



Date 7/30/92 BdB Page 1 of 9

Project Savanna @ Castle Rock Ranch 3rd Addn.

Item Sizing of Culvert across Sport of Kings Ct.

Use Rational Formula:  $Q = CiA$

I. Determine  $C_{100}$ :

Rd soil  $\rightarrow$  Soil Group D

Land use  $\rightarrow$  1/2 Ac. Residential (Single Family)

$$C_{100} = 0.72$$

II. Determine  $t_c$ ; select "i"

Assume  $t_c = 15$  min.  $\rightarrow i = 7.37$  in/hr.

III. Determine area:

$$2.8 + 0.7 = 3.5 \text{ Acres}$$

IV. Compute " $Q_{100}$ "

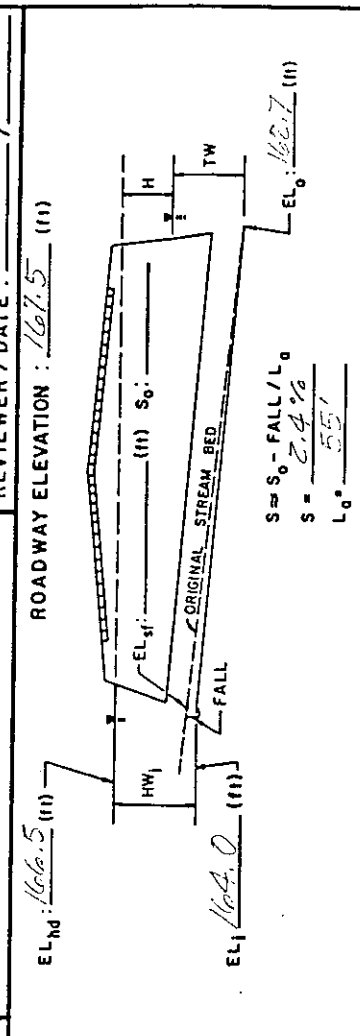
$$Q = CiA = (0.72)(7.37)(3.5) = \boxed{18.6 \text{ cfs}}$$

PROJECT: Savanna @ Castle Rock Ranch  
3rd Addn.

STATION: \_\_\_\_\_  
 SHEET 2 OF 2

CULVERT DESIGN FORM  
 DESIGNER/DATE: Bestwell, 7-30-92  
 REVIEWER/DATE: \_\_\_\_\_

HYDROLOGICAL DATA  
 METHOD: Rational  
 DRAINAGE AREA: 3.5 Ac. STREAM SLOPE: \_\_\_\_\_  
 CHANNEL SHAPE: \_\_\_\_\_  
 ROUTING: \_\_\_\_\_ OTHER: \_\_\_\_\_  
 DESIGN FLOWS/TAIWATER  
 R. 1. (YEARS) 100 FLOW (cfs) \_\_\_\_\_ TW (ft) \_\_\_\_\_  
19



CULVERT DESCRIPTION:  
 MATERIAL - SHAPE - SIZE - ENTRANCE  
24" R.C.P.

TOTAL FLOW Q (cfs)	FLOW PER BARREL Q/N	INLET CONTROL		OUTLET CONTROL				COMMENTS						
		HW <sub>1</sub> /D (2)	HW <sub>1</sub> (ft)	FALL (3)	EL <sub>h1</sub> (4)	TW (5)	d <sub>c</sub> (6)		h <sub>0</sub> (7)	k <sub>e</sub> (8)	H (9)	EL <sub>h0</sub> (10)		
19	19	1.2	2.4	—	164.4	?	1.6	1.8	0.5	0.5	165.0	166.4	—	OK

HEADWATER CALCULATIONS

(4) EL<sub>h1</sub> = HW<sub>1</sub> + EL<sub>1</sub> (INVERT OF INLET CONTROL SECTION)  
 (5) TW BASED ON DOWN STREAM CONTROL OR FLOW DEPTH IN CHANNEL.  
 (6) h<sub>0</sub> = TW or (d<sub>c</sub> + D/2) (WHICHEVER IS GREATER)  
 (7) H = [1 + k<sub>e</sub> + (29n<sup>2</sup>L) / R<sup>1.33</sup>] V<sup>2</sup> / 2g  
 (8) EL<sub>h0</sub> = EL<sub>0</sub> + H + h<sub>0</sub>

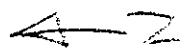
TECHNICAL FOOTNOTES:  
 (1) USE Q/NB FOR BOX CULVERTS  
 (2) HW<sub>1</sub>/D = HW / D OR HW<sub>1</sub>/D FROM DESIGN CHARTS  
 (3) FALL = HW<sub>1</sub> - (EL<sub>hd</sub> - EL<sub>sl</sub>); FALL IS ZERO FOR CULVERTS ON GRADE

SUBSCRIPT DEFINITIONS:  
 0. APPROXIMATE  
 1. CULVERT FACE  
 hd. DESIGN HEADWATER  
 h1. HEADWATER IN INLET CONTROL  
 h0. HEADWATER IN OUTLET CONTROL  
 l. INLET CONTROL SECTION  
 0. OUTLET  
 sl. STREAMBED AT CULVERT FACE  
 s. TAILWATER

