CHAPTER 10

DRAINAGE DESIGN TABLES AND CHARTS

CHAPTER 10 - DRAINAGE DESIGN TABLES AND CHARTS

A. DRAINAGE & HYDROLOGY ANALYSIS DATA

This chapter includes the drainage and hydrology analysis data necessary for the design of drainage improvements required by Chapter 2. The basic design criterion is presented in the attached tables, charts, and graphs. The information contained herein is not meant to be all inclusive and other equivalent methods for drainage design that are accepted in the industry may be employed upon the prior approval of the Director of Public Works.

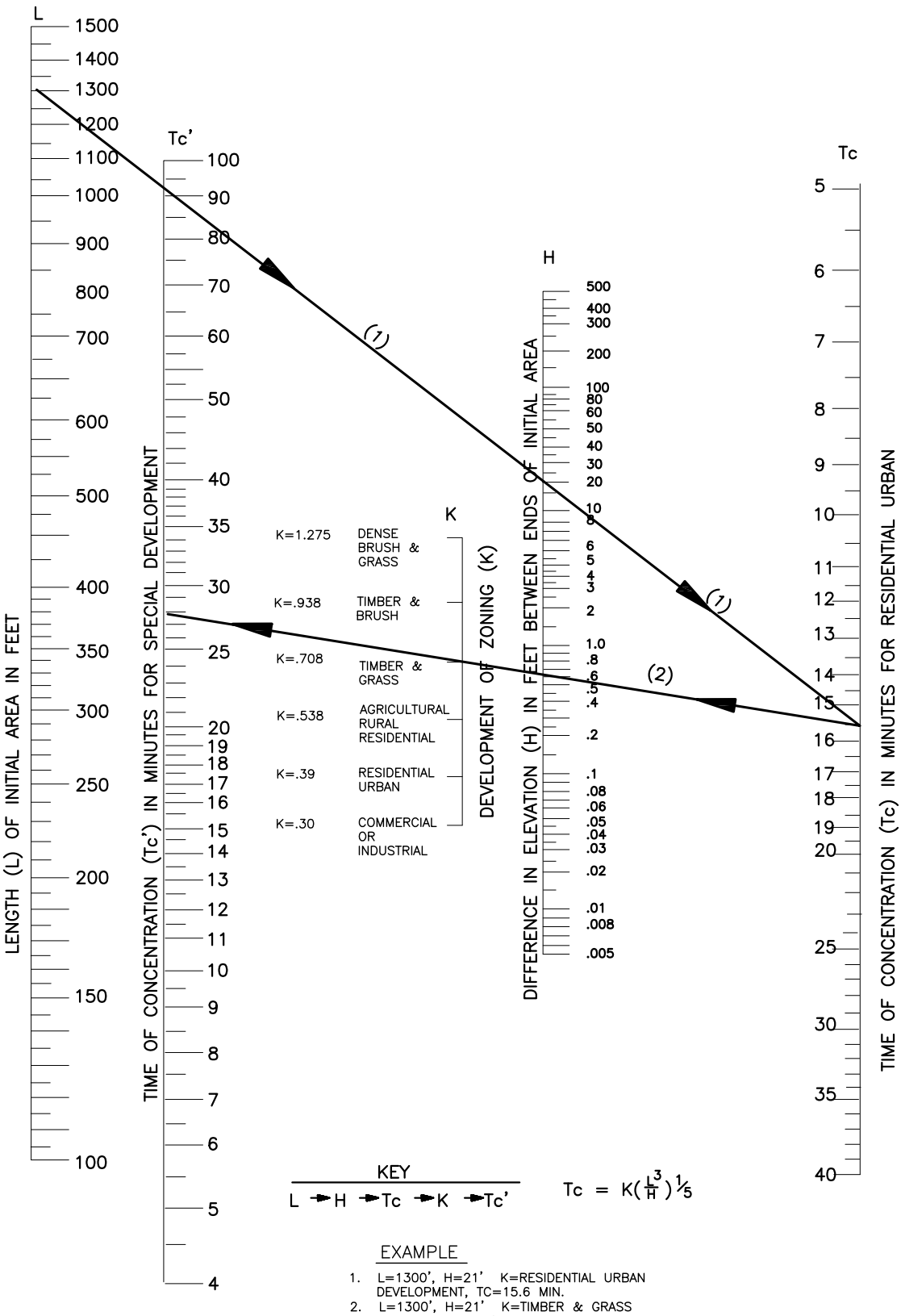
B. DRAINAGE DESIGN DIAGRAMS

TITLE **DRAWING NUMBERS**

RATIONAL METHOD

U.S.D.A. NATURAL RESOURCES CONSERVATION SERVICE METHOD

(www.nrcs.usda.gov)



