WALSH ENGINEERING & SURVEYING, INC.

CEQA DRAINAGE STUDY
For
Spring Valley TM 5636
(PDS2019-TM-5636)

(Vacant) Grand Avenue
Spring Valley, CA 91977

Prepared for:
Mark Khouli, President
Light House Builders, Inc.
1620 La Presa Avenue
Spring Valley, CA 91977

(Walsh Engineering Job No 201213)

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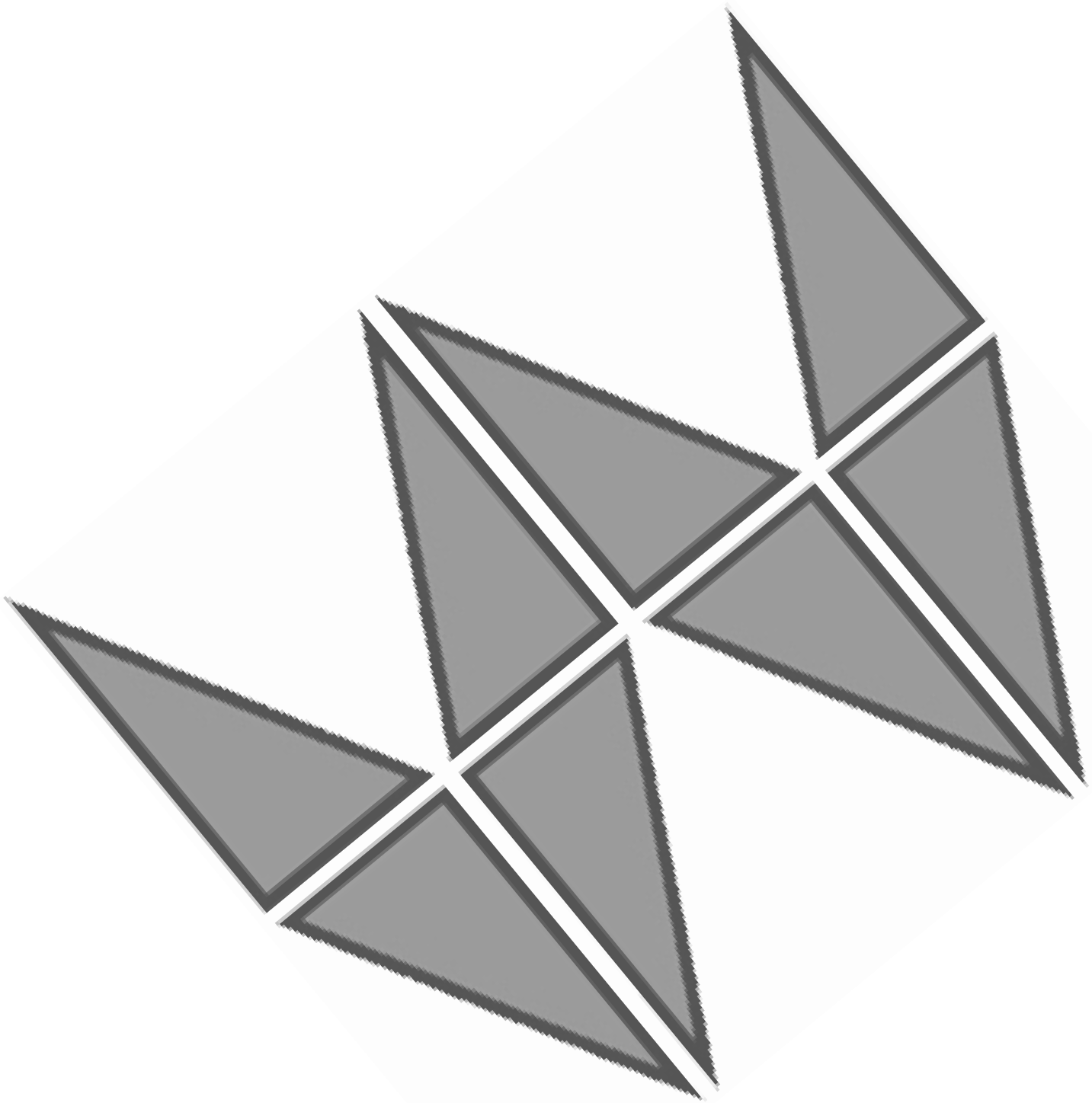


SECTION 1

Introduction
The property is located at (Vacant) Grand Avenue, Spring Valley, CA 91977 (see attached Vicinity Map and reduced Preliminary Grading Plan). The proposed subdivision on the undisturbed 9.88 acre parcel will create 7 lots with 7 residential homes, and one biological open space lot.

Pre-Developed Condition
In the current condition, the site is vacant hillside and the drainage pattern is generally northeast to southwest with an average slope of 25%. The drainage through the property exits the site at the westerly and southerly property lines in a sheet flow condition. Drainage flowing east is labeled Drainage Basin 1 and drainage flowing to the south is labeled as Drainage Basin 2 (see the Pre-Developed Drainage Map in Section 2).

The flow rate for each drainage basin was analyzed across the length of the property line due to the sheet flow condition of runoff exiting the site. Calculating the flow rate at the property line provides more accurate analysis of the onsite flow rate without influence from downstream properties. See the table on the next page for a summary of pre-developed values and flow rates.

There is also an area north of Basin 1 that is on-site that will remain undisturbed therefore, the area has been excluded from the Basin 1 calculations to better analyze the effects of the development. The flowrate does not change from the pre to post developed condition in this area and also includes an area of offsite flow coming through the site. The total of these areas (off-site and on-site) is 5.42 acres. See “Off-site area draining through site” Exhibit in Section 2 along with a summary table of calculations on right hand side of the exhibit.

Post-Developed Condition
In the post-developed condition, there will be 7 proposed single family residences with driveways for access off of Grand Avenue. Lots 6 and 7 will be accessed by a private joint driveway off of Grand Avenue. Due to the steepness of the site the proposed residences will be built on stem walls rather than graded pads and the majority of the site will be left undisturbed. The post-developed condition will have the same two Drainage Basin areas as the pre-developed condition and will maintain the same drainage patterns as the pre-developed condition described above. The increase in impervious area (C-value) is the main factor that influences the post-developed flow rate. The increase in flow rate for the post-developed condition will be mitigated by conjunctive use tree wells with 8” of flood storage ponding for detention and 1’ of freeboard on each of the lots (except for Lot 6). The tree well on Lot 7 is used for both Lots 6 and 7, and all tree wells adequately mitigate the impacts of the development. See the table on the next page for a summary of post-developed values, flow rates, and mitigation.

Summary/Conclusion

The flow rates and mitigated flow rates for Basins 1 and 2 were calculated using the Civil D and Hydraflow Express Programs. Output files from these programs showing the calculations can be found in Section 2 of this report. The mitigated flow rate was calculated by subtracting the unmitigated peak flow rate leaving each tree well within each Drainage Basin from the mitigated peak flow rate leaving each tree well after detention was provided. Detention within each tree well basin is adequately provided and an orifice (ranging from 1.5" to 4") in each tree well's catch basin separates the water quality storage layer from the flood storage ponding layer. See tree well detail in Section 2 for details and corresponding orifice sizes. The orifice sizes were determined by the Hydraflow Express program and sufficient detention has been provided to mitigate the increase in flow from the development.

The Hydraflow Express program also provides the inflow hydrograph, stage-storage relationships, and the stage-discharge relationships for the outlet structures. These results can be found in the output results in Section 2 as mentioned above. In conclusion, there is no net increase in flow from the pre to post developed condition. All impacts of the development and increase in flow rates is mitigated back to pre-developed flow rates.

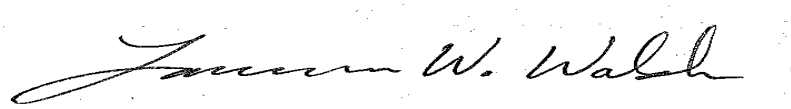
Basin	Pre-Developed Effective C	Post-Developed Effective C	Pre-Developed Tc (min.)	Post-Developed Tc (min.)	Pre-Developed I (in./hr.)	Post-Developed I (in./hr.)	Pre-Developed Area (acres)	Post-Developed Area (acres)
1	0.35	0.368	11.52	9.29	4.31	4.95	6.01	6.01
2	0.35	0.450	10.04	5.84	4.71	6.67	2.24	2.24

Basin	Pre-Developed Q100 (cfs)	Post-Developed Q100 (cfs)	Mitigated Q100 (cfs)	Mitigated Velocity V100 (ft/s)
1	9.06	10.53	9.02	3.6
2	3.69	5.87	2.64	3.3

DECLARATION OF RESPONSIBLE CHARGE

I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT. THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE COUNTY OF SAN DIEGO ARE CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.



1/2/24

LAWRENCE W. WALSH, RCE 88286 DATE

For CEQA purposes, the following information is provided in this study for project review.

Q: Will the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?
A: No. The overall existing drainage patterns will be maintained, no alterations to streams or rivers will occur and no increase in off-site erosion or siltation will be caused by this project.

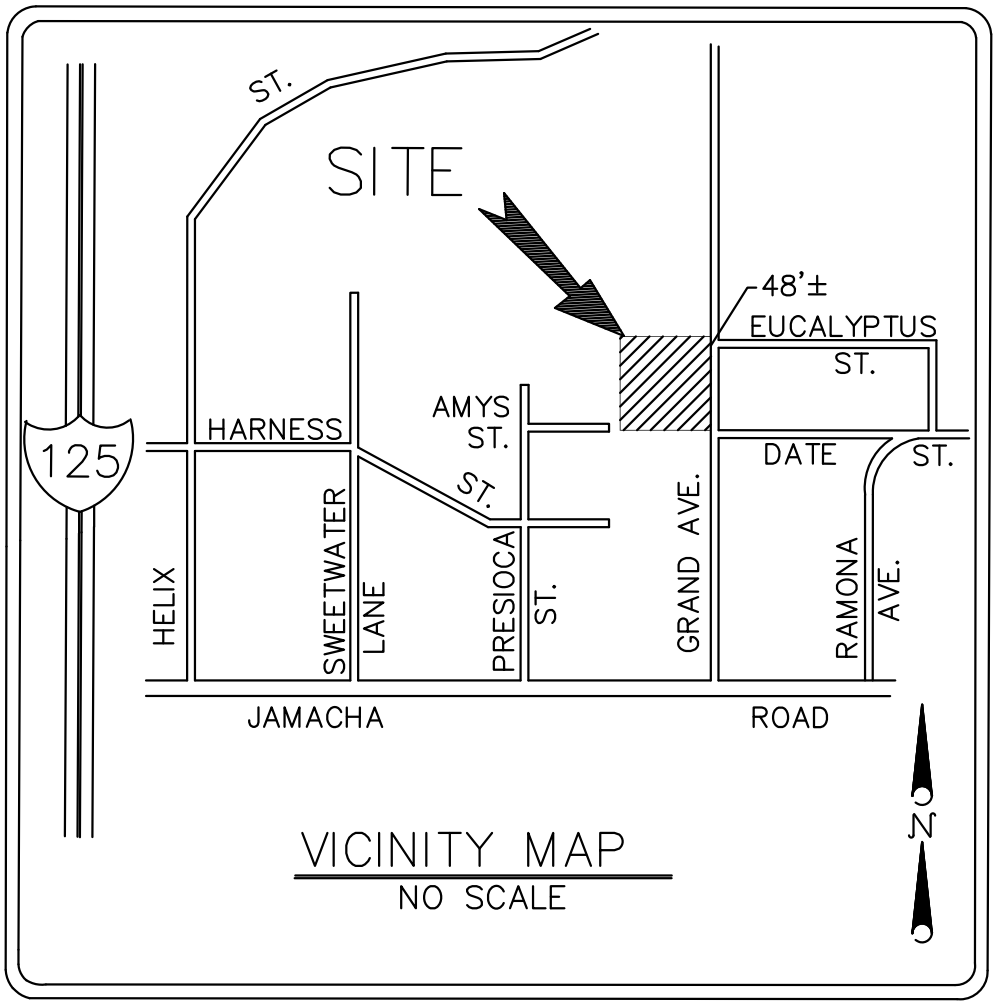
Q: Will the project substantially alter the existing drainage pattern of the site or area including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?
A: No. The overall existing drainage patterns will be maintained. No alterations to streams or rivers will occur and the rate or amount of runoff will not significantly increase.

Q: Will the project create or contribute runoff water which will exceed the capacity of existing or planned storm water drainage systems?
A: No. The project will not create or contribute runoff water which will exceed the capacity of existing or planned storm water drainage systems.

Q: Will the project place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map, including County Floodplain Maps?
A: No. The project does not propose to place housing within a 100-year flood hazard area.

Q: Will the project place within a 100-year flood hazard area structures which would impede or redirect flood flows?
A: No. The project will not place structures within a 100-year flood hazard area.

Q: Will the project expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam on-site or off-site?
A: No. The project will not expose people or structures to a significant risk of loss, injury or death involving flooding as a result of failure of Dam(s) or levee(s)



VICINITY MAP

NO SCALE

PRELIMINARY GRADING PLAN

PDS2019-TM-5636

EASEMENTS

Ⓐ ITEM 7 EASEMENT FOR THE PURPOSE SHOWN BELOW AND RIGHTS INCIDENTAL THERETO AS GRANTED IN DOCUMENT:

GRANTED TO:	SAN DIEGO GAS AND ELECTRIC COMPANY
PURPOSE:	UNDERGROUND FACILITIES AND ABOVE GROUND STRUCTURES
RECORDING DATE:	FEBRUARY 13, 1958
RECORDING NO:	BOOK 6948, PAGE 398, OF OFFICIAL RECORDS SAID LAND MORE PARTICULARLY DESCRIBED THEREIN

Ⓑ ITEM 9 EASEMENT FOR THE PURPOSE SHOWN BELOW AND RIGHTS INCIDENTAL THERETO AS GRANTED IN DOCUMENT:

GRANTED TO:	SPRING VALLEY SANITATION DISTRICT
PURPOSE:	SEWER LINE
RECORDING DATE:	MARCH 9, 1962
RECORDING NO:	40574, OF OFFICIAL RECORDS

Ⓒ ITEM 10 EASEMENT FOR THE PURPOSE SHOWN BELOW AND RIGHTS INCIDENTAL THERETO AS GRANTED IN DOCUMENT:

GRANTED TO:	COUNTY OF SAN DIEGO
PURPOSE:	SLOPES
RECORDING DATE:	NOVEMBER 18, 1964
RECORDING NO:	210201, OF OFFICIAL RECORDS

Ⓓ ITEM 11 EASEMENT FOR THE PURPOSE SHOWN BELOW AND RIGHTS INCIDENTAL THERETO AS SET FORTH IN DOCUMENT:

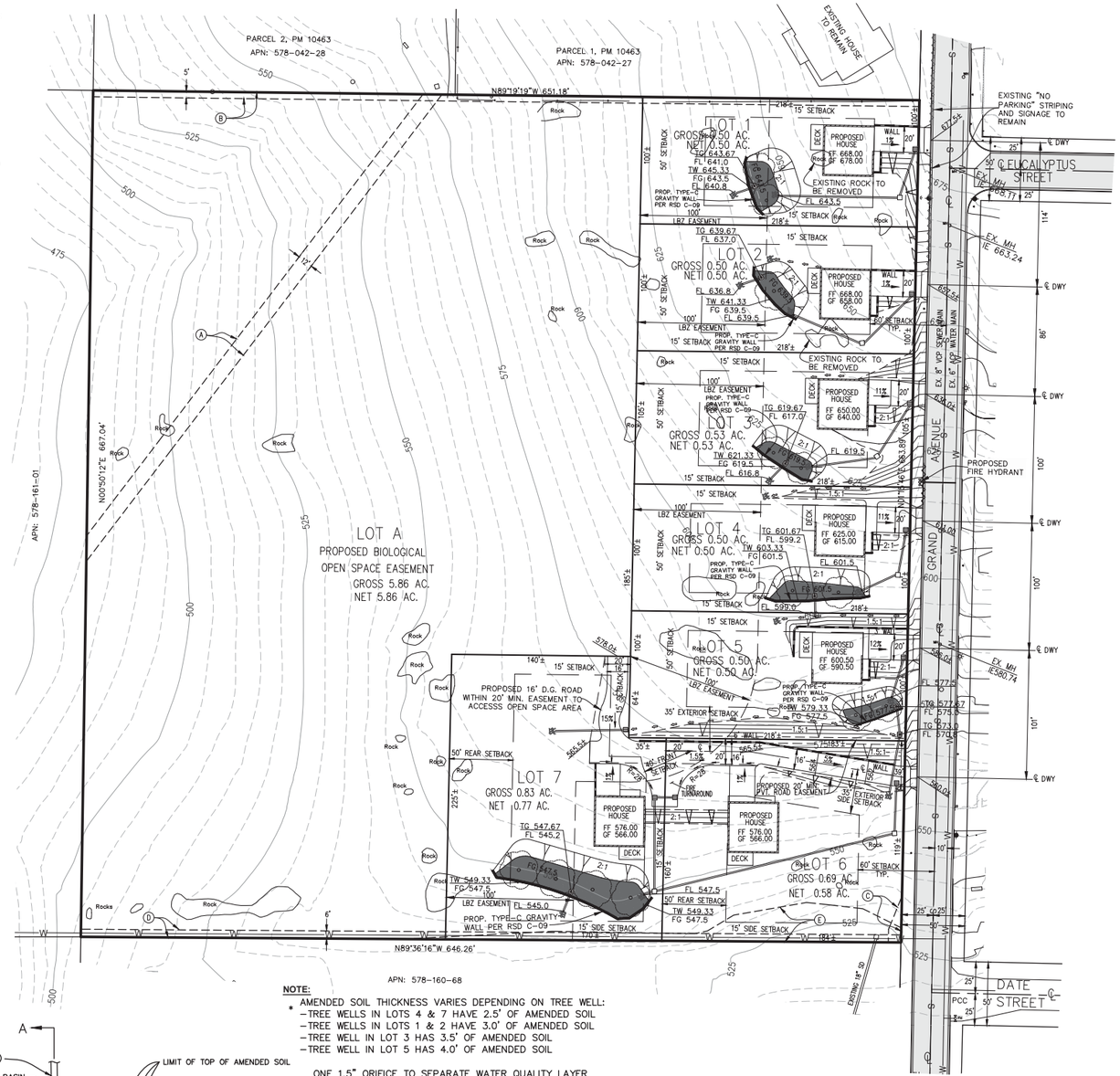
PURPOSE:	RIGHTS OF WAY TO INSTALL AND MAINTAIN WATER LINES
RECORDING DATE:	OCTOBER 16, 1967
RECORDING NO:	160118, OF OFFICIAL RECORDS

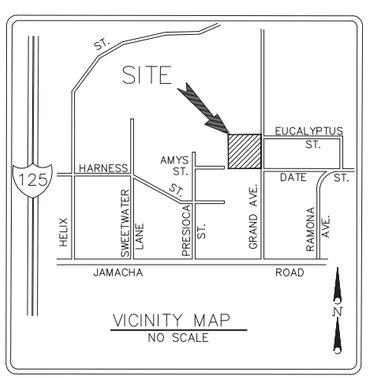
Ⓔ ITEM 14 EASEMENT FOR THE PURPOSE SHOWN BELOW AND RIGHTS INCIDENTAL THERETO AS SET FORTH IN DOCUMENT:

PURPOSE:	Off-site drainage
RECORDING DATE:	JULY 18, 2017
RECORDING NO:	2017-0322840, OF OFFICIAL RECORDS

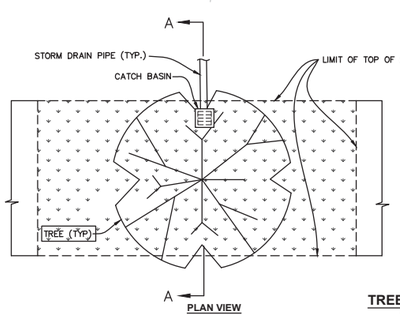
PRELIMINARY GRADING PLAN NOTE:

THIS PLAN IS PROVIDED TO ALLOW FOR THE FULL AND ADEQUATE DISCRETIONARY REVIEW OF A PROPOSED DEVELOPMENT PROJECT. THE PROPERTY OWNER ACKNOWLEDGES THAT ACCEPTANCE OR APPROVAL OF THIS PLAN DOES NOT CONSTITUTE AN APPROVAL TO TO PERFORM ANY GRADING SHOWN HEREON, AND AGREES TO OBTAIN A VALID GRADING PERMIT BEFORE COMMENCING SUCH ACTIVITY.





VICINITY MAP
NO SCALE

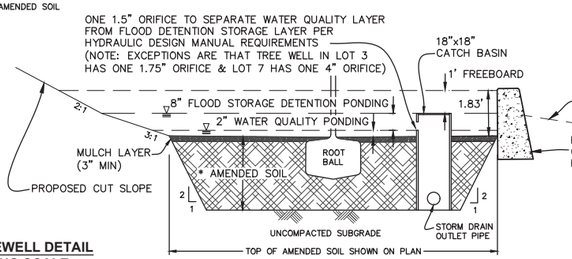


PLAN VIEW

NOTE:

* AMENDED SOIL THICKNESS VARIES DEPENDING ON TREE WELL:
- TREE WELLS IN LOTS 4 & 7 HAVE 2.5' OF AMENDED SOIL
- TREE WELLS IN LOTS 1 & 2 HAVE 3.0' OF AMENDED SOIL
- TREE WELL IN LOT 3 HAS 3.5' OF AMENDED SOIL
- TREE WELL IN LOT 5 HAS 4.0' OF AMENDED SOIL

ONE 1.5" ORIFICE TO SEPARATE WATER QUALITY LAYER FROM FLOOD DETENTION STORAGE LAYER PER HYDRAULIC DESIGN MANUAL REQUIREMENTS (NOTE: EXCEPTIONS ARE THAT TREE WELL IN LOT 3 HAS ONE 1.75" ORIFICE & LOT 7 HAS ONE 4" ORIFICE)



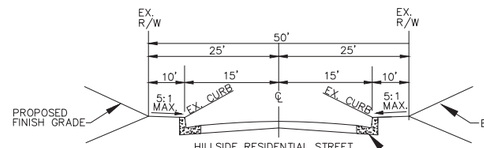
SECTION A-A

TREEWELL DETAIL
NO SCALE

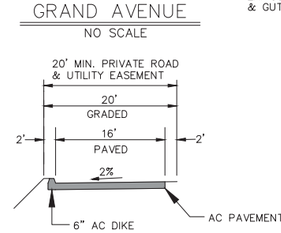
LEGEND

- BOUNDARY
- LOT LINES
- EASEMENTS
- FF FINISH FLOOR ELEVATION
- GF GARAGE FLOOR ELEVATION
- PROPOSED CUT SLOPES
- PROPOSED FILL SLOPES (2:1 TYP)
- PROPOSED CATCH BASIN
- PROPOSED CLEANOUT
- PROPOSED PCC BROW DITCH
- PROPOSED RIP RAP
- PROPOSED RETAINING WALL
- Ⓐ EASEMENT DESCRIPTION
- OPEN SPACE FENCING AND SIGNAGE
- TREE IN TREE WELL (SEE TABLE BELOW FOR TREE CANOPY SIZES)
- EXISTING "NO PARKING" STRIPING AND SIGNAGE
- PROPOSED "NO PARKING" RED CURB STRIPING AND SIGNAGE IN FRONT OF PROPOSED FIRE HYDRANT
- PROPOSED DRIVEWAY APRON PER RSD G-14A

EXISTING ROCK TO REMAIN (TYPICAL) UNLESS OTHERWISE SPECIFIED

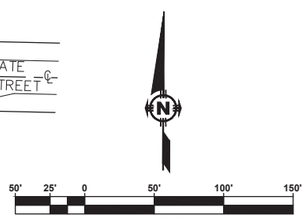


GRAND AVENUE
NO SCALE



PRIVATE DRIVEWAY
NO SCALE

LOT #	MAX. ELEVATION DIFFERENCE BETWEEN 1ST FLOOR PERIMETER AND ADJACENT FINISHED GRADE (12' MAX. ALLOWABLE)	PERCENTAGE OF 1ST FLOOR PERIMETER THAT IS MORE THAN 6' ABOVE ADJACENT FINISHED GRADE (50% MAX. ALLOWABLE)
1	12.0'	50%
2	11.5'	50%
3	11.0'	40%
4	5.5'	0%
5	2.5'	0%
6	12.0'	45%
7	10.0'	50%



SITE ADDRESS:
GRAND AVENUE
SPRING VALLEY, CA 91977

APN:
578-161-02

EARTHWORK:
CUT: 4,700 C.Y.
FILL: 2,300 C.Y.
EXPORT: 2,400 C.Y.

TREE WELL SUMMARY

LOT #	DMA	NO. OF TREE WELLS	MATURE CANOPY DIAMETER	SOIL DIMENSIONS PER TREE
1	1	2	25'	18' x 19.3' x 3'
2	2	1	30'	13.5' x 38' x 3'
3	3	2	25'	12.4' x 23' x 3.5'
4	4	2	25'	12' x 34' x 2.5'
5	5	2	25'	12' x 21.3' x 4'
7	6	4	30'	21' x 29.5' x 2.5'

REGISTERED PROFESSIONAL ENGINEER — LAWRENCE W. WALSH — 46316 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:

LAWRENCE W. WALSH — DATE 10/24/23

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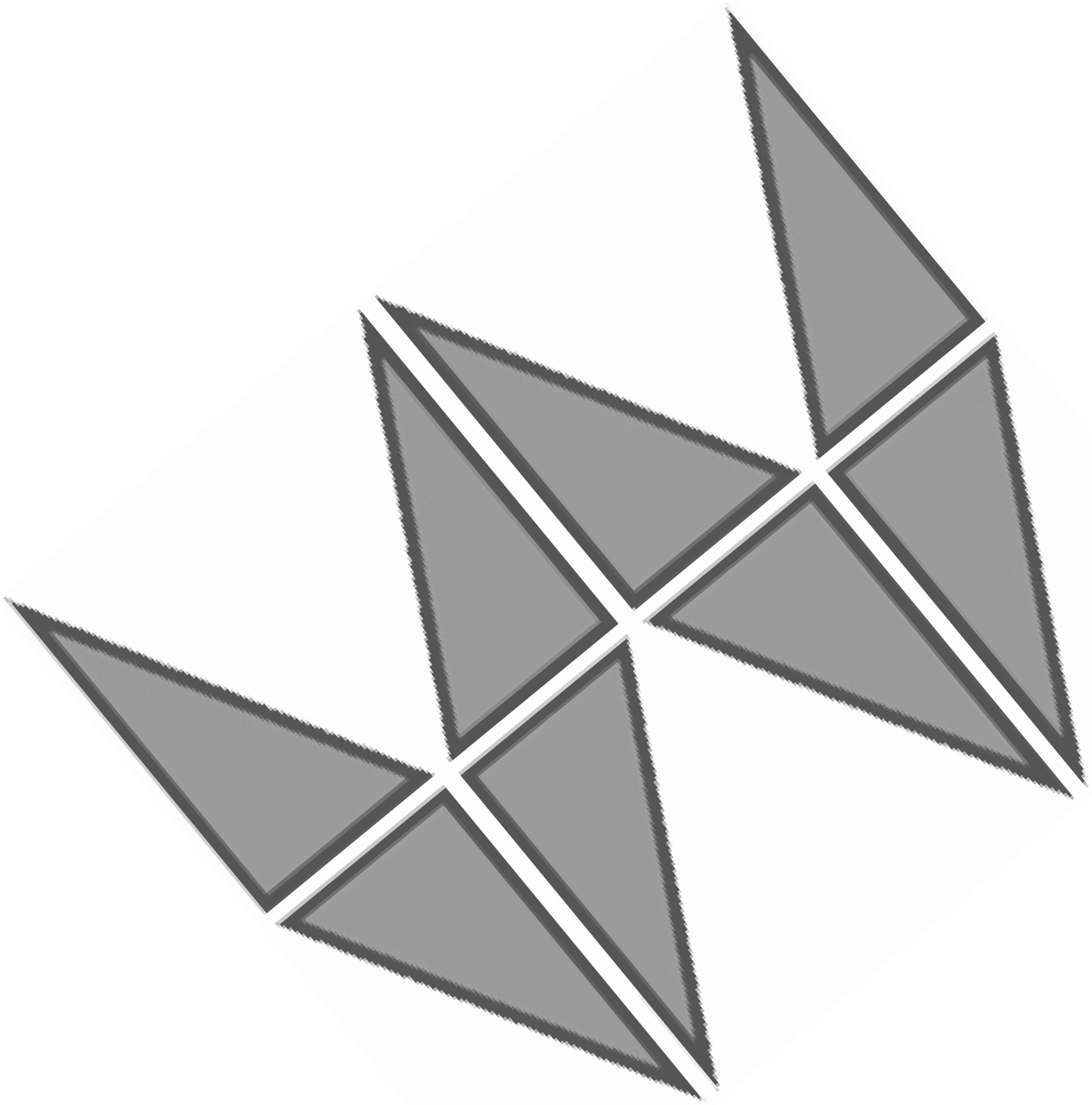
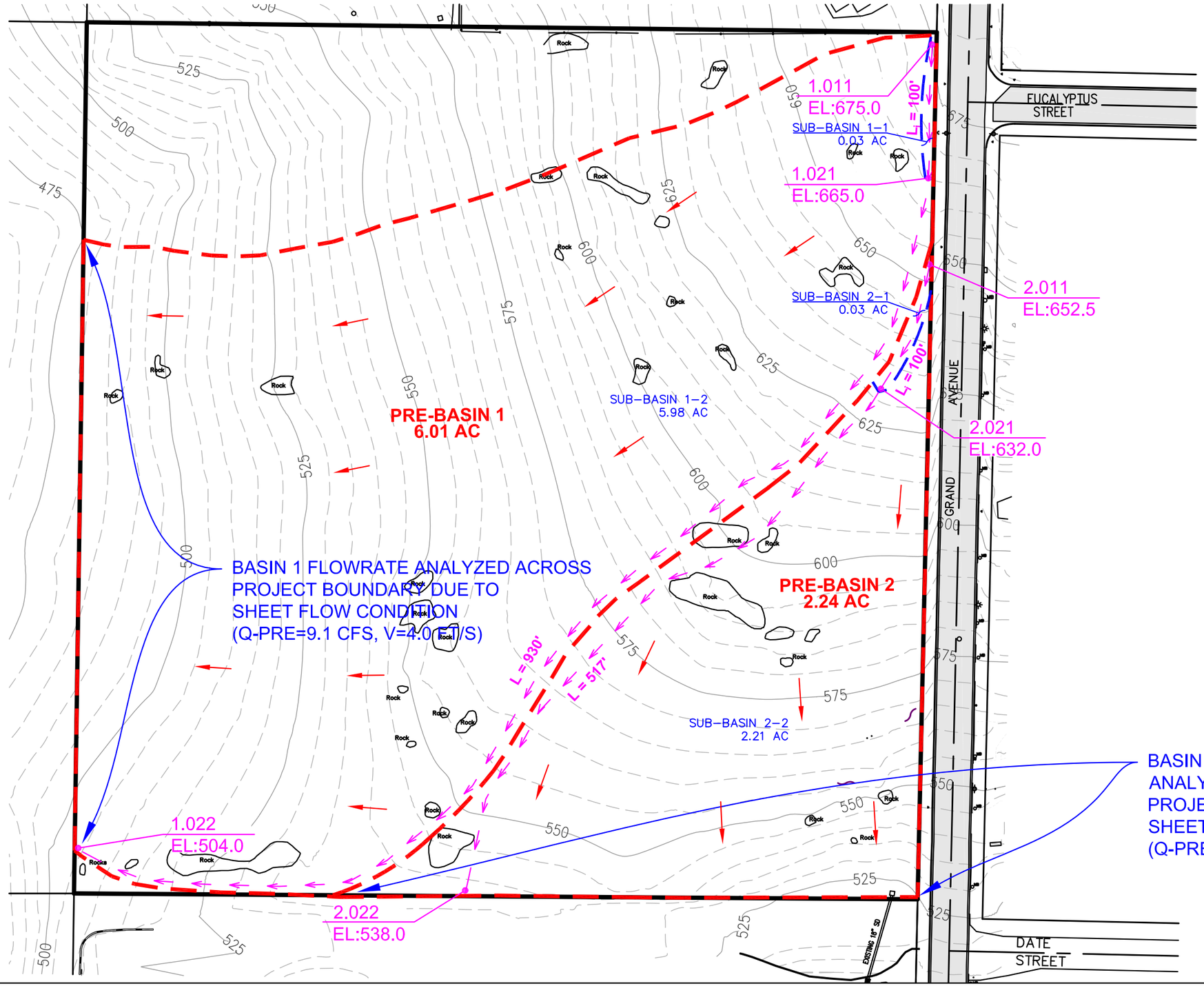


SECTION 2

PRE- DEVELOPED DRAINAGE MAP:

(VACANT) GRAND AVENUE
SPRING VALLEY, CA 91977



LEGEND:

- BASIN BOUNDARY
- FLOWPATH
- DIRECTION OF DRAINAGE

BASIN
SUB BASIN
NODE

1.022
EL=612

NODE ELEVATION

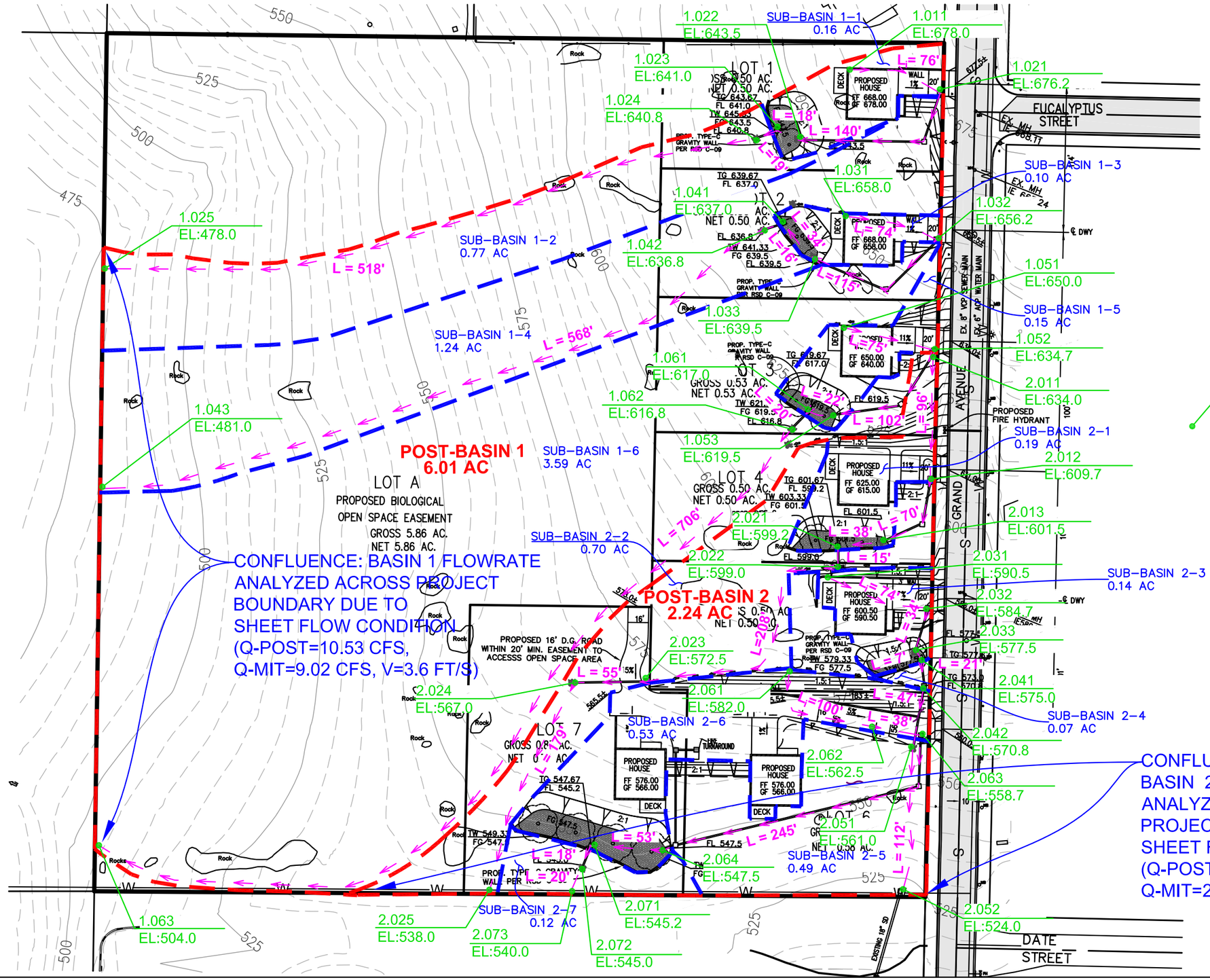
N

80' 40' 0 80'

SCALE: 1"=80'

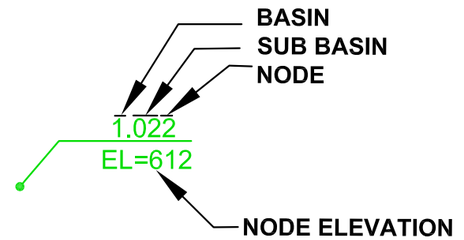
POST- DEVELOPED DRAINAGE MAP:

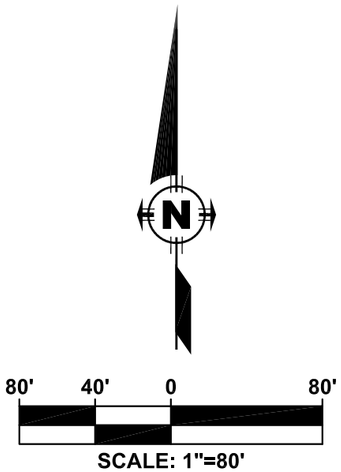
(VACANT) GRAND AVENUE
SPRING VALLEY, CA 91977



LEGEND:

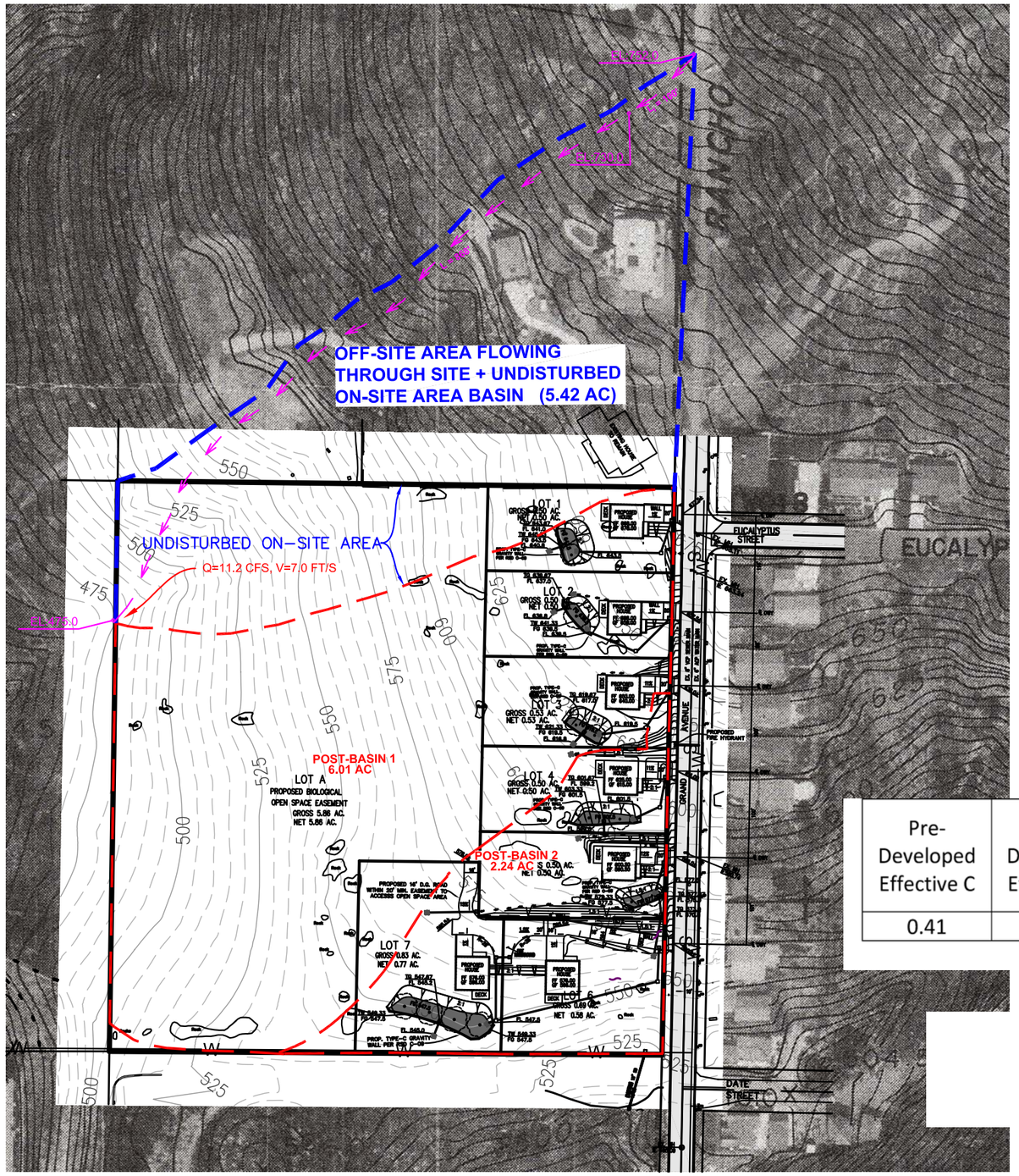
- BASIN BOUNDARY
- SUB-BASIN BOUNDARY
- FLOWPATH





OFF-SITE AREA DRAINING THROUGH SITE EXHIBIT

(VACANT) GRAND AVENUE
SPRING VALLEY, CA 91977



LEGEND:

- OFF-SITE BASIN BOUNDARY
- ON-SITE BASIN BOUNDARIES

N

150' 75' 0 150'

SCALE: 1"=150'

Pre-Developed Effective C	Post-Developed Effective C	Pre-Developed Tc (min.)	Post-Developed Tc (min.)	Pre-Developed I (in./hr.)	Post-Developed I (in./hr.)	Pre-Developed Area (acres)	Post-Developed Area (acres)
0.41	0.41	9.0	9.0	5.05	5.05	5.42	5.42

Pre-Developed Q100 (cfs)	Post-Developed Q100 (cfs)	Mitigated Q100 (cfs)	Velocity V100 (ft/s)
11.2	11.2	11.2	7.0

HYDROLOGY CALCULATIONS:
Rational Method

UNDISTURBED BASIN
Pre and Post-Developed

BASIN AREA:

A_{Total} = 5.42 acres — per Drainage Exhibit

RUNOFF COEFFICIENT:

