WALSH ENGINEERING & SURVEYING, INC.

CEQA DRAINAGE STUDY
For
Harbison Canyon TPM
(APN 513-101-11)

2030 Harbison Canyon Road
El Cajon, CA 92019

Prepared for:
Nagham Sabah
1233 Pfeifer Lane
El Cajon, CA 92020

(Walsh Engineering Job No 221331)

607 Aldwych Road * El Cajon, CA 92020 * Phone (619) 588-6747 * Fax (619) 792-1232
www.walsh-engineering.com

Table of Contents

Introduction

The project is a subdivision located at 2030 Harbison Canyon Road, El Cajon, CA 92019 (see attached Vicinity Map). The site will be divided into four parcels and a remainder parcel. A proposed private road will provide access.

Pre-Developed Condition

In the current condition, the site has two existing homes and a private road. The rest of the site is vacant natural land that slopes downward from west to east. There are three drainage basins with areas of 3.27, 2.06, and 9.99 acres for Basins 1, 2, and 3, respectively (see the Pre-Developed Drainage Map in Section 2). Basins 1, 2, and 3 had respective flow rates of 5.22, 3.90, and 12.34 cfs. See the table below for a summary of pre-developed values and flow rates.

Post-Developed Condition

In the post-developed condition, there will be a proposed private road and three new homes. There are three drainage basins that all have the same acreage as the pre-developed condition (see the Post Developed Drainage Map in Section 2). The post-developed flow rates for Basins 1, 2, and 3 were calculated to be 6.00, 3.23 and 13.00 cfs, respectively. The decrease in flow rate for Basin 2 is largely a result of the increased time of concentration from a proposed flat pad. The increase in flow rate for Basins 1 and 3 is due to the higher C-value from the proposed private road's AC pavement. See the table below for a summary of post-developed values and flow rates.

Summary/Conclusion

The increase in flow rates from the development will be mitigated back to pre-developed rates using tree wells, which will be conjunctive use facilities for both pollutant control and detention storage. The tree wells will provide 4" of ponding for detention storage above the 2" vertical orifice in the catch basin that is 2" above the finished grade of each tree well. The purpose of the orifice is to separate the water quality ponding layer from flood storage ponding to satisfy the County's conjunctive use requirements. Flood routing detention analysis was done through the Hydroflow Express Hydrographs

program (see Output files for Basins 1 and 3 in Section 2 herein). The mitigated flowrate for Basin 1 was calculated to be 4.58 cfs, which is below the pre-developed flow rate of 5.22 cfs. The mitigated flowrate for Basin 3 was calculated to be 11.51 cfs, which is below the pre-developed flow rate of 12.34 cfs. See the table below for a summary of hydrology values and flowrates.

There will be no increase in flow rate from the pre to post developed condition or adverse negative effects as a result of the development.

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	0.36	0.43	12.26	12.95	4.43	4.28	3.27	3.27
2	0.42	0.42	11.87	15.66	4.53	3.79	2.06	2.06
3	0.36	0.385	18.24	19.69	3.43	3.38	9.99	9.99

Basin	Pre-Developed Q_{100} (cfs)	Post-Developed Q_{100} (cfs)	Mitigated Q_{100} (cfs)
1	5.22	6.00	4.58
2	3.90	3.23	n/a
3	12.34	13.00	11.51

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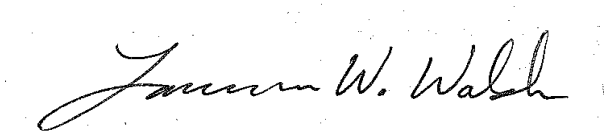
DECLARATION OF RESPONSIBLE CHARGE

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.



8/12/25

LAWRENCE W. WALSH, RCE 46316 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.

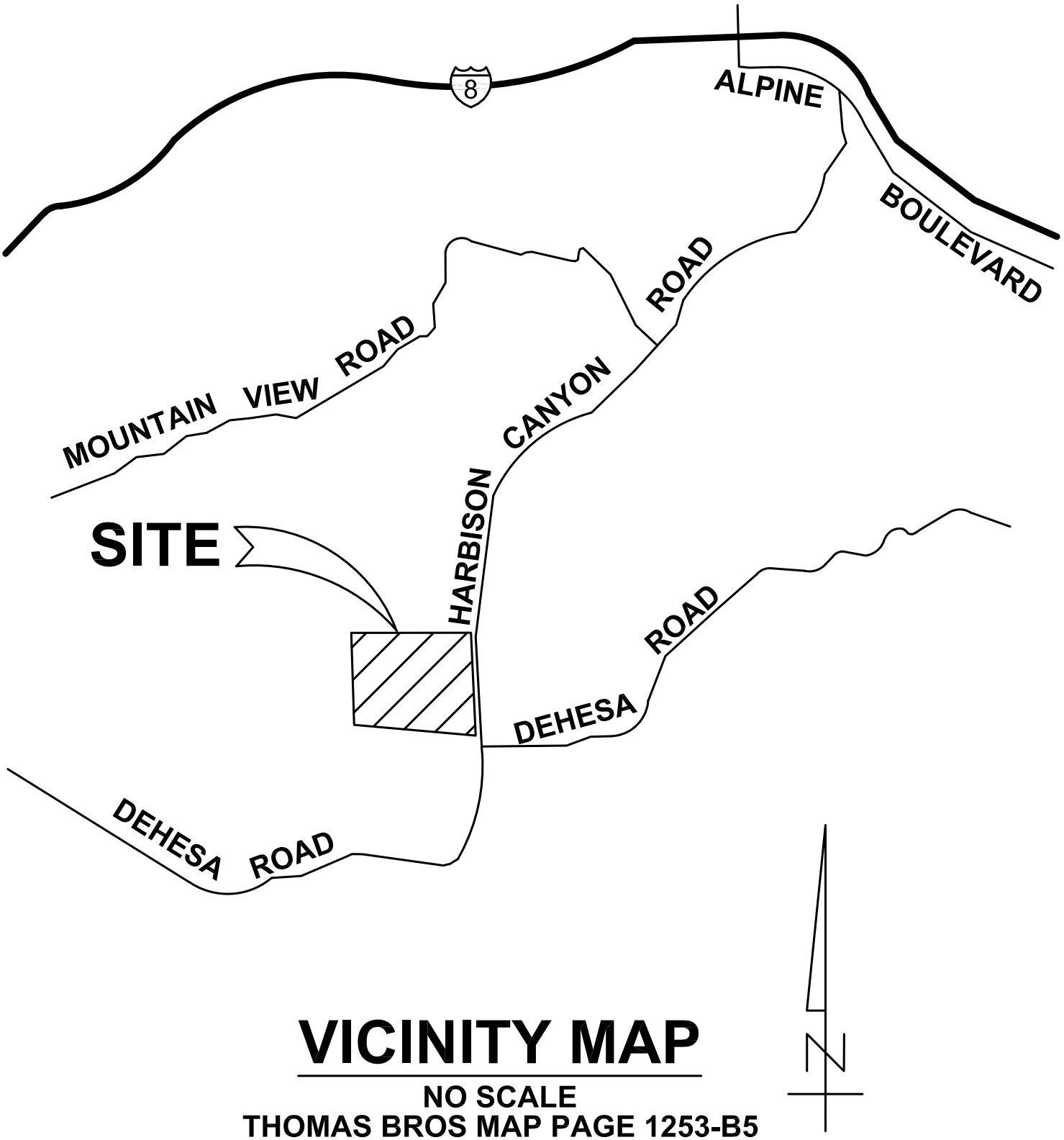
Q: Will the project substantially alter the existing drainage pattern of the site or area including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?
A: No. The overall 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 (see attached County Flood Areas map).

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.

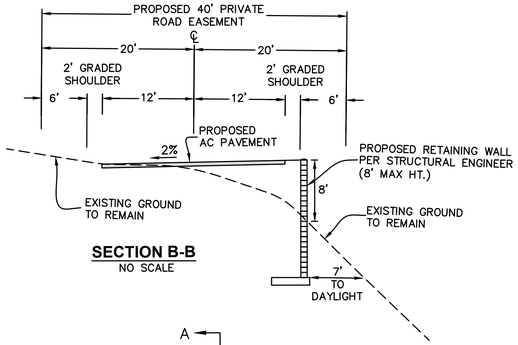
Q: Will the project expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam on-site or off-site?
A: No. The project will not expose people or structures to a significant risk of loss, injury or death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



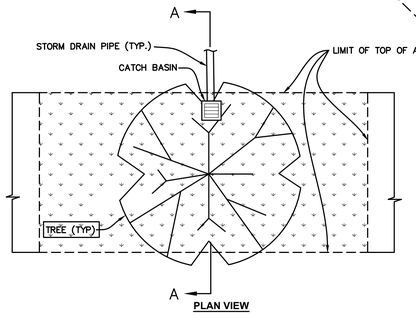
VICINITY MAP

NO SCALE
THOMAS BROS MAP PAGE 1253-B5

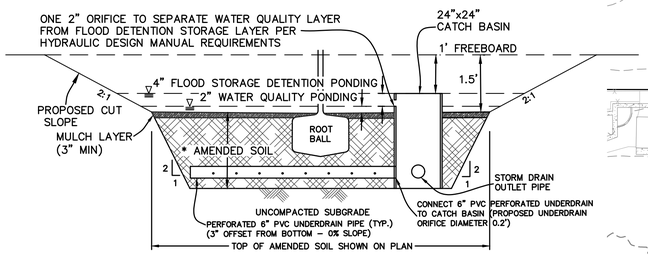
PRELIMINARY GRADING PLAN



SECTION B-B
NO SCALE



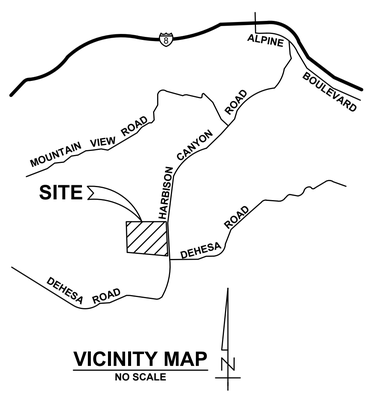
PLAN VIEW



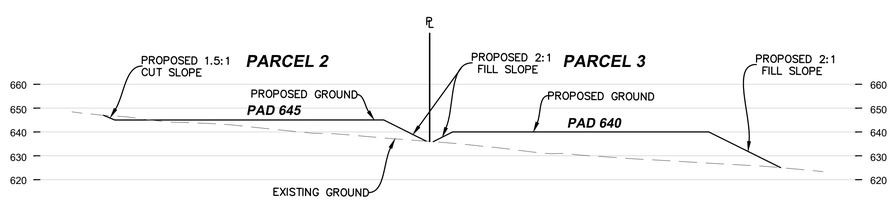
SECTION A-A

NOTE:
AMENDED SOIL THICKNESS VARIES DEPENDING ON TREE WELL:
- TREE WELLS IN DMAs 1,2,3 & 5 HAVE 3.0' OF AMENDED SOIL
- TREE WELLS IN DMAs 4,9 & 10 HAVE 4.0' OF AMENDED SOIL

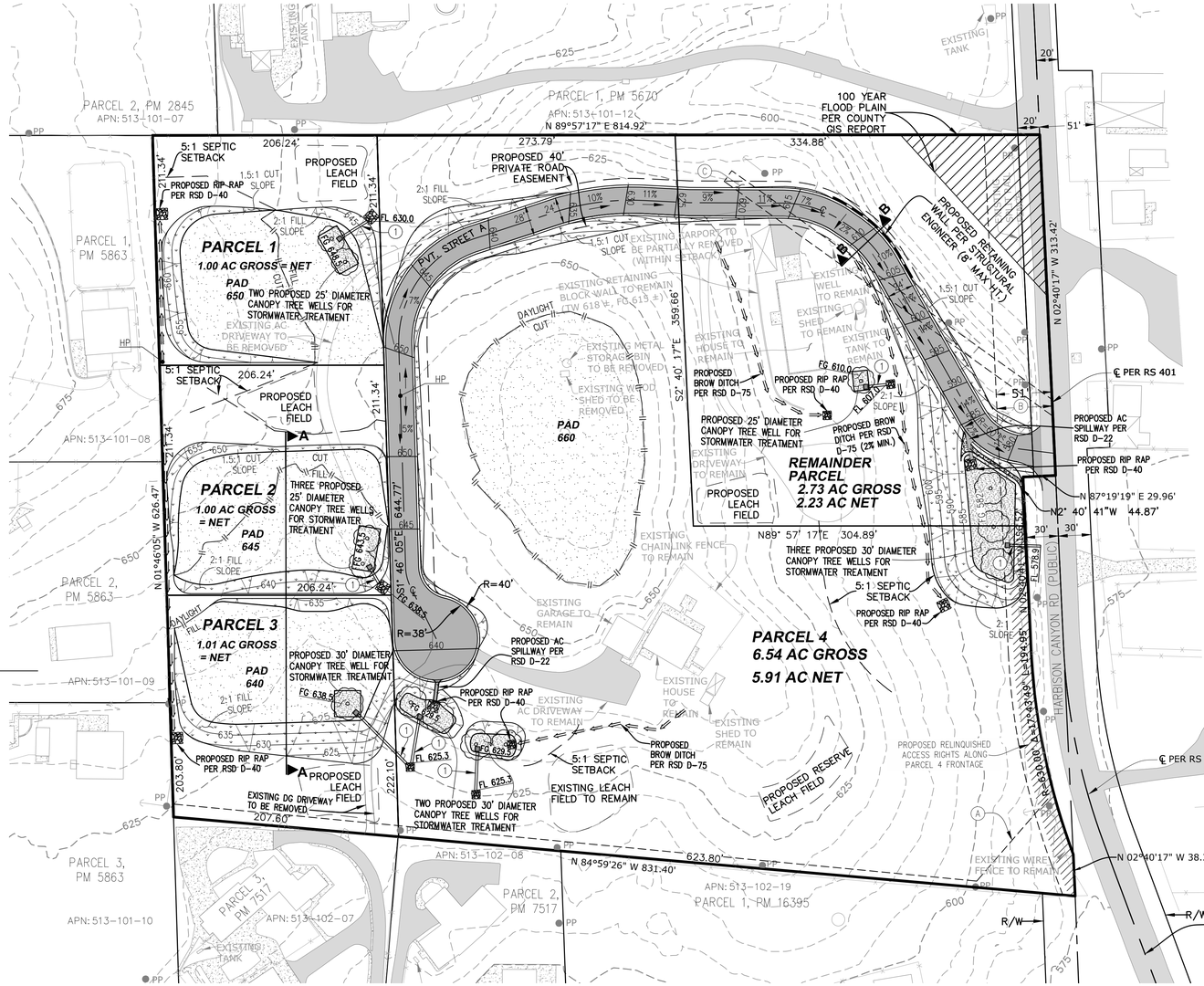
TREEWELL DETAIL
NO SCALE

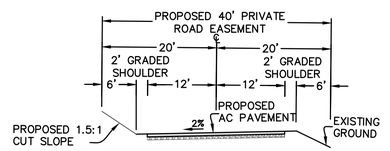


VICINITY MAP
NO SCALE

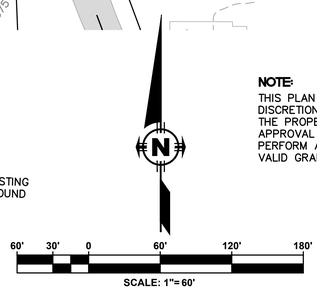


SECTION A-A
SCALE: H: 1"=30'
V: 1"=30'





PROPOSED "STREET A"
TYPICAL SECTION
NO SCALE
LOOKING WEST



NOTE:
THIS PLAN IS PROVIDED TO ALLOW FOR 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 PERFORM ANY GRADING SHOWN HEREON, AND AGREES TO OBTAIN VALID GRADING PERMISSIONS BEFORE COMMENCING SUCH ACTIVITY.

LEGAL DESCRIPTION:

PARCEL 4 OF PARCEL MAP NO. 1002, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, SEPTEMBER 21, 1972. EXCEPTING THEREFROM THAT PORTION DESCRIBED IN DEED TO THE COUNTY OF SAN DIEGO FOR ROAD SURVEY NO. 1530 RECORDED OCTOBER 24, 1963 AS INSTRUMENT NO. 190971.

BENCHMARK:

DESCRIPTION: 3" SAN DIEGO COUNTY SURVEY BRASS DISC STAMPED "BM EC 137"

LOCATION: APPROXIMATELY 0.4 MILES WESTERLY OF SLOANE CANYON ROAD ALONG DEHESA ROAD.

ELEVATION: 500.6 (NAVD88)

SOURCE: ROS 17739

TOPOGRAPHY:

TOPOGRAPHY PROVIDED BY PHOTOGEODETIC, INC.
DATE FLOWN: APRIL 19, 2022

EASEMENT NOTES:

EASEMENTS PLOTTED PER PRELIMINARY REPORT PREPARED BY CORINTHIAN TITLE COMPANY AS ORDER NO. 2015329-SH DATED MAY 02, 2022.

(A) CENTERLINE OF SDG&E PUBLIC UTILITY EASEMENT RECORDED MARCH 30, 1953 IN BOOK 4791, PAGE 23 (NO WIDTH GIVEN).

(B) IRREVOCABLE OFFER OF DEDICATION FOR PUBLIC HIGHWAY GRANTED TO THE COUNTY OF SAN DIEGO PER DOCUMENT RECORDED AUGUST 16, 1972 AS DOC# 1972-216628.

(C) 12' WIDE PUBLIC UTILITY EASEMENT PER DOCUMENT RECORDED FEBRUARY 20, 1973 AS DOC# 1973-044103.

CENTERLINE OF SDG&E PUBLIC UTILITY EASEMENT RECORDED JUNE 6, 1940 IN BOOK 1033, PAGE 302 (NOT PLOTTABLE).

25' WIDE UNNAMED EASEMENT RECORDED JUNE 13, 1946 IN BOOK 2153, PAGE 78 (NOT PLOTTABLE).