KEY

L → H → Tc → K → Tc'

$$Tc = K\left(\frac{L^3}{H}\right)^{1/5}$$

EXAMPLE

1. L=1300', H=21' K=RESIDENTIAL URBAN DEVELOPMENT, TC=15.6 MIN.
2. L=1300', H=21' K=TIMBER & GRASS DEVELOPMENT, TC'=28.0

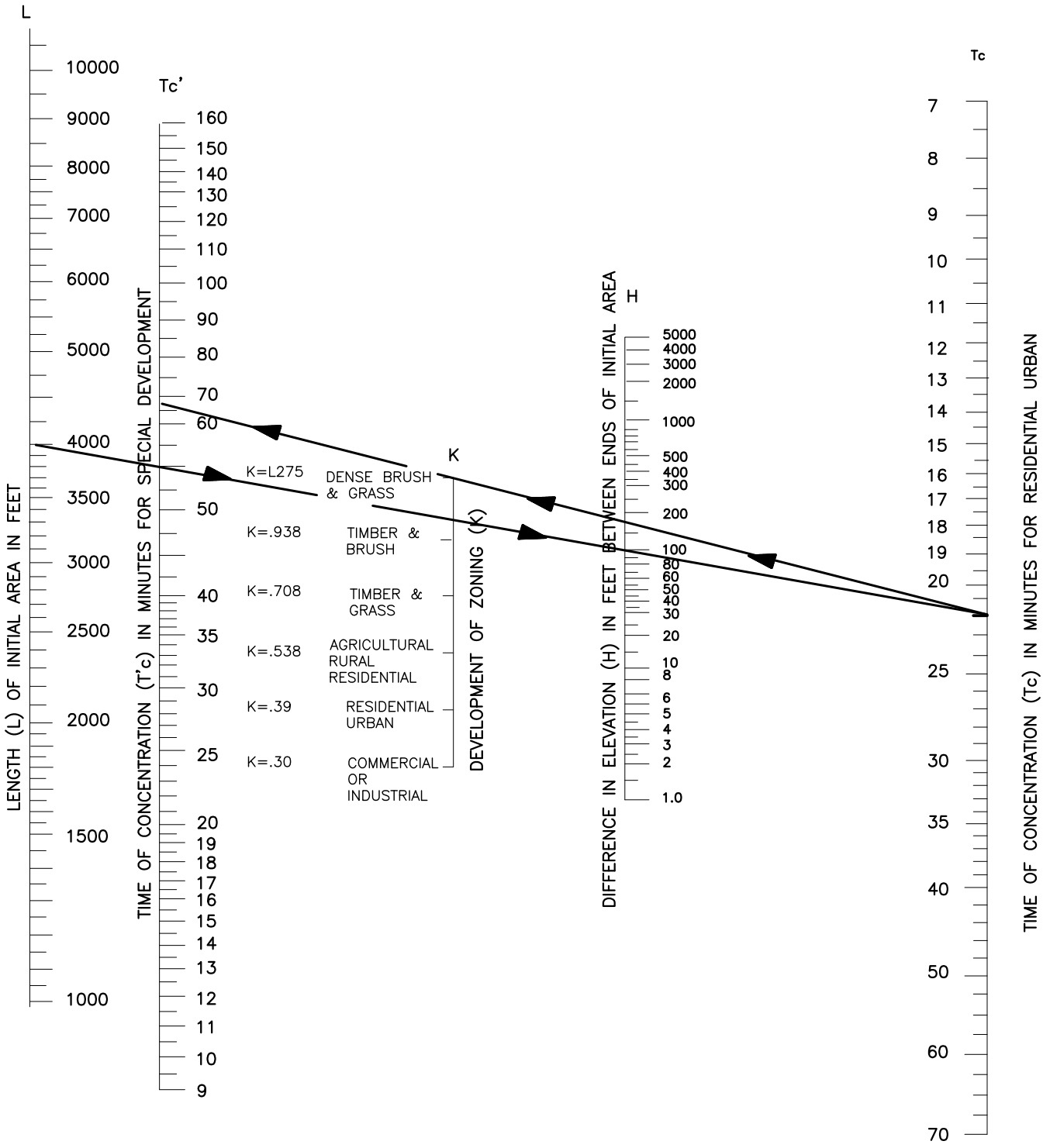
TEHAMA COUNTY DRAINAGE STANDARDS

REV. NO.	DATE	BY

HYDROLOGY
TIME OF CONCENTRATION FOR INITIAL AREA OVERLAND FLOW (L=100–1500)

DATE 1/07

DWG. NO. 1001



KEY

L → H → Tc → Tc'

$$Tc = K\left(\frac{L^3}{H}\right)^{1/5}$$

EXAMPLE

L = 4000'

