

Time period

From: 12/22/2017, 12:00:00 AM

To: 12/23/2017, 12:00:00 AM

Thresholds

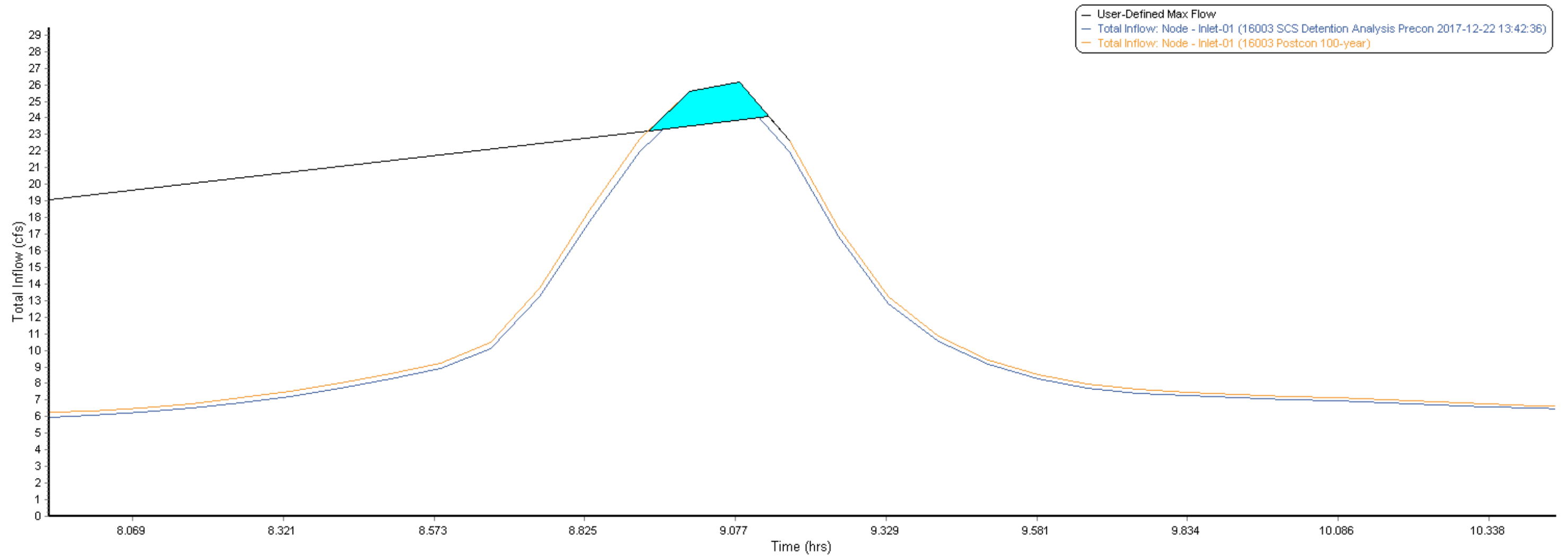
Exceedance: 0

Deficit: 0

Detention storage

Max flow: 10.92

Element ID	Inlet-01	Inlet-01
Maximum Total Inflow (cfs)	11.50	12.14
Minimum Total Inflow (cfs)	0.00	0.00
Event Mean Total Inflow (cfs)	1.97	2.07
Duration of Exceedances (hrs)	N/A	N/A
Duration of Deficits (hrs)	N/A	N/A
Number of Exceedances	N/A	N/A
Number of Deficits	N/A	N/A
Volume of Exceedance (ft ³)	N/A	N/A
Volume of Deficit (ft ³)	N/A	N/A
Total Inflow Volume (ft ³)	169592.62	177926.92
Detention Storage (ft ³)	700.39	700.39



Time period

From: 12/22/2017, 12:00:00 AM

To: 12/23/2017, 12:00:00 AM

Thresholds

Exceedance: 0

Deficit: 0

Detention storage

Max flow: 24.07

Element ID	Inlet-01	Inlet-01
Maximum Total Inflow (cfs)	25.34	26.18
Minimum Total Inflow (cfs)	0.00	0.00
Event Mean Total Inflow (cfs)	4.23	4.37
Duration of Exceedances (hrs)	N/A	N/A
Duration of Deficits (hrs)	N/A	N/A
Number of Exceedances	N/A	N/A
Number of Deficits	N/A	N/A
Volume of Exceedance (ft³)	N/A	N/A
Volume of Deficit (ft³)	N/A	N/A
Total Inflow Volume (ft³)	363969.77	375652.14
Detention Storage (ft³)	1126.73	1126.73