Soil Type : D — per Soils Group Map
Land Use: per Table 3-1, 1 DU/Acre or less

C-Value: C = 0.41

TIME OF CONCENTRATION: $T_c = T_i + T_1$

Initial Time, T_i
Land Use = Natural
Slope = 10 % — per Post-Dev. Drainage Map
Ti = 6.7 min — per Table 3-2 interpolated for C=0.36

Travel Time, T_1
Elevation Difference = 255 feet
Length = 868 feet — per Pre-Dev. Drainage Map
T_1 = 2.29 min — per Nomograph on Figure 3-4
Tc=[(11.9L^3)/ΔE]^0.385

Tc = 9.0 min

INTENSITY: $I = 7.44 (P6) (Tc)^{-0.645}$ in/hr — per Figure 3-1

100yr
,where P6 = 2.8 (in) per Isopluvial Map
I = 5.05 (in/hr) per Equation

FLOW RATE: Q = C I A

Q_{100} = 11.2 cfs

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, May 26 2022

V100 AT PROPERTY LINE FOR NORTHERLY UNDISTURBED AREA BASIN

Triangular

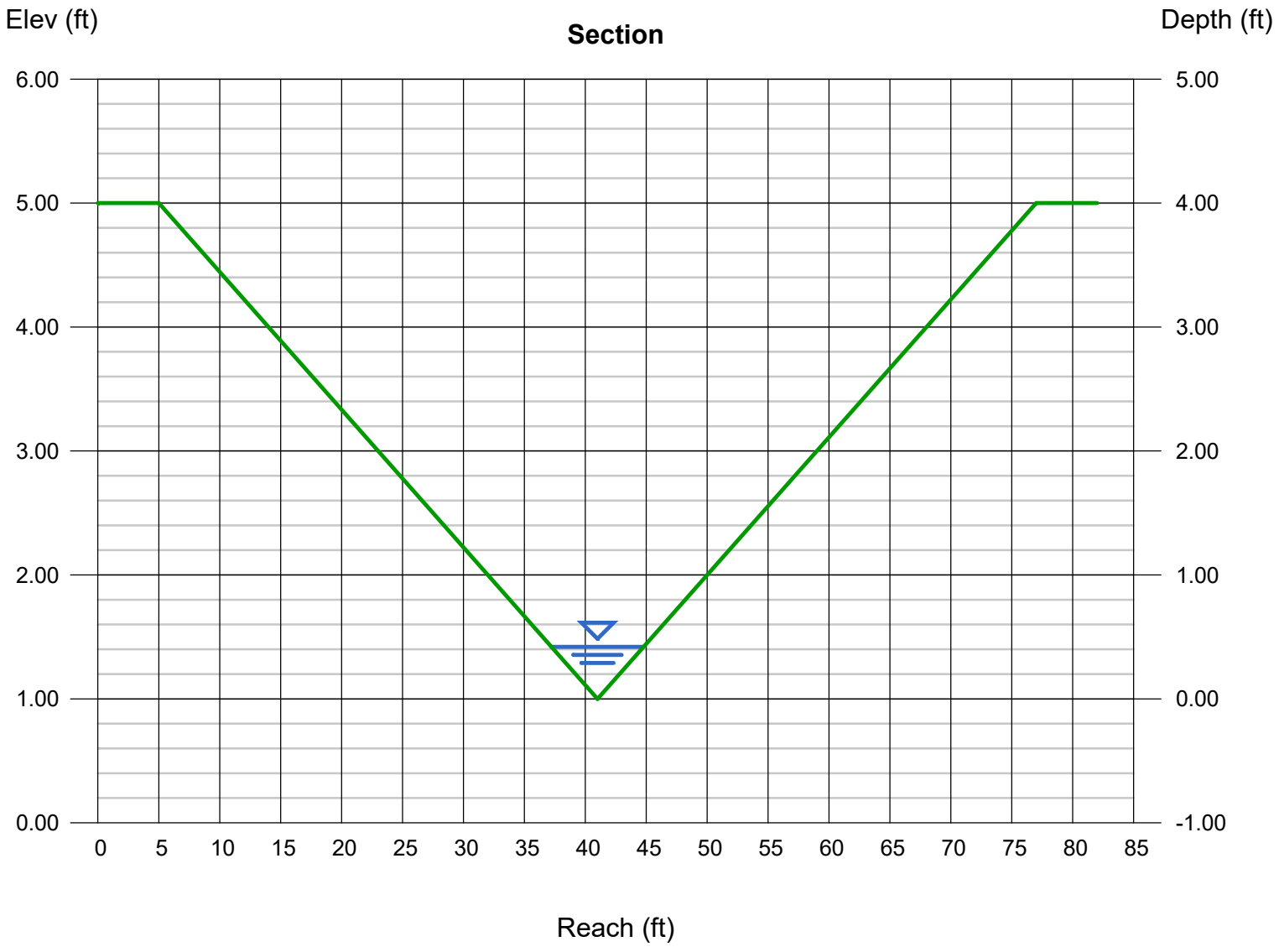
Side Slopes (z:1)	= 9.00, 9.00
Total Depth (ft)	= 4.00
Invert Elev (ft)	= 1.00
Slope (%)	= 25.00
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 11.20

Highlighted

Depth (ft)	= 0.42
Q (cfs)	= 11.20
Area (sqft)	= 1.59
Velocity (ft/s)	= 7.05
Wetted Perim (ft)	= 7.61
Crit Depth, Yc (ft)	= 0.63
Top Width (ft)	= 7.56
EGL (ft)	= 1.19



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                San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2019 Version 9.1

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 10/25/23
--------------------------------------------------------------------------
Spring Valley Pre Basin 1




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

--------------------------------------------------------------------------


Program License Serial Number 6548

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

Map data precipitation entered:
6 hour,  precipitation(inches) =  2.800
24 hour precipitation(inches) =  5.900
P6/P24 =    47.5%
San Diego hydrology manual 'C' values used


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.011 to Point/Station        1.021
**** 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
[UNDISTURBED NATURAL TERRAIN                ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.350
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =  675.000(Ft.)
Lowest elevation =  665.000(Ft.)
Elevation difference =   10.000(Ft.) Slope = 10.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
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The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of  10.00 %, in a development type of
 Permanent Open Space
In Accordance With Table 3-2
Initial Area Time of Concentration =   6.90 minutes
 (for slope value of  10.00 %)
Rainfall intensity (I) =      5.993(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.350
Subarea runoff =      0.063(CFS)
Total initial stream area =        0.030(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.021 to Point/Station        1.022
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      4.597(CFS)
Depth of flow =   0.166(Ft.), Average velocity =   3.355(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2             50.00              0.00
        3            100.00              1.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =      4.597(CFS)
  '     '        flow top width =     16.555(Ft.)
  '     '    velocity=    3.355(Ft/s)
  '     '        area =      1.370(Sq.Ft)
  '     '        Froude number =     2.055

Upstream point elevation =   665.000(Ft.)
Downstream point elevation =   504.000(Ft.)
Flow length =   930.000(Ft.)
Travel time  =    4.62 min.
Time of concentration =   11.52 min.
Depth of flow =   0.166(Ft.)
Average velocity =   3.355(Ft/s)
Total irregular channel flow =     4.597(CFS)
Irregular channel normal depth above invert elev. =   0.166(Ft.)
Average velocity of channel(s) =   3.355(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      4.306(In/Hr) for a   100.0 year storm
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
[UNDISTURBED NATURAL TERRAIN                ]
```

(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.350
Rainfall intensity =   4.306(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.350 CA =   2.103
Subarea runoff =   8.995(CFS) for   5.980(Ac.)
Total runoff =   9.058(CFS) Total area =   6.010(Ac.)
Depth of flow =   0.213(Ft.), Average velocity =   3.975(Ft/s)
End of computations, total study area =   6.010 (Ac.)

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2019 Version 9.1

Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study   Date: 10/20/23

Spring Valley Pre Basin 2

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

Program License Serial Number 6548

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

Map data precipitation entered:
6 hour, precipitation(inches) = 2.800
24 hour precipitation(inches) = 5.900
P6/P24 =   47.5%
San Diego hydrology manual 'C' values used

++
Process from Point/Station   2.011 to Point/Station   2.021
**** 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
[UNDISTURBED NATURAL TERRAIN   ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.350
Initial subarea total flow distance = 100.000(Ft.)
Highest elevation = 652.500(Ft.)
Lowest elevation = 632.000(Ft.)
Elevation difference =   20.500(Ft.) Slope = 20.500 %
Top of Initial Area Slope adjusted by User to 20.000 %

```
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of  20.00 %, in a development type of
 Permanent Open Space
In Accordance With Table 3-2
Initial Area Time of Concentration =   6.90 minutes
 (for slope value of  10.00 %)
Rainfall intensity (I) =      5.993(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.350
Subarea runoff =      0.063(CFS)
Total initial stream area =        0.030(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.021 to Point/Station        2.022
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      1.912(CFS)
Depth of flow =   0.118(Ft.), Average velocity =   2.744(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2             50.00              0.00
        3            100.00              1.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =      1.912(CFS)
  '     '        flow top width =     11.805(Ft.)
  '     '    velocity=    2.744(Ft/s)
  '     '        area =      0.697(Sq.Ft)
  '     '        Froude number =     1.990

Upstream point elevation =   632.000(Ft.)
Downstream point elevation =   538.000(Ft.)
Flow length =   517.000(Ft.)
Travel time  =    3.14 min.
Time of concentration =   10.04 min.
Depth of flow =   0.118(Ft.)
Average velocity =   2.744(Ft/s)
Total irregular channel flow =     1.912(CFS)
Irregular channel normal depth above invert elev. =   0.118(Ft.)
Average velocity of channel(s) =   2.744(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      4.706(In/Hr) for a   100.0 year storm
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
```

[UNDISTURBED NATURAL TERRAIN]
(Permanent Open Space)
Impervious value, Ai = 0.000
Sub-Area C Value = 0.350
Rainfall intensity = 4.706(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.350 CA = 0.784
Subarea runoff = 3.626(CFS) for 2.210(Ac.)
Total runoff = 3.689(CFS) Total area = 2.240(Ac.)
Depth of flow = 0.151(Ft.), Average velocity = 3.234(Ft/s)
End of computations, total study area = 2.240 (Ac.)

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2019 Version 9.1

Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study   Date: 12/29/23

Spring Valley Post Basin 1

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

Program License Serial Number 6548

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

Map data precipitation entered:
6 hour, precipitation(inches) = 2.800
24 hour precipitation(inches) = 5.900
P6/P24 =   47.5%
San Diego hydrology manual 'C' values used

++
Process from Point/Station   1.011 to Point/Station   1.021
**** 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
[MEDIUM DENSITY RESIDENTIAL   ]
(7.3 DU/A or Less   )
Impervious value, Ai = 0.400
Sub-Area C Value = 0.570
Initial subarea total flow distance =   76.000(Ft.)
Highest elevation = 678.000(Ft.)
Lowest elevation = 676.200(Ft.)
Elevation difference =   1.800(Ft.) Slope = 2.368 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:

```
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   2.37 %, in a development type of
 7.3 DU/A or Less
In Accordance With Table 3-2
Initial Area Time of Concentration =   7.40 minutes
 (for slope value of   2.00 %)
Rainfall intensity (I) =      5.729(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.570
Subarea runoff =      0.522(CFS)
Total initial stream area =        0.160(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.021 to Point/Station        1.022
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   676.200(Ft.)
Downstream point/station elevation =   643.500(Ft.)
Pipe length  =   140.00(Ft.) Slope =   0.2336  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.522(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.522(CFS)
Normal flow depth in pipe =    1.79(In.)
Flow top width inside pipe =    5.49(In.)
Critical Depth =    4.42(In.)
Pipe flow velocity =     10.67(Ft/s)
Travel time through pipe =    0.22 min.
Time of concentration (TC) =     7.62 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.022 to Point/Station        1.023
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   0.076(Ft.), Average velocity =   1.793(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2             50.00              0.00
        3            100.00              1.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =      0.523(CFS)
  '     '        flow top width =      7.633(Ft.)
  '     '    velocity=    1.793(Ft/s)
  '     '        area =      0.291(Sq.Ft)
  '     '        Froude number =     1.618
```

Upstream point elevation = 643.500(Ft.)
Downstream point elevation = 641.000(Ft.)
Flow length = 18.000(Ft.)
Travel time = 0.17 min.
Time of concentration = 7.79 min.
Depth of flow = 0.076(Ft.)
Average velocity = 1.793(Ft/s)
Total irregular channel flow = 0.522(CFS)
Irregular channel normal depth above invert elev. = 0.076(Ft.)
Average velocity of channel(s) = 1.793(Ft/s)

++
Process from Point/Station 1.022 to Point/Station 1.023
**** 6 HOUR HYDROGRAPH ****
_____
++
Hydrograph Data - Section 6, San Diego County Hydrology manual, June 2003

Time of Concentration = 7.79
Basin Area = 0.16 Acres
6 Hour Rainfall = 2.800 Inches
Runoff Coefficient = 0.570
Peak Discharge = 0.52 CFS

Time (Min)	Discharge (CFS)
0	0.000
7	0.015
14	0.016
21	0.016
28	0.016
35	0.017
42	0.017
49	0.017
56	0.018
63	0.018
70	0.019
77	0.019
84	0.020
91	0.020
98	0.021
105	0.022
112	0.022
119	0.023
126	0.024
133	0.025
140	0.026
147	0.027
154	0.028
161	0.030

168	0.032
175	0.034
182	0.036
189	0.040
196	0.042
203	0.048
210	0.052
217	0.064
224	0.073
231	0.107
238	0.151
245	0.522
252	0.086
259	0.058
266	0.045
273	0.038
280	0.033
287	0.029
294	0.027
301	0.024
308	0.023
315	0.021
322	0.020
329	0.019
336	0.018
343	0.017
350	0.016
357	0.016
364	0.015

++

6 - H O U R S T O R M

R u n o f f H y d r o g r a p h

Hydrograph in 1 Minute intervals ((CFS))

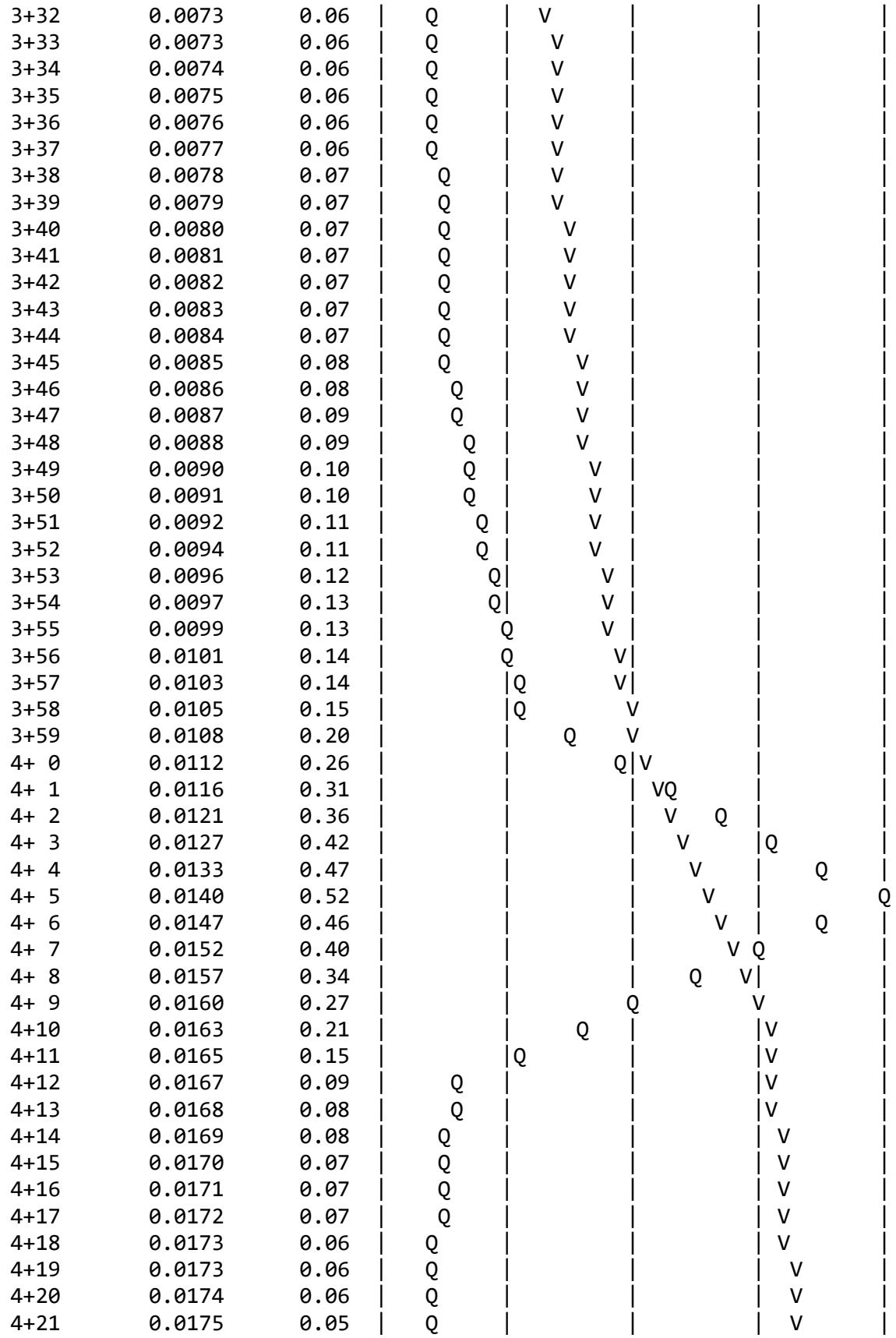
Time(h+m)	Volume Ac.Ft	Q(CFS)	0	0.1	0.3	0.4	0.5
0+ 0	0.0000	0.00	Q	|	|	|	|
0+ 1	0.0000	0.00	Q	|	|	|	|
0+ 2	0.0000	0.00	Q	|	|	|	|
0+ 3	0.0000	0.01	Q	|	|	|	|
0+ 4	0.0000	0.01	Q	|	|	|	|
0+ 5	0.0000	0.01	Q	|	|	|	|
0+ 6	0.0001	0.01	VQ	|	|	|	|
0+ 7	0.0001	0.02	VQ	|	|	|	|
0+ 8	0.0001	0.02	VQ	|	|	|	|
0+ 9	0.0001	0.02	VQ	|	|	|	|
0+10	0.0001	0.02	VQ	|	|	|	|
0+11	0.0002	0.02	VQ	|	|	|	|

```
0+12       0.0002      0.02  VQ        |          |          |          |
0+13       0.0002      0.02  VQ        |          |          |          |
0+14       0.0002      0.02  VQ        |          |          |          |
0+15       0.0003      0.02  VQ        |          |          |          |
0+16       0.0003      0.02  VQ        |          |          |          |
0+17       0.0003      0.02  VQ        |          |          |          |
0+18       0.0003      0.02  VQ        |          |          |          |
0+19       0.0003      0.02  VQ        |          |          |          |
0+20       0.0004      0.02  VQ        |          |          |          |
0+21       0.0004      0.02  VQ        |          |          |          |
0+22       0.0004      0.02  VQ        |          |          |          |
0+23       0.0004      0.02  VQ        |          |          |          |
0+24       0.0005      0.02  VQ        |          |          |          |
0+25       0.0005      0.02  VQ        |          |          |          |
0+26       0.0005      0.02  VQ        |          |          |          |
0+27       0.0005      0.02  VQ        |          |          |          |
0+28       0.0005      0.02  |Q        |          |          |          |
0+29       0.0006      0.02  |Q        |          |          |          |
0+30       0.0006      0.02  |Q        |          |          |          |
0+31       0.0006      0.02  |Q        |          |          |          |
0+32       0.0006      0.02  |Q        |          |          |          |
0+33       0.0007      0.02  |Q        |          |          |          |
0+34       0.0007      0.02  |Q        |          |          |          |
0+35       0.0007      0.02  |Q        |          |          |          |
0+36       0.0007      0.02  |Q        |          |          |          |
0+37       0.0007      0.02  |Q        |          |          |          |
0+38       0.0008      0.02  |Q        |          |          |          |
0+39       0.0008      0.02  |Q        |          |          |          |
0+40       0.0008      0.02  |Q        |          |          |          |
0+41       0.0008      0.02  |Q        |          |          |          |
0+42       0.0009      0.02  |Q        |          |          |          |
0+43       0.0009      0.02  |Q        |          |          |          |
0+44       0.0009      0.02  |Q        |          |          |          |
0+45       0.0009      0.02  |Q        |          |          |          |
0+46       0.0010      0.02  |Q        |          |          |          |
0+47       0.0010      0.02  |Q        |          |          |          |
0+48       0.0010      0.02  |Q        |          |          |          |
0+49       0.0010      0.02  |Q        |          |          |          |
0+50       0.0010      0.02  |QV       |          |          |          |
0+51       0.0011      0.02  |QV       |          |          |          |
0+52       0.0011      0.02  |QV       |          |          |          |
0+53       0.0011      0.02  |QV       |          |          |          |
0+54       0.0011      0.02  |QV       |          |          |          |
0+55       0.0012      0.02  |QV       |          |          |          |
0+56       0.0012      0.02  |QV       |          |          |          |
0+57       0.0012      0.02  |QV       |          |          |          |
0+58       0.0012      0.02  |QV       |          |          |          |
0+59       0.0013      0.02  |QV       |          |          |          |
1+ 0       0.0013      0.02  |QV       |          |          |          |
1+ 1       0.0013      0.02  |QV       |          |          |          |
```

```
1+ 2       0.0013      0.02  |QV       |          |          |          |
1+ 3       0.0014      0.02  |QV       |          |          |          |
1+ 4       0.0014      0.02  |QV       |          |          |          |
1+ 5       0.0014      0.02  |QV       |          |          |          |
1+ 6       0.0014      0.02  |QV       |          |          |          |
1+ 7       0.0015      0.02  |QV       |          |          |          |
1+ 8       0.0015      0.02  |QV       |          |          |          |
1+ 9       0.0015      0.02  |QV       |          |          |          |
1+10       0.0015      0.02  |QV       |          |          |          |
1+11       0.0016      0.02  |QV       |          |          |          |
1+12       0.0016      0.02  |Q V      |          |          |          |
1+13       0.0016      0.02  |Q V      |          |          |          |
1+14       0.0016      0.02  |Q V      |          |          |          |
1+15       0.0017      0.02  |Q V      |          |          |          |
1+16       0.0017      0.02  |Q V      |          |          |          |
1+17       0.0017      0.02  |Q V      |          |          |          |
1+18       0.0018      0.02  |Q V      |          |          |          |
1+19       0.0018      0.02  |Q V      |          |          |          |
1+20       0.0018      0.02  |Q V      |          |          |          |
1+21       0.0018      0.02  |Q V      |          |          |          |
1+22       0.0019      0.02  |Q V      |          |          |          |
1+23       0.0019      0.02  |Q V      |          |          |          |
1+24       0.0019      0.02  |Q V      |          |          |          |
1+25       0.0019      0.02  |Q V      |          |          |          |
1+26       0.0020      0.02  |Q V      |          |          |          |
1+27       0.0020      0.02  |Q V      |          |          |          |
1+28       0.0020      0.02  |Q V      |          |          |          |
1+29       0.0021      0.02  |Q V      |          |          |          |
1+30       0.0021      0.02  |Q V      |          |          |          |
1+31       0.0021      0.02  |Q  V     |          |          |          |
1+32       0.0021      0.02  |Q  V     |          |          |          |
1+33       0.0022      0.02  |Q  V     |          |          |          |
1+34       0.0022      0.02  |Q  V     |          |          |          |
1+35       0.0022      0.02  |Q  V     |          |          |          |
1+36       0.0023      0.02  |Q  V     |          |          |          |
1+37       0.0023      0.02  |Q  V     |          |          |          |
1+38       0.0023      0.02  |Q  V     |          |          |          |
1+39       0.0023      0.02  |Q  V     |          |          |          |
1+40       0.0024      0.02  |Q  V     |          |          |          |
1+41       0.0024      0.02  |Q  V     |          |          |          |
1+42       0.0024      0.02  |Q  V     |          |          |          |
1+43       0.0025      0.02  |Q  V     |          |          |          |
1+44       0.0025      0.02  |Q  V     |          |          |          |
1+45       0.0025      0.02  |Q  V     |          |          |          |
1+46       0.0025      0.02  |Q  V     |          |          |          |
1+47       0.0026      0.02  |Q  V     |          |          |          |
1+48       0.0026      0.02  |Q  V     |          |          |          |
1+49       0.0026      0.02  |Q   V    |          |          |          |
1+50       0.0027      0.02  |Q   V    |          |          |          |
1+51       0.0027      0.02  |Q   V    |          |          |          |
```

```
1+52       0.0027      0.02  |Q   V    |          |          |          |
1+53       0.0028      0.02  |Q   V    |          |          |          |
1+54       0.0028      0.02  |Q   V    |          |          |          |
1+55       0.0028      0.02  |Q   V    |          |          |          |
1+56       0.0028      0.02  |Q   V    |          |          |          |
1+57       0.0029      0.02  |Q   V    |          |          |          |
1+58       0.0029      0.02  |Q   V    |          |          |          |
1+59       0.0029      0.02  |Q   V    |          |          |          |
2+ 0       0.0030      0.02  |Q   V    |          |          |          |
2+ 1       0.0030      0.02  |Q   V    |          |          |          |
2+ 2       0.0030      0.02  |Q   V    |          |          |          |
2+ 3       0.0031      0.02  |Q   V    |          |          |          |
2+ 4       0.0031      0.02  |Q   V    |          |          |          |
2+ 5       0.0031      0.02  |Q   V    |          |          |          |
2+ 6       0.0032      0.02  |Q    V   |          |          |          |
2+ 7       0.0032      0.02  |Q    V   |          |          |          |
2+ 8       0.0032      0.02  |Q    V   |          |          |          |
2+ 9       0.0033      0.02  |Q    V   |          |          |          |
2+10       0.0033      0.02  |Q    V   |          |          |          |
2+11       0.0033      0.02  |Q    V   |          |          |          |
2+12       0.0034      0.02  |Q    V   |          |          |          |
2+13       0.0034      0.03  |Q    V   |          |          |          |
2+14       0.0034      0.03  |Q    V   |          |          |          |
2+15       0.0035      0.03  |Q    V   |          |          |          |
2+16       0.0035      0.03  |Q    V   |          |          |          |
2+17       0.0035      0.03  |Q    V   |          |          |          |
2+18       0.0036      0.03  |Q    V   |          |          |          |
2+19       0.0036      0.03  |Q    V   |          |          |          |
2+20       0.0037      0.03  |Q    V   |          |          |          |
2+21       0.0037      0.03  |Q     V  |          |          |          |
2+22       0.0037      0.03  | Q    V  |          |          |          |
2+23       0.0038      0.03  | Q    V  |          |          |          |
2+24       0.0038      0.03  | Q    V  |          |          |          |
2+25       0.0038      0.03  | Q    V  |          |          |          |
2+26       0.0039      0.03  | Q    V  |          |          |          |
2+27       0.0039      0.03  | Q    V  |          |          |          |
2+28       0.0039      0.03  | Q    V  |          |          |          |
2+29       0.0040      0.03  | Q    V  |          |          |          |
2+30       0.0040      0.03  | Q    V  |          |          |          |
2+31       0.0041      0.03  | Q    V  |          |          |          |
2+32       0.0041      0.03  | Q    V  |          |          |          |
2+33       0.0041      0.03  | Q    V  |          |          |          |
2+34       0.0042      0.03  | Q    V  |          |          |          |
2+35       0.0042      0.03  | Q     V |          |          |          |
2+36       0.0043      0.03  | Q     V |          |          |          |
2+37       0.0043      0.03  | Q     V |          |          |          |
2+38       0.0043      0.03  | Q     V |          |          |          |
2+39       0.0044      0.03  | Q     V |          |          |          |
2+40       0.0044      0.03  | Q     V |          |          |          |
2+41       0.0045      0.03  | Q     V |          |          |          |
```

```
2+42       0.0045      0.03  | Q     V |          |          |          |
2+43       0.0045      0.03  | Q     V |          |          |          |
2+44       0.0046      0.03  | Q     V |          |          |          |
2+45       0.0046      0.03  | Q     V |          |          |          |
2+46       0.0047      0.03  | Q     V |          |          |          |
2+47       0.0047      0.03  | Q     V |          |          |          |
2+48       0.0048      0.03  | Q      V|          |          |          |
2+49       0.0048      0.03  | Q      V|          |          |          |
2+50       0.0049      0.03  | Q      V|          |          |          |
2+51       0.0049      0.03  | Q      V|          |          |          |
2+52       0.0049      0.03  | Q      V|          |          |          |
2+53       0.0050      0.03  | Q      V|          |          |          |
2+54       0.0050      0.03  | Q      V|          |          |          |
2+55       0.0051      0.03  | Q      V|          |          |          |
2+56       0.0051      0.03  | Q      V|          |          |          |
2+57       0.0052      0.03  | Q      V|          |          |          |
2+58       0.0052      0.03  | Q      V|          |          |          |
2+59       0.0053      0.04  | Q       V          |          |          |
3+ 0        0.0053      0.04  | Q       V          |          |          |
3+ 1        0.0054      0.04  | Q       V          |          |          |
3+ 2        0.0054      0.04  | Q       V          |          |          |
3+ 3        0.0055      0.04  | Q       V          |          |          |
3+ 4        0.0055      0.04  | Q       V          |          |          |
3+ 5        0.0056      0.04  | Q       V          |          |          |
3+ 6        0.0056      0.04  | Q       V          |          |          |
3+ 7        0.0057      0.04  | Q       V          |          |          |
3+ 8        0.0057      0.04  |  Q      V          |          |          |
3+ 9        0.0058      0.04  |  Q      |V         |          |          |
3+10        0.0058      0.04  |  Q      |V         |          |          |
3+11        0.0059      0.04  |  Q      |V         |          |          |
3+12        0.0060      0.04  |  Q      |V         |          |          |
3+13        0.0060      0.04  |  Q      |V         |          |          |
3+14        0.0061      0.04  |  Q      |V         |          |          |
3+15        0.0061      0.04  |  Q      |V         |          |          |
3+16        0.0062      0.04  |  Q      |V         |          |          |
3+17        0.0062      0.04  |  Q      |V         |          |          |
3+18        0.0063      0.04  |  Q      | V        |          |          |
3+19        0.0064      0.04  |  Q      | V        |          |          |
3+20        0.0064      0.05  |  Q      | V        |          |          |
3+21        0.0065      0.05  |  Q      | V        |          |          |
3+22        0.0066      0.05  |  Q      | V        |          |          |
3+23        0.0066      0.05  |  Q      | V        |          |          |
3+24        0.0067      0.05  |  Q      | V        |          |          |
3+25        0.0068      0.05  |  Q      | V        |          |          |
3+26        0.0068      0.05  |  Q      |  V       |          |          |
3+27        0.0069      0.05  |  Q      |  V       |          |          |
3+28        0.0070      0.05  |  Q      |  V       |          |          |
3+29        0.0070      0.05  |  Q      |  V       |          |          |
3+30        0.0071      0.05  |   Q     |  V       |          |          |
3+31        0.0072      0.05  |   Q     |  V       |          |          |
```



```
4+22       0.0176      0.05  |  Q      |         |         |  V      |
4+23       0.0176      0.05  |  Q      |         |         |  V      |
4+24       0.0177      0.05  |  Q      |         |         |  V      |
4+25       0.0178      0.05  |  Q      |         |         |  V      |
4+26       0.0178      0.05  |  Q      |         |         |  V      |
4+27       0.0179      0.04  |  Q      |         |         |   V     |
4+28       0.0179      0.04  |  Q      |         |         |   V     |
4+29       0.0180      0.04  |  Q      |         |         |   V     |
4+30       0.0180      0.04  |  Q      |         |         |   V     |
4+31       0.0181      0.04  |  Q      |         |         |   V     |
4+32       0.0182      0.04  | Q       |         |         |   V     |
4+33       0.0182      0.04  | Q       |         |         |   V     |
4+34       0.0183      0.04  | Q       |         |         |   V     |
4+35       0.0183      0.04  | Q       |         |         |   V     |
4+36       0.0184      0.04  | Q       |         |         |   V     |
4+37       0.0184      0.03  | Q       |         |         |    V    |
4+38       0.0185      0.03  | Q       |         |         |    V    |
4+39       0.0185      0.03  | Q       |         |         |    V    |
4+40       0.0185      0.03  | Q       |         |         |    V    |
4+41       0.0186      0.03  | Q       |         |         |    V    |
4+42       0.0186      0.03  | Q       |         |         |    V    |
4+43       0.0187      0.03  | Q       |         |         |    V    |
4+44       0.0187      0.03  | Q       |         |         |    V    |
4+45       0.0188      0.03  | Q       |         |         |    V    |
4+46       0.0188      0.03  | Q       |         |         |    V    |
4+47       0.0188      0.03  | Q       |         |         |    V    |
4+48       0.0189      0.03  | Q       |         |         |    V    |
4+49       0.0189      0.03  | Q       |         |         |     V   |
4+50       0.0190      0.03  | Q       |         |         |     V   |
4+51       0.0190      0.03  | Q       |         |         |     V   |
4+52       0.0190      0.03  | Q       |         |         |     V   |
4+53       0.0191      0.03  | Q       |         |         |     V   |
4+54       0.0191      0.03  | Q       |         |         |     V   |
4+55       0.0191      0.03  | Q       |         |         |     V   |
4+56       0.0192      0.03  |Q        |         |         |     V   |
4+57       0.0192      0.03  |Q        |         |         |     V   |
4+58       0.0193      0.03  |Q        |         |         |     V   |
4+59       0.0193      0.03  |Q        |         |         |     V   |
5+ 0       0.0193      0.02  |Q        |         |         |     V   |
5+ 1       0.0194      0.02  |Q        |         |         |     V   |
5+ 2       0.0194      0.02  |Q        |         |         |     V   |
5+ 3       0.0194      0.02  |Q        |         |         |      V  |
5+ 4       0.0195      0.02  |Q        |         |         |      V  |
5+ 5       0.0195      0.02  |Q        |         |         |      V  |
5+ 6       0.0195      0.02  |Q        |         |         |      V  |
5+ 7       0.0195      0.02  |Q        |         |         |      V  |
5+ 8       0.0196      0.02  |Q        |         |         |      V  |
5+ 9       0.0196      0.02  |Q        |         |         |      V  |
5+10       0.0196      0.02  |Q        |         |         |      V  |
5+11       0.0197      0.02  |Q        |         |         |      V  |
```

```
5+12       0.0197      0.02  |Q        |         |         |       V  |
5+13       0.0197      0.02  |Q        |         |         |       V  |
5+14       0.0198      0.02  |Q        |         |         |       V  |
5+15       0.0198      0.02  |Q        |         |         |       V  |
5+16       0.0198      0.02  |Q        |         |         |       V  |
5+17       0.0198      0.02  |Q        |         |         |       V  |
5+18       0.0199      0.02  |Q        |         |         |       V  |
5+19       0.0199      0.02  |Q        |         |         |       V  |
5+20       0.0199      0.02  |Q        |         |         |       V  |
5+21       0.0200      0.02  |Q        |         |         |        V |
5+22       0.0200      0.02  |Q        |         |         |        V |
5+23       0.0200      0.02  |Q        |         |         |        V |
5+24       0.0200      0.02  |Q        |         |         |        V |
5+25       0.0201      0.02  |Q        |         |         |        V |
5+26       0.0201      0.02  |Q        |         |         |        V |
5+27       0.0201      0.02  |Q        |         |         |        V |
5+28       0.0201      0.02  |Q        |         |         |        V |
5+29       0.0202      0.02  |Q        |         |         |        V |
5+30       0.0202      0.02  |Q        |         |         |        V |
5+31       0.0202      0.02  |Q        |         |         |        V |
5+32       0.0203      0.02  |Q        |         |         |        V |
5+33       0.0203      0.02  |Q        |         |         |        V |
5+34       0.0203      0.02  |Q        |         |         |        V |
5+35       0.0203      0.02  |Q        |         |         |        V |
5+36       0.0204      0.02  |Q        |         |         |        V |
5+37       0.0204      0.02  |Q        |         |         |        V |
5+38       0.0204      0.02  |Q        |         |         |        V |
5+39       0.0204      0.02  |Q        |         |         |        V |
5+40       0.0205      0.02  |Q        |         |         |        V |
5+41       0.0205      0.02  |Q        |         |         |         V|
5+42       0.0205      0.02  |Q        |         |         |         V|
5+43       0.0205      0.02  |Q        |         |         |         V|
5+44       0.0205      0.02  |Q        |         |         |         V|
5+45       0.0206      0.02  |Q        |         |         |         V|
5+46       0.0206      0.02  |Q        |         |         |         V|
5+47       0.0206      0.02  |Q        |         |         |         V|
5+48       0.0206      0.02  |Q        |         |         |         V|
5+49       0.0207      0.02  |Q        |         |         |         V|
5+50       0.0207      0.02  |Q        |         |         |         V|
5+51       0.0207      0.02  |Q        |         |         |         V|
5+52       0.0207      0.02  |Q        |         |         |         V|
5+53       0.0207      0.02  |Q        |         |         |         V|
5+54       0.0208      0.02  |Q        |         |         |         V|
5+55       0.0208      0.02  |Q        |         |         |         V|
5+56       0.0208      0.02  |Q        |         |         |         V|
5+57       0.0208      0.02  |Q        |         |         |         V|
5+58       0.0209      0.02  |Q        |         |         |         V|
5+59       0.0209      0.02  |Q        |         |         |         V|
6+ 0       0.0209      0.02  |Q        |         |         |         V|
6+ 1       0.0209      0.02  |Q        |         |         |         V|
```

```
    6+ 2       0.0209      0.02  |Q        |         |         |        V|
    6+ 3       0.0210      0.02  |Q        |         |         |        V|
    6+ 4       0.0210      0.02  |Q        |         |         |         V
-------------------------------------------------------------------------
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.023 to Point/Station        1.024
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   641.000(Ft.)
Downstream point/station elevation =   640.800(Ft.)
Pipe length  =    19.00(Ft.) Slope =   0.0105  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.522(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.522(CFS)
Normal flow depth in pipe =    4.48(In.)
Flow top width inside pipe =    5.22(In.)
Critical Depth =    4.42(In.)
Pipe flow velocity =      3.32(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =     7.88 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.024 to Point/Station        1.025
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      1.118(CFS)
Depth of flow =   0.087(Ft.), Average velocity =   2.946(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2             50.00              0.00
        3            100.00              1.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =      1.119(CFS)
  '     '        flow top width =      8.713(Ft.)
  '     '    velocity=    2.947(Ft/s)
  '     '        area =      0.380(Sq.Ft)
  '     '        Froude number =     2.488

Upstream point elevation =   640.800(Ft.)
```

```
Downstream point elevation =   478.000(Ft.)
Flow length =   518.000(Ft.)
Travel time  =    2.93 min.
Time of concentration =   10.81 min.
Depth of flow =   0.087(Ft.)
Average velocity =   2.946(Ft/s)
Total irregular channel flow =     1.118(CFS)
Irregular channel normal depth above invert elev. =   0.087(Ft.)
Average velocity of channel(s) =   2.946(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      4.486(In/Hr) for a   100.0 year storm
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
[UNDISTURBED NATURAL TERRAIN                ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.350
Rainfall intensity =      4.486(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.388  CA =      0.361
Subarea runoff =      1.096(CFS) for      0.770(Ac.)
Total runoff =      1.618(CFS)  Total area =       0.930(Ac.)
Depth of flow =   0.100(Ft.), Average velocity =   3.232(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.025 to Point/Station        1.063
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      0.930(Ac.)
Runoff from this stream =      1.618(CFS)
Time of concentration =   10.81 min.
Rainfall intensity =     4.486(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.031 to Point/Station        1.032
**** 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
[HIGH DENSITY RESIDENTIAL                   ]
(24.0 DU/A or Less      )
```

```
Impervious value, Ai = 0.650
Sub-Area C Value = 0.710
Initial subarea total flow distance  =   74.000(Ft.)
Highest elevation =  658.000(Ft.)
Lowest elevation =  656.200(Ft.)
Elevation difference =    1.800(Ft.) Slope =  2.432 %
Top of Initial Area Slope adjusted by User to 13.800 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of  13.80 %, in a development type of
 24.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   2.93 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7100)*( 100.000^.5)/(  13.800^(1/3)]=   2.93
Calculated TC of    2.927 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.710
Subarea runoff =      0.524(CFS)
Total initial stream area =        0.100(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.032 to Point/Station        1.033
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   656.200(Ft.)
Downstream point/station elevation =   639.500(Ft.)
Pipe length  =   115.00(Ft.) Slope =   0.1452  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.524(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.524(CFS)
Normal flow depth in pipe =    2.02(In.)
Flow top width inside pipe =    5.67(In.)
Critical Depth =    4.43(In.)
Pipe flow velocity =      9.00(Ft/s)
Travel time through pipe =    0.21 min.
Time of concentration (TC) =     3.14 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.033 to Point/Station        1.041
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   0.086(Ft.), Average velocity =   1.414(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
```

```
        1              0.00              1.00
        2             50.00              0.00
        3            100.00              1.00
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =      0.524(CFS)
  '     '        flow top width =      8.608(Ft.)
  '     '    velocity=    1.414(Ft/s)
  '     '        area =      0.370(Sq.Ft)
  '     '        Froude number =     1.201

Upstream point elevation =   639.500(Ft.)
Downstream point elevation =   637.000(Ft.)
Flow length =    34.000(Ft.)
Travel time  =    0.40 min.
Time of concentration =    3.54 min.
Depth of flow =   0.086(Ft.)
Average velocity =   1.414(Ft/s)
Total irregular channel flow =     0.524(CFS)
Irregular channel normal depth above invert elev. =   0.086(Ft.)
Average velocity of channel(s) =   1.414(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.033 to Point/Station        1.041
**** 6 HOUR HYDROGRAPH ****
________________________________________________________________________
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Hydrograph Data - Section 6, San Diego County Hydrology manual, June 2003


