

DRAINAGE PLAN AND SUPPORTING CALCULATIONS

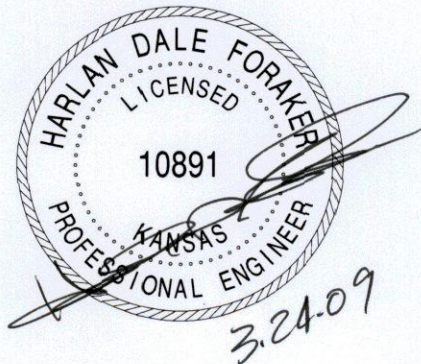
**FOR
SIMMONS 2ND ADDITION
AN ADDITION TO
WICHITA, KANSAS**

**PREPARED FOR:
DRN INVESTMENTS, LLC
C/O DENNIS NIEDENS
14530 KILLARNEY CIRCLE
WICHITA, KS 67230**

MARCH 24, 2009

PREPARED BY:

**CERTIFIED ENGINEERING DESIGN, P.A.
810 WEST DOUGLAS, SUITE C
WICHITA, KANSAS 67203-6105
(316)262-8808 PHONE
(316)262-1669 FAX**





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

Reviewer: _____ Date: _____
 Subdivision Name: Simmons 2nd Addition Location: 2929 WEST ELM
 Total Land Area Of Ownership: 0.9 Acres
 Type: Residential _____ Commercial _____ Industrial _____ Recreation _____ Municipal _____ Other _____
 Applicant: DBN INVESTMENTS LLC Contact: DENNIS MIEDENS Phone #: 305-5550
 Engineer: CERTIFIED ENG. DESIGN Contact: HARLAN FORAKER Phone #: 262-8808

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	<input checked="" type="checkbox"/>				
B. Discussion of development, existing conditions, and proposed impacts on stormwater, wetland, riparian, and flood plain	<input checked="" type="checkbox"/>				
C. Discussion of offsite conditions	<input checked="" type="checkbox"/>				
D. Summary of runoff calculations (pre/post development) No increase in peak discharge for all storm series					
E. Narrative description of the type and function of the permanent best management practices that are incorporated into the site design					
F. Copy of the plat	<input checked="" type="checkbox"/>				
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.)	<input checked="" type="checkbox"/>				
H. Professional Engineer seal, signature and date on cover of report	<input checked="" type="checkbox"/>				
I. CD of drainage plan in PDF format (one file) and one paper copy bound with this checklist included behind the cover	<input checked="" type="checkbox"/>				

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)	<input checked="" type="checkbox"/>				
B. Runoff Method (Rational, Hydrograph Method, or other approved methods by Engineering)	<input checked="" type="checkbox"/>				
C. Existing topography (no greater than 2-foot contours, 1-foot recommend)	<input checked="" type="checkbox"/>				
D. Total Site Area and Total Impervious Area (acres)	<input checked="" type="checkbox"/>				
E. Benchmarks used for site control	<input checked="" type="checkbox"/>				
F. Streams, creeks, and waterway labeled		<input checked="" type="checkbox"/>	NOT ON PLAT. SEE USGS TPO.		
G. Predominant soils from USDA soil surveys, and/or on site soil borings	<input checked="" type="checkbox"/>				
H. Location and boundaries of natural features such as wetlands, lakes, and ponds with the normal water elevation noted		<input checked="" type="checkbox"/>	NO WETLANDS, LAKES POND		
I. Location of existing roads, buildings, parking lots and other impervious areas.	<input checked="" type="checkbox"/>				



J. Location of existing utilities (e.g., water, sewer, gas, electric) and easements	✓				
K. Location of existing conveyance systems such as storm drains, inlets, catch basins, channels, swales, and areas of overland flow		✓	No onsite systems		
L. Flow paths	✓				
M. Location and dimensions of existing channels, bridges or culvert crossings		✓	No onsite culverts		
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	✓				
O. Assumed pre-developed runoff curve numbers	✓				
P. Existing time of concentrations used in calculations	✓		Assume Tc = 15 minutes		
Q. Evaluate immediate downstream drainage capacity, not to exceed more than 0.25 miles downstream of site	✓				
R. Existing structural elevations (e.g., invert of pipes, manholes, etc.)		✓			
S. Cross-section data for open channels		✓			
T. Ground water elevations, if applicable		✓			

