

## INTRODUCTION

This report contains supporting documentation and calculations for the existing storm water sewer system serving the apartment complex next to the proposed Oak Knoll 3<sup>rd</sup> Addition. The StormCad computer model by Haestad Methods, Inc. is used in the analysis of the above referenced storm water sewer system. This model determines the peak flow rates and pipe capacities based on input data taken from survey information and the City of Wichita design criteria for drainage and storm sewer systems. The output from the analysis of the storm sewer for the 5-year and 100-year frequencies can be found on the attached pages.

## HYDROLOGY

The computer model determines the peak flow rates for the system based on system flow time and the rational method for determining peak flows. The peak flow rates for the system are based on the assumption that the apartment complex draining to the storm sewer system and the portion of the proposed Oak Knoll 3<sup>rd</sup> Addition shown on the attached drainage plan will drain into the existing storm water sewer system.

## HYDRAULICS

The computer model then routes the flow rates through the pipe system to determine the hydraulic grade line of the system. The hydraulic grade line is the depth of flow in the pipes.

## CONCLUSION

According to the analysis of both the 5-year and 100-year frequency storms, the existing system can convey the flows without flooding the drives and adjacent properties. There are three pipes, two 12" and one 15", extended to the west from the existing inlets in the drive to the existing inlets which have been covered with plywood and soil. It is evident that the existing storm water sewer was designed to drain the proposed Oak Knoll 3<sup>rd</sup> Addition.

**5 Year Frequency  
Analysis**

# Node Report

5 Year  
Frequency

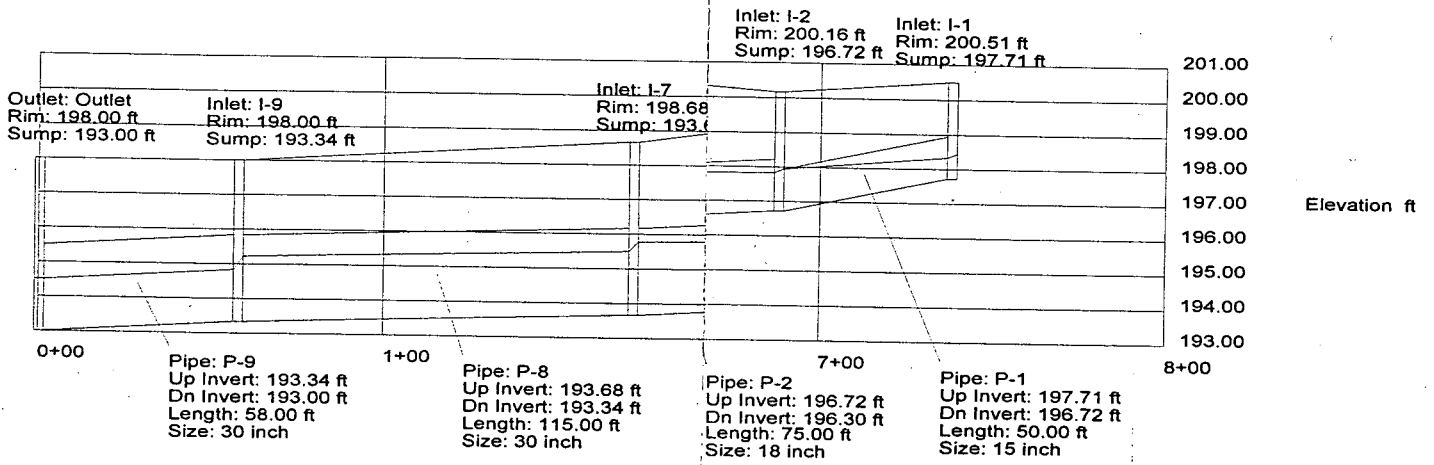
Node	Inlet A (acres)	C	Inlet CA (acres)	Tot CA (acres)	TC (min)	Up Flow Time (min)	Sys Flow Time (min)	I (in/hr)	Tot CIA (cfs)	Q (cfs)	Gr Elev (ft)	Rim (ft)	HGL In (ft)	HGL Out (ft)	I (in/hr)	Inlet Q (cfs)	Description
I-10	0.77	0.69	0.53	0.53	5.00	0.00	5.00	4.48	2.40	2.40	01.00	01.00	98.11	198.04	4.48	2.40	2x2 Drop
I-1	0.77	0.69	0.53	0.53	5.00	0.00	5.00	4.48	2.40	2.40	00.51	00.51	98.45	198.33	4.48	2.40	2x4 Drop
I-2	0.77	0.69	0.53	1.06	5.00	5.28	5.28	4.44	4.76	4.76	00.16	00.16	97.96	197.86	4.48	2.40	2x4 Drop
I-3	0.77	0.69	0.53	2.13	5.00	5.70	5.70	4.39	9.41	9.41	00.74	00.74	97.77	197.59	4.48	2.40	2x4 Drop
I-4	0.77	0.69	0.53	2.66	5.00	5.97	5.97	4.36	1.68	1.68	00.26	00.26	97.62	197.47	4.48	2.40	2x4 Drop
I-5	0.77	0.69	0.53	3.19	5.00	6.22	6.22	4.33	3.92	3.92	00.41	00.41	97.24	196.95	4.48	2.40	2x4 Drop
I-6	0.77	0.69	0.53	3.72	5.00	6.74	6.74	4.27	6.02	6.02	00.94	00.94	96.41	195.97	4.48	2.40	2x4 Drop
I-7	0.77	0.69	0.53	4.25	5.00	7.33	7.33	4.21	8.03	8.03	98.68	98.68	95.76	195.48	4.48	2.40	2x4 Drop
I-9	0.77	0.69	0.53	4.78	5.00	7.74	7.74	4.16	0.07	0.07	98.00	98.00	95.25	194.86	4.48	2.40	2x4 Drop
Outlet	N/A	N/A	N/A	4.78	N/A	7.89	7.89	4.15	9.99	N/A	98.00	98.00	94.52	194.52	N/A	N/A	30" End