Time of Concentration =   3.54
Basin Area =     0.10 Acres
6 Hour Rainfall =  2.800 Inches
Runoff Coefficient =  0.71
Peak Discharge =     0.52 CFS
     Time (Min)     Discharge (CFS)
       0               0.000
       3               0.012
       6               0.012
       9               0.012
       12               0.012
       15               0.012
       18               0.012
       21               0.012
       24               0.013
       27               0.013
       30               0.013
       33               0.013
       36               0.013
```

39	0.013
42	0.013
45	0.013
48	0.013
51	0.014
54	0.014
57	0.014
60	0.014
63	0.014
66	0.014
69	0.015
72	0.015
75	0.015
78	0.015
81	0.015
84	0.015
87	0.016
90	0.016
93	0.016
96	0.016
99	0.016
102	0.017
105	0.017
108	0.017
111	0.017
114	0.018
117	0.018
120	0.018
123	0.019
126	0.019
129	0.019
132	0.019
135	0.020
138	0.020
141	0.021
144	0.021
147	0.021
150	0.022
153	0.022
156	0.023
159	0.023
162	0.024
165	0.025
168	0.025
171	0.026
174	0.026
177	0.027
180	0.028
183	0.029
186	0.030

189	0.031
192	0.032
195	0.034
198	0.035
201	0.037
204	0.038
207	0.041
210	0.042
213	0.046
216	0.048
219	0.054
222	0.057
225	0.065
228	0.071
231	0.086
234	0.098
237	0.144
240	0.203
243	0.524
246	0.116
249	0.077
252	0.061
255	0.051
258	0.044
261	0.039
264	0.036
267	0.033
270	0.030
273	0.029
276	0.027
279	0.025
282	0.024
285	0.023
288	0.022
291	0.021
294	0.020
297	0.020
300	0.019
303	0.018
306	0.018
309	0.017
312	0.017
315	0.016
318	0.016
321	0.015
324	0.015
327	0.015
330	0.014
333	0.014
336	0.014

339	0.014
342	0.013
345	0.013
348	0.013
351	0.013
354	0.012
357	0.012
360	0.012
363	0.012

++

6 - H O U R S T O R M

R u n o f f H y d r o g r a p h

Hydrograph in 1 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	0.1	0.3	0.4	0.5
0+ 0	0.0000	0.00	Q	|	|	|	|
0+ 1	0.0000	0.00	Q	|	|	|	|
0+ 2	0.0000	0.01	Q	|	|	|	|
0+ 3	0.0000	0.01	Q	|	|	|	|
0+ 4	0.0000	0.01	Q	|	|	|	|
0+ 5	0.0001	0.01	Q	|	|	|	|
0+ 6	0.0001	0.01	Q	|	|	|	|
0+ 7	0.0001	0.01	Q	|	|	|	|
0+ 8	0.0001	0.01	Q	|	|	|	|
0+ 9	0.0001	0.01	Q	|	|	|	|
0+10	0.0001	0.01	Q	|	|	|	|
0+11	0.0002	0.01	Q	|	|	|	|
0+12	0.0002	0.01	Q	|	|	|	|
0+13	0.0002	0.01	Q	|	|	|	|
0+14	0.0002	0.01	Q	|	|	|	|
0+15	0.0002	0.01	Q	|	|	|	|
0+16	0.0002	0.01	Q	|	|	|	|
0+17	0.0003	0.01	Q	|	|	|	|
0+18	0.0003	0.01	Q	|	|	|	|
0+19	0.0003	0.01	Q	|	|	|	|
0+20	0.0003	0.01	Q	|	|	|	|
0+21	0.0003	0.01	Q	|	|	|	|
0+22	0.0004	0.01	Q	|	|	|	|
0+23	0.0004	0.01	Q	|	|	|	|
0+24	0.0004	0.01	Q	|	|	|	|
0+25	0.0004	0.01	QV	|	|	|	|
0+26	0.0004	0.01	QV	|	|	|	|
0+27	0.0004	0.01	QV	|	|	|	|
0+28	0.0005	0.01	QV	|	|	|	|
0+29	0.0005	0.01	QV	|	|	|	|
0+30	0.0005	0.01	QV	|	|	|	|
0+31	0.0005	0.01	QV	|	|	|	|

0+32	0.0005	0.01	QV				
0+33	0.0005	0.01	QV				
0+34	0.0006	0.01	QV				
0+35	0.0006	0.01	QV				
0+36	0.0006	0.01	QV				
0+37	0.0006	0.01	QV				
0+38	0.0006	0.01	QV				
0+39	0.0006	0.01	|Q				
0+40	0.0007	0.01	|Q				
0+41	0.0007	0.01	|Q				
0+42	0.0007	0.01	|Q				
0+43	0.0007	0.01	|Q				
0+44	0.0007	0.01	|Q				
0+45	0.0008	0.01	|Q				
0+46	0.0008	0.01	|Q				
0+47	0.0008	0.01	|QV				
0+48	0.0008	0.01	|QV				
0+49	0.0008	0.01	|QV				
0+50	0.0009	0.01	|QV				
0+51	0.0009	0.01	|QV				
0+52	0.0009	0.01	|QV				
0+53	0.0009	0.01	|QV				
0+54	0.0009	0.01	|QV				
0+55	0.0009	0.01	|QV				
0+56	0.0010	0.01	|QV				
0+57	0.0010	0.01	|QV				
0+58	0.0010	0.01	|QV				
0+59	0.0010	0.01	|QV				
1+ 0	0.0010	0.01	|QV				
1+ 1	0.0011	0.01	|QV				
1+ 2	0.0011	0.01	|QV				
1+ 3	0.0011	0.01	|QV				
1+ 4	0.0011	0.01	|QV				
1+ 5	0.0011	0.01	|QV				
1+ 6	0.0012	0.01	|QV				
1+ 7	0.0012	0.01	|Q V				
1+ 8	0.0012	0.01	|Q V				
1+ 9	0.0012	0.01	|Q V				
1+10	0.0012	0.01	|Q V				
1+11	0.0013	0.01	|Q V				
1+12	0.0013	0.01	|Q V				
1+13	0.0013	0.01	|Q V				
1+14	0.0013	0.01	|Q V				
1+15	0.0013	0.01	|Q V				
1+16	0.0014	0.01	|Q V				
1+17	0.0014	0.01	|Q V				
1+18	0.0014	0.02	|Q V				
1+19	0.0014	0.02	|Q V				
1+20	0.0014	0.02	|Q V				
1+21	0.0015	0.02	|Q V				

```
1+22       0.0015      0.02  |Q V      |          |          |          |
1+23       0.0015      0.02  |Q V      |          |          |          |
1+24       0.0015      0.02  |Q V      |          |          |          |
1+25       0.0016      0.02  |Q V      |          |          |          |
1+26       0.0016      0.02  |Q  V     |          |          |          |
1+27       0.0016      0.02  |Q  V     |          |          |          |
1+28       0.0016      0.02  |Q  V     |          |          |          |
1+29       0.0016      0.02  |Q  V     |          |          |          |
1+30       0.0017      0.02  |Q  V     |          |          |          |
1+31       0.0017      0.02  |Q  V     |          |          |          |
1+32       0.0017      0.02  |Q  V     |          |          |          |
1+33       0.0017      0.02  |Q  V     |          |          |          |
1+34       0.0017      0.02  |Q  V     |          |          |          |
1+35       0.0018      0.02  |Q  V     |          |          |          |
1+36       0.0018      0.02  |Q  V     |          |          |          |
1+37       0.0018      0.02  |Q  V     |          |          |          |
1+38       0.0018      0.02  |Q  V     |          |          |          |
1+39       0.0019      0.02  |Q  V     |          |          |          |
1+40       0.0019      0.02  |Q  V     |          |          |          |
1+41       0.0019      0.02  |Q  V     |          |          |          |
1+42       0.0019      0.02  |Q  V     |          |          |          |
1+43       0.0020      0.02  |Q  V     |          |          |          |
1+44       0.0020      0.02  |Q   V    |          |          |          |
1+45       0.0020      0.02  |Q   V    |          |          |          |
1+46       0.0020      0.02  |Q   V    |          |          |          |
1+47       0.0020      0.02  |Q   V    |          |          |          |
1+48       0.0021      0.02  |Q   V    |          |          |          |
1+49       0.0021      0.02  |Q   V    |          |          |          |
1+50       0.0021      0.02  |Q   V    |          |          |          |
1+51       0.0021      0.02  |Q   V    |          |          |          |
1+52       0.0022      0.02  |Q   V    |          |          |          |
1+53       0.0022      0.02  |Q   V    |          |          |          |
1+54       0.0022      0.02  |Q   V    |          |          |          |
1+55       0.0022      0.02  |Q   V    |          |          |          |
1+56       0.0023      0.02  |Q   V    |          |          |          |
1+57       0.0023      0.02  |Q   V    |          |          |          |
1+58       0.0023      0.02  |Q   V    |          |          |          |
1+59       0.0023      0.02  |Q   V    |          |          |          |
2+ 0       0.0024      0.02  |Q    V   |          |          |          |
2+ 1       0.0024      0.02  |Q    V   |          |          |          |
2+ 2       0.0024      0.02  |Q    V   |          |          |          |
2+ 3       0.0024      0.02  |Q    V   |          |          |          |
2+ 4       0.0025      0.02  |Q    V   |          |          |          |
2+ 5       0.0025      0.02  |Q    V   |          |          |          |
2+ 6       0.0025      0.02  |Q    V   |          |          |          |
2+ 7       0.0025      0.02  |Q    V   |          |          |          |
2+ 8       0.0026      0.02  |Q    V   |          |          |          |
2+ 9       0.0026      0.02  |Q    V   |          |          |          |
2+10       0.0026      0.02  |Q    V   |          |          |          |
2+11       0.0026      0.02  |Q    V   |          |          |          |
```

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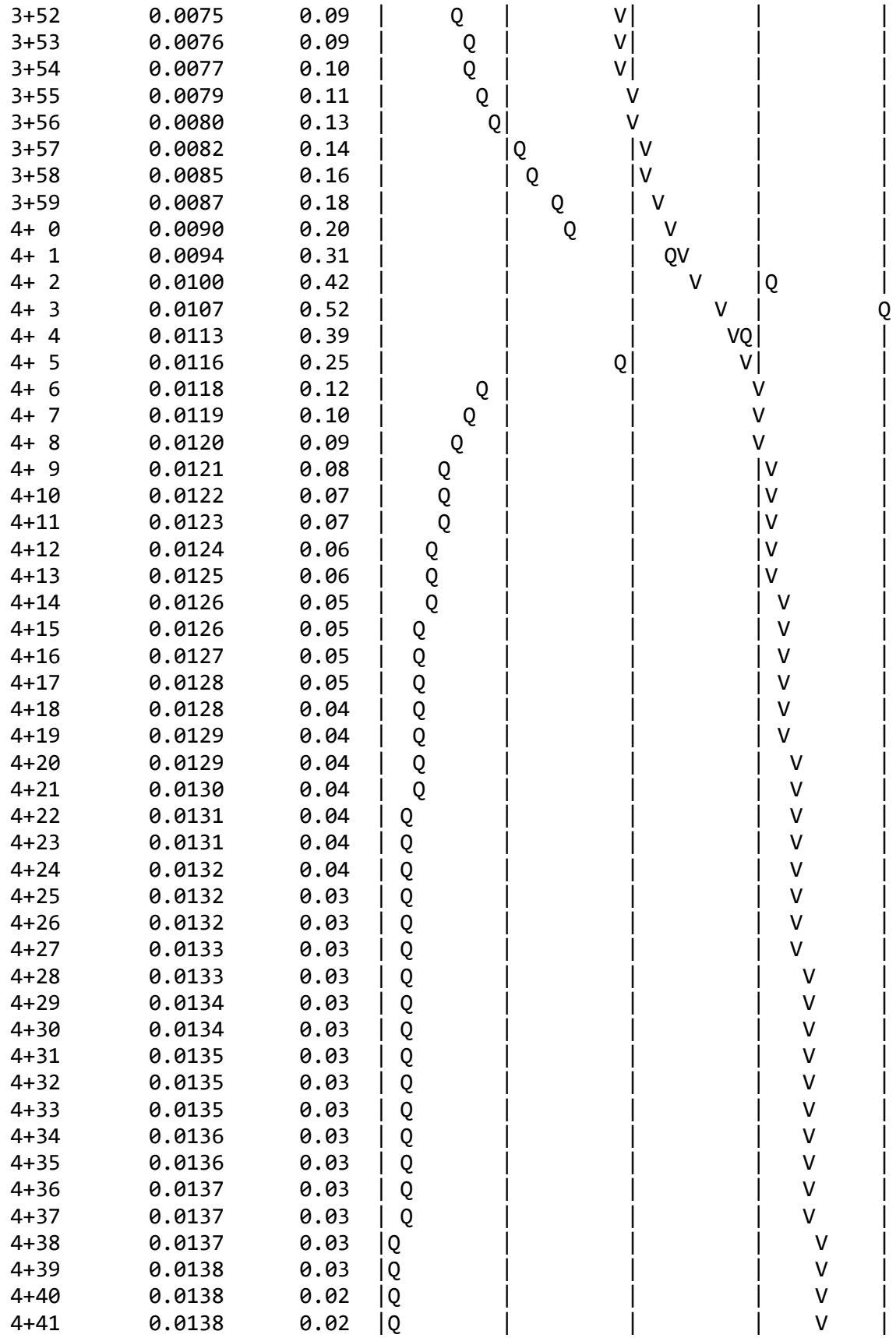
2+12       0.0027      0.02  |Q    V   |          |          |          |
2+13       0.0027      0.02  |Q    V   |          |          |          |
2+14       0.0027      0.02  |Q    V   |          |          |          |
2+15       0.0028      0.02  |Q     V  |          |          |          |
2+16       0.0028      0.02  |Q     V  |          |          |          |
2+17       0.0028      0.02  |Q     V  |          |          |          |
2+18       0.0028      0.02  |Q     V  |          |          |          |
2+19       0.0029      0.02  |Q     V  |          |          |          |
2+20       0.0029      0.02  |Q     V  |          |          |          |
2+21       0.0029      0.02  |Q     V  |          |          |          |
2+22       0.0029      0.02  |Q     V  |          |          |          |
2+23       0.0030      0.02  |Q     V  |          |          |          |
2+24       0.0030      0.02  |Q     V  |          |          |          |
2+25       0.0030      0.02  |Q     V  |          |          |          |
2+26       0.0031      0.02  |Q     V  |          |          |          |
2+27       0.0031      0.02  |Q     V  |          |          |          |
2+28       0.0031      0.02  |Q     V  |          |          |          |
2+29       0.0032      0.02  |Q      V |          |          |          |
2+30       0.0032      0.02  |Q      V |          |          |          |
2+31       0.0032      0.02  |Q      V |          |          |          |
2+32       0.0032      0.02  |Q      V |          |          |          |
2+33       0.0033      0.02  |Q      V |          |          |          |
2+34       0.0033      0.02  |Q      V |          |          |          |
2+35       0.0033      0.02  |Q      V |          |          |          |
2+36       0.0034      0.02  |Q      V |          |          |          |
2+37       0.0034      0.02  |Q      V |          |          |          |
2+38       0.0034      0.02  |Q      V |          |          |          |
2+39       0.0035      0.02  |Q      V |          |          |          |
2+40       0.0035      0.02  |Q      V |          |          |          |
2+41       0.0035      0.02  |Q       V|          |          |          |
2+42       0.0036      0.02  |Q       V|          |          |          |
2+43       0.0036      0.02  |Q       V|          |          |          |
2+44       0.0036      0.02  |Q       V|          |          |          |
2+45       0.0037      0.02  |Q       V|          |          |          |
2+46       0.0037      0.02  |Q       V|          |          |          |
2+47       0.0037      0.02  |Q       V|          |          |          |
2+48       0.0038      0.02  |Q       V|          |          |          |
2+49       0.0038      0.03  |Q       V|          |          |          |
2+50       0.0038      0.03  |Q       V|          |          |          |
2+51       0.0039      0.03  |Q       V|          |          |          |
2+52       0.0039      0.03  |Q       V|          |          |          |
2+53       0.0039      0.03  |Q        V          |          |          |
2+54       0.0040      0.03  | Q       V          |          |          |
2+55       0.0040      0.03  | Q       V          |          |          |
2+56       0.0041      0.03  | Q       V          |          |          |
2+57       0.0041      0.03  | Q       V          |          |          |
2+58       0.0041      0.03  | Q       V          |          |          |
2+59       0.0042      0.03  | Q       V          |          |          |
3+ 0       0.0042      0.03  | Q       V          |          |          |
3+ 1       0.0042      0.03  | Q       V          |          |          |
```

```
3+ 2       0.0043      0.03  | Q       V         |          |          |
3+ 3       0.0043      0.03  | Q       |V        |          |          |
3+ 4       0.0044      0.03  | Q       |V        |          |          |
3+ 5       0.0044      0.03  | Q       |V        |          |          |
3+ 6       0.0044      0.03  | Q       |V        |          |          |
3+ 7       0.0045      0.03  | Q       |V        |          |          |
3+ 8       0.0045      0.03  | Q       |V        |          |          |
3+ 9       0.0046      0.03  | Q       |V        |          |          |
3+10       0.0046      0.03  | Q       |V        |          |          |
3+11       0.0047      0.03  | Q       |V        |          |          |
3+12       0.0047      0.03  | Q       | V       |          |          |
3+13       0.0047      0.03  | Q       | V       |          |          |
3+14       0.0048      0.03  | Q       | V       |          |          |
3+15       0.0048      0.03  | Q       | V       |          |          |
3+16       0.0049      0.03  | Q       | V       |          |          |
3+17       0.0049      0.03  | Q       | V       |          |          |
3+18       0.0050      0.03  | Q       | V       |          |          |
3+19       0.0050      0.04  | Q       | V       |          |          |
3+20       0.0051      0.04  | Q       | V       |          |          |
3+21       0.0051      0.04  | Q       |  V      |          |          |
3+22       0.0052      0.04  | Q       |  V      |          |          |
3+23       0.0052      0.04  | Q       |  V      |          |          |
3+24       0.0053      0.04  | Q       |  V      |          |          |
3+25       0.0053      0.04  | Q       |  V      |          |          |
3+26       0.0054      0.04  |  Q      |  V      |          |          |
3+27       0.0055      0.04  |  Q      |  V      |          |          |
3+28       0.0055      0.04  |  Q      |   V     |          |          |
3+29       0.0056      0.04  |  Q      |   V     |          |          |
3+30       0.0056      0.04  |  Q      |   V     |          |          |
3+31       0.0057      0.04  |  Q      |   V     |          |          |
3+32       0.0057      0.04  |  Q      |   V     |          |          |
3+33       0.0058      0.05  |  Q      |   V     |          |          |
3+34       0.0059      0.05  |  Q      |    V    |          |          |
3+35       0.0059      0.05  |  Q      |    V    |          |          |
3+36       0.0060      0.05  |  Q      |    V    |          |          |
3+37       0.0061      0.05  |  Q      |    V    |          |          |
3+38       0.0061      0.05  |  Q      |    V    |          |          |
3+39       0.0062      0.05  |   Q     |    V    |          |          |
3+40       0.0063      0.05  |   Q     |     V   |          |          |
3+41       0.0064      0.06  |   Q     |     V   |          |          |
3+42       0.0065      0.06  |   Q     |     V   |          |          |
3+43       0.0065      0.06  |   Q     |     V   |          |          |
3+44       0.0066      0.06  |   Q     |     V   |          |          |
3+45       0.0067      0.07  |   Q     |      V  |          |          |
3+46       0.0068      0.07  |    Q    |      V  |          |          |
3+47       0.0069      0.07  |    Q    |      V  |          |          |
3+48       0.0070      0.07  |    Q    |      V  |          |          |
3+49       0.0071      0.08  |    Q    |       V |          |          |
3+50       0.0072      0.08  |     Q   |       V |          |          |
3+51       0.0073      0.09  |     Q   |       V |          |          |
```



```
4+42       0.0139      0.02  |Q        |          |          |    V     |
4+43       0.0139      0.02  |Q        |          |          |    V     |
4+44       0.0139      0.02  |Q        |          |          |    V     |
4+45       0.0140      0.02  |Q        |          |          |    V     |
4+46       0.0140      0.02  |Q        |          |          |    V     |
4+47       0.0140      0.02  |Q        |          |          |    V     |
4+48       0.0141      0.02  |Q        |          |          |    V     |
4+49       0.0141      0.02  |Q        |          |          |    V     |
4+50       0.0141      0.02  |Q        |          |          |     V    |
4+51       0.0141      0.02  |Q        |          |          |     V    |
4+52       0.0142      0.02  |Q        |          |          |     V    |
4+53       0.0142      0.02  |Q        |          |          |     V    |
4+54       0.0142      0.02  |Q        |          |          |     V    |
4+55       0.0143      0.02  |Q        |          |          |     V    |
4+56       0.0143      0.02  |Q        |          |          |     V    |
4+57       0.0143      0.02  |Q        |          |          |     V    |
4+58       0.0143      0.02  |Q        |          |          |     V    |
4+59       0.0144      0.02  |Q        |          |          |     V    |
5+ 0       0.0144      0.02  |Q        |          |          |     V    |
5+ 1       0.0144      0.02  |Q        |          |          |     V    |
5+ 2       0.0144      0.02  |Q        |          |          |     V    |
5+ 3       0.0145      0.02  |Q        |          |          |     V    |
5+ 4       0.0145      0.02  |Q        |          |          |      V   |
5+ 5       0.0145      0.02  |Q        |          |          |      V   |
5+ 6       0.0145      0.02  |Q        |          |          |      V   |
5+ 7       0.0146      0.02  |Q        |          |          |      V   |
5+ 8       0.0146      0.02  |Q        |          |          |      V   |
5+ 9       0.0146      0.02  |Q        |          |          |      V   |
5+10       0.0146      0.02  |Q        |          |          |      V   |
5+11       0.0147      0.02  |Q        |          |          |      V   |
5+12       0.0147      0.02  |Q        |          |          |      V   |
5+13       0.0147      0.02  |Q        |          |          |      V   |
5+14       0.0147      0.02  |Q        |          |          |      V   |
5+15       0.0147      0.02  |Q        |          |          |      V   |
5+16       0.0148      0.02  |Q        |          |          |      V   |
5+17       0.0148      0.02  |Q        |          |          |      V   |
5+18       0.0148      0.02  |Q        |          |          |      V   |
5+19       0.0148      0.02  |Q        |          |          |      V   |
5+20       0.0149      0.02  |Q        |          |          |      V   |
5+21       0.0149      0.02  |Q        |          |          |       V  |
5+22       0.0149      0.02  |Q        |          |          |       V  |
5+23       0.0149      0.02  |Q        |          |          |       V  |
5+24       0.0149      0.02  |Q        |          |          |       V  |
5+25       0.0150      0.02  |Q        |          |          |       V  |
5+26       0.0150      0.01  |Q        |          |          |       V  |
5+27       0.0150      0.01  |Q        |          |          |       V  |
5+28       0.0150      0.01  |Q        |          |          |       V  |
5+29       0.0150      0.01  |Q        |          |          |       V  |
5+30       0.0151      0.01  |Q        |          |          |       V  |
5+31       0.0151      0.01  |Q        |          |          |       V  |
```

```
    5+32       0.0151      0.01  |Q        |         |         |       V |
    5+33       0.0151      0.01  |Q        |         |         |       V |
    5+34       0.0151      0.01  |Q        |         |         |       V |
    5+35       0.0152      0.01  |Q        |         |         |       V |
    5+36       0.0152      0.01  |Q        |         |         |       V |
    5+37       0.0152      0.01  |Q        |         |         |       V |
    5+38       0.0152      0.01  |Q        |         |         |       V |
    5+39       0.0152      0.01  |Q        |         |         |       V |
    5+40       0.0153      0.01  |Q        |         |         |       V |
    5+41       0.0153      0.01  |Q        |         |         |        V|
    5+42       0.0153      0.01  |Q        |         |         |        V|
    5+43       0.0153      0.01  |Q        |         |         |        V|
    5+44       0.0153      0.01  |Q        |         |         |        V|
    5+45       0.0153      0.01  Q         |         |         |        V|
    5+46       0.0154      0.01  Q         |         |         |        V|
    5+47       0.0154      0.01  Q         |         |         |        V|
    5+48       0.0154      0.01  Q         |         |         |        V|
    5+49       0.0154      0.01  Q         |         |         |        V|
    5+50       0.0154      0.01  Q         |         |         |        V|
    5+51       0.0155      0.01  Q         |         |         |        V|
    5+52       0.0155      0.01  Q         |         |         |        V|
    5+53       0.0155      0.01  Q         |         |         |        V|
    5+54       0.0155      0.01  Q         |         |         |        V|
    5+55       0.0155      0.01  Q         |         |         |        V|
    5+56       0.0155      0.01  Q         |         |         |        V|
    5+57       0.0156      0.01  Q         |         |         |        V|
    5+58       0.0156      0.01  Q         |         |         |        V|
    5+59       0.0156      0.01  Q         |         |         |        V|
    6+ 0       0.0156      0.01  Q         |         |         |        V|
    6+ 1       0.0156      0.01  Q         |         |         |        V|
    6+ 2       0.0156      0.01  Q         |         |         |        V|
    6+ 3       0.0157      0.01  Q         |         |         |         V
-------------------------------------------------------------------------
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.041 to Point/Station        1.042
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   637.000(Ft.)
Downstream point/station elevation =   636.800(Ft.)
Pipe length  =    16.00(Ft.) Slope =   0.0125  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.524(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.524(CFS)
Normal flow depth in pipe =    4.20(In.)
```

```
Flow top width inside pipe =    5.50(In.)
Critical Depth =    4.43(In.)
Pipe flow velocity =      3.58(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =     3.61 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.042 to Point/Station        1.043
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      1.860(CFS)
Depth of flow =   0.108(Ft.), Average velocity =   3.179(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2             50.00              0.00
        3            100.00              1.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =      1.860(CFS)
  '     '        flow top width =     10.816(Ft.)
  '     '    velocity=    3.179(Ft/s)
  '     '        area =      0.585(Sq.Ft)
  '     '        Froude number =     2.409

Upstream point elevation =   636.800(Ft.)
Downstream point elevation =   481.000(Ft.)
Flow length =   568.000(Ft.)
Travel time  =    2.98 min.
Time of concentration =    6.59 min.
Depth of flow =   0.108(Ft.)
Average velocity =   3.179(Ft/s)
Total irregular channel flow =     1.860(CFS)
Irregular channel normal depth above invert elev. =   0.108(Ft.)
Average velocity of channel(s) =   3.179(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      6.172(In/Hr) for a   100.0 year storm
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
[UNDISTURBED NATURAL TERRAIN                ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.350
Rainfall intensity =      6.172(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
```

```
(Q=KCIA) is C = 0.377  CA =      0.505
Subarea runoff =      2.593(CFS) for      1.240(Ac.)
Total runoff =      3.117(CFS)  Total area =       1.340(Ac.)
Depth of flow =   0.131(Ft.), Average velocity =   3.618(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.043 to Point/Station        1.063
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.340(Ac.)
Runoff from this stream =      3.117(CFS)
Time of concentration =    6.59 min.
Rainfall intensity =     6.172(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.051 to Point/Station        1.052
**** 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
[MEDIUM DENSITY RESIDENTIAL                  ]
(7.3 DU/A or Less       )
Impervious value, Ai = 0.400
Sub-Area C Value = 0.570
Initial subarea total flow distance  =   75.000(Ft.)
Highest elevation =  640.000(Ft.)
Lowest elevation =  634.700(Ft.)
Elevation difference =    5.300(Ft.) Slope =  7.067 %
Top of Initial Area Slope adjusted by User to  7.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   7.00 %, in a development type of
 7.3 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration =   4.99 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.5700)*( 100.000^.5)/(   7.000^(1/3)]=   4.99
Calculated TC of    4.987 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.570
Subarea runoff =      0.631(CFS)
Total initial stream area =        0.150(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.052 to Point/Station        1.053
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   634.700(Ft.)
Downstream point/station elevation =   619.500(Ft.)
Pipe length  =   102.00(Ft.) Slope =   0.1490  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.631(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.631(CFS)
Normal flow depth in pipe =    2.22(In.)
Flow top width inside pipe =    5.79(In.)
Critical Depth =    4.84(In.)
Pipe flow velocity =      9.56(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =     5.16 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.053 to Point/Station        1.061
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
------------------------------------------------------------------------
Depth of flow =   0.085(Ft.), Average velocity =   1.744(Ft/s)
        ******* Irregular Channel Data ***********
-------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2             50.00              0.00
        3            100.00              1.00
Manning's 'N' friction factor =   0.035
-------------------------------------------------------------
Sub-Channel flow  =      0.631(CFS)
  '     '        flow top width =      8.506(Ft.)
  '     '    velocity=    1.744(Ft/s)
  '     '        area =      0.362(Sq.Ft)
  '     '        Froude number =     1.490

Upstream point elevation =   619.500(Ft.)
Downstream point elevation =   617.000(Ft.)
Flow length =    22.000(Ft.)
Travel time  =    0.21 min.
Time of concentration =    5.38 min.
Depth of flow =   0.085(Ft.)
Average velocity =   1.744(Ft/s)
Total irregular channel flow =     0.631(CFS)
Irregular channel normal depth above invert elev. =   0.085(Ft.)
Average velocity of channel(s) =   1.744(Ft/s)
```

++
Process from Point/Station 1.053 to Point/Station 1.061
**** 6 HOUR HYDROGRAPH ****
_____
++
Hydrograph Data - Section 6, San Diego County Hydrology manual, June 2003

Time of Concentration = 5.38
Basin Area = 0.15 Acres
6 Hour Rainfall = 2.800 Inches
Runoff Coefficient = 0.57
Peak Discharge = 0.63 CFS

Time (Min)	Discharge (CFS)
0	0.000
5	0.014
10	0.014
15	0.015
20	0.015
25	0.015
30	0.015
35	0.016
40	0.016
45	0.016
50	0.016
55	0.017
60	0.017
65	0.017
70	0.017
75	0.018
80	0.018
85	0.019
90	0.019
95	0.019
100	0.020
105	0.020
110	0.021
115	0.021
120	0.022
125	0.022
130	0.023
135	0.024
140	0.024
145	0.025
150	0.026
155	0.027
160	0.028
165	0.029

170	0.030
175	0.032
180	0.033
185	0.035
190	0.037
195	0.040
200	0.042
205	0.046
210	0.049
215	0.056
220	0.061
225	0.075
230	0.085
235	0.125
240	0.176
245	0.631
250	0.100
255	0.067
260	0.052
265	0.044
270	0.038
275	0.034
280	0.031
285	0.028
290	0.026
295	0.025
300	0.023
305	0.022
310	0.021
315	0.020
320	0.019
325	0.018
330	0.018
335	0.017
340	0.016
345	0.016
350	0.015
355	0.015
360	0.015
365	0.014

++

6 - H O U R S T O R M

R u n o f f H y d r o g r a p h

Hydrograph in 1 Minute intervals ((CFS))

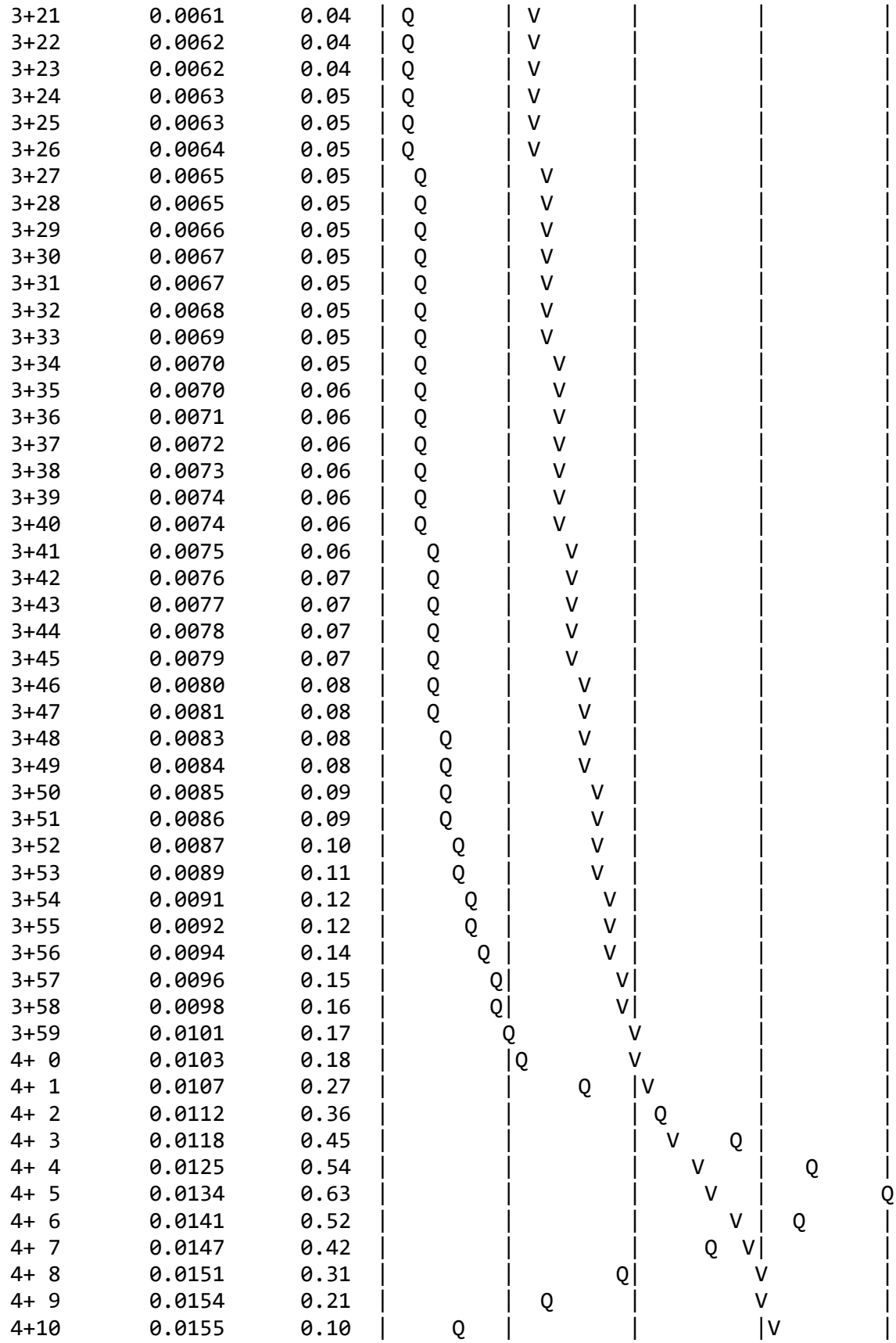
Time(h+m)	Volume Ac.Ft	Q(CFS)	0	0.2	0.3	0.5	0.6
0+ 0	0.0000	0.00	Q	|	|	|	|

```
0+ 1       0.0000      0.00  Q         |          |          |          |
0+ 2       0.0000      0.01  Q         |          |          |          |
0+ 3       0.0000      0.01  Q         |          |          |          |
0+ 4       0.0000      0.01  Q         |          |          |          |
0+ 5       0.0001      0.01  Q         |          |          |          |
0+ 6       0.0001      0.01  Q         |          |          |          |
0+ 7       0.0001      0.01  Q         |          |          |          |
0+ 8       0.0001      0.01  Q         |          |          |          |
0+ 9       0.0001      0.01  Q         |          |          |          |
0+10       0.0002      0.01  Q         |          |          |          |
0+11       0.0002      0.01  Q         |          |          |          |
0+12       0.0002      0.01  Q         |          |          |          |
0+13       0.0002      0.01  Q         |          |          |          |
0+14       0.0002      0.01  Q         |          |          |          |
0+15       0.0003      0.01  Q         |          |          |          |
0+16       0.0003      0.01  Q         |          |          |          |
0+17       0.0003      0.01  Q         |          |          |          |
0+18       0.0003      0.01  Q         |          |          |          |
0+19       0.0003      0.01  Q         |          |          |          |
0+20       0.0004      0.01  Q         |          |          |          |
0+21       0.0004      0.01  Q         |          |          |          |
0+22       0.0004      0.01  Q         |          |          |          |
0+23       0.0004      0.01  Q         |          |          |          |
0+24       0.0004      0.02  Q         |          |          |          |
0+25       0.0005      0.02  Q         |          |          |          |
0+26       0.0005      0.02  Q         |          |          |          |
0+27       0.0005      0.02  QV        |          |          |          |
0+28       0.0005      0.02  QV        |          |          |          |
0+29       0.0005      0.02  QV        |          |          |          |
0+30       0.0006      0.02  QV        |          |          |          |
0+31       0.0006      0.02  QV        |          |          |          |
0+32       0.0006      0.02  QV        |          |          |          |
0+33       0.0006      0.02  QV        |          |          |          |
0+34       0.0007      0.02  QV        |          |          |          |
0+35       0.0007      0.02  QV        |          |          |          |
0+36       0.0007      0.02  QV        |          |          |          |
0+37       0.0007      0.02  QV        |          |          |          |
0+38       0.0007      0.02  QV        |          |          |          |
0+39       0.0008      0.02  QV        |          |          |          |
0+40       0.0008      0.02  QV        |          |          |          |
0+41       0.0008      0.02  |Q        |          |          |          |
0+42       0.0008      0.02  |Q        |          |          |          |
0+43       0.0008      0.02  |Q        |          |          |          |
0+44       0.0009      0.02  |Q        |          |          |          |
0+45       0.0009      0.02  |Q        |          |          |          |
0+46       0.0009      0.02  |Q        |          |          |          |
0+47       0.0009      0.02  |Q        |          |          |          |
0+48       0.0010      0.02  |Q        |          |          |          |
0+49       0.0010      0.02  |Q        |          |          |          |
0+50       0.0010      0.02  |QV       |          |          |          |
```

```
0+51       0.0010      0.02  |QV       |          |          |          |
0+52       0.0010      0.02  |QV       |          |          |          |
0+53       0.0011      0.02  |QV       |          |          |          |
0+54       0.0011      0.02  |QV       |          |          |          |
0+55       0.0011      0.02  |QV       |          |          |          |
0+56       0.0011      0.02  |QV       |          |          |          |
0+57       0.0012      0.02  |QV       |          |          |          |
0+58       0.0012      0.02  |QV       |          |          |          |
0+59       0.0012      0.02  |QV       |          |          |          |
1+ 0       0.0012      0.02  |QV       |          |          |          |
1+ 1       0.0013      0.02  |QV       |          |          |          |
1+ 2       0.0013      0.02  |QV       |          |          |          |
1+ 3       0.0013      0.02  |QV       |          |          |          |
1+ 4       0.0013      0.02  |QV       |          |          |          |
1+ 5       0.0013      0.02  |QV       |          |          |          |
1+ 6       0.0014      0.02  |QV       |          |          |          |
1+ 7       0.0014      0.02  |QV       |          |          |          |
1+ 8       0.0014      0.02  |QV       |          |          |          |
1+ 9       0.0014      0.02  |QV       |          |          |          |
1+10       0.0015      0.02  |QV       |          |          |          |
1+11       0.0015      0.02  |QV       |          |          |          |
1+12       0.0015      0.02  |Q V      |          |          |          |
1+13       0.0015      0.02  |Q V      |          |          |          |
1+14       0.0016      0.02  |Q V      |          |          |          |
1+15       0.0016      0.02  |Q V      |          |          |          |
1+16       0.0016      0.02  |Q V      |          |          |          |
1+17       0.0016      0.02  |Q V      |          |          |          |
1+18       0.0017      0.02  |Q V      |          |          |          |
1+19       0.0017      0.02  |Q V      |          |          |          |
1+20       0.0017      0.02  |Q V      |          |          |          |
1+21       0.0017      0.02  |Q V      |          |          |          |
1+22       0.0018      0.02  |Q V      |          |          |          |
1+23       0.0018      0.02  |Q V      |          |          |          |
1+24       0.0018      0.02  |Q V      |          |          |          |
1+25       0.0018      0.02  |Q V      |          |          |          |
1+26       0.0019      0.02  |Q V      |          |          |          |
1+27       0.0019      0.02  |Q V      |          |          |          |
1+28       0.0019      0.02  |Q V      |          |          |          |
1+29       0.0019      0.02  |Q V      |          |          |          |
1+30       0.0020      0.02  |Q V      |          |          |          |
1+31       0.0020      0.02  |Q  V     |          |          |          |
1+32       0.0020      0.02  |Q  V     |          |          |          |
1+33       0.0020      0.02  |Q  V     |          |          |          |
1+34       0.0021      0.02  |Q  V     |          |          |          |
1+35       0.0021      0.02  |Q  V     |          |          |          |
1+36       0.0021      0.02  |Q  V     |          |          |          |
1+37       0.0022      0.02  |Q  V     |          |          |          |
1+38       0.0022      0.02  |Q  V     |          |          |          |
1+39       0.0022      0.02  |Q  V     |          |          |          |
1+40       0.0022      0.02  |Q  V     |          |          |          |
```

