 10 minutes).** Natural land slopes are too variable in Scottsdale to add a set amount of time for lot runoff.

3. Runoff Coefficients

Use Figure 4.1-4 or equivalent to obtain the runoff coefficients or "C" values. Composite "C" values for the appropriate zoning category or weighted average values calculated for the specific site are both acceptable approaches.

RUNOFF COEFFICIENTS - "C" VALUE

Land Use	Storm Frequency		
Composite Area-wide Values	2-25 Year	50 Year	100 Year
Commercial & Industrial Areas	0.80	0.83	0.86
Residential Areas-Single Family (average lot size)			
R1-1-1901	0.33	0.50	0.53
R1-130	0.35	0.51	0.59
R1-70	0.37	0.52	0.60
R1-43	0.38	0.55	0.61
R1-35 (35,000 square feet/lot)	0.40	0.56	0.62
R1-18 (18,000 square feet/lot)	0.43	0.58	0.64
R1-10 (10,000 square feet/lot)	0.47	0.62	0.67
R1-7 (7,000 square feet/lot)	0.51	0.64	0.94
Townhouses (R-2, R-4)	0.63	0.74	0.94
Apartments & Condominiums (R-3, R-5)	0.76	0.83	0.94
Specific Surface Type Values			
Paved streets, parking lots (concrete or asphalt), roofs, drive-ways, etc.	0.90	0.93	0.95
Lawns, golf courses, & parks (grassed areas)	0.20	0.25	0.30
Undisturbed natural desert or desert landscaping (no impervious weed barrier)	0.37	0.42	045
Desert landscaping (with impervious weed barrier)	0.63	0.73	0.83
Mountain terrain – slopes greater than 10%	0.60	0.70	0.80
Agricultural areas (flood-irrigated fields)	0.16	0.18	0.20

FIGURE 4.1-4 RUNOFF COEFFICIENTS FOR USE WITH RATIONAL METHOD

ONSITE HEC-1

RAINFALL
MAP=64,1219

SA-4 (EXISTING)

A=1.82 ac = 0.0028 mi2
L= 455ft = 0.086 mi
USGE = 1475
DSGE = 1465

SOIL TYPE	AREA
3	0.0028 mi2

LANDUSE	AREA
DESERT	0.0028 mi2

SA-4N (DEVELOPED)

A = 0.71 ac = 0.001 mi²
L = 315 ft = 0.060 mi
USEE = 1473
DSEE = 1468

SOILTYPE	AREA
3	0.001 mi²

LANDUSE	AREA	
COMM	0.001 mi²	(USE 310 WAREHOUSE)

SA-4S (DEVELOPED)

A = 1.40 ac = 0.002 mi²
L = 555 ft = 0.105 mi
USEE = 1473
DSEE = 1467.5

SOILTYPE	AREA
3	0.002 mi²

LANDUSE	AREA
COMM	0.002 mi²

DB-1

$$V = \frac{1983 + 8628}{2}(3)\frac{1}{43{,}560} = 0.37 \text{ ac-ft}$$

-CHECK DRAIN TIME

$Q = C_d A \sqrt{2gh}$ ORIFICE EQUATION

$C_d = 0.62$

$A_{6''} = \pi (0.25')^2 = 0.196 \text{ FT}^2$

$g = 32.2 \text{ ft/s}^2$

$h = 1.5' - 0.25' = 1.25'$ HEAD @ CENTERLINE

$Q = 0.62 (0.196 \text{ FT}^2)\sqrt{2(32.2)(1.25)}$

$Q = 1.1 \text{ CFS}$

$$t = \frac{V}{Q} = \frac{0.37 \text{ ac-ft } (43560)}{1.1 \frac{CF}{S} \times \frac{3600 S}{hr}}$$