# Pipe Report

Pipe	Up Node	Dn Node	Inlet A (acres)	C	Inlet CA (acres)	Tot CA (acres)	I (in/hr)	Q (cfs)	Length (ft)	S (ft/ft)	Size	Roughness	Cap (cfs)	Up Invert (ft)	Dn Invert (ft)	Up Gr Elev (ft)	Dn Gr Elev (ft)	Up Cover (ft)	Dn Cover (ft)	Up HGL (ft)	Dn HGL (ft)	Description
P-10	I-10	I-3	0.77	0.69	0.53	0.53	4.48	2.40	60.00	011667	12 inch	0.013	3.85	97.00	96.30	201.00	00.74	3.00	3.44	98.04	97.77	
P-1	I-1	I-2	0.77	0.69	0.53	0.53	4.48	2.40	50.00	019800	15 inch	0.013	9.09	97.71	96.72	200.51	00.16	1.55	2.19	98.33	97.96	
P-2	I-2	I-3	0.77	0.69	0.53	1.06	4.44	4.76	75.00	005600	18 inch	0.013	7.86	96.72	96.30	200.16	00.74	1.94	2.94	97.86	97.77	
P-3	I-3	I-4	0.77	0.69	0.53	2.13	4.39	9.41	60.00	009167	24 inch	0.013	1.66	96.30	95.75	200.74	00.26	2.44	2.51	97.59	97.62	
P-4	I-4	I-5	0.77	0.69	0.53	2.66	4.36	1.68	65.00	000923	24 inch	0.013	6.87	95.75	95.69	200.26	00.41	2.51	2.72	97.47	97.24	
P-5	I-5	I-6	0.77	0.69	0.53	3.19	4.33	3.92	45.00	007379	30 inch	0.013	5.23	95.69	94.62	200.41	00.94	2.22	3.82	96.95	96.41	
P-6	I-6	I-7	0.77	0.69	0.53	3.72	4.27	6.02	70.00	005529	30 inch	0.013	0.50	94.62	93.68	200.94	98.68	3.82	2.50	95.97	95.76	
P-8	I-7	I-9	0.77	0.69	0.53	4.25	4.21	8.03	15.00	002957	30 inch	0.013	2.30	93.68	93.34	198.68	98.00	2.50	2.16	95.48	95.24	
P-9	I-9	Outlet	0.77	0.69	0.53	4.78	4.16	0.07	58.00	005862	30 inch	0.013	1.40	93.34	93.00	198.00	98.00	2.16	2.50	94.86	94.52	

