
TENTATIVE TRACT NO. 38116 (LAKESIDE)

PRELIMINARY HYDROLOGY REPORT

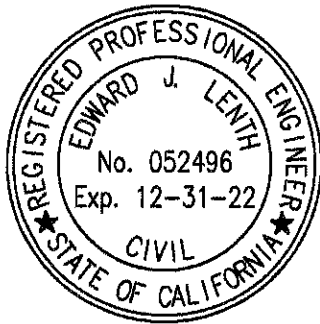
**Prepared date: March 26, 2021
Revised date: August 5, 2021**

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PLANNERS ENGINEERS SURVEYORS		



A handwritten signature in black ink, appearing to be "E. Lenth", written over a horizontal line.

8/5/2021

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TENTATIVE TRACT NO. 38116
(LAKESIDE)

[File: C:\Wspg1\89490\TR38116 Appendix Index]
JN 894-90

TENTATIVE TRACT NO. 38116

(Lakeside) Preliminary Hydrology Report

• Project Location

• Project Description

• Appendices

Appendix A: Rational Method Hydrology Calculations – Proposed Condition

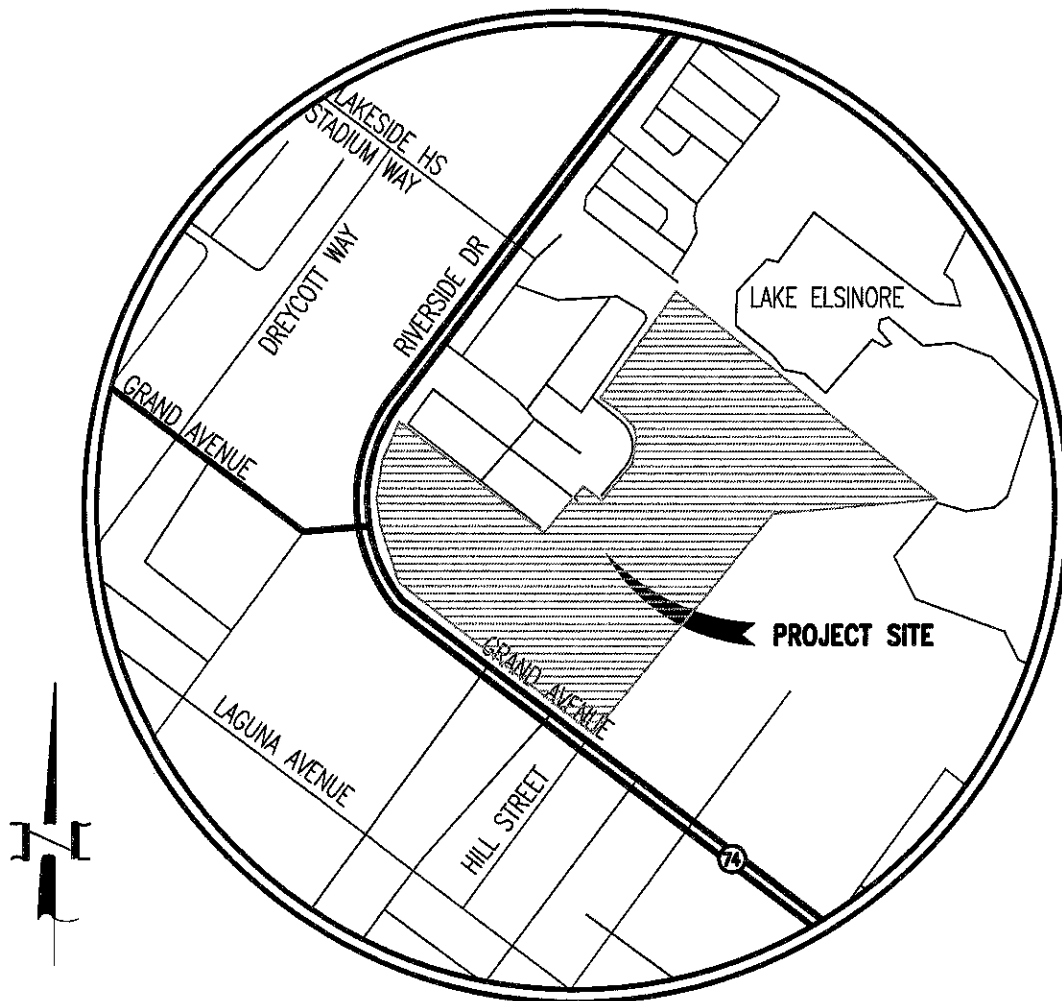
1. Q_{10} Calculations
2. Q_{100} Calculations

Appendix B: References

1. Standard Intensity-Duration Curves Data for Elsinore-Wildomar (Plate D-4.1, sheet 2 of 6)
2. Hydrologic Soils Group Map for Alberhill

Appendix C: Pocket Map Exhibits

1. Plate 1 – Proposed Hydrology Map



VICINITY MAP

N.T.S.

**2006 THOMAS BROTHERS
MAP BOOK, PAGES 865, GRID H6**

PURPOSE

The purpose of this report is to provide hydrologic and hydraulic calculations to support the conceptual design for the storm drain system proposed for Tentative Tract No. 38116.

EXISTING CONDITIONS

The project site consists of 17.7 acres located in the City of Lake Elsinore, County of Riverside, California. The project is located immediately east, of the intersection of Riverside Drive and Grand Avenue. The surrounding area consists of vacant land, with single family residential, and light commercial properties.

The site is currently vacant, naturally drains in a northeasterly direction. All the surface runoff from the project site ultimately drains into Wilson Creek. The site consist of open brush and natural fair cover. The entire project site consists of soil type B.

The project site can be found on Flood Insurance Rate Map (FIRM) No. 06065C2017G, effective on August 28, 2008, Zone X.

