



JUN 29 2009

Ruggles & Bohm, P.A.

Engineering, Surveying, Land Planning  
924 N. Main  
Wichita, Kansas 67203

Date: Monday, June 29, 2009

**MEMO**

To: Scott Lindebak, P.E.  
City Hall  
455 N. Main Street  
Wichita, KS 67213

**Description:**

- Confirmation
- Transmittal
- Transmittal under separate cover by

From: Alex M. Lane, P.E.

**Purpose:**

- Approval
- Review & comment
- Use
- Other : \_\_\_\_\_
- Distribution
- Information
- Record

Project: B.G.'s 1<sup>st</sup> Addition

**Enclosures/Attachments:**

- Prints
- Originals
- Diskettes containing: \_\_\_\_\_
- Change Order
- Shop Drawings
- Other: \_\_\_\_\_

RB Project No.: 3454E

Other Project Reference No.: \_\_\_\_\_

Copies	Description
1	Drainage Report

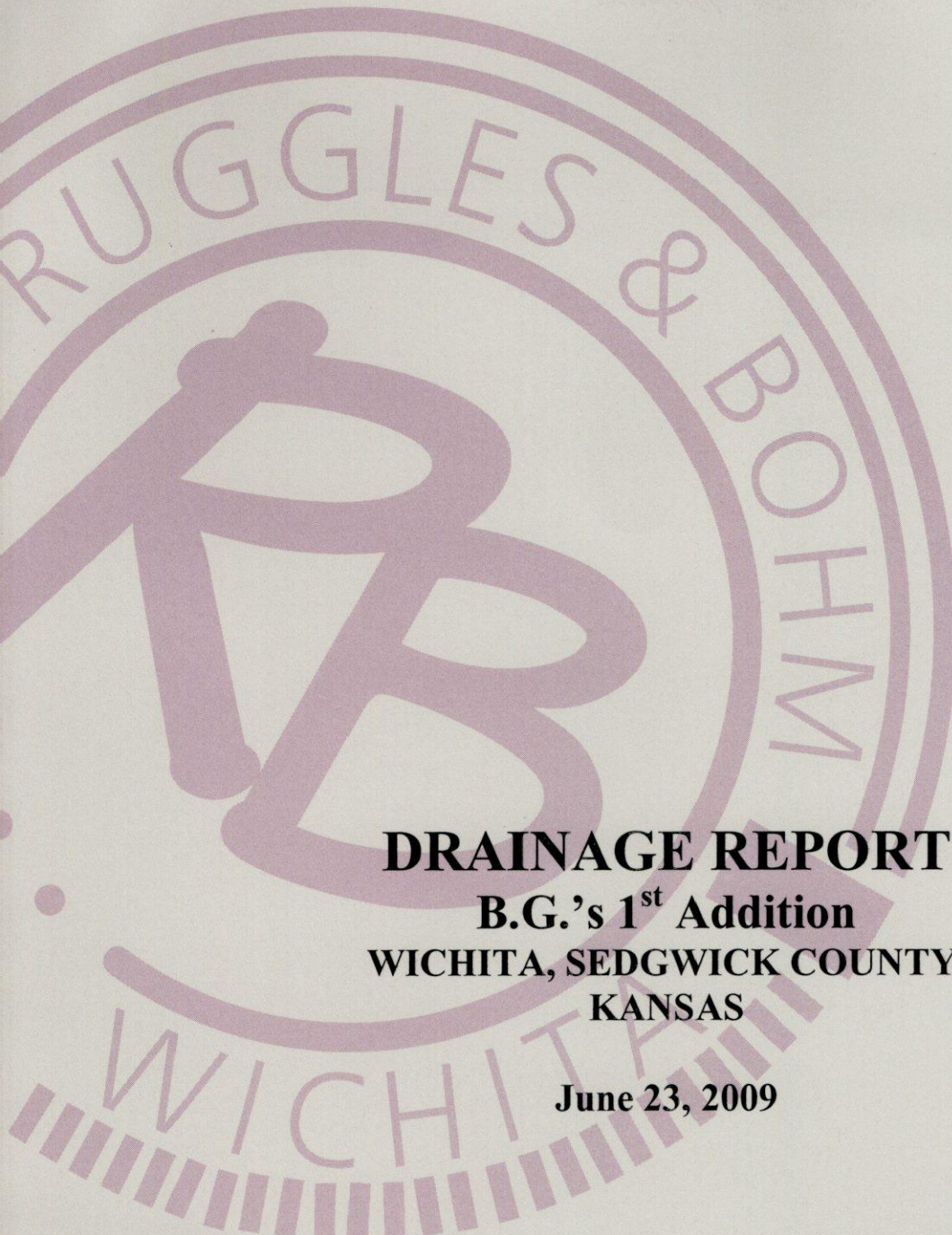
Remarks: \_\_\_\_\_

Copies to: \_\_\_\_\_

**If checked below, please:**

- Acknowledge receipt of enclosures
- Return enclosures to us.

Signed \_\_\_\_\_



**DRAINAGE REPORT**  
**B.G.'s 1<sup>st</sup> Addition**  
**WICHITA, SEDGWICK COUNTY,**  
**KANSAS**

**June 23, 2009**



**Ruggles & Bohm P.A.**

**Engineering, Surveying, Land Planning**



## Public Works, Engineering Division Final Drainage Plan Submittal Checklist

Reviewer: _____	Date: _____
Subdivision Name: _____	Location: _____
Total Land Area Of Ownership: _____ Acres	
Type: _____ Residential _____ Commercial _____ Industrial _____ Recreation _____ Municipal _____ Other	
Applicant: _____	Contact: _____ Phone #: _____
Engineer: _____	Contact: _____ Phone #: _____

Please check the appropriate box:

I = Included; NA = Non-Applicable; R= Required prior to development  
(If "NA" is checked, an explanation must be entered)

Tab 1. Project Narrative	Applicant			Engr	
	I	NA	Explanation / Location in Plan	I	NA
A. Site Location Map, using USGS Map			Drainage Report	X	
B. Discussion of development, existing conditions, and proposed impacts on stormwater, wetland, riparian, and flood plain			Drainage Report	X	
C. Discussion of offsite conditions			Drainage Report	X	
D. Summary of runoff calculations (pre/post development) No increase in peak discharge for all storm series			Drainage Report. No increase criteria is not met, for reasons explained in Drainage Report	X	
E. Narrative description of the type and function of the permanent best management practices that are incorporated into the site design			Drainage Report	X	
F. Copy of the plat			Drainage Report	X	
G. Preliminary grading plan (The final grading plan shall be sealed, signed and dated prior to Engineering receiving the final sanitary sewer plans. One plan sheet and PDF shall be submitted to the Subdivision Engineer.)			Drainage Plan	X	
H. Professional Engineer seal, signature and date on cover of report			Drainage Plan	X	
I. CD of drainage plan in PDF format (one file) and one paper copy bound with this checklist included behind the cover			CD provided when Drainage Report is approved.		X

Tab 2. Existing Conditions Runoff Calculations	Applicant			Engr	
	I	NA	Explanation / Location in Plan	I	NA
A. Copy of applicable orthophoto showing proposed project boundaries (preferable in color)			Drainage Report	X	
B. Runoff Method (Rational, Hydrograph Method, or other approved methods by Engineering)			Rational Method	X	
C. Existing topography (no greater than 2-foot contours, 1-foot recommend)			Drainage Plan	X	
D. Total Site Area and Total Impervious Area (acres)					
E. Benchmarks used for site control			Drainage Map	X	
F. Streams, creeks, and waterway labeled			NONE PRESENT		X
G. Predominant soils from USDA soil surveys, and/or on site soil borings			Drainage Report	X	
H. Location and boundaries of natural features such as wetlands, lakes, and ponds with the normal water elevation noted			NONE PRESENT		X
I. Location of existing roads, buildings, parking lots and other impervious areas.			Drainage Plan	X	



