

# PRELIMINARY HYDROLOGY REPORT

for

**CUP 190021**

**ARCO AM/PM**

Located in the City of Woodcrest  
County of Riverside, California

Prepared For:

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03-12-2020

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DATE

SEAL

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### 1. Purpose

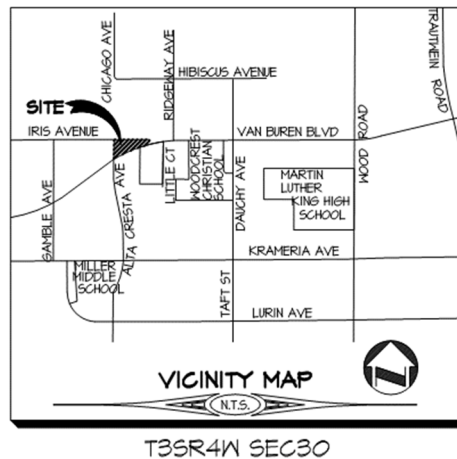
This Preliminary Hydrology Report has been prepared to ensure that adequate size and proper operation of drainage facilities is incorporated into the proposed project site.

### 2. Project Description

The site is located east of Chicago Ave, north of Van Buren Boulevard, and south of Iris Ave within a lot whose APN is 266-020-001 in the City of Woodcrest, within the County of Riverside. A portion of this project site will be developed to construct an AM/PM convenience store with an Arco gasoline station and drive-thru car wash with self-use vacuums.

#### A. Vicinity Map

THOMAS BROS. GUIDE PAGE 746, GRID B3



### 3. Existing Hydrology

There is an existing drainage structure that drains onto the lot which then drains north to another existing drainage pipe that drains north and outlets across the street of Iris Ave where it then follows an existing drainage ravine. The western side of the lot naturally drains to the northwest where it sumps and overflows into a pipe on the south side of Iris Ave and outlets north of Iris Ave. and into the existing shallow ravine.

### 4. Proposed Hydrology

Only a portion of the lot will be developed in order to conserve the existing hydrology with regard to the offsite flows that drain onto the lot and into the existing drainage pipe that drains offsite flows into the shallow ravine north of Iris Ave. The developed area drains northwest, conserving the natural drainage pattern- where it enters a bio-retention basin sized for water quality purposes, and with additional underground storage for basin routing purposes. The bioretention portion of the basin was designed taking off-site improvement area into account; effectively, the bioretention is oversized to overmitigate on-site for off-site improvements. Details regarding this design can be found in the preliminary water quality management plan (PWQMP).

The additional underground storage was provided given that the site exists within an area classified as susceptible to hydrologic conditions of concern per the PWQMP. As a result, a unit hydrograph analysis of the pre-developed and post-developed was also done in addition to a rational hydrology analysis to size drainage pipes and

structures. Ultimately, the basin storage took into account the storage provided by the water quality feature (the bio-retention storage) in addition to the storage that would be provided by underground detention units such as proprietary Eco-Rain Tanks. This was sized and routed to outlet the pre-developed 2-year 24-hour flow rate in the post-development scenario. It should also be noted, that at the request of governing agency, the off-site improvement area was included in the proposed unit hydrograph analysis to overmitigate on-site for HCOCs as well. That is, the on-site storage volume was increased and the outlet orifice sized to accommodate the additional impervious area due to off-site street improvements (widening of Van Buren and Iris Ave) based on the basin routing calculations.

Overflow drainage structures are proposed to convey at most, the rational 100-year post-development flow rate which will drain at a confluence point where the current off-site existing flows outlet on-site. An emergency overflow weir structure is also provided as a secondary overflow mechanism should the primary overflow outlet fail for any reason.

## **5. Method of Analysis**

The site hydrology was based upon Riverside County Flood Control and Water Conservation District Hydrology Manual, from which pertinent soil and rainfall information was obtained.

Storm flows were determined by the "RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM", Riverside County Flood Control & Water Conservation District 1978 Hydrology Manual, produced by Bondamin Engineering.

The site was also analyzed by the "SYNTHETIC UNIT HYDROLOGY METHOD COMPUTER PROGRAM", Riverside County Flood Control & Water Conservation District 1978 Hydrology Manual, produced by Bondamin Engineering.

## **6. Conclusion**

The hydrologic calculations provided herein substantiate the design of the proposed project and indicate the following:

- The proposed basin and drainage facilities will convey the 10 & 100 year storm events. Table 1 shows the pre-development and post-development peak flow rates for the 10-year and 100-year storm events at the furthest downstream point of discharge. It seems that the post-development flow rate increases slightly in comparison to the pre-development for the 10-year and 100-year analyses, but this is because only a portion of the entire lot is being developed.
- An emergency spillway is provided as part of the bioretention basin to allow runoff to overflow off-site in case the primary bioretention overflow catch basin becomes clogged.
- Sufficient basin storage is proposed along with an orifice sized to route the storm to simulate the pre-developed 2-year 24-hour storm event in order to provide the mitigation as required by the Santa Ana Region Water Quality Management Plan requirements to address hydrologic conditions of concern (HCOCs). See table 2 for a summary of the results.

Table 1: Pre-Development vs. Post-Development peak flowrates at discharge point

| <b>Condition</b>                       | <b><math>Q_{10}</math> (cfs)</b> | <b><math>Q_{100}</math> (cfs)</b> |
|----------------------------------------|----------------------------------|-----------------------------------|
| <b>Pre-Developed,<br/>53.52 acres</b>  | 52.85                            | 88.09                             |
| <b>Post-Developed,<br/>53.52 acres</b> | 53.18                            | 88.47                             |
| <b>Difference</b>                      | 0.33                             | 0.38                              |

Table 2: Unit Hydrograph & Basin Routing Results

| <b>Storm Event</b> | <b>Basin</b>      |       |                   |       |               |       |       |
|--------------------|-------------------|-------|-------------------|-------|---------------|-------|-------|
|                    | <b>Existing</b>   |       | <b>Proposed</b>   |       | <b>Routed</b> |       |       |
|                    | Volume<br>(ac*ft) | cfs   | Volume<br>(ac*ft) | cfs   | Volume        | cfs   | Depth |
| <b>2yr24hr</b>     | 0.0341            | 0.056 | 0.2799            | 0.461 | 0.218         | 0.055 | 7.03  |

Therefore, it is our conclusion that this proposed project does not negatively impact the surrounding storm facilities or community.

## **Section 1**

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**Pre-developed 10 and 100-year Rational Hydrology & Map**

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## **PRE-DEVELOPED 10-YEAR** **RATIONAL HYDROLOGY**

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 03/11/20 File:9567EX10YR.out

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9567 PRE-DEVELOPED 10-YEAR  
PREPARED BY RUDDY ARGUETA, PE @ ADKAN ENGINEERS  
CUP 190021

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

English (in-lb) Units used in input data file  
-----

Program License Serial Number 5006  
-----

Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 10.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation = 0.500(In.)  
100 year, 1 hour precipitation = 1.300(In.)

Storm event year = 10.0  
Calculated rainfall intensity data:  
1 hour intensity = 0.829(In/Hr)  
Slope of intensity duration curve = 0.5000

+++++  
Process from Point/Station 1.000 to Point/Station 2.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

-----  
Initial area flow distance = 632.000(Ft.)  
Top (of initial area) elevation = 1678.000(Ft.)  
Bottom (of initial area) elevation = 1630.000(Ft.)  
Difference in elevation = 48.000(Ft.)  
Slope = 0.07595 s(percent)= 7.59  
 $TC = k(0.940)*[(length^3)/(elevation\ change)]^{0.2}$   
Initial area time of concentration = 20.764 min.  
Rainfall intensity = 1.409(In/Hr) for a 10.0 year storm  
UNDEVELOPED (good cover) subarea  
Runoff Coefficient = 0.675  
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  
RI index for soil(AMC 2) = 74.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Initial subarea runoff = 9.406(CFS)  
Total initial stream area = 9.880(Ac.)  
Pervious area fraction = 1.000

+++++  
Process from Point/Station 2.000 to Point/Station 3.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

-----  
Top of natural channel elevation = 1630.000(Ft.)  
End of natural channel elevation = 1594.000(Ft.)  
Length of natural channel = 884.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 16.989(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:

Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
velocity using mean channel flow = 5.79(Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0407  
Corrected/adjusted channel slope = 0.0407  
Travel time = 2.55 min. TC = 23.31 min.

Adding area flow to channel  
USER INPUT of soil data for subarea  
Runoff Coefficient = 0.816  
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  
RI index for soil(AMC 2) = 69.00  
Pervious area fraction = 0.300; Impervious fraction = 0.700  
Rainfall intensity = 1.330(In/Hr) for a 10.0 year storm  
Subarea runoff = 17.295(CFS) for 15.930(Ac.)  
Total runoff = 26.701(CFS) Total area = 25.810(Ac.)

+++++  
Process from Point/Station 3.000 to Point/Station 4.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1594.000(Ft.)  
End of natural channel elevation = 1590.000(Ft.)  
Length of natural channel = 547.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 33.436(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
velocity using mean channel flow = 2.95(Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0073  
Corrected/adjusted channel slope = 0.0073  
Travel time = 3.09 min. TC = 26.40 min.

Adding area flow to channel  
SINGLE FAMILY (1/2 Acre Lot)  
Runoff Coefficient = 0.725  
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  
RI index for soil(AMC 2) = 69.00  
Pervious area fraction = 0.600; Impervious fraction = 0.400  
Rainfall intensity = 1.250(In/Hr) for a 10.0 year storm  
Subarea runoff = 11.800(CFS) for 13.020(Ac.)  
Total runoff = 38.502(CFS) Total area = 38.830(Ac.)

+++++  
Process from Point/Station 4.000 to Point/Station 5.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1590.000(Ft.)  
End of natural channel elevation = 1575.000(Ft.)  
Length of natural channel = 639.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 44.025(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
velocity using mean channel flow = 5.72(Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0235  
Corrected/adjusted channel slope = 0.0235  
Travel time = 1.86 min. TC = 28.26 min.

Adding area flow to channel  
USER INPUT of soil data for subarea  
Runoff Coefficient = 0.810  
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  
RI index for soil(AMC 2) = 69.00  
Pervious area fraction = 0.300; Impervious fraction = 0.700  
Rainfall intensity = 1.208(In/Hr) for a 10.0 year storm  
Subarea runoff = 10.908(CFS) for 11.140(Ac.)  
Total runoff = 49.410(CFS) Total area = 49.970(Ac.)

+++++  
Process from Point/Station 5.000 to Point/Station 6.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

Upstream point/station elevation = 1575.000(Ft.)  
Downstream point/station elevation = 1568.000(Ft.)  
Pipe length = 98.00(Ft.) Manning's N = 0.012  
No. of pipes = 1 Required pipe flow = 49.410(CFS)  
Nearest computed pipe diameter = 24.00(In.)  
Calculated individual pipe flow = 49.410(CFS)  
Normal flow depth in pipe = 15.56(In.)  
Flow top width inside pipe = 22.92(In.)  
Critical depth could not be calculated.  
Pipe flow velocity = 22.90(Ft/s)  
Travel time through pipe = 0.07 min.  
Time of concentration (TC) = 28.33 min.

+++++  
Process from Point/Station 6.000 to Point/Station 7.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

Top of natural channel elevation = 1568.000(Ft.)  
End of natural channel elevation = 1558.000(Ft.)  
Length of natural channel = 147.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 49.410(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
Velocity using mean channel flow = 10.06(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0680  
Corrected/adjusted channel slope = 0.0680  
Travel time = 0.24 min. TC = 28.58 min.

Adding area flow to channel  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.762  
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  
RI index for soil(AMC 2) = 86.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 1.201(In/Hr) for a 10.0 year storm  
Subarea runoff = 0.000(CFS) for 0.000(Ac.)  
Total runoff = 49.410(CFS) Total area = 49.970(Ac.)

+++++  
Process from Point/Station 6.000 to Point/Station 7.000  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
 Stream flow area = 49.970(Ac.)  
 Runoff from this stream = 49.410(CFS)  
 Time of concentration = 28.58 min.  
 Rainfall intensity = 1.201(In/Hr)

+++++  
 Process from Point/Station 8.000 to Point/Station 7.000  
 \*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 547.000(Ft.)  
 Top (of initial area) elevation = 1591.000(Ft.)  
 Bottom (of initial area) elevation = 1558.000(Ft.)  
 Difference in elevation = 33.000(Ft.)  
 Slope =  $0.06033 \text{ s(percent)} = 6.03$   
 $TC = k(0.530) * [(length^3)/(elevation \text{ change})]^{0.2}$   
 Initial area time of concentration = 11.571 min.  
 Rainfall intensity = 1.888(In/Hr) for a 10.0 year storm  
 UNDEVELOPED (poor cover) subarea  
 Runoff Coefficient = 0.807  
 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  
 RI index for soil(AMC 2) = 86.00  
 Pervious area fraction = 1.000; Impervious fraction = 0.000  
 Initial subarea runoff = 5.410(CFS)  
 Total initial stream area = 3.550(Ac.)  
 Pervious area fraction = 1.000

+++++  
 Process from Point/Station 8.000 to Point/Station 7.000  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 3.550(Ac.)  
 Runoff from this stream = 5.410(CFS)  
 Time of concentration = 11.57 min.  
 Rainfall intensity = 1.888(In/Hr)  
 Summary of stream data:

| Stream No. | Flow rate (CFS) | TC (min) | Rainfall Intensity (In/Hr) |
|------------|-----------------|----------|----------------------------|
| 1          | 49.410          | 28.58    | 1.201                      |
| 2          | 5.410           | 11.57    | 1.888                      |

Largest stream flow has longer time of concentration  
 $Q_p = 49.410 + \text{sum of}$   
 $Q_b \quad I_a/I_b$   
 $5.410 * 0.636 = 3.443$   
 $Q_p = 52.852$

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
 49.410 5.410  
 Area of streams before confluence:  
 49.970 3.550  
 Results of confluence:  
 Total flow rate = 52.852(CFS)  
 Time of concentration = 28.576 min.  
 Effective stream area after confluence = 53.520(Ac.)

+++++  
 Process from Point/Station 7.000 to Point/Station 9.000  
 \*\*\*\* PIPEFLOW TRAVEL TIME (User specified size) \*\*\*\*

---

Upstream point/station elevation = 1558.000(Ft.)  
 Downstream point/station elevation = 1557.500(Ft.)  
 Pipe length = 13.00(Ft.) Manning's N = 0.022  
 No. of pipes = 1 Required pipe flow = 52.852(CFS)

Given pipe size = 24.00(In.)  
 NOTE: Normal flow is pressure flow in user selected pipe size.  
 The approximate hydraulic grade line above the pipe invert is  
 8.124(Ft.) at the headworks or inlet of the pipe(s)  
 Pipe friction loss = 2.031(Ft.)  
 Minor friction loss = 6.592(Ft.) K-factor = 1.50  
 Critical depth could not be calculated.  
 Pipe flow velocity = 16.82(Ft/s)  
 Travel time through pipe = 0.01 min.  
 Time of concentration (TC) = 28.59 min.

++++++  
 Process from Point/Station 7.000 to Point/Station 9.000  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

Along Main Stream number: 1 in normal stream number 1  
 Stream flow area = 53.520(Ac.)  
 Runoff from this stream = 52.852(CFS)  
 Time of concentration = 28.59 min.  
 Rainfall intensity = 1.201(In/Hr)  
 Summary of stream data:

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

|   |        |       |       |
|---|--------|-------|-------|
| 1 | 52.852 | 28.59 | 1.201 |
|---|--------|-------|-------|

Largest stream flow has longer time of concentration  
 Qp = 52.852 + sum of  
 Qp = 52.852

Total of 1 streams to confluence:  
 Flow rates before confluence point:  
 52.852

Area of streams before confluence:  
 53.520

Results of confluence:  
 Total flow rate = 52.852(CFS)  
 Time of concentration = 28.588 min.  
 Effective stream area after confluence = 53.520(Ac.)  
 End of computations, total study area = 53.52 (Ac.)  
 The following figures may  
 be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.549  
 Area averaged RI index number = 71.1

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**PRE-DEVELOPED 100-YEAR**  
**RATIONAL HYDROLOGY**

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 03/11/20 File:9567EX100YR.out

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9567 PRE-DEVELOPED 100-YEAR  
PREPARED BY RUDDY ARGUETA, PE @ ADKAN ENGINEERS  
CUP 190021

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

English (in-lb) Units used in input data file

-----  
Program License Serial Number 5006

-----  
Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation = 0.500(In.)  
100 year, 1 hour precipitation = 1.300(In.)

Storm event year = 100.0  
Calculated rainfall intensity data:  
1 hour intensity = 1.300(In/Hr)  
Slope of intensity duration curve = 0.5000

+++++  
Process from Point/Station 1.000 to Point/Station 2.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

-----  
Initial area flow distance = 632.000(Ft.)  
Top (of initial area) elevation = 1678.000(Ft.)  
Bottom (of initial area) elevation = 1630.000(Ft.)  
Difference in elevation = 48.000(Ft.)  
Slope = 0.07595 s(percent)= 7.59  
 $TC = k(0.940)*[(length^3)/(elevation\ change)]^{0.2}$   
Initial area time of concentration = 20.764 min.  
Rainfall intensity = 2.210(In/Hr) for a 100.0 year storm  
UNDEVELOPED (good cover) subarea  
Runoff Coefficient = 0.743  
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  
RI index for soil(AMC 2) = 74.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Initial subarea runoff = 16.213(CFS)  
Total initial stream area = 9.880(Ac.)  
Pervious area fraction = 1.000

+++++  
Process from Point/Station 2.000 to Point/Station 3.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

-----  
Top of natural channel elevation = 1630.000(Ft.)  
End of natural channel elevation = 1594.000(Ft.)  
Length of natural channel = 884.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 29.284(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:

Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
velocity using mean channel flow = 6.71(Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0407  
Corrected/adjusted channel slope = 0.0407  
Travel time = 2.19 min. TC = 22.96 min.

Adding area flow to channel  
USER INPUT of soil data for subarea  
Runoff Coefficient = 0.840  
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  
RI index for soil(AMC 2) = 69.00  
Pervious area fraction = 0.300; Impervious fraction = 0.700  
Rainfall intensity = 2.102(In/Hr) for a 100.0 year storm  
Subarea runoff = 28.125(CFS) for 15.930(Ac.)  
Total runoff = 44.338(CFS) Total area = 25.810(Ac.)

+++++  
Process from Point/Station 3.000 to Point/Station 4.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

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Top of natural channel elevation = 1594.000(Ft.)  
End of natural channel elevation = 1590.000(Ft.)  
Length of natural channel = 547.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 55.522(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
velocity using mean channel flow = 3.41(Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0073  
Corrected/adjusted channel slope = 0.0073  
Travel time = 2.67 min. TC = 25.63 min.

Adding area flow to channel  
SINGLE FAMILY (1/2 Acre Lot)  
Runoff Coefficient = 0.775  
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  
RI index for soil(AMC 2) = 69.00  
Pervious area fraction = 0.600; Impervious fraction = 0.400  
Rainfall intensity = 1.989(In/Hr) for a 100.0 year storm  
Subarea runoff = 20.070(CFS) for 13.020(Ac.)  
Total runoff = 64.409(CFS) Total area = 38.830(Ac.)

+++++  
Process from Point/Station 4.000 to Point/Station 5.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1590.000(Ft.)  
End of natural channel elevation = 1575.000(Ft.)  
Length of natural channel = 639.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 73.648(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
velocity using mean channel flow = 6.64(Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0235  
Corrected/adjusted channel slope = 0.0235  
Travel time = 1.60 min. TC = 27.24 min.

Adding area flow to channel  
USER INPUT of soil data for subarea  
Runoff Coefficient = 0.836  
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  
RI index for soil(AMC 2) = 69.00  
Pervious area fraction = 0.300; Impervious fraction = 0.700  
Rainfall intensity = 1.930(In/Hr) for a 100.0 year storm  
Subarea runoff = 17.971(CFS) for 11.140(Ac.)  
Total runoff = 82.379(CFS) Total area = 49.970(Ac.)

\*\*\*\*\*  
Process from Point/Station 5.000 to Point/Station 6.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1575.000(Ft.)  
Downstream point/station elevation = 1568.000(Ft.)  
Pipe length = 98.00(Ft.) Manning's N = 0.012  
No. of pipes = 1 Required pipe flow = 82.379(CFS)  
Nearest computed pipe diameter = 27.00(In.)  
Calculated individual pipe flow = 82.379(CFS)  
Normal flow depth in pipe = 20.39(In.)  
Flow top width inside pipe = 23.22(In.)  
Critical depth could not be calculated.  
Pipe flow velocity = 25.59(Ft/s)  
Travel time through pipe = 0.06 min.  
Time of concentration (TC) = 27.30 min.

\*\*\*\*\*  
Process from Point/Station 6.000 to Point/Station 7.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1568.000(Ft.)  
End of natural channel elevation = 1558.000(Ft.)  
Length of natural channel = 147.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 82.379(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
Velocity using mean channel flow = 11.68(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0680  
Corrected/adjusted channel slope = 0.0680  
Travel time = 0.21 min. TC = 27.51 min.

Adding area flow to channel  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.809  
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  
RI index for soil(AMC 2) = 86.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 1.920(In/Hr) for a 100.0 year storm  
Subarea runoff = 0.000(CFS) for 0.000(Ac.)  
Total runoff = 82.379(CFS) Total area = 49.970(Ac.)

\*\*\*\*\*  
Process from Point/Station 6.000 to Point/Station 7.000  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
 Stream flow area = 49.970(Ac.)  
 Runoff from this stream = 82.379(CFS)  
 Time of concentration = 27.51 min.  
 Rainfall intensity = 1.920(In/Hr)

+++++  
 Process from Point/Station 8.000 to Point/Station 7.000  
 \*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 547.000(Ft.)  
 Top (of initial area) elevation = 1591.000(Ft.)  
 Bottom (of initial area) elevation = 1558.000(Ft.)  
 Difference in elevation = 33.000(Ft.)  
 Slope =  $0.06033 \text{ s(percent)} = 6.03$   
 $TC = k(0.530) * [(length^3)/(elevation \text{ change})]^{0.2}$   
 Initial area time of concentration = 11.571 min.  
 Rainfall intensity = 2.960(In/Hr) for a 100.0 year storm  
 UNDEVELOPED (poor cover) subarea  
 Runoff Coefficient = 0.839  
 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  
 RI index for soil(AMC 2) = 86.00  
 Pervious area fraction = 1.000; Impervious fraction = 0.000  
 Initial subarea runoff = 8.812(CFS)  
 Total initial stream area = 3.550(Ac.)  
 Pervious area fraction = 1.000

+++++  
 Process from Point/Station 8.000 to Point/Station 7.000  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 3.550(Ac.)  
 Runoff from this stream = 8.812(CFS)  
 Time of concentration = 11.57 min.  
 Rainfall intensity = 2.960(In/Hr)  
 Summary of stream data:

| Stream No. | Flow rate (CFS) | TC (min) | Rainfall Intensity (In/Hr) |
|------------|-----------------|----------|----------------------------|
| 1          | 82.379          | 27.51    | 1.920                      |
| 2          | 8.812           | 11.57    | 2.960                      |

Largest stream flow has longer time of concentration  
 $Q_p = 82.379 + \text{sum of}$   
 $Q_b \quad I_a/I_b$   
 $8.812 * 0.649 = 5.715$   
 $Q_p = 88.094$

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
 82.379 8.812  
 Area of streams before confluence:  
 49.970 3.550  
 Results of confluence:  
 Total flow rate = 88.094(CFS)  
 Time of concentration = 27.509 min.  
 Effective stream area after confluence = 53.520(Ac.)

+++++  
 Process from Point/Station 7.000 to Point/Station 9.000  
 \*\*\*\* PIPEFLOW TRAVEL TIME (User specified size) \*\*\*\*

---

Upstream point/station elevation = 1558.000(Ft.)  
 Downstream point/station elevation = 1557.500(Ft.)  
 Pipe length = 13.00(Ft.) Manning's N = 0.022  
 No. of pipes = 1 Required pipe flow = 88.094(CFS)

Given pipe size = 24.00(In.)  
 NOTE: Normal flow is pressure flow in user selected pipe size.  
 The approximate hydraulic grade line above the pipe invert is  
 23.459(Ft.) at the headworks or inlet of the pipe(s)  
 Pipe friction loss = 5.644(Ft.)  
 Minor friction loss = 18.315(Ft.) K-factor = 1.50  
 Critical depth could not be calculated.  
 Pipe flow velocity = 28.04(Ft/s)  
 Travel time through pipe = 0.01 min.  
 Time of concentration (TC) = 27.52 min.

+++++  
 Process from Point/Station 7.000 to Point/Station 9.000  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
 Stream flow area = 53.520(Ac.)  
 Runoff from this stream = 88.094(CFS)  
 Time of concentration = 27.52 min.  
 Rainfall intensity = 1.920(In/Hr)  
 Summary of stream data:

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

|   |        |       |       |
|---|--------|-------|-------|
| 1 | 88.094 | 27.52 | 1.920 |
|---|--------|-------|-------|

Largest stream flow has longer time of concentration  
 Qp = 88.094 + sum of  
 Qp = 88.094

Total of 1 streams to confluence:  
 Flow rates before confluence point:  
 88.094

Area of streams before confluence:  
 53.520

Results of confluence:  
 Total flow rate = 88.094(CFS)  
 Time of concentration = 27.516 min.  
 Effective stream area after confluence = 53.520(Ac.)  
 End of computations, total study area = 53.52 (Ac.)  
 The following figures may  
 be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.549  
 Area averaged RI index number = 71.1

**adkan**

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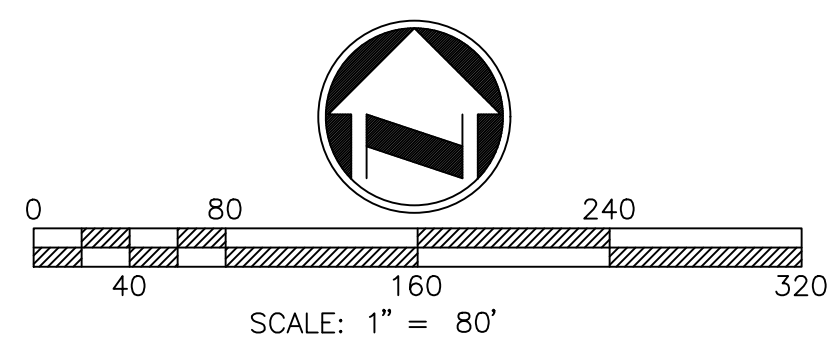
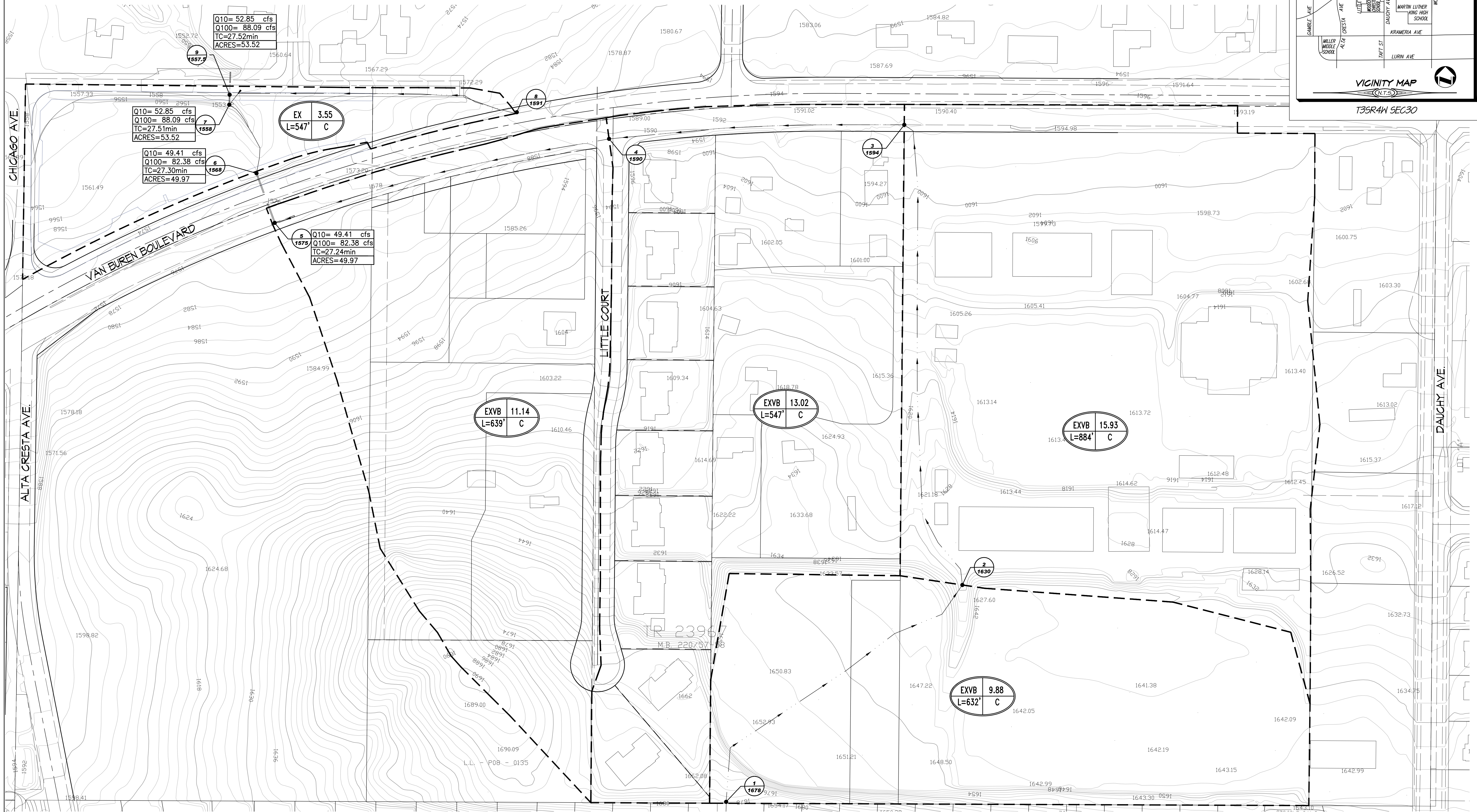
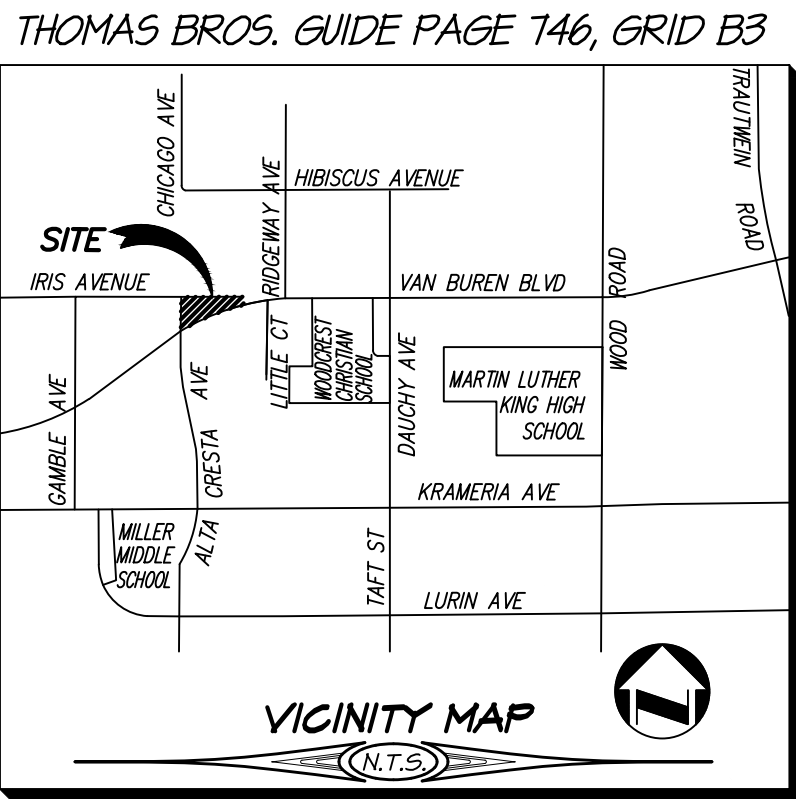
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***ENGINEERS***

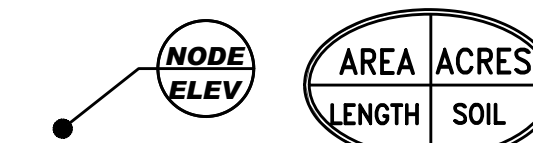
**PRE-DEVELOPED 100-YEAR**  
**RATIONAL HYDROLOGY**



CUP 190021: PRE-DEVELOPMENT HYDROLOGY MAP



### LEGEND




















WATERSHED BOUNDARY  
 FLOW PATH

PREPARATION DATE : MARCH 2020

PLAN PREPARED BY: **ndk**

# auKad

## ENGINEERS

Civil Engineering • Surveying • Planning

6879 Airport Drive, Riverside, CA 92504  
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U: \PROJECTS\ADMG\9567\ENGINEERING\HYDROLOGY\PRE DEVELOPMENT HYDROLOGY

PLOT DATE: 3/11/2020



## **Section 2**

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**Post-Developed 10 and 100-year Rational Hydrology & Map**

**POST-DEVELOPED 10-YEAR**  
**RATIONAL HYDROLOGY**

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 03/11/20 File:9567PR10YR.out

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9567 POST-DEVELOPED 10-YEAR  
PREPARED BY RUDDY ARGUETA, PE @ ADKAN ENGINEERS  
CUP 190021

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

English (in-lb) Units used in input data file  
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Program License Serial Number 5006

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Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 10.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation = 0.500(In.)  
100 year, 1 hour precipitation = 1.300(In.)