Pre-Construction Hydrology Report - 10-Year Storm

SN	Element ID	Area (acres)	Drainage Node ID	Weighted Curve Number	Rain Gage ID	Total Precipitation (inches)	Total Runoff (inches)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Sub-01	24.92	Inlet-01	75.03	Rain Gage-01	4.30	1.90	11.56	0 00:20:57

Pre-Construction Hydrology Report 100=Year

SN	Element ID	Area (acres)	Drainage Node ID	Weighted Curve Number	Rain Gage ID	Total Precipitation (inches)	Total Runoff (inches)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Sub-01	24.92	Inlet-01	75.03	Rain Gage-01	6.90	4.07	25.57	0 00:20:57

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Sheet Flow Equation

$$T_c = (0.007 * ((n * L_f)^{0.8}) / ((P^{0.5}) * (S_f^{0.4}))$$

Where:

Tc = Time of Concentration (hrs)

n = Manning's Roughness

Lf = Flow Length (ft)

P = 2 yr, 24 hr Rainfall (inches)

Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation

$$V = 16.1345 * (S_f^{0.5}) \text{ (unpaved surface)}$$

$$V = 20.3282 * (S_f^{0.5}) \text{ (paved surface)}$$

$$V = 15.0 * (S_f^{0.5}) \text{ (grassed waterway surface)}$$

$$V = 10.0 * (S_f^{0.5}) \text{ (nearly bare \& tilled surface)}$$

$$V = 9.0 * (S_f^{0.5}) \text{ (cultivated straight rows surface)}$$

$$V = 7.0 * (S_f^{0.5}) \text{ (short grass pasture surface)}$$

$$V = 5.0 * (S_f^{0.5}) \text{ (woodland surface)}$$

$$V = 2.5 * (S_f^{0.5}) \text{ (forest w/heavy litter surface)}$$

$$T_c = (L_f / V) / (3600 \text{ sec/hr})$$

Where:

Tc = Time of Concentration (hrs)

Lf = Flow Length (ft)

V = Velocity (ft/sec)

Sf = Slope (ft/ft)

Channel Flow Equation

$$V = (1.49 * (R^{(2/3)}) * (Sf^{0.5})) / n$$

$$R = Aq / Wp$$

$$Tc = (Lf / V) / (3600 \text{ sec/hr})$$

Where:

Tc = Time of Concentration (hrs)

Lf = Flow Length (ft)

R = Hydraulic Radius (ft)

Aq = Flow Area (ft²)

Wp = Wetted Perimeter (ft)

V = Velocity (ft/sec)

Sf = Slope (ft/ft)

n = Manning's Roughness

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Subbasin Sub-01

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Sheet Flow Computations

-	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	300	0.00	0.00
Slope (%):	28	0.00	0.00
2 yr, 24 hr Rainfall (in):	3.40	0.00	0.00
Velocity (ft/sec):	0.29	0.00	0.00
Computed Flow Time (minutes):	17.46	0.00	0.00

Shallow Concentrated Flow Computations

-	Subarea A	Subarea B	Subarea C
Flow Length (ft):	1375	0.00	0.00

Slope (%):	28	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	8.54	0.00	0.00
Computed Flow Time (minutes):	2.68	0.00	0.00

Channel Flow Computations

-	Subarea A	Subarea B	Subarea C
Manning's Roughness:	.035	0.00	0.00
Flow Length (ft):	340	0.00	0.00
Channel Slope (%):	5	0.00	0.00
Cross Section Area (ft ²):	3	0.00	0.00
Wetted Perimeter (ft):	4.82	0.00	0.00
Velocity (ft/sec):	6.94	0.00	0.00
Computed Flow Time (minutes):	0.82	0.00	0.00

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Total TOC (minutes):	20.96		
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Sheet Flow Equation

$$T_c = (0.007 * ((n * L_f)^{0.8}) / ((P^{0.5}) * (S_f^{0.4})))$$

Where:

Tc = Time of Concentration (hrs)

n = Manning's Roughness

Lf = Flow Length (ft)

P = 2 yr, 24 hr Rainfall (inches)

Sf = Slope (ft/ft)

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Where:

Tc = Time of Concentration (hrs)

Lf = Flow Length (ft)

V = Velocity (ft/sec)

Sf = Slope (ft/ft)

Channel Flow Equation

$$V = (1.49 * (R^{(2/3)}) * (Sf^{0.5})) / n$$

$$R = Aq / Wp$$

$$Tc = (Lf / V) / (3600 \text{ sec/hr})$$

Where:

Tc = Time of Concentration (hrs)

Lf = Flow Length (ft)

R = Hydraulic Radius (ft)

Aq = Flow Area (ft²)

Wp = Wetted Perimeter (ft)

V = Velocity (ft/sec)

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n = Manning's Roughness

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Subbasin Sub-01

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Sheet Flow Computations

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Manning's Roughness:	0.40	0.00	0.00
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2 yr, 24 hr Rainfall (in):	3.40	0.00	0.00
Velocity (ft/sec):	0.29	0.00	0.00
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Shallow Concentrated Flow Computations

-	Subarea A	Subarea B	Subarea C
Flow Length (ft):	1375	0.00	0.00

Slope (%):	28	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	8.54	0.00	0.00
Computed Flow Time (minutes):	2.68	0.00	0.00

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Cross Section Area (ft ²):	3	0.00	0.00
Wetted Perimeter (ft):	4.82	0.00	0.00
Velocity (ft/sec):	6.94	0.00	0.00
Computed Flow Time (minutes):	0.82	0.00	0.00

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Total TOC (minutes):	20.96		
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Post-Construction Hydrology Report 10-Year

SN	Element ID	Area (acres)	Drainage Node ID	Weighted Curve Number	Rain Gage ID	Total Precipitation (inches)	Total Runoff (inches)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Sub-01	24.92	Inlet-01	76.24	Rain Gage-01	4.30	1.99	12.21	0 00:20:57

Post-Construction Hydrology Report 100-Year

SN	Element ID	Area (acres)	Drainage Node ID	Weighted Curve Number	Rain Gage ID	Total Precipitation (inches)	Total Runoff (inches)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Sub-01	24.92	Inlet-01	76.24	Rain Gage-01	6.90	4.19	26.40	0 00:20:57

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Subbasin Sub-01

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Velocity (ft/sec):	8.54	0.00	0.00
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-	Subarea A	Subarea B	Subarea C
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Wetted Perimeter (ft):	4.82	0.00	0.00
Velocity (ft/sec):	6.94	0.00	0.00
Computed Flow Time (minutes):	0.82	0.00	0.00

