

Appendix B – Hydrologic Calculations

- Proposed Condition Standard Form 4
- Proposed Condition HEC-1 Output

TIME OF CONCENTRATION / LAG TIME DETERMINATION - less than 1 mi²



**PUBLIC STORAGE - SUMMERLIN PHASE II
PROPOSED CONDITIONS**

Project No: 192189003
Date: 3/27/23
Calculated by: RRD

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)							T _{lag}	REMARKS
Basin ID	DEV./UNDEV. (D or U)	CN	K	AREA	AREA	INITIAL LENGTH	SLOPE	Ti	TRAVEL LENGTH	SLOPE	V ₁	V ₂	Tt	Tc	Tc Check	T _{lag}	
				Ac	Mi ²						VELOCITY	VELOCITY				0.6Tc/60	RAINFALL
(1)	(2)	(3)	(4)	(5a)	(5b)	(6)	(7)	(8)	(9)	(10)	(10a)	(10b)	(11)	(12)	(13)	(14)	(15)
ON1	D	91.4	0.8165	2.65	0.004	90	3.33	3.2	450	0.67	1.6	2.5	4.5	7.8	13.0	0.078	2.77
ON2	D	91.4	0.8165	0.97	0.002	65	3.10	2.8	215	4.20	4.2	6.3	0.9	3.7	11.6	0.050	2.77
ON3	D	91.4	0.8165	2.60	0.004	175	1.00	6.8	380	3.95	4.0	6.1	1.6	8.3	13.1	0.083	2.77

NOTE:

(1) Subbasin Name	(7) Initial Slope	(10b) V ₂ applies to the remaining travel distance;	(15) Rainfall in inches
(2) Developed or Undeveloped Subbasin	(8) $T_i = 1.8 (1.1 - K) L^{1/2} / S^{1/3}$	Developed $V_2 = 30.6(S/100)^{1/2}$	
(3) Curve Number (See Subbasin CN Calculations)	(9) Travel Length	(11) $T_t = 500/(V_1*60) + (Travel\ Length - 500)/(V_2*60)$	
(4) $K = 0.0132 (CN) - 0.39$	(10) Slope	(12) $T_c = T_i + T_t$	
(5a) & (5b) Area	(10a) Slope V ₁ applies to the first 500 feet of travel distance;	(13) Tc Check = L/180+10 (select smaller Tc)	
(6) Initial Length	Developed $V_1 = 20.2(S/100)^{1/2}$	(14) Tlag = 0.6 Tc/60	

REFERENCE: Calculations based on the Clark County Regional Flood Control District HCDDM

STANDARD FORM 4

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1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
*
* RUN DATE 27MAR23 TIME 23:35:30 *
*
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*
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 756-1104 *
*
*****

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

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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
2 ID *****
3 ID * HYDROLOGIC ANALYSIS *
4 ID * FOR *
5 ID * PUBLIC STORAGE @ SUMMERLIN PHASE II *
6 ID * PROPOSED CONDITION *
7 ID *****
8 ID
9 ID *****
10 ID * 100 & 10 YEAR *
11 ID * STORM EVENT *
12 ID *****
13 ID
    *DIAGRAM
14 IT 5 0 0 300
15 IO 5 0 0
16 IN 5 0 0
17 JR PREC 1.00 0.58

18 KK OF1
19 KM REFERENCED FROM PHASE I STUDY
20 BA .0017
21 PB 3.00
22 PC .000 .020 .057 .070 .087 .108 .124 .130 .130 .130
23 PC .130 .130 .130 .133 .140 .142 .148 .158 .172 .181
24 PC .190 .197 .199 .200 .201 .204 .214 .229 .241 .249
25 PC .251 .256 .270 .278 .281 .283 .295 .322 .352 .409
26 PC .499 .590 .710 .744 .781 .812 .819 .835 .851 .856
27 PC .860 .868 .876 .888 .910 .926 .937 .950 .970 .976
28 PC .982 .985 .987 .989 .990 .993 .993 .994 .995 .998
29 PC .998 .999 1.00
30 LS 0 91.4
31 UD .075
    *

32 KK ON1
33 KM REFERENCED/REVISED FROM PHASE I STUDY
34 BA .004
35 LS 0 91.4
36 UD .078
    *

37 KK CP1
38 KM COMBINE OF1 AND ON1
39 HC 2
    *

40 KK ON2
41 KM REFERENCED/REVISED FROM PHASE I STUDY
42 BA .002
43 LS 0 91.4

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44 UD .050
*

1

HEC-1 INPUT

PAGE 2

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

45 KK ON3
46 KM ONSITE SUBBASIN
47 BA .004
48 LS 0 91.4
49 UD .083
*

50 KK CP2
51 KM COMBINE ON2 AND ON3
52 HC 2
*
53 ZZ

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE (V) ROUTING (--->) DIVERSION OR PUMP FLOW
 NO. (.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW

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18 OF1
.
.
32 . ON1
.
.
37 CP1.....
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.
40 . ON2
.
.
45 . ON3
.
.
50 . CP2.....
  
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 27MAR23 TIME 23:35:30 *
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*
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*****
* HYDROLOGIC ANALYSIS *
* FOR *
* PUBLIC STORAGE @ SUMMERLIN PHASE II *
* PROPOSED CONDITION *
*****
  
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*****
* 100 & 10 YEAR *
* STORM EVENT *
*****
  
```

15 IO OUTPUT CONTROL VARIABLES

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IPRNT 5 PRINT CONTROL
IPLOT 0 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE
  
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IT HYDROGRAPH TIME DATA

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NMIN 5 MINUTES IN COMPUTATION INTERVAL
IDATE 1 0 STARTING DATE
ITIME 0000 STARTING TIME
NQ 300 NUMBER OF HYDROGRAPH ORDINATES
NDDATE 2 0 ENDING DATE
NDTIME 0055 ENDING TIME
ICENT 19 CENTURY MARK
  
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COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 24.92 HOURS
  
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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

JP MULTI-PLAN OPTION
 NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
 RATIOS OF PRECIPITATION
 1.00 .58

1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
 FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
 TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION	
				RATIO 1	RATIO 2
				1.00	.58
HYDROGRAPH AT +	OF1	.00	1 FLOW TIME	3. 3.50	2. 3.50
HYDROGRAPH AT +	ON1	.00	1 FLOW TIME	8. 3.50	4. 3.50
2 COMBINED AT +	CP1	.01	1 FLOW TIME	11. 3.50	5. 3.50
HYDROGRAPH AT +	ON2	.00	1 FLOW TIME	4. 3.50	2. 3.50
HYDROGRAPH AT +	ON3	.00	1 FLOW TIME	8. 3.50	4. 3.50
2 COMBINED AT +	CP2	.01	1 FLOW TIME	12. 3.50	6. 3.50

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