

HYDROLOGY REPORT

FOR

JAKSICK HUFFAKER HILLS SITE

APH 22-050-05

Prepared by:

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April 1990

Hydrology Report

APN 22-050-05

Introduction

The subject property is a 13 acre parcel situated to the east and bordering Huffaker Hills Subdivision Units 6 and 7.

With the development of this subdivision, a storm drain system has been constructed which picks up flows coming from areas west of the subject property and routes them by means of (3) 30" diameter reinforced concrete pipes north through the subdivision to the Cochran Ditch which flows east along the northern boundary of Huffaker Hills Subdivision. Two cul-de-sacs (Berryhill Drive and Younghans Court) and the lots fronting them prevent flows from the west from entering the subject site (see figure 3).

Plans for the Huffaker Hills Unit 6 subdivision indicate that a 12" storm drain pipe is extended to the subject property from a 30" diameter storm drain line at the intersection of Autumn Hills Drive and Berryhill Drive. Instead, a 24" diameter pipe has been installed here. The presumed intent of this storm drain extension was to pick up storm flows from the subject site.

Any development of the subject 13 acre site would require extensive land filling to bring the ground level close to that of the adjoining subdivision. No definite plans have been developed for this site but in anticipation of future development, it is being prepared with the construction of engineered fill. Because there will be no surface improvements, the engineered fill has been treated in the hydrology report as an interim condition with no change in run-off characteristics.

Storm flows from a small (less than 50 acres) watershed presently enter the subject property from the east (see figure 2). These flows as well as site generated flows from the 5-year and 100-year storms are calculated in the following report.

A detention pond has been designed which effectively reduces the peak flow from the 5-year storm to an insignificant level and reduces the 100-year peak flow by approximately one third.

In addition to the pond, it is recommended that the ditch which transports flows from this site to the Cochran Ditch be cleaned. At present, little if any water can enter this ditch due to mud and debris which fill the end of the 30" diameter pipe.

Location

The site is located within the northwestern 1/4 of Section 5 T.18N., R.20E. in Reno, Nevada. The site is bordered on the north and east by Huffaker Hills and on the west by Huffaker Hills Subdivision Units 6 and 7. Access is by Autumn Hill Drive and Huffaker Lane East.

Site Description

The site is fairly flat with a 1% to 2% down slope to the northwest. An existing swale runs northward around the western edge of the property and empties into an existing 24" RCP storm drain on Autumn Hill Drive. The ground surface is bare dirt (fill).

Project Description

A detention pond is proposed to decrease peak storm flows and allow the storms to be routed through the existing storm drain system on Autumn Hill Drive.

Proposed Drainage System

A proposed detention pond will be located in the northwest corner of the site. The proposed pond will be fed by two drainage swales, one flowing in from the east and one flowing in from the south. The proposed pond will have a maximum depth of 3 feet. An 8" diameter CP outlet will direct the pond outflow to the existing drainage system on Autumn Hill Drive.

All calculations are based on the Rational Method and the POND2 computer program for detention basins.

Total Flows	Peak Inflow to Pond	Peak Outflow from Pond
5-year storm	18.1 cfs	2.3 cfs
100-year storm	48.6 cfs	33.0 cfs (estimated)

Conclusion

Outflow from the proposed pond for the peak 5-year storm can be routed through the existing storm drain system on Autumn Hill Drive. Outflow from the 100-year storm will overtop the pond and flow down Autumn Hill Drive. The 100-year flows should be contained entirely within the street.

Detention Pond Calculations

Rational Method

Drainage Area = 46.3 Ac.

Weighted C: 16.5 Ac @ C = 0.40 (low area)

29.8 Ac @ C = 0.55 (slopes)

$$C_w = [(16.5)(0.40) + (29.8)(0.55)]/46.3$$

$$C_w = C = 0.50$$

$$t_c = 300/(6 \text{ fps})60 + 1500'/(1 \text{ fps})60 = 25.8 \text{ min.}$$

$$i_5 = 0.78 \text{ in/hr} \quad i_{10} = 0.98 \text{ in/hr}$$

$$i_{100} = 2.1 \text{ in/hr}$$

$$Q_5 = C i_5 A = (0.50)(0.78 \text{ in/hr})(46.3 \text{ Ac}) = 18.1 \text{ cfs}$$

$$Q_{100} = C i_{100} A = (0.50)(2.1 \text{ in/hr})(46.3 \text{ Ac}) = 48.6 \text{ cfs}$$

$$Q_{10} = C i_{10} A = (0.50)(0.98 \text{ in/hr})(46.3 \text{ Ac}) = 22.7 \text{ cfs}$$

Drains into existing 24" RCP. S = 0.40% per plan. $Q_{full} = 15 \text{ cfs}$. Original design called for 12" RCP @ S = 0.40%, $Q_{full} = 2.2 \text{ cfs}$.