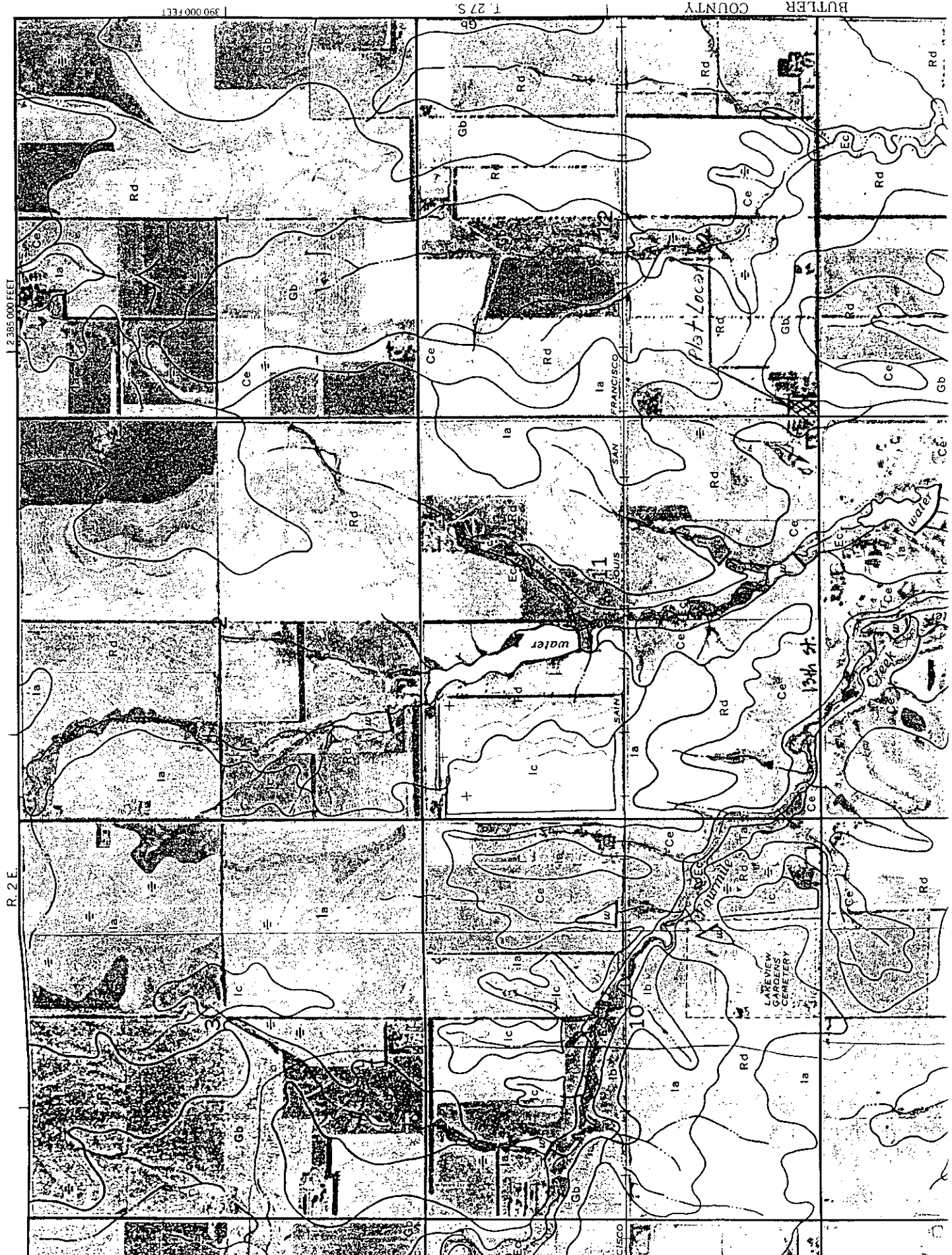
COMMENTS / DISCUSSION:

CULVERT BARREL SELECTED:  
 SIZE: 24" RCP  
 SHAPE: \_\_\_\_\_  
 MATERIAL: \_\_\_\_\_  
 ENTRANCE: \_\_\_\_\_

379



SEDGWICK COUNTY, KANSAS - SHEET NUMBER 36



1:2,385,000 FEET

1:390,000 FEET

1:27 S

BUTLER COUNTY

4/9

EXHIBIT NO. 1

SOIL LEGEND

<u>SYMBOL</u>	<u>HYDROLOGIC GROUP</u>	<u>NAME</u>
Aa	B	Albion-Shellabarger sandy loams, 1 to 4 percent slopes
Ab	B	Albion and Shellabarger sandy loams, 7 to 15 percent slopes
Ba	C	Blanket silt loam, 0 to 1 percent slopes
Bb	C	Blanket silt loam, 1 to 3 percent slopes
Ca	B	Canadian fine sandy loam
Cb	B	Canadian-Waldeck fine sandy loams
Cc	D	Carwile fine sandy loam
Cd	B	Clark-Ost clay loams, 1 to 4 percent slopes
Ce	C	Clime silty clay, 3 to 6 percent slopes
Ea	B	Elandco silt loam
Eb	B	Elandco silt loam, occasionally flooded
Ec	B	Elandco silt loam, frequently flooded
Fa	B	Farnum loam, 0 to 1 percent slopes
Fb	B	Farnum loam, 1 to 3 percent slopes
Fc	B	Farnum loam, sandy substratum, 0 to 1 percent slopes
Ga	D	Goessel silty clay, 0 to 1 percent slopes
Gb	D	Goessel silty clay, 1 to 2 percent slopes
Ia	D	Irwin silty clay loam, 1 to 3 percent slopes
Ib	D	Irwin silty clay loam, 3 to 6 percent slopes
Ic	D	Irwin silty clay loam, 2 to 6 percent slopes, eroded
La	C	Lesho loam
Lb	A	Lincoln soils
Ma	B	Milan loam, 1 to 3 percent slopes
Mb	B	Milan form, 3 to 6 percent slopes
Mc	B	Milan clay loam, 2 to 6 percent slopes, eroded
Na	B	Naron fine sandy loam
Oc	D	Owens clay loam, 1 to 3 percent slopes
Od	D	Owens-Rock outcrop complex, 3 to 10 percent slopes
Pa		Pits
Pb	D	Plevna fine sandy loam
Pc	A	Pratt loamy fine sand, undulating
Pd	A	Pratt-Tivoli complex, rolling
Ra	D	Renfrow silty clay loam, 1 to 3 percent slopes
Rb	D	Renfrow silty clay loam, 3 to 6 percent slopes
Rc	D	Renfrow-Owens clay loams, 1 to 4 percent slopes
Rd	D	Rosehill silty clay, 1 to 3 percent slopes
Sa	B	Shellabarger sandy loam, 1 to 3 percent slopes
Sb	B	Shellabarger sandy loam, 3 to 6 percent slopes
Sc	B	Shellabarger sandy loam, 3 to 6 percent slopes, eroded
Ta	D	Tabler silty clay loam
Tb	D	Tabler-Drummond complex
Ua	B	Urban land-Canadian complex
Ub	B	Urban land-Elandco complex
Uc	B	Urban land-Farnum complex, 0 to 3 percent slopes
Ud	D	Urban land-Irwin complex, 1 to 3 percent slopes
Ue	D	Urban land-Tabler complex
Va	B	Vanoss silt loam, 0 to 1 percent slopes
Vb	B	Vanoss silt loam, 1 to 3 percent slopes
Vc	B	Vanoss silt loam, 3 to 6 percent slopes
Vd	B	Vanoss silt loam, 3 to 6 percent slopes, eroded
Ve	D	Vernon sandy loam, 1 to 3 percent slopes
Vf	D	Vernon sandy loam, 3 to 6 percent slopes
Wa	C	Waldeck sandy loam
Wb	D	Waurika silt loam

ATTACHMENT D

DRAINAGE CRITERIA

CITY OF WICHITA, KANSAS

RECOMMENDED RUNOFF COEFFICIENTS FOR RATIONAL METHOD  
AND PERCENT IMPERVIOUS FOR UNIT HYDROGRAPH METHOD

Land Use or Surface Characteristics	Percent Impervious	Frequency			
		2	5	10	100
1. Business:					
Downtown Areas	95	0.84	0.85	0.87	0.91
Neighborhood Areas	70	0.68	0.69	0.73	0.80
2. Residential:					
Single Family (Soil Group D)					
1/8 Acre	50	0.57	0.61	0.66	0.79
1/4 Acre	38	0.50	0.54	0.62	0.76
1/3 Acre	30	0.46	0.50	0.59	0.73
1/2 Acre	25	0.42	0.48	0.56	0.72
3/4 Acre	22	0.42	0.46	0.55	0.71
1 Acre	20	0.41	0.45	0.54	0.71
Multi-Family (Soil Group D)					
Multi-Unit (detached)	60	0.62	0.66	0.72	0.82
Multi-Unit (attached)	65	0.64	0.68	0.73	0.83
Apartments	75	0.70	0.73	0.79	0.86
Single Family (Soil Group C)					
1/8 Acre	50	0.55	0.58	0.64	0.73
1/4 Acre	38	0.48	0.51	0.57	0.68
1/3 Acre	30	0.43	0.46	0.53	0.65
1/2 Acre	25	0.40	0.43	0.50	0.63
3/4 Acre	22	0.39	0.42	0.49	0.62
1 Acre	20	0.37	0.40	0.48	0.61
Multi-Family (Soil Group C)					
Multi-Unit (detached)	60	0.60	0.63	0.69	0.77
Multi-Unit (attached)	65	0.63	0.66	0.71	0.79
Apartments	75	0.68	0.72	0.77	0.83
Single-Family (Soil Group B)					
1/8 Acre	50	0.52	0.54	0.59	0.67
1/4 Acre	38	0.44	0.46	0.52	0.61
1/3 Acre	30	0.39	0.41	0.47	0.57
1/2 Acre	25	0.36	0.38	0.44	0.54
3/4 Acre	22	0.34	0.36	0.42	0.52
1 Acre	20	0.33	0.35	0.40	0.51
Multi-Family (Soil Group B)					
Multi-Unit (detached)	60	0.58	0.60	0.65	0.72
Multi-Unit (attached)	65	0.61	0.64	0.68	0.75
Apartments	75	0.67	0.70	0.74	0.80