SITE ADDRESS:

2030 HARBISON CANYON ROAD
EL CAJON, CA 92019

APN:

513-101-11

EARTHWORK:

CUT= 12,700 C.Y.
FILL= 11,400 C.Y.
10% SHRINKAGE= 1,300 C.Y.
IMPORT/EXPORT= 0 C.Y.

LEGEND

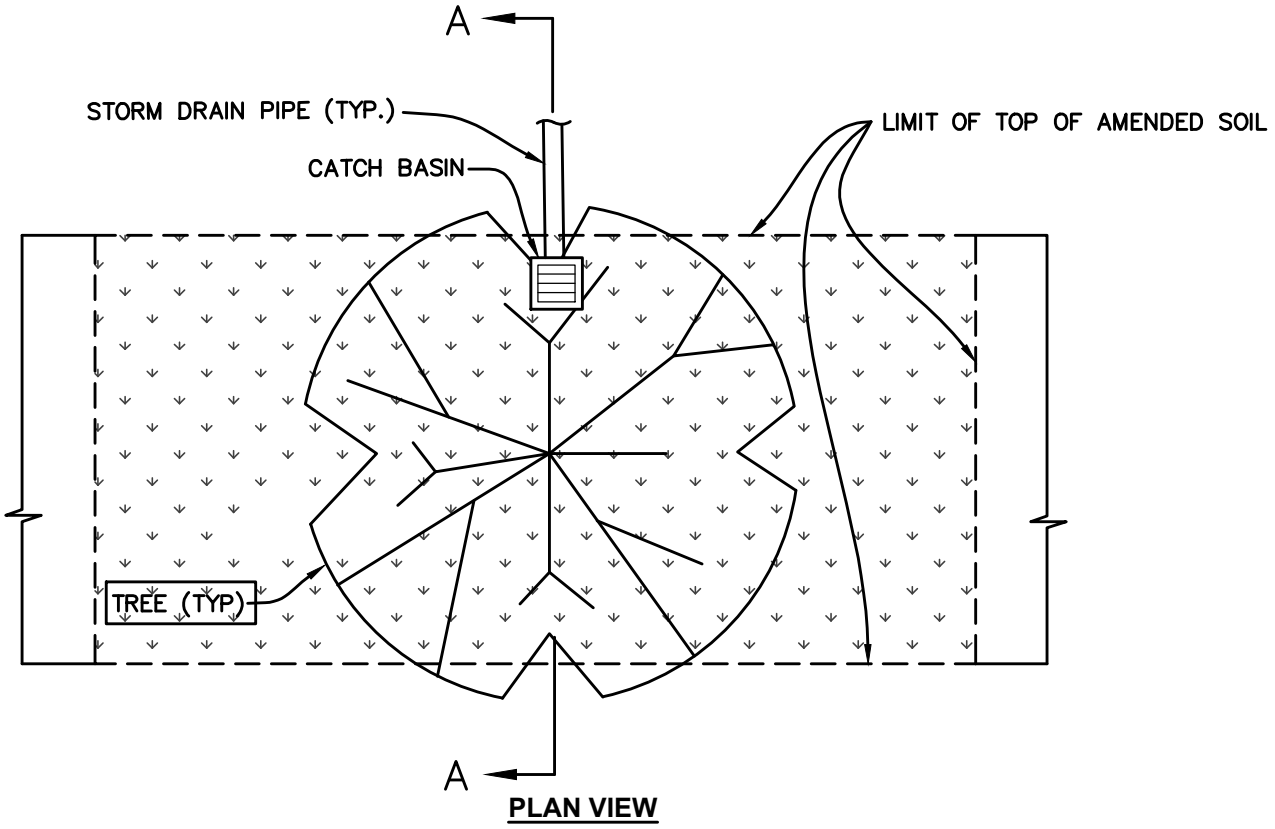
(1) PROPOSED 6" PVC STORM DRAIN PIPE

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

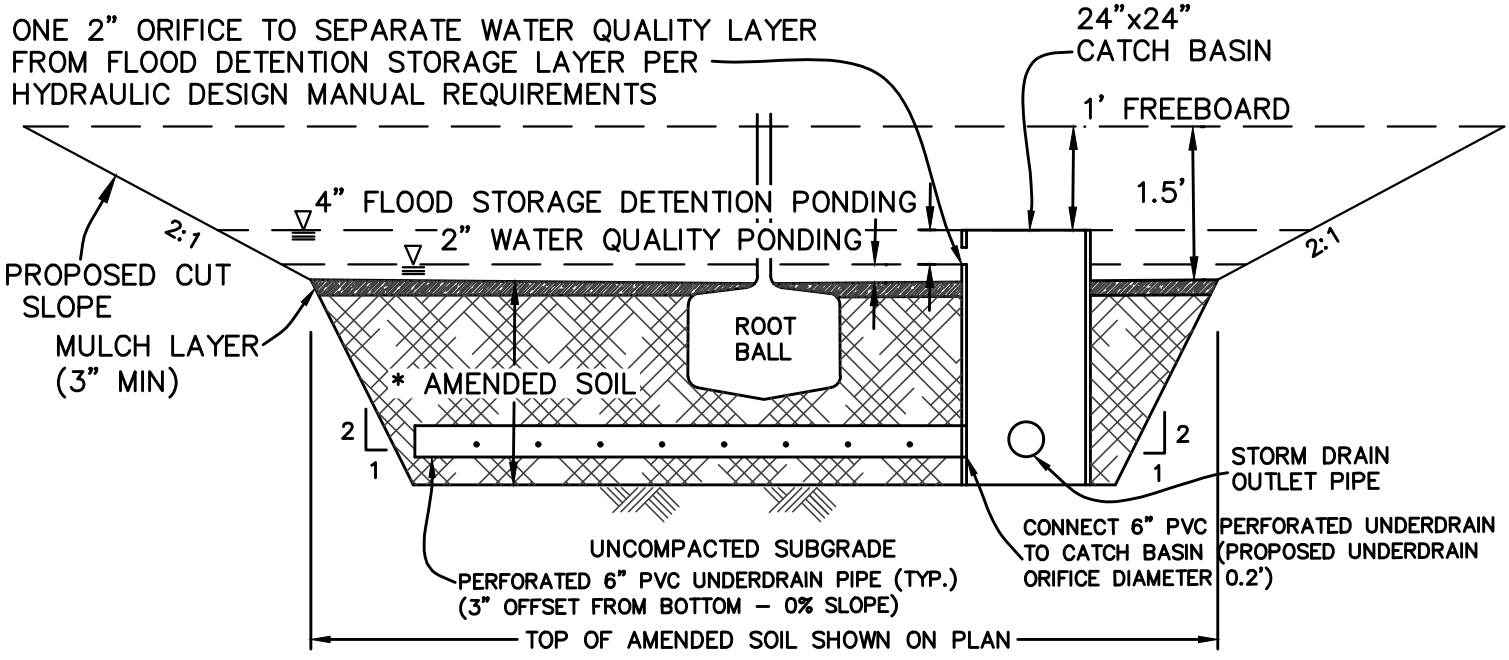
LAWRENCE W. WALSH — DATE

Walsh Engineering & Surveying, Inc.
607 Aldwych Road, El Cajon, CA 92020
(619) 588-6747 (619) 792-1232 Fax

PRELIMINARY GRADING PLAN- TPM NO. 21616



PLAN VIEW



SECTION A-A

NOTE:

AMENDED SOIL THICKNESS VARIES DEPENDING ON TREE WELL:
- TREE WELLS IN DMAs 1,2,3 & 5 HAVE 3.0' OF AMENDED SOIL
- TREE WELLS IN DMAs 4,9 & 10 HAVE 4.0' OF AMENDED SOIL

TYPICAL TREE WELL DETAIL

NO SCALE

SECTION 2

HYDROLOGY

DRAINAGE MAP: PRE-DEVELOPED

2030 HARBISON CANYON ROAD
EL CAJON, CA 92019

LEGEND:

- BASIN BOUNDARY
- SUB-BASIN BOUNDARY
- FLOWPATH (T_c)
- POC — POINT OF COMPARISON
- SOIL TYPE DIVISION LINE

BASIN
SUB BASIN
NODE
1.022
EL=612
NODE ELEVATION

SUB-BASIN 3-01
0.05 AC

3.011
EL=690

1.011
EL=690

3.021
EL=670

L_1 = 100'

L_2 = 100'

1.021
EL=673

SUB-BASIN 1-01
0.06 AC

BASIN 1
3.27 AC

SUB-BASIN 1-02
3.21 AC

L_2 = 594'

SUB-BASIN 3-02
6.06 AC

2.011
EL=670

SUB-BASIN 2-01
0.04 AC

L_1 = 100'

2.021
EL=665

L_2 = 892'

L_3 = 692'

3.022
EL=579

SUB-BASIN 3-03
3.88 AC

BASIN 3
9.99 AC

BASIN 2
2.06 AC

SUB-BASIN 3-02
2.02 AC

POC 1.022
EL=618

POC 2.022
EL=597

POC 3.023
EL=575

TYPE C SOIL
TYPE D SOIL
TYPE C SOIL
TYPE A SOIL

HARBISON CANYON ROAD

APN: 513-101-07
APN: 513-101-12
APN: 513-101-08
APN: 513-101-09
APN: 513-101-10
APN: 513-102-08
APN: 513-102-19
APN: 513-102-07

EXISTING POOL
EXISTING TANK
EXISTING RETAINING BLOCK WALL TO REMAIN (TW 618 ±, FG 615 ±)
EXISTING AC DRIVEWAY TO BE REMOVED
EXISTING METAL STORAGE BIN TO BE REMOVED
EXISTING WOOD SHED TO BE REMOVED
EXISTING WELL TO REMAIN
EXISTING SHED TO REMAIN
EXISTING HOUSE TO REMAIN
EXISTING TANK TO REMAIN
EXISTING CHAIN LINK FENCE TO REMAIN
EXISTING GARAGE TO REMAIN
EXISTING HOUSE TO REMAIN
EXISTING AC DRIVEWAY TO REMAIN
EXISTING SHED TO REMAIN
EXISTING WIRE FENCE TO REMAIN
R/W

100' 50' 0 100' 200' 300'

SCALE: 1"= 100'

DRAINAGE MAP: POST-DEVELOPED

2030 HARBISON CANYON ROAD
EL CAJON, CA 92019

LEGEND:

- BASIN BOUNDARY
- SUB-BASIN BOUNDARY
- FLOWPATH (T_c)
- POC — POINT OF COMPARISON
- BROW DITCH
- SOIL TYPE DIVISION LINE

BASIN
SUB BASIN
NODE
1.022
EL=2150
NODE ELEVATION

SUB-BASIN 3-03
4.06 AC

SUB-BASIN 3-02
0.25 AC

SUB-BASIN 3-01
0.05 AC

SUB-BASIN 3-06
1.62 AC

SUB-BASIN 3-05
0.04 AC

SUB-BASIN 1-01
0.06 AC

SUB-BASIN 2-01
0.04 AC

SUB-BASIN 1-02
1.37 AC

SUB-BASIN 1-03
1.84 AC

SUB-BASIN 3-04
3.97 AC

SUB-BASIN 1-02
2.02 AC

BASIN 1
3.27 AC

BASIN 2
2.06 AC

BASIN 3
9.99 AC

REMAINDER PARCEL
2.73 AC GROSS
2.20 AC NET

PARCEL 1
1.00 AC GROSS = NET

PARCEL 2
1.00 AC GROSS = NET

PARCEL
1.01 AC GROSS = NET

PARCEL 4
6.54 AC GROSS
5.91 AC NET

PARCEL 1, PM 5670
APN: 513-101-12

PARCEL 2, PM 2845
APN: 513-101-07

PARCEL 1, PM 5863

PARCEL 2, PM 5863

PARCEL 3, PM 5863

PARCEL 2, PM 7517

PARCEL 3, PM 7517

PARCEL 1, PM 16395

APN: 513-101-08

APN: 513-101-09

APN: 513-101-10

APN: 513-102-08

APN: 513-102-07

APN: 513-102-19

PROPOSED 40' PRIVATE ROAD EASEMENT

PVT. STREET A

HARBISON CANYON RD (PUBLIC)

100 YEAR FLOOD PLAIN PER COUNTY GIS REPORT

PROPOSED RETAINING WALL PER STRUCTURAL ENGINEER (8' MAX HT.)

PROPOSED 18' DEDICATION

℄ PER RS 1848

℄ PER RS 1530

℄ PER RS 153

PROPOSED AC SPILLWAY PER RSD D-22

PROPOSED RIP RAP PER RSD D-40

PROPOSED BROW DITCH PER RSD D-75

PROPOSED BROW DITCH PER RSD D-75 (2% MIN.)

PROPOSED 25' DIAMETER CANOPY TREE WELL FOR STORMWATER TREATMENT

TWO PROPOSED 25' DIAMETER CANOPY TREE WELLS FOR STORMWATER TREATMENT

TWO PROPOSED 30' DIAMETER CANOPY TREE WELLS FOR STORMWATER TREATMENT

THREE PROPOSED 25' DIAMETER CANOPY TREE WELLS FOR STORMWATER TREATMENT

PROPOSED LEACH FIELD

EXISTING LEACH FIELD TO REMAIN

5:1 SEPTIC SETBACK

EXISTING TANK

EXISTING WELL TO REMAIN

EXISTING SHED TO REMAIN

EXISTING HOUSE TO REMAIN

EXISTING GARAGE TO REMAIN

EXISTING AC DRIVEWAY TO REMAIN

EXISTING DG DRIVEWAY TO BE REMOVED

EXISTING WIRE FENCE TO REMAIN

TYPE C SOIL

TYPE D SOIL

TYPE A SOIL

3.031
EL= 659

3.022
EL= 662

3.021
EL=670

3.011
EL=690

1.011
EL=690

1.021
EL=673

3.062
EL=649

3.061
EL=660

1.022
EL=652.5

3.051
EL=660

2.011
EL=660

2.021
EL=660

3.063
EL=582

3.064
EL=579.5

3.065
EL=578.9

3.041
EL=579

1.023
EL=629.5

1.024
FL=625.75

1.031
FL=625.3

POC 1.032
EL=618

POC 2.022
EL=597

POC CONFLUENCE
3.042
3.066
EL=575

N 84°59'26" W 831.40'

N 02°40'17" W 313.42'

N 02° 40' 41"W 44.87'

N 87°19'19" E 29.96'

N 89° 57' 17"E

R=630.00' Δ=17°43'49" L=194.95'

100' 50' 0 100' 200' 300'

SCALE: 1"= 100'

Weighted C Value Calculations – Pre-Basin 1

Pre-Basin 1:
Weighted C value = C_W = ?
Total Area = 3.27 ac

Existing Impervious Area = 0.08 ac
% Existing Impervious = $\frac{0.08\ ac}{3.27\ ac}$ = 2%

C_W = 0.90(% Impervious) + C_P (1- % Impervious)

C_P = ?
%Soil Type C = 0.36 ac
$= \frac{0.36\ ac}{3.27\ ac} \times 100\% = 11\%$
%Soil Type D = 100% - 11% = 89%

C_P= 0.30 for Soil Type C and 0.35 for Soil Type D (Table 3-1, Hydrology Manual)
C_P = 0.11(0.30) + 0.89(0.35) = 0.344

C_W = 0.90(% Impervious) + C_P (1- % Impervious)
C_W = 0.90(0.02) + 0.344(1-0.02) = 0.36 = PRE C_w

Weighted C Value Calculations – Pre-Basin 2

Pre-Basin 2:
Weighted C value = C_W = ?
Total Area = 0.88 ac

Existing Impervious Area = 0.14 ac
% Existing Impervious = $\frac{0.14\ ac}{0.88\ ac}$ = 16%

C_W = 0.90(% Impervious) + C_P (1- % Impervious)

C_P = ?
%Soil Type C = 0.36 ac
$= \frac{0.36\ ac}{0.88\ ac} \times 100\% = 41\%$
%Soil Type D = 100% - 41% = 59%

C_P= 0.30 for Soil Type C and 0.35 for Soil Type D (Table 3-1, Hydrology Manual)
C_P = 0.41(0.30) + 0.59(0.35) = 0.329

C_W = 0.90(% Impervious) + C_P (1- % Impervious)
C_W = 0.90(0.16) + 0.329(1-0.16) = 0.42 = PRE C_w

Weighted C Value Calculations – Pre-Basin 3

Pre-Basin 3:
Weighted C value = C_W = ?
Total Area = 9.99 ac

Existing Impervious Area = 0.98 ac
% Existing Impervious = $\frac{0.98\ ac}{9.99\ ac}$ = 10%

C_W = 0.90(% Impervious) + C_P (1- % Impervious)

C_P = ?
%Soil Type A = 1.54 ac
$= \frac{1.54\ ac}{9.99\ ac} \times 100\% = 15\%$
%Soil Type C = 6.10 ac
$= \frac{6.10\ ac}{9.99\ ac} \times 100\% = 62\%$
%Soil Type D = 100% - (15% + 62%) = 23%

C_P= 0.30 for Soil Type C and 0.35 for Soil Type D (Table 3-1, Hydrology Manual)
C_P = 0.15(0.20) + 0.62(0.30) + 0.23(0.35) = 0.297

C_W = 0.90(% Impervious) + C_P (1- % Impervious)
C_W = 0.90(0.10) + 0.297(1-0.10) = 0.36 = PRE C_w

Weighted C Value Calculations – Post-Basin 1

Post-Basin 1:
Weighted C value = C_W = ?
Total Area = 3.27 ac

Impervious Area = Existing Impervious to Remain + Proposed Impervious

Existing Impervious to Remain = 0.01 ac

Proposed Impervious =
Future Impervious Area on Pads = 6,500 SF x (2 Pads) = 13,000 SF
+ Proposed Private Road = 9,486 SF
Total Proposed Impervious = 22,486 SF $\times \frac{1 \text{ ac}}{43{,}560 \text{ SF}}$ = 0.52 ac

Impervious Area = 0.01 ac + 0.52 ac = 0.53 ac
% Impervious = $\frac{0.53 \text{ ac}}{3.27 \text{ ac}}$ = 16%

$C_W = 0.90(\%\ \text{Impervious}) + C_P\ (1 - \%\ \text{Impervious})$

C_P = 0.344 (see Pre-Basin 1 calculations)

$C_W = 0.90(0.16) + 0.344(1-0.16) =$ 0.43 = POST C_w

Note: Future Impervious Area on Pads accounts for Future House, Driveway, and Flatwork.