**Final Drainage Plan Submittal Checklist**  
Adopted: February 23, 2007

J. Location of existing utilities (e.g., water, sewer, gas, electric) and easements			Drainage Plan	X	
K. Location of existing conveyance systems such as storm drains, inlets, catch basins, channels, swales, and areas of overland flow			Drainage Plan	X	
L. Flow paths			Drainage Plan	X	
M. Location and dimensions of existing channels, bridges or culvert crossings			Drainage Plan	X	
N. Existing conditions hydrologic analysis for runoff rates, volumes and velocities showing methodologies used and supporting calculations (2, 5, 10, 25 & 100 year, 24-hour storm events) or Critical Duration			Drainage Report 25-year not included, c-factor for 25-year not included in current drainage criteria	X	
O. Assumed pre-developed runoff curve numbers			Drainage Report	X	
P. Existing time of concentrations used in calculations			Drainage Report	X	
Q. Evaluate immediate downstream drainage capacity, not to exceed more than 0.25 miles downstream of site			Drainage Report	X	
R. Existing structural elevations (e.g., invert of pipes, manholes, etc.)			Drainage Plan	X	
S. Cross-section data for open channels			NONE PRESENT	<input checked="" type="checkbox"/>	X
T. Ground water elevations, if applicable			N/A		X

Tab 3. Post-Development Hydrologic Analysis	Applicant			Engr	
	I	NA	Explanation / Location in Plan	I	NA
A. Proposed (post-development) conditions hydrologic and hydraulic analysis for runoff rates, volumes, HGL, and velocities showing the methodologies used and supporting calculations for all applicable design storms (2, 5, 10, 25 & 100 year, 24-hour storm events)			Drainage Report 25-year not included, c-factor for 25-year not included in current drainage criteria	X	
B. Proposed time of concentrations used in calculations			Drainage Report	X	
C. Assumed post-developed runoff curve numbers			Drainage Report	X	
D. Proposed contours for detention facilities (to equal area used in outlet rating curves)			NO DETENTION		X
E. Preliminary sizing calculations for stormwater controls including contributing drainage area, storage, and outlet configuration			NO DETENTION		X
F. Stage-storage-discharge or outlet rating curves and inflow and outflow hydrographs for storage facilities			NO DETENTION		X
G. Final analysis of potential upstream/downstream impact/effects of project, where necessary			Drainage Report	X	
H. Existing and proposed structural elevations (e.g., invert of pipes, manholes, etc.)			Drainage Plan	X	
I. Design water surface elevations and normal pool elevation for ponds.			NO PONDS		X
J. Typical detail for outlet structures, embankments, spillways, grade control structures, conveyance channels, etc. To include height, width, elevation, and/or diameter.			NO PONDS		X
K. Proposed limits of clearing and grading			DRAINAGE MAP	X	
L. Location of existing and proposed roads, buildings, parking lots and other impervious areas.			DRAINAGE MAP	X	
M. Location of existing and proposed utilities (e.g., water, sewer) and easements			Drainage Plan	X	
N. Location of existing and proposed conveyance systems such as storm drains, inlets, catch basins, channels, swales, and areas of overland flow			Drainage Plan	X	
O. Preliminary location and dimensions of proposed channel modifications, such as bridge or culvert crossings			NO CHANNEL MODIFICATIONS PROPOSED		X



P. Preliminary selection and location of stormwater controls			Drainage Plan	X	
Q. Emergency overflow structure's flow path			NO DETENTION		X
R. Detention facility provides one-foot of freeboard above the HWL and emergency outfall shown (top of berm elevation shown)			NO DETENTION		X
S. The 100-year 24-hour HWL delineated on the plan for detention pond			NO DETENTION		X
T. Lowest opening elevations table on the plat for structures located adjacent to channels or ponds					
U. Stormwater Management Facilities located within a Reserve			NONE PRESENT		X
V. Maintenance responsibility of stormwater management facility shall be specified in the platters text. (e.g. HOA, Lot Owners Association, or lot)			NONE PRESENT		X
W. Off-site drainage easements or agreements required, where necessary			NONE REQUIRED		X

Tab 4. Floodplain Submittal	Applicant			Engr	
	I	NA	Explanation / Location in Plan	I	NA
A. Provide source of flood profile			NO FLOODPLAIN ON PROJECT SITE		X
B. Nearest base flood elevations					
C. Delineation of pre-developed regulatory floodplain/floodway limits					
D. Delineation of post-developed regulatory floodplain and floodway limits					
E. Floodplain boundary determination per elevation (project limits shown)					
F. Provide source of floodway data table and discharges					
G. Provide all hydrologic and hydraulic study information for site-specific floodplain studies, unnumbered Zone A area elevation determinations and flood plain map revisions or required permits					
H. Provide regulatory floodway and four natural profile models (10,50,100, and 500-yr) for existing and future watershed conditions					
I. Location of floodplain/floodway limits and relationship of site to upstream/downstream properties (floodplain limits to be per elevation and scaled location)					
J. Flood plains and floodways located within a Reserve, where necessary					

Tab 5. Federal, State and Local Permits (to be provided prior to construction unless otherwise specified)	Applicant			Engr	
	I/R	NA	Explanation / Location in Plan	I/R	NA
A. US Army Corps of Engineers - Regulatory program permits (404 water quality certification)			NOT REQUIRED		X
B. Kansas Department of Agriculture - Division of Water Resources Permits (Stream Obstruction, Channel Change, Flood Plain Fill, Levee, Water Appropriations, Dam safety permit, etc.)			NOT REQUIRED		X
C. Federal Emergency Management Agency (FEMA) Letter of Map Changes (LOMA, LOMR, LOMR-f, CLOMR, etc.) Shall be included and approved when project modifies the limits of the floodway.			NOT REQUIRED		X
D. Kansas Department of Transportation			NOT REQUIRED		X
E. Sedgwick County Right-of-way Permit			NOT REQUIRED		X

**DRAINAGE REPORT**  
**B.G.'s 1<sup>st</sup> Addition**  
**WICHITA, SEDGWICK COUNTY,**  
**KANSAS**

**June 23, 2009**

**B.G.'s 1st Addition  
DRAINAGE ANALYSIS  
June 8, 2009**

**INTRODUCTION**

This report contains supporting documentation and calculations for the proposed B.G.'s 1st Addition development. The site is located on the southwest corner of MacArthur and Hoover. The 2.8 acre proposed site currently exists in an undeveloped condition. The soil type of the site is designated as Vanoss silt loam, designated to be in hydrologic group B. The site is located on FEMA FIRM 20173C0485E in unshaded Zone X, defined as areas outside of the 0.2% chance floodplain. No offsite areas drain through the site, although both the project site and offsite areas consisting mainly of single-family housing drain to a common point.

**HYDROLOGY**

The site shall be developed into multifamily homes. The rational equation was used to model the existing and proposed conditions. Attachments A, D and E of the Interim Drainage Policy for the City of Wichita were used to determine the rainfall intensities, c-coefficients and times of concentration, respectively. The model parameters and results for the pre and proposed conditions are shown in the tables below.

Existing	Area (ac.)	TC (min.)	Q2 (cfs)	Q5 (cfs)	Q10 (cfs)	Q100 (cfs)
Area 1	3.7	40	3.4	4.4	5.7	10.0
Area 2	8.1	56	5.1	7.9	9.2	16.7

Proposed	Area (ac.)	TC (min.)	Q2 (cfs)	Q5 (cfs)	Q10 (cfs)	Q100 (cfs)
Area 1	3.7	40	5.9	6.1	7.6	12.2
Area 2	8.1	56	6.8	8.9	11.5	19.8

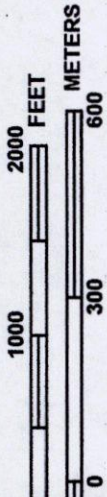
The runoff in both the pre development and the post development condition drains to the northeast. Area 1 consists of the offsite area draining into the south ditch of MacArthur while Area 2 is the area draining to the west ditch of Hoover. A storm sewer manhole accepts the runoff from both these ditches with an 18" RCP culvert directed west and south. The runoff is then directed across Hoover with a 30" RCP and released into the south ditch of MacArthur. An analysis of the existing storm sewer system was performed using StormCAD and the Hydraflow Express Extension for AutoCAD the results are included in this report. The design Q's used in the model was the proposed condition 100-yr runoff as shown in the chart above. The attached results demonstrate that the existing storm sewer is adequate to convey the proposed condition runoff except the Hoover ditch culvert must be increased from an 18" RCP to a 24" RCP. There will be no detention provided for this development for the following reasons. The site is an infill project and the last part of a large

part of the ¼ section to be developed where none of the other developments have provided detention facilities. The second reason is that providing detention will likely serve to increase the peak runoff at the culvert under Hoover. This would occur because the site is situated at the lower end of a watershed with a long time of concentration. A detention facility would serve to delay the peak runoff from the site to coincide with the peak runoff from the offsite areas. The resultant combined hydrograph actually has a greater peak runoff than if the site is allowed to release the runoff with no detention.

