

**B**

Type

Docs

Plans

GRD04-0003

Building Permit Number

33250

Street Number

KING Ridge Rd

Street Name

Community Code

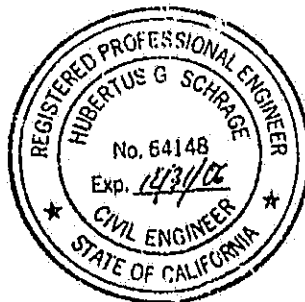
APN

## Hydrologic/Hydraulic Analysis

### Pahlmeyer Vineyards

Sonoma County, California  
APN 109-260-014

Revised June 2004



A handwritten signature in black ink, appearing to read "Hubertus G. Schrage".

By

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## Pahlmeyer Vineyards Project Description

### Existing Conditions:

Pahlmeyer Vineyards is located at 33250 King ridge Road, Cazadero, California. The scope of this project includes grading and drainage improvements that were completed with the existing vineyard blocks as shown on plans.

The parcel lies on relatively flat to mild slopes ranging from approximately 1% to 30%. Elevations range from 975' to 1123'. Existing vegetation in the development area consists of native grasses and oak woodlands. A non-designated unnamed seasonal tributary to Haupt Creek is located in portions of the west block. A 25' offset had been maintained to that feature. A reservoir is located on site in the northwest corner of the property.

### Proposed Drainage:

Included within are hydrologic and hydraulic calculations for the analysis of the existing vineyard. Pursuant to Sonoma County Water Agency (SCWA) standards, storm drains are sized to convey the 25-year storm event. V-ditch calculations have also been included and are sized accordingly.

Because of the large number of inlets, analysis was done by combining the area of the small individual inlets and only analyzing inlets where the pipe size changed. Included is a pipe summary (page 14) that accounts for this analysis method.

Note, storm drain system #1 includes pipe numbers 1-5. Inlet #2 contains an 8" pipe out (pipe #2) as well as a 10" pipe out (pipe #4). StormCAD has been modeled so that there is a separate inlet for pipe #2 and pipe #4, both accounting for the tributary areas #1 and #2 which produces 9.36 cfs. Pipe #2 cannot contain the system Q of the 9.33 cfs and can only handle 3.06 cfs. However, pipe #4 at full capacity can handle a maximum of 7.74 cfs. Therefore, when pipe #2 is at full capacity (3.06 cfs), pipe #4 will act as the bypass being fully capable of handling the generated flows. Due to the model created for the described bypass system, calculated outfall velocities for outfall #1 and #2 will be considerably less than the attached pipe report reflects. The system has been modeled with 3.06 cfs in pipe #2 and 6.30 cfs in pipe #4.

In addition, during the 25-yr flow, minor flooding occurs at I-11 where water will likely travel overland a short distance to the ex pond. Also at I-5 an additional head is required to accommodate the flow. However, because of the location of I-5, this is not seen as a problem. (I-5 is located in an approximate 6 foot depression).

To show the conservative nature of the analysis, if a n of 0.012 (manufacturer recommendation) was used in the analysis as shown on pages 9 & 10, all pipes would be under capacity and no flooding would occur.

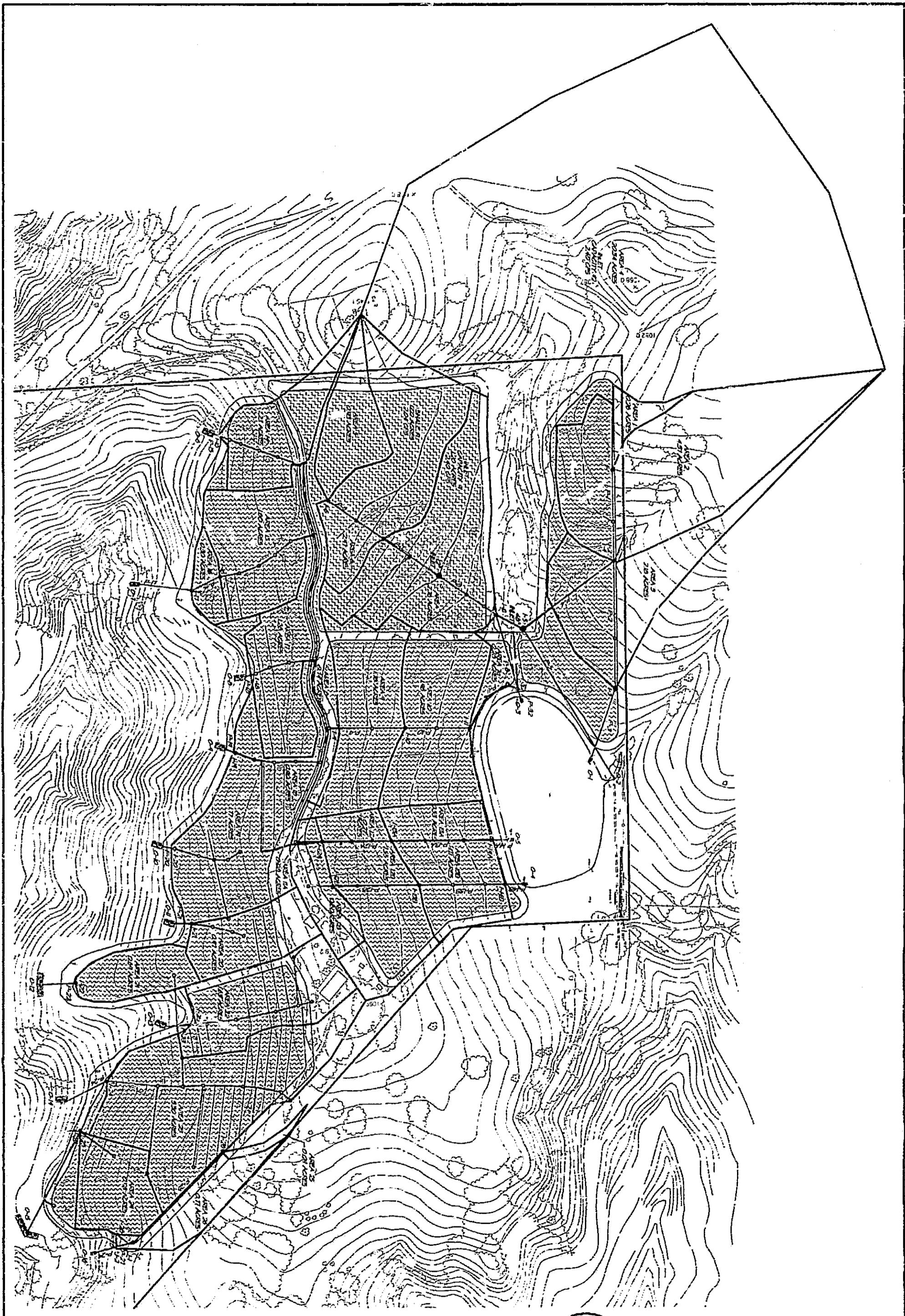
## Rainfall Data / Design Parameters

Review of the Sonoma County Water Agency (SCWA) Flood Control Design Criteria handbook provides the following mathematical models and constant values used in the hydrologic analysis:

Runoff Coefficient (Plate B-1)	$C = 0.44$ (Parks - Vegetated)
Rainfall Intensity (Plate B-2)	$I_{25} = 7.90t_c^{-0.516}$
Mean Seasonal Precipitation (Plate B-3)	70 inches/year
K Factor (Plate B-4)	$K = 2.325$
Design Storm Event	25-year
Initial Time of Concentration	10 and 15 min.
Manning Coefficient	0.015 (Plastic Pipe)

In order to analyze the on-site storm drain systems, we have elected to use Haestad Method's StormCAD software. StormCAD determines minor losses using the HEC-22 Energy method. The HEC-22 Energy method assumes the energy loss across a structure is proportional to the velocity head of the exit pipe. The proportionality constant takes into consideration several variables based on structure shape, configuration, plunging flows and benching of the structure bottom.

In order to account for the "K" factor applied to the basic Rational Method Formula ( $Q = CIAK$ ), the SCWA 25-year rainfall intensity coefficient used in the mathematical models for Sonoma County has been modified for use in the StormCAD software equation. The 25-year coefficient entered into the software is  $18.37 = (7.90 \times 2.325)$ . Therefore, calculations produced by StormCAD incorporate the K value of 2.325 into the rainfall intensity value I in the output report.



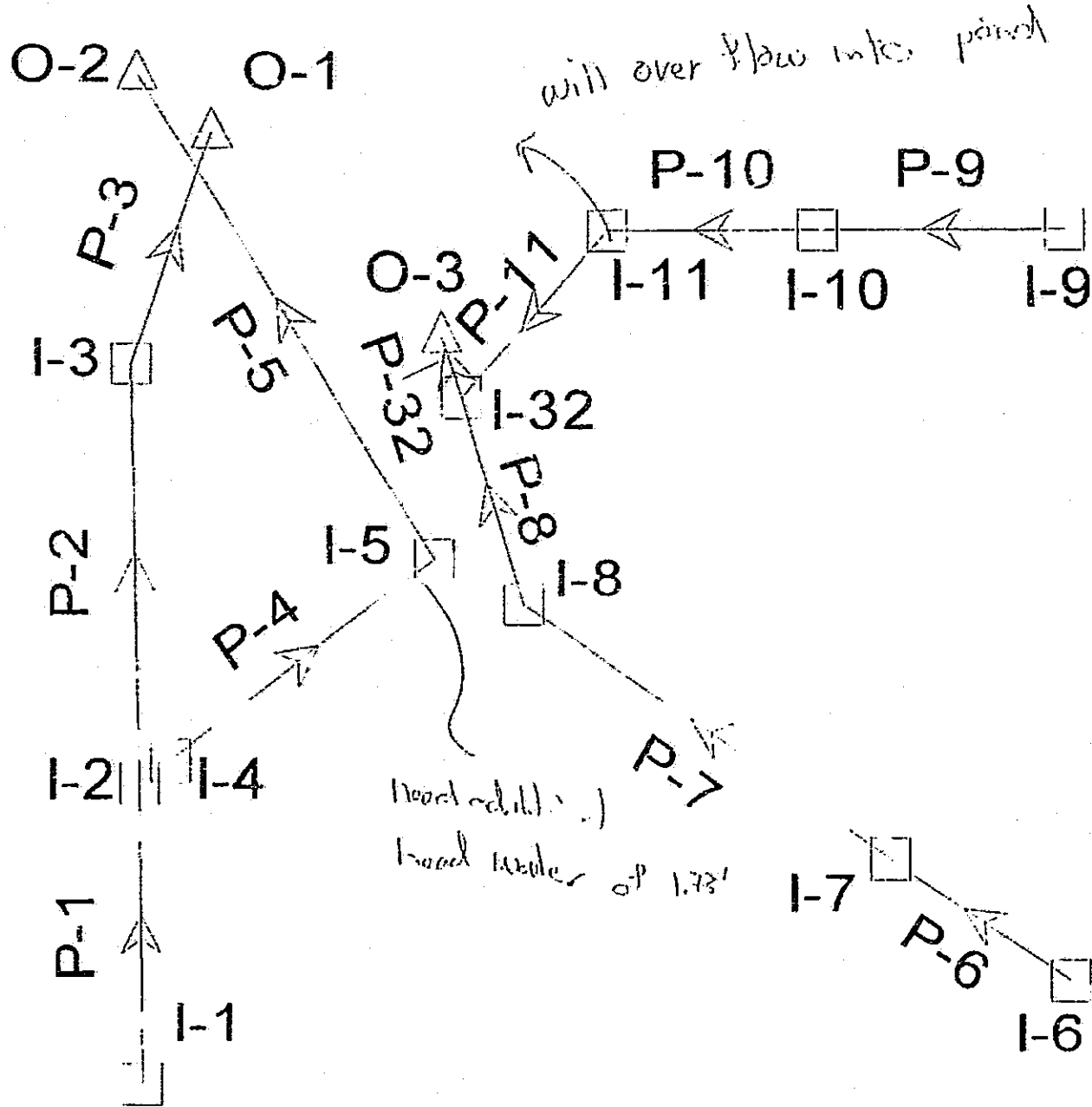
DATE: 7/21/2004  
 SCALE: 1" = 200'  
 DRAWN BY: JAS  
 CHECKED BY: JAS  
 SHEET NO.: EX1

