Appendix C Preliminary Drainage Study

Appendix

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Preliminary Drainage Study

Creekside

San Juan Capistrano, California

January 10, 2020

Prepared for

Integral Communities

Prepared by

KHR ASSOCIATES
Consulting Engineers - Surveyors - Planners

ATTESTATION

This report has been prepared by, and under the direction of, the undersigned, a duly Registered Civil Engineer in the State of California. Except as noted, the undersigned attests to the technical information contained herein, and has judged to be acceptable the qualifications of any technical specialists providing engineering data for this report, upon which findings, conclusions, and recommendations are based.

James H. Kawamura, P.E.
Registered Civil Engineer No. C30560
Exp. 3/31/22

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APPENDIX

Section 1 Purpose and Scope

This drainage study presents an analysis of the hydrology associated with the proposed residential development located on the intersection of Rancho Viejo Road and Malaspina Road, in the City of San Juan Capistrano, County of Orange. The study details the general project characteristics, the design, criteria and methodology applied to the analysis of the area in terms of drainage and associated conveyance facilities.

The plans and specifications in the drainage study are not for construction purposes; the contractor shall refer to final approved construction documents for plans and specifications.

Section 2 Project Information

2.1 Project Description

The proposed "Creekside" residential development entails the demolition of an existing surface parking lot, landscaping, and single story vacant building for the new construction of approximately 16.877 acres for 107 single-family residences and 81 town home units. The proposed project includes realignment of a portion of Rancho Viejo Road, private interior streets, driveways, visitor parking spaces, sidewalks, landscaping, a community recreation center, and various open space areas.

2.1.1 Project Location

Figure 1 below illustrates the project vicinity and Figure 2 provides an aerial perspective of the project site and immediate surroundings.

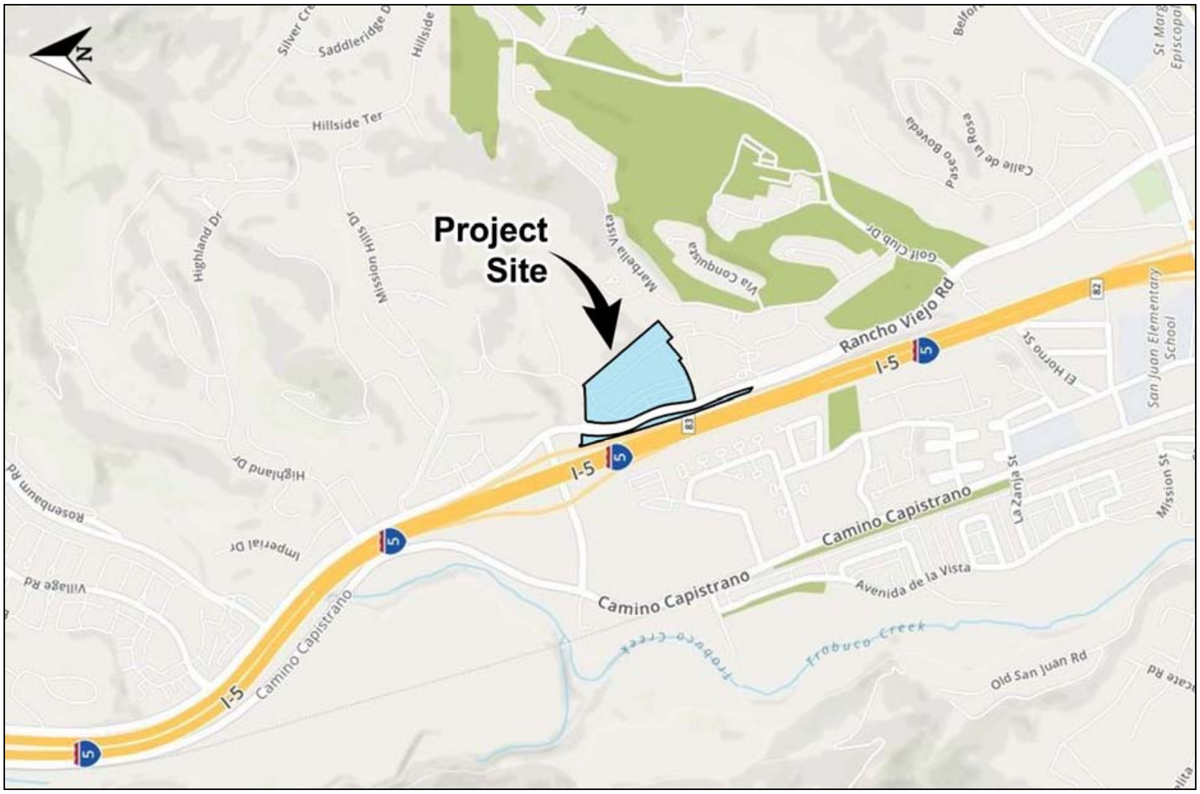


Figure 1 – Project Vicinity Map

Figure 2 – Aerial Perspective of Project Site

2.2 Hydrologic Setting

This section summarizes the project's size and location in the context of the larger watershed perspective, topography, soil and vegetation conditions, percent impervious area, natural and infrastructure drainage features, and other relevant hydrologic and environmental factors to be protected specific to the project area's watershed.

2.2.1 Watershed

The proposed project is located within the 29 square mile San Juan Creek Watershed. The receiving waters directly affected by the proposed development includes Arroyo Trabuco Creek.

2.2.2 Existing Topography, Drainage Patterns, and Facilities (Narrative)

The site topography has an elevation change of 76 feet from the east boundary to the northwest portion.

Rancho Viejo Road slopes from south to north and Malaspina Road slopes from east to west. The project site receives run-on from the hillside located on the east portion. The hillside consists of concrete storm ditches that direct runoff onto the site at two different directions towards the easterly parking lot. Runoff on the property flows westerly towards Rancho Viejo Road along the curb and gutter until it is collected by one of the six catch basins located near the westerly property line. All catch basins connect to the City's storm drain line which varies in size from 15", 18", 21", 36", 42", and 48". The City storm drain line runs from the southeast corner of the project site and travels the southern portion of the site in a westerly direction, passing through the Interstate 5 and residential areas on Camino Capistrano Street to the west. Furthermore, the runoff then travels into the San Juan Creek and disperses into the Pacific Ocean at Doheny State Beach.

2.2.3 Adjacent Land Use

The project site is bounded by community developments to both the east and south. Rancho Viejo Road and Interstate 5 freeway is located to the west. To the north is existing residential development, commercial buildings, and open space.

2.2.4 Soil Conditions

According to the County of Orange Soils Map, the soil near the project site generally consists of soil type D (see Appendix 1).

2.2.5 Downstream Conditions

This section summarizes the existing downstream conditions and any conditions of concern with respect to erosion and/or sedimentation due to the proposed project.

The project's stormwater flows westerly towards Rancho Viejo Road and will ultimately be collected by multiple catch basins that are spread out on the project site. All catch basins will be connected to the City storm drain line and will be collected by an existing 42-inch increasing to 48-inch City storm drain pipe. The storm drain system will be connecting to various residential areas therefore, the site runoff will join captured flows from different areas. All sheet flows will be discharged into the San Juan Creek.

According to the San Juan Capistrano Hydromodification Exemption Map (see Appendix 9), the proposed catch basins and associated storm drain system that collects runoff on Rancho Viejo Road is exempt from hydromodification. The runoff collected on Malaspina Road is not exempt from hydromodification requirements.

2.2.6 Impervious Cover

The proposed project will have a net increase in total impervious area compared to the existing condition of the site. Currently, the project site is being occupied by an existing building, landscape, and multiple parking lots with a total imperviousness percentage of 54% and perviousness of 46%. The proposed residential project increases the site's overall total imperviousness percentage to 86% and decreases perviousness to 14%.

2.3 Proposed Runoff Management Facilities

The proposed facilities managing runoff from the area include:

- ❑ Water quality treatment control Best Management Practices (BMPs); specifically, Modular Wetlands stormwater systems.

- ❑ Three proposed detention tanks will be placed on the southwest side of the project site with a sizing of two 6.0' DIA x 143' and 6.0' DIA x 269'.

- ❑ A proposed drainage system will drain the project area to multiple catch basins draining towards Rancho Viejo Road and will connect into the City of San Juan Capistrano storm drain network.

Section 3 Design Criteria and Methodology

This section summarizes the design criteria and methodology applied during the drainage analysis of the project site. The design criteria and methodology follows the Orange County Drainage Area Management Plan (DAMP 2003) and the Orange County Hydrology Manual (October 1986).

3.1 Design Criteria

3.1.1 Drainage Design Criteria

Local storm drain facilities have been designed to conform to City of San Juan Capistrano, and Orange County Standards.

3.1.2 Volume-Based Water Quality Numeric Sizing

Volume-based BMPs are designed to capture and treat what is usually described as the "first flush" of runoff from a storm event. Volume-based BMPs include extended retention basins, wet retention basins, retention/infiltration systems and water quality treatment wetlands.

The sizing criterion used for volume-based Best Management Practices is described in this project's WQMP report.

3.1.3 Flow-Based Numeric Sizing

The capacity of the existing storm drain system has been established by analyzing the existing flow of the 25-year and 100-year storm events.

Flow-based BMPs have been designed to filter or otherwise treat the "first flush" of runoff from any given storm event. Flow-based BMPs include bio-filtration systems (e.g., Modular Wetlands Systems). The sizing criterion used for flow-based BMPs can be found in this project's WQMP.

3.1.4 Runoff Calculation Method

Runoff calculations for this study were accomplished using the Orange County Hydrology Rational Method. The Rational Method is a physically-based numerical method where runoff is assumed to be directly proportional to rainfall and area, less losses for infiltration and depression storage. Flows were computed based on the rational formula:

Q = 0.9 (I – Fm) A

Where:

Q = peak discharge (cfs, cubic feet per second)

C = runoff coefficient, based on land use and soil type

I = rainfall intensity (inches/hour)

A = watershed area (acres)

Fm = rate of runoff (inches/hour)

The watershed time of concentration at any given point is defined as the time it would theoretically take runoff to travel from the most upstream point in the watershed to a concentration point, as estimated by the Time of Concentration Nomograph for Initial Subarea (Figure D-4 within the Orange County Hydrology Manual and the appendix section of this report).

Intensity for this site was determined by the intensity-duration curves from the Orange County Hydrology Manuals Figure's B-3 and B-4. The runoff coefficient represents the ratio of rainfall that runs off the watershed versus the portion that infiltrates to the soil or is held in depression storage. The runoff coefficient (C) is dependent on rainfall intensity (I), soil infiltration rate (Fp), and impervious/pervious area fractions (a_i and a_p).

Rational Method calculations were accomplished using hand calculations. Peak discharges were computed for both 25-year and 100-year hypothetical storm return frequencies and can be seen in the hydrology and drainage analysis section of this report. The output results of the calculations can be found in the Appendix section of this report.

3.2 South Orange County Hydrology Model (SOCHM)

The South Orange County Hydrology Model software, developed and provided by Clear Creek Solutions, Inc., is a tool that calculates various parameters for analyzing hydromodification effects of predevelopment/post- project conditions and provides sizing solutions to mitigate the increased runoffs. It provides appropriate data and runs continuous simulations of site runoff to generate flow duration curves, a module for sizing or checking control measure to achieve the hydromodification control standard; and a reporting module. The peak flood values were computed for the 2-year through 25-year flood frequency. A comparison of the predevelopment and post-project flow duration curves is conducted for 100 flow levels between the lower and the upper limit. It produces a final model that counts the number of 15-minute intervals that predevelopment flows exceed each of the flow levels during the entire simulation period.

The design criteria and methodology follows the South Orange County Hydromodification Management Plan (HMP 2017) and the South Orange County Hydrology Model Guidance Manual (March 2012).

Section 4 Hydrology and Drainage Analysis

This section summarizes the quantitative hydrologic analysis of the existing and proposed conditions of the site.

4.1 Summary of Drainage Delineation

Existing Analysis Part 1 - Catch Basin #1 and Area 1 (City Main on Rancho Viejo):

The existing site is divided into 19 subareas (subareas A-S). An analysis of the existing 25-year and 100-year storms can be found in the Appendix section of this report.

East of the property there is an existing hill with a high point roughly near the middle from west to east that divides flows.

Area 1:

System 1: Runoff from subareas B and C on the same hill are directed southeast to an existing storm drain headwall #1A. This headwall directs the runoff to an existing 36" storm drain line directed towards the city's public system of drainage.

System 2: Runoff from subarea L flows to an existing catch basin A to combine with runoff from subarea K of the next southerly adjacent catch basin B. Subareas L and K combine with Subarea J in the 3rd adjacent catch basin C at the east side of the property. This runoff joins runoff in the existing 36" private storm drain system System 1:

Catch Basin #1:

System 3: Subarea A from the existing hill flows southwest into an existing storm drain inlet #2. The inlet joins an existing headwall empties near the adjacent Fluidmasters property, and enters another existing headwall flowing west to Rancho Viejo. This runoff then flows north to Rancho Viejo directly towards and entering Catch Basin #1:

System 4: Subareas D and E from the southerly side of the hill combine with subarea F flowing south towards the existing access road. This runoff flows west combing with subarea G, then H, flowing west towards Rancho Viejo, next to combine with subarea I and S on the same street to combine with System 3 to lead directly into Catch Basin #1.

Systems 1 through 4 combine in the existing 36" storm drain structure going towards the public city system.

Summary:
- Subareas entering Catch Basin #1 and #1A Directly: A, D, E, F, G, H, I, S
- Subareas entering Area #1: B, C, J, K, L.
- Note: All are combined at the City Main beyond the property line.

Existing Analysis Part 2 – Catch Basin #2 and Catch Basin #3 (City Main on Rancho Viejo / Malaspina Road)

Catch Basin #2:

System 1: Runoff generated from Q and P flow northwest towards Rancho Viejo to combine with Subarea R. The total runoff crosses an existing cross gutter to enter Catch Basin 2.

Catch Basin #3:

System 2: Subareas M and N flow northwest from the high point on the existing hill east of the property. This runoff combines with runoff generated from subarea O, runs west along Malaspina Road to an existing 18" storm drain structure. This combines with runoff generated from System 1. The total runoff from systems 1 and 2 join an existing 48" storm piping system owned and maintained by the City.

Summary:
- Subareas entering Catch Basin #2 Directly: P, Q, R
- Subareas entering Catch Basin 3: M, N, O
- Note: All are combined at the City Main.

Proposed Analysis Part 1 – Catch Basin #1 and Area 1 (City Main on Rancho Viejo / Malaspina Road)

The proposed site is divided into 24 subareas (subareas A-W). An analysis of the proposed 25-year and 100-year storms can be found in the Appendix section of this report.

Catch Basin #1:

System 1: Subareas B and C are directed by drainage ditches to a proposed inlet on the east side of the proposed retaining wall. This runoff flows through a storm piping system to a proposed junction structure that joins the existing 36" storm drain line to empty near the adjacent Fluid Masters property.

System 2: Subarea A from the existing hill flows southwest into an existing storm drain inlet. The inlet joins the existing 36" storm drain line that empties through the same existing headwall located adjacent to the Fluidmasters property and combines with runoff generated from System 1. Next, this runoff flows through another storm piping system to empty on the south side of Rancho Viejo, flowing north.

System 3: Subarea T runs west along the access road to an existing inlet. This runoff combines with System 2 to flow towards Rancho Viejo Road to combine with Subarea U to eventually enter Catch Basin #1.

Area 1:

System 1: Subarea D and Q goes to a proposed catch basin, treated by a modular wetland unit, and combines on the southwest side of the proposed site.

System 2: Subarea E runs to a proposed inlet then through a storm piping system to the proposed tank at the southwest end of the site.

System 3: Subareas M, R, and S goes to a proposed catch basin, to be treated by a modular wetland unit, then enters into the proposed detention tank.

System 4: Subarea G, I, J, K, L, N, O, and P goes to its respective catch basin, to be treated by a modular wetlands unit, then flows towards Rancho Viejo through a storm piping structure to join the existing 36" storm drain city combining with systems 1, 2, and 3.

System 5: Subarea Q-1 combines at an inlet and enters the proposed tank on the southwest side of the proposed site.

Summary:

- Subareas entering Catch Basin #1 Directly: A, B, C, T, U
- Subareas not entering Catch Basin #1 Directly but through City Main:
- D, E, G, I, J, K, L, M, N, O , P, Q, Q-1, R, S

Proposed Analysis Part 2 – Catch Basins #2 and Catch Basin #3 (City Main on Rancho Viejo / Malaspina Road)

Catch Basin #2:

System 1: Subarea V flows north along Rancho Viejo Road to Enter Catch Basin # 2.

Catch Basin #3:

System 2: Subarea F and H from the existing hill flows northwest to a proposed inlet on the east side of the proposed retaining wall. This runoff flows through a storm piping system northerly towards a proposed parkway culvert on Malaspina Road.

System 3: Subarea W is generated from the north side of the proposed retaining wall. This runoff enters Malaspina to combine with system 2 to eventually enter Catch Basin #3.

Both Systems 2 and 3 combine into the existing 48" storm drain city main.

Summary:

- Subareas entering Catch Basin #2 Directly: V
- Subareas entering Catch Basin #3 Directly: F, H, W
- Note: All are combined at the City Main.

4.2 Summary of Results

The overall stormwater runoff produced in the existing and proposed condition is displayed in the tables provided below.

Existing Conditions

	Q_{25} (cfs)	Q_{100} (cfs)	Area (ac)
Catch Basin 1 & 1A	31.18	39.99	10.50
Area 1	39.28	50.27	11.93
Combined	70.46	90.26	22.43

	Q_{25} (cfs)	Q_{100} (cfs)	Area (ac)
Catch Basin 2	8.71	11.13	2.74
Catch Basin 3	8.45	10.80	2.68
Combined	17.16	21.93	5.42

$Q_{(25)total}$= 87.62 cfs
$Q_{(100)total}$= 112.19 cfs

Proposed Conditions

	Q_{25} (cfs)	Q_{100} (cfs)	Area (ac)
Catch Basin 1	27.98	35.98	9.96
Area 1	49.09	62.85	14.72
Combined	77.07	98.83	24.68

	Q_{25} (cfs)	Q_{100} (cfs)	Area (ac)
Catch Basin 2	5.45	6.99	1.69
Catch Basin 3	5.98	7.72	1.72
Combined	11.43	14.71	3.41

$Q_{(25)total}$= 88.50 cfs
$Q_{(100)total}$= 113.54 cfs

The following tables below summarizes the results of a storm event of 100-years for the on-site peak runoff for existing conditions for comparison to the proposed conditions on discharge point #1. The proposed on-site conditions has a higher flowrate of 62.85 cfs compared to the existing on-site rate of 52.09 due to an increase of imperviousness, the design of the private storm drain system, and the lot line adjustment. A portion of the water will be needed to be detained on-site and will be directed to the tanks (See appendix 7 for Hydrograph).

Existing Conditions

Point of Discharge	Area	Q_{100} (cfs)
1	On-site	52.09

Proposed Conditions

Point of Discharge	Area	Q_{100} (cfs)
1	On-site	62.85

Tank Storage Capacity			
Tank	**Detention volume needed (ft^3)**	**CMP Diameter & Length (ft.)**	**$V_{storage\ tank\ provided}$ (ft^3)**
A	15,300	6’x143’	4,043
B		6’x143’	4,043
C		6’x269’	7,606
Total			15,692

4.3 Hydromodification

SOCHM software by Clear Creek Solutions, Inc. was used to analyze the hydromodification effects for the off-site hillside area draining to Malaspina Road. According to the calculations, at the project's flow level the flow control standards were met (see Appendix 8 for the SOHM calculations). The proposed flow rates did not exceed the pre development flow rates and are within the threshold therefore, the project does not require any hydromodification mitigation controls.