Storm event year = 10.0  
Calculated rainfall intensity data:  
1 hour intensity = 0.829(In/Hr)  
Slope of intensity duration curve = 0.5000

+++++  
Process from Point/Station 1.000 to Point/Station 2.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

-----  
Initial area flow distance = 632.000(Ft.)  
Top (of initial area) elevation = 1678.000(Ft.)  
Bottom (of initial area) elevation = 1630.000(Ft.)  
Difference in elevation = 48.000(Ft.)  
Slope = 0.07595 s(percent)= 7.59  
 $TC = k(0.940)*[(length^3)/(elevation\ change)]^{0.2}$   
Initial area time of concentration = 20.764 min.  
Rainfall intensity = 1.409(In/Hr) for a 10.0 year storm  
UNDEVELOPED (good cover) subarea  
Runoff Coefficient = 0.675  
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  
RI index for soil(AMC 2) = 74.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Initial subarea runoff = 9.406(CFS)  
Total initial stream area = 9.880(Ac.)  
Pervious area fraction = 1.000

+++++  
Process from Point/Station 2.000 to Point/Station 3.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

-----  
Top of natural channel elevation = 1630.000(Ft.)  
End of natural channel elevation = 1594.000(Ft.)  
Length of natural channel = 884.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 16.989(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{0.5}))$   
Velocity using mean channel flow = 5.79(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0407  
Corrected/adjusted channel slope = 0.0407  
Travel time = 2.55 min. TC = 23.31 min.

Adding area flow to channel  
USER INPUT of soil data for subarea  
Runoff Coefficient = 0.816  
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  
RI index for soil(AMC 2) = 69.00  
Pervious area fraction = 0.300; Impervious fraction = 0.700  
Rainfall intensity = 1.330(In/Hr) for a 10.0 year storm  
Subarea runoff = 17.295(CFS) for 15.930(Ac.)  
Total runoff = 26.701(CFS) Total area = 25.810(Ac.)

+++++  
Process from Point/Station 3.000 to Point/Station 4.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1594.000(Ft.)  
End of natural channel elevation = 1590.000(Ft.)  
Length of natural channel = 547.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 33.436(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
velocity using mean channel flow = 2.95(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)  
Normal channel slope = 0.0073  
Corrected/adjusted channel slope = 0.0073  
Travel time = 3.09 min. TC = 26.40 min.

Adding area flow to channel  
SINGLE FAMILY (1/2 Acre Lot)  
Runoff Coefficient = 0.725  
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  
RI index for soil(AMC 2) = 69.00  
Pervious area fraction = 0.600; Impervious fraction = 0.400  
Rainfall intensity = 1.250(In/Hr) for a 10.0 year storm  
Subarea runoff = 11.800(CFS) for 13.020(Ac.)  
Total runoff = 38.502(CFS) Total area = 38.830(Ac.)

+++++  
Process from Point/Station 4.000 to Point/Station 5.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1590.000(Ft.)  
End of natural channel elevation = 1575.000(Ft.)  
Length of natural channel = 639.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 44.025(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
velocity using mean channel flow = 5.72(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)  
Normal channel slope = 0.0235  
Corrected/adjusted channel slope = 0.0235  
Travel time = 1.86 min. TC = 28.26 min.

Adding area flow to channel  
USER INPUT of soil data for subarea  
Runoff Coefficient = 0.810  
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  
 RI index for soil(AMC 2) = 69.00  
 Pervious area fraction = 0.300; Impervious fraction = 0.700  
 Rainfall intensity = 1.208(In/Hr) for a 10.0 year storm  
 Subarea runoff = 10.908(CFS) for 11.140(Ac.)  
 Total runoff = 49.410(CFS) Total area = 49.970(Ac.)

\*\*\*\*\*  
 Process from Point/Station 5.000 to Point/Station 6.000  
 \*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

Upstream point/station elevation = 1575.000(Ft.)  
 Downstream point/station elevation = 1568.000(Ft.)  
 Pipe length = 98.00(Ft.) Manning's N = 0.012  
 No. of pipes = 1 Required pipe flow = 49.410(CFS)  
 Nearest computed pipe diameter = 24.00(In.)  
 Calculated individual pipe flow = 49.410(CFS)  
 Normal flow depth in pipe = 15.56(In.)  
 Flow top width inside pipe = 22.92(In.)  
 Critical depth could not be calculated.  
 Pipe flow velocity = 22.90(Ft/s)  
 Travel time through pipe = 0.07 min.  
 Time of concentration (TC) = 28.33 min.

\*\*\*\*\*  
 Process from Point/Station 6.000 to Point/Station 7.000  
 \*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

Top of natural channel elevation = 1568.000(Ft.)  
 End of natural channel elevation = 1558.000(Ft.)  
 Length of natural channel = 147.000(Ft.)  
 Estimated mean flow rate at midpoint of channel = 49.410(CFS)

Natural valley channel type used  
 L.A. County flood control district formula for channel velocity:  
 Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
 Velocity using mean channel flow = 10.06(Ft/s)

Correction to map slope used on extremely rugged channels with  
 drops and waterfalls (Plate D-6.2)  
 Normal channel slope = 0.0680  
 Corrected/adjusted channel slope = 0.0680  
 Travel time = 0.24 min. TC = 28.58 min.

Adding area flow to channel  
 UNDEVELOPED (poor cover) subarea  
 Runoff Coefficient = 0.762  
 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  
 RI index for soil(AMC 2) = 86.00  
 Pervious area fraction = 1.000; Impervious fraction = 0.000  
 Rainfall intensity = 1.201(In/Hr) for a 10.0 year storm  
 Subarea runoff = 0.000(CFS) for 0.000(Ac.)  
 Total runoff = 49.410(CFS) Total area = 49.970(Ac.)

\*\*\*\*\*  
 Process from Point/Station 6.000 to Point/Station 7.000  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

Along Main Stream number: 1 in normal stream number 1  
 Stream flow area = 49.970(Ac.)  
 Runoff from this stream = 49.410(CFS)  
 Time of concentration = 28.58 min.  
 Rainfall intensity = 1.201(In/Hr)

\*\*\*\*\*  
 Process from Point/Station 8.000 to Point/Station 7.000  
 \*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Initial area flow distance = 534.000(Ft.)  
 Top (of initial area) elevation = 1591.000(Ft.)  
 Bottom (of initial area) elevation = 1558.000(Ft.)

Difference in elevation = 33.000(Ft.)  
 Slope = 0.06180 s(percent)= 6.18  
 $TC = k(0.530)*[(length^3)/(elevation\ change)]^{0.2}$   
 Initial area time of concentration = 11.405 min.  
 Rainfall intensity = 1.902(In/Hr) for a 10.0 year storm  
 UNDEVELOPED (poor cover) subarea  
 Runoff coefficient = 0.808  
 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  
 RI index for soil(AMC 2) = 86.00  
 Pervious area fraction = 1.000; Impervious fraction = 0.000  
 Initial subarea runoff = 1.505(CFS)  
 Total initial stream area = 0.980(Ac.)  
 Pervious area fraction = 1.000

\*\*\*\*\*  
 Process from Point/Station 8.000 to Point/Station 7.000  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 0.980(Ac.)  
 Runoff from this stream = 1.505(CFS)  
 Time of concentration = 11.41 min.  
 Rainfall intensity = 1.902(In/Hr)  
 Summary of stream data:

| Stream No. | Flow rate (CFS) | TC (min) | Rainfall Intensity (In/Hr) |
|------------|-----------------|----------|----------------------------|
| 1          | 49.410          | 28.58    | 1.201                      |
| 2          | 1.505           | 11.41    | 1.902                      |

Largest stream flow has longer time of concentration  
 $Q_p = 49.410 + \text{sum of } Q_b \quad I_a/I_b$   
 $1.505 * 0.632 = 0.951$   
 $Q_p = 50.361$

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
 49.410 1.505  
 Area of streams before confluence:  
 49.970 0.980  
 Results of confluence:  
 Total flow rate = 50.361(CFS)  
 Time of concentration = 28.576 min.  
 Effective stream area after confluence = 50.950(Ac.)

\*\*\*\*\*  
 Process from Point/Station 7.000 to Point/Station 9.000  
 \*\*\*\* PIPEFLOW TRAVEL TIME (User specified size) \*\*\*\*

Upstream point/station elevation = 1558.000(Ft.)  
 Downstream point/station elevation = 1557.500(Ft.)  
 Pipe length = 13.00(Ft.) Manning's N = 0.022  
 No. of pipes = 1 Required pipe flow = 50.361(CFS)  
 Given pipe size = 24.00(In.)  
 NOTE: Normal flow is pressure flow in user selected pipe size.  
 The approximate hydraulic grade line above the pipe invert is  
 7.330(Ft.) at the headworks or inlet of the pipe(s)  
 Pipe friction loss = 1.844(Ft.)  
 Minor friction loss = 5.985(Ft.) k-factor = 1.50  
 Critical depth could not be calculated.  
 Pipe flow velocity = 16.03(Ft/s)  
 Travel time through pipe = 0.01 min.  
 Time of concentration (TC) = 28.59 min.

\*\*\*\*\*  
 Process from Point/Station 7.000 to Point/Station 9.000  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

Along Main Stream number: 1 in normal stream number 1  
 Stream flow area = 50.950(Ac.)  
 Runoff from this stream = 50.361(CFS)  
 Time of concentration = 28.59 min.

Rainfall intensity = 1.201(In/Hr)

+++++  
Process from Point/Station 9.000 to Point/Station 10.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Initial area flow distance = 391.000(Ft.)  
Top (of initial area) elevation = 1581.000(Ft.)  
Bottom (of initial area) elevation = 1572.500(Ft.)  
Difference in elevation = 8.500(Ft.)  
Slope = 0.02174 s(percent)= 2.17  
TC =  $k(0.300)*[(length^3)/(elevation\ change)]^{0.2}$   
Initial area time of concentration = 7.023 min.  
Rainfall intensity = 2.423(In/Hr) for a 10.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.882  
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  
RI index for soil(AMC 2) = 69.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Initial subarea runoff = 5.494(CFS)  
Total initial stream area = 2.570(Ac.)  
Pervious area fraction = 0.100

+++++  
Process from Point/Station 10.000 to Point/Station 8.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

Upstream point/station elevation = 1572.500(Ft.)  
Downstream point/station elevation = 1557.500(Ft.)  
Pipe length = 325.00(Ft.) Manning's N = 0.012  
No. of pipes = 1 Required pipe flow = 5.494(CFS)  
Nearest computed pipe diameter = 12.00(In.)  
Calculated individual pipe flow = 5.494(CFS)  
Normal flow depth in pipe = 7.14(In.)  
Flow top width inside pipe = 11.78(In.)  
Critical Depth = 11.27(In.)  
Pipe flow velocity = 11.29(Ft/s)  
Travel time through pipe = 0.48 min.  
Time of concentration (TC) = 7.50 min.

+++++  
Process from Point/Station 10.000 to Point/Station 8.000  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

Along Main Stream number: 1 in normal stream number 2  
Stream flow area = 2.570(Ac.)  
Runoff from this stream = 5.494(CFS)  
Time of concentration = 7.50 min.  
Rainfall intensity = 2.345(In/Hr)  
Summary of stream data:

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

|   |        |       |       |
|---|--------|-------|-------|
| 1 | 50.361 | 28.59 | 1.201 |
| 2 | 5.494  | 7.50  | 2.345 |

Largest stream flow has longer time of concentration

Qp = 50.361 + sum of  
Qb Ia/Ib  
5.494 \* 0.512 = 2.815  
Qp = 53.175

Total of 2 streams to confluence:

Flow rates before confluence point:

50.361 5.494

Area of streams before confluence:

50.950 2.570

Results of confluence:

Total flow rate = 53.175(CFS)

Time of concentration = 28.589 min.

Effective stream area after confluence = 53.520(Ac.)

End of computations, total study area = 53.52 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction( $A_p$ ) = 0.505

Area averaged RI index number = 70.2

## **POST-DEVELOPED 100-YEAR RATIONAL HYDROLOGY**

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 03/11/20 File:9567PR100YR.out

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9567 POST-DEVELOPED 100-YEAR  
PREPARED BY RUDDY ARGUETA, PE @ ADKAN ENGINEERS  
CUP 190021

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

English (in-lb) Units used in input data file  
-----

Program License Serial Number 5006  
-----

Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation = 0.500(In.)  
100 year, 1 hour precipitation = 1.300(In.)

Storm event year = 100.0  
Calculated rainfall intensity data:  
1 hour intensity = 1.300(In/Hr)  
Slope of intensity duration curve = 0.5000

+++++  
Process from Point/Station 1.000 to Point/Station 2.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

-----  
Initial area flow distance = 632.000(Ft.)  
Top (of initial area) elevation = 1678.000(Ft.)  
Bottom (of initial area) elevation = 1630.000(Ft.)  
Difference in elevation = 48.000(Ft.)  
Slope = 0.07595 s(percent)= 7.59  
 $TC = k(0.940)*[(length^3)/(elevation\ change)]^{0.2}$   
Initial area time of concentration = 20.764 min.  
Rainfall intensity = 2.210(In/Hr) for a 100.0 year storm  
UNDEVELOPED (good cover) subarea  
Runoff Coefficient = 0.743  
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  
RI index for soil(AMC 2) = 74.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Initial subarea runoff = 16.213(CFS)  
Total initial stream area = 9.880(Ac.)  
Pervious area fraction = 1.000

+++++  
Process from Point/Station 2.000 to Point/Station 3.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

-----  
Top of natural channel elevation = 1630.000(Ft.)  
End of natural channel elevation = 1594.000(Ft.)  
Length of natural channel = 884.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 29.284(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{0.5}))$   
Velocity using mean channel flow = 6.71(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0407  
Corrected/adjusted channel slope = 0.0407  
Travel time = 2.19 min. TC = 22.96 min.

Adding area flow to channel  
USER INPUT of soil data for subarea  
Runoff Coefficient = 0.840  
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  
RI index for soil(AMC 2) = 69.00  
Pervious area fraction = 0.300; Impervious fraction = 0.700  
Rainfall intensity = 2.102(In/Hr) for a 100.0 year storm  
Subarea runoff = 28.125(CFS) for 15.930(Ac.)  
Total runoff = 44.338(CFS) Total area = 25.810(Ac.)

+++++  
Process from Point/Station 3.000 to Point/Station 4.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1594.000(Ft.)  
End of natural channel elevation = 1590.000(Ft.)  
Length of natural channel = 547.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 55.522(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
velocity using mean channel flow = 3.41(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)  
Normal channel slope = 0.0073  
Corrected/adjusted channel slope = 0.0073  
Travel time = 2.67 min. TC = 25.63 min.

Adding area flow to channel  
SINGLE FAMILY (1/2 Acre Lot)  
Runoff Coefficient = 0.775  
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  
RI index for soil(AMC 2) = 69.00  
Pervious area fraction = 0.600; Impervious fraction = 0.400  
Rainfall intensity = 1.989(In/Hr) for a 100.0 year storm  
Subarea runoff = 20.070(CFS) for 13.020(Ac.)  
Total runoff = 64.409(CFS) Total area = 38.830(Ac.)

+++++  
Process from Point/Station 4.000 to Point/Station 5.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1590.000(Ft.)  
End of natural channel elevation = 1575.000(Ft.)  
Length of natural channel = 639.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 73.648(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
velocity using mean channel flow = 6.64(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)  
Normal channel slope = 0.0235  
Corrected/adjusted channel slope = 0.0235  
Travel time = 1.60 min. TC = 27.24 min.

Adding area flow to channel  
USER INPUT of soil data for subarea  
Runoff Coefficient = 0.836  
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  
 RI index for soil(AMC 2) = 69.00  
 Pervious area fraction = 0.300; Impervious fraction = 0.700  
 Rainfall intensity = 1.930(In/Hr) for a 100.0 year storm  
 Subarea runoff = 17.971(CFS) for 11.140(Ac.)  
 Total runoff = 82.379(CFS) Total area = 49.970(Ac.)

\*\*\*\*\*  
 Process from Point/Station 5.000 to Point/Station 6.000  
 \*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

Upstream point/station elevation = 1575.000(Ft.)  
 Downstream point/station elevation = 1568.000(Ft.)  
 Pipe length = 98.00(Ft.) Manning's N = 0.012  
 No. of pipes = 1 Required pipe flow = 82.379(CFS)  
 Nearest computed pipe diameter = 27.00(In.)  
 Calculated individual pipe flow = 82.379(CFS)  
 Normal flow depth in pipe = 20.39(In.)  
 Flow top width inside pipe = 23.22(In.)  
 Critical depth could not be calculated.  
 Pipe flow velocity = 25.59(Ft/s)  
 Travel time through pipe = 0.06 min.  
 Time of concentration (TC) = 27.30 min.

\*\*\*\*\*  
 Process from Point/Station 6.000 to Point/Station 7.000  
 \*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

Top of natural channel elevation = 1568.000(Ft.)  
 End of natural channel elevation = 1558.000(Ft.)  
 Length of natural channel = 147.000(Ft.)  
 Estimated mean flow rate at midpoint of channel = 82.379(CFS)

Natural valley channel type used  
 L.A. County flood control district formula for channel velocity:  
 Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
 Velocity using mean channel flow = 11.68(Ft/s)

Correction to map slope used on extremely rugged channels with  
 drops and waterfalls (Plate D-6.2)  
 Normal channel slope = 0.0680  
 Corrected/adjusted channel slope = 0.0680  
 Travel time = 0.21 min. TC = 27.51 min.

Adding area flow to channel  
 UNDEVELOPED (poor cover) subarea  
 Runoff Coefficient = 0.809  
 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  
 RI index for soil(AMC 2) = 86.00  
 Pervious area fraction = 1.000; Impervious fraction = 0.000  
 Rainfall intensity = 1.920(In/Hr) for a 100.0 year storm  
 Subarea runoff = 0.000(CFS) for 0.000(Ac.)  
 Total runoff = 82.379(CFS) Total area = 49.970(Ac.)

\*\*\*\*\*  
 Process from Point/Station 6.000 to Point/Station 7.000  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

Along Main Stream number: 1 in normal stream number 1  
 Stream flow area = 49.970(Ac.)  
 Runoff from this stream = 82.379(CFS)  
 Time of concentration = 27.51 min.  
 Rainfall intensity = 1.920(In/Hr)

\*\*\*\*\*  
 Process from Point/Station 8.000 to Point/Station 7.000  
 \*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Initial area flow distance = 534.000(Ft.)  
 Top (of initial area) elevation = 1591.000(Ft.)  
 Bottom (of initial area) elevation = 1558.000(Ft.)

Difference in elevation = 33.000(Ft.)  
 Slope = 0.06180 s(percent)= 6.18  
 $TC = k(0.530)*[(length^3)/(elevation\ change)]^{0.2}$   
 Initial area time of concentration = 11.405 min.  
 Rainfall intensity = 2.982(In/Hr) for a 100.0 year storm  
 UNDEVELOPED (poor cover) subarea  
 Runoff coefficient = 0.839  
 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  
 RI index for soil(AMC 2) = 86.00  
 Pervious area fraction = 1.000; Impervious fraction = 0.000  
 Initial subarea runoff = 2.451(CFS)  
 Total initial stream area = 0.980(Ac.)  
 Pervious area fraction = 1.000

++++++  
 Process from Point/Station 8.000 to Point/Station 7.000  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 0.980(Ac.)  
 Runoff from this stream = 2.451(CFS)  
 Time of concentration = 11.41 min.  
 Rainfall intensity = 2.982(In/Hr)  
 Summary of stream data:

| Stream No. | Flow rate (CFS) | TC (min) | Rainfall Intensity (In/Hr) |
|------------|-----------------|----------|----------------------------|
| 1          | 82.379          | 27.51    | 1.920                      |
| 2          | 2.451           | 11.41    | 2.982                      |

Largest stream flow has longer time of concentration  
 $Q_p = 82.379 + \text{sum of}$   
 $Q_b \quad I_a/I_b$   
 $2.451 * 0.644 = 1.578$   
 $Q_p = 83.958$

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
 82.379 2.451  
 Area of streams before confluence:  
 49.970 0.980  
 Results of confluence:  
 Total flow rate = 83.958(CFS)  
 Time of concentration = 27.509 min.  
 Effective stream area after confluence = 50.950(Ac.)

++++++  
 Process from Point/Station 7.000 to Point/Station 9.000  
 \*\*\*\* PIPEFLOW TRAVEL TIME (User specified size) \*\*\*\*

Upstream point/station elevation = 1558.000(Ft.)  
 Downstream point/station elevation = 1557.500(Ft.)  
 Pipe length = 13.00(Ft.) Manning's N = 0.022  
 No. of pipes = 1 Required pipe flow = 83.958(CFS)  
 Given pipe size = 24.00(In.)  
 NOTE: Normal flow is pressure flow in user selected pipe size.  
 The approximate hydraulic grade line above the pipe invert is  
 21.261(Ft.) at the headworks or inlet of the pipe(s)  
 Pipe friction loss = 5.126(Ft.)  
 Minor friction loss = 16.635(Ft.) k-factor = 1.50  
 Critical depth could not be calculated.  
 Pipe flow velocity = 26.72(Ft/s)  
 Travel time through pipe = 0.01 min.  
 Time of concentration (TC) = 27.52 min.

++++++  
 Process from Point/Station 7.000 to Point/Station 9.000  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

Along Main Stream number: 1 in normal stream number 1  
 Stream flow area = 50.950(Ac.)  
 Runoff from this stream = 83.958(CFS)  
 Time of concentration = 27.52 min.

Rainfall intensity = 1.920(In/Hr)

+++++  
Process from Point/Station 9.000 to Point/Station 10.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Initial area flow distance = 391.000(Ft.)  
Top (of initial area) elevation = 1581.000(Ft.)  
Bottom (of initial area) elevation = 1572.500(Ft.)  
Difference in elevation = 8.500(Ft.)  
Slope = 0.02174 s(percent)= 2.17  
TC =  $k(0.300)*[(length^3)/(elevation\ change)]^{0.2}$   
Initial area time of concentration = 7.023 min.  
Rainfall intensity = 3.800(In/Hr) for a 100.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.888  
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  
RI index for soil(AMC 2) = 69.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Initial subarea runoff = 8.669(CFS)  
Total initial stream area = 2.570(Ac.)  
Pervious area fraction = 0.100

+++++  
Process from Point/Station 10.000 to Point/Station 8.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

Upstream point/station elevation = 1572.500(Ft.)  
Downstream point/station elevation = 1557.500(Ft.)  
Pipe length = 325.00(Ft.) Manning's N = 0.012  
No. of pipes = 1 Required pipe flow = 8.669(CFS)  
Nearest computed pipe diameter = 15.00(In.)  
Calculated individual pipe flow = 8.669(CFS)  
Normal flow depth in pipe = 8.17(In.)  
Flow top width inside pipe = 14.94(In.)  
Critical Depth = 13.72(In.)  
Pipe flow velocity = 12.68(Ft/s)  
Travel time through pipe = 0.43 min.  
Time of concentration (TC) = 7.45 min.

+++++  
Process from Point/Station 10.000 to Point/Station 8.000  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

Along Main Stream number: 1 in normal stream number 2  
Stream flow area = 2.570(Ac.)  
Runoff from this stream = 8.669(CFS)  
Time of concentration = 7.45 min.  
Rainfall intensity = 3.689(In/Hr)  
Summary of stream data:

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

|   |        |       |       |
|---|--------|-------|-------|
| 1 | 83.958 | 27.52 | 1.920 |
| 2 | 8.669  | 7.45  | 3.689 |

Largest stream flow has longer time of concentration

Qp = 83.958 + sum of  
Qb Ia/Ib  
8.669 \* 0.520 = 4.511  
Qp = 88.469

Total of 2 streams to confluence:

Flow rates before confluence point:

83.958 8.669

Area of streams before confluence:

50.950 2.570

Results of confluence:

Total flow rate = 88.469(CFS)

Time of concentration = 27.517 min.

Effective stream area after confluence = 53.520(Ac.)

End of computations, total study area = 53.52 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

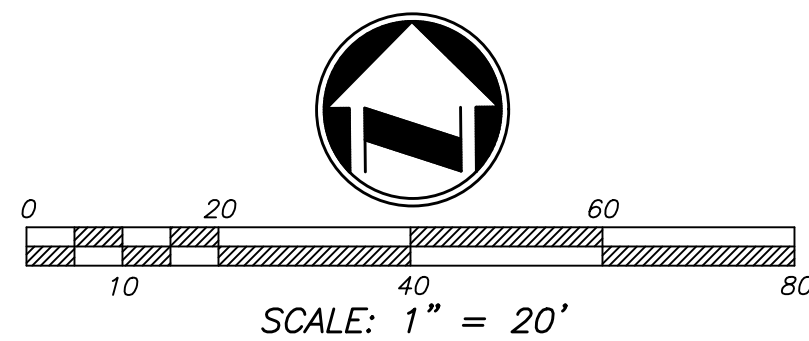
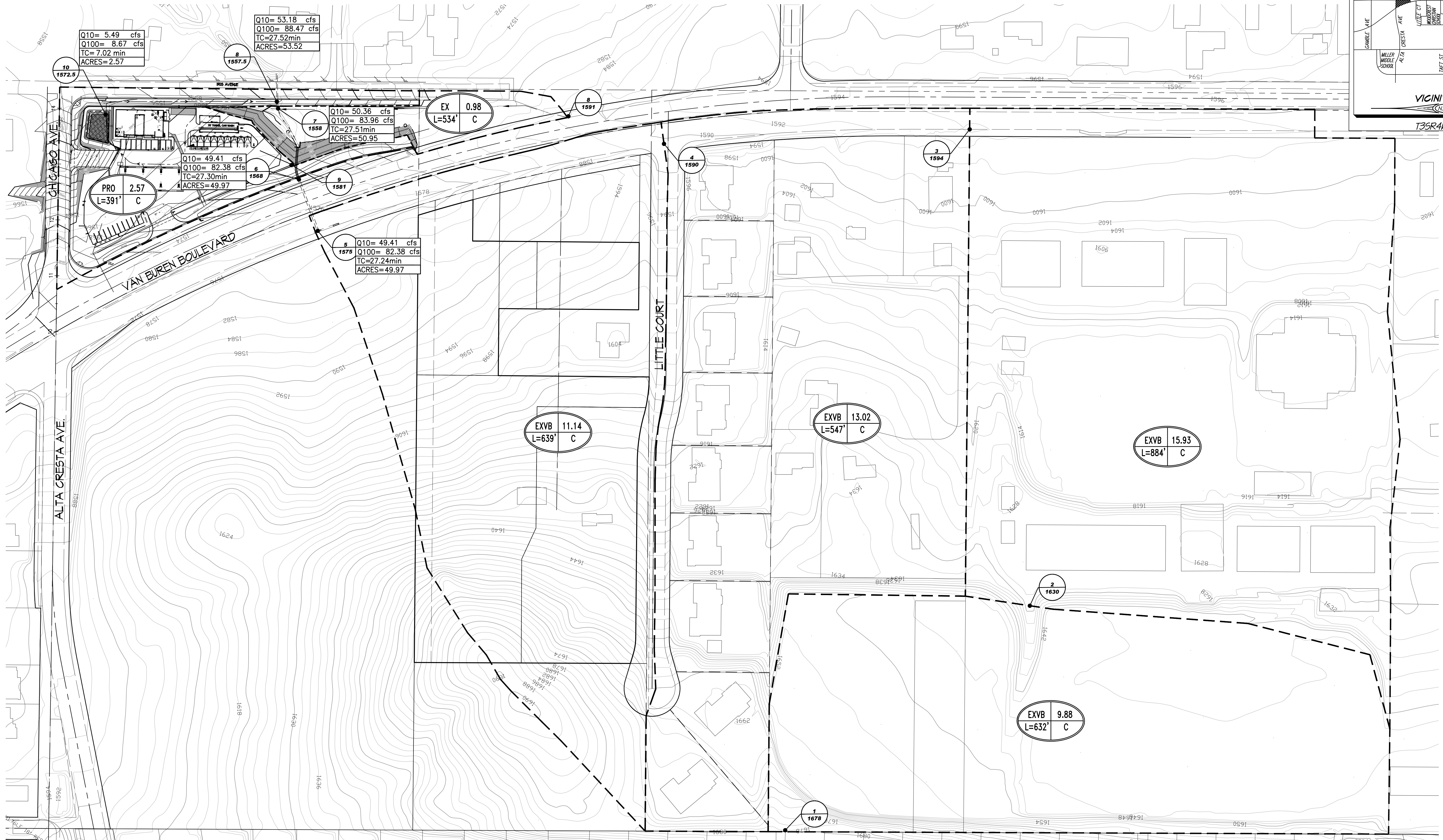
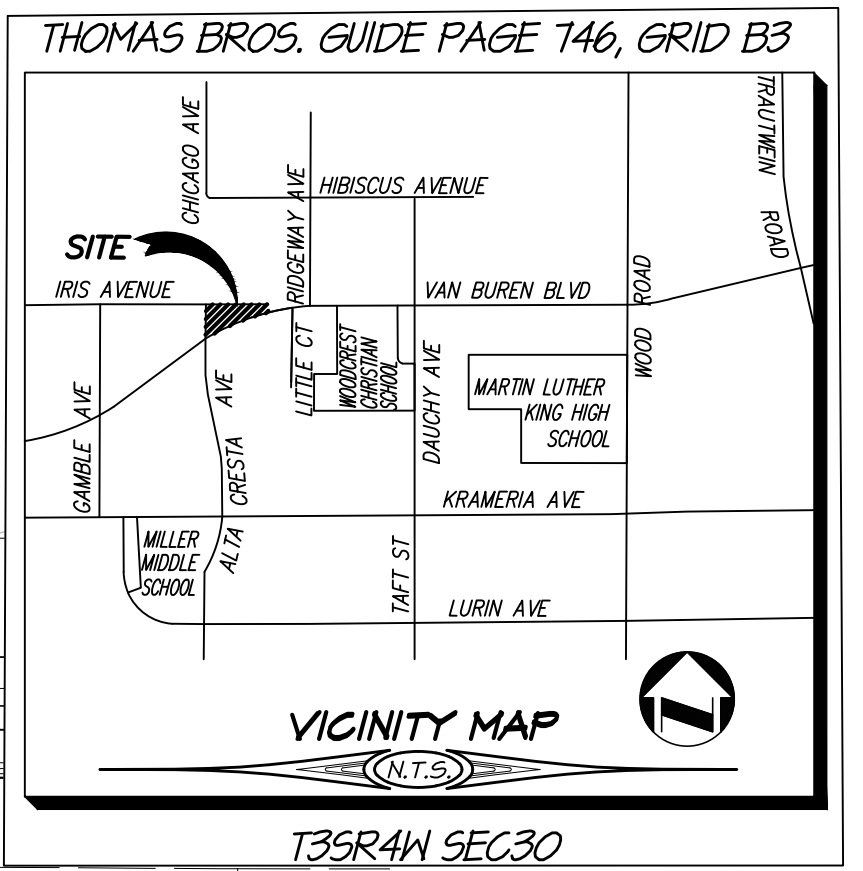
Area averaged pervious area fraction( $A_p$ ) = 0.505

Area averaged RI index number = 70.2

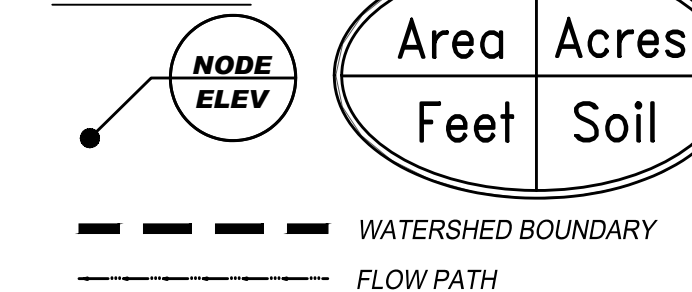


# CUP 190021: POST-DEVELOPMENT HYDROLOGY MAP

ADMG INC.