Route storm through proposed detention pond using POND2 program. Use 8" diameter CP for pond outlet.

APPENDIX

5/14

POND-2 Version: 4.10
S/N: 88021052

DETENTION POND 1
EAST HUFFAKER LANE, J# 1075.05
CODEGA & FRICKE, INC.
APRIL 13, 1990 KRK

CALCULATED 04-13-1990 13:38:04
DISK FILE : C:EHLPOND1.VOL

Planimeter scale: 1 inch = 40 ft.

Elevation (ft)	Planimeter (sq.in.)	Area (acres)	A1+A2+sq(A1*A2) (acres)	* Volume (acre-ft)	Volume Sum (acre-ft)
46.00	13.58	0.50	0.00	0.00	0.00
46.50	*I*	0.54	1.56	0.26	0.26
47.00	*I*	0.59	1.63	0.54	0.54
47.50	*I*	0.63	1.69	0.85	0.85
48.00	18.56	0.68	1.76	1.18	1.18
48.50	*I*	0.75	2.15	0.36	1.53
49.00	22.54	0.83	2.26	0.75	1.93

I ---> Interpolated area from closest two planimeter readings.

$$IA = (\text{sq.rt}(\text{Area1}) + ((Ei - E1) / (E2 - E1)) * (\text{sq.rt}(\text{Area2}) - \text{sq.rt}(\text{Area1})))^2$$

where: E1, E2 = Closest two elevations with planimeter data
 Ei = Elevation at which to interpolate area
 Area1, Area2 = Areas computed for E1, E2, respectively
 IA = Interpolated area for Ei

* Incremental volume computed by the Conic Method for Reservoir Volumes.

$$\text{Volume} = (1/3) * (EL2 - EL1) * (\text{Area1} + \text{Area2} + \text{sq.rt.}(\text{Area1} * \text{Area2}))$$

where: EL1, EL2 = Lower and upper elevations of the increment
 Area1, Area2 = Areas computed for EL1, EL2, respectively
 Volume = Incremental volume between EL1 and EL2

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PEAK 5-YR STORM

POND-2 Version: 4.10
S/N: 88021052

Page 1 of 3

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*****
*
* 5-YEAR STORM, 25 MINUTE DURATION, 8" DIA. OUTLET *
* EAST HUFFAKER LANE, J# 1075.05 *
* CODEGA & FRICKE, INC. *
* APRIL 13, 1990 KRK *
*
*****

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EXECUTED 04-13-1990 14:58:51
 Disk Files: C:EHL5-25 .PND ; C:EHLE5 .HYD

INITIAL CONDITIONS
 Elevation = 46.00 ft
 Outflow = 0.0 cfs

GIVEN POND DATA			COMPUTATIONS	
ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)	25/t (cfs)	25/t + Q (cfs)
46.00	0.0	0.00	0.0	0.0
46.50	1.1	0.26	75.5	76.6
47.00	1.4	0.54	156.9	158.2
47.50	1.8	0.85	246.9	248.8
48.00	2.2	1.18	342.8	345.0
48.50	2.5	1.53	444.5	447.0
49.00	2.7	1.93	560.7	563.4

Time increment (t) = 0.083 hrs.

7/14

Pond File: C:EHL5-25 .FND
 Inflow Hydrograph: C:EHLE5 .HYD
 Outflow Hydrograph: C:EHL5-25 .HYD

