

PRELIMINARY HYDROLOGY REPORT

For

Oakmont – Redlands at Nance Industrial

22-05040

PROJECT LOCATION

255 East Nance Street, Perris, CA

DEVELOPER

Oakmont Industrial Group
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PREPARED BY

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C52921, Exp 12/31/2022

PREPARATION DATE

May 17, 2022
Revised: TBD

HZ PROJECT NUMBER

R314482.01



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Introduction

This preliminary 100-year hydrologic analysis is prepared for Oakmont Industrial Group. The objective of this project is to build an industrial warehouse facility located at the southeast corner of Las Palmas and Nance Street in Perris, CA. The proposed building is approximately 202,500 square feet in size on approximately 9.57 acres of partially developed land. In order to treat stormwater runoff, the project's stormwater management strategy incorporates a bio-retention basin.

Purpose

The purpose of this report is to present the drainage concept and design flow rates for the project site. The existing and proposed hydrology maps reflect the tributary drainage areas as well as the 100-year storm runoff flow rates.

Existing Condition

The project site consists of a rectangular shaped parcel which is partially developed with residential buildings and industrial yards.

The site generally slopes 0.4% from the northern to the southern edge of the property. The site's maximum 1456.3± feet mean sea level (MSL) elevation is located at the northwest corner of the parcel. The site's minimum 1453.8± feet MSL elevation is located at the southwest corner of the parcel. Runoff sheet flows south to the southern property line, goes through openings in the screen wall, and eventually discharges to the Markham Street storm drain. The existing storm drain in Markham Street conveys the runoff to the San Jacinto River Basin.

From the hydrologic analysis, the existing 100-year stormwater runoff is approximately 15.32 cfs.

Proposed Condition

Under the proposed condition, the site's runoff will be directed to an on-site bio-retention basin located along the eastern portion of the property. See Appendix A for proposed on-site hydrology map. The captured water will drain into an on-site storm drain line which will convey the runoff to the proposed flood control master planned storm drain (Line D-2) west of the property.

Runoff from the site will sheet flow and surface drain into the bio-retention basin.

Hydrologic Analysis

A hydrologic analysis was prepared using the methodology outlined in the Riverside County Flood Control District (RCFCD) Hydrology Manual. A rational method analysis was completed for the proposed 100-year return event using Civild software.