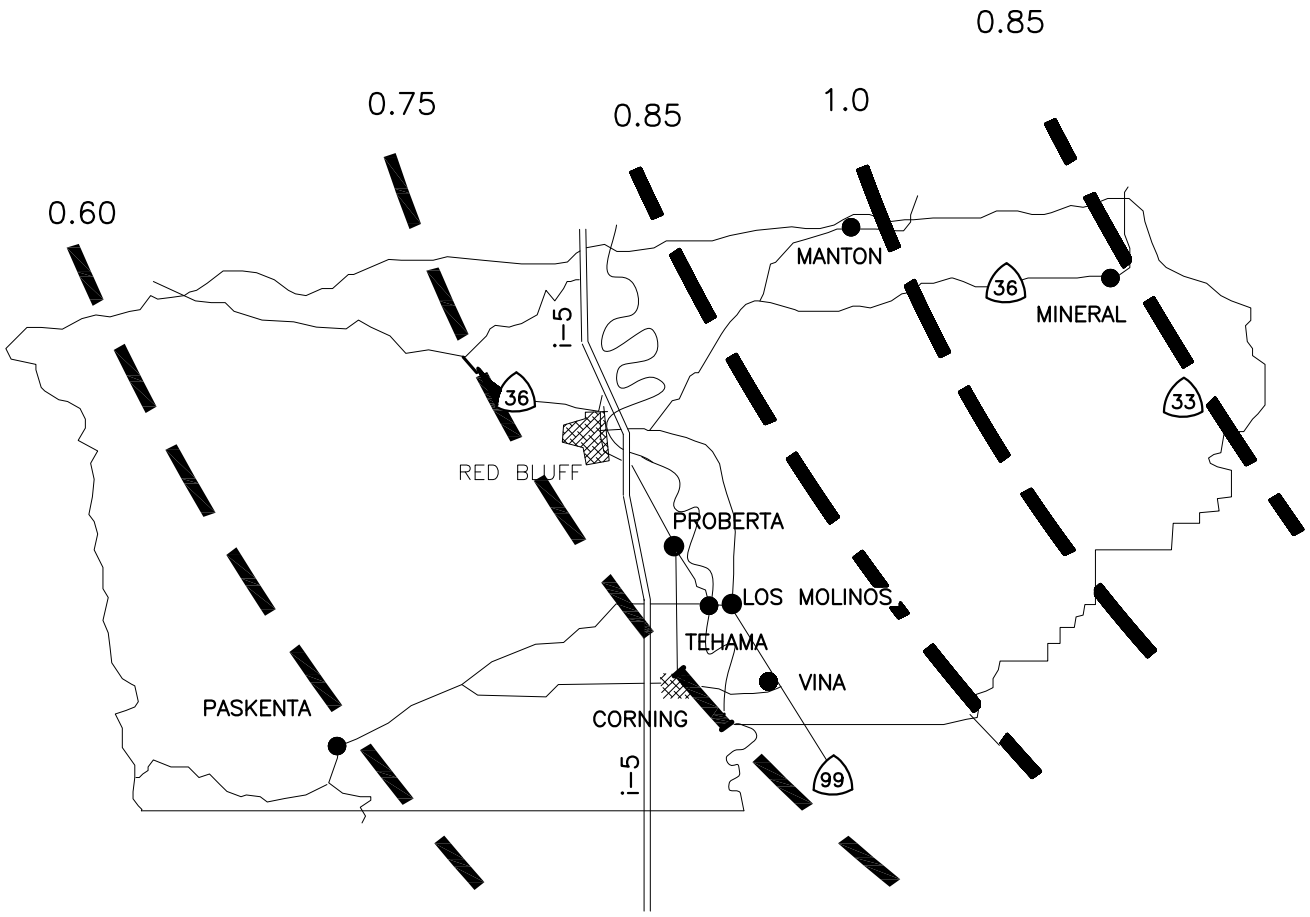
H = 100'

K = DENSE BRUSH AND GRASS

Tc' = 68.7

TEHAMA COUNTY DRAINAGE STANDARDS

REV. NO.	DATE:	REV. NO.	HYDROLOGY TIME OF CONCENTRATION FOR INITIAL AREA OVERLAND FLOW (L=1000+)	DATE 1/07
				DWG. NO. 1002