**PAHLMAYER VINEYARDS  
 HYDROLOGY EXHIBIT**  
 SONOMA COUNTY CALIFORNIA

**RIECHERS SPENCE**  
 INCORPORATED  
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NO.	DATE	REVISIONS	BY	APPRO

Scenario: SYSTEM #1



Scenario: SYSTEM #1

Pipe Report

Label	Up. Node	Dr. Node	Up. Inlet Area (acres)	Up. Inlet Rat. Coef.	System CA (acres)	L (ft)	S (ft/ft)	Size	Manning n	System Q (cfs)	Q Full (cfs)	Up. Invert (ft)	Dr. Invert (ft)	Up. Gr. Elev. (ft)	Dr. Gr. Elev. (ft)	Up. Cover (ft)	Dr. Cover (ft)	HGL In (ft)	HGL Out (ft)	Avg. v (ft/s)	EGL In (ft)	EGL Out (ft)
P-1	I-1	I-2	0.26	0.44	0.11	212.00	0.147	8 inch	0.015	0.65	4.01	1,076.33	1,045.17	1,080.00	1,049.00	3.00	3.16	1,076.71	1,047.32	8.44	1,076.86	1,047.37
P-2	I-2	I-3	0.00	0.00	0.11	304.00	0.086	8 inch	0.015	3.06	3.06	1,045.17	1,019.17	1,049.00	1,023.00	3.16	3.16	1,046.75	1,020.73	8.78	1,047.95	1,021.93
P-3	I-3	O-1	2.18	0.44	1.07	172.00	0.100	12 inch	0.015	7.36	9.76	1,019.17	1,002.00	1,023.00	1,002.00	2.83	3.00	1,020.15	1,002.65	13.65	1,021.53	1,005.54
P-4	I-4	I-5	0.00	0.00	0.00	275.00	0.152	10 inch	0.015	6.30	7.39	1,045.17	1,003.50	1,049.00	1,009.00	3.00	4.67	1,045.99	1,009.00	15.22	1,048.07	1,011.07
P-5	I-5	O-2	20.34	0.44	8.95	420.00	0.016	30 inch	0.015	*46.86	44.76	1,003.50	396.84	1,009.00	1,002.84	3.00	3.50	1,009.14	1,001.84	9.55	1,010.55	1,003.26
P-6	I-6	I-7	0.93	0.44	0.41	146.00	0.166	8 inch	0.015	2.31	4.26	1,086.33	1,062.17	1,090.00	1,066.00	3.00	3.17	1,086.97	1,063.00	12.45	1,087.67	1,063.68
P-7	I-7	I-8	2.47	0.44	1.50	296.00	0.147	10 inch	0.015	6.85	7.27	1,062.17	1,018.75	1,066.00	1,023.00	3.00	3.42	1,063.00	1,020.87	15.16	1,065.45	1,023.32
P-8	I-8	I-32	2.76	0.44	2.71	184.00	0.089	15 inch	0.015	12.27	16.74	1,018.75	1,002.30	1,023.00	1,007.30	3.00	3.75	1,019.97	1,004.11	14.90	1,021.54	1,005.66
P-9	I-9	I-10	0.74	0.44	0.33	171.00	0.141	8 inch	0.015	1.49	3.94	1,055.33	1,031.17	1,059.00	1,035.00	3.00	3.17	1,055.90	1,032.28	10.50	1,056.24	1,032.56
P-10	I-10	I-11	1.78	0.44	1.11	140.00	0.137	10 inch	0.015	5.03	7.03	1,031.17	1,012.00	1,035.00	1,016.00	3.00	3.17	1,031.99	1,016.00	14.00	1,033.32	1,017.32
P-11	I-11	I-32	1.97	0.44	1.98	161.00	0.060	12 inch	0.015	*8.91	7.58	1,012.00	1,002.30	1,016.00	1,007.30	3.00	4.00	1,017.65	1,004.24	11.35	1,019.65	1,006.24
P-32	I-32	O-3	0.28	0.44	4.81	16.00	0.019	24 inch	0.015	21.52	26.85	1,002.30	1,002.00	1,007.30	1,002.00	3.00	-2.00	1,003.96	1,003.45	9.50	1,004.89	1,004.66

\* Pipe flowing overcapacity causes increased head water @ I-5 and minor overland flow for a short distance @ I-11 to Ex Pond

Scenario: SYSTEM #1

Node Report

Label	Area (acres)	Inlet C	Inlet CA (acres)	System CA (acres)	Time of Concentration (min)	System Intensity (in/hr)	System Flow Time (min)	Total Flow To Inlet (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Energy Grade Line In (ft)	Energy Grade Line Out (ft)
I-1	0.28	0.44	0.11	0.11	10.00	5.60	10.00	0.65	0.65	1,060.00	1,080.00	1,076.71	1,076.71	1,076.86	1,076.86
I-2	0.00	0.00	0.00	0.11	15.00	4.54	15.00	2.54	3.06	1,049.00	1,049.00	1,047.32	1,046.75	1,046.51	1,047.95
I-3	2.18	0.44	0.96	1.07	15.00	4.45	15.58	4.39	7.36	1,023.00	1,023.00	1,020.73	1,020.15	1,022.11	1,021.53
O-1				1.07					7.33	1,002.00	1,002.83	1,002.00	1,002.00	1,002.00	1,002.00
I-4	0.00	0.00	0.00	0.00	15.00	0.00	15.00	6.30	6.30	1,049.00	1,049.00	1,045.99	1,045.99	1,048.07	1,048.07
I-5	20.34	0.44	8.95	8.95	15.00	4.50	15.30	40.97	46.86	1,009.00	1,009.00	*1,010.73	1,009.00	1,012.15	1,010.42
O-2				8.95					45.89	1,002.84	1,002.84	1,001.84	1,001.84	1,001.84	1,001.84
I-9	0.74	0.44	0.33	0.33	15.00	4.54	15.00	1.49	1.49	1,059.00	1,059.00	1,055.90	1,055.90	1,056.24	1,056.24
I-6	0.93	0.44	0.41	0.41	10.00	5.60	10.00	2.31	2.31	1,090.00	1,090.00	1,086.97	1,086.97	1,087.67	1,087.67
I-10	1.78	0.44	0.78	1.11	15.00	4.50	15.27	3.59	5.03	1,035.00	1,035.00	1,032.28	1,031.99	1,033.61	1,033.32
I-7	2.47	0.44	1.09	1.50	15.00	4.54	15.00	4.98	6.85	1,066.00	1,066.00	1,063.00	1,063.00	1,065.45	1,065.45
I-11	1.97	0.44	0.87	1.98	15.00	4.48	15.44	3.97	8.91	1,016.00	1,016.00	*1,020.66	1,016.00	1,022.66	1,018.00
I-8	2.76	0.44	1.21	2.71	15.00	4.49	15.33	5.56	12.27	1,023.00	1,023.00	1,020.87	1,019.97	1,022.44	1,021.54
I-32	0.28	0.44	0.12	4.81	10.00	4.44	15.67	0.70	21.52	1,007.30	1,007.30	1,004.11	1,003.96	1,005.03	1,004.89
O-3				4.81					21.50	1,002.00	1,004.00	1,002.00	1,002.00	1,002.00	1,002.00

