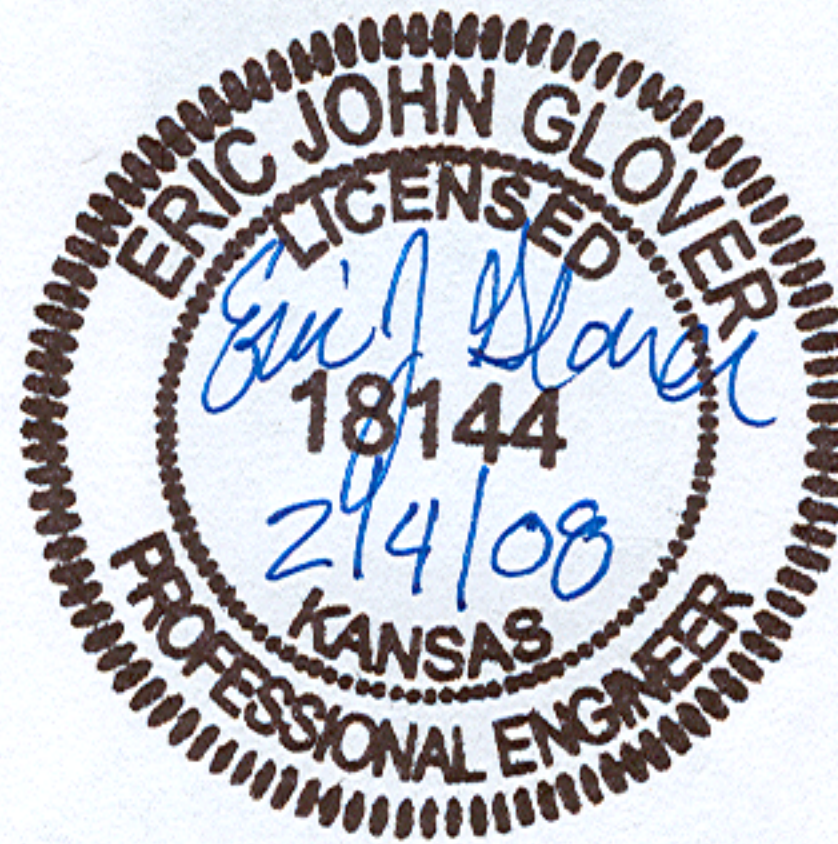


**DRAINAGE ANALYSIS  
BELLECHASE ADDITION  
WICHITA, SEDGWICK COUNTY, KANSAS  
FEBRUARY 2008**



**Ruggles & Bohm. P.A.  
Eric J Glover P.E.**

**BELLECHASE 2<sup>nd</sup> ADDITION  
WICHITA, SEDGWICK COUNTY, KANSAS  
DRAINAGE ANALYSIS  
NOVEMBER 2007**

Belle Chase Addition is located near the northwest corner of the intersection of 127<sup>th</sup> Street East and Harry Street. The total addition consists of approximately 100.8 acres. From the National Cooperative Web Soil Survey 2.0, the predominant on-site soils are Rosehill silty clay and Clime silty clay, hydrologic soils group D and C respectively. For the sake of drainage analysis type D hydrologic group characteristics will be used. The site is currently used as pasture.

Belle Chase Addition is situated immediately south of Country Hollow Addition, Wichita, Sedgwick County, Kansas. A small portion of the southernmost part of the plat is within the floodway.

In the pre-developed condition offsite drainage comes from Country Hollow Addition to the north of the site. Spring Branch Creek flows just south of the addition. The site drains from north to south into the Spring Branch.

In the developed condition, the site will be subdivided into 222 single family lots. There is an existing pond in the Northeast corner of the plat that will be improved. A detention pond will be constructed along the South edge of the plat. The site will be drained into storm water systems and then into the drainage ponds. Some drainage will flow to the Spring Branch undetained. The Spring Branch of the Four-mile creek is a fully developed creek.

There are no local stormwater drainage systems that will be impacted. No wetlands exist on site to be impacted. There is no proposed construction near riparian areas. There will be a need for a LOMA to remove some lots from the floodplain. The floodway will not be impacted by construction.

HEC-HMS 3.0.1 was used for the hydraulic analysis of the site. For all rainstorm events studied, the total discharge from the site was reduced in the developed condition.

Storm Return Period	Existing Runoff (cfs)	Developed Runoff (cfs)
2 yr	236.6	231.3
5 yr	329.6	314.8
10 yr	405.7	381.8
25 yr	480.8	448.9
100 yr	640.2	590.1

Table 1: Peak runoff for each studied rainfall event.

## Existing Conditions

The existing site is 100.8 acres of pasture with hydrologic group D and C soil. The Country Hollow Drainage plan was used to input discharge from Country Hollow onto Belle Chase. The time of concentration is 22.8 minutes for the West basin and 18.6 minutes for the East basin. Time of Concentration was found using the velocity method. Considering the soil types and land use, a curve number of 83 was used for the onsite areas. Existing runoff for each return period is shown in Table 1. Runoff from the West basin flows undetained to the Spring Branch. Runoff for the East basin flows into an existing pond. Existing Pond data is found in Table 2.

West Basin:

$T_c = 300' / 0.45 \text{ ft/sec (overland)} + 300' / 1.5 \text{ ft/sec (sheet flow)} + 1260' / 2.5 \text{ ft/sec (channel flow)} = 1370 \text{ seconds} = 22.8 \text{ minutes.}$

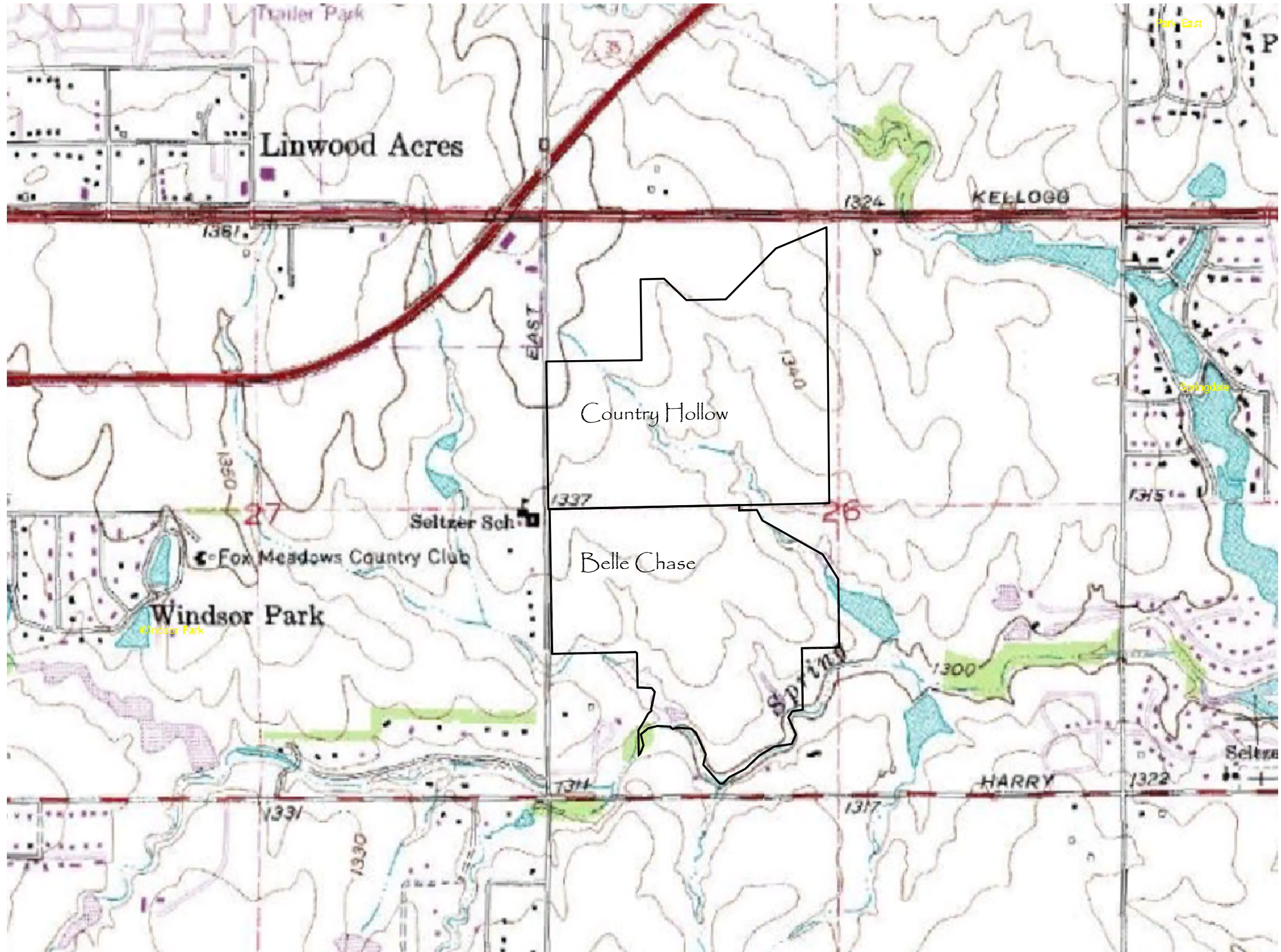
East Basin:

$T_c = 300' / 0.45 \text{ ft/sec (overland)} + 300' / 1.5 \text{ ft/sec (sheet flow)} + 630' / 2.5 \text{ ft/sec (channel flow)} = 1116 \text{ seconds} = 18.6 \text{ minutes.}$

The existing pond is controlled by a 12" CMP and ultimately a low area acts as a weir.