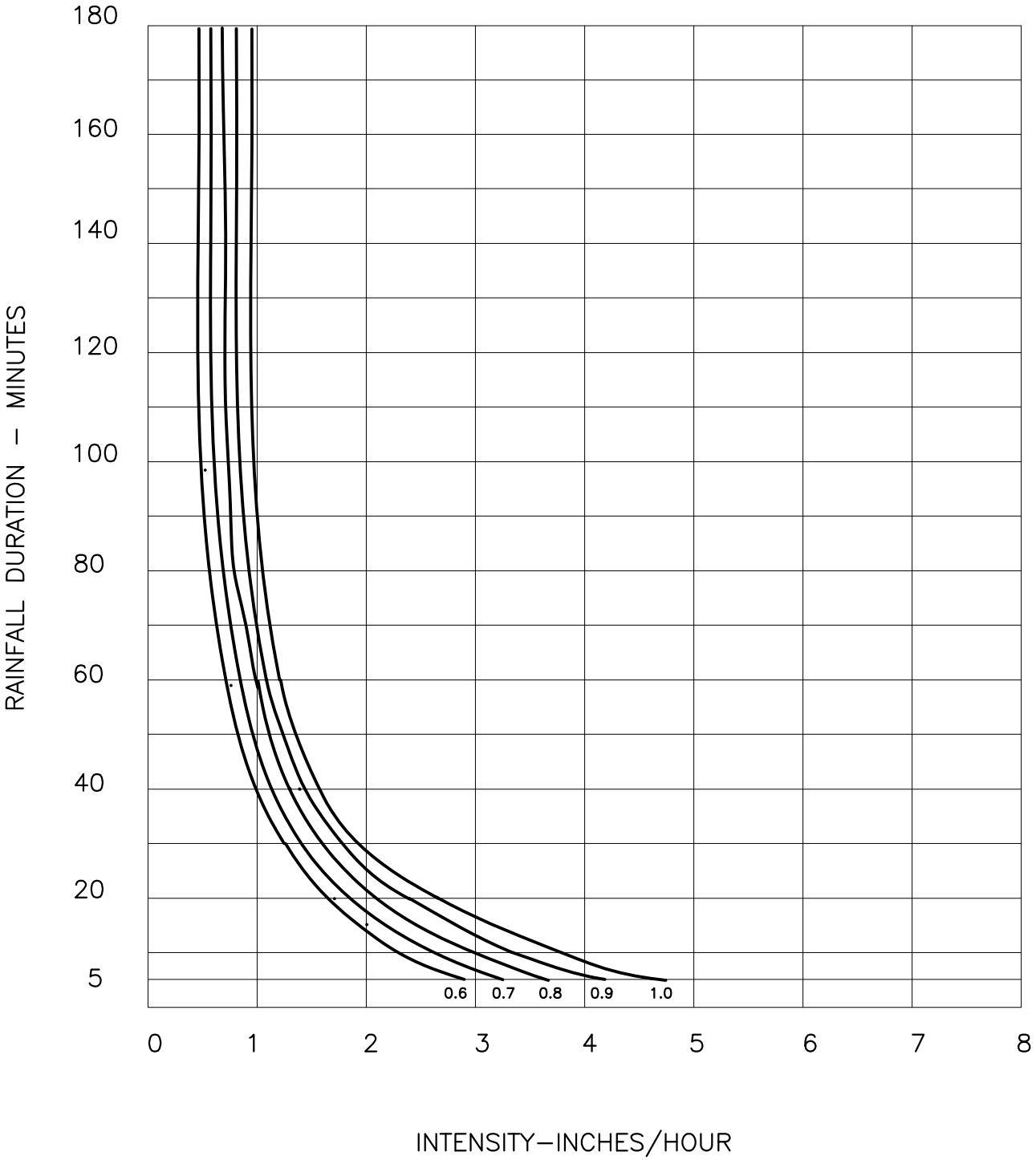


LINES OF EQUAL
RAINFALL INTENSITY

TEHAMA COUNTY DRAINAGE STANDARDS

REV. NO.	DATE	BY	ISOPLUVIAL MAP RAINFALL DATA BASED ON U.S. WEATHER BUREAU TECHNICAL PAPER NUMBER 40	DATE 1/07
				DWG. NO. 1003