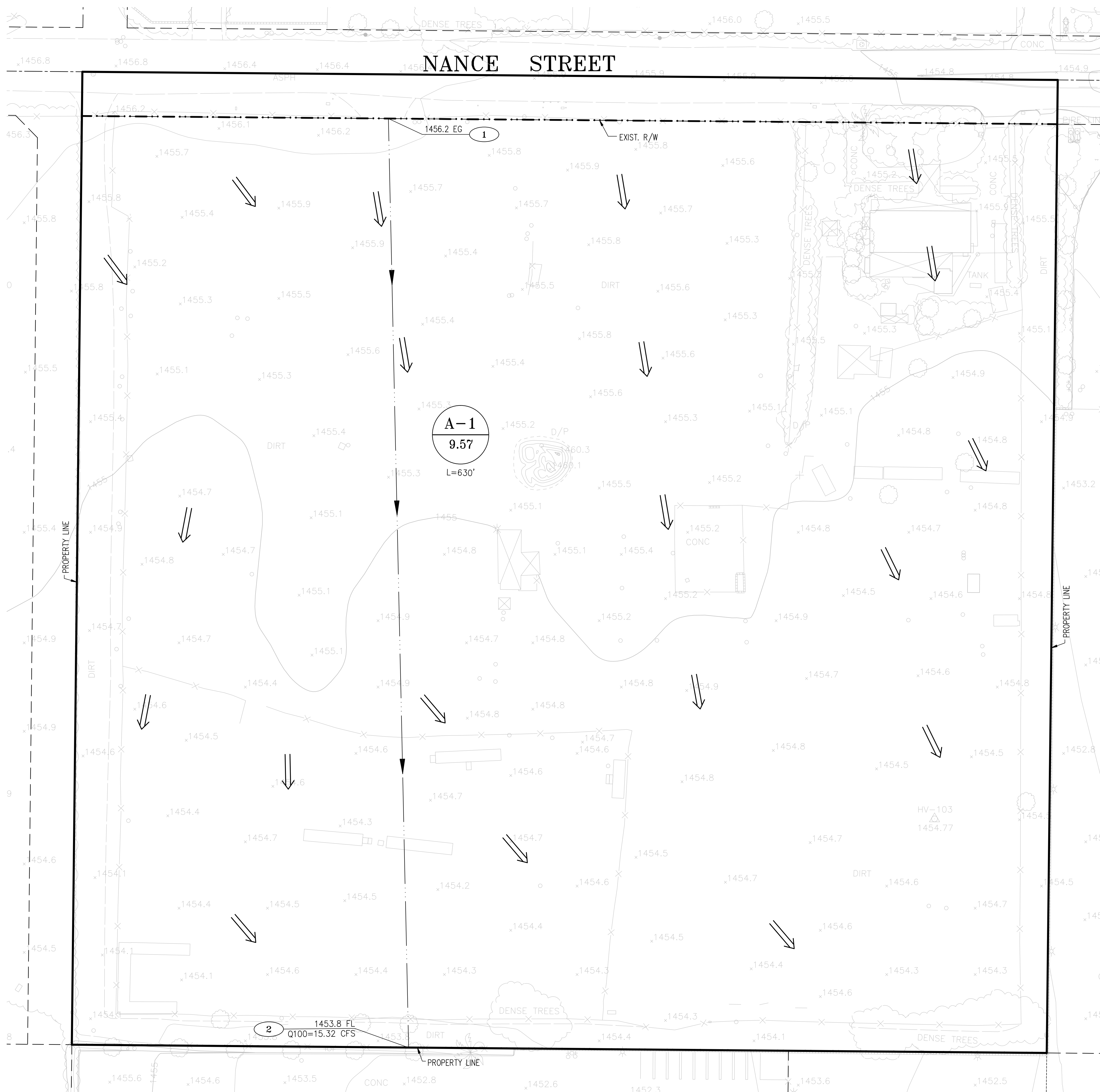
The 100-year (Q_{100}) 1-hour rainfall depth was taken from the isohyetal maps in the County of Riverside Hydrology Manual. The hydrologic soils type for the site is "C" and was taken from the soil map in the Hydrology Manual (see Appendix E for reference maps). A "commercial" land use was used with an AMC of III for the 100-year storm event.

Results

The bio-retention basin has been sized for water quality purposes. The proposed development resulted in a Q_{100} peak flow of approximately 18.88 cfs. However, we are discharging to a master planned storm drain (Line D-2) which is sized for the 100-year developed runoff.

All proposed drainage and storm drain facilities will be sized adequately for Q_{100} peak flow. Additional calculations will be provided in the final report including storm drain hydraulics and catch basin sizing.