\* Structure is flooded

Scenario: SYSTEM #1

Node Report

Label	Area (acres)	Inlet C	Inlet CA (acres)	System CA (acres)	Time of Concentration (min)	System Intensity (in/hr)	System Flow Time (min)	Total Flow To Inlet (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Energy Grade Line In (ft)	Energy Grade Line Out (ft)
I-1	0.26	0.44	0.11	0.11	10.00	5.60	10.00	0.65	0.65	1,080.00	1,080.00	1,076.71	1,076.71	1,076.69	1,076.86
I-2	0.00	0.00	0.00	0.11	15.00	4.54	15.00	2.37	2.89	1,049.00	1,049.00	1,046.13	1,045.83	1,047.20	1,046.90
I-3	2.18	0.44	0.96	1.07	15.00	4.46	15.51	4.39	7.20	1,023.00	1,023.00	1,020.70	1,020.15	1,022.03	1,021.47
O-1				1.07				16.72	7.17	1,002.00	1,002.83	1,002.00	1,002.00	1,002.00	1,002.00
I-4	0.00	0.00	0.00	0.00	15.00	0.00	15.00	8.30	8.30	1,049.00	1,049.00	1,045.99	1,045.99	1,048.07	1,048.07
I-5	20.34	0.44	8.95	8.95	15.00	4.50	15.30	40.97	48.86	1,009.00	1,009.00	1,010.73	1,009.00	1,012.15	1,010.42
O-2				8.95				16.03	45.89	1,002.84	1,002.84	1,001.84	1,001.84	1,001.84	1,001.84
I-9	0.74	0.44	0.33	0.33	15.00	4.54	15.00	1.49	1.49	1,059.00	1,059.00	1,055.90	1,055.90	1,056.24	1,056.24
I-6	0.93	0.44	0.41	0.41	10.00	5.60	10.00	2.31	2.31	1,090.00	1,090.00	1,086.97	1,086.97	1,087.67	1,087.67
I-10	1.78	0.44	0.78	1.11	15.00	4.50	15.27	3.59	5.03	1,035.00	1,035.00	1,032.28	1,031.99	1,033.61	1,033.32
I-7	2.47	0.44	1.09	1.50	15.00	4.54	15.00	4.98	6.85	1,066.00	1,066.00	1,063.00	1,063.00	1,065.45	1,065.45
I-11	1.35	0.44	0.59	1.70	15.00	4.48	15.44	2.72	7.58	1,016.00	1,016.00	1,015.84	1,014.13	1,017.33	1,015.61
I-8	2.76	0.44	1.21	2.71	15.00	4.49	15.33	5.56	12.27	1,023.00	1,023.00	1,020.87	1,019.97	1,022.44	1,021.54
I-32	0.28	0.44	0.12	4.54	10.00	4.43	15.71	0.70	20.28	1,007.30	1,007.30	1,004.05	1,003.92	1,004.91	1,004.78
O-3				4.54				15.74	20.26	1,002.00	1,004.00	1,002.00	1,002.00	1,002.00	1,002.00

① more flow to inlet before flooding occurs @ I-11  
 $(3.95 \text{ cfs}) - (2.72 \text{ cfs}) = 1.23 \text{ cfs}$  flowing overland into Ex. pond  
 total flow to inlet I-11      flow capable of entering inlet

②  $1010.73 - 1007.0 = 1.73'$  of ponding @ I-5  
 considered in-kind because of large ponding around I-5

Scenario: SYSTEM #1

*n = 0.012*

Pipe Report

Label	Up. Node	Dn. Node	Up. Inlet Area (acres)	Up. Inlet Rat. Coef.	System CA (acres)	L (ft)	S (ft/ft)	Size	Manning's n	System Q (cfs)	Q Full (cfs)	Up. Invert (ft)	Dn. Invert (ft)	Up. Gr. Elev. (ft)	Dn. Gr. Elev. (ft)	Up. Cover (ft)	Dn. Cover (ft)	HGL In (ft)	HGL Out (ft)	Avg. v (ft/s)	EGL In (ft)	EGL Out (ft)
P-1	I-1	I-2	0.28	0.44	0.11	212.00	0.147	8 inch	0.015	0.65	4.01	1,078.33	1,045.17	1,080.00	1,049.00	3.00	3.18	1,078.71	1,047.32	8.44	1,078.86	1,047.37
P-2	I-2	I-3	0.00	0.00	0.11	304.00	0.066	8 inch	0.015	3.06	3.06	1,045.17	1,019.17	1,043.00	1,023.00	3.16	3.16	1,046.75	1,020.73	8.78	1,047.95	1,021.93
P-3	I-3	O-1	2.18	0.44	1.07	172.00	0.100	12 inch	0.015	7.35	9.76	1,019.17	1,002.00	1,023.00	1,002.00	2.83	-1.00	1,020.15	1,002.65	13.65	1,021.53	1,005.54
P-4	I-4	I-5	0.00	0.00	0.00	275.00	0.152	10 inch	0.015	6.30	7.39	1,045.17	1,003.50	1,049.00	1,009.00	3.00	4.67	1,045.99	1,007.70	15.22	1,048.07	1,009.78
P-5	I-5	O-2	20.34	0.44	8.95	420.00	0.016	30 inch	0.012	46.66	55.95	1,003.50	998.84	1,009.00	1,002.84	3.00	3.50	1,006.51	1,001.84	9.55	1,007.93	1,003.28
P-6	I-6	I-7	0.93	0.44	0.41	146.00	0.166	8 inch	0.015	2.31	4.26	1,086.33	1,062.17	1,090.00	1,066.00	3.00	3.17	1,086.97	1,063.00	12.45	1,087.67	1,063.68
P-7	I-7	I-8	2.47	0.44	1.50	296.00	0.147	10 inch	0.015	6.85	7.27	1,062.17	1,018.75	1,066.00	1,023.00	3.00	3.42	1,063.00	1,020.87	15.16	1,065.45	1,023.32
P-8	I-8	I-32	2.76	0.44	2.71	184.00	0.089	15 inch	0.015	12.27	16.74	1,018.75	1,002.30	1,023.00	1,007.30	3.00	3.75	1,019.97	1,004.11	14.80	1,021.54	1,005.08
P-9	I-9	I-10	0.74	0.44	0.33	171.00	0.141	8 inch	0.015	1.49	3.94	1,055.33	1,031.17	1,059.00	1,035.00	3.00	3.17	1,055.90	1,032.28	10.50	1,056.24	1,032.56
P-10	I-10	I-11	1.78	0.44	1.11	140.00	0.137	10 inch	0.015	5.03	7.03	1,031.17	1,012.00	1,035.00	1,016.00	3.00	3.17	1,031.99	1,014.43	14.00	1,033.32	1,015.75
P-11	I-11	I-32	1.97	0.44	1.98	151.00	0.060	12 inch	0.012	8.91	9.47	1,012.00	1,002.30	1,016.00	1,007.30	3.00	4.00	1,012.99	1,004.24	13.72	1,015.00	1,006.24
P-32	I-32	O-3	0.28	0.44	4.81	16.00	0.019	24 inch	0.015	21.55	26.85	1,002.30	1,002.00	1,007.30	1,002.00	3.00	-2.00	1,003.96	1,003.45	9.50	1,004.89	1,004.66