Elevation	Area (acres)	Discharge (cfs)
1313.5	1.16	0.0
1314.0	1.30	0.8
1314.5	1.63	2.1
1315.0	1.95	3.3
1315.5	2.37	54.0
1316.0	2.78	185.0
1316.5	3.33	425.0
1317.0	3.88	792.0

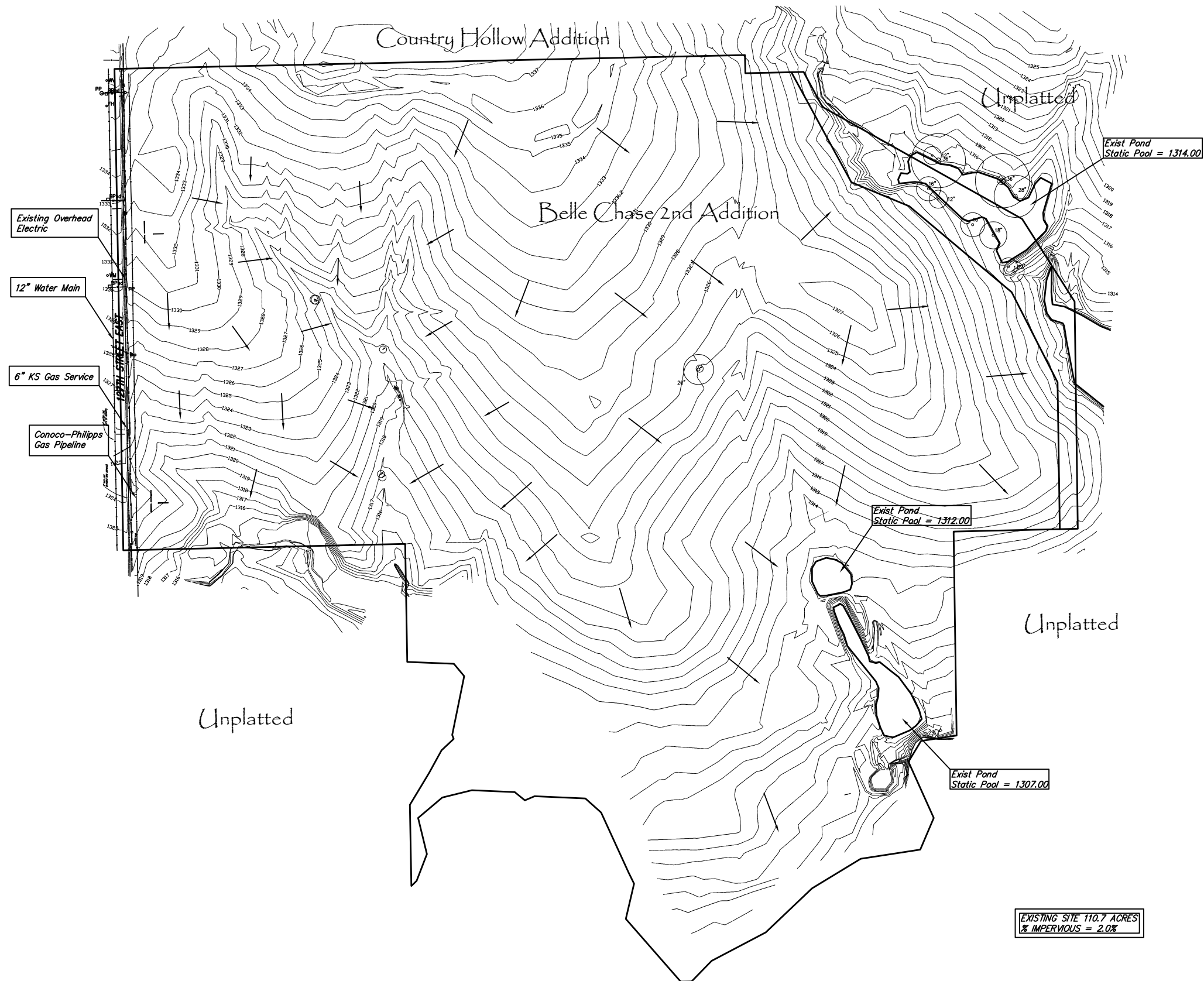
Table 2: Existing Pond data.



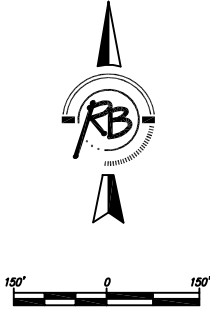
<b>BELLECHASE 2ND ADDITION USGS WICHITA, KANSAS</b>			
	<b>Ruggles &amp; Bohm, P.A.</b> Engineering, Surveying, Land Planning		DESIGN EJG
	824 North Main Wichita, Kansas 67203 www.rbkansas.com		(316) 264-8008 (316) 264-4621 fax E-mail: info@rbkansas.com
DRAWING FILE	PROJECT NUMBER	DATE	SHEET
		Dec. 4, 2007	OF



BELLECHASE 2ND ADDITION AERIAL WICHITA, KANSAS			
	<b>Ruggles &amp; Bohm, P.A.</b> Engineering, Surveying, Land Planning		DESIGN E.JG
	924 North Main Wichita, Kansas 67203 www.rbkansas.com		(316) 264-8008 (316) 264-4621 fax E-mail: info@rbkansas.com
DRAWING FILE	PROJECT NUMBER	DATE	SHEET
		Dec. 4, 2007	OF



EXISTING SITE 110.7 ACRES  
% IMPERVIOUS = 2.0%



<b>BELLECHASE 2ND ADDITION EXISTING CONTOURS WICHITA, KANSAS</b>			
	<b>Ruggles &amp; Bohm, P.A.</b> Engineering, Surveying, Land Planning		DESIGN EJG DRAWN EJG REVIEW EJG UTILITY DATE Dec. 4, 2007
	924 North Main Wichita, Kansas 67203 www.rbkansas.com		(316) 264-8008 (316) 264-4621 fax E-mail: info@rbkansas.com
DRAWING FILE		PROJECT NUMBER	

### **Developed Conditions**

The developed condition for Belle Chase Addition is 222 single family residential lots. 80.0 acres will be developed into lots with the remaining 30.7 left as reserves. The existing detention pond will be improved and controlled with a weir. A new detention pond will be constructed and controlled by a weir. A portion of the site will continue to drain to the Spring Branch undetained. However the overall discharge for the developed site will be decreased from the existing condition. The Country Hollow runoff was recreated using drainage model information furnished by MKEC.

Basin	Peak Discharge (cfs)				
	2-year	5-year	10-year	25-year	100-year
Onsite West	107.2	147.2	179.0	210.8	277.8
Pond Basin	27.2	37.3	45.3	53.3	70.2
Exist Pond	27.2	37.3	45.3	53.3	70.2
Onsite Southeast	19.6	27.9	32.7	38.5	50.6

Table 3 – Developed Basin Discharges.