## LEGEND



PREPARATION DATE: MARCH 2020  
PLAN PREPARED BY:

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CUP 190021  
POST-DEVELOPMENT  
HYDROLOGY MAP

SHEET 1 OF 1  
Plot Date: 3/11/2020



## Section 3

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### Pre-Developed Unit Hydrograph Calculations and Map



# Unit Hydrograph Analysis

Copyright (C) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1  
Study date 11/01/19 File: EX2YR242.out

Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 5006

English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used  
English Units used in output format

Drainage Area = 2.56(Ac.) = 0.004 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 2.56(Ac.) = 0.004 Sq. Mi.  
Length along longest watercourse = 636.00(Ft.)  
Length along longest watercourse measured to centroid = 318.00(Ft.)  
Length along longest watercourse = 0.120 Mi.  
Length along longest watercourse measured to centroid = 0.060 Mi.  
Difference in elevation = 24.00(Ft.)  
Slope along watercourse = 199.2453 Ft./Mi.  
Average Manning's 'N' = 0.030  
Lag time = 0.041 Hr.  
Lag time = 2.43 Min.  
25% of lag time = 0.61 Min.  
40% of lag time = 0.97 Min.  
Unit time = 5.00 Min.  
Duration of storm = 24 Hour(s)  
User Entered Base Flow = 0.00(CFS)  
2 YEAR Area rainfall data:  
Area(Ac.)[1] Rainfall(In)[2] Weighting[1\*2]  
2.56 1.60 4.10  
100 YEAR Area rainfall data:  
Area(Ac.)[1] Rainfall(In)[2] Weighting[1\*2]  
2.56 4.50 11.52  
STORM EVENT (YEAR) = 2.00  
Area Averaged 2-Year Rainfall = 1.600(In)  
Area Averaged 100-Year Rainfall = 4.500(In)  
Point rain (area averaged) = 1.600(In)  
Areal adjustment factor = 100.00 %  
Adjusted average point rain = 1.600(In)  
Sub-Area Data:  
Area(Ac.) Runoff Index Impervious %  
2.560 86.00 0.000  
Total Area Entered = 2.56(Ac.)  
RI RI Infil. Rate Impervious Adj. Infil. Rate Area% F  
AMC2 AMC-1 (In/Hr) (Dec.%) (In/Hr) (Dec.) (In/Hr)  
86.0 71.6 0.343 0.000 0.343 1.000 0.343  
Sum (F) = 0.343  
Area averaged mean soil loss (F) (In/Hr) = 0.343  
Minimum soil loss rate ((In/Hr)) = 0.172  
(for 24 hour storm duration)  
Soil loss rate (decimal) = 0.900

## Unit Hydrograph VALLEY S-Curve

### Unit Hydrograph Data

| Unit time period<br>(hrs) | Time % of lag | Distribution<br>Graph % | Unit Hydrograph<br>(CFS) |
|---------------------------|---------------|-------------------------|--------------------------|
| 1 0.083                   | 205.748       | 44.377                  | 1.145                    |
| 2 0.167                   | 411.496       | 42.968                  | 1.109                    |
| 3 0.250                   | 617.244       | 8.564                   | 0.221                    |
| 4 0.333                   | 822.992       | 4.090                   | 0.106                    |
|                           | Sum = 100.000 | Sum=                    | 2.580                    |

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

| Unit Time<br>(Hr.) | Pattern<br>Percent | Storm Rain<br>(In/Hr) | Loss rate(In./Hr)<br>Max   Low | Effective<br>(In/Hr) |
|--------------------|--------------------|-----------------------|--------------------------------|----------------------|
| 1 0.08             | 0.07               | 0.013                 | ( 0.608)                       | 0.012 0.001          |

|    |      |      |       |          |       |       |
|----|------|------|-------|----------|-------|-------|
| 2  | 0.17 | 0.07 | 0.013 | ( 0.606) | 0.012 | 0.001 |
| 3  | 0.25 | 0.07 | 0.013 | ( 0.604) | 0.012 | 0.001 |
| 4  | 0.33 | 0.10 | 0.019 | ( 0.601) | 0.017 | 0.002 |
| 5  | 0.42 | 0.10 | 0.019 | ( 0.599) | 0.017 | 0.002 |
| 6  | 0.50 | 0.10 | 0.019 | ( 0.597) | 0.017 | 0.002 |
| 7  | 0.58 | 0.10 | 0.019 | ( 0.594) | 0.017 | 0.002 |
| 8  | 0.67 | 0.10 | 0.019 | ( 0.592) | 0.017 | 0.002 |
| 9  | 0.75 | 0.10 | 0.019 | ( 0.590) | 0.017 | 0.002 |
| 10 | 0.83 | 0.13 | 0.026 | ( 0.587) | 0.023 | 0.003 |
| 11 | 0.92 | 0.13 | 0.026 | ( 0.585) | 0.023 | 0.003 |
| 12 | 1.00 | 0.13 | 0.026 | ( 0.583) | 0.023 | 0.003 |
| 13 | 1.08 | 0.10 | 0.019 | ( 0.580) | 0.017 | 0.002 |
| 14 | 1.17 | 0.10 | 0.019 | ( 0.578) | 0.017 | 0.002 |
| 15 | 1.25 | 0.10 | 0.019 | ( 0.576) | 0.017 | 0.002 |
| 16 | 1.33 | 0.10 | 0.019 | ( 0.573) | 0.017 | 0.002 |
| 17 | 1.42 | 0.10 | 0.019 | ( 0.571) | 0.017 | 0.002 |
| 18 | 1.50 | 0.10 | 0.019 | ( 0.569) | 0.017 | 0.002 |
| 19 | 1.58 | 0.10 | 0.019 | ( 0.567) | 0.017 | 0.002 |
| 20 | 1.67 | 0.10 | 0.019 | ( 0.564) | 0.017 | 0.002 |
| 21 | 1.75 | 0.10 | 0.019 | ( 0.562) | 0.017 | 0.002 |
| 22 | 1.83 | 0.13 | 0.026 | ( 0.560) | 0.023 | 0.003 |
| 23 | 1.92 | 0.13 | 0.026 | ( 0.558) | 0.023 | 0.003 |
| 24 | 2.00 | 0.13 | 0.026 | ( 0.555) | 0.023 | 0.003 |
| 25 | 2.08 | 0.13 | 0.026 | ( 0.553) | 0.023 | 0.003 |
| 26 | 2.17 | 0.13 | 0.026 | ( 0.551) | 0.023 | 0.003 |
| 27 | 2.25 | 0.13 | 0.026 | ( 0.549) | 0.023 | 0.003 |
| 28 | 2.33 | 0.13 | 0.026 | ( 0.546) | 0.023 | 0.003 |
| 29 | 2.42 | 0.13 | 0.026 | ( 0.544) | 0.023 | 0.003 |
| 30 | 2.50 | 0.13 | 0.026 | ( 0.542) | 0.023 | 0.003 |
| 31 | 2.58 | 0.17 | 0.032 | ( 0.540) | 0.029 | 0.003 |
| 32 | 2.67 | 0.17 | 0.032 | ( 0.537) | 0.029 | 0.003 |
| 33 | 2.75 | 0.17 | 0.032 | ( 0.535) | 0.029 | 0.003 |
| 34 | 2.83 | 0.17 | 0.032 | ( 0.533) | 0.029 | 0.003 |
| 35 | 2.92 | 0.17 | 0.032 | ( 0.531) | 0.029 | 0.003 |
| 36 | 3.00 | 0.17 | 0.032 | ( 0.529) | 0.029 | 0.003 |
| 37 | 3.08 | 0.17 | 0.032 | ( 0.526) | 0.029 | 0.003 |
| 38 | 3.17 | 0.17 | 0.032 | ( 0.524) | 0.029 | 0.003 |
| 39 | 3.25 | 0.17 | 0.032 | ( 0.522) | 0.029 | 0.003 |
| 40 | 3.33 | 0.17 | 0.032 | ( 0.520) | 0.029 | 0.003 |
| 41 | 3.42 | 0.17 | 0.032 | ( 0.518) | 0.029 | 0.003 |
| 42 | 3.50 | 0.17 | 0.032 | ( 0.516) | 0.029 | 0.003 |
| 43 | 3.58 | 0.17 | 0.032 | ( 0.513) | 0.029 | 0.003 |
| 44 | 3.67 | 0.17 | 0.032 | ( 0.511) | 0.029 | 0.003 |
| 45 | 3.75 | 0.17 | 0.032 | ( 0.509) | 0.029 | 0.003 |
| 46 | 3.83 | 0.20 | 0.038 | ( 0.507) | 0.035 | 0.004 |
| 47 | 3.92 | 0.20 | 0.038 | ( 0.505) | 0.035 | 0.004 |
| 48 | 4.00 | 0.20 | 0.038 | ( 0.503) | 0.035 | 0.004 |
| 49 | 4.08 | 0.20 | 0.038 | ( 0.501) | 0.035 | 0.004 |
| 50 | 4.17 | 0.20 | 0.038 | ( 0.498) | 0.035 | 0.004 |
| 51 | 4.25 | 0.20 | 0.038 | ( 0.496) | 0.035 | 0.004 |
| 52 | 4.33 | 0.23 | 0.045 | ( 0.494) | 0.040 | 0.004 |
| 53 | 4.42 | 0.23 | 0.045 | ( 0.492) | 0.040 | 0.004 |
| 54 | 4.50 | 0.23 | 0.045 | ( 0.490) | 0.040 | 0.004 |
| 55 | 4.58 | 0.23 | 0.045 | ( 0.488) | 0.040 | 0.004 |
| 56 | 4.67 | 0.23 | 0.045 | ( 0.486) | 0.040 | 0.004 |
| 57 | 4.75 | 0.23 | 0.045 | ( 0.484) | 0.040 | 0.004 |
| 58 | 4.83 | 0.27 | 0.051 | ( 0.482) | 0.046 | 0.005 |
| 59 | 4.92 | 0.27 | 0.051 | ( 0.480) | 0.046 | 0.005 |
| 60 | 5.00 | 0.27 | 0.051 | ( 0.477) | 0.046 | 0.005 |
| 61 | 5.08 | 0.20 | 0.038 | ( 0.475) | 0.035 | 0.004 |
| 62 | 5.17 | 0.20 | 0.038 | ( 0.473) | 0.035 | 0.004 |
| 63 | 5.25 | 0.20 | 0.038 | ( 0.471) | 0.035 | 0.004 |
| 64 | 5.33 | 0.23 | 0.045 | ( 0.469) | 0.040 | 0.004 |
| 65 | 5.42 | 0.23 | 0.045 | ( 0.467) | 0.040 | 0.004 |
| 66 | 5.50 | 0.23 | 0.045 | ( 0.465) | 0.040 | 0.004 |
| 67 | 5.58 | 0.27 | 0.051 | ( 0.463) | 0.046 | 0.005 |
| 68 | 5.67 | 0.27 | 0.051 | ( 0.461) | 0.046 | 0.005 |
| 69 | 5.75 | 0.27 | 0.051 | ( 0.459) | 0.046 | 0.005 |
| 70 | 5.83 | 0.27 | 0.051 | ( 0.457) | 0.046 | 0.005 |
| 71 | 5.92 | 0.27 | 0.051 | ( 0.455) | 0.046 | 0.005 |
| 72 | 6.00 | 0.27 | 0.051 | ( 0.453) | 0.046 | 0.005 |
| 73 | 6.08 | 0.30 | 0.058 | ( 0.451) | 0.052 | 0.006 |
| 74 | 6.17 | 0.30 | 0.058 | ( 0.449) | 0.052 | 0.006 |
| 75 | 6.25 | 0.30 | 0.058 | ( 0.447) | 0.052 | 0.006 |
| 76 | 6.33 | 0.30 | 0.058 | ( 0.445) | 0.052 | 0.006 |
| 77 | 6.42 | 0.30 | 0.058 | ( 0.443) | 0.052 | 0.006 |
| 78 | 6.50 | 0.30 | 0.058 | ( 0.441) | 0.052 | 0.006 |
| 79 | 6.58 | 0.33 | 0.064 | ( 0.439) | 0.058 | 0.006 |
| 80 | 6.67 | 0.33 | 0.064 | ( 0.437) | 0.058 | 0.006 |
| 81 | 6.75 | 0.33 | 0.064 | ( 0.435) | 0.058 | 0.006 |
| 82 | 6.83 | 0.33 | 0.064 | ( 0.433) | 0.058 | 0.006 |
| 83 | 6.92 | 0.33 | 0.064 | ( 0.431) | 0.058 | 0.006 |
| 84 | 7.00 | 0.33 | 0.064 | ( 0.429) | 0.058 | 0.006 |
| 85 | 7.08 | 0.33 | 0.064 | ( 0.427) | 0.058 | 0.006 |
| 86 | 7.17 | 0.33 | 0.064 | ( 0.425) | 0.058 | 0.006 |
| 87 | 7.25 | 0.33 | 0.064 | ( 0.423) | 0.058 | 0.006 |

|     |       |      |       |          |       |       |
|-----|-------|------|-------|----------|-------|-------|
| 88  | 7.33  | 0.37 | 0.070 | ( 0.421) | 0.063 | 0.007 |
| 89  | 7.42  | 0.37 | 0.070 | ( 0.419) | 0.063 | 0.007 |
| 90  | 7.50  | 0.37 | 0.070 | ( 0.417) | 0.063 | 0.007 |
| 91  | 7.58  | 0.40 | 0.077 | ( 0.416) | 0.069 | 0.008 |
| 92  | 7.67  | 0.40 | 0.077 | ( 0.414) | 0.069 | 0.008 |
| 93  | 7.75  | 0.40 | 0.077 | ( 0.412) | 0.069 | 0.008 |
| 94  | 7.83  | 0.43 | 0.083 | ( 0.410) | 0.075 | 0.008 |
| 95  | 7.92  | 0.43 | 0.083 | ( 0.408) | 0.075 | 0.008 |
| 96  | 8.00  | 0.43 | 0.083 | ( 0.406) | 0.075 | 0.008 |
| 97  | 8.08  | 0.50 | 0.096 | ( 0.404) | 0.086 | 0.010 |
| 98  | 8.17  | 0.50 | 0.096 | ( 0.402) | 0.086 | 0.010 |
| 99  | 8.25  | 0.50 | 0.096 | ( 0.400) | 0.086 | 0.010 |
| 100 | 8.33  | 0.50 | 0.096 | ( 0.399) | 0.086 | 0.010 |
| 101 | 8.42  | 0.50 | 0.096 | ( 0.397) | 0.086 | 0.010 |
| 102 | 8.50  | 0.50 | 0.096 | ( 0.395) | 0.086 | 0.010 |
| 103 | 8.58  | 0.53 | 0.102 | ( 0.393) | 0.092 | 0.010 |
| 104 | 8.67  | 0.53 | 0.102 | ( 0.391) | 0.092 | 0.010 |
| 105 | 8.75  | 0.53 | 0.102 | ( 0.389) | 0.092 | 0.010 |
| 106 | 8.83  | 0.57 | 0.109 | ( 0.387) | 0.098 | 0.011 |
| 107 | 8.92  | 0.57 | 0.109 | ( 0.386) | 0.098 | 0.011 |
| 108 | 9.00  | 0.57 | 0.109 | ( 0.384) | 0.098 | 0.011 |
| 109 | 9.08  | 0.63 | 0.122 | ( 0.382) | 0.109 | 0.012 |
| 110 | 9.17  | 0.63 | 0.122 | ( 0.380) | 0.109 | 0.012 |
| 111 | 9.25  | 0.63 | 0.122 | ( 0.378) | 0.109 | 0.012 |
| 112 | 9.33  | 0.67 | 0.128 | ( 0.377) | 0.115 | 0.013 |
| 113 | 9.42  | 0.67 | 0.128 | ( 0.375) | 0.115 | 0.013 |
| 114 | 9.50  | 0.67 | 0.128 | ( 0.373) | 0.115 | 0.013 |
| 115 | 9.58  | 0.70 | 0.134 | ( 0.371) | 0.121 | 0.013 |
| 116 | 9.67  | 0.70 | 0.134 | ( 0.369) | 0.121 | 0.013 |
| 117 | 9.75  | 0.70 | 0.134 | ( 0.368) | 0.121 | 0.013 |
| 118 | 9.83  | 0.73 | 0.141 | ( 0.366) | 0.127 | 0.014 |
| 119 | 9.92  | 0.73 | 0.141 | ( 0.364) | 0.127 | 0.014 |
| 120 | 10.00 | 0.73 | 0.141 | ( 0.362) | 0.127 | 0.014 |
| 121 | 10.08 | 0.50 | 0.096 | ( 0.361) | 0.086 | 0.010 |
| 122 | 10.17 | 0.50 | 0.096 | ( 0.359) | 0.086 | 0.010 |
| 123 | 10.25 | 0.50 | 0.096 | ( 0.357) | 0.086 | 0.010 |
| 124 | 10.33 | 0.50 | 0.096 | ( 0.355) | 0.086 | 0.010 |
| 125 | 10.42 | 0.50 | 0.096 | ( 0.354) | 0.086 | 0.010 |
| 126 | 10.50 | 0.50 | 0.096 | ( 0.352) | 0.086 | 0.010 |
| 127 | 10.58 | 0.67 | 0.128 | ( 0.350) | 0.115 | 0.013 |
| 128 | 10.67 | 0.67 | 0.128 | ( 0.348) | 0.115 | 0.013 |
| 129 | 10.75 | 0.67 | 0.128 | ( 0.347) | 0.115 | 0.013 |
| 130 | 10.83 | 0.67 | 0.128 | ( 0.345) | 0.115 | 0.013 |
| 131 | 10.92 | 0.67 | 0.128 | ( 0.343) | 0.115 | 0.013 |
| 132 | 11.00 | 0.67 | 0.128 | ( 0.342) | 0.115 | 0.013 |
| 133 | 11.08 | 0.63 | 0.122 | ( 0.340) | 0.109 | 0.012 |
| 134 | 11.17 | 0.63 | 0.122 | ( 0.338) | 0.109 | 0.012 |
| 135 | 11.25 | 0.63 | 0.122 | ( 0.337) | 0.109 | 0.012 |
| 136 | 11.33 | 0.63 | 0.122 | ( 0.335) | 0.109 | 0.012 |
| 137 | 11.42 | 0.63 | 0.122 | ( 0.333) | 0.109 | 0.012 |
| 138 | 11.50 | 0.63 | 0.122 | ( 0.332) | 0.109 | 0.012 |
| 139 | 11.58 | 0.57 | 0.109 | ( 0.330) | 0.098 | 0.011 |
| 140 | 11.67 | 0.57 | 0.109 | ( 0.328) | 0.098 | 0.011 |
| 141 | 11.75 | 0.57 | 0.109 | ( 0.327) | 0.098 | 0.011 |
| 142 | 11.83 | 0.60 | 0.115 | ( 0.325) | 0.104 | 0.012 |
| 143 | 11.92 | 0.60 | 0.115 | ( 0.324) | 0.104 | 0.012 |
| 144 | 12.00 | 0.60 | 0.115 | ( 0.322) | 0.104 | 0.012 |
| 145 | 12.08 | 0.83 | 0.160 | ( 0.320) | 0.144 | 0.016 |
| 146 | 12.17 | 0.83 | 0.160 | ( 0.319) | 0.144 | 0.016 |
| 147 | 12.25 | 0.83 | 0.160 | ( 0.317) | 0.144 | 0.016 |
| 148 | 12.33 | 0.87 | 0.166 | ( 0.316) | 0.150 | 0.017 |
| 149 | 12.42 | 0.87 | 0.166 | ( 0.314) | 0.150 | 0.017 |
| 150 | 12.50 | 0.87 | 0.166 | ( 0.312) | 0.150 | 0.017 |
| 151 | 12.58 | 0.93 | 0.179 | ( 0.311) | 0.161 | 0.018 |
| 152 | 12.67 | 0.93 | 0.179 | ( 0.309) | 0.161 | 0.018 |
| 153 | 12.75 | 0.93 | 0.179 | ( 0.308) | 0.161 | 0.018 |
| 154 | 12.83 | 0.97 | 0.186 | ( 0.306) | 0.167 | 0.019 |
| 155 | 12.92 | 0.97 | 0.186 | ( 0.305) | 0.167 | 0.019 |
| 156 | 13.00 | 0.97 | 0.186 | ( 0.303) | 0.167 | 0.019 |
| 157 | 13.08 | 1.13 | 0.218 | ( 0.301) | 0.196 | 0.022 |
| 158 | 13.17 | 1.13 | 0.218 | ( 0.300) | 0.196 | 0.022 |
| 159 | 13.25 | 1.13 | 0.218 | ( 0.298) | 0.196 | 0.022 |
| 160 | 13.33 | 1.13 | 0.218 | ( 0.297) | 0.196 | 0.022 |
| 161 | 13.42 | 1.13 | 0.218 | ( 0.295) | 0.196 | 0.022 |
| 162 | 13.50 | 1.13 | 0.218 | ( 0.294) | 0.196 | 0.022 |
| 163 | 13.58 | 0.77 | 0.147 | ( 0.292) | 0.132 | 0.015 |
| 164 | 13.67 | 0.77 | 0.147 | ( 0.291) | 0.132 | 0.015 |
| 165 | 13.75 | 0.77 | 0.147 | ( 0.289) | 0.132 | 0.015 |
| 166 | 13.83 | 0.77 | 0.147 | ( 0.288) | 0.132 | 0.015 |
| 167 | 13.92 | 0.77 | 0.147 | ( 0.286) | 0.132 | 0.015 |
| 168 | 14.00 | 0.77 | 0.147 | ( 0.285) | 0.132 | 0.015 |
| 169 | 14.08 | 0.90 | 0.173 | ( 0.284) | 0.156 | 0.017 |
| 170 | 14.17 | 0.90 | 0.173 | ( 0.282) | 0.156 | 0.017 |
| 171 | 14.25 | 0.90 | 0.173 | ( 0.281) | 0.156 | 0.017 |
| 172 | 14.33 | 0.87 | 0.166 | ( 0.279) | 0.150 | 0.017 |
| 173 | 14.42 | 0.87 | 0.166 | ( 0.278) | 0.150 | 0.017 |

|     |       |      |       |          |       |       |
|-----|-------|------|-------|----------|-------|-------|
| 174 | 14.50 | 0.87 | 0.166 | ( 0.276) | 0.150 | 0.017 |
| 175 | 14.58 | 0.87 | 0.166 | ( 0.275) | 0.150 | 0.017 |
| 176 | 14.67 | 0.87 | 0.166 | ( 0.274) | 0.150 | 0.017 |
| 177 | 14.75 | 0.87 | 0.166 | ( 0.272) | 0.150 | 0.017 |
| 178 | 14.83 | 0.83 | 0.160 | ( 0.271) | 0.144 | 0.016 |
| 179 | 14.92 | 0.83 | 0.160 | ( 0.269) | 0.144 | 0.016 |
| 180 | 15.00 | 0.83 | 0.160 | ( 0.268) | 0.144 | 0.016 |
| 181 | 15.08 | 0.80 | 0.154 | ( 0.267) | 0.138 | 0.015 |
| 182 | 15.17 | 0.80 | 0.154 | ( 0.265) | 0.138 | 0.015 |
| 183 | 15.25 | 0.80 | 0.154 | ( 0.264) | 0.138 | 0.015 |
| 184 | 15.33 | 0.77 | 0.147 | ( 0.263) | 0.132 | 0.015 |
| 185 | 15.42 | 0.77 | 0.147 | ( 0.261) | 0.132 | 0.015 |
| 186 | 15.50 | 0.77 | 0.147 | ( 0.260) | 0.132 | 0.015 |
| 187 | 15.58 | 0.63 | 0.122 | ( 0.259) | 0.109 | 0.012 |
| 188 | 15.67 | 0.63 | 0.122 | ( 0.257) | 0.109 | 0.012 |
| 189 | 15.75 | 0.63 | 0.122 | ( 0.256) | 0.109 | 0.012 |
| 190 | 15.83 | 0.63 | 0.122 | ( 0.255) | 0.109 | 0.012 |
| 191 | 15.92 | 0.63 | 0.122 | ( 0.253) | 0.109 | 0.012 |
| 192 | 16.00 | 0.63 | 0.122 | ( 0.252) | 0.109 | 0.012 |
| 193 | 16.08 | 0.13 | 0.026 | ( 0.251) | 0.023 | 0.003 |
| 194 | 16.17 | 0.13 | 0.026 | ( 0.249) | 0.023 | 0.003 |
| 195 | 16.25 | 0.13 | 0.026 | ( 0.248) | 0.023 | 0.003 |
| 196 | 16.33 | 0.13 | 0.026 | ( 0.247) | 0.023 | 0.003 |
| 197 | 16.42 | 0.13 | 0.026 | ( 0.246) | 0.023 | 0.003 |
| 198 | 16.50 | 0.13 | 0.026 | ( 0.244) | 0.023 | 0.003 |
| 199 | 16.58 | 0.10 | 0.019 | ( 0.243) | 0.017 | 0.002 |
| 200 | 16.67 | 0.10 | 0.019 | ( 0.242) | 0.017 | 0.002 |
| 201 | 16.75 | 0.10 | 0.019 | ( 0.241) | 0.017 | 0.002 |
| 202 | 16.83 | 0.10 | 0.019 | ( 0.239) | 0.017 | 0.002 |
| 203 | 16.92 | 0.10 | 0.019 | ( 0.238) | 0.017 | 0.002 |
| 204 | 17.00 | 0.10 | 0.019 | ( 0.237) | 0.017 | 0.002 |
| 205 | 17.08 | 0.17 | 0.032 | ( 0.236) | 0.029 | 0.003 |
| 206 | 17.17 | 0.17 | 0.032 | ( 0.235) | 0.029 | 0.003 |
| 207 | 17.25 | 0.17 | 0.032 | ( 0.233) | 0.029 | 0.003 |
| 208 | 17.33 | 0.17 | 0.032 | ( 0.232) | 0.029 | 0.003 |
| 209 | 17.42 | 0.17 | 0.032 | ( 0.231) | 0.029 | 0.003 |
| 210 | 17.50 | 0.17 | 0.032 | ( 0.230) | 0.029 | 0.003 |
| 211 | 17.58 | 0.17 | 0.032 | ( 0.229) | 0.029 | 0.003 |
| 212 | 17.67 | 0.17 | 0.032 | ( 0.228) | 0.029 | 0.003 |
| 213 | 17.75 | 0.17 | 0.032 | ( 0.227) | 0.029 | 0.003 |
| 214 | 17.83 | 0.13 | 0.026 | ( 0.225) | 0.023 | 0.003 |
| 215 | 17.92 | 0.13 | 0.026 | ( 0.224) | 0.023 | 0.003 |
| 216 | 18.00 | 0.13 | 0.026 | ( 0.223) | 0.023 | 0.003 |
| 217 | 18.08 | 0.13 | 0.026 | ( 0.222) | 0.023 | 0.003 |
| 218 | 18.17 | 0.13 | 0.026 | ( 0.221) | 0.023 | 0.003 |
| 219 | 18.25 | 0.13 | 0.026 | ( 0.220) | 0.023 | 0.003 |
| 220 | 18.33 | 0.13 | 0.026 | ( 0.219) | 0.023 | 0.003 |
| 221 | 18.42 | 0.13 | 0.026 | ( 0.218) | 0.023 | 0.003 |
| 222 | 18.50 | 0.13 | 0.026 | ( 0.217) | 0.023 | 0.003 |
| 223 | 18.58 | 0.10 | 0.019 | ( 0.216) | 0.017 | 0.002 |
| 224 | 18.67 | 0.10 | 0.019 | ( 0.215) | 0.017 | 0.002 |
| 225 | 18.75 | 0.10 | 0.019 | ( 0.214) | 0.017 | 0.002 |
| 226 | 18.83 | 0.07 | 0.013 | ( 0.213) | 0.012 | 0.001 |
| 227 | 18.92 | 0.07 | 0.013 | ( 0.212) | 0.012 | 0.001 |
| 228 | 19.00 | 0.07 | 0.013 | ( 0.211) | 0.012 | 0.001 |
| 229 | 19.08 | 0.10 | 0.019 | ( 0.210) | 0.017 | 0.002 |
| 230 | 19.17 | 0.10 | 0.019 | ( 0.209) | 0.017 | 0.002 |
| 231 | 19.25 | 0.10 | 0.019 | ( 0.208) | 0.017 | 0.002 |
| 232 | 19.33 | 0.13 | 0.026 | ( 0.207) | 0.023 | 0.003 |
| 233 | 19.42 | 0.13 | 0.026 | ( 0.206) | 0.023 | 0.003 |
| 234 | 19.50 | 0.13 | 0.026 | ( 0.205) | 0.023 | 0.003 |
| 235 | 19.58 | 0.10 | 0.019 | ( 0.204) | 0.017 | 0.002 |
| 236 | 19.67 | 0.10 | 0.019 | ( 0.203) | 0.017 | 0.002 |
| 237 | 19.75 | 0.10 | 0.019 | ( 0.202) | 0.017 | 0.002 |
| 238 | 19.83 | 0.07 | 0.013 | ( 0.201) | 0.012 | 0.001 |
| 239 | 19.92 | 0.07 | 0.013 | ( 0.200) | 0.012 | 0.001 |
| 240 | 20.00 | 0.07 | 0.013 | ( 0.199) | 0.012 | 0.001 |
| 241 | 20.08 | 0.10 | 0.019 | ( 0.198) | 0.017 | 0.002 |
| 242 | 20.17 | 0.10 | 0.019 | ( 0.197) | 0.017 | 0.002 |
| 243 | 20.25 | 0.10 | 0.019 | ( 0.197) | 0.017 | 0.002 |
| 244 | 20.33 | 0.10 | 0.019 | ( 0.196) | 0.017 | 0.002 |
| 245 | 20.42 | 0.10 | 0.019 | ( 0.195) | 0.017 | 0.002 |
| 246 | 20.50 | 0.10 | 0.019 | ( 0.194) | 0.017 | 0.002 |
| 247 | 20.58 | 0.10 | 0.019 | ( 0.193) | 0.017 | 0.002 |
| 248 | 20.67 | 0.10 | 0.019 | ( 0.192) | 0.017 | 0.002 |
| 249 | 20.75 | 0.10 | 0.019 | ( 0.192) | 0.017 | 0.002 |
| 250 | 20.83 | 0.07 | 0.013 | ( 0.191) | 0.012 | 0.001 |
| 251 | 20.92 | 0.07 | 0.013 | ( 0.190) | 0.012 | 0.001 |
| 252 | 21.00 | 0.07 | 0.013 | ( 0.189) | 0.012 | 0.001 |
| 253 | 21.08 | 0.10 | 0.019 | ( 0.189) | 0.017 | 0.002 |
| 254 | 21.17 | 0.10 | 0.019 | ( 0.188) | 0.017 | 0.002 |
| 255 | 21.25 | 0.10 | 0.019 | ( 0.187) | 0.017 | 0.002 |
| 256 | 21.33 | 0.07 | 0.013 | ( 0.186) | 0.012 | 0.001 |
| 257 | 21.42 | 0.07 | 0.013 | ( 0.186) | 0.012 | 0.001 |
| 258 | 21.50 | 0.07 | 0.013 | ( 0.185) | 0.012 | 0.001 |
| 259 | 21.58 | 0.10 | 0.019 | ( 0.184) | 0.017 | 0.002 |

|     |       |      |       |          |       |       |
|-----|-------|------|-------|----------|-------|-------|
| 260 | 21.67 | 0.10 | 0.019 | ( 0.184) | 0.017 | 0.002 |
| 261 | 21.75 | 0.10 | 0.019 | ( 0.183) | 0.017 | 0.002 |
| 262 | 21.83 | 0.07 | 0.013 | ( 0.182) | 0.012 | 0.001 |
| 263 | 21.92 | 0.07 | 0.013 | ( 0.182) | 0.012 | 0.001 |
| 264 | 22.00 | 0.07 | 0.013 | ( 0.181) | 0.012 | 0.001 |
| 265 | 22.08 | 0.10 | 0.019 | ( 0.181) | 0.017 | 0.002 |
| 266 | 22.17 | 0.10 | 0.019 | ( 0.180) | 0.017 | 0.002 |
| 267 | 22.25 | 0.10 | 0.019 | ( 0.179) | 0.017 | 0.002 |
| 268 | 22.33 | 0.07 | 0.013 | ( 0.179) | 0.012 | 0.001 |
| 269 | 22.42 | 0.07 | 0.013 | ( 0.178) | 0.012 | 0.001 |
| 270 | 22.50 | 0.07 | 0.013 | ( 0.178) | 0.012 | 0.001 |
| 271 | 22.58 | 0.07 | 0.013 | ( 0.177) | 0.012 | 0.001 |
| 272 | 22.67 | 0.07 | 0.013 | ( 0.177) | 0.012 | 0.001 |
| 273 | 22.75 | 0.07 | 0.013 | ( 0.176) | 0.012 | 0.001 |
| 274 | 22.83 | 0.07 | 0.013 | ( 0.176) | 0.012 | 0.001 |
| 275 | 22.92 | 0.07 | 0.013 | ( 0.175) | 0.012 | 0.001 |
| 276 | 23.00 | 0.07 | 0.013 | ( 0.175) | 0.012 | 0.001 |
| 277 | 23.08 | 0.07 | 0.013 | ( 0.175) | 0.012 | 0.001 |
| 278 | 23.17 | 0.07 | 0.013 | ( 0.174) | 0.012 | 0.001 |
| 279 | 23.25 | 0.07 | 0.013 | ( 0.174) | 0.012 | 0.001 |
| 280 | 23.33 | 0.07 | 0.013 | ( 0.173) | 0.012 | 0.001 |
| 281 | 23.42 | 0.07 | 0.013 | ( 0.173) | 0.012 | 0.001 |
| 282 | 23.50 | 0.07 | 0.013 | ( 0.173) | 0.012 | 0.001 |
| 283 | 23.58 | 0.07 | 0.013 | ( 0.173) | 0.012 | 0.001 |
| 284 | 23.67 | 0.07 | 0.013 | ( 0.172) | 0.012 | 0.001 |
| 285 | 23.75 | 0.07 | 0.013 | ( 0.172) | 0.012 | 0.001 |
| 286 | 23.83 | 0.07 | 0.013 | ( 0.172) | 0.012 | 0.001 |
| 287 | 23.92 | 0.07 | 0.013 | ( 0.172) | 0.012 | 0.001 |
| 288 | 24.00 | 0.07 | 0.013 | ( 0.172) | 0.012 | 0.001 |