*using n = 0.012 no over capacity on flooding*

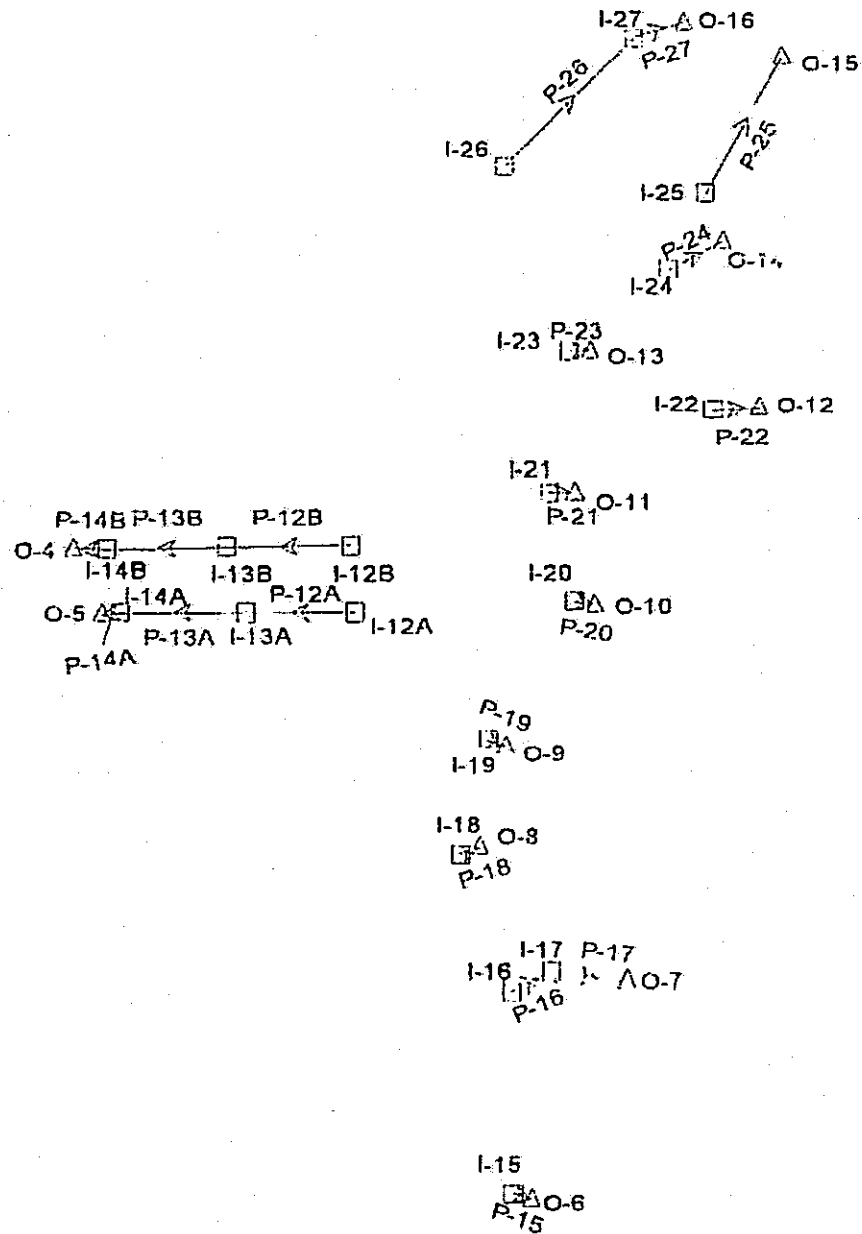
Scenario: SYSTEM #1

$n=0.01$

Node Report

Label	Area (acres)	Inlet C	Inlet CA (acres)	System CA (acres)	Time of Concentration (min)	System Intensity (in/hr)	System Flow Time (min)	Total Flow To Inlet (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Energy Grade Line In (ft)	Energy Grade Line Out (ft)
I-1	0.28	0.44	0.11	0.11	10.00	5.60	10.00	0.65	0.65	1,080.00	1,080.00	1,076.71	1,076.71	1,076.06	1,076.06
I-2	0.00	0.00	0.00	0.11	15.00	4.54	15.00	2.54	3.06	1,049.00	1,049.00	1,047.32	1,046.75	1,048.51	1,047.95
I-3	2.18	0.44	0.96	1.07	15.00	4.45	15.00	4.39	7.36	1,023.00	1,023.00	1,020.73	1,020.15	1,022.11	1,021.53
I-4	0.00	0.00	0.00	0.00	15.00	0.00	15.00	6.30	6.30	1,049.00	1,049.00	1,045.99	1,045.99	1,048.07	1,048.07
I-5	20.34	0.44	8.95	8.95	15.00	4.50	15.30	40.97	46.88	1,009.00	1,009.00	1,007.70	1,008.51	1,009.12	1,007.93
I-6	0.97	0.44	0.41	0.41	10.00	5.60	10.00	2.31	2.31	1,090.00	1,090.00	1,086.97	1,086.97	1,087.67	1,087.67
I-7	2.47	0.44	1.09	1.50	15.00	4.54	15.00	4.98	6.85	1,066.00	1,066.00	1,063.00	1,063.00	1,065.45	1,065.45
I-8	2.76	0.44	1.21	2.71	15.00	4.49	15.33	5.56	12.27	1,023.00	1,023.00	1,020.87	1,019.97	1,022.44	1,021.54
I-9	0.74	0.44	0.33	0.33	15.00	4.54	15.00	1.49	1.49	1,059.00	1,059.00	1,055.90	1,055.90	1,056.24	1,056.24
I-10	1.78	0.44	0.78	1.11	15.00	4.50	15.27	3.59	5.03	1,035.00	1,035.00	1,032.28	1,031.99	1,033.81	1,033.32
I-11	1.97	0.44	0.87	1.98	15.00	4.48	15.44	3.97	8.91	1,016.00	1,016.00	1,014.43	1,012.99	1,016.44	1,015.00
I-12	0.28	0.44	0.12	4.81	10.00	4.45	15.63	0.70	21.55	1,007.30	1,007.30	1,004.11	1,003.96	1,005.04	1,004.89
O-1				1.07		4.42	15.79		7.33	1,002.00	1,002.83	1,002.00	1,002.00	1,002.00	1,002.00
O-2				8.95		4.39	16.03		45.69	1,002.84	1,002.84	1,001.84	1,001.84	1,001.84	1,001.84
O-3				4.81		4.44	15.66		21.53	1,002.00	1,004.00	1,002.00	1,002.00	1,002.00	1,002.00

Scenario: SYSTEM #2



Scenario: SYSTEM #2

Node Report

Label	Area (acres)	Inlet C	Inlet CA (acres)	System CA (acres)	Time of Concentration (min)	System Intensity (in/hr)	System Flow Time (min)	Total Flow To Inlet (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Energy Grade Line In (ft)	Energy Grade Line Out (ft)
I-12A	0.08	0.44	0.04	0.04	10.00	5.60	10.00	0.20	0.20	1,063.00	1,063.00	1,059.53	1,059.53	1,059.61	1,059.61
I-12B	0.60	0.44	0.26	0.26	15.00	4.54	15.00	1.21	1.21	1,065.00	1,065.00	1,061.85	1,061.85	1,062.12	1,062.12
I-13A	0.27	0.44	0.12	0.15	15.00	4.54	15.00	0.54	0.71	1,043.00	1,043.00	1,039.56	1,039.54	1,039.70	1,039.68
I-13B	1.55	0.44	0.68	0.95	15.00	4.49	15.35	3.12	4.28	1,040.00	1,040.00	1,037.19	1,036.98	1,039.17	1,037.95
I-14A	0.53	0.44	0.23	0.39	15.00	4.47	15.46	1.07	1.75	1,013.00	1,013.00	1,009.01	1,009.56	1,009.64	1,009.79
I-14B	1.11	0.44	0.49	1.43	15.00	4.45	15.59	2.24	6.44	1,012.00	1,012.00	1,009.18	1,008.97	1,010.25	1,010.03
I-15	1.23	0.44	0.54	0.54	15.00	4.54	15.00	2.48	2.48	1,050.00	1,050.00	1,048.01	1,048.01	1,048.79	1,048.79
I-16	1.60	0.44	0.70	0.70	15.00	4.54	15.00	3.22	3.22	1,042.00	1,042.00	1,038.99	1,038.99	1,040.32	1,040.32
I-17	0.30	0.44	0.13	0.84	10.00	4.53	15.08	0.74	3.82	1,026.53	1,026.53	1,023.58	1,023.36	1,024.04	1,023.83
I-18	1.28	0.44	0.56	0.56	15.00	4.54	15.00	2.58	2.58	1,047.00	1,047.00	1,043.98	1,043.98	1,044.84	1,044.84
I-19	0.90	0.44	0.40	0.40	15.00	4.54	15.00	1.81	1.81	1,035.00	1,035.00	1,031.94	1,031.94	1,032.40	1,032.40
I-20	1.77	0.44	0.78	0.78	15.00	4.54	15.00	3.57	3.57	1,005.00	1,005.00	1,002.00	1,002.00	1,003.62	1,003.62
I-21	0.97	0.44	0.43	0.43	15.00	4.54	15.00	1.95	1.95	1,013.00	1,013.00	1,009.86	1,009.96	1,010.47	1,010.47
I-22	0.69	0.44	0.30	0.30	15.00	4.54	15.00	1.39	1.39	956.56	956.56	953.44	953.44	953.78	953.78
I-23	1.83	0.44	0.72	0.72	15.00	4.54	15.00	3.28	3.28	990.00	990.00	989.35	989.35	990.72	990.72
I-24	3.30	0.44	1.45	1.45	15.00	4.54	15.00	6.65	6.65	947.65	947.65	944.62	944.62	945.75	945.75
I-25	0.96	0.44	0.42	0.42	15.00	4.54	15.00	1.93	1.93	935.96	935.96	932.91	932.91	933.42	933.42
I-26	0.09	0.44	0.04	0.04	7.00	6.73	7.00	0.27	0.27	1,020.00	1,020.00	1,016.57	1,016.57	1,016.66	1,016.66
I-27	0.77	0.44	0.34	0.38	15.00	4.54	15.00	1.55	1.73	972.00	972.00	969.16	968.93	969.58	969.36
O-4				1.43		4.45	15.84		6.43	1,002.94	1,003.94	1,002.94	1,002.94	1,002.94	1,002.94
O-5				0.39		4.46	15.52		1.74	1,002.56	1,003.56	1,002.56	1,002.56	1,002.56	1,002.56
O-6				0.54		4.53	15.10		2.47	1,045.00	1,045.67	1,045.00	1,045.00	1,045.00	1,045.00
O-7				0.84		4.52	15.17		3.81	978.00	979.00	978.00	978.00	978.00	978.00
O-8				0.56		4.54	15.04		2.57	1,041.00	1,041.67	1,041.00	1,041.00	1,041.00	1,041.00
O-9				0.40		4.54	15.04		1.81	1,029.00	1,029.67	1,029.00	1,029.00	1,029.00	1,029.00
O-10				0.78		4.54	15.03		3.56	997.00	997.67	997.00	997.00	997.00	997.00
O-11				0.43		4.53	15.07		1.95	1,007.00	1,007.67	1,007.00	1,007.00	1,007.00	1,007.00
O-12				0.30		4.53	15.10		1.39	928.00	928.67	928.00	928.00	928.00	928.00
O-13				0.72		4.52	15.12		3.27	983.00	983.66	982.00	982.00	982.00	982.00
O-14				1.45		4.53	15.09		6.63	920.04	921.01	920.04	920.04	920.04	920.04
O-15				0.42		4.47	15.48		1.90	905.00	905.88	905.00	905.00	905.00	905.00
O-16				0.38		4.53	15.11		1.73	946.50	947.17	946.50	946.50	946.50	946.50

Scenario: SYSTEM #2

Pipe Report

Label	Up. Node	Dn. Node	Up. Inlet Area (acres)	Up. Inlet R/L Coef.	System CA (acres)	L (ft)	S (ft/ft)	Size	Manning's n	System Q (cfs)	Q Full (cfs)	Up. Invert (ft)	Dn. Invert (ft)	Up. Gr Elev. (ft)	Dn. Gr Elev. (ft)	Up. Cover (ft)	Dn. Cover (ft)	HGL In (ft)	HGL Out (ft)	Avg v (ft/s)	EGL In (ft)	EGL Out (ft)
P-12A	I-12A	I-13A	0.08	0.44	0.04	217.00	0.093	8 Inch	0.015	0.20	3.19	1,059.33	1,039.17	1,063.00	1,043.00	3.00	3.16	1,059.53	1,039.56	5.09	1,059.61	1,039.57
P-12B	I-12B	I-13B	0.60	0.44	0.26	201.00	0.125	8 Inch	0.015	1.21	3.71	1,061.33	1,036.17	1,065.00	1,040.00	3.00	3.17	1,061.85	1,037.19	9.49	1,062.12	1,037.38
P-13A	I-13A	I-14A	0.27	0.44	0.15	227.00	0.133	10 Inch	0.015	0.71	6.92	1,039.17	1,009.00	1,043.00	1,013.00	3.00	3.17	1,039.54	1,009.61	8.16	1,039.68	1,009.65
P-13B	I-13B	I-14B	1.55	0.44	0.95	197.00	0.143	10 Inch	0.015	4.23	7.19	1,036.17	1,008.00	1,040.00	1,012.00	3.00	3.17	1,036.98	1,009.18	13.74	1,037.95	1,010.14
P-14A	I-14A	O-5	0.53	0.44	0.39	40.00	0.161	12 Inch	0.015	1.75	12.33	1,009.00	1,002.56	1,013.00	1,002.56	3.00	-1.00	1,009.56	1,002.81	11.14	1,009.79	1,004.74
P-14B	I-14B	O-4	1.11	0.44	1.43	40.00	0.126	12 Inch	0.015	6.44	10.98	1,008.00	1,002.94	1,012.00	1,002.94	3.00	-1.00	1,008.97	1,003.50	14.53	1,010.03	1,006.60
P-15	I-15	O-6	1.23	0.44	0.54	42.00	0.032	8 Inch	0.015	2.48	1.87	1,046.33	1,045.00	1,050.00	1,045.00	3.00	-0.67	1,048.01	1,045.65	7.10	1,048.79	1,046.44
P-16	I-16	I-17	1.60	0.44	0.70	74.00	0.214	8 Inch	0.015	3.22	4.84	1,036.33	1,022.53	1,042.00	1,026.53	3.00	3.33	1,036.99	1,023.58	14.84	1,040.32	1,024.80
P-17	I-17	O-7	0.30	0.44	0.84	100.00	0.445	12 Inch	0.015	3.82	20.60	1,022.53	978.00	1,026.53	978.00	3.00	-1.00	1,023.36	978.29	20.04	1,023.83	984.53
P-18	I-18	O-8	1.28	0.44	0.56	25.00	0.093	8 Inch	0.015	2.58	3.20	1,043.33	1,041.00	1,047.00	1,041.00	3.00	-0.67	1,043.88	1,041.40	10.19	1,044.84	1,043.00
P-18	I-18	O-9	0.90	0.44	0.40	24.00	0.097	8 Inch	0.015	1.81	3.26	1,031.33	1,029.00	1,035.00	1,029.00	3.00	-0.67	1,031.94	1,029.36	9.59	1,032.40	1,030.75
P-20	I-20	O-10	1.77	0.44	0.78	28.00	0.167	8 Inch	0.015	3.57	4.28	1,001.33	997.00	1,005.00	997.00	3.00	-0.67	1,002.00	997.48	13.71	1,003.62	1,000.22
P-21	I-21	O-11	0.97	0.44	0.43	36.00	0.065	8 Inch	0.015	1.95	2.57	1,009.33	1,007.00	1,013.00	1,007.00	3.00	-0.67	1,009.98	1,007.42	8.34	1,010.47	1,008.51
P-22	I-22	O-12	0.69	0.44	0.30	80.00	0.311	8 Inch	0.015	1.39	5.84	952.89	928.00	956.56	928.00	3.00	-0.67	953.44	928.22	13.72	953.78	931.15
P-23	I-23	O-13	1.63	0.44	0.72	68.00	0.064	8 Inch	0.015	3.28	2.64	986.33	982.00	990.00	983.00	3.00	0.33	989.35	982.66	9.41	990.72	984.04
P-24	I-24	O-14	3.30	0.44	1.45	100.00	0.236	12 Inch	0.015	6.65	15.00	943.65	920.04	947.65	920.04	3.00	-1.00	944.62	920.51	18.52	945.75	925.84
P-25	I-25	O-15	0.96	0.44	0.42	274.00	0.100	8 Inch	0.015	1.93	3.30	932.29	905.00	935.96	905.00	3.00	-0.67	932.91	905.37	9.84	933.42	906.87
P-26	I-26	I-27	0.09	0.44	0.04	330.00	0.143	8 Inch	0.015	0.27	3.99	1,016.33	968.33	1,020.00	972.00	3.00	3.00	1,016.57	969.16	6.51	1,016.66	969.17
P-27	I-27	O-16	0.77	0.44	0.38	88.00	0.248	8 Inch	0.015	1.73	5.22	968.33	946.50	972.00	946.50	3.00	-0.67	968.93	946.76	13.43	969.36	949.57