In conclusion the site will drain as demonstrated in this report and supporting documentation. The downstream system with an size upgrade in one line segment has the capacity to accept the runoff from the site. Detention will not be provided for the reasons stated above.

**FEMA FIRM**

MAP SCALE 1" = 1000'



PANEL 0485E

**FIRM**  
**FLOOD INSURANCE RATE MAP**  
**SEDGWICK COUNTY,**  
**KANSAS**  
**AND INCORPORATED AREAS**

PANEL 485 OF 700

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HAYSVILLE, CITY OF	200324	0485	E
SEDGWICK COUNTY	200321	0485	E
WICHITA, CITY OF	200328	0485	E

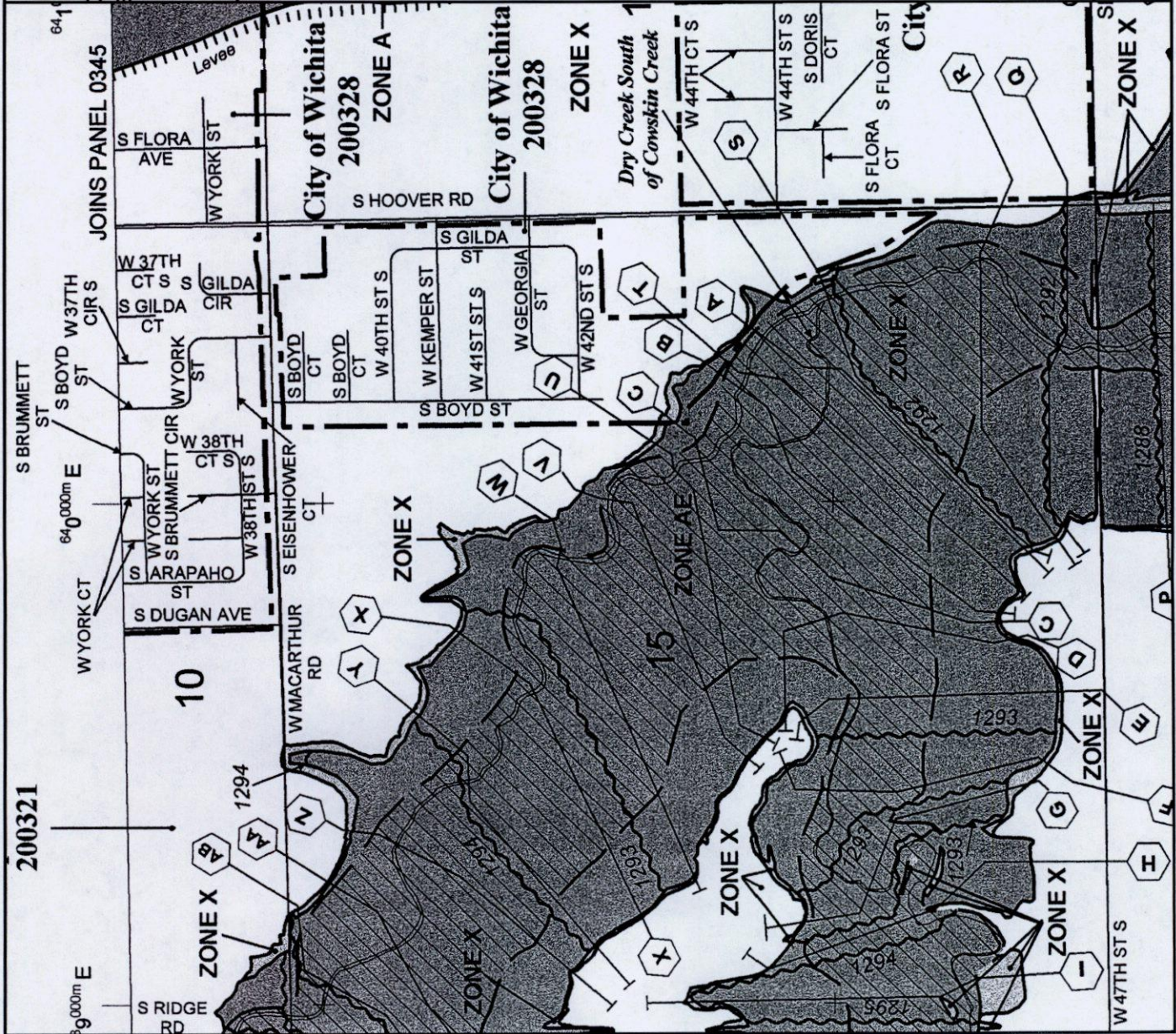
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.



MAP NUMBER  
20173C0485E

EFFECTIVE DATE  
FEBRUARY 2, 2007  
Federal Emergency Management Agency

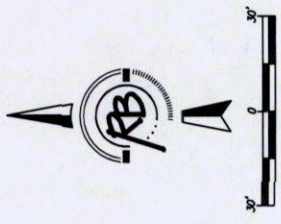
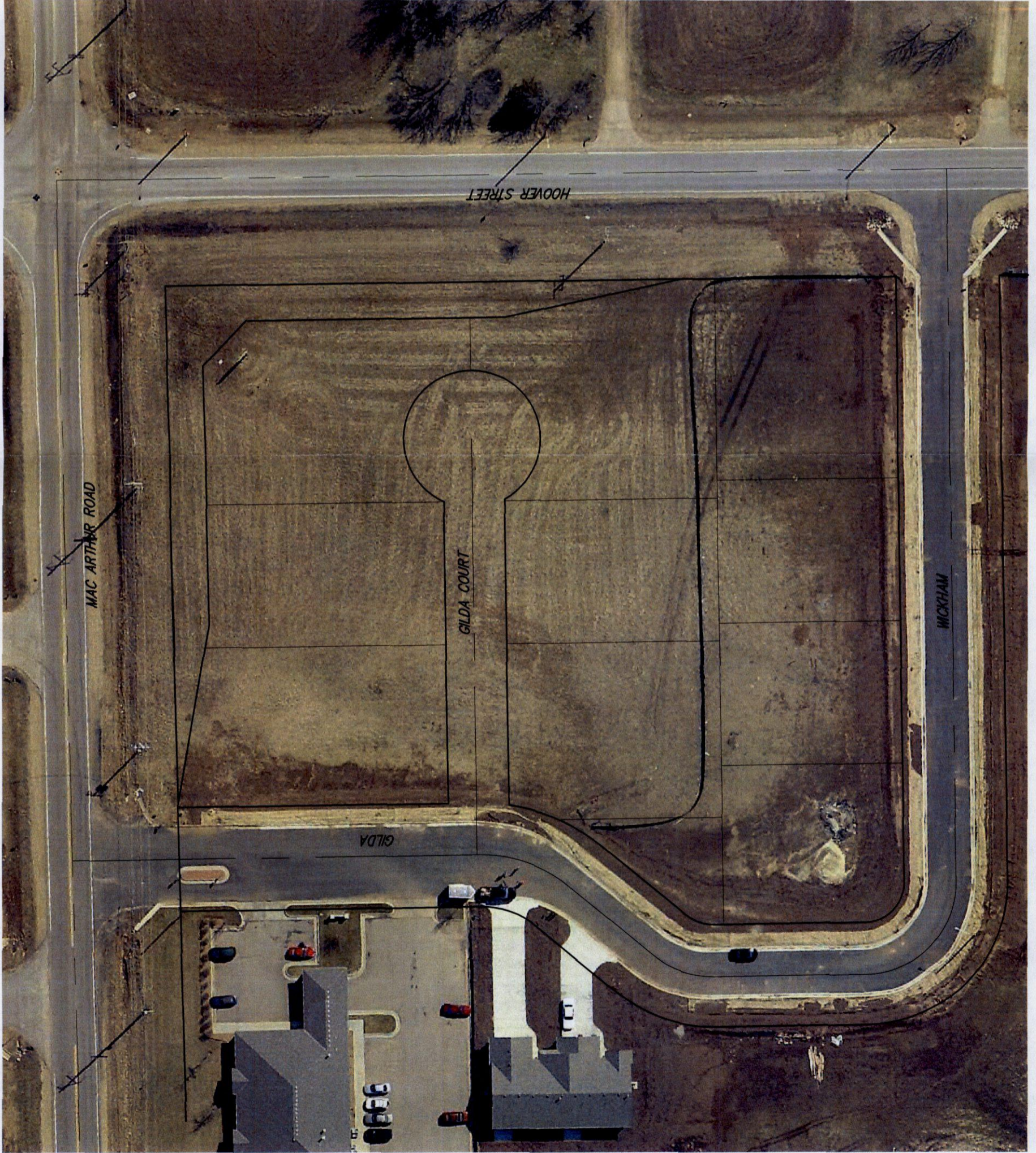
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at [www.msc.fema.gov](http://www.msc.fema.gov)