(Loss Rate Not Used)

|                   |                       |          |            |     |
|-------------------|-----------------------|----------|------------|-----|
| Sum =             | 100.0                 |          | Sum =      | 1.9 |
| Flood volume =    | Effective rainfall    | 0.16(In) |            |     |
| times area        | 2.6(Ac.)/[(In)/(Ft.)] | =        | 0.0(Ac.Ft) |     |
| Total soil loss = | 1.44(In)              |          |            |     |
| Total soil loss = | 0.307(Ac.Ft)          |          |            |     |
| Total rainfall =  | 1.60(In)              |          |            |     |
| Flood volume =    | 1486.8 Cubic Feet     |          |            |     |
| Total soil loss = | 13381.6 Cubic Feet    |          |            |     |

Peak flow rate of this hydrograph = 0.056(CFS)

+++++

24 - 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 5 Minute intervals ((CFS))

| Time(h+m) | Volume Ac.Ft | Q(CFS) | 0  | 2.5 | 5.0 | 7.5 | 10.0 |
|-----------|--------------|--------|----|-----|-----|-----|------|
| 0+ 5      | 0.0000       | 0.00   | Q  |     |     |     |      |
| 0+10      | 0.0000       | 0.00   | Q  |     |     |     |      |
| 0+15      | 0.0001       | 0.00   | Q  |     |     |     |      |
| 0+20      | 0.0001       | 0.00   | Q  |     |     |     |      |
| 0+25      | 0.0001       | 0.00   | Q  |     |     |     |      |
| 0+30      | 0.0001       | 0.00   | Q  |     |     |     |      |
| 0+35      | 0.0002       | 0.00   | Q  |     |     |     |      |
| 0+40      | 0.0002       | 0.00   | Q  |     |     |     |      |
| 0+45      | 0.0002       | 0.00   | Q  |     |     |     |      |
| 0+50      | 0.0003       | 0.01   | Q  |     |     |     |      |
| 0+55      | 0.0003       | 0.01   | Q  |     |     |     |      |
| 1+ 0      | 0.0004       | 0.01   | Q  |     |     |     |      |
| 1+ 5      | 0.0004       | 0.01   | Q  |     |     |     |      |
| 1+10      | 0.0005       | 0.01   | Q  |     |     |     |      |
| 1+15      | 0.0005       | 0.01   | Q  |     |     |     |      |
| 1+20      | 0.0005       | 0.00   | Q  |     |     |     |      |
| 1+25      | 0.0006       | 0.00   | Q  |     |     |     |      |
| 1+30      | 0.0006       | 0.00   | Q  |     |     |     |      |
| 1+35      | 0.0006       | 0.00   | Q  |     |     |     |      |
| 1+40      | 0.0007       | 0.00   | Q  |     |     |     |      |
| 1+45      | 0.0007       | 0.00   | Q  |     |     |     |      |
| 1+50      | 0.0007       | 0.01   | Q  |     |     |     |      |
| 1+55      | 0.0008       | 0.01   | Q  |     |     |     |      |
| 2+ 0      | 0.0008       | 0.01   | Q  |     |     |     |      |
| 2+ 5      | 0.0009       | 0.01   | QV |     |     |     |      |
| 2+10      | 0.0009       | 0.01   | QV |     |     |     |      |
| 2+15      | 0.0010       | 0.01   | QV |     |     |     |      |
| 2+20      | 0.0010       | 0.01   | QV |     |     |     |      |
| 2+25      | 0.0010       | 0.01   | QV |     |     |     |      |
| 2+30      | 0.0011       | 0.01   | QV |     |     |     |      |
| 2+35      | 0.0011       | 0.01   | QV |     |     |     |      |
| 2+40      | 0.0012       | 0.01   | QV |     |     |     |      |
| 2+45      | 0.0013       | 0.01   | QV |     |     |     |      |
| 2+50      | 0.0013       | 0.01   | QV |     |     |     |      |
| 2+55      | 0.0014       | 0.01   | QV |     |     |     |      |
| 3+ 0      | 0.0014       | 0.01   | QV |     |     |     |      |
| 3+ 5      | 0.0015       | 0.01   | QV |     |     |     |      |

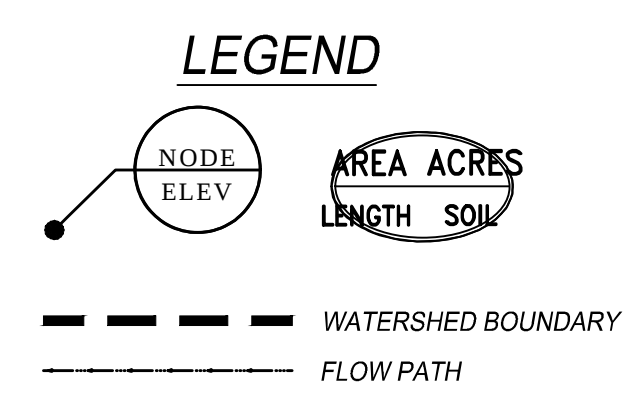
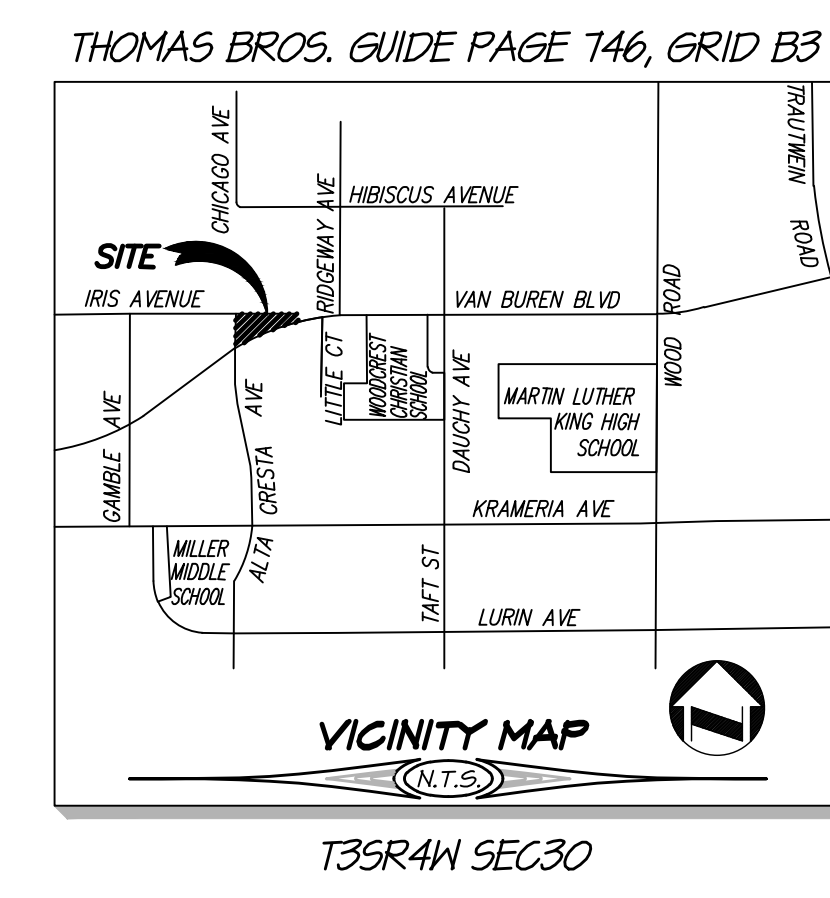
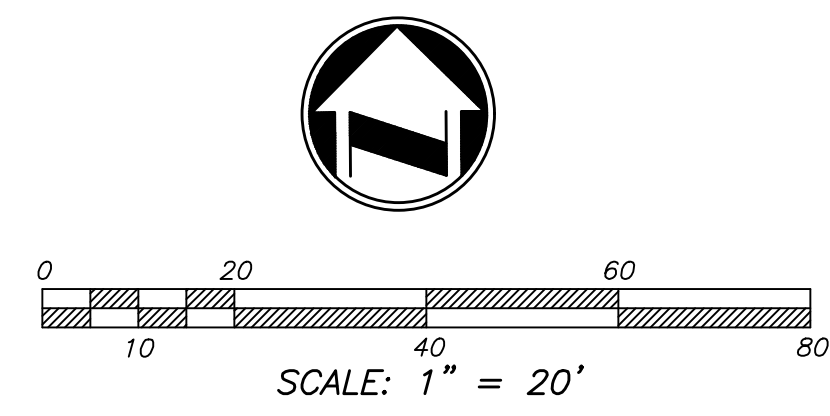
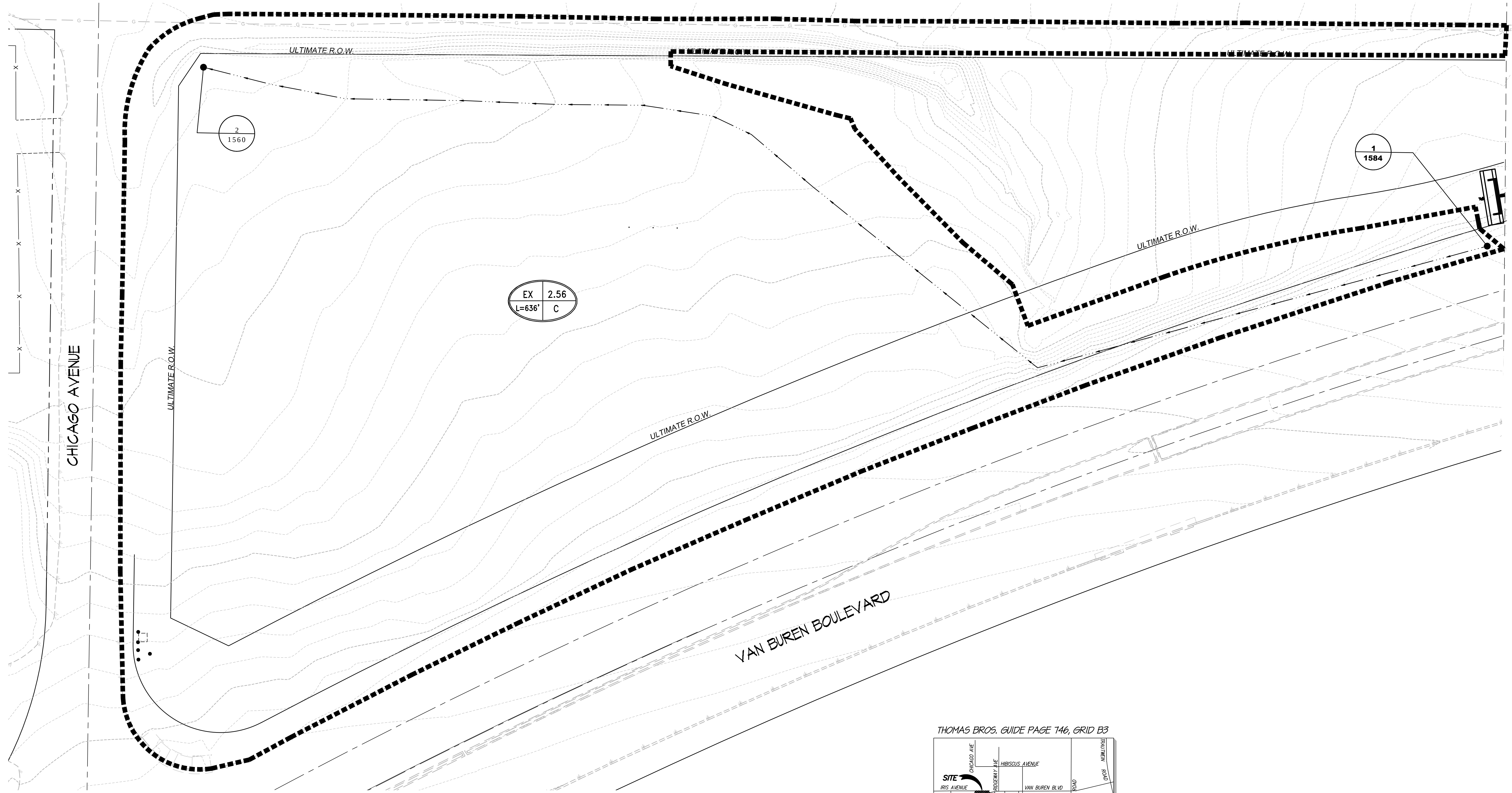
|       |        |      |     |  |  |  |  |
|-------|--------|------|-----|--|--|--|--|
| 3+10  | 0.0015 | 0.01 | QV  |  |  |  |  |
| 3+15  | 0.0016 | 0.01 | QV  |  |  |  |  |
| 3+20  | 0.0017 | 0.01 | QV  |  |  |  |  |
| 3+25  | 0.0017 | 0.01 | Q V |  |  |  |  |
| 3+30  | 0.0018 | 0.01 | Q V |  |  |  |  |
| 3+35  | 0.0018 | 0.01 | Q V |  |  |  |  |
| 3+40  | 0.0019 | 0.01 | Q V |  |  |  |  |
| 3+45  | 0.0019 | 0.01 | Q V |  |  |  |  |
| 3+50  | 0.0020 | 0.01 | Q V |  |  |  |  |
| 3+55  | 0.0021 | 0.01 | Q V |  |  |  |  |
| 4+ 0  | 0.0021 | 0.01 | Q V |  |  |  |  |
| 4+ 5  | 0.0022 | 0.01 | Q V |  |  |  |  |
| 4+10  | 0.0023 | 0.01 | Q V |  |  |  |  |
| 4+15  | 0.0023 | 0.01 | Q V |  |  |  |  |
| 4+20  | 0.0024 | 0.01 | Q V |  |  |  |  |
| 4+25  | 0.0025 | 0.01 | Q V |  |  |  |  |
| 4+30  | 0.0026 | 0.01 | Q V |  |  |  |  |
| 4+35  | 0.0027 | 0.01 | Q V |  |  |  |  |
| 4+40  | 0.0027 | 0.01 | Q V |  |  |  |  |
| 4+45  | 0.0028 | 0.01 | Q V |  |  |  |  |
| 4+50  | 0.0029 | 0.01 | Q V |  |  |  |  |
| 4+55  | 0.0030 | 0.01 | Q V |  |  |  |  |
| 5+ 0  | 0.0031 | 0.01 | Q V |  |  |  |  |
| 5+ 5  | 0.0032 | 0.01 | Q V |  |  |  |  |
| 5+10  | 0.0032 | 0.01 | Q V |  |  |  |  |
| 5+15  | 0.0033 | 0.01 | Q V |  |  |  |  |
| 5+20  | 0.0034 | 0.01 | Q V |  |  |  |  |
| 5+25  | 0.0034 | 0.01 | Q V |  |  |  |  |
| 5+30  | 0.0035 | 0.01 | Q V |  |  |  |  |
| 5+35  | 0.0036 | 0.01 | Q V |  |  |  |  |
| 5+40  | 0.0037 | 0.01 | Q V |  |  |  |  |
| 5+45  | 0.0038 | 0.01 | Q V |  |  |  |  |
| 5+50  | 0.0039 | 0.01 | Q V |  |  |  |  |
| 5+55  | 0.0040 | 0.01 | Q V |  |  |  |  |
| 6+ 0  | 0.0041 | 0.01 | Q V |  |  |  |  |
| 6+ 5  | 0.0042 | 0.01 | Q V |  |  |  |  |
| 6+10  | 0.0043 | 0.01 | Q V |  |  |  |  |
| 6+15  | 0.0044 | 0.01 | Q V |  |  |  |  |
| 6+20  | 0.0045 | 0.01 | Q V |  |  |  |  |
| 6+25  | 0.0046 | 0.01 | Q V |  |  |  |  |
| 6+30  | 0.0047 | 0.01 | Q V |  |  |  |  |
| 6+35  | 0.0048 | 0.02 | Q V |  |  |  |  |
| 6+40  | 0.0049 | 0.02 | Q V |  |  |  |  |
| 6+45  | 0.0050 | 0.02 | Q V |  |  |  |  |
| 6+50  | 0.0051 | 0.02 | Q V |  |  |  |  |
| 6+55  | 0.0052 | 0.02 | Q V |  |  |  |  |
| 7+ 0  | 0.0053 | 0.02 | Q V |  |  |  |  |
| 7+ 5  | 0.0055 | 0.02 | Q V |  |  |  |  |
| 7+10  | 0.0056 | 0.02 | Q V |  |  |  |  |
| 7+15  | 0.0057 | 0.02 | Q V |  |  |  |  |
| 7+20  | 0.0058 | 0.02 | Q V |  |  |  |  |
| 7+25  | 0.0059 | 0.02 | Q V |  |  |  |  |
| 7+30  | 0.0061 | 0.02 | Q V |  |  |  |  |
| 7+35  | 0.0062 | 0.02 | Q V |  |  |  |  |
| 7+40  | 0.0063 | 0.02 | Q V |  |  |  |  |
| 7+45  | 0.0065 | 0.02 | Q V |  |  |  |  |
| 7+50  | 0.0066 | 0.02 | Q V |  |  |  |  |
| 7+55  | 0.0067 | 0.02 | Q V |  |  |  |  |
| 8+ 0  | 0.0069 | 0.02 | Q V |  |  |  |  |
| 8+ 5  | 0.0070 | 0.02 | Q V |  |  |  |  |
| 8+10  | 0.0072 | 0.02 | Q V |  |  |  |  |
| 8+15  | 0.0074 | 0.02 | Q V |  |  |  |  |
| 8+20  | 0.0076 | 0.02 | Q V |  |  |  |  |
| 8+25  | 0.0077 | 0.02 | Q V |  |  |  |  |
| 8+30  | 0.0079 | 0.02 | Q V |  |  |  |  |
| 8+35  | 0.0081 | 0.03 | Q V |  |  |  |  |
| 8+40  | 0.0083 | 0.03 | Q V |  |  |  |  |
| 8+45  | 0.0084 | 0.03 | Q V |  |  |  |  |
| 8+50  | 0.0086 | 0.03 | Q V |  |  |  |  |
| 8+55  | 0.0088 | 0.03 | Q V |  |  |  |  |
| 9+ 0  | 0.0090 | 0.03 | Q V |  |  |  |  |
| 9+ 5  | 0.0092 | 0.03 | Q V |  |  |  |  |
| 9+10  | 0.0094 | 0.03 | Q V |  |  |  |  |
| 9+15  | 0.0096 | 0.03 | Q V |  |  |  |  |
| 9+20  | 0.0099 | 0.03 | Q V |  |  |  |  |
| 9+25  | 0.0101 | 0.03 | Q V |  |  |  |  |
| 9+30  | 0.0103 | 0.03 | Q V |  |  |  |  |
| 9+35  | 0.0105 | 0.03 | Q V |  |  |  |  |
| 9+40  | 0.0108 | 0.03 | Q V |  |  |  |  |
| 9+45  | 0.0110 | 0.03 | Q V |  |  |  |  |
| 9+50  | 0.0113 | 0.04 | Q V |  |  |  |  |
| 9+55  | 0.0115 | 0.04 | Q V |  |  |  |  |
| 10+ 0 | 0.0118 | 0.04 | Q V |  |  |  |  |
| 10+ 5 | 0.0120 | 0.03 | Q V |  |  |  |  |
| 10+10 | 0.0122 | 0.03 | Q V |  |  |  |  |
| 10+15 | 0.0123 | 0.03 | Q V |  |  |  |  |

|       |        |      |   |   |  |  |  |
|-------|--------|------|---|---|--|--|--|
| 10+20 | 0.0125 | 0.02 | Q | V |  |  |  |
| 10+25 | 0.0127 | 0.02 | Q | V |  |  |  |
| 10+30 | 0.0128 | 0.02 | Q | V |  |  |  |
| 10+35 | 0.0130 | 0.03 | Q | V |  |  |  |
| 10+40 | 0.0133 | 0.03 | Q | V |  |  |  |
| 10+45 | 0.0135 | 0.03 | Q | V |  |  |  |
| 10+50 | 0.0137 | 0.03 | Q | V |  |  |  |
| 10+55 | 0.0139 | 0.03 | Q | V |  |  |  |
| 11+ 0 | 0.0142 | 0.03 | Q | V |  |  |  |
| 11+ 5 | 0.0144 | 0.03 | Q | V |  |  |  |
| 11+10 | 0.0146 | 0.03 | Q | V |  |  |  |
| 11+15 | 0.0148 | 0.03 | Q | V |  |  |  |
| 11+20 | 0.0150 | 0.03 | Q | V |  |  |  |
| 11+25 | 0.0153 | 0.03 | Q | V |  |  |  |
| 11+30 | 0.0155 | 0.03 | Q | V |  |  |  |
| 11+35 | 0.0157 | 0.03 | Q | V |  |  |  |
| 11+40 | 0.0159 | 0.03 | Q | V |  |  |  |
| 11+45 | 0.0161 | 0.03 | Q | V |  |  |  |
| 11+50 | 0.0163 | 0.03 | Q | V |  |  |  |
| 11+55 | 0.0165 | 0.03 | Q | V |  |  |  |
| 12+ 0 | 0.0167 | 0.03 | Q | V |  |  |  |
| 12+ 5 | 0.0169 | 0.03 | Q | V |  |  |  |
| 12+10 | 0.0172 | 0.04 | Q | V |  |  |  |
| 12+15 | 0.0175 | 0.04 | Q | V |  |  |  |
| 12+20 | 0.0178 | 0.04 | Q | V |  |  |  |
| 12+25 | 0.0181 | 0.04 | Q | V |  |  |  |
| 12+30 | 0.0184 | 0.04 | Q | V |  |  |  |
| 12+35 | 0.0187 | 0.04 | Q | V |  |  |  |
| 12+40 | 0.0190 | 0.05 | Q | V |  |  |  |
| 12+45 | 0.0193 | 0.05 | Q | V |  |  |  |
| 12+50 | 0.0196 | 0.05 | Q | V |  |  |  |
| 12+55 | 0.0199 | 0.05 | Q | V |  |  |  |
| 13+ 0 | 0.0203 | 0.05 | Q | V |  |  |  |
| 13+ 5 | 0.0206 | 0.05 | Q | V |  |  |  |
| 13+10 | 0.0210 | 0.06 | Q | V |  |  |  |
| 13+15 | 0.0214 | 0.06 | Q | V |  |  |  |
| 13+20 | 0.0218 | 0.06 | Q | V |  |  |  |
| 13+25 | 0.0222 | 0.06 | Q | V |  |  |  |
| 13+30 | 0.0226 | 0.06 | Q | V |  |  |  |
| 13+35 | 0.0229 | 0.05 | Q | V |  |  |  |
| 13+40 | 0.0232 | 0.04 | Q | V |  |  |  |
| 13+45 | 0.0234 | 0.04 | Q | V |  |  |  |
| 13+50 | 0.0237 | 0.04 | Q | V |  |  |  |
| 13+55 | 0.0240 | 0.04 | Q | V |  |  |  |
| 14+ 0 | 0.0242 | 0.04 | Q | V |  |  |  |
| 14+ 5 | 0.0245 | 0.04 | Q | V |  |  |  |
| 14+10 | 0.0248 | 0.04 | Q | V |  |  |  |
| 14+15 | 0.0251 | 0.04 | Q | V |  |  |  |
| 14+20 | 0.0254 | 0.04 | Q | V |  |  |  |
| 14+25 | 0.0257 | 0.04 | Q | V |  |  |  |
| 14+30 | 0.0260 | 0.04 | Q | V |  |  |  |
| 14+35 | 0.0263 | 0.04 | Q | V |  |  |  |
| 14+40 | 0.0266 | 0.04 | Q | V |  |  |  |
| 14+45 | 0.0269 | 0.04 | Q | V |  |  |  |
| 14+50 | 0.0272 | 0.04 | Q | V |  |  |  |
| 14+55 | 0.0275 | 0.04 | Q | V |  |  |  |
| 15+ 0 | 0.0277 | 0.04 | Q | V |  |  |  |
| 15+ 5 | 0.0280 | 0.04 | Q | V |  |  |  |
| 15+10 | 0.0283 | 0.04 | Q | V |  |  |  |
| 15+15 | 0.0286 | 0.04 | Q | V |  |  |  |
| 15+20 | 0.0288 | 0.04 | Q | V |  |  |  |
| 15+25 | 0.0291 | 0.04 | Q | V |  |  |  |
| 15+30 | 0.0294 | 0.04 | Q | V |  |  |  |
| 15+35 | 0.0296 | 0.04 | Q | V |  |  |  |
| 15+40 | 0.0298 | 0.03 | Q | V |  |  |  |
| 15+45 | 0.0301 | 0.03 | Q | V |  |  |  |
| 15+50 | 0.0303 | 0.03 | Q | V |  |  |  |
| 15+55 | 0.0305 | 0.03 | Q | V |  |  |  |
| 16+ 0 | 0.0307 | 0.03 | Q | V |  |  |  |
| 16+ 5 | 0.0308 | 0.02 | Q | V |  |  |  |
| 16+10 | 0.0309 | 0.01 | Q | V |  |  |  |
| 16+15 | 0.0310 | 0.01 | Q | V |  |  |  |
| 16+20 | 0.0310 | 0.01 | Q | V |  |  |  |
| 16+25 | 0.0311 | 0.01 | Q | V |  |  |  |
| 16+30 | 0.0311 | 0.01 | Q | V |  |  |  |
| 16+35 | 0.0311 | 0.01 | Q | V |  |  |  |
| 16+40 | 0.0312 | 0.01 | Q | V |  |  |  |
| 16+45 | 0.0312 | 0.01 | Q | V |  |  |  |
| 16+50 | 0.0312 | 0.00 | Q | V |  |  |  |
| 16+55 | 0.0313 | 0.00 | Q | V |  |  |  |
| 17+ 0 | 0.0313 | 0.00 | Q | V |  |  |  |
| 17+ 5 | 0.0314 | 0.01 | Q | V |  |  |  |
| 17+10 | 0.0314 | 0.01 | Q | V |  |  |  |
| 17+15 | 0.0315 | 0.01 | Q | V |  |  |  |
| 17+20 | 0.0315 | 0.01 | Q | V |  |  |  |
| 17+25 | 0.0316 | 0.01 | Q | V |  |  |  |

|       |        |      |   |  |  |  |   |
|-------|--------|------|---|--|--|--|---|
| 17+30 | 0.0316 | 0.01 | Q |  |  |  | V |
| 17+35 | 0.0317 | 0.01 | Q |  |  |  | V |
| 17+40 | 0.0317 | 0.01 | Q |  |  |  | V |
| 17+45 | 0.0318 | 0.01 | Q |  |  |  | V |
| 17+50 | 0.0319 | 0.01 | Q |  |  |  | V |
| 17+55 | 0.0319 | 0.01 | Q |  |  |  | V |
| 18+ 0 | 0.0319 | 0.01 | Q |  |  |  | V |
| 18+ 5 | 0.0320 | 0.01 | Q |  |  |  | V |
| 18+10 | 0.0320 | 0.01 | Q |  |  |  | V |
| 18+15 | 0.0321 | 0.01 | Q |  |  |  | V |
| 18+20 | 0.0321 | 0.01 | Q |  |  |  | V |
| 18+25 | 0.0322 | 0.01 | Q |  |  |  | V |
| 18+30 | 0.0322 | 0.01 | Q |  |  |  | V |
| 18+35 | 0.0323 | 0.01 | Q |  |  |  | V |
| 18+40 | 0.0323 | 0.01 | Q |  |  |  | V |
| 18+45 | 0.0323 | 0.01 | Q |  |  |  | V |
| 18+50 | 0.0324 | 0.00 | Q |  |  |  | V |
| 18+55 | 0.0324 | 0.00 | Q |  |  |  | V |
| 19+ 0 | 0.0324 | 0.00 | Q |  |  |  | V |
| 19+ 5 | 0.0324 | 0.00 | Q |  |  |  | V |
| 19+10 | 0.0325 | 0.00 | Q |  |  |  | V |
| 19+15 | 0.0325 | 0.00 | Q |  |  |  | V |
| 19+20 | 0.0325 | 0.01 | Q |  |  |  | V |
| 19+25 | 0.0326 | 0.01 | Q |  |  |  | V |
| 19+30 | 0.0326 | 0.01 | Q |  |  |  | V |
| 19+35 | 0.0327 | 0.01 | Q |  |  |  | V |
| 19+40 | 0.0327 | 0.01 | Q |  |  |  | V |
| 19+45 | 0.0327 | 0.01 | Q |  |  |  | V |
| 19+50 | 0.0328 | 0.00 | Q |  |  |  | V |
| 19+55 | 0.0328 | 0.00 | Q |  |  |  | V |
| 20+ 0 | 0.0328 | 0.00 | Q |  |  |  | V |
| 20+ 5 | 0.0328 | 0.00 | Q |  |  |  | V |
| 20+10 | 0.0329 | 0.00 | Q |  |  |  | V |
| 20+15 | 0.0329 | 0.00 | Q |  |  |  | V |
| 20+20 | 0.0329 | 0.00 | Q |  |  |  | V |
| 20+25 | 0.0330 | 0.00 | Q |  |  |  | V |
| 20+30 | 0.0330 | 0.00 | Q |  |  |  | V |
| 20+35 | 0.0331 | 0.00 | Q |  |  |  | V |
| 20+40 | 0.0331 | 0.00 | Q |  |  |  | V |
| 20+45 | 0.0331 | 0.00 | Q |  |  |  | V |
| 20+50 | 0.0331 | 0.00 | Q |  |  |  | V |
| 20+55 | 0.0332 | 0.00 | Q |  |  |  | V |
| 21+ 0 | 0.0332 | 0.00 | Q |  |  |  | V |
| 21+ 5 | 0.0332 | 0.00 | Q |  |  |  | V |
| 21+10 | 0.0333 | 0.00 | Q |  |  |  | V |
| 21+15 | 0.0333 | 0.00 | Q |  |  |  | V |
| 21+20 | 0.0333 | 0.00 | Q |  |  |  | V |
| 21+25 | 0.0333 | 0.00 | Q |  |  |  | V |
| 21+30 | 0.0334 | 0.00 | Q |  |  |  | V |
| 21+35 | 0.0334 | 0.00 | Q |  |  |  | V |
| 21+40 | 0.0334 | 0.00 | Q |  |  |  | V |
| 21+45 | 0.0335 | 0.00 | Q |  |  |  | V |
| 21+50 | 0.0335 | 0.00 | Q |  |  |  | V |
| 21+55 | 0.0335 | 0.00 | Q |  |  |  | V |
| 22+ 0 | 0.0335 | 0.00 | Q |  |  |  | V |
| 22+ 5 | 0.0336 | 0.00 | Q |  |  |  | V |
| 22+10 | 0.0336 | 0.00 | Q |  |  |  | V |
| 22+15 | 0.0336 | 0.00 | Q |  |  |  | V |
| 22+20 | 0.0337 | 0.00 | Q |  |  |  | V |
| 22+25 | 0.0337 | 0.00 | Q |  |  |  | V |
| 22+30 | 0.0337 | 0.00 | Q |  |  |  | V |
| 22+35 | 0.0337 | 0.00 | Q |  |  |  | V |
| 22+40 | 0.0338 | 0.00 | Q |  |  |  | V |
| 22+45 | 0.0338 | 0.00 | Q |  |  |  | V |
| 22+50 | 0.0338 | 0.00 | Q |  |  |  | V |
| 22+55 | 0.0338 | 0.00 | Q |  |  |  | V |
| 23+ 0 | 0.0338 | 0.00 | Q |  |  |  | V |
| 23+ 5 | 0.0339 | 0.00 | Q |  |  |  | V |
| 23+10 | 0.0339 | 0.00 | Q |  |  |  | V |
| 23+15 | 0.0339 | 0.00 | Q |  |  |  | V |
| 23+20 | 0.0339 | 0.00 | Q |  |  |  | V |
| 23+25 | 0.0340 | 0.00 | Q |  |  |  | V |
| 23+30 | 0.0340 | 0.00 | Q |  |  |  | V |
| 23+35 | 0.0340 | 0.00 | Q |  |  |  | V |
| 23+40 | 0.0340 | 0.00 | Q |  |  |  | V |
| 23+45 | 0.0340 | 0.00 | Q |  |  |  | V |
| 23+50 | 0.0341 | 0.00 | Q |  |  |  | V |
| 23+55 | 0.0341 | 0.00 | Q |  |  |  | V |
| 24+ 0 | 0.0341 | 0.00 | Q |  |  |  | V |
| 24+ 5 | 0.0341 | 0.00 | Q |  |  |  | V |
| 24+10 | 0.0341 | 0.00 | Q |  |  |  | V |
| 24+15 | 0.0341 | 0.00 | Q |  |  |  | V |

# PRE-DEVELOPMENT UNIT HYDROGRAPH MAP

ADMG INC.