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Total TOC (minutes):	20.96		
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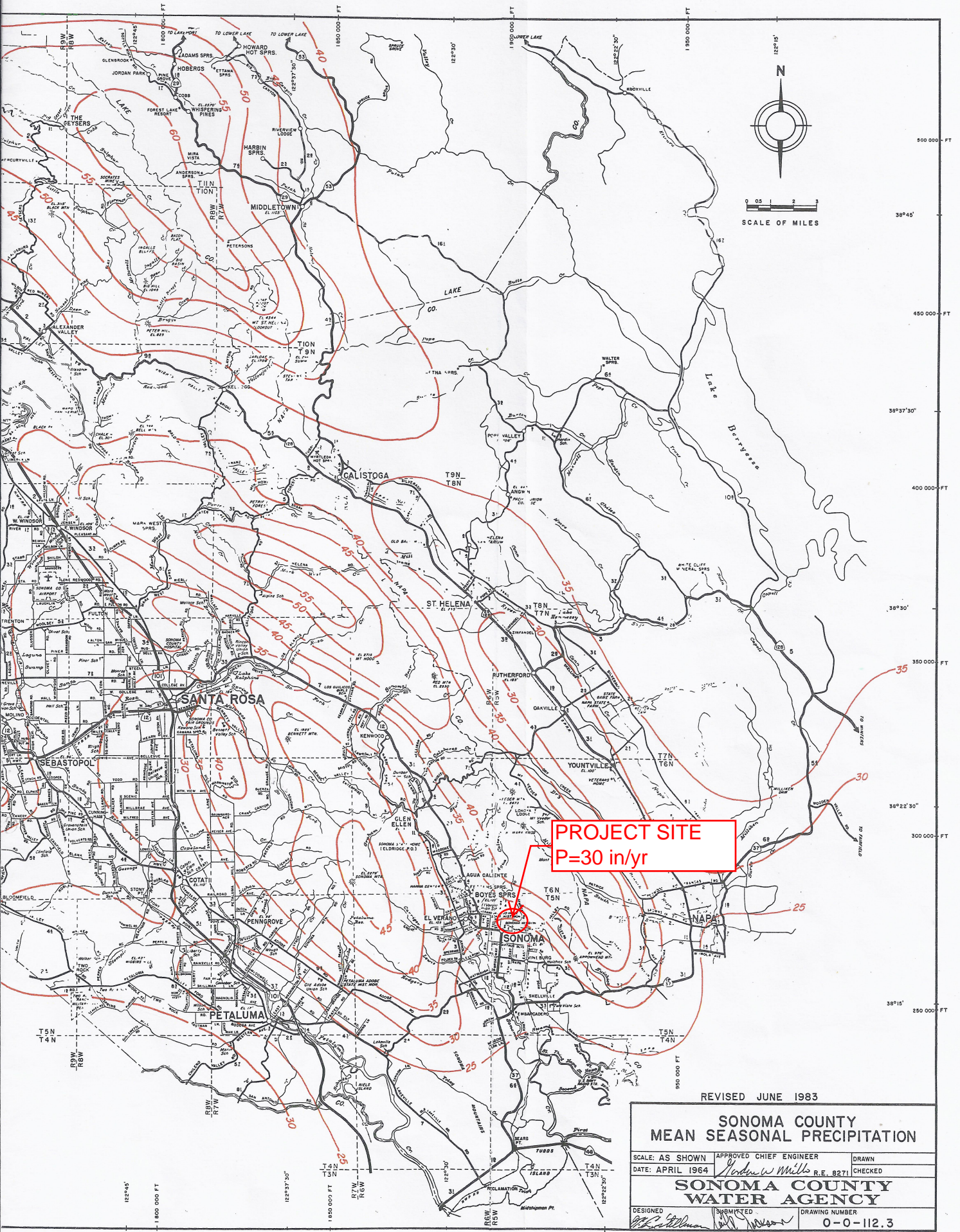
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APPENDIX



BEAR FLAG ENGINEERING, INC.

Civil Engineering - Land SURVEYING – SEPTIC SYSTEM DESIGN
Project management – LAND DEVELOPMENT – FORENSIC ENGINEERING
15 West Macarthur Street, Sonoma, Ca 95476
Phone: (707) 996-8449