10 YEAR RETURN PERIOD



TEHAMA COUNTY DRAINAGE STANDARDS

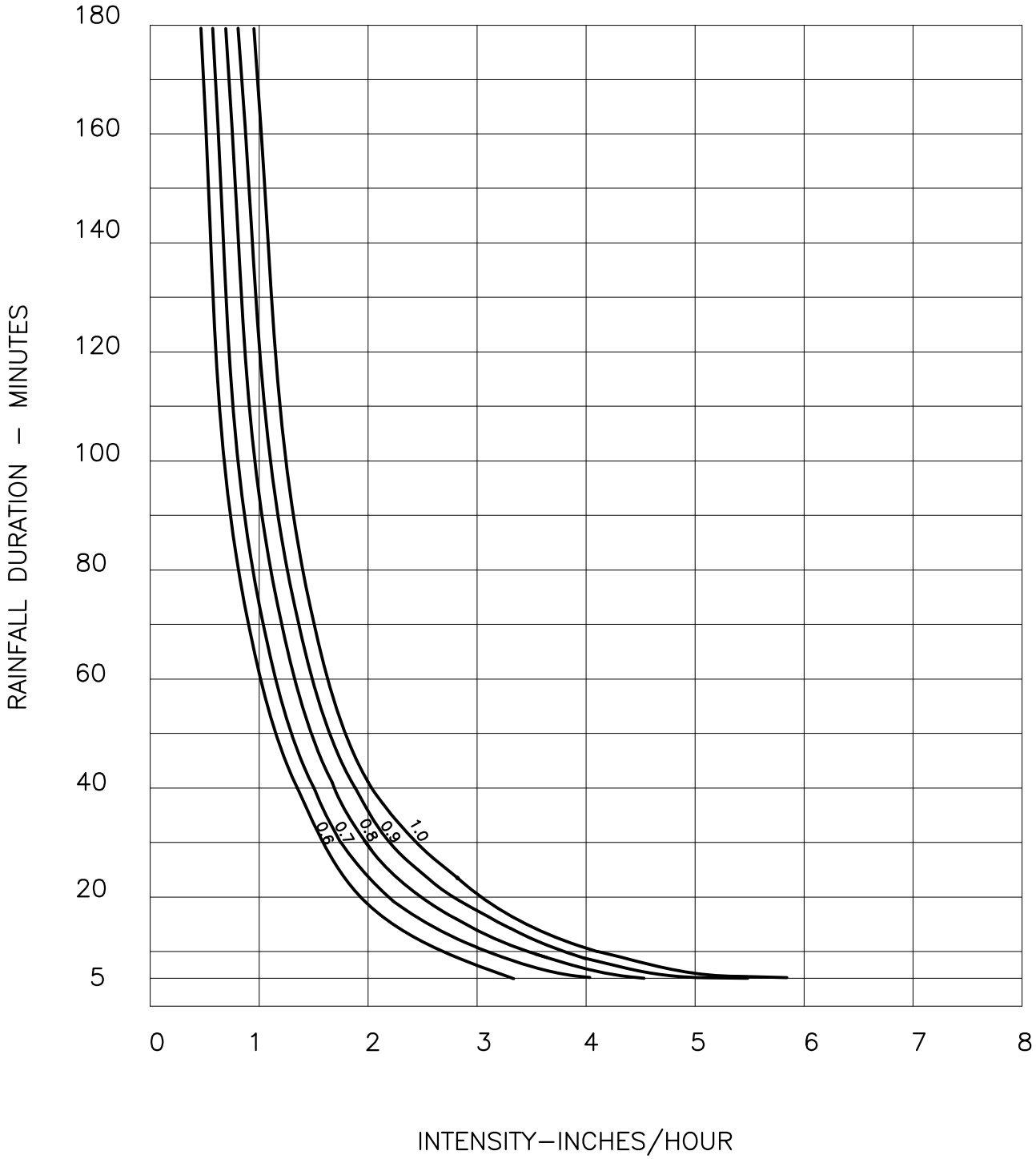
ADOPTED	DATE	BY

RAINFALL INTENSITY DURATION CURVES
10 YEAR RETURN PERIOD
FOR SELECTED ISOPLUVIAL

DATE 1/07

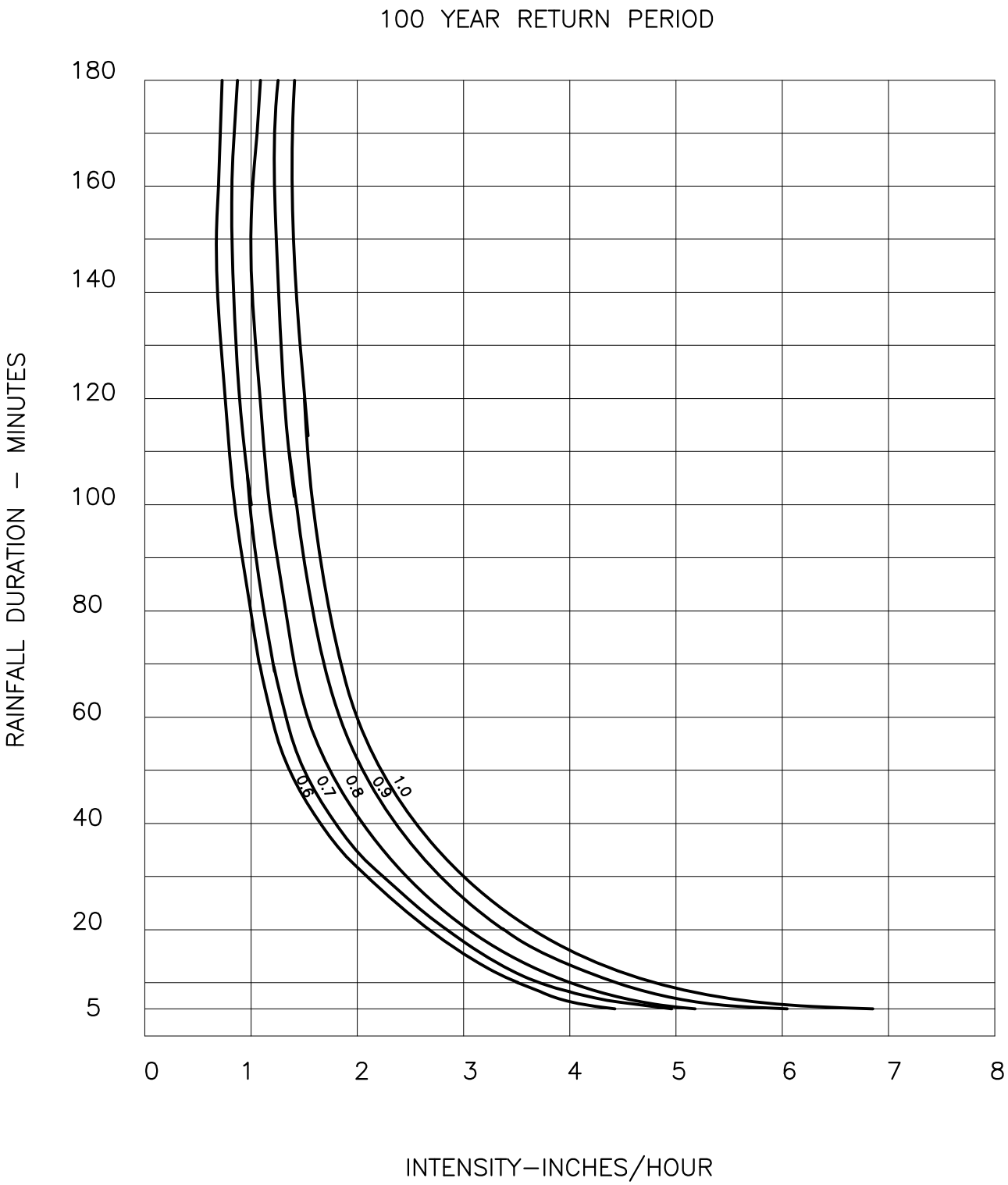
DWG. NO. 1004

25 YEAR RETURN PERIOD



TEHAMA COUNTY DRAINAGE STANDARDS

REV. BY.	DATE	BY	RAINFALL INTENSITY DURATION CURVES 25 YEAR RETURN PERIOD FOR SELECTED ISOPLUVIAL	DATE 1/07
				DWG. NO. 1005