## Pipe Summary

	SEGMENTS					SIZE	TOTAL
	LENGTH 1	LENGTH 2	LENGTH 3	LENGTH 4	LENGTH 5		
P1	120	92				8"	212
P2	184	120				8"	304
P3	172					12"	172
P4	275					10"	275
P5	420					30"	420
P6	75	71				8"	146
P7	68	78	71	48	31	10"	296
P8	184					15"	184
P9	99	72				8"	171
P10	68	72				10"	140
P11	80	60	21			12"	161
P12A	59	66	92			8"	217
P12B	56	69	76			8"	201
P13A	76	88	63			10"	227
P13B	78	75	44			10"	197
P14A	40					12"	40
P14B	40					12"	40
P15	42					8"	42
P16	74					8"	74
P17	100					12"	100
P18	25					8"	25
P19	24					8"	24
P20	26					8"	26
P21	36					8"	36
P22	80					8"	80
P23	68					8"	68
P24	100					12"	100
P25	188	86				8"	274
P26	330					8"	330
7	88					8"	88
P							0
P32	16					24"	16

### V-Ditch Channel Calculations

Largest tributary area to all V-ditches is 1.02 acres which produces 2.04 cfs (25-yr Storm). This is the maximum flow to any V-ditch at a 2% slope (minimum V-ditch slope). The following calculation indicates the largest flow generated can be contained within the standard V-ditch (see detail on sheet C6). Therefore all V-ditches are more than adequate to handle their respective tributary flows.

#### Given Input Data:

Shape ..... Trapezoidal  
Solving for ..... Depth of Flow  
Flowrate ..... 2.0400 cfs  
Slope ..... 0.0200 ft/ft (min. slope)  
Manning's n ..... 0.0200 (for earth channel)  
Height ..... 1.0000 ft  
Bottom width ..... 0.0000 ft  
Left slope ..... 0.5000 ft/ft (V/H)  
Right slope ..... 0.5000 ft/ft (V/H)

#### Computed Results:

Depth ..... 0.5100 ft  
Velocity ..... 3.9223 fps  
Full Flowrate ..... 12.2898 cfs  
Flow area ..... 0.5201 ft<sup>2</sup>  
Flow perimeter ..... 2.2806 ft  
Hydraulic radius ..... 0.2281 ft  
Top width ..... 2.0398 ft  
Area ..... 2.0000 ft<sup>2</sup>  
Perimeter ..... 4.4721 ft  
Percent full ..... 50.9956 %

#### Critical Information

Critical depth ..... 0.5783 ft  
Critical slope ..... 0.0102 ft/ft  
Critical velocity ..... 3.0501 fps  
Critical area ..... 0.6688 ft<sup>2</sup>  
Critical perimeter ..... 2.5862 ft  
Critical hydraulic radius ..... 0.2586 ft  
Critical top width ..... 2.3132 ft  
Specific energy ..... 0.7490 ft  
Minimum energy ..... 0.8674 ft  
Froude number ..... 1.3694  
Flow condition ..... Supercritical

## Inlet Capacity Calculations

All Inlets shall be constructed in a sump area (low point). We use the broad crested weir discharge formula to determine the inlet capacity. The weir discharge is calculated as:

$$Q=3.0*P*H^{3/2}$$

With:  $P= \frac{1}{2}$  of the inlet perimeter in feet for a conservative design approach. We assume that 35-40% of the inlet area is blocked with debris and 10-15% of the opening is occupied with the grate bearing bars.

$H=$  the water depth in feet above the grate.

For a worst case scenario, the largest tributary to all inlets (except on and off-site tributary from existing channel to 48" inlet shown below) is 1.20 acres which produces 2.40 cfs and a height of 0.54' which is fully containable within the standard V-Ditch (see detail on sheet C6).

### Inlet Capacity #1

Max Inlet flow to 12" Drop Inlet: 2.40cfs (25 yr Storm)

Inlet type is a 1ft square drop inlet, therefore  $P=2.0$  ft.

$$H = (Q/3P)^{2/3} = (2.40/6)^{2/3}$$

$H = 0.54$  ft which is approximately 0.6 ft and assumed to be acceptable

Max Inlet flow to 48" Drop Inlet: 40.64 cfs (25 yr Storm)

Inlet type is a 4ft square drop inlet, therefore  $P=8.0$  ft.

$$H = (Q/3P)^{2/3} = (40.64/24)^{2/3}$$

$H = 1.42$  ft which is approximately 1.50 and assumed to be acceptable since the existing on and off-site channel has a depth larger than that of 1.50 ft.

### Energy Dissipater Calculations

Storm Cadd has been modeled to incorporate a free outfall. Per the AS-BUILT plans, rock-energy dissipaters have been constructed to reduce flows within the vineyard. Therefore it is necessary to calculate the free outflow velocity reduction by the addition of rock-energy dissipaters as shown in the calculations that follow.

The following calculations indicate the largest velocities generated can be reduced within the standard Rock Energy Dissipater (see detail on sheet C6) to a maximum of 6 ft/s for non-erosive conditions. Therefore all Rock Energy Dissipater's are more than adequate to handle their respective system flows in a worst case scenario.

Please note, calculated reduced average velocities are at the point of the free outfall into the energy dissipaters and have not accounted for the additional velocity reductions due in part because of the length of the energy dissipaters.

<u>OUTFALL</u>	<u>PIPE SIZE</u>	<u>AVE. VELOCITY</u>	<u>REDUCED AVE. VELOCITY</u>
#12	8"	13.60 ft/s	4.96 ft/s
#1	10"	24.99 ft/s (Q full = 5.85cfs)	5.46 ft/s
#14	12"	18.06 ft/s	7.06 ft/s
#3	24"	8.28 ft/s	3.65 ft/s

OUTFALL for 8-inch.txt

Channel Calculator  
for OUTFALL #12

Given Input Data:

Shape ..... Rectangular  
Solving for ..... Depth of Flow  
Flowrate ..... 1.3900 cfs  
Slope ..... 0.3040 ft/ft  
Manning's n ..... 0.0350  
Height ..... 6.0000 in  
Bottom width ..... 32.0000 in

Computed Results:

Depth ..... 1.2617 in  
Velocity ..... 4.9575 fps  
Full Flowrate ..... 15.9015 cfs  
Flow area ..... 0.2804 ft<sup>2</sup>  
Flow perimeter ..... 34.5234 in  
Hydraulic radius ..... 1.1695 in  
Top width ..... 32.0000 in  
Area ..... 1.3333 ft<sup>2</sup>  
Perimeter ..... 44.0000 in  
Percent full ..... 21.0286 %

Critical Trformation

Critical depth ..... 2.4437 in  
Critical slope ..... 0.0367 ft/ft  
Critical velocity ..... 2.5597 fps  
Critical area ..... 0.5430 ft<sup>2</sup>  
Critical perimeter ..... 36.8874 in  
Critical hydraulic radius ..... 2.1199 in  
Critical top width ..... 32.0000 in  
Specific energy ..... 0.4871 ft  
Minimum energy ..... 0.3055 ft  
Froude number ..... 2.6954  
Flow condition ..... Supercritical

Per the energy dissipater detail located on sheet C6 of the AS BUILT plans,

OUTFALL for 8-inch.txt

the dissipater bed for outfall #12 is sized to have a minimum width of 2.67 feet and a minimum depth of 6 inches. Therefore reducing the free outfall velocity of 13.60 ft/s to 4.96 ft/s.

Note: calculated reduced average velocities are at the point of the free outfall into the energy dissipaters and have not accounted for the additional velocity reductions due in part because of the length of the energy dissipaters.