4.4 Conclusion

The proposed conditions has a higher flow rate compared to the existing flow rate due to an increase of imperviousness, the design of the proposed storm drain system, and lot line adjustment. The proposed stormwater runoff will be picked up by the private storm drain system and will flow into multiple modular wetland units for pre-treatment, then will be routed to the City storm drain network. In order for the stormwater in the proposed conditions to match with the existing conditions, the proposed tanks need to hold 15,300 cubic feet of water. The tanks has the capacity to store up to 15,692 cubic feet, which detains more than the required detention volume of 15,300 cubic feet. All tanks are sufficient to hold the required volume of stormwater before the runoff is allowed to be discharged onto the existing storm drain pipe.

APPENDIX

Appendix 1

Soils Map

ORANGE COUNTY
HYDROLOGY MANUAL

LEGEND

A B C D HYDROLOGIC SOIL GROUPS

HYDROLOGIC SOIL GROUP BOUNDARY

SOURCES:

BASE MAP - ORANGE COUNTY/RESOURCES & DEVELOPMENT MANAGEMENT DEPT GEOMATICS AND LAND INFORMATION SYSTEMS DIVISION

SOIL GROUPS - SOIL SURVEY OF ORANGE COUNTY AND WESTERN PART OF RIVERSIDE COUNTY, CALIFORNIA, USDA, SOIL CONSERVATION SERVICE, 1978.