EXECUTED: 04-13-1990
 14:58:51

INFLOW HYDROGRAPH

ROUTING COMPUTATIONS

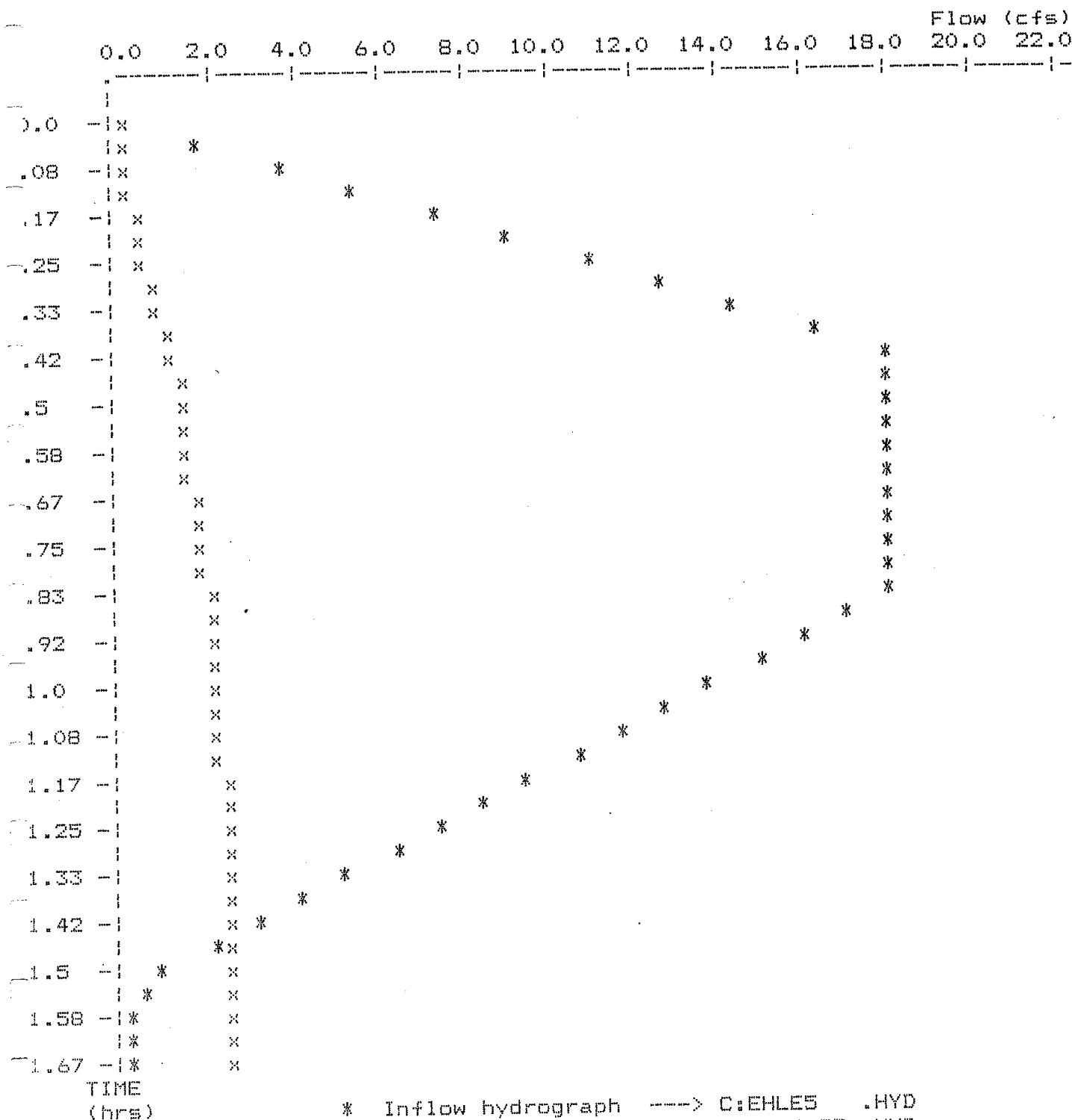
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - 0 (cfs)	2S/t + 0 (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
0.000	0.0	---	0.0	0.0	0.0	46.00
0.083	3.6	3.6	3.5	3.6	0.1	46.02
0.167	7.2	10.9	14.0	14.4	0.2	46.09
0.250	10.9	18.1	31.1	32.1	0.5	46.21
0.333	14.5	25.3	54.9	56.5	0.8	46.37
0.417	18.1	32.6	85.2	87.4	1.1	46.57
0.500	18.1	36.2	118.9	121.4	1.2	46.77
0.583	18.1	36.2	152.4	155.1	1.4	46.98
0.666	18.1	36.2	185.5	188.6	1.5	47.17
0.750	18.1	36.2	218.3	221.7	1.7	47.35
0.833	18.1	36.2	250.9	254.5	1.8	47.53
0.916	15.9	34.0	281.0	284.9	2.0	47.69
1.000	13.8	29.7	306.6	310.7	2.0	47.82
1.083	11.6	25.4	327.7	331.9	2.1	47.93
1.166	9.4	21.0	344.4	348.7	2.2	48.02
1.250	7.3	16.7	356.6	361.1	2.2	48.08
1.333	5.1	12.4	364.5	369.0	2.2	48.12
1.416	2.9	8.0	368.0	372.5	2.3	48.13
1.499	0.8	3.7	367.2	371.7	2.2	48.13
1.583	0.0	0.8	363.5	367.9	2.2	48.11
1.666	0.0	0.0	359.0	363.5	2.2	48.09

Peak Inflow = 18.1 cfs
 Peak Outflow = 2.3 cfs
 Peak Elevation = 48.13 ft

Pond File: C:EHL5-25 .PND
 Inflow Hydrograph: C:EHLES .HYD
 Outflow Hydrograph: C:EHL5-25 .HYD

