

PROFESSIONAL
ENGINEERING
CONSULTANTS
PROFESSIONAL ASSOCIATION



**DRAINAGE PLAN
AND
SUPPORTING CALCULATIONS**

**FOR
CAMBRIDGE ESTATES
AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS**

**PREPARED BY
PROFESSIONAL ENGINEERING CONSULTANTS, P.A.
ENGINEERS
WICHITA, KANSAS**

JULY 14, 1989

DIRECTORS

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D. I. NORTON, P.E.
B. E. REMSBERG, P.E.

February 22, 1990

Mr. Michael E. Lindebak, P.E.
City Engineer
City Hall - 7th Floor
455 N. Main
Wichita, KS 67202

Attention: Ms. Vicky Huang, P.E.

Reference: Cambridge Estates
Storm Water Drain No. 83
C.O.W. Project No. 468-76-245-81995-000-000-001
PEC File No. 32-89339-1-042

Dear Ms. Huang:

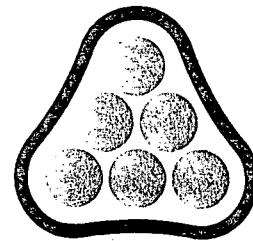
On January 24, 1990, Gary Wiley and I met with a few of the homeowners in the Miles Hidden Lakes Estates in regard to the referenced project. Because some of the existing homes in the Hidden Lakes subdivision are located fairly close to existing lakes and are subject to flooding (see FEMA map attached), the residents are generally concerned about any development in the Calfskin Creek Basin and are specifically concerned with the future runoff from Cambridge Estates.

According to the residents, flooding within Miles Hidden Lakes Estates has occurred by the following means:

- CASE A. Backwater from Calfskin Creek (Drainage Area = 10,800 acres, $Q_{100} = 7,490$ cfs, from Flood Insurance Study).
- CASE B. Flooding from the unnamed tributary which flows through Cambridge Estates (Drainage Area = 201 acres, $Q_{100} = 368$ cfs under current conditions).

In the following, we offer our comments regarding each of these scenarios:

- CASE A. In our Drainage Plan report for Cambridge Estates dated July 14, 1989, we have shown that the development is proposing two (2) detention-retention ponds and that the proposed 100-year peak runoff rate from Cambridge Estates will be approximately 405 cfs. This is less than the calculated existing runoff Rate of 368 cfs through the Cambridge area plus approximately 72 cfs of overland flow which occurs east of Miles Hidden Lakes Estates. (The combined hydrographs indicate a total existing runoff rate of 439 cfs from the Cambridge Estates area.) Since the proposed peak runoff rate from Cambridge



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Estates is less than the existing peak runoff rate, it is our opinion that the development of Cambridge Estates and construction of the detention ponds will not affect the peak runoff rate or the flood elevation of Calfskin Creek.

CASE B. To reiterate, in our drainage plan of July 14, 1989, we have shown the proposed peak Q_{100} from Cambridge Estates to be 405 cfs. This is a result of combining the Q_{100} from the large detention pond (371 cfs) plus the Q_{100} from the smaller detention pond (34 cfs). The 34 cfs is a result of diverting drainage from the area which is located east of Miles Hidden Lakes Estates through the smaller detention pond and the 36" outlet pipe discharging into Lake Marlene. We felt this diversion was necessary due to the existing trees located in the only drainage easement along the east side of Miles Hidden Lakes. This routing does, however, add approximately 34 cfs to the flow going into Lake Marlene and Lake Cathy in Miles Hidden Lakes Estates.

The residents of Miles Hidden Lakes Estates have rightfully expressed their concerns regarding this additional flow. They have requested that flooding in their area not be worsened by development of Cambridge Estates. In this regard, we offer the following possibilities:

1. Obtain additional easements along east line of Miles Hidden Lakes Estates and/or remove trees in existing drainage easement. Revise outlet piping out of the smaller detention pond to discharge near the northeast corner of Lot 9, Block 1, Miles Hidden Lakes Estates and allow it to flow south along the east line of Hidden Lakes.
2. Lower the proposed static pool elevation of the larger detention pond in Cambridge Estates by 1'. This would provide additional flood storage and reduce the peak Q_{100} out of the pond by 32 cfs. The combined 100-year flow would then be 373 cfs (see attached new HEC-1 calculations). This compares to the 368 cfs we calculated for the existing 100-year runoff.
3. Leave Cambridge Estates drainage system as is and reconstruct downstream weirs on Lake Marlene and Lake Cathy to facilitate the additional 34 cfs.
4. Allow the proposed drainage facilities in Cambridge Estates to remain as designed.

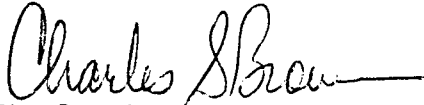
Mr. Michael Lindebak, P.E.
February 22, 1990
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In our opinion, Item 2 above should be the least expensive alternate, be the easiest to implement and still satisfy the concerns of the homeowners.

If you have any questions, please advise.

Very truly yours,

PROFESSIONAL ENGINEERING CONSULTANTS, P.A.



Charles S. Brown, P.E.
Manager
Land Development Division

cc: Mr. and Mrs. David Lane, 601 Hidden Valley
Mr. and Mrs. Doug Myers, 646 Hidden Valley
Steve Lackey, P.E.

CSB/cas


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*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
*   FEBRUARY 1981                 *
*   REVISED 02 AUG 86            *
*
* RUN DATE 02/15/1990 TIME 10:32:08 *
*
*****

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*****
*
* U.S. ARMY CORPS OF ENGINEERS *
* THE HYDROLOGIC ENGINEERING CENTER *
*   609 SECOND STREET          *
*   DAVIS, CALIFORNIA 95616    *
*   (916) 551-1748            *
*
*****

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X   X XXXXXXXX XXXXX      X
X   X X      X   X      XX
X   X X      X           X
XXXXXXX XXXX  X           XXXXX X
X   X X      X           X
X   X X      X   X      X
X   X XXXXXXXX XXXXX      XXX

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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1BS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
 THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
 NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
 DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
 KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

1 ID CAMBRIDGE ESTATES DRAINAGE PLAN
 2 ID PROJECT NO 36-67428-2-2208
 3 ID 100 YEAR PROPOSED CONDITIONS
 4 ID REVISED ANALYSIS-LOWER STATIC POOL TO ELEV. 133.0
 5 ID STAGE-STORAGE ANALYSIS - POND NOS. 1 & 2
 6 ID PROFESSIONAL ENGINEERING CONSULTANTS, P.A.
 7 ID COMPUTED BY M. W. BERRY, P.E. 2/15/90
 8 ID FILENAME = "A:CAMBRDGR.DOC" DISKNAME: MWB04