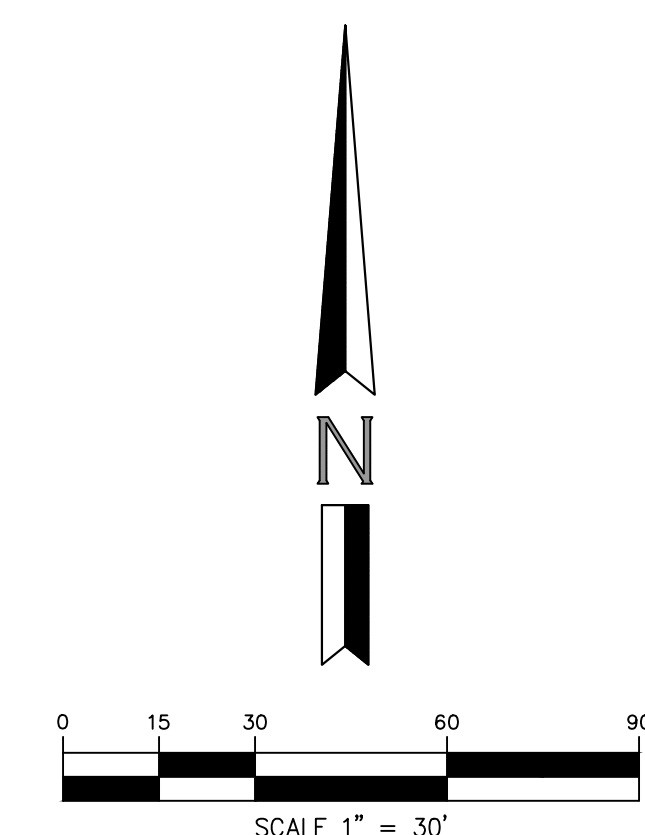
Appendix A
Preliminary Hydrology Maps



- LEGEND**
- (NO.) HYDROLOGY MODEL NODE NUMBER
 - (A-1) 9.57 TRIBUTARY AREA IN ACRES
 - 630' LENGTH OF FLOW
 - DRAINAGE BOUNDARY
 - FLOW LINE
 - ← FLOW DIRECTION

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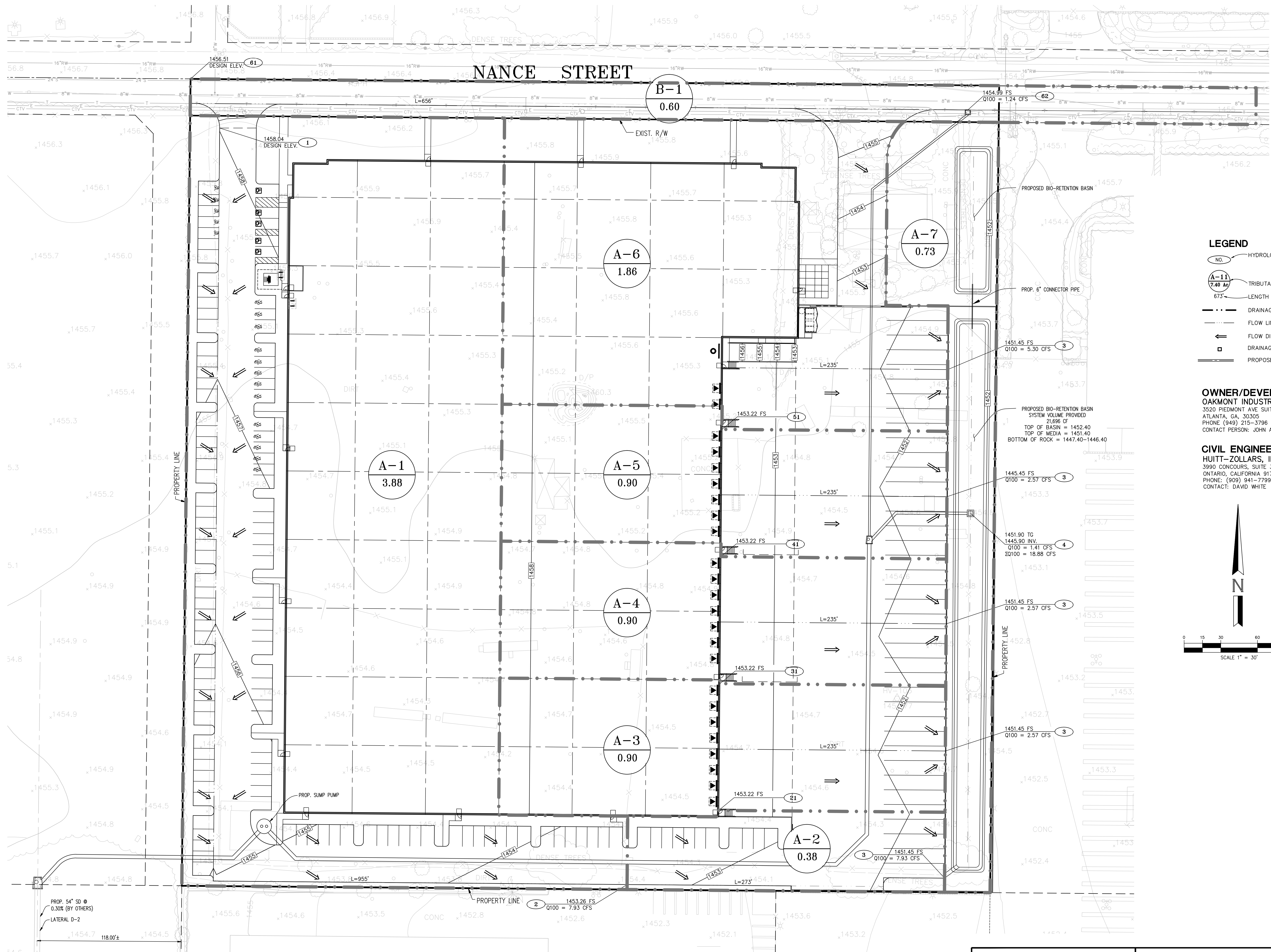
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CITY OF PERRIS
EXISTING CONDITION
HYDROLOGY MAP
OAKMONT - NANCE STREET WAREHOUSE
255 NANCE STREET