## Combined Pipe/Node Report

Pipe	Up Node	Dn Node	Length (ft)	Inlet A (acres)	C	Inlet CA (acres)	Tot CA (acres)	Inlet Q (cfs)	Size	Cap (cfs)	V avg (ft/s)	Up Invert (ft)	Dn Invert (ft)	S (ft/ft)	Description
P-10	I-10	I-3	60.00	0.77	0.69	0.53	0.53	2.40	12 inch	3.85	3.05	97.00	96.30	011667	
P-1	I-1	I-2	50.00	0.77	0.69	0.53	0.53	2.40	15 inch	9.09	2.95	97.71	96.72	019800	
P-2	I-2	I-3	75.00	0.77	0.69	0.53	1.06	2.40	18 inch	7.86	3.00	96.72	96.30	005600	
P-3	I-3	I-4	60.00	0.77	0.69	0.53	2.13	2.40	24 inch	1.66	3.74	96.30	95.75	009167	
P-4	I-4	I-5	65.00	0.77	0.69	0.53	2.66	2.40	24 inch	6.87	4.26	95.75	95.69	000923	
P-5	I-5	I-6	45.00	0.77	0.69	0.53	3.19	2.40	30 inch	5.23	4.67	95.69	94.62	007379	
P-6	I-6	I-7	70.00	0.77	0.69	0.53	3.72	2.40	30 inch	0.50	4.79	94.62	93.68	005529	
P-8	I-7	I-9	15.00	0.77	0.69	0.53	4.25	2.40	30 inch	2.30	4.62	93.68	93.34	002957	
P-9	I-9	Outlet	58.00	0.77	0.69	0.53	4.78	2.40	30 inch	1.40	6.42	93.34	93.00	005862	