## **Developed Drainage Basins**

### Onsite West

Undetained Drainage to Spring Branch

Area = 49.2 acres

CN = 90

Time of Concentration = 18 minutes

### Pond Basin

Onsite Drainage to Proposed Pond

Area = 11.3 acres

CN = 90

Time of Concentration = 15 minutes

### Existing Pond

Onsite Drainage to Existing Pond

Area = 11.3 acres

CN = 90

Time of Concentration = 15 minutes

### Southeast Basin

Undetained Drainage to Spring Branch

Area = 8.2 acres

CN = 90

Time of Concentration = 15 minutes

### **Pond Ratings**

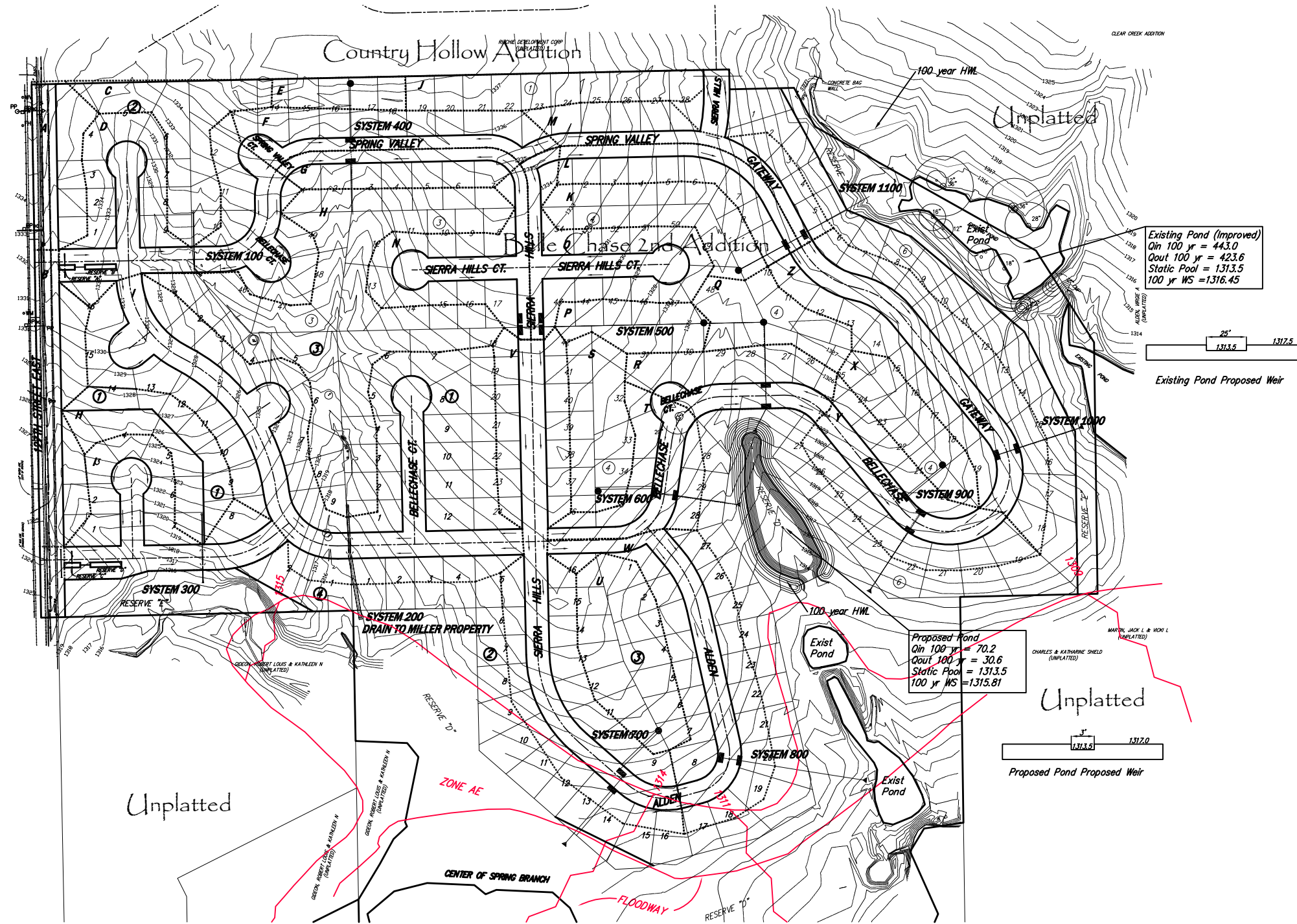
The following tables represent the data associated with the onsite detention ponds.

Elevation	Area (ac)	Discharge (cfs)	Storage (ac-ft)
1313.5	0.98	0.0	0
1314.0	1.55	29.5	0.63
1314.5	1.82	83.4	1.40
1315.0	2.09	153.3	2.30
1315.5	2.46	236.0	3.44
1316.0	2.83	329.8	4.76
1316.5	3.27	433.5	6.38
1317.0	3.71	546.3	8.21

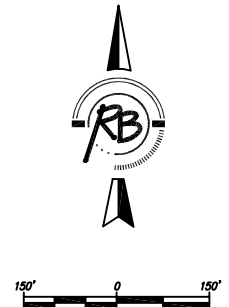
Table 4 – Existing pond (Improved) data.

Elevation	Area (ac)	Discharge (cfs)	Storage (ac-ft)
1313.5	0.79	0.0	0.0
1314.0	0.84	3.1	0.41
1314.5	0.89	8.7	0.84
1315.0	0.94	16.0	1.30
1315.5	0.99	24.6	1.78
1316.0	1.04	34.4	2.29
1316.5	1.09	45.2	2.82
1317.0	1.14	56.9	3.38

Table 5 – Proposed Pond Data.