# **DRAINAGE MAP**



**SITE AERIAL**



**B.G.'S 1ST ADDITION  
AERIAL  
WICHITA, KANSAS**



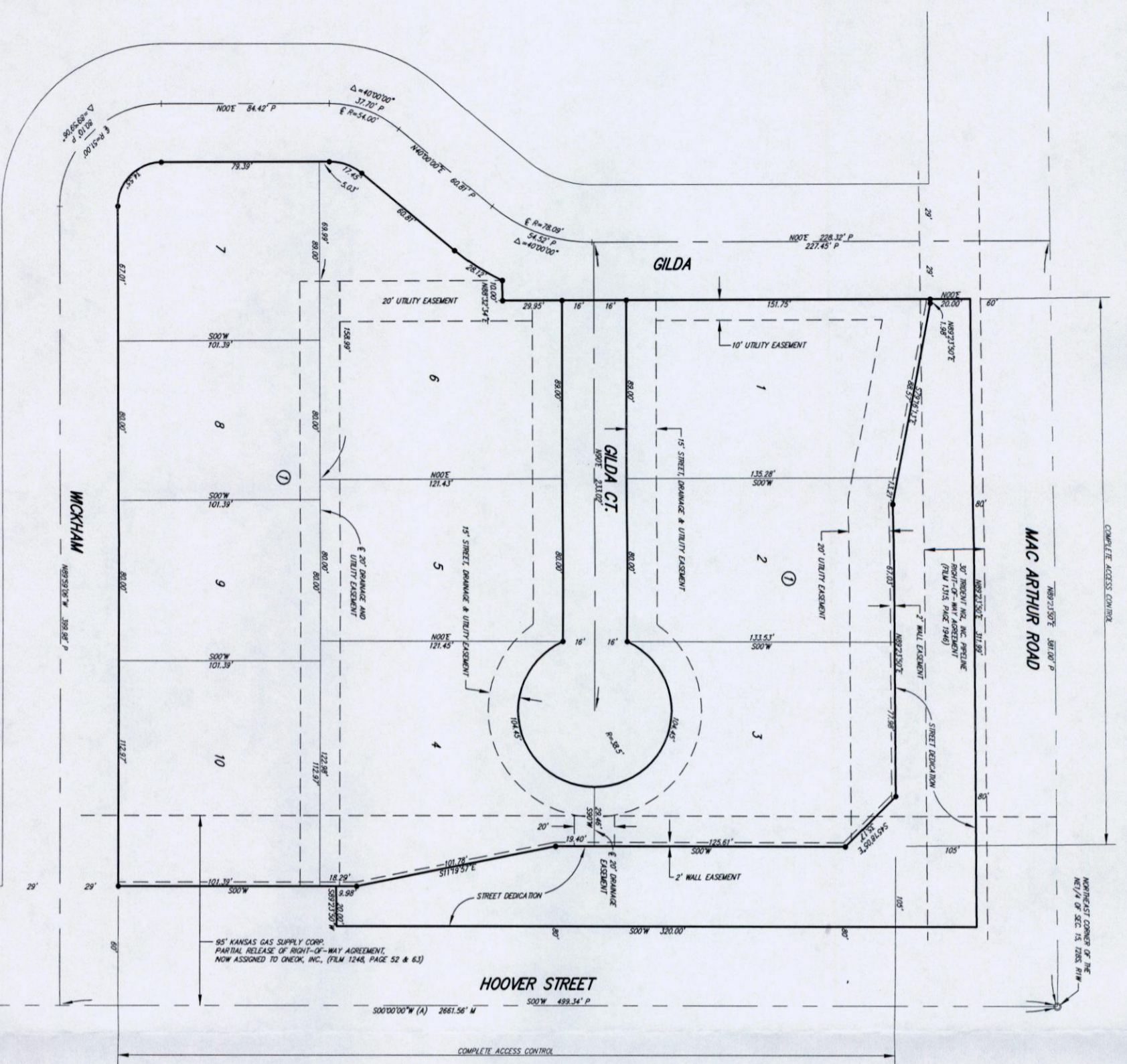
**Ruggles & Bohm, P.A.**  
 Engineering, Surveying, Land Planning  
 924 North Main  
 Wichita, Kansas 67203  
 www.rtkansas.com  
 (316) 264-8008  
 (316) 264-4621 fax  
 E-mail: info@rtkansas.com

DESIGN	AML	DATE	June 23, 2009
CHECK	AML	PROJECT NUMBER	---
REVIEW	---	DRAWING FILE	engineering\boas\Boas09e\Plan1
UTILITY	---	SHEET	1
		OF	1

**PLAT**

# B.G.'S 1ST ADDITION

## Wichita, Sedgwick County, Kansas



State of Kansas) SS  
Sedgwick County)

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 plotted "B.G.'S 1ST ADDITION", Wichita, Sedgwick County, Kansas, and that the accompanying plat is a true and correct exhibit of the property surveyed, described as follows:

Lot 1, Block A, Gray's 6th Addition, Wichita, Sedgwick County, Kansas.

That part of the NE 1/4 of Sec. 15, T28S, R1W of the 6th P.M., Sedgwick County, Kansas described as follows: Beginning at the NE corner of said NE 1/4, thence west along the north line of said NE 1/4, 362.00 feet; thence south parallel with the east line of said NE 1/4, 360 feet; thence east parallel with the north line of said NE 1/4, 362.00 feet to a point on the east line of said NE 1/4; thence north along the east line of said NE 1/4, 360.00 feet to the point of beginning, subject to road right-of-way of record, EXCEPT that part dedicated for street right-of-way purposes in DOC #/FLW-PC: 28889434, described as:

A tract of land located in the NE 1/4 of Sec. 15, T28S, R1W of the 6th P.M., Sedgwick County, Kansas, described as follows: Beginning at the NE corner of Lot 1, Block A, Wheeland Commercial Addition, Wichita, Sedgwick County, Kansas, lying on the south right-of-way line of Mac Arthur Road as dedicated in said Wheeland Commercial Addition; thence N00°00'00"E along the northerly extension of the east line of said Lot 1, 20.00 feet to the south right-of-way of Mac Arthur Road as granted in Misc. BK 561, Pg. 572; thence N69°23'50"E along said Mac Arthur Road as last described, 10.00 feet; thence S00°00'00"E parallel with the east line of said Lot 1, 233.70 feet; thence S89°23'50"W parallel with the north line of said NE 1/4, 10.00 feet to a point on the east line of said Lot 1; thence N00°00'00"E along the east line of said Lot 1, 213.70 feet to the point of beginning.