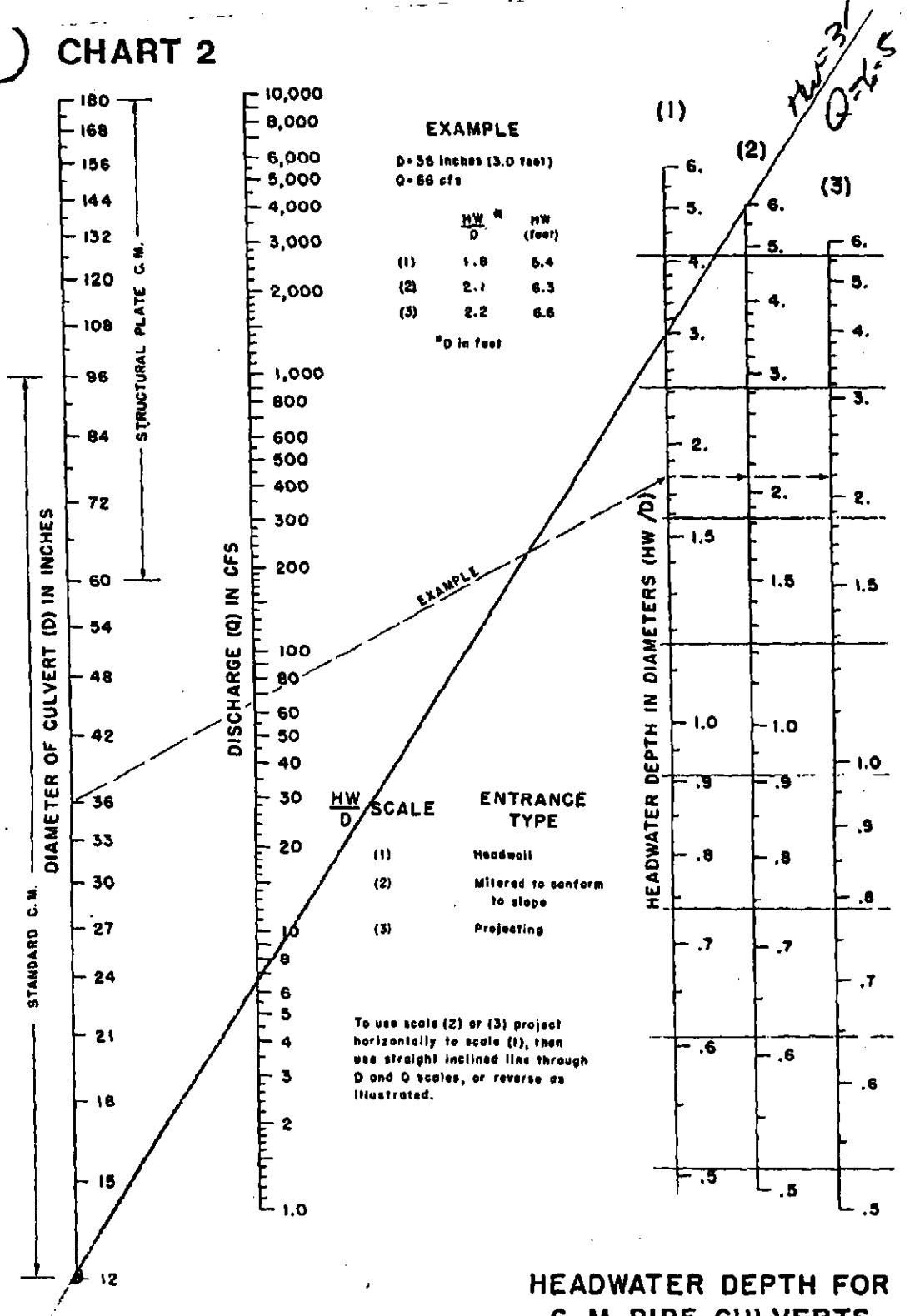
$t = 4.1 \text{ hr}$

DB-2

$$V = \frac{650 + 2901}{2}(3)\frac{1}{43560} = 0.12 \text{ ac-ft}$$

$$t = \frac{0.13 (43560)}{1.1 (3600)} = 1.3 \text{ hr}$$

CHART 2



HEADWATER DEPTH FOR C. M. PIPE CULVERTS WITH INLET CONTROL

BUREAU OF PUBLIC ROADS JAN. 1963

Appendix B – HEC-1 input/output

```
*****************************************
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1)    *
*            JUN  1998                  *
*          VERSION 4.1                  *
*                                       *
*  RUN DATE  14FEB18  TIME  09:55:52    *
*                                       *
*****************************************
```


```
*****************************************
*  U.S. ARMY CORPS OF ENGINEERS         *
*  HYDROLOGIC ENGINEERING CENTER        *
*       609 SECOND STREET               *
*     DAVIS, CALIFORNIA 95616           *
*       (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

1 HEC-1 INPUT PAGE 1

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

   1          ID        Flood Control District of Maricopa County
   2          ID        2259 - STORAGE AT SHEA
   3          ID        100 YEAR
   4          ID        6 Hour  Storm
   5          ID        Unit Hydrograph: Clark
   6          ID        Storm: Multiple
   7          ID        02/14/2018
              *DIAGRAM
   8          IT       1  1JAN99       0    2000
   9          IO       5
  10          IN      15
              *
  11          JD   2.723  0.0001
  12          PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
  13          PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
  14          PC   0.962   0.972   0.983   0.991   1.000
  15          JD   2.707  0.5000
  16          PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
  17          PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
  18          PC   0.962   0.972   0.983   0.991   1.000
              *

  19          KK    SA-4    BASIN
  20          BA   0.003
  21          LG    0.35     0.35    3.39    0.64       5
  22          UC   0.198    0.244
  23          UA       0      3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  24          UA     100
              *

  25          KK   SA-4N    BASIN
  26          BA   0.001
  27          LG    0.10     0.27    3.39    1.00      80
  28          UC   0.102    0.159
  29          UA       0      5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
  30          UA     100
              *

  31          KK    DB-2 STORAGE
  32          KO
  33          RS       1     STOR
  34          SV              0.12
  35          SQ              6.00
  36          SE  1465.0 1468.00
              *

  37          KK    SA-4S    BASIN
  38          BA   0.002
  39          LG    0.10     0.27    3.39    1.00      80
  40          UC   0.155    0.277
  41          UA       0      5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
  42          UA     100
              *
```

1 HEC-1 INPUT PAGE 2

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

  43          KK    CP.A COMBINE
  44          HC       2
              *

  45          KK    DB-1 STORAGE
  46          KO
  47          RS       1     STOR
  48          SV              0.31
  49          SQ              2.00
  50          SE  1464.5 1467.50
              *

  51          ZZ
```

1 SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE (V) ROUTING (---->) DIVERSION OR PUMP FLOW

```
19         SA-4
            .
            .
25          .          SA-4N
            .              V
            .              V
31          .          DB-2
            .              .
            .              .