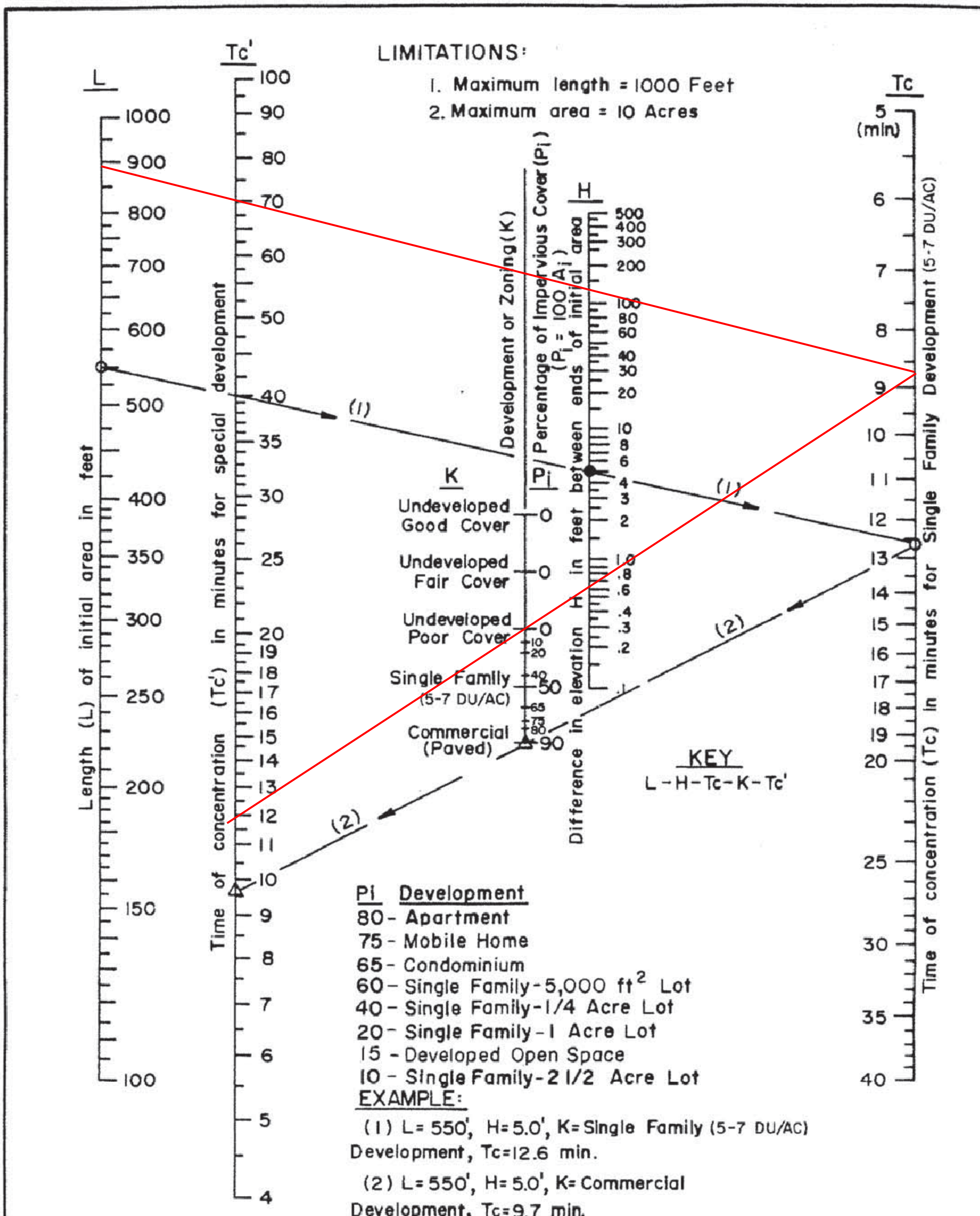
HYDROLOGIC CLASSIFICATION OF SOILS
ORANGE COUNTY, CALIFORNIA

PLATE C

Appendix 2

Initial Subarea Time of Concentration Nomographs

EXISTING CONDITIONS – AREA A

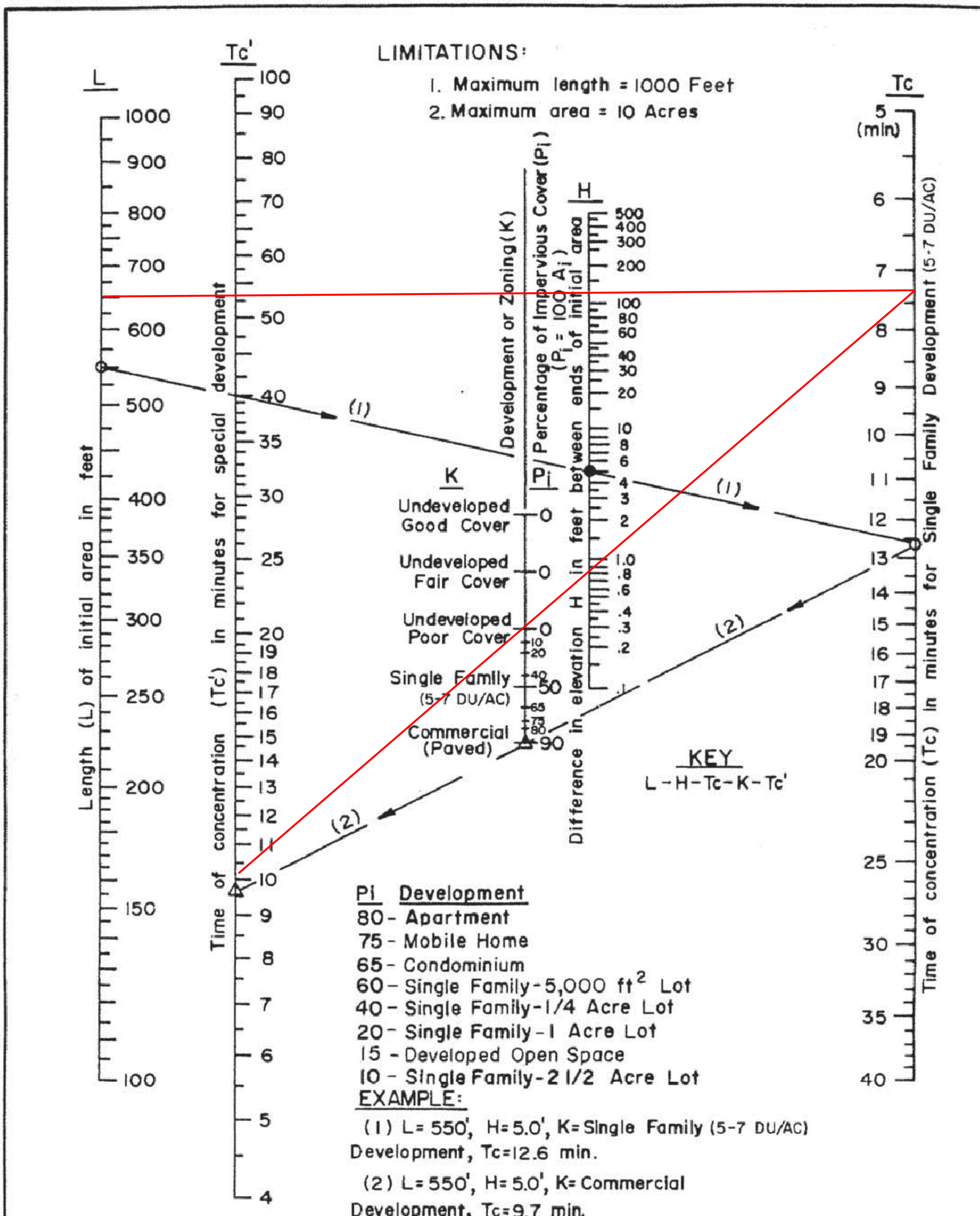


ORANGE COUNTY
HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1

EXISTING CONDITIONS – AREA B



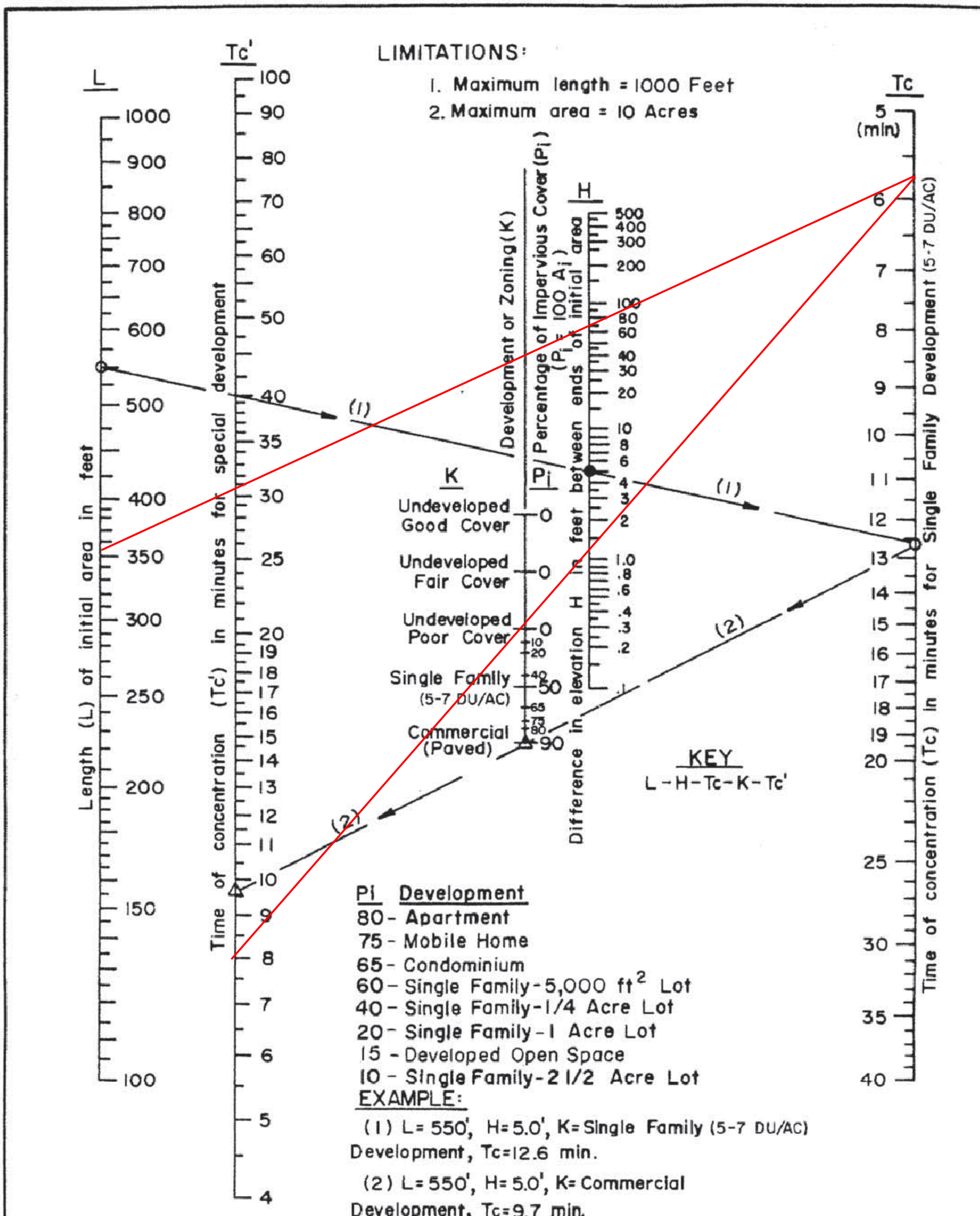
ORANGE COUNTY

HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1

EXISTING CONDITIONS – AREA D

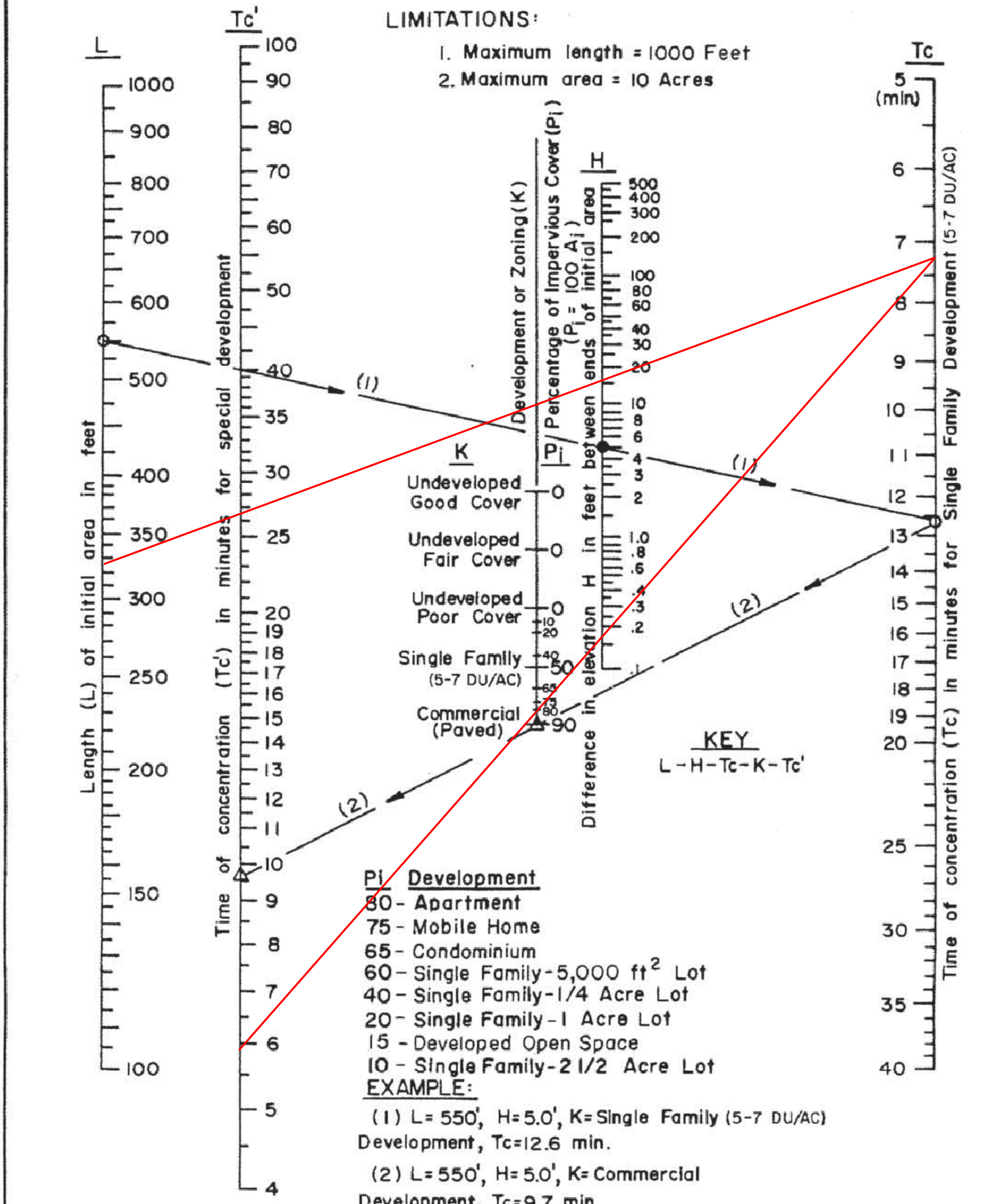


ORANGE COUNTY
HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1

EXISTING CONDITIONS – AREA H

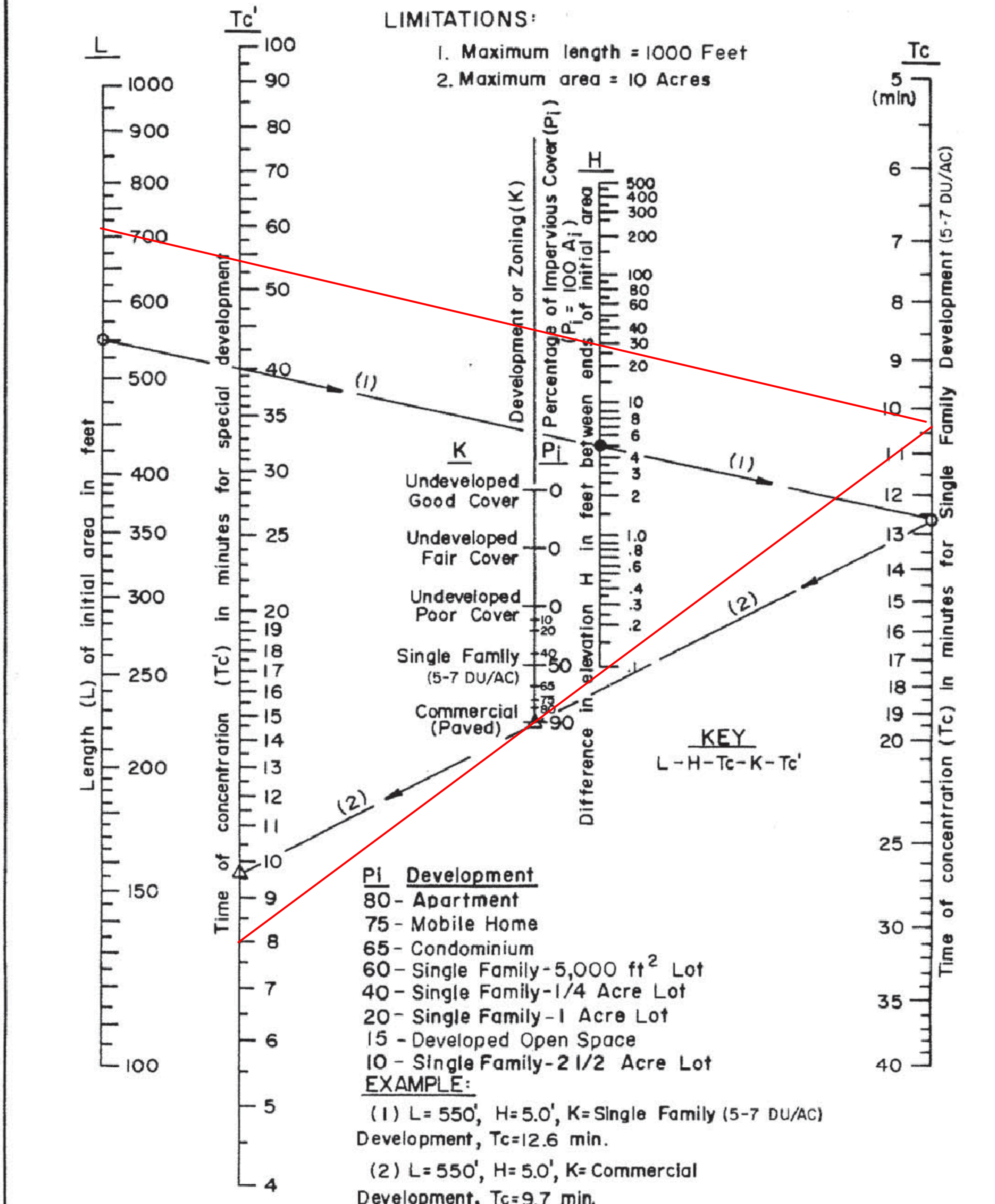


ORANGE COUNTY
HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1

EXISTING CONDITIONS – AREA J



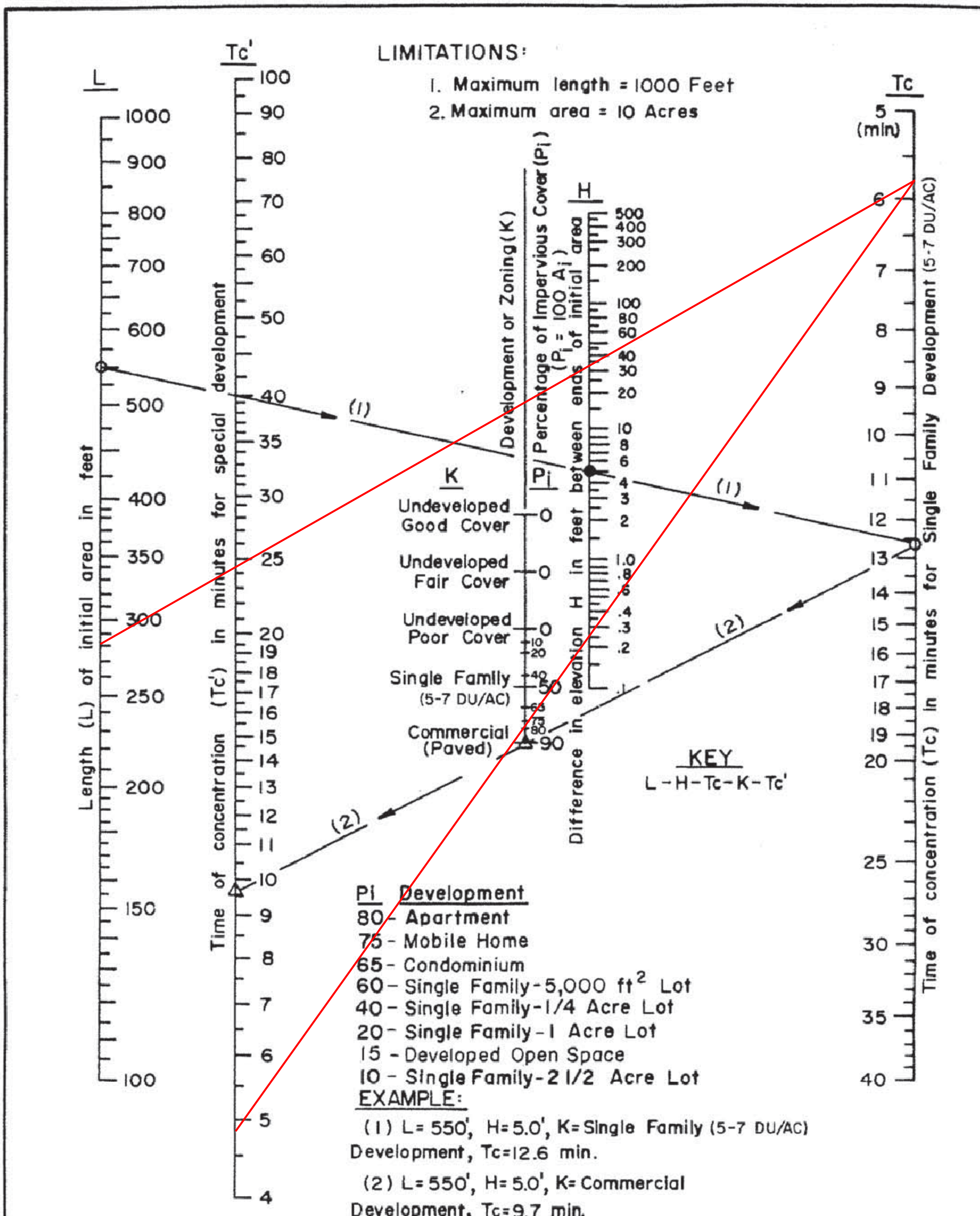
ORANGE COUNTY

HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1

EXISTING CONDITIONS – AREA K



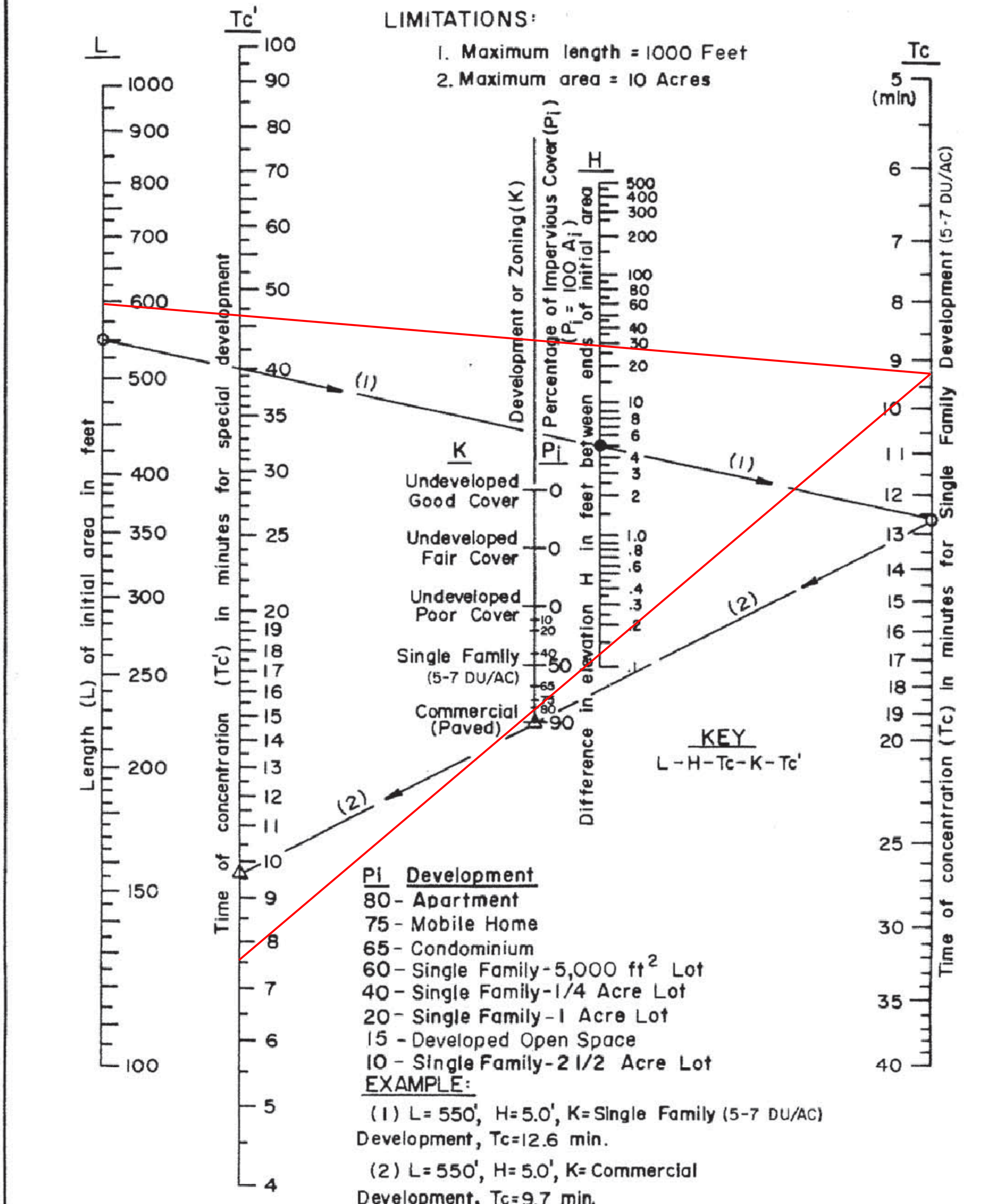
ORANGE COUNTY

HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1

EXISTING CONDITIONS – AREA L

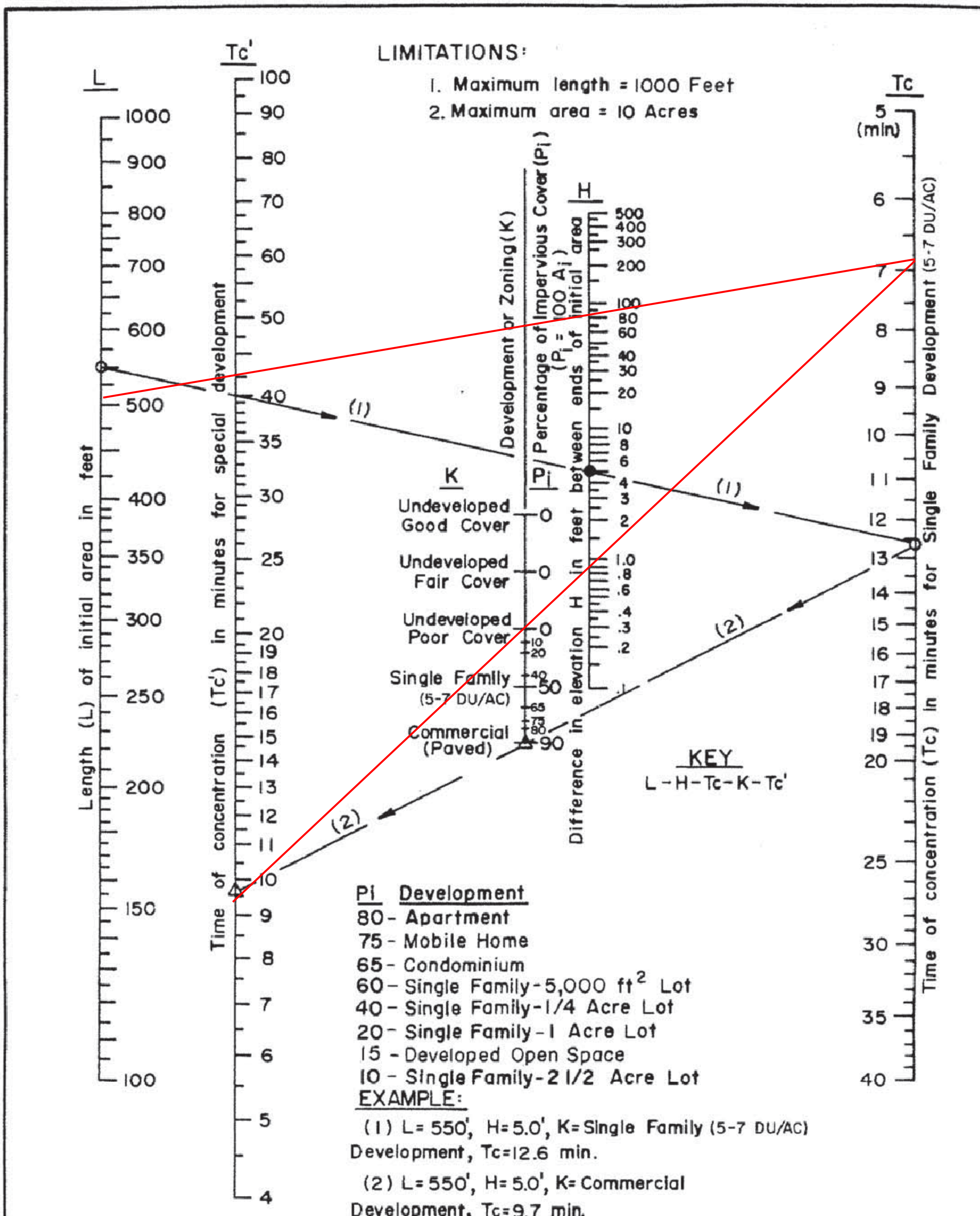


ORANGE COUNTY
HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1

EXISTING CONDITIONS – AREA M

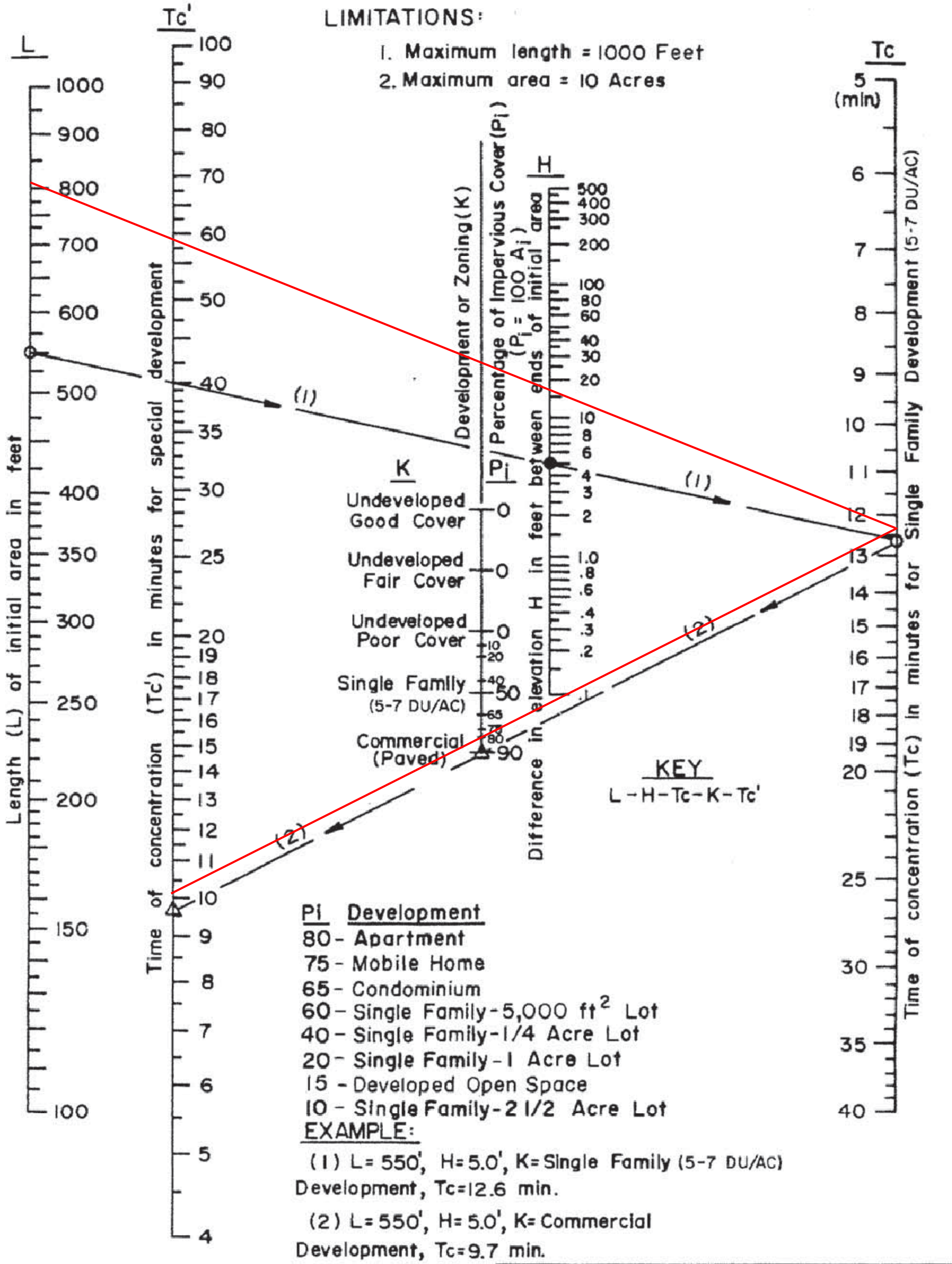