EXECUTED: 04-13-1990
 14:58:51

Peak Inflow = 18.1 cfs
 Peak Outflow = 2.3 cfs
 Peak Elevation = 48.13 ft



* Inflow hydrograph ---> C:EHLES .HYD

9/14

POND-2 Version: 4.10
S/N: 88021052

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*****
*
* 5-YEAR STORM, 40 MINUTE DURATION, 8" DIA. OUTLET *
*      EAST HUFFAKER LANE, J# 1075.05             *
*      CODEGA & FRICKE, INC.                     *
*      APRIL 13, 1990      KRK                   *
*
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EXECUTED 04-13-1990 14:44:30
 Disk Files: C:EHL5-25 .PND ; C:EHL5-40 .HYD

INITIAL CONDITIONS
 Elevation = 46.00 ft
 Outflow = 0.0 cfs

GIVEN POND DATA			COMPUTATIONS	
ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)	2S/t (cfs)	2S/t + 0 (cfs)
46.00	0.0	0.00	0.0	0.0
46.50	1.1	0.26	75.5	76.6
47.00	1.4	0.54	156.9	158.2
47.50	1.8	0.85	246.9	248.8
48.00	2.2	1.18	342.8	345.0
48.50	2.5	1.53	444.5	447.0
49.00	2.7	1.93	560.7	563.4

Time increment (t) = 0.083 hrs.

10/14

Pond File: C:EHL5-25 .PND
Inflow Hydrograph: C:EHL5-40 .HYD
Outflow Hydrograph: C:EHL5-25 .HYD