Tab 3. Post-Development Hydrologic Analysis	Applicant		Engr
	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)	✓		
B. Proposed time of concentrations used in calculations	✓		Assumed Tc = 15 minutes
C. Assumed post-developed runoff curve numbers	✓		
D. Proposed contours for detention facilities (to equal area used in outlet rating curves)		✓	No DETENTION PROPOSED
E. Preliminary sizing calculations for stormwater controls including contributing drainage area, storage, and outlet configuration		✓	" " "
F. Stage-storage-discharge or outlet rating curves and inflow and outflow hydrographs for storage facilities		✓	" " "
G. Final analysis of potential upstream/downstream impact/effects of project, where necessary	✓		GUTTER CONVEYANCE
H. Existing and proposed structural elevations (e.g., invert of pipes, manholes, etc.)	✓		
I. Design water surface elevations and normal pool elevation for ponds.		✓	No POND
J. Typical detail for outlet structures, embankments, spillways, grade control structures, conveyance channels, etc. To include height, width, elevation, and/or diameter.		✓	No OUTLET STRUCTURE
K. Proposed limits of clearing and grading	✓		
L. Location of existing and proposed roads, buildings, parking lots and other impervious areas.	✓		
M. Location of existing and proposed utilities (e.g., water, sewer) and easements	✓		
N. Location of existing and proposed conveyance systems such as storm drains, inlets, catch basins, channels, swales, and areas of overland flow		✓	No SWB PROPOSED
O. Preliminary location and dimensions of proposed channel modifications, such as bridge or culvert crossings		✓	No CHANNEL MODIFICATION



P. Preliminary selection and location of stormwater controls	✓		<i>PROPOSED BACK CURB Protection</i>		
Q. Emergency overflow structure's flow path		✓			
R. Detention facility provides one-foot of freeboard above the HWL and emergency outfall shown (top of berm elevation shown)		✓			
S. The 100-year 24-hour HWL delineated on the plan for detention pond		✓			
T. Lowest opening elevations table on the plat for structures located adjacent to channels or ponds					
U. Stormwater Management Facilities located within a Reserve		✓			
V. Maintenance responsibility of stormwater management facility shall be specified in the platters text. (e.g. HOA, Lot Owners Association, or lot)		✓			
W. Off-site drainage easements or agreements required, where necessary		✓			

Tab 4. Floodplain Submittal	Applicant		Explanation / Location in Plan	Engr	
	I	NA		I	NA
A. Provide source of flood profile	✓				
B. Nearest base flood elevations	✓		<i>PANEL 2017300355 E</i>		
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		Explanation / Location in Plan	Engr	
	I/R	NA		I/R	NA
A. US Army Corps of Engineers - Regulatory program permits (404 water quality certification)		✓			
B. Kansas Department of Agriculture - Division of Water Resources Permits (Stream Obstruction, Channel Change, Flood Plain Fill, Levee, Water Appropriations, Dam safety permit, etc.)		✓			
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.		✓			
D. Kansas Department of Transportation		✓			
E. Sedgwick County Right-of-way Permit		✓			

**DRAINAGE PLAN
AND
SUPPORTING CALCULATIONS**

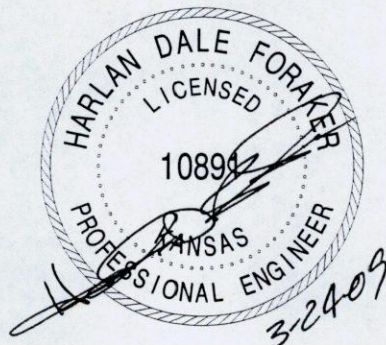
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Simmons 2nd Addition Drainage Plan(Con't)
Mr. Scott Lindebak, P.E.
March 24, 2009

CERTIFIED ENGINEERING DESIGN, P.A
810 West Douglas, Suite C
Wichita, KS 67203-6105
(316)262-8808 Office
(316)262-1669 Fax