1+41	0.0023	0.02	|Q V |	|	|	|
1+42	0.0023	0.02	|Q V |	|	|	|
1+43	0.0023	0.02	|Q V |	|	|	|
1+44	0.0023	0.02	|Q V |	|	|	|
1+45	0.0024	0.02	|Q V |	|	|	|
1+46	0.0024	0.02	|Q V |	|	|	|
1+47	0.0024	0.02	|Q V |	|	|	|
1+48	0.0025	0.02	|Q V |	|	|	|
1+49	0.0025	0.02	|Q V |	|	|	|
1+50	0.0025	0.02	|Q V |	|	|	|
1+51	0.0025	0.02	|Q V |	|	|	|
1+52	0.0026	0.02	|Q V |	|	|	|
1+53	0.0026	0.02	|Q V |	|	|	|
1+54	0.0026	0.02	|Q V |	|	|	|
1+55	0.0027	0.02	|Q V |	|	|	|
1+56	0.0027	0.02	|Q V |	|	|	|
1+57	0.0027	0.02	|Q V |	|	|	|
1+58	0.0027	0.02	|Q V |	|	|	|
1+59	0.0028	0.02	|Q V |	|	|	|
2+ 0	0.0028	0.02	|Q V |	|	|	|
2+ 1	0.0028	0.02	|Q V |	|	|	|
2+ 2	0.0029	0.02	|Q V |	|	|	|
2+ 3	0.0029	0.02	|Q V |	|	|	|
2+ 4	0.0029	0.02	|Q V |	|	|	|
2+ 5	0.0030	0.02	|Q V |	|	|	|
2+ 6	0.0030	0.02	|Q V |	|	|	|
2+ 7	0.0030	0.02	|Q V |	|	|	|
2+ 8	0.0031	0.02	|Q V |	|	|	|
2+ 9	0.0031	0.02	|Q V |	|	|	|
2+10	0.0031	0.02	|Q V |	|	|	|
2+11	0.0031	0.02	|Q V |	|	|	|
2+12	0.0032	0.02	|Q V |	|	|	|
2+13	0.0032	0.02	|Q V |	|	|	|
2+14	0.0032	0.02	|Q V |	|	|	|
2+15	0.0033	0.02	|Q V |	|	|	|
2+16	0.0033	0.02	|Q V |	|	|	|
2+17	0.0033	0.02	|Q V |	|	|	|
2+18	0.0034	0.02	|Q V |	|	|	|
2+19	0.0034	0.02	|Q V |	|	|	|
2+20	0.0034	0.02	|Q V |	|	|	|
2+21	0.0035	0.02	|Q V |	|	|	|
2+22	0.0035	0.02	|Q V |	|	|	|
2+23	0.0035	0.02	|Q V |	|	|	|
2+24	0.0036	0.03	|Q V |	|	|	|
2+25	0.0036	0.03	|Q V |	|	|	|
2+26	0.0036	0.03	|Q V |	|	|	|
2+27	0.0037	0.03	|Q V |	|	|	|
2+28	0.0037	0.03	|Q V |	|	|	|
2+29	0.0038	0.03	|Q V |	|	|	|
2+30	0.0038	0.03	|Q V |	|	|	|

```
2+31       0.0038      0.03  |Q     V  |          |          |          |
2+32       0.0039      0.03  |Q     V  |          |          |          |
2+33       0.0039      0.03  |Q     V  |          |          |          |
2+34       0.0039      0.03  |Q     V  |          |          |          |
2+35       0.0040      0.03  |Q     V  |          |          |          |
2+36       0.0040      0.03  |Q      V |          |          |          |
2+37       0.0040      0.03  |Q      V |          |          |          |
2+38       0.0041      0.03  |Q      V |          |          |          |
2+39       0.0041      0.03  |Q      V |          |          |          |
2+40       0.0042      0.03  |Q      V |          |          |          |
2+41       0.0042      0.03  |Q      V |          |          |          |
2+42       0.0042      0.03  |Q      V |          |          |          |
2+43       0.0043      0.03  |Q      V |          |          |          |
2+44       0.0043      0.03  |Q      V |          |          |          |
2+45       0.0044      0.03  |Q      V |          |          |          |
2+46       0.0044      0.03  |Q      V |          |          |          |
2+47       0.0044      0.03  |Q      V |          |          |          |
2+48       0.0045      0.03  |Q       V|          |          |          |
2+49       0.0045      0.03  |Q       V|          |          |          |
2+50       0.0046      0.03  |Q       V|          |          |          |
2+51       0.0046      0.03  |Q       V|          |          |          |
2+52       0.0046      0.03  |Q       V|          |          |          |
2+53       0.0047      0.03  |Q       V|          |          |          |
2+54       0.0047      0.03  | Q      V|          |          |          |
2+55       0.0048      0.03  | Q      V|          |          |          |
2+56       0.0048      0.03  | Q      V|          |          |          |
2+57       0.0049      0.03  | Q      V|          |          |          |
2+58       0.0049      0.03  | Q      V|          |          |          |
2+59       0.0050      0.03  | Q      V|          |          |          |
3+ 0       0.0050      0.03  | Q       V          |          |          |
3+ 1       0.0050      0.03  | Q       V          |          |          |
3+ 2       0.0051      0.03  | Q       V          |          |          |
3+ 3       0.0051      0.03  | Q       V          |          |          |
3+ 4       0.0052      0.03  | Q       V          |          |          |
3+ 5       0.0052      0.04  | Q       V          |          |          |
3+ 6       0.0053      0.04  | Q       V          |          |          |
3+ 7       0.0053      0.04  | Q       V          |          |          |
3+ 8       0.0054      0.04  | Q       V          |          |          |
3+ 9       0.0054      0.04  | Q       V          |          |          |
3+10       0.0055      0.04  | Q       |V         |          |          |
3+11       0.0055      0.04  | Q       |V         |          |          |
3+12       0.0056      0.04  | Q       |V         |          |          |
3+13       0.0056      0.04  | Q       |V         |          |          |
3+14       0.0057      0.04  | Q       |V         |          |          |
3+15       0.0058      0.04  | Q       |V         |          |          |
3+16       0.0058      0.04  | Q       |V         |          |          |
3+17       0.0059      0.04  | Q       |V         |          |          |
3+18       0.0059      0.04  | Q       |V         |          |          |
3+19       0.0060      0.04  | Q       | V        |          |          |
3+20       0.0060      0.04  | Q       | V        |          |          |
```



```
4+11       0.0157      0.09  |    Q    |         |         |V        |
4+12       0.0158      0.09  |    Q    |         |         |V        |
4+13       0.0159      0.08  |    Q    |         |         |V        |
4+14       0.0160      0.07  |   Q     |         |         | V       |
4+15       0.0161      0.07  |   Q     |         |         | V       |
4+16       0.0162      0.06  |   Q     |         |         | V       |
4+17       0.0163      0.06  |  Q      |         |         | V       |
4+18       0.0164      0.06  |  Q      |         |         | V       |
4+19       0.0164      0.06  |  Q      |         |         |  V      |
4+20       0.0165      0.05  |  Q      |         |         |  V      |
4+21       0.0166      0.05  |  Q      |         |         |  V      |
4+22       0.0166      0.05  |  Q      |         |         |  V      |
4+23       0.0167      0.05  |  Q      |         |         |  V      |
4+24       0.0168      0.05  | Q       |         |         |  V      |
4+25       0.0168      0.04  | Q       |         |         |  V      |
4+26       0.0169      0.04  | Q       |         |         |  V      |
4+27       0.0169      0.04  | Q       |         |         |   V     |
4+28       0.0170      0.04  | Q       |         |         |   V     |
4+29       0.0171      0.04  | Q       |         |         |   V     |
4+30       0.0171      0.04  | Q       |         |         |   V     |
4+31       0.0172      0.04  | Q       |         |         |   V     |
4+32       0.0172      0.04  | Q       |         |         |   V     |
4+33       0.0173      0.04  | Q       |         |         |   V     |
4+34       0.0173      0.03  | Q       |         |         |   V     |
4+35       0.0174      0.03  | Q       |         |         |   V     |
4+36       0.0174      0.03  | Q       |         |         |   V     |
4+37       0.0174      0.03  | Q       |         |         |    V    |
4+38       0.0175      0.03  | Q       |         |         |    V    |
4+39       0.0175      0.03  | Q       |         |         |    V    |
4+40       0.0176      0.03  |Q        |         |         |    V    |
4+41       0.0176      0.03  |Q        |         |         |    V    |
4+42       0.0177      0.03  |Q        |         |         |    V    |
4+43       0.0177      0.03  |Q        |         |         |    V    |
4+44       0.0177      0.03  |Q        |         |         |    V    |
4+45       0.0178      0.03  |Q        |         |         |    V    |
4+46       0.0178      0.03  |Q        |         |         |    V    |
4+47       0.0179      0.03  |Q        |         |         |    V    |
4+48       0.0179      0.03  |Q        |         |         |    V    |
4+49       0.0179      0.03  |Q        |         |         |     V   |
4+50       0.0180      0.03  |Q        |         |         |     V   |
4+51       0.0180      0.03  |Q        |         |         |     V   |
4+52       0.0180      0.03  |Q        |         |         |     V   |
4+53       0.0181      0.03  |Q        |         |         |     V   |
4+54       0.0181      0.03  |Q        |         |         |     V   |
4+55       0.0181      0.02  |Q        |         |         |     V   |
4+56       0.0182      0.02  |Q        |         |         |     V   |
4+57       0.0182      0.02  |Q        |         |         |     V   |
4+58       0.0182      0.02  |Q        |         |         |     V   |
4+59       0.0183      0.02  |Q        |         |         |     V   |
5+ 0       0.0183      0.02  |Q        |         |         |     V   |
```

```
5+ 1       0.0183      0.02  |Q        |         |         |     V   |
5+ 2       0.0184      0.02  |Q        |         |         |     V   |
5+ 3       0.0184      0.02  |Q        |         |         |      V  |
5+ 4       0.0184      0.02  |Q        |         |         |      V  |
5+ 5       0.0185      0.02  |Q        |         |         |      V  |
5+ 6       0.0185      0.02  |Q        |         |         |      V  |
5+ 7       0.0185      0.02  |Q        |         |         |      V  |
5+ 8       0.0185      0.02  |Q        |         |         |      V  |
5+ 9       0.0186      0.02  |Q        |         |         |      V  |
5+10       0.0186      0.02  |Q        |         |         |      V  |
5+11       0.0186      0.02  |Q        |         |         |      V  |
5+12       0.0187      0.02  |Q        |         |         |      V  |
5+13       0.0187      0.02  |Q        |         |         |      V  |
5+14       0.0187      0.02  |Q        |         |         |      V  |
5+15       0.0187      0.02  |Q        |         |         |      V  |
5+16       0.0188      0.02  |Q        |         |         |      V  |
5+17       0.0188      0.02  |Q        |         |         |      V  |
5+18       0.0188      0.02  |Q        |         |         |      V  |
5+19       0.0189      0.02  |Q        |         |         |      V  |
5+20       0.0189      0.02  |Q        |         |         |      V  |
5+21       0.0189      0.02  |Q        |         |         |       V |
5+22       0.0189      0.02  |Q        |         |         |       V |
5+23       0.0190      0.02  |Q        |         |         |       V |
5+24       0.0190      0.02  |Q        |         |         |       V |
5+25       0.0190      0.02  |Q        |         |         |       V |
5+26       0.0190      0.02  |Q        |         |         |       V |
5+27       0.0191      0.02  |Q        |         |         |       V |
5+28       0.0191      0.02  |Q        |         |         |       V |
5+29       0.0191      0.02  |Q        |         |         |       V |
5+30       0.0191      0.02  |Q        |         |         |       V |
5+31       0.0192      0.02  |Q        |         |         |       V |
5+32       0.0192      0.02  |Q        |         |         |       V |
5+33       0.0192      0.02  |Q        |         |         |       V |
5+34       0.0192      0.02  |Q        |         |         |       V |
5+35       0.0192      0.02  |Q        |         |         |       V |
5+36       0.0193      0.02  |Q        |         |         |       V |
5+37       0.0193      0.02  |Q        |         |         |       V |
5+38       0.0193      0.02  |Q        |         |         |       V |
5+39       0.0193      0.02  |Q        |         |         |       V |
5+40       0.0194      0.02  |Q        |         |         |       V |
5+41       0.0194      0.02  |Q        |         |         |       V |
5+42       0.0194      0.02  |Q        |         |         |        V|
5+43       0.0194      0.02  |Q        |         |         |        V|
5+44       0.0195      0.02  |Q        |         |         |        V|
5+45       0.0195      0.02  |Q        |         |         |        V|
5+46       0.0195      0.02  |Q        |         |         |        V|
5+47       0.0195      0.02  Q         |         |         |        V|
5+48       0.0195      0.02  Q         |         |         |        V|
5+49       0.0196      0.02  Q         |         |         |        V|
5+50       0.0196      0.02  Q         |         |         |        V|
```

```
    5+51       0.0196      0.02  Q         |         |         |         V|
    5+52       0.0196      0.02  Q         |         |         |         V|
    5+53       0.0196      0.02  Q         |         |         |         V|
    5+54       0.0197      0.02  Q         |         |         |         V|
    5+55       0.0197      0.01  Q         |         |         |         V|
    5+56       0.0197      0.01  Q         |         |         |         V|
    5+57       0.0197      0.01  Q         |         |         |         V|
    5+58       0.0197      0.01  Q         |         |         |         V|
    5+59       0.0198      0.01  Q         |         |         |         V|
    6+ 0       0.0198      0.01  Q         |         |         |         V|
    6+ 1       0.0198      0.01  Q         |         |         |         V|
    6+ 2       0.0198      0.01  Q         |         |         |         V|
    6+ 3       0.0198      0.01  Q         |         |         |         V|
    6+ 4       0.0199      0.01  Q         |         |         |         V|
    6+ 5       0.0199      0.01  Q         |         |         |          V
---------------------------------------------------------------------------

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.061 to Point/Station        1.062
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________________
Upstream point/station elevation =   617.000(Ft.)
Downstream point/station elevation =   616.800(Ft.)
Pipe length  =    20.00(Ft.) Slope =   0.0100  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.631(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     0.631(CFS)
Normal flow depth in pipe =    3.86(In.)
Flow top width inside pipe =    8.91(In.)
Critical Depth =    4.32(In.)
Pipe flow velocity =      3.49(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =     5.47 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.062 to Point/Station        1.063
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
____________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      3.682(CFS)
Depth of flow =   0.155(Ft.), Average velocity =   3.080(Ft/s)
        ******* Irregular Channel Data ***********
----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
```

```
        1              0.00              1.00
        2             50.00              0.00
        3            100.00              1.00
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =      3.682(CFS)
  '     '        flow top width =     15.464(Ft.)
  '     '    velocity=    3.080(Ft/s)
  '     '        area =      1.196(Sq.Ft)
  '     '        Froude number =     1.952

Upstream point elevation =   616.800(Ft.)
Downstream point elevation =   504.000(Ft.)
Flow length =   706.000(Ft.)
Travel time  =    3.82 min.
Time of concentration =    9.29 min.
Depth of flow =   0.155(Ft.)
Average velocity =   3.080(Ft/s)
Total irregular channel flow =     3.682(CFS)
Irregular channel normal depth above invert elev. =   0.155(Ft.)
Average velocity of channel(s) =   3.080(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      4.947(In/Hr) for a   100.0 year storm
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
[UNDISTURBED NATURAL TERRAIN                ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.350
Rainfall intensity =      4.947(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.359  CA =      1.342
Subarea runoff =      6.008(CFS) for      3.590(Ac.)
Total runoff =      6.639(CFS)  Total area =       3.740(Ac.)
Depth of flow =   0.193(Ft.), Average velocity =   3.569(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.063 to Point/Station        1.063
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      3.740(Ac.)
Runoff from this stream =      6.639(CFS)
Time of concentration =    9.29 min.
Rainfall intensity =     4.947(In/Hr)
Summary of stream data:
```

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


1        1.618     10.81                4.486
2        3.117      6.59                6.172
3        6.639      9.29                4.947
Qmax(1) =
           1.000 *    1.000 *     1.618) +
           0.727 *    1.000 *     3.117) +
           0.907 *    1.000 *     6.639) + =       9.904
Qmax(2) =
           1.000 *    0.610 *     1.618) +
           1.000 *    1.000 *     3.117) +
           1.000 *    0.710 *     6.639) + =       8.814
Qmax(3) =
           1.000 *    0.859 *     1.618) +
           0.801 *    1.000 *     3.117) +
           1.000 *    1.000 *     6.639) + =      10.527

Total of 3 main streams to confluence:
Flow rates before confluence point:
       1.618       3.117       6.639
Maximum flow rates at confluence using above data:
        9.904        8.814       10.527
Area of streams before confluence:
        0.930        1.340        3.740


Results of confluence:
Total flow rate =     10.527(CFS)
Time of concentration =     9.291 min.
Effective stream area after confluence  =      6.010(Ac.)
End of computations, total study area =          6.010 (Ac.)
```

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2019 Version 9.1

Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study   Date: 12/29/23

Spring Valley Post Basin 2

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

Program License Serial Number 6548

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

Map data precipitation entered:
6 hour, precipitation(inches) = 2.800
24 hour precipitation(inches) = 5.900
P6/P24 =   47.5%
San Diego hydrology manual 'C' values used

++
Process from Point/Station   2.011 to Point/Station   2.012
**** 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
[MEDIUM DENSITY RESIDENTIAL   ]
(7.3 DU/A or Less   )
Impervious value, Ai = 0.400
Sub-Area C Value = 0.570
Initial subarea total flow distance =   96.000(Ft.)
Highest elevation = 634.000(Ft.)
Lowest elevation = 609.700(Ft.)
Elevation difference =   24.300(Ft.) Slope = 25.312 %
Top of Initial Area Slope adjusted by User to 29.070 %

```
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of  29.07 %, in a development type of
 7.3 DU/A or Less
In Accordance With Table 3-2
Initial Area Time of Concentration =   4.80 minutes
 (for slope value of  10.00 %)
Calculated TC of    4.800 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.570
Subarea runoff =      0.799(CFS)
Total initial stream area =        0.190(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.012 to Point/Station        2.013
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   609.700(Ft.)
Downstream point/station elevation =   601.500(Ft.)
Pipe length  =    70.00(Ft.) Slope =   0.1171  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.799(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.799(CFS)
Normal flow depth in pipe =    2.70(In.)
Flow top width inside pipe =    5.97(In.)
Critical Depth =    5.33(In.)
Pipe flow velocity =      9.33(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =     4.92 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.013 to Point/Station        2.021
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   0.105(Ft.), Average velocity =   1.461(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2             50.00              0.00
        3            100.00              1.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =      0.799(CFS)
  '     '        flow top width =     10.460(Ft.)
  '     '    velocity=    1.461(Ft/s)
```

```
  '     '        area =      0.547(Sq.Ft)
  '     '        Froude number =     1.126

Upstream point elevation =   601.500(Ft.)
Downstream point elevation =   599.200(Ft.)
Flow length =    38.000(Ft.)
Travel time  =    0.43 min.
Time of concentration =    5.36 min.
Depth of flow =   0.105(Ft.)
Average velocity =   1.461(Ft/s)
Total irregular channel flow =     0.799(CFS)
Irregular channel normal depth above invert elev. =   0.105(Ft.)
Average velocity of channel(s) =   1.461(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.013 to Point/Station        2.021
**** 6 HOUR HYDROGRAPH ****
______________________________________________________________________
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Hydrograph Data - Section 6, San Diego County Hydrology manual, June 2003


Time of Concentration =   5.36
Basin Area =     0.19 Acres
6 Hour Rainfall =  2.800 Inches
Runoff Coefficient =  0.570
Peak Discharge =     0.80 CFS
     Time (Min)     Discharge (CFS)
       0               0.000
       5               0.018
       10               0.018
       15               0.019
       20               0.019
       25               0.019
       30               0.019
       35               0.020
       40               0.020
       45               0.020
       50               0.021
       55               0.021
       60               0.021
       65               0.022
       70               0.022
       75               0.023
       80               0.023
       85               0.024
       90               0.024
       95               0.025
       100               0.025
```

105	0.026
110	0.026
115	0.027
120	0.027
125	0.028
130	0.029
135	0.030
140	0.031
145	0.032
150	0.033
155	0.034
160	0.035
165	0.037
170	0.038
175	0.040
180	0.042
185	0.045
190	0.047
195	0.051
200	0.053
205	0.059
210	0.062
215	0.071
220	0.077
225	0.095
230	0.108
235	0.158
240	0.223
245	0.799
250	0.127
255	0.085
260	0.066
265	0.056
270	0.048
275	0.043
280	0.039
285	0.036
290	0.033
295	0.031
300	0.029
305	0.028
310	0.026
315	0.025
320	0.024
325	0.023
330	0.022
335	0.022
340	0.021
345	0.020
350	0.019

355	0.019
360	0.018
365	0.018

++

6 - H O U R S T O R M

R u n o f f H y d r o g r a p h

Hydrograph in 1 Minute intervals ((CFS))

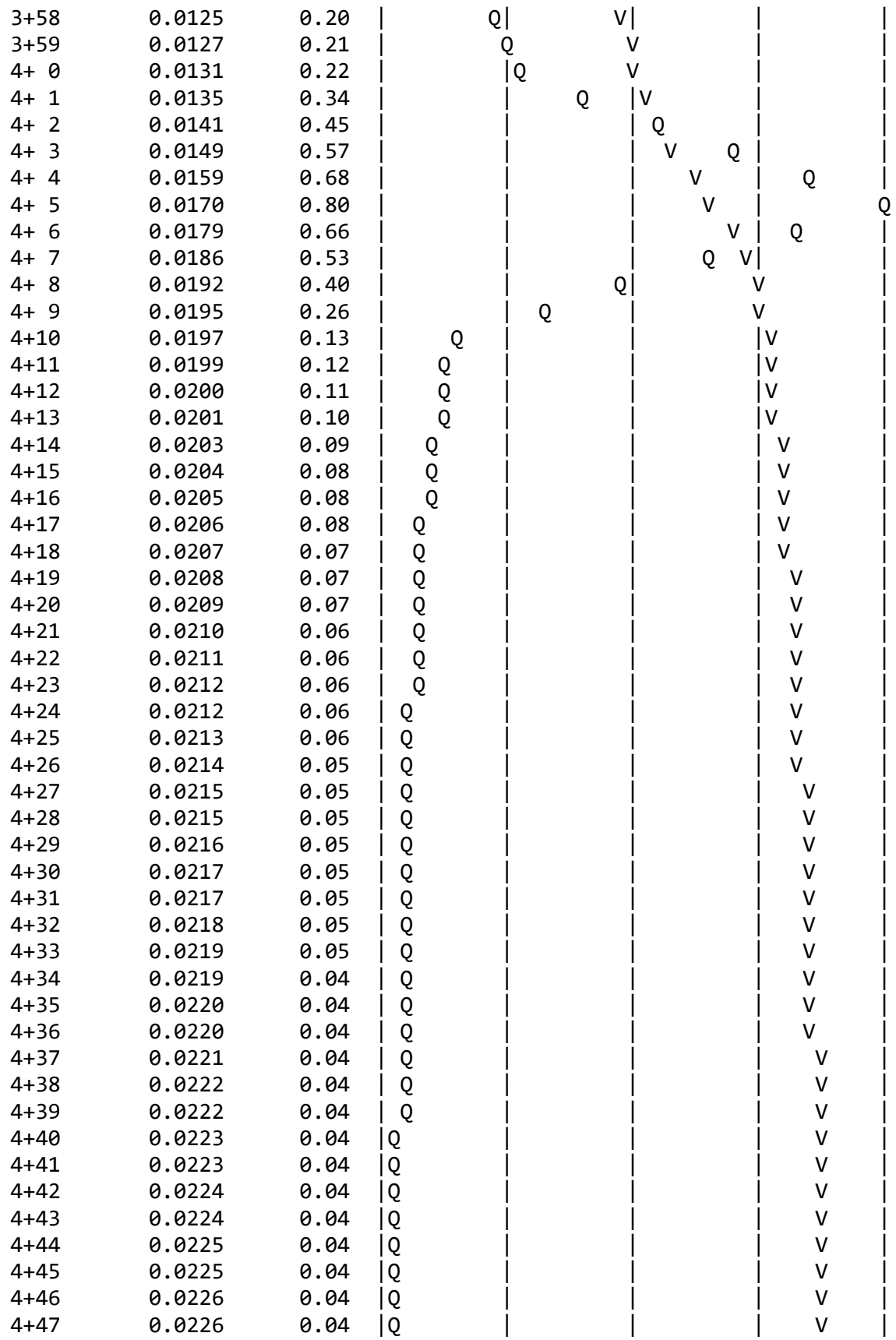
Time(h+m)	Volume Ac.Ft	Q(CFS)	0	0.2	0.4	0.6	0.8
0+ 0	0.0000	0.00	Q				
0+ 1	0.0000	0.00	Q				
0+ 2	0.0000	0.01	Q				
0+ 3	0.0000	0.01	Q				
0+ 4	0.0000	0.01	Q				
0+ 5	0.0001	0.02	Q				
0+ 6	0.0001	0.02	Q				
0+ 7	0.0001	0.02	Q				
0+ 8	0.0001	0.02	Q				
0+ 9	0.0002	0.02	Q				
0+10	0.0002	0.02	Q				
0+11	0.0002	0.02	Q				
0+12	0.0003	0.02	Q				
0+13	0.0003	0.02	Q				
0+14	0.0003	0.02	Q				
0+15	0.0003	0.02	Q				
0+16	0.0004	0.02	Q				
0+17	0.0004	0.02	Q				
0+18	0.0004	0.02	Q				
0+19	0.0004	0.02	Q				
0+20	0.0005	0.02	Q				
0+21	0.0005	0.02	Q				
0+22	0.0005	0.02	Q				
0+23	0.0005	0.02	Q				
0+24	0.0006	0.02	Q				
0+25	0.0006	0.02	Q				
0+26	0.0006	0.02	Q				
0+27	0.0006	0.02	QV				
0+28	0.0007	0.02	QV				
0+29	0.0007	0.02	QV				
0+30	0.0007	0.02	QV				
0+31	0.0007	0.02	QV				
0+32	0.0008	0.02	QV				
0+33	0.0008	0.02	QV				
0+34	0.0008	0.02	QV				
0+35	0.0009	0.02	QV				
0+36	0.0009	0.02	QV				
0+37	0.0009	0.02	QV				

```
0+38       0.0009      0.02  QV        |          |          |          |
0+39       0.0010      0.02  QV        |          |          |          |
0+40       0.0010      0.02  QV        |          |          |          |
0+41       0.0010      0.02  |Q        |          |          |          |
0+42       0.0010      0.02  |Q        |          |          |          |
0+43       0.0011      0.02  |Q        |          |          |          |
0+44       0.0011      0.02  |Q        |          |          |          |
0+45       0.0011      0.02  |Q        |          |          |          |
0+46       0.0012      0.02  |Q        |          |          |          |
0+47       0.0012      0.02  |Q        |          |          |          |
0+48       0.0012      0.02  |Q        |          |          |          |
0+49       0.0012      0.02  |Q        |          |          |          |
0+50       0.0013      0.02  |QV       |          |          |          |
0+51       0.0013      0.02  |QV       |          |          |          |
0+52       0.0013      0.02  |QV       |          |          |          |
0+53       0.0014      0.02  |QV       |          |          |          |
0+54       0.0014      0.02  |QV       |          |          |          |
0+55       0.0014      0.02  |QV       |          |          |          |
0+56       0.0014      0.02  |QV       |          |          |          |
0+57       0.0015      0.02  |QV       |          |          |          |
0+58       0.0015      0.02  |QV       |          |          |          |
0+59       0.0015      0.02  |QV       |          |          |          |
1+ 0       0.0016      0.02  |QV       |          |          |          |
1+ 1       0.0016      0.02  |QV       |          |          |          |
1+ 2       0.0016      0.02  |QV       |          |          |          |
1+ 3       0.0016      0.02  |QV       |          |          |          |
1+ 4       0.0017      0.02  |QV       |          |          |          |
1+ 5       0.0017      0.02  |QV       |          |          |          |
1+ 6       0.0017      0.02  |QV       |          |          |          |
1+ 7       0.0018      0.02  |QV       |          |          |          |
1+ 8       0.0018      0.02  |QV       |          |          |          |
1+ 9       0.0018      0.02  |QV       |          |          |          |
1+10       0.0019      0.02  |QV       |          |          |          |
1+11       0.0019      0.02  |QV       |          |          |          |
1+12       0.0019      0.02  |Q V      |          |          |          |
1+13       0.0020      0.02  |Q V      |          |          |          |
1+14       0.0020      0.02  |Q V      |          |          |          |
1+15       0.0020      0.02  |Q V      |          |          |          |
1+16       0.0020      0.02  |Q V      |          |          |          |
1+17       0.0021      0.02  |Q V      |          |          |          |
1+18       0.0021      0.02  |Q V      |          |          |          |
1+19       0.0021      0.02  |Q V      |          |          |          |
1+20       0.0022      0.02  |Q V      |          |          |          |
1+21       0.0022      0.02  |Q V      |          |          |          |
1+22       0.0022      0.02  |Q V      |          |          |          |
1+23       0.0023      0.02  |Q V      |          |          |          |
1+24       0.0023      0.02  |Q V      |          |          |          |
1+25       0.0023      0.02  |Q V      |          |          |          |
1+26       0.0024      0.02  |Q V      |          |          |          |
1+27       0.0024      0.02  |Q V      |          |          |          |
```

1+28	0.0024	0.02	|Q V	|	|	|	|
1+29	0.0025	0.02	|Q V	|	|	|	|
1+30	0.0025	0.02	|Q V	|	|	|	|
1+31	0.0025	0.02	|Q V	|	|	|	|
1+32	0.0026	0.02	|Q V	|	|	|	|
1+33	0.0026	0.02	|Q V	|	|	|	|
1+34	0.0026	0.02	|Q V	|	|	|	|
1+35	0.0027	0.02	|Q V	|	|	|	|
1+36	0.0027	0.02	|Q V	|	|	|	|
1+37	0.0027	0.02	|Q V	|	|	|	|
1+38	0.0028	0.02	|Q V	|	|	|	|
1+39	0.0028	0.02	|Q V	|	|	|	|
1+40	0.0028	0.02	|Q V	|	|	|	|
1+41	0.0029	0.03	|Q V	|	|	|	|
1+42	0.0029	0.03	|Q V	|	|	|	|
1+43	0.0029	0.03	|Q V	|	|	|	|
1+44	0.0030	0.03	|Q V	|	|	|	|
1+45	0.0030	0.03	|Q V	|	|	|	|
1+46	0.0030	0.03	|Q V	|	|	|	|
1+47	0.0031	0.03	|Q V	|	|	|	|
1+48	0.0031	0.03	|Q V	|	|	|	|
1+49	0.0031	0.03	|Q V	|	|	|	|
1+50	0.0032	0.03	|Q V	|	|	|	|
1+51	0.0032	0.03	|Q V	|	|	|	|
1+52	0.0033	0.03	|Q V	|	|	|	|
1+53	0.0033	0.03	|Q V	|	|	|	|
1+54	0.0033	0.03	|Q V	|	|	|	|
1+55	0.0034	0.03	|Q V	|	|	|	|
1+56	0.0034	0.03	|Q V	|	|	|	|
1+57	0.0034	0.03	|Q V	|	|	|	|
1+58	0.0035	0.03	|Q V	|	|	|	|
1+59	0.0035	0.03	|Q V	|	|	|	|
2+ 0	0.0036	0.03	|Q V	|	|	|	|
2+ 1	0.0036	0.03	|Q V	|	|	|	|
2+ 2	0.0036	0.03	|Q V	|	|	|	|
2+ 3	0.0037	0.03	|Q V	|	|	|	|
2+ 4	0.0037	0.03	|Q V	|	|	|	|
2+ 5	0.0037	0.03	|Q V	|	|	|	|
2+ 6	0.0038	0.03	|Q V	|	|	|	|
2+ 7	0.0038	0.03	|Q V	|	|	|	|
2+ 8	0.0039	0.03	|Q V	|	|	|	|
2+ 9	0.0039	0.03	|Q V	|	|	|	|
2+10	0.0039	0.03	|Q V	|	|	|	|
2+11	0.0040	0.03	|Q V	|	|	|	|
2+12	0.0040	0.03	|Q V	|	|	|	|
2+13	0.0041	0.03	|Q V	|	|	|	|
2+14	0.0041	0.03	|Q V	|	|	|	|
2+15	0.0041	0.03	|Q V	|	|	|	|
2+16	0.0042	0.03	|Q V	|	|	|	|
2+17	0.0042	0.03	|Q V	|	|	|	|

```
2+18       0.0043      0.03  |Q    V   |          |          |          |
2+19       0.0043      0.03  |Q    V   |          |          |          |
2+20       0.0044      0.03  |Q    V   |          |          |          |
2+21       0.0044      0.03  |Q    V   |          |          |          |
2+22       0.0044      0.03  |Q     V  |          |          |          |
2+23       0.0045      0.03  |Q     V  |          |          |          |
2+24       0.0045      0.03  |Q     V  |          |          |          |
2+25       0.0046      0.03  |Q     V  |          |          |          |
2+26       0.0046      0.03  |Q     V  |          |          |          |
2+27       0.0047      0.03  |Q     V  |          |          |          |
2+28       0.0047      0.03  |Q     V  |          |          |          |
2+29       0.0048      0.03  |Q     V  |          |          |          |
2+30       0.0048      0.03  |Q     V  |          |          |          |
2+31       0.0048      0.03  |Q     V  |          |          |          |
2+32       0.0049      0.03  |Q     V  |          |          |          |
2+33       0.0049      0.03  |Q     V  |          |          |          |
2+34       0.0050      0.03  |Q     V  |          |          |          |
2+35       0.0050      0.03  |Q     V  |          |          |          |
2+36       0.0051      0.03  |Q      V |          |          |          |
2+37       0.0051      0.03  |Q      V |          |          |          |
2+38       0.0052      0.03  |Q      V |          |          |          |
2+39       0.0052      0.03  |Q      V |          |          |          |
2+40       0.0053      0.04  |Q      V |          |          |          |
2+41       0.0053      0.04  |Q      V |          |          |          |
2+42       0.0054      0.04  |Q      V |          |          |          |
2+43       0.0054      0.04  |Q      V |          |          |          |
2+44       0.0055      0.04  |Q      V |          |          |          |
2+45       0.0055      0.04  |Q      V |          |          |          |
2+46       0.0056      0.04  |Q      V |          |          |          |
2+47       0.0056      0.04  |Q      V |          |          |          |
2+48       0.0057      0.04  |Q       V|          |          |          |
2+49       0.0057      0.04  |Q       V|          |          |          |
2+50       0.0058      0.04  |Q       V|          |          |          |
2+51       0.0058      0.04  |Q       V|          |          |          |
2+52       0.0059      0.04  |Q       V|          |          |          |
2+53       0.0059      0.04  |Q       V|          |          |          |
2+54       0.0060      0.04  | Q      V|          |          |          |
2+55       0.0060      0.04  | Q      V|          |          |          |
2+56       0.0061      0.04  | Q      V|          |          |          |
2+57       0.0062      0.04  | Q      V|          |          |          |
2+58       0.0062      0.04  | Q      V|          |          |          |
2+59       0.0063      0.04  | Q      V|          |          |          |
3+ 0       0.0063      0.04  | Q       V          |          |          |
3+ 1       0.0064      0.04  | Q       V          |          |          |
3+ 2       0.0064      0.04  | Q       V          |          |          |
3+ 3       0.0065      0.04  | Q       V          |          |          |
3+ 4       0.0066      0.04  | Q       V          |          |          |
3+ 5       0.0066      0.04  | Q       V          |          |          |
3+ 6       0.0067      0.05  | Q       V          |          |          |
3+ 7       0.0068      0.05  | Q       V          |          |          |
```

```
3+ 8       0.0068      0.05  | Q       V         |         |         |
3+ 9       0.0069      0.05  | Q       V         |         |         |
3+10       0.0069      0.05  | Q       |V        |         |         |
3+11       0.0070      0.05  | Q       |V        |         |         |
3+12       0.0071      0.05  | Q       |V        |         |         |
3+13       0.0071      0.05  | Q       |V        |         |         |
3+14       0.0072      0.05  | Q       |V        |         |         |
3+15       0.0073      0.05  | Q       |V        |         |         |
3+16       0.0074      0.05  | Q       |V        |         |         |
3+17       0.0074      0.05  | Q       |V        |         |         |
3+18       0.0075      0.05  | Q       |V        |         |         |
3+19       0.0076      0.05  | Q       | V       |         |         |
3+20       0.0076      0.05  | Q       | V       |         |         |
3+21       0.0077      0.05  | Q       | V       |         |         |
3+22       0.0078      0.06  | Q       | V       |         |         |
3+23       0.0079      0.06  | Q       | V       |         |         |
3+24       0.0080      0.06  | Q       | V       |         |         |
3+25       0.0080      0.06  | Q       | V       |         |         |
3+26       0.0081      0.06  | Q       | V       |         |         |
3+27       0.0082      0.06  |  Q      |  V      |         |         |
3+28       0.0083      0.06  |  Q      |  V      |         |         |
3+29       0.0084      0.06  |  Q      |  V      |         |         |
3+30       0.0085      0.06  |  Q      |  V      |         |         |
3+31       0.0085      0.06  |  Q      |  V      |         |         |
3+32       0.0086      0.07  |  Q      |  V      |         |         |
3+33       0.0087      0.07  |  Q      |  V      |         |         |
3+34       0.0088      0.07  |  Q      |   V     |         |         |
3+35       0.0089      0.07  |  Q      |   V     |         |         |
3+36       0.0090      0.07  |  Q      |   V     |         |         |
3+37       0.0091      0.07  |  Q      |   V     |         |         |
3+38       0.0092      0.07  |  Q      |   V     |         |         |
3+39       0.0093      0.08  |  Q      |   V     |         |         |
3+40       0.0094      0.08  |  Q      |   V     |         |         |
3+41       0.0095      0.08  |   Q     |    V    |         |         |
3+42       0.0097      0.08  |   Q     |    V    |         |         |
3+43       0.0098      0.09  |   Q     |    V    |         |         |
3+44       0.0099      0.09  |   Q     |    V    |         |         |
3+45       0.0100      0.09  |   Q     |    V    |         |         |
3+46       0.0102      0.10  |   Q     |     V   |         |         |
3+47       0.0103      0.10  |   Q     |     V   |         |         |
3+48       0.0105      0.10  |    Q    |     V   |         |         |
3+49       0.0106      0.11  |    Q    |     V   |         |         |
3+50       0.0107      0.11  |    Q    |      V  |         |         |
3+51       0.0109      0.12  |    Q    |      V  |         |         |
3+52       0.0111      0.13  |     Q   |      V  |         |         |
3+53       0.0113      0.14  |     Q   |      V  |         |         |
3+54       0.0115      0.15  |      Q  |       V |         |         |
3+55       0.0117      0.16  |      Q  |       V |         |         |
3+56       0.0119      0.17  |       Q |       V |         |         |
3+57       0.0122      0.18  |        Q|        V|         |         |
```



```
4+48       0.0227      0.03  |Q        |         |         |    V    |
4+49       0.0227      0.03  |Q        |         |         |     V   |
4+50       0.0228      0.03  |Q        |         |         |     V   |
4+51       0.0228      0.03  |Q        |         |         |     V   |
4+52       0.0228      0.03  |Q        |         |         |     V   |
4+53       0.0229      0.03  |Q        |         |         |     V   |
4+54       0.0229      0.03  |Q        |         |         |     V   |
4+55       0.0230      0.03  |Q        |         |         |     V   |
4+56       0.0230      0.03  |Q        |         |         |     V   |
4+57       0.0231      0.03  |Q        |         |         |     V   |
4+58       0.0231      0.03  |Q        |         |         |     V   |
4+59       0.0231      0.03  |Q        |         |         |     V   |
5+ 0       0.0232      0.03  |Q        |         |         |     V   |
5+ 1       0.0232      0.03  |Q        |         |         |     V   |
5+ 2       0.0233      0.03  |Q        |         |         |     V   |
5+ 3       0.0233      0.03  |Q        |         |         |      V  |
5+ 4       0.0233      0.03  |Q        |         |         |      V  |
5+ 5       0.0234      0.03  |Q        |         |         |      V  |
5+ 6       0.0234      0.03  |Q        |         |         |      V  |
5+ 7       0.0235      0.03  |Q        |         |         |      V  |
5+ 8       0.0235      0.03  |Q        |         |         |      V  |
5+ 9       0.0235      0.03  |Q        |         |         |      V  |
5+10       0.0236      0.03  |Q        |         |         |      V  |
5+11       0.0236      0.03  |Q        |         |         |      V  |
5+12       0.0236      0.03  |Q        |         |         |      V  |
5+13       0.0237      0.03  |Q        |         |         |      V  |
5+14       0.0237      0.03  |Q        |         |         |      V  |
5+15       0.0237      0.03  |Q        |         |         |      V  |
5+16       0.0238      0.03  |Q        |         |         |      V  |
5+17       0.0238      0.02  |Q        |         |         |      V  |
5+18       0.0238      0.02  |Q        |         |         |      V  |
5+19       0.0239      0.02  |Q        |         |         |      V  |
5+20       0.0239      0.02  |Q        |         |         |      V  |
5+21       0.0239      0.02  |Q        |         |         |       V |
5+22       0.0240      0.02  |Q        |         |         |       V |
5+23       0.0240      0.02  |Q        |         |         |       V |
5+24       0.0240      0.02  |Q        |         |         |       V |
5+25       0.0241      0.02  |Q        |         |         |       V |
5+26       0.0241      0.02  |Q        |         |         |       V |
5+27       0.0241      0.02  |Q        |         |         |       V |
5+28       0.0242      0.02  |Q        |         |         |       V |
5+29       0.0242      0.02  |Q        |         |         |       V |
5+30       0.0242      0.02  |Q        |         |         |       V |
5+31       0.0243      0.02  |Q        |         |         |       V |
5+32       0.0243      0.02  |Q        |         |         |       V |
5+33       0.0243      0.02  |Q        |         |         |       V |
5+34       0.0244      0.02  |Q        |         |         |       V |
5+35       0.0244      0.02  |Q        |         |         |       V |
5+36       0.0244      0.02  |Q        |         |         |       V |
5+37       0.0244      0.02  |Q        |         |         |       V |
```

```
    5+38       0.0245      0.02  |Q        |         |         |        V |
    5+39       0.0245      0.02  |Q        |         |         |        V |
    5+40       0.0245      0.02  |Q        |         |         |        V |
    5+41       0.0246      0.02  |Q        |         |         |        V |
    5+42       0.0246      0.02  |Q        |         |         |         V|
    5+43       0.0246      0.02  |Q        |         |         |         V|
    5+44       0.0246      0.02  |Q        |         |         |         V|
    5+45       0.0247      0.02  |Q        |         |         |         V|
    5+46       0.0247      0.02  |Q        |         |         |         V|
    5+47       0.0247      0.02  Q         |         |         |         V|
    5+48       0.0247      0.02  Q         |         |         |         V|
    5+49       0.0248      0.02  Q         |         |         |         V|
    5+50       0.0248      0.02  Q         |         |         |         V|
    5+51       0.0248      0.02  Q         |         |         |         V|
    5+52       0.0249      0.02  Q         |         |         |         V|
    5+53       0.0249      0.02  Q         |         |         |         V|
    5+54       0.0249      0.02  Q         |         |         |         V|
    5+55       0.0249      0.02  Q         |         |         |         V|
    5+56       0.0250      0.02  Q         |         |         |         V|
    5+57       0.0250      0.02  Q         |         |         |         V|
    5+58       0.0250      0.02  Q         |         |         |         V|
    5+59       0.0250      0.02  Q         |         |         |         V|
    6+ 0       0.0251      0.02  Q         |         |         |         V|
    6+ 1       0.0251      0.02  Q         |         |         |         V|
    6+ 2       0.0251      0.02  Q         |         |         |         V|
    6+ 3       0.0251      0.02  Q         |         |         |         V|
    6+ 4       0.0252      0.02  Q         |         |         |         V|
    6+ 5       0.0252      0.02  Q         |         |         |          V
-------------------------------------------------------------------------
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.021 to Point/Station        2.022
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   599.200(Ft.)
Downstream point/station elevation =   599.000(Ft.)
Pipe length  =    15.00(Ft.) Slope =   0.0133  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.799(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     0.799(CFS)
Normal flow depth in pipe =    4.06(In.)
Flow top width inside pipe =    8.96(In.)
Critical Depth =    4.90(In.)
Pipe flow velocity =      4.13(Ft/s)
Travel time through pipe =    0.06 min.
```

```
Time of concentration (TC) =     5.42 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.022 to Point/Station        2.023
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      1.480(CFS)
Depth of flow =   0.115(Ft.), Average velocity =   2.253(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2             50.00              0.00
        3            100.00              1.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =      1.481(CFS)
  '     '        flow top width =     11.465(Ft.)
  '     '    velocity=    2.253(Ft/s)
  '     '        area =      0.657(Sq.Ft)
  '     '        Froude number =     1.658