PROPOSED CONDITIONS

The project site proposes 140 detached multi-family residential dwellings, associated infrastructure and open space. On site runoff will be conveyed through private street improvements and discharge into the existing channel.

Based on the post-development condition hydrology study for Tentative Tract No. 38116, the project site with a contributing storm water runoff area of 17.7 acres, generates a peak flow rate a 100-year storm event of **Q=31.4 cfs**.

HYDROLOGY

Hydrologic calculations within this report have been prepared using 2016 Advance Engineering Software's (AES) Rational Method software for Riverside County. Hydrologic variables include "B" soil type. Rainfall intensities as follows: 10 yr - 10 min. = 2.32, 10 yr - 60 min. = 0.98, 100 yr - 10 min. = 3.54, 100 yr - 60 min. = 1.50. Calculations have been prepared for both the 10 and 100 year events.

CONCLUSIONS

This drainage report includes the post-development hydrology analyses for the 10 and 100-Yr. storm events. Base on this drainage study, we conclude that the proposed storm drain system provides adequate capacity to convey flows for the 100-Yr. storm.

Appendix A-1

RATIONAL METHOD CALCULATIONS

PROPOSED CONDITION

1. 10 - YEAR STORM

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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
(RCFC&WCD) 1978 HYDROLOGY MANUAL
(c) Copyright 1982-2016 Advanced Engineering Software (aes)
(Rational Tabling Version 23.0)
Release Date: 07/01/2016 License ID 1269

Analysis prepared by:

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***** DESCRIPTION OF STUDY *****

* TENTATIVE TRACT 38116 *
* PRELIMINARY PROPOSED HYDROLOGY *
* 10-YEAR STORM EVENT *

FILE NAME: C:\AES2016\HYDROSFT\RATSCX\89490\89490DEV.DAT
TIME/DATE OF STUDY: 11:20 08/05/2021

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) = 2.320
10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 0.980
100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) = 3.540
100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.500
SLOPE OF 10-YEAR INTENSITY-DURATION CURVE = 0.4809628
SLOPE OF 100-YEAR INTENSITY-DURATION CURVE = 0.4792280

COMPUTED RAINFALL INTENSITY DATA:

STORM EVENT = 10.00 1-HOUR INTENSITY(INCH/HOUR) = 0.990
SLOPE OF INTENSITY DURATION CURVE = 0.4810

RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD

NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL:		CURB HEIGHT (FT)	GUTTER-GEOMETRIES:			MANNING FACTOR (n)
			IN- SIDE	OUT-/PARK- SIDE/ WAY		WIDTH (FT)	LIP (FT)	HIKE (FT)	
1	18.0	13.0	0.020	0.020/0.020	0.50	2.00	0.0313	0.125	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.50 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
- *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN

DEV10
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

FLOW PROCESS FROM NODE 10.00 TO NODE 11.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

ASSUMED INITIAL SUBAREA UNIFORM
DEVELOPMENT IS CONDOMINIUM

TC = $K * [(LENGTH^{**3}) / (ELEVATION\ CHANGE)]^{**2}$
INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00
UPSTREAM ELEVATION(FEET) = 1294.20
DOWNSTREAM ELEVATION(FEET) = 1284.20
ELEVATION DIFFERENCE(FEET) = 10.00
TC = $0.359 * [(1000.00^{**3}) / (10.00)]^{**2} = 14.300$
10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 1.973
CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .7907
SOIL CLASSIFICATION IS "B"
SUBAREA RUNOFF(CFS) = 6.69
TOTAL AREA(ACRES) = 4.29 TOTAL RUNOFF(CFS) = 6.69

FLOW PROCESS FROM NODE 11.00 TO NODE 12.00 IS CODE = 62

>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 1284.20 DOWNSTREAM ELEVATION(FEET) = 1278.50
STREET LENGTH(FEET) = 800.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 13.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 9.19
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.39
HALFSTREET FLOOD WIDTH(FEET) = 13.66
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.28
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.89
STREET FLOW TRAVEL TIME(MIN.) = 5.84 Tc(MIN.) = 20.14
10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 1.673
CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .7787
SOIL CLASSIFICATION IS "B"
SUBAREA AREA(ACRES) = 3.82 SUBAREA RUNOFF(CFS) = 4.98
TOTAL AREA(ACRES) = 8.1 PEAK FLOW RATE(CFS) = 11.67

END OF SUBAREA STREET FLOW HYDRAULICS:

DEV10

DEPTH(FEET) = 0.42 HALFSTREET FLOOD WIDTH(FEET) = 15.03
FLOW VELOCITY(FEET/SEC.) = 2.42 DEPTH*VELOCITY(FT*FT/SEC.) = 1.01
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 12.00 = 1800.00 FEET.

FLOW PROCESS FROM NODE 12.00 TO NODE 13.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1273.00 DOWNSTREAM(FEET) = 1272.00
FLOW LENGTH(FEET) = 165.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 16.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.70
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 11.67
PIPE TRAVEL TIME(MIN.) = 0.48 Tc(MIN.) = 20.63
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 13.00 = 1965.00 FEET.

FLOW PROCESS FROM NODE 13.00 TO NODE 22.00 IS CODE = 52

>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1272.00 DOWNSTREAM(FEET) = 1270.50
CHANNEL LENGTH THRU SUBAREA(FEET) = 446.00 CHANNEL SLOPE = 0.0034
CHANNEL FLOW THRU SUBAREA(CFS) = 11.67
FLOW VELOCITY(FEET/SEC) = 1.51 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) = 4.93 Tc(MIN.) = 25.56
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 22.00 = 2411.00 FEET.