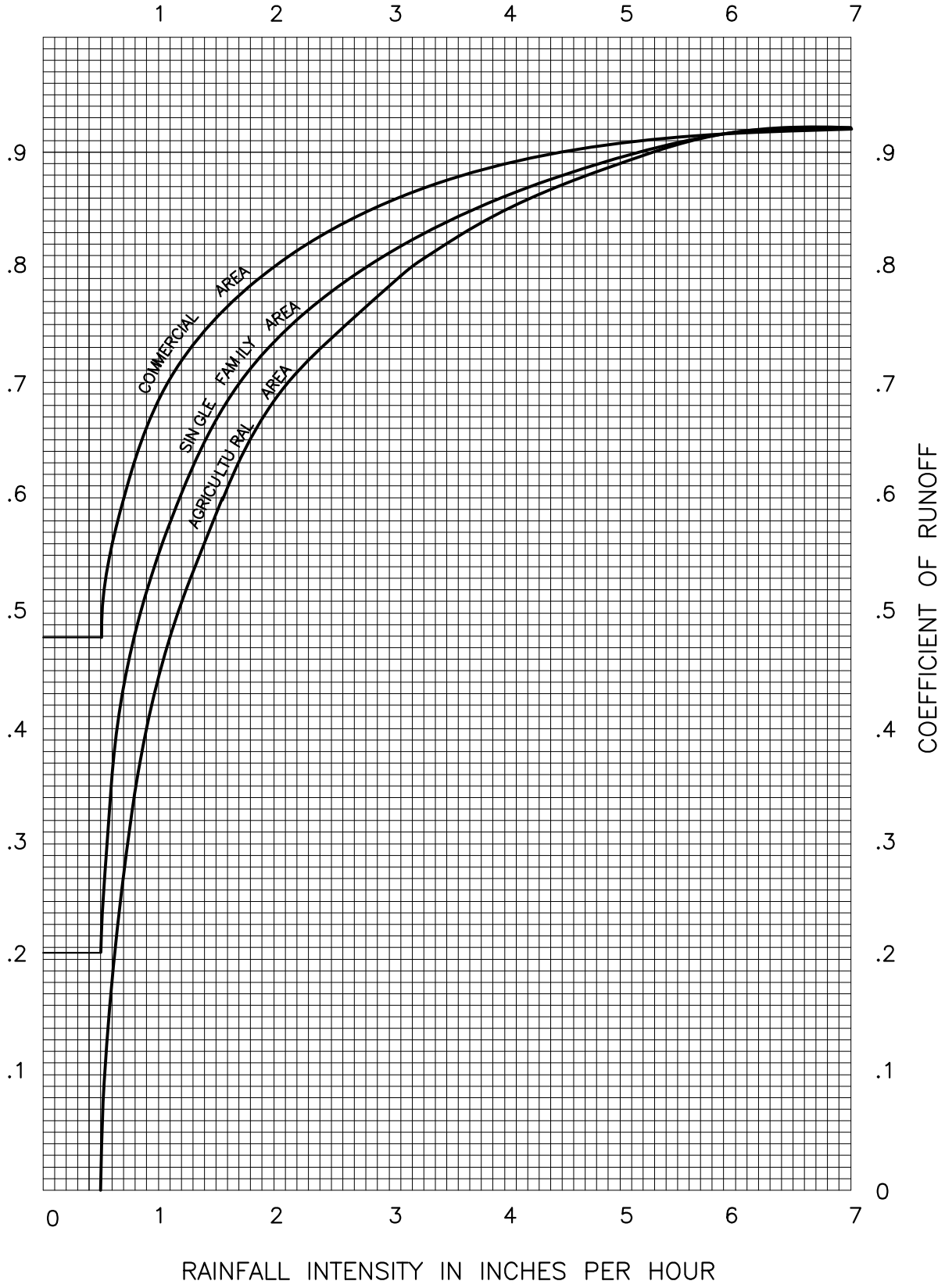
TEHAMA COUNTY DRAINAGE STANDARDS

REV. NO.	DATE	BY	RAINFALL INTENSITY DURATION CURVES 100 YEAR RETURN PERIOD FOR SELECTED ISOPLUVIAL	DATE 1/07
				DWG. NO. 1006

AIKEN	B
ALTAMONT	D
ANITA	D
ARBUCKLE	C
BERRENDOS	B
CHILDS	B
CHUMMY	D
COHAS	C
COLUMBIA	B
CONE	A
CORNING	D
CORTINA	A
DIBBLE	C
DUBAKELLA	C
ELAM	A
ELAM, Hard Substratum	B
FARWELL	C
FORWARD	C
GOULDING	D
GUENOC	C
HENNEKE	D
HILLGATE	C
HUGO	C
HULLS	C
INKS	D
INSKIP	C
IRONMOUNTAIN	D
JIGGS	D
JOSEPHINE	C
KEEFERS	C
KIMBALL	B
LANIGER	C
LODO	D
LOSGATOS	D
LOSROBLES	C
LYONSVILLE	C
MANTON	B
MASTERSON	B
MAYWOOD	B
MCARTHY	C
MILLRACE	B
MILLSAP	D
MILLSSHOM	D
MODA	C
MOLINOS	B
MYERS	D
NACIMIENTO	C
NANNY	B
NEUNS	D
NEWVILLE	C
ORLAND	B
PARRISH	D
PERKINS	C
PLEASANTON	C
REDBLUFF	C
REDDING	D
SEHORN	D
SHEETIRON	D
STONYFORD	D
SUPAN	D
TEHAMA	C
TOOMES	D
TUSCAN	D
TYSON	B
VINA	B
WINDY	C
WYO	C
YOLLABOLLY	D
YOLO	B
ZAMORA	B