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

Ruggles & Bohm, P.A.

Thomas C. Ruggles  
Land Surveyor

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, and Streets, to be known as "B.G.'S 1ST ADDITION", WICHITA Sedgwick County, Kansas. Access Controls as indicated are hereby granted to the appropriate governing body. 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 Easement is 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.

Billy J. Gray  
Owner

Billy J. Gray  
President

State of Kansas) SS  
Sedgwick County)

The foregoing instrument acknowledged before me, this \_\_\_\_\_ day of \_\_\_\_\_, 2009, by Billy J. Gray, owner of GKCF LLC.

My appointment expires \_\_\_\_\_  
Notary Public

State of Kansas) SS  
Sedgwick County)

The foregoing instrument acknowledged before me, this \_\_\_\_\_ day of \_\_\_\_\_, 2009, by Billy J. Gray, President, on behalf of Gray Development Inc.

My appointment expires \_\_\_\_\_  
Notary Public

This plat of "B.G.'S 1ST ADDITION", Wichita, Sedgwick County, Kansas, has been submitted to and approved by the Wichita-Sedgwick County Metropolitan Area Planning Commission, Wichita, Kansas.

Wichita-Sedgwick County Metropolitan Area Planning Commission

Darrell Downing  
Chair

John L. Schlegel  
Secretary

This plat approved and all dedications shown hereon accepted by the City Council of the City of Wichita, Kansas, this \_\_\_\_\_ day of \_\_\_\_\_, 2009.

At the Direction of the City Council

Carl Brewer  
Mayor

Karen Sublett  
City Clerk

Reviewed in accordance with K.S.A. 58-2005 on this \_\_\_\_\_ day of \_\_\_\_\_, 2009.

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

Kelly B. Arnold  
County Clerk

State of Kansas) SS  
Sedgwick County)

This is to certify that this plat has been filed for record in the office of the Register of Deeds this \_\_\_\_\_ day of \_\_\_\_\_, 2009, at \_\_\_\_\_ o'clock \_\_\_\_\_ M. and is duly recorded.

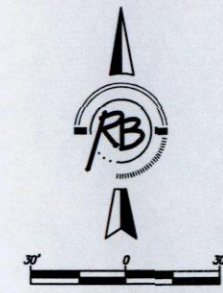
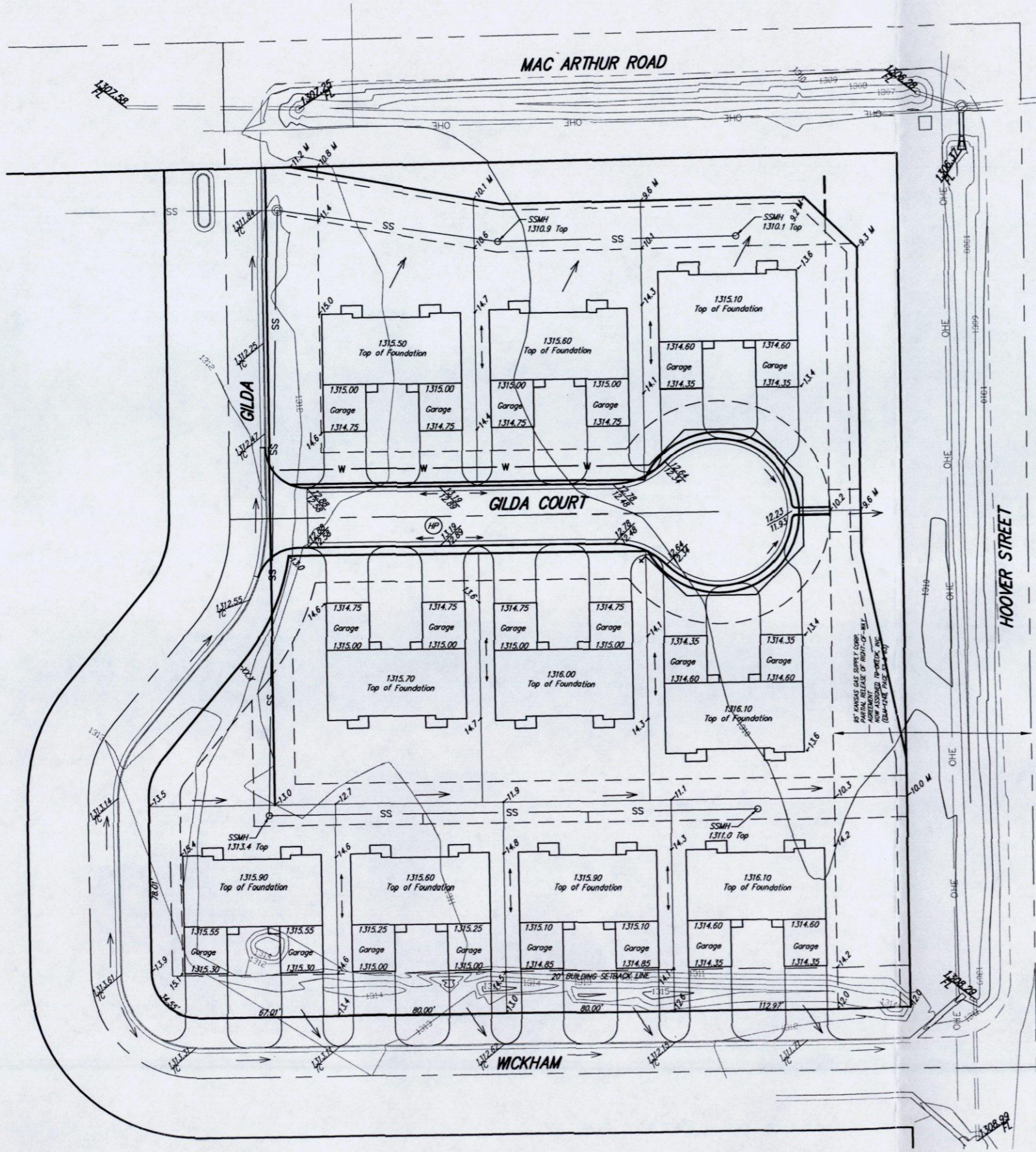
Bill Meek  
Register of Deeds

Tony Buckingham  
Deputy

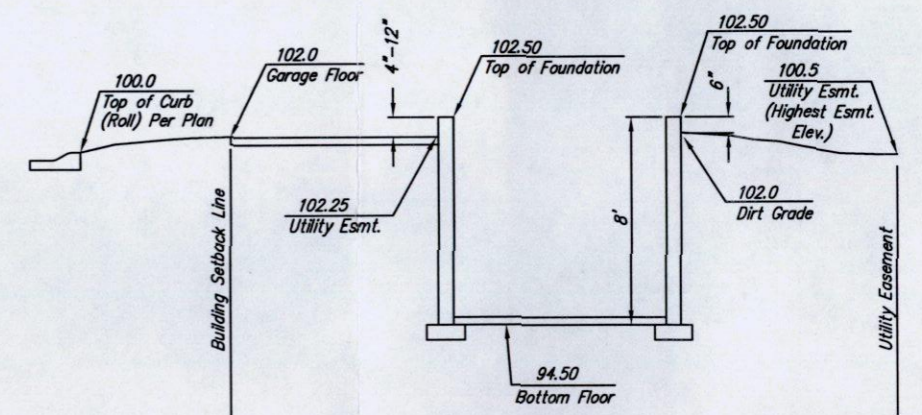
ONE FIVE SURVEY BASE  
PROJECT NO. 3064P  
DATE: 02, 2009

Rugles & Bohm, P.A.  
Engineering, Surveying, Land Planning  
924 North Main  
Wichita, Kansas 67203  
(316) 264-8008  
(316) 264-4271 fax  
www.rubohm.com  
E-mail: info@rubohm.com