ORANGE COUNTY
HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1

EXISTING CONDITIONS – AREA R

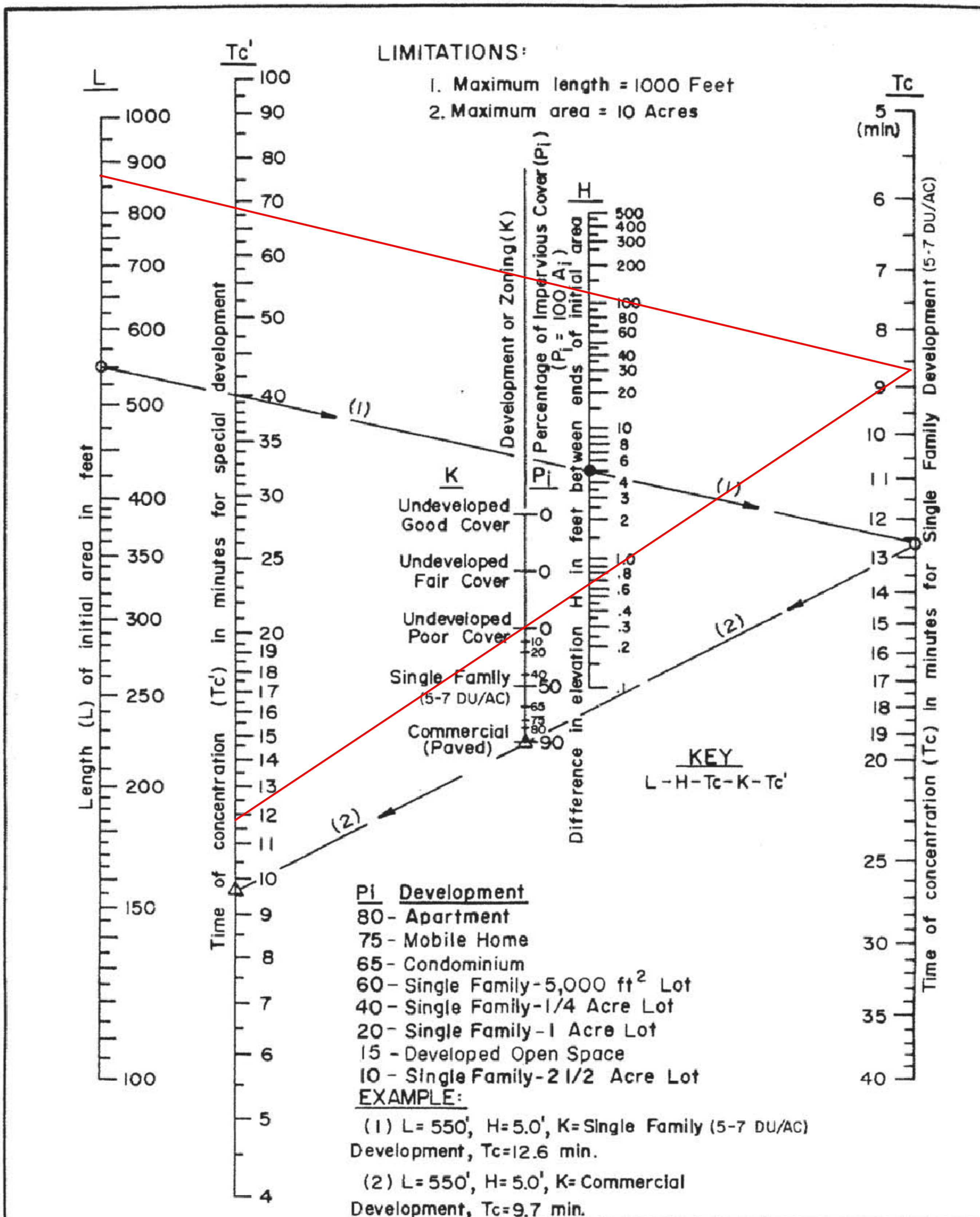


ORANGE COUNTY
HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1

PROPOSED – *AREA* A



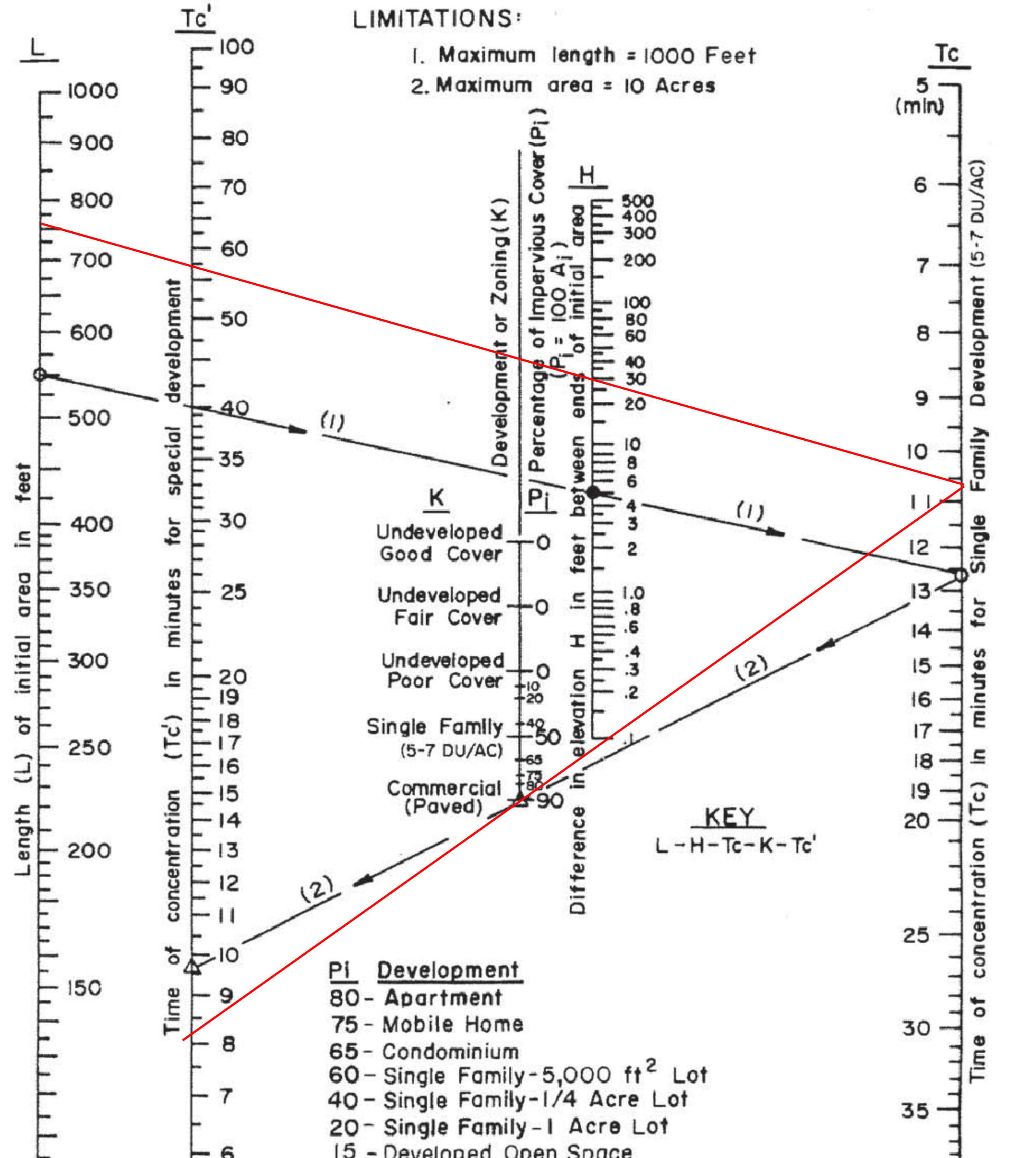
ORANGE COUNTY

HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1

PROPOSED – AREA D



Pi	Development
80	Apartment
75	Mobile Home
65	Condominium
60	Single Family-5,000 ft² Lot
40	Single Family-1/4 Acre Lot
20	Single Family-1 Acre Lot
15	Developed Open Space
10	Single Family-2 1/2 Acre Lot

EXAMPLE:

(1) L = 550', H = 5.0', K = Single Family (5-7 DU/AC) Development, Tc = 12.6 min.

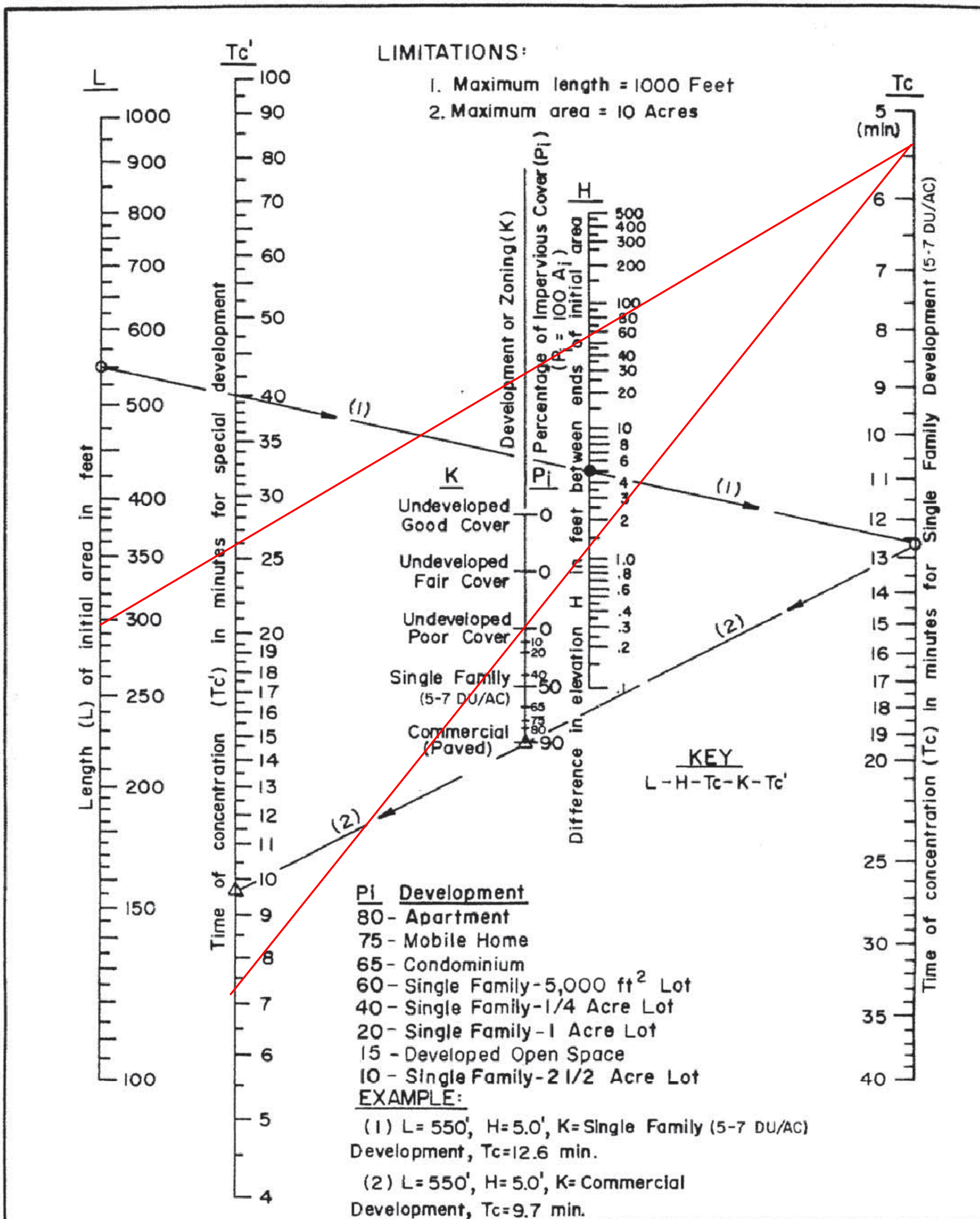
(2) L = 550', H = 5.0', K = Commercial Development, Tc = 9.7 min.

ORANGE COUNTY
HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1

PROPOSED – *AREA* H

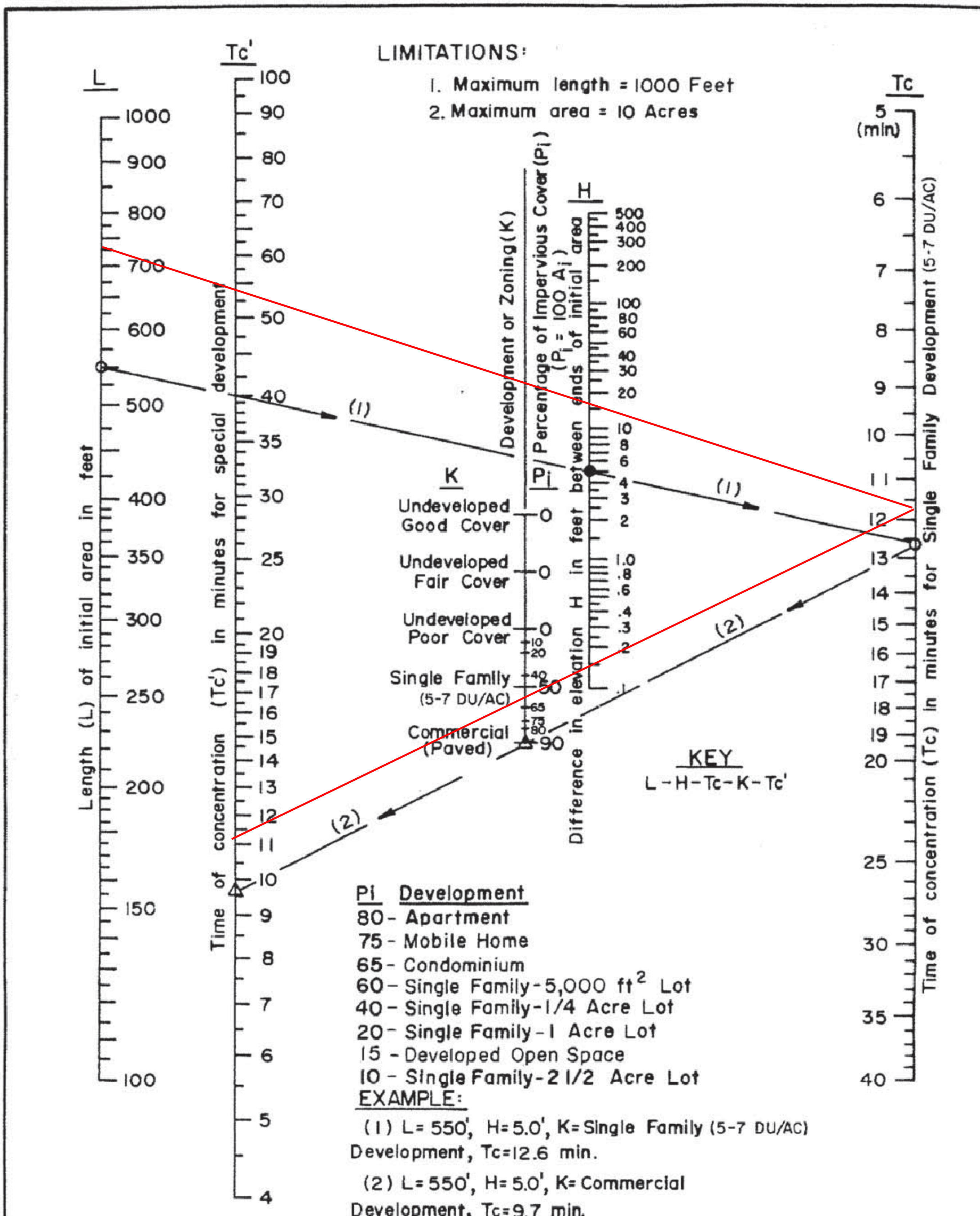


ORANGE COUNTY
HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1

PROPOSED – AREA J

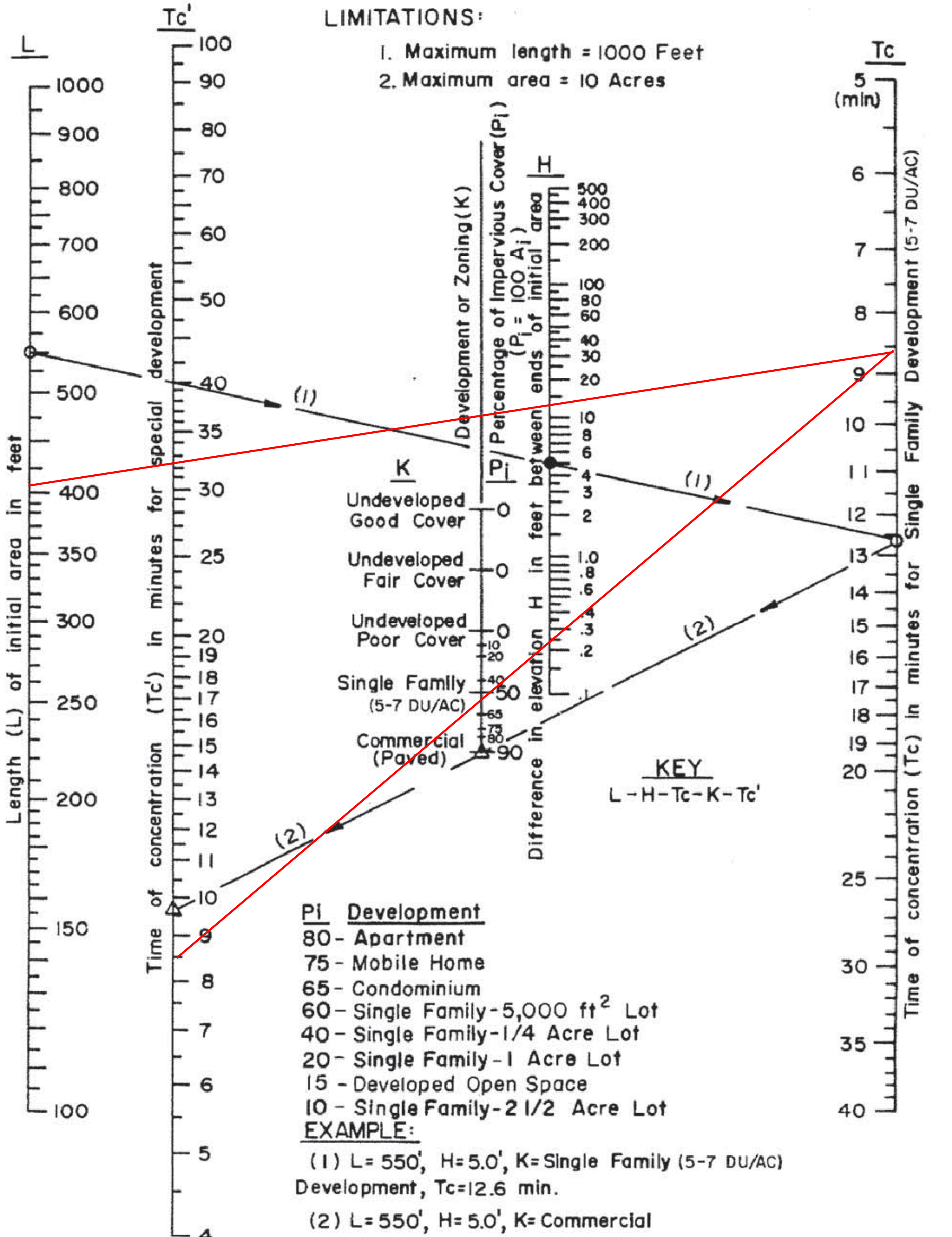


ORANGE COUNTY
HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1

PROPOSED – *AREA* M



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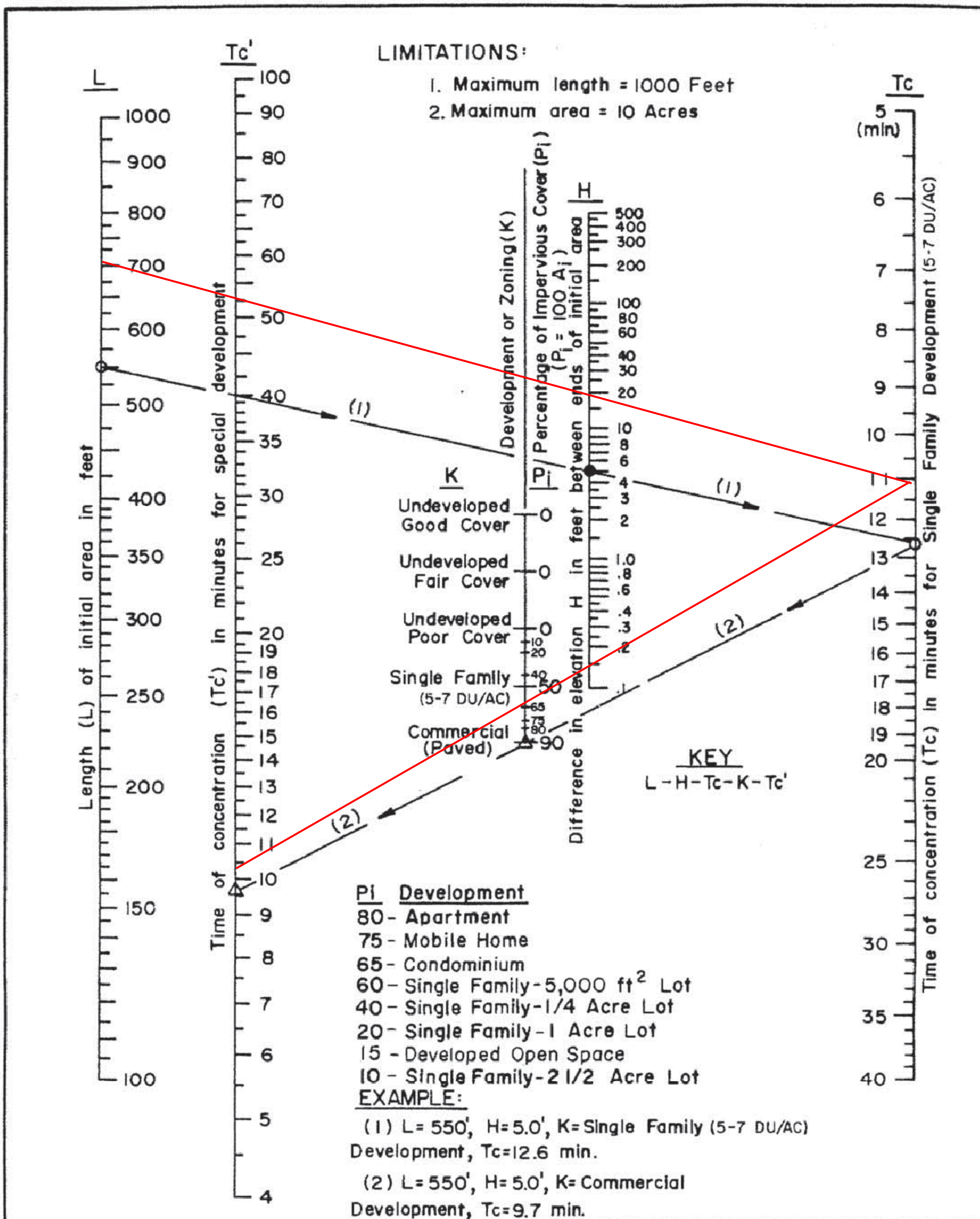
ORANGE COUNTY

HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1

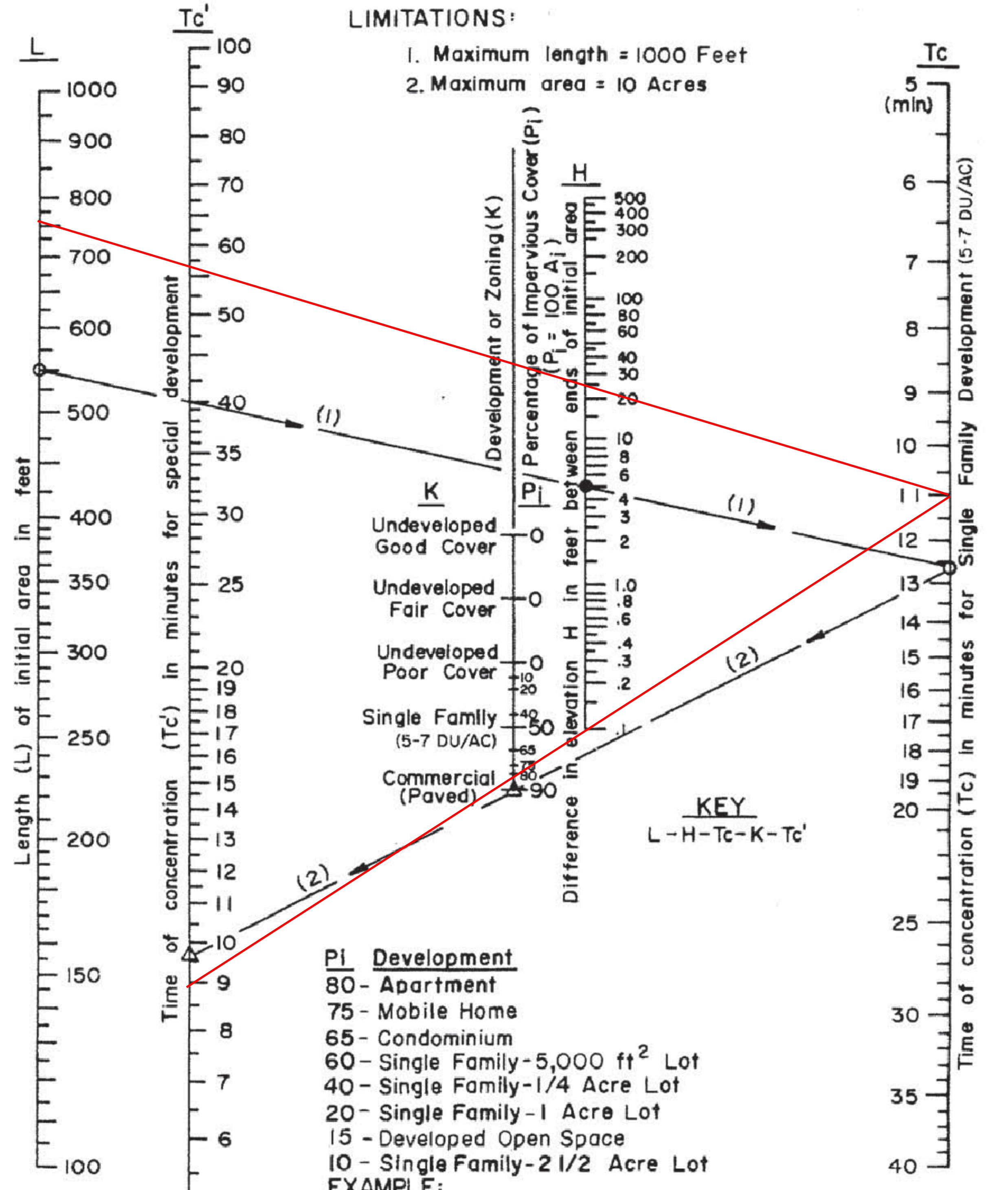
PROPOSED – *AREA* Q



ORANGE COUNTY
HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

PROPOSED- AREA T



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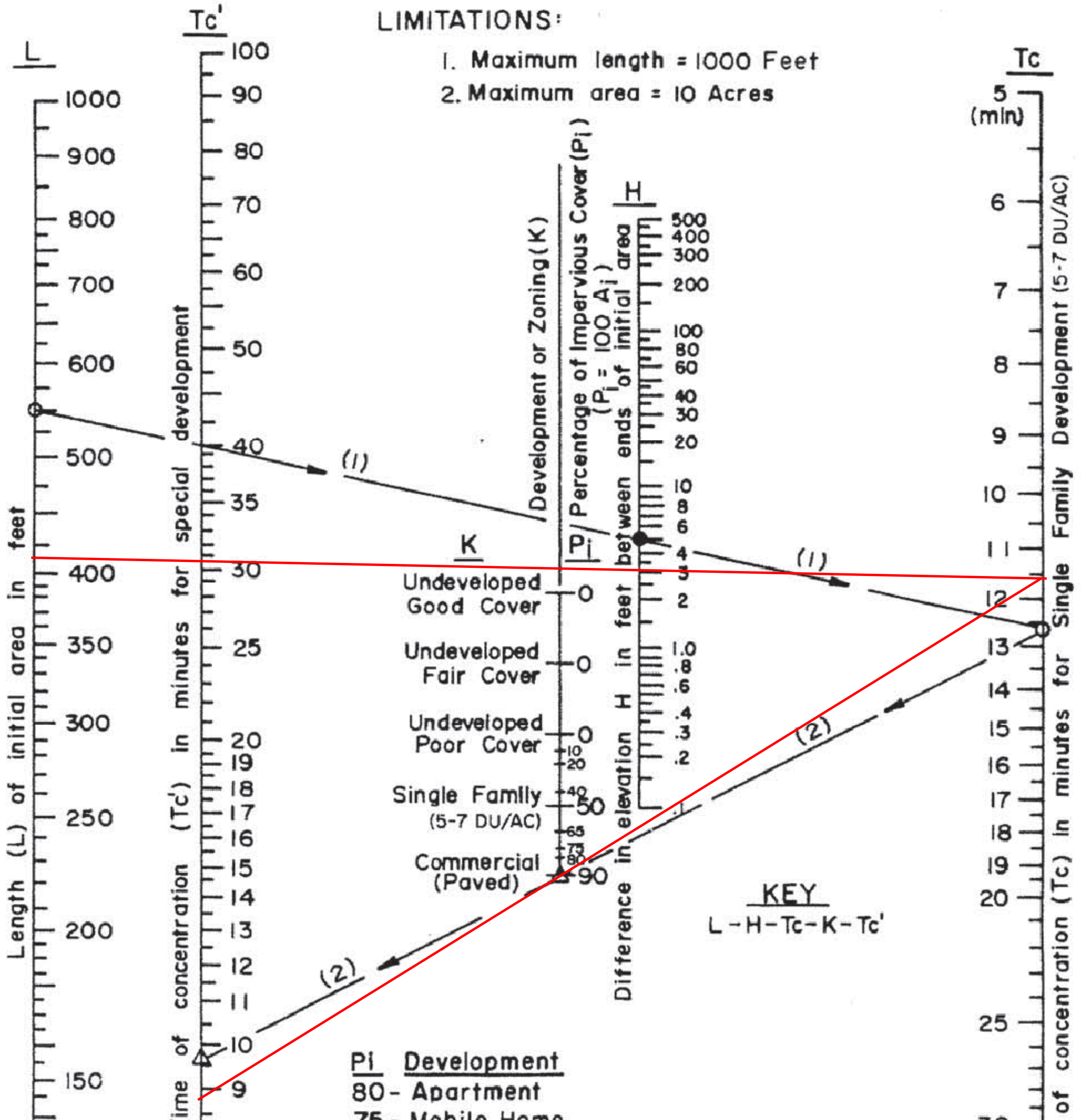
ORANGE COUNTY
HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1

PROPOSED – AREA U



Pi	Development
80	Apartment
75	Mobile Home
65	Condominium
60	Single Family - 5,000 ft^2 Lot
40	Single Family - 1/4 Acre Lot
20	Single Family - 1 Acre Lot
15	Developed Open Space
10	Single Family - 2 1/2 Acre Lot

EXAMPLE:

(1) L = 550', H = 5.0', K = Single Family (5-7 DU/AC) Development, Tc = 12.6 min.

(2) L = 550', H = 5.0', K = Commercial Development, Tc = 9.7 min.

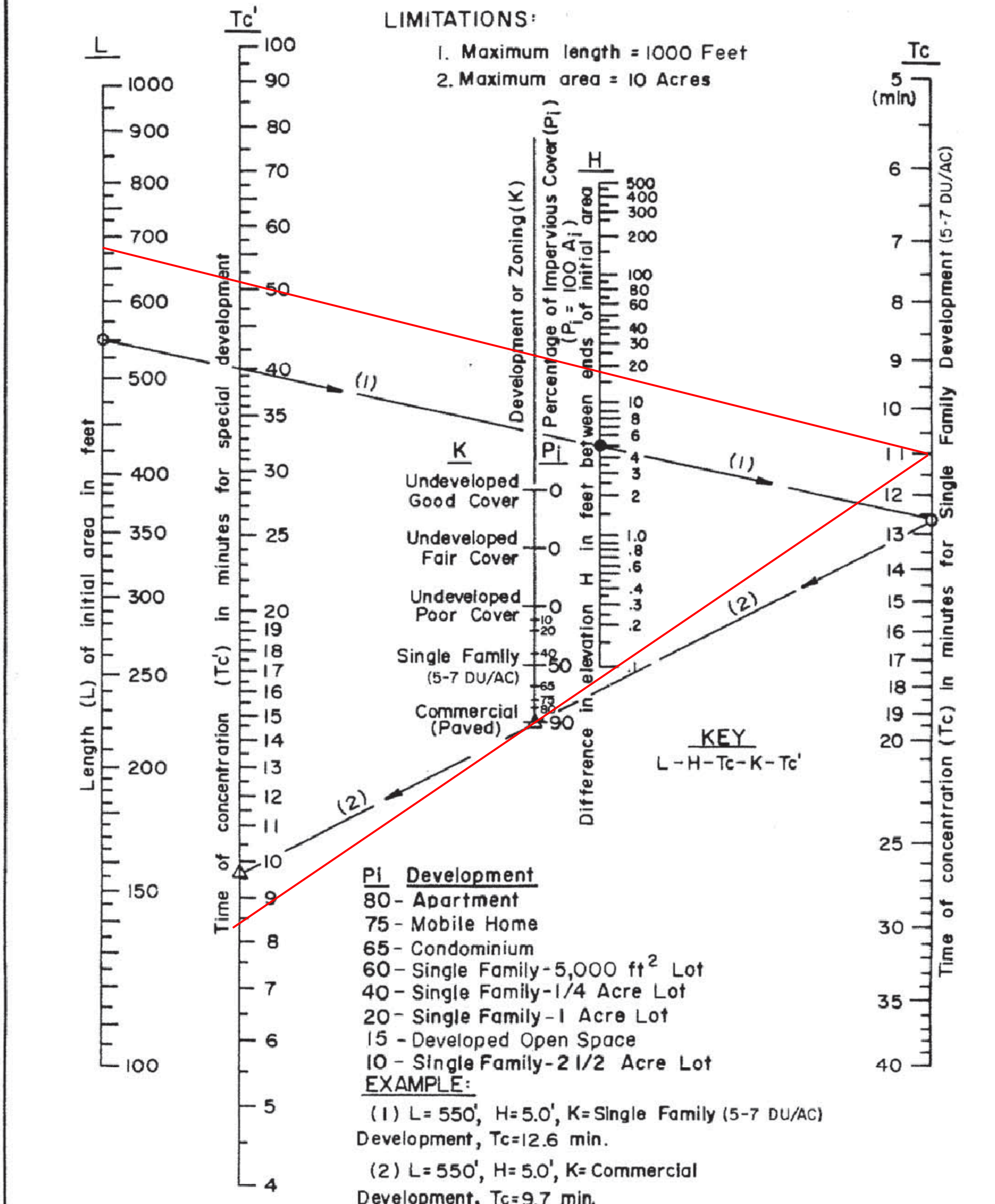
ORANGE COUNTY

HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1

PROPOSED – *AREA* V



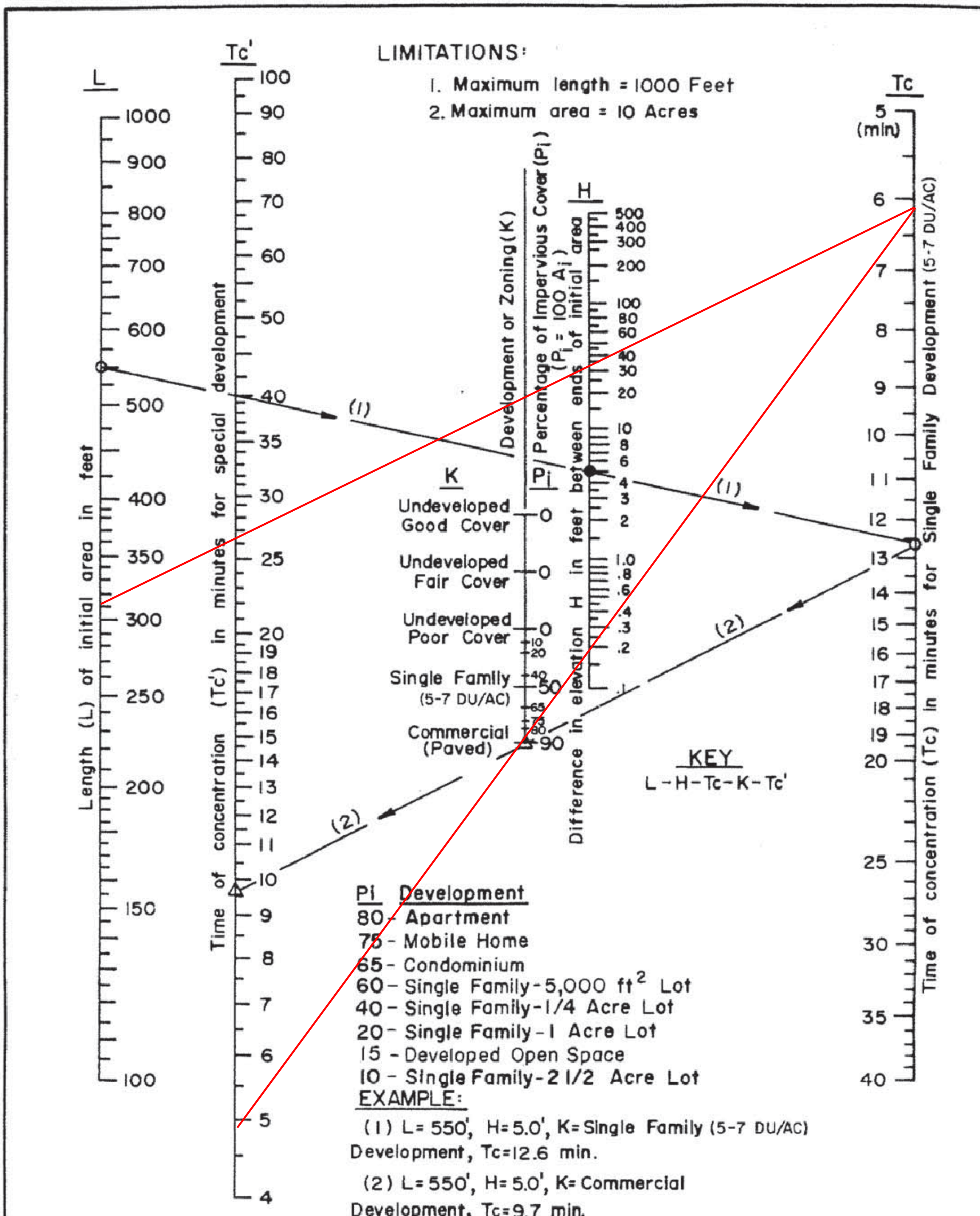
ORANGE COUNTY

HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1

PROPOSED – AREA W



ORANGE COUNTY

HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1

Appendix 3

Hydrology Calculations for Existing Conditions-

25 & 100 Year Storm

Q25 Rational Method Hydrology Calculations for Existing Improvements
Project: Creekside, San Juan Capistrano

Area No.	A (sqft)	A (ac)	ΣA (ac)	Soil type	Dev type	K_i	T_c (min)	I25 (in/hr)	F_m (in/hr)	F_p avg	F_m avg	a_i	a_p	Q25 (cfs)	S_0	L (ft)	H (ft)	d (in)	n	K_{pipe}	D/d	D (ft)	V (fps)	T_t (min)	Description
EX-A	145615	**3.34**	3.34	**D**	Poor Grass	0.697	**11.70**	3.0	0.18	0.20	0.18	0.10	0.90	**8.43**	16.32%	864.00	141.00								Initial Subarea - Surface Flow
																									CB #1 (Flow 1 of 8)
EX-B	91744	2.11	2.11	**D**	Poor Grass	0.697	10.20	3.2	0.02	0.20	0.02	0.91	0.09	6.07	20.00%	650.00	139.00								Initial Subarea - Surface Flow
																									Drainage Ditch
																									Area #1 (Flow 1 of 5)
EX-C	26005	0.60	0.60	**D**	Poor Grass	0.697		3.0	0.02	0.20	0.02	0.91	0.09	1.61	19.00%	478.00	96.00							11.46	Surface Flow
																									36" City Storm Drain
		2.70					**21.66**							**7.68**											**Area #1 (Flow 2 of 5)**
EX-D	46214	1.06	1.06	**D**	Poor Grass	0.697	8.0	3.7	0.02	0.20	0.02	0.91	0.09	3.51	19.31%	352.00	68.00								Initial Subarea - Surface Flow
																									CB #1 (Flow 2 of 8)
EX-E	12804	0.29	0.29	**D**	Poor Grass	0.697		3.7						0.99	17.51%	177.00	31.00							7.83	Surface Flow
		1.35					15.8							4.503											(D+E)
																									CB #1 (Flow 3 of 8)
EX-F	23652	0.54	0.54	**D**	Commercial	0.298		2.8	0.02	0.20	0.02	0.91	0.09	1.36	0.10%	398	0.50							13.01	Surface Flow
		1.90					28.8							5.87											(E+F)
																									CB #1 (Flow 4 of 8)
EX-G	29195	0.67	0.67	**D**	Commercial	0.298		4.0						2.39	2.69%	446	12.00							7.05	Surface Flow
																									Existing Inlet #1 (F+G)
		2.57					**35.9**							**8.25**											**CB #1 (Flow 5 of 8)**
EX-H	10973	0.25	0.25	**D**	Commercial	0.298	6.00	4.4	0.02	0.20	0.02	0.91	0.09	0.98	4.89%	327	16.00								Initial Subarea - Surface Flow
																									CB #1 (Flow 6 of 8)
EX-I	34976	0.80	0.80	**D**	Commercial	0.298		4.0						2.90	2.00%	367	7.00							6.92	Surface Flow
																									(G+H)
		1.05					**12.9**							**3.88**											**CB #1 (Flow 7 of 8)**
EX-J	223152	5.12	5.12	**D**	Commercial	0.298	8.0	3.7	0.02	0.20	0.02	0.91	0.09	16.96	4.00%	714	29.00								Initial Subarea - Surface Flow
																									Area #1 (Flow 3 of 5)
		5.12					**8.0**							**16.96**											
EX-K	26759	0.61	0.61	**D**	Commercial	0.298	5.0	4.8	0.02	0.20	0.02	0.91	0.09	2.66	12.14%	280.00	34.00								Initial Subarea - Surface Flow
																									Area #1 (Flow 4 of 5)
		0.61					**5.0**							**2.66**											
EX-L	151872	3.49	3.49	**D**	Commercial	0.298	7.5	3.8	0.02	0.20	0.02	0.91	0.09	11.98	5.18%	598.00	31.00							6.95	Initial Subarea - Surface Flow
																									Area #1 (Flow 5 of 5)
		3.49					**7.5**							**11.98**											
EX-M	60216	1.38	1.38	**D**	Poor Grass	0.697	9.4	3.4	0.02	0.20	0.02	0.91	0.09	4.18	15.24%	505	77.00								Initial Subarea - Surface Flow
																									Area #2 (Flow 1 of 3)
EX-N	26949	0.62	0.62	**D**	Poor Grass	0.697		3.2						1.76	11.68%	308	36.00							10.60	Surface Flow
		2.00					20.0							5.93											**Area #2 (Flow 2 of 3)**
EX-O	29467	0.68	0.68	**D**	Commercial	0.298		4.1						2.52	4.25%	470	20.00							6.57	Surface Flow
		2.68					**26.6**							**8.45**											**Area #2 (Flow 3 of 3)**
EX-P	21943	0.50	0.50	**D**	Poor Grass	0.697		4.1						1.86	14.81%	108	16.00							6.64	Surface Flow
							6.6																		**CB #2 (Flow 1 out of 3)**
EX-Q	39650	0.91	0.91	**D**	Poor Grass	0.697		3.7						3.01	17.27%	191	33.00							8.09	Surface Flow
							14.7																		**CB #2 (Flow 2 out of 3)**
EX-R	57671	1.32	1.32	**D**	Commercial	0.298	10.2	3.2						3.84	1.82%	714	13.00								Initial Subarea - Surface Flow
																									CB #2 (Flow 3 out of 3)
		2.74					**24.9**							**8.71**											
EX-S	153982	3.53	3.53	**D**	Commercial	0.298	9.5	3.4	0.02	0.20	0.02	0.91	0.09	10.61	3.00%	929	26.00								Initial Subarea - Surface Flow
																									CB #1 (Flow 8 of 8)