OUTFALL for 10-inch.txt

Channel Calculator  
for OUTFALL #1

Given Input Data:

Shape ..... Rectangular  
Solving for ..... Depth of Flow  
Flowrate ..... 5.8500 cfs  
Slope ..... 0.0950 ft/ft  
Manning's n ..... 0.0350  
Height ..... 0.5000 ft  
Bottom width ..... 3.3300 ft

Computed Results:

Depth ..... 0.3217 ft  
Velocity ..... 5.4612 fps  
Full Flowrate ..... 11.5216 cfs  
Flow area ..... 1.0712 ft<sup>2</sup>  
Flow perimeter ..... 3.9734 ft  
Hydraulic radius ..... 0.2696 ft  
Top width ..... 3.3300 ft  
Area ..... 1.6650 ft<sup>2</sup>  
Perimeter ..... 4.3300 ft  
Percent full ..... 64.3361 %

Critical Information

Critical depth ..... 0.4578 ft  
Critical slope ..... 0.0320 ft/ft  
Critical velocity ..... 3.8377 fps  
Critical area ..... 1.5243 ft<sup>2</sup>  
Critical perimeter ..... 4.2455 ft  
Critical hydraulic radius ..... 0.3590 ft  
Critical top width ..... 3.3300 ft  
Specific energy ..... 0.7852 ft  
Minimum energy ..... 0.6856 ft  
Froude number ..... 1.6975  
Flow condition ..... Supercritical

Per the energy dissipater detail located on sheet C6 of the AS BUILT plans,

OUTFALL for 10-inch.txt

the dissipater bed for outfall #1 is sized to have a minimum width of 3.33 feet and a minimum depth of 6 inches. Therefore reducing the free outfall velocity for a Q full of 5.85 cfs to 5.46 ft/s.

Note: calculated reduced average velocities are at the point of the free outfall into the energy dissipaters and have not accounted for the additional velocity reductions due in part because of the length of the energy dissipaters.

OUTFALL for 12-inch.txt

Channel Calculator  
for OUTFALL #14

Given Input Data:

Shape ..... Rectangular  
Solving for ..... Depth of Flow  
Flowrate ..... 6.6500 cfs  
Slope ..... 0.2210 ft/ft  
Manning's n ..... 0.0350  
Height ..... 0.5000 ft  
Bottom width ..... 4.0000 ft

Computed Results:

Depth ..... 0.2353 ft  
Velocity ..... 7.0643 fps  
Full Flowrate ..... 21.6712 cfs  
Flow area ..... 0.9414 ft<sup>2</sup>  
Flow perimeter ..... 4.4707 ft  
Hydraulic radius ..... 0.2106 ft  
Top width ..... 4.0000 ft  
Area ..... 2.0000 ft<sup>2</sup>  
Perimeter ..... 5.0000 ft  
Percent full ..... 47.0678 %

Critical Information

Critical depth ..... 0.4412 ft  
Critical slope ..... 0.0306 ft/ft  
Critical velocity ..... 3.7678 fps  
Critical area ..... 1.7650 ft<sup>2</sup>  
Critical perimeter ..... 4.8825 ft  
Critical hydraulic radius ..... 0.3615 ft  
Critical top width ..... 4.0000 ft  
Specific energy ..... 1.0109 ft  
Minimum energy ..... 0.6619 ft  
Froude number ..... 2.5672  
Flow condition ..... Supercritical

OUTFALL for 12-inch.txt

Per the energy dissipater detail located on sheet C6 of the AS BUILT plans, the dissipater bed for outfall #14 is sized to have a minimum width of 4.00 feet and a minimum depth of 6 inches. Therefore reducing the free outfall velocity of 18.06 ft/s to 7.06 ft/s.

Note: calculated reduced average velocities are at the point of the free outfall into the energy dissipaters and have not accounted for the additional velocity reductions due in part because of the length of the energy dissipaters.

OUTFALL for 24-inch.txt

Channel Calculator  
for OUTFALL #3

Given Input Data:

Shape ..... Rectangular  
Solving for ..... Depth of Flow  
Flowrate ..... 21.4600 cfs  
Slope ..... 0.0140 ft/ft  
Manning's n ..... 0.0350  
Height ..... 0.7500 ft  
Bottom width ..... 8.0000 ft

Computed Results:

Depth ..... 0.7342 ft  
Velocity ..... 3.6539 fps  
Full Flowrate ..... 22.1880 cfs  
Flow area ..... 5.8732 ft<sup>2</sup>  
Flow perimeter ..... 9.4683 ft  
Hydraulic radius ..... 0.6203 ft  
Top width ..... 8.0000 ft  
Area ..... 6.0000 ft<sup>2</sup>  
Perimeter ..... 9.5000 ft  
Percent full ..... 97.8874 %

Critical Information

Critical depth ..... 0.6070 ft  
Critical slope ..... 0.0254 ft/ft  
Critical velocity ..... 4.4192 fps  
Critical area ..... 4.8560 ft<sup>2</sup>  
Critical perimeter ..... 9.2140 ft  
Critical hydraulic radius ..... 0.5270 ft  
Critical top width ..... 8.0000 ft  
Specific energy ..... 0.9416 ft  
Minimum energy ..... 0.9105 ft  
Froude number ..... 0.7518  
Flow condition ..... Subcritical

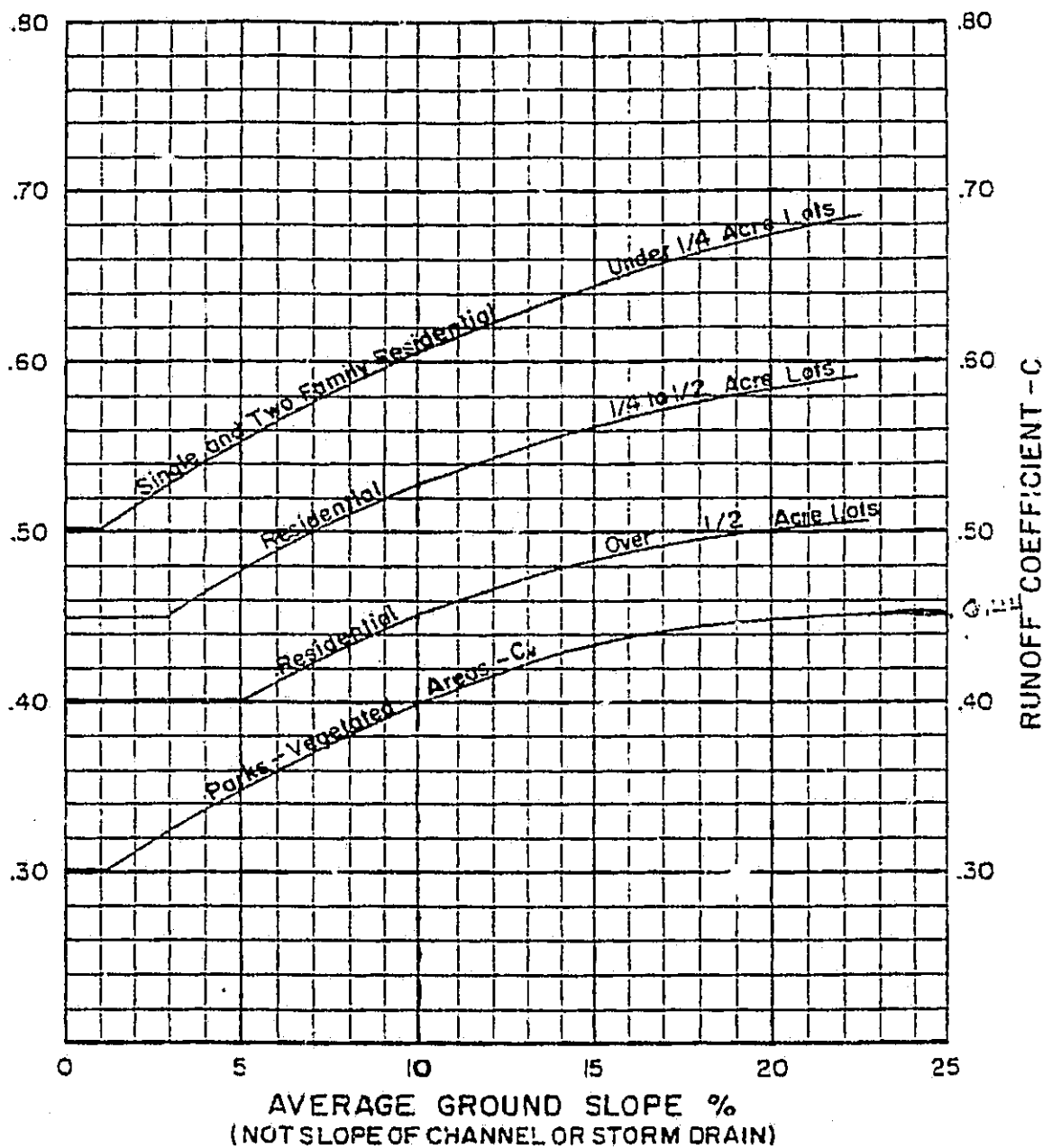
OUTFALL for 24-inch.txt

Per the energy dissipater detail located on sheet C6 of the AS BUILT plans, the dissipater bed for outfall #3 is sized to have a minimum width of 8.00 feet and a minimum depth of 9 inches. Therefore reducing the free outfall velocity of 8.28 ft/s to 3.65 ft/s.

Note: calculated reduced average velocities are at the point of the free outfall into the energy dissipaters and have not accounted for the additional velocity reductions due in part because of the length of the energy dissipaters.