PRE-DEVELOPMENT  
UNIT HYDROGRAPH MAP

PREPARATION DATE : AUGUST 2019  
REVISION DATE : NOVEMBER 1ST, 2019  
PLAN PREPARED BY:

**adkan**  
**ENGINEERS**  
Civil Engineering • Surveying • Planning  
6879 Airport Drive, Riverside, CA 92504  
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## **Section 4**

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### **Post-Developed Unit Hydrograph Calculations and Map**



# Unit Hydrograph Analysis

Copyright (C) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1  
Study date 11/01/19 File: PRO2YR242.out

Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 5006

English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input values Used  
English Units used in output format

Drainage Area = 2.56(Ac.) = 0.004 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 2.56(Ac.) = 0.004 Sq. Mi.  
Length along longest watercourse = 376.00(Ft.)  
Length along longest watercourse measured to centroid = 188.00(Ft.)  
Length along longest watercourse = 0.071 Mi.  
Length along longest watercourse measured to centroid = 0.036 Mi.  
Difference in elevation = 8.90(Ft.)  
Slope along watercourse = 124.9787 Ft./Mi.  
Average Manning's 'N' = 0.015  
Lag time = 0.015 Hr.  
Lag time = 0.89 Min.  
25% of lag time = 0.22 Min.  
40% of lag time = 0.36 Min.  
Unit time = 5.00 Min.  
Duration of storm = 24 Hour(s)  
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | weighting[1*2] |
|--------------|-----------------|----------------|
| 2.56         | 1.60            | 4.10           |

100 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | weighting[1*2] |
|--------------|-----------------|----------------|
| 2.56         | 4.50            | 11.52          |

STORM EVENT (YEAR) = 2.00  
Area Averaged 2-Year Rainfall = 1.600(In)  
Area Averaged 100-Year Rainfall = 4.500(In)  
Point rain (area averaged) = 1.600(In)  
Areal adjustment factor = 100.00 %  
Adjusted average point rain = 1.600(In)

Sub-Area Data:

| Area(Ac.) | Runoff Index | Impervious % |
|-----------|--------------|--------------|
| 2.560     | 69.00        | 0.900        |

Total Area Entered = 2.56(Ac.)

| RI        | RI    | Infil. Rate (In/Hr) | Impervious (Dec.) | Adj. Infil. Rate (In/Hr) | Area% (Dec.) | F (In/Hr) |
|-----------|-------|---------------------|-------------------|--------------------------|--------------|-----------|
| AMC2      | AMC-1 |                     |                   |                          |              |           |
| 69.0      | 49.8  | 0.574               | 0.900             | 0.109                    | 1.000        | 0.109     |
| Sum (F) = |       |                     |                   |                          |              | 0.109     |

Area averaged mean soil loss (F) (In/Hr) = 0.109  
Minimum soil loss rate ((In/Hr)) = 0.055  
(for 24 hour storm duration)  
Soil loss rate (decimal) = 0.180

## Unit Hydrograph VALLEY S-Curve

### Unit Hydrograph Data

| Unit time period (hrs) | Time % of lag | Distribution Graph % | Unit Hydrograph (CFS) |
|------------------------|---------------|----------------------|-----------------------|
| 1                      | 0.083         | 561.520              | 73.722                |
| 2                      | 0.167         | 1123.041             | 26.278                |
|                        |               | Sum = 100.000        | Sum = 2.580           |

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

| Unit Time | Pattern | Storm Rain | Loss rate(In./Hr) | Effective |
|-----------|---------|------------|-------------------|-----------|
|-----------|---------|------------|-------------------|-----------|

|    | (Hr.) | Percent | (In/Hr) | Max      | Low   | (In/Hr) |
|----|-------|---------|---------|----------|-------|---------|
| 1  | 0.08  | 0.07    | 0.013   | ( 0.193) | 0.002 | 0.010   |
| 2  | 0.17  | 0.07    | 0.013   | ( 0.193) | 0.002 | 0.010   |
| 3  | 0.25  | 0.07    | 0.013   | ( 0.192) | 0.002 | 0.010   |
| 4  | 0.33  | 0.10    | 0.019   | ( 0.191) | 0.003 | 0.016   |
| 5  | 0.42  | 0.10    | 0.019   | ( 0.190) | 0.003 | 0.016   |
| 6  | 0.50  | 0.10    | 0.019   | ( 0.190) | 0.003 | 0.016   |
| 7  | 0.58  | 0.10    | 0.019   | ( 0.189) | 0.003 | 0.016   |
| 8  | 0.67  | 0.10    | 0.019   | ( 0.188) | 0.003 | 0.016   |
| 9  | 0.75  | 0.10    | 0.019   | ( 0.187) | 0.003 | 0.016   |
| 10 | 0.83  | 0.13    | 0.026   | ( 0.187) | 0.005 | 0.021   |
| 11 | 0.92  | 0.13    | 0.026   | ( 0.186) | 0.005 | 0.021   |
| 12 | 1.00  | 0.13    | 0.026   | ( 0.185) | 0.005 | 0.021   |
| 13 | 1.08  | 0.10    | 0.019   | ( 0.184) | 0.003 | 0.016   |
| 14 | 1.17  | 0.10    | 0.019   | ( 0.184) | 0.003 | 0.016   |
| 15 | 1.25  | 0.10    | 0.019   | ( 0.183) | 0.003 | 0.016   |
| 16 | 1.33  | 0.10    | 0.019   | ( 0.182) | 0.003 | 0.016   |
| 17 | 1.42  | 0.10    | 0.019   | ( 0.182) | 0.003 | 0.016   |
| 18 | 1.50  | 0.10    | 0.019   | ( 0.181) | 0.003 | 0.016   |
| 19 | 1.58  | 0.10    | 0.019   | ( 0.180) | 0.003 | 0.016   |
| 20 | 1.67  | 0.10    | 0.019   | ( 0.179) | 0.003 | 0.016   |
| 21 | 1.75  | 0.10    | 0.019   | ( 0.179) | 0.003 | 0.016   |
| 22 | 1.83  | 0.13    | 0.026   | ( 0.178) | 0.005 | 0.021   |
| 23 | 1.92  | 0.13    | 0.026   | ( 0.177) | 0.005 | 0.021   |
| 24 | 2.00  | 0.13    | 0.026   | ( 0.176) | 0.005 | 0.021   |
| 25 | 2.08  | 0.13    | 0.026   | ( 0.176) | 0.005 | 0.021   |
| 26 | 2.17  | 0.13    | 0.026   | ( 0.175) | 0.005 | 0.021   |
| 27 | 2.25  | 0.13    | 0.026   | ( 0.174) | 0.005 | 0.021   |
| 28 | 2.33  | 0.13    | 0.026   | ( 0.174) | 0.005 | 0.021   |
| 29 | 2.42  | 0.13    | 0.026   | ( 0.173) | 0.005 | 0.021   |
| 30 | 2.50  | 0.13    | 0.026   | ( 0.172) | 0.005 | 0.021   |
| 31 | 2.58  | 0.17    | 0.032   | ( 0.172) | 0.006 | 0.026   |
| 32 | 2.67  | 0.17    | 0.032   | ( 0.171) | 0.006 | 0.026   |
| 33 | 2.75  | 0.17    | 0.032   | ( 0.170) | 0.006 | 0.026   |
| 34 | 2.83  | 0.17    | 0.032   | ( 0.169) | 0.006 | 0.026   |
| 35 | 2.92  | 0.17    | 0.032   | ( 0.169) | 0.006 | 0.026   |
| 36 | 3.00  | 0.17    | 0.032   | ( 0.168) | 0.006 | 0.026   |
| 37 | 3.08  | 0.17    | 0.032   | ( 0.167) | 0.006 | 0.026   |
| 38 | 3.17  | 0.17    | 0.032   | ( 0.167) | 0.006 | 0.026   |
| 39 | 3.25  | 0.17    | 0.032   | ( 0.166) | 0.006 | 0.026   |
| 40 | 3.33  | 0.17    | 0.032   | ( 0.165) | 0.006 | 0.026   |
| 41 | 3.42  | 0.17    | 0.032   | ( 0.165) | 0.006 | 0.026   |
| 42 | 3.50  | 0.17    | 0.032   | ( 0.164) | 0.006 | 0.026   |
| 43 | 3.58  | 0.17    | 0.032   | ( 0.163) | 0.006 | 0.026   |
| 44 | 3.67  | 0.17    | 0.032   | ( 0.162) | 0.006 | 0.026   |
| 45 | 3.75  | 0.17    | 0.032   | ( 0.162) | 0.006 | 0.026   |
| 46 | 3.83  | 0.20    | 0.038   | ( 0.161) | 0.007 | 0.031   |
| 47 | 3.92  | 0.20    | 0.038   | ( 0.160) | 0.007 | 0.031   |
| 48 | 4.00  | 0.20    | 0.038   | ( 0.160) | 0.007 | 0.031   |
| 49 | 4.08  | 0.20    | 0.038   | ( 0.159) | 0.007 | 0.031   |
| 50 | 4.17  | 0.20    | 0.038   | ( 0.158) | 0.007 | 0.031   |
| 51 | 4.25  | 0.20    | 0.038   | ( 0.158) | 0.007 | 0.031   |
| 52 | 4.33  | 0.23    | 0.045   | ( 0.157) | 0.008 | 0.037   |
| 53 | 4.42  | 0.23    | 0.045   | ( 0.156) | 0.008 | 0.037   |
| 54 | 4.50  | 0.23    | 0.045   | ( 0.156) | 0.008 | 0.037   |
| 55 | 4.58  | 0.23    | 0.045   | ( 0.155) | 0.008 | 0.037   |
| 56 | 4.67  | 0.23    | 0.045   | ( 0.154) | 0.008 | 0.037   |
| 57 | 4.75  | 0.23    | 0.045   | ( 0.154) | 0.008 | 0.037   |
| 58 | 4.83  | 0.27    | 0.051   | ( 0.153) | 0.009 | 0.042   |
| 59 | 4.92  | 0.27    | 0.051   | ( 0.152) | 0.009 | 0.042   |
| 60 | 5.00  | 0.27    | 0.051   | ( 0.152) | 0.009 | 0.042   |
| 61 | 5.08  | 0.20    | 0.038   | ( 0.151) | 0.007 | 0.031   |
| 62 | 5.17  | 0.20    | 0.038   | ( 0.150) | 0.007 | 0.031   |
| 63 | 5.25  | 0.20    | 0.038   | ( 0.150) | 0.007 | 0.031   |
| 64 | 5.33  | 0.23    | 0.045   | ( 0.149) | 0.008 | 0.037   |
| 65 | 5.42  | 0.23    | 0.045   | ( 0.148) | 0.008 | 0.037   |
| 66 | 5.50  | 0.23    | 0.045   | ( 0.148) | 0.008 | 0.037   |
| 67 | 5.58  | 0.27    | 0.051   | ( 0.147) | 0.009 | 0.042   |
| 68 | 5.67  | 0.27    | 0.051   | ( 0.147) | 0.009 | 0.042   |
| 69 | 5.75  | 0.27    | 0.051   | ( 0.146) | 0.009 | 0.042   |
| 70 | 5.83  | 0.27    | 0.051   | ( 0.145) | 0.009 | 0.042   |
| 71 | 5.92  | 0.27    | 0.051   | ( 0.145) | 0.009 | 0.042   |
| 72 | 6.00  | 0.27    | 0.051   | ( 0.144) | 0.009 | 0.042   |
| 73 | 6.08  | 0.30    | 0.058   | ( 0.143) | 0.010 | 0.047   |
| 74 | 6.17  | 0.30    | 0.058   | ( 0.143) | 0.010 | 0.047   |
| 75 | 6.25  | 0.30    | 0.058   | ( 0.142) | 0.010 | 0.047   |
| 76 | 6.33  | 0.30    | 0.058   | ( 0.141) | 0.010 | 0.047   |
| 77 | 6.42  | 0.30    | 0.058   | ( 0.141) | 0.010 | 0.047   |
| 78 | 6.50  | 0.30    | 0.058   | ( 0.140) | 0.010 | 0.047   |
| 79 | 6.58  | 0.33    | 0.064   | ( 0.140) | 0.012 | 0.052   |
| 80 | 6.67  | 0.33    | 0.064   | ( 0.139) | 0.012 | 0.052   |
| 81 | 6.75  | 0.33    | 0.064   | ( 0.138) | 0.012 | 0.052   |
| 82 | 6.83  | 0.33    | 0.064   | ( 0.138) | 0.012 | 0.052   |
| 83 | 6.92  | 0.33    | 0.064   | ( 0.137) | 0.012 | 0.052   |
| 84 | 7.00  | 0.33    | 0.064   | ( 0.136) | 0.012 | 0.052   |
| 85 | 7.08  | 0.33    | 0.064   | ( 0.136) | 0.012 | 0.052   |

|     |       |      |       |          |       |       |
|-----|-------|------|-------|----------|-------|-------|
| 86  | 7.17  | 0.33 | 0.064 | ( 0.135) | 0.012 | 0.052 |
| 87  | 7.25  | 0.33 | 0.064 | ( 0.135) | 0.012 | 0.052 |
| 88  | 7.33  | 0.37 | 0.070 | ( 0.134) | 0.013 | 0.058 |
| 89  | 7.42  | 0.37 | 0.070 | ( 0.133) | 0.013 | 0.058 |
| 90  | 7.50  | 0.37 | 0.070 | ( 0.133) | 0.013 | 0.058 |
| 91  | 7.58  | 0.40 | 0.077 | ( 0.132) | 0.014 | 0.063 |
| 92  | 7.67  | 0.40 | 0.077 | ( 0.131) | 0.014 | 0.063 |
| 93  | 7.75  | 0.40 | 0.077 | ( 0.131) | 0.014 | 0.063 |
| 94  | 7.83  | 0.43 | 0.083 | ( 0.130) | 0.015 | 0.068 |
| 95  | 7.92  | 0.43 | 0.083 | ( 0.130) | 0.015 | 0.068 |
| 96  | 8.00  | 0.43 | 0.083 | ( 0.129) | 0.015 | 0.068 |
| 97  | 8.08  | 0.50 | 0.096 | ( 0.128) | 0.017 | 0.079 |
| 98  | 8.17  | 0.50 | 0.096 | ( 0.128) | 0.017 | 0.079 |
| 99  | 8.25  | 0.50 | 0.096 | ( 0.127) | 0.017 | 0.079 |
| 100 | 8.33  | 0.50 | 0.096 | ( 0.127) | 0.017 | 0.079 |
| 101 | 8.42  | 0.50 | 0.096 | ( 0.126) | 0.017 | 0.079 |
| 102 | 8.50  | 0.50 | 0.096 | ( 0.125) | 0.017 | 0.079 |
| 103 | 8.58  | 0.53 | 0.102 | ( 0.125) | 0.018 | 0.084 |
| 104 | 8.67  | 0.53 | 0.102 | ( 0.124) | 0.018 | 0.084 |
| 105 | 8.75  | 0.53 | 0.102 | ( 0.124) | 0.018 | 0.084 |
| 106 | 8.83  | 0.57 | 0.109 | ( 0.123) | 0.020 | 0.089 |
| 107 | 8.92  | 0.57 | 0.109 | ( 0.123) | 0.020 | 0.089 |
| 108 | 9.00  | 0.57 | 0.109 | ( 0.122) | 0.020 | 0.089 |
| 109 | 9.08  | 0.63 | 0.122 | ( 0.121) | 0.022 | 0.100 |
| 110 | 9.17  | 0.63 | 0.122 | ( 0.121) | 0.022 | 0.100 |
| 111 | 9.25  | 0.63 | 0.122 | ( 0.120) | 0.022 | 0.100 |
| 112 | 9.33  | 0.67 | 0.128 | ( 0.120) | 0.023 | 0.105 |
| 113 | 9.42  | 0.67 | 0.128 | ( 0.119) | 0.023 | 0.105 |
| 114 | 9.50  | 0.67 | 0.128 | ( 0.119) | 0.023 | 0.105 |
| 115 | 9.58  | 0.70 | 0.134 | ( 0.118) | 0.024 | 0.110 |
| 116 | 9.67  | 0.70 | 0.134 | ( 0.117) | 0.024 | 0.110 |
| 117 | 9.75  | 0.70 | 0.134 | ( 0.117) | 0.024 | 0.110 |
| 118 | 9.83  | 0.73 | 0.141 | ( 0.116) | 0.025 | 0.115 |
| 119 | 9.92  | 0.73 | 0.141 | ( 0.116) | 0.025 | 0.115 |
| 120 | 10.00 | 0.73 | 0.141 | ( 0.115) | 0.025 | 0.115 |
| 121 | 10.08 | 0.50 | 0.096 | ( 0.115) | 0.017 | 0.079 |
| 122 | 10.17 | 0.50 | 0.096 | ( 0.114) | 0.017 | 0.079 |
| 123 | 10.25 | 0.50 | 0.096 | ( 0.113) | 0.017 | 0.079 |
| 124 | 10.33 | 0.50 | 0.096 | ( 0.113) | 0.017 | 0.079 |
| 125 | 10.42 | 0.50 | 0.096 | ( 0.112) | 0.017 | 0.079 |
| 126 | 10.50 | 0.50 | 0.096 | ( 0.112) | 0.017 | 0.079 |
| 127 | 10.58 | 0.67 | 0.128 | ( 0.111) | 0.023 | 0.105 |
| 128 | 10.67 | 0.67 | 0.128 | ( 0.111) | 0.023 | 0.105 |
| 129 | 10.75 | 0.67 | 0.128 | ( 0.110) | 0.023 | 0.105 |
| 130 | 10.83 | 0.67 | 0.128 | ( 0.110) | 0.023 | 0.105 |
| 131 | 10.92 | 0.67 | 0.128 | ( 0.109) | 0.023 | 0.105 |
| 132 | 11.00 | 0.67 | 0.128 | ( 0.109) | 0.023 | 0.105 |
| 133 | 11.08 | 0.63 | 0.122 | ( 0.108) | 0.022 | 0.100 |
| 134 | 11.17 | 0.63 | 0.122 | ( 0.108) | 0.022 | 0.100 |
| 135 | 11.25 | 0.63 | 0.122 | ( 0.107) | 0.022 | 0.100 |
| 136 | 11.33 | 0.63 | 0.122 | ( 0.106) | 0.022 | 0.100 |
| 137 | 11.42 | 0.63 | 0.122 | ( 0.106) | 0.022 | 0.100 |
| 138 | 11.50 | 0.63 | 0.122 | ( 0.105) | 0.022 | 0.100 |
| 139 | 11.58 | 0.57 | 0.109 | ( 0.105) | 0.020 | 0.089 |
| 140 | 11.67 | 0.57 | 0.109 | ( 0.104) | 0.020 | 0.089 |
| 141 | 11.75 | 0.57 | 0.109 | ( 0.104) | 0.020 | 0.089 |
| 142 | 11.83 | 0.60 | 0.115 | ( 0.103) | 0.021 | 0.094 |
| 143 | 11.92 | 0.60 | 0.115 | ( 0.103) | 0.021 | 0.094 |
| 144 | 12.00 | 0.60 | 0.115 | ( 0.102) | 0.021 | 0.094 |
| 145 | 12.08 | 0.83 | 0.160 | ( 0.102) | 0.029 | 0.131 |
| 146 | 12.17 | 0.83 | 0.160 | ( 0.101) | 0.029 | 0.131 |
| 147 | 12.25 | 0.83 | 0.160 | ( 0.101) | 0.029 | 0.131 |
| 148 | 12.33 | 0.87 | 0.166 | ( 0.100) | 0.030 | 0.136 |
| 149 | 12.42 | 0.87 | 0.166 | ( 0.100) | 0.030 | 0.136 |
| 150 | 12.50 | 0.87 | 0.166 | ( 0.099) | 0.030 | 0.136 |
| 151 | 12.58 | 0.93 | 0.179 | ( 0.099) | 0.032 | 0.147 |
| 152 | 12.67 | 0.93 | 0.179 | ( 0.098) | 0.032 | 0.147 |
| 153 | 12.75 | 0.93 | 0.179 | ( 0.098) | 0.032 | 0.147 |
| 154 | 12.83 | 0.97 | 0.186 | ( 0.097) | 0.033 | 0.152 |
| 155 | 12.92 | 0.97 | 0.186 | ( 0.097) | 0.033 | 0.152 |
| 156 | 13.00 | 0.97 | 0.186 | ( 0.096) | 0.033 | 0.152 |
| 157 | 13.08 | 1.13 | 0.218 | ( 0.096) | 0.039 | 0.178 |
| 158 | 13.17 | 1.13 | 0.218 | ( 0.095) | 0.039 | 0.178 |
| 159 | 13.25 | 1.13 | 0.218 | ( 0.095) | 0.039 | 0.178 |
| 160 | 13.33 | 1.13 | 0.218 | ( 0.094) | 0.039 | 0.178 |
| 161 | 13.42 | 1.13 | 0.218 | ( 0.094) | 0.039 | 0.178 |
| 162 | 13.50 | 1.13 | 0.218 | ( 0.093) | 0.039 | 0.178 |
| 163 | 13.58 | 0.77 | 0.147 | ( 0.093) | 0.026 | 0.121 |
| 164 | 13.67 | 0.77 | 0.147 | ( 0.092) | 0.026 | 0.121 |
| 165 | 13.75 | 0.77 | 0.147 | ( 0.092) | 0.026 | 0.121 |
| 166 | 13.83 | 0.77 | 0.147 | ( 0.092) | 0.026 | 0.121 |
| 167 | 13.92 | 0.77 | 0.147 | ( 0.091) | 0.026 | 0.121 |
| 168 | 14.00 | 0.77 | 0.147 | ( 0.091) | 0.026 | 0.121 |
| 169 | 14.08 | 0.90 | 0.173 | ( 0.090) | 0.031 | 0.142 |
| 170 | 14.17 | 0.90 | 0.173 | ( 0.090) | 0.031 | 0.142 |
| 171 | 14.25 | 0.90 | 0.173 | ( 0.089) | 0.031 | 0.142 |

|     |       |      |       |          |       |       |
|-----|-------|------|-------|----------|-------|-------|
| 172 | 14.33 | 0.87 | 0.166 | ( 0.089) | 0.030 | 0.136 |
| 173 | 14.42 | 0.87 | 0.166 | ( 0.088) | 0.030 | 0.136 |
| 174 | 14.50 | 0.87 | 0.166 | ( 0.088) | 0.030 | 0.136 |
| 175 | 14.58 | 0.87 | 0.166 | ( 0.087) | 0.030 | 0.136 |
| 176 | 14.67 | 0.87 | 0.166 | ( 0.087) | 0.030 | 0.136 |
| 177 | 14.75 | 0.87 | 0.166 | ( 0.086) | 0.030 | 0.136 |
| 178 | 14.83 | 0.83 | 0.160 | ( 0.086) | 0.029 | 0.131 |
| 179 | 14.92 | 0.83 | 0.160 | ( 0.086) | 0.029 | 0.131 |
| 180 | 15.00 | 0.83 | 0.160 | ( 0.085) | 0.029 | 0.131 |
| 181 | 15.08 | 0.80 | 0.154 | ( 0.085) | 0.028 | 0.126 |
| 182 | 15.17 | 0.80 | 0.154 | ( 0.084) | 0.028 | 0.126 |
| 183 | 15.25 | 0.80 | 0.154 | ( 0.084) | 0.028 | 0.126 |
| 184 | 15.33 | 0.77 | 0.147 | ( 0.083) | 0.026 | 0.121 |
| 185 | 15.42 | 0.77 | 0.147 | ( 0.083) | 0.026 | 0.121 |
| 186 | 15.50 | 0.77 | 0.147 | ( 0.083) | 0.026 | 0.121 |
| 187 | 15.58 | 0.63 | 0.122 | ( 0.082) | 0.022 | 0.100 |
| 188 | 15.67 | 0.63 | 0.122 | ( 0.082) | 0.022 | 0.100 |
| 189 | 15.75 | 0.63 | 0.122 | ( 0.081) | 0.022 | 0.100 |
| 190 | 15.83 | 0.63 | 0.122 | ( 0.081) | 0.022 | 0.100 |
| 191 | 15.92 | 0.63 | 0.122 | ( 0.080) | 0.022 | 0.100 |
| 192 | 16.00 | 0.63 | 0.122 | ( 0.080) | 0.022 | 0.100 |
| 193 | 16.08 | 0.13 | 0.026 | ( 0.080) | 0.005 | 0.021 |
| 194 | 16.17 | 0.13 | 0.026 | ( 0.079) | 0.005 | 0.021 |
| 195 | 16.25 | 0.13 | 0.026 | ( 0.079) | 0.005 | 0.021 |
| 196 | 16.33 | 0.13 | 0.026 | ( 0.078) | 0.005 | 0.021 |
| 197 | 16.42 | 0.13 | 0.026 | ( 0.078) | 0.005 | 0.021 |
| 198 | 16.50 | 0.13 | 0.026 | ( 0.078) | 0.005 | 0.021 |
| 199 | 16.58 | 0.10 | 0.019 | ( 0.077) | 0.003 | 0.016 |
| 200 | 16.67 | 0.10 | 0.019 | ( 0.077) | 0.003 | 0.016 |
| 201 | 16.75 | 0.10 | 0.019 | ( 0.076) | 0.003 | 0.016 |
| 202 | 16.83 | 0.10 | 0.019 | ( 0.076) | 0.003 | 0.016 |
| 203 | 16.92 | 0.10 | 0.019 | ( 0.076) | 0.003 | 0.016 |
| 204 | 17.00 | 0.10 | 0.019 | ( 0.075) | 0.003 | 0.016 |
| 205 | 17.08 | 0.17 | 0.032 | ( 0.075) | 0.006 | 0.026 |
| 206 | 17.17 | 0.17 | 0.032 | ( 0.075) | 0.006 | 0.026 |
| 207 | 17.25 | 0.17 | 0.032 | ( 0.074) | 0.006 | 0.026 |
| 208 | 17.33 | 0.17 | 0.032 | ( 0.074) | 0.006 | 0.026 |
| 209 | 17.42 | 0.17 | 0.032 | ( 0.073) | 0.006 | 0.026 |
| 210 | 17.50 | 0.17 | 0.032 | ( 0.073) | 0.006 | 0.026 |
| 211 | 17.58 | 0.17 | 0.032 | ( 0.073) | 0.006 | 0.026 |
| 212 | 17.67 | 0.17 | 0.032 | ( 0.072) | 0.006 | 0.026 |
| 213 | 17.75 | 0.17 | 0.032 | ( 0.072) | 0.006 | 0.026 |
| 214 | 17.83 | 0.13 | 0.026 | ( 0.072) | 0.005 | 0.021 |
| 215 | 17.92 | 0.13 | 0.026 | ( 0.071) | 0.005 | 0.021 |
| 216 | 18.00 | 0.13 | 0.026 | ( 0.071) | 0.005 | 0.021 |
| 217 | 18.08 | 0.13 | 0.026 | ( 0.071) | 0.005 | 0.021 |
| 218 | 18.17 | 0.13 | 0.026 | ( 0.070) | 0.005 | 0.021 |
| 219 | 18.25 | 0.13 | 0.026 | ( 0.070) | 0.005 | 0.021 |
| 220 | 18.33 | 0.13 | 0.026 | ( 0.070) | 0.005 | 0.021 |
| 221 | 18.42 | 0.13 | 0.026 | ( 0.069) | 0.005 | 0.021 |
| 222 | 18.50 | 0.13 | 0.026 | ( 0.069) | 0.005 | 0.021 |
| 223 | 18.58 | 0.10 | 0.019 | ( 0.069) | 0.003 | 0.016 |
| 224 | 18.67 | 0.10 | 0.019 | ( 0.068) | 0.003 | 0.016 |
| 225 | 18.75 | 0.10 | 0.019 | ( 0.068) | 0.003 | 0.016 |
| 226 | 18.83 | 0.07 | 0.013 | ( 0.068) | 0.002 | 0.010 |
| 227 | 18.92 | 0.07 | 0.013 | ( 0.067) | 0.002 | 0.010 |
| 228 | 19.00 | 0.07 | 0.013 | ( 0.067) | 0.002 | 0.010 |
| 229 | 19.08 | 0.10 | 0.019 | ( 0.067) | 0.003 | 0.016 |
| 230 | 19.17 | 0.10 | 0.019 | ( 0.066) | 0.003 | 0.016 |
| 231 | 19.25 | 0.10 | 0.019 | ( 0.066) | 0.003 | 0.016 |
| 232 | 19.33 | 0.13 | 0.026 | ( 0.066) | 0.005 | 0.021 |
| 233 | 19.42 | 0.13 | 0.026 | ( 0.065) | 0.005 | 0.021 |
| 234 | 19.50 | 0.13 | 0.026 | ( 0.065) | 0.005 | 0.021 |
| 235 | 19.58 | 0.10 | 0.019 | ( 0.065) | 0.003 | 0.016 |
| 236 | 19.67 | 0.10 | 0.019 | ( 0.064) | 0.003 | 0.016 |
| 237 | 19.75 | 0.10 | 0.019 | ( 0.064) | 0.003 | 0.016 |
| 238 | 19.83 | 0.07 | 0.013 | ( 0.064) | 0.002 | 0.010 |
| 239 | 19.92 | 0.07 | 0.013 | ( 0.064) | 0.002 | 0.010 |
| 240 | 20.00 | 0.07 | 0.013 | ( 0.063) | 0.002 | 0.010 |
| 241 | 20.08 | 0.10 | 0.019 | ( 0.063) | 0.003 | 0.016 |
| 242 | 20.17 | 0.10 | 0.019 | ( 0.063) | 0.003 | 0.016 |
| 243 | 20.25 | 0.10 | 0.019 | ( 0.062) | 0.003 | 0.016 |
| 244 | 20.33 | 0.10 | 0.019 | ( 0.062) | 0.003 | 0.016 |
| 245 | 20.42 | 0.10 | 0.019 | ( 0.062) | 0.003 | 0.016 |
| 246 | 20.50 | 0.10 | 0.019 | ( 0.062) | 0.003 | 0.016 |
| 247 | 20.58 | 0.10 | 0.019 | ( 0.061) | 0.003 | 0.016 |
| 248 | 20.67 | 0.10 | 0.019 | ( 0.061) | 0.003 | 0.016 |
| 249 | 20.75 | 0.10 | 0.019 | ( 0.061) | 0.003 | 0.016 |
| 250 | 20.83 | 0.07 | 0.013 | ( 0.061) | 0.002 | 0.010 |
| 251 | 20.92 | 0.07 | 0.013 | ( 0.060) | 0.002 | 0.010 |
| 252 | 21.00 | 0.07 | 0.013 | ( 0.060) | 0.002 | 0.010 |
| 253 | 21.08 | 0.10 | 0.019 | ( 0.060) | 0.003 | 0.016 |
| 254 | 21.17 | 0.10 | 0.019 | ( 0.060) | 0.003 | 0.016 |
| 255 | 21.25 | 0.10 | 0.019 | ( 0.059) | 0.003 | 0.016 |
| 256 | 21.33 | 0.07 | 0.013 | ( 0.059) | 0.002 | 0.010 |
| 257 | 21.42 | 0.07 | 0.013 | ( 0.059) | 0.002 | 0.010 |

|     |       |      |       |          |       |       |
|-----|-------|------|-------|----------|-------|-------|
| 258 | 21.50 | 0.07 | 0.013 | ( 0.059) | 0.002 | 0.010 |
| 259 | 21.58 | 0.10 | 0.019 | ( 0.059) | 0.003 | 0.016 |
| 260 | 21.67 | 0.10 | 0.019 | ( 0.058) | 0.003 | 0.016 |
| 261 | 21.75 | 0.10 | 0.019 | ( 0.058) | 0.003 | 0.016 |
| 262 | 21.83 | 0.07 | 0.013 | ( 0.058) | 0.002 | 0.010 |
| 263 | 21.92 | 0.07 | 0.013 | ( 0.058) | 0.002 | 0.010 |
| 264 | 22.00 | 0.07 | 0.013 | ( 0.058) | 0.002 | 0.010 |
| 265 | 22.08 | 0.10 | 0.019 | ( 0.057) | 0.003 | 0.016 |
| 266 | 22.17 | 0.10 | 0.019 | ( 0.057) | 0.003 | 0.016 |
| 267 | 22.25 | 0.10 | 0.019 | ( 0.057) | 0.003 | 0.016 |
| 268 | 22.33 | 0.07 | 0.013 | ( 0.057) | 0.002 | 0.010 |
| 269 | 22.42 | 0.07 | 0.013 | ( 0.057) | 0.002 | 0.010 |
| 270 | 22.50 | 0.07 | 0.013 | ( 0.057) | 0.002 | 0.010 |
| 271 | 22.58 | 0.07 | 0.013 | ( 0.056) | 0.002 | 0.010 |
| 272 | 22.67 | 0.07 | 0.013 | ( 0.056) | 0.002 | 0.010 |
| 273 | 22.75 | 0.07 | 0.013 | ( 0.056) | 0.002 | 0.010 |
| 274 | 22.83 | 0.07 | 0.013 | ( 0.056) | 0.002 | 0.010 |
| 275 | 22.92 | 0.07 | 0.013 | ( 0.056) | 0.002 | 0.010 |
| 276 | 23.00 | 0.07 | 0.013 | ( 0.056) | 0.002 | 0.010 |
| 277 | 23.08 | 0.07 | 0.013 | ( 0.055) | 0.002 | 0.010 |
| 278 | 23.17 | 0.07 | 0.013 | ( 0.055) | 0.002 | 0.010 |
| 279 | 23.25 | 0.07 | 0.013 | ( 0.055) | 0.002 | 0.010 |
| 280 | 23.33 | 0.07 | 0.013 | ( 0.055) | 0.002 | 0.010 |
| 281 | 23.42 | 0.07 | 0.013 | ( 0.055) | 0.002 | 0.010 |
| 282 | 23.50 | 0.07 | 0.013 | ( 0.055) | 0.002 | 0.010 |
| 283 | 23.58 | 0.07 | 0.013 | ( 0.055) | 0.002 | 0.010 |
| 284 | 23.67 | 0.07 | 0.013 | ( 0.055) | 0.002 | 0.010 |
| 285 | 23.75 | 0.07 | 0.013 | ( 0.055) | 0.002 | 0.010 |
| 286 | 23.83 | 0.07 | 0.013 | ( 0.055) | 0.002 | 0.010 |
| 287 | 23.92 | 0.07 | 0.013 | ( 0.055) | 0.002 | 0.010 |
| 288 | 24.00 | 0.07 | 0.013 | ( 0.055) | 0.002 | 0.010 |