Upstream point elevation =   599.000(Ft.)
Downstream point elevation =   572.500(Ft.)
Flow length =   208.000(Ft.)
Travel time  =    1.54 min.
Time of concentration =    6.96 min.
Depth of flow =   0.115(Ft.)
Average velocity =   2.253(Ft/s)
Total irregular channel flow =     1.480(CFS)
Irregular channel normal depth above invert elev. =   0.115(Ft.)
Average velocity of channel(s) =   2.253(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      5.961(In/Hr) for a   100.0 year storm
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
[UNDISTURBED NATURAL TERRAIN                 ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.350
Rainfall intensity =      5.961(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.397  CA =      0.353
Subarea runoff =      1.307(CFS) for      0.700(Ac.)
Total runoff =      2.106(CFS)  Total area =       0.890(Ac.)
Depth of flow =   0.131(Ft.), Average velocity =   2.460(Ft/s)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.023 to Point/Station        2.024
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   572.500(Ft.)
Downstream point/station elevation =   567.000(Ft.)
Pipe length  =    55.00(Ft.) Slope =   0.1000  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.106(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.106(CFS)
Normal flow depth in pipe =    3.97(In.)
Flow top width inside pipe =    8.94(In.)
Critical Depth =    7.87(In.)
Pipe flow velocity =     11.20(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =     7.04 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.024 to Point/Station        2.025
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Depth of flow =   0.125(Ft.), Average velocity =   2.692(Ft/s)
        ******* Irregular Channel Data ***********
----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2             50.00              0.00
        3            100.00              1.00
Manning's 'N' friction factor =   0.035
----------------------------------------------------------------
Sub-Channel flow  =      2.106(CFS)
  '     '        flow top width =     12.508(Ft.)
  '     '    velocity=    2.692(Ft/s)
  '     '        area =      0.782(Sq.Ft)
  '     '        Froude number =     1.897

Upstream point elevation =   567.000(Ft.)
Downstream point elevation =   538.000(Ft.)
Flow length =   179.000(Ft.)
Travel time  =    1.11 min.
Time of concentration =    8.15 min.
Depth of flow =   0.125(Ft.)
Average velocity =   2.692(Ft/s)
Total irregular channel flow =     2.106(CFS)
Irregular channel normal depth above invert elev. =   0.125(Ft.)
Average velocity of channel(s) =   2.692(Ft/s)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.025 to Point/Station        2.025
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      0.890(Ac.)
Runoff from this stream =      2.106(CFS)
Time of concentration =    8.15 min.
Rainfall intensity =     5.384(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.031 to Point/Station        2.032
**** 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
[MEDIUM DENSITY RESIDENTIAL                  ]
(10.9 DU/A or Less      )
Impervious value, Ai = 0.450
Sub-Area C Value = 0.600
Initial subarea total flow distance  =   74.000(Ft.)
Highest elevation =  590.500(Ft.)
Lowest elevation =  584.700(Ft.)
Elevation difference =    5.800(Ft.) Slope =  7.838 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   7.84 %, in a development type of
 10.9 DU/A or Less
In Accordance With Table 3-2
Initial Area Time of Concentration =   4.50 minutes
 (for slope value of  10.00 %)
Calculated TC of    4.500 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.600
Subarea runoff =      0.620(CFS)
Total initial stream area =        0.140(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.032 to Point/Station        2.033
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
```

```
Upstream point/station elevation =   584.700(Ft.)
Downstream point/station elevation =   577.500(Ft.)
Pipe length  =    34.00(Ft.) Slope =   0.2118  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.620(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.620(CFS)
Normal flow depth in pipe =    2.00(In.)
Flow top width inside pipe =    5.66(In.)
Critical Depth =    4.80(In.)
Pipe flow velocity =     10.81(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =     4.55 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.033 to Point/Station        2.041
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________________
Depth of flow =   0.068(Ft.), Average velocity =   2.667(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2             50.00              0.00
        3            100.00              1.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =      0.620(CFS)
  '     '        flow top width =      6.817(Ft.)
  '     '    velocity=    2.667(Ft/s)
  '     '        area =      0.232(Sq.Ft)
  '     '        Froude number =     2.546

Upstream point elevation =   577.500(Ft.)
Downstream point elevation =   575.000(Ft.)
Flow length =     7.000(Ft.)
Travel time  =    0.04 min.
Time of concentration =    4.60 min.
Depth of flow =   0.068(Ft.)
Average velocity =   2.667(Ft/s)
Total irregular channel flow =     0.620(CFS)
Irregular channel normal depth above invert elev. =   0.068(Ft.)
Average velocity of channel(s) =   2.667(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.033 to Point/Station        2.041
**** 6 HOUR HYDROGRAPH ****
______________________________________________________________________________
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++
Hydrograph Data - Section 6, San Diego County Hydrology manual, June 2003

Time of Concentration = 4.60
Basin Area = 0.14 Acres
6 Hour Rainfall = 2.800 Inches
Runoff Coefficient = 0.60
Peak Discharge = 0.62 CFS

Time (Min)	Discharge (CFS)
0	0.000
4	0.014
8	0.014
12	0.014
16	0.014
20	0.015
24	0.015
28	0.015
32	0.015
36	0.015
40	0.015
44	0.016
48	0.016
52	0.016
56	0.016
60	0.017
64	0.017
68	0.017
72	0.017
76	0.018
80	0.018
84	0.018
88	0.018
92	0.019
96	0.019
100	0.020
104	0.020
108	0.020
112	0.021
116	0.021
120	0.021
124	0.022
128	0.022
132	0.023
136	0.023
140	0.024
144	0.025
148	0.025
152	0.026
156	0.027

160	0.027
164	0.029
168	0.029
172	0.031
176	0.031
180	0.033
184	0.034
188	0.036
192	0.037
196	0.040
200	0.042
204	0.045
208	0.047
212	0.053
216	0.056
220	0.064
224	0.069
228	0.085
232	0.097
236	0.142
240	0.200
244	0.620
248	0.114
252	0.076
256	0.059
260	0.050
264	0.043
268	0.039
272	0.035
276	0.032
280	0.030
284	0.028
288	0.026
292	0.025
296	0.024
300	0.023
304	0.022
308	0.021
312	0.020
316	0.019
320	0.019
324	0.018
328	0.017
332	0.017
336	0.016
340	0.016
344	0.016
348	0.015
352	0.015
356	0.015

360 0.014
364 0.014

++

6 - H O U R S T O R M

R u n o f f H y d r o g r a p h

Hydrograph in 1 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	0.2	0.3	0.5	0.6
0+ 0	0.0000	0.00	Q				
0+ 1	0.0000	0.00	Q				
0+ 2	0.0000	0.01	Q				
0+ 3	0.0000	0.01	Q				
0+ 4	0.0000	0.01	Q				
0+ 5	0.0001	0.01	Q				
0+ 6	0.0001	0.01	Q				
0+ 7	0.0001	0.01	Q				
0+ 8	0.0001	0.01	Q				
0+ 9	0.0001	0.01	Q				
0+10	0.0002	0.01	Q				
0+11	0.0002	0.01	Q				
0+12	0.0002	0.01	Q				
0+13	0.0002	0.01	Q				
0+14	0.0002	0.01	Q				
0+15	0.0003	0.01	Q				
0+16	0.0003	0.01	Q				
0+17	0.0003	0.01	Q				
0+18	0.0003	0.01	Q				
0+19	0.0003	0.01	Q				
0+20	0.0004	0.01	Q				
0+21	0.0004	0.01	Q				
0+22	0.0004	0.01	Q				
0+23	0.0004	0.01	Q				
0+24	0.0004	0.01	Q				
0+25	0.0005	0.01	Q				
0+26	0.0005	0.01	QV				
0+27	0.0005	0.01	QV				
0+28	0.0005	0.01	QV				
0+29	0.0005	0.02	QV				
0+30	0.0006	0.02	QV				
0+31	0.0006	0.02	QV				
0+32	0.0006	0.02	QV				
0+33	0.0006	0.02	QV				
0+34	0.0007	0.02	QV				
0+35	0.0007	0.02	QV				
0+36	0.0007	0.02	QV				
0+37	0.0007	0.02	QV				
0+38	0.0007	0.02	QV				

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0+39       0.0008      0.02  QV        |          |          |          |
0+40       0.0008      0.02  QV        |          |          |          |
0+41       0.0008      0.02  |Q        |          |          |          |
0+42       0.0008      0.02  |Q        |          |          |          |
0+43       0.0008      0.02  |Q        |          |          |          |
0+44       0.0009      0.02  |Q        |          |          |          |
0+45       0.0009      0.02  |Q        |          |          |          |
0+46       0.0009      0.02  |Q        |          |          |          |
0+47       0.0009      0.02  |Q        |          |          |          |
0+48       0.0010      0.02  |QV       |          |          |          |
0+49       0.0010      0.02  |QV       |          |          |          |
0+50       0.0010      0.02  |QV       |          |          |          |
0+51       0.0010      0.02  |QV       |          |          |          |
0+52       0.0010      0.02  |QV       |          |          |          |
0+53       0.0011      0.02  |QV       |          |          |          |
0+54       0.0011      0.02  |QV       |          |          |          |
0+55       0.0011      0.02  |QV       |          |          |          |
0+56       0.0011      0.02  |QV       |          |          |          |
0+57       0.0012      0.02  |QV       |          |          |          |
0+58       0.0012      0.02  |QV       |          |          |          |
0+59       0.0012      0.02  |QV       |          |          |          |
1+ 0       0.0012      0.02  |QV       |          |          |          |
1+ 1       0.0012      0.02  |QV       |          |          |          |
1+ 2       0.0013      0.02  |QV       |          |          |          |
1+ 3       0.0013      0.02  |QV       |          |          |          |
1+ 4       0.0013      0.02  |QV       |          |          |          |
1+ 5       0.0013      0.02  |QV       |          |          |          |
1+ 6       0.0014      0.02  |QV       |          |          |          |
1+ 7       0.0014      0.02  |QV       |          |          |          |
1+ 8       0.0014      0.02  |QV       |          |          |          |
1+ 9       0.0014      0.02  |Q V      |          |          |          |
1+10       0.0015      0.02  |Q V      |          |          |          |
1+11       0.0015      0.02  |Q V      |          |          |          |
1+12       0.0015      0.02  |Q V      |          |          |          |
1+13       0.0015      0.02  |Q V      |          |          |          |
1+14       0.0016      0.02  |Q V      |          |          |          |
1+15       0.0016      0.02  |Q V      |          |          |          |
1+16       0.0016      0.02  |Q V      |          |          |          |
1+17       0.0016      0.02  |Q V      |          |          |          |
1+18       0.0016      0.02  |Q V      |          |          |          |
1+19       0.0017      0.02  |Q V      |          |          |          |
1+20       0.0017      0.02  |Q V      |          |          |          |
1+21       0.0017      0.02  |Q V      |          |          |          |
1+22       0.0017      0.02  |Q V      |          |          |          |
1+23       0.0018      0.02  |Q V      |          |          |          |
1+24       0.0018      0.02  |Q V      |          |          |          |
1+25       0.0018      0.02  |Q V      |          |          |          |
1+26       0.0018      0.02  |Q V      |          |          |          |
1+27       0.0019      0.02  |Q V      |          |          |          |
1+28       0.0019      0.02  |Q V      |          |          |          |
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1+29       0.0019      0.02  |Q  V     |          |          |          |
1+30       0.0019      0.02  |Q  V     |          |          |          |
1+31       0.0020      0.02  |Q  V     |          |          |          |
1+32       0.0020      0.02  |Q  V     |          |          |          |
1+33       0.0020      0.02  |Q  V     |          |          |          |
1+34       0.0021      0.02  |Q  V     |          |          |          |
1+35       0.0021      0.02  |Q  V     |          |          |          |
1+36       0.0021      0.02  |Q  V     |          |          |          |
1+37       0.0021      0.02  |Q  V     |          |          |          |
1+38       0.0022      0.02  |Q  V     |          |          |          |
1+39       0.0022      0.02  |Q  V     |          |          |          |
1+40       0.0022      0.02  |Q  V     |          |          |          |
1+41       0.0022      0.02  |Q  V     |          |          |          |
1+42       0.0023      0.02  |Q  V     |          |          |          |
1+43       0.0023      0.02  |Q  V     |          |          |          |
1+44       0.0023      0.02  |Q  V     |          |          |          |
1+45       0.0023      0.02  |Q  V     |          |          |          |
1+46       0.0024      0.02  |Q  V     |          |          |          |
1+47       0.0024      0.02  |Q   V    |          |          |          |
1+48       0.0024      0.02  |Q   V    |          |          |          |
1+49       0.0025      0.02  |Q   V    |          |          |          |
1+50       0.0025      0.02  |Q   V    |          |          |          |
1+51       0.0025      0.02  |Q   V    |          |          |          |
1+52       0.0025      0.02  |Q   V    |          |          |          |
1+53       0.0026      0.02  |Q   V    |          |          |          |
1+54       0.0026      0.02  |Q   V    |          |          |          |
1+55       0.0026      0.02  |Q   V    |          |          |          |
1+56       0.0027      0.02  |Q   V    |          |          |          |
1+57       0.0027      0.02  |Q   V    |          |          |          |
1+58       0.0027      0.02  |Q   V    |          |          |          |
1+59       0.0027      0.02  |Q   V    |          |          |          |
2+ 0       0.0028      0.02  |Q   V    |          |          |          |
2+ 1       0.0028      0.02  |Q   V    |          |          |          |
2+ 2       0.0028      0.02  |Q   V    |          |          |          |
2+ 3       0.0029      0.02  |Q    V   |          |          |          |
2+ 4       0.0029      0.02  |Q    V   |          |          |          |
2+ 5       0.0029      0.02  |Q    V   |          |          |          |
2+ 6       0.0030      0.02  |Q    V   |          |          |          |
2+ 7       0.0030      0.02  |Q    V   |          |          |          |
2+ 8       0.0030      0.02  |Q    V   |          |          |          |
2+ 9       0.0030      0.02  |Q    V   |          |          |          |
2+10       0.0031      0.02  |Q    V   |          |          |          |
2+11       0.0031      0.02  |Q    V   |          |          |          |
2+12       0.0031      0.02  |Q    V   |          |          |          |
2+13       0.0032      0.02  |Q    V   |          |          |          |
2+14       0.0032      0.02  |Q    V   |          |          |          |
2+15       0.0032      0.02  |Q    V   |          |          |          |
2+16       0.0033      0.02  |Q    V   |          |          |          |
2+17       0.0033      0.02  |Q    V   |          |          |          |
2+18       0.0033      0.02  |Q     V  |          |          |          |
```

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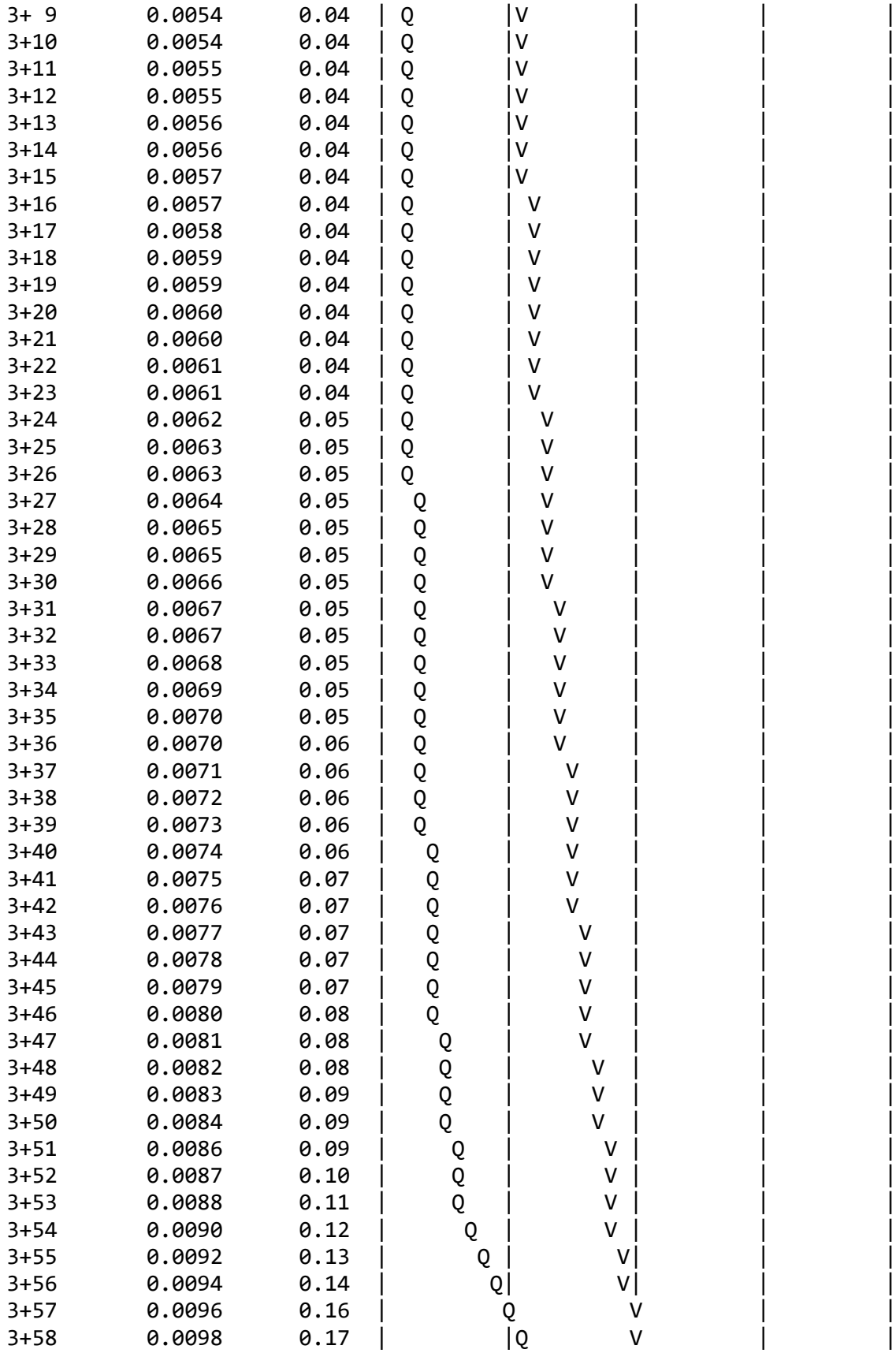
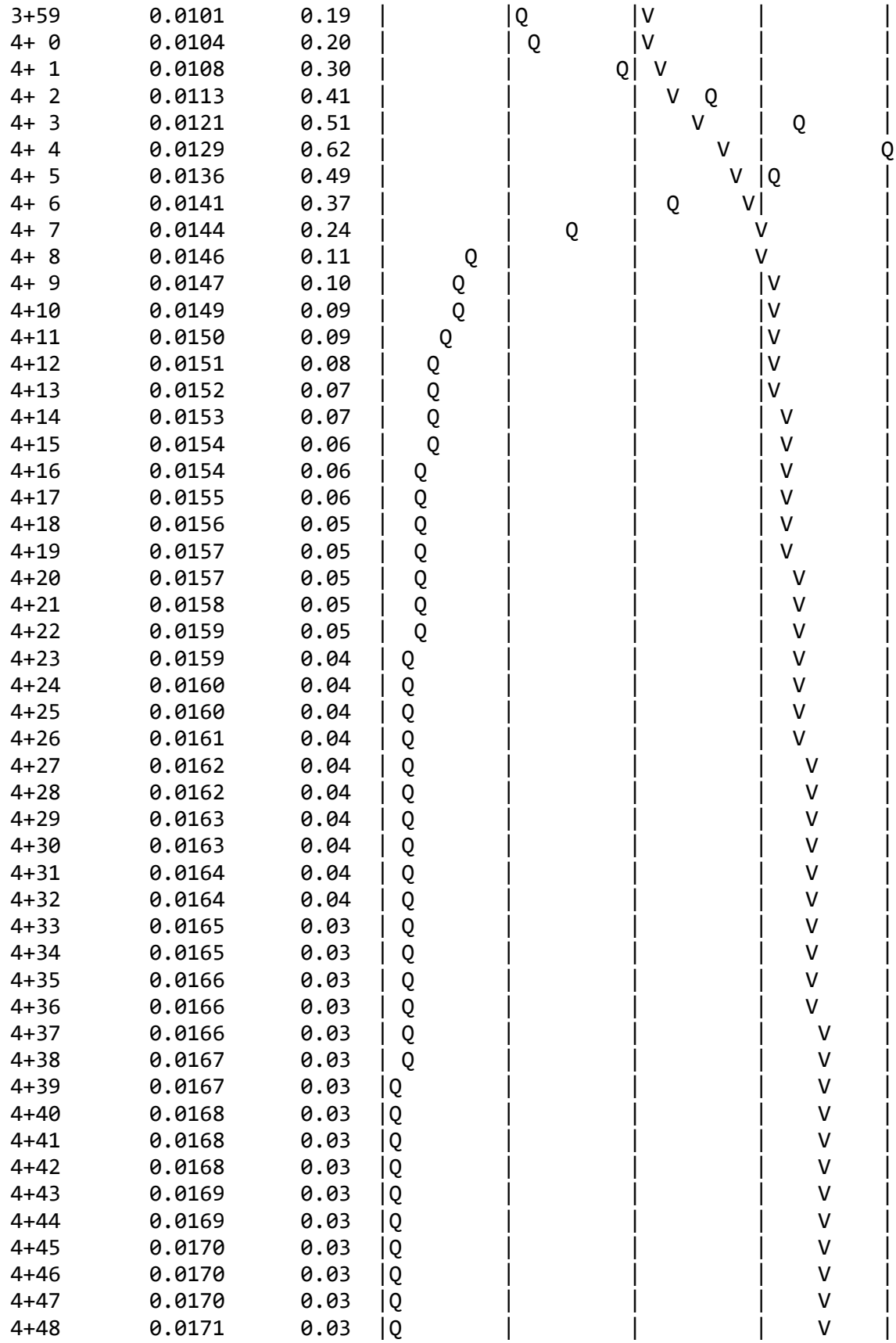
2+19       0.0034      0.02  |Q     V  |          |          |          |
2+20       0.0034      0.02  |Q     V  |          |          |          |
2+21       0.0034      0.02  |Q     V  |          |          |          |
2+22       0.0035      0.02  |Q     V  |          |          |          |
2+23       0.0035      0.02  |Q     V  |          |          |          |
2+24       0.0035      0.02  |Q     V  |          |          |          |
2+25       0.0036      0.02  |Q     V  |          |          |          |
2+26       0.0036      0.02  |Q     V  |          |          |          |
2+27       0.0036      0.03  |Q     V  |          |          |          |
2+28       0.0037      0.03  |Q     V  |          |          |          |
2+29       0.0037      0.03  |Q     V  |          |          |          |
2+30       0.0037      0.03  |Q     V  |          |          |          |
2+31       0.0038      0.03  |Q     V  |          |          |          |
2+32       0.0038      0.03  |Q      V |          |          |          |
2+33       0.0039      0.03  |Q      V |          |          |          |
2+34       0.0039      0.03  |Q      V |          |          |          |
2+35       0.0039      0.03  |Q      V |          |          |          |
2+36       0.0040      0.03  |Q      V |          |          |          |
2+37       0.0040      0.03  |Q      V |          |          |          |
2+38       0.0040      0.03  |Q      V |          |          |          |
2+39       0.0041      0.03  |Q      V |          |          |          |
2+40       0.0041      0.03  |Q      V |          |          |          |
2+41       0.0041      0.03  |Q      V |          |          |          |
2+42       0.0042      0.03  |Q      V |          |          |          |
2+43       0.0042      0.03  |Q      V |          |          |          |
2+44       0.0043      0.03  |Q      V |          |          |          |
2+45       0.0043      0.03  |Q       V|          |          |          |
2+46       0.0043      0.03  |Q       V|          |          |          |
2+47       0.0044      0.03  |Q       V|          |          |          |
2+48       0.0044      0.03  |Q       V|          |          |          |
2+49       0.0045      0.03  |Q       V|          |          |          |
2+50       0.0045      0.03  |Q       V|          |          |          |
2+51       0.0045      0.03  |Q       V|          |          |          |
2+52       0.0046      0.03  |Q       V|          |          |          |
2+53       0.0046      0.03  |Q       V|          |          |          |
2+54       0.0047      0.03  | Q      V|          |          |          |
2+55       0.0047      0.03  | Q      V|          |          |          |
2+56       0.0048      0.03  | Q       V          |          |          |
2+57       0.0048      0.03  | Q       V          |          |          |
2+58       0.0049      0.03  | Q       V          |          |          |
2+59       0.0049      0.03  | Q       V          |          |          |
3+ 0       0.0049      0.03  | Q       V          |          |          |
3+ 1       0.0050      0.03  | Q       V          |          |          |
3+ 2       0.0050      0.03  | Q       V          |          |          |
3+ 3       0.0051      0.03  | Q       V          |          |          |
3+ 4       0.0051      0.03  | Q       V          |          |          |
3+ 5       0.0052      0.03  | Q       V          |          |          |
3+ 6       0.0052      0.04  | Q       |V         |          |          |
3+ 7       0.0053      0.04  | Q       |V         |          |          |
3+ 8       0.0053      0.04  | Q       |V         |          |          |
```


3+ 9 0.0054 0.04
3+10 0.0054 0.04
3+11 0.0055 0.04
3+12 0.0055 0.04
3+13 0.0056 0.04
3+14 0.0056 0.04
3+15 0.0057 0.04
3+16 0.0057 0.04
3+17 0.0058 0.04
3+18 0.0059 0.04
3+19 0.0059 0.04
3+20 0.0060 0.04
3+21 0.0060 0.04
3+22 0.0061 0.04
3+23 0.0061 0.04
3+24 0.0062 0.05
3+25 0.0063 0.05
3+26 0.0063 0.05
3+27 0.0064 0.05
3+28 0.0065 0.05
3+29 0.0065 0.05
3+30 0.0066 0.05
3+31 0.0067 0.05
3+32 0.0067 0.05
3+33 0.0068 0.05
3+34 0.0069 0.05
3+35 0.0070 0.05
3+36 0.0070 0.06
3+37 0.0071 0.06
3+38 0.0072 0.06
3+39 0.0073 0.06
3+40 0.0074 0.06
3+41 0.0075 0.07
3+42 0.0076 0.07
3+43 0.0077 0.07
3+44 0.0078 0.07
3+45 0.0079 0.07
3+46 0.0080 0.08
3+47 0.0081 0.08
3+48 0.0082 0.08
3+49 0.0083 0.09
3+50 0.0084 0.09
3+51 0.0086 0.09
3+52 0.0087 0.10
3+53 0.0088 0.11
3+54 0.0090 0.12
3+55 0.0092 0.13
3+56 0.0094 0.14
3+57 0.0096 0.16
3+58 0.0098 0.17



```
4+49       0.0171      0.03  |Q        |         |         |     V   |
4+50       0.0171      0.03  |Q        |         |         |     V   |
4+51       0.0172      0.03  |Q        |         |         |     V   |
4+52       0.0172      0.02  |Q        |         |         |     V   |
4+53       0.0172      0.02  |Q        |         |         |     V   |
4+54       0.0173      0.02  |Q        |         |         |     V   |
4+55       0.0173      0.02  |Q        |         |         |     V   |
4+56       0.0173      0.02  |Q        |         |         |     V   |
4+57       0.0174      0.02  |Q        |         |         |     V   |
4+58       0.0174      0.02  |Q        |         |         |     V   |
4+59       0.0174      0.02  |Q        |         |         |     V   |
5+ 0       0.0175      0.02  |Q        |         |         |     V   |
5+ 1       0.0175      0.02  |Q        |         |         |     V   |
5+ 2       0.0175      0.02  |Q        |         |         |     V   |
5+ 3       0.0176      0.02  |Q        |         |         |     V   |
5+ 4       0.0176      0.02  |Q        |         |         |      V  |
5+ 5       0.0176      0.02  |Q        |         |         |      V  |
5+ 6       0.0177      0.02  |Q        |         |         |      V  |
5+ 7       0.0177      0.02  |Q        |         |         |      V  |
5+ 8       0.0177      0.02  |Q        |         |         |      V  |
5+ 9       0.0177      0.02  |Q        |         |         |      V  |
5+10       0.0178      0.02  |Q        |         |         |      V  |
5+11       0.0178      0.02  |Q        |         |         |      V  |
5+12       0.0178      0.02  |Q        |         |         |      V  |
5+13       0.0178      0.02  |Q        |         |         |      V  |
5+14       0.0179      0.02  |Q        |         |         |      V  |
5+15       0.0179      0.02  |Q        |         |         |      V  |
5+16       0.0179      0.02  |Q        |         |         |      V  |
5+17       0.0180      0.02  |Q        |         |         |      V  |
5+18       0.0180      0.02  |Q        |         |         |      V  |
5+19       0.0180      0.02  |Q        |         |         |      V  |
5+20       0.0180      0.02  |Q        |         |         |      V  |
5+21       0.0181      0.02  |Q        |         |         |       V |
5+22       0.0181      0.02  |Q        |         |         |       V |
5+23       0.0181      0.02  |Q        |         |         |       V |
5+24       0.0181      0.02  |Q        |         |         |       V |
5+25       0.0182      0.02  |Q        |         |         |       V |
5+26       0.0182      0.02  |Q        |         |         |       V |
5+27       0.0182      0.02  |Q        |         |         |       V |
5+28       0.0182      0.02  |Q        |         |         |       V |
5+29       0.0183      0.02  |Q        |         |         |       V |
5+30       0.0183      0.02  |Q        |         |         |       V |
5+31       0.0183      0.02  |Q        |         |         |       V |
5+32       0.0183      0.02  |Q        |         |         |       V |
5+33       0.0183      0.02  |Q        |         |         |       V |
5+34       0.0184      0.02  |Q        |         |         |       V |
5+35       0.0184      0.02  |Q        |         |         |       V |
5+36       0.0184      0.02  |Q        |         |         |       V |
5+37       0.0184      0.02  |Q        |         |         |       V |
5+38       0.0185      0.02  |Q        |         |         |       V |
```

```
    5+39       0.0185      0.02  |Q        |         |         |        V |
    5+40       0.0185      0.02  |Q        |         |         |        V |
    5+41       0.0185      0.02  |Q        |         |         |         V|
    5+42       0.0186      0.02  |Q        |         |         |         V|
    5+43       0.0186      0.02  |Q        |         |         |         V|
    5+44       0.0186      0.02  |Q        |         |         |         V|
    5+45       0.0186      0.02  |Q        |         |         |         V|
    5+46       0.0186      0.02  Q         |         |         |         V|
    5+47       0.0187      0.02  Q         |         |         |         V|
    5+48       0.0187      0.02  Q         |         |         |         V|
    5+49       0.0187      0.02  Q         |         |         |         V|
    5+50       0.0187      0.02  Q         |         |         |         V|
    5+51       0.0187      0.01  Q         |         |         |         V|
    5+52       0.0188      0.01  Q         |         |         |         V|
    5+53       0.0188      0.01  Q         |         |         |         V|
    5+54       0.0188      0.01  Q         |         |         |         V|
    5+55       0.0188      0.01  Q         |         |         |         V|
    5+56       0.0188      0.01  Q         |         |         |         V|
    5+57       0.0189      0.01  Q         |         |         |         V|
    5+58       0.0189      0.01  Q         |         |         |         V|
    5+59       0.0189      0.01  Q         |         |         |         V|
    6+ 0       0.0189      0.01  Q         |         |         |         V|
    6+ 1       0.0189      0.01  Q         |         |         |         V|
    6+ 2       0.0190      0.01  Q         |         |         |         V|
    6+ 3       0.0190      0.01  Q         |         |         |         V|
    6+ 4       0.0190      0.01  Q         |         |         |          V
---------------------------------------------------------------------------
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.041 to Point/Station        2.042
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________________
Upstream point/station elevation =   575.000(Ft.)
Downstream point/station elevation =   570.800(Ft.)
Pipe length  =    21.00(Ft.) Slope =   0.2000  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.620(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.620(CFS)
Normal flow depth in pipe =    2.03(In.)
Flow top width inside pipe =    5.68(In.)
Critical Depth =    4.80(In.)
Pipe flow velocity =     10.59(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =     4.63 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.042 to Point/Station        2.042
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
Calculated TC of    4.629 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      7.377(In/Hr) for a   100.0 year storm
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
[UNDISTURBED NATURAL TERRAIN                 ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.350
Time of concentration =     4.63 min.
Rainfall intensity =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.517  CA =      0.109
Subarea runoff =      0.181(CFS) for      0.070(Ac.)
Total runoff =      0.800(CFS)  Total area =       0.210(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.042 to Point/Station        2.051
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   570.800(Ft.)
Downstream point/station elevation =   561.000(Ft.)
Pipe length  =    47.00(Ft.) Slope =   0.2085  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.800(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.800(CFS)
Normal flow depth in pipe =    2.30(In.)
Flow top width inside pipe =    5.84(In.)
Critical Depth =    5.33(In.)
Pipe flow velocity =     11.54(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =     4.70 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.051 to Point/Station        2.052
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      1.440(CFS)
Depth of flow =   0.095(Ft.), Average velocity =   3.198(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
```

```
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2             50.00              0.00
        3            100.00              1.00
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =      1.440(CFS)
  '     '        flow top width =      9.491(Ft.)
  '     '    velocity=    3.198(Ft/s)
  '     '        area =      0.450(Sq.Ft)
  '     '        Froude number =     2.587

Upstream point elevation =   561.000(Ft.)
Downstream point elevation =   524.000(Ft.)
Flow length =   112.000(Ft.)
Travel time  =    0.58 min.
Time of concentration =    5.28 min.
Depth of flow =   0.095(Ft.)
Average velocity =   3.198(Ft/s)
Total irregular channel flow =     1.440(CFS)
Irregular channel normal depth above invert elev. =   0.095(Ft.)
Average velocity of channel(s) =   3.198(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      7.122(In/Hr) for a   100.0 year storm
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
[UNDISTURBED NATURAL TERRAIN                 ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.350
Rainfall intensity =      7.122(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.400  CA =      0.280
Subarea runoff =      1.194(CFS) for      0.490(Ac.)
Total runoff =      1.994(CFS)  Total area =       0.700(Ac.)
Depth of flow =   0.107(Ft.), Average velocity =   3.469(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.052 to Point/Station        2.025
**** CONFLUENCE OF MAIN STREAMS ****
_________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.700(Ac.)
Runoff from this stream =      1.994(CFS)
Time of concentration =    5.28 min.
```

```
Rainfall intensity =     7.122(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.061 to Point/Station        2.062
**** 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
[MEDIUM DENSITY RESIDENTIAL                  ]
(10.9 DU/A or Less      )
Impervious value, Ai = 0.450
Sub-Area C Value = 0.600
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =  582.000(Ft.)
Lowest elevation =  562.500(Ft.)
Elevation difference =   19.500(Ft.) Slope = 19.500 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of  19.50 %, in a development type of
 10.9 DU/A or Less
In Accordance With Table 3-2
Initial Area Time of Concentration =   4.50 minutes
 (for slope value of  10.00 %)
Calculated TC of    4.500 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.600
Subarea runoff =      2.346(CFS)
Total initial stream area =        0.530(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.062 to Point/Station        2.063
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________________
Upstream point elevation =   562.500(Ft.)
Downstream point elevation =   558.700(Ft.)
Channel length thru subarea  =    38.000(Ft.)
Channel base width      =   16.000(Ft.)
Slope or 'Z' of left channel bank =   0.333
Slope or 'Z' of right channel bank =  50.000
Manning's 'N'    = 0.015
Maximum depth of channel  =    0.500(Ft.)
Flow(q) thru subarea =      2.346(CFS)
Depth of flow =   0.040(Ft.), Average velocity =   3.495(Ft/s)
Channel flow top width =   17.988(Ft.)
```

```
Flow Velocity =    3.49(Ft/s)
Travel time  =    0.18 min.
Time of concentration =    4.68 min.
Critical depth =      0.084(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.063 to Point/Station        2.064
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   558.700(Ft.)
Downstream point/station elevation =   547.500(Ft.)
Pipe length  =   245.00(Ft.) Slope =   0.0457  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.346(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.346(CFS)
Normal flow depth in pipe =    5.36(In.)
Flow top width inside pipe =    8.84(In.)
Critical Depth =    8.16(In.)
Pipe flow velocity =      8.56(Ft/s)
Travel time through pipe =    0.48 min.
Time of concentration (TC) =     5.16 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.064 to Point/Station        2.071
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   0.167(Ft.), Average velocity =   1.688(Ft/s)
        ******* Irregular Channel Data **********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2             50.00              0.00
        3            100.00              1.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =      2.346(CFS)
  '     '        flow top width =     16.674(Ft.)
  '     '    velocity=    1.688(Ft/s)
  '     '        area =      1.390(Sq.Ft)
  '     '        Froude number =     1.030

Upstream point elevation =   547.500(Ft.)
Downstream point elevation =   545.200(Ft.)
Flow length =    53.000(Ft.)
Travel time  =    0.52 min.
Time of concentration =    5.68 min.
Depth of flow =   0.167(Ft.)
```

Average velocity = 1.688(Ft/s)
Total irregular channel flow = 2.346(CFS)
Irregular channel normal depth above invert elev. = 0.167(Ft.)
Average velocity of channel(s) = 1.688(Ft/s)

++
Process from Point/Station 2.064 to Point/Station 2.071
**** 6 HOUR HYDROGRAPH ****
_____
++
Hydrograph Data - Section 6, San Diego County Hydrology manual, June 2003

Time of Concentration = 5.68
Basin Area = 0.53 Acres
6 Hour Rainfall = 2.800 Inches
Runoff Coefficient = 0.60
Peak Discharge = 2.35 CFS

Time (Min)	Discharge (CFS)
0	0.000
5	0.053
10	0.054
15	0.055
20	0.055
25	0.056
30	0.057
35	0.058
40	0.058
45	0.060
50	0.060
55	0.062
60	0.062
65	0.064
70	0.065
75	0.066
80	0.067
85	0.069
90	0.070
95	0.072
100	0.073
105	0.075
110	0.077
115	0.079
120	0.080
125	0.083
130	0.085
135	0.088
140	0.090
145	0.094

150	0.096
155	0.101
160	0.103
165	0.109
170	0.112
175	0.119
180	0.123
185	0.131
190	0.137
195	0.148
200	0.155
205	0.172
210	0.183
215	0.210
220	0.227
225	0.278
230	0.316
235	0.465
240	0.654
245	2.346
250	0.373
255	0.249
260	0.195
265	0.163
270	0.142
275	0.127
280	0.115
285	0.106
290	0.098
295	0.092
300	0.086
305	0.082
310	0.078
315	0.074
320	0.071
325	0.068
330	0.066
335	0.063
340	0.061
345	0.059
350	0.057
355	0.056
360	0.054
365	0.053

++

6 - H O U R S T O R M

R u n o f f H y d r o g r a p h

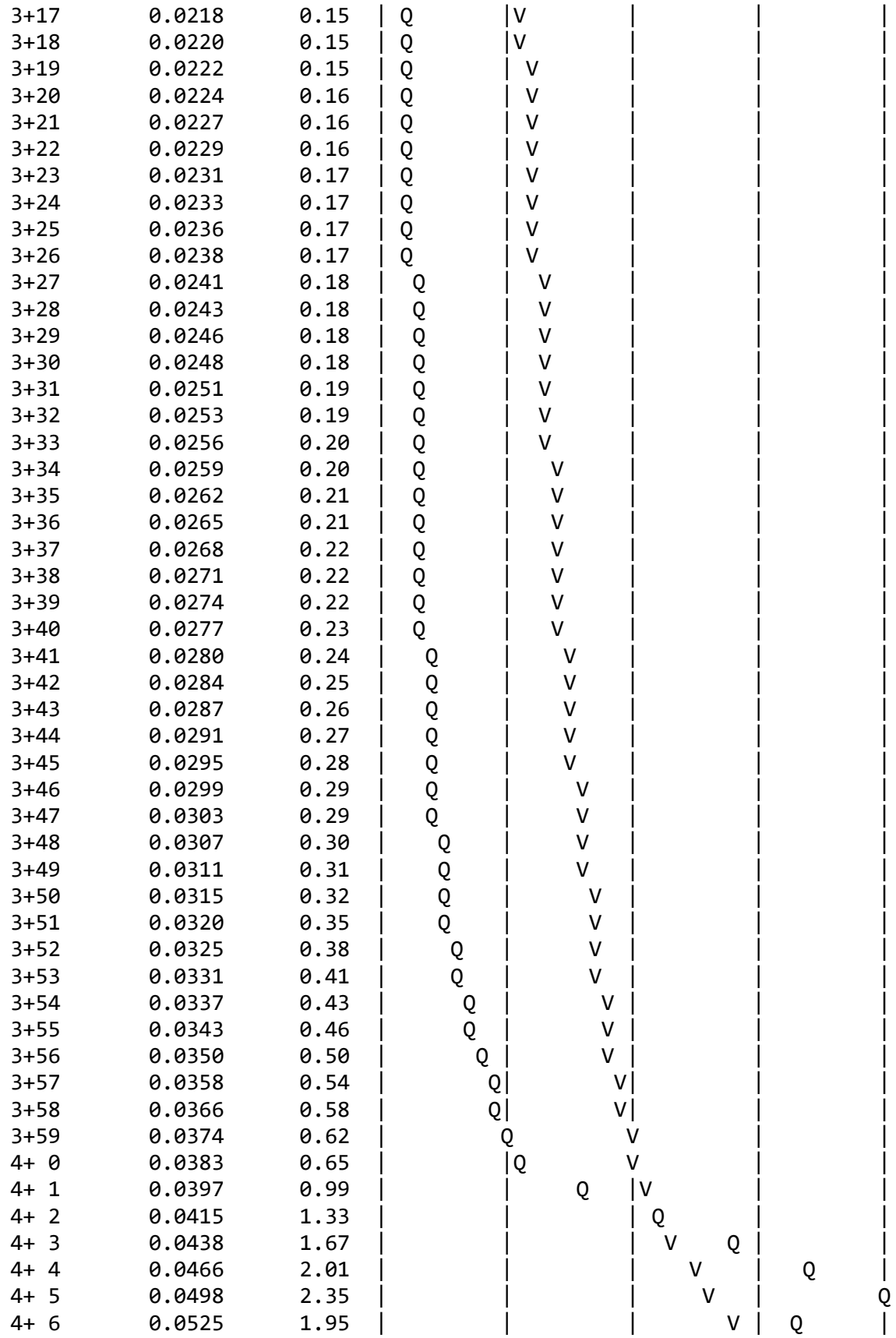
Hydrograph in 1 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	0.6	1.2	1.8	2.3
0+ 0	0.0000	0.00	Q				
0+ 1	0.0000	0.01	Q				
0+ 2	0.0000	0.02	Q				
0+ 3	0.0001	0.03	Q				
0+ 4	0.0001	0.04	Q				
0+ 5	0.0002	0.05	Q				
0+ 6	0.0003	0.05	Q				
0+ 7	0.0004	0.05	Q				
0+ 8	0.0004	0.05	Q				
0+ 9	0.0005	0.05	Q				
0+10	0.0006	0.05	Q				
0+11	0.0007	0.05	Q				
0+12	0.0007	0.05	Q				
0+13	0.0008	0.05	Q				
0+14	0.0009	0.05	Q				
0+15	0.0010	0.05	Q				
0+16	0.0010	0.05	Q				
0+17	0.0011	0.05	Q				
0+18	0.0012	0.05	Q				
0+19	0.0013	0.05	Q				
0+20	0.0013	0.06	Q				
0+21	0.0014	0.06	Q				
0+22	0.0015	0.06	Q				
0+23	0.0016	0.06	Q				
0+24	0.0016	0.06	Q				
0+25	0.0017	0.06	Q				
0+26	0.0018	0.06	Q				
0+27	0.0019	0.06	QV				
0+28	0.0020	0.06	QV				
0+29	0.0020	0.06	QV				
0+30	0.0021	0.06	QV				
0+31	0.0022	0.06	QV				
0+32	0.0023	0.06	QV				
0+33	0.0023	0.06	QV				
0+34	0.0024	0.06	QV				
0+35	0.0025	0.06	QV				
0+36	0.0026	0.06	QV				
0+37	0.0027	0.06	QV				
0+38	0.0027	0.06	QV				
0+39	0.0028	0.06	QV				
0+40	0.0029	0.06	QV				
0+41	0.0030	0.06	|Q				
0+42	0.0031	0.06	|Q				
0+43	0.0031	0.06	|Q				
0+44	0.0032	0.06	|Q				
0+45	0.0033	0.06	|Q				
0+46	0.0034	0.06	|Q				

```
0+47       0.0035      0.06  |Q         |          |          |          |
0+48       0.0036      0.06  |Q         |          |          |          |
0+49       0.0036      0.06  |Q         |          |          |          |
0+50       0.0037      0.06  |QV        |          |          |          |
0+51       0.0038      0.06  |QV        |          |          |          |
0+52       0.0039      0.06  |QV        |          |          |          |
0+53       0.0040      0.06  |QV        |          |          |          |
0+54       0.0041      0.06  |QV        |          |          |          |
0+55       0.0041      0.06  |QV        |          |          |          |
0+56       0.0042      0.06  |QV        |          |          |          |
0+57       0.0043      0.06  |QV        |          |          |          |
0+58       0.0044      0.06  |QV        |          |          |          |
0+59       0.0045      0.06  |QV        |          |          |          |
1+ 0       0.0046      0.06  |QV        |          |          |          |
1+ 1       0.0047      0.06  |QV        |          |          |          |
1+ 2       0.0047      0.06  |QV        |          |          |          |
1+ 3       0.0048      0.06  |QV        |          |          |          |
1+ 4       0.0049      0.06  |QV        |          |          |          |
1+ 5       0.0050      0.06  |QV        |          |          |          |
1+ 6       0.0051      0.06  |QV        |          |          |          |
1+ 7       0.0052      0.06  |QV        |          |          |          |
1+ 8       0.0053      0.06  |QV        |          |          |          |
1+ 9       0.0054      0.06  |QV        |          |          |          |
1+10       0.0055      0.06  |QV        |          |          |          |
1+11       0.0055      0.07  |QV        |          |          |          |
1+12       0.0056      0.07  |Q V       |          |          |          |
1+13       0.0057      0.07  |Q V       |          |          |          |
1+14       0.0058      0.07  |Q V       |          |          |          |
1+15       0.0059      0.07  |Q V       |          |          |          |
1+16       0.0060      0.07  |Q V       |          |          |          |
1+17       0.0061      0.07  |Q V       |          |          |          |
1+18       0.0062      0.07  |Q V       |          |          |          |
1+19       0.0063      0.07  |Q V       |          |          |          |
1+20       0.0064      0.07  |Q V       |          |          |          |
1+21       0.0065      0.07  |Q V       |          |          |          |
1+22       0.0066      0.07  |Q V       |          |          |          |
1+23       0.0066      0.07  |Q V       |          |          |          |
1+24       0.0067      0.07  |Q V       |          |          |          |
1+25       0.0068      0.07  |Q V       |          |          |          |
1+26       0.0069      0.07  |Q V       |          |          |          |
1+27       0.0070      0.07  |Q V       |          |          |          |
1+28       0.0071      0.07  |Q V       |          |          |          |
1+29       0.0072      0.07  |Q V       |          |          |          |
1+30       0.0073      0.07  |Q V       |          |          |          |
1+31       0.0074      0.07  |Q  V      |          |          |          |
1+32       0.0075      0.07  |Q  V      |          |          |          |
1+33       0.0076      0.07  |Q  V      |          |          |          |
1+34       0.0077      0.07  |Q  V      |          |          |          |
1+35       0.0078      0.07  |Q  V      |          |          |          |
1+36       0.0079      0.07  |Q  V      |          |          |          |
```