EXECUTED: 04-13-1990
14:44:30

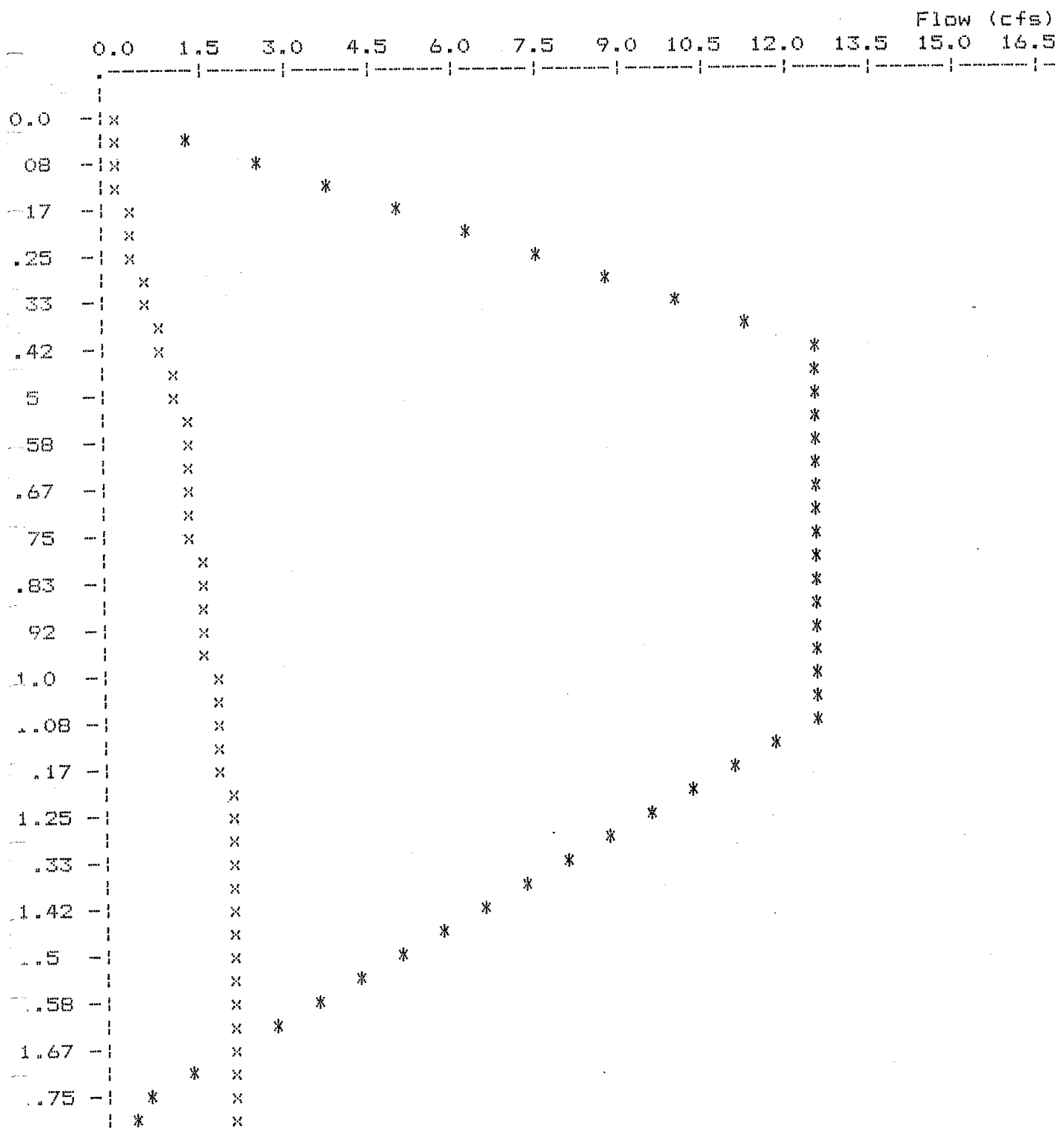
INFLOW HYDROGRAPH

ROUTING COMPUTATIONS

TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - 0 (cfs)	2S/t + 0 (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
0.000	0.0	-----	0.0	0.0	0.0	46.00
0.083	2.5	2.5	2.4	2.5	0.0	46.02
0.167	5.0	7.5	9.6	9.9	0.1	46.06
0.250	7.5	12.5	21.5	22.1	0.3	46.14
0.333	10.0	17.5	37.9	39.0	0.6	46.25
0.417	12.5	22.5	58.7	60.4	0.9	46.39
0.500	12.5	25.0	81.4	83.7	1.1	46.54
0.583	12.5	25.0	104.0	106.4	1.2	46.68
0.666	12.5	25.0	126.5	129.0	1.3	46.82
0.750	12.5	25.0	148.8	151.5	1.3	46.96
0.833	12.5	25.0	170.9	173.8	1.4	47.09
0.916	12.5	25.0	192.8	195.9	1.6	47.21
1.000	12.5	25.0	214.4	217.8	1.7	47.33
1.083	12.5	25.0	235.9	239.4	1.8	47.45
1.166	11.0	23.5	255.7	259.4	1.9	47.56
1.250	9.5	20.5	272.3	276.2	1.9	47.64
1.333	8.0	17.5	285.9	289.9	2.0	47.71
1.416	6.5	14.5	296.4	300.4	2.0	47.77
1.499	5.0	11.5	303.9	307.9	2.0	47.81
1.583	3.5	8.5	308.3	312.4	2.1	47.83
1.666	2.0	5.5	309.7	313.9	2.1	47.84
1.749	0.5	2.5	308.2	312.3	2.1	47.83
1.833	0.0	0.5	304.6	308.7	2.0	47.81

Peak Inflow = 12.5 cfs
Peak Outflow = 2.1 cfs
Peak Elevation = 47.84 ft

11/14



TIME
(hrs)

* Inflow hydrograph ----> C:EHL5-40 .HYD
 x Outflow hydrograph ----> C:EHL5-25 .HYD

12/14

POND-2 Version: 4.10
S/N: 88021052

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*****
*
* 100-YEAR STORM, 25 MINUTE DURATION, 8" DIA OUTLET *
* EAST HUFFAKER LANE, J# 1075.05 *
* CODEGA & FRICKE, INC. *
* APRIL 13, 1990 KRK *
*
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EXECUTED 04-13-1990 15:13:39
 Disk Files: C:EHL5-25 .PND ; C:EHL-100 .HYD

INITIAL CONDITIONS
 Elevation = 46.00 ft
 Outflow = 0.0 cfs

GIVEN POND DATA			COMPUTATIONS	
ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)	2S/t (cfs)	2S/t + 0 (cfs)
46.00	0.0	0.00	0.0	0.0
46.50	1.1	0.26	75.5	76.6
47.00	1.4	0.54	156.9	158.2
47.50	1.8	0.85	246.9	248.8
48.00	2.2	1.18	342.8	345.0
48.50	2.5	1.53	444.5	447.0
49.00	2.7	1.93	560.7	563.4

Time increment (t) = 0.083 hrs.

13/14

Pond File: C:EHL5-25 .PND EXECUTED: 04-13-1990
 Inflow Hydrograph: C:EHL-100 .HYD 15:13:39
 Outflow Hydrograph: C:EHL5-25 .HYD

INFLOW HYDROGRAPH

ROUTING COMPUTATIONS

TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - 0 (cfs)	2S/t + 0 (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
0.000	0.0	-----	0.0	0.0	0.0	46.00
0.083	9.7	9.7	9.4	9.7	0.1	46.06
0.167	19.4	29.2	37.5	38.6	0.6	46.25
0.250	29.2	48.6	83.8	86.1	1.1	46.56
0.333	38.9	68.0	149.2	151.9	1.3	46.96
0.417	48.6	87.5	233.1	236.7	1.8	47.43
0.500	48.6	97.2	326.1	330.3	2.1	47.92
0.583	48.6	97.2	418.5	423.3	2.4	48.38
0.666	48.6	97.2	510.4	515.7	2.6	48.80
0.750	48.6	97.2	602.2	607.6	2.7	49.00
0.833	48.6	97.2	693.9	699.4	2.7	49.00
0.916	42.8	91.4	779.8	785.3	2.7	49.00
1.000	37.0	79.7	854.0	859.5	2.7	49.00
1.083	31.1	68.1	916.7	922.1	2.7	49.00
1.166	25.3	56.5	967.6	973.1	2.7	49.00
1.250	19.5	44.8	1007.0	1012.5	2.7	49.00
1.333	13.7	33.2	1034.7	1040.2	2.7	49.00
1.416	7.9	21.5	1050.7	1056.2	2.7	49.00
1.499	2.0	9.9	1055.2	1060.6	2.7	49.00
1.583	0.0	2.0	1051.7	1057.2	2.7	49.00
1.666	0.0	0.0	1046.2	1051.7	2.7	49.00