FLOW PROCESS FROM NODE 22.00 TO NODE 22.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 1.492
UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5288
SOIL CLASSIFICATION IS "B"
SUBAREA AREA(ACRES) = 0.95 SUBAREA RUNOFF(CFS) = 0.75
TOTAL AREA(ACRES) = 9.1 TOTAL RUNOFF(CFS) = 12.42
TC(MIN.) = 25.56

FLOW PROCESS FROM NODE 22.00 TO NODE 22.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<

FLOW PROCESS FROM NODE 20.00 TO NODE 21.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

=====

ASSUMED INITIAL SUBAREA UNIFORM
DEVELOPMENT IS CONDOMINIUM

TC = $K * [(LENGTH^{**3}) / (ELEVATION\ CHANGE)]^{**0.2}$
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 820.00
 UPSTREAM ELEVATION(FEET) = 1294.20
 DOWNSTREAM ELEVATION(FEET) = 1276.80
 ELEVATION DIFFERENCE(FEET) = 17.40
 TC = $0.359 * [(820.00^{**3}) / (17.40)]^{**0.2} = 11.364$
 10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.203
 CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .7985
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) = 9.57
 TOTAL AREA(ACRES) = 5.44 TOTAL RUNOFF(CFS) = 9.57

FLOW PROCESS FROM NODE 21.00 TO NODE 21.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 11.36
 RAINFALL INTENSITY(INCH/HR) = 2.20
 TOTAL STREAM AREA(ACRES) = 5.44
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 9.57

FLOW PROCESS FROM NODE 30.00 TO NODE 21.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

ASSUMED INITIAL SUBAREA UNIFORM
DEVELOPMENT IS CONDOMINIUM

TC = $K * [(LENGTH^{**3}) / (ELEVATION\ CHANGE)]^{**0.2}$
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 689.00
 UPSTREAM ELEVATION(FEET) = 1281.00
 DOWNSTREAM ELEVATION(FEET) = 1276.80
 ELEVATION DIFFERENCE(FEET) = 4.20
 TC = $0.359 * [(689.00^{**3}) / (4.20)]^{**0.2} = 13.603$
 10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.021
 CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .7925
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) = 5.09
 TOTAL AREA(ACRES) = 3.18 TOTAL RUNOFF(CFS) = 5.09

FLOW PROCESS FROM NODE 21.00 TO NODE 21.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

DEV10

TIME OF CONCENTRATION(MIN.) = 13.60
RAINFALL INTENSITY(INCH/HR) = 2.02
TOTAL STREAM AREA(ACRES) = 3.18
PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.09

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	9.57	11.36	2.203	5.44
2	5.09	13.60	2.021	3.18

*****WARNING*****

IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	13.83	11.36	2.203
2	13.87	13.60	2.021

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 13.83 Tc(MIN.) = 11.36
TOTAL AREA(ACRES) = 8.6
LONGEST FLOWPATH FROM NODE 20.00 TO NODE 21.00 = 820.00 FEET.

FLOW PROCESS FROM NODE 21.00 TO NODE 22.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(Feet) = 1272.00 DOWNSTREAM(Feet) = 1270.50
FLOW LENGTH(Feet) = 286.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.2 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.) = 5.72
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 13.83
PIPE TRAVEL TIME(MIN.) = 0.83 Tc(MIN.) = 12.20
LONGEST FLOWPATH FROM NODE 20.00 TO NODE 22.00 = 1106.00 FEET.

FLOW PROCESS FROM NODE 22.00 TO NODE 22.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM	RUNOFF	Tc	INTENSITY	AREA
--------	--------	----	-----------	------

DEV10

NUMBER	(CFS)	(MIN.)	(INCH/HOUR)	(ACRE)
1	13.83	12.20	2.130	8.62

LONGEST FLOWPATH FROM NODE 20.00 TO NODE 22.00 = 1106.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	12.42	25.56	1.492	9.06

LONGEST FLOWPATH FROM NODE 10.00 TO NODE 22.00 = 2411.00 FEET.

*****WARNING*****

IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	19.75	12.20	2.130
2	22.11	25.56	1.492

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 19.75 Tc(MIN.) = 12.20
TOTAL AREA(ACRES) = 17.7

FLOW PROCESS FROM NODE 22.00 TO NODE 22.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 1 <<<<<

FLOW PROCESS FROM NODE 22.00 TO NODE 23.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(Feet) = 1270.50 DOWNSTREAM(Feet) = 1264.50
FLOW LENGTH(Feet) = 168.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 12.7 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.) = 13.04
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 19.75
PIPE TRAVEL TIME(MIN.) = 0.21 Tc(MIN.) = 12.41
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 23.00 = 2579.00 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 17.7 TC(MIN.) = 12.41
PEAK FLOW RATE(CFS) = 19.75

END OF RATIONAL METHOD ANALYSIS

Appendix A-2

RATIONAL METHOD CALCULATIONS

PROPOSED CONDITION

1. 100 - YEAR STORM

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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
 RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
 (RCFC&WCD) 1978 HYDROLOGY MANUAL
 (c) Copyright 1982-2016 Advanced Engineering Software (aes)
 (Rational Tabling Version 23.0)
 Release Date: 07/01/2016 License ID 1269

Analysis prepared by:

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 Email: mdsirvine@mdsconsulting.net

***** DESCRIPTION OF STUDY *****

* TENTATIVE TRACT 38116 *
 * PRELIMINARY PROPOSED HYDROLOGY *
 * 100-YEAR STORM EVENT *

FILE NAME: C:\AES2016\HYDROSFT\RATSCX\89490\89490DEV.DAT
 TIME/DATE OF STUDY: 11:03 08/05/2021

 USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

USER SPECIFIED STORM EVENT(YEAR) = 100.00
 SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
 10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) = 2.320
 10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 0.980
 100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) = 3.540
 100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.500
 SLOPE OF 10-YEAR INTENSITY-DURATION CURVE = 0.4809628
 SLOPE OF 100-YEAR INTENSITY-DURATION CURVE = 0.4792280