6/9

April 15, 1986

ATTACHMENT A  
DRAINAGE CRITERIA MANUAL

CITY OF WICHITA, KANSAS

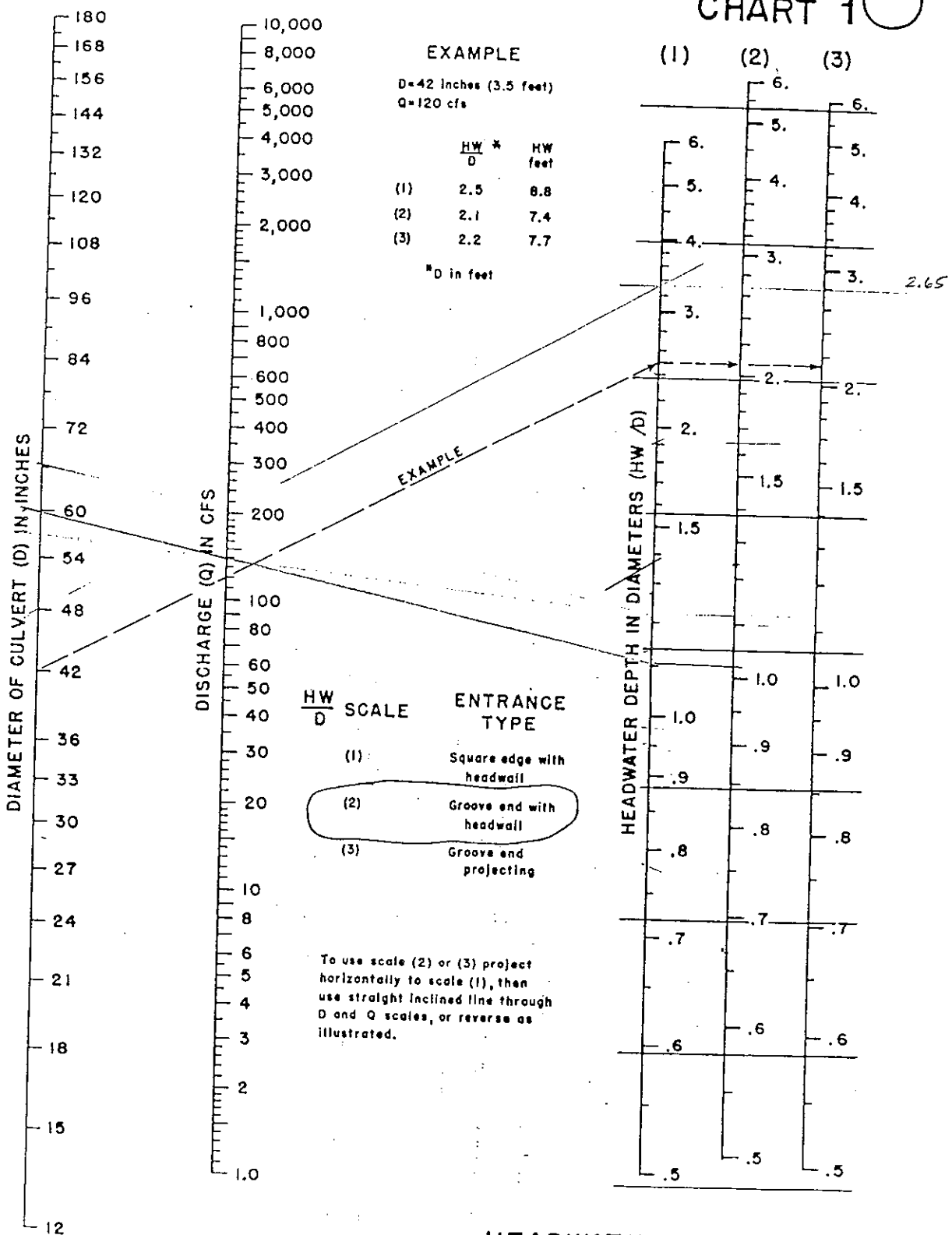
RAINFALL INTENSITY TABLE FOR SEDGWICK COUNTY, KANSAS

The following tabulation contains rainfall intensity in inches per hour as derived from ESSA Weather Bureau Technical Paper 40 Modified to NWS Hydro-35, 1977 During First Hour