**100 Year Frequency  
Analysis**

100 Year  
Frequency

### Node Report

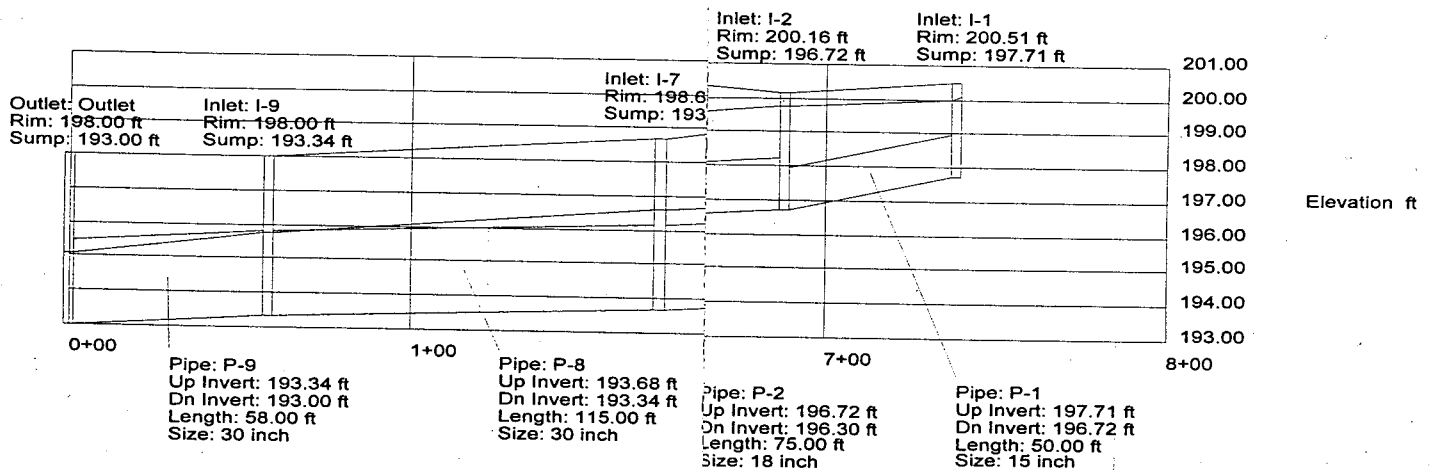
Node	Inlet A (acres)	C	Inlet CA (acres)	Tot CA (acres)	TC (min)	Up Flow Time (min)	Sys Flow Time (min)	I (in/hr)	Tot CIA (cfs)	Q (cfs)	Gr Elev (ft)	Rim (ft)	HGL In (ft)	HGL Out (ft)	I (in/hr)	Inlet Q (cfs)	Description
I-10	0.77	0.80	0.62	0.62	5.00	0.00	5.00	7.29	4.53	4.53	01.00	01.00	00.15	200.15	7.29	4.53	2x2 Drop
I-1	0.77	0.80	0.62	0.62	5.00	0.00	5.00	7.29	4.53	4.53	00.51	00.51	00.08	199.98	7.29	4.53	2x4 Drop
I-2	0.77	0.80	0.62	1.23	5.00	5.23	5.23	7.25	9.01	9.01	00.16	00.16	99.73	199.73	7.29	4.53	2x4 Drop
I-3	0.77	0.80	0.62	2.46	5.00	5.47	5.47	7.21	7.90	7.90	00.74	00.74	99.18	199.18	7.29	4.53	2x4 Drop
I-4	0.77	0.80	0.62	3.08	5.00	5.65	5.65	7.17	2.28	2.28	00.26	00.26	98.80	198.80	7.29	4.53	2x4 Drop
I-5	0.77	0.80	0.62	3.70	5.00	5.80	5.80	7.15	6.63	6.63	00.41	00.41	98.17	198.17	7.29	4.53	2x4 Drop
I-6	0.77	0.80	0.62	4.31	5.00	6.24	6.24	7.07	0.73	0.73	00.94	00.94	97.56	197.56	7.29	4.53	2x4 Drop
I-7	0.77	0.80	0.62	4.93	5.00	6.70	6.70	6.99	4.73	4.73	98.68	98.68	96.61	196.61	7.29	4.53	2x4 Drop
I-9	0.77	0.80	0.62	5.54	5.00	6.97	6.97	6.95	8.82	8.82	98.00	98.00	95.78	195.78	7.29	4.53	2x4 Drop
Outlet	N/A	N/A	N/A	5.54	N/A	7.08	7.08	6.93	8.72	N/A	98.00	98.00	95.10	195.10	N/A	N/A	30" End

# Pipe Report

Pipe	Up Node	Dn Node	Inlet A (acres)	C	Inlet CA (acres)	Tot CA (acres)	I (in/hr)	Q (cfs)	Length (ft)	S (ft/ft)	Size	Roughness	Cap (cfs)	Up Invert (ft)	Dn Invert (ft)	Up Gr Elev (ft)	Dn Gr Elev (ft)	Up Cover (ft)	Dn Cover (ft)	Up HGL (ft)	Dn HGL (ft)	Description
P-10	I-10	I-3	0.77	0.80	0.62	0.62	7.29	4.53	60.00	011667	12 inch	0.013	3.85	97.00	96.30	201.00	00.74	3.00	3.44	00.15	99.18	
P-1	I-1	I-2	0.77	0.80	0.62	0.62	7.29	4.53	50.00	019800	15 inch	0.013	9.09	97.71	96.72	200.51	00.16	1.55	2.19	99.98	99.73	
P-2	I-2	I-3	0.77	0.80	0.62	1.23	7.25	9.01	75.00	005600	18 inch	0.013	7.86	96.72	96.30	200.16	00.74	1.94	2.94	99.73	99.18	
P-3	I-3	I-4	0.77	0.80	0.62	2.46	7.21	7.90	60.00	009167	24 inch	0.013	1.66	96.30	95.75	200.74	00.26	2.44	2.51	99.18	98.80	
P-4	I-4	I-5	0.77	0.80	0.62	3.08	7.17	2.28	65.00	000923	24 inch	0.013	6.87	95.75	95.69	200.26	00.41	2.51	2.72	98.80	98.17	
P-5	I-5	I-6	0.77	0.80	0.62	3.70	7.15	6.63	45.00	007379	30 inch	0.013	5.23	95.69	94.62	200.41	00.94	2.22	3.82	98.17	97.56	
P-6	I-6	I-7	0.77	0.80	0.62	4.31	7.07	0.73	70.00	005529	30 inch	0.013	0.50	94.62	93.68	200.94	98.68	3.82	2.50	97.56	96.61	
P-8	I-7	I-9	0.77	0.80	0.62	4.93	6.99	4.73	15.00	002957	30 inch	0.013	2.30	93.68	93.34	198.68	98.00	2.50	2.16	96.61	95.78	
P-9	I-9	Outlet	0.77	0.80	0.62	5.54	6.95	8.82	58.00	005862	30 inch	0.013	1.40	93.34	93.00	198.00	98.00	2.16	2.50	95.78	95.10	