*** LIST ***
 *** FREE ***

*DIAGRAM

9 IT 10 11JUL89 600 0 11JUL89 1800
 10 IO 0 0 0 0

11 KK INTO1INFLOW HYDROGRAPH TO POND NO. 1
 12 KO 0 2
 13 BA 0.3044 0 0
 14 IN 12 11JUL89 600
 15 QI 0 38 95 260 450 558 565 522 430 320
 16 QI 200 150 125 107 97 82 72 67 62 57
 17 QI 54 50 48 46 43 41 38 36 34 32
 18 QI 29 27 24 21 19 17 14 12 9 7
 19 QI 5 2 0 0 0 0 0 0 0 0
 20 QI 0 0 0 0 0 0 0 0 0 0
 21 QI 0 0 0 0 0 0 0 0 0 0

22 KK POND1STAGE-STORAGE THROUGH POND 1
 23 KO 0 2
 24 RS 1 ELEV 133 0
 25 SQ 0.0 0.0 0.0 0.0 10.0 34.0 90.0 152.0 196.0 389.0
 26 SQ 720.0
 27 SE 133. 134. 135. 136. 137.0 138.0 139.0 140.0 141.0 142.0
 28 SE 143.0
 29 SA 3.29 3.49 3.67 4.02 4.19 4.37 4.54 4.72 4.90 5.10
 30 SA 5.30
 31 SE 133.0 134.0 135.0 136.0 137.0 138.0 139.0 140.0 141.0 142.0
 32 SE 143.0

33 KK INTO2INFLOW INTO POND NO. 2
 34 KO 0 2
 35 BA 0.0614
 36 IN 10 11JUL89 600
 37 QI 16 80 160 192 176 128 80 49 38 31
 38 QI 27 24 22 20 18 17 16 15 14 12
 39 QI 11 10 8 7 6 5 4 3 2 0
 40 QI 0 0 0 0 0 0 0 0 0 0

41 KK POND2STAGE-STORAGE THROUGH POND NO. 2 - 36" RCP
 42 KO 0 2
 43 RS 1 ELEV 135.0 0
 44 SA 3.04 3.88
 45 SE 135 140.5
 46 SQ 0 5 18 32 50
 47 SE 135 136 137 138 139

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

48	KK	COMBINE OUTFLOW HYDROGRAPHS FROM POND NOS. 1 & 2	
49	KD	0	2
50	HC	2	0
51	ZZ		

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT

LINE

(V) ROUTING

(---) DIVERSION OR PUMP FLOW

NO.

(.) CONNECTOR

((---)) RETURN OF DIVERTED OR PUMPED FLOW

```

11  INT01
    V
    V
22  POND1
    .
    .
33  .    INT02
    .    V
    .    V
41  .    POND2
    .    .
    .    .
48  COMBO.....
    
```

(**) RUNOFF ALSO COMPUTED AT THIS LOCATION

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*****
*
* FLOOD HYDROGRAPH PACKAGE (HED-1)
* FEBRUARY 1981
* REVISED 02 AUG 88
*
* RUN DATE 02/15/1990 TIME 10:32:00
*
*****
```

```
*****
*
* U.S. ARMY CORPS OF ENGINEERS
* THE HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 551-1748
*
*****
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CAMBRIDGE ESTATES DRAINAGE PLAN
PROJECT NO 36-67428-2-2208
100 YEAR PROPOSED CONDITIONS
REVISED ANALYSIS-LOWER STATIC POOL TO ELEV. 133.0
STAGE-STORAGE ANALYSIS - POND NOS. 1 & 2
PROFESSIONAL ENGINEERING CONSULTANTS, P.A.
COMPUTED BY M. W. BERRY, P.E. 2/15/90
FILENAME = "A:CAMBRDGR.DDC" DISKNAME: MW604
```

```
10 IO OUTPUT CONTROL VARIABLES
      IPRNT      0 PRINT CONTROL
      IPLOT      0 PLOT CONTROL
      QSCAL      0. HYDROGRAPH PLOT SCALE
```

```
IT HYDROGRAPH TIME DATA
      NMIN      10 MINUTES IN COMPUTATION INTERVAL
      IDATE     11JUL89 STARTING DATE
      ITIME     0600 STARTING TIME
      ND        73 NUMBER OF HYDROGRAPH ORDINATES
      NDDATE    11JUL89 ENDING DATE
      NDTIME    1800 ENDING TIME
      ICENT     19 CENTURY MARK
```

```
COMPUTATION INTERVAL .17 HOURS
TOTAL TIME BASE 12.00 HOURS
```

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ENGLISH UNITS
DRAINAGE AREA SQUARE MILES
PRECIPITATION DEPTH INCHES
LENGTH, ELEVATION FEET
FLOW CUBIC FEET PER SECOND
STORAGE VOLUME ACRE-FEET
SURFACE AREA ACRES
TEMPERATURE DEGREES FAHRENHEIT
```

*** **

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*****
*
11 KK * INTO1 * INFLOW HYDROGRAPH TO POND NO. 1
*
*****
```