LETTER OF TRANSMITTAL

DATE: March 24, 2009

TO: Mr. Scott Lindebak, P.E.
Engineering Division
455 North Main
Wichita, KS 67202

RE: Drainage Plan
Simmons 2nd Addition
Wichita, KS

FROM: Harlan D. Foraker, P.E. *HOF*

I. PROJECT NARRATIVE

The site is located on the south side of Elm Street at North Custer Avenue in the Southeast ¼ of Section 13, Township 27 South, Range 1 West, Wichita, Sedgwick County, Kansas. The address of the existing site is 2929 West Elm. The site currently undeveloped grass with trees

II. EXISTING AND PROPOSED CONDITIONS RUNOFF CALCULATIONS

The rational method will be used to determine the peak discharges from the study area. Rational 'C' Factors were assigned to the existing site and proposed improvements from "Interim Drainage and Storm Sewer Policy for Design Criteria and Documentation" for the City of Wichita, Kansas. Rainfall Intensity tables from the same policy were utilized to determine the rainfall intensity for the 2, 5, 10, 25, and 100 year design storms.

The Soil Conservation Service TR-55 manual was used to compute the Time of Concentration for the drainage subareas. A design assumption was made as follows: that the minimum subarea time of concentration is 15 minutes.

The developed drainage subareas have been delineated on the 1" = 40' drainage plan and topographic mapping survey performed for this site.

Simmons 2nd Addition Drainage Plan(Con't)

Mr. Scott Lindebak, P.E.

March 24, 2009

Design Storm Events Evaluated: 2, 5, 10, 25, and 100 yr. storm events

The runoff calculations for the property have been computed for all 5 storm events. The existing SCS soil type is Urban land-Canadian complex which is an SCS Type B Soil.

The existing site drains by sheet flow to the existing street. The runoff then flows east in the existing curb and gutter to the City storm water sewer.

The following tables summarize the peak discharge for the 0.90 acre drainage area.

EXISTING PEAK DISCHARGE FOR THE SIMMONS 2ND ADDITION

Description	C	Tc	I	Area	Q(cfs)
Existing Drainage Area(2 yr.)	.20	15	3.80	0.90	0.68
Existing Drainage Area(5 yr.)	.22	15	4.62	0.90	0.91
Existing Drainage Area(10 yr.)	.28	15	5.21	0.90	1.31
Existing Drainage Area(25 yr.)	.32	15	6.06	0.90	1.75
Existing Drainage Area(100 yr.)	.41	15	7.40	0.90	2.73

The proposed improvements to the site will consist of the addition of 4 duplex units with the associated parking driveway and parking. The proposed improvements will add approximately 0.48 acres of impervious area to the site. The remaining pervious area which will remain in grass is 0.45 acres.

DEVELOPED PEAK DISCHARGE FOR THE SIMMONS 2ND ADDITION

A weighted runoff coefficient was calculated for the developed site conditions on this plat for each of the design storm frequencies.

Description	Wtd. 'C'	Tc	I	Area	Q(cfs)
Existing Drainage Area(2 yr.)	.56	15	3.80	0.90	1.92
Existing Drainage Area(5 yr.)	.57	15	4.62	0.90	2.37
Existing Drainage Area(10 yr.)	.61	15	5.21	0.90	2.86
Existing Drainage Area(25 yr.)	.63	15	6.06	0.90	3.43
Existing Drainage Area(100 yr.)	.68	15	7.40	0.90	4.53

The existing and developed discharge flows out to Elm Street and then east to existing curb & gutter inlets located at Elm Street and . There appears to be no overland flow coming onto the property from off-site sources. The existing curb and gutter street system conveys the existing conditions discharge of 0.68 cfs at a spread of 6.41 feet. The developed peak discharge of 1.92 cfs is conveyed in the existing south gutter of Elm Street at a spread of 9.46 feet. The existing street drainage system has adequate capacity to convey the developed peak discharge from Simmons 2nd Addition.