## Combined Pipe/Node Report

Pipe	Upstream Node	Downstream Node	Length (ft)	Inlet Area (acres)	Weighted Roughness Coefficient	Inlet CA (acres)	Total CA (acres)	Inlet Discharge (cfs)	Section Size	Capacity (cfs)	Average Velocity (ft/s)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Constructed Slope (ft/ft)	Description
P-10	I-10	I-3	60.00	0.77	0.80	0.62	0.62	4.53	12 inch	3.85	5.77	197.00	196.30	0.011667	
P-1	I-1	I-2	50.00	0.77	0.80	0.62	0.62	4.53	15 inch	9.09	3.69	197.71	196.72	0.019800	
P-2	I-2	I-3	75.00	0.77	0.80	0.62	1.23	4.53	18 inch	7.86	5.10	196.72	196.30	0.005600	
P-3	I-3	I-4	60.00	0.77	0.80	0.62	2.46	4.53	24 inch	21.66	5.70	196.30	195.75	0.009167	
P-4	I-4	I-5	65.00	0.77	0.80	0.62	3.08	4.53	24 inch	6.87	7.09	195.75	195.69	0.000923	
P-5	I-5	I-6	45.00	0.77	0.80	0.62	3.70	4.53	30 inch	35.23	5.43	195.69	194.62	0.007379	
P-6	I-6	I-7	70.00	0.77	0.80	0.62	4.31	4.53	30 inch	30.50	6.26	194.62	193.68	0.005529	
P-8	I-7	I-9	15.00	0.77	0.80	0.62	4.93	4.53	30 inch	22.30	7.10	193.68	193.34	0.002957	
P-9	I-9	Outlet	58.00	0.77	0.80	0.62	5.54	4.53	30 inch	31.40	8.38	193.34	193.00	0.005862	



# Drainage Plan

**BAUGHMAN COMPANY, P.A.**

ENGINEERING, SURVEYING &amp; PLANNING

316/262-7271 • FAX 316/262-0149 • 315 ELLIS • WICHITA, KANSAS 67211

December 28, 1998

Mr. John LeMay  
Oak Knoll Home Owners Association

**RE: Drainage Evaluation  
Oak Knoll 3rd Addition**

John,

I have reviewed the Oak Knoll 3rd Addition drainage report for the proposed expansion and development of the area located immediately west of your existing development.

The area proposed for development identified as Oak Knoll 3rd Addition or the hecox site was always planned to be discharged into the existing storm sewers located within your area. When we designed your area in 1984 then identified as The Highlands Condominiums Phase V, the proposed development in a different configuration was to drain easterly into the storm sewer within your area. The installed storm sewers were installed in accordance with this area having the capability to drain basically as is now being proposed. The undated drainage report submitted to you by Dale Hecox conceptually follows the same hydraulic pipe design as our firm provided for in 1984. The report does not address how the specific improvements within the Hecox development are to take place nor offers a site grading plan for review.

Conceptually, I would recommend approval of their plan with the following items to be fulfilled and resubmitted to you for your review and approval prior to any construction proceeding on the Hecox site.