```
12 AD OUTPUT CONTROL VARIABLES
      IPRNT      0 PRINT CONTROL
      IPLOT      2 PLOT CONTROL
      QSCAL      0. HYDROGRAPH PLOT SCALE
```

JXTIN 12 TIME INTERVAL IN MINUTES
 JXDATE 11JUL89 STARTING DATE
 JXTIME 600 STARTING TIME

SUBBASIN RUNOFF DATA

13 EA SUBBASIN CHARACTERISTICS
 TAREA .30 SUBBASIN AREA

HYDROGRAPH AT STATION INTJ1

DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*
11	JUL	0600	1	0.	*	11	JUL	0910	20	74.	*	11	JUL	1220	39	25.	*
11	JUL	0610	2	32.	*	11	JUL	0920	21	69.	*	11	JUL	1230	40	23.	*
11	JUL	0620	3	76.	*	11	JUL	0930	22	65.	*	11	JUL	1240	41	20.	*
11	JUL	0630	4	178.	*	11	JUL	0940	23	60.	*	11	JUL	1250	42	19.	*
11	JUL	0640	5	323.	*	11	JUL	0950	24	57.	*	11	JUL	1300	43	17.	*
11	JUL	0650	6	468.	*	11	JUL	1000	25	54.	*	11	JUL	1310	44	15.	*
11	JUL	0700	7	556.	*	11	JUL	1010	26	51.	*	11	JUL	1320	45	13.	*
11	JUL	0710	8	564.	*	11	JUL	1020	27	49.	*	11	JUL	1330	46	11.	*
11	JUL	0720	9	536.	*	11	JUL	1030	28	47.	*	11	JUL	1340	47	8.	*
11	JUL	0730	10	478.	*	11	JUL	1040	29	45.	*	11	JUL	1350	48	7.	*
11	JUL	0740	11	393.	*	11	JUL	1050	30	43.	*	11	JUL	1400	49	5.	*
11	JUL	0750	12	300.	*	11	JUL	1100	31	41.	*	11	JUL	1410	50	3.	*
11	JUL	0800	13	200.	*	11	JUL	1110	32	39.	*	11	JUL	1420	51	1.	*
11	JUL	0810	14	158.	*	11	JUL	1120	33	37.	*	11	JUL	1430	52	0.	*
11	JUL	0820	15	133.	*	11	JUL	1130	34	35.	*	11	JUL	1440	53	0.	*
11	JUL	0830	16	116.	*	11	JUL	1140	35	33.	*	11	JUL	1450	54	0.	*
11	JUL	0840	17	104.	*	11	JUL	1150	36	32.	*	11	JUL	1500	55	0.	*
11	JUL	0850	18	95.	*	11	JUL	1200	37	29.	*	11	JUL	1510	56	0.	*
11	JUL	0900	19	82.	*	11	JUL	1210	38	27.	*	11	JUL	1520	57	0.	*

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	12.00-HR
564.	1.17	(CFS) 157.	81.	81.	81.
		(INCHES) 4.791	4.955	4.955	4.955
		(AC-FT) 78.	80.	80.	80.

CUMULATIVE AREA = .30 SQ MI

*** ** ** ** **

22 KK * POND1 * STAGE-STORAGE THROUGH POND 1
 * *

23 KO OUTPUT CONTROL VARIAELES
 IPRNT 0 PRINT CONTROL
 IFLPT 2 PLOT CONTROL
 QSCAL 0. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

24 RS STORAGE ROUTING
 NSTPS 1 NUMBER OF SUBREACHES
 ITYP ELEV TYPE OF INITIAL CONDITION
 RSVRIC 133.00 INITIAL CONDITION
 X .00 WORKING R AND D COEFFICIENT

29 SA AREA 3.3 3.5 3.7 4.0 4.2 4.4 4.5 4.7 4.9 5.1
 5.3

31 SE ELEVATION 133.00 134.00 135.00 136.00 137.00 138.00 139.00 140.00 141.00 142.00
 143.00

25 SQ DISCHARGE 0. 0. 0. 0. 10. 34. 90. 152. 196. 339.
 720.

27 SE ELEVATION 133.00 134.00 135.00 136.00 137.00 138.00 139.00 140.00 141.00 142.00
 143.00

COMPUTED STORAGE-ELEVATION DATA

STORAGE	.00	3.39	6.97	10.61	14.92	19.20	23.65	28.28	33.09	38.09
ELEVATION	133.00	134.00	135.00	136.00	137.00	138.00	139.00	140.00	141.00	142.00
STORAGE	43.29									
ELEVATION	143.00									

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	.00	3.39	6.97	10.61	14.92	19.20	23.65	28.28	33.09	38.09
OUTFLOW	.00	.00	.00	.00	10.00	34.00	90.00	152.00	196.00	339.00
ELEVATION	133.00	134.00	135.00	136.00	137.00	138.00	139.00	140.00	141.00	142.00
STORAGE	43.29									
OUTFLOW	720.00									
ELEVATION	143.00									

HYDROGRAPH AT STATION POND1

11 JUL 0600	1	0.	1.0	133.0	*	11 JUL 1010	25	89.	23.6	139.0	*	11 JUL 1420	51	21.	16.8	137.5
11 JUL 0610	2	0.	1.2	133.1	*	11 JUL 1020	27	83.	23.1	138.9	*	11 JUL 1430	52	19.	16.6	137.4
11 JUL 0620	3	0.	1.0	133.3	*	11 JUL 1030	28	77.	22.6	138.8	*	11 JUL 1440	53	18.	16.3	137.3