TEHAMA COUNTY STANDARD PLANS

REV.NO.	DATE	BY	HYDROLOGIC SOIL GROUPS	DATE 1/07
				DWG. NO. 1007



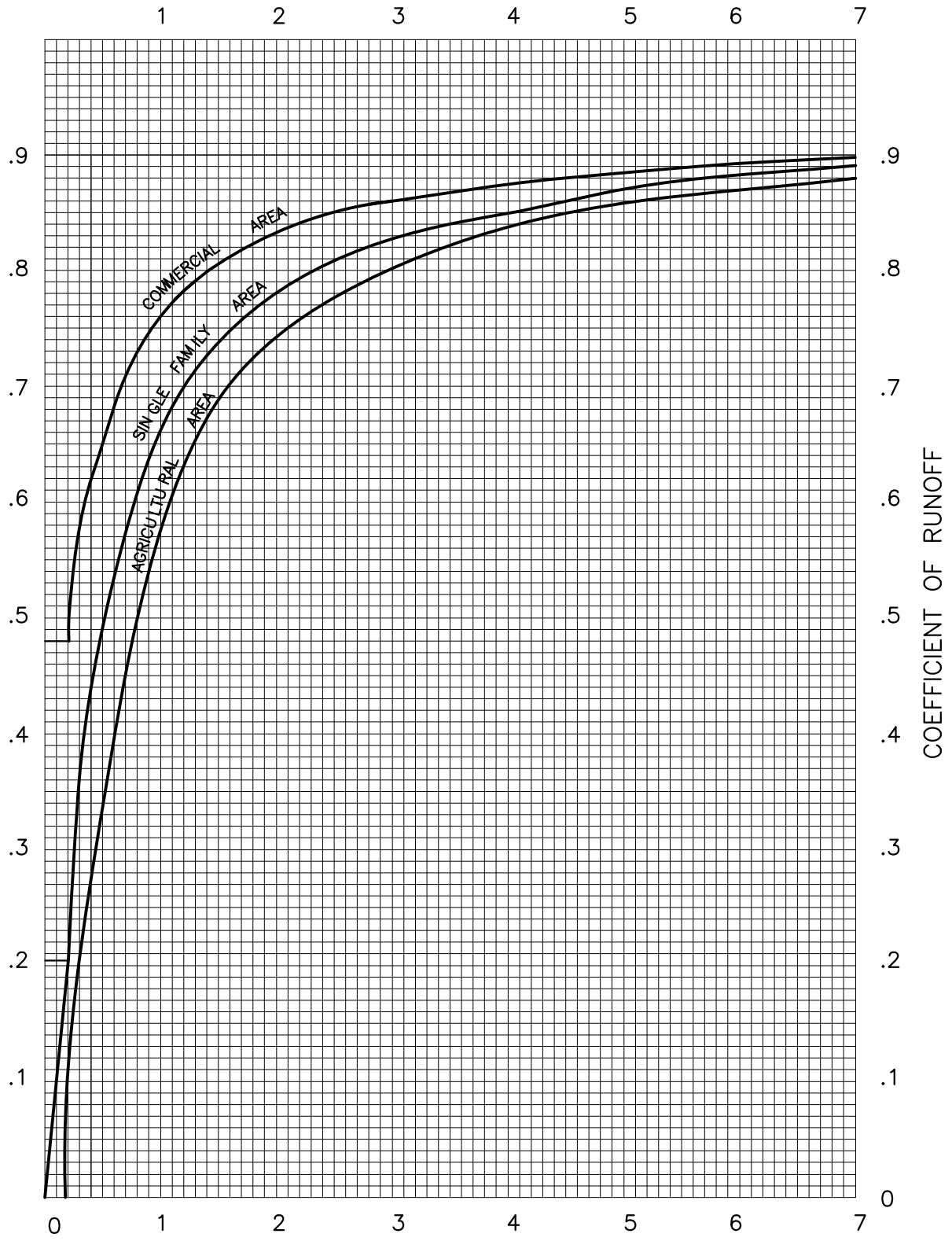
TEHAMA COUNTY DRAINAGE STANDARDS

REV. NO.	DATE	BY

RUNOFF COEFFICIENT CURVE
SOIL CLASS B

DATE 1/07

DWG. NO. 1008



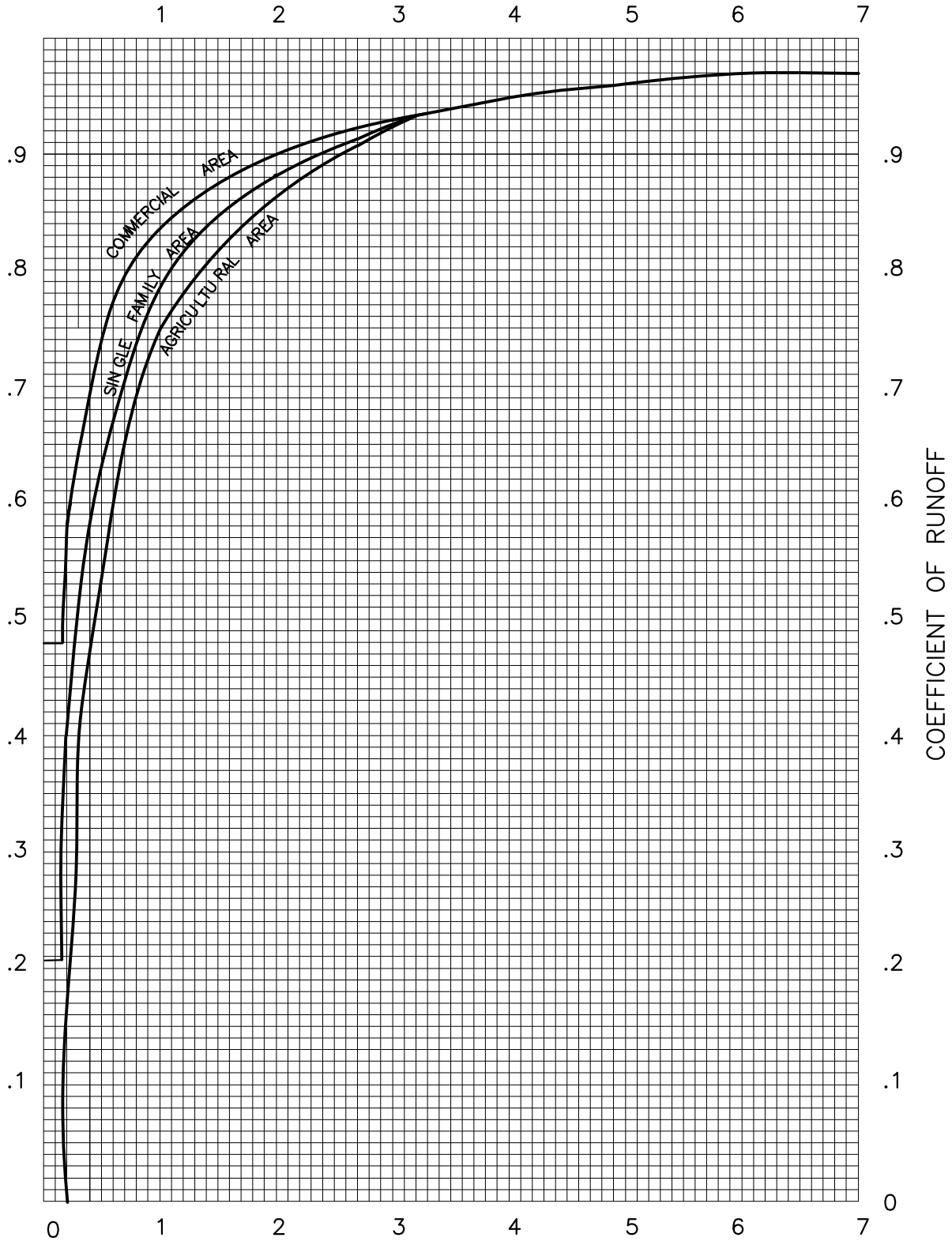
TEHAMA COUNTY DRAINAGE STANDARDS

REV. NO.	DATE	BY

RUNOFF COEFFICIENT CURVE
SOIL CLASS C

DATE 1/07

DWG. NO. 1009



TEHAMA COUNTY DRAINAGE STANDARDS

REV. NO.	DATE	BY

RUNOFF COEFFICIENT CURVE
SOIL CLASS D

DATE 1/07

DWG. NO. 1010

Hydrology Computation, EFH-2
CaArea1-ENG-400 (01/07)

U. S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONS. SERVICE

Sht: 1

Project: Tributary to Sacramento River
Filename: Corning High Ranch
Quad. Map:
Soil Survey: Tehama

Date: 1/7/2007
Computed by: TDB
Checked by:_____

DRAINAGE AREA (DA): 100.0 acres

RUNOFF CURVE NUMBER (CN).

HSG	Landuse/Condition	CN	Area	CN X Area
C	Range and Oaks	75	100.0	7,500.0
	Weighted CN=	75.0	100.0	7,500.0
	Use CN:	75.0		

TIME OF CONCENTRATION (Tc).

Flow Length (ft):	3,000	AMC (I,II,or III):	II
Watershed Slope (%):	10.0	Avg. Velocity (fps)=	1.78
Ponded Area (%):	0.0	Time of Conc. (hr)=	0.47
		Use Tc (hr):	0.47