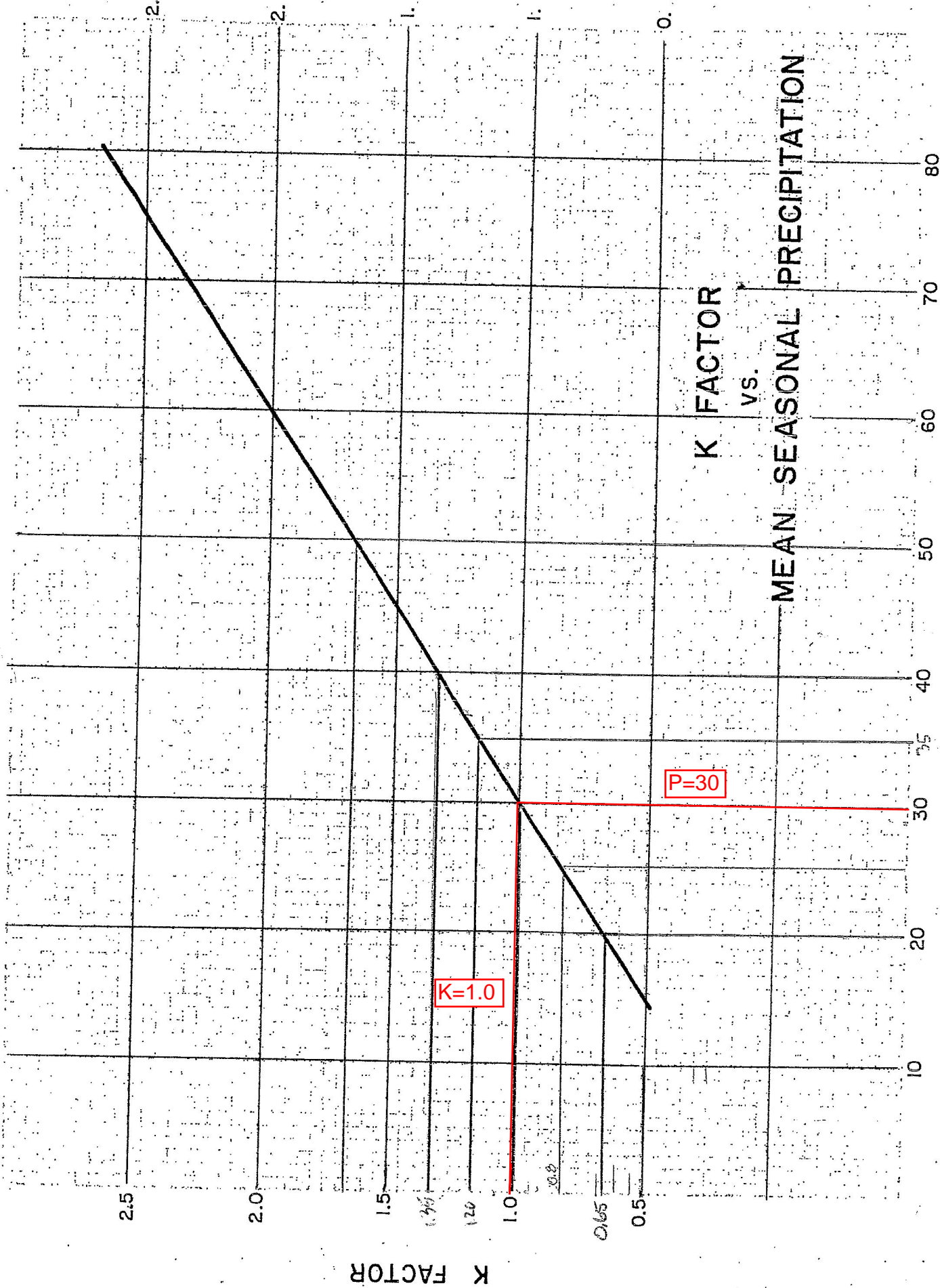
REVISED JUNE 1983

**SONOMA COUNTY
MEAN SEASONAL PRECIPITATION**

