Preliminary Hydrology Report

For:

Domino's Outparcel - Yucca Valley

Twentynine Palms Highway and Balsa Avenue

Prepared for:

Fernando Tapia

GAFE Pizza, Inc DBA Domino's

7807 Telegraph Road, Suite L & K

Montebello, CA 90640

(323) 201 - 8500

Prepared by:

Kimley Horn and Associates, Inc.

Engineer: Shea Anti, P.E. Registration No. 78274

3880 Lemon Street, Suite 420

Riverside, CA 92501

(951) 543-9868

Submittal Date: April 16, 2020

This Drainage Report has been prepared by Kimley-Horn and Associates, Inc. under the direct supervision of the following Registered Civil engineer. The undersigned attests to the technical data contained in this study, and to the qualifications of technical specialists providing engineering computations upon which the recommendations and conclusions are based.

Registered Civil Engineer

06/24/2020

Date

Purpose of Report

This Hydrology Report has been prepared for Fernando Tapia of GAFE Pizza, Inc DBA Domino's by Kimley-Horn and Associates, Inc. (KHA). The Hydrology Report is intended to comply with the requirements of the San Bernardino County Hydrology Manual to assist in the development of the entitlement documents for the project.

Site Description and Drainage Patterns

The project is a proposed multi-tenant outparcel development to include a Domino's Pizza end cap located at the northwest corner of Twentynine Palms Highway and Balsa Avenue. As part of this project, a portion of the existing parking will be demolished and developed into a new parking lot and restaurant with the addition of multiple landscape areas. Landscape will be a variety of trees, shrubs, and ground covered of drought tolerant native species.

Land use at the proposed site will include indoor food preparation, cooking, indoor eating areas, a drive-thru, and improvements to the surface parking and landscaping design. A covered trash enclosure is proposed at the southeast corner of the parking area to the northeast of the proposed building. Expected wastes will be food waste, grease from cooking, trash and debris.

The proposed building will be a rectangle-oriented East to West with entrances on the North and South faces of the building. The drive-thru approach will be on the west side of the building and circulation is counter-clockwise. The drive-thru exit will be to the north face of the building. The building will have a roof drain system that discharges to the surface parking lot area and will therefore be included in drainage calculations.

In the existing condition runoff from the site surface flows from the southern property line, across the parking lot to an existing catch basin located on the Stater Brother's parking lot on the north side of the site. In the proposed conditions the existing drainage patterns will be maintained. That is stormwater will surface flow across the site from south to north and discharge into the existing catch basin located on the Stater Brother's parking lot.

Methodology Used

The rational method was used to determine the peak flow for storm drain and low impact design. All calculations are in accordance with the San Bernardino County Hydrology Manual and Technical Guidance Document for Water Quality Management.

Summary

The hydrology analysis has been completed for the 10-year, 25-year and 100-year storm events for the existing and proposed conditions. Calculations are included for reference. As a result of the increase in pervious area on the site, it is expected that the runoff produced will be decreased for all storm events. Therefore no additional mitigation measures will be required as it is expected that the downstream infrastructure is adequately sized to convey the proposed development flows.

Table 1: 10-year Storm Event

10-year storm event (Existing Conditions)							
DMA	**Flow Path Length (ft)**	**ΔElevation (ft)**	**T_c (min)**	**I_{10} (in/hr.)**	**C**	**A (acre)**	**Q_{10} (cfs)**
DMA 1	200	8.43	5.0	3.6	0.871	0.75	2.35
Total						**0.75**	**2.35**

10-year storm event (Proposed Conditions)							
DMA	**Flow Path Length (ft)**	**ΔElevation (ft)**	**T_c (min)**	**I_{10} (in/hr.)**	**C**	**A (acre)**	**Q_{10} (cfs)**
DMA 1	205	7.87	5.0	3.6	0.855	0.75	2.31
Total						**0.75**	**2.31**

Table 2: 25-year Storm Event

25-year storm event (Existing Conditions)							
DMA	**Flow Path Length (ft)**	**ΔElevation (ft)**	**T_c (min)**	**I_{25} (in/hr.)**	**C**	**A (acre)**	**Q_{25} (cfs)**
DMA 1	200	8.43	5.0	4.9	0.879	0.75	3.23
Total						**0.75**	**3.23**