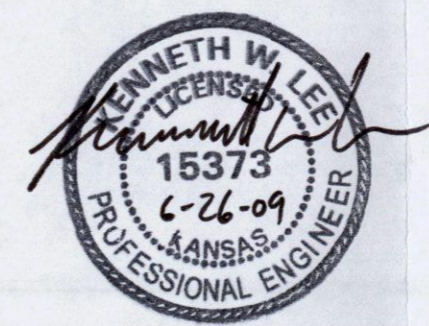
**FOUR-CORNER LOT GRADING PLAN**



BENCH MARK: CHISELED SQUARE ON TOP OF CURB AT THE LOT LINE COMMON TO LOTS 8 AND 9, BLOCK 1, B.G.'S 1ST ADDITION, ELEVATION = 1312.69 (NAVD88)



\* Varies (Check Individual Lot)  
Typical Section



<b>B.G.'S 1ST ADDITION</b> <b>Four Corner Lot Grading Plan</b> <b>WICHITA, KANSAS</b>		DESIGN <b>KWL</b>
<b>Ruggles &amp; Bohm, P.A.</b> Engineering, Surveying, Land Planning		DRAWN <b>KWL</b>
924 North Main Wichita, Kansas 67203 www.rbkansas.com		REVIEW  UTILITY
(316) 264-8008 (316) 264-4621 fax E-mail: info@rbkansas.com		DATE June 26, 2009
DRAWING FILE engineering base [Drainage Plan]	PROJECT NUMBER ---	

**USGS**

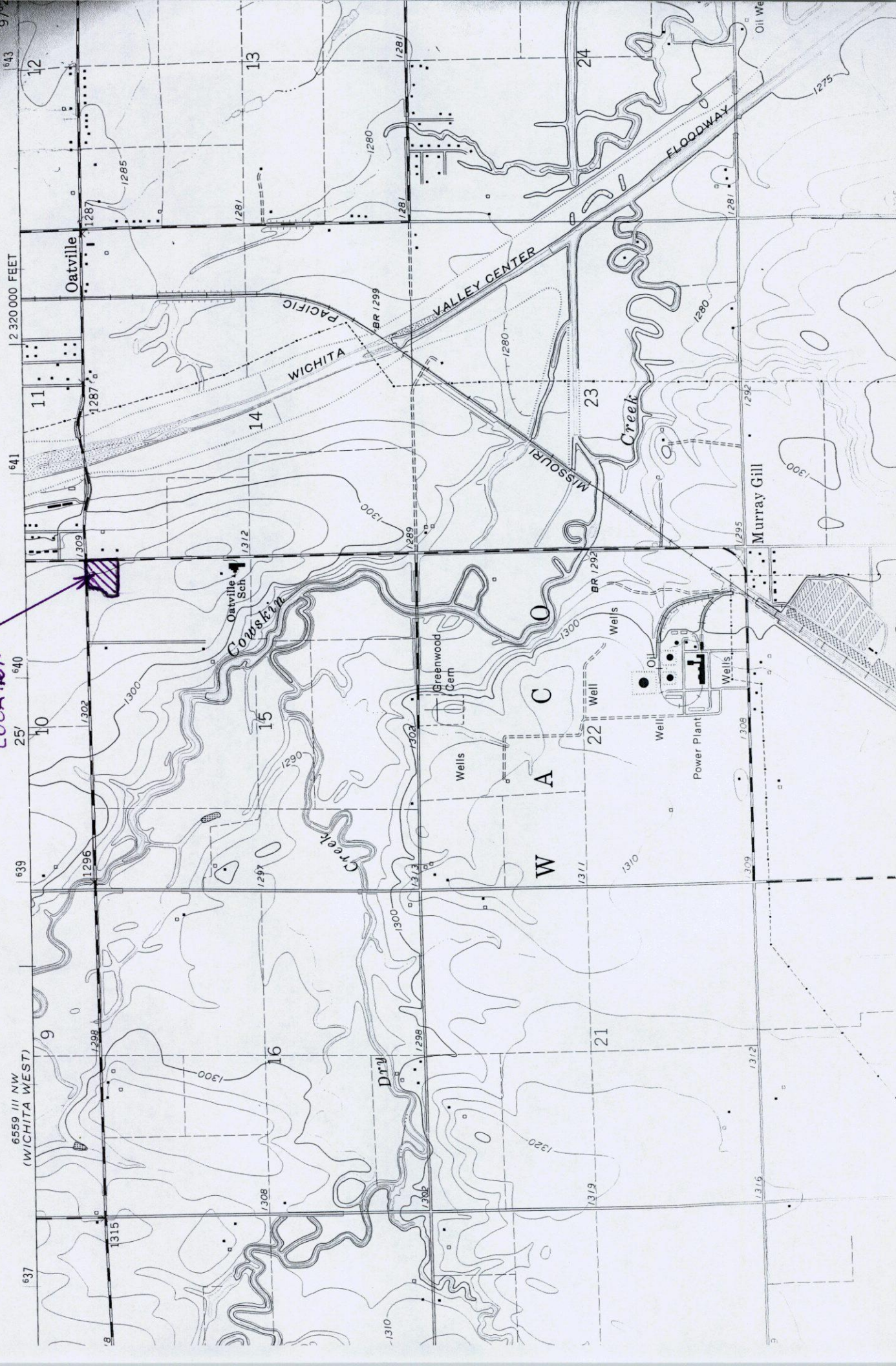
BAYNEVILLE QUADRANGLE  
KANSAS - SEDGWICK CO.  
7.5 MINUTE SERIES (TOPOGRAPHIC)

STATE OF KANSAS

6559 III NW  
(WICHITA WEST)

2 320 000 FEET

PROJECT  
LOCATION



**STORMCAD & HYDRAFLOW OUTPUT**

# Culvert Report

EXIST MacArthur Ditch Culvert

Hydraflow Express Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc.

Wednesday, Jun 24 2009

## Cir Culvert

Invert Elev Dn (ft) = 1306.21  
 Pipe Length (ft) = 20.00  
 Slope (%) = 0.35  
 Invert Elev Up (ft) = 1306.28  
 Rise (in) = 18.0  
 Shape = Cir  
 Span (in) = 18.0  
 No. Barrels = 1  
 n-Value = 0.013  
 Inlet Edge = Projecting  
 Coeff. K,M,c,Y,k = 0.0045, 2, 0.0317, 0.69, 0.5