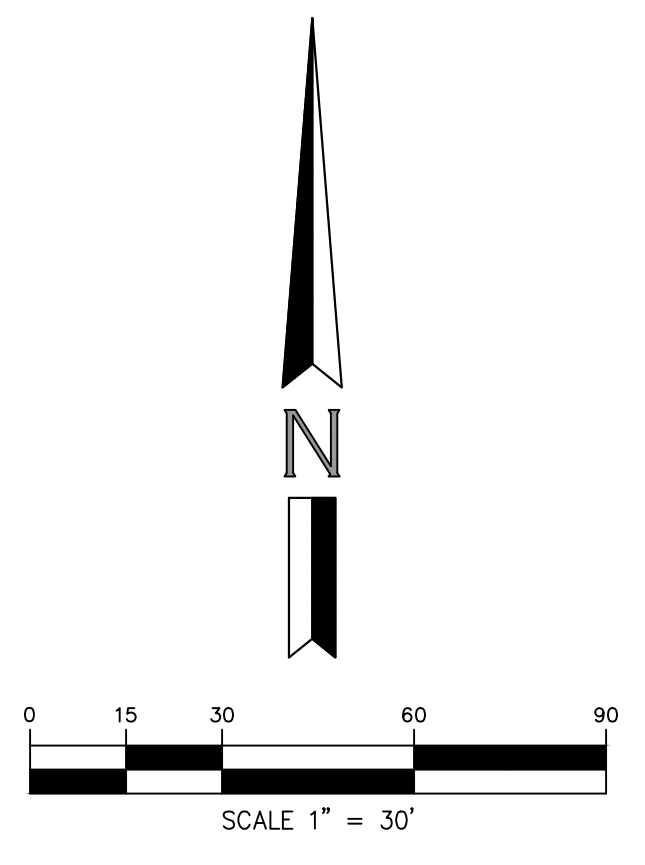
SHEET
1 OF 1



- LEGEND**
- (NO.) HYDROLOGY MODEL NODE NUMBER
 - (A-1) 7.40 AC TRIBUTARY AREA IN ACRES
 - 673' LENGTH OF FLOW
 - DRAINAGE BOUNDARY
 - FLOW LINE
 - FLOW DIRECTION
 - DRAINAGE INLET/CATCH BASIN (CB)
 - PROPOSED STORM DRAIN