1. Storm sewers be extended into the Hecox site from the three locations at the west line of your development.
2. Adequate street inlets be constructed the Hecox site to discharge at a minimum the 5 year design storm before any runoff passes into your development.

Mr. John LeMay

Page 2.

3. Adequate area inlets be constructed to properly drain the rear yard areas between the two developments including any roof drain discharges from the proposed Hecox development.
4. The right to review and approve the final grading and storm sewer plans when they become available for a final approval of the project.

If you should have any questions, do not hesitate to contact me at 262-7271.

Thank you.

Sincerely,  
**Baughman Company, P.A.**

N. Brent Wooten, P.E.  
President.

# OAK KNOLL 3RD ADDITION

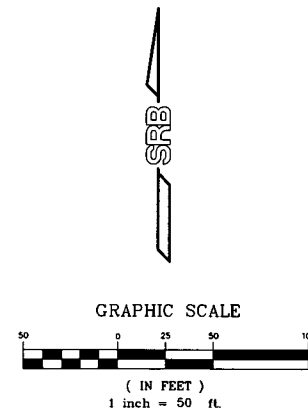
WICHITA, SEDGWICK COUNTY, KANSAS

**DESCRIPTION:**

Lot 1, Block 1, Oak Knoll Addition to Wichita, Sedgwick County, Kansas, except a tract described as: Beginning at the northeast corner of Lot 1; thence southerly along the east line of said Lot 1, bearing S00°E a distance of 604.44 feet to the S.E. corner of said Lot 1; thence bearing N90°W a distance of 230.00 feet; thence bearing N00°E a distance of 163.00 feet; thence bearing N90°W a distance of 98.00 feet; thence bearing S00°E a distance of 10.00 feet; thence bearing N90°W a distance of 32.00 feet; thence bearing N00°E a distance of 6.44 feet; thence bearing N45°W a distance of 72.12 feet; thence bearing N90°W a distance of 16.00 feet; thence bearing N00°E a distance of 30.00 feet; thence bearing N90°E a distance of 10.00 feet; thence bearing N00°E a distance of 102.00 feet; thence bearing N90°W a distance of 10.00 feet; thence bearing N00°E a distance of 30.00 feet; thence bearing N90°E a distance of 16.00 feet; thence bearing N45°E a distance of 73.54 feet; thence bearing N00°E a distance of 16.00 feet; thence bearing N90°E a distance of 121.00 feet; thence bearing N00°E a distance of 165.25 feet to the north line of said Lot 1; thence bearing S89°42'E along the north line a distance of 238.00 feet to the point of beginning.