Simmons 2nd Addition Drainage Plan(Con't)
Mr. Scott Lindebak, P.E.
March 24, 2009

IV. FLOODPLAIN SUBMITTAL – A Zone X FEMA floodplain is located on this property which is an area protected from the 1% flood by levee or other flood structure. The nearest BFE on the Arkansas River is 1298 at Central Avenue so the required minimum pad would be 1300. The existing ground is an elevation of 1307 so the minimum pad shown on the plat is 1309.

V. FEDERAL, STATE AND LOCAL PERMITS

- A. US Army Corp of Engineers-Not Applicable
- B. Kansas Dept. of Agriculture-Not Applicable
- C. FEMA- Not Applicable
- D. Kansas Department of Transportation-Not Applicable
- E. Sedgwick County Right-of-Way Permit-Not Applicable

VII. APPENDIX I:

All charts, graphs, tables including a 1"=40' scale drainage plan map are included for review.

Sedgwick County Maps



Legend

Historic Site Buffers

- 1000' National Historic Site Buffers
- 500' Local Historic Site Buffers
- Historic Districts
- Nationally Registered Historic Sites
- Locally Registered Historic Sites
- Special Use Cases

Zoning Districts

- Rural Residential
- Single Family 20,000
- Single Family 10,000
- Single Family 5,000
- Two-Family
- Multi-Family 18 d.u./ac
- Multi-Family 29 d.u./ac
- Multi-Family 75 d.u./ac
- Manufactured Housing
- Neighborhood Office
- General Office
- Neighborhood Retail
- Limited Commercial
- Office Warehouse
- General Commercial
- Industrial Park
- Industrial Park - Airport
- Central Business District
- Limited Industrial
- General Industrial
- University
- Planned Unit Development
- Air Force Base
- Unknown
- Not Zoned



Geographic Information Services
 Division of Information & Operations
www.sedgwickcounty.org/gis
 525 N. Main, Suite 212, Wichita, KS 67203
 Tel: 316.660.9290 Fax: 316.262.1174

DISCLAIMER: It is understood that, while Sedgwick County Geographic Information Services (SCGIS), City of Wichita GIS, (for purposes of the road cartilage fee), participating agencies, and information suppliers, have no indication or reason to believe that there are inaccuracies in information provided, SCGIS, its suppliers make no representations of any kind, including, but not limited to, warranties of merchantability or fitness for a particular use, nor are any such warranties to be implied with respect to the information, data or service furnished herein. In no event shall the Data Providers become liable to users of these data, or any other party, for any loss or damages, consequential or otherwise, including but not limited to time, money, or goodwill, arising from the use, operation or modification of the data. In using these data, users further agree to indemnify, defend, and hold harmless the Data Providers for any and all liability of any nature arising out of or resulting from the lack of accuracy or correctness of the data, or the use of the data. No person shall sell, give or receive for the purpose of selling or offering for sale, any portion of the information provided herein.

33

(Joins sheet 26)