Peak Inflow = 48.6 cfs
 Peak Outflow = 2.7 cfs
 Peak Elevation = 49.00 ft

>>>>> Warning, pond overtopped during routing. <<<<<<
 The calculated peak outflow/elevation is invalid.

>>>>> Warning, peak outflow = last ordinate point. <<<<<<

14/14

100-YR STORM

POND-2 Version: S/N:

>>>> OUTFLOW HYDROGRAPH ESTIMATOR <<<<

04-13-1990 15:29:15
Inflow Hydrograph: C:EHL-100 .HYD Qpeak = 48.6 cfs
Estimated Outflow: C:ESTIMATE.EST Qpeak = 33.0 cfs

Approximate Storage Volume
(computed from t= 0.00 to 1.06 hrs)

1.8 acre-ft

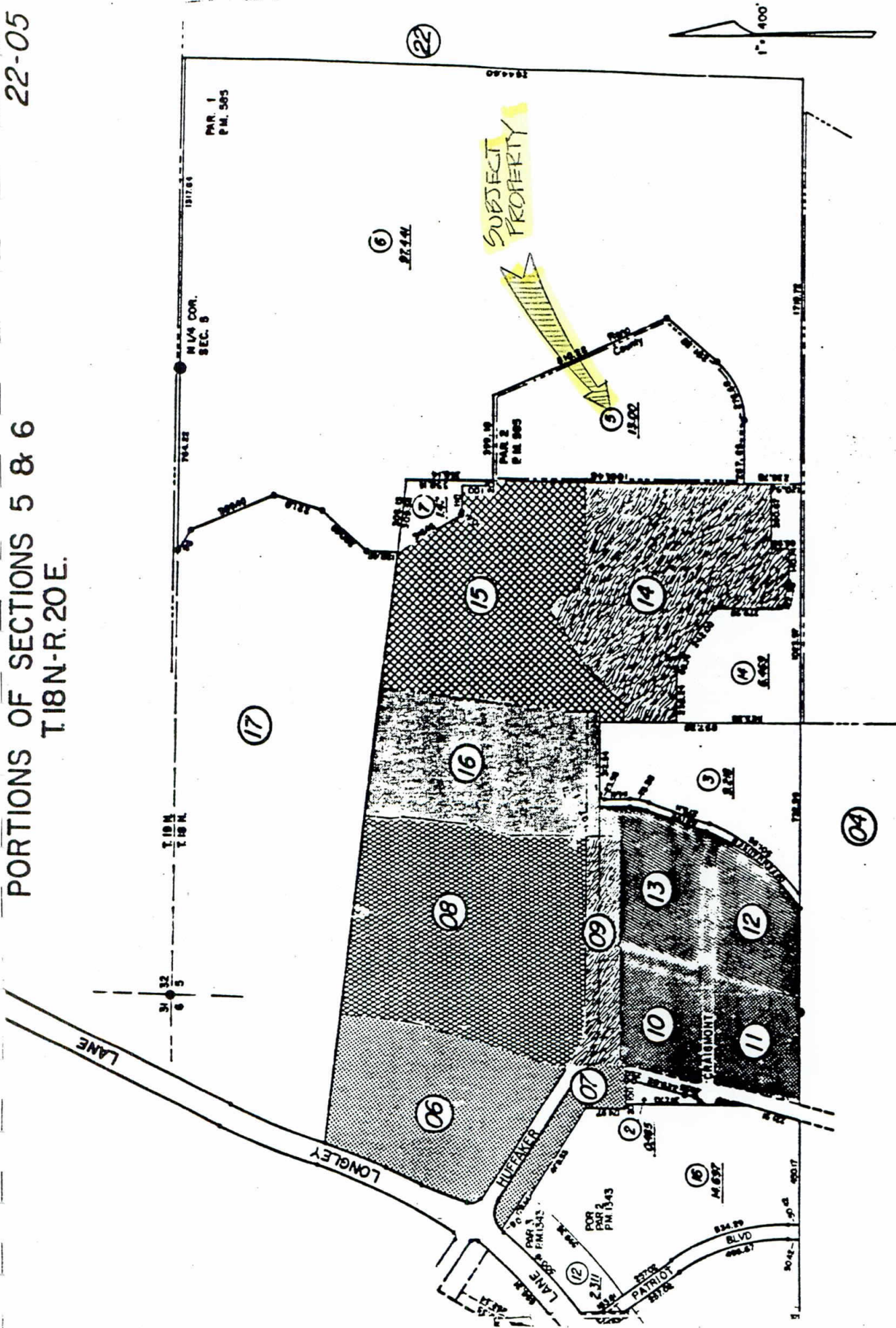
33.0 cfs = estimated peak outflow for 100-yr storm

Pond is overtopped and runoff flows down
Autumn Hill Drive.