37          .              .        SA-4S
            .              .            .
            .              .            .
43          .          CP.A............
            .              V
            .              V
45          .          DB-1

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

```
1****************************************                    ****************************************
 *                                      *                    *                                      *
 *   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   14FEB18  TIME  09:55:52  *                    *           (916) 756-1104             *
 *                                      *                    *                                      *
 ****************************************                    ****************************************
```

```
                    Flood Control District of Maricopa County
                    2259 - STORAGE AT SHEA
                    100 YEAR
                    6 Hour  Storm
                    Unit Hydrograph: Clark
                    Storm: Multiple
                    02/14/2018

  9 IO        OUTPUT CONTROL VARIABLES
                    IPRNT          5  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL         0.  HYDROGRAPH PLOT SCALE

    IT        HYDROGRAPH TIME DATA
                     NMIN          1  MINUTES IN COMPUTATION INTERVAL
                    IDATE     1JAN99  STARTING DATE
                    ITIME       0000  STARTING TIME
                       NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE     2JAN99  ENDING DATE
                   NDTIME       0919  ENDING TIME
                    ICENT         19  CENTURY MARK

               COMPUTATION INTERVAL    0.02 HOURS
                    TOTAL TIME BASE   33.32 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

 11 JD         INDEX STORM NO. 1
                    STRM       2.72  PRECIPITATION DEPTH
                    TRDA       0.00  TRANSPOSITION DRAINAGE AREA

 12 PI          PRECIPITATION PATTERN
```

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.03	0.03	0.03
0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

```
 15 JD          INDEX STORM NO. 2
                    STRM       2.71  PRECIPITATION DEPTH
```

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.03	0.03	0.03
0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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

              **************
              *            *
   31 KK      *    DB-2    *      STORAGE
              *            *
              **************

   32 KO          OUTPUT CONTROL VARIABLES
                         IPRNT           5  PRINT CONTROL
                         IPLOT           0  PLOT CONTROL
                         QSCAL          0.  HYDROGRAPH PLOT SCALE

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

              **************
              *            *
   45 KK      *    DB-1    *      STORAGE
              *            *
              **************

   46 KO          OUTPUT CONTROL VARIABLES
                         IPRNT           5  PRINT CONTROL
                         IPLOT           0  PLOT CONTROL
                         QSCAL          0.  HYDROGRAPH PLOT SCALE
1
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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	SA-4	4.	4.12	0.	0.	0.	0.00		
+	HYDROGRAPH AT	SA-4N	2.	4.02	0.	0.	0.	0.00		
+	ROUTED TO	DB-2	2.	4.13	0.	0.	0.	0.00		
+	HYDROGRAPH AT	SA-4S	4.	4.05	0.	0.	0.	0.00		
+	2 COMBINED AT	CP.A	5.	4.07	1.	0.	0.	0.00		
+	ROUTED TO	DB-1	1.	4.65	1.	0.	0.	0.00		

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