(Loss Rate Not Used)

Sum = 100.0 Sum = 15.7

Flood volume = Effective rainfall 1.31(In)  
times area 2.6(Ac.)/[(In)/(Ft.)] = 0.3(Ac.Ft)  
Total soil loss = 0.29(In)  
Total soil loss = 0.061(Ac.Ft)  
Total rainfall = 1.60(In)  
Flood volume = 12192.1 Cubic Feet  
Total soil loss = 2676.3 Cubic Feet

Peak flow rate of this hydrograph = 0.461(CFS)

+++++

24 - 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 5 Minute intervals ((CFS))

| Time(h+m) | Volume Ac.Ft | Q(CFS) | 0  | 2.5 | 5.0 | 7.5 | 10.0 |
|-----------|--------------|--------|----|-----|-----|-----|------|
| 0+ 5      | 0.0001       | 0.02   | Q  |     |     |     |      |
| 0+10      | 0.0003       | 0.03   | Q  |     |     |     |      |
| 0+15      | 0.0005       | 0.03   | Q  |     |     |     |      |
| 0+20      | 0.0008       | 0.04   | Q  |     |     |     |      |
| 0+25      | 0.0010       | 0.04   | Q  |     |     |     |      |
| 0+30      | 0.0013       | 0.04   | Q  |     |     |     |      |
| 0+35      | 0.0016       | 0.04   | Q  |     |     |     |      |
| 0+40      | 0.0019       | 0.04   | Q  |     |     |     |      |
| 0+45      | 0.0022       | 0.04   | Q  |     |     |     |      |
| 0+50      | 0.0025       | 0.05   | Q  |     |     |     |      |
| 0+55      | 0.0029       | 0.05   | Q  |     |     |     |      |
| 1+ 0      | 0.0033       | 0.05   | Q  |     |     |     |      |
| 1+ 5      | 0.0036       | 0.04   | Q  |     |     |     |      |
| 1+10      | 0.0038       | 0.04   | Q  |     |     |     |      |
| 1+15      | 0.0041       | 0.04   | Q  |     |     |     |      |
| 1+20      | 0.0044       | 0.04   | Q  |     |     |     |      |
| 1+25      | 0.0047       | 0.04   | Q  |     |     |     |      |
| 1+30      | 0.0050       | 0.04   | Q  |     |     |     |      |
| 1+35      | 0.0052       | 0.04   | Q  |     |     |     |      |
| 1+40      | 0.0055       | 0.04   | Q  |     |     |     |      |
| 1+45      | 0.0058       | 0.04   | Q  |     |     |     |      |
| 1+50      | 0.0062       | 0.05   | Q  |     |     |     |      |
| 1+55      | 0.0065       | 0.05   | Q  |     |     |     |      |
| 2+ 0      | 0.0069       | 0.05   | Q  |     |     |     |      |
| 2+ 5      | 0.0073       | 0.05   | QV |     |     |     |      |
| 2+10      | 0.0076       | 0.05   | QV |     |     |     |      |
| 2+15      | 0.0080       | 0.05   | QV |     |     |     |      |
| 2+20      | 0.0084       | 0.05   | QV |     |     |     |      |
| 2+25      | 0.0088       | 0.05   | QV |     |     |     |      |
| 2+30      | 0.0091       | 0.05   | QV |     |     |     |      |
| 2+35      | 0.0096       | 0.06   | QV |     |     |     |      |
| 2+40      | 0.0100       | 0.07   | QV |     |     |     |      |
| 2+45      | 0.0105       | 0.07   | QV |     |     |     |      |
| 2+50      | 0.0110       | 0.07   | QV |     |     |     |      |
| 2+55      | 0.0114       | 0.07   | QV |     |     |     |      |

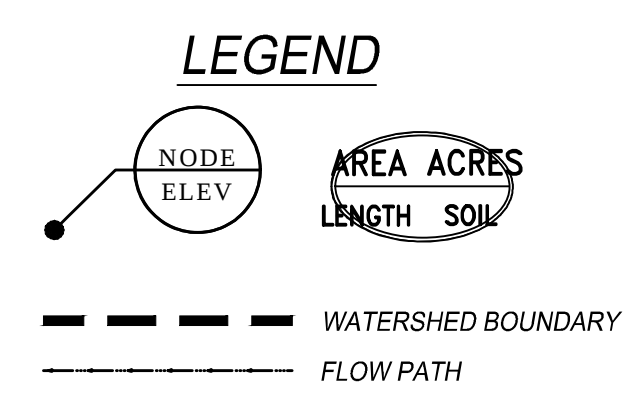
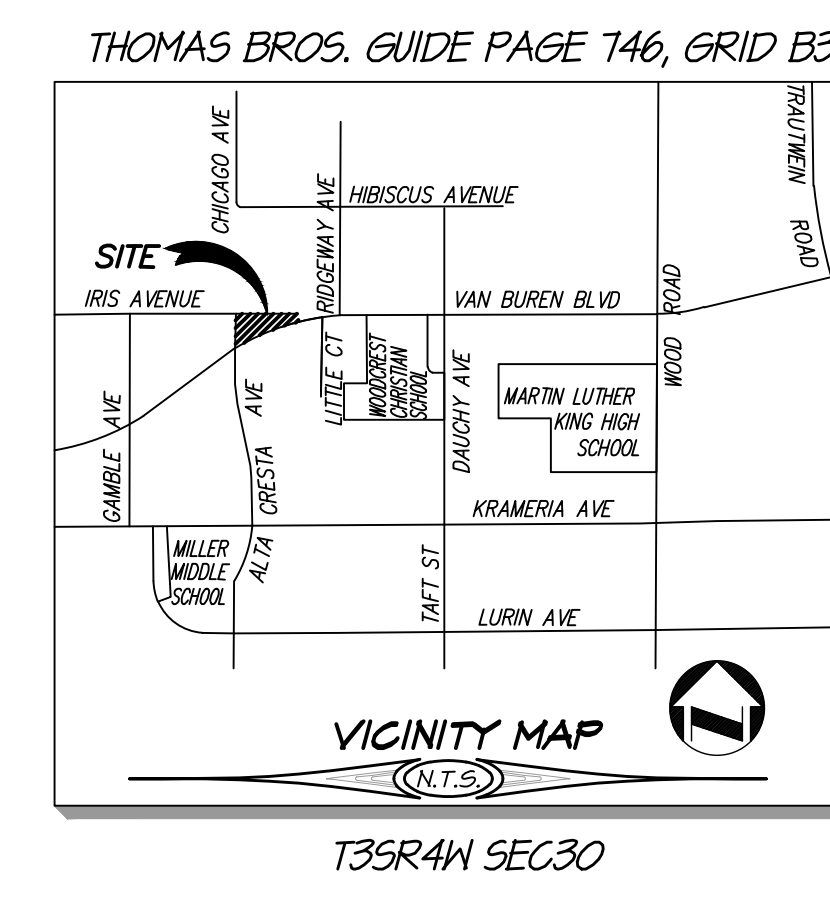
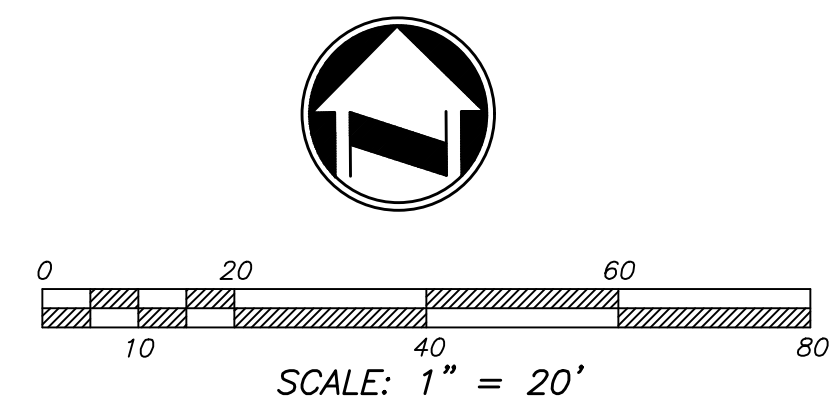
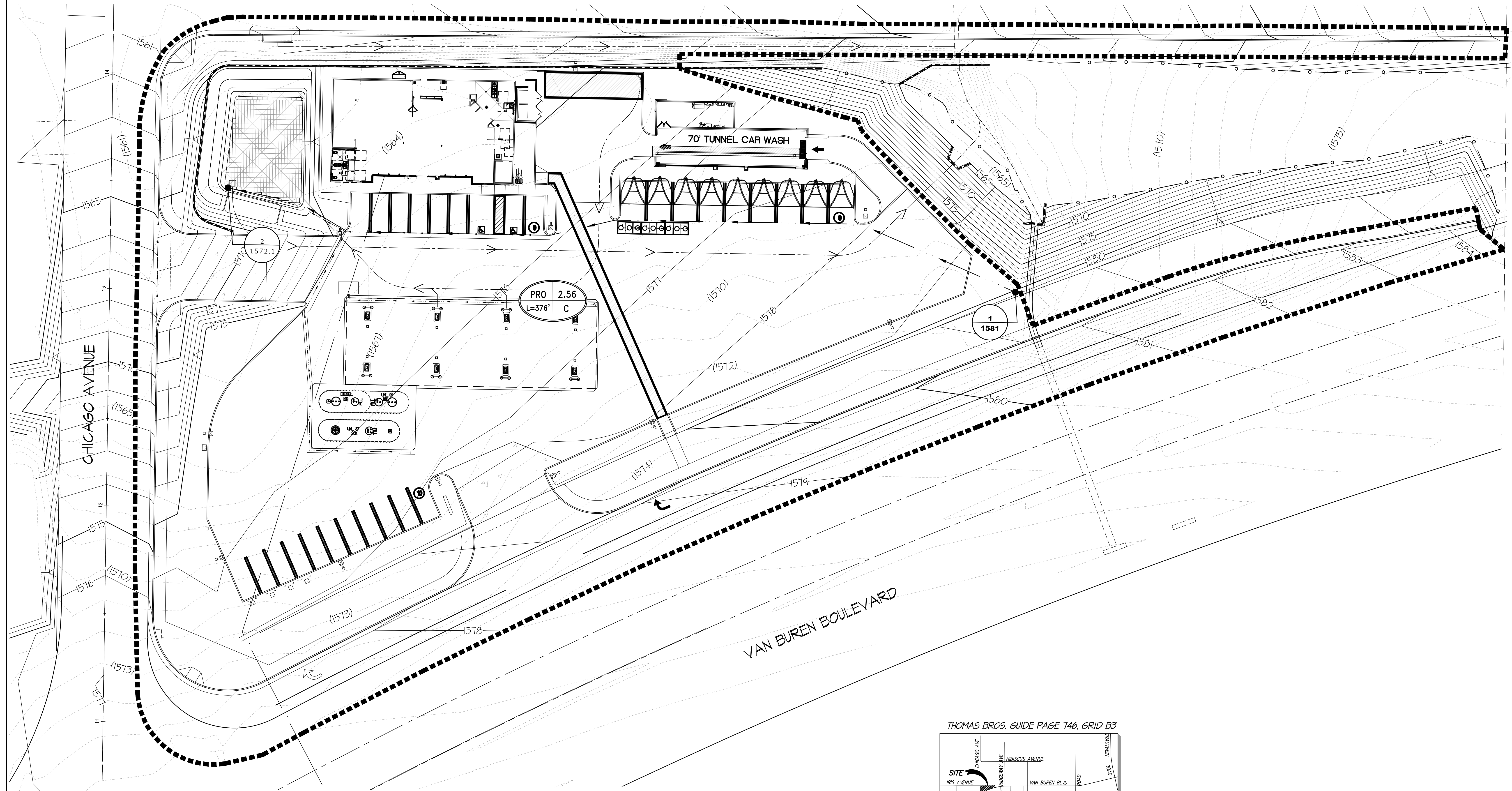
|       |        |      |     |  |  |  |  |
|-------|--------|------|-----|--|--|--|--|
| 3+ 0  | 0.0119 | 0.07 | QV  |  |  |  |  |
| 3+ 5  | 0.0124 | 0.07 | QV  |  |  |  |  |
| 3+10  | 0.0128 | 0.07 | QV  |  |  |  |  |
| 3+15  | 0.0133 | 0.07 | QV  |  |  |  |  |
| 3+20  | 0.0138 | 0.07 | QV  |  |  |  |  |
| 3+25  | 0.0142 | 0.07 | Q V |  |  |  |  |
| 3+30  | 0.0147 | 0.07 | Q V |  |  |  |  |
| 3+35  | 0.0152 | 0.07 | Q V |  |  |  |  |
| 3+40  | 0.0156 | 0.07 | Q V |  |  |  |  |
| 3+45  | 0.0161 | 0.07 | Q V |  |  |  |  |
| 3+50  | 0.0166 | 0.08 | Q V |  |  |  |  |
| 3+55  | 0.0172 | 0.08 | Q V |  |  |  |  |
| 4+ 0  | 0.0178 | 0.08 | Q V |  |  |  |  |
| 4+ 5  | 0.0183 | 0.08 | Q V |  |  |  |  |
| 4+10  | 0.0189 | 0.08 | Q V |  |  |  |  |
| 4+15  | 0.0194 | 0.08 | Q V |  |  |  |  |
| 4+20  | 0.0201 | 0.09 | Q V |  |  |  |  |
| 4+25  | 0.0207 | 0.09 | Q V |  |  |  |  |
| 4+30  | 0.0214 | 0.09 | Q V |  |  |  |  |
| 4+35  | 0.0220 | 0.09 | Q V |  |  |  |  |
| 4+40  | 0.0227 | 0.09 | Q V |  |  |  |  |
| 4+45  | 0.0233 | 0.09 | Q V |  |  |  |  |
| 4+50  | 0.0241 | 0.10 | Q V |  |  |  |  |
| 4+55  | 0.0248 | 0.11 | Q V |  |  |  |  |
| 5+ 0  | 0.0256 | 0.11 | Q V |  |  |  |  |
| 5+ 5  | 0.0262 | 0.09 | Q V |  |  |  |  |
| 5+10  | 0.0267 | 0.08 | Q V |  |  |  |  |
| 5+15  | 0.0273 | 0.08 | Q V |  |  |  |  |
| 5+20  | 0.0279 | 0.09 | Q V |  |  |  |  |
| 5+25  | 0.0286 | 0.09 | Q V |  |  |  |  |
| 5+30  | 0.0292 | 0.09 | Q V |  |  |  |  |
| 5+35  | 0.0299 | 0.10 | Q V |  |  |  |  |
| 5+40  | 0.0307 | 0.11 | Q V |  |  |  |  |
| 5+45  | 0.0314 | 0.11 | Q V |  |  |  |  |
| 5+50  | 0.0322 | 0.11 | Q V |  |  |  |  |
| 5+55  | 0.0329 | 0.11 | Q V |  |  |  |  |
| 6+ 0  | 0.0337 | 0.11 | Q V |  |  |  |  |
| 6+ 5  | 0.0345 | 0.12 | Q V |  |  |  |  |
| 6+10  | 0.0353 | 0.12 | Q V |  |  |  |  |
| 6+15  | 0.0362 | 0.12 | Q V |  |  |  |  |
| 6+20  | 0.0370 | 0.12 | Q V |  |  |  |  |
| 6+25  | 0.0378 | 0.12 | Q V |  |  |  |  |
| 6+30  | 0.0387 | 0.12 | Q V |  |  |  |  |
| 6+35  | 0.0396 | 0.13 | Q V |  |  |  |  |
| 6+40  | 0.0405 | 0.14 | Q V |  |  |  |  |
| 6+45  | 0.0415 | 0.14 | Q V |  |  |  |  |
| 6+50  | 0.0424 | 0.14 | Q V |  |  |  |  |
| 6+55  | 0.0433 | 0.14 | Q V |  |  |  |  |
| 7+ 0  | 0.0443 | 0.14 | Q V |  |  |  |  |
| 7+ 5  | 0.0452 | 0.14 | Q V |  |  |  |  |
| 7+10  | 0.0461 | 0.14 | Q V |  |  |  |  |
| 7+15  | 0.0471 | 0.14 | Q V |  |  |  |  |
| 7+20  | 0.0481 | 0.15 | Q V |  |  |  |  |
| 7+25  | 0.0491 | 0.15 | Q V |  |  |  |  |
| 7+30  | 0.0501 | 0.15 | Q V |  |  |  |  |
| 7+35  | 0.0512 | 0.16 | Q V |  |  |  |  |
| 7+40  | 0.0523 | 0.16 | Q V |  |  |  |  |
| 7+45  | 0.0534 | 0.16 | Q V |  |  |  |  |
| 7+50  | 0.0546 | 0.17 | Q V |  |  |  |  |
| 7+55  | 0.0558 | 0.18 | Q V |  |  |  |  |
| 8+ 0  | 0.0571 | 0.18 | Q V |  |  |  |  |
| 8+ 5  | 0.0584 | 0.20 | Q V |  |  |  |  |
| 8+10  | 0.0598 | 0.20 | Q V |  |  |  |  |
| 8+15  | 0.0612 | 0.20 | Q V |  |  |  |  |
| 8+20  | 0.0626 | 0.20 | Q V |  |  |  |  |
| 8+25  | 0.0640 | 0.20 | Q V |  |  |  |  |
| 8+30  | 0.0654 | 0.20 | Q V |  |  |  |  |
| 8+35  | 0.0669 | 0.21 | Q V |  |  |  |  |
| 8+40  | 0.0684 | 0.22 | Q V |  |  |  |  |
| 8+45  | 0.0699 | 0.22 | Q V |  |  |  |  |
| 8+50  | 0.0714 | 0.23 | Q V |  |  |  |  |
| 8+55  | 0.0730 | 0.23 | Q V |  |  |  |  |
| 9+ 0  | 0.0746 | 0.23 | Q V |  |  |  |  |
| 9+ 5  | 0.0763 | 0.25 | Q V |  |  |  |  |
| 9+10  | 0.0781 | 0.26 | Q V |  |  |  |  |
| 9+15  | 0.0799 | 0.26 | Q V |  |  |  |  |
| 9+20  | 0.0817 | 0.27 | Q V |  |  |  |  |
| 9+25  | 0.0836 | 0.27 | Q V |  |  |  |  |
| 9+30  | 0.0854 | 0.27 | Q V |  |  |  |  |
| 9+35  | 0.0874 | 0.28 | Q V |  |  |  |  |
| 9+40  | 0.0893 | 0.28 | Q V |  |  |  |  |
| 9+45  | 0.0913 | 0.28 | Q V |  |  |  |  |
| 9+50  | 0.0933 | 0.29 | Q V |  |  |  |  |
| 9+55  | 0.0954 | 0.30 | Q V |  |  |  |  |
| 10+ 0 | 0.0974 | 0.30 | Q V |  |  |  |  |
| 10+ 5 | 0.0990 | 0.23 | Q V |  |  |  |  |

|       |        |      |   |   |  |  |  |
|-------|--------|------|---|---|--|--|--|
| 10+10 | 0.1004 | 0.20 | Q | V |  |  |  |
| 10+15 | 0.1018 | 0.20 | Q | V |  |  |  |
| 10+20 | 0.1032 | 0.20 | Q | V |  |  |  |
| 10+25 | 0.1046 | 0.20 | Q | V |  |  |  |
| 10+30 | 0.1060 | 0.20 | Q | V |  |  |  |
| 10+35 | 0.1077 | 0.25 | Q | V |  |  |  |
| 10+40 | 0.1096 | 0.27 | Q | V |  |  |  |
| 10+45 | 0.1115 | 0.27 | Q | V |  |  |  |
| 10+50 | 0.1133 | 0.27 | Q | V |  |  |  |
| 10+55 | 0.1152 | 0.27 | Q | V |  |  |  |
| 11+ 0 | 0.1171 | 0.27 | Q | V |  |  |  |
| 11+ 5 | 0.1189 | 0.26 | Q | V |  |  |  |
| 11+10 | 0.1206 | 0.26 | Q | V |  |  |  |
| 11+15 | 0.1224 | 0.26 | Q | V |  |  |  |
| 11+20 | 0.1242 | 0.26 | Q | V |  |  |  |
| 11+25 | 0.1260 | 0.26 | Q | V |  |  |  |
| 11+30 | 0.1277 | 0.26 | Q | V |  |  |  |
| 11+35 | 0.1294 | 0.24 | Q | V |  |  |  |
| 11+40 | 0.1309 | 0.23 | Q | V |  |  |  |
| 11+45 | 0.1325 | 0.23 | Q | V |  |  |  |
| 11+50 | 0.1342 | 0.24 | Q | V |  |  |  |
| 11+55 | 0.1359 | 0.24 | Q | V |  |  |  |
| 12+ 0 | 0.1375 | 0.24 | Q | V |  |  |  |
| 12+ 5 | 0.1397 | 0.31 | Q | V |  |  |  |
| 12+10 | 0.1420 | 0.34 | Q | V |  |  |  |
| 12+15 | 0.1444 | 0.34 | Q | V |  |  |  |
| 12+20 | 0.1468 | 0.35 | Q | V |  |  |  |
| 12+25 | 0.1492 | 0.35 | Q | V |  |  |  |
| 12+30 | 0.1516 | 0.35 | Q | V |  |  |  |
| 12+35 | 0.1542 | 0.37 | Q | V |  |  |  |
| 12+40 | 0.1568 | 0.38 | Q | V |  |  |  |
| 12+45 | 0.1594 | 0.38 | Q | V |  |  |  |
| 12+50 | 0.1621 | 0.39 | Q | V |  |  |  |
| 12+55 | 0.1648 | 0.39 | Q | V |  |  |  |
| 13+ 0 | 0.1675 | 0.39 | Q | V |  |  |  |
| 13+ 5 | 0.1706 | 0.44 | Q | V |  |  |  |
| 13+10 | 0.1737 | 0.46 | Q | V |  |  |  |
| 13+15 | 0.1769 | 0.46 | Q | V |  |  |  |
| 13+20 | 0.1801 | 0.46 | Q | V |  |  |  |
| 13+25 | 0.1832 | 0.46 | Q | V |  |  |  |
| 13+30 | 0.1864 | 0.46 | Q | V |  |  |  |
| 13+35 | 0.1888 | 0.35 | Q | V |  |  |  |
| 13+40 | 0.1910 | 0.31 | Q | V |  |  |  |
| 13+45 | 0.1931 | 0.31 | Q | V |  |  |  |
| 13+50 | 0.1953 | 0.31 | Q | V |  |  |  |
| 13+55 | 0.1974 | 0.31 | Q | V |  |  |  |
| 14+ 0 | 0.1996 | 0.31 | Q | V |  |  |  |
| 14+ 5 | 0.2020 | 0.35 | Q | V |  |  |  |
| 14+10 | 0.2045 | 0.37 | Q | V |  |  |  |
| 14+15 | 0.2070 | 0.37 | Q | V |  |  |  |
| 14+20 | 0.2095 | 0.36 | Q | V |  |  |  |
| 14+25 | 0.2119 | 0.35 | Q | V |  |  |  |
| 14+30 | 0.2143 | 0.35 | Q | V |  |  |  |
| 14+35 | 0.2167 | 0.35 | Q | V |  |  |  |
| 14+40 | 0.2192 | 0.35 | Q | V |  |  |  |
| 14+45 | 0.2216 | 0.35 | Q | V |  |  |  |
| 14+50 | 0.2240 | 0.34 | Q | V |  |  |  |
| 14+55 | 0.2263 | 0.34 | Q | V |  |  |  |
| 15+ 0 | 0.2286 | 0.34 | Q | V |  |  |  |
| 15+ 5 | 0.2309 | 0.33 | Q | V |  |  |  |
| 15+10 | 0.2331 | 0.33 | Q | V |  |  |  |
| 15+15 | 0.2354 | 0.33 | Q | V |  |  |  |
| 15+20 | 0.2375 | 0.32 | Q | V |  |  |  |
| 15+25 | 0.2397 | 0.31 | Q | V |  |  |  |
| 15+30 | 0.2418 | 0.31 | Q | V |  |  |  |
| 15+35 | 0.2437 | 0.27 | Q | V |  |  |  |
| 15+40 | 0.2455 | 0.26 | Q | V |  |  |  |
| 15+45 | 0.2472 | 0.26 | Q | V |  |  |  |
| 15+50 | 0.2490 | 0.26 | Q | V |  |  |  |
| 15+55 | 0.2508 | 0.26 | Q | V |  |  |  |
| 16+ 0 | 0.2526 | 0.26 | Q | V |  |  |  |
| 16+ 5 | 0.2533 | 0.11 | Q | V |  |  |  |
| 16+10 | 0.2537 | 0.05 | Q | V |  |  |  |
| 16+15 | 0.2540 | 0.05 | Q | V |  |  |  |
| 16+20 | 0.2544 | 0.05 | Q | V |  |  |  |
| 16+25 | 0.2548 | 0.05 | Q | V |  |  |  |
| 16+30 | 0.2552 | 0.05 | Q | V |  |  |  |
| 16+35 | 0.2555 | 0.04 | Q | V |  |  |  |
| 16+40 | 0.2557 | 0.04 | Q | V |  |  |  |
| 16+45 | 0.2560 | 0.04 | Q | V |  |  |  |
| 16+50 | 0.2563 | 0.04 | Q | V |  |  |  |
| 16+55 | 0.2566 | 0.04 | Q | V |  |  |  |
| 17+ 0 | 0.2569 | 0.04 | Q | V |  |  |  |
| 17+ 5 | 0.2573 | 0.06 | Q | V |  |  |  |
| 17+10 | 0.2578 | 0.07 | Q | V |  |  |  |
| 17+15 | 0.2582 | 0.07 | Q | V |  |  |  |

|       |        |      |   |  |  |  |  |   |
|-------|--------|------|---|--|--|--|--|---|
| 17+20 | 0.2587 | 0.07 | Q |  |  |  |  | V |
| 17+25 | 0.2592 | 0.07 | Q |  |  |  |  | V |
| 17+30 | 0.2596 | 0.07 | Q |  |  |  |  | V |
| 17+35 | 0.2601 | 0.07 | Q |  |  |  |  | V |
| 17+40 | 0.2606 | 0.07 | Q |  |  |  |  | V |
| 17+45 | 0.2610 | 0.07 | Q |  |  |  |  | V |
| 17+50 | 0.2614 | 0.06 | Q |  |  |  |  | V |
| 17+55 | 0.2618 | 0.05 | Q |  |  |  |  | V |
| 18+ 0 | 0.2622 | 0.05 | Q |  |  |  |  | V |
| 18+ 5 | 0.2625 | 0.05 | Q |  |  |  |  | V |
| 18+10 | 0.2629 | 0.05 | Q |  |  |  |  | V |
| 18+15 | 0.2633 | 0.05 | Q |  |  |  |  | V |
| 18+20 | 0.2637 | 0.05 | Q |  |  |  |  | V |
| 18+25 | 0.2640 | 0.05 | Q |  |  |  |  | V |
| 18+30 | 0.2644 | 0.05 | Q |  |  |  |  | V |
| 18+35 | 0.2647 | 0.04 | Q |  |  |  |  | V |
| 18+40 | 0.2650 | 0.04 | Q |  |  |  |  | V |
| 18+45 | 0.2653 | 0.04 | Q |  |  |  |  | V |
| 18+50 | 0.2655 | 0.03 | Q |  |  |  |  | V |
| 18+55 | 0.2657 | 0.03 | Q |  |  |  |  | V |
| 19+ 0 | 0.2658 | 0.03 | Q |  |  |  |  | V |
| 19+ 5 | 0.2661 | 0.04 | Q |  |  |  |  | V |
| 19+10 | 0.2664 | 0.04 | Q |  |  |  |  | V |
| 19+15 | 0.2667 | 0.04 | Q |  |  |  |  | V |
| 19+20 | 0.2670 | 0.05 | Q |  |  |  |  | V |
| 19+25 | 0.2674 | 0.05 | Q |  |  |  |  | V |
| 19+30 | 0.2678 | 0.05 | Q |  |  |  |  | V |
| 19+35 | 0.2681 | 0.04 | Q |  |  |  |  | V |
| 19+40 | 0.2683 | 0.04 | Q |  |  |  |  | V |
| 19+45 | 0.2686 | 0.04 | Q |  |  |  |  | V |
| 19+50 | 0.2688 | 0.03 | Q |  |  |  |  | V |
| 19+55 | 0.2690 | 0.03 | Q |  |  |  |  | V |
| 20+ 0 | 0.2692 | 0.03 | Q |  |  |  |  | V |
| 20+ 5 | 0.2695 | 0.04 | Q |  |  |  |  | V |
| 20+10 | 0.2697 | 0.04 | Q |  |  |  |  | V |
| 20+15 | 0.2700 | 0.04 | Q |  |  |  |  | V |
| 20+20 | 0.2703 | 0.04 | Q |  |  |  |  | V |
| 20+25 | 0.2706 | 0.04 | Q |  |  |  |  | V |
| 20+30 | 0.2709 | 0.04 | Q |  |  |  |  | V |
| 20+35 | 0.2711 | 0.04 | Q |  |  |  |  | V |
| 20+40 | 0.2714 | 0.04 | Q |  |  |  |  | V |
| 20+45 | 0.2717 | 0.04 | Q |  |  |  |  | V |
| 20+50 | 0.2719 | 0.03 | Q |  |  |  |  | V |
| 20+55 | 0.2721 | 0.03 | Q |  |  |  |  | V |
| 21+ 0 | 0.2723 | 0.03 | Q |  |  |  |  | V |
| 21+ 5 | 0.2725 | 0.04 | Q |  |  |  |  | V |
| 21+10 | 0.2728 | 0.04 | Q |  |  |  |  | V |
| 21+15 | 0.2731 | 0.04 | Q |  |  |  |  | V |
| 21+20 | 0.2733 | 0.03 | Q |  |  |  |  | V |
| 21+25 | 0.2735 | 0.03 | Q |  |  |  |  | V |
| 21+30 | 0.2737 | 0.03 | Q |  |  |  |  | V |
| 21+35 | 0.2739 | 0.04 | Q |  |  |  |  | V |
| 21+40 | 0.2742 | 0.04 | Q |  |  |  |  | V |
| 21+45 | 0.2745 | 0.04 | Q |  |  |  |  | V |
| 21+50 | 0.2747 | 0.03 | Q |  |  |  |  | V |
| 21+55 | 0.2749 | 0.03 | Q |  |  |  |  | V |
| 22+ 0 | 0.2751 | 0.03 | Q |  |  |  |  | V |
| 22+ 5 | 0.2753 | 0.04 | Q |  |  |  |  | V |
| 22+10 | 0.2756 | 0.04 | Q |  |  |  |  | V |
| 22+15 | 0.2759 | 0.04 | Q |  |  |  |  | V |
| 22+20 | 0.2761 | 0.03 | Q |  |  |  |  | V |
| 22+25 | 0.2763 | 0.03 | Q |  |  |  |  | V |
| 22+30 | 0.2765 | 0.03 | Q |  |  |  |  | V |
| 22+35 | 0.2767 | 0.03 | Q |  |  |  |  | V |
| 22+40 | 0.2769 | 0.03 | Q |  |  |  |  | V |
| 22+45 | 0.2770 | 0.03 | Q |  |  |  |  | V |
| 22+50 | 0.2772 | 0.03 | Q |  |  |  |  | V |
| 22+55 | 0.2774 | 0.03 | Q |  |  |  |  | V |
| 23+ 0 | 0.2776 | 0.03 | Q |  |  |  |  | V |
| 23+ 5 | 0.2778 | 0.03 | Q |  |  |  |  | V |
| 23+10 | 0.2780 | 0.03 | Q |  |  |  |  | V |
| 23+15 | 0.2782 | 0.03 | Q |  |  |  |  | V |
| 23+20 | 0.2784 | 0.03 | Q |  |  |  |  | V |
| 23+25 | 0.2785 | 0.03 | Q |  |  |  |  | V |
| 23+30 | 0.2787 | 0.03 | Q |  |  |  |  | V |
| 23+35 | 0.2789 | 0.03 | Q |  |  |  |  | V |
| 23+40 | 0.2791 | 0.03 | Q |  |  |  |  | V |
| 23+45 | 0.2793 | 0.03 | Q |  |  |  |  | V |
| 23+50 | 0.2795 | 0.03 | Q |  |  |  |  | V |
| 23+55 | 0.2797 | 0.03 | Q |  |  |  |  | V |
| 24+ 0 | 0.2798 | 0.03 | Q |  |  |  |  | V |
| 24+ 5 | 0.2799 | 0.01 | Q |  |  |  |  | V |