25-year storm event (Proposed Conditions)							
DMA	**Flow Path Length (ft)**	**ΔElevation (ft)**	**T_c (min)**	**I_{25} (in/hr.)**	**C**	**A (acre)**	**Q_{25} (cfs)**
DMA 1	205	7.87	5.0	4.9	0.867	0.75	3.18
Total						**0.75**	**3.18**

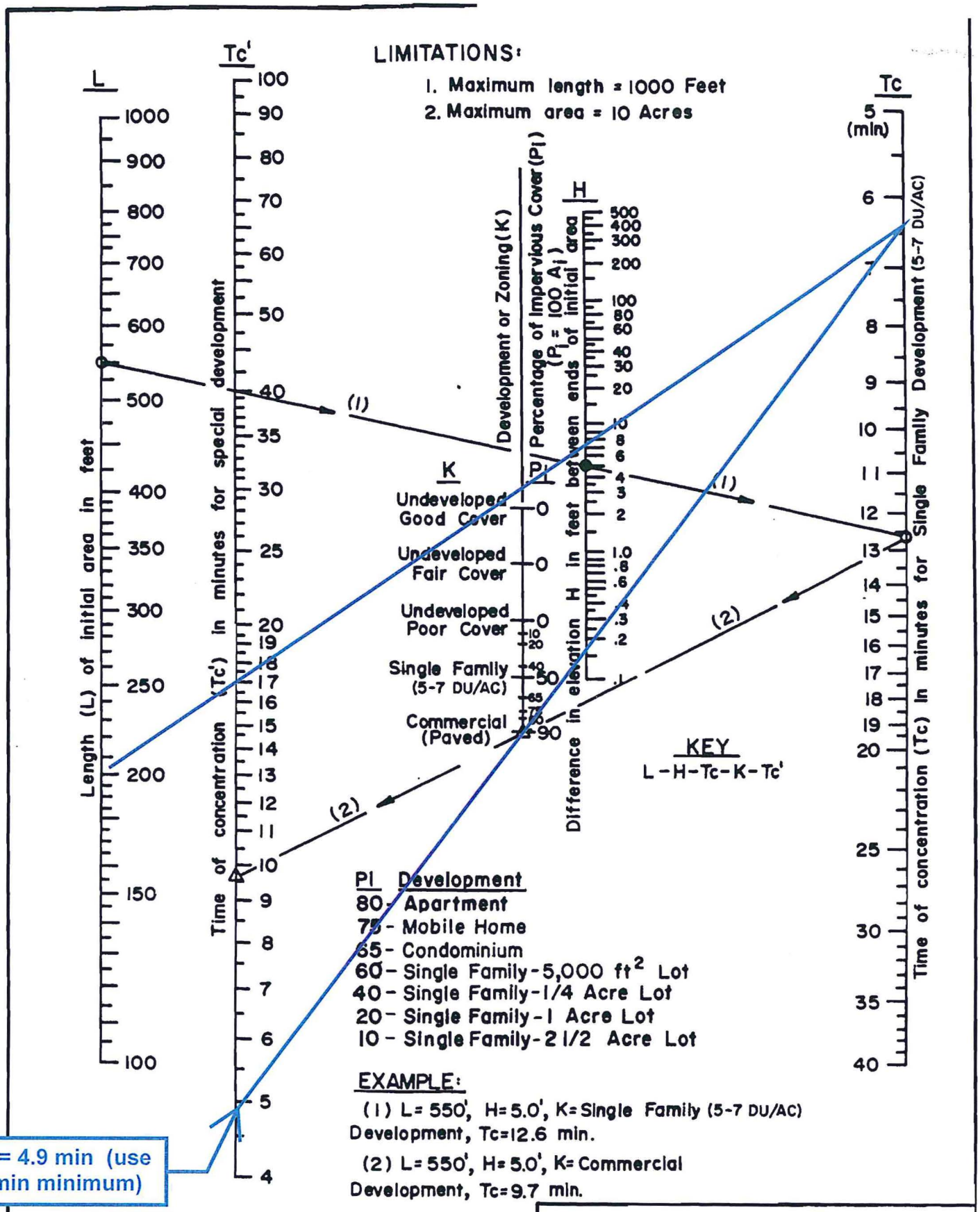
Table 3: 100-year Storm Event

100-year storm event (Existing Conditions)							
DMA	**Flow Path Length (ft)**	**ΔElevation (ft)**	**T_c (min)**	**I_{100} (in/hr.)**	**C**	**A (acre)**	**Q_{100} (cfs)**
DMA 1	200	8.43	5.0	7.8	0.892	0.75	5.21
Total						**0.75**	**5.21**