COMPUTED RAINFALL INTENSITY DATA:

STORM EVENT = 100.00 1-HOUR INTENSITY(INCH/HOUR) = 1.500
 SLOPE OF INTENSITY DURATION CURVE = 0.4792

RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD

NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
 AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	18.0	13.0	0.020/0.020/0.020	0.50	2.00 0.0313 0.125	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.50 FEET
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN

DEV100
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

FLOW PROCESS FROM NODE 10.00 TO NODE 11.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

ASSUMED INITIAL SUBAREA UNIFORM
DEVELOPMENT IS CONDOMINIUM

TC = $K * [(LENGTH ** 3) / (ELEVATION\ CHANGE)] ** .2$
INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00
UPSTREAM ELEVATION(FEET) = 1294.20
DOWNSTREAM ELEVATION(FEET) = 1284.20
ELEVATION DIFFERENCE(FEET) = 10.00
TC = $0.359 * [(1000.00 ** 3) / (10.00)] ** .2 = 14.300$
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.982
CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .8181
SOIL CLASSIFICATION IS "B"
SUBAREA RUNOFF(CFS) = 10.47
TOTAL AREA(ACRES) = 4.29 TOTAL RUNOFF(CFS) = 10.47

FLOW PROCESS FROM NODE 11.00 TO NODE 12.00 IS CODE = 62

>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 1284.20 DOWNSTREAM ELEVATION(FEET) = 1278.50
STREET LENGTH(FEET) = 800.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 13.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 14.44
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.44
HALFSTREET FLOOD WIDTH(FEET) = 16.40
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.54
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.13
STREET FLOW TRAVEL TIME(MIN.) = 5.24 Tc(MIN.) = 19.54
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.568
CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .8087
SOIL CLASSIFICATION IS "B"
SUBAREA AREA(ACRES) = 3.82 SUBAREA RUNOFF(CFS) = 7.93
TOTAL AREA(ACRES) = 8.1 PEAK FLOW RATE(CFS) = 18.40

END OF SUBAREA STREET FLOW HYDRAULICS:

DEV100

DEPTH(FEET) = 0.48 HALFSTREET FLOOD WIDTH(FEET) = 18.00
 FLOW VELOCITY(FEET/SEC.) = 2.71 DEPTH*VELOCITY(FT*FT/SEC.) = 1.29
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 12.00 = 1800.00 FEET.

FLOW PROCESS FROM NODE 12.00 TO NODE 13.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1273.00 DOWNSTREAM(FEET) = 1272.00
 FLOW LENGTH(FEET) = 165.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 18.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.54
 ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 18.40
 PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 19.96
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 13.00 = 1965.00 FEET.

FLOW PROCESS FROM NODE 13.00 TO NODE 22.00 IS CODE = 52

>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<
 >>>>TRAVELTIME THRU SUBAREA<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1272.00 DOWNSTREAM(FEET) = 1270.50
 CHANNEL LENGTH THRU SUBAREA(FEET) = 446.00 CHANNEL SLOPE = 0.0034
 CHANNEL FLOW THRU SUBAREA(CFS) = 18.40
 FLOW VELOCITY(FEET/SEC) = 1.70 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) = 4.37 Tc(MIN.) = 24.33
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 22.00 = 2411.00 FEET.

FLOW PROCESS FROM NODE 22.00 TO NODE 22.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.312
 UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6193
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) = 0.95 SUBAREA RUNOFF(CFS) = 1.36
 TOTAL AREA(ACRES) = 9.1 TOTAL RUNOFF(CFS) = 19.76
 TC(MIN.) = 24.33

FLOW PROCESS FROM NODE 22.00 TO NODE 22.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<

FLOW PROCESS FROM NODE 20.00 TO NODE 21.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

=====

ASSUMED INITIAL SUBAREA UNIFORM
DEVELOPMENT IS CONDOMINIUM

TC = $K * [(LENGTH^{**3}) / (ELEVATION\ CHANGE)]^{**0.2}$
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 820.00
 UPSTREAM ELEVATION(FEET) = 1294.20
 DOWNSTREAM ELEVATION(FEET) = 1276.80
 ELEVATION DIFFERENCE(FEET) = 17.40
 TC = $0.359 * [(820.00^{**3}) / (17.40)]^{**0.2}$ = 11.364
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.330
 CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .8246
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) = 14.94
 TOTAL AREA(ACRES) = 5.44 TOTAL RUNOFF(CFS) = 14.94

FLOW PROCESS FROM NODE 21.00 TO NODE 21.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 11.36
 RAINFALL INTENSITY(INCH/HR) = 3.33
 TOTAL STREAM AREA(ACRES) = 5.44
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 14.94

FLOW PROCESS FROM NODE 30.00 TO NODE 21.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

ASSUMED INITIAL SUBAREA UNIFORM
DEVELOPMENT IS CONDOMINIUM

TC = $K * [(LENGTH^{**3}) / (ELEVATION\ CHANGE)]^{**0.2}$
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 689.00
 UPSTREAM ELEVATION(FEET) = 1281.00
 DOWNSTREAM ELEVATION(FEET) = 1276.80
 ELEVATION DIFFERENCE(FEET) = 4.20
 TC = $0.359 * [(689.00^{**3}) / (4.20)]^{**0.2}$ = 13.603
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.055
 CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .8196
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) = 7.96
 TOTAL AREA(ACRES) = 3.18 TOTAL RUNOFF(CFS) = 7.96

FLOW PROCESS FROM NODE 21.00 TO NODE 21.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

DEV100

TIME OF CONCENTRATION(MIN.) = 13.60
RAINFALL INTENSITY(INCH/HR) = 3.05
TOTAL STREAM AREA(ACRES) = 3.18
PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.96

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	14.94	11.36	3.330	5.44
2	7.96	13.60	3.055	3.18

*****WARNING*****

IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	21.59	11.36	3.330
2	21.66	13.60	3.055

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 21.59 Tc(MIN.) = 11.36
TOTAL AREA(ACRES) = 8.6
LONGEST FLOWPATH FROM NODE 20.00 TO NODE 21.00 = 820.00 FEET.