Weighted C Value Calculations – Post-Basin 2

Post-Basin 2:
Weighted C value = C_W = ?
Total Area = 0.88 ac

Impervious Area = Existing Impervious + Proposed Impervious

Existing Impervious = 0.14 ac (same as Pre-Basin 2)

Proposed Impervious = 0 ac

Impervious Area = 0.14 ac + 0 ac = 0.14 ac
% Impervious = $\frac{0.14\ ac}{0.88\ ac}$ = 16%

C_W = 0.90(% Impervious) + C_P (1- % Impervious)

C_P = 0.329 (see Pre-Basin 2 calculations)

C_W = 0.90(0.16) + 0.329(1-0.16) = 0.42 = POST C_w

Weighted C Value Calculations – Post-Basin 3

NOTE: 1 DU/Acre or Less used for Land Use in Undisturbed/Untouched Areas of Post-Basin 3 (Same as Pre-Developed) – C-values for 1 DU/Acre varies based on Varying Soil Types throughout site.

Post-Basin 3: 9.99 Ac Total Area

(Sub-Basin 3-01 & 3-02): 0.30 Ac Total
Type D 1.0 Du/Ac = C=0.41 for 0.30 Ac

(Sub-Basin 3-03): 4.06 Ac Total
10% of 4.06 Ac - Type A 1.0 Du/Ac = C=0.27 = (0.1)(0.27) = 0.027
45% of 4.06 Ac - Type C 1.0 Du/Ac = C=0.36 = (0.45)(0.36) = 0.162
45% of 4.06 Ac- Type D 1.0 Du/Ac = C=0.41 = (0.45)(0.41) = 0.1845

Weighted C value for Sub-Basin 3-03 = 0.374

(Sub-Basin 3-04): 3.97 Ac Total
* Using 100% Type C, 1.0 Du/Ac even though there is small area of Type A (Conservative Approach) = C=0.36 for 3.97 Ac

(Sub-Basin 3-05): 0.04 Ac Total
Type C 1.0 Du/Ac = C=0.36 for 0.04 Ac

(Sub-Basin 3-06): 1.62 Ac Total

Impervious Area = Existing Impervious to Remain + Proposed Impervious
Existing Impervious to Remain = 0.04 ac
Proposed Impervious Area = Proposed Private Road = 18,430 SF = 0.42 ac
Impervious Area = 0.04 ac + 0.42 ac = 0.46 ac

$$\% \text{ Impervious} = \frac{0.46 \text{ ac}}{1.62 \text{ ac}} = 28.3\%$$

$C_W = 0.90(\%\ \text{Impervious}) + C_P\ (1 - \%\ \text{Impervious})$
$C_P = 0.297$ (see Pre-Basin 3 calculations)
$C_W = 0.90(0.283) + 0.297(1-0.283) = 0.468$

Weighted C value for Sub-Basin 3-06 = 0.468

Total Weighted C- Value for Post Basin 3
0.41(0.30 Ac) + 0.374(4.06 Ac) + 0.36(3.97 Ac) + 0.36(0.04 Ac) + 0.468(1.62 Ac) / 9.99 Ac =0.385

$C_W = 0.385$

San Diego County Rational Hydrology Program

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Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study   Date: 08/08/25

Harbison Canyon 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) = 3.000
24 hour precipitation(inches) = 6.000
P6/P24 =   50.0%
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 = 1.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL   ]
(1.0 DU/A or Less   )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.360
Initial subarea total flow distance = 100.000(Ft.)
Highest elevation = 690.000(Ft.)
Lowest elevation = 673.000(Ft.)
Elevation difference =   17.000(Ft.) Slope = 17.000 %

```
Top of Initial Area Slope adjusted by User to  5.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   5.00 %, in a development type of
 1.0 DU/A or Less
In Accordance With Table 3-2
Initial Area Time of Concentration =   8.00 minutes
 (for slope value of   5.00 %)
Rainfall intensity (I) =      5.837(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.360
Subarea runoff =      0.126(CFS)
Total initial stream area =        0.060(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 =      2.703(CFS)
Depth of flow =   0.153(Ft.), Average velocity =   2.323(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  =      2.703(CFS)
  '     '        flow top width =     15.255(Ft.)
  '     '    velocity=    2.323(Ft/s)
  '     '        area =      1.164(Sq.Ft)
  '     '        Froude number =     1.482

Upstream point elevation =   673.000(Ft.)
Downstream point elevation =   618.000(Ft.)
Flow length =   594.000(Ft.)
Travel time  =    4.26 min.
Time of concentration =   12.26 min.
Depth of flow =   0.153(Ft.)
Average velocity =   2.323(Ft/s)
Total irregular channel flow =     2.703(CFS)
Irregular channel normal depth above invert elev. =   0.153(Ft.)
Average velocity of channel(s) =   2.323(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      4.432(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.360 given for subarea
Rainfall intensity =      4.432(In/Hr) for a   100.0 year storm
```

```
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.360  CA =      1.177
Subarea runoff =      5.091(CFS) for      3.210(Ac.)
Total runoff =      5.217(CFS)  Total area =       3.270(Ac.)
Depth of flow =   0.195(Ft.), Average velocity =   2.738(Ft/s)
End of computations, total study area =           3.270 (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: 07/24/25

Harbison Canyon 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) = 3.000
24 hour precipitation(inches) = 6.000
P6/P24 =   50.0%
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 = 1.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL   ]
(1.0 DU/A or Less   )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.360
Initial subarea total flow distance = 100.000(Ft.)
Highest elevation = 670.000(Ft.)
Lowest elevation = 665.000(Ft.)

```
Elevation difference =    5.000(Ft.) Slope =  5.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   5.00 %, in a development type of
 1.0 DU/A or Less
In Accordance With Table 3-2
Initial Area Time of Concentration =   8.00 minutes
 (for slope value of   5.00 %)
Rainfall intensity (I) =      5.837(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.360
Subarea runoff =      0.084(CFS)
Total initial stream area =        0.040(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 =      2.023(CFS)
Depth of flow =   0.130(Ft.), Average velocity =   2.397(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  =      2.023(CFS)
  '     '        flow top width =     12.993(Ft.)
  '     '    velocity=    2.397(Ft/s)
  '     '        area =      0.844(Sq.Ft)
  '     '        Froude number =     1.657

Upstream point elevation =   665.000(Ft.)
Downstream point elevation =   597.000(Ft.)
Flow length =   557.000(Ft.)
Travel time  =    3.87 min.
Time of concentration =   11.87 min.
Depth of flow =   0.130(Ft.)
Average velocity =   2.397(Ft/s)
Total irregular channel flow =     2.023(CFS)
Irregular channel normal depth above invert elev. =   0.130(Ft.)
Average velocity of channel(s) =   2.397(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      4.525(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.420 given for subarea
Rainfall intensity =      4.525(In/Hr) for a   100.0 year storm
```

Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.419 CA = 0.863
Subarea runoff = 3.820(CFS) for 2.020(Ac.)
Total runoff = 3.904(CFS) Total area = 2.060(Ac.)
Depth of flow = 0.166(Ft.), Average velocity = 2.825(Ft/s)
End of computations, total study area = 2.060 (Ac.)

San Diego County Rational Hydrology Program

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Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study   Date: 11/03/23

Harbison Canyon Pre Basin 3

 *********   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) = 3.000
24 hour precipitation(inches) = 6.000
P6/P24 =   50.0%
San Diego hydrology manual 'C' values used

++
Process from Point/Station   3.011 to Point/Station   3.021
**** 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
[LOW DENSITY RESIDENTIAL   ]
(1.0 DU/A or Less   )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.410
Initial subarea total flow distance = 100.000(Ft.)
Highest elevation = 690.000(Ft.)
Lowest elevation = 670.000(Ft.)
Elevation difference =   20.000(Ft.) Slope = 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
 1.0 DU/A or Less
In Accordance With Table 3-2
Initial Area Time of Concentration =   6.40 minutes
 (for slope value of  10.00 %)
Rainfall intensity (I) =      6.741(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.410
Subarea runoff =      0.138(CFS)
Total initial stream area =        0.050(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.021 to Point/Station        3.022
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      5.150(CFS)
Depth of flow =   0.191(Ft.), Average velocity =   2.831(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  =      5.150(CFS)
  '     '        flow top width =     19.077(Ft.)
  '     '    velocity=    2.831(Ft/s)
  '     '        area =      1.820(Sq.Ft)
  '     '        Froude number =     1.615

Upstream point elevation =   670.000(Ft.)
Downstream point elevation =   579.000(Ft.)
Flow length =   892.000(Ft.)
Travel time  =    5.25 min.
Time of concentration =   11.65 min.
Depth of flow =   0.191(Ft.)
Average velocity =   2.831(Ft/s)
Total irregular channel flow =     5.150(CFS)
Irregular channel normal depth above invert elev. =   0.191(Ft.)
Average velocity of channel(s) =   2.831(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      4.580(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.360 given for subarea
Rainfall intensity =      4.580(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.360  CA =      2.202
Subarea runoff =      9.947(CFS) for      6.060(Ac.)
```

```
Total runoff =     10.086(CFS)  Total area =       6.110(Ac.)
Depth of flow =   0.245(Ft.), Average velocity =   3.348(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.022 to Point/Station        3.023
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =     11.252(CFS)
Depth of flow =   0.802(Ft.), Average velocity =   1.749(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2             10.00              0.00
        3             20.00              1.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =     11.252(CFS)
  '     '        flow top width =     16.040(Ft.)
  '     '    velocity=    1.749(Ft/s)
  '     '        area =      6.432(Sq.Ft)
  '     '        Froude number =     0.487

Upstream point elevation =   579.000(Ft.)
Downstream point elevation =   575.000(Ft.)
Flow length =   692.000(Ft.)
Travel time  =    6.59 min.
Time of concentration =   18.24 min.
Depth of flow =   0.802(Ft.)
Average velocity =   1.749(Ft/s)
Total irregular channel flow =    11.252(CFS)
Irregular channel normal depth above invert elev. =   0.802(Ft.)
Average velocity of channel(s) =   1.749(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      3.430(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.360 given for subarea
Rainfall intensity =      3.430(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.360  CA =      3.599
Subarea runoff =      2.258(CFS) for      3.880(Ac.)
Total runoff =     12.343(CFS)  Total area =       9.990(Ac.)
Depth of flow =   0.830(Ft.), Average velocity =   1.790(Ft/s)
End of computations, total study area =           9.990 (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: 08/08/25

Harbison Canyon 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) = 3.000
24 hour precipitation(inches) = 6.000
P6/P24 =   50.0%
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 = 1.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL   ]
(1.0 DU/A or Less   )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.360
Initial subarea total flow distance = 100.000(Ft.)
Highest elevation = 690.000(Ft.)
Lowest elevation = 673.000(Ft.)
Elevation difference =   17.000(Ft.) Slope = 17.000 %

```
Top of Initial Area Slope adjusted by User to  5.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of   5.00 %, in a development type of
 1.0 DU/A or Less
In Accordance With Table 3-2
Initial Area Time of Concentration =   8.00 minutes
 (for slope value of   5.00 %)
Rainfall intensity (I) =      5.837(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.360
Subarea runoff =      0.126(CFS)
Total initial stream area =        0.060(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 =      1.566(CFS)
Depth of flow =   0.130(Ft.), Average velocity =   1.851(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  =      1.566(CFS)
  '     '        flow top width =     13.006(Ft.)
  '     '    velocity=    1.851(Ft/s)
  '     '        area =      0.846(Sq.Ft)
  '     '        Froude number =     1.279

Upstream point elevation =   673.000(Ft.)
Downstream point elevation =   652.500(Ft.)
Flow length =   282.000(Ft.)
Travel time  =    2.54 min.
Time of concentration =   10.54 min.
Depth of flow =   0.130(Ft.)
Average velocity =   1.851(Ft/s)
Total irregular channel flow =     1.566(CFS)
Irregular channel normal depth above invert elev. =   0.130(Ft.)
Average velocity of channel(s) =   1.851(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      4.886(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.430 given for subarea
Rainfall intensity =      4.886(In/Hr) for a   100.0 year storm
```

```
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.427  CA =      0.611
Subarea runoff =      2.858(CFS) for      1.370(Ac.)
Total runoff =      2.984(CFS)  Total area =       1.430(Ac.)
Depth of flow =   0.166(Ft.), Average velocity =   2.175(Ft/s)
```

↟

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.022 to Point/Station        1.023
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =   652.500(Ft.)
Downstream point elevation =   629.500(Ft.)
Channel length thru subarea  =   288.000(Ft.)
Channel base width      =   24.000(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 =      2.984(CFS)
Depth of flow =   0.038(Ft.), Average velocity =   3.108(Ft/s)
Channel flow top width =   25.936(Ft.)
Flow Velocity =    3.11(Ft/s)
Travel time  =    1.54 min.
Time of concentration =   12.08 min.
Critical depth =      0.076(Ft.)
```