1+37	0.0080	0.07	|Q V |	|	|	|
1+38	0.0081	0.07	|Q V |	|	|	|
1+39	0.0082	0.07	|Q V |	|	|	|
1+40	0.0083	0.07	|Q V |	|	|	|
1+41	0.0084	0.07	|Q V |	|	|	|
1+42	0.0085	0.07	|Q V |	|	|	|
1+43	0.0086	0.07	|Q V |	|	|	|
1+44	0.0087	0.07	|Q V |	|	|	|
1+45	0.0088	0.08	|Q V |	|	|	|
1+46	0.0089	0.08	|Q V |	|	|	|
1+47	0.0090	0.08	|Q V |	|	|	|
1+48	0.0091	0.08	|Q V |	|	|	|
1+49	0.0092	0.08	|Q V |	|	|	|
1+50	0.0093	0.08	|Q V |	|	|	|
1+51	0.0095	0.08	|Q V |	|	|	|
1+52	0.0096	0.08	|Q V |	|	|	|
1+53	0.0097	0.08	|Q V |	|	|	|
1+54	0.0098	0.08	|Q V |	|	|	|
1+55	0.0099	0.08	|Q V |	|	|	|
1+56	0.0100	0.08	|Q V |	|	|	|
1+57	0.0101	0.08	|Q V |	|	|	|
1+58	0.0102	0.08	|Q V |	|	|	|
1+59	0.0103	0.08	|Q V |	|	|	|
2+ 0	0.0104	0.08	|Q V |	|	|	|
2+ 1	0.0105	0.08	|Q V |	|	|	|
2+ 2	0.0107	0.08	|Q V |	|	|	|
2+ 3	0.0108	0.08	|Q V |	|	|	|
2+ 4	0.0109	0.08	|Q V |	|	|	|
2+ 5	0.0110	0.08	|Q V |	|	|	|
2+ 6	0.0111	0.08	|Q V |	|	|	|
2+ 7	0.0112	0.08	|Q V |	|	|	|
2+ 8	0.0113	0.08	|Q V |	|	|	|
2+ 9	0.0115	0.08	|Q V |	|	|	|
2+10	0.0116	0.08	|Q V |	|	|	|
2+11	0.0117	0.09	|Q V |	|	|	|
2+12	0.0118	0.09	|Q V |	|	|	|
2+13	0.0119	0.09	|Q V |	|	|	|
2+14	0.0121	0.09	|Q V |	|	|	|
2+15	0.0122	0.09	|Q V |	|	|	|
2+16	0.0123	0.09	|Q V |	|	|	|
2+17	0.0124	0.09	|Q V |	|	|	|
2+18	0.0125	0.09	|Q V |	|	|	|
2+19	0.0127	0.09	|Q V |	|	|	|
2+20	0.0128	0.09	|Q V |	|	|	|
2+21	0.0129	0.09	|Q V |	|	|	|
2+22	0.0130	0.09	|Q V |	|	|	|
2+23	0.0132	0.09	|Q V |	|	|	|
2+24	0.0133	0.09	|Q V |	|	|	|
2+25	0.0134	0.09	|Q V |	|	|	|
2+26	0.0136	0.09	|Q V |	|	|	|

```
2+27       0.0137      0.09  |Q     V  |          |          |          |
2+28       0.0138      0.10  |Q     V  |          |          |          |
2+29       0.0140      0.10  |Q     V  |          |          |          |
2+30       0.0141      0.10  |Q     V  |          |          |          |
2+31       0.0142      0.10  |Q     V  |          |          |          |
2+32       0.0144      0.10  |Q     V  |          |          |          |
2+33       0.0145      0.10  |Q     V  |          |          |          |
2+34       0.0146      0.10  |Q     V  |          |          |          |
2+35       0.0148      0.10  |Q     V  |          |          |          |
2+36       0.0149      0.10  |Q      V |          |          |          |
2+37       0.0150      0.10  |Q      V |          |          |          |
2+38       0.0152      0.10  |Q      V |          |          |          |
2+39       0.0153      0.10  |Q      V |          |          |          |
2+40       0.0155      0.10  |Q      V |          |          |          |
2+41       0.0156      0.10  |Q      V |          |          |          |
2+42       0.0158      0.11  |Q      V |          |          |          |
2+43       0.0159      0.11  |Q      V |          |          |          |
2+44       0.0160      0.11  |Q      V |          |          |          |
2+45       0.0162      0.11  |Q      V |          |          |          |
2+46       0.0164      0.11  |Q      V |          |          |          |
2+47       0.0165      0.11  |Q      V |          |          |          |
2+48       0.0167      0.11  |Q       V|          |          |          |
2+49       0.0168      0.11  |Q       V|          |          |          |
2+50       0.0170      0.11  |Q       V|          |          |          |
2+51       0.0171      0.11  |Q       V|          |          |          |
2+52       0.0173      0.11  |Q       V|          |          |          |
2+53       0.0174      0.12  |Q       V|          |          |          |
2+54       0.0176      0.12  | Q      V|          |          |          |
2+55       0.0178      0.12  | Q      V|          |          |          |
2+56       0.0179      0.12  | Q      V|          |          |          |
2+57       0.0181      0.12  | Q      V|          |          |          |
2+58       0.0183      0.12  | Q      V|          |          |          |
2+59       0.0184      0.12  | Q      V|          |          |          |
3+ 0       0.0186      0.12  | Q       V          |          |          |
3+ 1       0.0188      0.12  | Q       V          |          |          |
3+ 2       0.0189      0.13  | Q       V          |          |          |
3+ 3       0.0191      0.13  | Q       V          |          |          |
3+ 4       0.0193      0.13  | Q       V          |          |          |
3+ 5       0.0195      0.13  | Q       V          |          |          |
3+ 6       0.0197      0.13  | Q       V          |          |          |
3+ 7       0.0198      0.13  | Q       V          |          |          |
3+ 8       0.0200      0.13  | Q       V          |          |          |
3+ 9       0.0202      0.14  | Q       V          |          |          |
3+10       0.0204      0.14  | Q       |V         |          |          |
3+11       0.0206      0.14  | Q       |V         |          |          |
3+12       0.0208      0.14  | Q       |V         |          |          |
3+13       0.0210      0.14  | Q       |V         |          |          |
3+14       0.0212      0.15  | Q       |V         |          |          |
3+15       0.0214      0.15  | Q       |V         |          |          |
3+16       0.0216      0.15  | Q       |V         |          |          |
```


3+17 0.0218 0.15
3+18 0.0220 0.15
3+19 0.0222 0.15
3+20 0.0224 0.16
3+21 0.0227 0.16
3+22 0.0229 0.16
3+23 0.0231 0.17
3+24 0.0233 0.17
3+25 0.0236 0.17
3+26 0.0238 0.17
3+27 0.0241 0.18
3+28 0.0243 0.18
3+29 0.0246 0.18
3+30 0.0248 0.18
3+31 0.0251 0.19
3+32 0.0253 0.19
3+33 0.0256 0.20
3+34 0.0259 0.20
3+35 0.0262 0.21
3+36 0.0265 0.21
3+37 0.0268 0.22
3+38 0.0271 0.22
3+39 0.0274 0.22
3+40 0.0277 0.23
3+41 0.0280 0.24
3+42 0.0284 0.25
3+43 0.0287 0.26
3+44 0.0291 0.27
3+45 0.0295 0.28
3+46 0.0299 0.29
3+47 0.0303 0.29
3+48 0.0307 0.30
3+49 0.0311 0.31
3+50 0.0315 0.32
3+51 0.0320 0.35
3+52 0.0325 0.38
3+53 0.0331 0.41
3+54 0.0337 0.43
3+55 0.0343 0.46
3+56 0.0350 0.50
3+57 0.0358 0.54
3+58 0.0366 0.58
3+59 0.0374 0.62
4+ 0 0.0383 0.65
4+ 1 0.0397 0.99
4+ 2 0.0415 1.33
4+ 3 0.0438 1.67
4+ 4 0.0466 2.01
4+ 5 0.0498 2.35
4+ 6 0.0525 1.95

```
4+ 7       0.0546      1.56  |          |          |     Q  V|          |
4+ 8       0.0562      1.16  |          |        Q|         V          |
4+ 9       0.0573      0.77  |          |  Q       |         V          |
4+10       0.0578      0.37  |     Q    |          |          |V        |
4+11       0.0583      0.35  |    Q     |          |          |V        |
4+12       0.0587      0.32  |    Q     |          |          |V        |
4+13       0.0592      0.30  |    Q     |          |          |V        |
4+14       0.0595      0.27  |   Q      |          |          | V       |
4+15       0.0599      0.25  |   Q      |          |          | V       |
4+16       0.0602      0.24  |   Q      |          |          | V       |
4+17       0.0605      0.23  |  Q       |          |          | V       |
4+18       0.0608      0.22  |  Q       |          |          | V       |
4+19       0.0611      0.21  |  Q       |          |          |  V      |
4+20       0.0614      0.20  |  Q       |          |          |  V      |
4+21       0.0616      0.19  |  Q       |          |          |  V      |
4+22       0.0619      0.18  |  Q       |          |          |  V      |
4+23       0.0621      0.18  |  Q       |          |          |  V      |
4+24       0.0624      0.17  | Q        |          |          |  V      |
4+25       0.0626      0.16  | Q        |          |          |  V      |
4+26       0.0628      0.16  | Q        |          |          |  V      |
4+27       0.0630      0.15  | Q        |          |          |   V     |
4+28       0.0632      0.15  | Q        |          |          |   V     |
4+29       0.0634      0.15  | Q        |          |          |   V     |
4+30       0.0636      0.14  | Q        |          |          |   V     |
4+31       0.0638      0.14  | Q        |          |          |   V     |
4+32       0.0640      0.14  | Q        |          |          |   V     |
4+33       0.0642      0.13  | Q        |          |          |   V     |
4+34       0.0644      0.13  | Q        |          |          |   V     |
4+35       0.0645      0.13  | Q        |          |          |   V     |
4+36       0.0647      0.12  | Q        |          |          |   V     |
4+37       0.0649      0.12  | Q        |          |          |    V    |
4+38       0.0650      0.12  | Q        |          |          |    V    |
4+39       0.0652      0.12  | Q        |          |          |    V    |
4+40       0.0654      0.12  |Q         |          |          |    V    |
4+41       0.0655      0.11  |Q         |          |          |    V    |
4+42       0.0657      0.11  |Q         |          |          |    V    |
4+43       0.0658      0.11  |Q         |          |          |    V    |
4+44       0.0660      0.11  |Q         |          |          |    V    |
4+45       0.0661      0.11  |Q         |          |          |    V    |
4+46       0.0663      0.10  |Q         |          |          |    V    |
4+47       0.0664      0.10  |Q         |          |          |    V    |
4+48       0.0665      0.10  |Q         |          |          |    V    |
4+49       0.0667      0.10  |Q         |          |          |     V   |
4+50       0.0668      0.10  |Q         |          |          |     V   |
4+51       0.0669      0.10  |Q         |          |          |     V   |
4+52       0.0671      0.10  |Q         |          |          |     V   |
4+53       0.0672      0.09  |Q         |          |          |     V   |
4+54       0.0673      0.09  |Q         |          |          |     V   |
4+55       0.0675      0.09  |Q         |          |          |     V   |
4+56       0.0676      0.09  |Q         |          |          |     V   |
```

```
4+57       0.0677      0.09  |Q        |         |         |     V   |
4+58       0.0678      0.09  |Q        |         |         |     V   |
4+59       0.0680      0.09  |Q        |         |         |     V   |
5+ 0       0.0681      0.09  |Q        |         |         |     V   |
5+ 1       0.0682      0.09  |Q        |         |         |     V   |
5+ 2       0.0683      0.08  |Q        |         |         |     V   |
5+ 3       0.0684      0.08  |Q        |         |         |      V  |
5+ 4       0.0685      0.08  |Q        |         |         |      V  |
5+ 5       0.0686      0.08  |Q        |         |         |      V  |
5+ 6       0.0688      0.08  |Q        |         |         |      V  |
5+ 7       0.0689      0.08  |Q        |         |         |      V  |
5+ 8       0.0690      0.08  |Q        |         |         |      V  |
5+ 9       0.0691      0.08  |Q        |         |         |      V  |
5+10       0.0692      0.08  |Q        |         |         |      V  |
5+11       0.0693      0.08  |Q        |         |         |      V  |
5+12       0.0694      0.08  |Q        |         |         |      V  |
5+13       0.0695      0.08  |Q        |         |         |      V  |
5+14       0.0696      0.07  |Q        |         |         |      V  |
5+15       0.0697      0.07  |Q        |         |         |      V  |
5+16       0.0698      0.07  |Q        |         |         |      V  |
5+17       0.0699      0.07  |Q        |         |         |      V  |
5+18       0.0700      0.07  |Q        |         |         |      V  |
5+19       0.0701      0.07  |Q        |         |         |      V  |
5+20       0.0702      0.07  |Q        |         |         |      V  |
5+21       0.0703      0.07  |Q        |         |         |       V |
5+22       0.0704      0.07  |Q        |         |         |       V |
5+23       0.0705      0.07  |Q        |         |         |       V |
5+24       0.0706      0.07  |Q        |         |         |       V |
5+25       0.0707      0.07  |Q        |         |         |       V |
5+26       0.0708      0.07  |Q        |         |         |       V |
5+27       0.0709      0.07  |Q        |         |         |       V |
5+28       0.0710      0.07  |Q        |         |         |       V |
5+29       0.0711      0.07  |Q        |         |         |       V |
5+30       0.0711      0.07  |Q        |         |         |       V |
5+31       0.0712      0.07  |Q        |         |         |       V |
5+32       0.0713      0.06  |Q        |         |         |       V |
5+33       0.0714      0.06  |Q        |         |         |       V |
5+34       0.0715      0.06  |Q        |         |         |       V |
5+35       0.0716      0.06  |Q        |         |         |       V |
5+36       0.0717      0.06  |Q        |         |         |       V |
5+37       0.0718      0.06  |Q        |         |         |       V |
5+38       0.0718      0.06  |Q        |         |         |       V |
5+39       0.0719      0.06  |Q        |         |         |       V |
5+40       0.0720      0.06  |Q        |         |         |       V |
5+41       0.0721      0.06  |Q        |         |         |       V |
5+42       0.0722      0.06  |Q        |         |         |        V|
5+43       0.0723      0.06  |Q        |         |         |        V|
5+44       0.0723      0.06  |Q        |         |         |        V|
5+45       0.0724      0.06  |Q        |         |         |        V|
5+46       0.0725      0.06  |Q        |         |         |        V|
```

```
    5+47       0.0726      0.06  Q         |         |         |         V|
    5+48       0.0727      0.06  Q         |         |         |         V|
    5+49       0.0727      0.06  Q         |         |         |         V|
    5+50       0.0728      0.06  Q         |         |         |         V|
    5+51       0.0729      0.06  Q         |         |         |         V|
    5+52       0.0730      0.06  Q         |         |         |         V|
    5+53       0.0731      0.06  Q         |         |         |         V|
    5+54       0.0731      0.06  Q         |         |         |         V|
    5+55       0.0732      0.06  Q         |         |         |         V|
    5+56       0.0733      0.06  Q         |         |         |         V|
    5+57       0.0734      0.05  Q         |         |         |         V|
    5+58       0.0734      0.05  Q         |         |         |         V|
    5+59       0.0735      0.05  Q         |         |         |         V|
    6+ 0       0.0736      0.05  Q         |         |         |         V|
    6+ 1       0.0737      0.05  Q         |         |         |         V|
    6+ 2       0.0737      0.05  Q         |         |         |         V|
    6+ 3       0.0738      0.05  Q         |         |         |         V|
    6+ 4       0.0739      0.05  Q         |         |         |         V|
    6+ 5       0.0740      0.05  Q         |         |         |          V
---------------------------------------------------------------------------

    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
    Process from Point/Station        2.071 to Point/Station        2.072
    **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
    ______________________________________________________________________
    Upstream point/station elevation =   545.200(Ft.)
    Downstream point/station elevation =   545.000(Ft.)
    Pipe length  =    18.00(Ft.) Slope =   0.0111  Manning's N = 0.013
    No. of pipes = 1  Required pipe flow  =     2.346(CFS)
    Nearest computed pipe diameter  =     12.00(In.)
    Calculated individual pipe flow  =     2.346(CFS)
    Normal flow depth in pipe =    6.87(In.)
    Flow top width inside pipe =   11.87(In.)
    Critical Depth =    7.87(In.)
    Pipe flow velocity =      5.04(Ft/s)
    Travel time through pipe =    0.06 min.
    Time of concentration (TC) =     5.74 min.


    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
    Process from Point/Station        2.072 to Point/Station        2.073
    **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
    ______________________________________________________________________
    Estimated mean flow rate at midpoint of channel =      2.467(CFS)
    Depth of flow =   0.122(Ft.), Average velocity =   3.295(Ft/s)
```

```
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2             50.00              0.00
        3            100.00              1.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =      2.467(CFS)
  '     '        flow top width =     12.235(Ft.)
  '     '    velocity=    3.295(Ft/s)
  '     '        area =      0.748(Sq.Ft)
  '     '        Froude number =     2.348

Upstream point elevation =   545.000(Ft.)
Downstream point elevation =   540.000(Ft.)
Flow length =    20.000(Ft.)
Travel time  =    0.10 min.
Time of concentration =    5.84 min.
Depth of flow =   0.122(Ft.)
Average velocity =   3.295(Ft/s)
Total irregular channel flow =     2.467(CFS)
Irregular channel normal depth above invert elev. =   0.122(Ft.)
Average velocity of channel(s) =   3.295(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      6.673(In/Hr) for a   100.0 year storm
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
[LOW DENSITY RESIDENTIAL                     ]
(2.0 DU/A or Less       )
Impervious value, Ai = 0.200
Sub-Area C Value = 0.460
Rainfall intensity =      6.673(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.574  CA =      0.373
Subarea runoff =      0.144(CFS) for      0.120(Ac.)
Total runoff =      2.490(CFS)  Total area =       0.650(Ac.)
Depth of flow =   0.123(Ft.), Average velocity =   3.303(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.073 to Point/Station        2.025
**** CONFLUENCE OF MAIN STREAMS ****
____________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      0.650(Ac.)
```

Runoff from this stream = 2.490(CFS)
Time of concentration = 5.84 min.
Rainfall intensity = 6.673(In/Hr)
Summary of stream data:

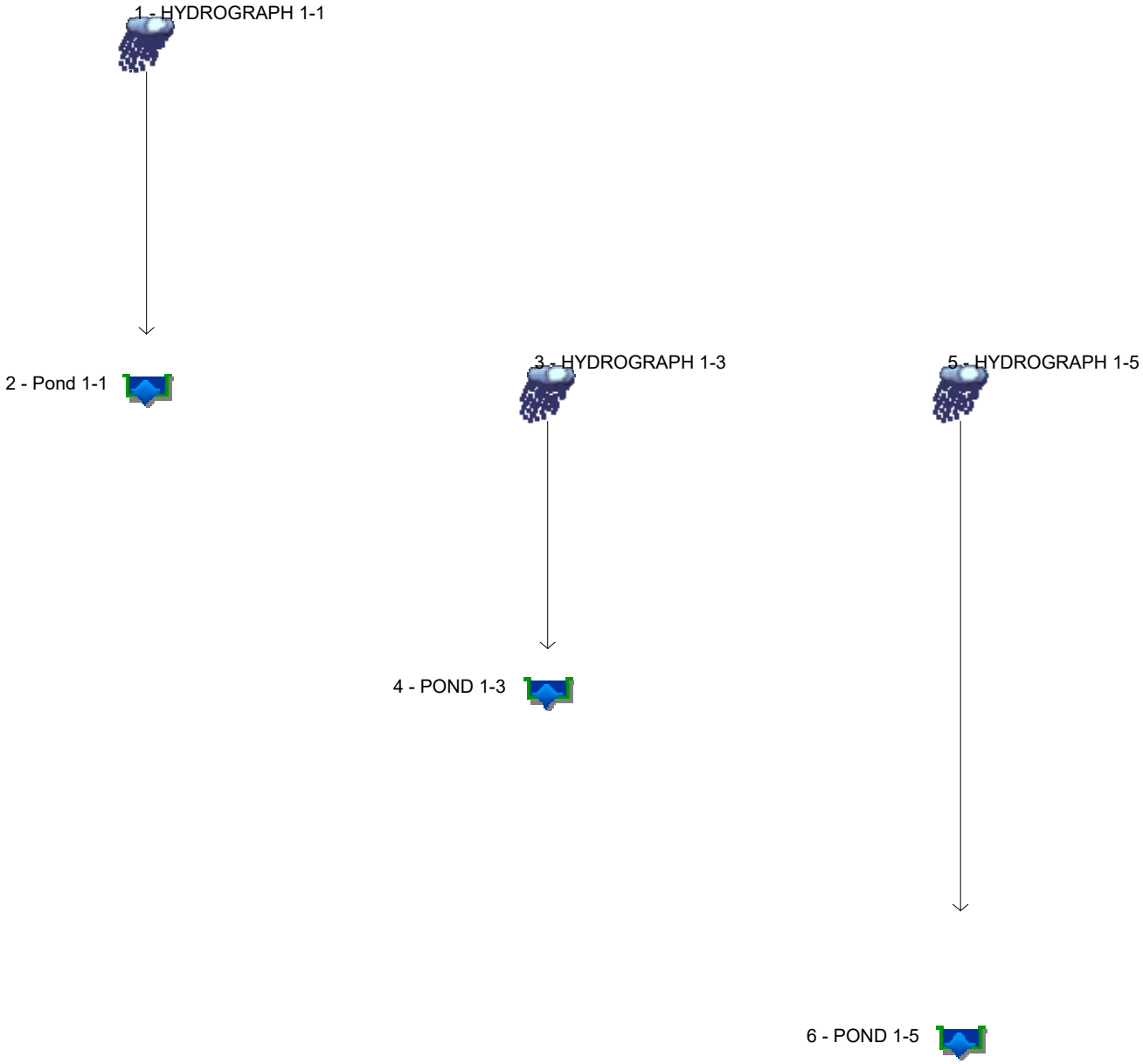
Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	2.106	8.15	5.384
2	1.994	5.28	7.122
3	2.490	5.84	6.673

```
Qmax(1) =
           1.000 *    1.000 *     2.106) +
           0.756 *    1.000 *     1.994) +
           0.807 *    1.000 *     2.490) + =       5.623
Qmax(2) =
           1.000 *    0.648 *     2.106) +
           1.000 *    1.000 *     1.994) +
           1.000 *    0.904 *     2.490) + =       5.610
Qmax(3) =
           1.000 *    0.717 *     2.106) +
           0.937 *    1.000 *     1.994) +
           1.000 *    1.000 *     2.490) + =       5.869

Total of 3 main streams to confluence:
Flow rates before confluence point:
       2.106       1.994       2.490
Maximum flow rates at confluence using above data:
        5.623        5.610        5.869
Area of streams before confluence:
        0.890        0.700        0.650


Results of confluence:
Total flow rate =      5.869(CFS)
Time of concentration =     5.842 min.
Effective stream area after confluence  =      2.240(Ac.)
End of computations, total study area =          2.240 (Ac.)
```

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	Manual	HYDROGRAPH 1-1
2	Reservoir	Pond 1-1
3	Manual	HYDROGRAPH 1-3
4	Reservoir	POND 1-3
5	Manual	HYDROGRAPH 1-5
6	Reservoir	POND 1-5

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

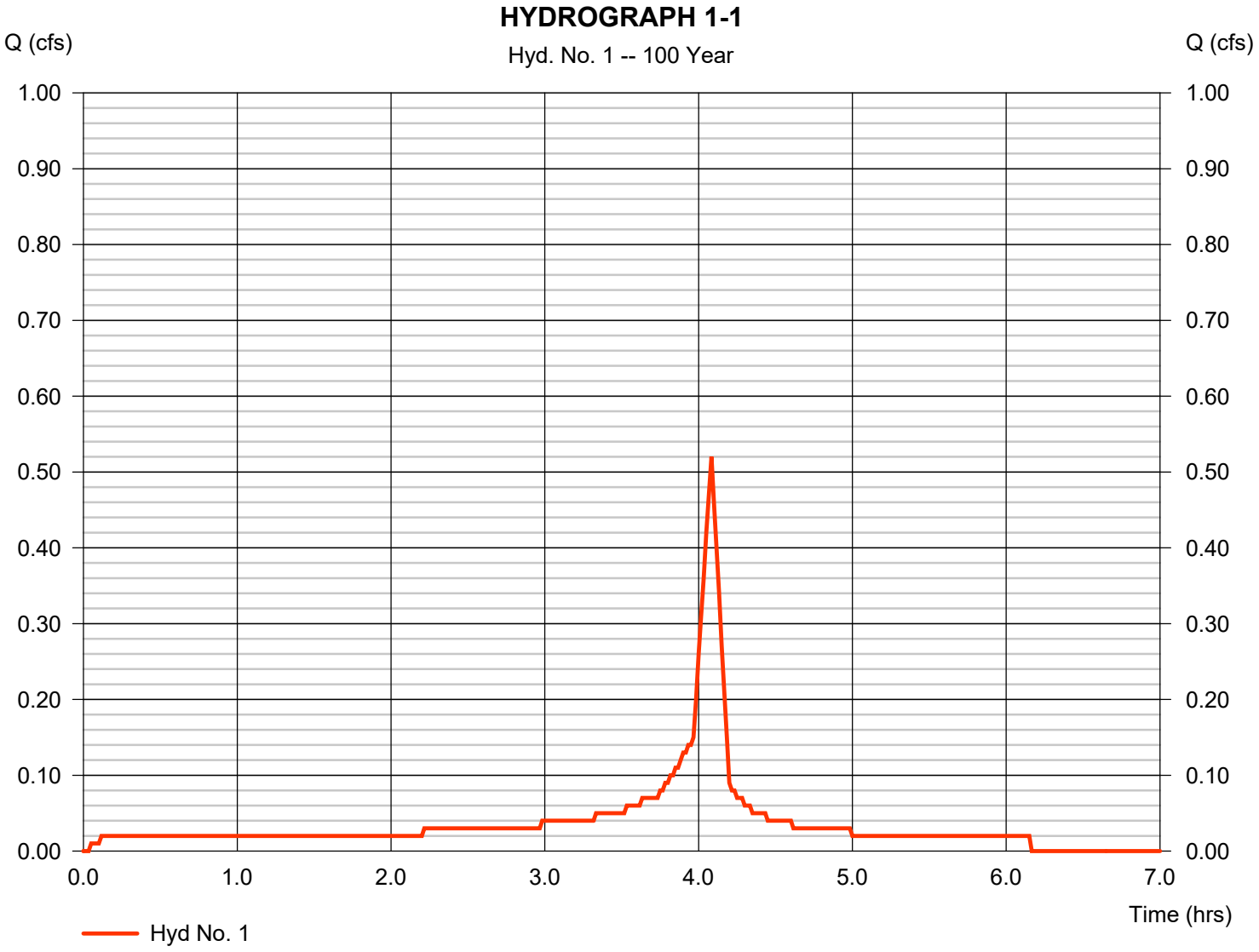
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Manual	0.520	1	245	936	------	------	------	HYDROGRAPH 1-1
2	Reservoir	0.062	1	258	929	1	644.34	517	Pond 1-1
3	Manual	0.520	1	243	671	------	------	------	HYDROGRAPH 1-3
4	Reservoir	0.042	1	258	666	3	640.25	340	POND 1-3
5	Manual	0.630	1	245	877	------	------	------	HYDROGRAPH 1-5
6	Reservoir	0.061	1	256	873	5	620.32	431	POND 1-5

Hydrograph Report

Hyd. No. 1

HYDROGRAPH 1-1

Hydrograph type	= Manual	Peak discharge	= 0.520 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.08 hrs
Time interval	= 1 min	Hyd. volume	= 936 cuft



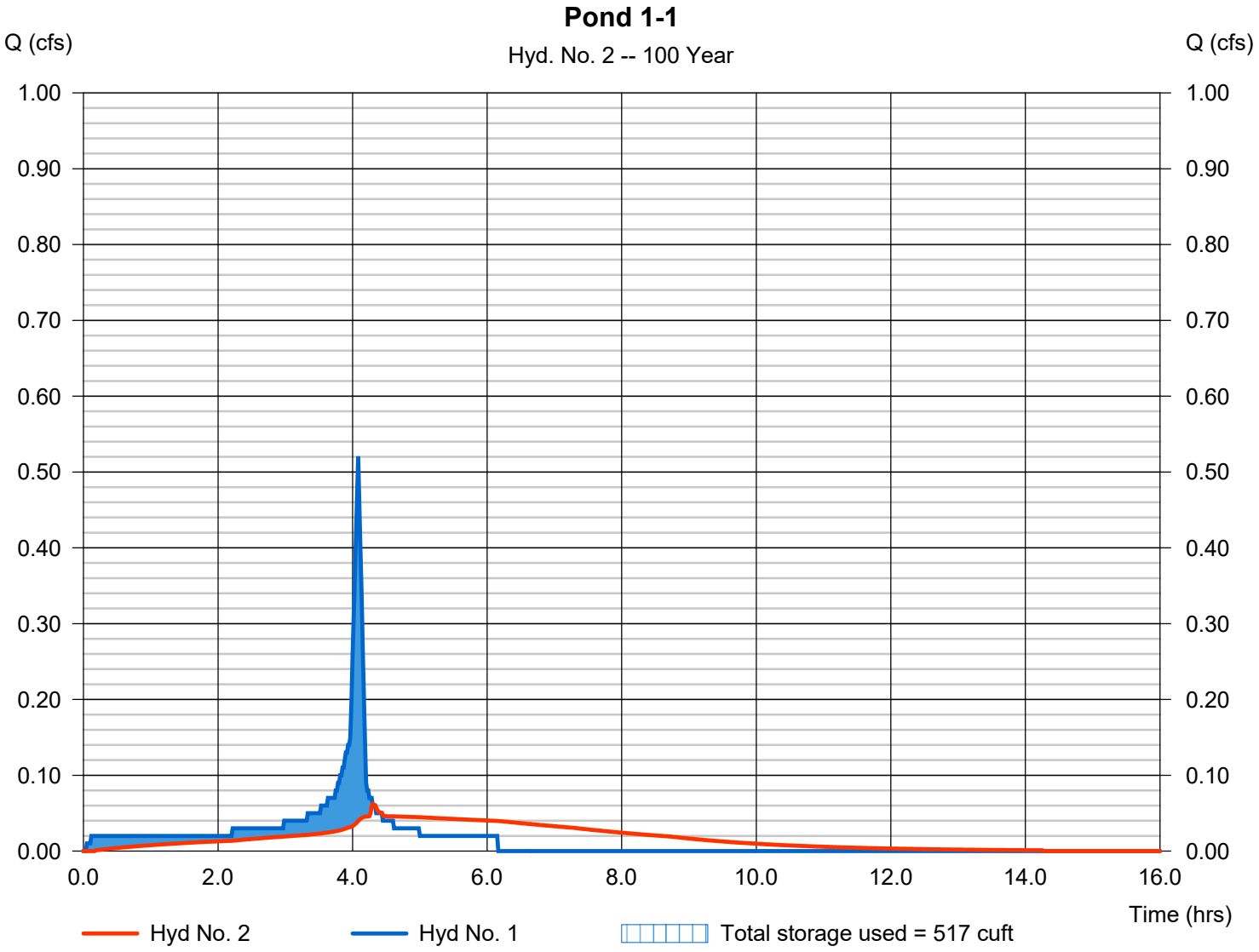
Hydrograph Report

Hyd. No. 2

Pond 1-1

Hydrograph type	=	Reservoir	Peak discharge	=	0.062 cfs
Storm frequency	=	100 yrs	Time to peak	=	4.30 hrs
Time interval	=	1 min	Hyd. volume	=	929 cuft
Inflow hyd. No.	=	1 - HYDROGRAPH 1-1	Max. Elevation	=	644.34 ft
Reservoir name	=	Sub-Basin 1-1	Max. Storage	=	517 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Sub-Basin 1-1

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 643.67 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	643.67	695	0	0
1.67	645.34	849	1,289	1,289

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	1.50	0.00	0.00
Span (in)	= 6.00	1.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 641.00	643.67	0.00	0.00
Length (ft)	= 19.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 6.00	0.00	0.00	0.00
Crest El. (ft)	= 644.34	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

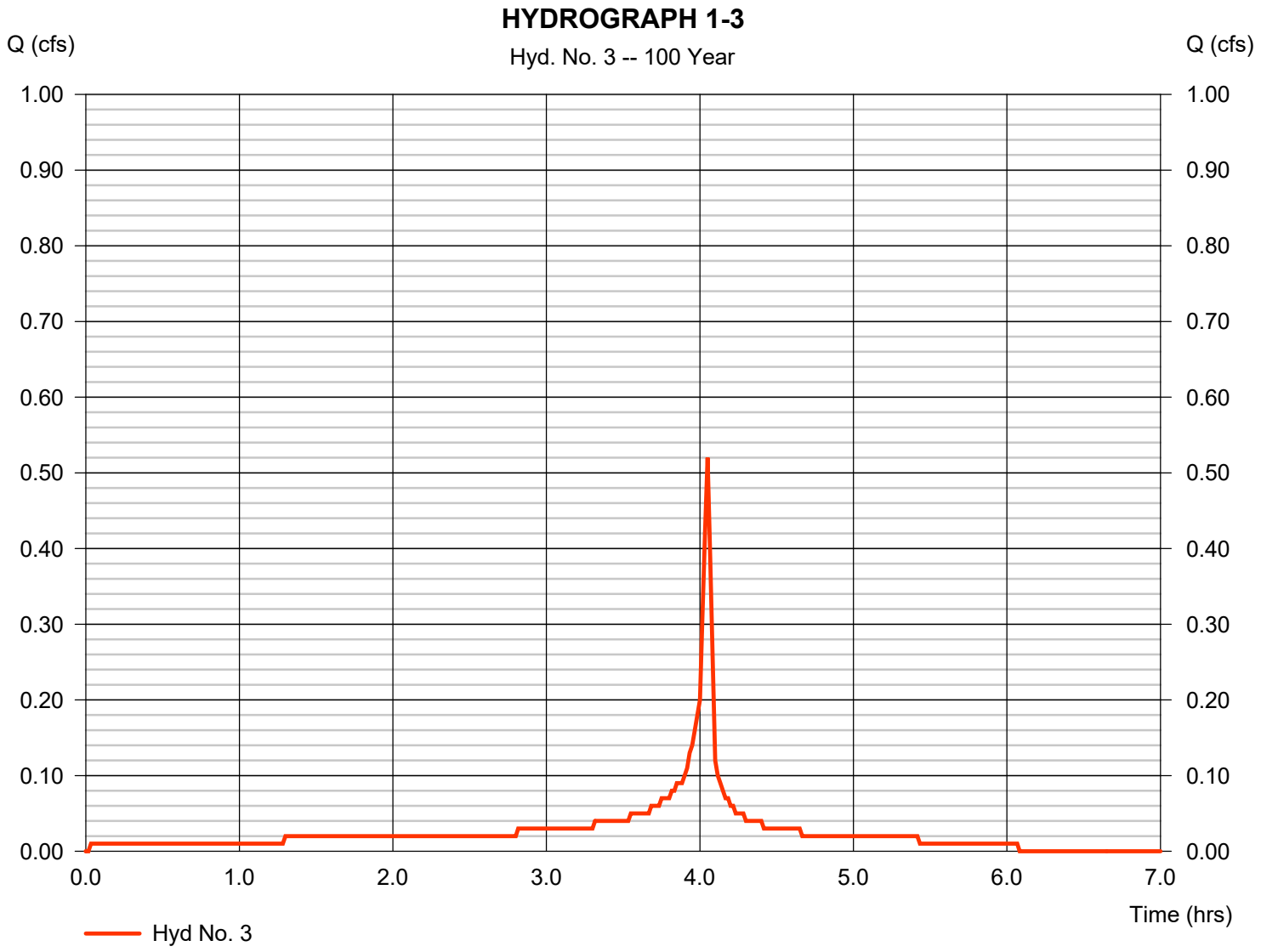
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	643.67	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.17	129	643.84	1.40 oc	0.02 ic	---	---	0.00	---	---	---	---	---	0.019
0.33	258	644.00	1.40 oc	0.03 ic	---	---	0.00	---	---	---	---	---	0.031
0.50	387	644.17	1.40 oc	0.04 ic	---	---	0.00	---	---	---	---	---	0.039
0.67	516	644.34	1.40 oc	0.05 ic	---	---	0.00	---	---	---	---	---	0.046
0.84	645	644.50	1.40 oc	0.05 ic	---	---	1.34	---	---	---	---	---	1.390
1.00	774	644.67	1.67 oc	0.01 ic	---	---	1.66 s	---	---	---	---	---	1.665
1.17	902	644.84	1.71 oc	0.01 ic	---	---	1.70 s	---	---	---	---	---	1.709
1.34	1,031	645.01	1.75 oc	0.00 ic	---	---	1.75 s	---	---	---	---	---	1.751
1.50	1,160	645.17	1.79 oc	0.00 ic	---	---	1.77 s	---	---	---	---	---	1.773
1.67	1,289	645.34	1.83 oc	0.00 ic	---	---	1.83 s	---	---	---	---	---	1.829

Hydrograph Report

Hyd. No. 3

HYDROGRAPH 1-3

Hydrograph type	= Manual	Peak discharge	= 0.520 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.05 hrs
Time interval	= 1 min	Hyd. volume	= 671 cuft



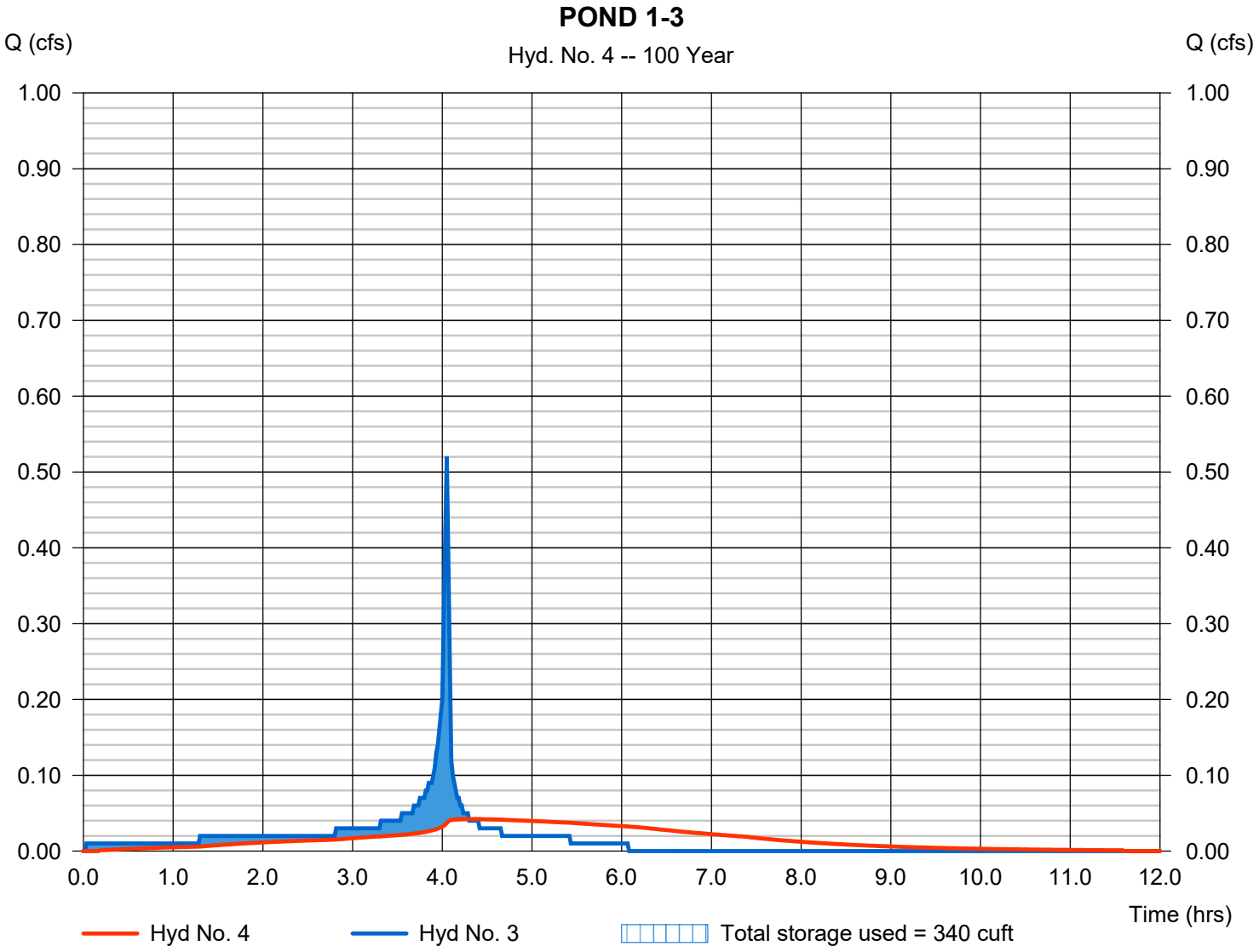
Hydrograph Report

Hyd. No. 4

POND 1-3

Hydrograph type	=	Reservoir	Peak discharge	=	0.042 cfs
Storm frequency	=	100 yrs	Time to peak	=	4.30 hrs
Time interval	=	1 min	Hyd. volume	=	666 cuft
Inflow hyd. No.	=	3 - HYDROGRAPH 1-3	Max. Elevation	=	640.25 ft
Reservoir name	=	Sub-Basin 1-3	Max. Storage	=	340 cuft

Storage Indication method used.