FLOW PROCESS FROM NODE 21.00 TO NODE 22.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(Feet) = 1272.00 DOWNSTREAM(Feet) = 1270.50
FLOW LENGTH(Feet) = 286.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 21.8 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.) = 6.27
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 21.59
PIPE TRAVEL TIME(MIN.) = 0.76 Tc(MIN.) = 12.12
LONGEST FLOWPATH FROM NODE 20.00 TO NODE 22.00 = 1106.00 FEET.

FLOW PROCESS FROM NODE 22.00 TO NODE 22.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM	RUNOFF	Tc	INTENSITY	AREA
--------	--------	----	-----------	------

DEV100

NUMBER	(CFS)	(MIN.)	(INCH/HOUR)	(ACRE)
1	21.59	12.12	3.228	8.62

LONGEST FLOWPATH FROM NODE 20.00 TO NODE 22.00 = 1106.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	19.76	24.33	2.312	9.06

LONGEST FLOWPATH FROM NODE 10.00 TO NODE 22.00 = 2411.00 FEET.

*****WARNING*****

IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	31.43	12.12	3.228
2	35.22	24.33	2.312

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 31.43 Tc(MIN.) = 12.12
TOTAL AREA(ACRES) = 17.7

FLOW PROCESS FROM NODE 22.00 TO NODE 22.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 1 <<<<

FLOW PROCESS FROM NODE 22.00 TO NODE 23.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(Feet) = 1270.50 DOWNSTREAM(Feet) = 1264.50
FLOW LENGTH(Feet) = 168.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.6 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.) = 14.57
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 31.43
PIPE TRAVEL TIME(MIN.) = 0.19 Tc(MIN.) = 12.32
LONGEST FLOWPATH FROM NODE 10.00 TO NODE 23.00 = 2579.00 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 17.7 TC(MIN.) = 12.32
PEAK FLOW RATE(CFS) = 31.43

END OF RATIONAL METHOD ANALYSIS

Appendix B

REFERENCES

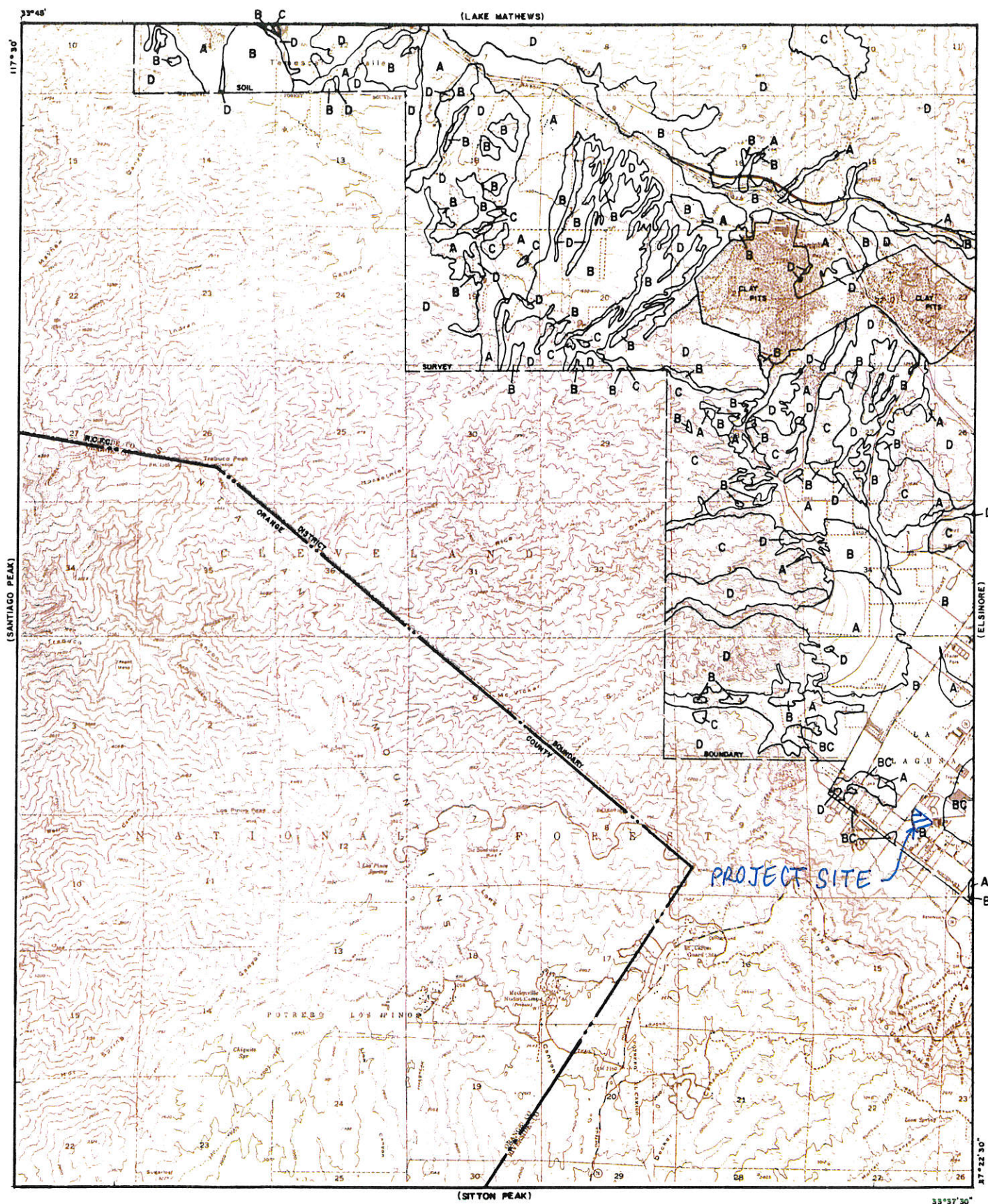
MDS CONSULTING	MORSE	17320 Redhill Ave. Suite 350 Irvine, CA 92614 Voice: 949-251-8821 FAX: 949-251-0516
	SCHULTZ	
PLANNERS ENGINEERS SURVEYORS		