DESIGN PRECIPITATION (P), DESIGN RUNOFF (RO), & DISTRIBUTION TYPE.

Freq. (yrs)	P6 (in)	P24 (in)	P6/P24 (in/in)	Distrib. Type	RO (in)
2	1.40	2.50	0.560	I	0.65
5	1.60	3.00	0.533	I	0.96
10	1.80	3.30	0.545	I	1.16
25	2.00	4.00	0.500	IA	1.67
50	2.25	4.20	0.536	I	1.82
100	2.40	5.00	0.480	IA	2.45
			Use Type:	IA	

DESIGN PEAK YIELD (Y) AND DISCHARGE (q).

Freq. (yrs)	Prob. (%/yr)	qu (cfs/ac-in)	Y (cfs/ac)	qi (cfs)	qo (cfs)
2	50	0.119	0.077	7.7	**7.7**
5	20	0.145	0.140	14.0	**14.0**
10	10	0.156	0.182	18.2	**18.2**
25	4	0.174	0.290	29.0	**29.0**
50	2	0.178	0.324	32.4	**32.4**
100	1	0.190	0.466	46.6	**46.6**
			Detention Storage (ac-ft):		0.0

Table 2-2a Runoff curve numbers for urban areas 1/

Cover description: Cover type and hydrologic condition	Average percent impervious area 2/	Curve numbers for hydrologic soil group: A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) 3/:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) 4/		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) 5/		77	86	91	94

Idle lands (CN's are determined using cover types similar to those in table 2-2c).

1 Average runoff condition, and $I_a = 0.2S$.

2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

4 Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.