# POST-DEVELOPMENT UNIT HYDROGRAPH MAP

## ADMG INC.





## Section 5

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### Basin Routing and Flow Sizing Table & Calculations



# Basin Size and Flow Calculations

ADMG

Basin

| Basin Elevation | BASIN PARAMETERS |           |             |              |                        | OUTLET                              |                                     |                                     |                                     |                                     |                                     |                                     |                |               |
|-----------------|------------------|-----------|-------------|--------------|------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|----------------|---------------|
|                 | Depth            | Area S.F. | Volume C.F. | Volume AC-FT | Effective Volume AC-FT | Q <sub>1</sub> Orrifice Plate (cfs) | Q <sub>2</sub> Orrifice Plate (cfs) | Q <sub>3</sub> Orrifice Plate (cfs) | Q <sub>4</sub> Orrifice Plate (cfs) | Q <sub>5</sub> Orrifice Plate (cfs) | Q <sub>6</sub> Orrifice Plate (cfs) | Q <sub>7</sub> Orrifice Plate (cfs) | Q Weir 1 (cfs) | Q Total (cfs) |
| 1564.20         | 0.00             | 1,188.90  | 0.00        | 0.000        | 0.000                  | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000          | 0.000         |
| 1566.20         | 2.00             | 1,188.90  | 2,377.80    | 0.055        | 0.055                  | 0.029                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000          | 0.029         |
| 1568.20         | 4.00             | 1,188.90  | 4,755.60    | 0.109        | 0.109                  | 0.041                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000          | 0.041         |
| 1568.50         | 4.30             | 1,188.90  | 5,112.27    | 0.117        | 0.117                  | 0.043                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000          | 0.043         |
| 1569.20         | 5.00             | 396.30    | 3,963.00    | 0.091        | 0.144                  | 0.046                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000          | 0.046         |
| 1569.50         | 5.30             | 396.30    | 4,200.78    | 0.096        | 0.149                  | 0.048                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000          | 0.048         |
| 1570.00         | 5.80             | 528.40    | 4,980.17    | 0.114        | 0.167                  | 0.050                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000          | 0.050         |
| 1571.00         | 6.80             | 528.40    | 5,838.82    | 0.134        | 0.187                  | 0.054                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000          | 0.054         |
| 1572.00         | 7.80             | 1,788.00  | 11,609.91   | 0.267        | 0.319                  | 0.058                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000          | 0.058         |
| 1573.00         | 8.80             | 2,049.00  | 14,246.76   | 0.327        | 0.380                  | 0.062                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 14.128         | 14.190        |
| 1574.00         | 9.80             | 2,323.00  | 17,208.31   | 0.395        | 0.448                  | 0.065                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 0.000                               | 73.411         | 73.476        |

## SUPPORTING DESIGN PARAMETERS

|                               |             |                     |         |        |        |        |        |        |        |        |        |        |        |  |
|-------------------------------|-------------|---------------------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--|
| Orifice Coefficient           | 0.66        | Dia of Orrifice     | 0.85    |        |        |        |        |        |        |        |        |        |        |  |
| Gravimetric Constant          | 32.2 ft/s^2 | Eff Dia of Orrifice | 0.0708  | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |  |
| Number of Rows                | 1           | Area of Orrifice    | 0.0039  | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |  |
| Minimum Orrifice Plate Height |             | Number of Orrifeces | 1       | 1      | 1      | 1      | 1      | 1      | 1      | 1      | 1      | 1      | 1      |  |
| Minimum Orrifice Plate Width  |             | Centroid Elev       | 1564.25 |        |        |        |        |        |        |        |        |        |        |  |

Sharp Crest Weir Coefficient 3.33  
Length of Weir 12.00  
Elev. at Crest of Weir 1572.5

### Orifice Equation

$$Q = C_d(1/4\pi D^2)\sqrt{2gh}$$

### Weir Equation

$$(Q/(Weir Length * Weir Coefficient))^{2/3}$$

| Q100 Elevation Weir Calc           |         |     |
|------------------------------------|---------|-----|
| Weir Calc                          |         |     |
| Crest Wier Elev.                   | 1572.50 |     |
| Q100                               | 4.9     | cfs |
| Weir Length                        | 12      |     |
| Weir Coeff.                        | 3.33    |     |
| H Weir                             | 0.24682 |     |
| Q100 Elevation                     | 1572.75 |     |
| Q100 Elevation Weir Calc           |         |     |
| Basin Emergency Spillway Weir Calc |         |     |
| Crest Wier Elev.                   | 1573.00 |     |
| Q100                               | 4.9     | cfs |
| Weir Length                        | 25      |     |
| Weir Coeff.                        | 3.33    |     |
| H Weir                             | 0.15131 |     |
| Q100 Elevation                     | 1573.15 |     |

|  |                             |
|--|-----------------------------|
|  | Eco-rain Tanks - Model 1503 |
|  | Gravel                      |
|  | Soil Media                  |
|  | Infiltration Basin          |



| Basin       |          |       |          |       |        |       |       |
|-------------|----------|-------|----------|-------|--------|-------|-------|
| Storm Event | Existing |       | Proposed |       | Routed |       |       |
|             | Volume   | cfs   | Volume   | cfs   | Volume | cfs   | Depth |
| 2yr24hr     | 0.0341   | 0.056 | 0.2799   | 0.461 | 0.218  | 0.055 | 7.03  |





Program License Serial Number 5006

\*\*\*\*\* HYDROGRAPH INFORMATION \*\*\*\*\*

From study/file name: pro2yr242.rte  
 \*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
 Number of intervals = 289  
 Time interval = 5.0 (Min.)  
 Maximum/Peak flow rate = 0.461 (CFS)  
 Total volume = 0.280 (Ac.Ft)  
 Status of hydrographs being held in storage  

|             | Stream 1 | Stream 2 | Stream 3 | Stream 4 | Stream 5 |
|-------------|----------|----------|----------|----------|----------|
| Peak (CFS)  | 0.000    | 0.000    | 0.000    | 0.000    | 0.000    |
| Vol (Ac.Ft) | 0.000    | 0.000    | 0.000    | 0.000    | 0.000    |

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+++++  
 Process from Point/Station 1.000 to Point/Station 2.000  
 \*\*\*\* RETARDING BASIN ROUTING \*\*\*\*

User entry of depth-outflow-storage data

-----  
 Total number of inflow hydrograph intervals = 289  
 Hydrograph time unit = 5.000 (Min.)  
 Initial depth in storage basin = 0.00(Ft.)  
 -----

Initial basin depth = 0.00 (Ft.)  
 Initial basin storage = 0.00 (Ac.Ft)  
 Initial basin outflow = 0.00 (CFS)  
 -----

Depth vs. Storage and Depth vs. Discharge data:  

| Basin Depth<br>(Ft.) | Storage<br>(Ac.Ft) | Outflow<br>(CFS) | (S-O*dt/2)<br>(Ac.Ft) | (S+O*dt/2)<br>(Ac.Ft) |
|----------------------|--------------------|------------------|-----------------------|-----------------------|
| 0.000                | 0.000              | 0.000            | 0.000                 | 0.000                 |
| 2.000                | 0.055              | 0.029            | 0.055                 | 0.055                 |
| 4.000                | 0.109              | 0.041            | 0.109                 | 0.109                 |
| 4.300                | 0.117              | 0.043            | 0.117                 | 0.117                 |
| 5.000                | 0.144              | 0.046            | 0.144                 | 0.144                 |
| 5.300                | 0.149              | 0.048            | 0.149                 | 0.149                 |
| 5.800                | 0.167              | 0.050            | 0.167                 | 0.167                 |
| 6.800                | 0.187              | 0.054            | 0.187                 | 0.187                 |
| 7.800                | 0.319              | 0.058            | 0.319                 | 0.319                 |
| 8.800                | 0.380              | 14.190           | 0.331                 | 0.429                 |
| 9.800                | 0.448              | 73.476           | 0.195                 | 0.701                 |

 -----

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

| Time<br>(Hours) | Inflow<br>(CFS) | Outflow<br>(CFS) | Storage<br>(Ac.Ft) | .0  | 0.1 | 0.23 | 0.35 | 0.46 | Depth<br>(Ft.) |
|-----------------|-----------------|------------------|--------------------|-----|-----|------|------|------|----------------|
| 0.083           | 0.02            | 0.00             | 0.000              | O I |     |      |      |      | 0.00           |
| 0.167           | 0.03            | 0.00             | 0.000              | O I |     |      |      |      | 0.01           |
| 0.250           | 0.03            | 0.00             | 0.000              | O I |     |      |      |      | 0.02           |
| 0.333           | 0.04            | 0.00             | 0.001              | O I |     |      |      |      | 0.02           |
| 0.417           | 0.04            | 0.00             | 0.001              | O I |     |      |      |      | 0.03           |
| 0.500           | 0.04            | 0.00             | 0.001              | O I |     |      |      |      | 0.04           |
| 0.583           | 0.04            | 0.00             | 0.001              | O I |     |      |      |      | 0.05           |
| 0.667           | 0.04            | 0.00             | 0.002              | O I |     |      |      |      | 0.06           |
| 0.750           | 0.04            | 0.00             | 0.002              | O I |     |      |      |      | 0.07           |
| 0.833           | 0.05            | 0.00             | 0.002              | O I |     |      |      |      | 0.08           |
| 0.917           | 0.05            | 0.00             | 0.003              | O I |     |      |      |      | 0.10           |
| 1.000           | 0.05            | 0.00             | 0.003              | O I |     |      |      |      | 0.11           |
| 1.083           | 0.04            | 0.00             | 0.003              | O I |     |      |      |      | 0.12           |
| 1.167           | 0.04            | 0.00             | 0.004              | O I |     |      |      |      | 0.13           |
| 1.250           | 0.04            | 0.00             | 0.004              | O I |     |      |      |      | 0.14           |
| 1.333           | 0.04            | 0.00             | 0.004              | O I |     |      |      |      | 0.15           |

|       |      |      |       |   |   |  |  |  |  |      |
|-------|------|------|-------|---|---|--|--|--|--|------|
| 1.417 | 0.04 | 0.00 | 0.004 | 0 | I |  |  |  |  | 0.16 |
| 1.500 | 0.04 | 0.00 | 0.005 | 0 | I |  |  |  |  | 0.17 |
| 1.583 | 0.04 | 0.00 | 0.005 | 0 | I |  |  |  |  | 0.18 |
| 1.667 | 0.04 | 0.00 | 0.005 | 0 | I |  |  |  |  | 0.19 |
| 1.750 | 0.04 | 0.00 | 0.005 | 0 | I |  |  |  |  | 0.20 |
| 1.833 | 0.05 | 0.00 | 0.006 | 0 | I |  |  |  |  | 0.21 |
| 1.917 | 0.05 | 0.00 | 0.006 | 0 | I |  |  |  |  | 0.22 |
| 2.000 | 0.05 | 0.00 | 0.006 | 0 | I |  |  |  |  | 0.23 |
| 2.083 | 0.05 | 0.00 | 0.007 | 0 | I |  |  |  |  | 0.25 |
| 2.167 | 0.05 | 0.00 | 0.007 | 0 | I |  |  |  |  | 0.26 |
| 2.250 | 0.05 | 0.00 | 0.007 | 0 | I |  |  |  |  | 0.27 |
| 2.333 | 0.05 | 0.00 | 0.008 | 0 | I |  |  |  |  | 0.29 |
| 2.417 | 0.05 | 0.00 | 0.008 | 0 | I |  |  |  |  | 0.30 |
| 2.500 | 0.05 | 0.00 | 0.009 | 0 | I |  |  |  |  | 0.31 |
| 2.583 | 0.06 | 0.00 | 0.009 | 0 | I |  |  |  |  | 0.32 |
| 2.667 | 0.07 | 0.00 | 0.009 | 0 | I |  |  |  |  | 0.34 |
| 2.750 | 0.07 | 0.01 | 0.010 | 0 | I |  |  |  |  | 0.35 |
| 2.833 | 0.07 | 0.01 | 0.010 | 0 | I |  |  |  |  | 0.37 |
| 2.917 | 0.07 | 0.01 | 0.011 | 0 | I |  |  |  |  | 0.39 |
| 3.000 | 0.07 | 0.01 | 0.011 | 0 | I |  |  |  |  | 0.40 |
| 3.083 | 0.07 | 0.01 | 0.011 | 0 | I |  |  |  |  | 0.42 |
| 3.167 | 0.07 | 0.01 | 0.012 | 0 | I |  |  |  |  | 0.43 |
| 3.250 | 0.07 | 0.01 | 0.012 | 0 | I |  |  |  |  | 0.45 |
| 3.333 | 0.07 | 0.01 | 0.013 | 0 | I |  |  |  |  | 0.46 |
| 3.417 | 0.07 | 0.01 | 0.013 | 0 | I |  |  |  |  | 0.48 |
| 3.500 | 0.07 | 0.01 | 0.014 | 0 | I |  |  |  |  | 0.49 |
| 3.583 | 0.07 | 0.01 | 0.014 | 0 | I |  |  |  |  | 0.51 |
| 3.667 | 0.07 | 0.01 | 0.014 | 0 | I |  |  |  |  | 0.52 |
| 3.750 | 0.07 | 0.01 | 0.015 | 0 | I |  |  |  |  | 0.54 |
| 3.833 | 0.08 | 0.01 | 0.015 | 0 | I |  |  |  |  | 0.56 |
| 3.917 | 0.08 | 0.01 | 0.016 | 0 | I |  |  |  |  | 0.57 |
| 4.000 | 0.08 | 0.01 | 0.016 | 0 | I |  |  |  |  | 0.59 |
| 4.083 | 0.08 | 0.01 | 0.017 | 0 | I |  |  |  |  | 0.61 |
| 4.167 | 0.08 | 0.01 | 0.017 | 0 | I |  |  |  |  | 0.63 |
| 4.250 | 0.08 | 0.01 | 0.018 | 0 | I |  |  |  |  | 0.65 |
| 4.333 | 0.09 | 0.01 | 0.018 | 0 | I |  |  |  |  | 0.66 |
| 4.417 | 0.09 | 0.01 | 0.019 | 0 | I |  |  |  |  | 0.69 |
| 4.500 | 0.09 | 0.01 | 0.019 | 0 | I |  |  |  |  | 0.71 |
| 4.583 | 0.09 | 0.01 | 0.020 | 0 | I |  |  |  |  | 0.73 |
| 4.667 | 0.09 | 0.01 | 0.021 | 0 | I |  |  |  |  | 0.75 |
| 4.750 | 0.09 | 0.01 | 0.021 | 0 | I |  |  |  |  | 0.77 |
| 4.833 | 0.10 | 0.01 | 0.022 | 0 | I |  |  |  |  | 0.79 |
| 4.917 | 0.11 | 0.01 | 0.022 | 0 | I |  |  |  |  | 0.82 |
| 5.000 | 0.11 | 0.01 | 0.023 | 0 | I |  |  |  |  | 0.84 |
| 5.083 | 0.09 | 0.01 | 0.024 | 0 | I |  |  |  |  | 0.86 |
| 5.167 | 0.08 | 0.01 | 0.024 | 0 | I |  |  |  |  | 0.88 |
| 5.250 | 0.08 | 0.01 | 0.025 | 0 | I |  |  |  |  | 0.90 |
| 5.333 | 0.09 | 0.01 | 0.025 | 0 | I |  |  |  |  | 0.92 |
| 5.417 | 0.09 | 0.01 | 0.026 | 0 | I |  |  |  |  | 0.94 |
| 5.500 | 0.09 | 0.01 | 0.026 | 0 | I |  |  |  |  | 0.96 |
| 5.583 | 0.10 | 0.01 | 0.027 | 0 | I |  |  |  |  | 0.98 |
| 5.667 | 0.11 | 0.01 | 0.028 | 0 | I |  |  |  |  | 1.00 |
| 5.750 | 0.11 | 0.01 | 0.028 | 0 | I |  |  |  |  | 1.02 |
| 5.833 | 0.11 | 0.02 | 0.029 | 0 | I |  |  |  |  | 1.05 |
| 5.917 | 0.11 | 0.02 | 0.029 | 0 | I |  |  |  |  | 1.07 |
| 6.000 | 0.11 | 0.02 | 0.030 | 0 | I |  |  |  |  | 1.09 |
| 6.083 | 0.12 | 0.02 | 0.031 | 0 | I |  |  |  |  | 1.12 |
| 6.167 | 0.12 | 0.02 | 0.031 | 0 | I |  |  |  |  | 1.14 |
| 6.250 | 0.12 | 0.02 | 0.032 | 0 | I |  |  |  |  | 1.17 |
| 6.333 | 0.12 | 0.02 | 0.033 | 0 | I |  |  |  |  | 1.20 |
| 6.417 | 0.12 | 0.02 | 0.034 | 0 | I |  |  |  |  | 1.22 |
| 6.500 | 0.12 | 0.02 | 0.034 | 0 | I |  |  |  |  | 1.25 |
| 6.583 | 0.13 | 0.02 | 0.035 | 0 | I |  |  |  |  | 1.28 |
| 6.667 | 0.14 | 0.02 | 0.036 | 0 | I |  |  |  |  | 1.30 |
| 6.750 | 0.14 | 0.02 | 0.037 | 0 | I |  |  |  |  | 1.33 |
| 6.833 | 0.14 | 0.02 | 0.037 | 0 | I |  |  |  |  | 1.36 |
| 6.917 | 0.14 | 0.02 | 0.038 | 0 | I |  |  |  |  | 1.39 |
| 7.000 | 0.14 | 0.02 | 0.039 | 0 | I |  |  |  |  | 1.42 |
| 7.083 | 0.14 | 0.02 | 0.040 | 0 | I |  |  |  |  | 1.45 |
| 7.167 | 0.14 | 0.02 | 0.041 | 0 | I |  |  |  |  | 1.48 |
| 7.250 | 0.14 | 0.02 | 0.041 | 0 | I |  |  |  |  | 1.51 |
| 7.333 | 0.15 | 0.02 | 0.042 | 0 | I |  |  |  |  | 1.54 |
| 7.417 | 0.15 | 0.02 | 0.043 | 0 | I |  |  |  |  | 1.57 |
| 7.500 | 0.15 | 0.02 | 0.044 | 0 | I |  |  |  |  | 1.60 |
| 7.583 | 0.16 | 0.02 | 0.045 | 0 | I |  |  |  |  | 1.63 |
| 7.667 | 0.16 | 0.02 | 0.046 | 0 | I |  |  |  |  | 1.67 |
| 7.750 | 0.16 | 0.02 | 0.047 | 0 | I |  |  |  |  | 1.70 |
| 7.833 | 0.17 | 0.03 | 0.048 | 0 | I |  |  |  |  | 1.74 |
| 7.917 | 0.18 | 0.03 | 0.049 | 0 | I |  |  |  |  | 1.77 |
| 8.000 | 0.18 | 0.03 | 0.050 | 0 | I |  |  |  |  | 1.81 |
| 8.083 | 0.20 | 0.03 | 0.051 | 0 | I |  |  |  |  | 1.85 |
| 8.167 | 0.20 | 0.03 | 0.052 | 0 | I |  |  |  |  | 1.89 |
| 8.250 | 0.20 | 0.03 | 0.053 | 0 | I |  |  |  |  | 1.94 |
| 8.333 | 0.20 | 0.03 | 0.054 | 0 | I |  |  |  |  | 1.98 |
| 8.417 | 0.20 | 0.03 | 0.056 | 0 | I |  |  |  |  | 2.03 |
| 8.500 | 0.20 | 0.03 | 0.057 | 0 | I |  |  |  |  | 2.07 |

|        |      |      |       |   |   |   |   |   |   |      |
|--------|------|------|-------|---|---|---|---|---|---|------|
| 8.583  | 0.21 | 0.03 | 0.058 | 0 | I |   |   |   |   | 2.12 |
| 8.667  | 0.22 | 0.03 | 0.059 | 0 | I |   |   |   |   | 2.16 |
| 8.750  | 0.22 | 0.03 | 0.061 | 0 | I |   |   |   |   | 2.21 |
| 8.833  | 0.23 | 0.03 | 0.062 | 0 | I |   |   |   |   | 2.26 |
| 8.917  | 0.23 | 0.03 | 0.063 | 0 | I |   |   |   |   | 2.31 |
| 9.000  | 0.23 | 0.03 | 0.065 | 0 | I |   |   |   |   | 2.36 |
| 9.083  | 0.25 | 0.03 | 0.066 | 0 |   | I |   |   |   | 2.41 |
| 9.167  | 0.26 | 0.03 | 0.068 | 0 |   | I |   |   |   | 2.47 |
| 9.250  | 0.26 | 0.03 | 0.069 | 0 |   | I |   |   |   | 2.53 |
| 9.333  | 0.27 | 0.03 | 0.071 | 0 |   |   | I |   |   | 2.59 |
| 9.417  | 0.27 | 0.03 | 0.072 | 0 |   |   | I |   |   | 2.65 |
| 9.500  | 0.27 | 0.03 | 0.074 | 0 |   |   | I |   |   | 2.71 |
| 9.583  | 0.28 | 0.03 | 0.076 | 0 |   |   |   | I |   | 2.77 |
| 9.667  | 0.28 | 0.03 | 0.077 | 0 |   |   |   | I |   | 2.83 |
| 9.750  | 0.28 | 0.03 | 0.079 | 0 |   |   |   | I |   | 2.90 |
| 9.833  | 0.29 | 0.03 | 0.081 | 0 |   |   |   |   | I | 2.96 |
| 9.917  | 0.30 | 0.04 | 0.083 | 0 |   |   |   |   | I | 3.03 |
| 10.000 | 0.30 | 0.04 | 0.085 | 0 |   |   |   |   | I | 3.10 |
| 10.083 | 0.23 | 0.04 | 0.086 | 0 | I |   |   |   |   | 3.15 |
| 10.167 | 0.20 | 0.04 | 0.087 | 0 | I |   |   |   |   | 3.20 |
| 10.250 | 0.20 | 0.04 | 0.089 | 0 | I |   |   |   |   | 3.24 |
| 10.333 | 0.20 | 0.04 | 0.090 | 0 | I |   |   |   |   | 3.28 |
| 10.417 | 0.20 | 0.04 | 0.091 | 0 | I |   |   |   |   | 3.33 |
| 10.500 | 0.20 | 0.04 | 0.092 | 0 | I |   |   |   |   | 3.37 |
| 10.583 | 0.25 | 0.04 | 0.093 | 0 |   | I |   |   |   | 3.42 |
| 10.667 | 0.27 | 0.04 | 0.095 | 0 |   |   | I |   |   | 3.48 |
| 10.750 | 0.27 | 0.04 | 0.096 | 0 |   |   | I |   |   | 3.53 |
| 10.833 | 0.27 | 0.04 | 0.098 | 0 |   |   | I |   |   | 3.59 |
| 10.917 | 0.27 | 0.04 | 0.100 | 0 |   |   | I |   |   | 3.65 |
| 11.000 | 0.27 | 0.04 | 0.101 | 0 |   |   | I |   |   | 3.71 |
| 11.083 | 0.26 | 0.04 | 0.103 | 0 |   |   |   | I |   | 3.77 |
| 11.167 | 0.26 | 0.04 | 0.104 | 0 |   | I |   |   |   | 3.83 |
| 11.250 | 0.26 | 0.04 | 0.106 | 0 |   | I |   |   |   | 3.88 |
| 11.333 | 0.26 | 0.04 | 0.107 | 0 |   | I |   |   |   | 3.94 |
| 11.417 | 0.26 | 0.04 | 0.109 | 0 |   | I |   |   |   | 3.99 |
| 11.500 | 0.26 | 0.04 | 0.110 | 0 |   | I |   |   |   | 4.05 |
| 11.583 | 0.24 | 0.04 | 0.112 | 0 |   |   | I |   |   | 4.10 |
| 11.667 | 0.23 | 0.04 | 0.113 | 0 | I |   |   |   |   | 4.15 |
| 11.750 | 0.23 | 0.04 | 0.114 | 0 | I |   |   |   |   | 4.20 |
| 11.833 | 0.24 | 0.04 | 0.116 | 0 |   | I |   |   |   | 4.25 |
| 11.917 | 0.24 | 0.04 | 0.117 | 0 |   | I |   |   |   | 4.30 |
| 12.000 | 0.24 | 0.04 | 0.118 | 0 |   | I |   |   |   | 4.34 |
| 12.083 | 0.31 | 0.04 | 0.120 | 0 |   |   | I |   |   | 4.38 |
| 12.167 | 0.34 | 0.04 | 0.122 | 0 |   |   |   | I |   | 4.43 |
| 12.250 | 0.34 | 0.04 | 0.124 | 0 |   |   |   | I |   | 4.48 |
| 12.333 | 0.35 | 0.04 | 0.126 | 0 |   |   |   |   | I | 4.53 |
| 12.417 | 0.35 | 0.04 | 0.128 | 0 |   |   |   |   | I | 4.59 |
| 12.500 | 0.35 | 0.04 | 0.130 | 0 |   |   |   |   | I | 4.64 |
| 12.583 | 0.37 | 0.04 | 0.132 | 0 |   |   |   |   | I | 4.70 |
| 12.667 | 0.38 | 0.04 | 0.135 | 0 |   |   |   |   | I | 4.76 |
| 12.750 | 0.38 | 0.05 | 0.137 | 0 |   |   |   |   | I | 4.82 |
| 12.833 | 0.39 | 0.05 | 0.139 | 0 |   |   |   |   | I | 4.88 |
| 12.917 | 0.39 | 0.05 | 0.142 | 0 |   |   |   |   | I | 4.94 |
| 13.000 | 0.39 | 0.05 | 0.144 | 0 |   |   |   |   | I | 5.01 |
| 13.083 | 0.44 | 0.05 | 0.147 | 0 |   |   |   |   | I | 5.16 |
| 13.167 | 0.46 | 0.05 | 0.150 | 0 |   |   |   |   | I | 5.31 |
| 13.250 | 0.46 | 0.05 | 0.152 | 0 |   |   |   |   | I | 5.39 |
| 13.333 | 0.46 | 0.05 | 0.155 | 0 |   |   |   |   | I | 5.47 |
| 13.417 | 0.46 | 0.05 | 0.158 | 0 |   |   |   |   | I | 5.55 |
| 13.500 | 0.46 | 0.05 | 0.161 | 0 |   |   |   |   | I | 5.63 |
| 13.583 | 0.35 | 0.05 | 0.163 | 0 |   |   |   |   | I | 5.70 |
| 13.667 | 0.31 | 0.05 | 0.165 | 0 |   |   |   |   | I | 5.75 |
| 13.750 | 0.31 | 0.05 | 0.167 | 0 |   |   |   |   | I | 5.80 |
| 13.833 | 0.31 | 0.05 | 0.169 | 0 |   |   |   |   | I | 5.89 |
| 13.917 | 0.31 | 0.05 | 0.171 | 0 |   |   |   |   | I | 5.98 |
| 14.000 | 0.31 | 0.05 | 0.172 | 0 |   |   |   |   | I | 6.07 |
| 14.083 | 0.35 | 0.05 | 0.174 | 0 |   |   |   |   | I | 6.17 |
| 14.167 | 0.37 | 0.05 | 0.176 | 0 |   |   |   |   | I | 6.27 |
| 14.250 | 0.37 | 0.05 | 0.179 | 0 |   |   |   |   | I | 6.38 |
| 14.333 | 0.36 | 0.05 | 0.181 | 0 |   |   |   |   | I | 6.49 |
| 14.417 | 0.35 | 0.05 | 0.183 | 0 |   |   |   |   | I | 6.59 |
| 14.500 | 0.35 | 0.05 | 0.185 | 0 |   |   |   |   | I | 6.69 |
| 14.583 | 0.35 | 0.05 | 0.187 | 0 |   |   |   |   | I | 6.80 |
| 14.667 | 0.35 | 0.05 | 0.189 | 0 |   |   |   |   | I | 6.82 |
| 14.750 | 0.35 | 0.05 | 0.191 | 0 |   |   |   |   | I | 6.83 |
| 14.833 | 0.34 | 0.05 | 0.193 | 0 |   |   |   |   | I | 6.85 |
| 14.917 | 0.34 | 0.05 | 0.195 | 0 |   |   |   |   | I | 6.86 |
| 15.000 | 0.34 | 0.05 | 0.197 | 0 |   |   |   |   | I | 6.88 |
| 15.083 | 0.33 | 0.05 | 0.199 | 0 |   |   |   |   | I | 6.89 |
| 15.167 | 0.33 | 0.05 | 0.201 | 0 |   |   |   |   | I | 6.90 |
| 15.250 | 0.33 | 0.05 | 0.203 | 0 |   |   |   |   | I | 6.92 |
| 15.333 | 0.32 | 0.05 | 0.204 | 0 |   |   |   |   | I | 6.93 |
| 15.417 | 0.31 | 0.05 | 0.206 | 0 |   |   |   |   | I | 6.95 |
| 15.500 | 0.31 | 0.05 | 0.208 | 0 |   |   |   |   | I | 6.96 |
| 15.583 | 0.27 | 0.05 | 0.210 | 0 |   |   |   |   | I | 6.97 |
| 15.667 | 0.26 | 0.05 | 0.211 | 0 |   |   |   |   | I | 6.98 |