100-year storm event (Proposed Conditions)							
DMA	**Flow Path Length (ft)**	**ΔElevation (ft)**	**T_c (min)**	**I_{100} (in/hr.)**	**C**	**A (acre)**	**Q_{100} (cfs)**
DMA 1	205	7.87	5.0	7.8	0.885	0.75	5.18
Total						**0.75**	**5.18**

Rational Method Calculations per the San Bernardino County Hydrology Manual

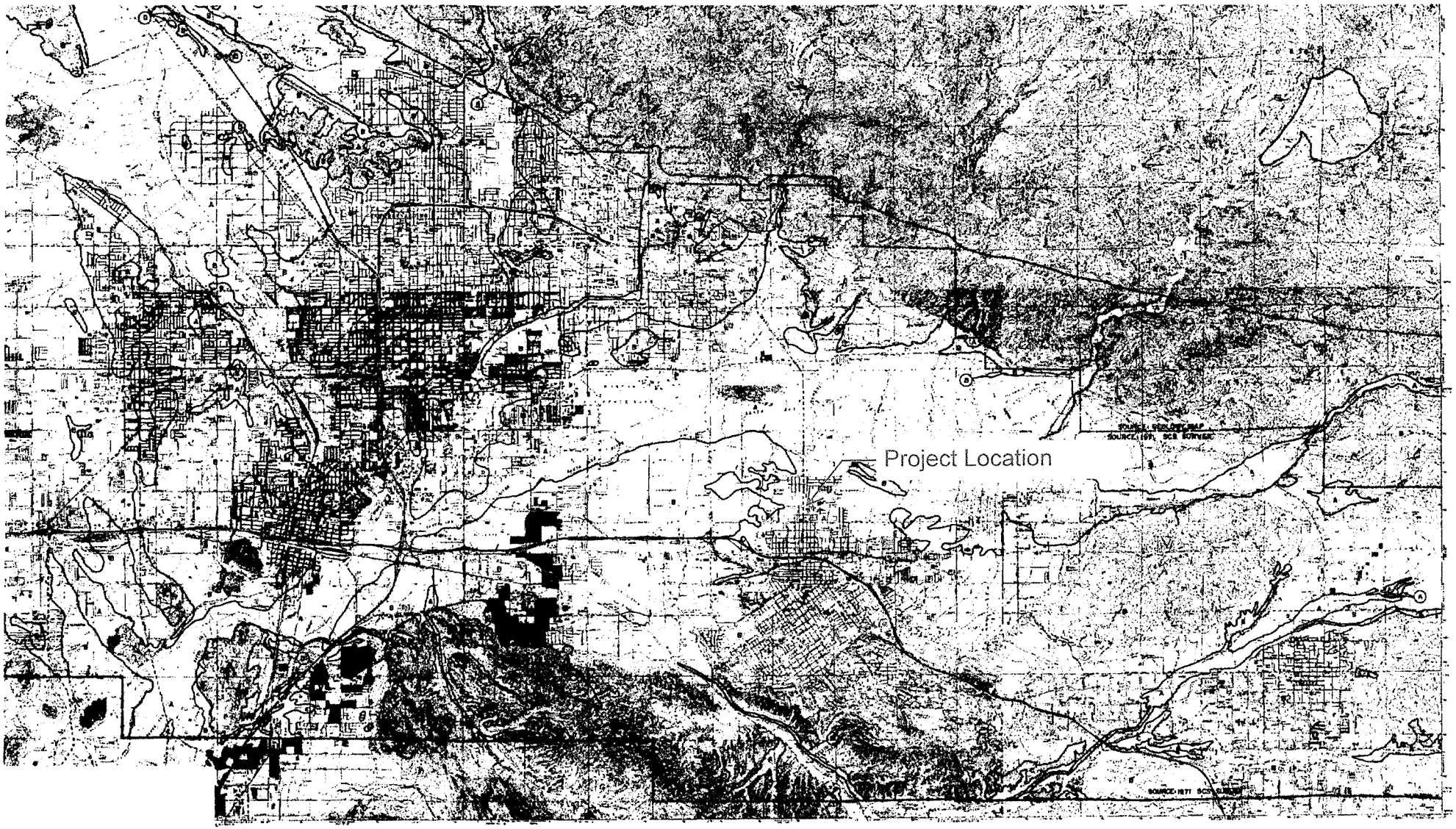
Proposed Conditions

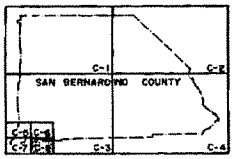


SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1





INDEX MAP

LEGEND

SOIL GROUP BOUNDARY

A SOIL GROUP DESIGNATION

BOUNDARY OF INDICATED SOURCE

SCALE 1:48,000

SCALE REDUCED BY 1/2

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

HYDROLOGIC SOILS GROUP MAP
FOR
SOUTHWEST-D AREA

FIGURE C-16

Curve (1) Numbers of Hydrologic Soil-Cover Complexes For Pervious Areas-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
NATURAL COVERS -					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparral, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparral, Narrowleaf (Chamise and redshank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas (Areas with seasonally high water table, principal vegetation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	71	78
Open Brush (Soft wood shrubs - buckwheat, sage, etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent.)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	25	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