Q25 Rational Method Hydrology Calculations for Existing Improvements
Project: Creekside, San Juan Capistrano

Legend:

A	Area of subarea (acres)
ΣA	Total area (acres)
a_i	Fractional portion of impervious area
a_p	Fractional portion of pervious area
F_p	Infiltration rate (in inches per hour)
F_m	Rate of runoff (in inches per hour) = a_pF_p
Length	Flowpath length (feet)
Ave S	Average slope of subarea (ft/ft)
T_c	Time of concentration (minutes; 5 minute minimum)
T_t	Travel time (minutes) between points of concentration
I	Rainfall intensity (in/hr) in non-mountainous areas for 100-yr frequency, $I_t = 11.995\ t^{-0.566}$
Q_{100}	Peak discharge (cfs) = $0.9(I-F_m)\Sigma A$
K_i	Development type constant for initial time of concentration: $Tc=K_i(L^3/H)^{0.2}$

OVERALL SITE		
Total incoming flow at CB #1 *A+D+E+F+G+H+I+S*	31.18 cfs	10.50 acres
Total incoming flow at CB #2 *P+Q+R*	8.71 cfs	2.74 acres
Total incoming flow at Area #1 *B+C+J+K+L*	39.28 cfs	11.93 acres
Total incoming flow at Catch Basin #3 *M+N+O*	8.45 cfs	2.68 acres
Total Flow	87.62 cfs	

Q100 Rational Method Hydrology Calculations for Existing Improvements
Project: Creekside, San Juan Capistrano

Area No.	A (sqft)	A (ac)	ΣA (ac)	Soil type	Dev type	K_i	T_c (min)	I25 (in/hr)	F_m (in/hr)	F_p avg	F_m avg	a_i	a_p	Q25 (cfs)	S_0	L (ft)	H (ft)	d (in)	n	K_{pipe}	D/d	D (ft)	V (fps)	T_t (min)	Description
EX-A	145615	**3.34**	3.34	**D**	Poor Grass	0.697	**11.70**	3.8	0.18	0.20	0.18	0.10	0.90	**10.90**	16.32%	864.00	141.00								Initial Subarea - Surface Flow
																									CB #1 (Flow 1 of 8)
EX-B	91744	2.11	2.11	**D**	Poor Grass	0.697	10.20	4.1	0.02	0.20	0.02	0.91	0.09	7.76	20.00%	650.00	139.00								Initial Subarea - Surface Flow
																									Drainage Ditch
																									Area #1 (Flow 1 of 5)
EX-C	26005	0.60	0.60	**D**	Poor Grass	0.697		3.8	0.02	0.20	0.02	0.91	0.09	2.06	19.00%	478.00	96.00							11.46	Surface Flow
																									36" City Storm Drain
		2.70					**21.66**							**9.82**											**Area #1 (Flow 2 of 5)**
EX-D	46214	1.06	1.06	**D**	Poor Grass	0.697	8.0	4.7	0.02	0.20	0.02	0.91	0.09	4.50	19.31%	352.00	68.00								Initial Subarea - Surface Flow
																									CB #1 (Flow 2 of 8)
EX-E	12804	0.29	0.29	**D**	Poor Grass	0.697		4.8						1.27	17.51%	177.00	31.00							7.83	Surface Flow
		1.35					15.8							5.762											(D+E)
																									CB #1 (Flow 3 of 8)
EX-F	23652	0.54	0.54	**D**	Commercial	0.298		3.6	0.02	0.20	0.02	0.91	0.09	1.74	0.10%	398	0.50							13.01	Surface Flow
		1.90					28.8							7.50											(E+F)
																									CB #1 (Flow 4 of 8)
EX-G	29195	0.67	0.67	**D**	Commercial	0.298		5.1						3.06	2.69%	446	12.00							7.05	Surface Flow
																									Existing Inlet #1 (F+G)
		2.57					**35.9**							**10.56**											**CB #1 (Flow 5 of 8)**
EX-H	10973	0.25	0.25	**D**	Commercial	0.298	6.00	5.6	0.02	0.20	0.02	0.91	0.09	1.26	4.89%	327	16.00								Initial Subarea - Surface Flow
																									CB #1 (Flow 6 of 8)
EX-I	34976	0.80	0.80	**D**	Commercial	0.298		5.1						3.71	2.00%	367	7.00							6.92	Surface Flow
																									(G+H)
		1.05					**12.9**							**4.97**											**CB #1 (Flow 7 of 8)**
EX-J	223152	5.12	5.12	**D**	Commercial	0.298	8.0	4.7	0.02	0.20	0.02	0.91	0.09	21.71	4.00%	714	29.00								Initial Subarea - Surface Flow
																									Area #1 (Flow 3 of 5)
		5.12					**8.0**							**21.71**											
EX-K	26759	0.61	0.61	**D**	Commercial	0.298	5.0	6.2	0.02	0.20	0.02	0.91	0.09	3.41	12.14%	280.00	34.00								Initial Subarea - Surface Flow
																									Area #1 (Flow 4 of 5)
		0.61					**5.0**							**3.41**											
EX-L	151872	3.49	3.49	**D**	Commercial	0.298	7.5	4.9	0.02	0.20	0.02	0.91	0.09	15.33	5.18%	598.00	31.00							6.95	Initial Subarea - Surface Flow
																									Area #1 (Flow 5 of 5)
		3.49					**7.5**							**15.33**											
EX-M	60216	1.38	1.38	**D**	Poor Grass	0.697	9.4	4.3	0.02	0.20	0.02	0.91	0.09	5.34	15.24%	505	77.00								Initial Subarea - Surface Flow
																									Area #2 (Flow 1 of 3)
EX-N	26949	0.62	0.62	**D**	Poor Grass	0.697		4.0						2.24	11.68%	308	36.00							10.60	Surface Flow
		2.00					20.0							7.58											**Area #2 (Flow 2 of 3)**
EX-O	29467	0.68	0.68	**D**	Commercial	0.298		5.3						3.22	4.25%	470	20.00							6.57	Surface Flow
		2.68					**26.6**							**10.80**											**Area #2 (Flow 3 of 3)**
EX-P	21943	0.50	0.50	**D**	Poor Grass	0.697		5.3						2.38	14.81%	108	16.00							6.64	Surface Flow
							6.6																		**CB #2 (Flow 1 out of 3)**
EX-Q	39650	0.91	0.91	**D**	Poor Grass	0.697		4.7						3.85	17.27%	191	33.00							8.09	Surface Flow
							14.7																		**CB #2 (Flow 2 out of 3)**
EX-R	57671	1.32	1.32	**D**	Commercial	0.298	10.2	4.1						4.90	1.82%	714	13.00								Initial Subarea - Surface Flow
																									CB #2 (Flow 3 out of 3)
		2.74					**24.9**							**11.13**											
EX-S	153982	3.53	3.53	**D**	Commercial	0.298	9.5	4.3	0.02	0.20	0.02	0.91	0.09	13.57	3.00%	929	26.00								Initial Subarea - Surface Flow
																									CB #1 (Flow 8 of 8)

Q100 Rational Method Hydrology Calculations for Existing Improvements
Project: Creekside, San Juan Capistrano

Legend:

A	Area of subarea (acres)
ΣA	Total area (acres)
a_i	Fractional portion of impervious area
a_p	Fractional portion of pervious area
F_p	Infiltration rate (in inches per hour)
F_m	Rate of runoff (in inches per hour) = a_pF_p
Length	Flowpath length (feet)
Ave S	Average slope of subarea (ft/ft)
T_c	Time of concentration (minutes; 5 minute minimum)
T_t	Travel time (minutes) between points of concentration
I	Rainfall intensity (in/hr) in non-mountainous areas for 100-yr frequency, $I_t = 11.995\ t^{-0.566}$
Q_{100}	Peak discharge (cfs) = $0.9(I-F_m)\Sigma A$
K_i	Development type constant for initial time of concentration: $Tc=K_i(L^3/H)^{0.2}$

OVERALL SITE		
Total incoming flow at CB #1 *A+D+E+F+G+H+I+S*	39.99 cfs	10.50 acres
Total incoming flow at CB #2 *P+Q+R*	11.13 cfs	2.74 acres
Total incoming flow at Area #1 *B+C+J+K+L*	50.27 cfs	11.93 acres
Total incoming flow at Catch Basin #3 *M+N+O*	10.80 cfs	2.68 acres
Total Flow	112.19 cfs	

ON-SITE		
Total incoming flow at Discharge Point #1	52.09 cfs	12.14 acres

Appendix 4

Hydrology Calculations for Proposed Conditions-

25 & 100 Year Storm

Q 25 Rational Method Hydrology Calculations for Proposed Development
Project: Creekside, San Juan Capistrano

Area No.	A (sqft)	A (ac)	ΣA (ac)	Soil type	Dev type	K_i	T_c (min)	I_{25} (in/hr)	F_m (in/hr)	F_p avg	F_m avg	a_i	a_p	Q25 (cfs)	S_0	L (ft)	H (ft)	d (in)	n	K_{pipe}	D/d	D (ft)	V (fps)	T_t (min)	Description
A	145405.0	3.338	3.34	D	Poor Grass	0.697	11.7	3.0	0.18	0.20	0.18	0.10	0.90	8.42	16.31%	864	141								Initial Subarea - Surface Flow **CB #1 (Flow 1 of 5)**
B	69573.0	1.597	1.60	D	Poor Grass	0.697	10.5	3.2	0.18	0.20	0.18	0.10	0.90	4.30	15.08%	696	105								Surface Flow **CB #1 (Flow 2 of 5)**
C	17577.0	0.404	0.40	D	Poor Grass	0.697	8.5	3.6	0.18	0.20	0.18	0.10	0.90	1.23	18.13%	375	68								Surface Flow **CB #1 (Flow 3 of 5)**
D	44077.0	1.012	1.01	D	Asphalt Concrete	0.298	8.1	3.7	0.00	0.20	0.00	1.00	0.00	3.34	3.91%	766	30								Initial Subarea - Surface Flow **Area (Flow 1 of 14)**
E	40120.0	0.921	0.92	D	Apartments	0.325	7.3	3.9	0.02	0.20	0.02	0.90	0.10	3.21	1.63%	307	5								Surface Flow **Area 1 (Flow 2 of 14)**
F	31252.0	0.717	0.72	D	Poor Grass	0.697	7.0	4.0	0.18	0.20	0.18	0.10	0.90	2.46	25.94%	316	82								Surface Flow **CB #3 (Flow 1 of 3)**
G	39078.0	0.897	0.90	D	Apartments	0.325	7.2	3.9	0.02	0.20	0.02	0.92	0.08	3.17	1.69%	296	5								Surface Flow *Modular Wetlands* **Area 1 (Flow 3 of 14)**
H	38179.0	0.876	0.88	D	Poor Grass	0.697	7.2	3.9	0.18	0.20	0.18	0.10	0.90	2.95	18.72%	299	56								Initial Subarea - Surface Flow **CB #3 (Flow 2 of 3)**
I	46189.0	1.060	1.06	D	Apartments	0.325	6.9	4.0	0.02	0.20	0.02	0.90	0.10	3.81	1.78%	281	5								Surface Flow *Modular Wetlands* **Area 1 (Flow 4 of 14)**
J	68310.0	1.568	1.57	D	Single Family	0.391	11.1	3.1	0.02	0.20	0.02	0.90	0.10	4.31	2.20%	726	16								Initial Subarea - Surface Flow *Modular Wetlands* **Area 1 (Flow 5 of 14)**
K	45741.0	1.050	1.05	D	Single Family	0.391	6.4	4.2	0.02	0.20	0.02	0.90	0.10	3.95	3.90%	256	10								Surface Flow *Modular Wetlands* **Area 1 (Flow 6 of 14)**
L	53432.0	1.227	1.23	D	Single Family	0.391	7.4	3.9	0.02	0.20	0.02	0.90	0.10	4.24	3.97%	352	14								Surface Flow *Modular Wetlands* **Area 1 (Flow 7 of 14)**
M	43135.0	0.990	0.99	D	Single Family	0.391	8.5	3.6	0.02	0.20	0.02	0.90	0.10	3.17	2.93%	410	12								Surface Flow *Modular Wetlands* **Area 1 (Flow 8 of 14)**
N	75395.0	1.731	1.73	D	Single Family	0.391	8.1	3.7	0.02	0.20	0.02	0.90	0.10	5.69	3.18%	377	12								Surface Flow *Modular Wetlands* **Area 1 (Flow 9 of 14)**
O	8654.0	0.199	0.20	D	Single Family	0.391	5.4	4.6	0.09	0.20	0.09	0.54	0.46	0.81	4.54%	154	7								Surface Flow *Modular Wetlands* **Area 1 (Flow 10 of 14)**
P	20003.0	0.459	0.46	D	Single Family	0.391	6.9	4.0	0.04	0.20	0.04	0.81	0.19	1.65	2.65%	226	6								Surface Flow *Modular Wetlands* **Area 1 (Flow 11 of 14)**
Q	38162.0	0.876	0.88	D	Single Family	0.391	10.2	3.2	0.02	0.20	0.02	0.90	0.10	2.52	2.82%	283	11								Initial Subarea - Surface Flow **Area 1 (Flow 12 of 14)**
Q-1	60080.0	1.379	1.38	D	Single Family	0.391	10.2	3.2	0.02	0.20	0.02	0.90	0.10	3.97	2.82%	425	11								Initial Subarea - Surface Flow **Area 1 (Flow 12 of 14)**
R	37943.0	0.871	0.87	D	Single Family	0.391	6.4	4.2	0.02	0.20	0.02	0.90	0.10	3.26	4.92%	244	12								Surface Flow **Area 1 (Flow 13 of 14)**
S	21012.0	0.482	0.48	D	Single Family	0.391	5.3	4.7	0.02	0.20	0.02	0.90	0.10	2.01	5.98%	167	10								Surface Flow **Area 1 (Flow 14 of 14)**
T	153834.0	3.532	3.53	D	Commercial	0.298	9.5	3.4	0.02	0.20	0.02	0.90	0.10	10.60	3.28%	760	25								Initial Subarea - Surface Flow **CB #1 (Flow 4 of 5)**
U	47660.0	1.094	1.09	D	Asphalt Concrete	0.298	8.7	3.5	0.04	0.20	0.04	0.81	0.19	3.43	0.69%	432	3								Initial Subarea - Surface Flow **CB #1 (Flow 5 of 5)**
V	73723.0	1.692	1.69	D	Asphalt Concrete	0.298	8.3	3.6	0.04	0.20	0.04	0.80	0.20	5.45	2.51%	676	17								Initial Subarea - Surface Flow **CB #2 (Flow 1 of 1)**
W	5682.0	0.130	0.13	D	Asphalt Concrete	0.298	5.0	4.8	0.00	0.20	0.00	1.00	0.00	0.57	10.09%	317	32								Initial Subarea - Surface Flow **CB #3 (Flow 3 of 3)**

Q_{25} Rational Method Hydrology Calculations for Proposed Development
Project: Creekside, San Juan Capistrano

Legend:

A	Area of subarea (acres)
ΣA	Total area (acres)
a_i	Fractional portion of impervious area
a_p	Fractional portion of pervious area
F_p	Infiltration rate (in inches per hour)
F_m	Rate of runoff (in inches per hour) = a_pF_p
Length	Flowpath length (feet)
Ave S	Average slope of subarea (ft/ft)
T_c	Time of concentration (minutes; 5 minute minimum)
T_t	Travel time (minutes) between points of concentration
I	Rainfall intensity (in/hr) in non-mountainous areas for 100-yr frequency, $I_t = 11.995\ t^{-0.566}$
Q25	Peak discharge (cfs) = $0.9(I-F_m)\Sigma A$
K_i	Development type constant for initial time of concentration: $Tc=K_i(L^3/H)^{0.2}$

OVERALL SITE		
Total incoming flow at CB #1 (Off-site) *A+B+C+T+U*	27.98 cfs	9.96 acres
Total incoming flow at CB #2 *V*	5.45 cfs	1.69 acres
Total incoming flow at CB #3 *F+H+W*	5.98 cfs	1.72 acres
Incoming flow at Area 1 *D+E+G+I+J+K+L+M+N+O+P+Q+Q1+R+S*	49.09 cfs	13.34 acres
Total	88.50 cfs	26.72 acres

ON-SITE		
Total incoming flow at Dicharge Point #1	45.12 cfs	13.34 acres

Q 100 Rational Method Hydrology Calculations for Proposed Development
Project: Creekside, San Juan Capistrano