R.1W | R.1E



5000 Feet

Scale 1:20,000

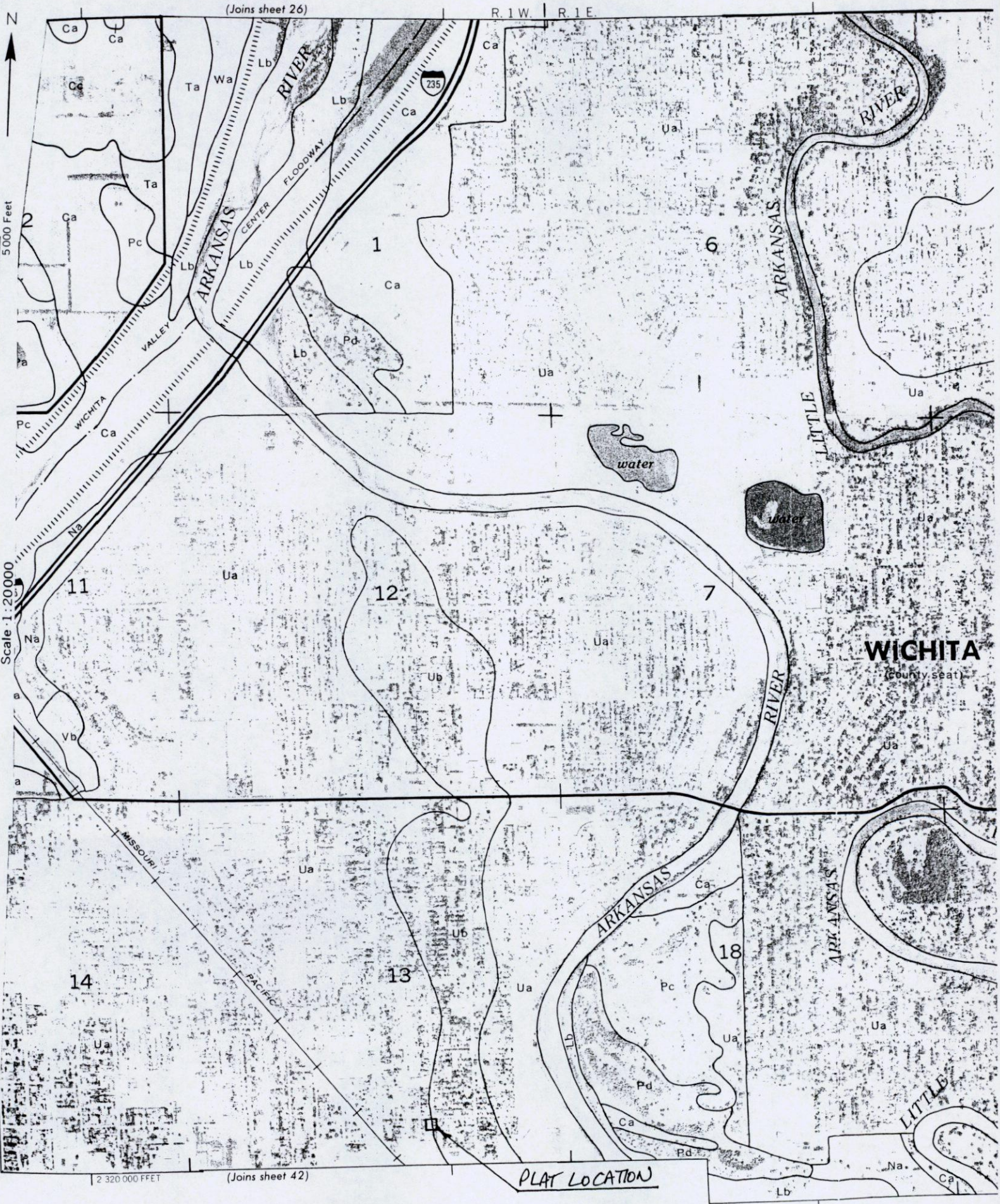
MISSOURI

PACIFIC

2 320 000 FEET

(Joins sheet 42)

PLAT LOCATION



CRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different base Flood Elevations, based upon Flood Protection.

Base Flood Elevation line and value: elevation in feet*
Base Flood Elevation value where uniform within zone; elevation in feet* (EL. 987)

Cross section line
Traverse line
*Referenced to the North American Vertical Datum of 1988

Geographic coordinates referenced to the North American Datum of 1982 (NAD 83), Western Hemisphere:
1000-meter Universal Transverse Mercator grid values, zone 14
Bench mark (see explanation in Notes to Users section of this FIRM panel)