### Calculations

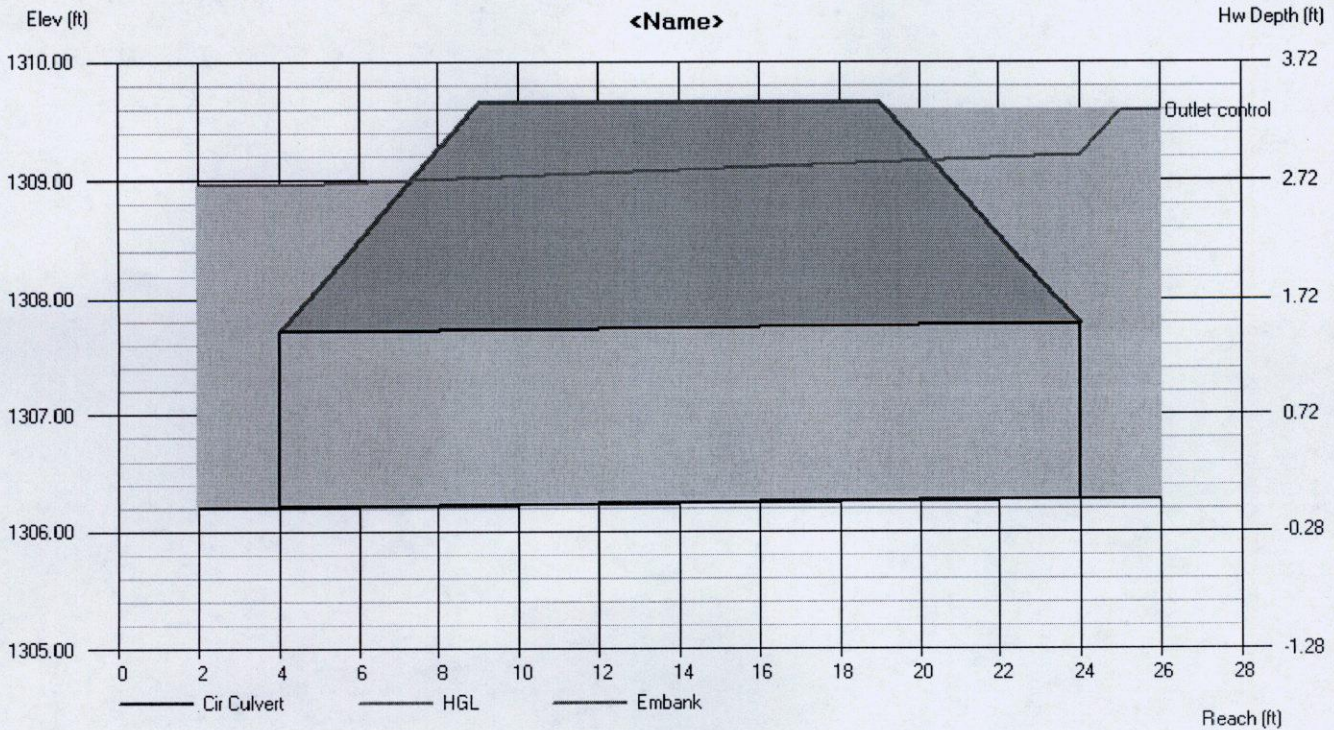
Qmin (cfs) = 0.00  
 Qmax (cfs) = 12.20  
 Tailwater Elev (ft) = 1308.96

### Highlighted

Qtotal (cfs) = 12.00  
 Qpipe (cfs) = 12.00  
 Qovertop (cfs) = 0.00  
 Veloc Dn (ft/s) = 6.79  
 Veloc Up (ft/s) = 6.79  
 HGL Dn (ft) = 1308.96  
 HGL Up (ft) = 1309.22  
 Hw Elev (ft) = 1309.58  
 Hw/D (ft) = 2.20  
 Flow Regime = Outlet Control

### Embankment

Top Elevation (ft) = 1309.65  
 Top Width (ft) = 10.00  
 Crest Width (ft) = 50.00



# Culvert Report

Proposed Hoover Ditch Culvert

Hydraflow Express Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc.

Wednesday, Jun 24 2009

## Cir Culvert

Invert Elev Dn (ft) = 1306.21  
 Pipe Length (ft) = 18.00  
 Slope (%) = 0.89  
 Invert Elev Up (ft) = 1306.37  
 Rise (in) = 24.0  
 Shape = Cir  
 Span (in) = 24.0  
 No. Barrels = 1  
 n-Value = 0.013  
 Inlet Edge = Projecting  
 Coeff. K,M,c,Y,k = 0.0045, 2, 0.0317, 0.69, 0.5

## Calculations

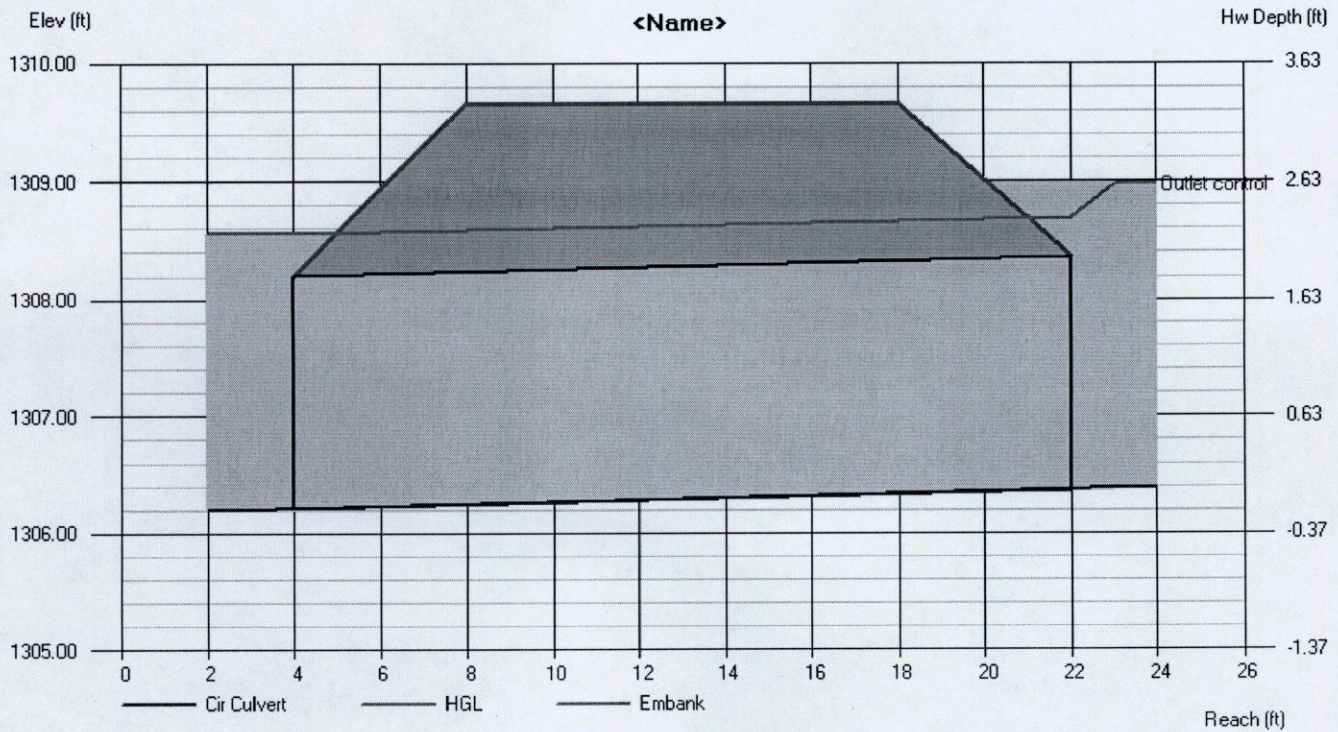
Qmin (cfs) = 0.00  
 Qmax (cfs) = 19.80  
 Tailwater Elev (ft) = 1308.56

## Highlighted

Qtotal (cfs) = 19.00  
 Qpipe (cfs) = 19.00  
 Qovertop (cfs) = 0.00  
 Veloc Dn (ft/s) = 6.05  
 Veloc Up (ft/s) = 6.05  
 HGL Dn (ft) = 1308.56  
 HGL Up (ft) = 1308.69  
 Hw Elev (ft) = 1308.97  
 Hw/D (ft) = 1.30  
 Flow Regime = Outlet Control

## Embankment

Top Elevation (ft) = 1309.65  
 Top Width (ft) = 10.00  
 Crest Width (ft) = 50.00