↟

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.023 to Point/Station        1.024
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   0.145(Ft.), Average velocity =   2.854(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  =      2.984(CFS)
  '     '        flow top width =     14.462(Ft.)
  '     '    velocity=    2.854(Ft/s)
  '     '        area =      1.046(Sq.Ft)
  '     '        Froude number =     1.870
```

Upstream point elevation = 629.500(Ft.)
Downstream point elevation = 625.750(Ft.)
Flow length = 25.000(Ft.)
Travel time = 0.15 min.
Time of concentration = 12.23 min.
Depth of flow = 0.145(Ft.)
Average velocity = 2.854(Ft/s)
Total irregular channel flow = 2.984(CFS)
Irregular channel normal depth above invert elev. = 0.145(Ft.)
Average velocity of channel(s) = 2.854(Ft/s)

++
Process from Point/Station 1.024 to Point/Station 1.024
**** 6 HOUR HYDROGRAPH ****
_____
++
Hydrograph Data - Section 6, San Diego County Hydrology manual, June 2003

Time of Concentration = 12.23
Basin Area = 1.43 Acres
6 Hour Rainfall = 3.000 Inches
Runoff Coefficient = 0.427
Peak Discharge = 2.98 CFS

Time (Min)	Discharge (CFS)
0	0.000
12	0.110
24	0.112
36	0.118
48	0.121
60	0.127
72	0.131
84	0.139
96	0.143
108	0.154
120	0.160
132	0.174
144	0.182
156	0.202
168	0.214
180	0.245
192	0.266
204	0.325
216	0.370
228	0.543
240	0.766
252	2.984
264	0.436

276	0.292
288	0.228
300	0.191
312	0.166
324	0.148
336	0.135
348	0.124
360	0.115
372	0.107

++

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))

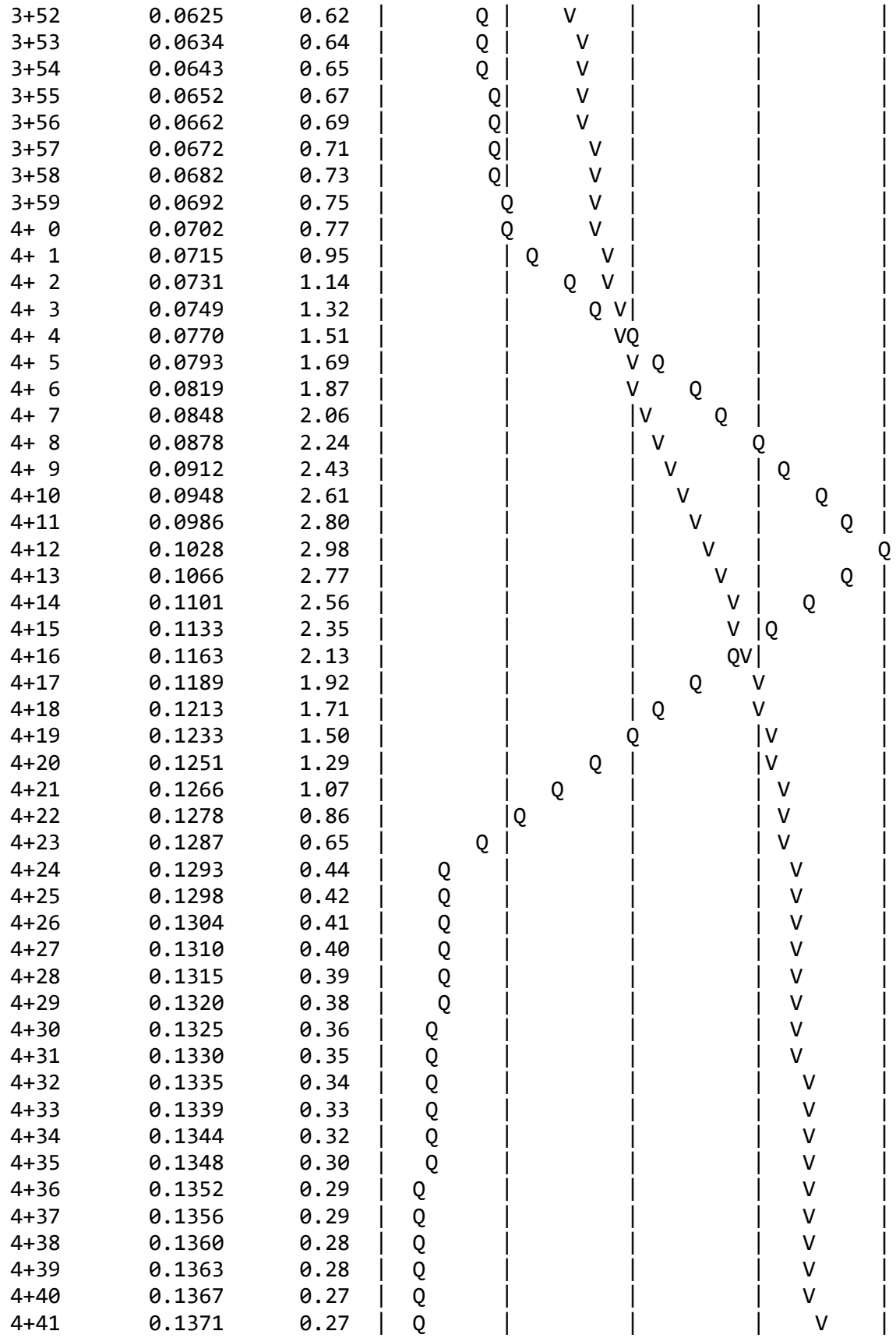
Time(h+m)	Volume Ac.Ft	Q(CFS)	0	0.7	1.5	2.2	3.0
0+ 0	0.0000	0.00	Q	|	|	|	|
0+ 1	0.0000	0.01	Q	|	|	|	|
0+ 2	0.0000	0.02	Q	|	|	|	|
0+ 3	0.0001	0.03	Q	|	|	|	|
0+ 4	0.0001	0.04	Q	|	|	|	|
0+ 5	0.0002	0.05	Q	|	|	|	|
0+ 6	0.0003	0.05	Q	|	|	|	|
0+ 7	0.0004	0.06	Q	|	|	|	|
0+ 8	0.0005	0.07	Q	|	|	|	|
0+ 9	0.0006	0.08	VQ	|	|	|	|
0+10	0.0007	0.09	VQ	|	|	|	|
0+11	0.0008	0.10	VQ	|	|	|	|
0+12	0.0010	0.11	VQ	|	|	|	|
0+13	0.0011	0.11	VQ	|	|	|	|
0+14	0.0013	0.11	VQ	|	|	|	|
0+15	0.0014	0.11	VQ	|	|	|	|
0+16	0.0016	0.11	VQ	|	|	|	|
0+17	0.0017	0.11	VQ	|	|	|	|
0+18	0.0019	0.11	VQ	|	|	|	|
0+19	0.0020	0.11	VQ	|	|	|	|
0+20	0.0022	0.11	VQ	|	|	|	|
0+21	0.0024	0.11	VQ	|	|	|	|
0+22	0.0025	0.11	VQ	|	|	|	|
0+23	0.0027	0.11	VQ	|	|	|	|
0+24	0.0028	0.11	VQ	|	|	|	|
0+25	0.0030	0.11	VQ	|	|	|	|
0+26	0.0031	0.11	VQ	|	|	|	|
0+27	0.0033	0.11	VQ	|	|	|	|
0+28	0.0034	0.11	VQ	|	|	|	|
0+29	0.0036	0.11	VQ	|	|	|	|
0+30	0.0038	0.11	VQ	|	|	|	|
0+31	0.0039	0.12	|Q	|	|	|	|

0+32	0.0041	0.12	|Q	|	|	|	|
0+33	0.0042	0.12	|Q	|	|	|	|
0+34	0.0044	0.12	|Q	|	|	|	|
0+35	0.0046	0.12	|Q	|	|	|	|
0+36	0.0047	0.12	|Q	|	|	|	|
0+37	0.0049	0.12	|Q	|	|	|	|
0+38	0.0050	0.12	|Q	|	|	|	|
0+39	0.0052	0.12	|Q	|	|	|	|
0+40	0.0054	0.12	|Q	|	|	|	|
0+41	0.0055	0.12	|Q	|	|	|	|
0+42	0.0057	0.12	|Q	|	|	|	|
0+43	0.0059	0.12	|Q	|	|	|	|
0+44	0.0060	0.12	|Q	|	|	|	|
0+45	0.0062	0.12	|Q	|	|	|	|
0+46	0.0064	0.12	|Q	|	|	|	|
0+47	0.0065	0.12	|Q	|	|	|	|
0+48	0.0067	0.12	|Q	|	|	|	|
0+49	0.0069	0.12	|Q	|	|	|	|
0+50	0.0070	0.12	|Q	|	|	|	|
0+51	0.0072	0.12	|Q	|	|	|	|
0+52	0.0074	0.12	|Q	|	|	|	|
0+53	0.0075	0.12	|Q	|	|	|	|
0+54	0.0077	0.12	|Q	|	|	|	|
0+55	0.0079	0.12	|QV	|	|	|	|
0+56	0.0081	0.12	|QV	|	|	|	|
0+57	0.0082	0.13	|QV	|	|	|	|
0+58	0.0084	0.13	|QV	|	|	|	|
0+59	0.0086	0.13	|QV	|	|	|	|
1+ 0	0.0087	0.13	|QV	|	|	|	|
1+ 1	0.0089	0.13	|QV	|	|	|	|
1+ 2	0.0091	0.13	|QV	|	|	|	|
1+ 3	0.0093	0.13	|QV	|	|	|	|
1+ 4	0.0095	0.13	|QV	|	|	|	|
1+ 5	0.0096	0.13	|QV	|	|	|	|
1+ 6	0.0098	0.13	|QV	|	|	|	|
1+ 7	0.0100	0.13	|QV	|	|	|	|
1+ 8	0.0102	0.13	|QV	|	|	|	|
1+ 9	0.0103	0.13	|QV	|	|	|	|
1+10	0.0105	0.13	|QV	|	|	|	|
1+11	0.0107	0.13	|QV	|	|	|	|
1+12	0.0109	0.13	|QV	|	|	|	|
1+13	0.0111	0.13	|QV	|	|	|	|
1+14	0.0112	0.13	|QV	|	|	|	|
1+15	0.0114	0.13	|QV	|	|	|	|
1+16	0.0116	0.13	|QV	|	|	|	|
1+17	0.0118	0.13	|Q V	|	|	|	|
1+18	0.0120	0.13	|Q V	|	|	|	|
1+19	0.0122	0.14	|Q V	|	|	|	|
1+20	0.0124	0.14	|Q V	|	|	|	|
1+21	0.0125	0.14	|Q V	|	|	|	|

1+22	0.0127	0.14	Q V				
1+23	0.0129	0.14	Q V				
1+24	0.0131	0.14	Q V				
1+25	0.0133	0.14	Q V				
1+26	0.0135	0.14	Q V				
1+27	0.0137	0.14	Q V				
1+28	0.0139	0.14	Q V				
1+29	0.0141	0.14	Q V				
1+30	0.0143	0.14	Q V				
1+31	0.0145	0.14	Q V				
1+32	0.0147	0.14	Q V				
1+33	0.0149	0.14	Q V				
1+34	0.0151	0.14	Q V				
1+35	0.0153	0.14	Q V				
1+36	0.0155	0.14	Q V				
1+37	0.0157	0.14	Q V				
1+38	0.0159	0.15	Q V				
1+39	0.0161	0.15	Q V				
1+40	0.0163	0.15	Q V				
1+41	0.0165	0.15	Q V				
1+42	0.0167	0.15	Q V				
1+43	0.0169	0.15	Q V				
1+44	0.0171	0.15	Q V				
1+45	0.0173	0.15	Q V				
1+46	0.0175	0.15	Q V				
1+47	0.0177	0.15	Q V				
1+48	0.0179	0.15	Q V				
1+49	0.0181	0.15	Q V				
1+50	0.0183	0.15	Q V				
1+51	0.0186	0.16	Q V				
1+52	0.0188	0.16	Q V				
1+53	0.0190	0.16	Q V				
1+54	0.0192	0.16	Q V				
1+55	0.0194	0.16	Q V				
1+56	0.0196	0.16	Q V				
1+57	0.0199	0.16	Q V				
1+58	0.0201	0.16	Q V				
1+59	0.0203	0.16	Q V				
2+ 0	0.0205	0.16	Q V				
2+ 1	0.0207	0.16	Q V				
2+ 2	0.0210	0.16	Q V				
2+ 3	0.0212	0.16	Q V				
2+ 4	0.0214	0.16	Q V				
2+ 5	0.0216	0.17	Q V				
2+ 6	0.0219	0.17	Q V				
2+ 7	0.0221	0.17	Q V				
2+ 8	0.0223	0.17	Q V				
2+ 9	0.0226	0.17	Q V				
2+10	0.0228	0.17	Q V				
2+11	0.0230	0.17	Q V				

```
2+12       0.0233      0.17  | Q  V    |         |         |         |
2+13       0.0235      0.17  | Q   V   |         |         |         |
2+14       0.0238      0.18  | Q   V   |         |         |         |
2+15       0.0240      0.18  | Q   V   |         |         |         |
2+16       0.0242      0.18  | Q   V   |         |         |         |
2+17       0.0245      0.18  | Q   V   |         |         |         |
2+18       0.0247      0.18  | Q   V   |         |         |         |
2+19       0.0250      0.18  | Q   V   |         |         |         |
2+20       0.0252      0.18  | Q   V   |         |         |         |
2+21       0.0255      0.18  | Q   V   |         |         |         |
2+22       0.0257      0.18  | Q   V   |         |         |         |
2+23       0.0260      0.18  | Q   V   |         |         |         |
2+24       0.0262      0.18  | Q   V   |         |         |         |
2+25       0.0265      0.18  | Q   V   |         |         |         |
2+26       0.0267      0.19  | Q   V   |         |         |         |
2+27       0.0270      0.19  | Q   V   |         |         |         |
2+28       0.0272      0.19  | Q   V   |         |         |         |
2+29       0.0275      0.19  | Q    V  |         |         |         |
2+30       0.0278      0.19  | Q    V  |         |         |         |
2+31       0.0280      0.19  | Q    V  |         |         |         |
2+32       0.0283      0.20  | Q    V  |         |         |         |
2+33       0.0286      0.20  | Q    V  |         |         |         |
2+34       0.0289      0.20  | Q    V  |         |         |         |
2+35       0.0291      0.20  | Q    V  |         |         |         |
2+36       0.0294      0.20  | Q    V  |         |         |         |
2+37       0.0297      0.20  | Q    V  |         |         |         |
2+38       0.0300      0.20  | Q    V  |         |         |         |
2+39       0.0302      0.20  | Q    V  |         |         |         |
2+40       0.0305      0.21  | Q    V  |         |         |         |
2+41       0.0308      0.21  | Q    V  |         |         |         |
2+42       0.0311      0.21  | Q    V  |         |         |         |
2+43       0.0314      0.21  | Q     V |         |         |         |
2+44       0.0317      0.21  | Q     V |         |         |         |
2+45       0.0320      0.21  | Q     V |         |         |         |
2+46       0.0323      0.21  | Q     V |         |         |         |
2+47       0.0326      0.21  | Q     V |         |         |         |
2+48       0.0328      0.21  | Q     V |         |         |         |
2+49       0.0331      0.22  | Q     V |         |         |         |
2+50       0.0334      0.22  | Q     V |         |         |         |
2+51       0.0338      0.22  | Q     V |         |         |         |
2+52       0.0341      0.22  |  Q    V |         |         |         |
2+53       0.0344      0.23  |  Q    V |         |         |         |
2+54       0.0347      0.23  |  Q    V |         |         |         |
2+55       0.0350      0.23  |  Q    V |         |         |         |
2+56       0.0353      0.23  |  Q     V|         |         |         |
2+57       0.0357      0.24  |  Q     V|         |         |         |
2+58       0.0360      0.24  |  Q     V|         |         |         |
2+59       0.0363      0.24  |  Q     V|         |         |         |
3+ 0       0.0367      0.25  |  Q     V|         |         |         |
3+ 1       0.0370      0.25  |  Q     V|         |         |         |
```

```
3+ 2       0.0373      0.25  |  Q     V|          |          |          |
3+ 3       0.0377      0.25  |  Q     V|          |          |          |
3+ 4       0.0380      0.25  |  Q     V|          |          |          |
3+ 5       0.0384      0.25  |  Q     V|          |          |          |
3+ 6       0.0387      0.26  |  Q     V|          |          |          |
3+ 7       0.0391      0.26  |  Q     V|          |          |          |
3+ 8       0.0395      0.26  |  Q      V          |          |          |
3+ 9       0.0398      0.26  |  Q      V          |          |          |
3+10       0.0402      0.26  |  Q      V          |          |          |
3+11       0.0405      0.26  |  Q      V          |          |          |
3+12       0.0409      0.27  |  Q      V          |          |          |
3+13       0.0413      0.27  |  Q      V          |          |          |
3+14       0.0417      0.28  |  Q      V          |          |          |
3+15       0.0420      0.28  |  Q      V          |          |          |
3+16       0.0424      0.29  |  Q      V          |          |          |
3+17       0.0428      0.29  |  Q      V          |          |          |
3+18       0.0432      0.30  |  Q      |V          |          |          |
3+19       0.0437      0.30  |   Q     |V          |          |          |
3+20       0.0441      0.31  |   Q     |V          |          |          |
3+21       0.0445      0.31  |   Q     |V          |          |          |
3+22       0.0449      0.32  |   Q     |V          |          |          |
3+23       0.0454      0.32  |   Q     |V          |          |          |
3+24       0.0458      0.32  |   Q     |V          |          |          |
3+25       0.0463      0.33  |   Q     |V          |          |          |
3+26       0.0467      0.33  |   Q     |V          |          |          |
3+27       0.0472      0.34  |   Q     | V         |          |          |
3+28       0.0477      0.34  |   Q     | V         |          |          |
3+29       0.0481      0.34  |   Q     | V         |          |          |
3+30       0.0486      0.35  |   Q     | V         |          |          |
3+31       0.0491      0.35  |   Q     | V         |          |          |
3+32       0.0496      0.36  |   Q     | V         |          |          |
3+33       0.0501      0.36  |   Q     | V         |          |          |
3+34       0.0506      0.36  |   Q     | V         |          |          |
3+35       0.0511      0.37  |   Q     |  V        |          |          |
3+36       0.0516      0.37  |   Q     |  V        |          |          |
3+37       0.0521      0.38  |    Q    |  V        |          |          |
3+38       0.0527      0.40  |    Q    |  V        |          |          |
3+39       0.0532      0.41  |    Q    |  V        |          |          |
3+40       0.0538      0.43  |    Q    |  V        |          |          |
3+41       0.0544      0.44  |    Q    |  V        |          |          |
3+42       0.0551      0.46  |     Q   |   V       |          |          |
3+43       0.0557      0.47  |     Q   |   V       |          |          |
3+44       0.0564      0.49  |     Q   |   V       |          |          |
3+45       0.0571      0.50  |     Q   |   V       |          |          |
3+46       0.0578      0.51  |     Q   |   V       |          |          |
3+47       0.0585      0.53  |      Q  |   V       |          |          |
3+48       0.0593      0.54  |      Q  |    V      |          |          |
3+49       0.0600      0.56  |      Q  |    V      |          |          |
3+50       0.0608      0.58  |      Q  |    V      |          |          |
3+51       0.0617      0.60  |       Q |    V      |          |          |
```