Area No.	A (sqft)	A (ac)	ΣA (ac)	Soil type	Dev type	K_i	T_c (min)	I_{25} (in/hr)	F_m (in/hr)	F_p avg	F_m avg	a_i	a_p	Q25 (cfs)	S_0	L (ft)	H (ft)	d (in)	n	K_{pipe}	D/d	D (ft)	V (fps)	T_t (min)	Description
A	145405.0	3.338	3.34	D	Poor Grass	0.697	11.7	3.8	0.18	0.20	0.18	0.10	0.90	10.88	16.31%	864	141								Initial Subarea - Surface Flow **CB #1 (Flow 1 of 5)**
B	69573.0	1.597	1.60	D	Poor Grass	0.697	10.5	4.0	0.18	0.20	0.18	0.10	0.90	5.56	15.08%	696	105								Surface Flow **CB #1 (Flow 2 of 5)**
C	17577.0	0.404	0.40	D	Poor Grass	0.697	8.5	4.6	0.18	0.20	0.18	0.10	0.90	1.59	18.13%	375	68								Surface Flow **CB #1 (Flow 3 of 5)**
D	44077.0	1.012	1.01	D	Asphalt Concrete	0.298	8.1	4.7	0.00	0.20	0.00	1.00	0.00	4.27	3.91%	766	30								Initial Subarea - Surface Flow **Area (Flow 1 of 14)**
E	40120.0	0.921	0.92	D	Apartments	0.325	7.3	5.0	0.02	0.20	0.02	0.90	0.10	4.11	1.63%	307	5								Surface Flow **Area 1 (Flow 2 of 14)**
F	31252.0	0.717	0.72	D	Poor Grass	0.697	7.0	5.1	0.18	0.20	0.18	0.10	0.90	3.18	25.94%	316	82								Surface Flow **CB #3 (Flow 1 of 3)**
G	39078.0	0.897	0.90	D	Apartments	0.325	7.2	5.0	0.02	0.20	0.02	0.92	0.08	4.05	1.69%	296	5								Surface Flow *Modular Wetlands* **Area 1 (Flow 3 of 14)**
H	38179.0	0.876	0.88	D	Poor Grass	0.697	7.2	5.0	0.18	0.20	0.18	0.10	0.90	3.82	18.72%	299	56								Initial Subarea - Surface Flow **CB #3 (Flow 2 of 3)**
I	46189.0	1.060	1.06	D	Apartments	0.325	6.9	5.1	0.02	0.20	0.02	0.90	0.10	4.87	1.78%	281	5								Surface Flow *Modular Wetlands* **Area 1 (Flow 4 of 14)**
J	68310.0	1.568	1.57	D	Single Family	0.391	11.1	3.9	0.02	0.20	0.02	0.90	0.10	5.50	2.20%	726	16								Initial Subarea - Surface Flow *Modular Wetlands* **Area 1 (Flow 5 of 14)**
K	45741.0	1.050	1.05	D	Single Family	0.391	6.4	5.4	0.02	0.20	0.02	0.90	0.10	5.06	3.90%	256	10								Surface Flow *Modular Wetlands* **Area 1 (Flow 6 of 14)**
L	53432.0	1.227	1.23	D	Single Family	0.391	7.4	4.9	0.02	0.20	0.02	0.90	0.10	5.43	3.97%	352	14								Surface Flow *Modular Wetlands* **Area 1 (Flow 7 of 14)**
M	43135.0	0.990	0.99	D	Single Family	0.391	8.5	4.6	0.02	0.20	0.02	0.90	0.10	4.05	2.93%	410	12								Surface Flow *Modular Wetlands* **Area 1 (Flow 8 of 14)**
N	75395.0	1.731	1.73	D	Single Family	0.391	8.1	4.7	0.02	0.20	0.02	0.90	0.10	7.28	3.18%	377	12								Surface Flow *Modular Wetlands* **Area 1 (Flow 9 of 14)**
O	8654.0	0.199	0.20	D	Single Family	0.391	5.4	5.9	0.09	0.20	0.09	0.54	0.46	1.04	4.54%	154	7								Surface Flow *Modular Wetlands* **Area 1 (Flow 10 of 14)**
P	20003.0	0.459	0.46	D	Single Family	0.391	6.9	5.1	0.04	0.20	0.04	0.81	0.19	2.11	2.65%	226	6								Surface Flow *Modular Wetlands* **Area 1 (Flow 11 of 14)**
Q	38162.0	0.876	0.88	D	Single Family	0.391	10.2	4.1	0.02	0.20	0.02	0.90	0.10	3.23	2.82%	283	11								Initial Subarea - Surface Flow **Area 1 (Flow 12 of 14)**
Q-1	60080.0	1.379	1.38	D	Single Family	0.391	10.2	4.1	0.02	0.20	0.02	0.90	0.10	5.08	2.82%	425	11								Initial Subarea - Surface Flow **Area 1 (Flow 12 of 14)**
R	37943.0	0.871	0.87	D	Single Family	0.391	6.4	5.4	0.02	0.20	0.02	0.90	0.10	4.18	4.92%	244	12								Surface Flow **Area 1 (Flow 13 of 14)**
S	21012.0	0.482	0.48	D	Single Family	0.391	5.3	6.0	0.02	0.20	0.02	0.90	0.10	2.58	5.98%	167	10								Surface Flow **Area 1 (Flow 14 of 14)**
T	153834.0	3.532	3.53	D	Commercial	0.298	9.5	4.3	0.02	0.20	0.02	0.90	0.10	13.55	3.28%	760	25								Initial Subarea - Surface Flow **CB #1 (Flow 4 of 5)**
U	47660.0	1.094	1.09	D	Asphalt Concrete	0.298	8.7	4.5	0.04	0.20	0.04	0.81	0.19	4.40	0.69%	432	3								Initial Subarea - Surface Flow **CB #1 (Flow 5 of 5)**
V	73723.0	1.692	1.69	D	Asphalt Concrete	0.298	8.3	4.6	0.04	0.20	0.04	0.80	0.20	6.99	2.51%	676	17								Initial Subarea - Surface Flow **CB #2 (Flow 1 of 1)**
W	5682.0	0.130	0.13	D	Asphalt Concrete	0.298	5.0	6.2	0.00	0.20	0.00	1.00	0.00	0.73	10.09%	317	32								Initial Subarea - Surface Flow **CB #3 (Flow 3 of 3)**

Legend:

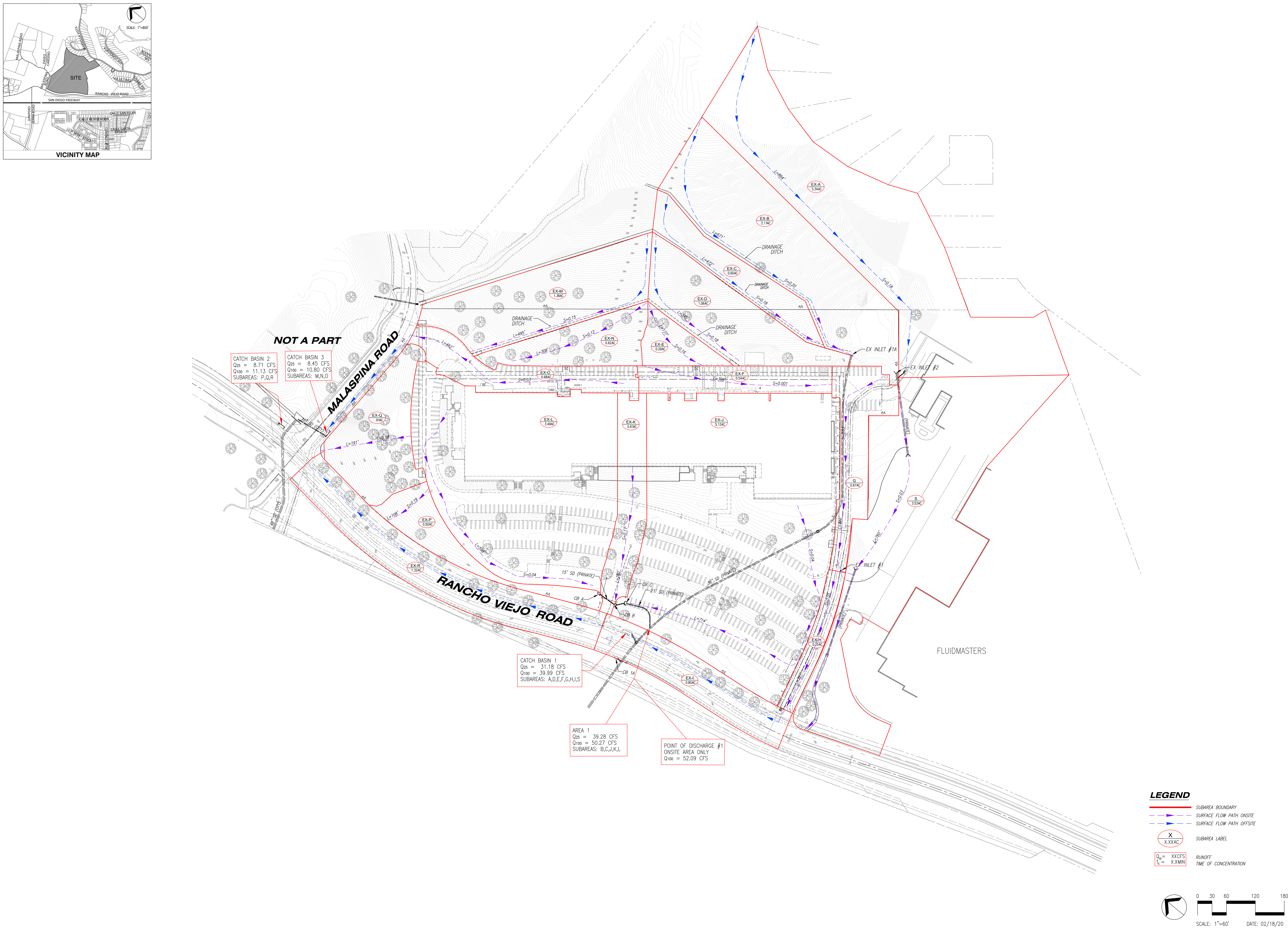
A	Area of subarea (acres)
ΣA	Total area (acres)
a_i	Fractional portion of impervious area
a_p	Fractional portion of pervious area
F_p	Infiltration rate (in inches per hour)
F_m	Rate of runoff (in inches per hour) = a_pF_p
Length	Flowpath length (feet)
Ave S	Average slope of subarea (ft/ft)
T_c	Time of concentration (minutes; 5 minute minimum)
T_t	Travel time (minutes) between points of concentration
I	Rainfall intensity (in/hr) in non-mountainous areas for 100-yr frequency, $I_t = 11.995\ t^{-0.566}$
Q_{100}	Peak discharge (cfs) = $0.9(I-F_m)\Sigma A$
K_i	Development type constant for initial time of concentration: $Tc=K_i(L^3/H)^{0.2}$

OVERALL SITE		
Total incoming flow at CB #1 (Off-site) *A+B+C+T+U*	35.98 cfs	9.96 acres
Total incoming flow at CB #2 *V*	6.99 cfs	1.69 acres
Total incoming flow at CB #3 *F+H+W*	7.72 cfs	1.72 acres
Incoming flow at Area 1 *D+E+G+I+J+K+L+M+N+O+P+Q+Q1+R+S*	62.85 cfs	13.34 acres
Total	113.53 cfs	26.72 acres

ON-SITE		
Total incoming flow at Dicharge Point #1	62.85 cfs	13.34 acres

Appendix 5

Existing Conditions Hydrology Map



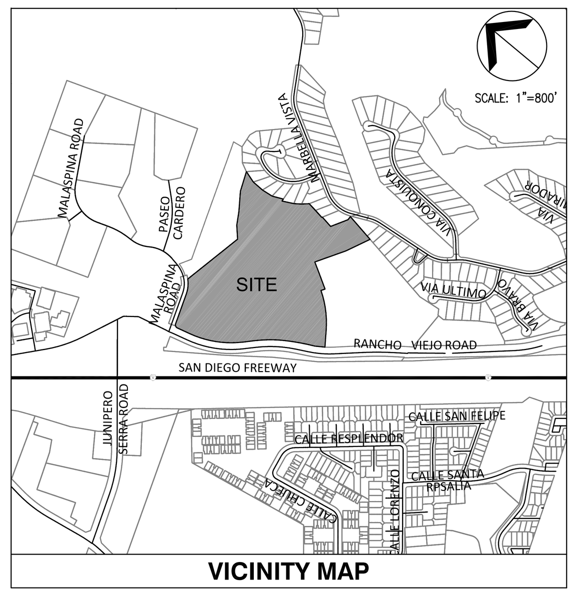
30700 RANCHO VIEJO ROAD

INTEGRAL COMMUNITIES | **EXISTING DRAINAGE PLAN** | **SAN JUAN CAPISTRANO , CALIFORNIA**

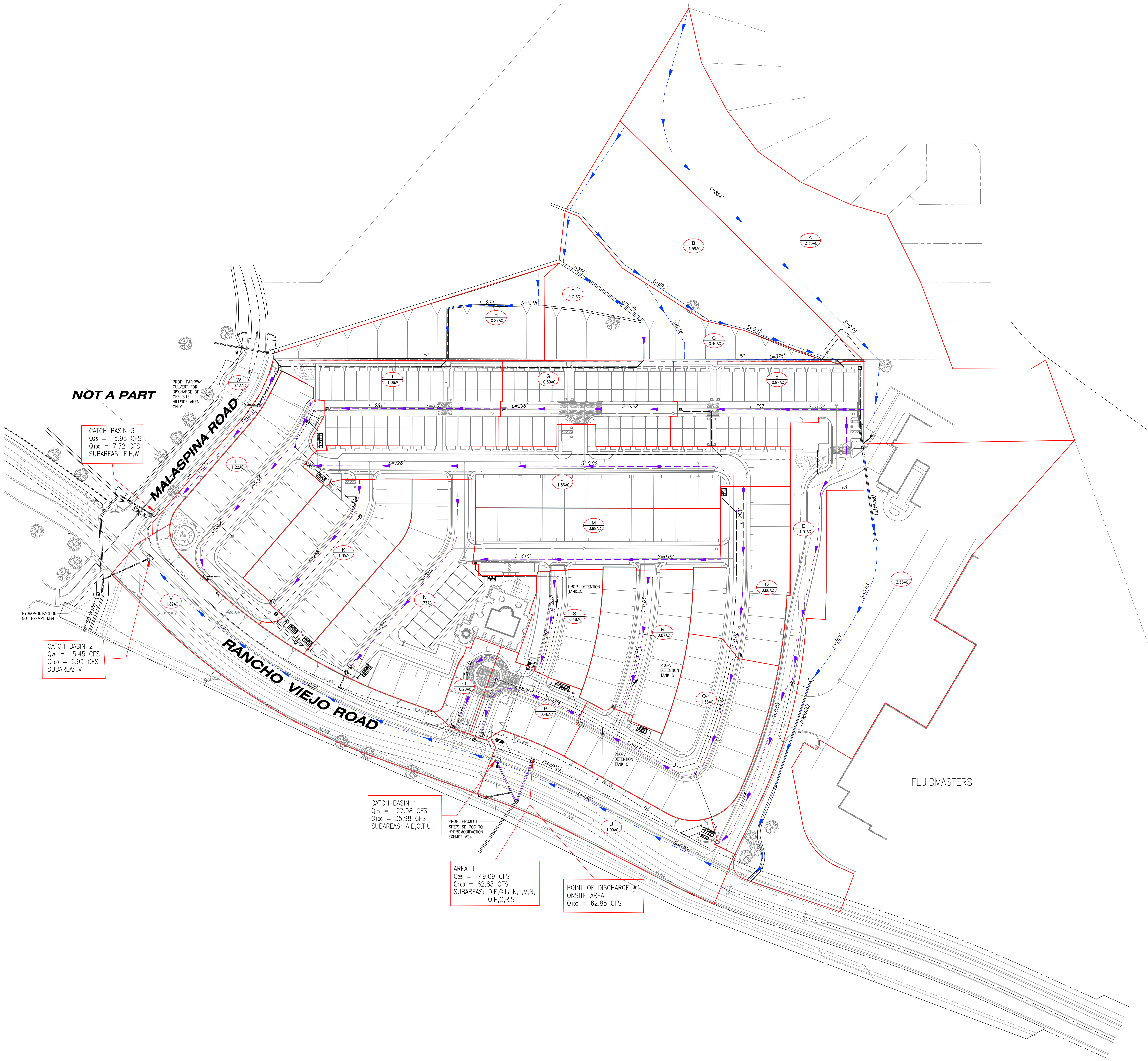
KHR ASSOCIATES
CONSULTING ENGINEERS/SURVEYORS/PLANNERS
17530 Von Karman Ave. - Suite 200
Irvine, California 92614
Tel (949) 756-6440

Appendix 6

Proposed Conditions Hydrology Map



VICINITY MAP



LEGEND

- SUBAREA BOUNDARY
- SURFACE FLOW PATH ONSITE
- SURFACE FLOW PATH OFFSITE
- X / X.XXAC — SUBAREA LABEL
- Q_{10} = XXCFS — RUNOFF
- T_c = X.XMIN — TIME OF CONCENTRATION

0 20 40 80 120

SCALE: 1"=60' DATE: 02/18/20

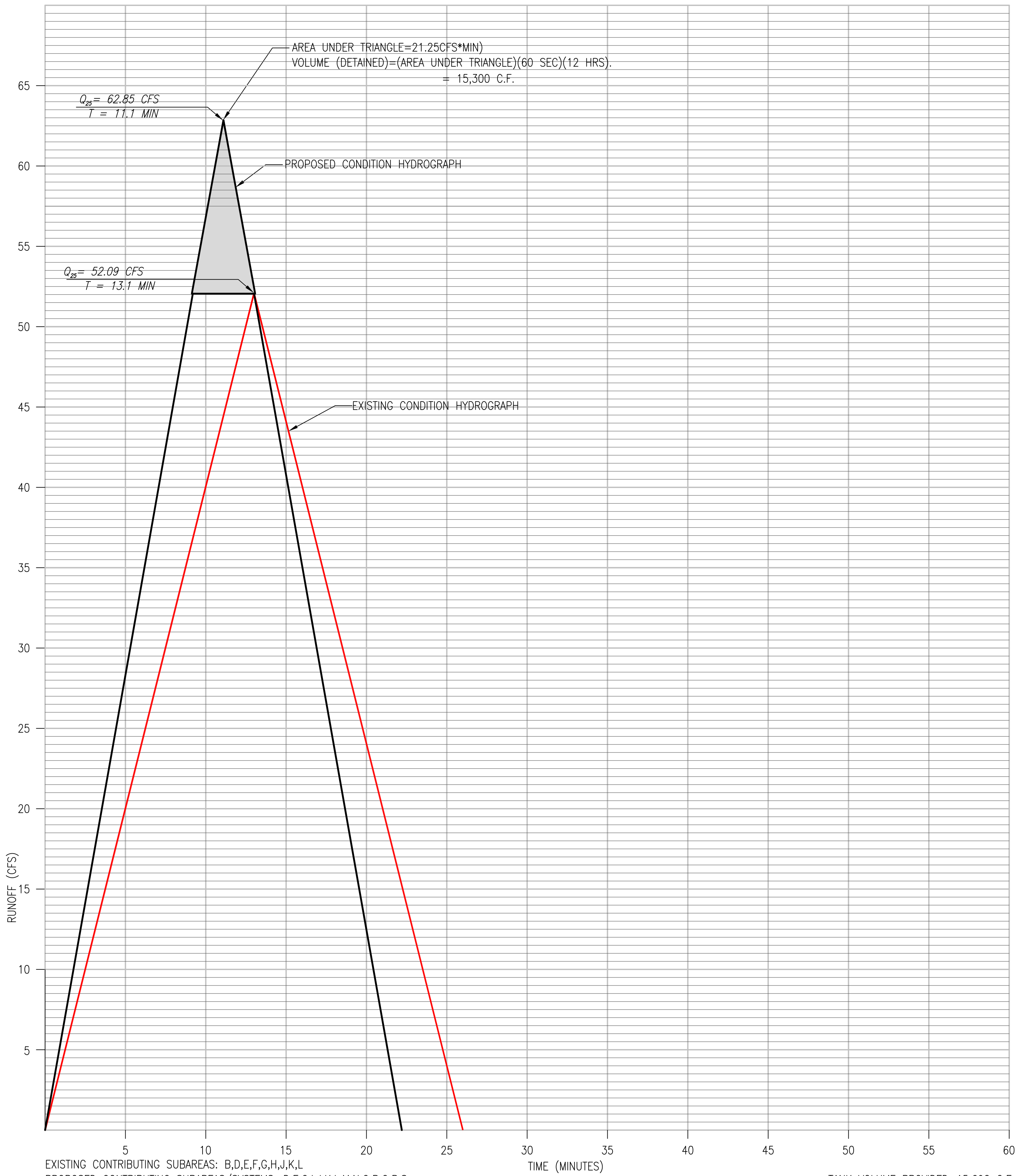
30700 RANCHO VIEJO ROAD

INTEGRAL COMMUNITIES **PROPOSED DRAINAGE PLAN** **SAN JUAN CAPISTRANO , CALIFORNIA**

KHR ASSOCIATES
CONSULTING ENGINEERS/SURVEYORS/PLANNERS
17530 Von Karman Ave. - Suite 200 Tel (949) 756-6440
Irvine, California 92614

Appendix 7

Hydrograph



EXISTING CONTRIBUTING SUBAREAS: B,D,E,F,G,H,J,K,L
PROPOSED CONTRIBUTING SUBAREAS/SYSTEMS: D,E,G,I,J,K,L,M,N,O,P,Q,R,S

TANK VOLUME PROVIDED=15,692 C.F.