11 JUL 0630	4	0.	2.7	133.8	*	11 JUL 1040	29	72.	22.2	138.7	*	11 JUL 1450	54	17.	16.1	137.3
11 JUL 0640	5	0.	6.2	134.8	*	11 JUL 1050	30	68.	21.9	138.6	*	11 JUL 1500	55	15.	15.9	137.2
11 JUL 0650	6	2.	11.6	136.2	*	11 JUL 1100	31	64.	21.6	138.5	*	11 JUL 1510	56	14.	15.7	137.2
11 JUL 0700	7	30.	18.4	137.8	*	11 JUL 1110	32	60.	21.3	138.5	*	11 JUL 1520	57	13.	15.5	137.1
11 JUL 0710	8	111.	25.2	139.3	*	11 JUL 1120	33	56.	21.0	138.4	*	11 JUL 1530	58	12.	15.3	137.1
11 JUL 0720	9	175.	30.8	140.5	*	11 JUL 1130	34	53.	20.7	138.3	*	11 JUL 1540	59	11.	15.1	137.1
11 JUL 0730	10	261.	34.8	141.3	*	11 JUL 1140	35	50.	20.5	138.3	*	11 JUL 1550	60	10.	15.0	137.0
11 JUL 0740	11	334.	36.7	141.7	*	11 JUL 1150	36	47.	20.2	138.2	*	11 JUL 1600	61	10.	14.8	137.0
11 JUL 0750	12	339.	36.8	141.7	*	11 JUL 1200	37	45.	20.0	138.2	*	11 JUL 1610	62	10.	14.7	137.0
11 JUL 0800	13	302.	35.8	141.5	*	11 JUL 1210	38	42.	19.8	138.1	*	11 JUL 1620	63	9.	14.6	136.9
11 JUL 0810	14	250.	34.5	141.3	*	11 JUL 1220	39	39.	19.6	138.1	*	11 JUL 1630	64	9.	14.5	136.9
11 JUL 0820	15	206.	33.4	141.1	*	11 JUL 1230	40	37.	19.4	138.1	*	11 JUL 1640	65	9.	14.3	136.9
11 JUL 0830	16	189.	32.4	140.8	*	11 JUL 1240	41	34.	19.2	138.0	*	11 JUL 1650	66	8.	14.2	136.8
11 JUL 0840	17	180.	31.3	140.6	*	11 JUL 1250	42	33.	19.0	138.0	*	11 JUL 1700	67	8.	14.1	136.8
11 JUL 0850	18	170.	30.3	140.4	*	11 JUL 1300	43	32.	18.8	137.9	*	11 JUL 1710	68	8.	14.0	136.8
11 JUL 0900	19	161.	29.2	140.2	*	11 JUL 1310	44	31.	18.6	137.9	*	11 JUL 1720	69	8.	13.9	136.8
11 JUL 0910	20	150.	28.1	140.0	*	11 JUL 1320	45	29.	18.4	137.8	*	11 JUL 1730	70	7.	13.8	136.7
11 JUL 0920	21	137.	27.2	139.8	*	11 JUL 1330	46	28.	18.2	137.8	*	11 JUL 1740	71	7.	13.7	136.7
11 JUL 0930	22	125.	26.3	139.6	*	11 JUL 1340	47	27.	17.9	137.7	*	11 JUL 1750	72	7.	13.6	136.7
11 JUL 0940	23	114.	25.5	139.4	*	11 JUL 1350	48	25.	17.6	137.6	*	11 JUL 1800	73	7.	13.5	136.7
11 JUL 0950	24	105.	24.8	139.2	*	11 JUL 1400	49	24.	17.4	137.6	*					
11 JUL 1000	25	97.	24.1	139.1	*	11 JUL 1410	50	22.	17.1	137.5	*					

*

*

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	12.00-HR
339.	1.83	(CFS) 122.	67.	67.	67.
		(INCHES) 3.722	4.123	4.123	4.123
		(AC-FT) 60.	67.	67.	67.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	12.00-HR
37.	1.83	26.	20.	20.	20.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	12.00-HR
141.74	1.83	139.39	136.05	136.05	136.05

CUMULATIVE AREA = .30 SQ MI

*** ** ** ** **

33 KK * INT02 * INFLOW INTO POND NO. 2
* *

34 KO OUTPUT CONTROL VARIABLES
IPRNT 0 PRINT CONTROL
IPLOT 2 PLOT CONTROL
GSCAL 0. HYDROGRAPH PLOT SCALE

36 IN TIME DATA FOR INPUT TIME SERIES
JXMIN 10 TIME INTERVAL IN MINUTES
JXDATE 11JUL89 STARTING DATE
JXTIME 600 STARTING TIME

SUBBASIN RUNOFF DATA

35 BA SUBBASIN CHARACTERISTICS
TAREA .06 SUBBASIN AREA

HYDROGRAPH AT STATION INT02

DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW
11	JUL	0600	1	16.	*	11	JUL	0910	20	12.	*	11	JUL	1530	58	0.
11	JUL	0610	2	80.	*	11	JUL	0920	21	11.	*	11	JUL	1540	59	0.
11	JUL	0620	3	160.	*	11	JUL	0930	22	10.	*	11	JUL	1550	60	0.
11	JUL	0630	4	192.	*	11	JUL	0940	23	8.	*	11	JUL	1600	61	0.
11	JUL	0640	5	176.	*	11	JUL	0950	24	7.	*	11	JUL	1610	62	0.
11	JUL	0650	6	128.	*	11	JUL	1000	25	6.	*	11	JUL	1620	63	0.
11	JUL	0700	7	80.	*	11	JUL	1010	26	5.	*	11	JUL	1630	64	0.
11	JUL	0710	8	49.	*	11	JUL	1020	27	4.	*	11	JUL	1640	65	0.