|        |      |      |       |     |   |   |  |      |
|--------|------|------|-------|-----|---|---|--|------|
| 15.750 | 0.26 | 0.05 | 0.213 | O   |   | I |  | 6.99 |
| 15.833 | 0.26 | 0.05 | 0.214 | O   |   | I |  | 7.00 |
| 15.917 | 0.26 | 0.05 | 0.215 | O   |   | I |  | 7.01 |
| 16.000 | 0.26 | 0.05 | 0.217 | O   |   | I |  | 7.03 |
| 16.083 | 0.11 | 0.05 | 0.218 | O   | I |   |  | 7.03 |
| 16.167 | 0.05 | 0.05 | 0.218 | O   |   |   |  | 7.03 |
| 16.250 | 0.05 | 0.05 | 0.218 | O   |   |   |  | 7.03 |
| 16.333 | 0.05 | 0.05 | 0.218 | O   |   |   |  | 7.03 |
| 16.417 | 0.05 | 0.05 | 0.218 | O   |   |   |  | 7.03 |
| 16.500 | 0.05 | 0.05 | 0.218 | O   |   |   |  | 7.03 |
| 16.583 | 0.04 | 0.05 | 0.218 | O   |   |   |  | 7.03 |
| 16.667 | 0.04 | 0.05 | 0.218 | IO  |   |   |  | 7.03 |
| 16.750 | 0.04 | 0.05 | 0.218 | IO  |   |   |  | 7.03 |
| 16.833 | 0.04 | 0.05 | 0.217 | IO  |   |   |  | 7.03 |
| 16.917 | 0.04 | 0.05 | 0.217 | IO  |   |   |  | 7.03 |
| 17.000 | 0.04 | 0.05 | 0.217 | IO  |   |   |  | 7.03 |
| 17.083 | 0.06 | 0.05 | 0.217 | OI  |   |   |  | 7.03 |
| 17.167 | 0.07 | 0.05 | 0.217 | OI  |   |   |  | 7.03 |
| 17.250 | 0.07 | 0.05 | 0.217 | OI  |   |   |  | 7.03 |
| 17.333 | 0.07 | 0.05 | 0.217 | OI  |   |   |  | 7.03 |
| 17.417 | 0.07 | 0.05 | 0.218 | OI  |   |   |  | 7.03 |
| 17.500 | 0.07 | 0.05 | 0.218 | OI  |   |   |  | 7.03 |
| 17.583 | 0.07 | 0.05 | 0.218 | OI  |   |   |  | 7.03 |
| 17.667 | 0.07 | 0.05 | 0.218 | OI  |   |   |  | 7.03 |
| 17.750 | 0.07 | 0.05 | 0.218 | OI  |   |   |  | 7.03 |
| 17.833 | 0.06 | 0.05 | 0.218 | OI  |   |   |  | 7.03 |
| 17.917 | 0.05 | 0.05 | 0.218 | O   |   |   |  | 7.03 |
| 18.000 | 0.05 | 0.05 | 0.218 | O   |   |   |  | 7.03 |
| 18.083 | 0.05 | 0.05 | 0.218 | O   |   |   |  | 7.03 |
| 18.167 | 0.05 | 0.05 | 0.218 | O   |   |   |  | 7.03 |
| 18.250 | 0.05 | 0.05 | 0.218 | O   |   |   |  | 7.03 |
| 18.333 | 0.05 | 0.05 | 0.218 | O   |   |   |  | 7.03 |
| 18.417 | 0.05 | 0.05 | 0.218 | O   |   |   |  | 7.03 |
| 18.500 | 0.05 | 0.05 | 0.218 | O   |   |   |  | 7.03 |
| 18.583 | 0.04 | 0.05 | 0.218 | O   |   |   |  | 7.03 |
| 18.667 | 0.04 | 0.05 | 0.218 | IO  |   |   |  | 7.03 |
| 18.750 | 0.04 | 0.05 | 0.218 | IO  |   |   |  | 7.03 |
| 18.833 | 0.03 | 0.05 | 0.218 | IO  |   |   |  | 7.03 |
| 18.917 | 0.03 | 0.05 | 0.217 | I O |   |   |  | 7.03 |
| 19.000 | 0.03 | 0.05 | 0.217 | I O |   |   |  | 7.03 |
| 19.083 | 0.04 | 0.05 | 0.217 | IO  |   |   |  | 7.03 |
| 19.167 | 0.04 | 0.05 | 0.217 | IO  |   |   |  | 7.03 |
| 19.250 | 0.04 | 0.05 | 0.217 | IO  |   |   |  | 7.03 |
| 19.333 | 0.05 | 0.05 | 0.217 | O   |   |   |  | 7.03 |
| 19.417 | 0.05 | 0.05 | 0.217 | O   |   |   |  | 7.03 |
| 19.500 | 0.05 | 0.05 | 0.217 | O   |   |   |  | 7.03 |
| 19.583 | 0.04 | 0.05 | 0.217 | O   |   |   |  | 7.02 |
| 19.667 | 0.04 | 0.05 | 0.217 | IO  |   |   |  | 7.02 |
| 19.750 | 0.04 | 0.05 | 0.216 | IO  |   |   |  | 7.02 |
| 19.833 | 0.03 | 0.05 | 0.216 | IO  |   |   |  | 7.02 |
| 19.917 | 0.03 | 0.05 | 0.216 | I O |   |   |  | 7.02 |
| 20.000 | 0.03 | 0.05 | 0.216 | I O |   |   |  | 7.02 |
| 20.083 | 0.04 | 0.05 | 0.216 | IO  |   |   |  | 7.02 |
| 20.167 | 0.04 | 0.05 | 0.216 | IO  |   |   |  | 7.02 |
| 20.250 | 0.04 | 0.05 | 0.216 | IO  |   |   |  | 7.02 |
| 20.333 | 0.04 | 0.05 | 0.216 | IO  |   |   |  | 7.02 |
| 20.417 | 0.04 | 0.05 | 0.215 | IO  |   |   |  | 7.02 |
| 20.500 | 0.04 | 0.05 | 0.215 | IO  |   |   |  | 7.01 |
| 20.583 | 0.04 | 0.05 | 0.215 | IO  |   |   |  | 7.01 |
| 20.667 | 0.04 | 0.05 | 0.215 | IO  |   |   |  | 7.01 |
| 20.750 | 0.04 | 0.05 | 0.215 | IO  |   |   |  | 7.01 |
| 20.833 | 0.03 | 0.05 | 0.215 | IO  |   |   |  | 7.01 |
| 20.917 | 0.03 | 0.05 | 0.215 | I O |   |   |  | 7.01 |
| 21.000 | 0.03 | 0.05 | 0.215 | I O |   |   |  | 7.01 |
| 21.083 | 0.04 | 0.05 | 0.214 | IO  |   |   |  | 7.01 |
| 21.167 | 0.04 | 0.05 | 0.214 | IO  |   |   |  | 7.01 |
| 21.250 | 0.04 | 0.05 | 0.214 | IO  |   |   |  | 7.01 |
| 21.333 | 0.03 | 0.05 | 0.214 | IO  |   |   |  | 7.00 |
| 21.417 | 0.03 | 0.05 | 0.214 | I O |   |   |  | 7.00 |
| 21.500 | 0.03 | 0.05 | 0.214 | I O |   |   |  | 7.00 |
| 21.583 | 0.04 | 0.05 | 0.214 | IO  |   |   |  | 7.00 |
| 21.667 | 0.04 | 0.05 | 0.213 | IO  |   |   |  | 7.00 |
| 21.750 | 0.04 | 0.05 | 0.213 | IO  |   |   |  | 7.00 |
| 21.833 | 0.03 | 0.05 | 0.213 | IO  |   |   |  | 7.00 |
| 21.917 | 0.03 | 0.05 | 0.213 | I O |   |   |  | 7.00 |
| 22.000 | 0.03 | 0.05 | 0.213 | I O |   |   |  | 7.00 |
| 22.083 | 0.04 | 0.05 | 0.213 | IO  |   |   |  | 6.99 |
| 22.167 | 0.04 | 0.05 | 0.213 | IO  |   |   |  | 6.99 |
| 22.250 | 0.04 | 0.05 | 0.212 | IO  |   |   |  | 6.99 |
| 22.333 | 0.03 | 0.05 | 0.212 | IO  |   |   |  | 6.99 |
| 22.417 | 0.03 | 0.05 | 0.212 | I O |   |   |  | 6.99 |
| 22.500 | 0.03 | 0.05 | 0.212 | I O |   |   |  | 6.99 |
| 22.583 | 0.03 | 0.05 | 0.212 | I O |   |   |  | 6.99 |
| 22.667 | 0.03 | 0.05 | 0.212 | I O |   |   |  | 6.99 |
| 22.750 | 0.03 | 0.05 | 0.211 | I O |   |   |  | 6.98 |
| 22.833 | 0.03 | 0.05 | 0.211 | I O |   |   |  | 6.98 |

|        |      |      |       |   |   |  |  |  |  |      |
|--------|------|------|-------|---|---|--|--|--|--|------|
| 22.917 | 0.03 | 0.05 | 0.211 | I | 0 |  |  |  |  | 6.98 |
| 23.000 | 0.03 | 0.05 | 0.211 | I | 0 |  |  |  |  | 6.98 |
| 23.083 | 0.03 | 0.05 | 0.211 | I | 0 |  |  |  |  | 6.98 |
| 23.167 | 0.03 | 0.05 | 0.210 | I | 0 |  |  |  |  | 6.98 |
| 23.250 | 0.03 | 0.05 | 0.210 | I | 0 |  |  |  |  | 6.98 |
| 23.333 | 0.03 | 0.05 | 0.210 | I | 0 |  |  |  |  | 6.97 |
| 23.417 | 0.03 | 0.05 | 0.210 | I | 0 |  |  |  |  | 6.97 |
| 23.500 | 0.03 | 0.05 | 0.210 | I | 0 |  |  |  |  | 6.97 |
| 23.583 | 0.03 | 0.05 | 0.209 | I | 0 |  |  |  |  | 6.97 |
| 23.667 | 0.03 | 0.05 | 0.209 | I | 0 |  |  |  |  | 6.97 |
| 23.750 | 0.03 | 0.05 | 0.209 | I | 0 |  |  |  |  | 6.97 |
| 23.833 | 0.03 | 0.05 | 0.209 | I | 0 |  |  |  |  | 6.97 |
| 23.917 | 0.03 | 0.05 | 0.209 | I | 0 |  |  |  |  | 6.96 |
| 24.000 | 0.03 | 0.05 | 0.209 | I | 0 |  |  |  |  | 6.96 |
| 24.083 | 0.01 | 0.05 | 0.208 | I | 0 |  |  |  |  | 6.96 |
| 24.167 | 0.00 | 0.05 | 0.208 | I | 0 |  |  |  |  | 6.96 |

Remaining water in basin = 0.21 (Ac.Ft)

```

*****HYDROGRAPH DATA*****
      Number of intervals = 290
      Time interval = 5.0 (Min.)
      Maximum/Peak flow rate = 0.055 (CFS)
      Total volume = 0.072 (Ac.Ft)
      Status of hydrographs being held in storage
      Stream 1 Stream 2 Stream 3 Stream 4 Stream 5
      Peak (CFS) 0.000 0.000 0.000 0.000 0.000
      Vol (Ac.Ft) 0.000 0.000 0.000 0.000 0.000
*****

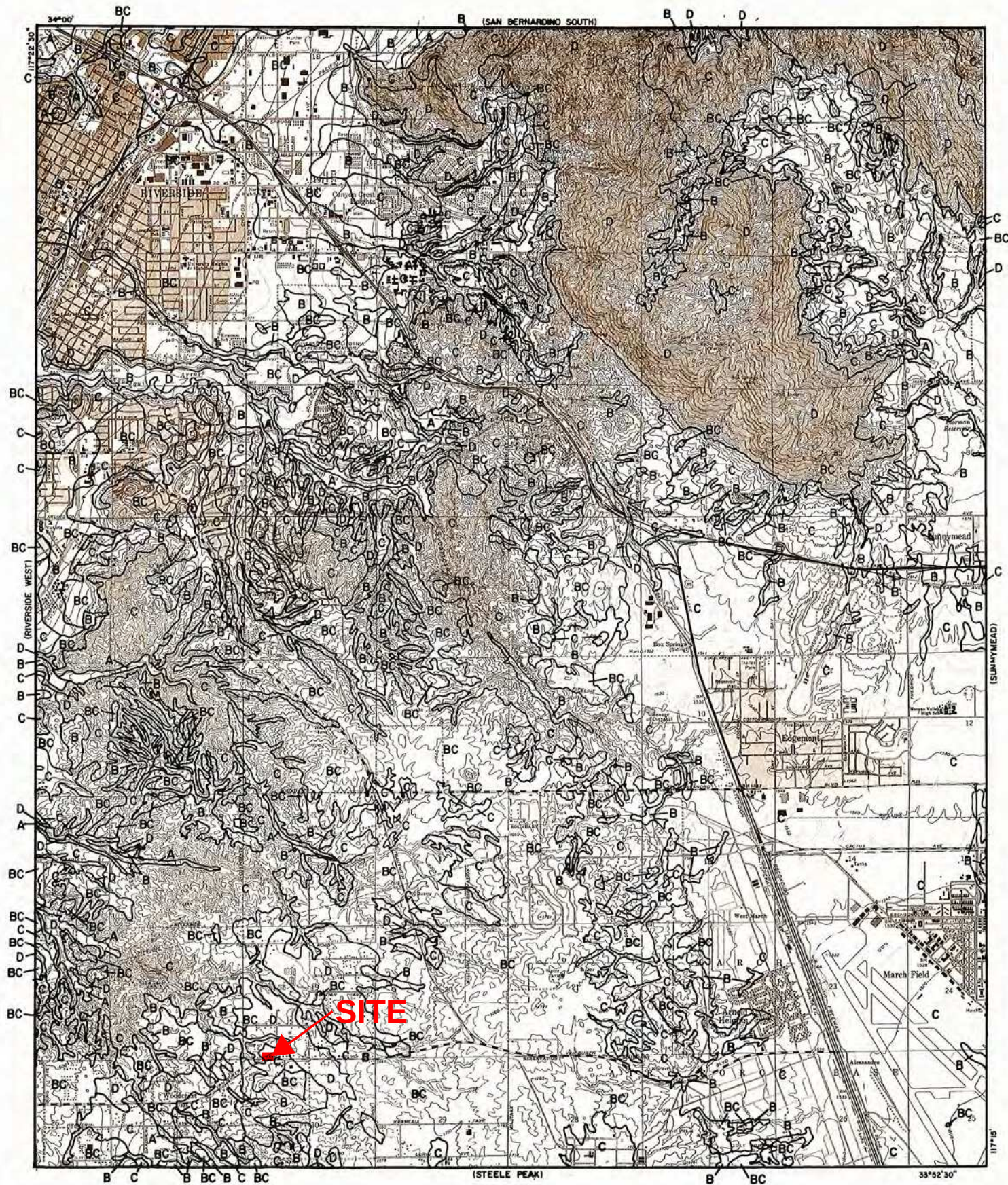
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## **Section 6**

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### **Riverside County Plates**



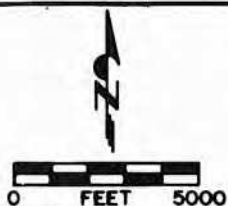


**LEGEND**

- SOILS GROUP BOUNDARY
- A SOILS GROUP DESIGNATION

**RCFC&WCD**

HYDROLOGY MANUAL

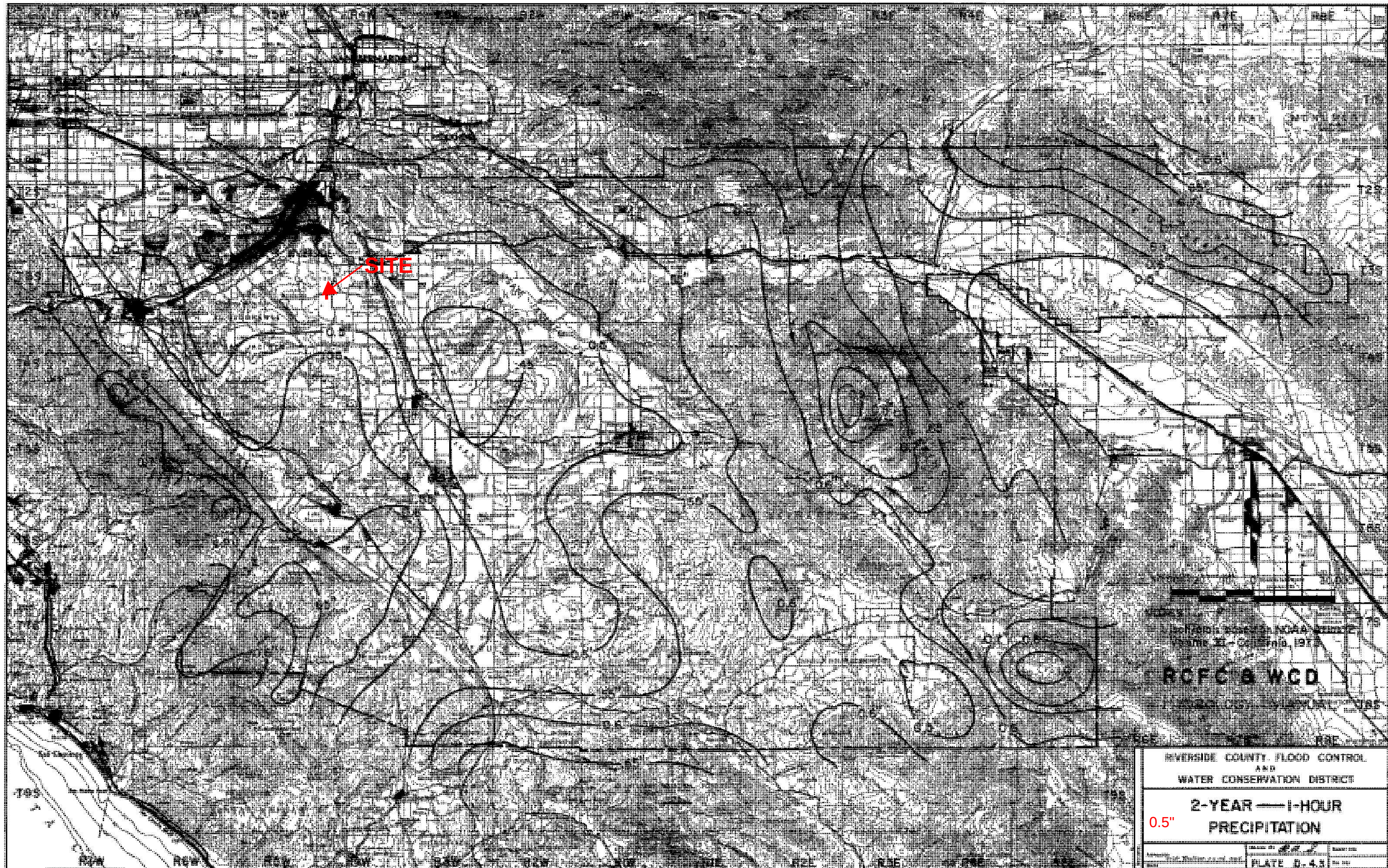


**HYDROLOGIC SOILS GROUP MAP  
FOR**

**RIVERSIDE-EAST**

**"C"**





SITE



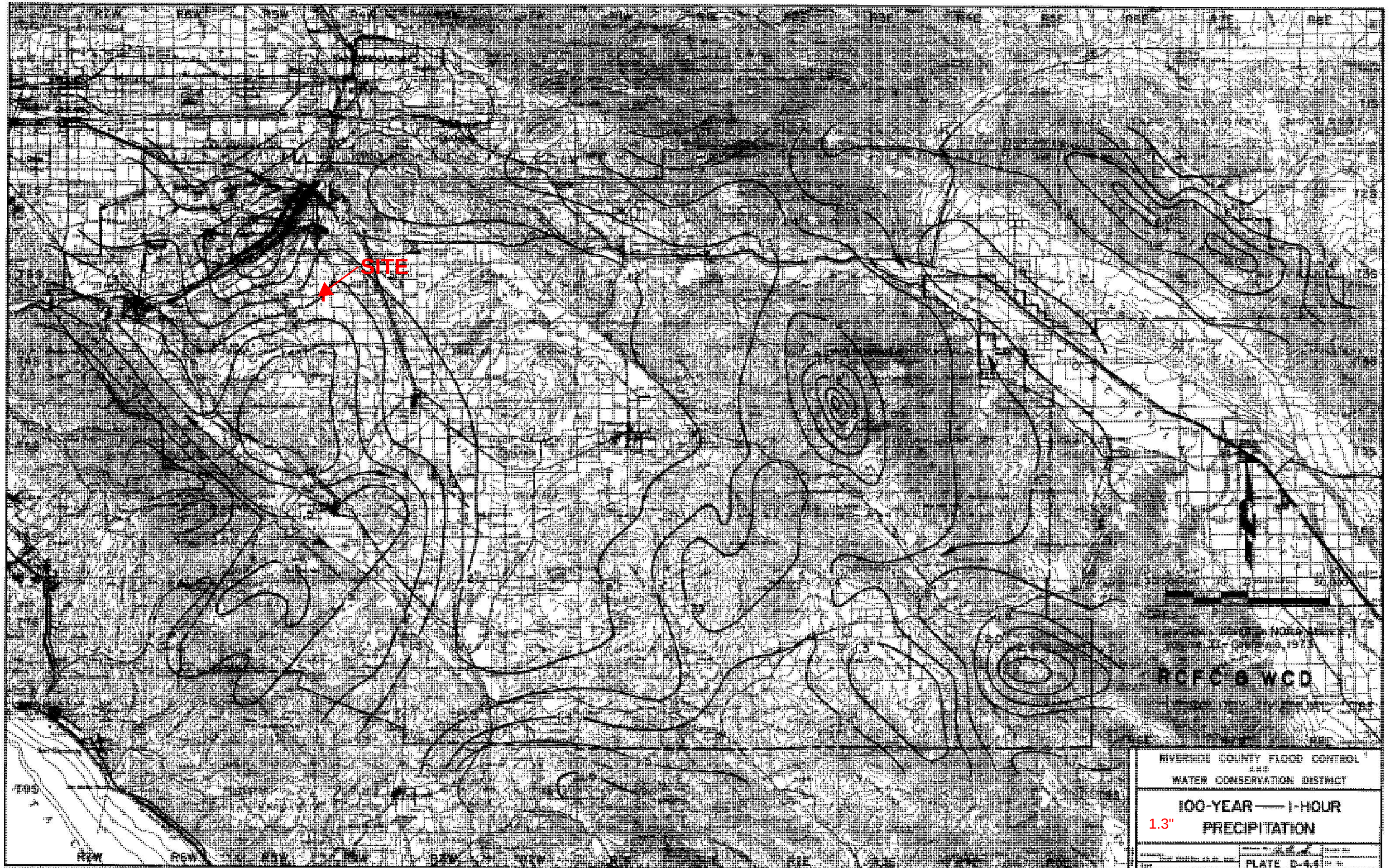
Division of Water Resources  
County of Riverside, California  
Plate 21 - Contour, 1975

RCFC & WCD

RIVERSIDE COUNTY FLOOD CONTROL  
AND  
WATER CONSERVATION DISTRICT

2-YEAR — 1-HOUR  
0.5" PRECIPITATION

PLATE 21-4.1



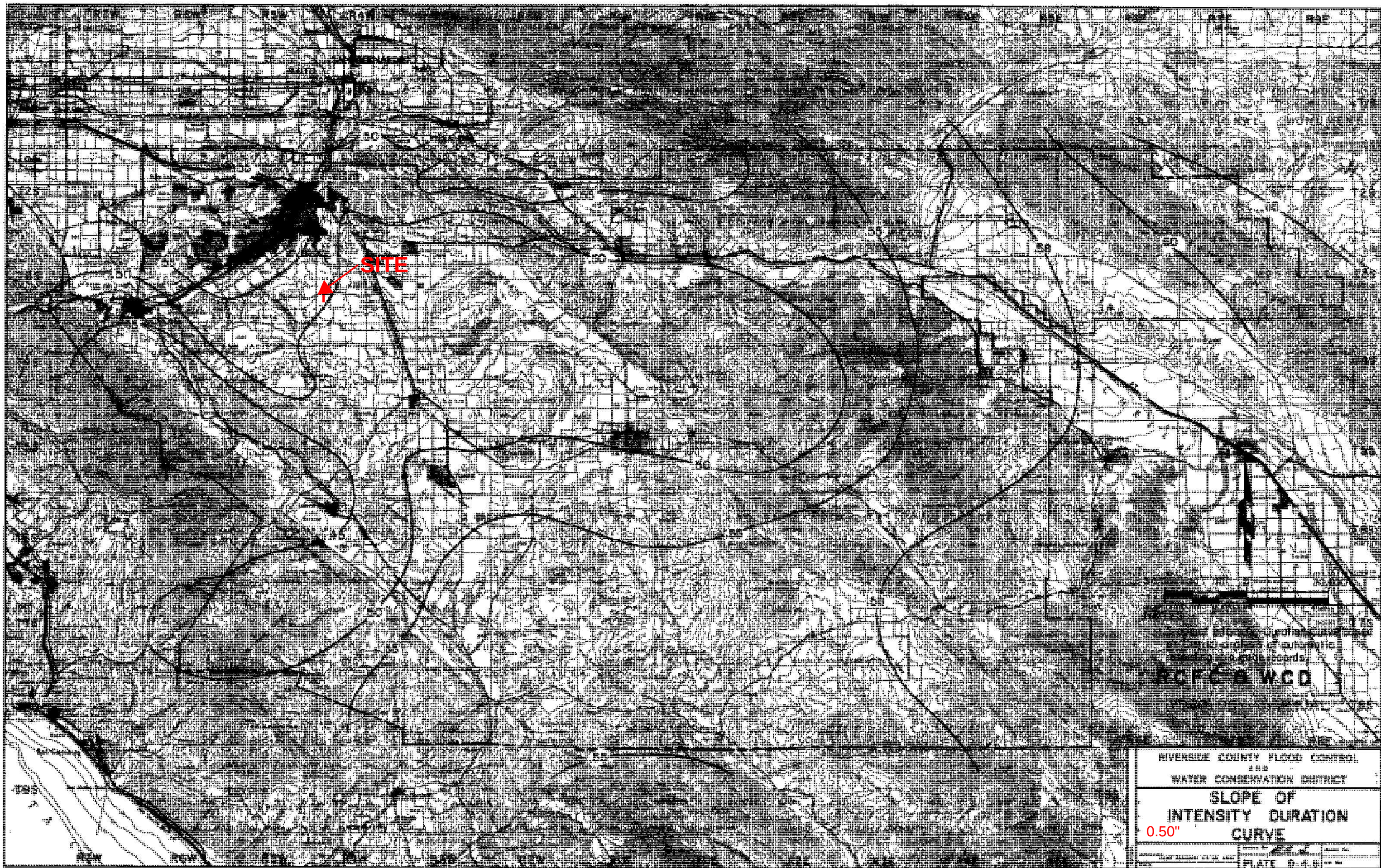
SITE

RECEIVED BY RIVERSIDE COUNTY FLOOD CONTROL DISTRICT  
JAN 12 1978  
RCFC & WCD  
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT

RIVERSIDE COUNTY FLOOD CONTROL  
AND  
WATER CONSERVATION DISTRICT

100-YEAR — 1-HOUR  
1.3" PRECIPITATION

PLATE D-44

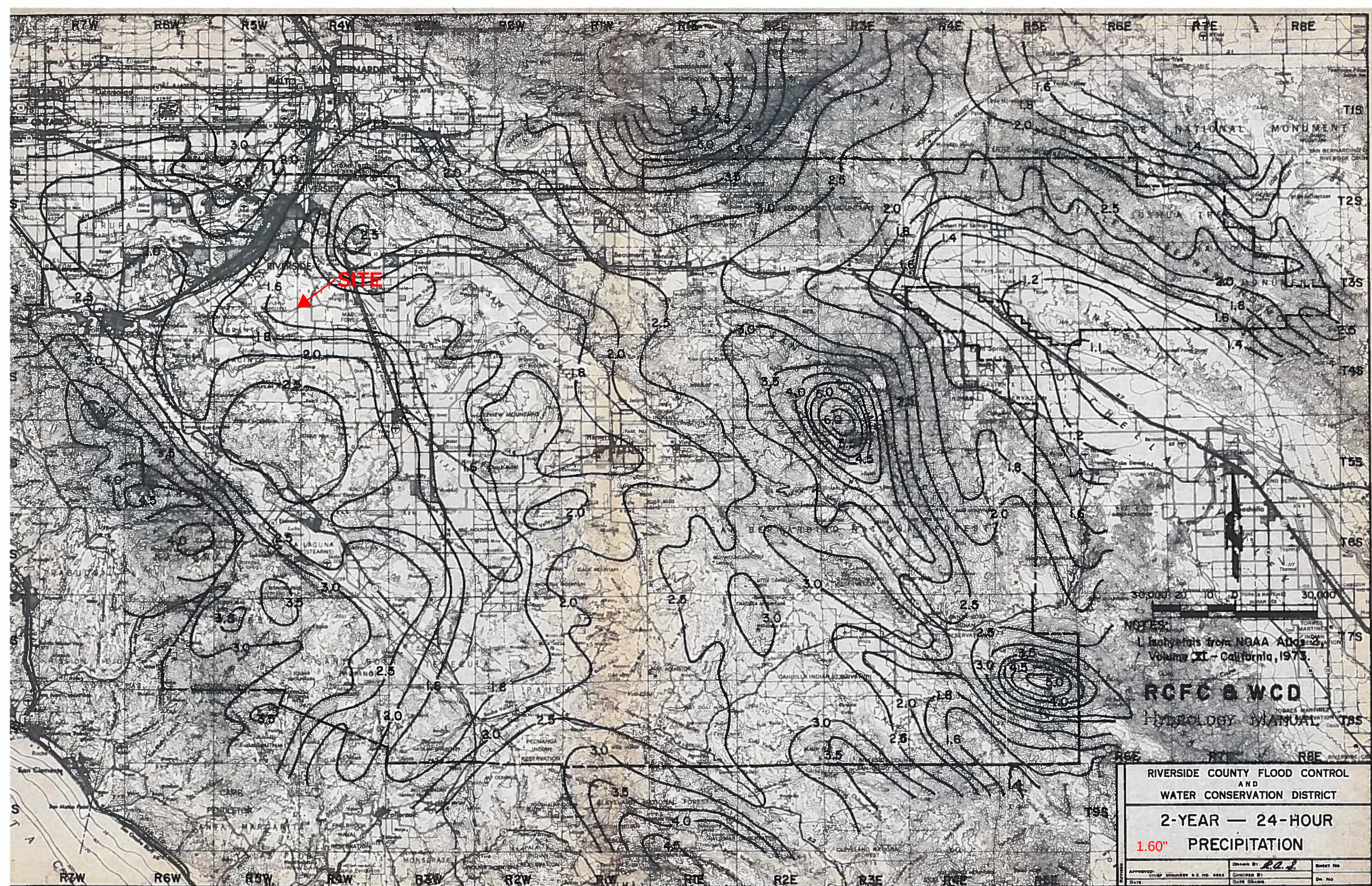


These maps are for informational purposes only and do not constitute a contract or warranty of any kind. The user assumes all responsibility for the use of these maps. No liability is assumed by the County for any errors or omissions.

**RCFC & WCD**

PLATE 0-4-A

|                                                                      |                  |                    |
|----------------------------------------------------------------------|------------------|--------------------|
| RIVERSIDE COUNTY FLOOD CONTROL<br>AND<br>WATER CONSERVATION DISTRICT |                  |                    |
| SLOPE OF<br>INTENSITY DURATION<br>CURVE                              |                  |                    |
| 0.50"                                                                |                  |                    |
| DATE: 10/1/81                                                        | BY: J. L. HARRIS | SCALE: 1" = 1 MILE |
| PLATE 0-4-A                                                          |                  | OF 1               |



NOTES:  
 1. Isohyets from NOAA Atlas  
 Volume XI - California, 1973.

**RCFC & WCD**  
 Hydrology Manual

**RIVERSIDE COUNTY FLOOD CONTROL  
 AND  
 WATER CONSERVATION DISTRICT**  
**2-YEAR — 24-HOUR  
 1.60" PRECIPITATION**

|                              |                              |           |
|------------------------------|------------------------------|-----------|
| APPROVED: <i>[Signature]</i> | Drawn By: <i>[Signature]</i> | Sheet No. |
| DATE: _____                  | DATE: _____                  | De. No.   |