```
4+42      0.1374      0.26  |  Q      |         |         |    V    |
4+43      0.1378      0.25  |  Q      |         |         |    V    |
4+44      0.1381      0.25  |  Q      |         |         |    V    |
4+45      0.1385      0.24  |  Q      |         |         |    V    |
4+46      0.1388      0.24  |  Q      |         |         |    V    |
4+47      0.1391      0.23  |  Q      |         |         |    V    |
4+48      0.1394      0.23  |  Q      |         |         |    V    |
4+49      0.1397      0.23  |  Q      |         |         |    V    |
4+50      0.1400      0.22  | Q       |         |         |    V    |
4+51      0.1403      0.22  | Q       |         |         |    V    |
4+52      0.1406      0.22  | Q       |         |         |    V    |
4+53      0.1409      0.21  | Q       |         |         |    V    |
4+54      0.1412      0.21  | Q       |         |         |     V   |
4+55      0.1415      0.21  | Q       |         |         |     V   |
4+56      0.1418      0.20  | Q       |         |         |     V   |
4+57      0.1421      0.20  | Q       |         |         |     V   |
4+58      0.1423      0.20  | Q       |         |         |     V   |
4+59      0.1426      0.19  | Q       |         |         |     V   |
5+ 0      0.1429      0.19  | Q       |         |         |     V   |
5+ 1      0.1431      0.19  | Q       |         |         |     V   |
5+ 2      0.1434      0.19  | Q       |         |         |     V   |
5+ 3      0.1436      0.18  | Q       |         |         |     V   |
5+ 4      0.1439      0.18  | Q       |         |         |     V   |
5+ 5      0.1441      0.18  | Q       |         |         |     V   |
5+ 6      0.1444      0.18  | Q       |         |         |     V   |
5+ 7      0.1446      0.18  | Q       |         |         |     V   |
5+ 8      0.1449      0.17  | Q       |         |         |     V   |
5+ 9      0.1451      0.17  | Q       |         |         |      V  |
5+10      0.1453      0.17  | Q       |         |         |      V  |
5+11      0.1456      0.17  | Q       |         |         |      V  |
5+12      0.1458      0.17  | Q       |         |         |      V  |
5+13      0.1460      0.16  | Q       |         |         |      V  |
5+14      0.1463      0.16  | Q       |         |         |      V  |
5+15      0.1465      0.16  | Q       |         |         |      V  |
5+16      0.1467      0.16  | Q       |         |         |      V  |
5+17      0.1469      0.16  | Q       |         |         |      V  |
5+18      0.1471      0.16  | Q       |         |         |      V  |
5+19      0.1474      0.16  | Q       |         |         |      V  |
5+20      0.1476      0.15  | Q       |         |         |      V  |
5+21      0.1478      0.15  | Q       |         |         |      V  |
5+22      0.1480      0.15  | Q       |         |         |      V  |
5+23      0.1482      0.15  | Q       |         |         |      V  |
5+24      0.1484      0.15  |Q        |         |         |      V  |
5+25      0.1486      0.15  |Q        |         |         |      V  |
5+26      0.1488      0.15  |Q        |         |         |      V  |
5+27      0.1490      0.14  |Q        |         |         |       V |
5+28      0.1492      0.14  |Q        |         |         |       V |
5+29      0.1494      0.14  |Q        |         |         |       V |
5+30      0.1496      0.14  |Q        |         |         |       V |
5+31      0.1498      0.14  |Q        |         |         |       V |
```

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   5+32       0.1500      0.14  |Q        |         |         |        V |
   5+33       0.1502      0.14  |Q        |         |         |        V |
   5+34       0.1504      0.14  |Q        |         |         |        V |
   5+35       0.1505      0.14  |Q        |         |         |        V |
   5+36       0.1507      0.13  |Q        |         |         |        V |
   5+37       0.1509      0.13  |Q        |         |         |        V |
   5+38       0.1511      0.13  |Q        |         |         |        V |
   5+39       0.1513      0.13  |Q        |         |         |        V |
   5+40       0.1515      0.13  |Q        |         |         |        V |
   5+41       0.1516      0.13  |Q        |         |         |        V |
   5+42       0.1518      0.13  |Q        |         |         |        V |
   5+43       0.1520      0.13  |Q        |         |         |        V |
   5+44       0.1522      0.13  |Q        |         |         |        V |
   5+45       0.1523      0.13  |Q        |         |         |        V |
   5+46       0.1525      0.13  |Q        |         |         |        V |
   5+47       0.1527      0.12  |Q        |         |         |        V |
   5+48       0.1529      0.12  |Q        |         |         |         V|
   5+49       0.1530      0.12  |Q        |         |         |         V|
   5+50       0.1532      0.12  |Q        |         |         |         V|
   5+51       0.1534      0.12  |Q        |         |         |         V|
   5+52       0.1535      0.12  |Q        |         |         |         V|
   5+53       0.1537      0.12  |Q        |         |         |         V|
   5+54       0.1539      0.12  |Q        |         |         |         V|
   5+55       0.1540      0.12  |Q        |         |         |         V|
   5+56       0.1542      0.12  |Q        |         |         |         V|
   5+57       0.1543      0.12  |Q        |         |         |         V|
   5+58       0.1545      0.12  |Q        |         |         |         V|
   5+59       0.1547      0.12  |Q        |         |         |         V|
   6+ 0       0.1548      0.11  |Q        |         |         |         V|
   6+ 1       0.1550      0.11  |Q        |         |         |         V|
   6+ 2       0.1551      0.11  |Q        |         |         |         V|
   6+ 3       0.1553      0.11  |Q        |         |         |         V|
   6+ 4       0.1554      0.11  |Q        |         |         |         V|
   6+ 5       0.1556      0.11  |Q        |         |         |         V|
   6+ 6       0.1558      0.11  |Q        |         |         |         V|
   6+ 7       0.1559      0.11  |Q        |         |         |         V|
   6+ 8       0.1561      0.11  |Q        |         |         |         V|
   6+ 9       0.1562      0.11  |Q        |         |         |         V|
   6+10       0.1564      0.11  |Q        |         |         |         V|
   6+11       0.1565      0.11  |Q        |         |         |         V|
   6+12       0.1567      0.11  |Q        |         |         |          V
-----------------------------------------------------------------------
```

```
    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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```
Process from Point/Station        1.024 to Point/Station        1.031
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   625.750(Ft.)
Downstream point/station elevation =   625.300(Ft.)
Pipe length  =    45.00(Ft.) Slope =   0.0100  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.984(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.984(CFS)
Normal flow depth in pipe =    8.40(In.)
Flow top width inside pipe =   11.00(In.)
Critical Depth =    8.89(In.)
Pipe flow velocity =      5.08(Ft/s)
Travel time through pipe =    0.15 min.
Time of concentration (TC) =    12.38 min.
```



```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.031 to Point/Station        1.032
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
------------------------------------------------------------------------
Estimated mean flow rate at midpoint of channel =      4.518(CFS)
Depth of flow =   0.188(Ft.), Average velocity =   2.546(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  =      4.518(CFS)
  '     '        flow top width =     18.839(Ft.)
  '     '    velocity=    2.546(Ft/s)
  '     '        area =      1.775(Sq.Ft)
  '     '        Froude number =     1.462

Upstream point elevation =   625.300(Ft.)
Downstream point elevation =   618.000(Ft.)
Flow length =    87.000(Ft.)
Travel time  =    0.57 min.
Time of concentration =   12.95 min.
Depth of flow =   0.188(Ft.)
Average velocity =   2.546(Ft/s)
Total irregular channel flow =     4.518(CFS)
Irregular channel normal depth above invert elev. =   0.188(Ft.)
Average velocity of channel(s) =   2.546(Ft/s)
 Adding area flow to channel
```

Rainfall intensity (I) = 4.279(In/Hr) for a 100.0 year storm
User specified 'C' value of 0.430 given for subarea
Rainfall intensity = 4.279(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.429 CA = 1.402
Subarea runoff = 3.015(CFS) for 1.840(Ac.)
Total runoff = 5.999(CFS) Total area = 3.270(Ac.)
Depth of flow = 0.210(Ft.), Average velocity = 2.733(Ft/s)
End of computations, total study area = 3.270 (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: 07/24/25

Harbison Canyon 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) = 3.000
24 hour precipitation(inches) = 6.000
P6/P24 =   50.0%
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 = 1.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL   ]
(1.0 DU/A or Less   )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.360
Initial subarea total flow distance = 100.000(Ft.)
Highest elevation = 660.000(Ft.)
Lowest elevation = 659.000(Ft.)

```
Elevation difference =    1.000(Ft.) Slope =  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 1.0 DU/A or Less
In Accordance With Table 3-2
Initial Area Time of Concentration =  11.50 minutes
 (for slope value of   1.00 %)
Rainfall intensity (I) =      4.619(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.360
Subarea runoff =      0.067(CFS)
Total initial stream area =        0.040(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 =      1.707(CFS)
Depth of flow =   0.124(Ft.), Average velocity =   2.232(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  =      1.707(CFS)
  '     '        flow top width =     12.366(Ft.)
  '     '    velocity=    2.232(Ft/s)
  '     '        area =      0.765(Sq.Ft)
  '     '        Froude number =     1.582

Upstream point elevation =   659.999(Ft.)
Downstream point elevation =   597.000(Ft.)
Flow length =   557.000(Ft.)
Travel time  =    4.16 min.
Time of concentration =   15.66 min.
Depth of flow =   0.124(Ft.)
Average velocity =   2.232(Ft/s)
Total irregular channel flow =     1.707(CFS)
Irregular channel normal depth above invert elev. =   0.124(Ft.)
Average velocity of channel(s) =   2.232(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      3.785(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.420 given for subarea
Rainfall intensity =      3.785(In/Hr) for a   100.0 year storm
```

```
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.419  CA =      0.863
Subarea runoff =      3.199(CFS) for      2.020(Ac.)
Total runoff =      3.266(CFS)  Total area =       2.060(Ac.)
Depth of flow =   0.158(Ft.), Average velocity =   2.625(Ft/s)
End of computations, total study area =           2.060 (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: 04/16/25

Harbison Canyon Post Basin 3

 *********   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) = 3.000
24 hour precipitation(inches) = 6.000
P6/P24 =   50.0%
San Diego hydrology manual 'C' values used

++
Process from Point/Station   3.011 to Point/Station   3.021
**** 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
[LOW DENSITY RESIDENTIAL   ]
(1.0 DU/A or Less   )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.410
Initial subarea total flow distance = 100.000(Ft.)
Highest elevation = 690.000(Ft.)
Lowest elevation = 670.000(Ft.)
Elevation difference =   20.000(Ft.) Slope = 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
 1.0 DU/A or Less
In Accordance With Table 3-2
Initial Area Time of Concentration =   6.40 minutes
 (for slope value of  10.00 %)
Rainfall intensity (I) =      6.741(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.410
Subarea runoff =      0.138(CFS)
Total initial stream area =        0.050(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.021 to Point/Station        3.022
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.484(CFS)
Depth of flow =   0.073(Ft.), Average velocity =   1.828(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  =      0.484(CFS)
  '     '        flow top width =      7.275(Ft.)
  '     '    velocity=    1.828(Ft/s)
  '     '        area =      0.265(Sq.Ft)
  '     '        Froude number =     1.689

Upstream point elevation =   670.000(Ft.)
Downstream point elevation =   662.000(Ft.)
Flow length =    52.000(Ft.)
Travel time  =    0.47 min.
Time of concentration =    6.87 min.
Depth of flow =   0.073(Ft.)
Average velocity =   1.828(Ft/s)
Total irregular channel flow =     0.484(CFS)
Irregular channel normal depth above invert elev. =   0.073(Ft.)
Average velocity of channel(s) =   1.828(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      6.437(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                    ]
```

```
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.410
Rainfall intensity =      6.437(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.410  CA =      0.123
Subarea runoff =      0.654(CFS) for      0.250(Ac.)
Total runoff =      0.792(CFS)  Total area =       0.300(Ac.)
Depth of flow =   0.088(Ft.), Average velocity =   2.068(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.022 to Point/Station        3.031
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =   662.000(Ft.)
Downstream point elevation =   659.000(Ft.)
Channel length thru subarea  =    56.000(Ft.)
Channel base width      =   10.000(Ft.)
Slope or 'Z' of left channel bank =  10.000
Slope or 'Z' of right channel bank =  10.000
Manning's 'N'    = 0.015
Maximum depth of channel  =    0.500(Ft.)
Flow(q) thru subarea =      0.792(CFS)
Depth of flow =   0.033(Ft.), Average velocity =   2.315(Ft/s)
Channel flow top width =   10.662(Ft.)
Flow Velocity =    2.31(Ft/s)
Travel time  =    0.40 min.
Time of concentration =    7.28 min.
Critical depth =      0.057(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.031 to Point/Station        3.041
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      4.008(CFS)
Depth of flow =   0.176(Ft.), Average velocity =   2.600(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  =      4.008(CFS)
  '     '        flow top width =     17.558(Ft.)
  '     '    velocity=    2.600(Ft/s)
```

```
  '     '        area =      1.541(Sq.Ft)
  '     '        Froude number =     1.547

Upstream point elevation =   659.000(Ft.)
Downstream point elevation =   579.000(Ft.)
Flow length =   832.000(Ft.)
Travel time  =    5.33 min.
Time of concentration =   12.61 min.
Depth of flow =   0.176(Ft.)
Average velocity =   2.600(Ft/s)
Total irregular channel flow =     4.008(CFS)
Irregular channel normal depth above invert elev. =   0.176(Ft.)
Average velocity of channel(s) =   2.600(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      4.352(In/Hr) for a   100.0 year storm
Decimal fraction soil group A = 0.100
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.450
Decimal fraction soil group D = 0.450
[LOW DENSITY RESIDENTIAL                    ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.374
Rainfall intensity =      4.352(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.376  CA =      1.639
Subarea runoff =      6.344(CFS) for      4.060(Ac.)
Total runoff =      7.135(CFS)  Total area =       4.360(Ac.)
Depth of flow =   0.218(Ft.), Average velocity =   3.003(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.041 to Point/Station        3.042
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      8.616(CFS)
Depth of flow =   0.726(Ft.), Average velocity =   1.637(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2             10.00              0.00
        3             20.00              1.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =      8.616(CFS)
  '     '        flow top width =     14.512(Ft.)
  '     '    velocity=    1.637(Ft/s)
  '     '        area =      5.265(Sq.Ft)
```

```
  '     '        Froude number =     0.479

Upstream point elevation =   579.000(Ft.)
Downstream point elevation =   575.000(Ft.)
Flow length =   692.000(Ft.)
Travel time  =    7.05 min.
Time of concentration =   19.66 min.
Depth of flow =   0.726(Ft.)
Average velocity =   1.637(Ft/s)
Total irregular channel flow =     8.616(CFS)
Irregular channel normal depth above invert elev. =   0.726(Ft.)
Average velocity of channel(s) =   1.637(Ft/s)
 Adding area flow to channel
Rainfall intensity (I) =      3.269(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 = 1.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                    ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.360
Rainfall intensity =      3.269(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.368  CA =      3.069
Subarea runoff =      2.895(CFS) for      3.970(Ac.)
Total runoff =     10.030(CFS)  Total area =       8.330(Ac.)
Depth of flow =   0.768(Ft.), Average velocity =   1.700(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.042 to Point/Station        3.066
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      8.330(Ac.)
Runoff from this stream =     10.030(CFS)
Time of concentration =   19.66 min.
Rainfall intensity =     3.269(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.051 to Point/Station        3.061
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
```

```
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                     ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.360
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =  660.000(Ft.)
Lowest elevation =  659.000(Ft.)
Elevation difference =    1.000(Ft.) Slope =  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 1.0 DU/A or Less
In Accordance With Table 3-2
Initial Area Time of Concentration =  11.50 minutes
 (for slope value of   1.00 %)
Rainfall intensity (I) =      4.619(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.360
Subarea runoff =      0.067(CFS)
Total initial stream area =        0.040(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.061 to Point/Station        3.062
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   0.016(Ft.), Average velocity =   5.516(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  =      0.067(CFS)
  '     '        flow top width =      1.553(Ft.)
  '     '    velocity=    5.517(Ft/s)
  '     '        area =      0.012(Sq.Ft)
  '     '        Froude number =    11.033

Upstream point elevation =   659.000(Ft.)
Downstream point elevation =     0.000(Ft.)
Flow length =    60.000(Ft.)
Travel time  =    0.18 min.
Time of concentration =   11.68 min.
Depth of flow =   0.016(Ft.)
Average velocity =   5.516(Ft/s)
Total irregular channel flow =     0.067(CFS)
```

```
Irregular channel normal depth above invert elev. =   0.016(Ft.)
Average velocity of channel(s) =   5.516(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.062 to Point/Station        3.063
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =   649.000(Ft.)
Downstream point elevation =   582.000(Ft.)
Channel length thru subarea  =   705.000(Ft.)
Channel base width      =   12.000(Ft.)
Slope or 'Z' of left channel bank =  50.000
Slope or 'Z' of right channel bank =   0.500
Estimated mean flow rate at midpoint of channel =      1.502(CFS)
Manning's 'N'    = 0.013
Maximum depth of channel  =    0.500(Ft.)
Flow(q) thru subarea =      1.502(CFS)
Depth of flow =   0.033(Ft.), Average velocity =   3.500(Ft/s)
Channel flow top width =   13.687(Ft.)
Flow Velocity =    3.50(Ft/s)
Travel time  =    3.36 min.
Time of concentration =   15.04 min.
Critical depth =      0.074(Ft.)
 Adding area flow to channel
Rainfall intensity (I) =      3.885(In/Hr) for a   100.0 year storm
User specified 'C' value of 0.468 given for subarea
Rainfall intensity =      3.885(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.465  CA =      0.773
Subarea runoff =      2.935(CFS) for      1.620(Ac.)
Total runoff =      3.001(CFS)  Total area =       1.660(Ac.)
Depth of flow =   0.050(Ft.), Average velocity =   4.506(Ft/s)
Critical depth =      0.115(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.063 to Point/Station        3.064
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   0.198(Ft.), Average velocity =   1.538(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  =      3.001(CFS)
  '     '        flow top width =     19.757(Ft.)
  '     '    velocity=    1.538(Ft/s)
  '     '        area =      1.952(Sq.Ft)
  '     '        Froude number =     0.862

Upstream point elevation =   582.000(Ft.)
Downstream point elevation =   579.500(Ft.)
Flow length =    87.000(Ft.)
Travel time  =    0.94 min.
Time of concentration =   15.98 min.
Depth of flow =   0.198(Ft.)
Average velocity =   1.538(Ft/s)
Total irregular channel flow =     3.001(CFS)
Irregular channel normal depth above invert elev. =   0.198(Ft.)
Average velocity of channel(s) =   1.538(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.064 to Point/Station        3.064
**** 6 HOUR HYDROGRAPH ****
________________________________________________________________________
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Hydrograph Data - Section 6, San Diego County Hydrology manual, June 2003


Time of Concentration =  15.98
Basin Area =     ~~9.99 Acres~~ 1.66 Acres
6 Hour Rainfall =  3.000 Inches
Runoff Coefficient = ~~0.077~~ 0.465
Peak Discharge =     3.00 CFS
     Time (Min)     Discharge (CFS)
       0               0.000
       15               0.139
       30               0.143
       45               0.152
       60               0.157
       75               0.168
       90               0.175
       105               0.190
       120               0.199
       135               0.221
       150               0.234
       165               0.269
       180               0.291
       195               0.356
       210               0.405
       225               0.595
       240               0.839
       255               3.001
```

Corrected Area and Runoff Coefficient have been listed on left

270	0.477
285	0.319
300	0.250
315	0.209
330	0.182
345	0.163
360	0.148
375	0.136

++

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))