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CITY OF PERRIS
PRELIMINARY PROPOSED CONDITION
HYDROLOGY MAP
 OAKMONT - NANCE STREET WAREHOUSE
 255 NANCE STREET

SHEET
1 OF 1

Appendix B
100-year Rational Method

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 05/18/22 File:4482Q100E.out

OAKMONT - REDLANDS AT NANCE INDUSTRIAL
100 YEAR STORM - EXISTING RATIONAL METHOD
4482Q100E
AC

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

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

Program License Serial Number 6145

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

Storm event (year) = 100.00 Antecedent Moisture Condition = 3

Standard intensity-duration curves data (Plate D-4.1)
For the [Perris Valley] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.780(In/Hr)
100 year storm 10 minute intensity = 2.690(In/Hr)
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.120(In/Hr)
Slope of intensity duration curve = 0.4900

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

Initial area flow distance = 630.000(Ft.)
Top (of initial area) elevation = 1456.200(Ft.)
Bottom (of initial area) elevation = 1453.800(Ft.)
Difference in elevation = 2.400(Ft.)
Slope = 0.00381 s(percent)= 0.38
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 19.267 min.
Rainfall intensity = 1.954(In/Hr) for a 100.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.819
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 3) = 84.40
Pervious area fraction = 0.800; Impervious fraction = 0.200

Initial subarea runoff = 15.323 (CFS)
Total initial stream area = 9.570 (Ac.)
Pervious area fraction = 0.800
End of computations, total study area = 9.57 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 0.800
Area averaged RI index number = 69.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 05/18/22 File:4482Q100POFF.out

OAKMONT - REDLANDS AT NANCE INDUSTRIAL
100 YEAR STORM - PROPOSED RATIONAL METHOD OFFSITE
4482Q100POFF
AC

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

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

Program License Serial Number 6145

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

Storm event (year) = 100.00 Antecedent Moisture Condition = 3

Standard intensity-duration curves data (Plate D-4.1)
For the [Perris Valley] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.780(In/Hr)
100 year storm 10 minute intensity = 2.690(In/Hr)
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.120(In/Hr)
Slope of intensity duration curve = 0.4900

+++++
Process from Point/Station 61.000 to Point/Station 62.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 656.000(Ft.)
Top (of initial area) elevation = 1456.510(Ft.)
Bottom (of initial area) elevation = 1454.990(Ft.)
Difference in elevation = 1.520(Ft.)
Slope = 0.00232 s(percent)= 0.23
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 13.517 min.
Rainfall intensity = 2.325(In/Hr) for a 100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.891
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 3) = 84.40
Pervious area fraction = 0.100; Impervious fraction = 0.900

Initial subarea runoff = 1.243 (CFS)
Total initial stream area = 0.600 (Ac.)
Pervious area fraction = 0.100
End of computations, total study area = 0.60 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 0.100
Area averaged RI index number = 69.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 03/29/22 File:4482Q100P.out

OAKMONT - REDLANDS AT NANCE INDUSTRIAL
100 YEAR STORM - PROPOSED RATIONAL METHOD
4482Q100P
AC

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

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

Program License Serial Number 6145

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

Storm event (year) = 100.00 Antecedent Moisture Condition = 3

Standard intensity-duration curves data (Plate D-4.1)
For the [Perris Valley] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.780(In/Hr)
100 year storm 10 minute intensity = 2.690(In/Hr)
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.120(In/Hr)
Slope of intensity duration curve = 0.4900

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

Initial area flow distance = 1000.000(Ft.)
Top (of initial area) elevation = 1457.960(Ft.)
Bottom (of initial area) elevation = 1453.260(Ft.)
Difference in elevation = 4.700(Ft.)
Slope = 0.00470 s(percent)= 0.47
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 13.890 min.
Rainfall intensity = 2.294(In/Hr) for a 100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.891
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 3) = 84.40
Pervious area fraction = 0.100; Impervious fraction = 0.900