North Arrow
M.L.S. 10, N
M.L.S. 10, E

MAP DEPOSITORY
Refer to listing of Map Depositories on Map Index

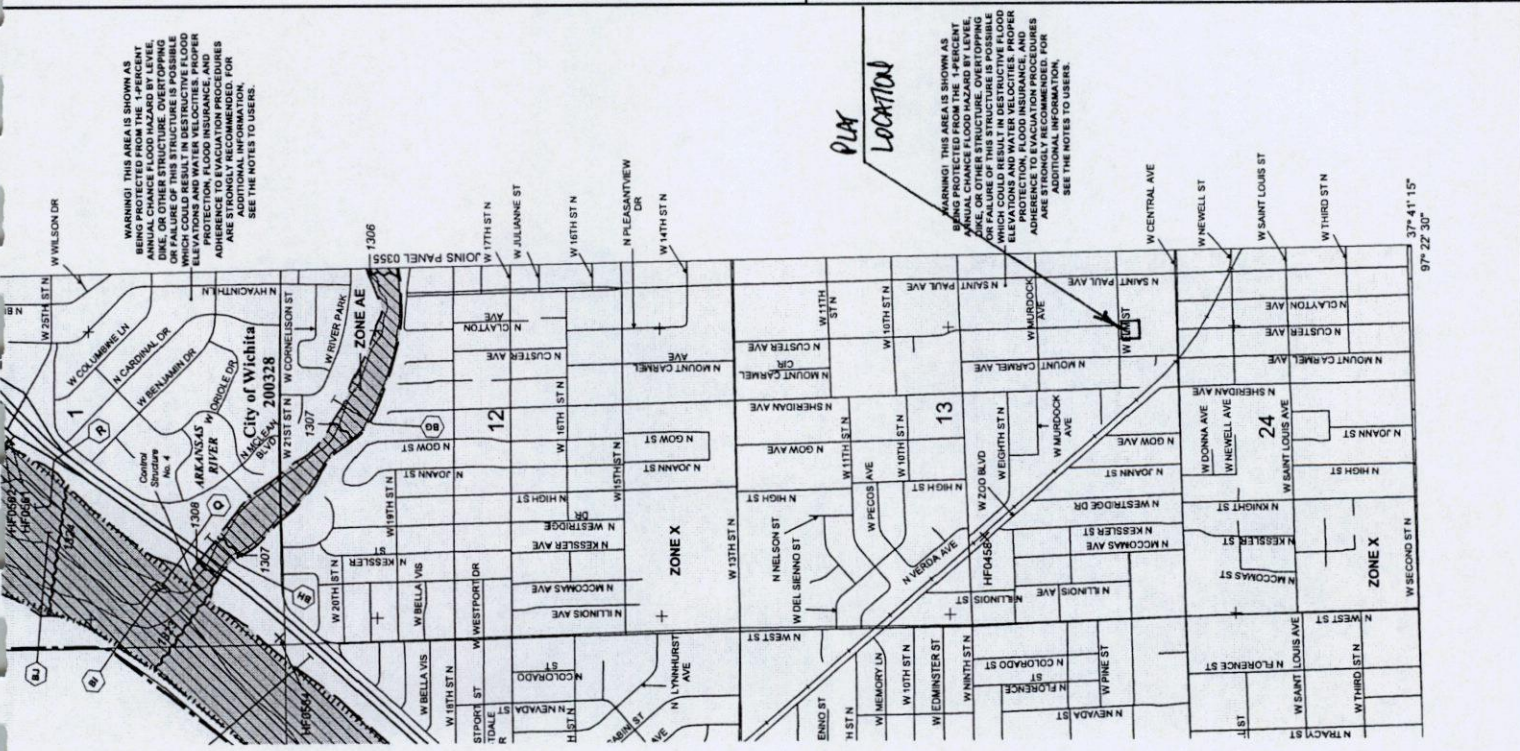
EFFECTIVE DATE OF COMMUNITY FLOOD INSURANCE RATE MAP
FEBRUARY 2, 2007

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

FOR COMMUNITY MAP REVISION HISTORY please refer to the Community Map History book located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-368-6201.

MAP SCALE 1" = 1000'
500 1000 2000 FEET
300 600 METERS



NFP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0335E

FIRM FLOOD INSURANCE RATE MAP

SEDGWICK COUNTY, KANSAS AND INCORPORATED AREAS

PANEL 335 OF 700

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	SEDGWICK COUNTY	NUMBER	200321	PANEL	0335	SHEET	E
	WICHITA, CITY OF		200328		0335		E

MAP NUMBER
20173C0335E

EFFECTIVE DATE
FEBRUARY 2, 2007

Federal Emergency Management Agency

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.



ions must be compared to structure and ground elevations vertical datum. For information regarding conversion geodetic Vertical Datum of 1929 and the North American 83, visit the National Geodetic Survey website at or contact the National Geodetic Survey at the following