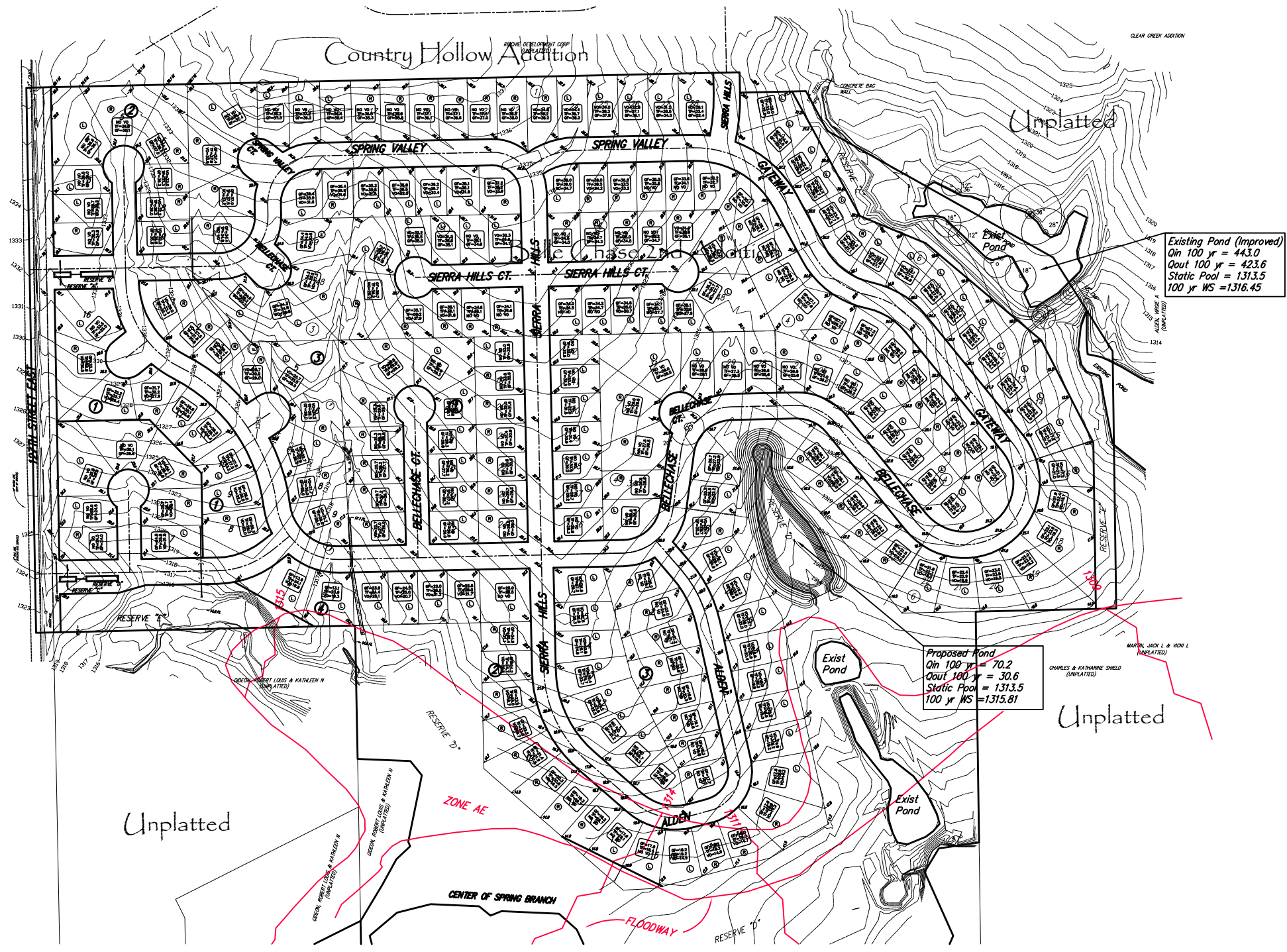


Basin	Area	C	I	Q <sub>u</sub>
A	1.23	0.68	7.37	6.16
B	1.77	0.68	7.37	8.87
C	1.79	0.68	7.37	8.97
D	4.13	0.76	7.37	23.13
E	0.59	0.68	7.37	2.96
F	1.85	0.76	7.37	10.36
G	1.22	0.76	7.37	6.83
H	5.77	0.68	7.37	28.92
I	8.94	0.76	7.37	50.07
J	1.39	0.68	7.37	6.97
K	1.54	0.68	7.37	7.72
L	1.49	0.76	7.37	8.35
M	1.60	0.76	7.37	8.96
N	1.97	0.76	7.37	11.03
O	2.25	0.76	7.37	12.60
P	0.95	0.68	7.37	4.76
Q	1.26	0.68	7.37	6.31
R	1.63	0.76	7.37	9.13
S	1.43	0.68	7.37	7.17
T	1.65	0.76	7.37	9.24
U	2.08	0.68	7.37	10.42
V	5.31	0.76	7.37	29.74
W	3.69	0.76	7.37	20.67
X	1.19	0.68	7.37	5.96
Y	2.61	0.76	7.37	14.62
Z	4.19	0.76	7.37	23.47



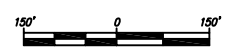
**BELLECHASE 2ND ADDITION  
DRAINAGE BASINS  
WICHITA, KANSAS**

 <b>Ruggles &amp; Bohm, P.A.</b> Engineering, Surveying, Land Planning	924 North Main Wichita, Kansas 67203 www.rbkansas.com	(316) 284-8008 (316) 284-4621 fax E-mail: info@rbkansas.com	DESIGN E.J.G. DRAWN E.J.G. REVIEW UTILITY DATE Dec. 4, 2007
	DRAWING FILE	PROJECT NUMBER	SHEET OF



Existing Pond (Improved)  
 Qin 100 yr = 443.0  
 Qout 100 yr = 423.6  
 Static Pool = 1313.5  
 100 yr WS = 1316.45

Proposed Pond  
 Qin 100 yr = 70.2  
 Qout 100 yr = 30.6  
 Static Pool = 1313.5  
 100 yr WS = 1315.81



**BELLECHASE 2ND ADDITION  
 4 CORNER LOT GRADING  
 WICHITA, KANSAS**

	<b>Ruggles &amp; Bohm, P.A.</b> Engineering, Surveying, Land Planning		DESIGN EJG
	924 North Main Wichita, Kansas 67203 www.rbkansas.com		(316) 284-8008 (316) 284-4621 fax E-mail: info@rbkansas.com
DRAWING FILE	PROJECT NUMBER	DATE	SHEET OF
		Dec. 4, 2007	

# BELLECHASE SECOND ADDITION

## an Addition to Wichita, Sedgwick County, Kansas

State of Kansas)  
Sedgwick County) SS

State of Kansas)  
Sedgwick County) SS

We, Ruggles & Bohm, P.A., Land Surveyors in aforesaid county and state, do hereby certify that, under the supervision of the undersigned, we have surveyed and platted "BELLECHASE SECOND ADDITION", an Addition to Wichita, Sedgwick County, Kansas, and that the accompanying plat is a true and correct exhibit of the property surveyed, described as follows:

The foregoing instrument acknowledged before me, this \_\_\_\_\_ day of \_\_\_\_\_, 2008, by Stephen G. Miller, President, on behalf of BELLECHASE DEVELOPMENT L.L.C.

\_\_\_\_\_  
Notary Public

My appointment expires \_\_\_\_\_

We, the undersigned, holders of a mortgage on the above described property, do hereby consent to this plat of "BELLECHASE SECOND ADDITION", an Addition to Wichita, Sedgwick County, Kansas, this \_\_\_\_\_ day of \_\_\_\_\_, 2008.

Garden Plain State Bank

\_\_\_\_\_  
President  
Patrick F. Waldon

State of Kansas)  
Sedgwick County) SS

The foregoing instrument acknowledged before me, this \_\_\_\_\_ day of \_\_\_\_\_, 2008, by Patrick F. Waldon, President of Garden Plain State Bank on behalf of the Bank.

\_\_\_\_\_  
Notary Public

My appointment expires \_\_\_\_\_

This plat of "BELLECHASE SECOND ADDITION", an Addition to Wichita, Sedgwick County, Kansas, has been submitted to and approved by the Wichita-Sedgwick County Metropolitan Area Planning Commission, Wichita, Kansas.

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 2008.

Wichita-Sedgwick County Metropolitan Area Planning Commission

\_\_\_\_\_  
Chair  
M.S. Mitchell

\_\_\_\_\_  
Secretary  
John L. Schlegel

This plat approved and all dedications shown hereon accepted by the City Council of the City of Wichita, Kansas, this \_\_\_\_\_ day of \_\_\_\_\_, 2008.

At the Direction of the City Council

\_\_\_\_\_  
Mayor  
Carl Brewer

\_\_\_\_\_  
City Clerk  
Karen Sublett

Reviewed in accordance with K.S.A. 58-2005 on this \_\_\_\_\_ day of \_\_\_\_\_, 2008.

\_\_\_\_\_  
Deputy County Surveyor  
Sedgwick County Kansas  
Tricia L. Robello, LS #1246

Entered on transfer record this \_\_\_\_\_ day of \_\_\_\_\_, 2008.

\_\_\_\_\_  
County Clerk  
Don Brace

State of Kansas)  
Sedgwick County) SS  
This is to certify that this plat has been filed for record in the office of the Register of Deeds, this \_\_\_\_\_ day of \_\_\_\_\_, 2008, at \_\_\_\_\_ o'clock \_\_\_\_\_ M., and is duly recorded.

\_\_\_\_\_  
Register of Deeds  
Bill Meek

\_\_\_\_\_  
Deputy  
Tonya Buckingham

That part of the N1/2, SW1/4, Sec. 26, T27S, R2E of the 6th P.M., Sedgwick County, Kansas described as beginning at the N.W. corner of said N1/2; thence N88°45'24"E along the north line of said N1/2, 1766.84 feet; thence S01°14'36"E, 50.00 feet; thence N88°45'24"E, parallel with said north line, 101.09 feet; thence S28°20'44"E, 340.19 feet; thence S43°13'32"E, 90.88 feet; thence S87°45'22"E, 101.77 feet; thence S49°57'33"E, 369.12 feet; thence S27°00'03"E, 279.24 feet to a point 50.00 feet West of the east line of said N1/2; thence S00°50'19"E, parallel with said east line, 405.68 feet to the south line of said N1/2; thence S88°42'16"W along said south line, 2585.83 feet to the S.W. corner of said N1/2; thence N01°02'26"W along the west line of said N1/2, 1329.64 feet to the place of beginning. EXCEPT that part platted as Bellechase, An Addition to Wichita, Sedgwick County, Kansas, AND EXCEPT that part described as beginning at the northeast corner of said addition; thence N88°45'24"E along said north line, 1373.84 feet; thence S01°14'36"E, 50.00 feet; thence N88°45'24"E, parallel with said north line, 101.09 feet; thence S28°20'44"E, 340.19 feet; thence S43°13'32"E, 90.88 feet; thence S87°45'22"E, 101.77 feet; thence S49°57'33"E, 369.12 feet; thence S27°00'03"E, 279.24 feet to a point 50.00 feet West of the east line of said N1/2; thence S00°50'19"E, parallel with said east line, 405.68 feet to the south line of said N1/2; thence S88°42'16"W along said south line, 766.53 feet; thence N31°37'02"W, 229.82 feet; thence S07°48'23"E, 5.53 feet; thence N82°11'37"W, 64.00 feet to a point of curve to the right having a radius of 93.00 feet, a central angle of 80°53'53", and a chord bearing S48°15'19"W, 120.67 feet; thence south-westerly along said curve a distance of 131.31 feet to a point of tangency of said curve; thence S88°42'16"W, 352.31 feet; thence N01°17'44"W, 502.64 feet; thence S88°45'24"W, parallel with said north line, 331.28 feet to the northeast corner of Lot 5, Block 3, in said addition; thence S88°45'24"W along the north line of said Lot 5, 213.37 feet to the northwest corner of Lot 4, Block 3, in said addition; thence N43°03'34"W along the northeast line of said Lot 4, 207.71 feet to the northeast corner of Lot 1, Block 3, in said addition; thence N05°21'38"W, 64.18 feet to the southeast corner of Lot 9, Block 2, in said addition; thence N01°02'26"W, 413.18 feet to the place of beginning.