RAINFALL INTENSITY-INCHES PER HOUR

CATHEDRAL CITY			CHERRY VALLEY			CORONA			DESERT HOT SPRINGS			ELSINORE - WILDOMAR		
DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR
5	4.14	6.76	5	3.65	5.49	5	3.10	4.78	5	4.39	6.76	5	3.23	4.94
6	3.73	6.08	6	3.30	4.97	6	2.84	4.38	6	3.95	6.08	6	2.96	4.53
7	3.41	5.56	7	3.03	4.56	7	2.64	4.07	7	3.62	5.56	7	2.75	4.21
8	3.15	5.15	8	2.82	4.24	8	2.47	3.81	8	3.35	5.15	8	2.58	3.95
9	2.95	4.81	9	2.64	3.97	9	2.34	3.60	9	3.13	4.81	9	2.44	3.73
10	2.77	4.52	10	2.49	3.75	10	2.22	3.43	10	2.94	4.52	10	2.32	3.54
11	2.62	4.28	11	2.36	3.56	11	2.12	3.27	11	2.78	4.28	11	2.21	3.39
12	2.49	4.07	12	2.25	3.39	12	2.04	3.14	12	2.65	4.07	12	2.12	3.25
13	2.38	3.88	13	2.16	3.25	13	1.96	3.02	13	2.53	3.88	13	2.04	3.13
14	2.28	3.72	14	2.07	3.12	14	1.89	2.92	14	2.42	3.72	14	1.97	3.02
15	2.19	3.58	15	1.99	3.00	15	1.83	2.82	15	2.32	3.58	15	1.91	2.92
16	2.11	3.44	16	1.92	2.90	16	1.77	2.73	16	2.24	3.44	16	1.85	2.83
17	2.04	3.32	17	1.86	2.80	17	1.72	2.66	17	2.16	3.32	17	1.80	2.75
18	1.97	3.22	18	1.80	2.71	18	1.68	2.58	18	2.09	3.22	18	1.75	2.67
19	1.91	3.12	19	1.75	2.64	19	1.63	2.52	19	2.03	3.12	19	1.70	2.60
20	1.85	3.03	20	1.70	2.56	20	1.59	2.46	20	1.97	3.03	20	1.66	2.54
22	1.75	2.86	22	1.61	2.43	22	1.52	2.35	22	1.86	2.86	22	1.59	2.43
24	1.67	2.72	24	1.54	2.32	24	1.46	2.25	24	1.77	2.72	24	1.52	2.33
26	1.59	2.60	26	1.47	2.22	26	1.40	2.17	26	1.69	2.60	26	1.46	2.24
28	1.52	2.49	28	1.41	2.13	28	1.36	2.09	28	1.62	2.49	28	1.41	2.16
30	1.46	2.39	30	1.36	2.05	30	1.31	2.02	30	1.55	2.39	30	1.37	2.09
32	1.41	2.30	32	1.31	1.98	32	1.27	1.96	32	1.50	2.30	32	1.33	2.03
34	1.36	2.22	34	1.27	1.91	34	1.23	1.90	34	1.45	2.22	34	1.29	1.97
36	1.32	2.15	36	1.23	1.85	36	1.20	1.85	36	1.40	2.15	36	1.25	1.92
38	1.28	2.09	38	1.20	1.80	38	1.17	1.81	38	1.36	2.09	38	1.22	1.87
40	1.24	2.02	40	1.16	1.75	40	1.14	1.76	40	1.32	2.02	40	1.19	1.82
45	1.16	1.89	45	1.09	1.64	45	1.08	1.66	45	1.23	1.89	45	1.13	1.72
50	1.09	1.78	50	1.03	1.55	50	1.03	1.58	50	1.16	1.78	50	1.07	1.64
55	1.03	1.68	55	.98	1.47	55	.98	1.51	55	1.09	1.68	55	1.02	1.56
60	.98	1.60	60	.93	1.40	60	.94	1.45	60	1.04	1.60	60	.98	1.50
65	.94	1.53	65	.89	1.34	65	.90	1.40	65	.99	1.53	65	.94	1.44
70	.90	1.46	70	.85	1.29	70	.87	1.35	70	.95	1.46	70	.91	1.39
75	.86	1.41	75	.82	1.24	75	.84	1.30	75	.91	1.41	75	.88	1.35
80	.83	1.35	80	.79	1.20	80	.82	1.26	80	.88	1.35	80	.85	1.31
85	.80	1.31	85	.77	1.16	85	.80	1.23	85	.85	1.31	85	.83	1.27
SLOPE = .580			SLOPE = .550			SLOPE = .480			SLOPE = .580			SLOPE = .480		