Division
NOAA
910

n, description, and/or location information about the bench top, please contact the Information Services Branch of the Survey at (301) 713-3242, or visit their website at

shown on this FIRM was provided by Sedgwick County Kansas State Plane Coordinate System South at a scale of 1 inch = 100 feet, as of June 2000.

on this map are based on the best data available at the time changes due to annexations or de-annexations may have been published, map users should contact appropriate authority for current corporate limit locations.

detailed up-to-date stream channel configurations than shown on this FIRM for this jurisdiction. The floodplains and floodways shown on the previous FIRM may have been adjusted to conform with the most current channel configurations. As a result, the Flood Profiles shown in the Flood Insurance Study report (which contains Flood Profiles for each panel) may reflect stream channel distances that differ from those shown on this map.

separately printed Map Index for an overview map of the entire area covered by this FIRM. Available products may include a Flood Insurance Study report, a National Flood Insurance Program Flood Hazard Insurance Study, a National Flood Insurance Program Flood Hazard Insurance Study, as well as a listing of the panels on which each community is shown.

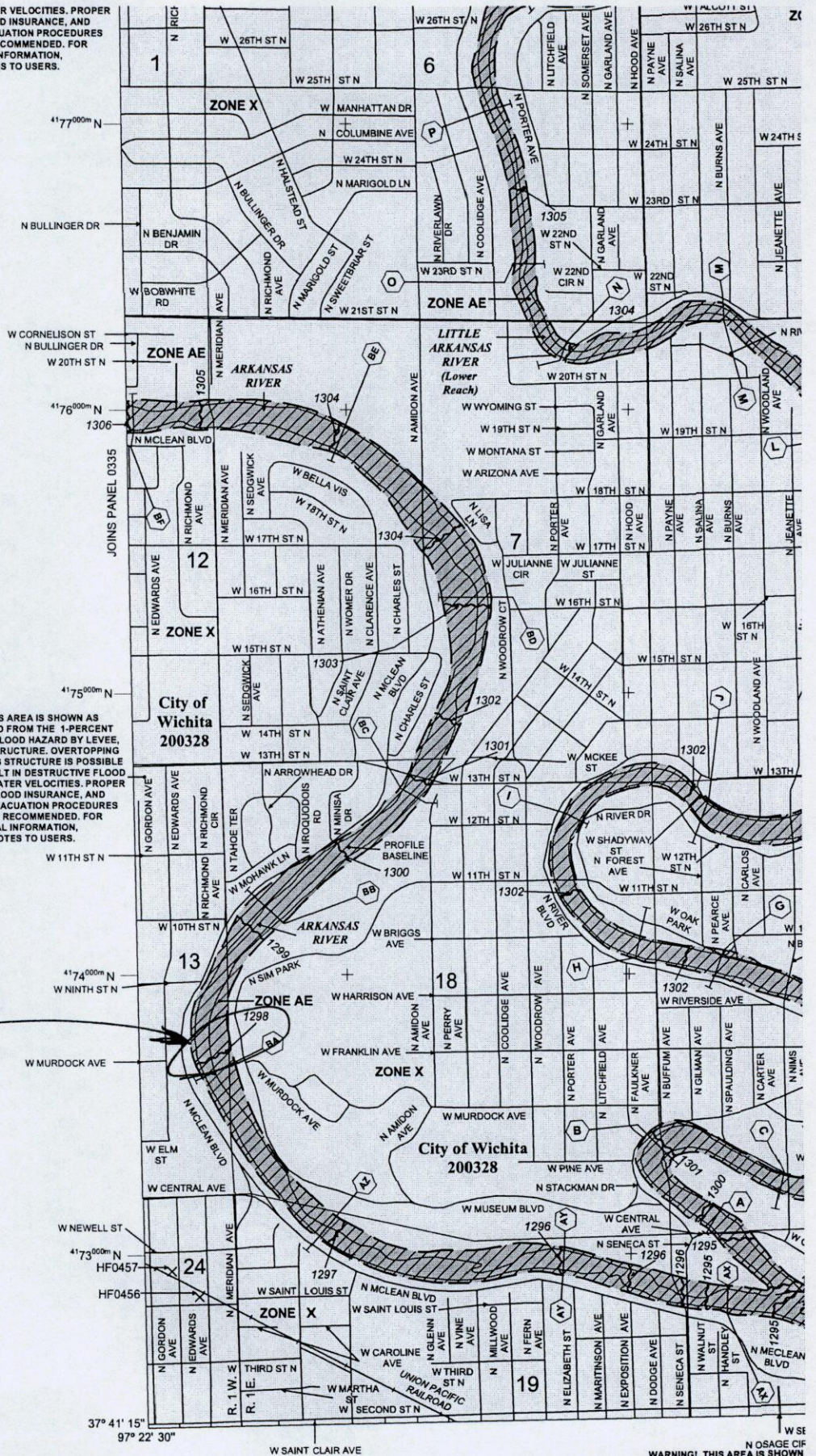
Map Service Center at 1-800-358-9616 for information associated with this FIRM. Available products may include a Flood Insurance Study report, a National Flood Insurance Program Flood Hazard Insurance Study, a National Flood Insurance Program Flood Hazard Insurance Study, as well as a listing of the panels on which each community is shown.