**GROSS SIZE:**  
165,082.03 Sq. Ft. ±  
3.79 Acres ±

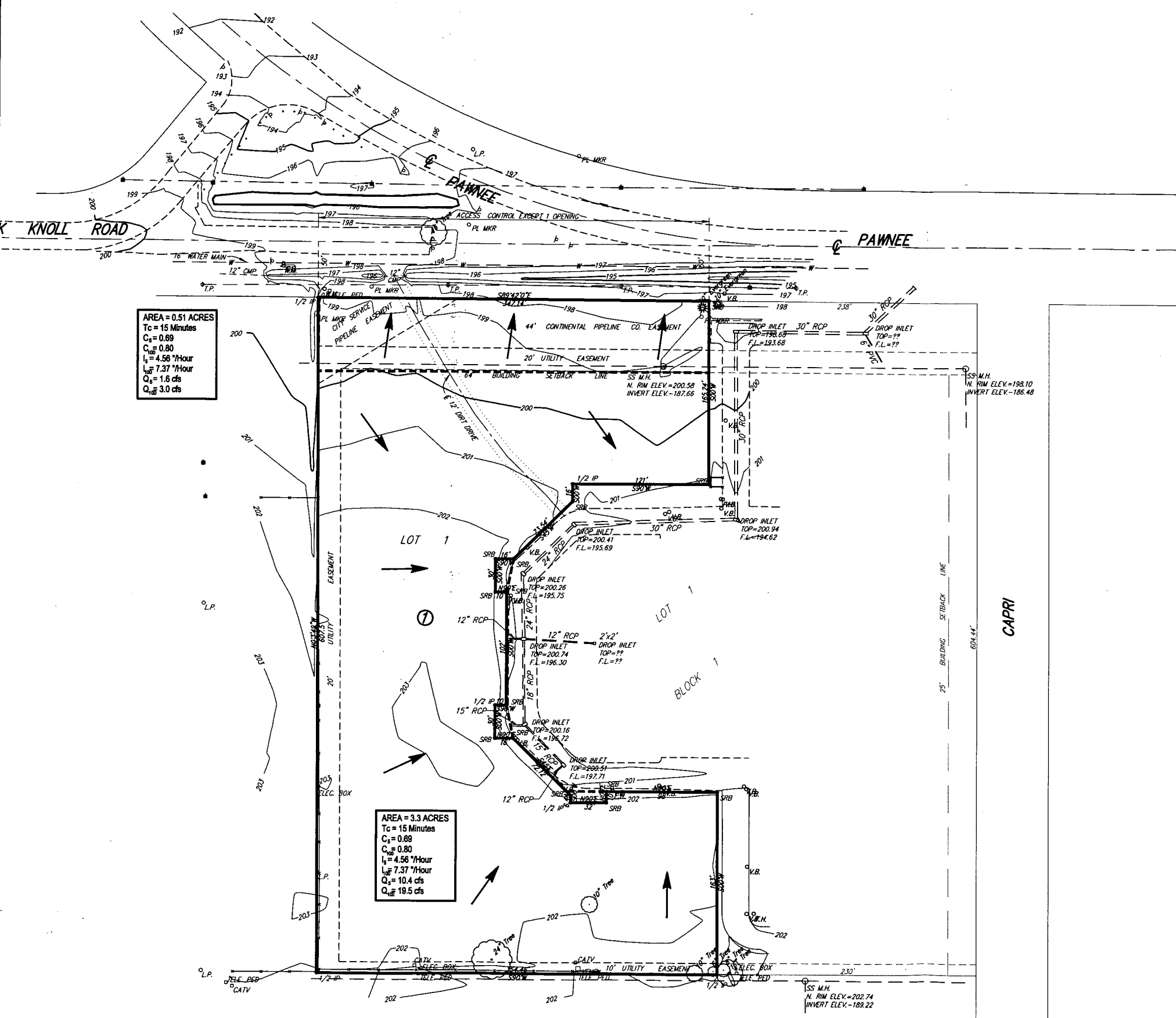
DALE HECOX  
8212 MAPLE  
WICHITA, KANSAS 67209  
(316) 721-8603



**DRAINAGE PLAN  
OAK KNOLL 3RD ADDITION  
CITY OF WICHITA, KANSAS**

**SRB** 224 NORTH MAIN WICHITA, KANSAS 67203 316-264-8008  
SAVOY, RUGGLES & BOHM, P.A. ENGINEERING & SURVEYING  
PROJECT NUMBER

DESIGN	DRAWN	CHECKED	REVIEW	DATE	REVISED
CMB				2-16-98	Nov. 4, 1998



AREA = 0.51 ACRES  
T<sub>c</sub> = 15 Minutes  
C<sub>i</sub> = 0.80  
C<sub>s</sub> = 0.80  
I<sub>a</sub> = 4.58 <sup>1</sup>/<sub>hour</sub>  
I<sub>p</sub> = 7.37 <sup>1</sup>/<sub>hour</sub>  
Q<sub>1</sub> = 1.6 cfs  
Q<sub>2</sub> = 3.0 cfs

AREA = 3.3 ACRES  
T<sub>c</sub> = 15 Minutes  
C<sub>i</sub> = 0.80  
C<sub>s</sub> = 0.80  
I<sub>a</sub> = 4.58 <sup>1</sup>/<sub>hour</sub>  
I<sub>p</sub> = 7.37 <sup>1</sup>/<sub>hour</sub>  
Q<sub>1</sub> = 10.4 cfs  
Q<sub>2</sub> = 19.5 cfs