$(\frac{1}{T_c})$ DURATION IN MINUTES	RETURN PERIODS OF						
	1-YR	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
5	$i = 4.18$	5.57	6.53	7.41	8.52	9.48	10.32
6	3.99	5.32	6.25	7.09	8.16	9.09	9.89
7	3.81	5.09	5.99	6.81	7.84	8.74	9.50
8	3.66	4.89	5.75	6.55	7.55	8.42	9.15
9	3.52	4.70	5.54	6.31	7.28	8.13	8.83
10	3.39	4.52	5.34	6.09	7.04	7.86	8.54
11	3.27	4.36	5.16	5.89	6.81	7.61	8.27
12	3.18	4.21	4.99	5.71	6.60	7.38	8.02
13	3.05	4.08	4.84	5.53	6.41	7.17	7.79
14	2.96	3.95	4.69	5.37	6.23	6.97	7.57
15	2.87	3.83	4.56	5.22	6.06	6.78	7.37
16	2.78	3.72	4.43	5.08	5.90	6.60	7.18
17	2.71	3.61	4.31	4.95	5.75	6.44	7.00
18	2.63	3.51	4.20	4.83	5.61	6.29	6.84
19	2.56	3.42	4.10	4.71	5.47	6.14	6.68
20	2.50	3.33	4.00	4.60	5.35	6.00	6.53
21	2.44	3.25	3.90	4.50	5.23	5.87	6.39
22	2.38	3.17	3.81	4.40	5.12	5.75	6.26
23	2.32	3.10	3.73	4.31	5.01	5.63	6.13
24	2.27	3.03	3.65	4.22	4.91	5.52	6.01
25	2.22	2.96	3.57	4.13	4.81	5.41	5.90
26	2.20	2.90	3.50	4.05	4.72	5.31	5.79
27	2.16	2.84	3.43	3.98	4.63	5.21	5.69
28	2.14	2.78	3.37	3.90	4.55	5.12	5.59
29	2.11	2.72	3.30	3.83	4.47	5.03	5.49
30	2.08	2.67	3.24	3.76	4.39	4.94	5.40
31	2.05	2.62	3.19	3.70	4.32	4.86	5.32
32	2.02	2.57	3.10	3.63	4.25	4.79	5.22
33	1.99	2.52	3.05	3.57	4.18	4.71	5.14
34	1.96	2.48	3.01	3.51	4.11	4.63	5.07
35	1.93	2.44	2.98	3.46	4.05	4.56	5.00
36	1.91	2.39	2.93	3.41	3.99	4.50	4.93
37	1.89	2.35	2.88	3.36	3.93	4.43	4.86
38	1.87	2.32	2.84	3.31	3.87	4.37	4.79
39	1.85	2.28	2.80	3.26	3.82	4.31	4.73
40	1.83	2.24	2.76	3.22	3.76	4.25	4.66
41	1.81	2.21	2.72	3.17	3.71	4.19	4.60
42	1.79	2.18	2.68	3.13	3.66	4.13	4.54
43	1.77	2.14	2.64	3.09	3.61	4.08	4.49
44	1.75	2.11	2.61	3.05	3.57	4.03	4.43
45	1.73	2.08	2.57	3.01	3.52	3.98	4.38