URBAN COVERS -					
Residential or Commercial Landscaping (Lawn, shrubs, etc.)	Good	32	56	69	75
Turf (Irrigated and mowed grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
AGRICULTURAL COVERS -					
Fallow (Land plowed but not tilled or seeded)		77	86	91	94

Existing Condition

Proposed Condition

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

CURVE NUMBERS FOR PERVIOUS AREAS

Figure C-3 (1 of 2)

Curve (1) Numbers of Hydrologic Soil-Cover Complexes For Pervious Areas-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
AGRICULTURAL COVERS (Continued)					
Legumes, Close Seeded (Alfalfa, sweetclover, timothy, etc.)	Poor	66	77	85	89
	Good	58	72	81	85
Orchards, Evergreen (Citrus, avocados, etc.)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
Pasture, Dryland (Annual grasses)	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Pasture, Irrigated (Legumes and perennial grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
Row Crops (Field crops - tomatoes, sugar beets, etc.)	Poor	72	81	88	91
	Good	67	78	85	89
Small grain (Wheat, oats, barley, etc.)	Poor	65	76	84	88
	Good	63	75	83	87

Notes:

1. All curve numbers are for Antecedent Moisture Condition (AMC) II.
2. Quality of cover definitions:

   Poor-Heavily grazed, regularly burned areas, or areas of high burn potential. Less than 50 percent of the ground surface is protected by plant cover or brush and tree canopy.