FIGURES

PORTIONS OF SECTIONS 5 & 6
T.18N-R.20E.

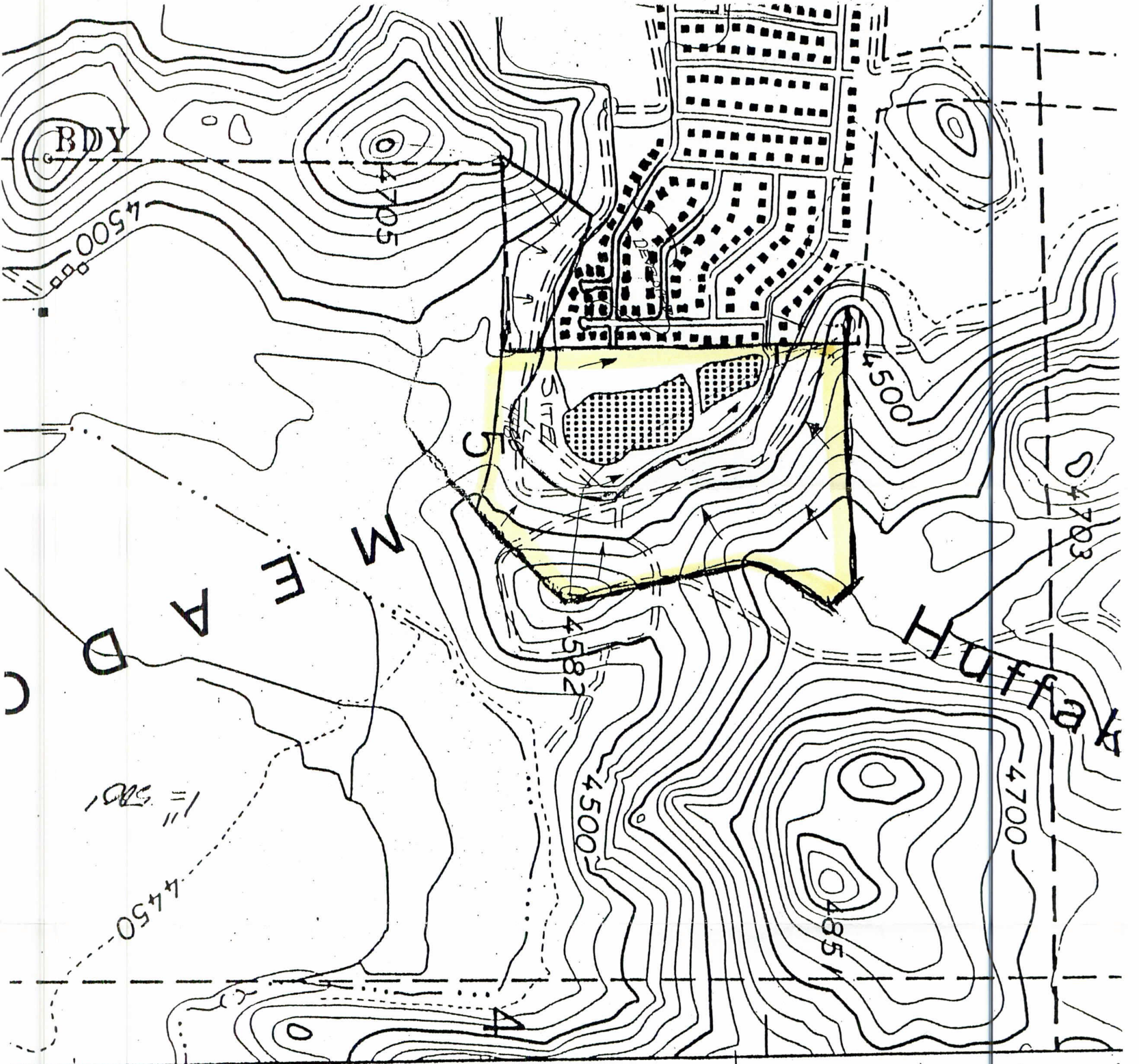
FIG. 1 LOCATION



drawn by MARY CRAIG 10/79
 revised 1/85 & 05 4/98 & 99
 superseded

Assessor's Map County of Washoe, Nevada
 NOTE - ASSESSOR'S BLOCK NUMBERS SHOWN IN ELLIPSES
 ASSESSOR'S PARCEL NUMBERS SHOWN IN CIRCLES

is provided for the use of the Washoe County
 in and illustrative purposes only. It does
 not constitute a warranty. No liability is assumed as
 to the accuracy of the data derived hereon.