11	JUL	0720	9	38.	*	11	JUL	1030	28	3.	*	11	JUL	1650	66	0.
11	JUL	0730	10	31.	*	11	JUL	1040	29	2.	*	11	JUL	1700	67	0.
11	JUL	0740	11	27.	*	11	JUL	1050	30	0.	*	11	JUL	1710	68	0.
11	JUL	0750	12	24.	*	11	JUL	1100	31	0.	*	11	JUL	1720	69	0.
11	JUL	0800	13	22.	*	11	JUL	1110	32	0.	*	11	JUL	1730	70	0.
11	JUL	0810	14	20.	*	11	JUL	1120	33	0.	*	11	JUL	1740	71	0.
11	JUL	0820	15	18.	*	11	JUL	1130	34	0.	*	11	JUL	1750	72	0.
11	JUL	0830	16	17.	*	11	JUL	1140	35	0.	*	11	JUL	1800	73	0.
11	JUL	0840	17	16.	*	11	JUL	1150	36	0.	*					
11	JUL	0850	18	15.	*	11	JUL	1200	37	0.	*					
11	JUL	0900	19	14.	*	11	JUL	1210	38	0.	*					

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	12.00-HR
192.	.30	(CFS) 33.	16.	15.	15.
		(INCHES) 4.976	4.976	4.976	4.976

*** **

41 KK * POND2 * STAGE-STORAGE THROUGH POND NO. 2 - 36" RCP
* *

42 KD OUTPUT CONTROL VARIABLES
IFRNT 0 PRINT CONTROL
IPLT 2 PLOT CONTROL
RSCAL 0. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

43 RS STORAGE ROUTING
NSTPS 1 NUMBER OF SUBREACHES
ITYP ELEV TYPE OF INITIAL CONDITION
RSVRIC 135.00 INITIAL CONDITION
X .00 WORKING R AND D COEFFICIENT

44 SA AREA 3.0 3.9
45 SE ELEVATION 135.00 140.50
46 SD DISCHARGE 0. 5. 10. 32. 50.
47 SE ELEVATION 135.00 136.00 137.00 138.00 139.00

COMPUTED STORAGE-ELEVATION DATA

STORAGE .00 18.98
ELEVATION 135.00 140.50

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE .00 3.11 6.37 9.78 13.34 18.98
OUTFLOW .00 5.00 18.00 32.00 50.00 77.00
ELEVATION 135.00 136.00 137.00 138.00 139.00 140.50

HYDROGRAPH AT STATION POND2

Table with 15 columns: DA, MON, HRMN, ORD, OUTFLOW, STORAGE, STAGE. It contains two rows of data for each hour from 0600 to 1300, showing the progression of outflow, storage, and stage at station POND2.

11 JUL 0750	12	34.	10.1	136.1	*	11 JUL 1200	37	12.	4.9	136.6	*	11 JUL 1610	62	4.	2.5	135.8
11 JUL 0800	13	33.	9.9	136.0	*	11 JUL 1210	38	12.	4.8	136.5	*	11 JUL 1620	63	4.	2.5	135.8
11 JUL 0810	14	32.	9.8	136.0	*	11 JUL 1220	39	11.	4.6	136.5	*	11 JUL 1630	64	4.	2.5	135.8
11 JUL 0820	15	31.	9.6	136.0	*	11 JUL 1230	40	10.	4.5	136.4	*	11 JUL 1640	65	4.	2.4	135.8
11 JUL 0830	16	31.	9.4	137.9	*	11 JUL 1240	41	10.	4.3	136.4	*	11 JUL 1650	66	4.	2.3	135.6
11 JUL 0840	17	30.	9.2	137.8	*	11 JUL 1250	42	9.	4.2	136.3	*	11 JUL 1700	67	4.	2.3	135.7
11 JUL 0850	18	29.	9.0	137.8	*	11 JUL 1300	43	9.	4.1	136.3	*	11 JUL 1710	68	4.	2.2	135.7
11 JUL 0900	19	28.	8.9	137.7	*	11 JUL 1310	44	8.	3.9	136.3	*	11 JUL 1720	69	4.	2.2	135.7
11 JUL 0910	20	27.	8.7	137.7	*	11 JUL 1320	45	8.	3.8	136.2	*	11 JUL 1730	70	3.	2.2	135.7
11 JUL 0920	21	26.	8.4	137.6	*	11 JUL 1330	46	7.	3.7	136.2	*	11 JUL 1740	71	3.	2.1	135.7
11 JUL 0930	22	26.	8.2	137.5	*	11 JUL 1340	47	7.	3.6	136.2	*	11 JUL 1750	72	3.	2.1	135.7
11 JUL 0940	23	25.	8.0	137.5	*	11 JUL 1350	48	7.	3.5	136.1	*	11 JUL 1800	73	3.	2.0	135.6
11 JUL 0950	24	24.	7.8	137.4	*	11 JUL 1400	49	6.	3.4	136.1	*					
11 JUL 1000	25	23.	7.5	137.3	*	11 JUL 1410	50	6.	3.4	136.1	*					

* * *

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	12.00-HR
34.	1.33	(CFS) 24.	14.	14.	14.
		(INCHES) 3.571	4.362	4.362	4.362
		(AC-FT) 12.	14.	14.	14.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	12.00-HR
10.	1.33	3.	3.	3.	5.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	12.00-HR
136.14	1.50	137.39	136.66	136.66	136.66

CUMULATIVE AREA = .06 SQ MI

STATION PONDS