RCFC & WCD
HYDROLOGY MANUAL

STANDARD
INTENSITY-DURATION
CURVES DATA



LEGEND

— SOILS GROUP BOUNDARY
 A SOILS GROUP DESIGNATION

RCFC & WCD
 HYDROLOGY MANUAL

0 FEET 5000

**HYDROLOGIC SOILS GROUP MAP
 FOR
 ALBERHILL**

Appendix C

POCKET MAP EXHIBIT

MDS
CONSULTING

MORSE

SCHULTZ

17320 Redhill Ave.

Suite 350

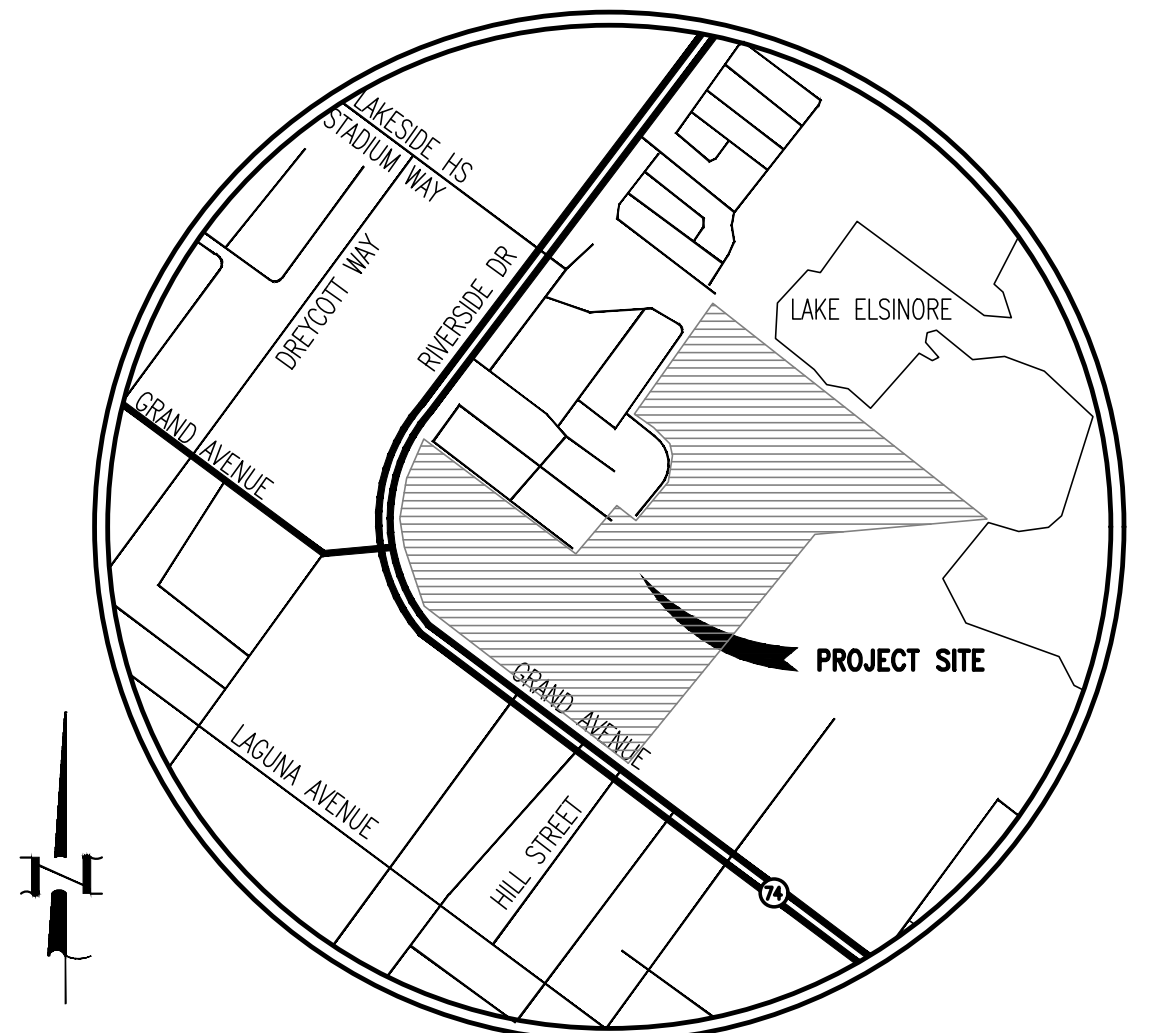
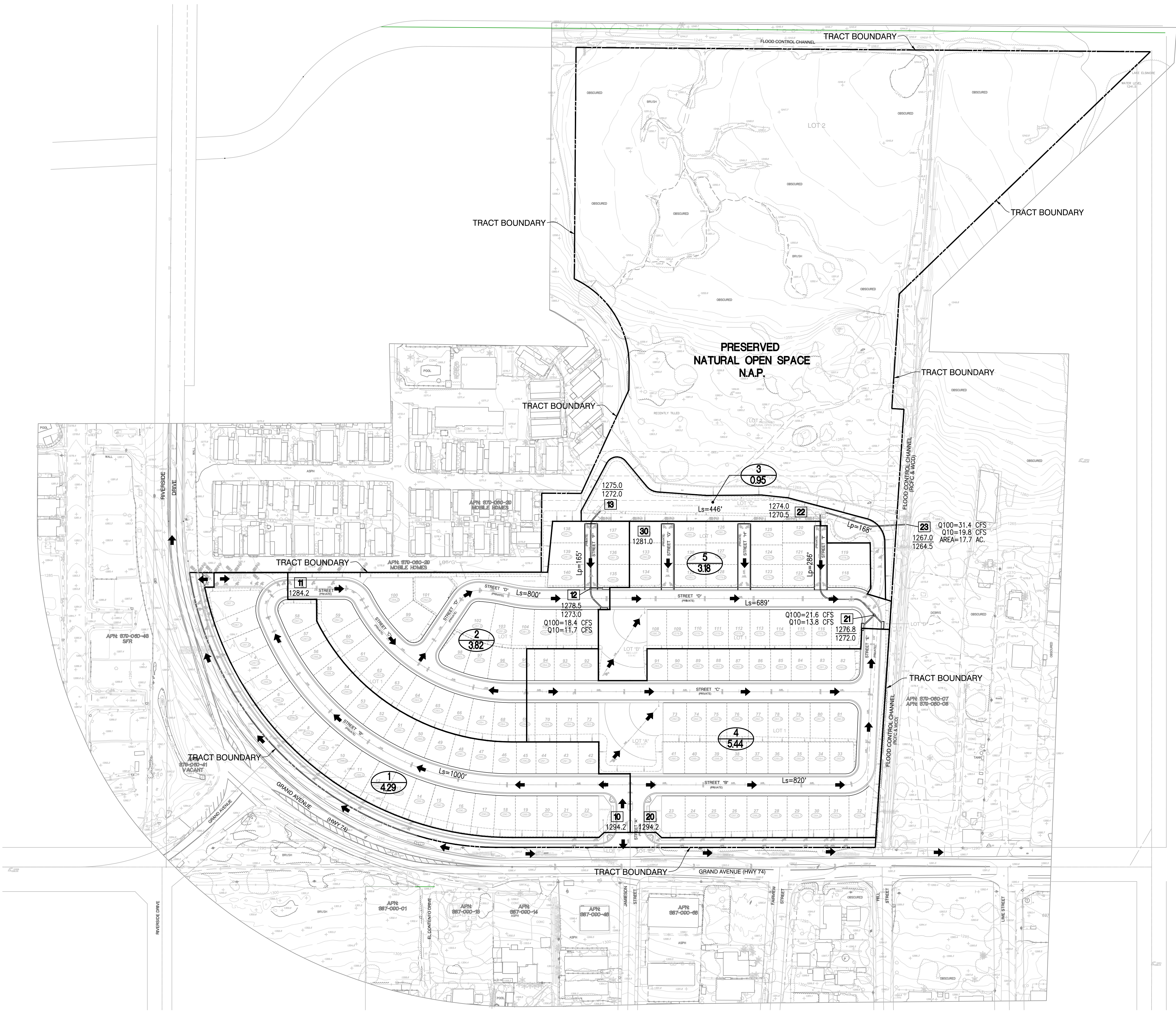
Irvine, CA 92614