7/9 ~~4/8~~

# CHART 1



## HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

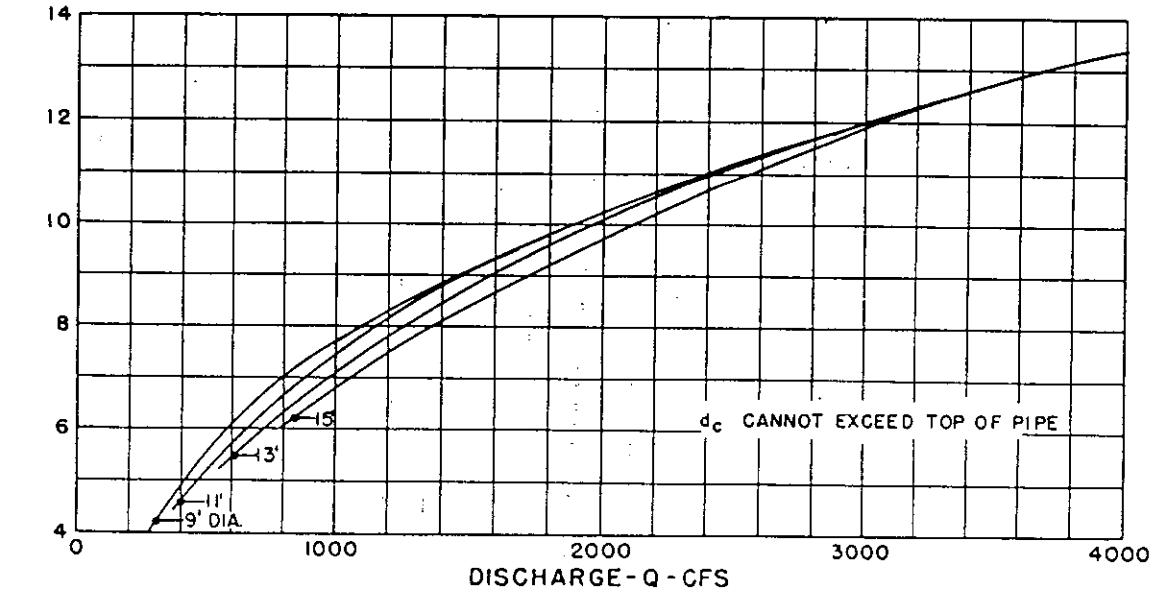
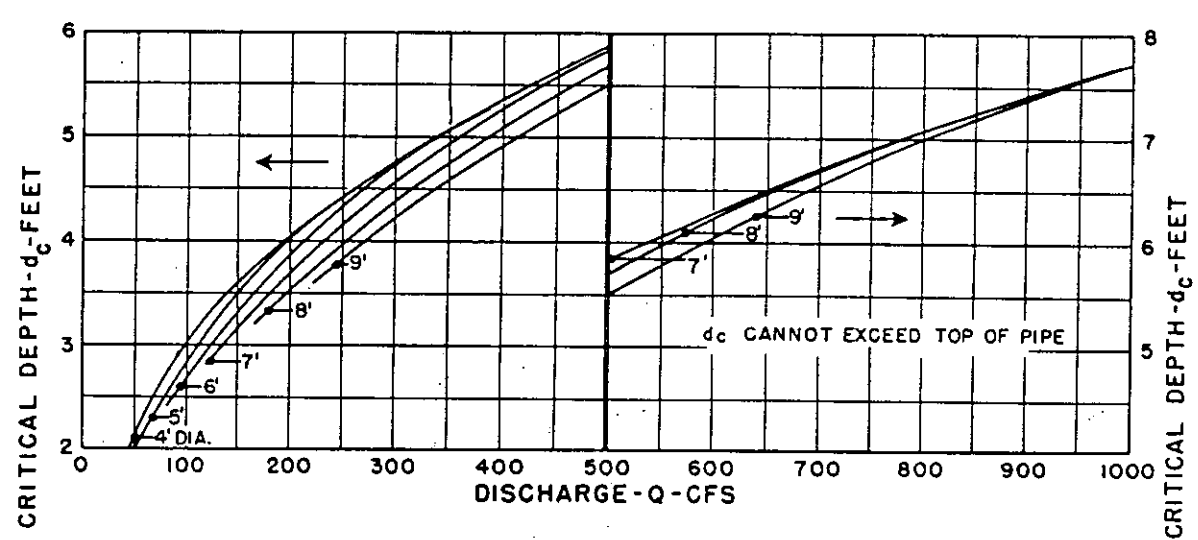
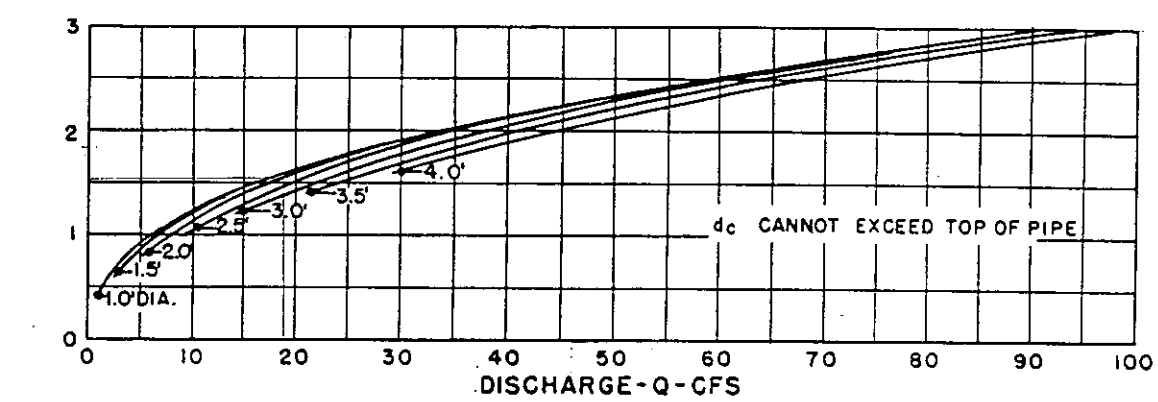
HEADWATER SCALES 283  
 REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN. 1963