Initial subarea runoff = 7.933 (CFS)
Total initial stream area = 3.880 (Ac.)
Pervious area fraction = 0.100

++++
Process from Point/Station 2.000 to Point/Station 3.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

Top of street segment elevation = 1453.260 (Ft.)
End of street segment elevation = 1451.450 (Ft.)
Length of street segment = 273.000 (Ft.)
Height of curb above gutter flowline = 6.0 (In.)
Width of half street (curb to crown) = 20.000 (Ft.)
Distance from crown to crossfall grade break = 18.500 (Ft.)
Slope from gutter to grade break (v/hz) = 0.020
Slope from grade break to crown (v/hz) = 0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line = 10.000 (Ft.)
Slope from curb to property line (v/hz) = 0.018
Gutter width = 1.500 (Ft.)
Gutter hike from flowline = 1.000 (In.)
Manning's N in gutter = 0.0150
Manning's N from gutter to grade break = 0.0150
Manning's N from grade break to crown = 0.0150
Estimated mean flow rate at midpoint of street = 8.321 (CFS)
Depth of flow = 0.412 (Ft.), Average velocity = 2.549 (Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width = 17.956 (Ft.)
Flow velocity = 2.55 (Ft/s)
Travel time = 1.78 min. TC = 15.67 min.
Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.891
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 3) = 84.40
Pervious area fraction = 0.100; Impervious fraction = 0.900
Rainfall intensity = 2.162 (In/Hr) for a 100.0 year storm
Subarea runoff = 0.732 (CFS) for 0.380 (Ac.)
Total runoff = 8.665 (CFS) Total area = 4.260 (Ac.)
Street flow at end of street = 8.665 (CFS)
Half street flow at end of street = 8.665 (CFS)
Depth of flow = 0.418 (Ft.), Average velocity = 2.575 (Ft/s)
Flow width (from curb towards crown) = 18.235 (Ft.)

++++
Process from Point/Station 1.000 to Point/Station 3.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area = 4.260 (Ac.)
Runoff from this stream = 8.665 (CFS)
Time of concentration = 15.67 min.
Rainfall intensity = 2.162 (In/Hr)
Program is now starting with Main Stream No. 2

++++

Process from Point/Station 21.000 to Point/Station 3.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 235.000(Ft.)
Top (of initial area) elevation = 1453.220(Ft.)
Bottom (of initial area) elevation = 1451.450(Ft.)
Difference in elevation = 1.770(Ft.)
Slope = 0.00753 s(percent)= 0.75
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 7.082 min.
Rainfall intensity = 3.191(In/Hr) for a 100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.894
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 3) = 84.40
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 2.566(CFS)
Total initial stream area = 0.900(Ac.)
Pervious area fraction = 0.100

+++++
Process from Point/Station 21.000 to Point/Station 3.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area = 0.900(Ac.)
Runoff from this stream = 2.566(CFS)
Time of concentration = 7.08 min.
Rainfall intensity = 3.191(In/Hr)
Program is now starting with Main Stream No. 3

+++++
Process from Point/Station 31.000 to Point/Station 3.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 235.000(Ft.)
Top (of initial area) elevation = 1453.220(Ft.)
Bottom (of initial area) elevation = 1451.450(Ft.)
Difference in elevation = 1.770(Ft.)
Slope = 0.00753 s(percent)= 0.75
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 7.082 min.
Rainfall intensity = 3.191(In/Hr) for a 100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.894
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 3) = 84.40
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 2.566(CFS)
Total initial stream area = 0.900(Ac.)
Pervious area fraction = 0.100

+++++

Process from Point/Station 31.000 to Point/Station 3.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 3
Stream flow area = 0.900(Ac.)
Runoff from this stream = 2.566(CFS)
Time of concentration = 7.08 min.
Rainfall intensity = 3.191(In/Hr)
Program is now starting with Main Stream No. 4