**RUNOFF COEFFICIENTS  
FOR  
RATIONAL FORMULA**



**NOTE: Commercial, Industrial & Multiple Residential Areas**

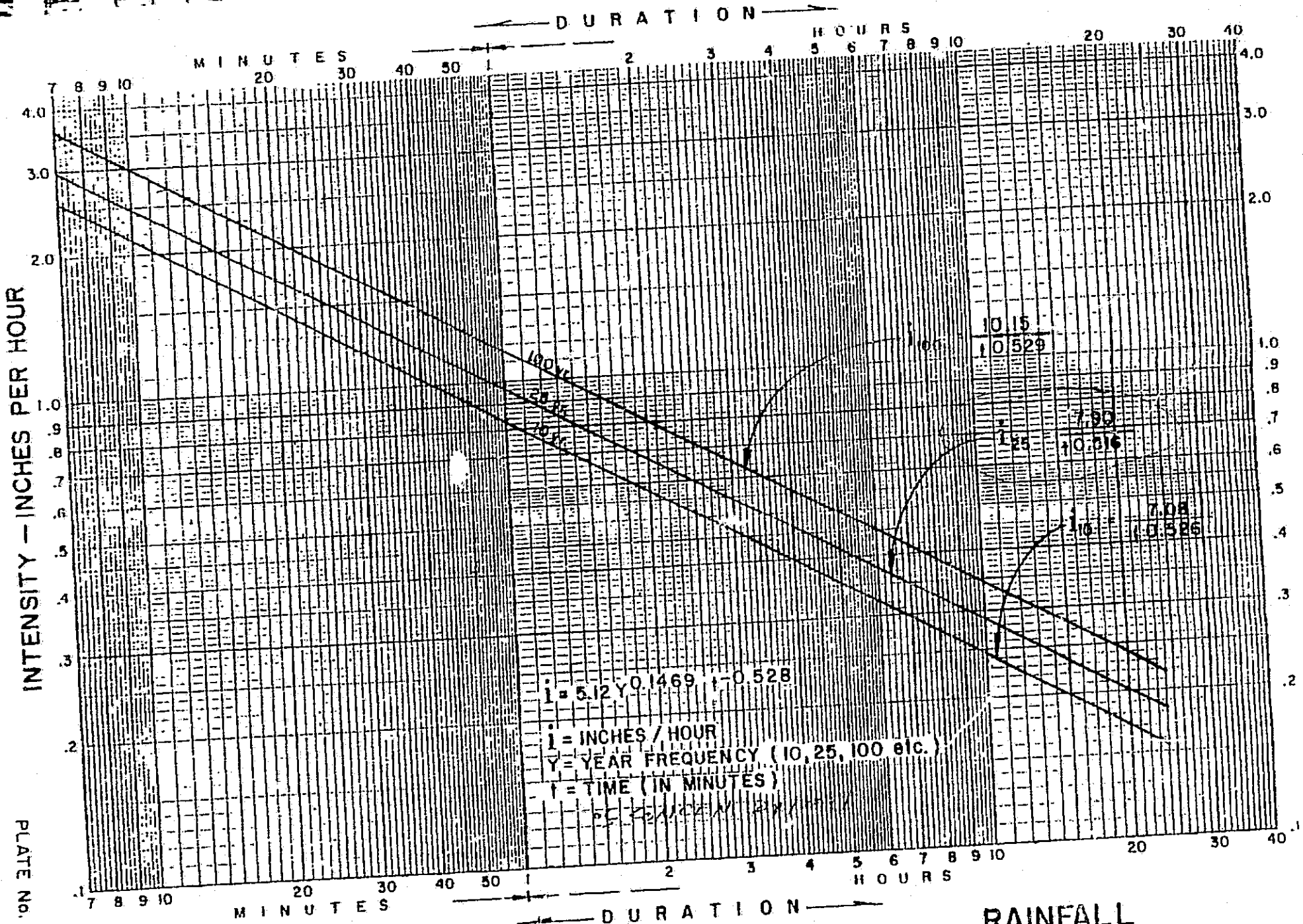
$C_p = 0.9$  (Based on paving, roofs, etc.)

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

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

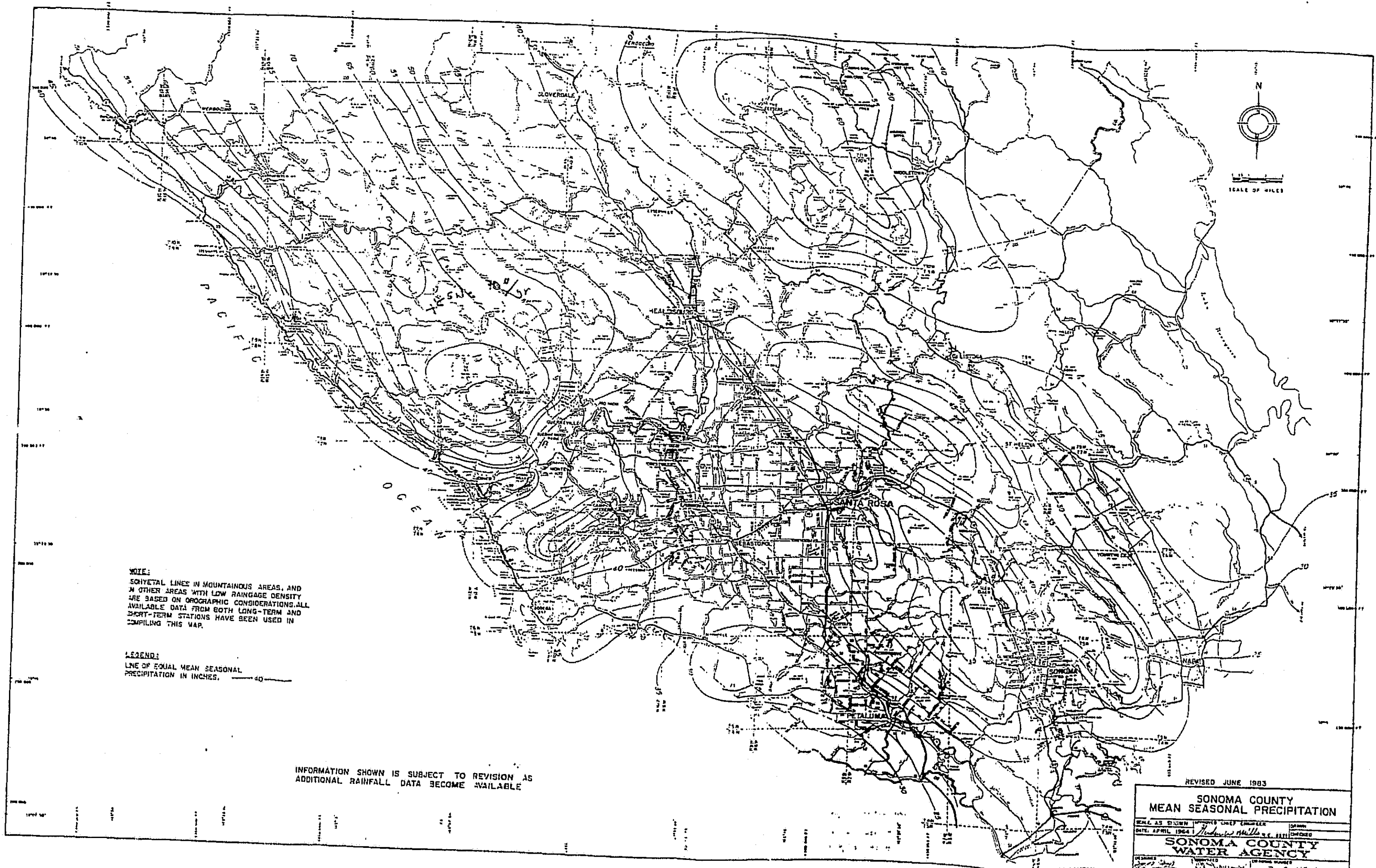
SONOMA COUNTY WATER AGENCY

PLATE No. B-1



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

RAINFALL  
INTENSITY vs. DURATION



**NOTE:**  
 ISOHYETAL LINES IN MOUNTAINOUS AREAS, AND  
 IN OTHER AREAS WITH LOW RAINGAGE DENSITY  
 ARE BASED ON OROGRAPHIC CONSIDERATIONS. ALL  
 AVAILABLE DATA FROM BOTH LONG-TERM AND  
 SHORT-TERM STATIONS HAVE BEEN USED IN  
 COMPILING THIS MAP.