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# CHART 4

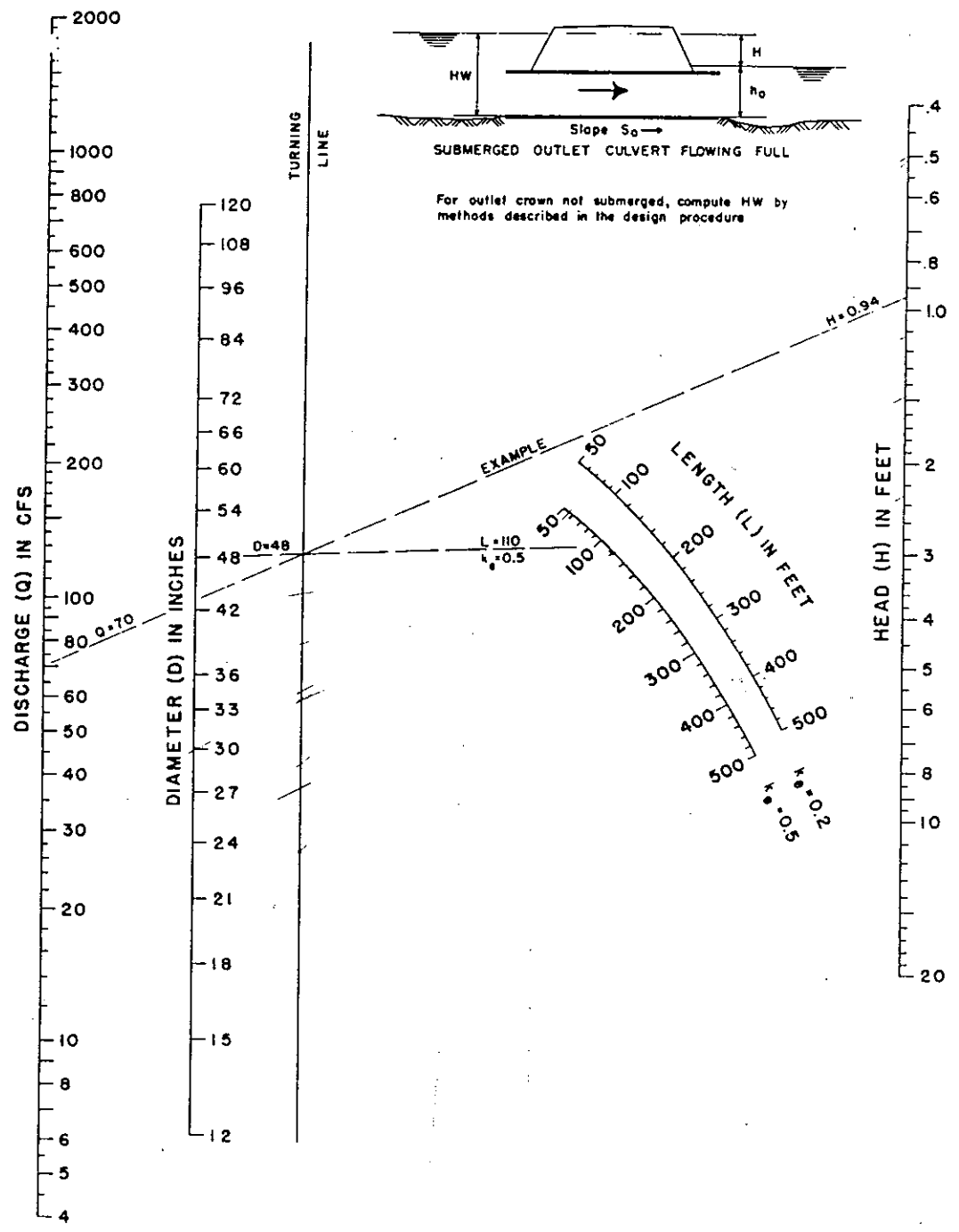


BUREAU OF PUBLIC ROADS  
JAN. 1964

## CRITICAL DEPTH CIRCULAR PIPE

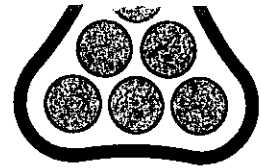


# CHART 5

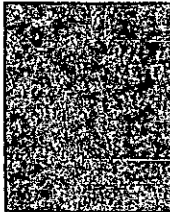


HEAD FOR  
 CONCRETE PIPE CULVERTS  
 FLOWING FULL  
 $n = 0.012$

M. D. SCHOMAKER, P.E.  
G. D. SCHOCK, P.E.  
J. H. BAILEY, P.E., PH.D.  
D. I. NORTON, P.E.  
B. E. REMSBERG, P.E.  
G. K. GREENWOOD, P.E.  
D. E. HAGER, P.E.



**P**ROFESSIONAL  
**E**NGINEERING  
**C**ONSULTANTS  
PROFESSIONAL ASSOCIATION



July 31, 1992

Mr. Harlan Foraker, P.E.  
Sedgwick County  
Bureau of Public Works  
1250 S. Seneca  
Wichita, KS 67213

Reference: Savannah 3rd Addition Drainage Plan  
PEC Project No. 36-92318-024

Dear Harlan:

Transmitted herewith is a copy of the drainage plan and supporting calculations for Savannah at Castle Rock Ranch 3rd Addition.

If you have any questions or need additional information regarding this transmittal, please advise.

Very truly yours,

PROFESSIONAL ENGINEERING CONSULTANTS, P.A.

Brian D. Boutwell, P.E.  
Project Engineer

BDB/mfc

Encl: As noted

cc: Vicky Huang, P.E.