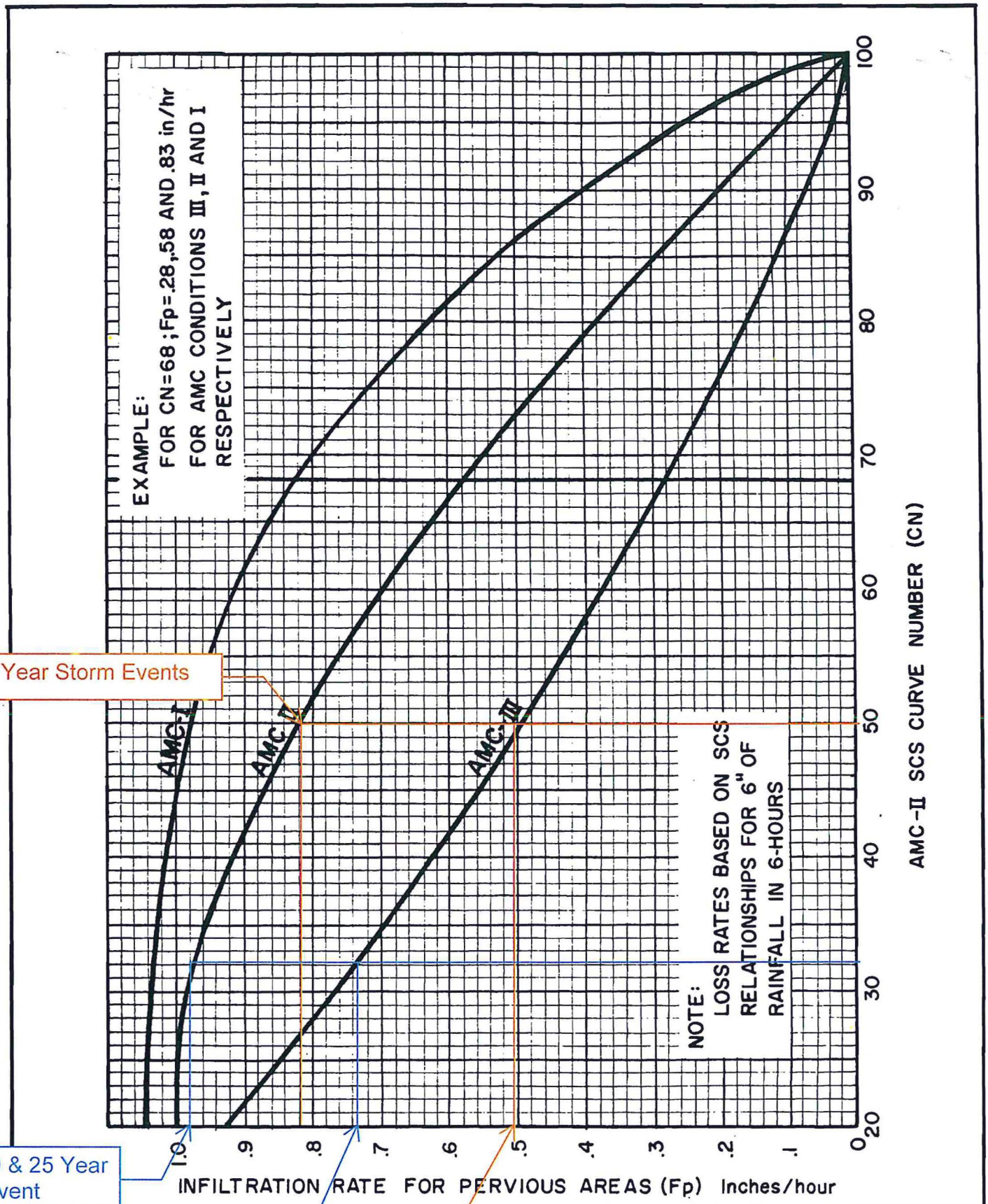
   Fair-Moderate cover with 50 percent to 75 percent of the ground surface protected.

   Good-Heavy or dense cover with more than 75 percent of the ground surface protected.
3. See Figure C-2 for definition of cover types.

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

CURVE NUMBERS FOR PERVIOUS AREAS

Figure C-3 (2 of 2)