The east 762 feet of the west 1540.5 feet of the S1/2 of the SW1/4 of Sec. 26, T27S, R2E of the 6th P.M., Sedgwick County, Kansas, lying north of the centerline of the creek, EXCEPT that part described as: Commencing at the S.W. corner of said east 762 feet; thence North on the west line of said east 762 feet, with an assumed bearing of N00°32'58"W, a distance of 608.70 feet to the point of beginning; thence N00°32'58"W, a distance of 394.82 feet; thence S87°08'11"E, a distance of 128.77 feet; thence S38°46'30"E, a distance of 44.36 feet; thence S11°57'15"W, a distance of 165.81 feet; thence S21°14'53"E, a distance of 11.72 feet; thence S47°30'57"W, a distance of 46.10 feet; thence S29°18'56"W, a distance of 70.61 feet; thence S31°33'22"W, a distance of 103.23 feet to the point of beginning.

The S1/2 of the SW1/4 of Sec. 26, T27S, R2E of the 6th P.M., Sedgwick County, Kansas, EXCEPT the east 343.18 feet thereof; AND EXCEPT the west 1540.5 feet thereof; AND EXCEPT that part south of the centerline of the creek.

All public easements and dedications are hereby vacated by virtue of K.S.A. 12-512(b).

Ruggles & Bohm, P.A.

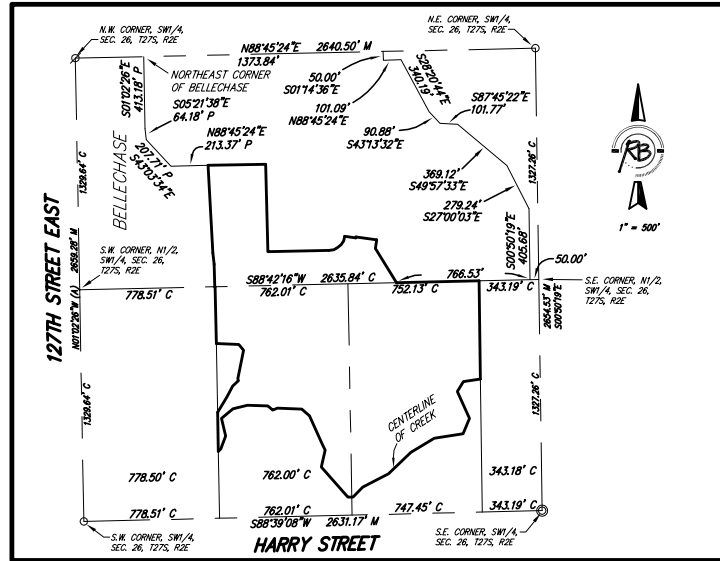
\_\_\_\_\_  
Land Surveyor  
Thomas C. Ruggles

Know all men by these presents that we, the undersigned, have caused the land described in the surveyor's certificate to be platted into Lots, Blocks, a Reserve and Streets, to be known as "BELLECHASE SECOND ADDITION", an Addition to Wichita, Sedgwick County, Kansas. The streets are hereby dedicated to and for the use of the public. Utility Easements are hereby granted for the construction and maintenance of all public utilities. Drainage Easements are hereby granted to the public as indicated for drainage purposes. Reserve "A" is hereby reserved for irrigation, gazebos, playground structures, picnic areas/ tables with canopies, walks, lighting, landscaping, lakes, drainage, drainage structures, and utilities confined to easements. The Reserve is to be owned and maintained by the Home Owners Association for the addition. A drainage plan has been developed for this plat; the property shall remain at established grades, or as modified with the approval of the City Engineer, and unobstructed to allow for the conveyance of storm water.

BELLECHASE DEVELOPMENT L.L.C.

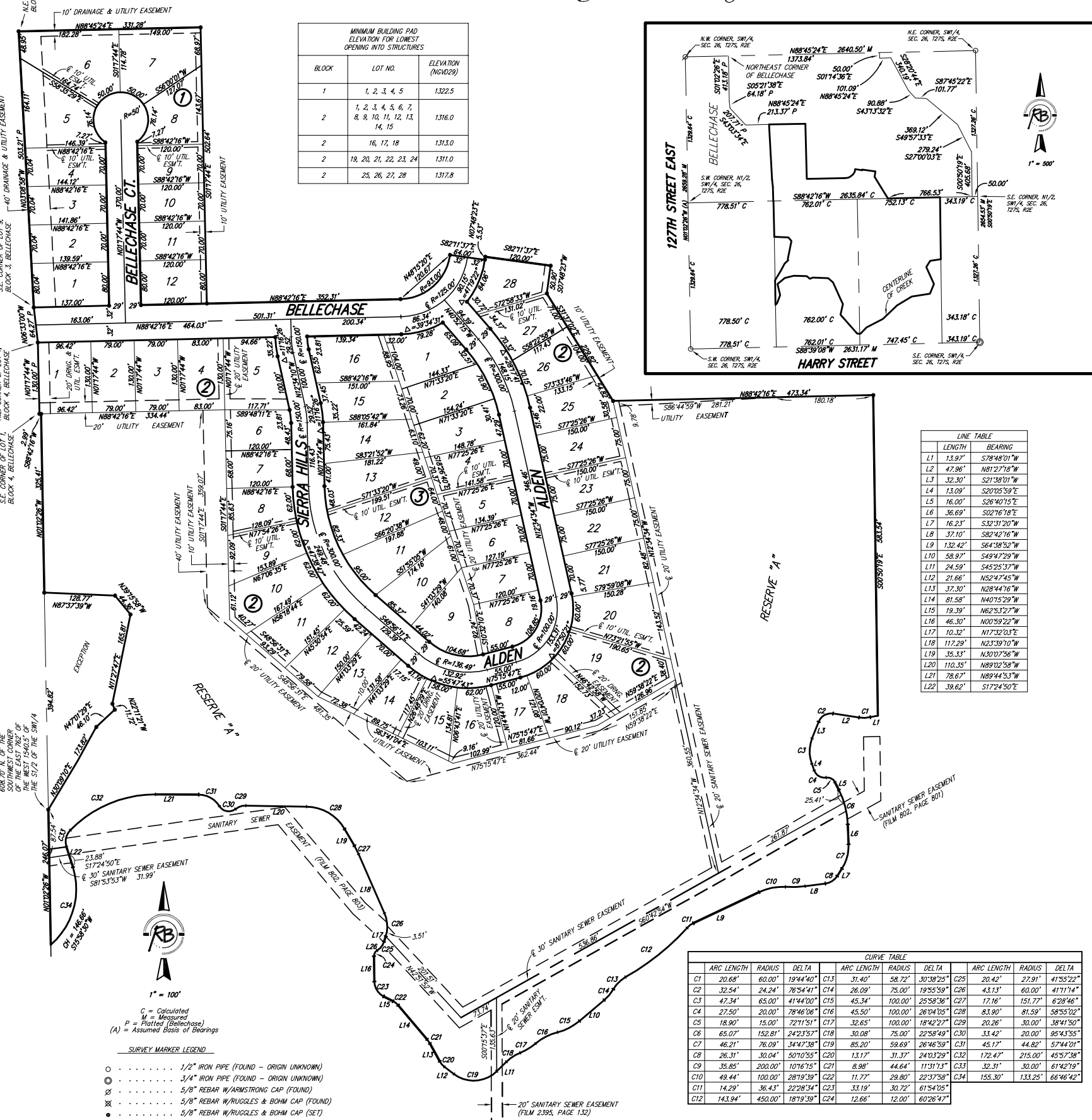
\_\_\_\_\_  
President  
Stephen G. Miller

BLOCK	LOT NO.	ELEVATION (NGVD29)
1	1, 2, 3, 4, 5	1322.5
2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15	1316.0
2	16, 17, 18	1313.0
2	19, 20, 21, 22, 23, 24	1311.0
2	25, 26, 27, 28	1317.8