**LEGEND:**  
 LINE OF EQUAL MEAN SEASONAL  
 PRECIPITATION IN INCHES.

INFORMATION SHOWN IS SUBJECT TO REVISION AS  
 ADDITIONAL RAINFALL DATA BECOME AVAILABLE

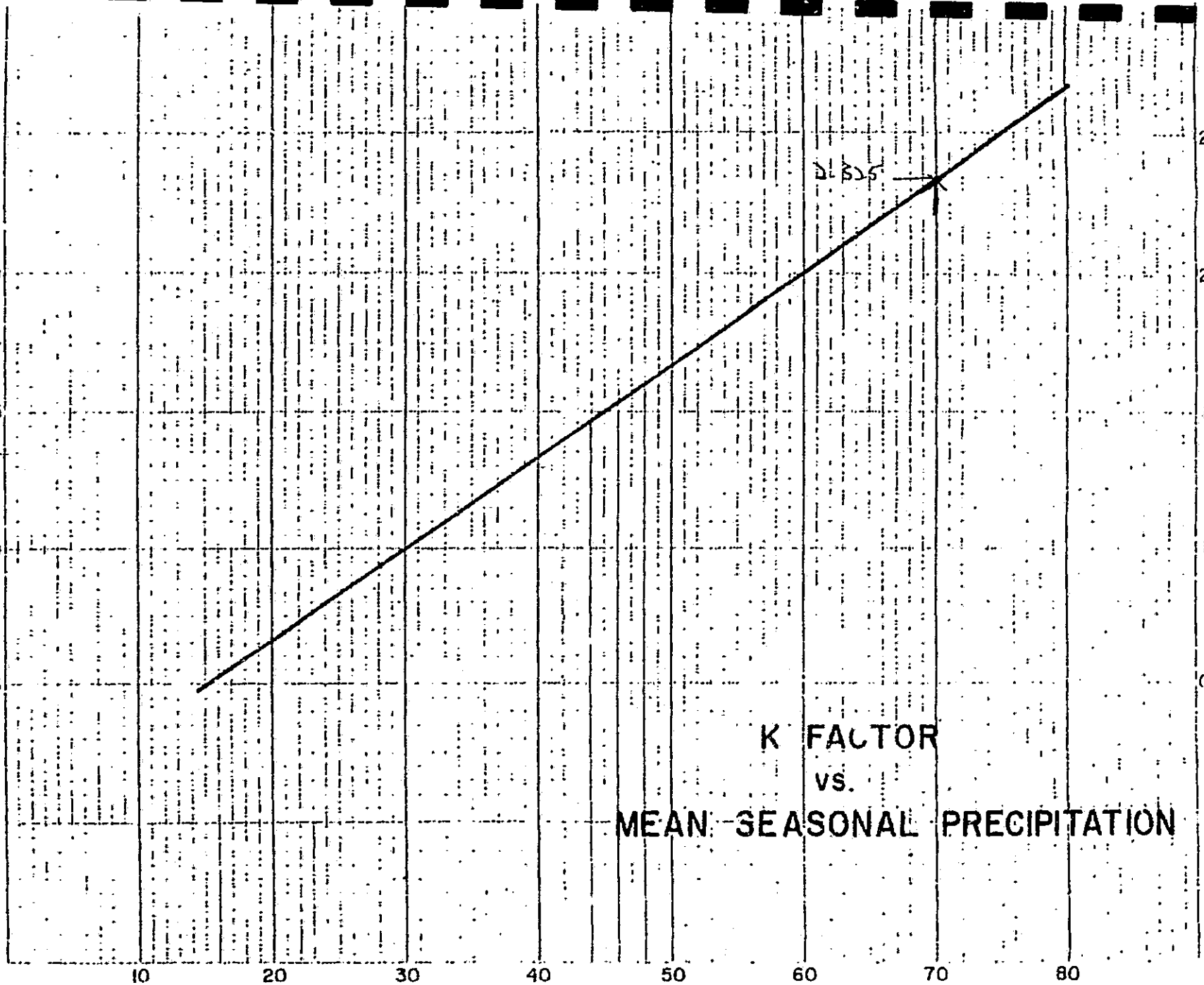
REVISED JUNE 1983

**SONOMA COUNTY  
 MEAN SEASONAL PRECIPITATION**

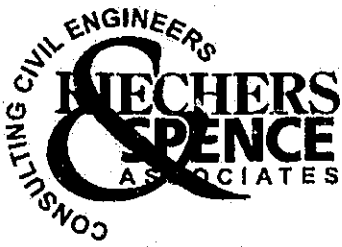
SCALE AS SHOWN  
 DATE: APRIL 1964  
**SONOMA COUNTY  
 WATER AGENCY**

K FACTOR

2.5  
2.0  
1.5  
1.0  
0.5



K FACTOR  
VS.  
MEAN SEASONAL PRECIPITATION



#2102083.0  
December 1, 2005

Alex Rosas  
Sonoma County  
2550 Ventura Avenue  
Santa Rosa, CA 95403

RE: Pahlmeyer Vineyards  
Revised As-Built Plans

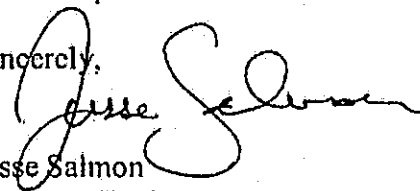
Dear Mr. Rosas:

As you requested, I have included the following pertaining the Pahlmeyer As-Built plans:

- Original redlined As-Built plans
- Three (3) sets of revised plans

Thank you for your constructive review comments. If you have any additional comments or concerns please let me know.

Sincerely,

  
Jesse Salmon  
Assistant Engineer

JS:av

Encl.

cc: Ed Hogan, Pahlmeyer Vineyards w/ 1 encl.

SCOTT -  
I RECEIVED THIS AS-BUILT  
PLANS, REVIEWED & APPROVED  
THEM. SEE ME IF YOU  
HAVE ANY QUESTIONS.

Alex 12/13/05

PERMIT #s:

B-154566  
G2004-0003



**COUNTY OF SONOMA**  
**PERMIT AND RESOURCE MANAGEMENT DEPARTMENT**

2550 Ventura Avenue, Santa Rosa, CA 95403-2829  
(707) 565-1900 FAX (707) 565-1103

November 28, 2005

Jesse Salmon  
Richers Spence & Associates, Inc.  
1541 Third St.  
Napa, CA 94559  
(707) 252-3301

- 1<sup>st</sup> Review Completed
- 2<sup>nd</sup> Review Completed
- 3<sup>rd</sup> Review Completed

Permit #: GRD04 – 0003 & B – 154566  
Subject: Review of As-Built Plans for Pahlmeyer Vineyards  
33250 King Ridge Road, Cazadero

Dear Mr. Salmon,

The subject plans have been reviewed for drainage compliance.

Please address the comments shown on the red-lined plans then return the following:

- Original red-lined As-Built plans dated 9/23/05.
- Three (3) sets of revised plans.

If you have any questions, please contact me by phone at (707) 565-3746 or by e-mail at [arosas2@sonoma-county.org](mailto:arosas2@sonoma-county.org).

Thank you,

  
Alex Rosas, P.E.  
Assistant Engineer

enc: red-lined As-Built plans



#2102083.0  
November 15, 2005

Kevin Doble  
Sonoma County PRMD  
2550 Ventura Avenue  
Santa Rosa, CA 95403-2829

RE: Pahlmeyer Vineyards  
Resubmitta: As Built B-154566

Dear Kevin:

In response to the Correction Notice dated July 24, 2002, the following items are being submitted for your review:

- Three (3) sets of As-Built Plans
- One (1) Geotechnical Report
- Copy of Sonoma County Correction Notice

Please review and notify me of any additional requirements that may be needed to finalize the project.

Sincerely,



Jesse Salmon  
Assistant Engineer

JS:av

Encl.

cc: Ed Hogan, Pahlmeyer Vineyards w/ encl.



# **PJC & Associates, Inc.**

*Consulting Engineers & Geologists*

November 7, 2005

Job No. 1878.01

Pahlmeyer Vineyards  
Attention: Jason Pahlmeyer  
P.O. Box 2910  
Napa, CA 94558

**Subject:** Final Report  
Observations and Testing Services  
During Site Grading of Undocumented Fill  
Pahlmeyer Vineyards  
33250 King Ridge Road  
Cazadero, California

**References:** Report titled, "Geotechnical Investigation, Additional Fill at Nayfarer Reservoir and Vineyard Roads, 33250 King Ridge Road, A.P. No. 109-260-014, Cazadero, California," prepared BACE Geotechnical, dated July 23, 2003.

Project Plans, Sheets C1 and C2, prepared by Riechers Spence Associates, Inc., dated March 10, 2005.

Dear Jason:

This final report presents the results of observation and testing services provided by PJC & Associates, Inc. (PJC) during site grading and earthwork for correction of the undocumented fill located at Pahlmeyer Vineyards, 33250 King Ridge Road in Cazadero, California. Our services were completed in accordance with our agreement for professional geotechnical engineering services. The field density and laboratory test results are presented in Tables 1, 2, 3 and 4, respectively.

## **1. PROJECT DESCRIPTION**

The project generally consisted of correcting the undocumented fill that was placed along the eastern perimeter of the existing pond embankment. The project also consisted of correcting undocumented fill that was placed on the downhill perimeter of an existing ranch road at an area designated Block D at the southern perimeter of the existing vineyard. The work consisted of subexcavating the fill material until stable bedrock was exposed. The excavated material was keyed into bedrock, moisture conditioned and compacted.

## 2. PREVIOUS WORK

BACE Geotechnical previously performed a geotechnical investigation for the project and presented the results in a written report dated July 23, 2003. That report along with the project grading and drainage plans by Riechers Spence Associates provided guidelines and specifications for our work on the project.

## 3. SCOPE OF WORK

The work described in this report was performed August 18, 2005 and September 8, 2005. The following scope of services was performed during the earthwork activities.

- a. Observe stripping of surface vegetation and complete removal of the undocumented fill.
- b. Observe subexcavation of keyways.
- c. Observe installation of subsurface subdrains in keyways.
- d. Observation and field density testing during placement and compaction of fill.
- e. Laboratory testing to determine the maximum dry density and optimum moisture content of the soils used as fill.
- f. Consultations during grading.
- g. Preparation of this summary report.

Field density test locations were selected on a basis of random sampling and included those areas considered to be initially below average. Field density tests were performed in accordance with ASTM Test Designation D2922-81 and D3017-78 (nuclear methods). The results of the field density tests are summarized in Tables 1, 2 and 3. The laboratory maximum dry density of the soils used for fill was determined in accordance to ASTM Test Designation 1557-91. The results of the laboratory tests are presented in Table 4.

## 4. CONSTRUCTION OBSERVATIONS SERVICES

- a. Northerly Reservoir Embankment. It was previously determined by BACE that the fill placed at the northerly perimeter of the existing reservoir did not meet the required compaction. The existing fill was completely removed and a keyway was constructed at the toe of the embankment. The keyway extended approximately four feet below existing adjacent grade and into firm soils or weathered bedrock. The fill

appeared to have been moderately compacted, but the surface soils had not been removed. Due to the lack of seepage, no subsurface drain was placed in the keyway. The keyway was filled with the excavated material in thin lifts, moisture conditioned as necessary, and compacted to at least 90 percent of the material's maximum dry density. As the fill continued upslope, the fill and weak soils were removed and recompactd until the processed material benched into the original embankment.

- b. Mid-Portion Road (Block D). The work commenced with stripping of surface vegetation. The existing fill was removed until bedrock was exposed. A keyway extending two to three feet into bedrock, as measured on the downhill side, was constructed. A subsurface subdrain was constructed at the rear of the keyway and daylighted with a solid pipe through the keyway. The keyway was filled with the on-site excavated material and compacted to at least 90 percent of the material's maximum dry density.
- c. Southerly-Portion Road (Block D). The work commenced with stripping of surface vegetation. The existing fill was completely removed until bedrock was exposed. A keyway extending three to four feet into bedrock, as measured on the downhill side, was constructed at the rear of the keyway and daylighted with a solid pipe through the keyway. The keyway was filled with the on-site excavated material and compacted to at least 90 percent of the material's maximum dry density. As the fill continued upslope, benches cut into bedrock were constructed and filled and compacted with the on-site material.

## 5. DISCUSSION

Based on the results of our field density testing, observation of the construction procedures, and our experience, we judge that the grading was constructed in accordance to the project geotechnical report, the approved plans, and sound geotechnical practice.

The presence of our field representative at the site was to provide a continuing source of professional advice, opinions and recommendations, based upon the field representative's observations of the contractor's work, and did not include any superintending, supervision or direction of the actual work of the contractor or the contractor's workers. No review was made of the adequacy of the contractor's safety measures on or near the site, since working conditions on any construction project are the sole responsibility of the contractor. We did not verify finish grades. That work was performed by the grading contractor.

We appreciate this opportunity to be of service. If you need any clarification of any of the information in this report, please do not hesitate to contact us.

Sincerely,

PJC & ASSOCIATES, INC.

*Patrick J. Conway*  
Patrick J. Conway  
Geotechnical Engineer  
GE 2303, California



PJC: mh

cc: Riechers Spence (2)







TABLE 4

SUMMARY OF LABORATORY COMPACTION TESTS

<u>Material No.</u>	<u>Description</u>	<u>Optimum Moisture Content* (%)</u>	<u>Maximum Dry Density* (pcf)</u>
1	Pale Yellowish Brown Clayey Sand (SC)	10.0	120.5
2	Pale Yellowish Brown Clayey Sand (SC)	10.0	123.5

\* Optimum moisture content and maximum dry density were determined in accordance with ASTM Test Method D1557-91.