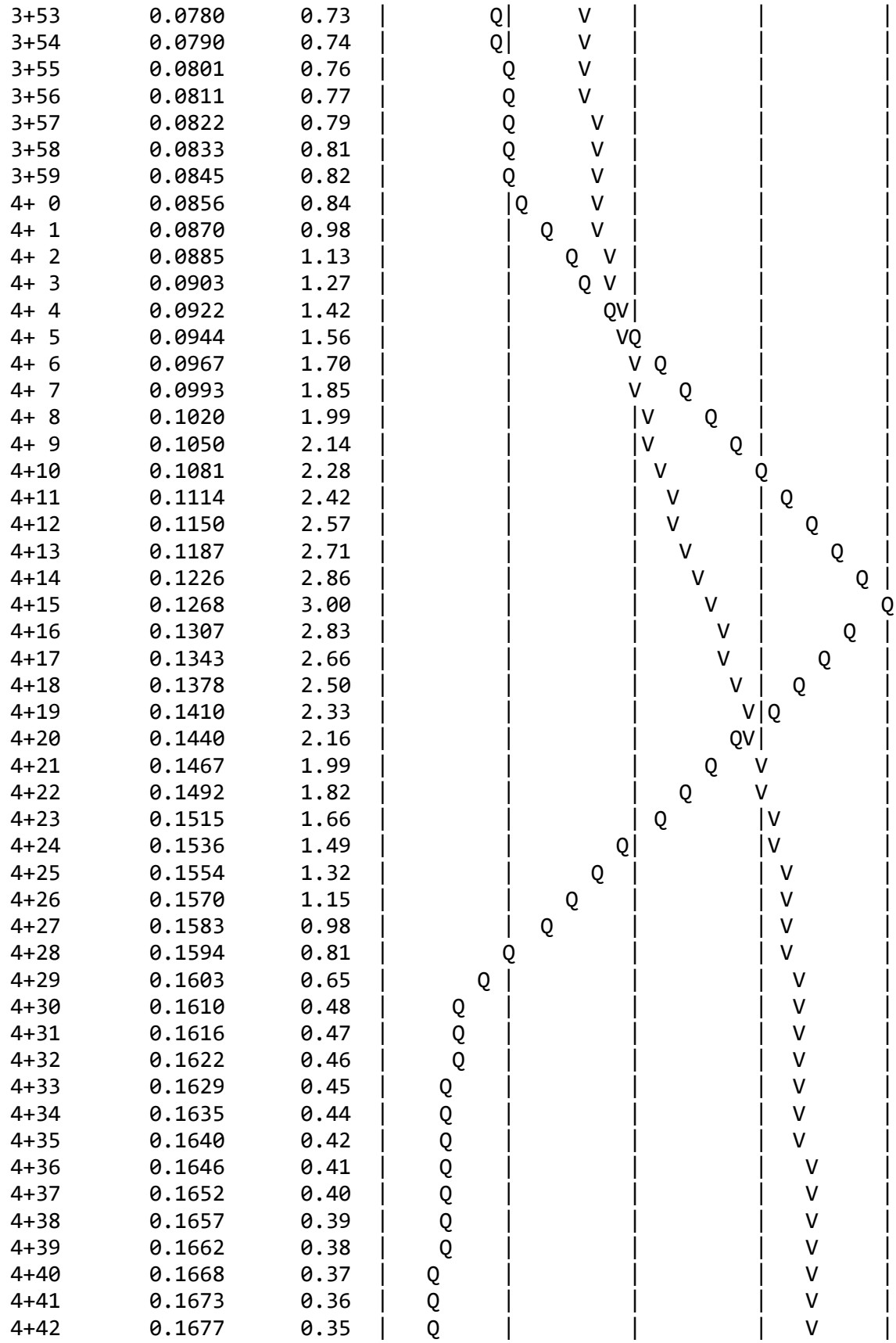
Time(h+m)	Volume Ac.Ft	Q(CFS)	0	0.8	1.5	2.3	3.0
0+ 0	0.0000	0.00	Q	|	|	|	|
0+ 1	0.0000	0.01	Q	|	|	|	|
0+ 2	0.0000	0.02	Q	|	|	|	|
0+ 3	0.0001	0.03	Q	|	|	|	|
0+ 4	0.0001	0.04	Q	|	|	|	|
0+ 5	0.0002	0.05	Q	|	|	|	|
0+ 6	0.0003	0.06	Q	|	|	|	|
0+ 7	0.0004	0.07	Q	|	|	|	|
0+ 8	0.0005	0.07	Q	|	|	|	|
0+ 9	0.0006	0.08	VQ	|	|	|	|
0+10	0.0007	0.09	VQ	|	|	|	|
0+11	0.0008	0.10	VQ	|	|	|	|
0+12	0.0010	0.11	VQ	|	|	|	|
0+13	0.0012	0.12	VQ	|	|	|	|
0+14	0.0013	0.13	VQ	|	|	|	|
0+15	0.0015	0.14	VQ	|	|	|	|
0+16	0.0017	0.14	VQ	|	|	|	|
0+17	0.0019	0.14	VQ	|	|	|	|
0+18	0.0021	0.14	VQ	|	|	|	|
0+19	0.0023	0.14	VQ	|	|	|	|
0+20	0.0025	0.14	VQ	|	|	|	|
0+21	0.0027	0.14	VQ	|	|	|	|
0+22	0.0029	0.14	VQ	|	|	|	|
0+23	0.0031	0.14	VQ	|	|	|	|
0+24	0.0033	0.14	VQ	|	|	|	|
0+25	0.0035	0.14	VQ	|	|	|	|
0+26	0.0037	0.14	VQ	|	|	|	|
0+27	0.0039	0.14	VQ	|	|	|	|
0+28	0.0041	0.14	VQ	|	|	|	|
0+29	0.0043	0.14	VQ	|	|	|	|
0+30	0.0045	0.14	VQ	|	|	|	|
0+31	0.0047	0.14	VQ	|	|	|	|
0+32	0.0049	0.14	|Q	|	|	|	|

0+33	0.0051	0.15	|Q	|	|	|	|
0+34	0.0053	0.15	|Q	|	|	|	|
0+35	0.0055	0.15	|Q	|	|	|	|
0+36	0.0057	0.15	|Q	|	|	|	|
0+37	0.0059	0.15	|Q	|	|	|	|
0+38	0.0061	0.15	|Q	|	|	|	|
0+39	0.0063	0.15	|Q	|	|	|	|
0+40	0.0065	0.15	|Q	|	|	|	|
0+41	0.0067	0.15	|Q	|	|	|	|
0+42	0.0069	0.15	|VQ	|	|	|	|
0+43	0.0071	0.15	|VQ	|	|	|	|
0+44	0.0073	0.15	|VQ	|	|	|	|
0+45	0.0075	0.15	|VQ	|	|	|	|
0+46	0.0077	0.15	|VQ	|	|	|	|
0+47	0.0079	0.15	|VQ	|	|	|	|
0+48	0.0081	0.15	|VQ	|	|	|	|
0+49	0.0084	0.15	|VQ	|	|	|	|
0+50	0.0086	0.15	|VQ	|	|	|	|
0+51	0.0088	0.15	|VQ	|	|	|	|
0+52	0.0090	0.15	|VQ	|	|	|	|
0+53	0.0092	0.15	|VQ	|	|	|	|
0+54	0.0094	0.16	|VQ	|	|	|	|
0+55	0.0096	0.16	|VQ	|	|	|	|
0+56	0.0099	0.16	| Q	|	|	|	|
0+57	0.0101	0.16	| Q	|	|	|	|
0+58	0.0103	0.16	| Q	|	|	|	|
0+59	0.0105	0.16	| Q	|	|	|	|
1+ 0	0.0107	0.16	| Q	|	|	|	|
1+ 1	0.0109	0.16	| Q	|	|	|	|
1+ 2	0.0111	0.16	| Q	|	|	|	|
1+ 3	0.0114	0.16	| Q	|	|	|	|
1+ 4	0.0116	0.16	| Q	|	|	|	|
1+ 5	0.0118	0.16	| Q	|	|	|	|
1+ 6	0.0120	0.16	| Q	|	|	|	|
1+ 7	0.0123	0.16	| Q	|	|	|	|
1+ 8	0.0125	0.16	| Q	|	|	|	|
1+ 9	0.0127	0.16	| Q	|	|	|	|
1+10	0.0129	0.16	| Q	|	|	|	|
1+11	0.0132	0.17	| Q	|	|	|	|
1+12	0.0134	0.17	| Q	|	|	|	|
1+13	0.0136	0.17	| Q	|	|	|	|
1+14	0.0139	0.17	| Q	|	|	|	|
1+15	0.0141	0.17	| Q	|	|	|	|
1+16	0.0143	0.17	| Q	|	|	|	|
1+17	0.0146	0.17	| QV	|	|	|	|
1+18	0.0148	0.17	| QV	|	|	|	|
1+19	0.0150	0.17	| QV	|	|	|	|
1+20	0.0153	0.17	| QV	|	|	|	|
1+21	0.0155	0.17	| QV	|	|	|	|
1+22	0.0157	0.17	| QV	|	|	|	|

1+23	0.0160	0.17	QV				
1+24	0.0162	0.17	QV				
1+25	0.0164	0.17	QV				
1+26	0.0167	0.17	QV				
1+27	0.0169	0.17	QV				
1+28	0.0172	0.17	QV				
1+29	0.0174	0.17	QV				
1+30	0.0176	0.18	QV				
1+31	0.0179	0.18	QV				
1+32	0.0181	0.18	QV				
1+33	0.0184	0.18	QV				
1+34	0.0186	0.18	QV				
1+35	0.0189	0.18	QV				
1+36	0.0191	0.18	QV				
1+37	0.0194	0.18	Q V				
1+38	0.0196	0.18	Q V				
1+39	0.0199	0.18	Q V				
1+40	0.0201	0.19	Q V				
1+41	0.0204	0.19	Q V				
1+42	0.0206	0.19	Q V				
1+43	0.0209	0.19	Q V				
1+44	0.0212	0.19	Q V				
1+45	0.0214	0.19	Q V				
1+46	0.0217	0.19	Q V				
1+47	0.0219	0.19	Q V				
1+48	0.0222	0.19	Q V				
1+49	0.0225	0.19	Q V				
1+50	0.0227	0.19	Q V				
1+51	0.0230	0.19	Q V				
1+52	0.0233	0.19	Q V				
1+53	0.0235	0.20	Q V				
1+54	0.0238	0.20	Q V				
1+55	0.0241	0.20	Q V				
1+56	0.0244	0.20	Q V				
1+57	0.0246	0.20	Q V				
1+58	0.0249	0.20	Q V				
1+59	0.0252	0.20	Q V				
2+ 0	0.0255	0.20	Q V				
2+ 1	0.0257	0.20	Q V				
2+ 2	0.0260	0.20	Q V				
2+ 3	0.0263	0.20	Q V				
2+ 4	0.0266	0.21	Q V				
2+ 5	0.0269	0.21	Q V				
2+ 6	0.0271	0.21	Q V				
2+ 7	0.0274	0.21	Q V				
2+ 8	0.0277	0.21	Q V				
2+ 9	0.0280	0.21	Q V				
2+10	0.0283	0.21	Q V				
2+11	0.0286	0.22	Q V				
2+12	0.0289	0.22	Q V				

2+13	0.0292	0.22	Q V				
2+14	0.0295	0.22	Q V				
2+15	0.0298	0.22	Q V				
2+16	0.0301	0.22	Q V				
2+17	0.0304	0.22	Q V				
2+18	0.0307	0.22	Q V				
2+19	0.0310	0.22	Q V				
2+20	0.0313	0.23	Q V				
2+21	0.0317	0.23	Q V				
2+22	0.0320	0.23	Q V				
2+23	0.0323	0.23	Q V				
2+24	0.0326	0.23	Q V				
2+25	0.0329	0.23	Q V				
2+26	0.0332	0.23	Q V				
2+27	0.0336	0.23	Q V				
2+28	0.0339	0.23	Q V				
2+29	0.0342	0.23	Q V				
2+30	0.0345	0.23	Q V				
2+31	0.0348	0.24	Q V				
2+32	0.0352	0.24	Q V				
2+33	0.0355	0.24	Q V				
2+34	0.0358	0.24	Q V				
2+35	0.0362	0.25	Q V				
2+36	0.0365	0.25	Q V				
2+37	0.0369	0.25	Q V				
2+38	0.0372	0.25	Q V				
2+39	0.0376	0.25	Q V				
2+40	0.0379	0.26	Q V				
2+41	0.0383	0.26	Q V				
2+42	0.0386	0.26	Q V				
2+43	0.0390	0.26	Q V				
2+44	0.0394	0.27	Q V				
2+45	0.0397	0.27	Q V				
2+46	0.0401	0.27	Q V				
2+47	0.0405	0.27	Q V				
2+48	0.0409	0.27	Q V				
2+49	0.0412	0.27	Q V				
2+50	0.0416	0.28	Q V				
2+51	0.0420	0.28	Q V				
2+52	0.0424	0.28	Q V				
2+53	0.0428	0.28	Q V				
2+54	0.0432	0.28	Q V				
2+55	0.0436	0.28	Q V				
2+56	0.0439	0.29	Q V				
2+57	0.0443	0.29	Q V				
2+58	0.0447	0.29	Q V				
2+59	0.0451	0.29	Q V				
3+ 0	0.0455	0.29	Q V				
3+ 1	0.0459	0.30	Q V				
3+ 2	0.0464	0.30	Q V				

```
3+ 3       0.0468      0.30  |   Q    V|         |         |         |
3+ 4       0.0472      0.31  |   Q    V|         |         |         |
3+ 5       0.0476      0.31  |   Q    V|         |         |         |
3+ 6       0.0481      0.32  |   Q    V|         |         |         |
3+ 7       0.0485      0.32  |   Q     V         |         |         |
3+ 8       0.0490      0.33  |   Q     V         |         |         |
3+ 9       0.0494      0.33  |   Q     V         |         |         |
3+10       0.0499      0.33  |   Q     V         |         |         |
3+11       0.0503      0.34  |   Q     V         |         |         |
3+12       0.0508      0.34  |   Q     V         |         |         |
3+13       0.0513      0.35  |   Q     V         |         |         |
3+14       0.0518      0.35  |   Q     V         |         |         |
3+15       0.0523      0.36  |   Q     V         |         |         |
3+16       0.0528      0.36  |   Q     V         |         |         |
3+17       0.0533      0.36  |   Q     |V        |         |         |
3+18       0.0538      0.37  |   Q     |V        |         |         |
3+19       0.0543      0.37  |   Q     |V        |         |         |
3+20       0.0548      0.37  |   Q     |V        |         |         |
3+21       0.0553      0.38  |    Q    |V        |         |         |
3+22       0.0558      0.38  |    Q    |V        |         |         |
3+23       0.0564      0.38  |    Q    |V        |         |         |
3+24       0.0569      0.39  |    Q    |V        |         |         |
3+25       0.0574      0.39  |    Q    |V        |         |         |
3+26       0.0580      0.39  |    Q    |V        |         |         |
3+27       0.0585      0.40  |    Q    | V       |         |         |
3+28       0.0591      0.40  |    Q    | V       |         |         |
3+29       0.0596      0.40  |    Q    | V       |         |         |
3+30       0.0602      0.41  |    Q    | V       |         |         |
3+31       0.0607      0.42  |    Q    | V       |         |         |
3+32       0.0613      0.43  |    Q    | V       |         |         |
3+33       0.0619      0.44  |    Q    | V       |         |         |
3+34       0.0626      0.46  |     Q   | V       |         |         |
3+35       0.0632      0.47  |     Q   |  V      |         |         |
3+36       0.0639      0.48  |     Q   |  V      |         |         |
3+37       0.0646      0.49  |     Q   |  V      |         |         |
3+38       0.0653      0.51  |     Q   |  V      |         |         |
3+39       0.0660      0.52  |     Q   |  V      |         |         |
3+40       0.0667      0.53  |      Q  |  V      |         |         |
3+41       0.0675      0.54  |      Q  |  V      |         |         |
3+42       0.0682      0.56  |      Q  |   V     |         |         |
3+43       0.0690      0.57  |      Q  |   V     |         |         |
3+44       0.0698      0.58  |      Q  |   V     |         |         |
3+45       0.0706      0.60  |      Q  |   V     |         |         |
3+46       0.0715      0.61  |       Q |   V     |         |         |
3+47       0.0723      0.63  |       Q |   V     |         |         |
3+48       0.0732      0.64  |       Q |    V    |         |         |
3+49       0.0741      0.66  |       Q |    V    |         |         |
3+50       0.0751      0.68  |        Q|    V    |         |         |
3+51       0.0760      0.69  |        Q|    V    |         |         |
3+52       0.0770      0.71  |        Q|    V    |         |         |
```



4+43	0.1682	0.34	Q			V	
4+44	0.1687	0.33	Q			V	
4+45	0.1691	0.32	Q			V	
4+46	0.1695	0.31	Q			V	
4+47	0.1700	0.31	Q			V	
4+48	0.1704	0.31	Q			V	
4+49	0.1708	0.30	Q			V	
4+50	0.1712	0.30	Q			V	
4+51	0.1716	0.29	Q			V	
4+52	0.1720	0.29	Q			V	
4+53	0.1724	0.28	Q			V	
4+54	0.1728	0.28	Q			V	
4+55	0.1731	0.27	Q			V	
4+56	0.1735	0.27	Q			V	
4+57	0.1739	0.26	Q			V	
4+58	0.1742	0.26	Q			V	
4+59	0.1746	0.25	Q			V	
5+ 0	0.1749	0.25	Q			V	
5+ 1	0.1753	0.25	Q			V	
5+ 2	0.1756	0.24	Q			V	
5+ 3	0.1759	0.24	Q			V	
5+ 4	0.1763	0.24	Q			V	
5+ 5	0.1766	0.24	Q			V	
5+ 6	0.1769	0.23	Q			V	
5+ 7	0.1772	0.23	Q			V	
5+ 8	0.1776	0.23	Q			V	
5+ 9	0.1779	0.23	Q			V	
5+10	0.1782	0.22	Q			V	
5+11	0.1785	0.22	Q			V	
5+12	0.1788	0.22	Q			V	
5+13	0.1791	0.21	Q			V	
5+14	0.1794	0.21	Q			V	
5+15	0.1797	0.21	Q			V	
5+16	0.1799	0.21	Q			V	
5+17	0.1802	0.21	Q			V	
5+18	0.1805	0.20	Q			V	
5+19	0.1808	0.20	Q			V	
5+20	0.1811	0.20	Q			V	
5+21	0.1813	0.20	Q			V	
5+22	0.1816	0.20	Q			V	
5+23	0.1819	0.19	Q			V	
5+24	0.1821	0.19	Q			V	
5+25	0.1824	0.19	Q			V	
5+26	0.1827	0.19	Q			V	
5+27	0.1829	0.19	Q			V	
5+28	0.1832	0.19	Q			V	
5+29	0.1834	0.18	Q			V	
5+30	0.1837	0.18	Q			V	
5+31	0.1839	0.18	Q			V	
5+32	0.1842	0.18	Q			V	