LINE	LENGTH	BEARING
L1	13.97'	S78°48'01"W
L2	47.96'	N81°27'18"W
L3	32.30'	S21°38'01"W
L4	13.09'	S20°05'59"E
L5	16.00'	S26°40'15"E
L6	36.69'	S02°16'18"E
L7	16.23'	S32°31'20"W
L8	37.10'	S82°42'16"W
L9	132.42'	S64°38'52"W
L10	58.97'	S49°47'29"W
L11	24.59'	S45°25'57"W
L12	21.66'	N52°47'45"W
L13	37.30'	N28°44'16"W
L14	81.58'	N40°15'29"W
L15	19.39'	N62°53'27"W
L16	46.30'	N00°59'22"W
L17	10.32'	N17°32'03"E
L18	117.29'	N23°39'10"W
L19	35.33'	N30°07'56"W
L20	110.35'	N89°02'58"W
L21	78.67'	N89°44'53"W
L22	39.62'	S17°24'50"E

ARC LENGTH	RADIUS	DELTA	ARC LENGTH	RADIUS	DELTA	ARC LENGTH	RADIUS	DELTA			
C1	20.68'	60.00'	19°44'40"	C13	31.40'	58.72'	30°38'25"	C25	20.42'	27.91'	41°55'22"
C2	32.54'	24.24'	76°54'41"	C14	26.09'	75.00'	19°55'59"	C26	43.13'	60.00'	41°11'14"
C3	47.34'	65.00'	41°44'00"	C15	45.34'	100.00'	25°58'36"	C27	17.16'	151.77'	6°28'46"
C4	27.50'	20.00'	78°46'08"	C16	45.50'	100.00'	26°04'05"	C28	83.90'	81.59'	58°55'02"
C5	18.90'	15.00'	72°11'51"	C17	32.65'	100.00'	18°42'27"	C29	20.26'	30.00'	38°41'50"
C6	65.07'	152.81'	24°23'57"	C18	30.08'	75.00'	22°58'49"	C30	33.42'	20.00'	95°43'55"
C7	46.21'	76.09'	34°47'38"	C19	85.20'	59.69'	26°46'59"	C31	45.17'	44.82'	57°44'01"
C8	26.31'	30.04'	50°10'55"	C20	13.17'	31.37'	24°03'29"	C32	172.47'	215.00'	45°57'38"
C9	35.85'	200.00'	10°16'15"	C21	8.98'	44.64'	11°31'13"	C33	32.31'	30.00'	61°42'19"
C10	49.44'	100.00'	28°19'58"	C22	11.77'	28.80'	22°37'58"	C34	155.30'	133.25'	66°46'42"
C11	14.29'	36.43'	22°28'34"	C23	33.19'	30.72'	61°54'05"				
C12	143.94'	450.00'	18°19'39"	C24	12.66'	12.00'	60°26'47"				



- SURVEY MARKER LEGEND**
- 1/2" IRON PIPE (FOUND - ORIGIN UNKNOWN)
  - 3/4" IRON PIPE (FOUND - ORIGIN UNKNOWN)
  - 5/8" REBAR W/ARMSTRONG CAP (FOUND)
  - 5/8" REBAR W/RUGGLES & BOHM CAP (FOUND)
  - 5/8" REBAR W/RUGGLES & BOHM CAP (SET)

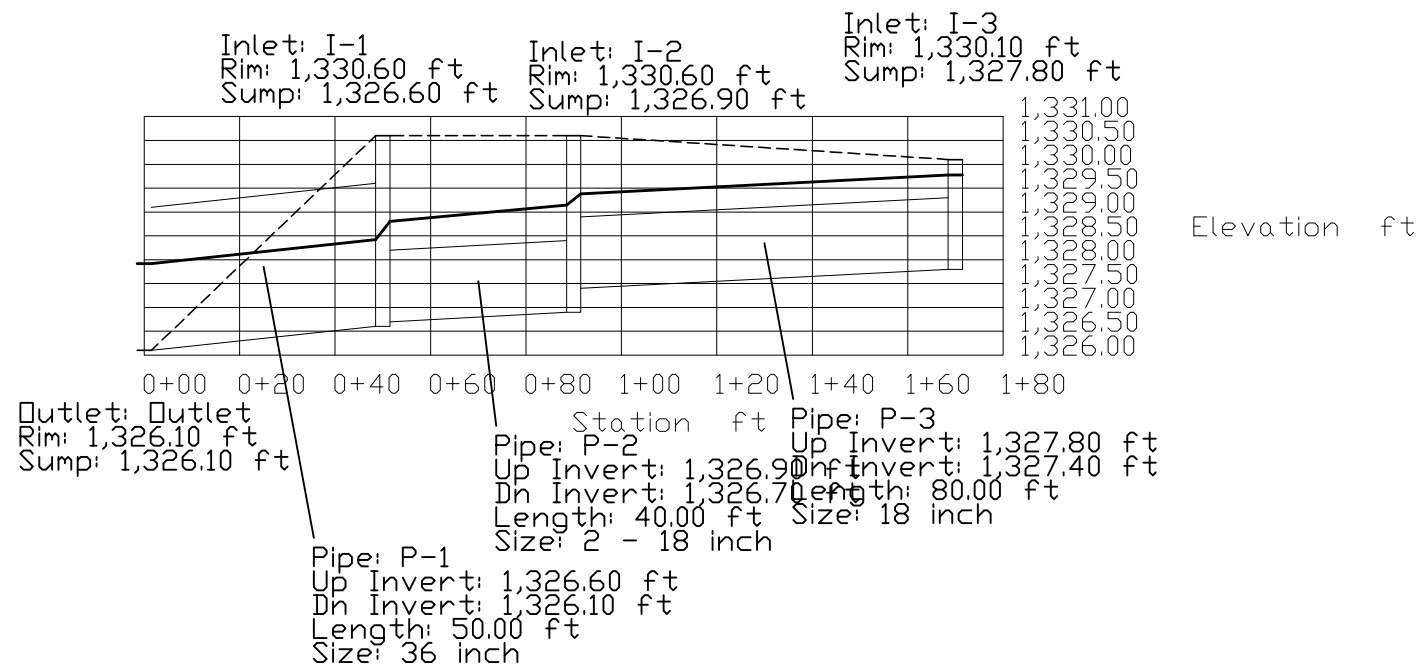
BENCH MARK: RAILROAD SPIKE IN SOUTH FACE OF POWER POLE 79' SOUTH SOUTHWEST OF THE WEST QUARTER CORNER OF SEC. 26, T27S, R2E. ELEVATION = 1337.46 (NGVD29)

DWG FILE: SURVEY BASE PROJECT NO. 3163P JANUARY 10, 2008

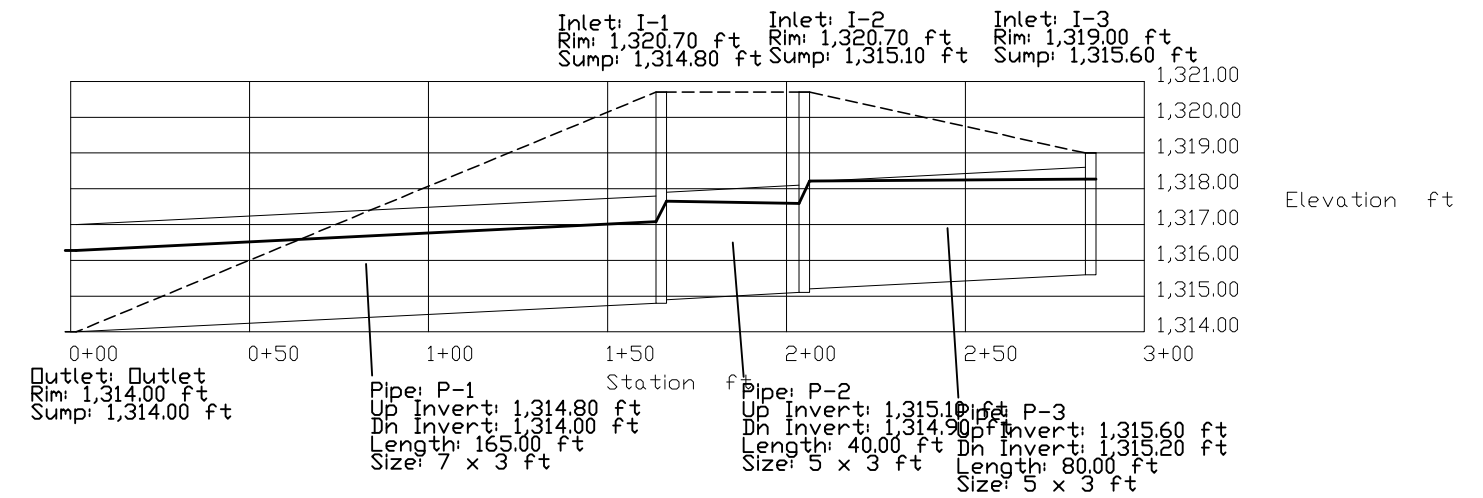


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www.rbkansas.com  
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(316) 264-4621 fax  
E-mail: info@rbkansas.com