SAN JUAN CAPISTRANO-RANCHO VIEJO - 100-YEAR (12 HR) STORM DETENTION

PREPARED BY:
KHR ASSOCIATES
CONSULTING ENGINEERS/SURVEYORS/PLANNERS
20411 SW Birch, Suite 310 Newport Beach, California 92660
(949) 756-6440 Fax (949) 756-6444

Appendix 8

South Orange County Hydrology Model Calculations

SOHM

PROJECT REPORT

General Model Information

Project Name:	Malaspina Road
Site Name:	
Site Address:	
City:	SAN JUAN CAPISTRANO
Report Date:	1/29/2020
Gage:	Laguna Beach
Data Start:	10/01/1949
Data End:	09/30/2006
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2018/07/12

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data
Predeveloped Land Use

M,N,O,P,Q,R,S

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
Impervious,Mod(5-10)	5.34
Impervious Total	5.34
Basin Total	5.34

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

H,F,V,W

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A,Scrub,Steep(10-15)	1.59
Pervious Total	1.59
Impervious Land Use	acre
Impervious,Mod(5-10)	1.84
Impervious Total	1.84
Basin Total	3.43

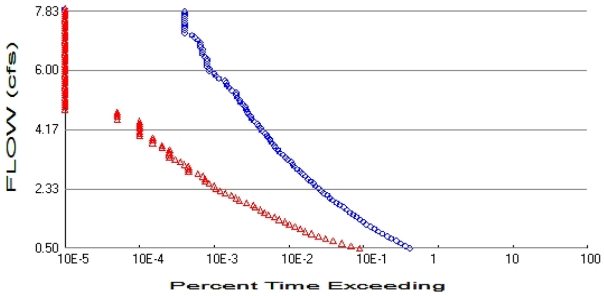
Element Flows To:

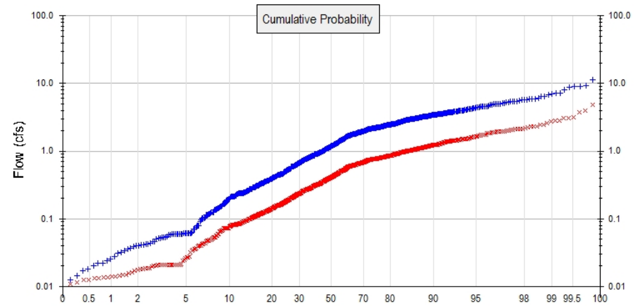
Surface	Interflow	Groundwater

Routing Elements
Predeveloped Routing

Mitigated Routing

Analysis Results
POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0
Total Impervious Area: 5.34

Mitigated Landuse Totals for POC #1
Total Pervious Area: 1.59
Total Impervious Area: 1.84

Flow Frequency Method: Cunnane

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	5.014565
5 year	6.377922
10 year	7.833882
25 year	9.08618

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	1.937365
5 year	2.430261
10 year	3.041172
25 year	3.751238

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.5015	8250	1766	21	Pass
0.5755	7201	1357	18	Pass
0.6496	6278	1024	16	Pass
0.7237	5462	782	14	Pass
0.7977	4703	617	13	Pass
0.8718	4113	497	12	Pass
0.9458	3560	403	11	Pass
1.0199	3150	333	10	Pass
1.0940	2776	281	10	Pass
1.1680	2460	239	9	Pass
1.2421	2177	202	9	Pass
1.3162	1976	178	9	Pass
1.3902	1785	148	8	Pass
1.4643	1605	128	7	Pass
1.5384	1455	106	7	Pass
1.6124	1301	94	7	Pass
1.6865	1190	83	6	Pass
1.7606	1075	70	6	Pass
1.8346	955	66	6	Pass
1.9087	859	54	6	Pass
1.9828	770	43	5	Pass
2.0568	700	39	5	Pass
2.1309	652	34	5	Pass
2.2049	585	28	4	Pass
2.2790	536	24	4	Pass
2.3531	494	21	4	Pass
2.4271	456	20	4	Pass
2.5012	422	17	4	Pass
2.5753	389	15	3	Pass
2.6493	358	15	4	Pass
2.7234	331	14	4	Pass
2.7975	301	12	3	Pass
2.8715	280	9	3	Pass
2.9456	257	9	3	Pass
3.0197	238	9	3	Pass
3.0937	224	8	3	Pass
3.1678	213	7	3	Pass
3.2419	194	6	3	Pass
3.3159	179	5	2	Pass
3.3900	169	5	2	Pass
3.4641	152	5	3	Pass
3.5381	143	5	3	Pass
3.6122	132	4	3	Pass
3.6862	126	4	3	Pass
3.7603	118	3	2	Pass
3.8344	113	3	2	Pass
3.9084	106	3	2	Pass
3.9825	101	2	1	Pass
4.0566	96	2	2	Pass
4.1306	86	2	2	Pass
4.2047	84	2	2	Pass
4.2788	79	2	2	Pass
4.3528	75	2	2	Pass

4.4269	68	2	2	Pass
4.5010	64	1	1	Pass
4.5750	61	1	1	Pass
4.6491	57	1	1	Pass
4.7232	56	1	1	Pass
4.7972	53	0	0	Pass
4.8713	52	0	0	Pass
4.9454	48	0	0	Pass
5.0194	44	0	0	Pass
5.0935	43	0	0	Pass
5.1675	41	0	0	Pass
5.2416	39	0	0	Pass
5.3157	39	0	0	Pass
5.3897	34	0	0	Pass
5.4638	32	0	0	Pass
5.5379	30	0	0	Pass
5.6119	29	0	0	Pass
5.6860	28	0	0	Pass
5.7601	23	0	0	Pass
5.8341	21	0	0	Pass
5.9082	20	0	0	Pass
5.9823	17	0	0	Pass
6.0563	17	0	0	Pass
6.1304	16	0	0	Pass
6.2045	16	0	0	Pass
6.2785	16	0	0	Pass
6.3526	16	0	0	Pass
6.4266	15	0	0	Pass
6.5007	14	0	0	Pass
6.5748	14	0	0	Pass
6.6488	14	0	0	Pass
6.7229	13	0	0	Pass
6.7970	13	0	0	Pass
6.8710	13	0	0	Pass
6.9451	12	0	0	Pass
7.0192	11	0	0	Pass
7.0932	10	0	0	Pass
7.1673	8	0	0	Pass
7.2414	8	0	0	Pass
7.3154	8	0	0	Pass
7.3895	8	0	0	Pass
7.4636	8	0	0	Pass
7.5376	8	0	0	Pass
7.6117	8	0	0	Pass
7.6858	8	0	0	Pass
7.7598	8	0	0	Pass
7.8339	8	0	0	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

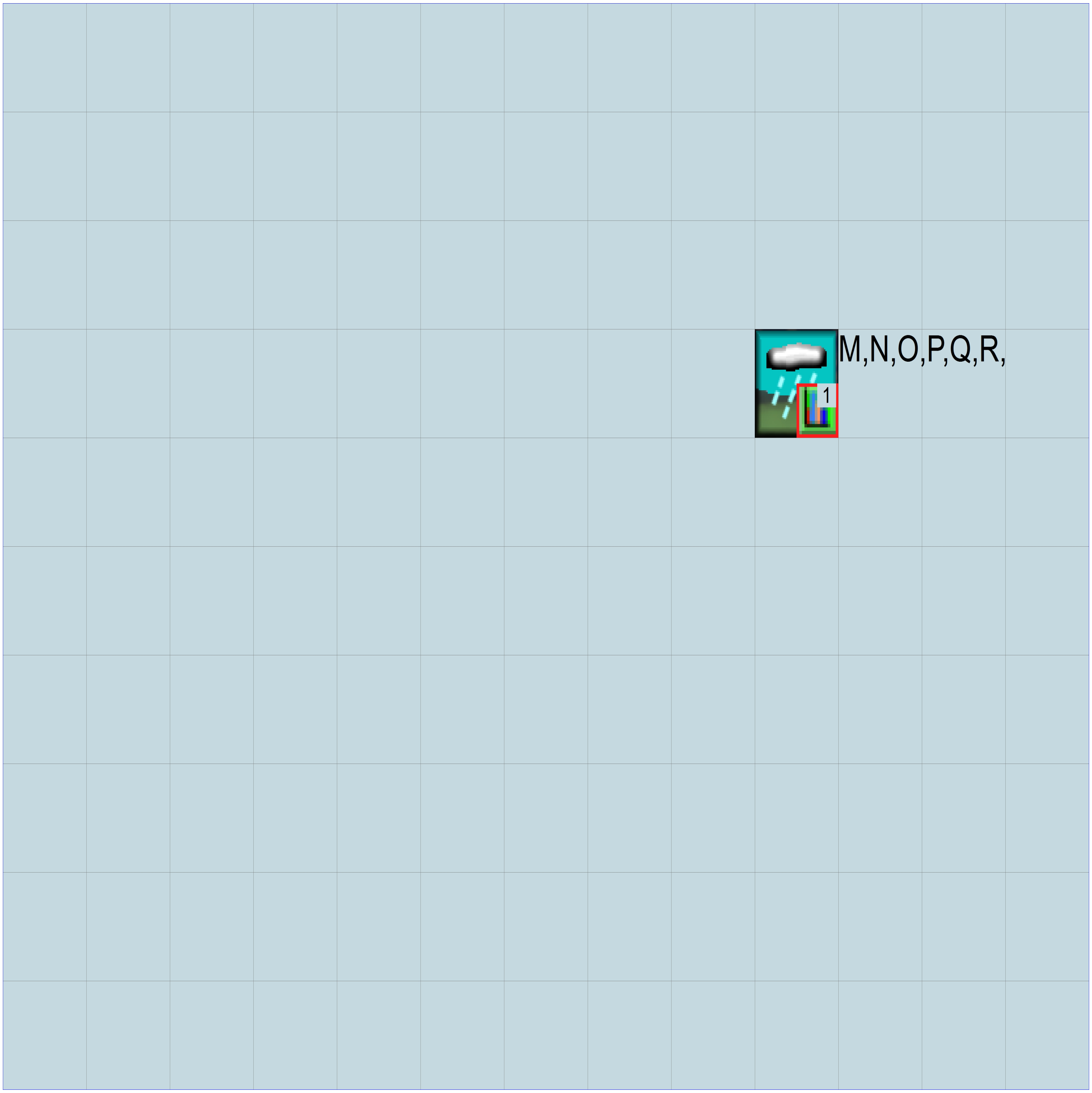
PERLND Changes

No PERLND changes have been made.

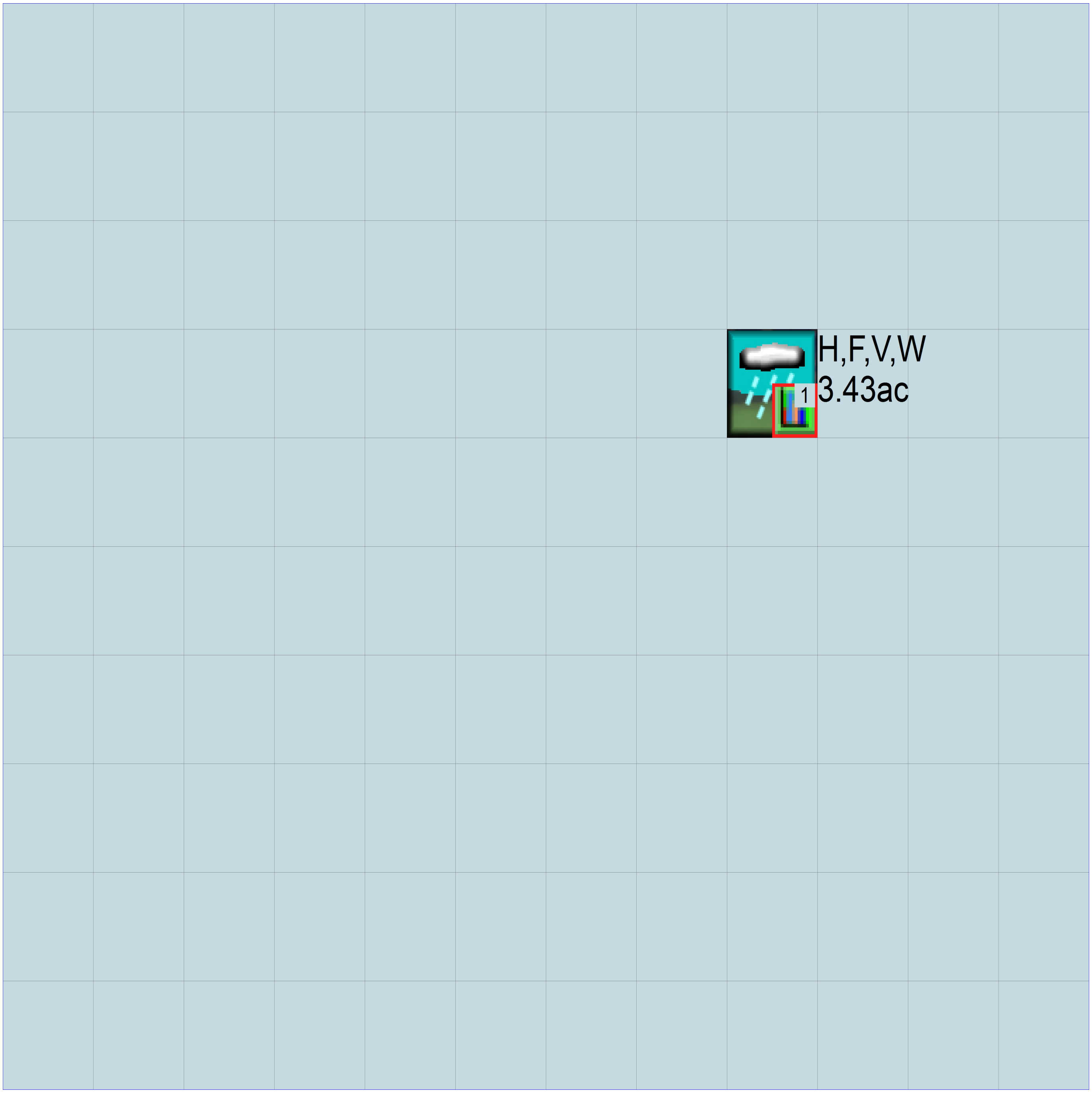
IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1949 10 01        END    2006 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM        26   Malaspina Road.wdm
MESSU      25   PreMalaspina Road.MES
           27   PreMalaspina Road.L61
           28   PreMalaspina Road.L62
           30   POCMalaspina Road1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      IMPLND       2
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        M,N,O,P,Q,R,S              MAX                      1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out            ***
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
```

```
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                               ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
              ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                      in  out           ***
    2     Impervious,Mod(5-10)    1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    2         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    2         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
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  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    2            100       0.1       0.1      0.09
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    2              0         0
  END IWAT-PARM3
```

```
  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    2            0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
M,N,O,P,Q,R,S***
IMPLND   2                        5.34     COPY   501     15

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                 ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG            ***
                                          in  out                            ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                      ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                         ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit       for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES
```

```
EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1949 10 01        END    2006 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                             ***
WDM        26   Malaspina Road.wdm
MESSU      25   MitMalaspina Road.MES
           27   MitMalaspina Road.L61
           28   MitMalaspina Road.L62
           30   POCMalaspina Road1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND       3
      IMPLND       2
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        H,F,V,W                     MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
    3     A,Scrub,Steep(10-15)    1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
    3         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
    3         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
```

```
  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
    3         0    0    0    1    0    0    0    0    1    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
    3             0       4.5     0.045       300      0.15       0.8     0.955
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    3            40        35         2         2         0      0.03         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                               ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    3             0       0.5       0.3       2.6       0.4         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    3       0.5  0.5  0.5  0.6 0.65 0.65 0.65 0.65 0.65 0.65 0.55  0.5
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
    3      0.13 0.13 0.13 0.13 0.13 0.13 0.13 0.13 0.13 0.13 0.13    0
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
              ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
    3             0         0      0.05         0       0.9       0.3      0.01
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out            ***
    2     Impervious,Mod(5-10)    1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    2         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    2         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    2         0    0    0    0    0
  END IWAT-PARM1
```

```
  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    2            100       0.1       0.1      0.09
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    2              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    2              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
H,F,V,W***
PERLND   3                        1.59     COPY   501     12
PERLND   3                        1.59     COPY   501     13
IMPLND   2                        1.84     COPY   501     15

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                 ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG            ***
                                         in  out                             ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                      ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
```

```
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                          ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit       for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY     1 OUTPUT MEAN   1 1     48.4      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15


END MASS-LINK

END RUN
```

Disclaimer

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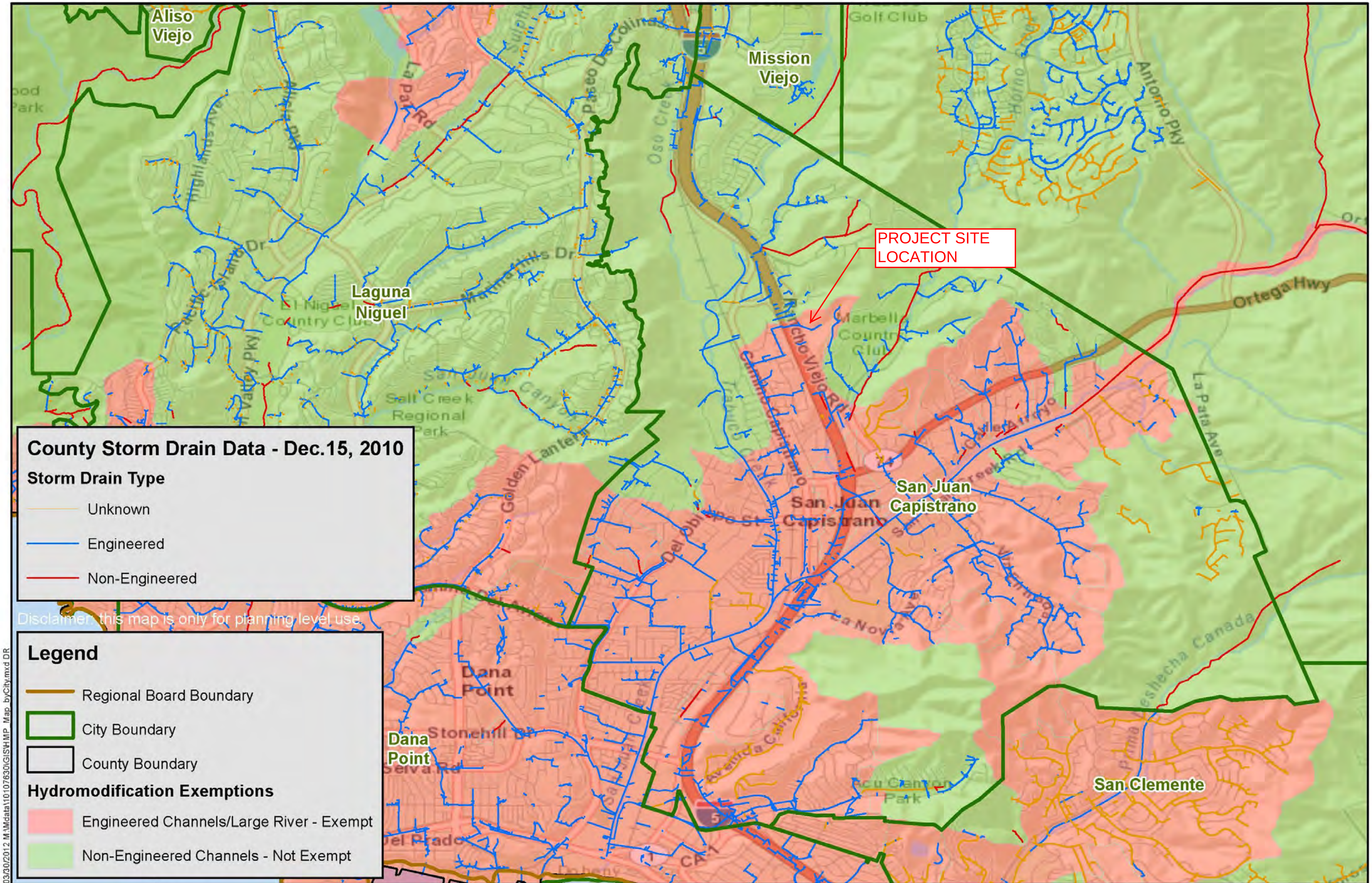
Appendix 9

San Juan Capistrano Hydromodification Exemption Map



South Orange County Engineered Channel Exemption Areas
San Juan Capistrano Exemption Map

RBF CONSULTING A Baker Company — GIS

Sources: County of Orange; Caltrans; ESRI; RBF Consulting; San Diego RWQCB; SWRCB