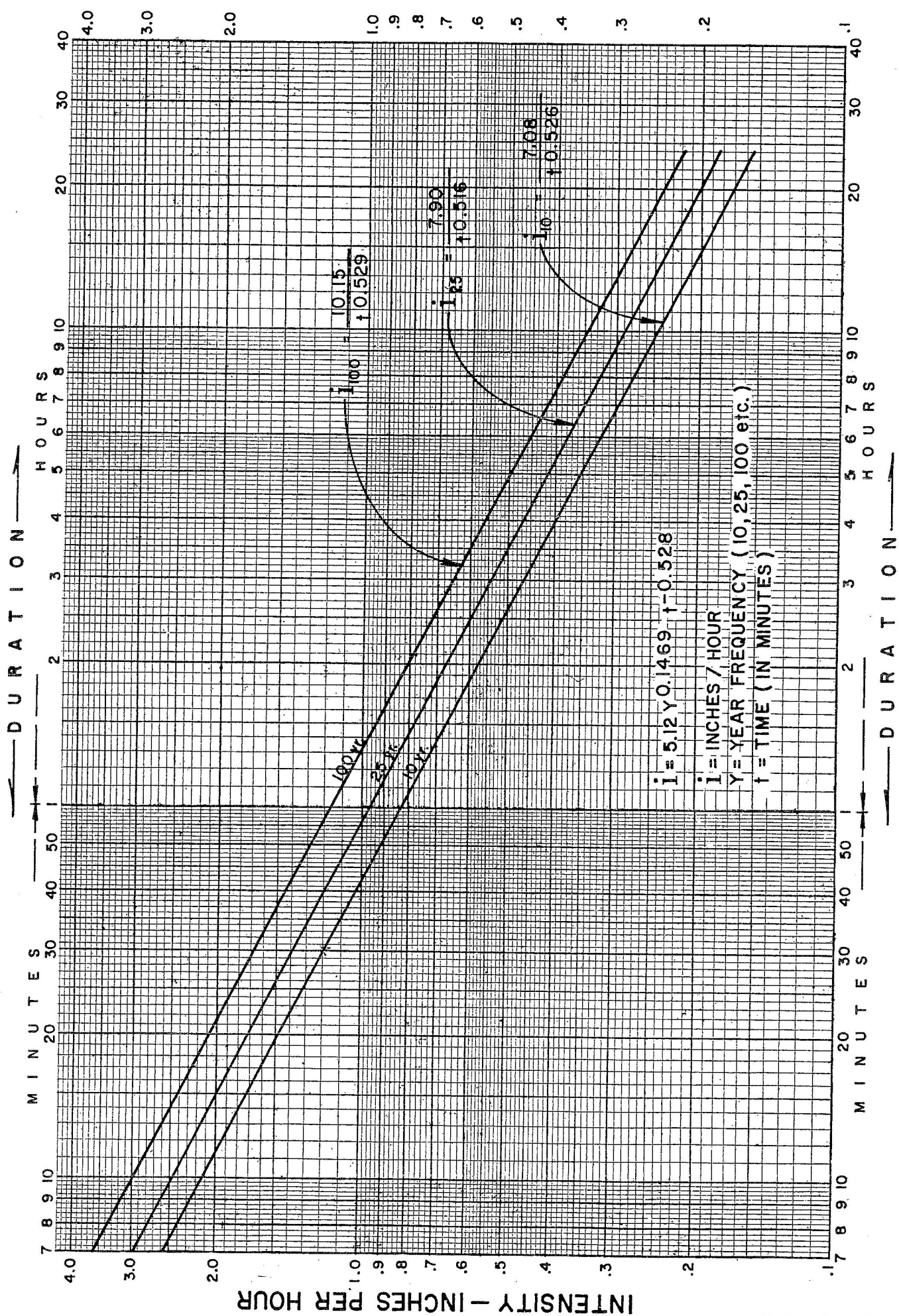
SCALE: AS SHOWN APPROVED CHIEF ENGINEER DRAWN
 DATE: APRIL 1964 *Robert W. Mills* R.E. 8271 CHECKED