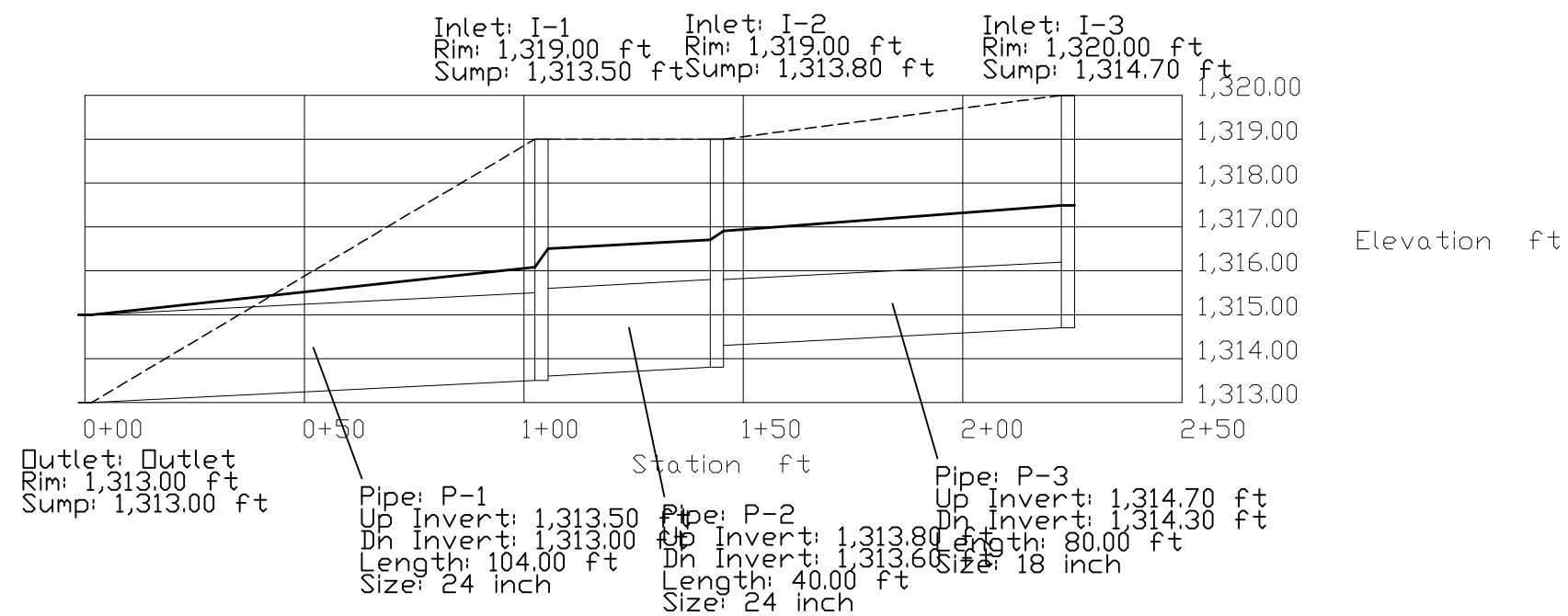
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SYSTEM 200 PROFILE



SYSTEM 300 PROFILE



**BELLE CHASE 2nd ADDITION  
SWS PROFILES**



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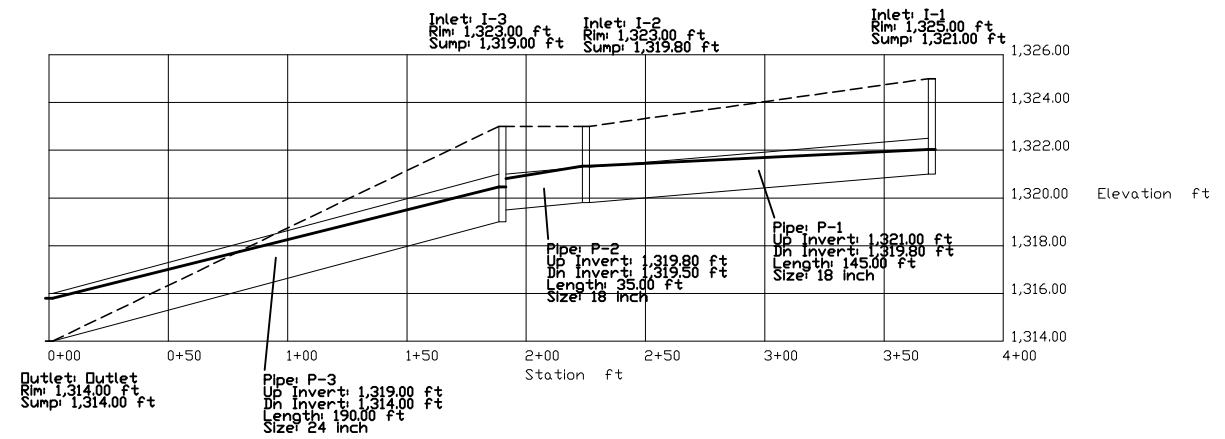
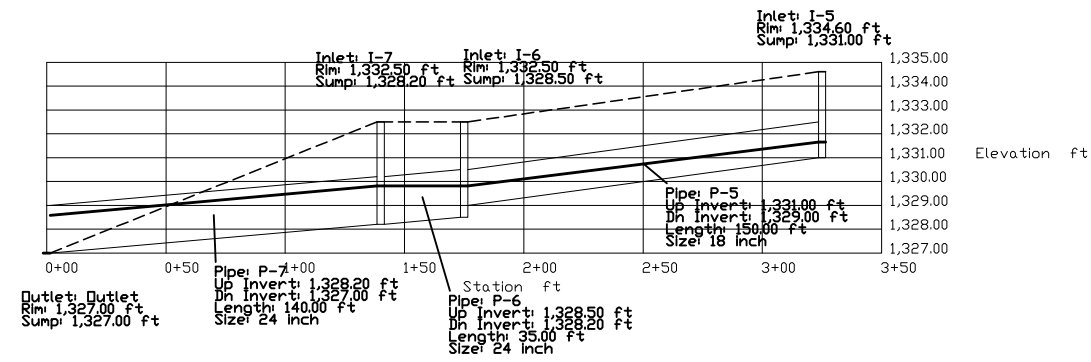
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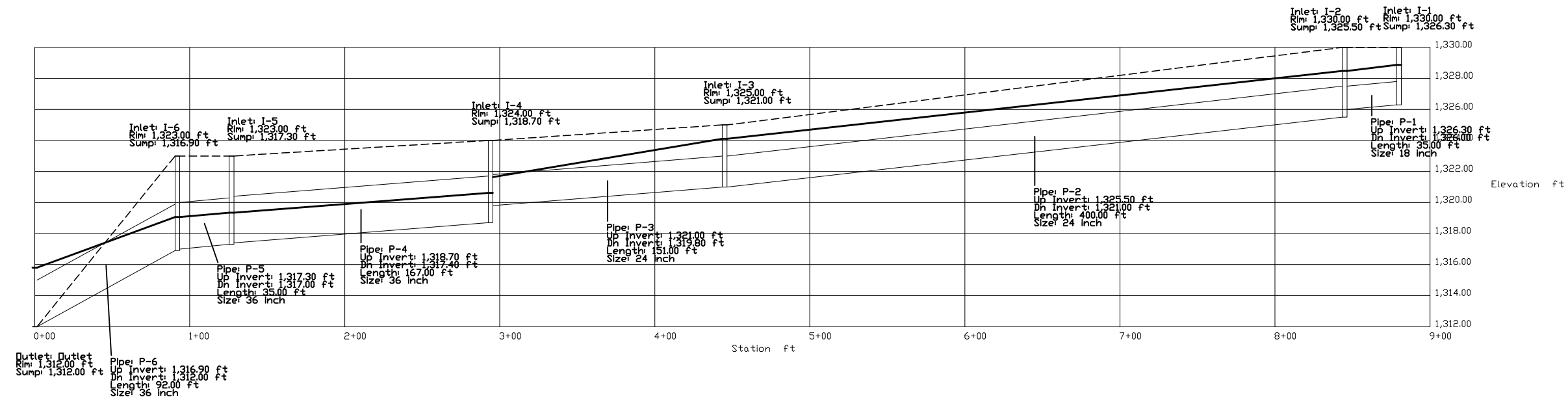
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DRAWN <i>EJC</i>	DATE
REVIEW	SHEET
UTILITY	OF
DRAWING FILE <i>SWS Profiles</i>	PROJECT NUMBER
DATE <i>Dec. 4, 2007</i>	