5+33	0.1844	0.18	Q				V
5+34	0.1847	0.18	Q				V
5+35	0.1849	0.18	Q				V
5+36	0.1851	0.17	Q				V
5+37	0.1854	0.17	Q				V
5+38	0.1856	0.17	Q				V
5+39	0.1859	0.17	Q				V
5+40	0.1861	0.17	Q				V
5+41	0.1863	0.17	Q				V
5+42	0.1865	0.17	Q				V
5+43	0.1868	0.17	Q				V
5+44	0.1870	0.16	Q				V
5+45	0.1872	0.16	Q				V
5+46	0.1874	0.16	Q				V
5+47	0.1877	0.16	Q				V
5+48	0.1879	0.16	Q				V
5+49	0.1881	0.16	Q				V
5+50	0.1883	0.16	Q				V
5+51	0.1885	0.16	Q				V
5+52	0.1888	0.16	Q				V
5+53	0.1890	0.15	Q				V
5+54	0.1892	0.15	Q				V
5+55	0.1894	0.15	Q				V
5+56	0.1896	0.15	Q				V
5+57	0.1898	0.15	Q				V
5+58	0.1900	0.15	Q				V
5+59	0.1902	0.15	Q				V
6+ 0	0.1904	0.15	Q				V
6+ 1	0.1906	0.15	Q				V
6+ 2	0.1908	0.15	Q				V
6+ 3	0.1910	0.15	Q				V
6+ 4	0.1912	0.14	Q				V
6+ 5	0.1914	0.14	Q				V
6+ 6	0.1916	0.14	Q				V
6+ 7	0.1918	0.14	Q				V
6+ 8	0.1920	0.14	Q				V
6+ 9	0.1922	0.14	Q				V
6+10	0.1924	0.14	Q				V
6+11	0.1926	0.14	Q				V
6+12	0.1928	0.14	Q				V
6+13	0.1930	0.14	Q				V
6+14	0.1931	0.14	Q				V
6+15	0.1933	0.14	Q				V

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.064 to Point/Station        3.065
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   579.500(Ft.)
Downstream point/station elevation =   578.900(Ft.)
Pipe length  =    33.00(Ft.) Slope =   0.0182  Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.001(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.001(CFS)
Normal flow depth in pipe =    6.87(In.)
Flow top width inside pipe =   11.87(In.)
Critical Depth =    8.92(In.)
Pipe flow velocity =      6.45(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    16.07 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.065 to Point/Station        3.066
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   0.426(Ft.), Average velocity =   1.653(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2             10.00              0.00
        3             20.00              1.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =      3.001(CFS)
  '     '        flow top width =      8.521(Ft.)
  '     '    velocity=    1.653(Ft/s)
  '     '        area =      1.815(Sq.Ft)
  '     '        Froude number =     0.631

Upstream point elevation =   578.900(Ft.)
Downstream point elevation =   575.000(Ft.)
Flow length =   325.000(Ft.)
Travel time  =    3.28 min.
Time of concentration =   19.34 min.
Depth of flow =   0.426(Ft.)
Average velocity =   1.653(Ft/s)
Total irregular channel flow =     3.001(CFS)
Irregular channel normal depth above invert elev. =   0.426(Ft.)
Average velocity of channel(s) =   1.653(Ft/s)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.042 to Point/Station        3.066
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.660(Ac.)
Runoff from this stream =      3.001(CFS)
Time of concentration =   19.34 min.
Rainfall intensity =     3.303(In/Hr)
Summary of stream data:

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


1       10.030     19.66                 3.269
2        3.001     19.34                 3.303
Qmax(1) =
           1.000 *    1.000 *    10.030) +
           0.990 *    1.000 *     3.001) + =      13.000
Qmax(2) =
           1.000 *    0.984 *    10.030) +
           1.000 *    1.000 *     3.001) + =      12.871

Total of 2 main streams to confluence:
Flow rates before confluence point:
      10.030       3.001
Maximum flow rates at confluence using above data:
       13.000       12.871
Area of streams before confluence:
        8.330        1.660