SUBDIVISION COMMITTEE  
METROPOLITAN AREA PLANNING COMMISSION

AGENDA ITEM NO. 6

August 20, 1992

STAFF REPORT  
(Final Plat)

CASE NUMBER: S/D 92-35 - SAVANNA AT CASTLE ROCK 3RD ADDITION

OWNER/APPLICANT: Kyle Martin Stephenson & Linda Lucille Stephenson Trust, c/o Larry Stephenson, Savanna, Inc., 14010 East 13th Street North, Wichita, KS 67230

SURVEYOR/ENGINEER: Professional Engineering Consultants, P.A., c/o Gary Wiley, 303 South Topeka, Wichita, KS 67202

LOCATION: Northeast corner of 143rd Street East and 13th Street North

SITE SIZE: 8.34 Acres

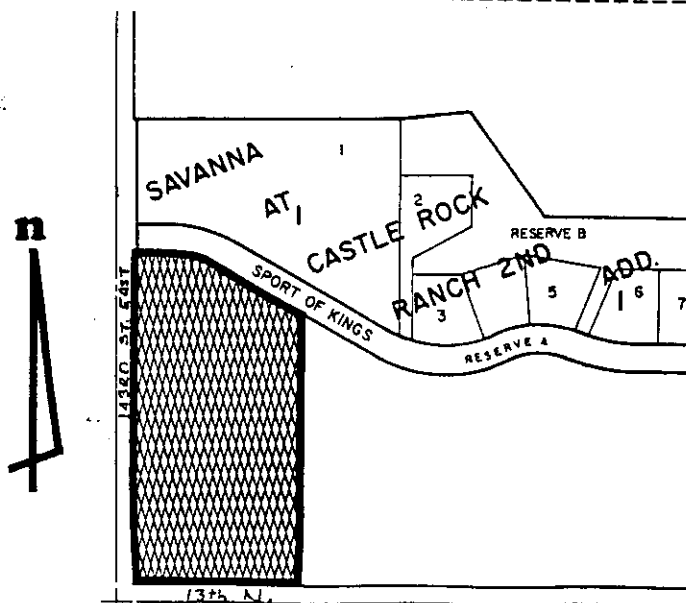
NUMBER OF LOTS

Residential:	9
Office:	
Commercial:	
Industrial:	
Total:	9

MINIMUM LOT AREA: 23,500 sq. ft.

CURRENT ZONING: R-1 Suburban Residential District

VICINITY MAP:



NOTE: Since this residential plat is below 10 acres in size, it has been accepted in final form only even though it exceeds the 5-lot criteria. In 1988, an overall preliminary plat of nearly 80 acres was submitted for the Savanna at Castle Rock Ranch development. Subsequently, two portions of that preliminary were finalized out. This addition, however, was not included within that original preliminary plat. As originally proposed, this overall addition was platted with reserves to allow for private streets, with gravel surfaces, so as to allow for horseback riding along the streets. However, these reserves have now been dedicated to the County with petitions submitted for paving.

STAFF COMMENTS:

- A. The applicant shall guarantee the extension of sanitary sewer to serve the lots being platted. This guarantee will apparently involve use of a County sanitary sewer system and County Engineering needs to indicate any requirements it may have.
- B. The applicant shall guarantee the extension of City water to serve the lots being platted. This guarantee will apparently involve use of City of Wichita water and City Engineering needs to indicate any specific requirements it may have. The applicant shall submit an outside-the-City water service application and associated restrictive covenant.
- C. The applicant shall guarantee the paving of Sport of Kings Court. Based on the Subdivision Regulations, suburban development involving lots of under 25,000 square feet and within the urbanizing area of Wichita, should be required to pave streets to the urban standard. However, it appears that the paving of Sport of Kings is intended to be to the alternate suburban paving standard (no curb and gutter). Consequently, County Engineering needs to indicate the paving standard considered appropriate for the street serving this addition.
- D. The applicant shall guarantee any drainage improvements required by the platting of this property.
- E. If improvements are guaranteed by petition, a notarized certificate listing the petitions shall be submitted to the Planning Department for recording.
- F. Prior to this plat being scheduled for City Council review, the applicant shall submit a letter indicating that the buildings located in street right-of-way have been removed.
- G. On the final plat tracing, the building setback along the north line of Lot 1 shall be more distinctly labeled so as to better identify it and the easement which is also located in the same area.
- H. As indicated in the platting binder, a sanitary sewer easement,

created by separate instrument, may effect this site. This easement, if on this site should either be shown on the plat or if being vacated and replatted, proper reference to this should be noted in the plattor's text.

- I. The applicant shall install or guarantee the installation of all utilities and facilities which are applicable and described in Article 8 of the MAPC Subdivision Regulations.
- J. The applicant's engineer is advised that the Register of Deeds is requiring the name(s) of the notary public, who acknowledges the signatures on this plat, to be printed beneath the notary's signature.
- K. To receive mail delivery without delay, and to avoid unnecessary expense, the applicant is advised of the necessity to meet with the U.S. Postal Service Growth Management Coordinator (phone 316-946-4527) prior to development of the plat so that the type of delivery, and the tentative mailbox locations can be determined.
- L. Perimeter closure computations shall be submitted with the final plat tracing. Section 5-101(c).
- M. Recording of the plat within 30 days after approval by the City Council.
- N. The representatives from the utility companies should be prepared to comment on the need for utility easements to be platted on this property.
- O. The representative from County Engineering should be prepared to comment on the status of the applicant's drainage plan.

Note: This plat has been submitted in final form only.