Voice: 949-251-8821

FAX: 949-251-0516

PLANNERS ENGINEERS SURVEYORS

Date	By	REVISIONS	App'd



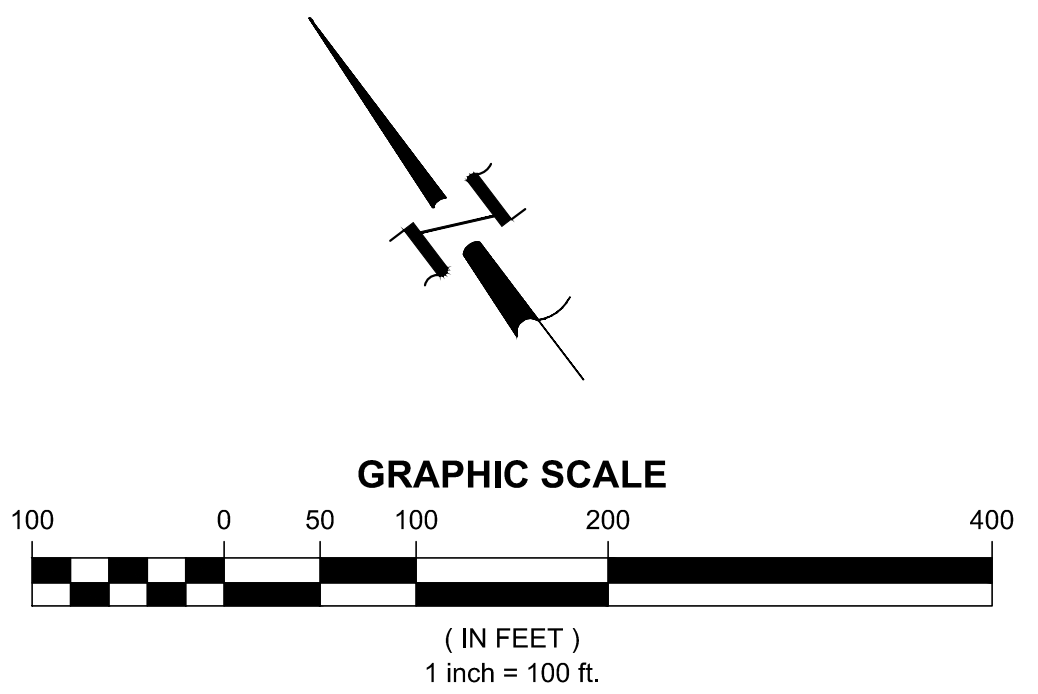
VICINITY MAP
N.T.S.
2006 THOMAS BROTHERS
MAP BOOK, PAGES 865, GRID H6

NOTE:

SOIL TYPE "B"

LEGEND

- 1/10: DRAINAGE AREA No. / DRAINAGE AREA (ACRE)
- 25: NODE NUMBER / FINISH SURFACE ELEVATION / INVERT ELEVATION
- 28: NODE NUMBER / FINISH SURFACE ELEVATION
- Arrow: DIRECTION OF FLOW
- Line: DRAINAGE AREA BOUNDARY
- Lp=25': LENGTH OF PIPE (FEET)
- Ls=120': SURFACE FLOW LENGTH (FEET)



APPLICANT/DEVELOPER/OWNER

tri pointe
HOMES
1250 Corona Pointe Court
Suite 600
Corona, CA 92879
(951) 428-4400

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Suite 300
Irvine, CA 92614
Voice: 949-251-8821
FAX: 949-251-0516

PLATE
1



TENTATIVE TRACT NO. 38116
LAKESIDE
PROPOSED HYDROLOGY MAP