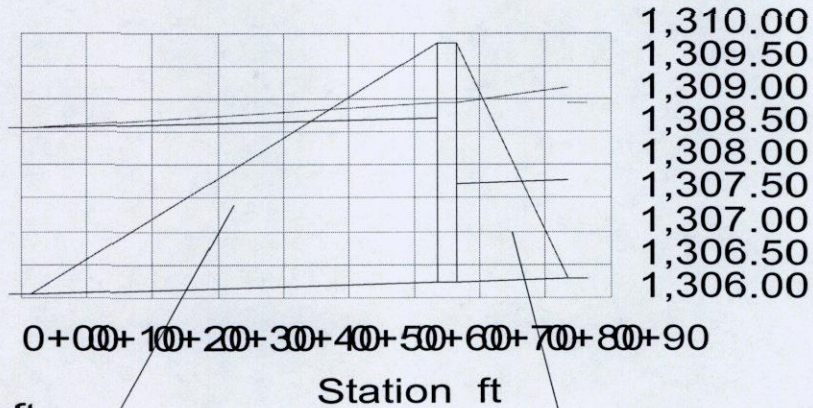
DOT Report

PROPOSED

Pipe	-Node- Upstream Downstream	Inlet Area (acres)	Inlet CA (acres)	Total CA (acres)	-Ground- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)	-Slope- Energy Constructed (ft/ft)	-Section- Discharge Capacity (cfs)	-Section- Shape Size	Length (ft)	Average Velocity (ft/s)	Description
P-3	I-2	0.00	0.00	0.00	1,306.37	1,309.64	0.007661	19.80	Circular	21.00	6.30	
	J-1				1,309.85	1,309.48	0.007619	19.75	24 inch			
P-1	I-1	0.00	0.00	0.00	1,306.28	1,309.73	0.013491	12.20	Circular	18.00	6.90	
	J-1				1,309.85	1,309.48	0.003889	6.55	18 inch			
P-2	J-1	N/A	N/A	0.00	1,309.85	1,308.96	0.006087	32.00	Circular	65.00	6.52	
	Outlet				1,306.06	1,308.56	0.002308	19.70	30 inch			

Junction: J-1  
 Rim: 1,309.85 ft  
 Sump: 1,306.21 ft

Inlet: I-1  
 Rim: 1,306.28 ft  
 Sump: 1,306.28 ft



Elevation ft

Outlet: Outlet  
 Rim: 1,306.06 ft  
 Sump: 1,306.06 ft

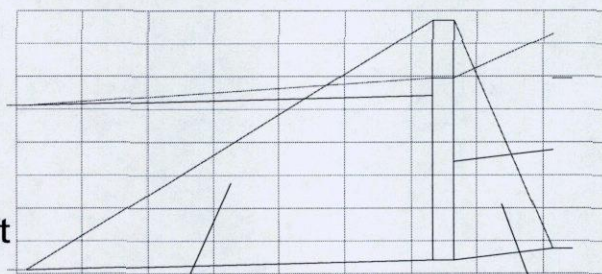
Pipe: P-7  
 Up Invert: 1,306.21 ft  
 Dn Invert: 1,306.06 ft  
 Length: 65.00 ft  
 Size: 30 inch

Pipe: P-5  
 Up Invert: 1,306.28 ft  
 Dn Invert: 1,306.21 ft  
 Length: 20.00 ft  
 Size: 18 inch

Outlet: Outlet  
 Rim: 1,306.06 ft  
 Sump: 1,306.06 ft

Junction: J-1  
 Rim: 1,309.85 ft  
 Sump: 1,306.21 ft

Inlet: I-3  
 Rim: 1,306.37 ft  
 Sump: 1,306.37 ft



Elevation ft

0+00 10+ 20+ 30+ 40+ 50+ 60+ 70+ 80+ 90

Station ft

Pipe: P-7  
 Up Invert: 1,306.21 ft  
 Dn Invert: 1,306.06 ft  
 Length: 65.00 ft  
 Size: 30 inch

Pipe: P-6  
 Up Invert: 1,306.37 ft  
 Dn Invert: 1,306.21 ft  
 Length: 18.00 ft  
 Size: 18 inch

6-22-09

B.G.'s 1st Addition MacArthur & Hoover AML 1/2

Soil Hydrologic Group is B

Soil Type Vanoss silt loam

Area 1

Drains to S. Ditch MacArthur

A = 3.7 acres

EXISTING

0.8 ac. multi-fam,  $C = \begin{matrix} 2 & 5 & 10 & 100 \\ 0.58 & 0.60 & 0.65 & 0.72 \end{matrix}$

0.8 commercial,  $C = 0.74 \ 0.76 \ 0.79 \ 0.84$

2.1 undeveloped,  $C = 0.2 \ 0.22 \ 0.28 \ 0.41$

Composite  $C = 0.41 \ 0.43 \ 0.48 \ 0.58$

T<sub>c</sub>

T<sub>1</sub> = 300' = short grass @ 0.33% =  $\frac{300'}{0.17/s} = 29 \text{ min.}$

T<sub>2</sub> = 450' = grassed waterway =  $\frac{450'}{0.65/s} = 11.5$

T<sub>total</sub> = 40 min.

Proposed

0.8 ac. multi-fam  $C = \begin{matrix} 2 & 5 & 10 & 100 \\ 0.58 & 0.60 & 0.65 & 0.72 \end{matrix}$

0.8 commercial  $C = 0.74 \ 0.76 \ 0.79 \ 0.84$

2.1 multifam.  $C = 0.52 \ 0.53 \ 0.57 \ 0.65$   
Comp.  $C = 0.58 \ 0.60 \ 0.64 \ 0.71$

Area 2

Drains to W. Ditch Hoover

A = 8.4 acres

EXISTING

5.0 acre single fam,  $C = \begin{matrix} 2 & 5 & 10 & 100 \\ 0.44 & 0.46 & 0.52 & 0.61 \end{matrix}$

3.1 acre und.,  $C = 0.2 \ 0.22 \ 0.28 \ 0.41$

Comp  $C = 0.35 \ 0.37 \ 0.43 \ 0.63$

Proposed

5.0 acre single fam.  $C = 0.44 \ 0.46 \ 0.52 \ 0.61$

3.1 acre multifam.  $C = 0.52 \ 0.53 \ 0.57 \ 0.65$

Composite  $C = 0.47 \ 0.49 \ 0.54 \ 0.63$

T<sub>c</sub> Post Development

= T<sub>c</sub> Pre Development

Typical Lot = 0.145 ac. Grass

0.274 total 0.129 ac. impervious

T<sub>c</sub>

T<sub>1</sub> = 300' = short grass =  $\frac{300}{0.18} = 27.8 \text{ min.}$

T<sub>2</sub> = 1000' = grassed waterway =  $\frac{1000'}{0.67/s} = 24.9$

T<sub>3</sub> = 700' = assumed v = 3.5fps = 3.3 min

56 min.

T<sub>c</sub> post = T<sub>c</sub> pre

6-22-09

## B.G.'s 1st Addition

AML

2/2

Q

$$C \times I \times A = Q$$

AREA 1	EXIST.	2	$0.41 \times 2.24 \times 3.7 = Q_2 = 3.4 \text{ cfs}$
		5	$0.43 \times 2.76 \times 3.7 = Q_5 = 4.4 \text{ cfs}$
		10	$0.48 \times 3.22 \times 3.7 = Q_{10} = 5.7 \text{ cfs}$
		100	$0.58 \times 4.66 \times 3.7 = Q_{100} = 10.0 \text{ cfs}$
PROP		2	$0.58 \times 2.24 \times 3.7 = Q_2 = 5.9 \text{ cfs}$
		5	$0.60 \times 2.76 \times 3.7 = Q_5 = 6.1 \text{ cfs}$
		10	$0.64 \times 3.22 \times 3.7 = Q_{10} = 7.6 \text{ cfs}$
		100	$0.71 \times 4.66 \times 3.7 = Q_{100} = 12.2 \text{ cfs}$
AREA 2	EXIST	2	$0.35 \times 1.79 \times 8.1 = Q_2 = 5.1 \text{ cfs}$
		5	$0.37 \times 2.25 \times 8.1 = Q_5 = 7.9 \text{ cfs}$
		10	$0.43 \times 2.64 \times 8.1 = Q_{10} = 9.2 \text{ cfs}$
		100	$0.53 \times 3.88 \times 8.1 = Q_{100} = 16.7 \text{ cfs}$
PROP		2	$0.47 \times 1.79 \times 8.1 = Q_2 = 6.8 \text{ cfs}$
		5	$0.49 \times 2.25 \times 8.1 = Q_5 = 8.9 \text{ cfs}$
		10	$0.54 \times 2.64 \times 8.1 = Q_{10} = 11.5 \text{ cfs}$
		100	$0.63 \times 3.88 \times 8.1 = Q_{100} = 19.8 \text{ cfs}$