Pond Report

Pond No. 3 - Sub-Basin 1-3

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 639.67 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	639.67	513	0	0
1.67	641.34	665	984	984

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	1.50	0.00	0.00
Span (in)	= 6.00	1.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 637.00	639.67	0.00	0.00
Length (ft)	= 16.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 6.00	0.00	0.00	0.00
Crest El. (ft)	= 640.34	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

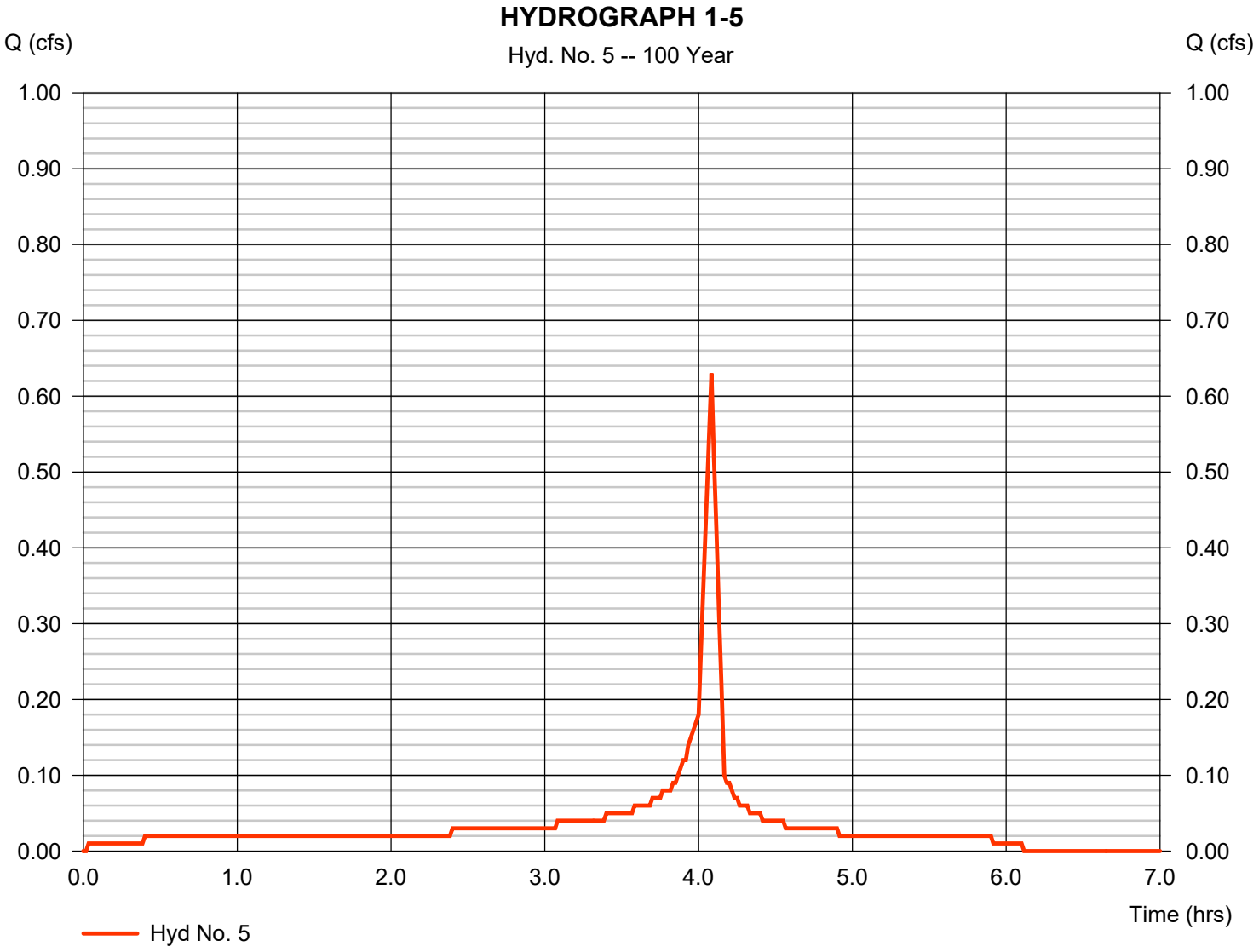
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	639.67	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.17	98	639.84	1.45 oc	0.02 ic	---	---	0.00	---	---	---	---	---	0.019
0.33	197	640.00	1.45 oc	0.03 ic	---	---	0.00	---	---	---	---	---	0.031
0.50	295	640.17	1.45 oc	0.04 ic	---	---	0.00	---	---	---	---	---	0.039
0.67	393	640.34	1.45 oc	0.05 ic	---	---	0.00	---	---	---	---	---	0.046
0.83	492	640.50	1.45 oc	0.05 ic	---	---	1.34	---	---	---	---	---	1.390
1.00	590	640.67	1.73 oc	0.01 ic	---	---	1.72 s	---	---	---	---	---	1.726
1.17	689	640.84	1.78 oc	0.01 ic	---	---	1.77 s	---	---	---	---	---	1.772
1.34	787	641.01	1.82 oc	0.00 ic	---	---	1.80 s	---	---	---	---	---	1.808
1.50	885	641.17	1.86 oc	0.00 ic	---	---	1.85 s	---	---	---	---	---	1.855
1.67	984	641.34	1.90 oc	0.00 ic	---	---	1.88 s	---	---	---	---	---	1.881

Hydrograph Report

Hyd. No. 5

HYDROGRAPH 1-5

Hydrograph type	= Manual	Peak discharge	= 0.630 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.08 hrs
Time interval	= 1 min	Hyd. volume	= 877 cuft



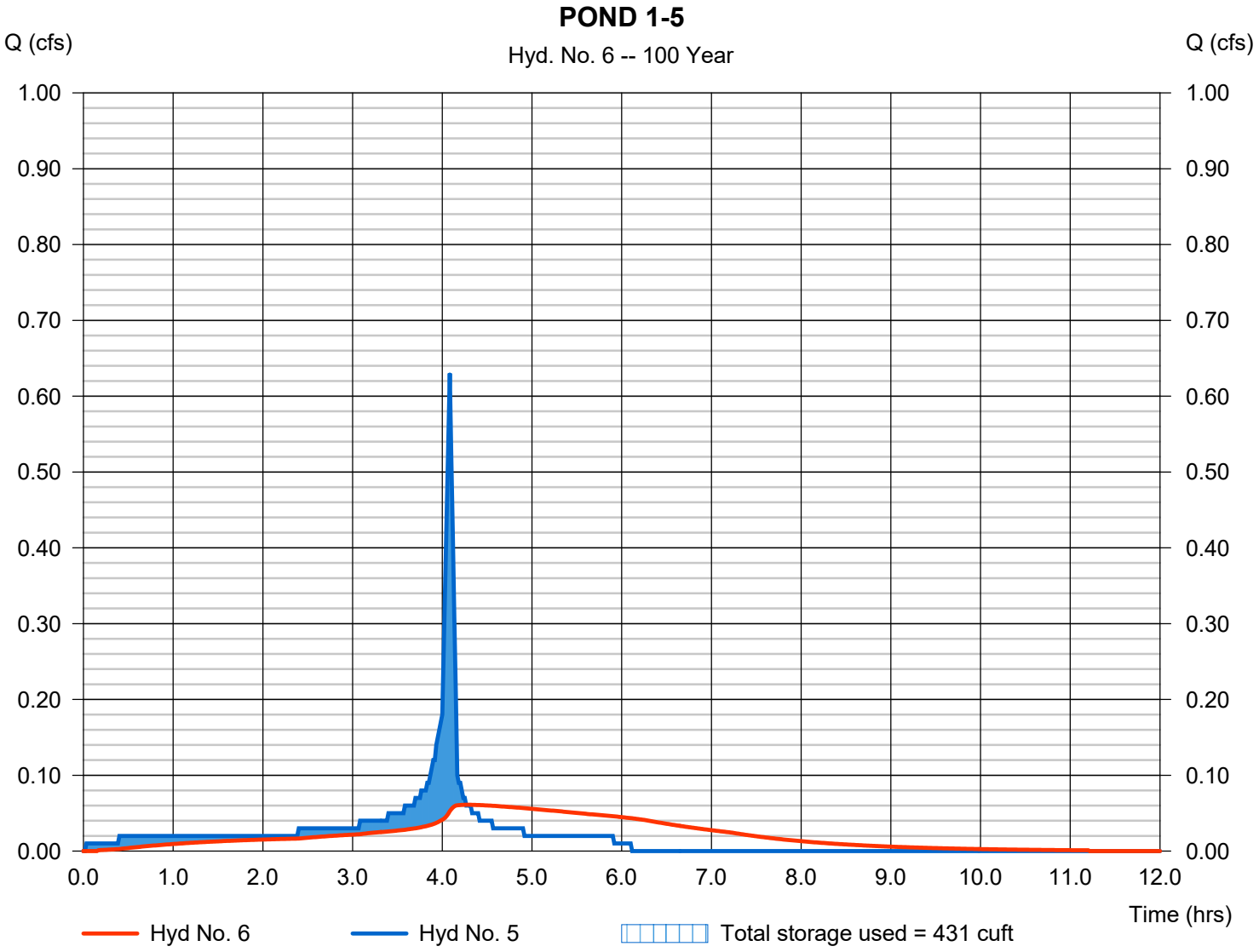
Hydrograph Report

Hyd. No. 6

POND 1-5

Hydrograph type	=	Reservoir	Peak discharge	=	0.061 cfs
Storm frequency	=	100 yrs	Time to peak	=	4.27 hrs
Time interval	=	1 min	Hyd. volume	=	873 cuft
Inflow hyd. No.	=	5 - HYDROGRAPH 1-5	Max. Elevation	=	620.32 ft
Reservoir name	=	Sub-Basin 1-5	Max. Storage	=	431 cuft

Storage Indication method used.



Pond Report

Pond No. 5 - Sub-Basin 1-5

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 619.67 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	619.67	571	0	0
1.67	621.34	755	1,107	1,107

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	1.75	0.00	0.00
Span (in)	= 6.00	1.75	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 617.00	619.67	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 6.00	0.00	0.00	0.00
Crest El. (ft)	= 620.34	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

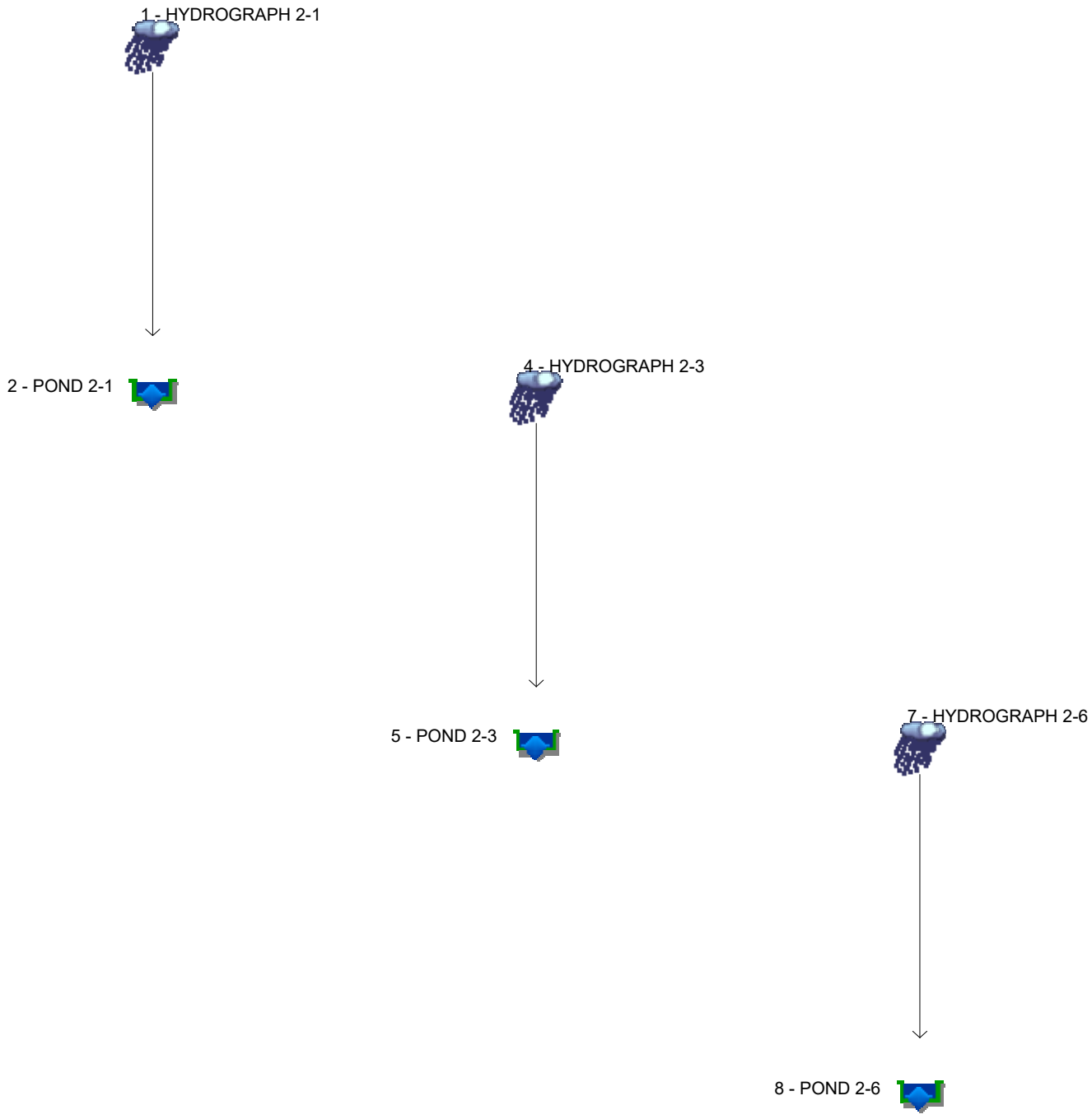
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	619.67	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.17	111	619.84	1.47 ic	0.02 ic	---	---	0.00	---	---	---	---	---	0.025
0.33	221	620.00	1.47 ic	0.04 ic	---	---	0.00	---	---	---	---	---	0.041
0.50	332	620.17	1.47 ic	0.05 ic	---	---	0.00	---	---	---	---	---	0.053
0.67	443	620.34	1.47 ic	0.06 ic	---	---	0.00	---	---	---	---	---	0.062
0.83	554	620.50	1.47 ic	0.07 ic	---	---	1.34	---	---	---	---	---	1.408
1.00	664	620.67	1.74 ic	0.01 ic	---	---	1.73 s	---	---	---	---	---	1.741
1.17	775	620.84	1.79 ic	0.01 ic	---	---	1.77 s	---	---	---	---	---	1.782
1.34	886	621.01	1.83 ic	0.01 ic	---	---	1.82 s	---	---	---	---	---	1.826
1.50	996	621.17	1.87 ic	0.00 ic	---	---	1.85 s	---	---	---	---	---	1.856
1.67	1,107	621.34	1.91 ic	0.00 ic	---	---	1.86 s	---	---	---	---	---	1.862

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	Manual	HYDROGRAPH 2-1
2	Reservoir	POND 2-1
4	Manual	HYDROGRAPH 2-3
5	Reservoir	POND 2-3
7	Manual	HYDROGRAPH 2-6
8	Reservoir	POND 2-6

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

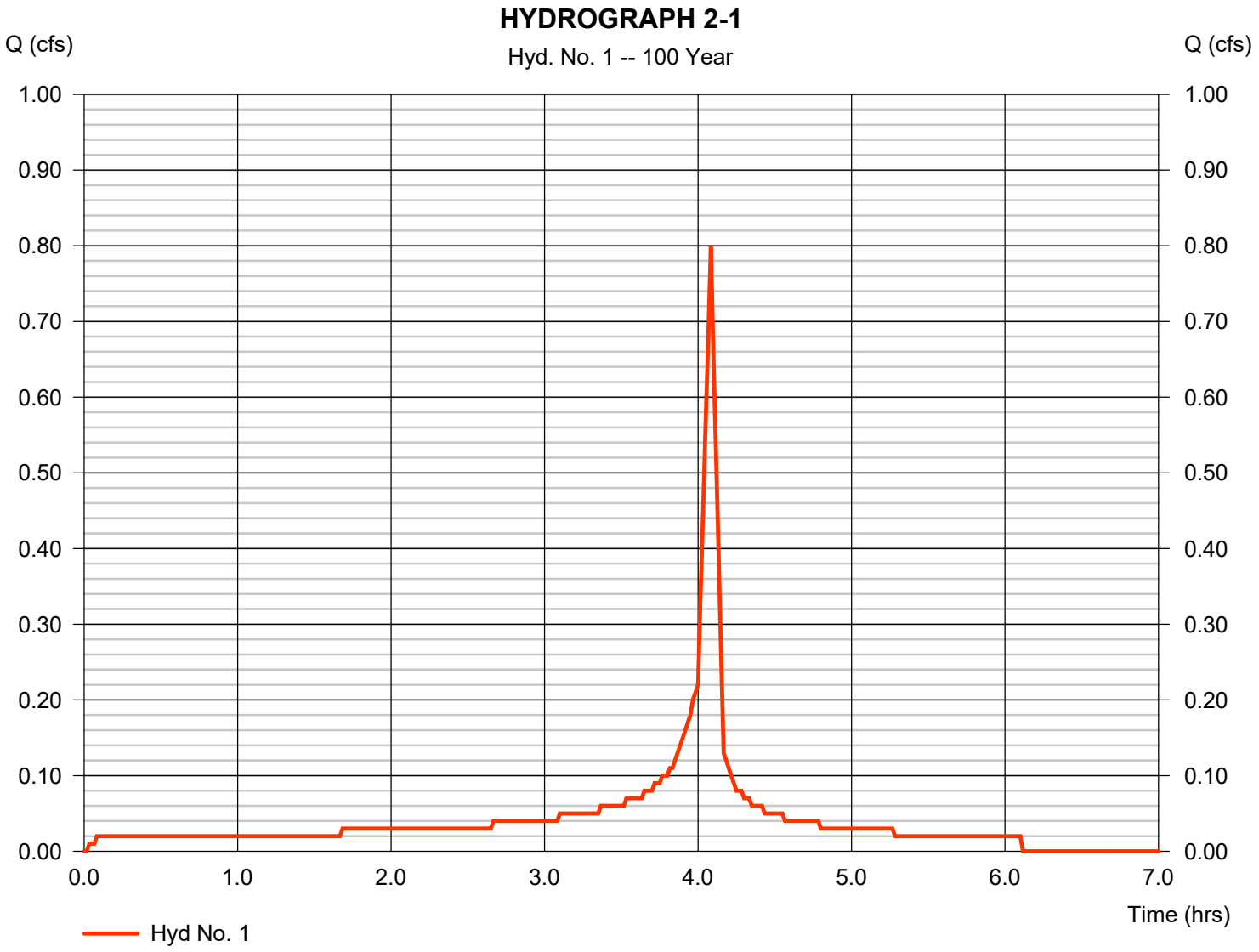
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Manual	0.800	1	245	1,096	------	------	------	HYDROGRAPH 2-1
2	Reservoir	0.095	1	253	1,087	1	602.34	642	POND 2-1
4	Manual	0.620	1	244	833	------	------	------	HYDROGRAPH 2-3
5	Reservoir	0.152	1	248	828	4	578.35	406	POND 2-3
7	Manual	2.350	1	245	3,221	------	------	------	HYDROGRAPH 2-6
8	Reservoir	0.289	1	253	3,213	7	548.28	1,666	POND 2-6

Hydrograph Report

Hyd. No. 1

HYDROGRAPH 2-1

Hydrograph type	= Manual	Peak discharge	= 0.800 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.08 hrs
Time interval	= 1 min	Hyd. volume	= 1,096 cuft



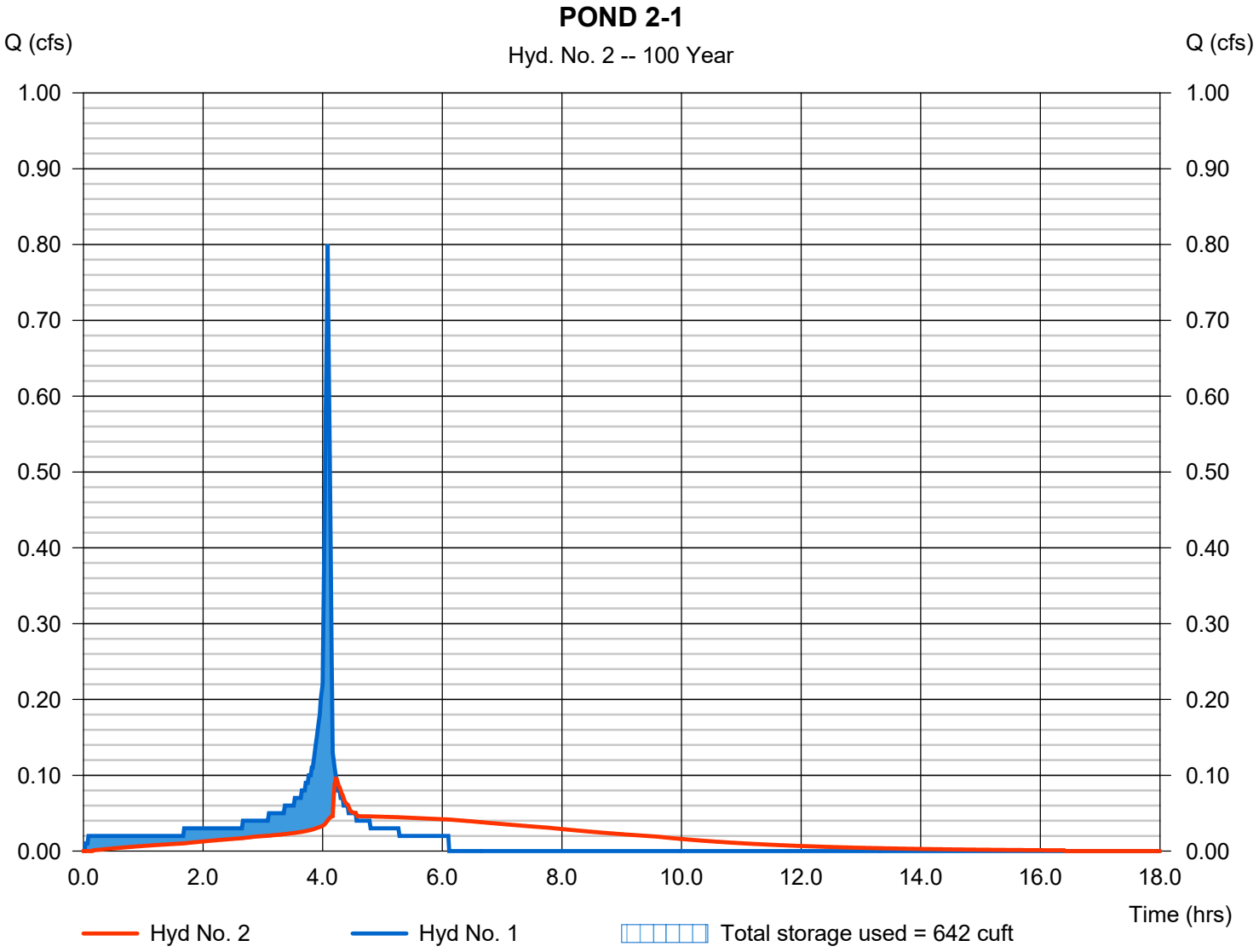
Hydrograph Report

Hyd. No. 2

POND 2-1

Hydrograph type	=	Reservoir	Peak discharge	=	0.095 cfs
Storm frequency	=	100 yrs	Time to peak	=	4.22 hrs
Time interval	=	1 min	Hyd. volume	=	1,087 cuft
Inflow hyd. No.	=	1 - HYDROGRAPH 2-1	Max. Elevation	=	602.34 ft
Reservoir name	=	Sub-Basin 2-1	Max. Storage	=	642 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Sub-Basin 2-1

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 601.67 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	601.67	816	0	0
1.67	603.34	1,088	1,590	1,590

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	1.50	0.00	0.00
Span (in)	= 6.00	1.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 599.20	601.67	0.00	0.00
Length (ft)	= 15.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 6.00	0.00	0.00	0.00
Crest El. (ft)	= 602.34	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

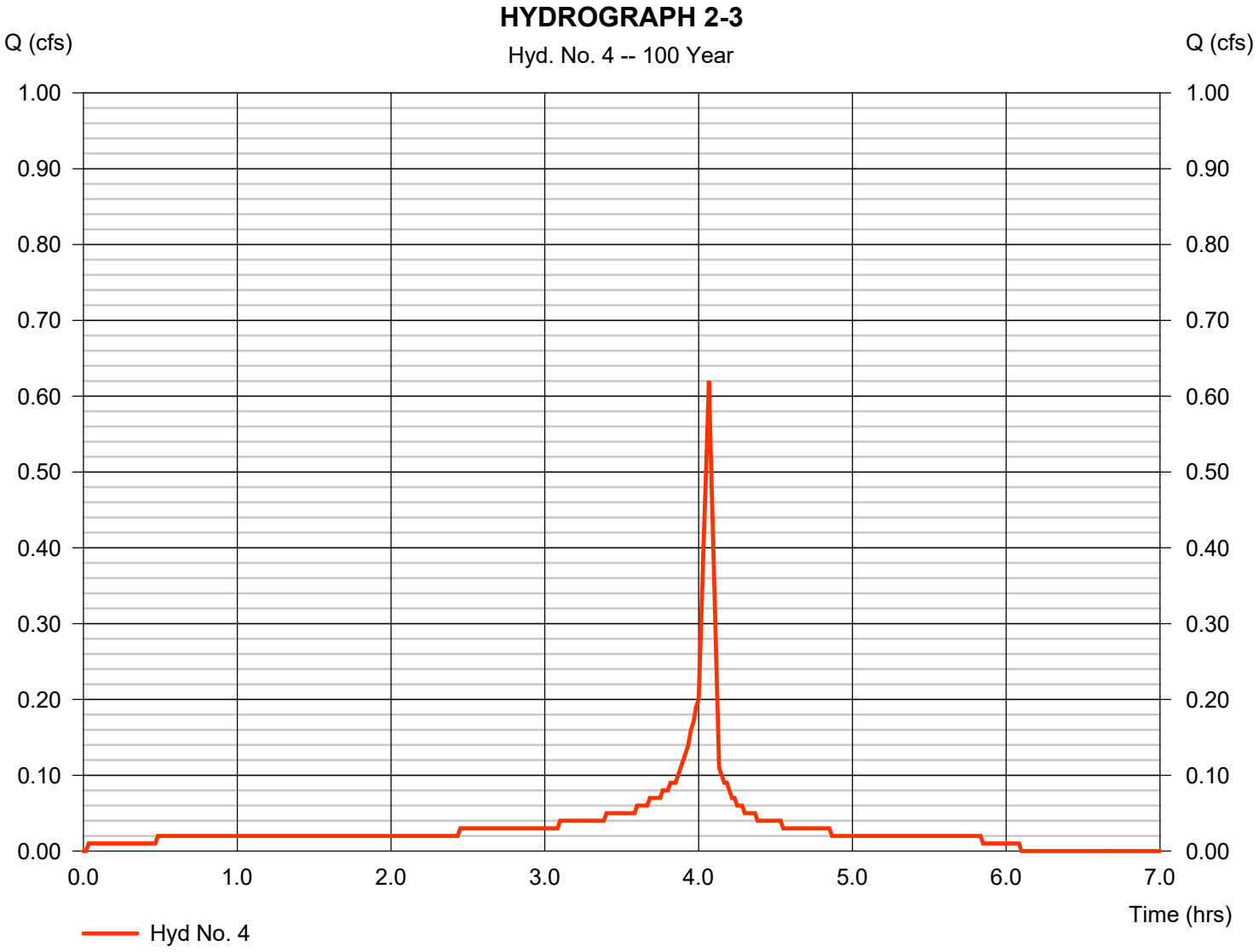
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	601.67	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.17	159	601.84	1.40 oc	0.02 ic	---	---	0.00	---	---	---	---	---	0.019
0.33	318	602.00	1.40 oc	0.03 ic	---	---	0.00	---	---	---	---	---	0.031
0.50	477	602.17	1.40 oc	0.04 ic	---	---	0.00	---	---	---	---	---	0.039
0.67	636	602.34	1.40 oc	0.05 ic	---	---	0.00	---	---	---	---	---	0.046
0.83	795	602.50	1.40 oc	0.05 ic	---	---	1.34	---	---	---	---	---	1.390
1.00	954	602.67	1.69 ic	0.01 ic	---	---	1.68 s	---	---	---	---	---	1.688
1.17	1,113	602.84	1.74 ic	0.01 ic	---	---	1.73 s	---	---	---	---	---	1.732
1.34	1,272	603.01	1.78 ic	0.00 ic	---	---	1.77 s	---	---	---	---	---	1.775
1.50	1,431	603.17	1.82 ic	0.00 ic	---	---	1.79 s	---	---	---	---	---	1.793
1.67	1,590	603.34	1.86 ic	0.00 ic	---	---	1.86 s	---	---	---	---	---	1.861

Hydrograph Report

Hyd. No. 4

HYDROGRAPH 2-3

Hydrograph type	= Manual	Peak discharge	= 0.620 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.07 hrs
Time interval	= 1 min	Hyd. volume	= 833 cuft



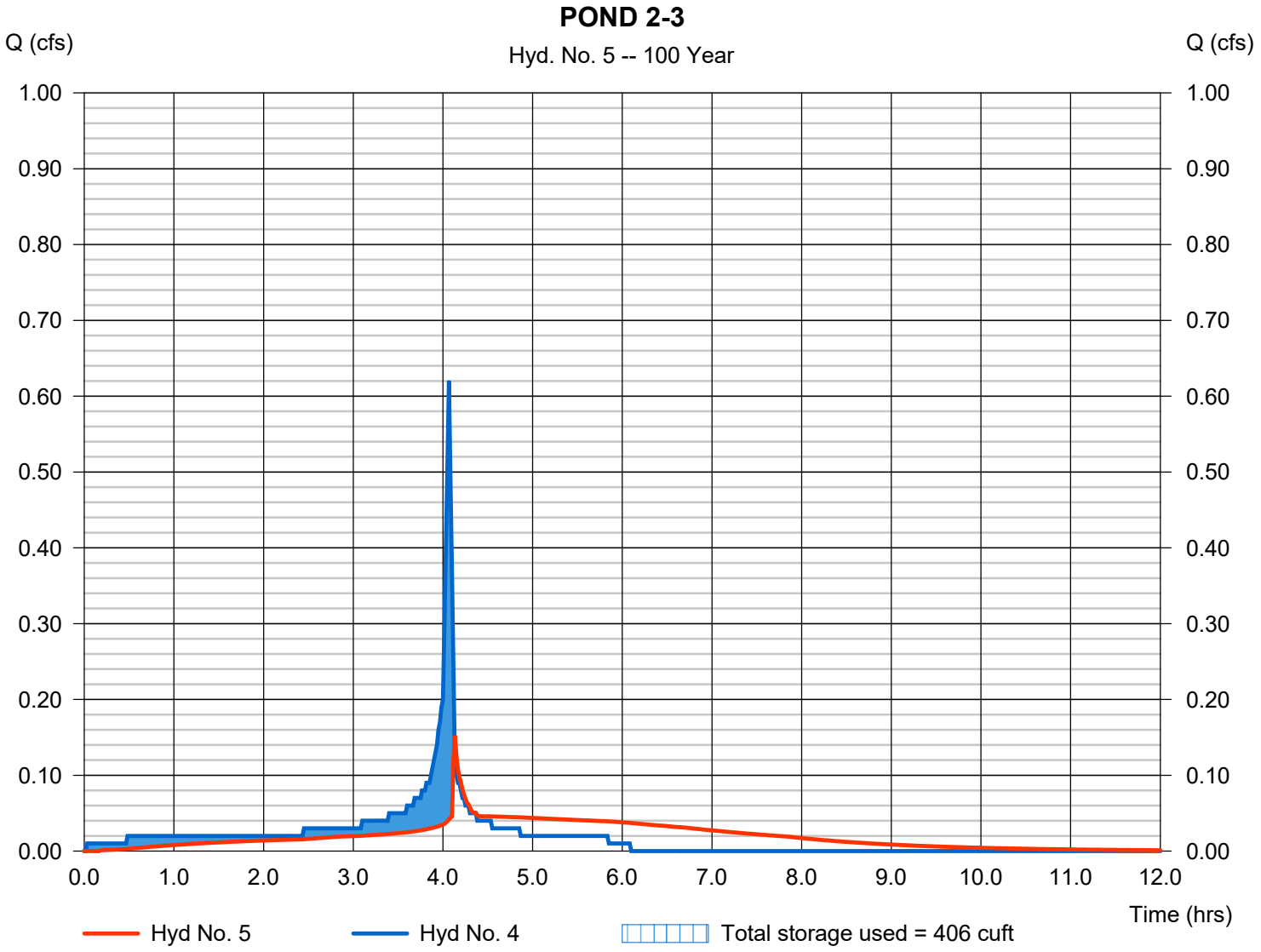
Hydrograph Report

Hyd. No. 5

POND 2-3

Hydrograph type	=	Reservoir	Peak discharge	=	0.152 cfs
Storm frequency	=	100 yrs	Time to peak	=	4.13 hrs
Time interval	=	1 min	Hyd. volume	=	828 cuft
Inflow hyd. No.	=	4 - HYDROGRAPH 2-3	Max. Elevation	=	578.35 ft
Reservoir name	=	Sub-Basin 2-3	Max. Storage	=	406 cuft

Storage Indication method used.



Pond Report

Pond No. 2 - Sub-Basin 2-3

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 577.67 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	577.67	511	0	0
1.67	579.34	682	996	996

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	1.50	0.00	0.00
Span (in)	= 6.00	1.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 575.00	577.67	0.00	0.00
Length (ft)	= 21.00	0.00	0.00	0.00
Slope (%)	= 20.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 6.00	0.00	0.00	0.00
Crest El. (ft)	= 578.34	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

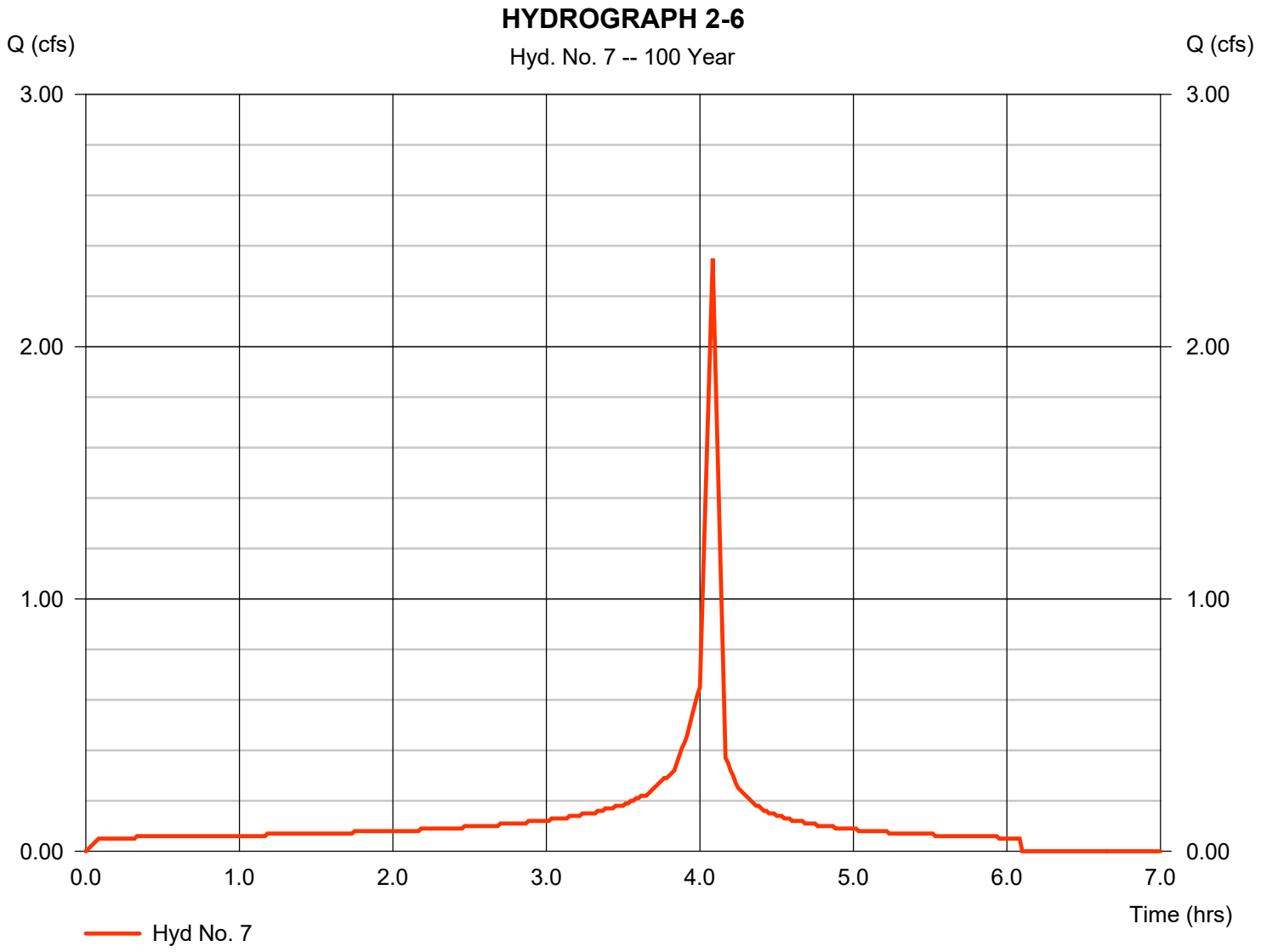
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	577.67	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.17	100	577.84	1.47 ic	0.02 ic	---	---	0.00	---	---	---	---	---	0.019
0.33	199	578.00	1.47 ic	0.03 ic	---	---	0.00	---	---	---	---	---	0.031
0.50	299	578.17	1.47 ic	0.04 ic	---	---	0.00	---	---	---	---	---	0.039
0.67	398	578.34	1.47 ic	0.05 ic	---	---	0.00	---	---	---	---	---	0.046
0.83	498	578.50	1.47 ic	0.05 ic	---	---	1.34	---	---	---	---	---	1.390
1.00	598	578.67	1.74 ic	0.01 ic	---	---	1.73 s	---	---	---	---	---	1.740
1.17	697	578.84	1.79 ic	0.01 ic	---	---	1.78 s	---	---	---	---	---	1.787
1.34	797	579.01	1.83 ic	0.00 ic	---	---	1.82 s	---	---	---	---	---	1.825
1.50	897	579.17	1.87 ic	0.00 ic	---	---	1.85 s	---	---	---	---	---	1.855
1.67	996	579.34	1.91 ic	0.00 ic	---	---	1.91 s	---	---	---	---	---	1.911

Hydrograph Report

Hyd. No. 7

HYDROGRAPH 2-6

Hydrograph type	= Manual	Peak discharge	= 2.350 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.08 hrs
Time interval	= 1 min	Hyd. volume	= 3,221 cuft



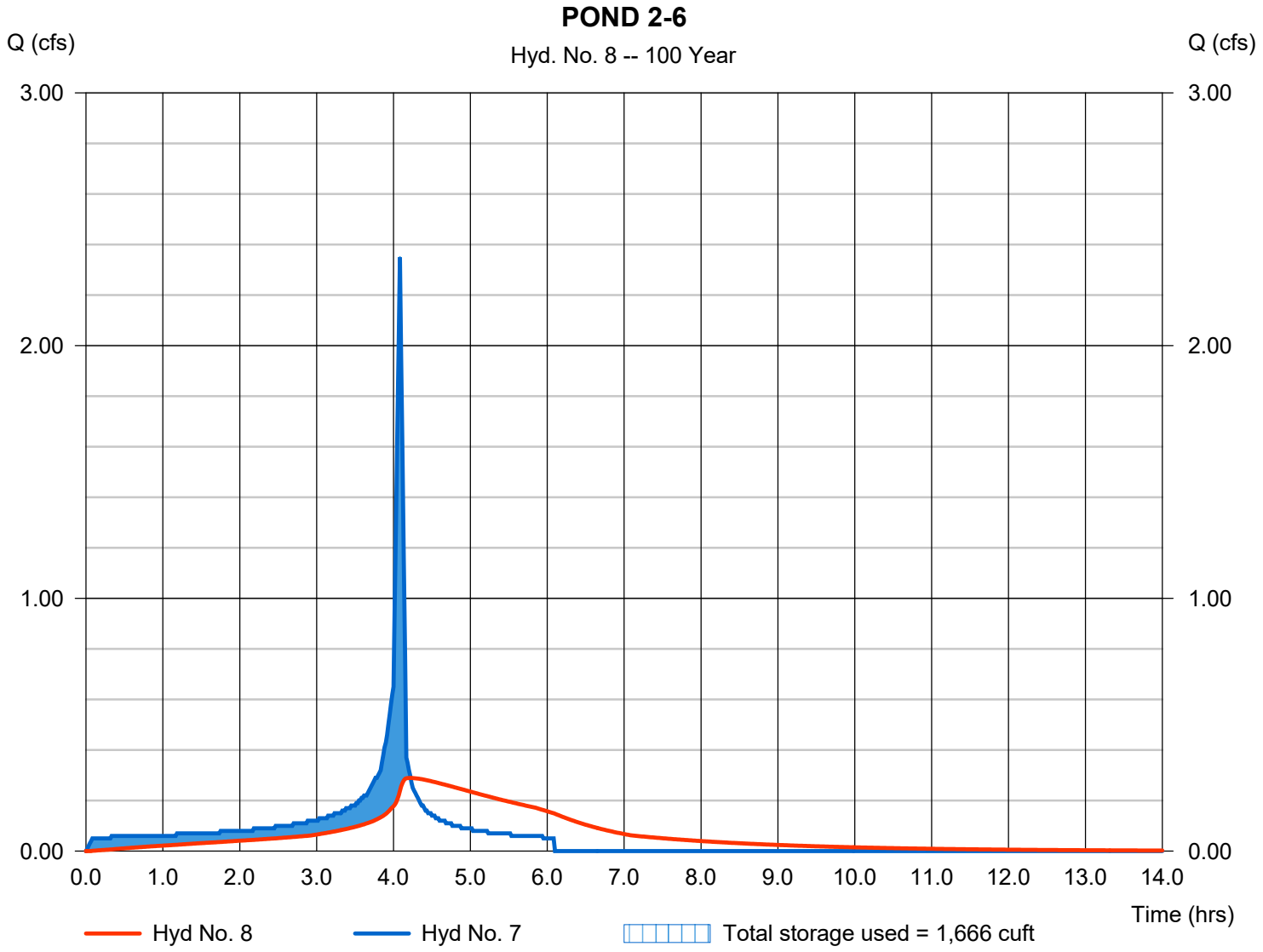
Hydrograph Report

Hyd. No. 8

POND 2-6

Hydrograph type	=	Reservoir	Peak discharge	=	0.289 cfs
Storm frequency	=	100 yrs	Time to peak	=	4.22 hrs
Time interval	=	1 min	Hyd. volume	=	3,213 cuft
Inflow hyd. No.	=	7 - HYDROGRAPH 2-6	Max. Elevation	=	548.28 ft
Reservoir name	=	Sub-Basin 2-6	Max. Storage	=	1,666 cuft

Storage Indication method used.