**SONOMA COUNTY
WATER AGENCY**

DESIGNED SUBMITTED DRAWING NUMBER
[Signature] *[Signature]* 0-0-112.3



K FACTOR VS. MEAN SEASONAL PRECIPITATION

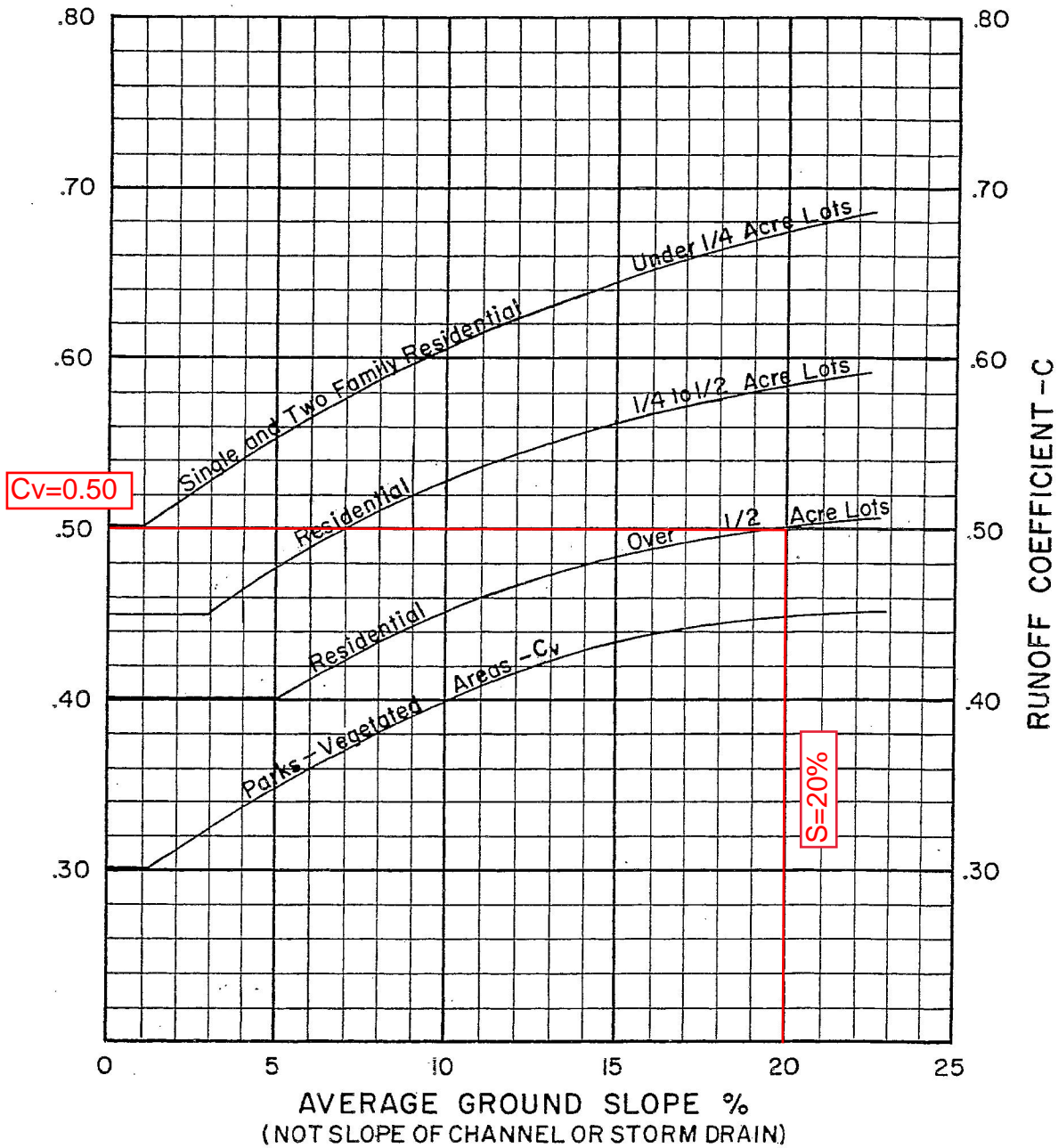


INTENSITY - INCHES PER HOUR

**RAINFALL
INTENSITY vs DURATION**

NOTE: THE INFORMATION SHOWN IS SUBJECT TO ANNUAL REVISION AS ADDITIONAL RAINFALL DATA BECOMES AVAILABLE

RUNOFF COEFFICIENTS FOR RATIONAL FORMULA



NOTE: Commercial, Industrial & Multiple Residential Areas

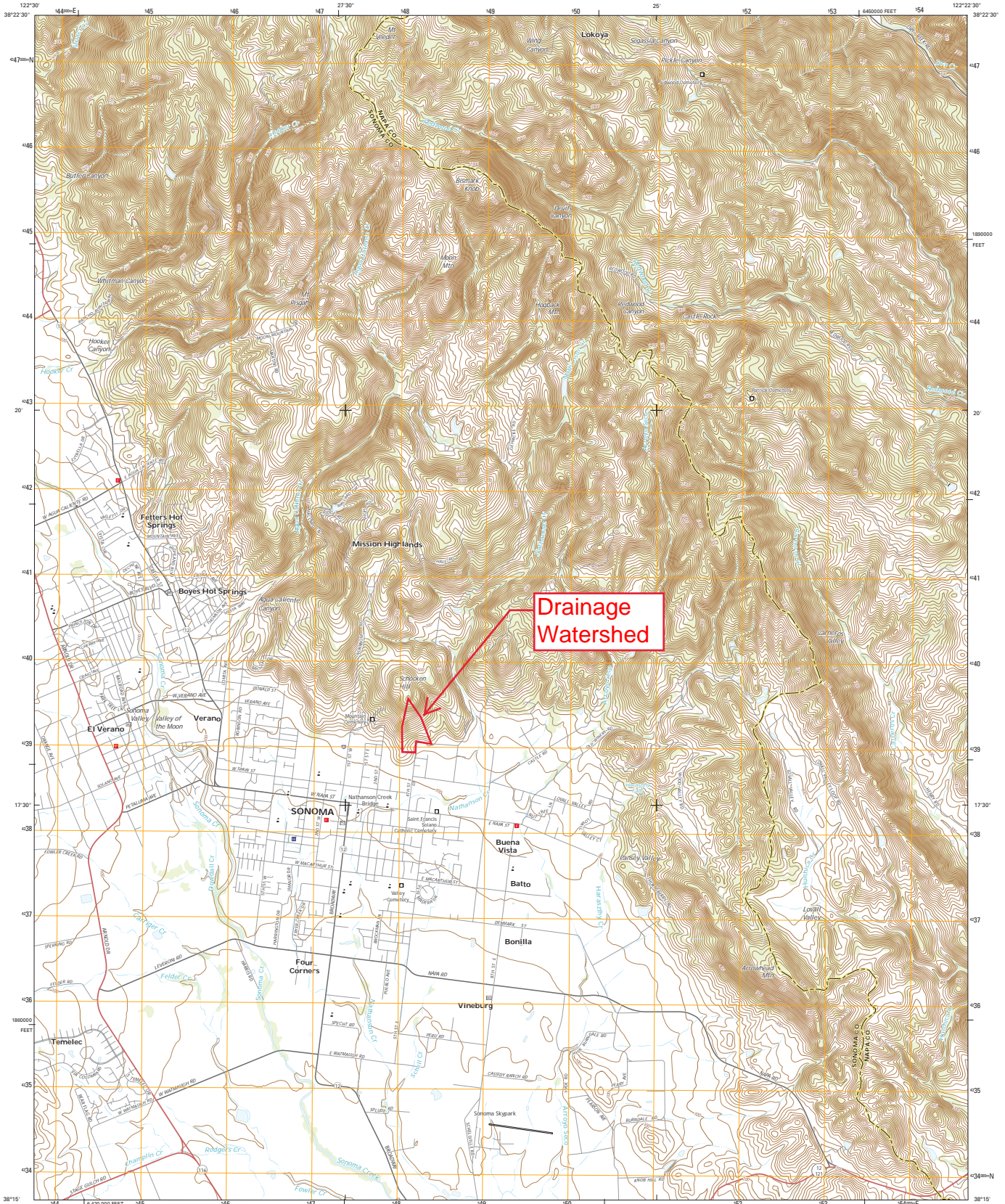
$C_p = 0.9$ (Based on paving, roofs, etc.)

When vegetated area exceeds 20% of total,
 C_v from vegetated curve may be used to reduce
 above C_p as follows:

$$C_T = C_v \frac{A_v}{A_T} + C_p \frac{A_p}{A_T}$$

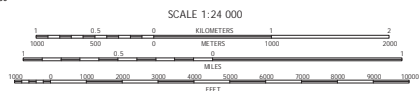
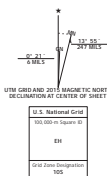
SONOMA COUNTY WATER AGENCY

PLATE No. B-1



Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84) Projection and
1,000-meter grid. Universal Transverse Mercator, Zone 10S
13,000-foot ticks. California Coordinate System of 1983 (Zone 2)
This map is not a legal document. Boundaries may be
generalized for this map scale. Private lands within government
reservations may not be shown. Obtain permission before
entering private lands.

Imagery: NIP, May 2012
Roads: HERE, ©2013-2014
Boundaries: CME, ©2014
Hydrography: National Hydrography Dataset, 2012
Contours: National Elevation Dataset, 1986
Boundaries: Multiple sources; see metadata file 1912-2015
Public Land Survey System: BLM, 2011



ROAD CLASSIFICATION

Expressway	Local Connector
Secondary Hwy	Local Road
Ramp	4WD
Interstate Route	US Route
	State Route

1	2	3	1	Karwood
4	5	6	2	Rutherford
7	8	7	3	Yountville
8	9	8	4	Clon Eillon
			5	Sage
			6	Petaluma River
			7	Saint Faith
			8	Cutting Wharf