+++++
Process from Point/Station 41.000 to Point/Station 3.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 235.000(Ft.)
Top (of initial area) elevation = 1453.220(Ft.)
Bottom (of initial area) elevation = 1451.450(Ft.)
Difference in elevation = 1.770(Ft.)
Slope = 0.00753 s(percent)= 0.75
TC = $k(0.300)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 7.082 min.
Rainfall intensity = 3.191(In/Hr) for a 100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.894
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 3) = 84.40
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 2.566(CFS)
Total initial stream area = 0.900(Ac.)
Pervious area fraction = 0.100

+++++
Process from Point/Station 41.000 to Point/Station 3.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 4
Stream flow area = 0.900(Ac.)
Runoff from this stream = 2.566(CFS)
Time of concentration = 7.08 min.
Rainfall intensity = 3.191(In/Hr)
Program is now starting with Main Stream No. 5

+++++
Process from Point/Station 51.000 to Point/Station 3.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 235.000(Ft.)
Top (of initial area) elevation = 1453.220(Ft.)
Bottom (of initial area) elevation = 1451.450(Ft.)
Difference in elevation = 1.770(Ft.)
Slope = 0.00753 s(percent)= 0.75
TC = $k(0.300)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 7.082 min.
Rainfall intensity = 3.191(In/Hr) for a 100.0 year storm
COMMERCIAL subarea type

Runoff Coefficient = 0.894
 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 3) = 84.40
 Pervious area fraction = 0.100; Impervious fraction = 0.900
 Initial subarea runoff = 5.303(CFS)
 Total initial stream area = 1.860(Ac.)
 Pervious area fraction = 0.100

++++++
 Process from Point/Station 51.000 to Point/Station 3.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 5
 Stream flow area = 1.860(Ac.)
 Runoff from this stream = 5.303(CFS)
 Time of concentration = 7.08 min.
 Rainfall intensity = 3.191(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	8.665	15.67	2.162
2	2.566	7.08	3.191
3	2.566	7.08	3.191
4	2.566	7.08	3.191
5	5.303	7.08	3.191

Largest stream flow has longer time of concentration

Qp = 8.665 + sum of
 Qb Ia/Ib
 2.566 * 0.678 = 1.739
 Qb Ia/Ib
 2.566 * 0.678 = 1.739
 Qb Ia/Ib
 2.566 * 0.678 = 1.739
 Qb Ia/Ib
 5.303 * 0.678 = 3.593
 Qp = 17.474

Total of 5 main streams to confluence:

Flow rates before confluence point:
 8.665 2.566 2.566 2.566 5.303
 Area of streams before confluence:
 4.260 0.900 0.900 0.900 1.860

Results of confluence:

Total flow rate = 17.474(CFS)
 Time of concentration = 15.675 min.
 Effective stream area after confluence = 8.820(Ac.)