Results of confluence:
Total flow rate =     13.000(CFS)
Time of concentration =    19.658 min.
Effective stream area after confluence  =      9.990(Ac.)
End of computations, total study area =          9.990 (Ac.)
```

Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2026

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2026

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	2.980	1	252	6,823	------	------	------	<no description>
2	Reservoir	1.561	1	259	6,817	1	630.75	1,185	<no description>

Hydrograph Report

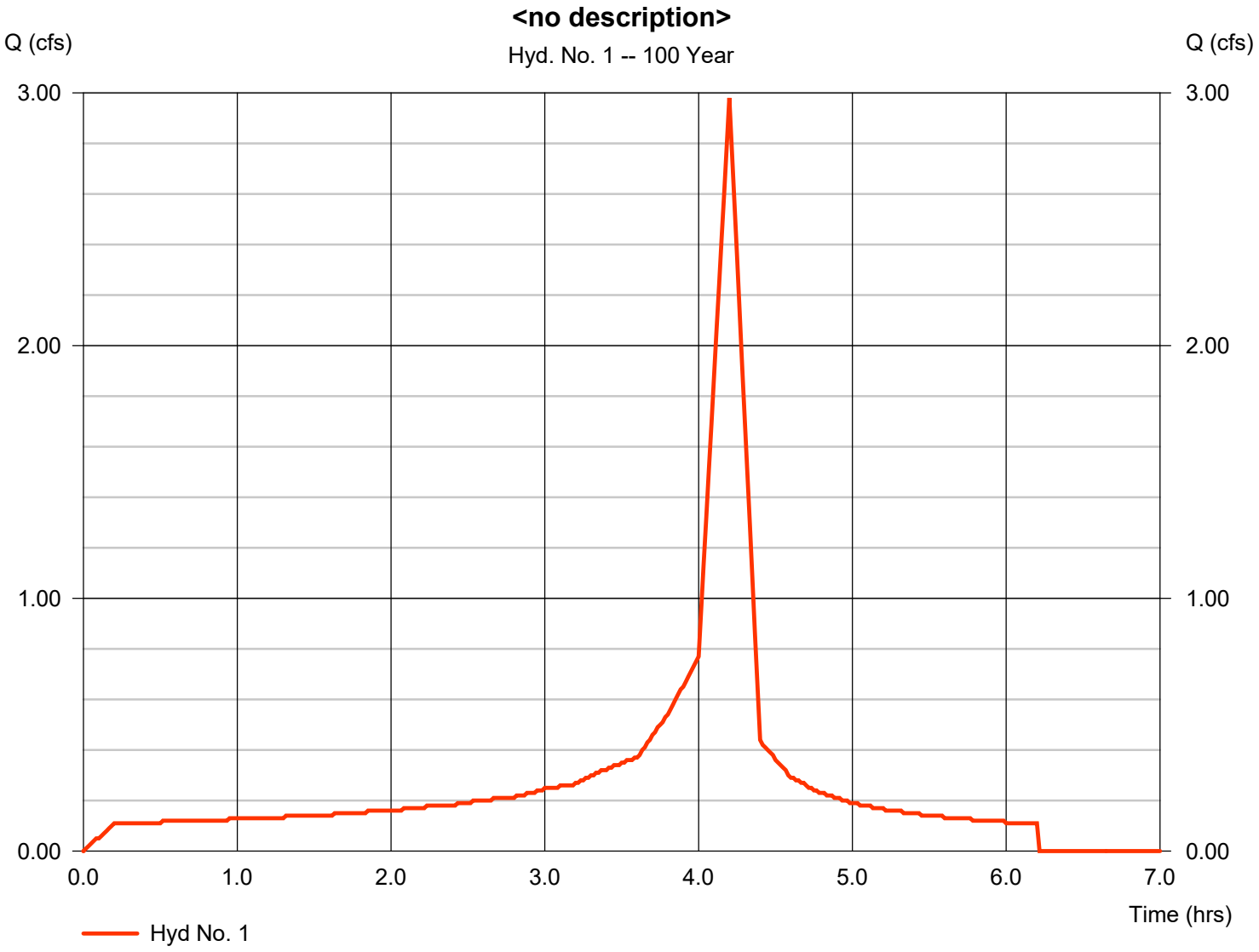
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2026

Tuesday, 08 / 12 / 2025

Hyd. No. 1

<no description>

Hydrograph type	= Manual	Peak discharge	= 2.980 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.20 hrs
Time interval	= 1 min	Hyd. volume	= 6,823 cuft



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2026

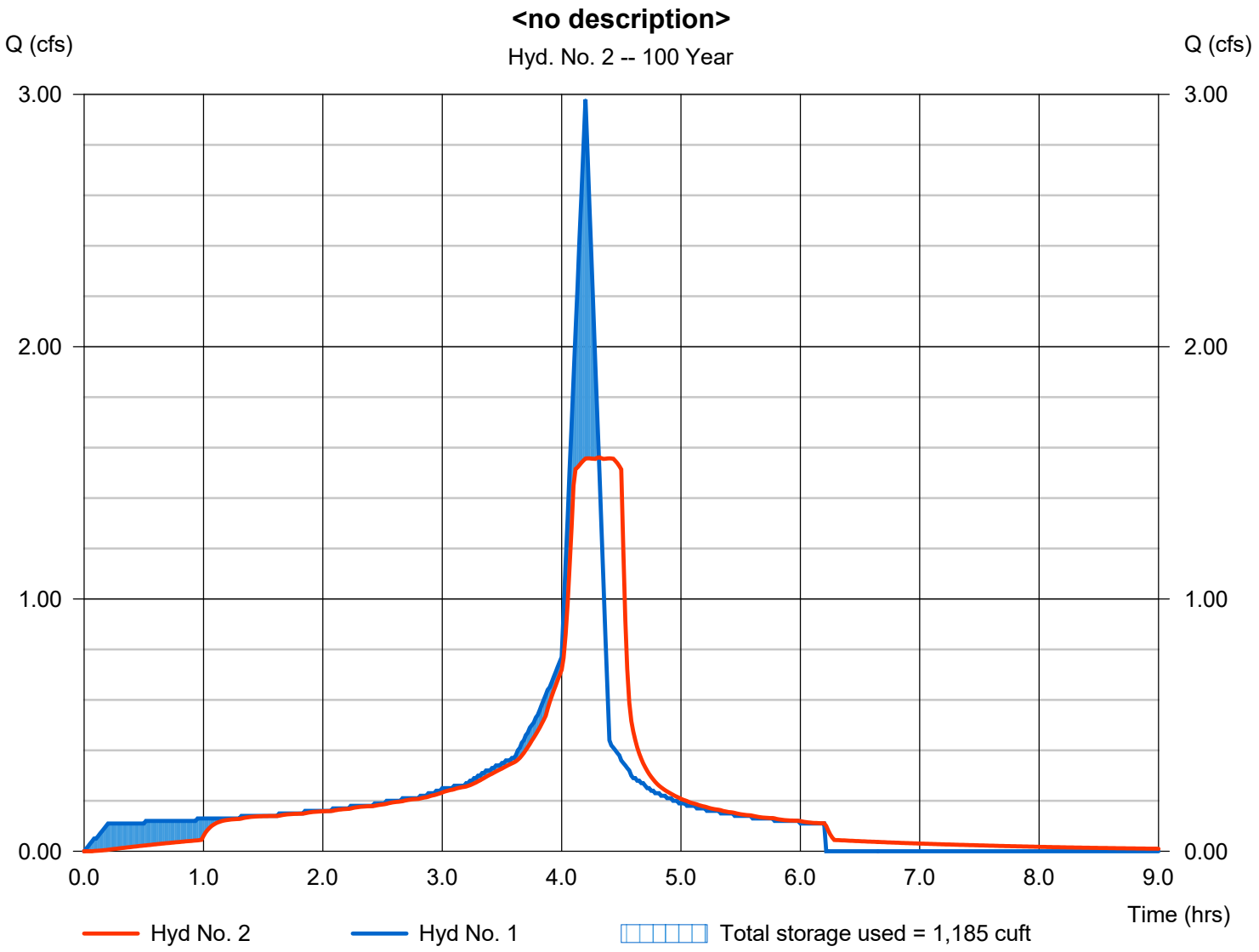
Tuesday, 08 / 12 / 2025

Hyd. No. 2

<no description>

Hydrograph type	=	Reservoir	Peak discharge	=	1.561 cfs
Storm frequency	=	100 yrs	Time to peak	=	4.32 hrs
Time interval	=	1 min	Hyd. volume	=	6,817 cuft
Inflow hyd. No.	=	1 - <no description>	Max. Elevation	=	630.75 ft
Reservoir name	=	<New Pond>	Max. Storage	=	1,185 cuft

Storage Indication method used.



Pond No. 1 - <New Pond>

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 629.67 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	629.67	1,000	0	0
1.33	631.00	1,196	1,458	1,458

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	2.00	0.00	0.00
Span (in)	= 6.00	2.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 625.75	629.67	0.00	0.00
Length (ft)	= 41.00	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)	= 8.00	0.00	0.00	0.00
Crest El. (ft)	= 630.00	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	629.67	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.13	146	629.80	1.42 oc	0.02 ic	---	---	0.00	---	---	---	---	---	0.023
0.27	292	629.94	1.42 oc	0.04 ic	---	---	0.00	---	---	---	---	---	0.045
0.40	437	630.07	1.42 oc	0.06 ic	---	---	0.48	---	---	---	---	---	0.542
0.53	583	630.20	1.51 oc	0.02 ic	---	---	1.49 s	---	---	---	---	---	1.512
0.67	729	630.33	1.54 oc	0.01 ic	---	---	1.53 s	---	---	---	---	---	1.538
0.80	875	630.47	1.56 oc	0.01 ic	---	---	1.55 s	---	---	---	---	---	1.556
0.93	1,021	630.60	1.59 oc	0.00 ic	---	---	1.55 s	---	---	---	---	---	1.558
1.06	1,167	630.73	1.61 oc	0.00 ic	---	---	1.55 s	---	---	---	---	---	1.555
1.20	1,312	630.87	1.63 oc	0.00 ic	---	---	1.60 s	---	---	---	---	---	1.602
1.33	1,458	631.00	1.65 oc	0.00 ic	---	---	1.59 s	---	---	---	---	---	1.588

Watershed Model Schematic

Legend

Hyd.	Origin	Description
1	Manual	<no description>
2	Reservoir	<no description>

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	3.000	1	255	8,422	------	------	------	<no description>
2	Reservoir	1.505	1	264	8,396	1	582.84	3,040	<no description>

Hydrograph Report

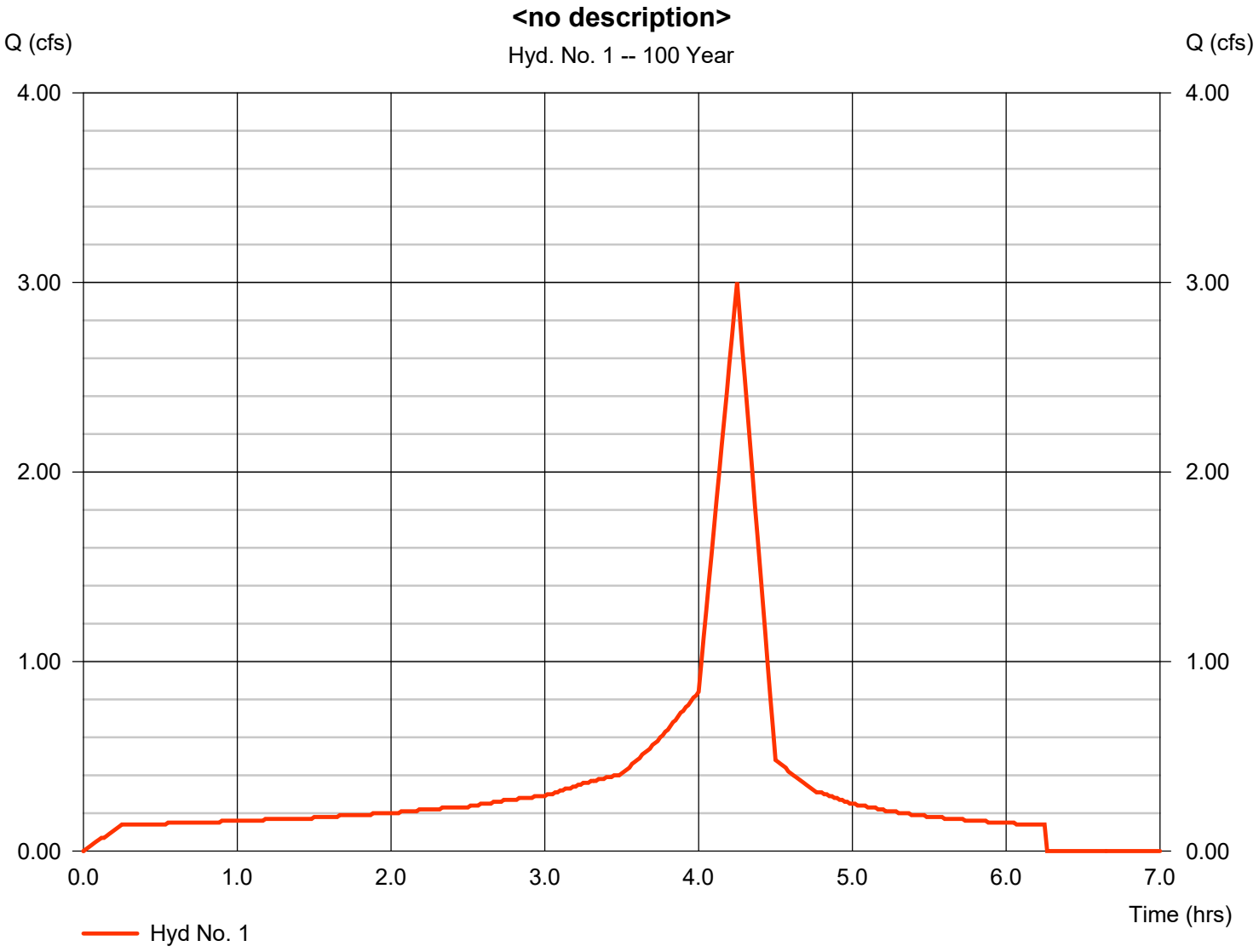
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Friday, 04 / 11 / 2025

Hyd. No. 1

<no description>

Hydrograph type	= Manual	Peak discharge	= 3.000 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.25 hrs
Time interval	= 1 min	Hyd. volume	= 8,422 cuft



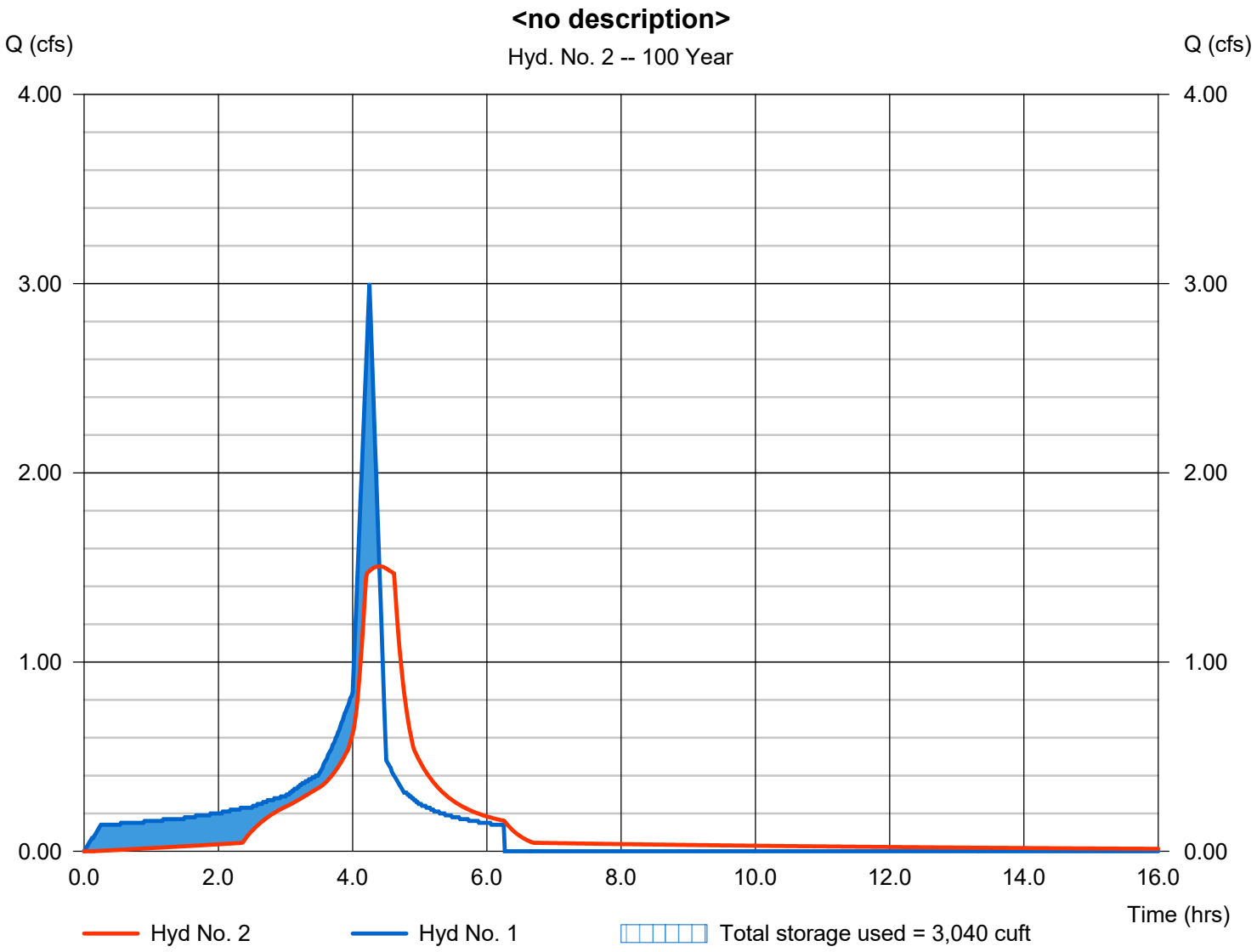
Hydrograph Report

Hyd. No. 2

<no description>

Hydrograph type	=	Reservoir	Peak discharge	=	1.505 cfs
Storm frequency	=	100 yrs	Time to peak	=	4.40 hrs
Time interval	=	1 min	Hyd. volume	=	8,396 cuft
Inflow hyd. No.	=	1 - <no description>	Max. Elevation	=	582.84 ft
Reservoir name	=	<New Pond>	Max. Storage	=	3,040 cuft

Storage Indication method used.



Pond No. 1 - <New Pond>

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 582.17 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	582.17	4,100	0	0
1.33	583.50	4,982	6,029	6,029

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	2.00	0.00	0.00
Span (in)	= 6.00	2.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 579.25	582.17	0.00	0.00
Length (ft)	= 28.00	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)	= 8.00	0.00	0.00	0.00
Crest El. (ft)	= 582.50	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

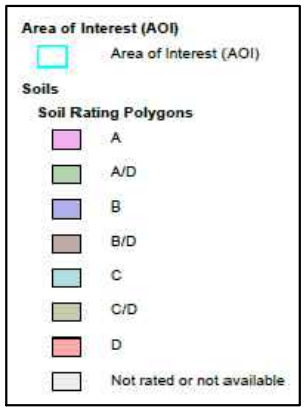
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	582.17	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.13	603	582.30	1.35 oc	0.02 ic	---	---	0.00	---	---	---	---	---	0.023
0.27	1,206	582.44	1.35 oc	0.04 ic	---	---	0.00	---	---	---	---	---	0.045
0.40	1,809	582.57	1.35 oc	0.06 ic	---	---	0.48	---	---	---	---	---	0.542
0.53	2,412	582.70	1.47 oc	0.02 ic	---	---	1.45 s	---	---	---	---	---	1.467
0.67	3,015	582.84	1.50 oc	0.01 ic	---	---	1.49 s	---	---	---	---	---	1.504
0.80	3,618	582.97	1.54 oc	0.01 ic	---	---	1.52 s	---	---	---	---	---	1.530
0.93	4,221	583.10	1.56 oc	0.00 ic	---	---	1.53 s	---	---	---	---	---	1.537
1.06	4,824	583.23	1.59 oc	0.00 ic	---	---	1.57 s	---	---	---	---	---	1.578
1.20	5,426	583.37	1.62 oc	0.00 ic	---	---	1.54 s	---	---	---	---	---	1.544
1.33	6,029	583.50	1.65 oc	0.00 ic	---	---	1.64 s	---	---	---	---	---	1.641

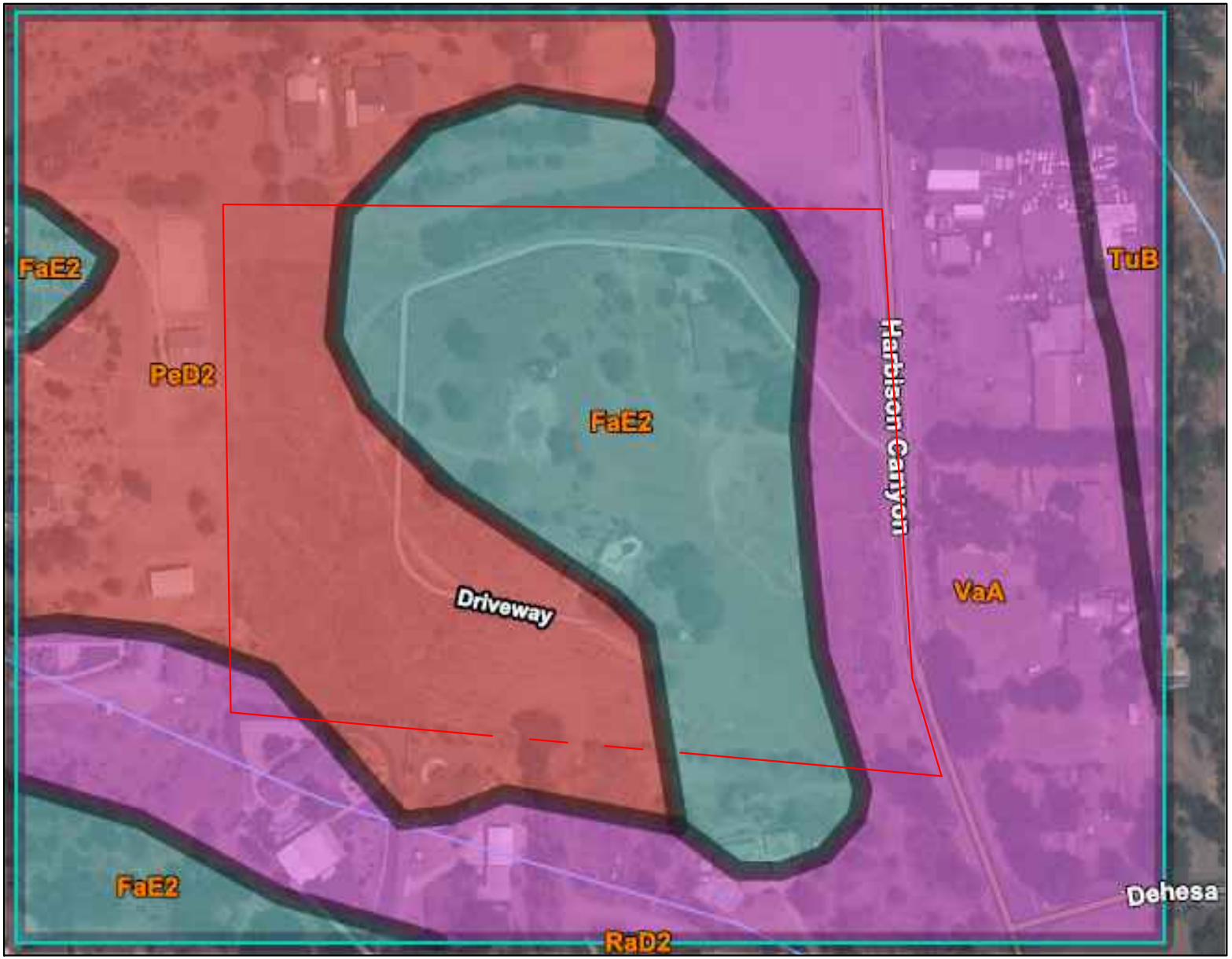
SECTION 3

ATTACHMENTS

SOILS MAP

LEGEND:

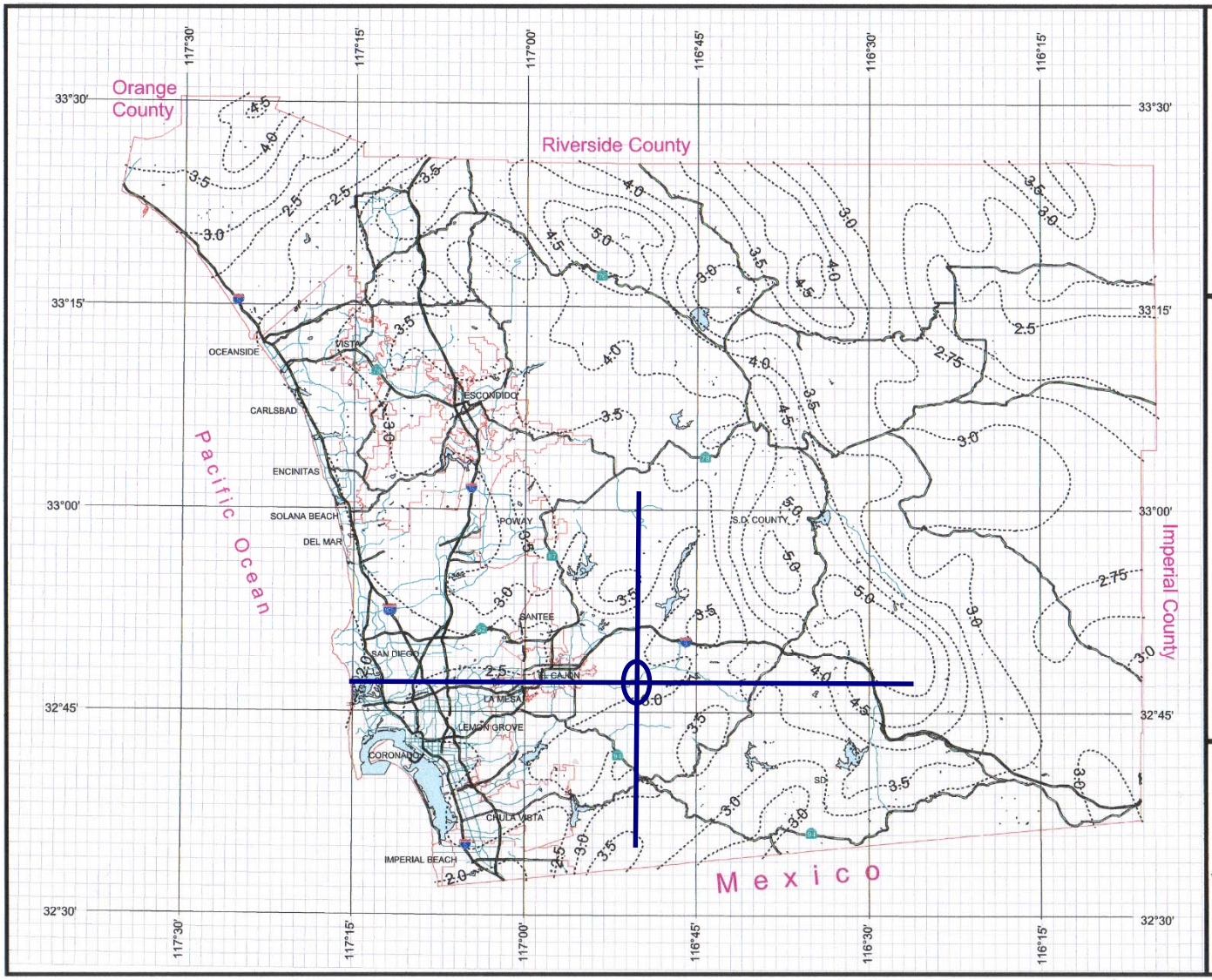




NO SCALE

(SOURCE: USDA WEB SOIL SURVEY)

M M



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

Lat:
32°47'30"N
Long:
116°50'20"W

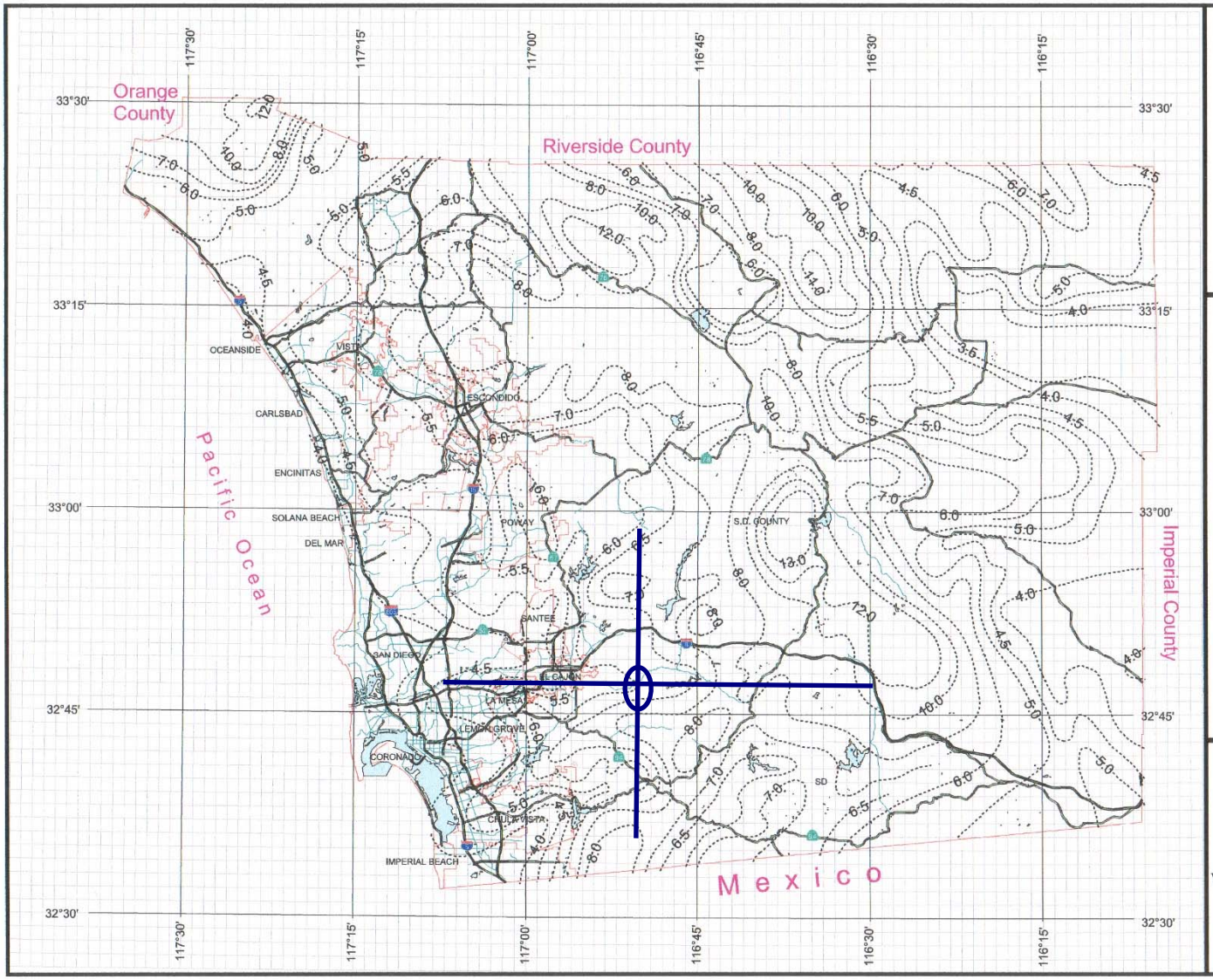
P6 = 3.0 in

DPW GIS — Department of Public Works Geographic Information Services

SanGIS — We Have San Diego Covered!

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°47'30"N
Long:
116°50'20"W

P24 = 6.0 in

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

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

"C" = 0.9 x (% Impervious) + Cp x (1- % Impervious)