SYSTEM 600 PROFILE


SYSTEM 400 PROFILE



SYSTEM 500 PROFILE



**BELLE CHASE 2nd ADDITION  
SWS PROFILES**



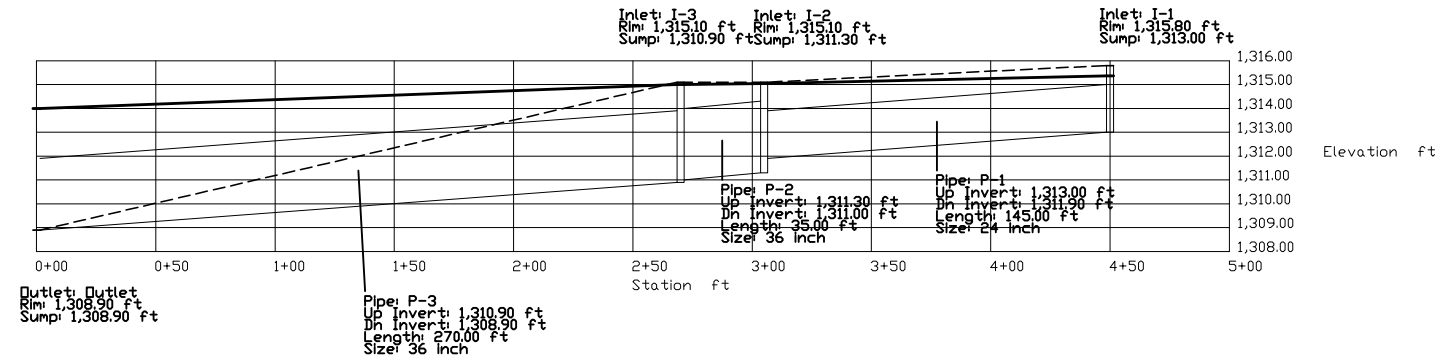
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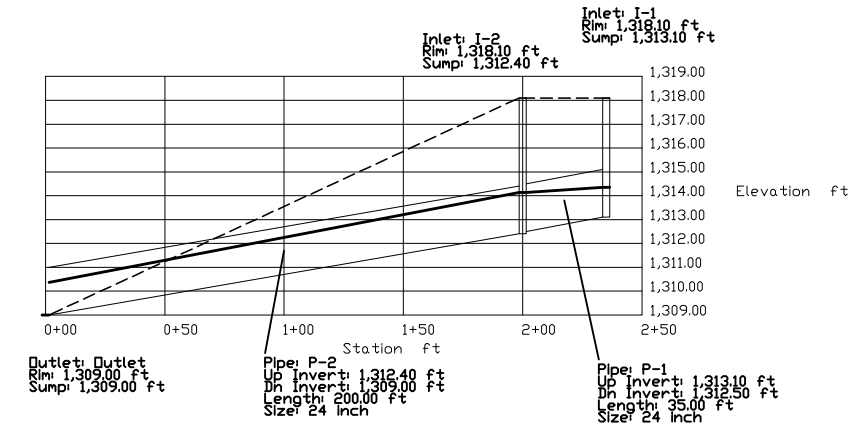
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(316) 264-4621 fax  
E-mail: info@rbkansas.com

DESIGN EJC	SHEET  OF	
DRAWN EJC		
REVIEW		
UTILITY		
DRAWING FILE SWS Profiles	PROJECT NUMBER	DATE Dec. 4, 2007

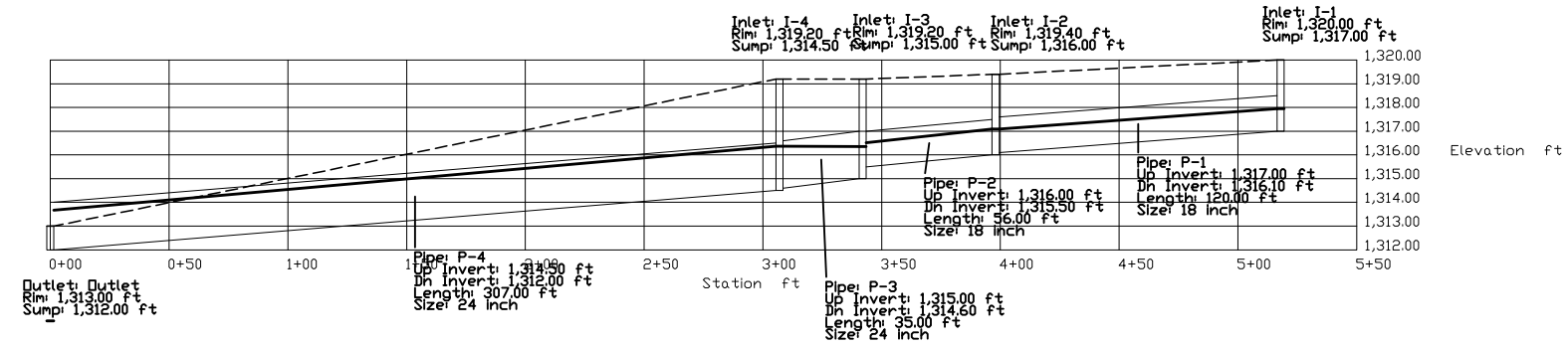
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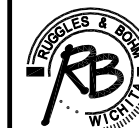
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BELLE CHASE 2nd ADDITION  
SWS PROFILES

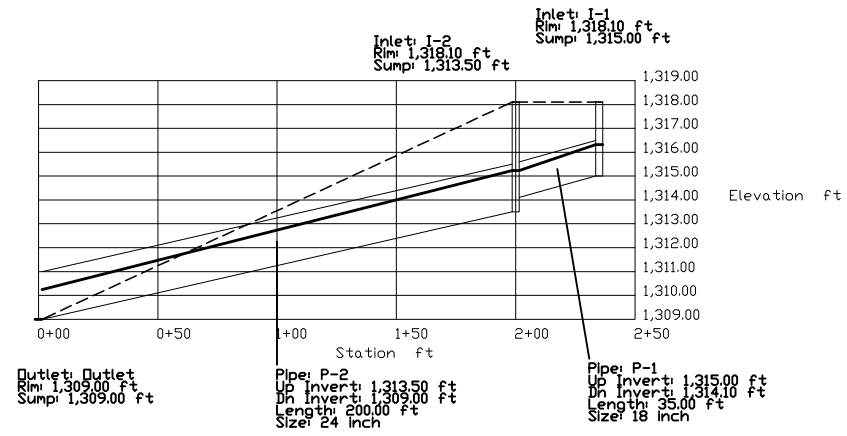


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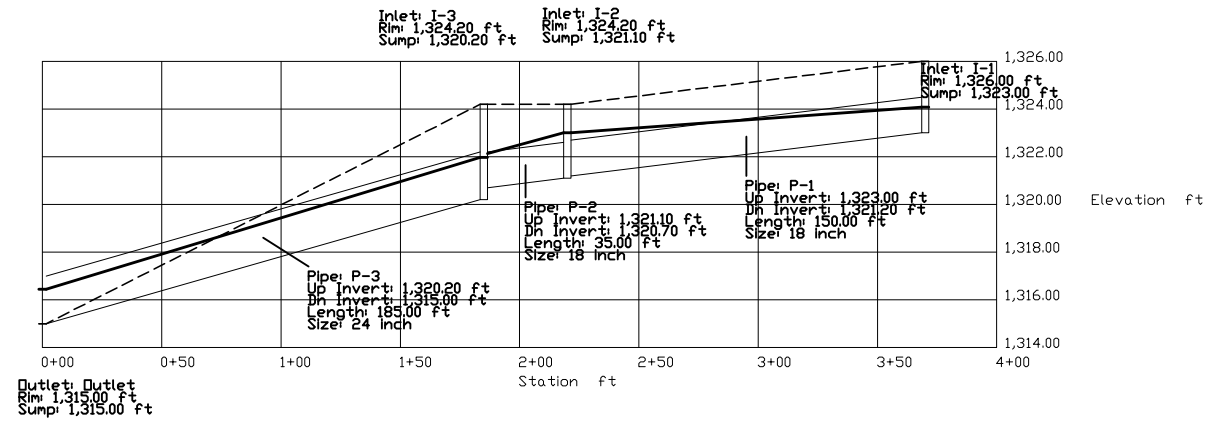
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DESIGN EJC	SHEET OF
DRAWN EJC	
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UTILITY	

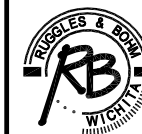
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SYSTEM 1100 PROFILE



BELLE CHASE 2nd ADDITION  
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