(I) INFLOW, (O) OUTFLOW

STATION	(I) INFLOW					(O) OUTFLOW					(S) STORAGE		
	0.	40.	80.	120.	160.	200.	0.	0.	0.	0.		0.	0.
DAWRAN PER	0.	0.	0.	0.	0.	0.	0.	4.	8.	12.	0.	0.	0.
110500	10	I						S					
110610	20		I					S					
110620	3.0							S					
110630	4. 0						I	S					
110640	5. 0						I		S				
110650	6. 0								S				
110700	7. 0		I							S			
110710	8. 0	I								S			
110720	9. 0	I								S			
110730	10. 10.									S			
110740	11. 1.0									S			
110750	12. 1 0									S			
110800	13. 1 0									S			
110810	14. 1 0									S			
110820	15. 1 0									S			
110830	16. 1 0									S			
110840	17. 1 0									S			
110850	18. 1 0									S			
110900	19. 1 0									S			
110910	20. 1 0									S			
110920	21. 1. 0									S			
110930	22. 1 0									S			
110940	23. 1 0									S			
110950	24. 1 0									S			
111000	25. 1 0									S			
111010	26. 1 0									S			
111020	27. 1 0									S			
111030	28. 1 0									S			
111040	29. 1 0									S			
111050	30. 1 0									S			
111100	31. 1 0									S			
111110	32. 1 0									S			
111120	33. 1 0									S			
111130	34. 1 0									S			
111140	35. 1 0									S			
111150	36. 1 0									S			
111200	37. 1 0									S			
111210	38. 1 0									S			
111220	39. 1 0									S			
111230	40. 1 0									S			
111240	41. 1 0									S			
111250	42. 1 0									S			
111300	43. 1 0									S			
111310	44. 1 0									S			
111320	45. 1 0									S			
111330	46. 1 0									S			
111340	47. 1 0									S			
111350	48. 1 0									S			
111400	49. 1 0									S			
111410	50. 1 0									S			
111420	51. 1 0									S			
111430	52. 1 0									S			
111440	53. 1 0									S			
111450	54. 1 0									S			
111500	55. 1 0									S			
111510	56. 1 0									S			
111520	57. 1 0									S			

*** ** ** ** **

48 KK * COMBO * COMBINE OUTFLOW HYDROGRAPHS FROM POND NOS. 1 & 2

49 KD OUTPUT CONTROL VARIABLES

IPRNT 0 PRINT CONTROL
 IPLOT 2 PLOT CONTROL
 QSCAL 0. HYDROGRAPH PLOT SCALE

50 HC HYDROGRAPH COMBINATION

ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

HYDROGRAPH AT STATION COMBO
 SUM OF 2 HYDROGRAPHS

DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	
11	JUL	0600	1	0.	*	11	JUL	0910	20	178.	*	11	JUL	1220	39	50.	*	11	JUL	1530	58	17.	
11	JUL	0610	2	1.	*	11	JUL	0920	21	163.	*	11	JUL	1230	40	47.	*	11	JUL	1540	59	16.	
11	JUL	0620	3	4.	*	11	JUL	0930	22	151.	*	11	JUL	1240	41	44.	*	11	JUL	1550	60	15.	
11	JUL	0630	4	11.	*	11	JUL	0940	23	139.	*	11	JUL	1250	42	42.	*	11	JUL	1600	61	14.	
11	JUL	0640	5	20.	*	11	JUL	0950	24	129.	*	11	JUL	1300	43	41.	*	11	JUL	1610	62	14.	
11	JUL	0650	6	29.	*	11	JUL	1000	25	119.	*	11	JUL	1310	44	39.	*	11	JUL	1620	63	13.	
11	JUL	0700	7	61.	*	11	JUL	1010	26	111.	*	11	JUL	1320	45	37.	*	11	JUL	1630	64	13.	
11	JUL	0710	8	145.	*	11	JUL	1020	27	104.	*	11	JUL	1330	46	36.	*	11	JUL	1640	65	12.	
11	JUL	0720	9	210.	*	11	JUL	1030	28	97.	*	11	JUL	1340	47	34.	*	11	JUL	1650	66	12.	
11	JUL	0730	10	296.	*	11	JUL	1040	29	91.	*	11	JUL	1350	48	32.	*	11	JUL	1700	67	12.	
11	JUL	0740	11	368.	*	11	JUL	1050	30	86.	*	11	JUL	1400	49	30.	*	11	JUL	1710	68	11.	
11	JUL	0750	12	373.	*	11	JUL	1100	31	81.	*	11	JUL	1410	50	28.	*	11	JUL	1720	69	11.	
11	JUL	0800	13	335.	*	11	JUL	1110	32	76.	*	11	JUL	1420	51	27.	*	11	JUL	1730	70	11.	
11	JUL	0810	14	282.	*	11	JUL	1120	33	72.	*	11	JUL	1430	52	25.	*	11	JUL	1740	71	10.	