10 & 25 Year Storm Events

Prop. 10 & 25 Year Storm Event

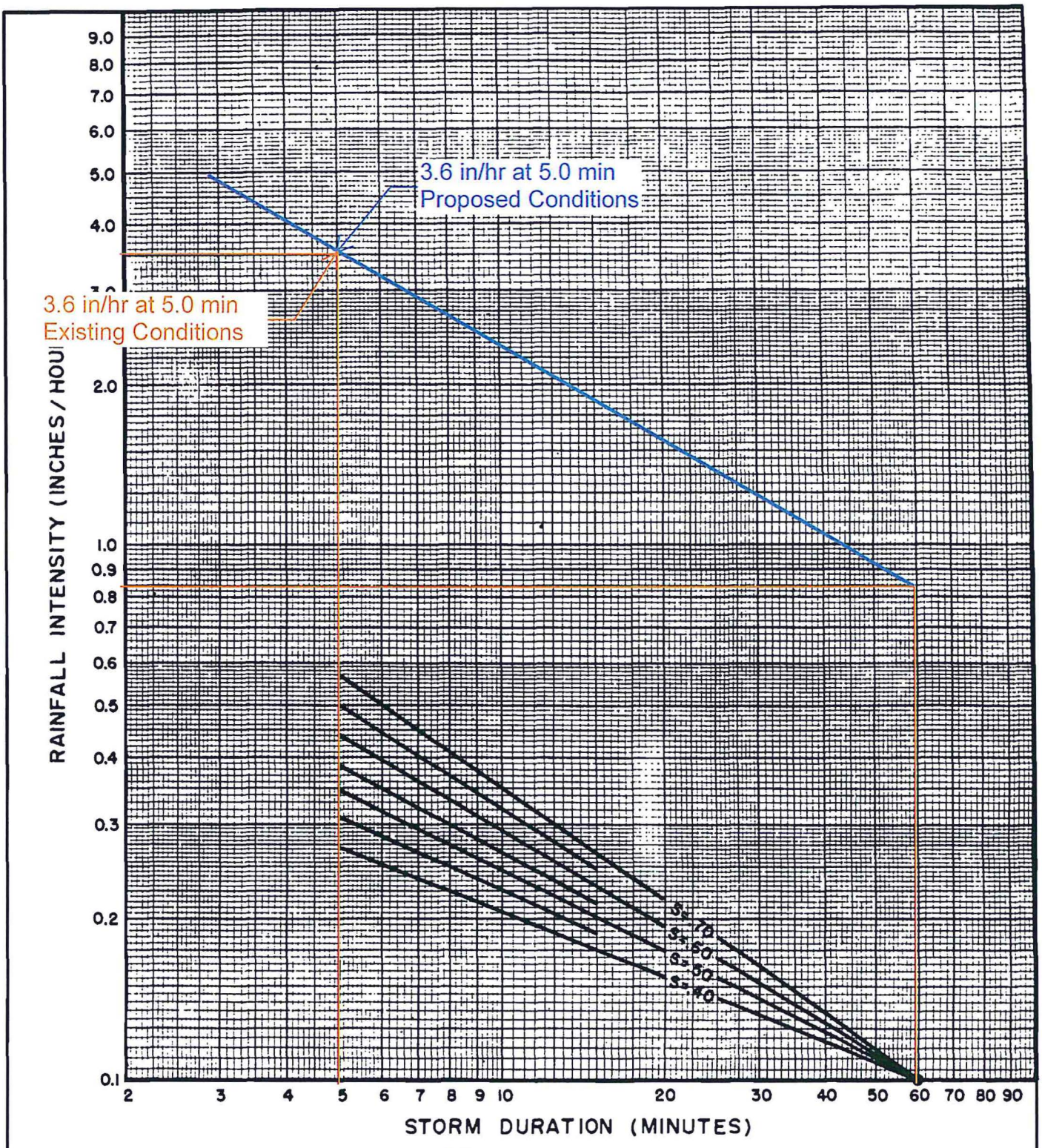
Prop. 100 Year Storm Event

Ex. 100 Year Storm Event

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

INFILTRATION RATE FOR PERVIOUS AREAS VERSUS SCS CURVE NUMBERS

Figure C-6



DESIGN STORM FREQUENCY = 10 YEARS

ONE HOUR POINT RAINFALL = 0.84 INCHES

LOG-LOG SLOPE = 0.6

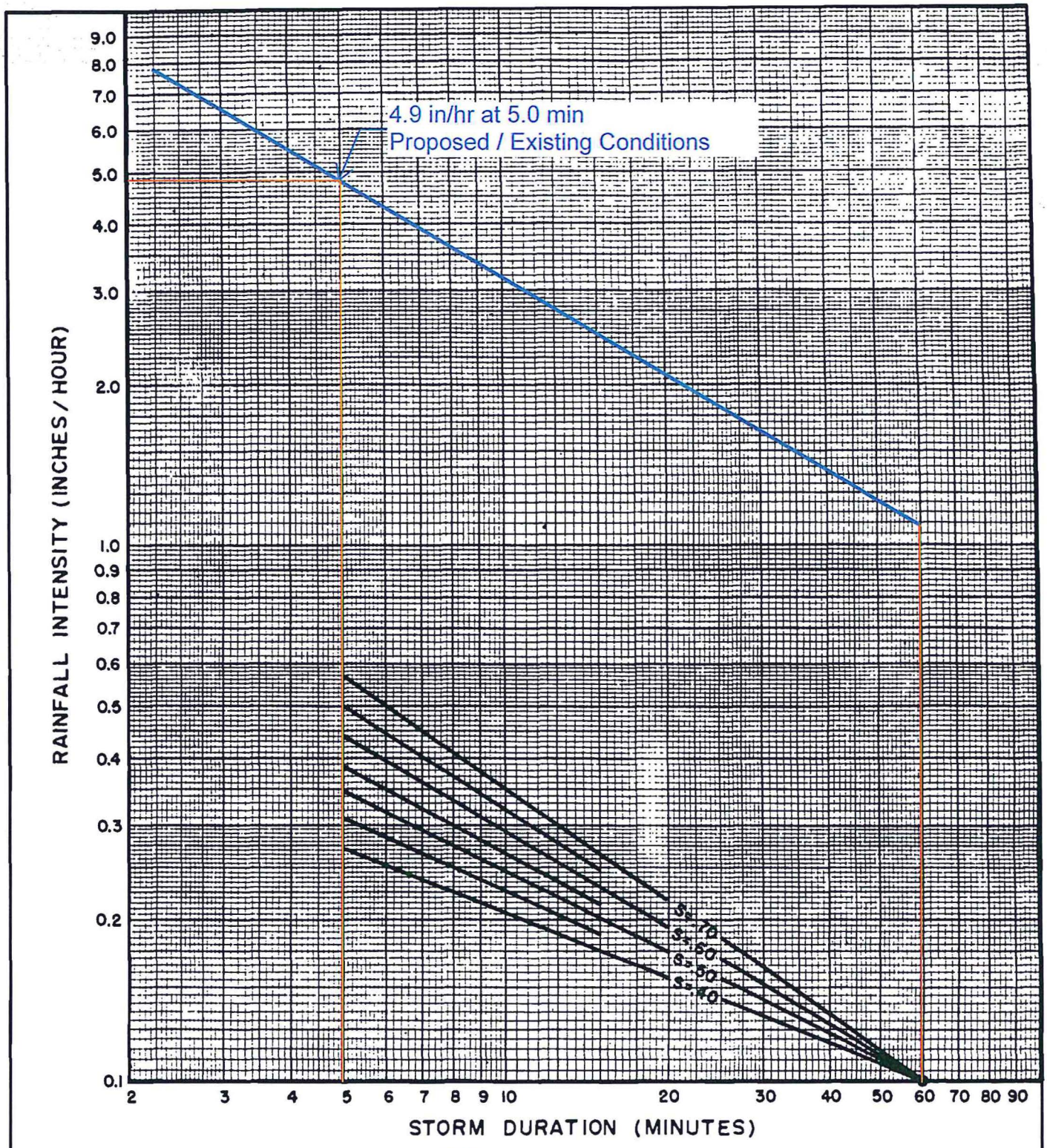
PROJECT LOCATION = Valley

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

INTENSITY - DURATION CURVES CALCULATION SHEET

FIGURE D-3



DESIGN STORM FREQUENCY = 25 YEARS

ONE HOUR POINT RAINFALL = 1.19 INCHES