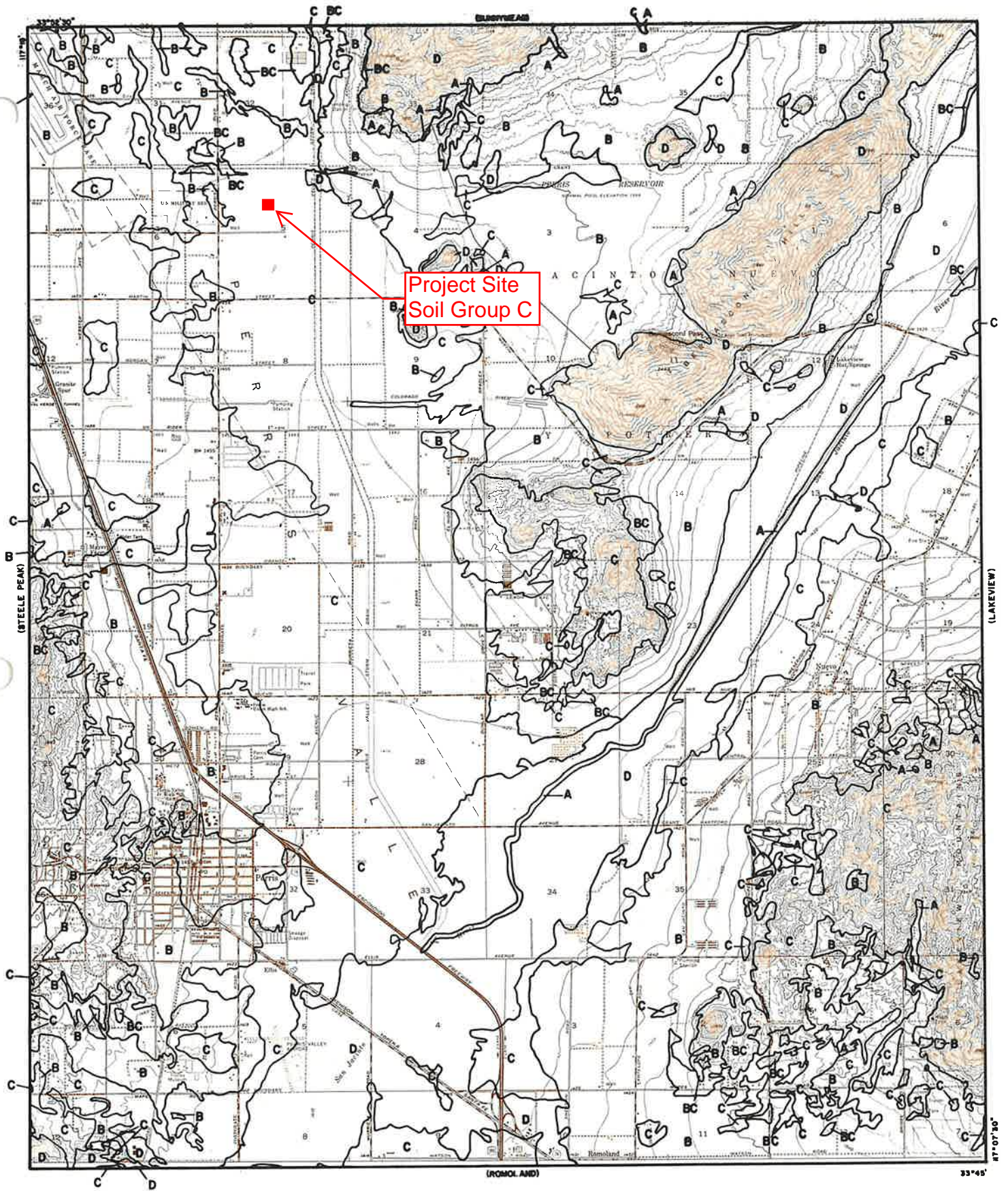
++++++
 Process from Point/Station 3.000 to Point/Station 3.000
 **** SUBAREA FLOW ADDITION ****

COMMERCIAL subarea type

Runoff Coefficient = 0.891
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 3) = 84.40
Pervious area fraction = 0.100; Impervious fraction = 0.900
Time of concentration = 15.67 min.
Rainfall intensity = 2.162(In/Hr) for a 100.0 year storm
Subarea runoff = 1.406(CFS) for 0.730(Ac.)
Total runoff = 18.880(CFS) Total area = 9.550(Ac.)
End of computations, total study area = 9.55 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 0.100
Area averaged RI index number = 69.0

Appendix C
Hydrologic Soils Group and Isohyetal Maps



LEGEND

— SOILS GROUP BOUNDARY
 A SOILS GROUP DESIGNATION

RCFC & WCD
 HYDROLOGY MANUAL

0 FEET 5000

**HYDROLOGIC SOILS GROUP MAP
 FOR
 PERRIS**