11	JUL	0820	15	238.	*	11	JUL	1130	34	67.	*	11	JUL	1440	53	23.	*	11	JUL	1750	72	10.	
11	JUL	0830	16	220.	*	11	JUL	1140	35	64.	*	11	JUL	1450	54	21.	*	11	JUL	1800	73	10.	
11	JUL	0840	17	210.	*	11	JUL	1150	36	60.	*	11	JUL	1500	55	20.	*						
11	JUL	0850	18	199.	*	11	JUL	1200	37	57.	*	11	JUL	1510	56	19.	*						
11	JUL	0900	19	189.	*	11	JUL	1210	38	53.	*	11	JUL	1520	57	18.	*						

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	12.00-HR
373.	1.83	(CFS) 144.	82.	82.	82.
		(INCHES) 3.671	4.163	4.163	4.163
		(AC-FT) 72.	81.	81.	81.

CUMULATIVE AREA = .37 98 AC

RUNOFF SUMMARY
 FLOW IN CUBIC FEET PER SECOND
 TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
				6-HOUR	24-HOUR	72-HOUR			
HYDROGRAPH AT	INT01	564.	1.17	157.	81.	81.	.30		
ROUTED TO	POND1	339.	1.33	122.	67.	67.	.30	141.74	1.33
HYDROGRAPH AT	INT02	192.	.50	33.	16.	16.	.06		
ROUTED TO	POND2	34.	1.33	24.	14.	14.	.06	138.14	1.50
2 COMBINED AT	CON00	373.	1.33	144.	82.	82.	.37		

*** NORMAL END OF HEC-1 ***

THE CITY OF WICHITA

**DEPARTMENT OF
PUBLIC WORKS**
STORM WATER MANAGEMENT DIVISION
CITY HALL — EIGHTH FLOOR
455 NORTH MAIN STREET
WICHITA, KANSAS 67202
(316) 268-4498

April 30, 1996

Mr. Howard Rigg
314 S. Circle Lake Circle
Wichita, KS

Re: Cambridge Estates Lakes

Dear Mr. Rigg:

I am writing regarding your call in March of this year about the lakes and culverts at Cambridge Estates. The paragraphs below explain my findings.

After speaking with you our maintenance crews checked the two 66"x 40" culverts crossing under Taft east of Circle Lake Circle as you requested. We found these culverts to be clean and free of debris.

I also met with two representatives from the City Engineer's office, the Assistant City Engineer, Gene Rath, and the Subdivision Engineer, Vicky Huang, to discuss the original intent of the lakes as per the subdivision drainage plan. According to Vicky Huang, the stand pipe seen in the west lake is not functional because another outfall structure was built to replace it in the southeast corner of the lake to relieve the overflow. It also seems the lakes were intended to have a static water level, in other words, a normal pool elevation.

Some problems with the static pool were encountered in the early years of the development and due to homeowners complaints to the developer, a petition was circulated, approved, and passed to finance the placement of a clay lining on the east lake. Therefore, this lake should hold a static pool except under extreme circumstances. If the homeowners association desires to circulate petitions for lining any of the other lakes, they should contact the City Engineer's office.

Due to extremely wet weather in 1993 and 1995, these lakes probably were higher than the static elevation a large percent of the time. Also, during our recent dry spell since August of 1995, these lakes maybe lower than the static pool due to evaporation. A static pool can be maintained during years of average precipitation, but in the off years, the lake levels may fluctuate.



If you are concerned about the erosion and/or aesthetics of the perimeter of the lake due to the water level fluctuation, I would suggest you consider placing some light quarry run stone, or planting some wetlands vegetation in that area. Both methods will prevent erosion and improve upon the unsightliness of a bare bank.