Pond Report

Pond No. 3 - Sub-Basin 2-6

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 547.67 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	547.67	2,478	0	0
1.67	549.34	2,950	4,532	4,532

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	4.00	0.00	0.00
Span (in)	= 6.00	4.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 545.20	547.67	0.00	0.00
Length (ft)	= 18.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

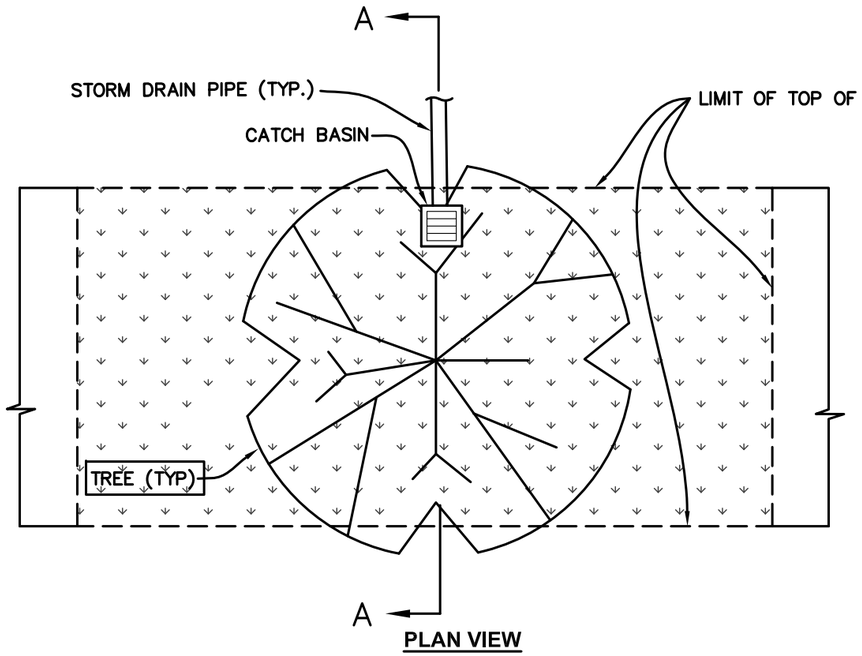
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 6.00	0.00	0.00	0.00
Crest El. (ft)	= 548.33	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

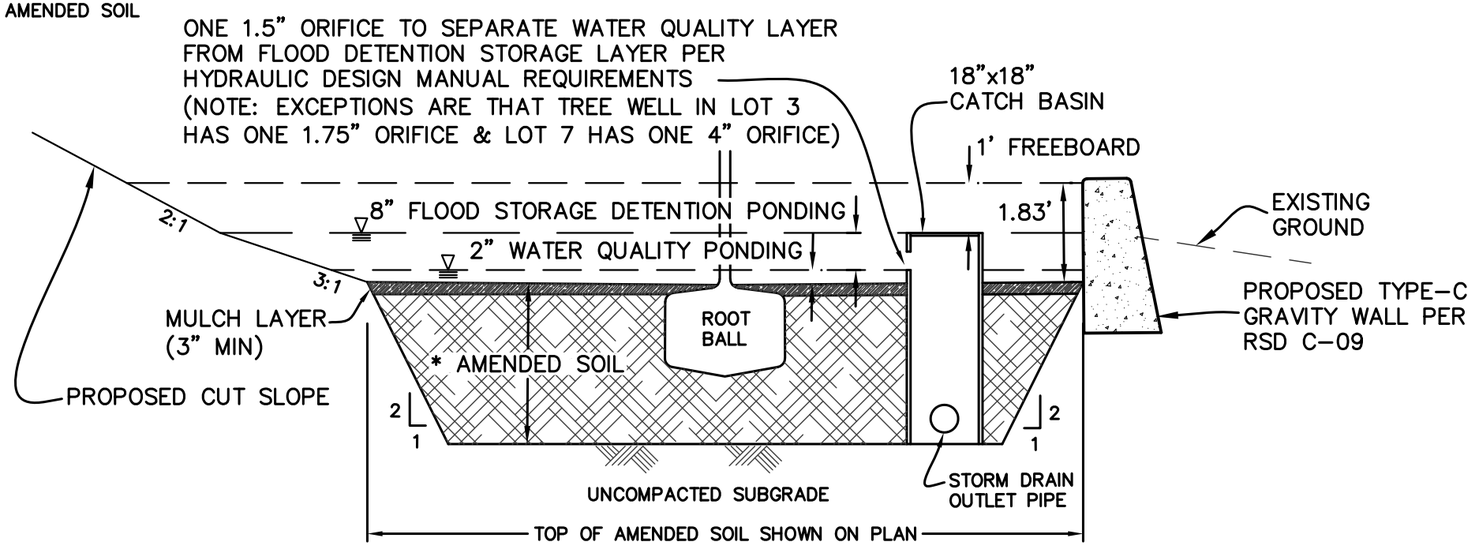
Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	547.67	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.17	453	547.84	1.36 oc	0.06 ic	---	---	0.00	---	---	---	---	---	0.062
0.33	906	548.00	1.36 oc	0.17 ic	---	---	0.00	---	---	---	---	---	0.172
0.50	1,360	548.17	1.36 oc	0.24 ic	---	---	0.00	---	---	---	---	---	0.243
0.67	1,813	548.34	1.36 oc	0.30 ic	---	---	0.01	---	---	---	---	---	0.312
0.83	2,266	548.50	1.56 oc	0.16 ic	---	---	1.40 s	---	---	---	---	---	1.560
1.00	2,719	548.67	1.64 oc	0.06 ic	---	---	1.58 s	---	---	---	---	---	1.636
1.17	3,173	548.84	1.68 oc	0.04 ic	---	---	1.64 s	---	---	---	---	---	1.677
1.34	3,626	549.01	1.73 oc	0.02 ic	---	---	1.69 s	---	---	---	---	---	1.717
1.50	4,079	549.17	1.77 oc	0.02 ic	---	---	1.74 s	---	---	---	---	---	1.758
1.67	4,532	549.34	1.81 oc	0.01 ic	---	---	1.76 s	---	---	---	---	---	1.773



PLAN VIEW

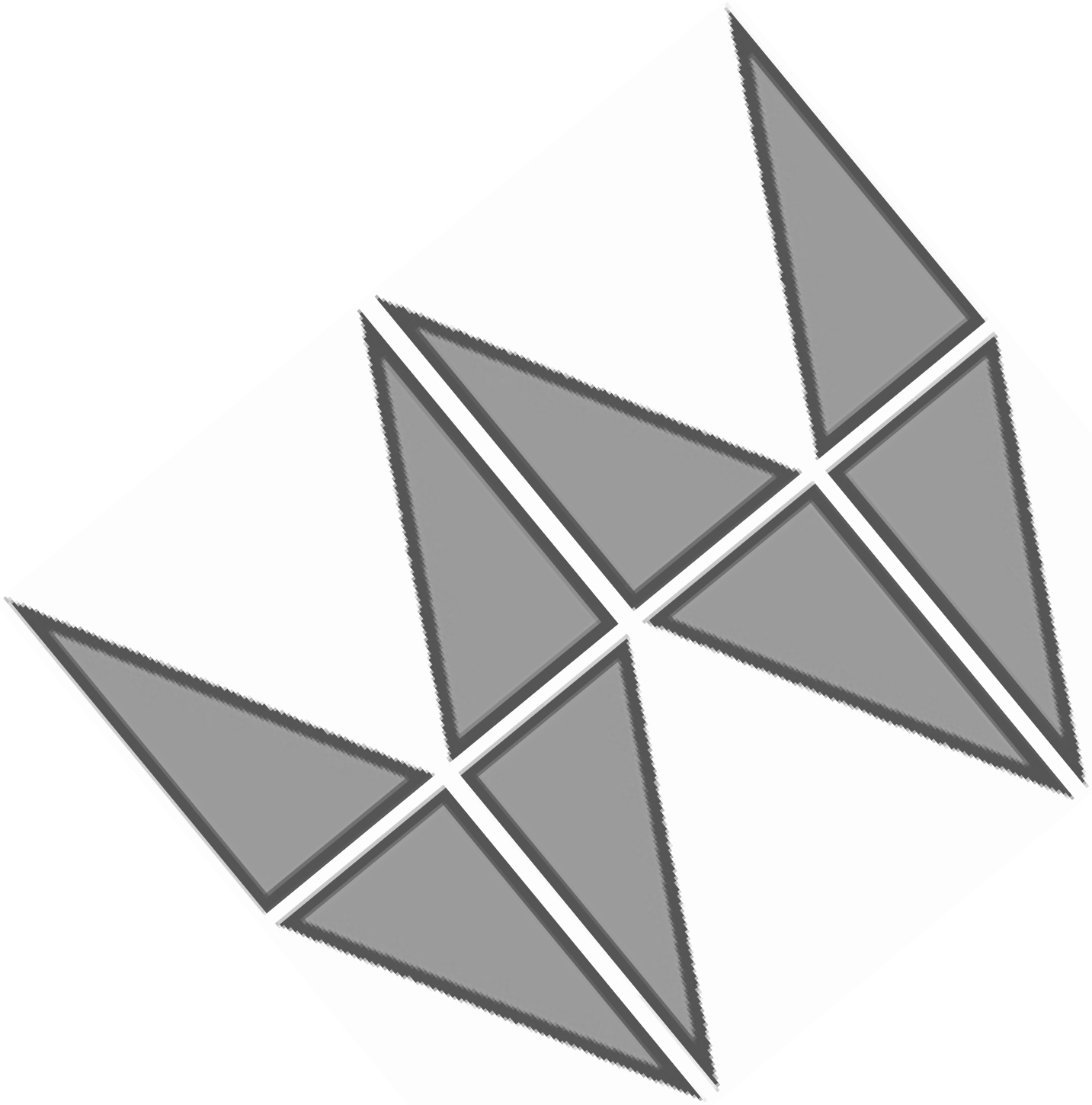


SECTION A-A

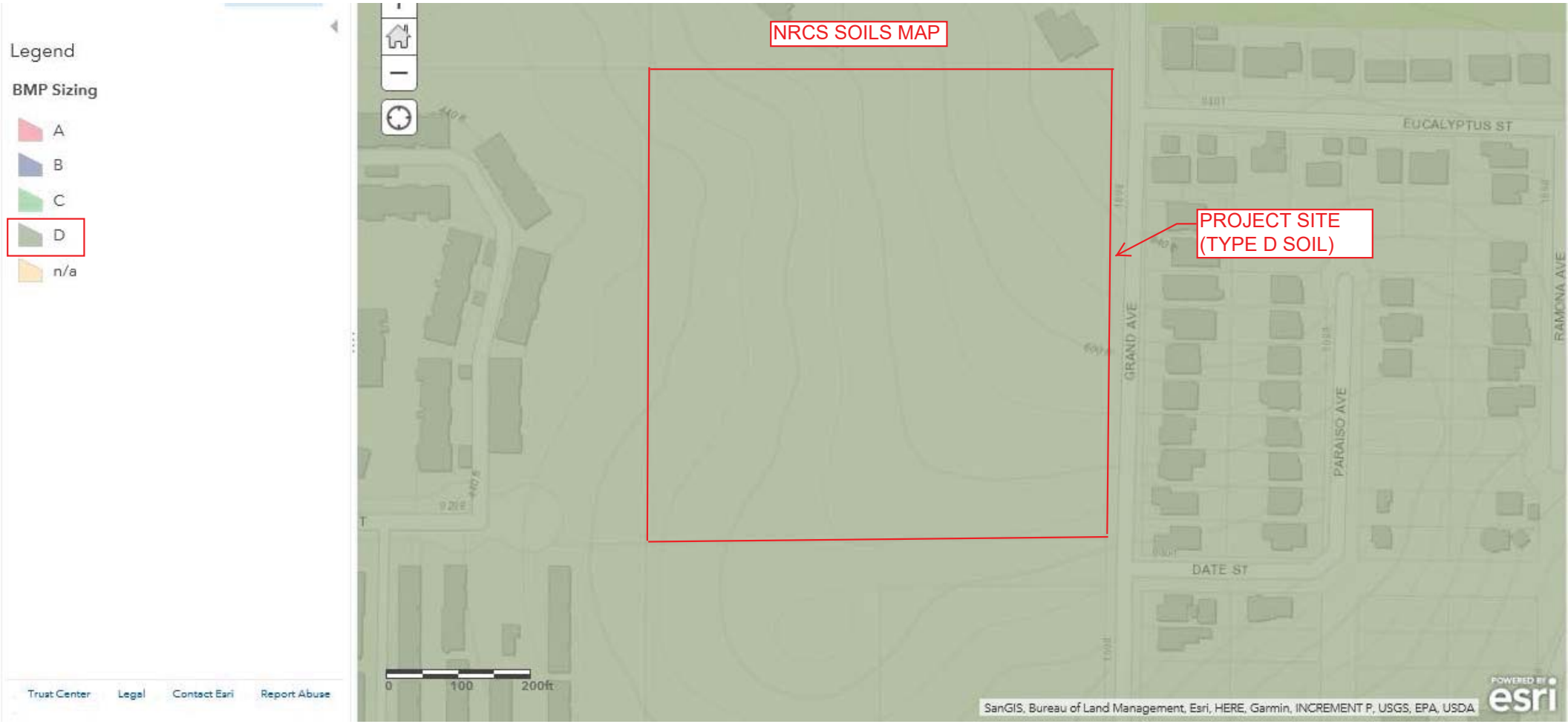
TREEWELL DETAIL
NO SCALE

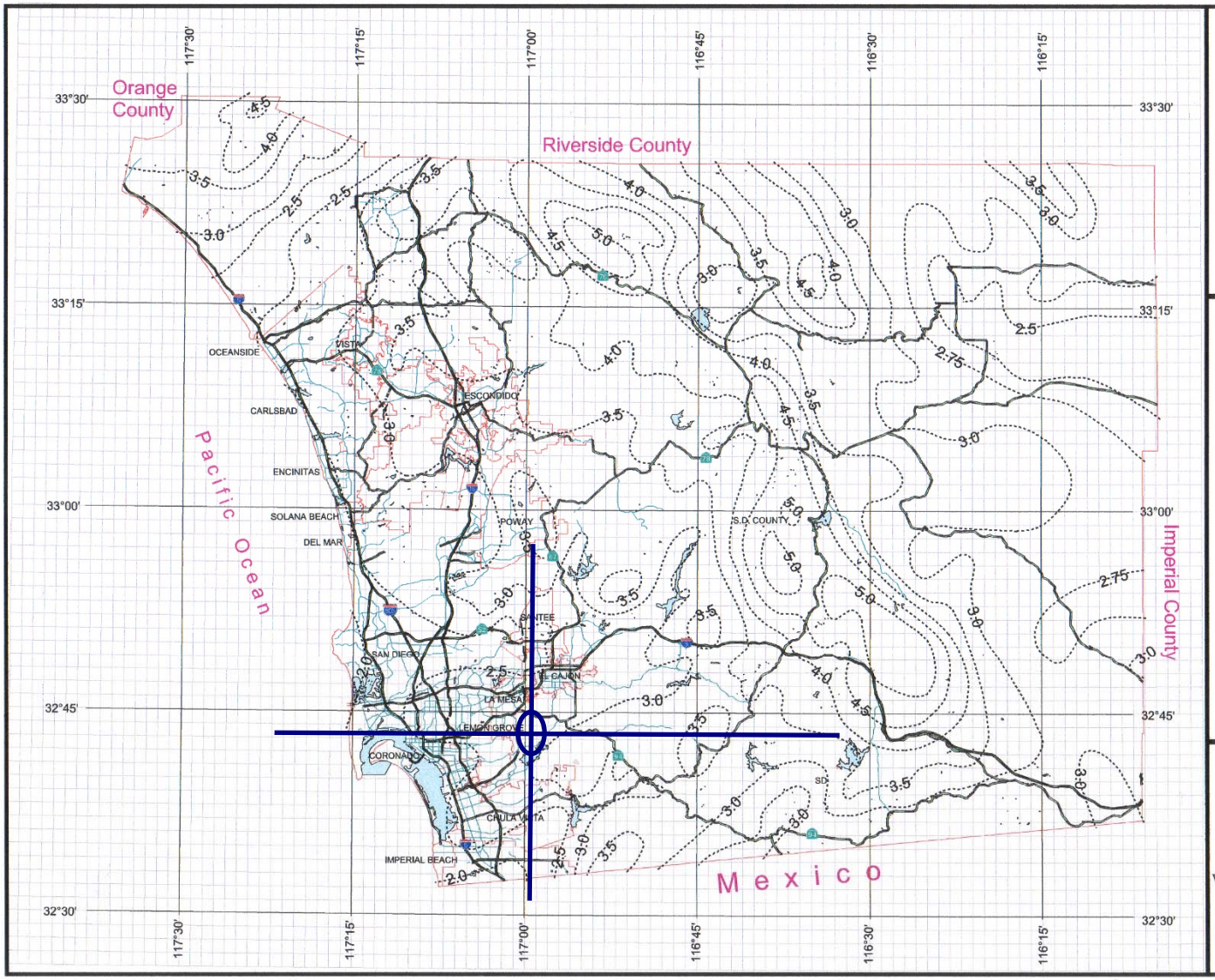
NOTE:

* AMENDED SOIL THICKNESS VARIES DEPENDING ON TREE WELL:
- TREE WELLS IN LOTS 4 & 7 HAVE 2.5' OF AMENDED SOIL
- TREE WELLS IN LOTS 1 & 2 HAVE 3.0' OF AMENDED SOIL
- TREE WELL IN LOT 3 HAS 3.5' OF AMENDED SOIL
- TREE WELL IN LOT 5 HAS 4.0' OF AMENDED SOIL



SECTION 3


Legend
BMP Sizing
A
B
C
D
n/a
Trust Center
Legal
Contact Esri
Report Abuse
NRCS SOILS MAP
PROJECT SITE
(TYPE D SOIL)
EUCALYPTUS ST
GRAND AVE
PARAISO AVE
RAMONA AVE
DATE ST
0
100
200ft
SanGIS, Bureau of Land Management, Esri, HERE, Garmin, INCREMENT P, USGS, EPA, USDA
esri



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

Lat:
32°43'16"N
Long:
116°59'53"W

P6 = 2.8 in

DPW GIS
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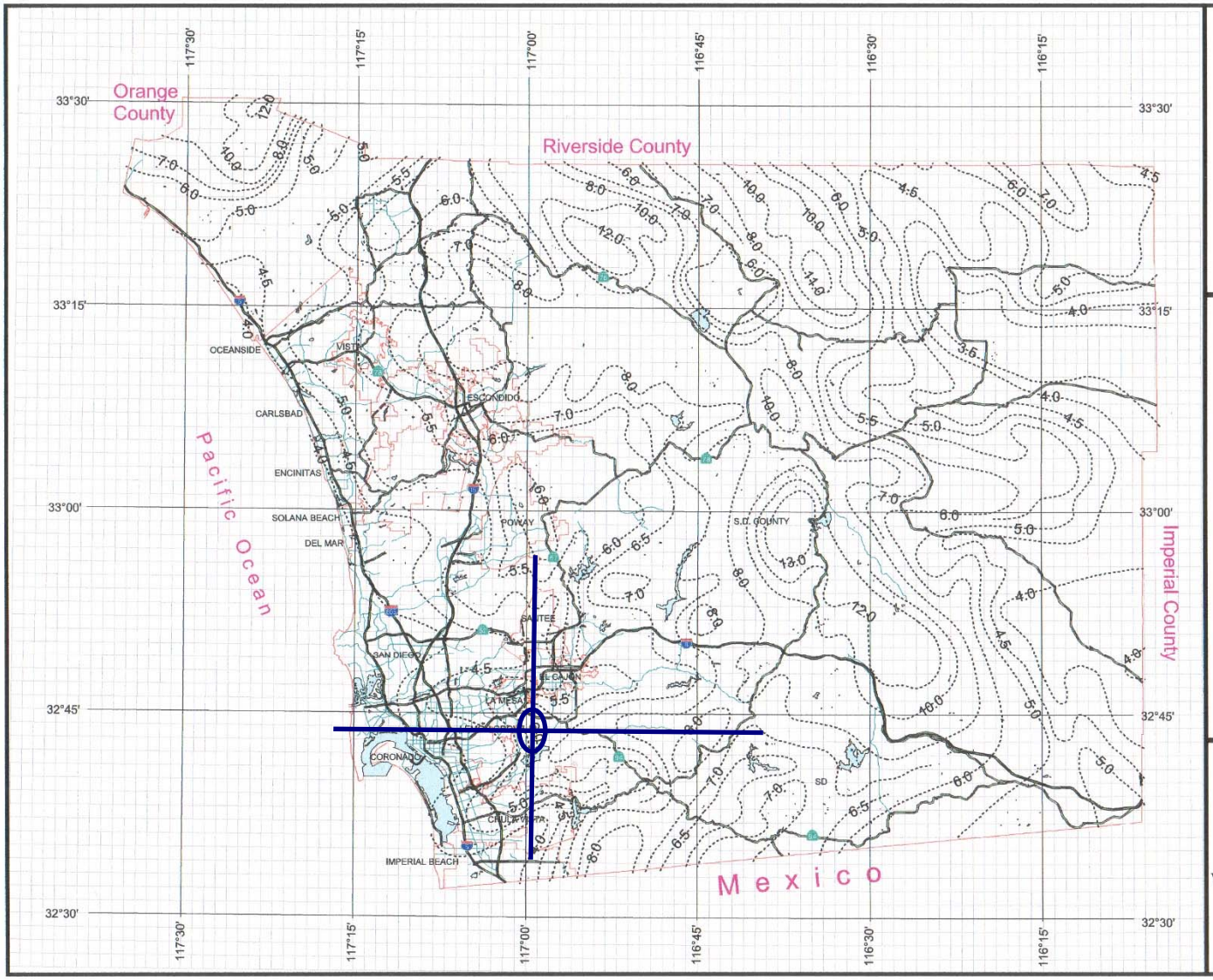
N W E S

3 0 3 Miles



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)

Lat:
32°43'16"N
Long:
116°59'53"W

P24 = 5.9 in

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
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N W E S

3 0 3 Miles

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use		Runoff Coefficient "C"				
			Soil Type			
NRCS Elements	County Elements	% IMPER.	A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).
DU/A = dwelling units per acre
NRCS = National Resources Conservation Service

Note that the Initial Time of Concentration should be reflective of the general land-use at the upstream end of a drainage basin. A single lot with an area of two or less acres does not have a significant effect where the drainage basin area is 20 to 600 acres.

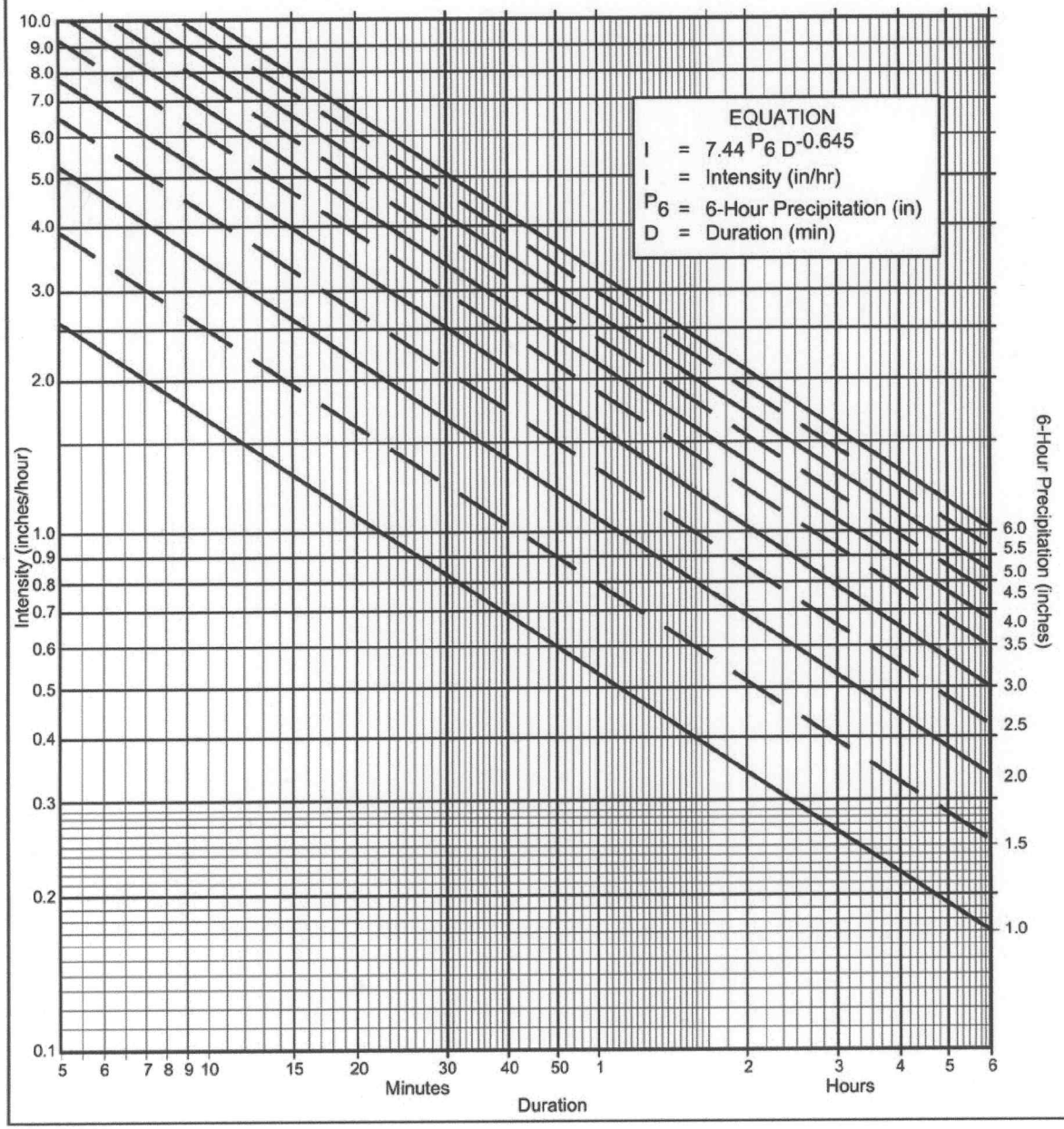
Table 3-2 provides limits of the length (Maximum Length (L_M)) of sheet flow to be used in hydrology studies. Initial T_i values based on average C values for the Land Use Element are also included. These values can be used in planning and design applications as described below. Exceptions may be approved by the "Regulating Agency" when submitted with a detailed study.

Table 3-2

MAXIMUM OVERLAND FLOW LENGTH (L_M) & INITIAL TIME OF CONCENTRATION (T_i)

Element*	DU/ Acre	.5%		1%		2%		3%		5%		10%	
		L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i
Natural		50	13.2	70	12.5	85	10.9	100	10.3	100	8.7	100	6.9
LDR	1	50	12.2	70	11.5	85	10.0	100	9.5	100	8.0	100	6.4
LDR	2	50	11.3	70	10.5	85	9.2	100	8.8	100	7.4	100	5.8
LDR	2.9	50	10.7	70	10.0	85	8.8	95	8.1	100	7.0	100	5.6
MDR	4.3	50	10.2	70	9.6	80	8.1	95	7.8	100	6.7	100	5.3
MDR	7.3	50	9.2	65	8.4	80	7.4	95	7.0	100	6.0	100	4.8
MDR	10.9	50	8.7	65	7.9	80	6.9	90	6.4	100	5.7	100	4.5
MDR	14.5	50	8.2	65	7.4	80	6.5	90	6.0	100	5.4	100	4.3
HDR	24	50	6.7	65	6.1	75	5.1	90	4.9	95	4.3	100	3.5
HDR	43	50	5.3	65	4.7	75	4.0	85	3.8	95	3.4	100	2.7
N. Com		50	5.3	60	4.5	75	4.0	85	3.8	95	3.4	100	2.7
G. Com		50	4.7	60	4.1	75	3.6	85	3.4	90	2.9	100	2.4
O.P./Com		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
Limited I.		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
General I.		50	3.7	60	3.2	70	2.7	80	2.6	90	2.3	100	1.9

*See Table 3-1 for more detailed description



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency _____ year

(b) P_6 = _____ in., P_{24} = _____, $\frac{P_6}{P_{24}}$ = _____ %(2)

(c) Adjusted P_6(2) = _____ in.

(d) t_x = _____ min.

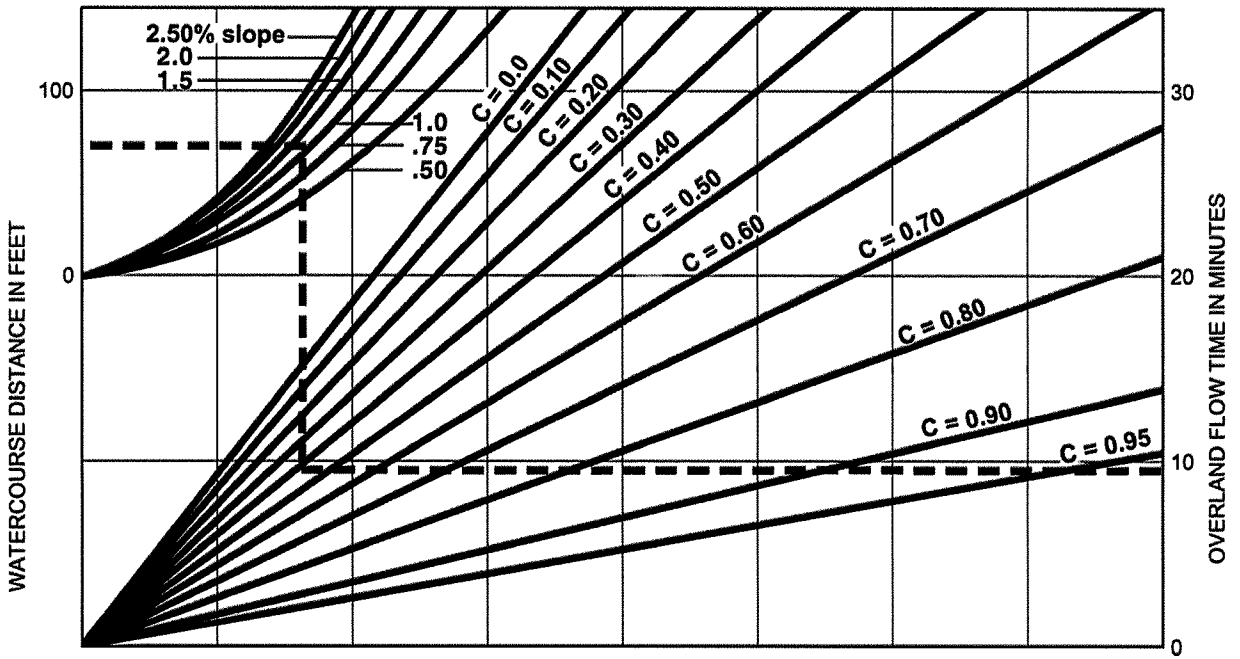
(e) I = _____ in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1



EXAMPLE:
Given: Watercourse Distance (D) = 70 Feet
Slope (s) = 1.3%
Runoff Coefficient (C) = 0.41
Overland Flow Time (T) = 9.5 Minutes

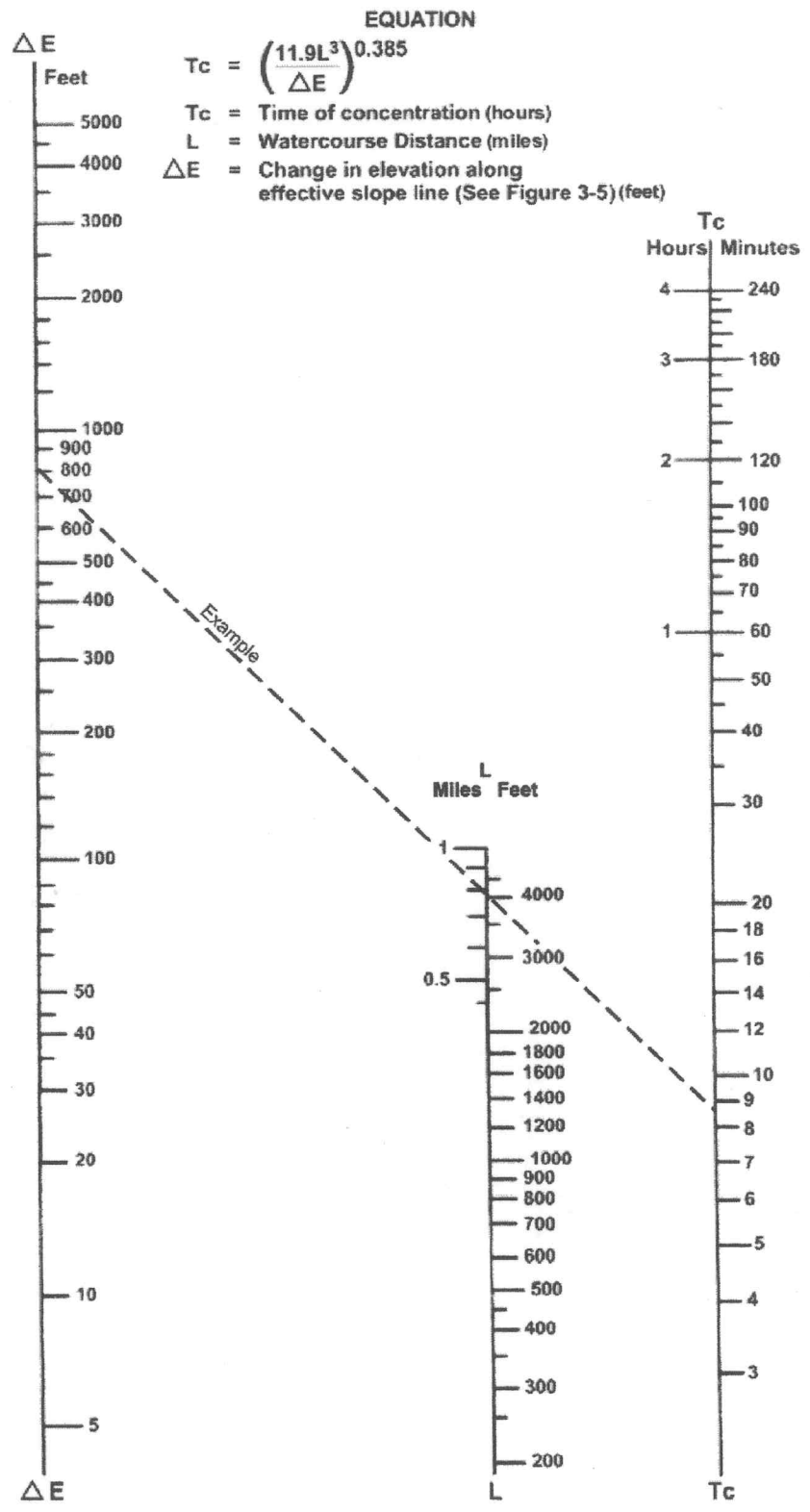
$$T = \frac{1.8\,(1.1-C)\sqrt{D}}{\sqrt[3]{s}}$$

SOURCE: Airport Drainage, Federal Aviation Administration, 1965

FIGURE

Rational Formula - Overland Time of Flow Nomograph

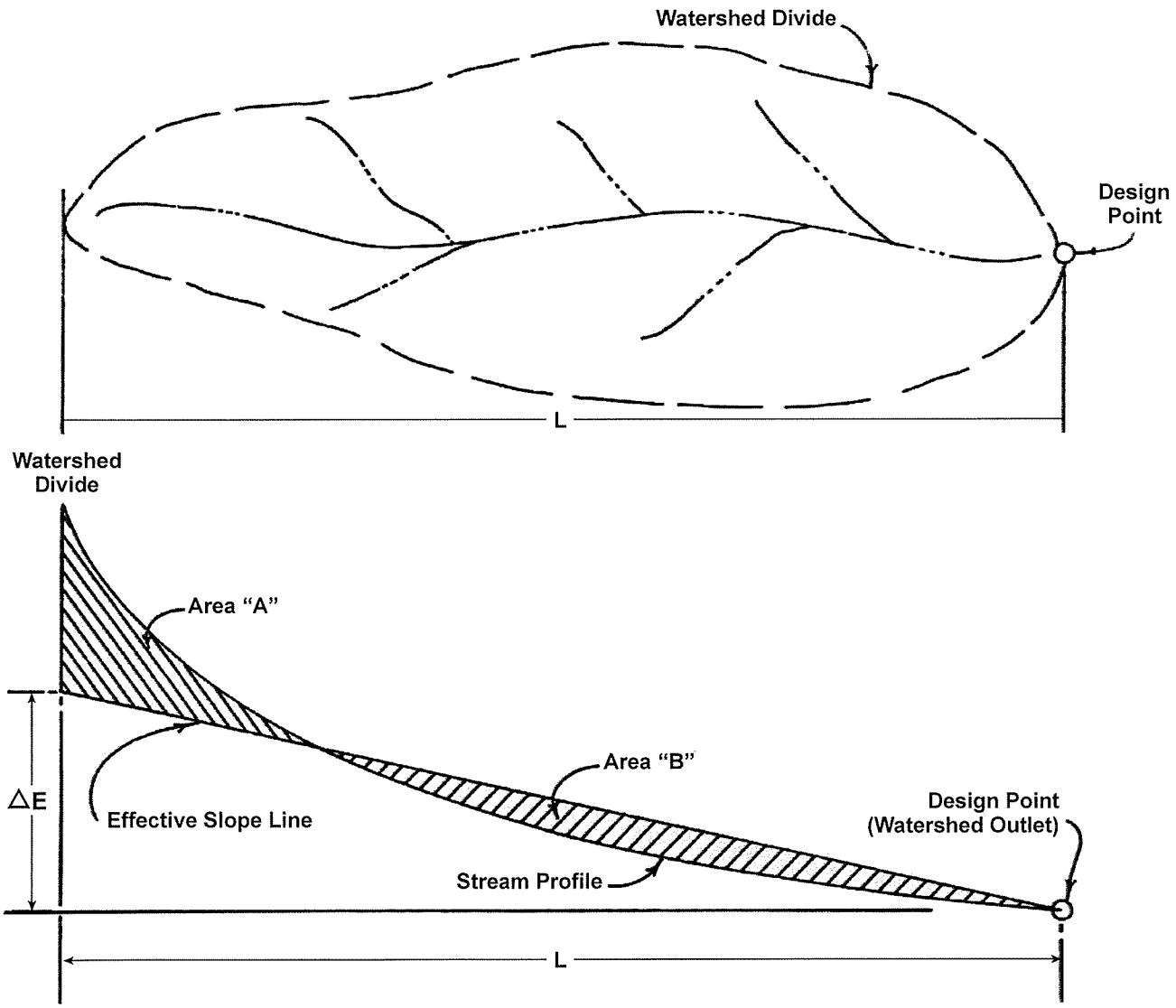
3-3



SOURCE: California Division of Highways (1941) and Kirpich (1940)

FIGURE 3-4

Nomograph for Determination of
Time of Concentration (Tc) or Travel Time (Tt) for Natural Watersheds



Area "A" = Area "B"

SOURCE: California Division of Highways (1941) and Kirpich (1940)

FIGURE

Computation of Effective Slope for Natural Watersheds

3-5