For more information about this map or questions concerning the National Flood Insurance Program, please call 1-877-FEMA MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov>.

ELEVATIONS AND WATER VELOCITIES. PROPER PROTECTION, FLOOD INSURANCE, AND ADHERENCE TO EVACUATION PROCEDURES ARE STRONGLY RECOMMENDED. FOR ADDITIONAL INFORMATION, SEE THE NOTES TO USERS.

WARNING! THIS AREA IS SHOWN AS BEING PROTECTED FROM THE 1-PERCENT ANNUAL CHANCE FLOOD HAZARD BY LEVEE, DIKE, OR OTHER STRUCTURE. OVERTOPPING OR FAILURE OF THIS STRUCTURE IS POSSIBLE WHICH COULD RESULT IN DESTRUCTIVE FLOOD ELEVATIONS AND WATER VELOCITIES. PROPER PROTECTION, FLOOD INSURANCE, AND ADHERENCE TO EVACUATION PROCEDURES ARE STRONGLY RECOMMENDED. FOR ADDITIONAL INFORMATION, SEE THE NOTES TO USERS.

NEAREST
BFE =
1298



WARNING! THIS AREA IS SHOWN AS BEING PROTECTED FROM THE 1-PERCENT ANNUAL CHANCE FLOOD HAZARD BY LEVEE, DIKE, OR OTHER STRUCTURE. OVERTOPPING OR FAILURE OF THIS STRUCTURE IS POSSIBLE WHICH COULD RESULT IN DESTRUCTIVE FLOOD ELEVATIONS AND WATER VELOCITIES. PROPER PROTECTION, FLOOD INSURANCE, AND ADHERENCE TO EVACUATION PROCEDURES ARE STRONGLY RECOMMENDED. FOR ADDITIONAL INFORMATION, SEE THE NOTES TO USERS.

Existing discharge spread on south half Elm Street
Worksheet for Gutter Section

Project Description	
Worksheet	Gutter Section -
Type	Gutter Section
Solve For	Spread

Input Data	
Slope	005000 ft/ft
Discharge	0.68 cfs
Gutter Width	1.67 ft
Gutter Cross Slope	020800 ft/ft
Road Cross Slope	020800 ft/ft
Mannings Coeff	0.013

Results	
Spread	6.41 ft → <i>EXISTING SPREAD</i>
Flow Area	0.4 ft ²
Depth	0.13 ft
Gutter Depress	0.0 in
Velocity	1.59 ft/s

Developed discharge spread on south half Elm Street
Worksheet for Gutter Section

Project Description	
Worksheet	Gutter Section -
Type	Gutter Section
Solve For	Spread

Input Data	
Slope	005000 ft/ft
Discharge	1.92 cfs
Gutter Width	1.67 ft
Gutter Cross Slope	020800 ft/ft
Road Cross Slope	020800 ft/ft
Mannings Coeff	0.013

Results	
Spread	9.46 ft
Flow Area	0.9 ft ²
Depth	0.20 ft
Gutter Depress	0.0 in
Velocity	2.06 ft/s

← DEVELOPED
SPREAD