LOG-LOG SLOPE = 0.6

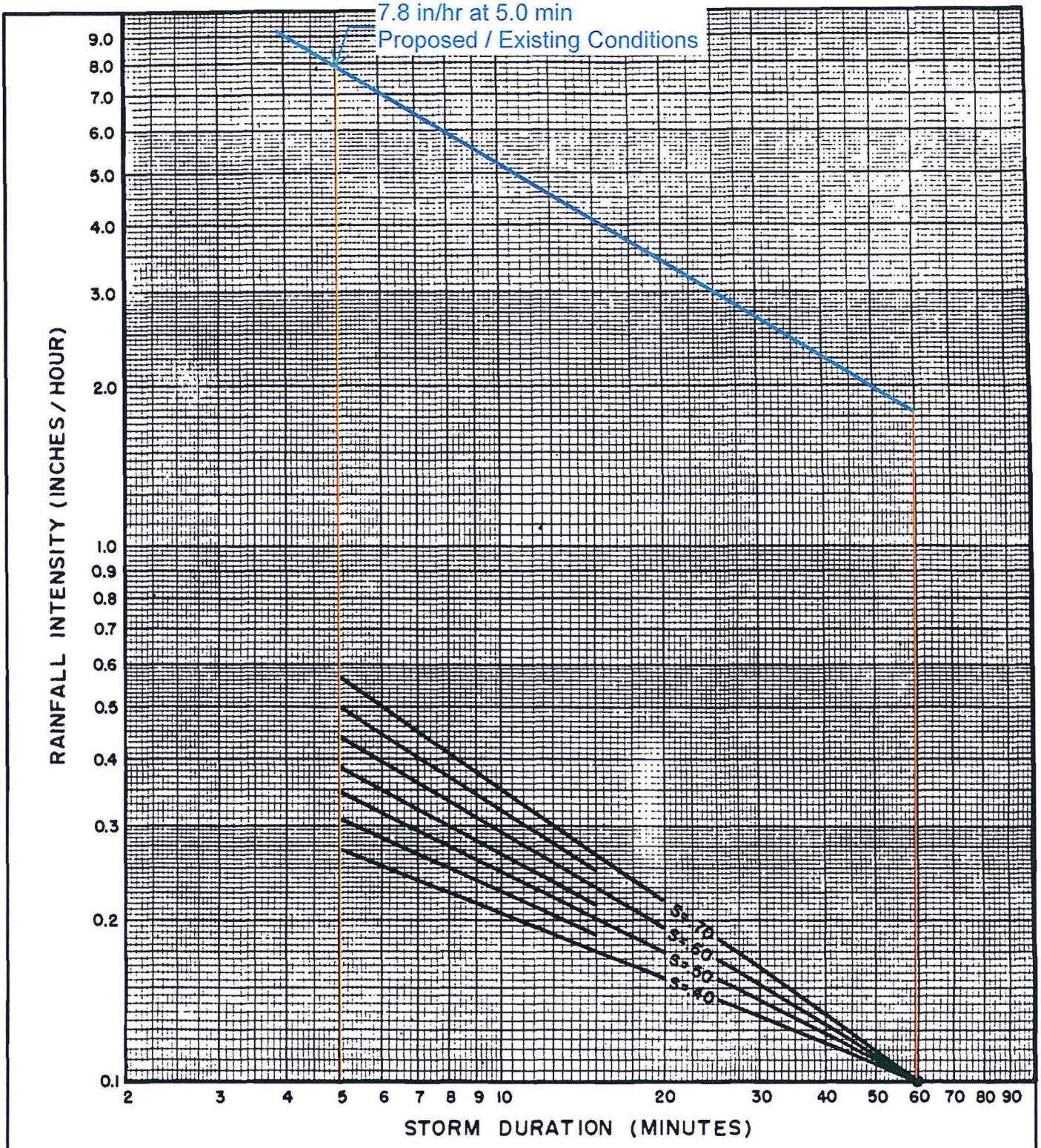
PROJECT LOCATION = Valley

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

INTENSITY - DURATION CURVES CALCULATION SHEET

FIGURE D-3



DESIGN STORM FREQUENCY = 100 YEARS

ONE HOUR POINT RAINFALL = 1.78 INCHES

LOG-LOG SLOPE = 0.6

PROJECT LOCATION = Valley

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

INTENSITY - DURATION CURVES CALCULATION SHEET

FIGURE D-3

Calculating C

Formula D.3	$0.90(a_i + ((I-F_p)a_p)/I$

10-year Storm

Existing Conditions

DMA	F_p (in/hr)	Intensity (in/hr)	Total Area (ft^2)	Pervious Area (ft^2)	Impervious Area (ft^2)	a_i	a_p	C
1	0.82	3.6	32842	4609	28233	0.860	0.140	0.871

Proposed Conditions

1	0.99	3.6	32842	5915	26927	0.820	0.180	0.855

25-year Storm

Existing Conditions

DMA	F_p (in/hr)	Intensity (in/hr)	Total Area (ft^2)	Pervious Area (ft^2)	Impervious Area (ft^2)	a_i	a_p	C
1	0.82	4.9	32842	4609	28233	0.860	0.140	0.879

Proposed Conditions

1	0.99	4.9	32842	5915	26927	0.820	0.180	0.867

100-year Storm

Existing Conditions

DMA	F_p (in/hr)	Intensity (in/hr)	Total Area (ft^2)	Pervious Area (ft^2)	Impervious Area (ft^2)	a_i	a_p	C
1	0.505	7.8	32842	4609	28233	0.860	0.140	0.892

Proposed Conditions

1	0.74	7.8	32842	5915	26927	0.820	0.180	0.885

Drainage Area Maps