I hope this has answered your questions concerning the lakes at Cambridge Estates. If you need additional information, please feel free to contact myself at 268-4498, or the City Engineer's office at 268-4501.

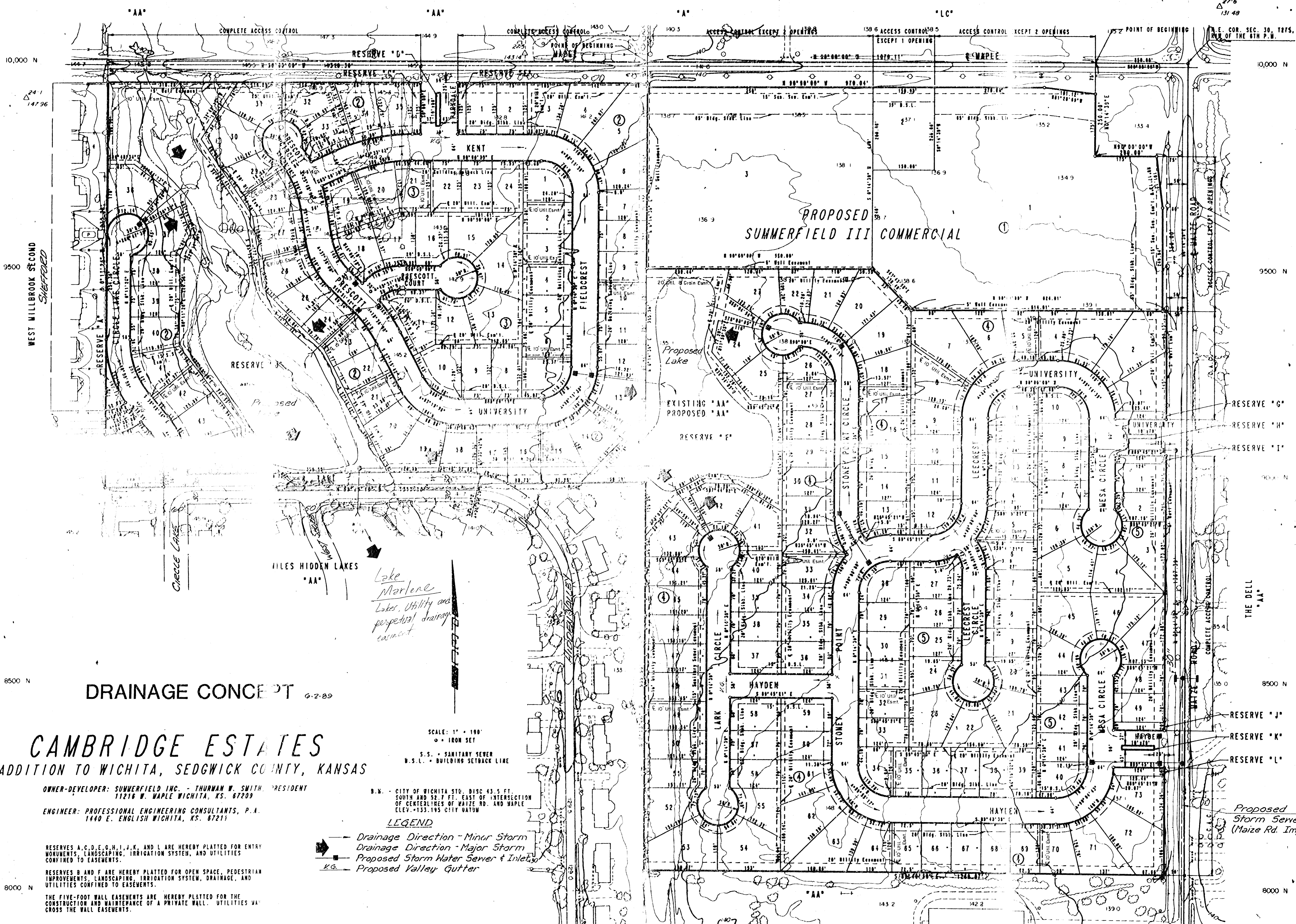
Sincerely,



Suzanne C. S. Loomis
Acting Storm Water Engineer

cc: ~~Gene Rath~~
✓ Vicky Huang

27-6
131.48



DRAINAGE CONCEPT 6-2-89

CAMBRIDGE ESTATES

AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS

OWNER-DEVELOPER: SUMMERFIELD INC. - THURMAN W. SMITH, PRESIDENT
11216 W. MAPLE WICHITA, KS. 67209

ENGINEER: PROFESSIONAL ENGINEERING CONSULTANTS, P.A.
1440 E. ENGLISH WICHITA, KS. 67211

D.W. - CITY OF WICHITA STD. DISC 43.5 FT. SOUTH AND 52.7 FT. EAST OF INTERSECTION OF CENTERLINES OF MAIZE RD. AND MAPLE
ELEV. +133.195 CITY DATUM

LEGEND

- Drainage Direction - Minor Storm
- Drainage Direction - Major Storm
- Proposed Storm Water Sewer & Inlets
- Proposed Valley Gutter

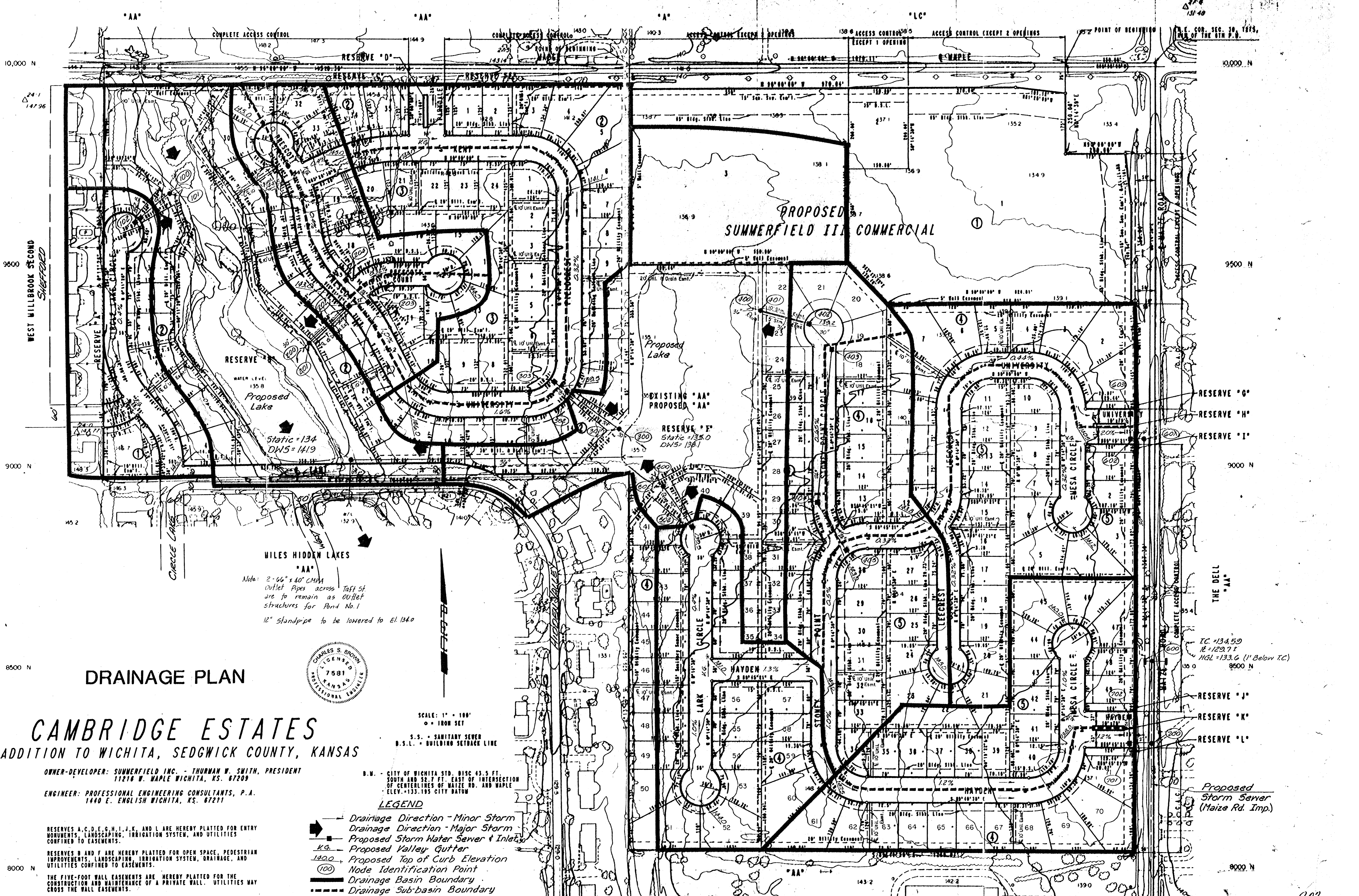
RESERVES A, C, D, E, G, H, I, J, K, AND L ARE HEREBY PLATTED FOR ENTRY MONUMENTS, LANDSCAPING, IRRIGATION SYSTEM, AND UTILITIES CONFINED TO EASEMENTS.

RESERVES B AND F ARE HEREBY PLATTED FOR OPEN SPACE, PEDESTRIAN IMPROVEMENTS, LANDSCAPING, IRRIGATION SYSTEM, DRAINAGE, AND UTILITIES CONFINED TO EASEMENTS.

THE FIVE-FOOT WALL EASEMENTS ARE HEREBY PLATTED FOR THE CONSTRUCTION AND MAINTENANCE OF A PRIVATE WALL. UTILITIES MAY CROSS THE WALL EASEMENTS.

SCALE: 1" = 100'
● IRON SET
S.S. - SANITARY SEWER
B.S.L. - BUILDING SETBACK LINE

Proposed Storm Sewer (Maize Rd. Imp.)



DRAINAGE PLAN

CAMBRIDGE ESTATES

AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS

OWNER-DEVELOPER: SUMMERFIELD INC. - THURMAN W. SMITH, PRESIDENT
11216 W. MAPLE WICHITA, KS. 67209

ENGINEER: PROFESSIONAL ENGINEERING CONSULTANTS, P.A.
1440 E. ENGLISH WICHITA, KS. 67211



SCALE: 1" = 100'
○ = IRON SET

S.S. - SANITARY SEWER
B.S.L. - BUILDING SETBACK LINE

D.W. - CITY OF WICHITA STD. DISC 43.5 FT. SOUTH AND 32.7 FT. EAST OF INTERSECTION OF CENTERLINES OF MAIZE RD. AND MAPLE ELEV. = 133.195 CITY DATUM

- LEGEND**
- Drainage Direction - Minor Storm
 - ➔ Drainage Direction - Major Storm
 - Proposed Storm Water Sewer & Inlets
 - KG Proposed Valley Gutter
 - 1400 Proposed Top of Curb Elevation
 - (100) Node Identification Point
 - Drainage Basin Boundary
 - Drainage Sub-basin Boundary

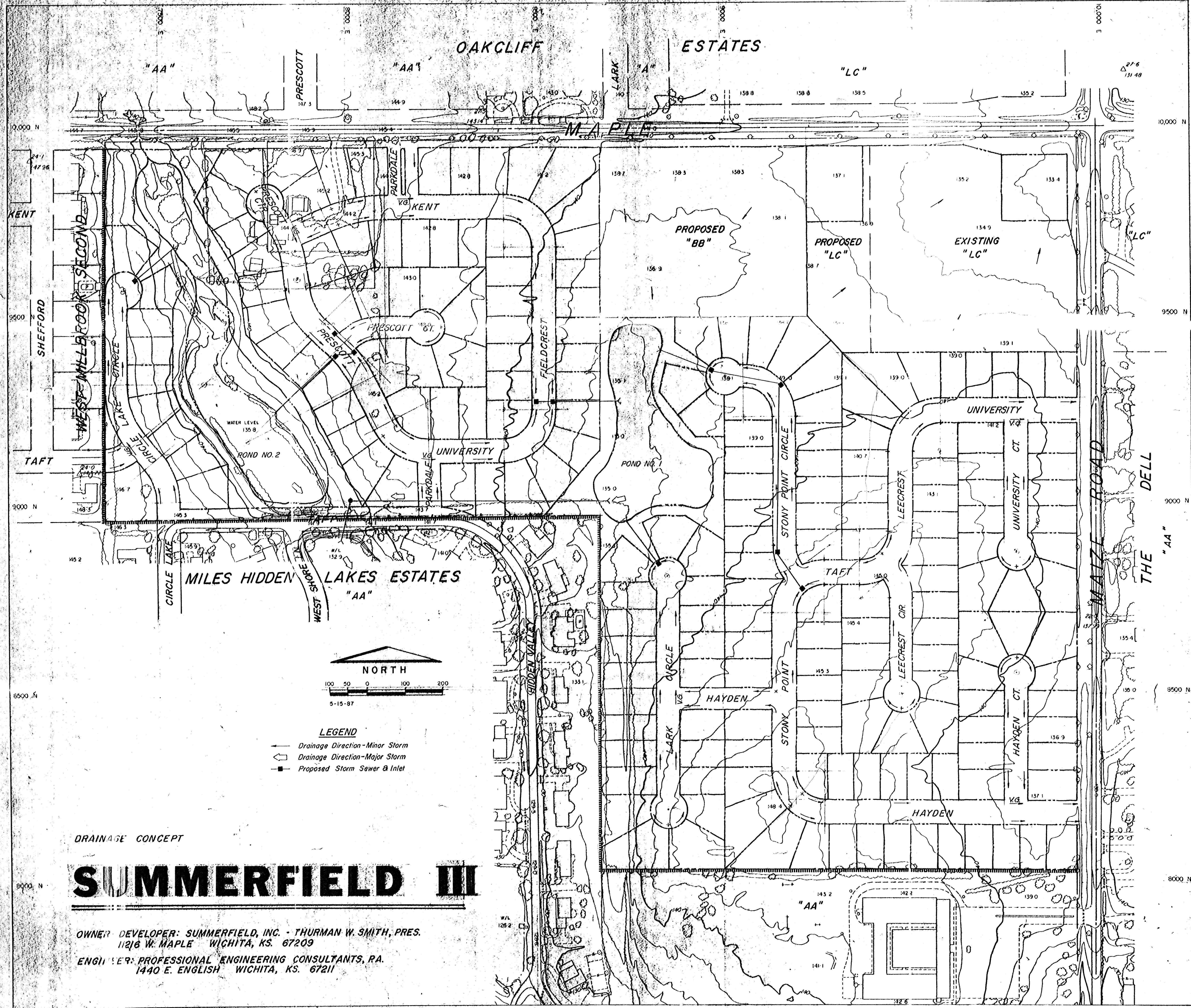
RESERVES A, C, D, E, G, H, I, J, K, AND L ARE HEREBY PLATTED FOR ENTRY MONUMENTS, LANDSCAPING, IRRIGATION SYSTEM, AND UTILITIES CONFINED TO EASEMENTS.

RESERVES B AND F ARE HEREBY PLATTED FOR OPEN SPACE, PEDESTRIAN IMPROVEMENTS, LANDSCAPING, IRRIGATION SYSTEM, DRAINAGE, AND UTILITIES CONFINED TO EASEMENTS.

THE FIVE-FOOT WALL EASEMENTS ARE HEREBY PLATTED FOR THE CONSTRUCTION AND MAINTENANCE OF A PRIVATE WALL. UTILITIES MAY CROSS THE WALL EASEMENTS.

TC = 134.50
E = 129.71
HGL = 133.6 (1' Below TC)
50 0
8500 N

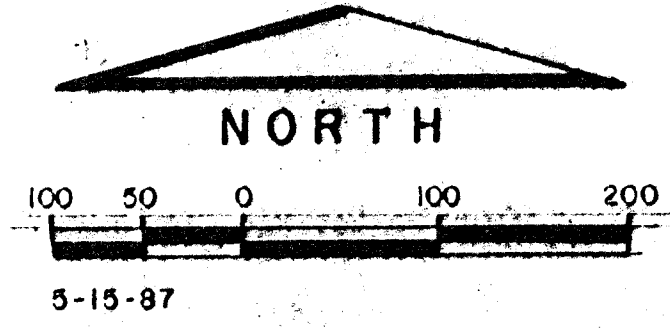
Proposed Storm Sewer (Maize Rd. Imp.)



DRAINAGE CONCEPT

SUMMERFIELD III

OWNER/DEVELOPER: SUMMERFIELD, INC. - THURMAN W. SMITH, PRES.
 11216 W. MAPLE WICHITA, KS. 67209
 ENGINEER: PROFESSIONAL ENGINEERING CONSULTANTS, P.A.
 1440 E. ENGLISH WICHITA, KS. 67211



- LEGEND**
- ← Drainage Direction - Minor Storm
 - ⇐ Drainage Direction - Major Storm
 - Proposed Storm Sewer & Inlet