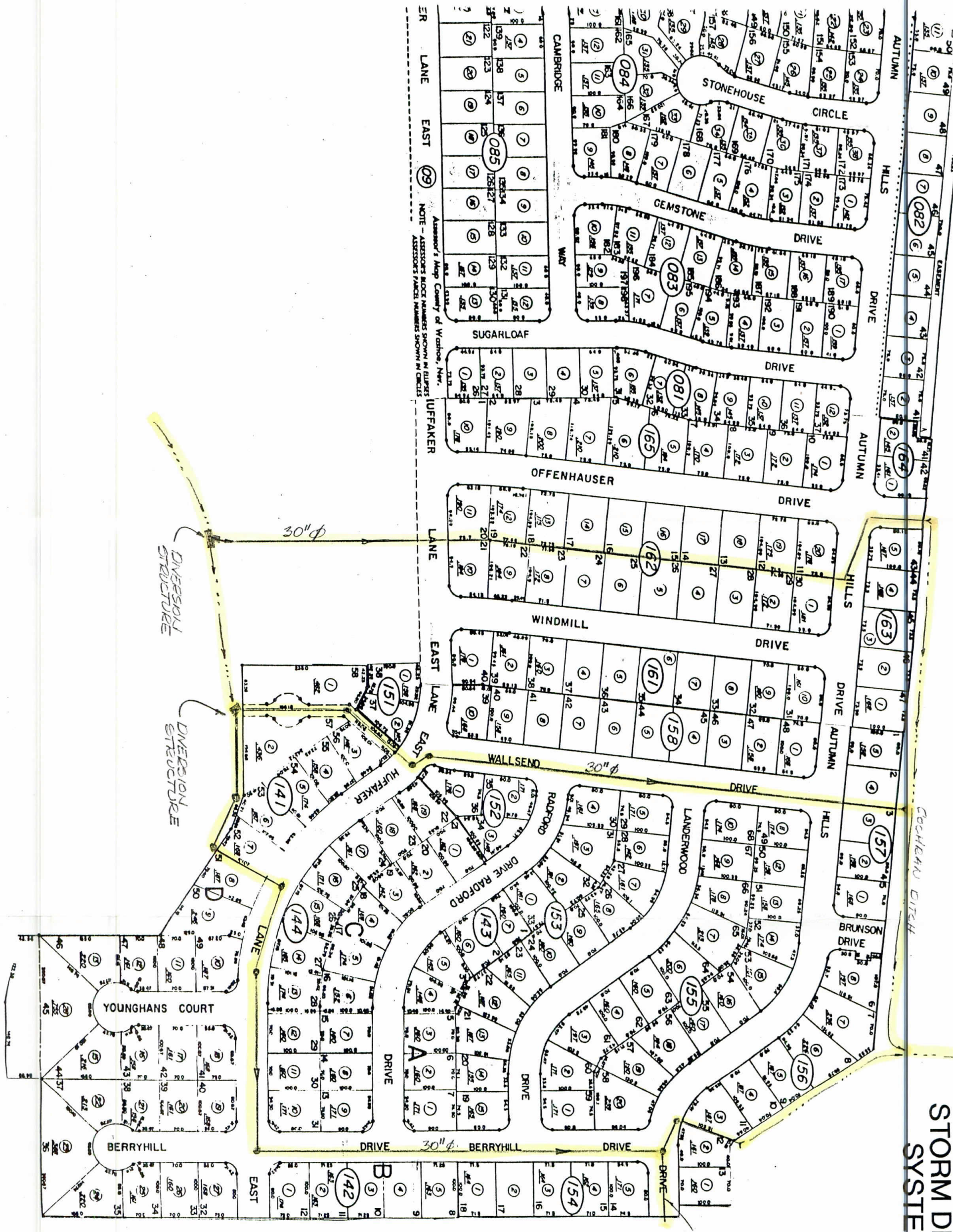
T. 19 N. 4
T. 18 N.

FIG. 2
DRAINAGE AREA

27'30"
4371

4370

FIG. 3
EXISTING
STORM DRAIN
SYSTEM



Assessor's Map County of Windsor, N.Y.
 NOTE - ASSessor's LOT NUMBERS SHOWN IN SQUARES
 ASSessor's PARCEL NUMBERS SHOWN IN CIRCLES

24" STUB

DIVERSION STRUCTURE
 DIVERSION STRUCTURE

CASHMAN DITCH

